Malayan Forest Records No. 48
Series I: Ferns and Lycophytes , Volume 3



Flora of Peninsular Malaysia

Edited by
B.S. Parris
R. Kiew
R.C.K. Chung
Y.H. Cheah

FLORA
OF
PENINSULAR MALAYSIA

Series I: Ferns and Lycophytes

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GOVERNMENT OF MALAYSIA

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29. BLECHNACEAE

R. Jaman

11 Jalan 2/3B, 43650 Bandar Baru Bangi, Selangor, Malaysia

Newman, Hist. Brit. Ferns (ed. 2) (1844) 8; Kramer *et al.*, Fam. Gen. Vasc. Pl. 1 (1990) 60; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Smith *et al.*, Taxon 55 (2006) 715; Nooteboom *et al.*, Fl. Malesiana 2, 1 (2012) 1; Gasper *et al*., Phytotaxa 275, 3 (2016) 191; PPG I, J. Syst. Evol. 54 (2016) 582; Mabberley, Plant Book. 4th ed. (2017) 117.

Terrestrial or lithophytic, small to large ferns, sometimes scandent, rarely epiphytic, very rarely aquatic. **Rhizomes** erect or ascending, rather stout, sometimes subarborescent, rarely slender, or creeping, sometimes stoloniferous. **Stipes** grooved above, with several vascular bundles usually arranged in a U-shaped pattern, base covered with scales. **Laminae** simple, pinnatifid, pinnate or rarely bipinnate, monomorphic or dimorphic; **rachis** grooved above; pinnae articulate or not, veins free or anastomosing. **Sori** short to long and narrow or forming one long continuous sorus, indusium attached along receptacle and opening towards the costa, rarely indusium absent, rarely sporangia spreading along veins or acrostichoid, without sterile appendages. **Spores** monolete, bilateral with a variety of ornamentation. **Gametophyte** above ground, green, cordate or elongate,

Distribution. Cosmopolitan family of 24 genera and *c*. 265 species (PPG 1, 2016), most numerous in the tropics. In Peninsular Malaysia represented by eight genera, *Austroblechnum*, *Blechnopsis*, *Brainea*, *Diploblechnum*, *Parablechnum*, *Stenochlaena*, *Telmatoblechnum*, and *Woodwardia*, and nine species.

Ecology. In light to deep shade in moist lowland to montane forest and elsewhere in alpine habitats, sometimes in swamps or open rocky sites including coastal areas, sometimes as primary colonisers.

Uses. Wild-collected young shoots of *Stenochlaena palustris* are commonly sold in markets throughout Malesia as a vegetable or for 'ulam' (eaten raw with chili sauce), while *Blechnopsis orientalis* is a popular vegetable in Borneo. The latter has potential as a medicinal supplement (*BMC Complementary and Alternative Medicine* 10 (2010) 15, 11 (2011) 62). Chambers & Farrant (2001) reported that the croziers and young leaves of *Telmatoblechnum indicum* were sold in markets in SE Asia and were even canned. The stems of *Stenochlaena palustris* are used in Peninsular Malaysia to bind baskets and fish traps. Several species of *Austroblechnum*, *Blechnum*, *Cranfillia*, *Doodia*, *Lomaria*, *Lomariocycas*, *Neoblechnum*, *Oceanopteris*, *Parablechnum* and *Woodwardia* are cultivated for their ornamental value but only *Oceanopteris gibba* (Labill.) Gasper & Salino (*Blechnum gibbum* (Labill.) Mett.) is available locally (Boo *et al.*, 1001 Garden Plants in Singapore. 2nd ed. (2006) 83).

Taxonomy. Holttum (1968) placed *Blechnum*, *Brainea*, *Stenochlaena* and *Woodwardia* in Dennstaedtiaceae, with *Blechnum*, *Brainea* and *Woodwardia* in subfamily Blechnoideae and

Stenochlaena in subfamily Pteridioideae. Recent molecular studies show that Blechnaceae is monophyletic and that the genera fall within three subfamilies (PPG I, 2016). Among the Malaysian genera, *Austroblechnum*, *Blechnopsis*, *Brainea*, *Diploblechnum* and *Parablechnum* belong to subfamily Blechnoideae Gasper, V.A.O.Dittrich & Salino, *Woodwardia* to subfamily Woodwardioideae Gasper, V.A.O.Dittrich & Salino, and *Stenochlaena* and *Telmatoblechnum* to subfamily Stenochlaenoideae (Ching) J.P.Roux.

Key to genera and species

1. Rhizomes long-creeping, scandent or climbing.....**6. Stenochlaena (*S. palustris*)**
   Rhizomes not as above.....2

2. Sori without indusium.....**3. Brainea (*B. insignis*)**
   Sori with indusium.....3

3. Sterile pinnae with anastomosing veins.....**8. Woodwardia (*W. auriculata*)**
   Sterile pinnae with free veins.....4

4. Lamina bipinnatifid.....**4. Diploblechnum (*D. fraseri*)**
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5. Lamina pinnatifid…….....**1. Austroblechnum (*A. melanocaulon* subsp. *pallens*)**
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6. Lamina monomorphic, fertile and sterile fronds similar.....**2. Blechnopsis**
   Lamina dimorphic, fertile fronds much narrower than the sterile fronds.....7

7. Pinnae articulated to rachis; stipe and rachis scales 3–4 × 1 mm.....
   .....**7. Telmatoblechnum (*T. indicum*)**
   Pinnae not articulated to rachis; stipe and rachis scales 18–35 × 3–7 mm.....
   .....**5. Parablechnum (*P. vestitum*)**

1. **AUSTROBLECHNUM** Gasper & V.A.O.Dittrich

(Latin, *austro* = southern and *Blechnon*, an ancient Greek word for ferns in general, referring to the mainly southern hemisphere distribution of the genus)

Phytotaxa 275, 3 (2016) 202. **Synonym:** *Blechnum* L., Sp. Pl. 2 (1753) 1077 *p.p.*; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 444 *p.p.*; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 63 *p.p.*; Chambers & Farrant, Flora Malesiana 2, 4 (2012) 8 *p.p.*

Terrestrial or lithophytic. **Rhizomes** erect, ascending, short- or long-creeping, sometimes stoloniferous, sometimes forming short trunks. **Fronds** dimorphic, pinnate, pinnatifid or rarely entire; **stipes** usually longer in fertile fronds than in sterile; **laminae** with reduced pinnae at base, **pinnae** partially or completely adnate, not articulated to rachis; **veins** *free.* **Sori** linear, indusium *entire to erose or fimbriate*.

Distribution. 40 species (PPG I, 2016), in tropical and south temperate regions, with one species in Peninsular Malaysia.

Ecology. From lowland forest to alpine habitats, including open rocky sites.

Austroblechnum melanocaulon (Brack.) Gasper & V.A.O.Dittrich

(Latin, *melano* = black, *caulon* = stem)

Phytotaxa 275, 3 (2016) 203. **Basionym:** *Lomaria melanocaulon* Brack., US Expl. Exped. 16 (1854) 122. **Type:** *Brackenridge s.n.,* Philippines, Luzon, Mt. Maijaijai. (holotype US, *n.v.*). **Synonyms:** *Blechnum melanocaulon* (Brack.) Chambers & Farrant, Blumea 46 (2001) 318, figs. 2i, 12a–d, Fl. Malesiana 2, 4 (2012) 40. *Blechnum patersonii auct. non* (R.Br.) Spreng.: Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 635; Piggott, Ferns Malay. (1988) 405, figs. 1242–1244. *Blechnum pallescens* T.C.Chambers *ined.*, Parris & Latiff, Malay. Nat. J. 50 (1997) 242.

Rhizomes *short-creeping to suberect*, with scales attenuate, entire, dark reddish brown, sometimes fading and slightly paler at margin. **Stipes** up to half the length of the frond, stipes of fertile fronds usually longer than those of sterile fronds. **Laminae** *simple*, *lobed or pinnatifid in sterile fronds*, simple to pinnate in fertile fronds, with basal segments of lobed or pinnatifid sterile fronds reduced to progressively smaller and more distant crescent-shaped lobes; rachis and costae pale yellowish, brown, reddish brown, dark purple or black. **Sori** covering the undersurface of pinnae except for sterile shortly attenuate apex and sometimes the costa.

Taxonomy. Chambers & Farrant (2001) recognised two subspecies: subsp. *melanocaulon* from Borneo (G. Kinabalu), Sulawesi, the Philippines, New Guinea, and Fiji with a deeply pigmented purplish black upper stipe and often also the rachis and costa; and subsp. *pallens* from Sri Lanka and S India, West Malesia and New Guinea, Solomon Is. and Vanuatu with fawn-brown to pale yellow upper stipe, rachis and costa. Only subsp. *pallens* occurs in Peninsular Malaysia.

subsp. pallens (T.C. Chambers & P.A. Farrant) Parris, **comb. nov.** Map 1

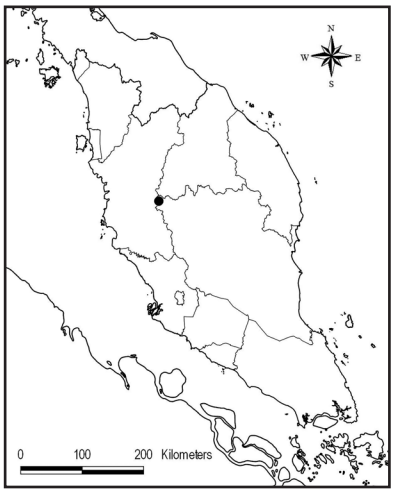
(Latin, *pallens* = pale; referring to the stipe, rachis and costa)

Basionym: *Blechnum melanocaulon* subsp. *pallens* T.C. Chambers & P.A. Farrant, Blumea 46 (2001) 321, fig. 12d. **Type:** *Blume s.n*., Java, Kandang Badak (holotype L, *n.v.*).

Lithophyte**. Rhizomes** with dark reddish brown scales at apex, narrowly elliptic-broadly triangular, entire, rigid, 3–14 × 1–4 mm, not persistent. **Stipes** *c*. 10 cm long, dark at base, in the upper portion *brown or reddish brown becoming fawn-brown to pale yellow towards the apex*; base covered with scales; pinnae gradually reduced downwards to *c*. 3–4 pairs of small elongate auricle-like pinnae. **Laminae** *pinnatifid*; rachis broadly winged, rachis and costa *glabrous*, *pale yellowish*; laminae with a few ascending lobes; sterile fronds 55–61 cm long; pinnae not articulated to the rachis, 3.3 cm apart on each side of the rachis, narrowly elliptic to falcate, *c*. 15 × 2 cm wide, adnate, attached by broad base and separated by sinuses on both sides of the rachis, somewhat thick, forming a wing, margin with a fine cartilaginous border; costa sunken, narrowly grooved above, raised below; veins once forked, free, scarcely visible

above and visible on lower surfaces but not prominent; fertile fronts to 52 cm long, pinnae very narrow, 15–17.5 × 0.3–0.7 cm.

Distribution. Sri Lanka and S India, Sumatra, Java, Peninsular Malaysia, the Philippines, New Guinea, Solomon Is. and Vanuatu. In Peninsular Malaysia known only from the G. Batu Brinchang area, Cameron Highlands, Pahang.



Map 1. Distribution of *Austroblechnum melanocaulon* subsp. *pallens.*

Conservation status. Critically Endangered B2ab(ii,iii) (assessed by Y.H. Cheah). Known from a single locality, its sparse population is seriously threatened by tourist activities in the surrounding area.

Ecology. On rock surfaces in moderate shade by streams in upper montane forest at 2050 m altitude.

2. **BLECHNOPSIS** C.Presl

(Resembling *Blechnum*)

Abh. Königl. Böhm. Ges. Wiss., series 5, 6 (1851) 475; Gasper *et al*., Phytotaxa 275, 3 (2016) 205. **Synonym:** *Blechnum* L., Sp. Pl. 2 (1753) 1077 *p.p*.; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 444 *p.p*.; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 63 *p.p*.; Chambers & Farrant, Flora Malesiana 2, 4 (2012) 8 *p.p*.

Terrestrial. **Rhizomes** *erect to suberect*, stout, not stoloniferous. **Stipes** with numerous pairs of auriculate pinnae. **Fronds** *monomorphic*, *pinnate*; pinnae sessile or stalked, *not articulated to rachis*. **Veins** *free*, 1-forked. **Sori** linear; indusium *entire at maturity*, reflexed and not covering sporangia.

Distribution. Two species (PPG I, 2016) in Asia, Malesia (both in Peninsular Malaysia), Australia and the Pacific Islands.

Ecology. In shade, semi-shade or more open habitats in lowland to upland tropical to subtropical forests, sometimes a primary coloniser after fire or cultivation, also on eroding surfaces.

Key to Blechnopsis species

Juvenile fronds simple to lobed. Pinnae of adult plants 3–4.5 cm wide.……**1. B. finlaysoniana**

Juvenile fronds pinnatifid. Pinnae of adult plants to *c*. 0.7–1.5 cm wide.…….....**2. B. orientalis**

1. **Blechnopsis finlaysoniana** (Wall. *ex* Hook. & Grev.) C.Presl Fig. 1, Plate 43A, Map 2

(George Finlayson, 1790–1823, a Scottish naturalist)

Epim. Bot. (1851) 116; Gasper *et al*., Phytotaxa 275, 3 (2016) 205. **Basionym:** *Blechnum finlaysonianum* Wall. *ex* Hook. & Grev., Icon. Filic. 2 (1831) *t*. 225; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 445, figs. 259c, 260b, 261; Piggott, Ferns Malay. (1988) 399, figs. 1222–1225; Tagawa & Iwatsuki, Fl. Thailand 3, 3 (1988) 298, fig. 24, 1–2; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Chambers & Farrant, Fl. Malesiana 2, 4 (2012) 21, fig. 7a–f. **Type:** *Wallich 2172*, Peninsular Malaysia, Penang (holotype *ex* Icon. Fil, *t*. 225, Herb. Finlayson).

Rhizomes: apex and stipe bases densely covered with stiff scales, 2–3 mm wide at their base, 11–20 mm long tapering to their apex, entire, shiny dark reddish brown with black central zone and narrow reddish brown margin. **Stipes** short, (9–)50–85 cm, shiny, purplish brown, deeply grooved above, adaxial surfaces with linear scales; small auricled pinnae 3–5 cm apart, 6–20 pairs or more present below normal pinnae. Juvenile fronds *always simple*, *entire or irregularly lobed*. **Fronds** erect, large, 1–2 m long, (30–)60–100 cm wide, reddish-green when young, 11–20 pairs of pinnae plus the terminal one; pinnae sessile, oblong-narrowly elliptic, base cuneate, apex abruptly narrowed to form an acuminate apex, *20–40 × 3–4.5 cm*, semi-adnate and decurrent at basiscopic side towards the lamina apex, thinly coriaceous to papery, entire. **Sori** close to the costa but not completely covering the lower surface.

Distribution. Widespread from Indo-China south throughout Malesia including Peninsular Malaysia (except for Perlis), also Sabah and Sarawak.

Conservation status. Least Concern (assessed by Y.H. Cheah).

Ecology. It is common in shade in lowland to hill forest in Peninsular Malaysia to 600 m altitude, by rivers, sometimes as a rheophyte; also in shaded areas of oil palm plantations.

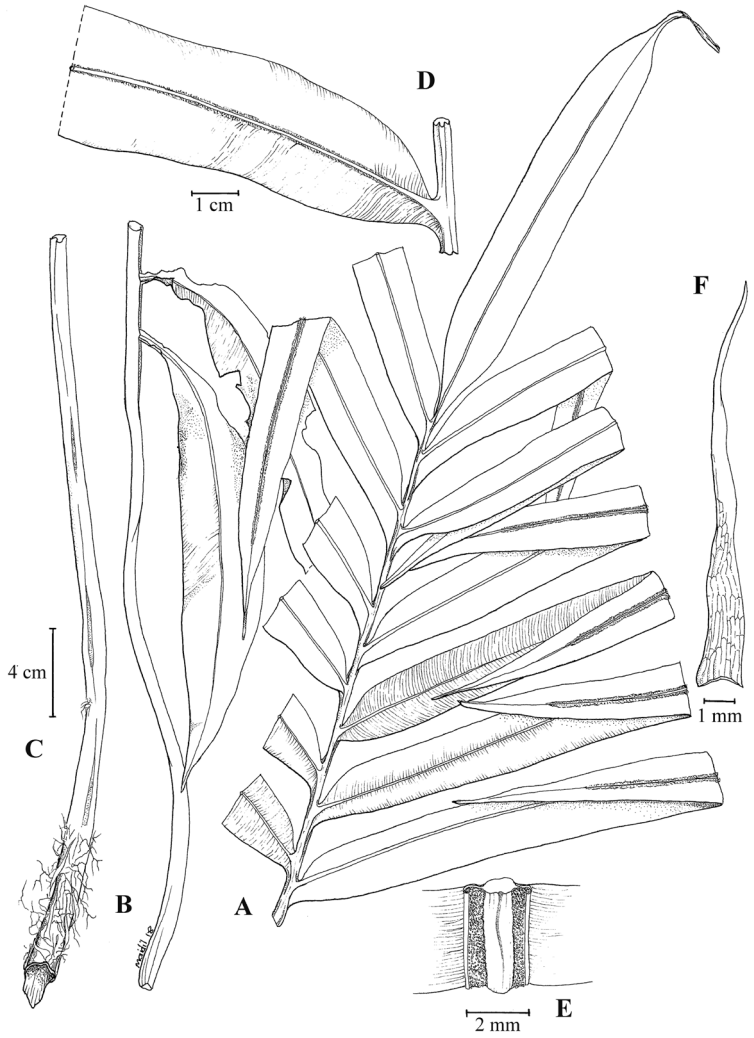
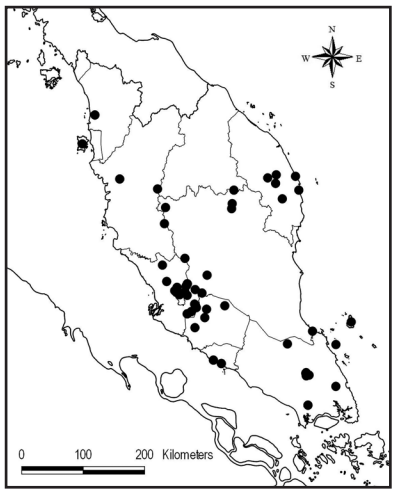


Figure 1. *Blechnopsis finlaysoniana.* A, upper portion of the frond; B, upper surface of lower two pinnae; C, basal portion of stipe with scales; D, attachment of pinnae to rachis; E, Cross-section of midrib with indusia; F, scale. (A–E from *FRI 70168*; F from *FRI 77685*.)



Map 2. Distribution of *Blechnopsis finlaysoniana.*

2. **Blechnopsis orientalis** (L.) C.Presl Plate 43B, Map 3

(Latin, *orientalis* = of the East)

Epim. Bot (1851) 117; Gasper *et al*., Phytotaxa 275, 3 (2016) 205. **Basionym:** *Blechnum orientale* L., Sp. Pl. (1753) 1077 (as *B. occidentale* L.); Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 446, figs. 259b, 260a, 262a–d; Piggott, Ferns Malay. (1988) 400, figs. 1226–1231; Tagawa & Iwatsuki, Fl. Thailand 3, 3 (1988) 298; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Chambers & Farrant, Blumea 46 (2001) 324, figs. 1b, 7g. **Type:** *Osbeck s.n*., 'Habitat in China' (holotype LINN, *n.v*.).

Rhizomes: apex densely covered with shining brown scales to 20 × 1 mm. **Stipes** stout, 30–50(–110) cm long, dark purplish, with small auricles *c*. 3 cm apart throughout, often covered with a dense tangle of pale hairs. Juvenile fronds *pinnatifid*. **Fronds** erect, young leaves often red. **Laminae** to 150(–200) cm long, 45–60 cm wide, beginning to produce sori when 20 × 6.5 cm; pinnae (25–)40–75 pairs, close together, coriaceous, narrowly elliptic, *10–16*(*–30*) × *0.75–1*(*–2*) *cm*, lower ones truncate or broadly cuneate at the base, all very gradually narrowed to the apex, margins entire; veins simple or forked, spreading at a broad angle to the midrib, hardly more than 0.5 mm apart at the midrib, lower surface of midrib of fertile pinna narrow, rounded. **Sori** narrow or sometimes quite wide (more than 1 mm) especially in fronds with narrow pinnae, at maturity enlarged to overlap or cover the costa.

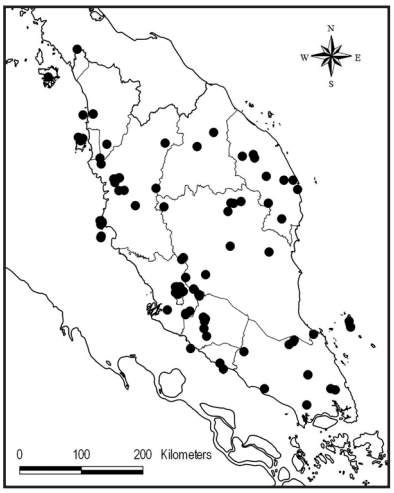
Vernacular name. *Paku lipan* (Malay).

Distribution. Nepal, India, Sri Lanka, Myanmar, to China and Japan, throughout Malesia to Australia and the Pacific Islands. In Peninsular Malaysia in all states, also in Sabah and Sarawak.

Conservation status. Least Concern (assessed by Y.H. Cheah).

Ecology. It is one of the commonest ferns in sunny, open places in the lowlands to upper montane forests, up to 1700 m altitude, often on river banks and in logged or secondary forest or colonising exposed soil banks, e.g. on road cuttings, also in swamps or on coasts but it is

not found in shade. In very exposed places, the plants may be stunted, in which case the sori are often unusually wide.



Map 3. Distribution of *Blechnopsis orientalis.*

Uses. *Blechnopsis orientalis* is reported to have several potential medicinal uses as an antioxidant agent, for colon cancer therapy and for treatment of methicillin-resistant *Staphylococcus aureus* infections (*BMC Complementary and Alternative Medicine* 10 (2010) 15) and as a dermal wound healing agent (*BMC Complementary and Alternative Medicine* 11 (2011) 62) and traditionally for treating boils and mouth ulcers. It is also a popular vegetable in Borneo.

Incompletely Known Taxon

Two specimens from Fraser's Hill, Pahang, *Jaman & A.L. Qistina RJ 10364* (UKMB) from Jelatik Trail, and *Imin FRI 84056* (KEP) resemble *Blechnopsis orientalis* in characters of leaves and sori but are distinct in their juvenile croziers being densely covered by small and large scales (not sparsely covered as in *B. orientalis*); the scales are dull dark brown with the teeth forked (not shining brown and the teeth not forked), the auricles on the stipe are very small and hardly reach 1 mm long (vs. auricles more than 1 mm long), the stipes have small appressed scales (vs. without appressed scales on stipe), and in life the pinnae margins are distinctly corrugate (vs. not corrugate). However, *B. orientalis* is a variable species. Until a greater range of specimens of this montane taxon is collected, its status remains obscure.

3. **BRAINEA** J.Sm.

(J.C. Braine, a British botanist)

Cat. Kew Ferns (1856) 5; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 66, fig. 25F, G; Tagawa & Iwatsuki, Fl. Thailand 3, 3 (1988) 302, fig. 24, 5–6; Nooteboom, Fl. Malesiana 2, 4 (2012) 67; Gasper *et al.*, Phytotaxa 275, 3 (2016) 206.

Terrestrial. **Rhizomes** *erect*, *stout*, *trunk-like*, 40(–100) cm tall, not stoloniferous, bearing a rosette of fronds at the top; apex densely covered in brown peltate scales, scales narrowly lanceolate, to 20 × 1.5 mm, contracted above the peltate bases to a long acuminate apex, margin entire. **Stipes** to 30 cm long, pale yellow, slightly grooved above, densely scaly at base, glabrous above. **Fronds** *pinnate*, dimorphic, lanceolate, 45–80 cm long, 20–23 cm wide, young fronds light brown, pinnae many, sessile, *non-articulate*, almost opposite, leathery; rachis sparsely scaly or glabrescent, sterile pinnae 8–12 × 0.7–0.9 cm, cordate on basiscopic side, and truncate on acroscopic side, margin finely crenate, more-or-less revolute; veins sparsely scaly beneath, close to each other, once or twice forked near costa and joining in a single series of a triangular costal areoles; fertile pinnae usually smaller than sterile ones, *c*. 8 × 0.4 cm. **Sori** *without indusia*, sporangia along most of the length of the veins and at maturity almost covering them.

Distribution. Only one species (PPG I, 2016). From NE India to S China and Taiwan, Myanmar (Tenasserim), Thailand, N Sumatra, Peninsular Malaysia, the Philippines (Mindanao) and Maluku (Wetar).

Ecology. Mainly found in coastal, open areas, especially on boulders sprayed by seawater where the massive rhizome with fronds slightly ascending grows on rocky seashores in moderate shade in almost dry areas. Usually near sea level but once found in the highlands on G. Terbakar, Cameron Highlands, at 1330 m altitude.

Brainea insignis (Hook.) J.Sm. Fig. 2, Map 4

(Latin, *insignis* = outstanding, referring to the appearance of the plant)

Cat. Kew Ferns (1856) 5; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 450; Piggott, Ferns Malay. (1988) 409, figs. 1253–1254; Parris & Latiff, Malay. Nat. J. 50 (1997) 243; Gasper *et al.*, Phytotaxa 275, 3 (2016) 207. **Basionym:** *Bowringia insignis* Hook., J. Bot. 5 (1853) 237. **Syntypes:** *Champion 294*, *Champion 295*, both from Hong Kong (both K *n.v.*); *Hooker s.n.,* Khasia Hills, India (K *n.v.*).

Description. As for genus.

Distribution. As for genus. In Peninsular Malaysia from Perak, Pahang and Johor.

Conservation status. Near Threatened, nearly meeting Vulnerable B2ab(ii,iii) (assessed by Y.H. Cheah). The population in Cameron Highlands is vulnerable to rapid expansion of vegetable farms.

Ecology. As for genus.

Uses. It has potential as an indoor ornamental plant.

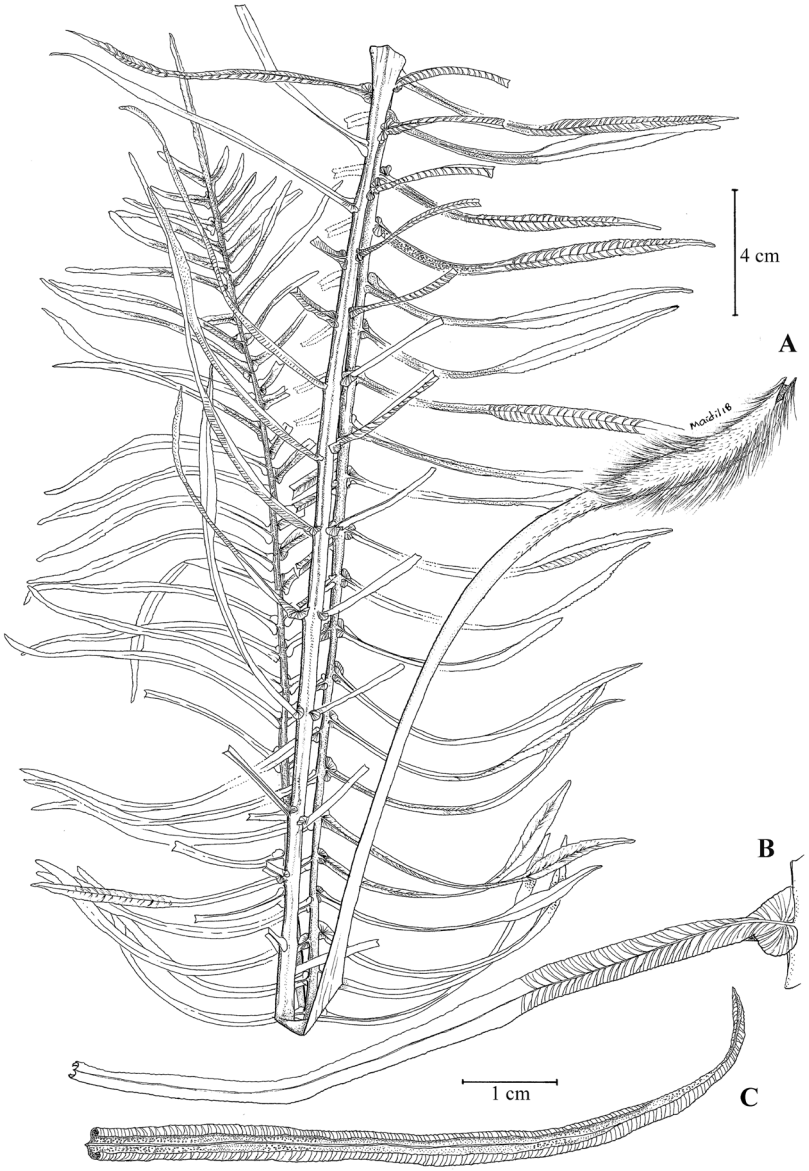
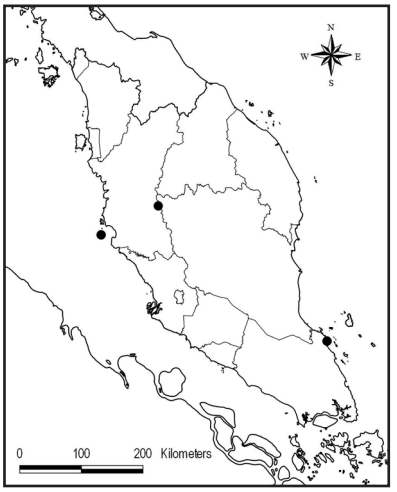


Figure 2. *Brainea insignis.* A, frond; B, upper surface of pinnule; C, lower surface of pinnule. (All from *Razali RJ 1777*.)



Map 4. Distribution of *Brainea insignis.*

4. **DIPLOBLECHNUM** Hayata

(Double *Blechnum*, referring to the bipinnatifid fronds)

Bot. Mag. (Tokyo) 41 (1927) 702; Gasper *et al.*, Phytotaxa 275, 3 (2016) 208. **Synonym:** *Blechnum* L., Sp. Pl. 2 (1753) 1077 *p.p.*; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 444 *p.p.*; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 63 *p.p.*; Chambers & Farrant, Flora Malesiana 2, 4 (2012) 8 *p.p.*

Terrestrial. **Rhizomes** slender, short- to long-creeping or erect, not stoloniferus. **Fronds** slightly dimorphic to dimorphic; pinnae not articulate to rachis; lamina pinnate to bipinnate; veins *usually free*, once-forked, or anastomosing (not in Peninsula Malaysia); **Sori** linear, indusia *subentire to erose*, reflexed at maturity and not covering sporangia.

Distribution. Six species (PPG I, 2016), in Taiwan, Malesia, Australia, New Zealand and New Caledonia. One species in Peninsular Malaysia.

Diploblechnum fraseri (A.Cunn.) DeVol Fig. 3, Plate 44A, Map 5

(Charles Fraser, Superintendent of Sydney Botanic Gardens, Australia, between 1816–1831)

Fl. Taiwan 1 (1975) 153; Gasper *et al.*, Phytotaxa 275, 3 (2016) 208. **Basionym:** *Lomaria fraseri* A.Cunn., Hooker Comp. Bot. Mag. 2 (1836) 364. **Type:** *C. Fraser s.n.*, New Zealand, east coast of North Island, 1825 (lectotype K). **Homotypic synonyms:** *Blechnum fraseri* (A.Cunn.) Luerss., Flora 59 (1876) 292; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Chambers & Farrant, Fl. Malesiana Ser. 2, 4 (2012) 27, fig. 9g–h. *Blechnum fraseri* var. *philippinense* (Christ) Copel., Polyp. Phil. (1905) 149, pl. 2a–h; Molesworth-Allen, Gard. Bull. Singapore 17 (1959) 263, photo; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 635; Piggott, Ferns Malay. (1988) 406, figs. 1245–1249. **Basionym:** *Lomaria fraseri* A. Cunn. var. *philippinense* Christ, Bull. Herb. Boiss. 6 (1898) 149, pl. 2a–h. **Type:** *Loher 935*, Philippines, Cordilliere central de Luzon, Mt Data (isotype K).

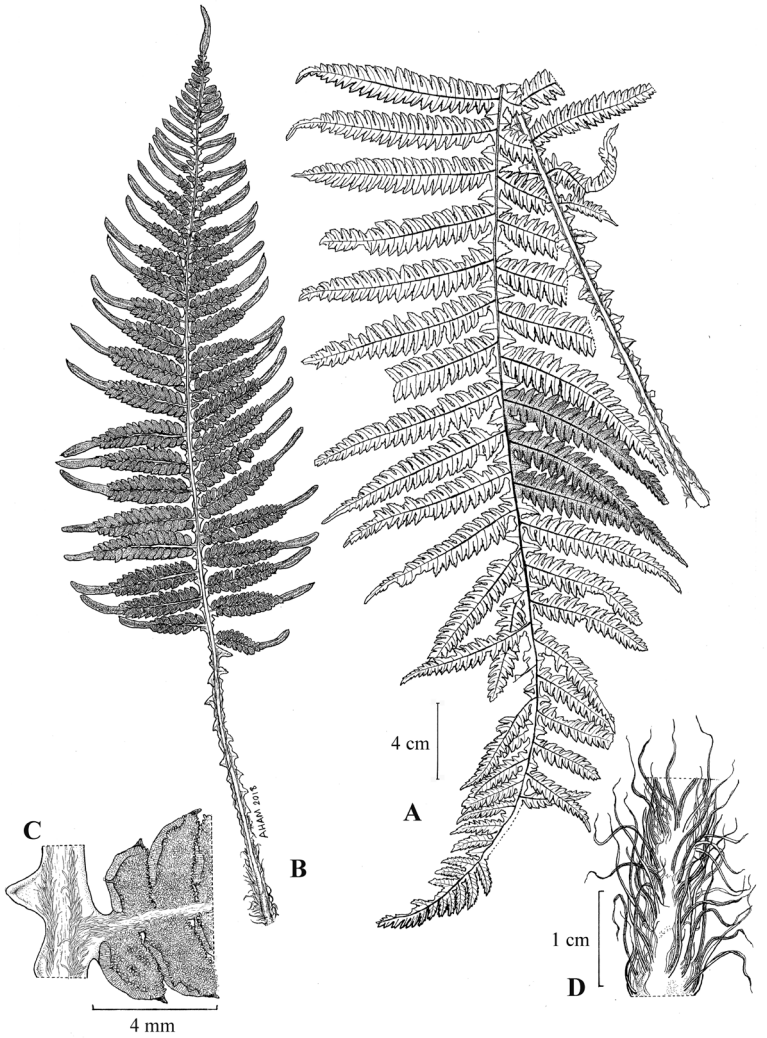
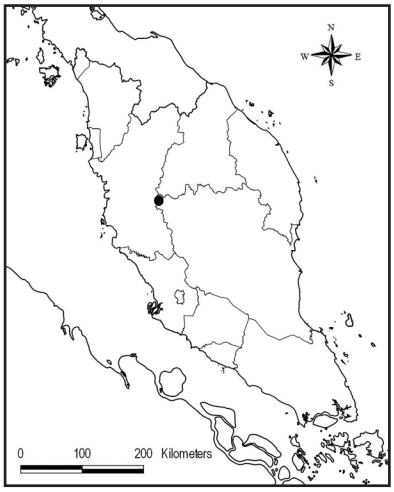


Figure 3. *Diploblechnum fraseri*. A, upper surface of frond; B, lower surface of frond; C, lower surface of a portion of rachis and fertile lobes of the pinnule; D, scales on a portion of the stipe base. (A–C from *Schuettpelz 780B*; D, from *Parris 10937*.)

Rhizomes erect, *slender*, *forming a trunk to 1*(–3) *m tall*, 5 cm thick at base, *with the appearance of a miniature tree fern;* scales linear-acuminate, *c.* 10–12 × 1–2 mm, reddish brown and shiny. **Stipes** short, 5–7 cm long, densely scaly at base. **Fronds** *usually bipinnatifid*, *dimorphic,* with many small reduced pinnae; rachis raised and deeply grooved adaxially, raised and rounded abaxially, *with conspicuous triangular toothed wings between pinnae*; sterile frond 50.7–67.5 cm long, 8.4–24 cm wide; pinnae 16–36 pairs, each (3.5–)9(–15) × (0.8–)1.5(–3) cm, almost incised to costae, acroscopic pinnae lobes bigger than basiscopic pinnae lobes; costa raised and grooved on both sides, sparsely covered by short and somewhat rounded scales; fertile fronds shorter than the sterile with slightly narrower lamina, 38–52 cm long, 9–16 cm wide, fertile pinnae 16–22 pairs, each 5–8 × 1–2 cm. **Sori** *completely covering the lower surface except for costa and costules*.

Distribution. Taiwan, Malesia, widespread but very localised (Sumatra, Peninsular Malaysia, Borneo (Sabah), the Philippines and New Guinea), New Zealand. In Peninsular Malaysia known only from G. Batu Brinchang, Cameron Highlands, Pahang.



Map 5. Distribution of *Diploblechnum fraseri.*

Conservation status. Endangered B2ab(ii,iii) (assessed by Y.H. Cheah). Known only from a single locality that does not lie within the network of Totally Protected Areas. Observed encroachment into its roadside habitat is major threat.

Ecology. In moderate shade in lower to upper montane forest at 1700–2150 m altitude on steep mossy slopes. Piggott (1988) noted the plants at Cameron Highlands are found in clumps and are rarely fertile, suggesting that it spreads by stolons. Chambers & Farrant, (2012) note that it reproduces vegetatively by creeping rhizomes.

Taxonomy. Malesian material was formerly referred to var. *philippinense*, but Chambers & Farrant (2012) point out that there are no consistent morphological differences between material from New Zealand and Malesia, so do not retain the variety as distinct.

5. **PARABLECHNUM** C.Presl

(Close to *Blechnum*)

Abh. Königl. Böhm. Ges. Wiss., series 5, 6 (1851) 469; Gasper *et al*., Phytotaxa 275, 3 (2016) 215. **Synonym:** *Blechnum* L., Sp. Pl. 2 (1753) 1077 *p.p*.; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 444 *p.p*.; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 63 *p.p*.; Chambers & Farrant, Flora Malesiana 2, 4 (2012) 8 *p.p*.

Terrestrial. **Rhizomes** *erect or suberect*, *sometimes subarborescent to decumbent*, *short-creeping*, not stoloniferous. **Fronds** *usually dimorphic*, rarely monomorphic or subdimorphic; **laminae** *pinnate*; pinnae sessile or stalked, *usually not articulate to rachis*; veins *free*, simple or once-forked. **Sori** linear, indusium *subentire to lacerate or erose*.

Distribution. Pantropical. About 65 species (PPG I, 2016) with one species in Peninsular Malaysia.

Ecology. In forest, often in clearings or at forest margins, and open exposed habitats.

Parablechnum vestitum (Blume) Gasper & Salino Fig. 4, Plate 44B, Map 6

(Latin, *vestitum* = clothing; referring to covering of scales on the stipe and rachis)

Phytotaxa 275, 3 (2016) 217. **Basionym:** *Lomaria vestita* Blume, Enum. Pl. Javae 2 (1828) 203. **Type:** *Blume s.n.*, 'crescit in montibus altissimis Javae' (holotype L). **Synonym:** *Blechnum vestitum* (Blume) Kuhn, Ann. Mus. Bot. Lugd.-Bat. 4 (1869) 284; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 449, fig. 259d; Piggott, Ferns Malay. (1988) 403, figs. 1237–1241; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Chambers & Farrant, Fl. Malesiana 2, 4 (2012) 55, fig. 15.

Rhizomes stout, erect, fronds tufted. **Stipes** 50–90 cm long, *from base to apex completely and densely covered by broad, brown to dark purple persistent scales*, *18–35 × 3–7 mm*. **Fronds** *dimorphic*, to 150 cm long, 30 cm wide, young fronds bright purple-red; sterile fronds tough and a bit shorter than fertile fronds; pinnae 21–33 pairs, close and often touching each other, petioles *c*. 0.25 mm long, not articulate, laminae 13–27 × 2–5–3.2 cm, narrowly oblong-elliptic, cordate at base, glossy, coriaceous, margin broadly serrate, paler; rachis *scaly*; costa grooved above and raised and scaly below; veins free, once forked and a few veins simple, hardly reaching margin; fertile fronds 103 cm or more long, much narrower than sterile ones, pinnae 11–24 × *c*. 0.5 cm, margins recurved. **Sori:** indusium to 1.3 mm broad, paler, at first covering the sporangia, at maturity *sporangia nearly covering the lower surface of the pinna*.

Distribution. Throughout Malesia (except for mainland New Guinea) to Bougainville and New Ireland. In Peninsular Malaysia, known only from Perak (G. Batu Puteh and G. Korbu) and Pahang (G. Ulu Kali, G. Tahan and Cameron Highlands) and in Borneo from Sabah and Sarawak.

Conservation status. Least Concern (assessed by Y.H. Cheah).

Ecology. On peaty soil in upper montane forest on ridges and summits, in exposed places, 1500–2000 m altitude.

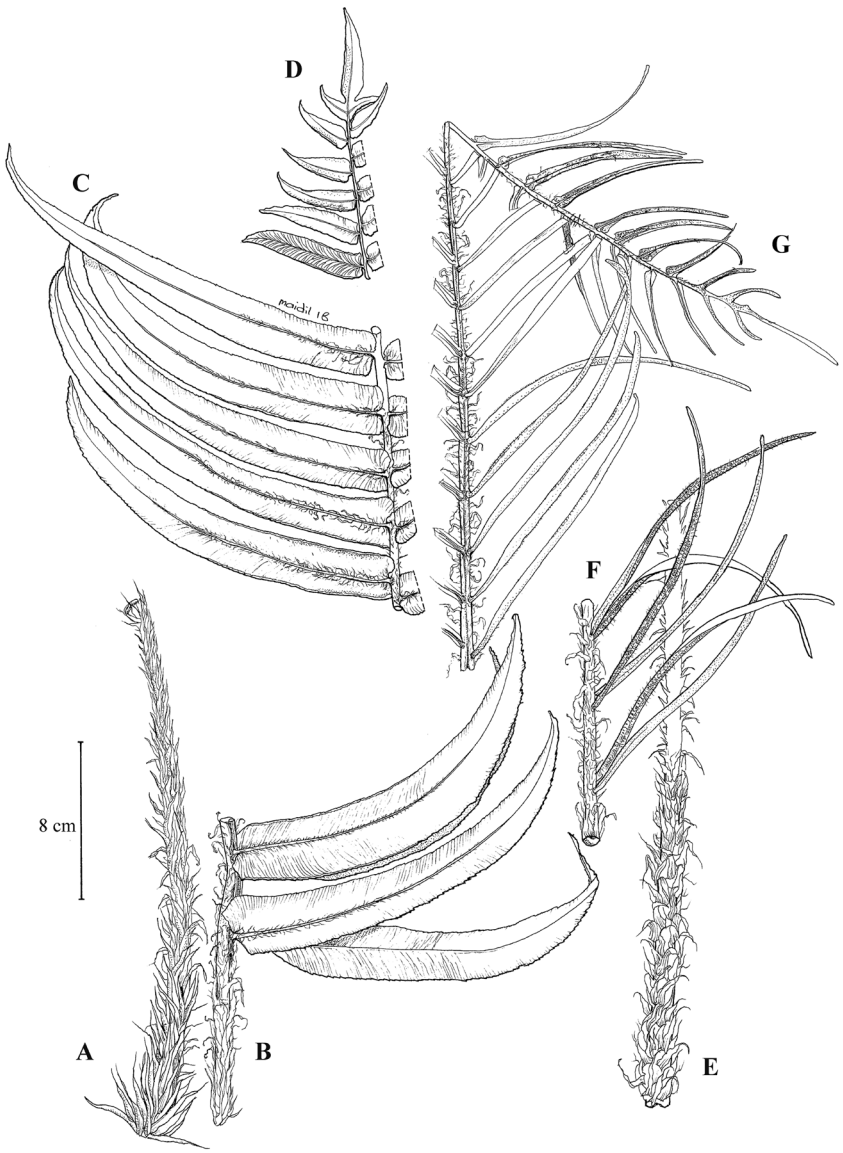
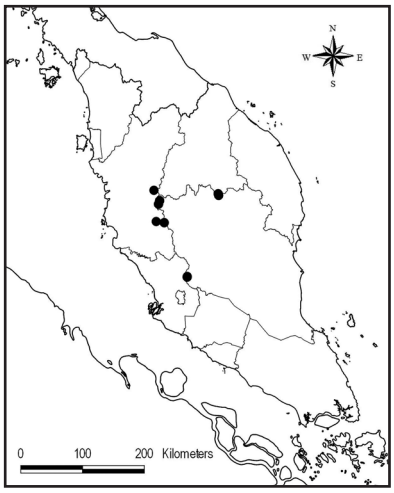


Figure 4. *Parablechnum vestitum.* Sterile frond: A, stipe base with scales; B, lowest pinnules; C, middle pinnules; D, apical pinnules. Fertile frond: E, stipe base with scales; F, middle pinnules; G, apical pinnules. (All from *FRI 77654*.)



Map 6. Distribution of *Parablechnum vestitum.*

6. **STENOCHLAENA** J.Sm.

(Greek, *stenos* = slender or narrow, *chlaena* = cloak; meaning unclear)

J. Bot. (Hooker) 3 (1841) 401; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 410, fig. 241, Amer. Fern J. 61 (1971) 119; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 67, fig. 25A–E; Tagawa & Iwatsuki, Fl. Thailand 3, 2 (1985) 259; Parris & Latiff, Malay. Nat. J. 50 (1997) 243; Holttum & Nooteboom, Fl. Malesiana 2, 4 (2012) 72; Gasper *et al*., Phytotaxa 275, 3 (2016) 200.

Terrestrial or rarely epiphytic. **Rhizomes** *long-creeping*, *scandent or climbing*, not stoloniferous. **Fronds** dimorphic, sterile fronds pinnate, sometimes articulate to rachis, fertile fronds sometimes bipinnate; free veins simple or forked, arising from a series of inconspicuous costal areoles. **Sori** acrostichoid, without indusium.

Distribution. Seven species (PPG I, 2016), in tropical and subtropical Africa and E Asia, SE Asia, Malesia, Australia and the Pacific Islands. One species in Peninsular Malaysia and Sabah and Sarawak.

Ecology. High climbers in wet forest, usually at low altitudes.

Stenochlaena palustris (Burm.*f.*) Bedd. Fig. 5, Plate 45 & 46A, Map 7

(Latin, *palustris* = swampy or marshy; referring to its habitat)

Ferns Brit. Ind. Suppl. (1876) 26; Holttum, Gard. Bull. S.S. 5 (1932) 254, Rev. Fl. Malaya 2, 2nd ed. (1968) 412, fig. 241, Amer. Fern J. 61 (1971) 119–123; Piggott, Ferns Malay. (1988) 410, figs. 1255–1259; Parris & Latiff, Malay. Nat. J. 50 (1997) 243; Gasper *et al*. Phytotaxa 275, 3 (2016) 200. **Basionym:** *Polypodium palustre* Burm.*f*., Fl. Ind. (1768) 234. **Type:** *Burman*, Sri Lanka [Ceylon], Thes. Zeyl. (1736) 100, *t*. 46.

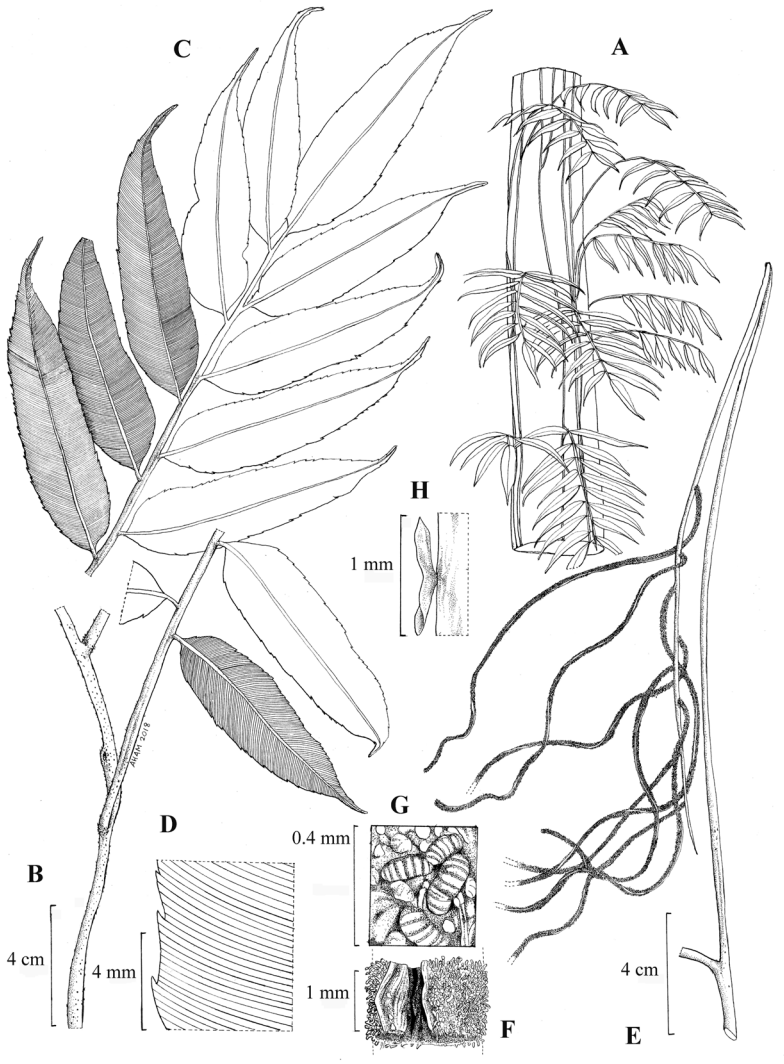
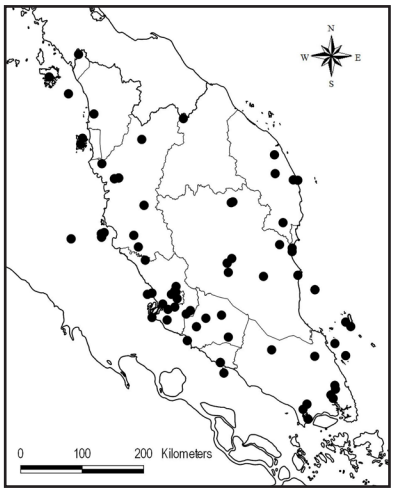


Figure 5. *Stenochlaena palustris.* A, climbing habit; B, portion of base of frond; C, apical portion of frond; D, portion of lower pinna surface; E, lower fertile pinnae; F, lower surface of a portion of the fertile pinna; G, sporangia in a portion of mature sorus; H, peltate scale. (All from live material.)

Terrestrial or hemi-epiphyte. **Rhizomes** *scandent or high-climbing*, brownish green, to 10 m long. **Stipes** 15–20 cm long, covered with small, round to narrowly peltate scales. **Fronds** petiolate. **Laminae** *pinnate* (occasionally pinnatifid or simple), 40–100 cm long, with 8–15 pairs of pinnae and a similar terminal pinna, the upper pinnae somewhat reduced, young fronds bronze-coloured; sterile pinnae very shortly stalked, *articulate with the rachis at the base of the stalk*, varying much in size and shape, commonly (10–)15–16(–24) × (1.5–)2.5–3.5(–4.5) cm, base broadly cuneate, apex acuminate, margins pellucid, sharply and irregularly serrate; smooth and shining, the lower surface paler than the upper, coriaceous; veins pellucid, free veins at a broad angle to the costa, straight, simple or forked; fertile pinnae 20–25 × 0.3 cm wide.

Vernacular names. *Paku miding*, *lemiding* (Malay).

Distribution. Widely distributed from S & N India, S. China, Myanmar (Tenasserim), Thailand and throughout Malesia to Australia and the Pacific Islands. In Peninsular Malaysia common throughout, in all states, as well as Sabah and Sarawak.



Map 7. Distribution of *Stenochlaena palustris.*

Conservation status. Least Concern (assessed by Y.H. Cheah).

Ecology. In Peninsular Malaysia, it is common in open swampy places, wet ditches, peat swamp forest, on trees in coastal forest, and in secondary vegetation where there is enough moisture, scrambling or producing a long stem that climbs high up trees, and occasionally in wet areas in lowland forest, in oil palm plantations and once from limestone (*FRI 66452*); in the lowlands from sea level to *c.* 50 m altitude.

Uses. The reddish young fronds of wild plants are commonly collected for 'ulam' or as a vegetable. It is served in restaurants and is frequently used in *bubur lambok* (traditional Malay porridge). In villages, its stems may be used to bind baskets and fish traps. It is sufficiently common that its widespread harvesting does not impact on its populations.

7. **TELMATOBLECHNUM** Perrie, D.J.Ohlsen & Brownsey

(Greek, *telmat* = marsh, pools or swamps; referring to its habitat preference)

Taxon 63 (2014) 755. **Synonym:** *Blechnum* L., Sp. Pl. 2 (1753) 1077 *p.p.*; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 444 *p.p.*; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 63 *p.p.*; Chambers & Farrant, Flora Malesiana 2, 4 (2012) 8 *p.p.*

Terrestrial, rarely lithophytic. **Rhizomes** *erect* to long-creeping, not stoloniferous. **Fronds** *pinnate*, *dimorphic*, outside our region monomorphic or slightly dimorphic; pinnae *articulate to rachis*. **Sori** linear, indusium *erose or lacerate*.

Distribution. Two species (PPG I, 2016), one in the New World, one in SE Asia, Malesia including Peninular Malaysia, Australia and the western Pacific Islands.

Ecology. In swamps, open wetlands and savannahs, sometimes forming extensive colonies.

Telmatoblechnum indicum (Burm.*f.*) Perrie, D.J.Ohlsen & Brownsey Fig. 6, Map 8

(of India)

Taxon 63 (2014) 755. **Basionym:** *Blechnum indicum* Burm.*f.*, Fl. Indica (1768) 231; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 446, figs. 259a, 260c; Piggott, Ferns Malay. (1988) 402, figs. 1232–1236; Tagawa & Iwatsuki, Fl. Thailand 3, 3 (1988) 297, fig. 24, 3–4; Parris & Latiff, Malay. Nat. J. 50 (1997) 242; Chambers & Farrant, Blumea 46 (2001) 313, fig. 2g. **Type:** *Coveny 4712,* Australia. New South Wales, Evans Head (neotype NSW *n.v.*; isoneotypes BM *n.v.*, K *n.v.*, L *n.v.*). **Synonym:** *Blechnopsis malaccensis* C.Presl, Epimel. Bot. (1851) 120. **Type:** *Cuming 385*, Peninsular Malaysia, Melaka [Malacca] (holotype *RB 144558 ex* Herb. A. Feé *n.v.*; isotypes BM *n.v.*, K *n.v.*).

Terrestrial. **Rhizomes** of three kinds: 1) stout and erect, 2) thick and horizontal, often extensively branched, giving rise to 3) slender creeping rhizomes; rhizome scales dark brown to blackish, linear to triangular, *3–4 mm long, 1 mm broad*. **Stipes** 15–30 cm long, *erect*, densely covered by scales at the base, above smooth and yellowish when dry, *without auricles*. **Fronds** tufted, *dimorphic*, *once pinnate*, oblong-acuminate, to 50(–85) cm long, 15–23 cm wide; rachis rigid, naked; pinnae sessile, linear-oblong, 12–24 pairs; fertile pinnae *much narrower than those of the sterile fronds*; sterile pinnae 8–12.7 × 1–1.9 cm, *coriaceous*, unequal at base, basiscopic base cordate and acroscopic truncate, margin *finely serrate*, pinnae narrowed gradually towards apex; veins very fine and closed, not conspicuous. **Sori** *close to costa*, *sporangia at maturity very copious and overlapping the costa*.

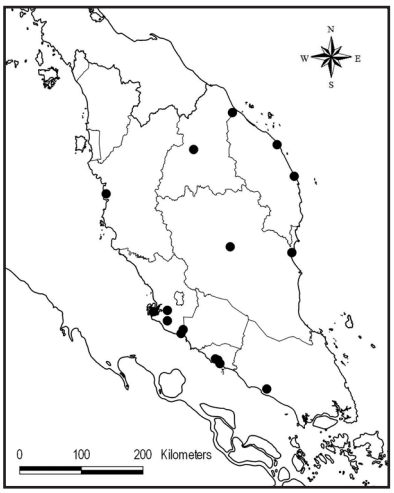
Distribution. SE Asia, Malesia (Sumatra, Peninsular Malaysia, Borneo (Sabah and Sarawak), Maluku, New Guinea), Australia and the western Pacific Islands. In Peninsular Malaysia, it has been recorded from Perak, Selangor, Melaka, Kelantan, Terengganu, Pahang and Johor.

Conservation status. Vulnerable A2c, B2ab(ii,iii) (assessed by Y.H. Cheah). Habitat loss is the major threat.

Ecology. Locally common in open *gelam* (*Melaleuca cajuputi* Powell) forest at low altitudes or in brackish swampy areas and near coasts on wet sandy or peaty ground. It is becoming rare in Peninsular Malaysia due to habitat destruction.



Figure 6. *Telmatoblechnum indicum.* A, plant; B, lower pinnule surface with sori. (All from *Littke s.n.,* 30 July 1981.)



Map 8. Distribution of *Telmatoblechnum indicum*.

Uses. Chambers & Farrant (2001) reported that the croziers and young leaves were sold in markets in SE Asia and were even canned. It is not eaten in Malaysia.

8. **WOODWARDIA** Sm.

(T.J. Woodward, 1745–1820, an English botanist)

Mém. Acad. Roy. Sci.Turin 5 (1793) 411; Kramer *et al*., Fam. Gen. Vasc. Pl. 1 (1990) 61, fig. 21A; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 449; Parris & Latiff, Malay. Nat. J. 50 (1997) 243; Cranfill & Nooteboom, Fl. Malesiana 2, 4 (2012) 76; Gasper *et al*., Phytotaxa 275, 3 (2016) 197.

Terrestrial, rarely lithophytic. **Rhizomes** *usually short-creeping to erect*, not stoloniferous. **Fronds** monomorphic, simple to bipinnatifid; pinnae not articulated to rachis; veins *anastomosing*, without free included veinlets, forming a regular series of areoles along costae and costules, ultimate veins free. **Sori** discrete, superficial to sunken, along the primary areoles of rachis costae and/or costules; indusium *membranous*, attached to the exterior vein segment of the primary areole.

Distribution. About 13 species (PPG I, 2016), widely distributed in the north temperate to tropical regions of the Old World and the New World. One species in Peninsular Malaysia.

Ecology. In forest and at forest margins.

Woodwardia auriculata Blume Fig. 7, Plate 46B, Map 9

(Latin, *auriculata* = with ear-like appendage; referring to the pinna lobes)

Enum. Pl. Javae 2 (1828) 196; Holttum, Rev. Fl. Malaya 2, 2nd ed. (1968) 450; Piggott, Ferns Malay. (1988) 408, figs. 1250–1252; Parris & Latiff, Malay. Nat. J. 50 (1997) 243; Cranfill & Nooteboom, Fl. Malesiana Ser. 2, 4 (2012) 77; Gasper *et al*. Phytotaxa 275, 3 (2016) 199. **Type:** *Kuhl s.n.*, Java, Pangrango (lectotype L, barcode L0052402).

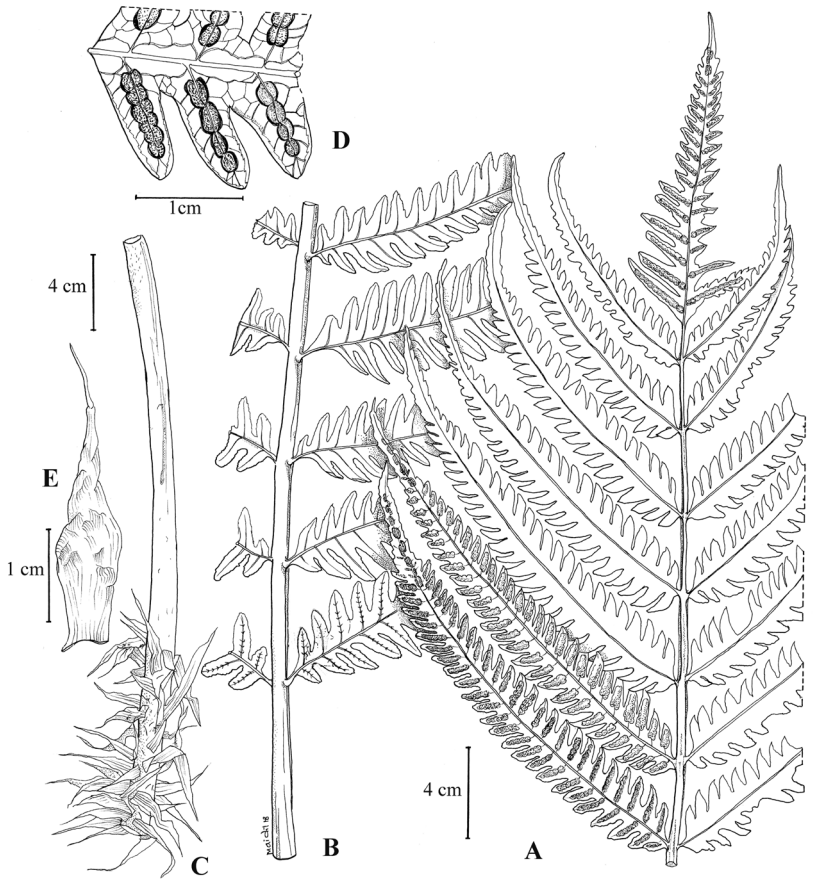
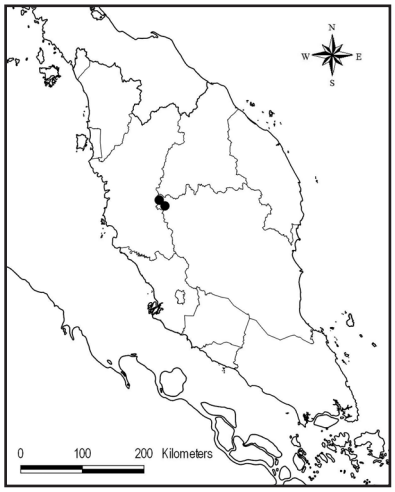


Figure 7. *Woodwardia auriculata.* A, lower surface of apical portion of frond; B, lower pinnae; C, stipe base with scales; D, lower surface of pinnae lobes with sori; E, scale. (A–E from *Schuettpelz 805B*.)

Terrestrial. **Rhizomes** *short*, *sub-erect to erect*, to 2 m tall, *massive*, to 5 cm diameter, densely covered with large thin reddish light brown scales. **Stipes** 74–133 cm long, pale yellow, base densely covered with large thin reddish brown scales at the base that gradually decrease in size and density towards the frond apex. **Scales** large, thin, reddish light brown, 16–35 × 4–8 mm, apex acuminate. **Fronds** *deeply bipinnatifid*, hardly dimorphic, 100–130(–200) cm long, *c.* 50 cm wide, young fronds pinkish or reddish light brown, mature fronds green above, paler below; pinnae 23–51 × 3–5.4 cm wide, sessile or with petiolules to 2–3 mm long, base cordate at basiscopic side and truncate on acroscopic side, towards apex the pinnae adnate to rachis, somewhat rigid, margin shortly serrate; costa raised and slightly grooved above and raised and prominent beneath; veins clear but not raised above, raised below. **Sori** *short,* 8–12 pairs on each of costules *in chain-like rows*, indusium *distinct*, *flap-like.*

Distribution. Sumatra, Peninsular Malaysia and Java. In Peninsular Malaysia, known only from Cameron Highlands, Pahang.



Map 9. Distribution of *Woodwardia auriculata.*

Conservation status. Endangered B2ab(ii,iii) (assessed by Y.H. Cheah). Known from a single locality that does not lie within the network of Total Protected Areas. Encroachment into roadside vegetation and forest margins pose a major threat.

Ecology. Locally common on steep slopes or mossy rocky road banks in upper montane forest at 1750–2000 m altitude in moderate shade and moisture.

PLATES



Y.H. Cheah



Y.H. Cheah & K. Imin (inset)

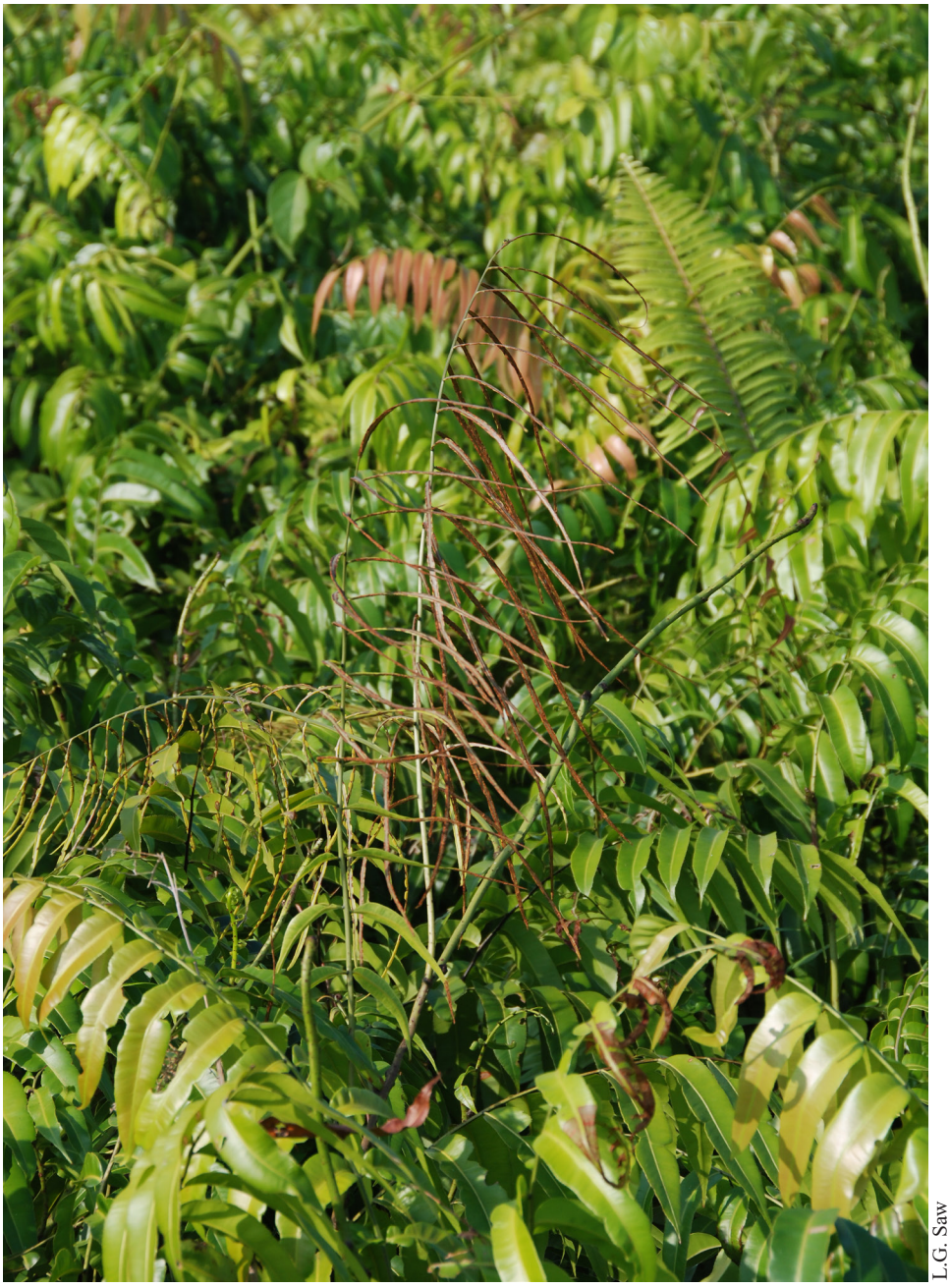
Plate 43. Blechnaceae. A, *Blechnopsis finlaysoniana*; B, *Blechnopsis orientalis*.



Y.H. Cheah & K. Imin (inset)

K. Imin

Plate 44. Blechnaceae. A, *Diploblechnum fraseri*; B, *Parablechnum vestitum*.



L.G. Saw

Plate 45. Blechnaceae. *Stenochlaena palustris*.



L.G. Saw



Y.H. Cheah & K. Imin (inset)

Plate 46. Blechnaceae. A, *Stenochlaena palustris*; B, *Woodwardia auriculata*.

Flora of Peninsular Malaysia

The Flora of Peninsular Malaysia Series I provides revisions for lycophytes and fern families that occur in Peninsular Malaysia. Volume 3 includes 9 families, 32 genera and 115 species in the Lycopodiaceae, Adiantaceae, Aspleniaceae, Blechnaceae, Cryptogrammaceae, Cyatheaceae, Lomariopsidaceae, Marattiaceae, and Sinopteridaceae. Accounts include descriptions and keys for the identification of genera and species, and, in addition, species accounts include distribution maps, conservation status, illustrations and, where available, colour photographs. A key to the families that occur in Peninsular Malaysia is also provided.

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