

## A review of *Desmodium* s.l. (Leguminosae, subfamily Papilionoideae) in Singapore and nomenclature updates in the Malay Peninsula

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**ABSTRACT.** All *Desmodium* Desv. species previously included in the most recent published checklist for Singapore have been recently transferred to *Grona* Lour. *Desmodium scorpiurus* (Sw.) Desv. and *Pleurolobus gangeticus* (L.) J.St.-Hil. are reported here as non-native new records for Singapore. An identification key to the species of the *Desmodium* group in Singapore is provided. Descriptions are provided for the new records based on the Singapore specimens. A lectotype is designated for *Desmodium polycarpon* var. *albiflorum* Ridl. which is reduced to synonymy of *Grona heterocarpos* (L.) H. Ohashi & K. Ohashi subsp. *heterocarpos* var. *heterocarpos*. Second step lectotypifications are designated here for *Hedysarum heterophyllum* Willd. and *Hedysarum scorpiurus* Sw. 30 species names in tribe Desmodieae for the Malay Peninsula with updated nomenclature is given.

**Keywords.** Desmodieae, *Grona*, lectotypifications, new records, non-native, Peninsular Malaysia, *Pleurolobus*, taxonomy

### Introduction

*Desmodium* Desv. is the core genus in the *Desmodium* group of the papilionoid legume tribe Desmodieae, comprising c. 200 species (Ohashi et al., 2018a). Members of the group (sensu Ohashi, 2004a, 2004b) can generally be recognised by the combination of the principally trifoliolate leaves (some species reduced to unifoliolate or a mixture of both types), presence of stipels, presence of hooked hairs and lomentaceous fruit (Ohashi, 1973, 2004a). The controversy surrounding the delimitation of *Desmodium* as a genus has been long-standing (Lima et al., 2014; Ohashi et al., 2018a). Recent progress in molecular phylogenetic studies has supported the polyphyly of *Desmodium* resulting in its reorganisation, including the segregation of previously synonymised genera and the description of new genera (Jabbour et al., 2018; Ohashi et al., 2018a, 2018b, 2019). Under the currently accepted classification, all of the Asian species of *Desmodium* are transferred into various segregated genera while the remaining species, i.e. *Desmodium* s.s., are restricted to the New World in their native distribution (Ohashi et al., 2018a, 2018b, 2019 and references therein).

Ohashi (1973) monographed *Desmodium* and related genera for Asia. Later, Ohashi (2004a, 2004b) reviewed the species for Malesia with minor adjustments. In Singapore, there are three recorded species of *Desmodium* according to the most-recent published checklist (Chong et al., 2009): *D. heterocarpon* (L.) DC., *D. heterophyllum* (Willd.) DC. and *D. triflorum* (L.) DC. All were listed as ‘weeds of uncertain origin’, a phrase now replaced with the term ‘cryptogenic’ (Chong et al., 2011). Earlier, Ohashi (1973) had already transferred *Desmodium umbellatum* (L.) DC. to *Dendrolobium umbellatum* (L.) Benth. and Ohashi (1999) transferred *Desmodium caudatum* (Thunb.) DC. to *Ohwia caudata* (Thunb.) H.Ohashi. Recently, all remaining reported species of *Desmodium* in Singapore have been moved into the newly resurrected genus *Grona* Lour. based on molecular sequence data with some morphological support, including from palynological characters (Ohashi & Ohashi, 2018a).

Recent opportunistic sampling of spontaneous ruderal plants in Singapore has resulted in two non-native new country records from the *Desmodium* group, *Desmodium scorpiurus* (Sw.) Desv. and *Pleurolobus gangeticus* (L.) J.St.Hil. We are taking this opportunity to review all representative species of the *Desmodium* group in Singapore and provide an identification key for them. An updated checklist of records in the tribe Desmodieae from the Malay Peninsula (Singapore and Peninsular Malaysia) is also provided to facilitate the use of current names.

### Materials and methods

All Singapore specimens of species in the *Desmodium* group deposited in the SING and SINU herbaria (Thiers, continuously updated) were studied. This was supplemented with examination of newly collected and fresh materials. Major published works on the *Desmodium* group sensu Ohashi (2004a, 2004b) in tropical Asia were consulted. Descriptions for the new records for Singapore are based on the newly collected specimens. The checklist of species in tribe Desmodieae is based on records from Ridley (1922) and Turner (1997) with more recent updates from additional published literature (e.g., Ohashi, 2004a, 2004b). For each taxon treated, the provisional IUCN conservation assessment for Singapore is assessed under the criteria set out in Davison (2008).

### Key to the species of the *Desmodium* group in Singapore

1. Woody trees or erect shrubs; petals white to pale yellow ..... 2
1. Scrambling to ascending herbs or subshrubs; petals often pink to purplish red, rarely white to pale yellow ..... 3
2. Trees; leaves without wings along petiole; inflorescence pseudo-umbellate; mature loment somewhat incurved, thick and corky, articles oblong, 1.2–1.5 times longer than wide, surface with sparse appressed straight hairs (hooked hairs absent) ..... *Dendrolobium umbellatum*

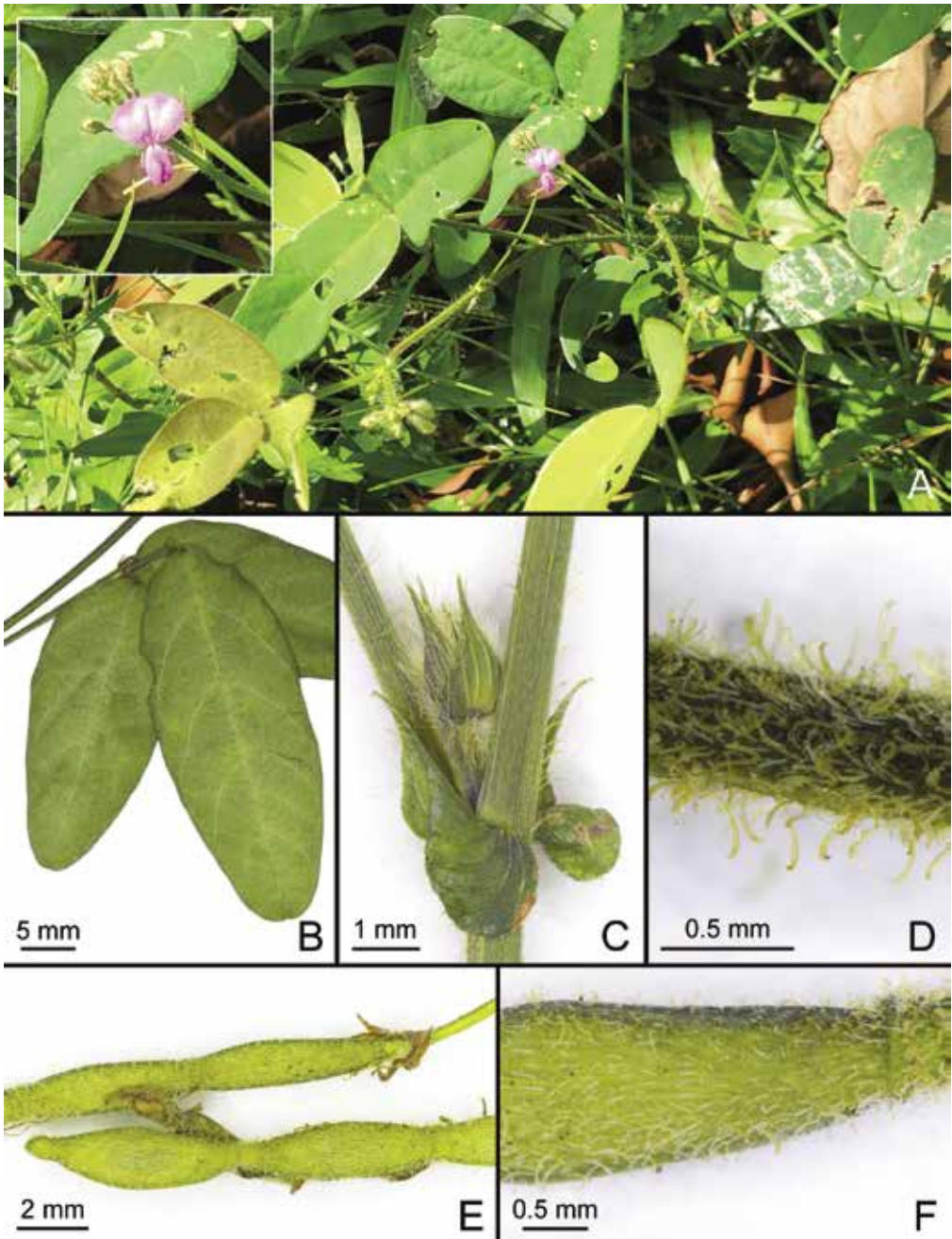
2. Shrubs; leaves with narrow wings along petiole; inflorescence pseudoracemose or paniculate; mature loment straight, flat and leathery, articles narrowly elliptic, 2.5–3 times longer than wide, surface with dense erect hooked hairs ..... *Ohwia caudata*
3. Stipules auriculate at base, semi-amplexicaul; articles narrowly elliptic, at least 2.5 times longer than wide, both sutures equally and shallowly notched between the articles ..... 1. *Desmodium scorpiurus*
3. Stipules not auriculate at base; articles semi-elliptic to orbicular, no more than 1.5 times longer than wide, lower (abaxial) suture more deeply notched than the upper (adaxial) suture between articles ..... 4
4. Prostrate and/or ascending herbs, often mat forming, rooting at the base and some nodes along creeping stems; terminal leaflets often less than 2 cm long, occasionally up to 3 cm; inflorescences axillary, fascicles or rarely very short and lax racemes, 1–6-flowered; calyx sub-equally 5-lobed, upper lobes shallowly connate to about middle ..... 5
4. Prostrate and ascending or erect subshrubs, often rooting at the base only; terminal leaflets mostly more than 2 cm long, occasionally smaller; inflorescences often terminal, occasionally mixed with axillary ones, elongated racemes at least 2 cm long, often longer, many-flowered; calyx seemingly 4-lobed, upper calyx lobes connate almost to the apex ..... 6
5. Hairs on young shoots erect-spreading, at least 1 mm long, slightly golden-brown; abaxial surface of petiole and rachis with minute hooked hairs; terminal leaflets obtuse to rounded (convex edge) at base, acute, obtuse or (less often) emarginate at apex; pedicels more than 10 mm long; loment up to 5 articles, 3.5–4 mm wide; mixture of straight and hooked hairs on articles ..... 4. *Grona heterophylla*
5. Hairs on young shoots loosely appressed to ascending, rarely spreading, less than 1 mm long, white; abaxial surface of petiole and rachis glabrous or with few appressed straight hairs; terminal leaflets acute to cuneate (straight edge) at base, often truncate and/or emarginate at apex; pedicels up to 8 mm long (up to 12 mm in fruit); loment up to 4 articles, 2–3 mm wide; all hairs on articles hooked at the tip ..... 5. *Grona triflora*
6. Leaves entirely unifoliolate; inflorescences slender, sparse-flowered, rachis usually 10–30 cm long, primary bracts narrow (up to 1 mm), not covering flower buds, corolla yellow becoming pale to white (rose to violet outside Singapore); isthmus (narrowed part between articles) c. 1/3–1/2 as wide as loment ..... 2. *Pleurolobus gangeticus*
6. Leaves trifoliolate, occasionally mixed with unifoliolate leaves, rarely entirely unifoliolate; inflorescences usually a dense-flowered pseudoraceme forming a compact cone, rachis usually under 10 cm long, primary bracts broad (more than 1.5 mm), entirely covering the flower buds, corolla usually pink to violet, rarely entirely white; isthmus at least 2/3 as wide as loment ..... 7 (3. *Grona heterocarpos*)

7. Plants prostrate; leaves unifoliolate becoming trifoliolate, terminal leaflets ovate or broadly elliptic to broadly ovate to almost orbicular; underside of leaflets covered with dense white silky hairs; inflorescence often less than 5 cm long; loments densely pubescent throughout .....  
 ..... 3.2 *Grona heterocarpos* subsp. *ovalifolia*
7. Plants prostrate and ascending or erect; leaves mostly trifoliolate, terminal leaflets usually obovate, elliptic or oblong; underside of leaflets covered with sparse minute white hairs; inflorescence usually more than 5 cm long; loments pubescent along both sutures and sparsely to absent on the surface .....  
 ..... 8 (*Grona heterocarpos* subsp. *heterocarpos*)
8. Inflorescence rachis covered with sparse, spreading, hooked hairs .....  
 ..... 3.1.1 *Grona heterocarpos* subsp. *heterocarpos* var. *heterocarpos*
8. Inflorescence rachis covered with dense, appressed, straight hairs, rarely mixed with a few hooked hairs .....  
 ..... 3.1.2 *Grona heterocarpos* subsp. *heterocarpos* var. *strigosa*

### Descriptions and notes

**1. *Desmodium scorpiurus*** (Sw.) Desv., J. Bot. Agric. 1: 122 (1813); Van Meeuwen et al., Reinwardtia 6(1): 101 (1961); Knaap-Van Meeuwen, Reinwardtia 6(3): 258 (1962); Ohashi, Ginkgoana 1: 95 (1973); Verdcourt, Man. New Guinea Legumes 407 (1979); Ohashi, J. Jap. Bot. 79: 137 (2004). – *Hedysarum scorpiurus* Sw., Prodr. 107 (1788). – TYPE: Jamaica, Swartz *s.n.* (lectotype S [S-R-2774], first step designated by Schubert (1980: 656), second step designated here; isolectotypes B [W 13825 -01 0], LD [LD1263645], S [S13-17668]). (Fig. 1).

Subshrub, stems prostrate and ascending, 15–20 cm tall. **Leaves** alternate, trifoliolate; stipules leafy, c. 4 × 2 mm, base auriculate, often clasping the stem (amplexicaul), apex long-attenuate; petiole 1.3–3 cm, minutely hooked-hairy intermixed with erect straight hairs; stipels up to c. 2 mm long; terminal leaflet blade oblong-ovate to broadly elliptic, 1.2–2.5 × 2.8–5 cm, lateral ones slightly smaller, base obtuse, apex obtuse, rounded or emarginate, both surfaces sparsely adpressed hairy. **Inflorescences** pseudoracemes, terminal, occasionally axillary; rachis slender, minutely hooked-hairy, flowering lax, 1–3-flowered at each node, often with one poorly developed; pedicels 4–6 mm, with hooked hairs intermixed with straight hairs. **Calyx** campanulate, c. 2.5 mm, 4-lobed; upper lobes slightly 2-toothed. **Corolla** pinkish-purple, c. 4 mm; standard broadly obovate; wings oblong, shortly clawed; keel narrowly obovate, long-clawed. Ovary linear, c. 3.5 mm; style curved. **Legume** a loment, linear, slender, 2–3.5 × 0.15–0.2 cm, 4–8-jointed, constricted along both sutures between articles; articles 4–6 mm long, 3–4 × as long as wide, hooked-hairy throughout.



**Fig. 1.** *Desmodium scorpiurus* (Sw.) Desv. **A.** Habit. Inset: Flower in close-up. **B.** Leaflets. **C.** Stipules, showing the distinctly auriculate base. **D.** Hooked hairs on pedicel. **E.** Loments. **F.** Close-up of article showing the hooked hairs. All from *Chen LCMJ 2019-141*. (Photos: A, L.M.J. Chen; B–F, B.C. Ho).

*Distribution.* Native to tropical America. Introduced and naturalised in Africa, Taiwan, Philippines, Lombok, Papua New Guinea, Australia and the Pacific islands.

*Etymology.* Latin, *scorpi-* = scorpion, *-urus* = tail; alluding to the similarity of the fruit shape to a scorpion's tail.

*Specimen examined.* SINGAPORE: vicinity of Kranji Marshes, 8 Aug 2019, *Chen & Liew LCMJ 2019-141* (SING [SING0291109]).

*Notes.* The peculiar stipules easily distinguish *Desmodium scorpiurus* from other *Desmodium* group species in Asia, even when sterile. With a sporadic distribution within Asia, this is the first record of the species in western Malesia.

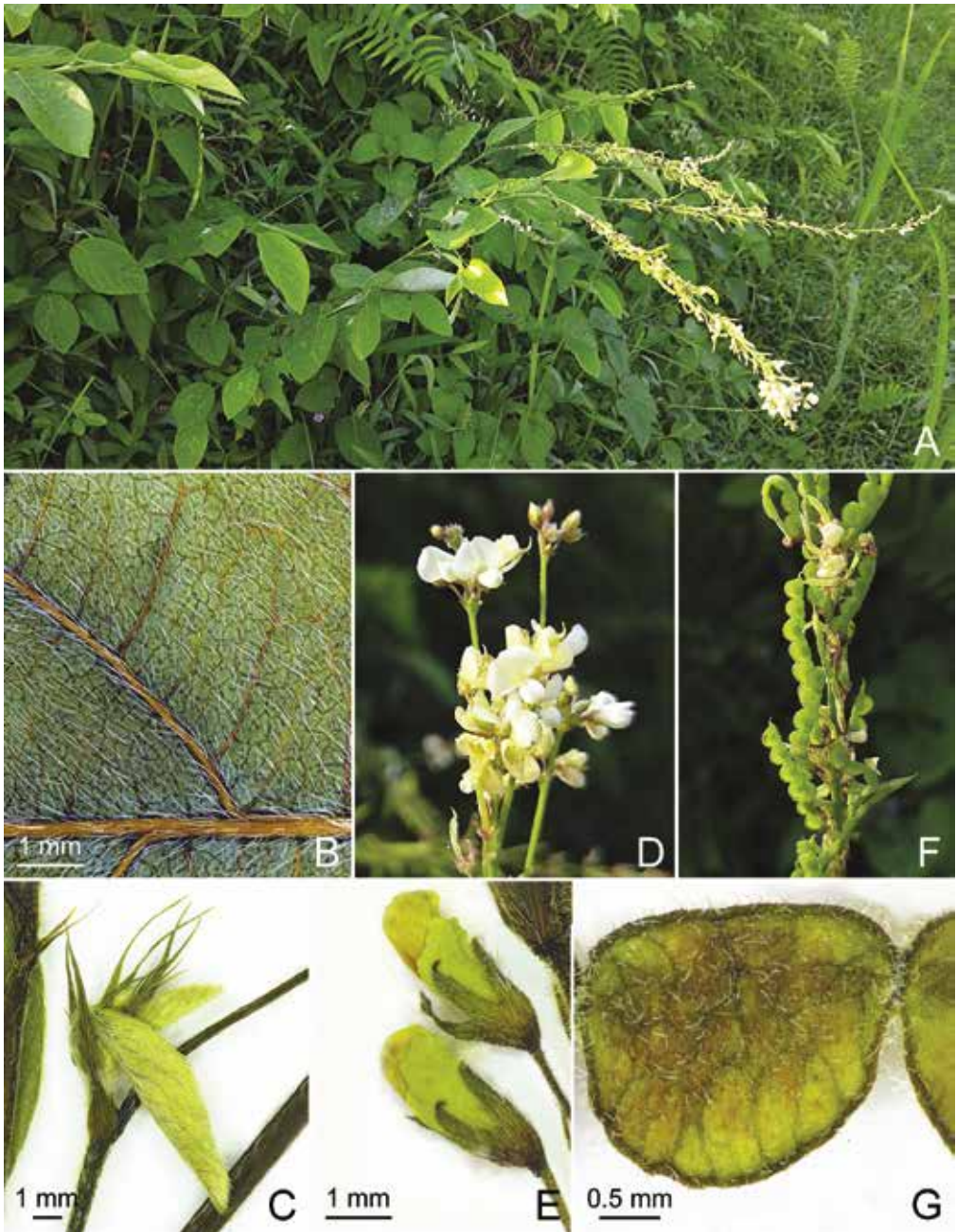
The collection in the herbarium of the Swedish Museum of Natural History (S) listed by Schubert (1980) as 'holotype' has already been corrected to lectotype by Lima et al. (2014) in conformity with ICN Art. 9.10 (Turland et al., 2018) and as advocated by McNeill (2014). However, a search in the S digital database has shown that there are at least two Swartz specimens annotated with the same information; thus further selection to a single specimen is done here following ICN Art. 9.17 (Turland et al., 2018). Neither of the specimens is at variance with the original description, but one of them is already indicated as the type in S. The choice is followed and formally designated here in a second step lectotypification.

The species is currently known in Singapore only from a single population, where it grows alongside other spontaneous plants. We consider this species to be "casual" in Singapore following the definition given in Chong et al. (2009) but may later be found to be naturalising if self-replacing populations are discovered from our ongoing surveys.

**2. *Pleurolobus gangeticus* (L.) J.St.-Hil.,** *Nouv. Bull. Sci. Soc. Philom. Paris* 3: 192 (1812); Ohashi et al., *J. Jap. Bot.* 93: 184 (2018). – *Hedysarum gangeticum* L., *Sp. Pl.* 2: 746 (1753). – *Desmodium gangeticum* (L.) DC., *Prodr.* 2: 327 (1825); Ridley, *Fl. Malay Penins.* 1: 610 (1922); Henderson, *Malay. Wild Fls., Dicot.* 80, fig. 76 (1959); Knaap-Van Meeuwen, *Reinwardtia* 6(3): 249 (1962); Ohashi, *Ginkgoana* 1: 194, pl. 22b (1973); Verdcourt, *Man. New Guinea Legumes* 397 (1979); Ohashi, *Fl. Cambodge Laos Vietnam* 27: 121 (1994); Pedley, *Revis. Handb. Fl. Ceylon* 10: 182 (1996); Ohashi, *J. Jap. Bot.* 79: 122 (2004). – TYPE: [India], *Hedysarum* no. 13. "5 gangeticum" (lectotype LINN [LINN-HL921-13], designated by Schubert (1963: 294)). (Fig. 2).

Subshrub, prostrate to ascending, up to 1 m tall. Stems simple to sparsely branched (up to 3) near the nodes below inflorescence; hairs white appressed, rigid, mixed with minute retrorse hooked ones. **Leaves** alternate, unifoliolate; stipules narrowly triangular, 4–8 × c. 1.5 mm, apex long-acuminate, glabrescent, ciliate along the margin; petiole 1–2 cm long; stipels persistent, aristate, 2–5 mm long, sparsely fringed; leaflet lamina elliptic





**Fig. 2.** *Pleurolobus gangeticus* (L.) J.St.-Hil. **A.** Habit of plants growing on a slope. **B.** Indumentum on under-surface of leaflet. **C.** Stipules and young leaves. **D.** Inflorescence. **E.** Close-up of flower buds after drying. **F.** Loment. **G.** Close-up of an article showing the hooked hairs. All from *Ho 19-288*. (Photos: B.C. Ho).

to ovate, 3.5–8 × 2.5–5.5 cm, base rounded, apex acute, sometimes obtuse, abaxially thinly appressed grey villous, adaxially almost glabrous except along larger veins with minute retrorse hooked hairs with occasional appressed straight ones. **Inflorescences** pseudoracemes, terminal, long and lax, 10–15 cm, 2-flowered at each node, hooked hairy throughout with occasional appressed straight hairs; pedicels 3–4.5 mm, hooked hairy. **Calyx** c. 2 mm, 4-lobed, upper lobes slightly 2-toothed; lobes slightly longer than tube. **Corolla** greenish white becoming light yellow, 3–4 mm; standard broadly obovate; wings oblong, base auriculate, shortly clawed; keel narrowly obovate. **Ovary** hairy. **Legume** a loment, linear, up to c. 20 cm long, articles 5–7, each c. 3 × 2.5 mm, lower suture deeply undulate, upper suture slightly constricted between seeds, hooked pubescent throughout, 5–7-jointed.

**Distribution.** Native to Africa, India, Sri Lanka, Southern China, throughout continental Southeast Asia, Malesia (Peninsular Malaysia, Sumatra, Borneo, Java, Sulawesi, Moluccas, Philippines, New Guinea) and Australia. Introduced and naturalised in Jamaica, Madagascar and the Pacific Islands.

**Etymology.** From the Ganges, the sacred river of India.

**Specimen examined.** SINGAPORE: Bukit Batok West, 29 Jun 2019, *Ho 19-288* (SING [SING0291110]).

**Notes.** Its unifoliolate leaves and the slender sparsely flowered inflorescence easily set this apart from other *Desmodium* group species in Singapore. The species was first reported from several states in Peninsular Malaysia by Ridley (1922: 610), including Johor. These were reported as having white or yellow corollas, like the Singapore plants, whereas purple to pink flowers have been reported elsewhere (e.g., Ohashi, 1973; Verdcourt, 1979). The flower colour variation has been shown to follow a mendelian inheritance pattern (Nandanwar & Manivel, 2014).

Although the species has been reported throughout Southeast Asia, it has not previously been collected in Singapore. We speculate that the species could have been planted for use in traditional medicine (Ohashi, 1994) and subsequently escaped from cultivation. The species is currently known only from a single population of c. 20 plants alongside other naturalised plants in an open scrubby area near a housing estate. We consider this species to be “casual” in Singapore following the definition given in Chong et al. (2009) but may later be found to be naturalising if self-replacing populations are discovered from our ongoing surveys.

**3. *Grona heterocarpos* (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 112 (2018), as ‘heterocarpa’. – *Hedysarum heterocarpon* L., Sp. Pl. 2: 747 (1753). – *Desmodium heterocarpon* (L.) DC., Prodr. 2: 337 (1825), as ‘heterocarpum’; Van Meeuwen, Reinwardtia 6(1): 95 (1961), excl. syn. *D. ovalifolium*; Knaap-Van Meeuwen, Reinwardtia 6(3): 251 (1962), excl. syn. *D. ovalifolium*; Ohashi, Ginkgoana 1:**



210 (1973); Verdcourt, Man. New Guinea Legumes 399 (1979); Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. 35 (1990); Ohashi, J. Jap. Bot. 66: 17 (1991); Turner, Gard. Bull. Singapore 45: 120 (1993); Ohashi, Fl. Cambodge Laos Vietnam 27: 134 (1994); Pedley, Revis. Handb. Fl. Ceylon 10: 187 (1996); Ohashi, J. Jap. Bot. 79: 124 (2004); Chong et al., Checkl. Vasc. Pl. Fl. Singapore 33, 134, 270 (2009). – TYPE: Ceylon [Sri Lanka], *Unknown Collector s.n.* [Herb. Hermann 2: 32, No. 294, left-hand specimen] (lectotype BM [BM000621619], designated by Pedley (in Turland & Jarvis, 1997: 471)).

*Desmodium polycarpon* (Poir.) DC. var. *albiflorum* Ridl., Fl. Malay Penins. 1: 609 (1922), as ‘*polycarpum*’, **syn. nov.** – *Desmodium heterocarpon* subsp. *heterocarpon* var. *heterocarpon* f. *albiflorum* (Ridl.) H. Ohashi, J. Jap. Bot. 66(1): 20 (1991). – TYPE: Peninsular Malaysia, Pahang, Sungei Meang, May 1890, *Ridley 1424* (lectotype SING [SING0265699], designated here).

*Notes.* The species epithet “*heterocarpa*” is corrected to “*heterocarpos*” to reflect the correct Greek feminine termination (see Nicolson, 1986).

*Grona heterocarpos*, better known in the literature as *Desmodium heterocarpon*, is polymorphic and has been variously delimited. In the plant checklists for Singapore by Turner (1993) and Chong et al. (2009), no infraspecific taxa are accepted for *Desmodium heterocarpon*. Under *Desmodium heterocarpon*, Turner (1993) included the two heterotypic synonyms *D. ovalifolium* (Prain) Wall. ex Merr. and *D. polycarpon*, which are here recognised as infraspecific taxa of *Desmodium heterocarpon*, following Ohashi (1991) with nomenclatural updates from Ohashi & Ohashi (2018a).

Of the four possible syntypes of *Desmodium polycarpon* var. *albiflorum* located in SING, only *Ridley 1424* has spreading hooked hairs on the inflorescence rachis, a diagnostic character to separate *Grona heterocarpos* var. *heterocarpos* and *G. heterocarpos* var. *strigosa* (Ohashi, 1991, 2004a). The rest of the located syntypes have dense appressed straight hairs. No possible syntypes have been found in Kew.

### 3.1.1 *Grona heterocarpos* subsp. *heterocarpos* var. *heterocarpos* (Fig. 3)

*Distribution.* Indian subcontinent, southern China, southern Japan, throughout continental Southeast Asia and Malesia, northeastern Australia and Pacific islands. The variety is confirmed for Singapore (but see notes below).

*Etymology.* Greek, *hetero-* = differing, *-carpon* = fruit; alluding to the pods on the lower part being one-seeded (articles probably having fallen off with age or as a result of insufficient pollination) while the upper ones are many-seeded.

*Provisional IUCN conservation assessment for Singapore.* Critically Endangered (CR/D). Only three authentic specimens have been collected in Singapore so far, the last being 24 years ago. As the species, *Grona heterocarpos*, is frequently collected,



**Fig. 3.** *Grona heterocarpos* (L.) H.Ohashi & K.Ohashi subsp. *heterocarpos* var. *heterocarpos*. **A.** Inflorescence. **B.** Close-up of inflorescence rachis at base with dense appressed straight hairs. **C.** Close-up of inflorescence rachis at middle with spreading hooked hairs. All from Samsuri AS 1299. (Photos: B.C. Ho).

it is unlikely that *G. heterocarpos* var. *heterocarpos* has been overlooked but rather that it is genuinely rare. It is therefore presumed that there are fewer than 50 mature individuals in Singapore, thereby qualifying as Critically Endangered under the criteria set out in Davison (2008).

*Specimens examined.* SINGAPORE: Pulau Hantu, 24 Jul 1976, *Samsuri SA 1299* (SING [SING0018443]); Chan Chu Kang, 1892, *Ridley s.n.* (SING [SING0018452]); Western Catchment area, 9 Aug 1996, *Tan et al. WCA 011* (SINU [2007005202]).

*Notes.* Most authors, treating this taxon under the name *Desmodium heterocarpon*, have followed Van Meeuwen (in Van Meeuwen et al., 1961) in recognising the infraspecific hierarchy as set out here (Knaap-Van Meeuwen, 1962; Ohashi, 1973; Verdcourt, 1979; Ohashi, 1991; Ohashi, 1994; Pedley, 1996; Ohashi, 2004a). Ohashi (1994: 137, pl. 29) has provided useful illustrations to distinguish the type variety from what he referred to as *Desmodium heterocarpon* var. *strigosum* Meeuwen.

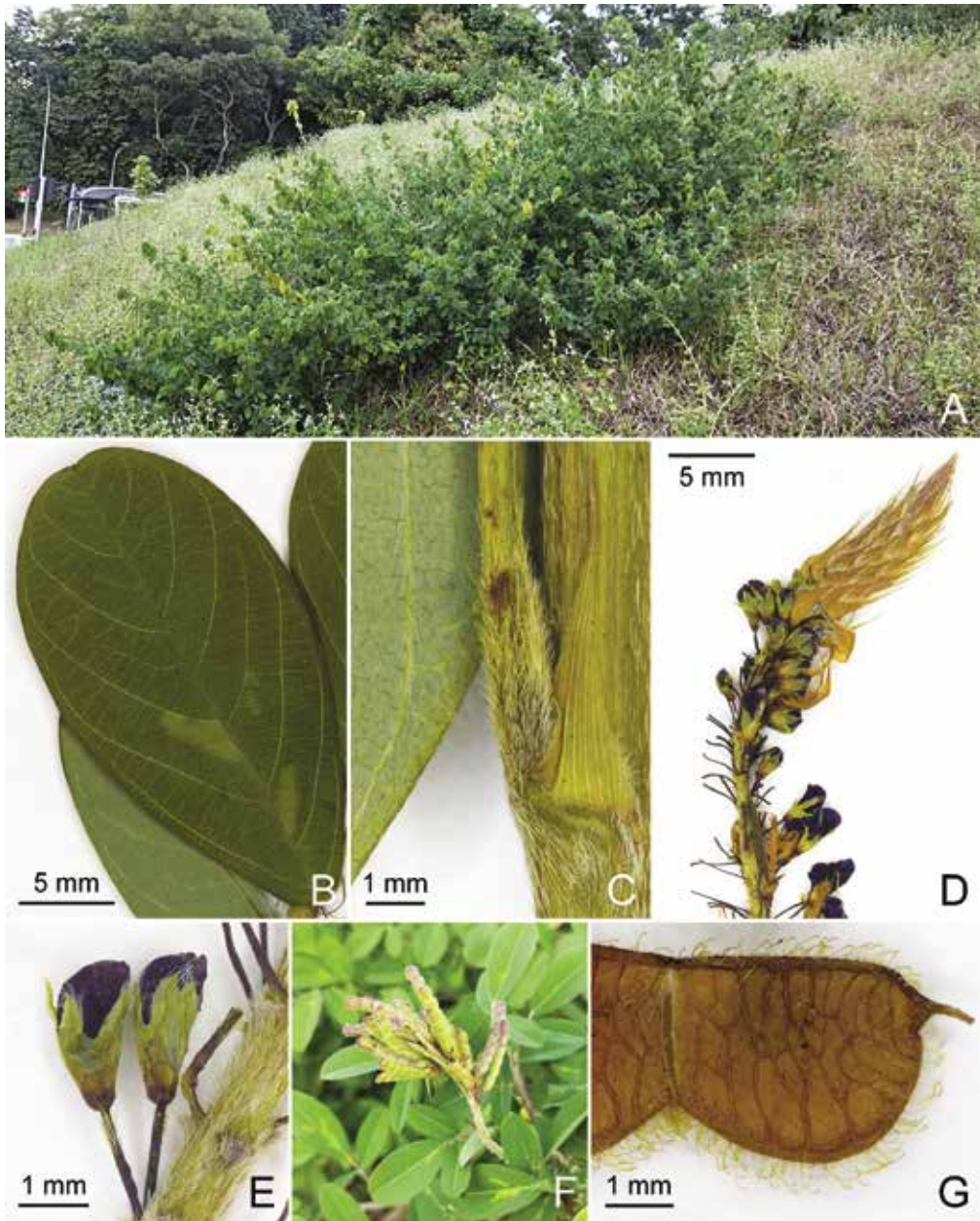
The earlier record of *Desmodium heterocarpon* var. *heterocarpon* from Pulau Ubin reported by Lee et al. (2003: 298) is based on a misidentified specimen of *Ohwia caudata* (Gwee et al. *GAT 373* (SING [SING0047718])). In the type variety, the hairs at the very base of the inflorescence rachis may resemble those on *Grona heterocarpos* var. *strigosa* (Meeuwen) H.Ohashi & K.Ohashi but are progressively replaced by spreading hooked hairs. From around mid-way up the inflorescence rachis, only spreading hooked hairs are present.

**3.1.2 *Grona heterocarpos* subsp. *heterocarpos* var. *strigosa*** (Meeuwen) H.Ohashi & K.Ohashi, *J. Jap. Bot.* 93: 112 (2018). – *Desmodium heterocarpon* var. *strigosum* Meeuwen, *Reinwardtia* 6(1): 95 (1961); Knaap-Van Meeuwen, *Reinwardtia* 6(3): 251 (1962); Ohashi, *Ginkgoana* 1: 215, pl. 29b (1973); Verdcourt, *Man. New Guinea Legumes* 399 (1979); Ohashi, *Fl. Cambodge Laos Viêtname* 27: 138, pl. 29: 3–5 (1994); Pedley, *Revis. Handb. Fl. Ceylon* 10: 189 (1996); Ohashi, *J. Jap. Bot.* 79: 125 (2004). – TYPE: Indonesia, New Guinea [Papua], Hollandia [Jayapura], Hamadi, 22 August 1956, *Kalkman BW 3596* (holotype L [L0018945]). (Fig. 4 & 5).

*Hedysarum polycarpon* Poir., *Encycl.* 6(2): 413 (1805). – *Desmodium polycarpon* (Poir.) DC., *Prodr.* 2: 334 (1825); Ridley, *J. Straits Branch Roy. Asiat. Soc.* 33: 73 (1900), as '*polycarpum*'; Ridley, *Fl. Malay Penins.* 1: 609 (1922), as '*polycarpum*'. – TYPE: East Indies, *Unknown collector s.n.* (lectotype P [P02938485], designated by Schubert (1971: 462)).

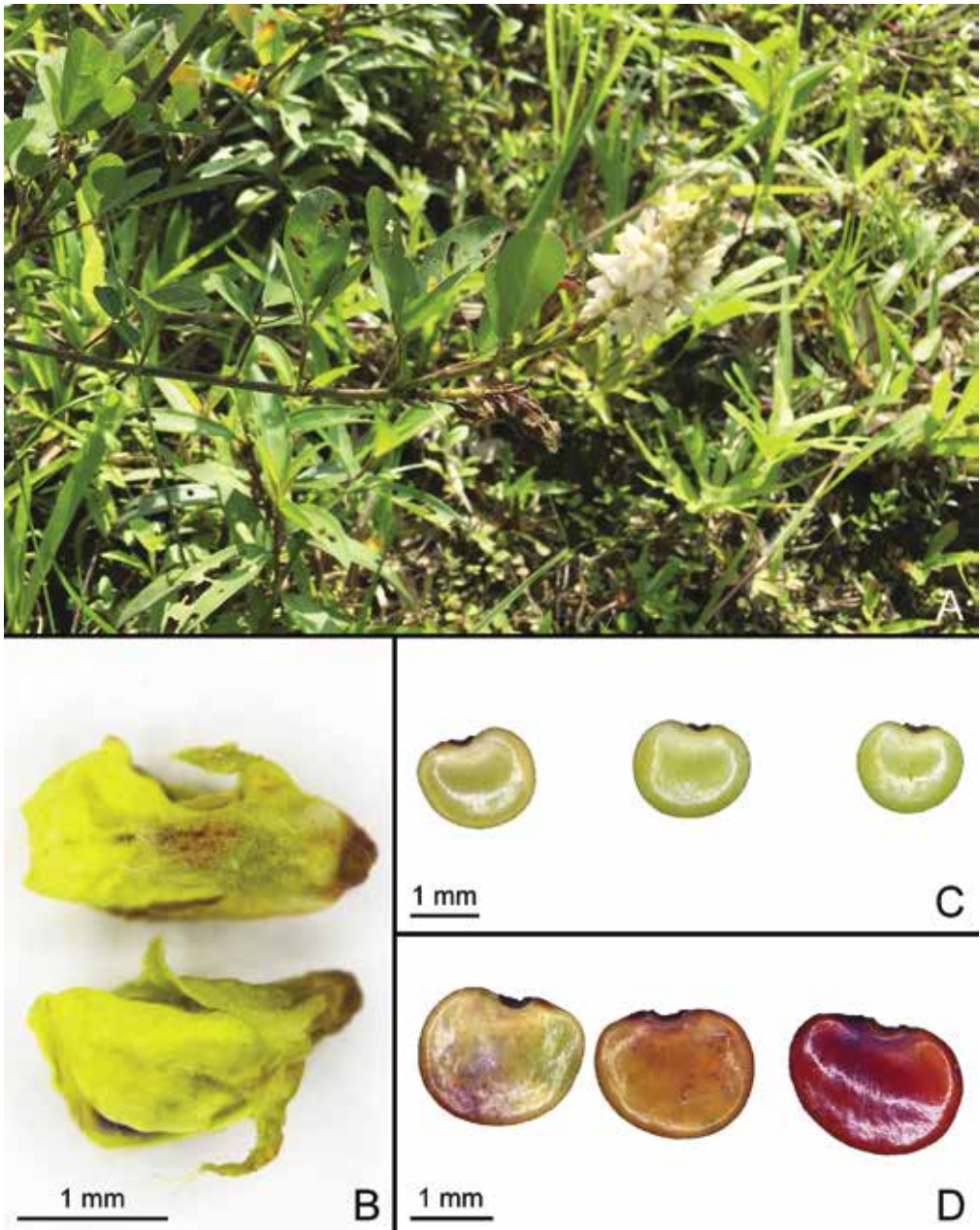
*Desmodium ovalifolium* auct. non (Prain) Wall. ex Merr.: Ridley, *J. Straits Branch Roy. Asiat. Soc.* 33: 73 (1900). [See note under *Grona heterocarpos* subsp. *ovalifolia*.]

*Desmodium polycarpon* var. *ovalifolium* auct. non Prain: Ridley, *Fl. Malay Penins.* 1: 610 (1922), p.p., as '*polycarpum*'. [See notes under *Grona heterocarpos* subsp. *ovalifolia*.]



**Fig. 4.** *Grona heterocarpos* (L.) H.Ohashi & K.Ohashi subsp. *heterocarpos* var. *strigosa* (Meeuwen) H.Ohashi & K.Ohashi, purple-corolla form. **A.** Habit. **B.** Leaflets. **C.** Stipule. **D.** Pseudoracemose inflorescence forming a compact cone. **E.** Close-up of inflorescence (rachis covered) with appressed straight hairs and flower buds. **F.** Loments. **G.** Close-up of terminal article showing hooked hairs. All from *Ho 19-307*. (Photos: B.C. Ho).





**Fig. 5.** *Grona heterocarpos* (L.) H. Ohashi & K. Ohashi subsp. *heterocarpos* var. *strigosa* (Meeuwen) H. Ohashi & K. Ohashi. **A–C.** White-corolla form. **A.** Habit of plants growing on a slope in the Bidadari area. **B.** Flowers with white corolla becoming pale yellow upon drying. **C.** Pale coloured seeds. **D.** Dark-coloured seeds of purple-corolla form. **A–C** from *Chen LCMJ 2020-027*; **D** from *Ho 19-307*. (Photos: **A**, L.M.J. Chen; **B–D**, B.C. Ho).

*Distribution.* Indian subcontinent, southern China, throughout continental Southeast Asia and Malesia, Australia and western Pacific islands. Introduced and naturalised in Hawaii.

*Etymology.* Latin, *strigosa* = having stiff hairs; alluding to the indumentum on the inflorescence rachis.

*Provisional IUCN conservation assessment for Singapore.* Vulnerable (VU/D). Although a common and widespread taxon, it has not been much collected from Singapore in the last 30 years. It is estimated that there are currently fewer than 1000 mature individuals in Singapore, thereby qualifying it as Vulnerable for Singapore under the criteria set out in Davison (2008). They are found on beaches and wasteland, but natural beaches are rare today in Singapore and wastelands are often cleared for development or are under active management.

*Representative specimens examined* (total c. 35). PENINSULAR MALAYSIA: **Perak:** Kuala Kangsar, Gunong Keledang, Oct 1898, *Ridley 9684* (SING [SING02644838], with white corolla, syntype of *Desmodium polycarpon* var. *albiflorum*); Gunong Keledang and Telok Pinang, Oct 1898, *Unknown collector [?Ridley] 9684* (SING [SING0264835], with white corolla, syntype of *Desmodium polycarpon* var. *albiflorum*). **Pahang:** Kwala Bruas [Kuala Beruas], May 1890, *Ridley 1571* (SING [SING0265698], with white corolla, syntype of *Desmodium polycarpon* var. *albiflorum*).

SINGAPORE: Western Catchment, 28 Nov 2006, *Gwee et al. SING2006-33* (SING [SING0084934]); Bukit Batok West, 30 Jul 2019, *Ho 19-307* (SING [SING0291111]); Turut track, 22 Jan 1991, *Chua & Tan 354* (SINU [200705212]); Kranji Nature Reserve, 28 Aug 1973, *Samsuri SA 814* (SING [SING0018454]); Central Catchment, track 15, 1 Apr 1993, *Turner et al. 1368* (SINU [2007005197]); Ang Mo Kio, 8 Mar 1889, *Ridley 255* (SING [SING0018444]); Bidadari, 13 Jan 2020, *Chen LCMJ 2020-027* (SING [SING0291107, SING0291108, with white corolla]); Bedok, off East Coast Parkway, 18 Aug 1982, *Maxwell 82-229* (SING [SING0018442], with white corolla); Changi, 1890, *Ridley s.n.* (SING [SING0018453]); Pulau Tekong, 25 Jul 2018, *Lua SING2018-801* (SING [SING00274284]).

*Notes.* This variety has been more commonly collected in Singapore than *Grona heterocarpos* var. *heterocarpos*, as is also the case elsewhere in Malesia (Ohashi, 2004a). It was first reported in Singapore by Ridley (1900) as *Desmodium polycarpon* (“*polycarpum*”). Following Keng (1990), the variety was lumped under the species name in previous checklists (Turner, 1993; Chong et al., 2009). The majority of the specimens filed as *Desmodium heterocarpon* in both SING and SINU belong to *Grona heterocarpos* subsp. *heterocarpos* var. *strigosa* and can be easily distinguished by the dense whitish or yellowish long straight hairs along the inflorescence rachis.

Recently, a population in Singapore with white corollas (Fig. 5) was found. In Singapore, Ridley (1900) already reported occasional individuals of *Desmodium heterocarpon* with white flowers, but no specimens in SING that were collected during his time were annotated as such. It was thus unclear where these white-flowered



individuals belonged in the infraspecific hierarchy. The white-corolla form reported by Ridley (1922) from Peninsular Malaysia was first given a formal nomenclatural status: *Desmodium polycarpon* var. *albiflorum* (see notes above). Of the four syntypes of *Desmodium polycarpon* var. *albiflorum* found in SING, three clearly show the diagnostic feature of *Grona heterocarpos* var. *strigosa* (dense appressed straight hairs on inflorescence rachis) and not *Grona heterocarpos* var. *heterocarpos*. Instead of formalising another white-flowered form under *Grona heterocarpos* var. *strigosa*, we argue that individuals with white corollas are to be treated as natural variations within both varieties. Flower colour in this species could follow simple Mendelian inheritance (Mendel, 1866). Previous investigations in peas (*Pisum sativum* L.) have suggested that the white corolla character is determined by a recessive allele (Goodrich et al., 1992; Spelt et al., 2002; Grotewold, 2006; Schwinn et al., 2006). Flower colour variations in at least two related species, *Desmodium uncinatum* (Jacq.) DC. (Park & Rotar, 1968, as *D. sandwicense* E.Mey.) and *Pleurolobus gangeticus* (Nandanwar & Manivel, 2014, as *Desmodium gangeticum*) have been shown to follow Mendelian inheritance where the white corolla is the recessive phenotype. Occasional white corollas have also been reported for species in the *Desmodium* group which usually have red to purple corollas, including *Grona triflora* (see Henderson, 1959, as *Desmodium triflorum*).

Apart from the white corolla, we have noticed from our new collection that that seeds of the white-corolla form are pale greenish yellow and measure 1.7–1.8 mm across the longest axis (Fig. 5). Seeds of the purple-corolla individuals are reddish brown and slightly larger (2–2.2 mm).

The type of *Hedysarum polycarpon* has been cited as a ‘plant from E. Indies grown at Paris (P-LA, holo.!)’ by Schubert (1971), as ‘from East Indies, herb. Lamarck’ by Pedley (1996), and as ‘Indes orientales in herb. Lam (P, n.v.)’ by Pedley (1999). A specimen in ex Herb. Poiret [P02938485] found in the database of the Muséum National d’Histoire Naturelle, Paris is deposited as a type, but it does not have any annotation by Schubert. Further verification of the specimens in P would be necessary to typify the name with an exact specimen.

**3.2 *Grona heterocarpos* subsp. *ovalifolia*** (Prain) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 114 (2018). – *Desmodium polycarpon* var. *ovalifolium* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 141 (1897). – *Desmodium ovalifolium* (Prain) Wall. ex Merr., Philipp. J. Sci., C 5: 85 (1910); Ridley, Fl. Malay Penins. 1: 610 (1922); Henderson, Malay. Wild Fls., Dicot. 76, fig. 70 (1959). – *Desmodium heterocarpon* var. *ovalifolium* (Prain) Rugayah, Berita Biol. 3(5): 205 (1986); Rugayah, Reinwardtia 10: 382 (1987). – *Desmodium heterocarpon* subsp. *ovalifolium* (Prain) H.Ohashi, J. Jap. Bot. 66(1): 21, fig. 4 & 5 (1991); Ohashi, Fl. Cambodge Laos Vietnam 27: 138 (1994); Ohashi, J. Jap. Bot. 79: 125 (2004). – TYPE: [Peninsular Malaysia], Penang, 1822, *Wallich 5730a* (lectotype K [K001121922], designated by Ohashi (1994: 139)). (Fig. 6).

*Distribution.* South China, continental Southeast Asia, Peninsular Malaysia, Sumatra, Borneo, Java, Philippines.

*Etymology.* Latin, *ovalis*- = ovate, *-folium* = leaf; alluding to the broadly ovate leaves.

*Provisional IUCN conservation assessment for Singapore.* Critically Endangered (CR/D). With only a single authentic specimen so far collected in Singapore, it is assessed here as Critically Endangered under the criteria set out in Davison (2008). With the species being otherwise reasonably well-collected, it is unlikely that *Grona heterocarpos* var. *ovalifolia* has been overlooked. Future colonisation through water dispersal from the sea is possible.

*Specimen examined.* SINGAPORE: Admiralty Road West, coastal hillock, 1998, *Lai LJ 456* (SING [SING0019926]).

*Notes.* *Desmodium polycarpon* var. *ovalifolium* was included as a synonym of *Desmodium heterocarpon* var. *heterocarpon* by Van Meeuwen (in Van Meeuwen et al., 1961), Knaap-Van Meeuwen (1962), and Ohashi (1973), until it was resurrected by Rugayah (1986, 1987) and Ohashi (1991) as an infraspecific taxon of *Desmodium heterocarpon*. The first report of this taxon for Singapore was by Ridley (1900) from Ang Mo Kio as *Desmodium ovalifolium* and the same specimen was subsequently cited in Ridley (1922) as *Desmodium polycarpon* var. *ovalifolium*. Only a single specimen collected from this locality has been found in the SING herbarium but the specimen sheet was not annotated as such by Ridley. Following Keng (1990), *Desmodium ovalifolium* was lumped under *Desmodium heterocarpon* in previous checklists (Turner, 1993; Chong et al., 2009). Nonetheless, the specimen cited by Ridley (1900) belongs to *Grona heterocarpos* subsp. *heterocarpos* var. *strigosa* with typical dense straight hairs on the inflorescence rachis. *Grona heterocarpos* subsp. *ovalifolia* has similar spreading hooked hairs on the inflorescence rachis like those of *Grona heterocarpos* subsp. *heterocarpos* var. *heterocarpos* (Ohashi, 2004a). An authentic specimen in Singapore was collected much later. This variety can have both unifoliolate and trifoliolate leaves, but our specimen has only unifoliolate leaves. No flowers but a few fruits are observed on the specimen. This can be confused with *Grona styracifolia* (Osbeck) H.Ohashi & K.Ohashi (synonym: *Desmodium styracifolium* (Osbeck) Merr.) which has a similar prostrate habit, mixture of unifoliolate and trifoliolate leaves, broadly ovate to orbicular leaflets with lower surface densely covered by dense appressed silky hairs, and short (up to 5 cm long) dense inflorescences. In *Grona styracifolia*, the young stems and petioles are covered with erect pale yellowish silky hairs which continue on the inflorescence rachis, the developing young loment are plicate folded but straightened upon maturity, and the hooked hairs on mature loment are sparser (Ohashi, 1973, 2004a).



**Fig. 6.** *Grona heterocarpus* (L.) H.Ohashi & K.Ohashi subsp. *ovalifolia* (Prain) H.Ohashi & K.Ohashi. **A.** Specimen collected from a coastal hillock in Admiralty Road West. **B.** A unifoliolate leaf with broadly ovate leaflet. **C.** Stipules. **D.** Loment. **E.** Close-up of article showing dense pubescence of straight and hooked hairs. All from *Lai LJ 456*. (Photos: A, D. Liew; B–F, B.C. Ho).

**4. *Grona heterophylla*** (Willd.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 114 (2018). – *Hedysarum heterophyllum* Willd., Sp. Pl., ed. 4, 3(2): 1201 (1802). – *Desmodium heterophyllum* (Willd.) DC., Prodr. 2: 334 (1825); Ridley, J. Straits Branch Roy. Asiatic Soc. 33: 73 (1900); Ridley, Fl. Malay Penins. 1: 606 (1922); Henderson, Malay. Wild Fls., Dicot. 75, fig. 68 (1959); Knaap-Van Meeuwen, Reinwardtia 6(3): 251 (1962); Ohashi, Ginkgoana 1: 239, pl. 35b (1973); Verdcourt, Man. New Guinea Legumes 400 (1979); Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. 35, fig. 28.11 (1990); Turner, Gard. Bull. Singapore 45: 120 (1993); Ohashi, Fl. Cambodge Laos Vietnam 27: 110 (1994); Pedley, Revis. Handb. Fl. Ceylon 10: 179 (1996); Ohashi, J. Jap. Bot. 79: 126 (2004); Chong et al., Checkl. Vasc. Pl. Fl. Singapore 33, 134, 270 (2009). – TYPE: Ceylon [Sri Lanka], *Unknown collector s.n.* [Herb. Willdenow 13832, sheet 3] (lectotype B [B-W13832-030], first step designated by Ohashi (2004a: 126), second step designated here). (Fig. 7A–D).

*Hedysarum triflorum* var.  $\beta$  L., Sp. Pl. 2: 749 (1753), nom. inval.

*Hedysarum triflorum* var.  $\gamma$  L., Sp. Pl. 2: 749 (1753), nom. inval.

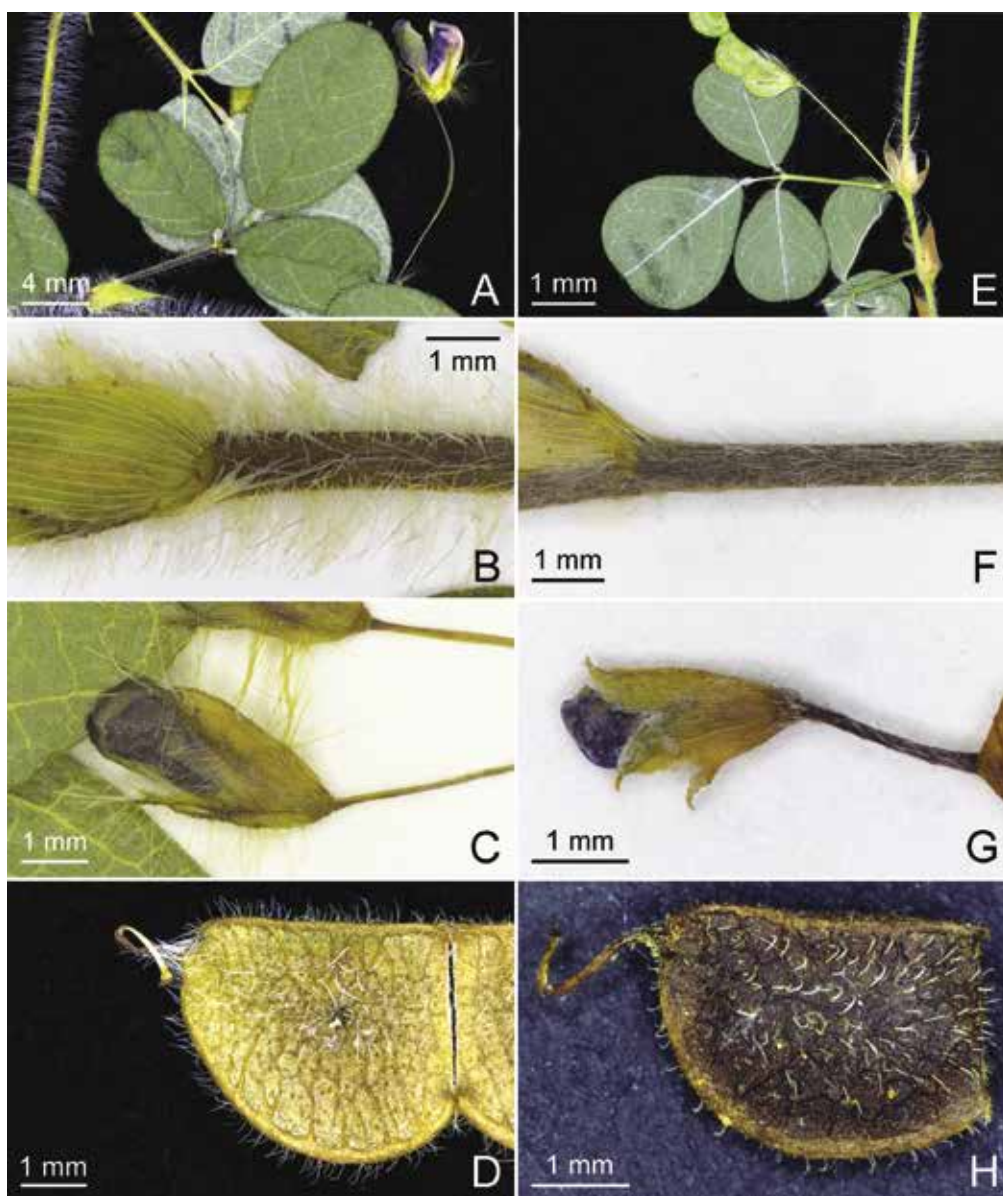
*Desmodium triflorum* auct. non (L.) DC.: Keng, Concise Fl. Singapore, vol. 1, Gymn. Dicot. 35 (1990).

*Distribution.* Indian subcontinent, southern China, throughout continental Southeast Asia and throughout Malesia. Introduced and naturalised in Australia and the Pacific Islands.

*Etymology.* Latin, *hetero-* = differing, *-phylla* = leaves; alluding to often having unifoliolate leaves among trifoliolate ones on the same shoot.

*Provisional IUCN conservation assessment for Singapore.* Least Concern (LC). Although Chong et al. (2009) listed this species as a ‘weed of uncertain origin’, all published records consider it to be native to tropical Asia. We do not see any reason for not treating the species as a common widespread species throughout the region and that it is native to Singapore.

*Representative specimens examined* (total c. 40). SINGAPORE: s.l., 1884, *Hullett 418* (SING [SING0036704]); Bukit Batok West, near Bukit Gombak Stadium, 27 May 2018, *Ho & Yeo SING2018-618* (SING [SING00257444]); Choa Chu Kang, 28 Nov 1995, *Tang & Sidek 1111* (SING [SING0016905]); Sungei Buloh, 13 Oct 1993, *Chua et al. SB 3110* (SINU [2007005223]); Seletar Wet Gap, 28 Jul 2003, *Morgany & Tan 705* (SINU [2007005217]); Singapore Botanic Gardens, nursery, 8 Feb 1955, *Purseglove 4050* (SING [SING0036695]); Pulau Seringat, 28 Jan 1994, *Chua et al. SR45* (SINU [2007005219]); Changi, 1891, *Ridley 2079* (SING [SING0036705]); Pulau Sajahat, 1 Nov 1996, *Tan et al. SAJ 030* (SINU [2007005221]).



**Fig. 7.** Comparison of the two *Grona* species native to Singapore. **A–D.** *Grona heterophylla* (Willd.) H.Ohashi & K.Ohashi. **A.** A leaf showing typical obovate terminal leaflet with obtuse base and rounded tip. **B.** Erect-spreading hairs on stem. **C.** Close-up of a flower bud showing long spreading hairs on calyx. **D.** Close-up of article showing a mixture of straight and hooked hairs. **E–H.** *Grona triflora* (L.) H.Ohashi & K.Ohashi. **E.** A leaf showing typical obcordate terminal leaflet with cuneate base and truncate tip. **F.** Loosely appressed hairs on stem. **G.** Close-up of flower showing appressed hairs on calyx. **H.** Article with hooked hairs. A–D from Ho & Yeo SING2018-618, E–H from Ho & Yeo SING2018-617. (Photos: B.C. Ho).

*Notes.* The size and shape of the terminal leaflets are often used as characters to distinguish *Grona heterophylla* and *Grona triflora* (Pedley, 1996, 1999). However, many specimens of *Grona heterophylla* with smaller leaves have formerly been misidentified and filed as *Desmodium triflorum*, including *Ridley 2079* (SING) as cited by Keng (1990: 35). Indeed, the broadly obovate juvenile-stage terminal leaflets of *Grona heterophylla* may closely resemble the usually obcordate ones of *G. triflora*. The primary difference appears to be whether the lower third of the leaflets has convex edges, i.e. a rounded or obtuse base in *Grona heterophylla* versus the straight edges of *G. triflora*, i.e. cuneate base in the latter. The often-truncate emarginate tips more often found in terminal leaflets of *Grona triflora* are variable and may be absent in larger leaves while it can also occur occasionally in *G. heterophylla*. Pedley (1996, 1999) has reported the terminal leaflets in *Grona triflora* to measure 4–7.5 mm, occasionally 9 mm long, and those in *G. heterophylla* to be 10–27 mm long. Larger terminal leaflets in *Grona triflora* of up to 12 mm long have been observed in Singapore populations. These larger ones often belong to populations growing in the shade and remain sterile, thus are rarely collected as specimens. Smaller terminal leaflets of 8 mm long (occasionally as small as 6 mm long) in *Grona heterophylla* are not uncommon, but often mixed with leaves with larger leaflets along the same stem. These observed size ranges of the leaflets in both species are closer to those given in the descriptions of Ohashi (1973).

With the overlapping leaflet sizes and shapes, the identity of sterile specimens can easily get confused. In the absence of fertile parts, the ability to accurately identify sterile plants is an added advantage, for instance in ecological studies where all specimens need to be named regardless of whether they are fertile or not. It has been observed, at least in the Singapore specimens, that the hairs on young shoots of *Grona heterophylla* are erect-spreading, at least 1 mm long, and slightly golden-brown, whereas those in *Grona triflora* are loosely appressed to ascending (rarely spreading), below 1 mm long, and white. Nonetheless, the indumentum has been regarded as a variable character (e.g., Knaap-Van Meeuwen, 1962: 252). In addition, we have noticed that a few minute hooked hairs are almost always present on the abaxial surface of the petiole and rachis in *Grona heterophylla*, whereas in *Grona triflora*, the abaxial surfaces of the petiole and rachis are glabrous or with few appressed straight hairs. This is a character that has not hitherto been highlighted in the published literature.

Ohashi (2004a) cited “Herb. Willdenow 13832” as the type of *Hedysarum heterophyllum*. There are four sheets under this folder number in B and none is at variance with the original description. The best (sheet 3) is here selected in a second step lectotypification following the ICN Art. 9.17 (Turland et al., 2018).

**5. *Grona triflora*** (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 117 (2018). – *Hedysarum triflorum* L., Sp. Pl. 2: 749 (1753), excl. var.  $\beta$  & var.  $\gamma$ . – *Desmodium triflorum* (L.) DC., Prodr. 2: 334 (1825); Ridley, J. Straits Branch Roy. Asiat. Soc. 33: 73 (1900); Ridley, Fl. Malay Penins. 1: 606 (1922); Henderson, Malay. Wild Fls., Dicot. 74, fig. 67 (1959); Knaap-Van Meeuwen, Reinwardtia 6(3): 261 (1962); Ohashi, Ginkgoana 1: 245, pl. 36b (1973); Verdcourt, Man. New Guinea Legumes 409 (1979); Turner, Gard.



Bull. Singapore 45: 121 (1993); Ohashi, Fl. Cambodge Laos Vietnam 27: 111, pl. 24: 1–9 (1994); Pedley, Revis. Handb. Fl. Ceylon 10: 178 (1996); Ohashi, J. Jap. Bot. 79: 131 (2004: 131); Chong et al., Checkl. Vasc. Pl. Fl. Singapore 33, 134, 270 (2009). – TYPE: Ceylon [Sri Lanka], *Unknown collector s.n.* [Herb. Hermann 1: 21, No. 297b] (lectotype BM [BM000621300], first step designated by Fawcett & Rendle (1920: 38), second step designated by Pedley (in Turland & Jarvis, 1997: 472)). (Fig. 7E–H).

*Distribution.* Pantropical. Introduced and naturalised in Australia and the Pacific Islands.

*Etymology.* Latin, *tri-* = three, *-flora* = flowers; alluding to the flowers in fascicles of threes, although it varies from one to four.

*Provisional IUCN conservation assessment for Singapore.* Least Concern (LC). As for *Grona heterophylla*, we here change the status of this species from ‘weed of uncertain origin’ (Chong et al., 2009) to native in Singapore where it is fairly common.

*Representative specimens examined* (total c. 40). SINGAPORE: Bukit Batok West, near Bukit Gombak Stadium, 27 May 2018, *Ho & Yeo SING2018-617* (SING [SING0257443]); Singapore Botanic Gardens, 26 Sep 1954, *Purseglove 4002* (SING [SING0257615]); Coney Island Park, 13 Dec 2018, *Ng SING2018-979* (SING [SING0286304]); Labrador Park, 21 Apr 1994, *Tan et al. L 149* (SINU [2007016851]); Tanjong Rhu, 4 Aug 2000, *Teo TR Plot1* (SINU [2007005254]); Pulau Tekukor, 22 Oct 1996, *Tan et al. Ter 85* (SINU [2007016175]); Pulau Satumu, Raffles Lighthouse, *Tan et al. RL 31* (SINU [2007019226]).

*Notes.* Common but under-collected, which manifests in fewer specimens in SING than would be expected. The larger number of specimens in SINU is probably due to the many floristic surveys from past students’ projects, but unfortunately the majority of the herbarium sheets consist of one or few small sterile shoots. *Grona triflora* is usually smaller in overall size than *G. heterophylla*. These two species often grow together but *Grona triflora* appears to be slightly more tolerant of xeric habitats such as sandy beaches. See notes under *Grona heterophylla* for a discussion of their morphological differences. In SINU, some specimens of *Oxalis corniculata* L. (Oxalidaceae), a common species found in similar habitats, were also mistaken for *Grona triflora*. Perhaps this is because both have trifoliolate compound leaves with similar obcordate leaflets often with truncate emarginate tips. However, *Oxalis corniculata* can be easily distinguished when sterile by the digitate/palmate trifoliolate leaves in contrast to the pinnate trifoliolate leaves of *Grona triflora*. The five free yellow petals and 5-locular capsules of *Oxalis corniculata* are very different to the flowers and fruits of *Grona triflora*.

The lectotype sheet bears three barcodes, two of which are linked to parts annotated as 297a [BM000621299] and 297b [BM000621300]. The better of the two is further selected in a second step lectotypification following ICN Art. 9.17 (Turland et al., 2018).

**Nomenclatural updates for names in tribe Desmodieae  
from the Malay Peninsula**

Currently accepted names (in **bold**) are arranged in alphabetical order, followed by major references citing the name, as well as citing the records for Singapore and/or Peninsular Malaysia. Thirty accepted species are here listed. Type information is omitted pending more detailed work on this for the Flora of Peninsular Malaysia treatment.

**1. *Alysicarpus vaginalis*** (L.) DC., Prodr. 2: 353 (1825); Ridley, Fl. Malay Penins. 1: 604 (1922); Van Meeuwen et al., Reinwardtia 6(1): 87 (1961); Turner, Gard. Bull. Singapore 47: 291 (1997 [‘1995’]). – *Hedysarum vaginale* L., Sp. Pl. 2: 746 (1753). – *Alysicarpus vaginalis* var. *typica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 132 (1897), nom. inval.

*Alysicarpus nummulariifolius* DC., Prodr. 2: 353 (1825), as ‘*nummularifolius*’; Ridley, Fl. Malay Penins. 1: 604 (1922), as ‘*nummularifolius*’ – *Alysicarpus vaginalis* (L.) DC. var. *nummulariifolius* (DC.) Miq., Fl. Ned. Ind. 1(1): 232 (1855), as ‘*nummularifolius*’; Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 132 (1897), as ‘*nummularifolia*’ Ridley, J. Straits Branch Roy. Asiat. Soc. 33: 73 (1900), as ‘*nummularifolia*’.

**2. *Aphyllodium biarticulatum*** (L.) Gagnep., Notul. Syst. (Paris) 3: 254 (1916); Ohashi, J. Jap. Bot. 79: 107 (2004). – *Hedysarum biarticulatum* L., Sp. Pl. 2: 747 (1753).

**3. *Christia vespertilionis*** (L.f.) Bakh.f. in Van Meeuwen et al., Reinwardtia 6(1): 90 (1961); Ratnasabapathy, Sains Malaysiana 3: 177 (1974); Turner, Gard. Bull. Singapore 47: 297 (1997 [‘1995’]). – *Hedysarum vespertilionis* L.f., Suppl. Pl. 331 (1782). – *Lourea vespertilionis* (L.f.) Desv., J. Bot. Agric. 1: 122 (1813); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 132 (1897).

**4. *Codariocalyx gyroides*** (Roxb. ex Link) X.Y.Zhu, Legumes China 146 (2007). – *Hedysarum gyroides* Roxb. ex Link, Enum. Hort. Berol. Alt. 2: 247 (1822). – *Desmodium gyroides* (Roxb. ex Link) DC., Prodr. 2: 326 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 145 (1897); Ridley, Fl. Malay Penins. 1: 611 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 250 (1962). – *Codariocalyx gyroides* Haask, Flora 25(2): Beibl. 49 (1842), nom. inval.; Ohashi, Ginkgoana 1: 43 (1973); Turner, Gard. Bull. Singapore 47: 297 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 109 (2004).

**5. *Dendrolobium rugosum*** (Prain) Schindl., Repert. Spec. Nov. Regni Veg. 20: 279 (1954); Ohashi, Ginkgoana 1: 72 (1973); Chin, Gard. Bull. Singapore 32: 167 (1979);

Turner, Gard. Bull. Singapore 47: 300 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 113 (2004). – *Desmodium rugosum* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 137 (1897); Ridley, Fl. Malay Penins. 1: 607 (1922).

### 5.1 *Dendrolobium rugosum* var. *rugosum*

*Notes.* Ohashi (1973: 74) recognised two varieties, of which *Dendrolobium rugosum* var. *moniliferum* H.Ohashi is limited to Cambodia, Myanmar, Thailand and Vietnam.

**6. *Dendrolobium umbellatum*** (L.) Benth. in Miquel, Pl. Jungh. 2: 218 (1852); Ohashi, Ginkgoana 1: 82 (1973); Turner, Gard. Bull. Singapore 47: 300 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 115 (2004). – *Hedysarum umbellatum* L., Sp. Pl. 2: 747 (1753). – *Desmodium umbellatum* (L.) DC., Prodr. 2: 325 (1825); Ridley, Fl. Malay Penins. 1: 607 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 263 (1962).

### 6.1 *Dendrolobium umbellatum* f. *umbellatum*

*Notes.* Ohashi (1973: 84) identified a Singapore collection as the type form.

**7. *Desmodium scorpiurus*** (Sw.) Desv., J. Bot. Agric. 1: 122 (1813). – *Hedysarum scorpiurus* Sw., Prodr. 107 (1788).

*Notes.* The occurrence of this species newly reported here in Singapore also represents the first record for the Malay Peninsula and western Malasia.

**8. *Grona adscendens*** (Sw.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 108 (2018). – *Hedysarum adscendens* Sw., Prodr. 106 (1788). – *Desmodium adscendens* (Sw.) DC., Prodr. 2: 332 (1825); Knaap-Van Meeuwen, Reinwardtia 6(3): 245 (1962); Ohashi, Ginkgoana 1: 199 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 133 (2004).

*Desmodium trifoliastrum* Miq., Fl. Ned. Ind. 1(1): 248 (1855); Ridley, Fl. Malay Penins. 1: 606 (1922).

### 8.1 *Grona adscendens* var. *adscendens*

*Notes.* Ohashi & Ohashi (2018a: 108) recognised only the type variety for Malaysia.

**9. *Grona heterocarpos*** (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 112 (2018), as ‘*heterocarpa*’. – *Hedysarum heterocarpon* L., Sp. Pl. 2: 747 (1753). – *Desmodium heterocarpon* (L.) DC., Prodr. 2: 337 (1825), as ‘*heterocarpum*’; Knaap-Van Meeuwen, Reinwardtia 6(3): 251 (1962); Ohashi, Ginkgoana 1: 210 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 125 (2004).

*Desmodium polycarpon* (Poir.) DC. var. *albiflorum* Ridl., Fl. Malay Penins. 1: 609 (1922), as ‘*polycarpum*’.

### 9.1 *Grona heterocarpos* subsp. *heterocarpos*

*Notes.* Turner (1997: 301) and Ohashi (2004a: 125) recognised it as *Desmodium heterocarpon* (L.) DC. subsp. *heterocarpon*.

#### 9.1.1 *Grona heterocarpos* subsp. *heterocarpos* var. *heterocarpos*

*Notes.* Knaap-Van Meeuwen (1962: 251) and Ohashi (1973: 210; 2004a: 125) recognised it as *Desmodium heterocarpon* subsp. *heterocarpon* var. *heterocarpon*.

**9.1.2 *Grona heterocarpos* subsp. *heterocarpos* var. *strigosa*** (Meeuwen) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 112 (2018), as ‘*heterocarpa*’. – *Desmodium heterocarpon* subsp. *heterocarpon* var. *strigosum* Meeuwen, Reinwardtia 6(1): 95 (1961); Knaap-Van Meeuwen, Reinwardtia 6(3): 251 (1962); Ohashi, Ginkgoana 1: 215 (1973).

*Desmodium polycarpon* (Poir.) DC., Prodr. 2: 334 (1825); Ridley, Fl. Malay Penins. 1: 609 (1922), as ‘*polycarpum*’. – *Hedysarum polycarpon* Poir., Encycl. 6(2): 413 (1805).

*Desmodium polycarpon* (Poir.) DC. var. *typica* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 141 (1897), nom. inval., as ‘*polycarpum*’.

**9.2 *Grona heterocarpos* subsp. *angustifolia*** (H.Ohashi) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 114 (2018), as ‘*heterocarpa*’. – *Desmodium heterocarpon* subsp. *angustifolium* H.Ohashi, Ginkgoana 1: 212 (1973); Ohashi, J. Jap. Bot. 79: 125 (2004).

*Desmodium polycarpon* var. *rigidum* Ridl., Fl. Malay Penins. 1: 609 (1922), as ‘*polycarpum*’.

**9.3 *Grona heterocarpos* subsp. *ovalifolia*** (Prain) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 114 (2018), as '*heterocarpa*'. – *Desmodium polycarpon* var. *ovalifolium* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 141 (1897), as '*polycarpum*'. – *Desmodium ovalifolium* (Prain) Merr., Philipp. J. Sci., C 5: 85 (1910); Ridley, Fl. Malay Penins. 1: 610 (1922). – *Desmodium heterocarpon* subsp. *ovalifolium* (Prain) H.Ohashi, J. Jap. Bot. 66: 21 (1991); Turner, Gard. Bull. Singapore 47: 301 (1997 ['1995']); Ohashi, J. Jap. Bot. 79: 125 (2004).

*Notes.* *Desmodium ovalifolium* was included under *Desmodium heterocarpon* subsp. *heterocarpon* var. *heterocarpon* in Knaap-Van Meeuwen (1962: 251) and Ohashi (1973: 210).

**10. *Grona heterophylla*** (Willd.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 114 (2018). – *Hedysarum heterophyllum* Willd., Sp. Pl., ed. 4, 3(2): 1201 (1802). – *Desmodium heterophyllum* (Willd.) DC., Prodr. 2: 334 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 135 (1897); Ridley, Fl. Malay Penins. 1: 606 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 251 (1962); Ohashi, Ginkgoana 1: 239 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 ['1995']); Ohashi, J. Jap. Bot. 79: 126 (2004).

**11. *Grona retroflexa*** (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 385 (2018). – *Hedysarum retroflexum* L., Mant. Pl. 103 (1767). – *Desmodium retroflexum* DC., Prodr. 2: 336 (1825).

*Hedysarum capitatum* Burm.f., Fl. Ind. 167 (1768). – *Desmodium capitatum* (Burm.f.) DC., Prodr. 2: 336 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 139 (1897); Ridley, Fl. Malay Penins. 1: 609 (1922); Ohashi, J. Jap. Bot. 79: 120 (2004). – *Grona capitata* (Burm.f.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 110 (2018).

*Desmodium styracifolium* auct. non (Osbeck) Merr.: Knaap-Van Meeuwen, Reinwardtia 6(3): 259 (1962); Ohashi, Ginkgoana 1: 224 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 ['1995']).

*Notes.* See discussion on taxonomic confusion and misapplication in Ohashi & Ohashi (2018b: 385).

**12. *Grona rubra*** (Lour.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 116 (2018). – *Ornithopus ruber* Lour., Fl. Cochinch. 2: 452 (1790). – *Desmodium rubrum* (Lour.) DC., Prodr. 2: 327 (1825); Ohashi, J. Jap. Bot. 79: 128 (2004).

### 12.1 *Grona rubra* var. *rubra*

*Notes.* Ohashi (2004a: 128) identified the Malayan specimens as *Desmodium rubrum* var. *rubrum*.

**13. *Grona triflora*** (L.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 117 (2018). – *Hedysarum triflorum* L., Sp. Pl. 2: 749 (1753), excl. var.  $\beta$  & var.  $\gamma$ . – *Desmodium triflorum* (L.) DC., Prodr. 2: 334 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 135 (1897); Ridley, Fl. Malay Penins. 1: 606 (1922); Ohashi, Ginkgoana 1: 245 (1973); Turner, Gard. Bull. Singapore 47: 302 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 131 (2004).

**14. *Hegnera obcordata*** (Miq.) Schindl., Repert. Spec. Nov. Regni Veg. 20: 285 (1924); Ohashi, J. Jap. Bot. 79: 157 (2004). – *Uraria obcordata* Miq., Fl. Ned. Ind., Eerste Bijv. 2: 305 (1861). – *Desmodium obcordatum* (Miq.) Kurz, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 42(4): 229 (1874 [‘1873’]); Turner, Gard. Bull. Singapore 46: 127 (1994); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

**15. *Hylodesmum leptopus*** (A.Gray ex Benth.) H.Ohashi & R.R.Mill, Edinburgh J. Bot. 57(2): 179 (2000); Ohashi, J. Jap. Bot. 79: 159 (2004). – *Desmodium leptopus* A.Gray ex Benth. in Miquel, Pl. Jungh. 2: 226 (1852). – *Desmodium laxum* DC. subsp. *leptopus* (A.Gray ex Benth.) H.Ohashi, Ginkgoana 1: 141 (1973).

*Desmodium laxum* auct. non DC.: Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 138 (1897); Ridley, Fl. Malay Penins. 1: 608 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 253 (1962), p.p.; Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

*Notes.* See discussion on misapplication in Ohashi (2004b: 159).

**16. *Hylodesmum repandum*** (Vahl) H.Ohashi & R.R.Mill, Edinburgh J. Bot. 57(2): 185 (2000); Ohashi, J. Jap. Bot. 79: 164 (2004). – *Hedysarum repandum* Vahl, Symb. Bot. 2: 82 (1791). – *Desmodium repandum* (Vahl) DC., Prodr. 2: 334 (1825); Ohashi, Ginkgoana 1: 160 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

*Desmodium scalpe* DC., Prodr. 2: 334 (1825); Ridley, Fl. Malay Penins. 1: 607 (1922).

**17. *Ohwia caudata*** (Thunb.) H.Ohashi, Sci. Rep. Tôhoku Imp. Univ., Ser. 4, Biol. 40: 243 (1999); Ohashi, J. Jap. Bot. 79: 166 (2004). – *Hedysarum caudatum* Thunb., Fl.



Jap. 286 (1784). – *Desmodium caudatum* (Thunb.) DC., Prodr. 2: 337 (1825); Knaap-Van Meeuwen, Reinwardtia 6(3): 248 (1962); Ohashi, Ginkgoana 1: 91 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

*Desmodium laburnifolium* (Poir.) DC., Prodr. 2: 337 (1825); Ridley, Fl. Malay Penins. 1: 608 (1922). – *Hedysarum laburnifolium* Poir., Encycl. 6(2): 422 (1805).

**18. *Ototropis megaphylla*** (Zoll. & Moritz) H. Ohashi & K. Ohashi, J. Jap. Bot. 87: 114 (2012). – *Desmodium megaphyllum* Zoll. & Moritz, Natuur- Geneesk. Arch. Ned.-Indië 3: 77 (1846); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 139 (1897); Ridley, Fl. Malay Penins. 1: 608 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 253 (1962); Ohashi, Ginkgoana 1: 111 (1973); Ohashi, J. Jap. Bot. 79: 127 (2004); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

### 18.1 *Ototropis megaphylla* var. *megaphylla*

*Notes.* Ohashi (1973: 111) recognised the Malaysian specimens as *Desmodium megaphyllum* var. *megaphyllum*.

**19. *Phyllodium pulchellum*** (L.) Desv., J. Bot. Agric. 1: 124 (1813); Ohashi, Ginkgoana 1: 276 (1973); Turner, Gard. Bull. Singapore 47: 308 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 168 (2004). – *Hedysarum pulchellum* L., Sp. Pl. 2: 747 (1753). – *Desmodium puchellum* (L.) Benth. in Miquel, Pl. Jungh. 2: 217 (1852); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 136 (1897); Ridley, Fl. Malay Penins. 1: 607 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 256 (1962).

**20. *Phyllodium vestitum*** Benth. in Miquel, Pl. Jungh. 2: 217 (1852); Ohashi, J. Jap. Bot. 79: 168 (2004). – *Desmodium vestitum* (Benth.) Benth. ex Baker in Hooker, Fl. Brit. India 2(4): 162 (1876); Ridley, Fl. Malay Penins. 1: 607 (1922).

**21. *Pleurolobus gangeticus*** (L.) J. St.-Hil., Nouv. Bull. Sci. Soc. Philom. Paris 3: 192 (1812); Ohashi et al., J. Jap. Bot. 93: 184 (2018). – *Hedysarum gangeticum* L., Sp. Pl. 2: 746 (1753). – *Desmodium gangeticum* (L.) DC., Prodr. 2: 327 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 142 (1897); Ridley, Fl. Malay Penins. 1: 610 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 249 (1962); Ohashi, Ginkgoana 1: 184 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 122 (2004).

**22. *Polhillides velutina*** (Willd.) H.Ohashi & K.Ohashi, J. Jap. Bot. 94: 72 (2019). – *Hedysarum velutinum* Willd., Sp. Pl., ed. 4, 3(2): 1174 (1802). – *Desmodium velutinum* (Willd.) DC., Prodr. 2: 328 (1825); Knaap-Van Meeuwen, Reinwardtia 6(3): 261 (1962); Ohashi, Ginkgoana 1: 192 (1973); Turner, Gard. Bull. Singapore 47: 302 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 132 (2004).

*Desmodium virgatum* Zoll. & Moritzi ex Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 143 (1897); Ridley, Fl. Malay Penins. 1: 611 (1922).

*Hedysarum lasiocarpum* P.Beauv., Fl. Oware 1: 32, pl. 18. – *Desmodium lasiocarpum* (P.Beauv.) DC., Prodr. 2: 328 (1825); Henderson, Gard. Bull. Straits Settlem. 7(2): 99 (1933).

### **22.1 *Polhillides velutina* subsp. *velutina***

*Notes.* Ohashi (2004a: 132) recognised only *Desmodium velutinum* subsp. *velutinum* in Malasia.

#### **22.1.1 *Polhillides velutina* subsp. *velutina* var. *velutina***

*Notes.* Ohashi (1973: 195) recognised Malesian specimens as *Desmodium velutinum* subsp. *velutinum* var. *velutinum*.

**23. *Pseudarthria viscida*** (L.) Wight & Arn., Prodr. Fl. Ind. Orient. 1: 209 (1834); Sinclair, Gard. Bull. Singapore 14: 32 (1953); Van Meeuwen et al., Reinwardtia 6(1): 105 (1961); Turner, Gard. Bull. Singapore 47: 308 (1997 [‘1995’]).

**24. *Sohmaea laxiflora*** (DC.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 162 (2018). – *Desmodium laxiflorum* DC., Ann. Sci. Nat. (Paris) 4: 100 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 141 (1897); Knaap-Van Meeuwen, Reinwardtia 6(3): 252 (1962); Ohashi, Ginkgoana 1: 101 (1973); Turner, Gard. Bull. Singapore 47: 301 (1997 [‘1995’]).

**25. *Sohmaea teres*** (Wall. ex Benth.) H.Ohashi & K.Ohashi, J. Jap. Bot. 93: 163 (2018); Rafidah et al., Gard. Bull. Singapore 72: 24 (2020). – *Desmodium teres* Wall. ex Benth. in Miquel, Pl. Jungh. 2: 225 (1852).

**26. *Sohmaea zonata*** (Miq.) H. Ohashi & K. Ohashi, J. Jap. Bot. 93: 163 (2018). – *Desmodium zonatum* Miq., Fl. Ned. Ind. 1(1): 250 (1885); Knaap-Van Meeuwen, Reinwardtia 6(3): 265 (1962); Ohashi, Ginkgoana 1: 107 (1973); Turner, Gard. Bull. Singapore 47: 302 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 133 (2004).

*Desmodium ormocarpoides* DC. var. *velutina* Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 142 (1897); Ridley, Fl. Malay Penins. 1: 610 (1922).

**27. *Tadehagi triquetrum*** (L.) H. Ohashi, Ginkgoana 1: 290 (1973); Turner, Gard. Bull. Singapore 47: 311 (1997 [‘1995’]); Ohashi, J. Jap. Bot. 79: 169 (2004). – *Hedysarum triquetrum* L., Sp. Pl. 2: 746 (1753). – *Desmodium triquetrum* (L.) DC., Prodr. 2: 326 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 143 (1897); Ridley, Fl. Malay Penins. 1: 611 (1922); Knaap-Van Meeuwen, Reinwardtia 6(3): 262 (1962).

#### **27.1 *Tadehagi triquetrum* subsp. *triquetrum***

*Notes.* Knaap-Van Meeuwen (1962: 262) and Ohashi (1973: 296; 2004b: 169) recognised at least the western Malesian specimens as *Desmodium triquetrum* subsp. *triquetrum* and *Tadehagi triquetrum* subsp. *triquetrum*, respectively.

**28. *Uraria crinita*** (L.) Desv. ex DC., Prodr. 2: 324 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 130 (1897); Ridley, Fl. Malay Penins. 1: 602 (1922); Turner, Gard. Bull. Singapore 47: 311 (1997 [‘1995’]); Ohashi & Iokawa, Taiwaniana 52: 177 (2007). – *Hedysarum crinitum* L., Mant. Pl. 102 (1767).

**29. *Uraria lagopodioides*** (L.) Desv., Mém. Soc. Linn. Paris 4: 309 (1826); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 131 (1897); Ridley, Fl. Malay Penins. 1: 603 (1922); Turner, Gard. Bull. Singapore 47: 311 (1997 [‘1995’]); Ohashi & Iokawa, Taiwaniana 52: 179 (2007). – *Hedysarum lagopodioides* L., Sp. Pl. 2: 1198 (1753).

**30. *Uraria picta*** (Jacq.) Desv. ex DC., Prodr. 2: 324 (1825); Prain, J. Asiat. Soc. Bengal, Pt. 2, Nat. Hist. 66(2): 130 (1897); Ridley, Fl. Malay Penins. 1: 603 (1922); Turner, Gard. Bull. Singapore 47: 311 (1997 [‘1995’]); Ohashi & Iokawa, Taiwaniana 52: 181 (2007). – *Hedysarum pictum* Jacq., Collectanea 2: 262 (1798 [‘1788’]).

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