

**NOTES ON DAVALLIACEAE I. THE GENERA ARAIOSTEGIA,
DAVALLODES, LEUCOSTEGIA, AND GYMNORAMMITIS**

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SUMMARY

A revision is given of the following genera: *Araiostegia* with 4 species, *Davallodes* with 7 species, *Leucostegia* with 2 species, and *Gymnogrammitis* with 1 species. The delimitation of genera is according to Kato (1985).

ARAIOSTEGIA

Araiostegia Copel., Philipp. J. Sci. 34 (1927) 240, t. 1, 2; Univ. Calif. Publ. Bot. 12 (1931) 397, t. 53a; Gen. Fil. (1947) 85; Holttum, Revis. Fl. Malaya 2, sec. ed. (1966) 364; Copel., Fern Fl. Philipp. (1958) 167; Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 285; Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 13 (1985) 564. — Type: *A. hymenophylloides* (Blume) Copel.
Paradavallodes Ching, Acta Phytotax. Sin. 11 (1966) 18. — Type: *P. multidentatum* Ching.

Rhizome bearing only scales. Roots restricted to the ventral side of lateral buds. Scales without pale border, narrowed evenly towards the apex, or broad, ovate to oblong-subdeltoid with round to acute apex, not bearing multiseptate hairs, with few or no marginal setae, toothed or entire, smooth on the adaxial surface, basifixed with cordate, much overlapping base. Extra-axillary lateral buds lateral to the phyllopodia, or lower and slightly anterior. Stipe articulated at the base on phyllopodia, pale or dark brown when dry, adaxially grooved, glabrous or with few scales. Lamina compound, tripinnate or quadripinnate, deltoid and broadest towards base or elongate, but lower pinnae not very small, about as long as the longest pinnae, bearing multicellular hairs (*A. multidentata*) or glabrous. Lamina not or slightly dimorphous. Hairs between veins on both surfaces absent or nearly so. Pinnules of at least the larger pinnae anadromous. Leaf axes glabrous or at least rachises hairy (only in *A. multidentata*). Veins in ultimate lobes simple or forked, not reaching the margin. False veins not present. Sori indusiate, separate, frequently single on a segment, facing midveins at the forking point of the veins, or facing midveins at their bending point. Indusium scale-like, either attached only at the narrow cordate base or along a broad base.

Distribution – Ceylon, India, Nepal, Sikkim, Bhutan, Burma, Thailand, South China; one species in Malesia.

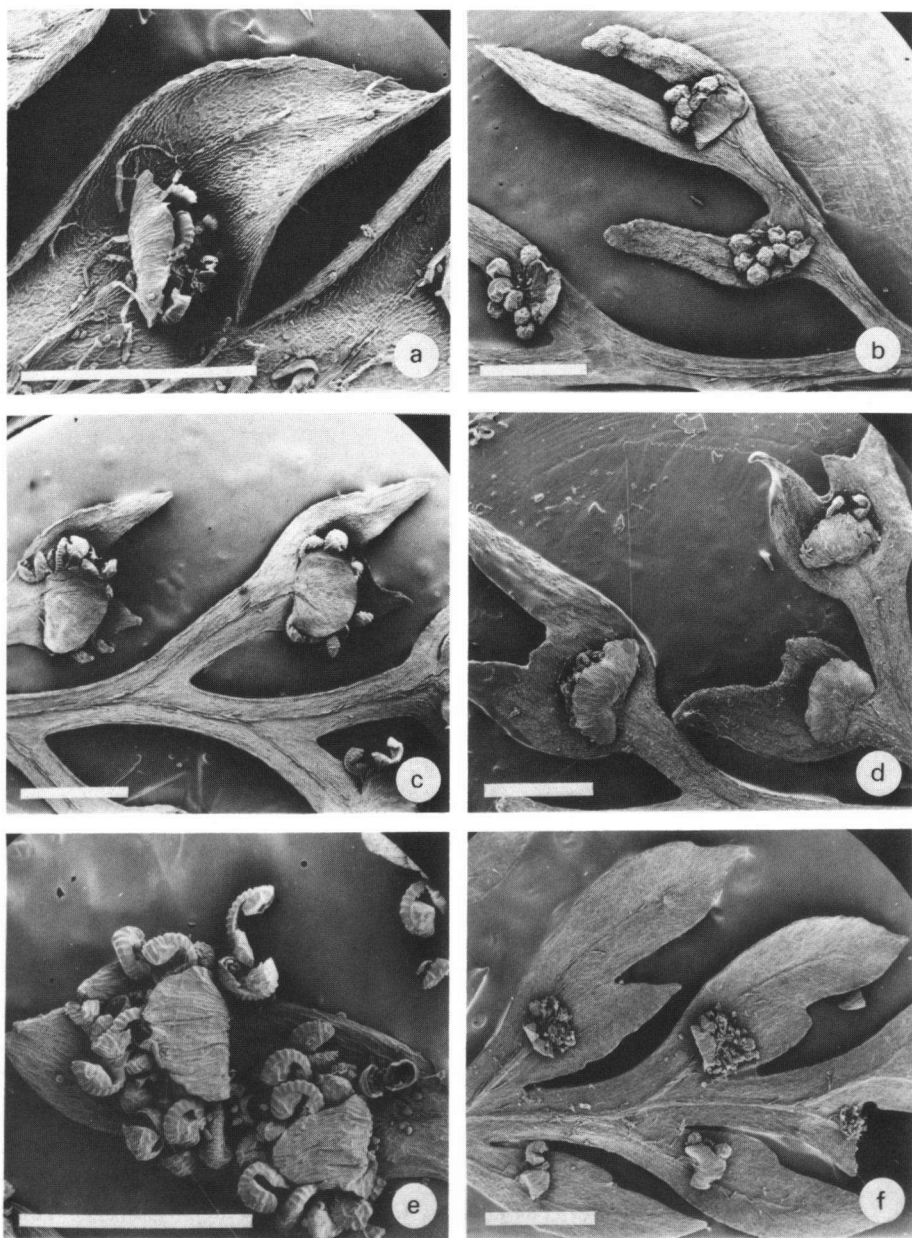


Fig. 1. Indusia (SEM); scale bar = 1 mm. — a. *Davalodes novoguineense* (Rosenstock) Copel. (Croxall & Parris 5768). — b. *Araiostegia clarkei* Copel. (Ludlow et al. 16863); c. idem (Hennipman 3406); d. idem (Y.F. Chen 2471). — e. *Araiostegia pulchra* (D. Don) Copel. (G. Mann, Aug. 1889); f. idem (Murata T 15110).



Fig. 2. *Araiostegia clarkei* Copel. (M.T. Kao 4193).



PROCEEDINGS OF THE

ROYAL BOTANICAL SOCIETY OF GREAT BRITAIN AND IRELAND

EX HERBARIO MUSEI BRITANNICI
FLORA OF NEPAL
Leucostegia Clarke (Bak.) C. Chr.
Maharigson.
10,500 ft.
15.7.1952.
Growing in *Betula* forest.
Scales on rhizome shining golden brown.
No. 186
O. POLUNIN, W. R. SYDES & L. H. J. WILLIAMS

Fig. 3. *Araiostegia clarkei* Copel. (Polunin et al. 186).



Fig. 4. *Araiostegia clarkei* Copel. (Hennipman 3406).

KEY TO THE SPECIES

- 1a. Scales broad, ovate to oblong-subdeltoid, with round to acute apex **4. A. pulchra**
 b. Scales evenly narrowed towards the acute apex 2
 2a. Pinnae sessile **1. A. clarkei**
 b. Longest petiolules 2.5 to 30 mm 3
 3a. Lamina deltoid, broadest at base; leaf axes, at least rachises, hairy **3. A. multidentata**
 b. Lamina elongate, not broadest at base; leaf axes glabrous **2. A. hymenophylloides**

ALTERNATIVE KEY TO THE SPECIES

- 1a. Leaf axes, at least rachises, hairy **3. A. multidentata**
 b. Leaf axes glabrous 2
 2a. Pinnae sessile **1. A. clarkei**
 b. Longest petiolules 2.5 to 30 mm long 3
 3a. Scales often curling backward, narrowed evenly towards apex, stipes dark brown **2. A. hymenophylloides**
 b. Scales appressed, usually crisped, margins recurved, broad, ovate to oblong-subdeltoid with round to acute apex, stipes pale **4. A. pulchra**

1. Araiostegia clarkei (Baker) Copel. — Figs. 1b–d, 2–4

- Araiostegia clarkei* Copel., Philipp. J. Sci. 34 (1927) 241. — [*Acrophorus hookeri* Moore, Ind. Fil. (1857) 2, nom. nud.] — *Davallia clarkei* Baker, Syn. Fil. (1874) 91. — *Leucostegia hookeri* Bedd., Handb. Ferns Brit. India (1883) 32. — *Humata hookeri* Diels in E. & P., Nat. Pflanzenfam. 1, 4 (1899) 209. — *Leucostegia clarkei* C. Chr., Contr. U.S. Natl. Herb. 26 (1931) 294. — *Araiostegia hookeri* Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 291; Panigrahi & Basu, J. Econ. Tax. Bot. 5 (1984) 845. — Type: *Hooker f. & Thomson 315* (BM; iso K), India, Sirmur.
- Davallia perdurans* Christ, Bull. Herb. Boissier 6 (1898) 970. — *Humata perdurans* Hieron., Hedwigia 62 (1920) 12. — *Leucostegia perdurans* C. Chr., Contr. U.S. Natl. Herb. 26 (1931) 294. — *Araiostegia perdurans* Copel., Univ. Calif. Publ. Bot. 12 (1931) 397. — Syntypes: *Henry 10086 & A + B* (BM, A in K), China, Yunnan.
- Davallia parvipinnula* Hayata, Mat. Fl. Formosa (1911) 431. — *Leucostegia parvipinnula* Hayata, Icon. Pl. Formos. 4 (1914) 205, f. 139. — *Araiostegia parvipinnula* Ching, Fl. Reipubl. Popul. Sin. (1959) 292. — Type: *Kawakami & Mori 1823* (n.v.), in monte Morrison.
- Davallia subalpina* Hayata, Mat. Fl. Formosa (1911) 432. — Type: *G. Nakahara*, Nov. 1906 (n.v.), Arizan.
- Davallia clarkei* Baker var. *faberiana* C. Chr., Acta Horti Gothob. 1 (1924) 73. — *Leucostegia clarkei* var. *faberiana* C. Chr., Contr. U.S. Natl. Herb. 26 (1931) 194. — *Leucostegia faberiana* Ching in C. Chr., Index Filic. Suppl. 3 (1934) 120. — *Araiostegia faberiana* Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 293; Tagawa & Iwatsuki, Acta Phytotax. Geobot. 24 (1970) 180. — Type: *Faber 1089* (W; iso K, P), Szechuan, Omei summit.
- Araiostegia parva* Copel., Univ. Calif. Publ. Bot. 12 (1931) 399. — *Leucostegia parva* C. Chr., Index Filic. Suppl. 3 (1934) 121. — Type: *Hooker* (UC, n.v.), Sikkim.
- Araiostegia hopei* Panigrahi & Basu, [J. Econ. Taxon. Bot. 5 (1984) 849, nom. nud.]; op. cit. 6 (1985) 470. — Type: *H. C. Levinge s.n.* (CAL, n.v.), Darjeeling, Sundukpho.

Rhizome without the scales 5 mm diam. (with scales c. 10 mm); scales light brown, evenly narrowed towards the acute apex, 7–10 mm long. Stipes pale when dry, 7–35 cm long. Lamina tripinnate or quadripinnate, deltoid and broadest towards base, glabrous, 10–50 cm long, 6–50 cm broad. Longest pinnae 2–30 cm long, 1.2–18 cm broad. Both lowest pinnules of at least basal pinnae inserted on pinna base (pinnae sessile, sometimes only one pinnule at base of pinna), other pinnules anadromous. Longest pinnules or pinnalobes 6–130 mm long, 2–50 mm broad. Ultimate leaflets linear oblong, lobed almost to the midrib. Ultimate segments 1–4 mm long, 0.2–1 mm broad. Sori facing midveins at the forking point of the veins. Indusium scale-like, attached at the narrow, cordate base only, or attached at the broad base and hardly or not along the sides, reniform or semicircular, wider than long or about as wide as long, 0.3–1.2 mm long, 0.4–1.5 mm broad.

Distribution – NW India 2 coll., Bhutan 4 coll., Nepal 6 coll., Burma 1 coll., N Thailand (Doi Inthanon and Chieng Rai) 6 coll., China (Tibet 8 coll., Yunnan many coll., Sichuan 2 coll., Gueizow 1 coll., Hongkong, Taiwan many coll.).

Habitat & Ecology – Generally epiphytic, in dense evergreen or mossy forest. Altitude 1200–4250 m.

Note – *Araiostegia clarkei* is a very variable species, but most of the variability is in the dimensions.

2. *Araiostegia hymenophylloides* (Blume) Copel. — Fig. 5

Araiostegia hymenophylloides (Blume) Copel., Philipp. J. Sci. 34 (1927) 241; Copel., Fern Fl. Philipp. (1958) 166. — *Aspidium hymenophylloides* Blume, Enum. Pl. Javae (1828) 172. — *Leucostegia hymenophylloides* Bedd., Ferns S. India (1863) t. 252; Hook., Syn. Fil. (1868) 92; Bedd., Suppl. Ferns S. India (1876) 4; Handb. Ferns Brit. India (1883) 54. — *Davallia hymenophylloides* Kuhn, Ann. Mus. Bot. Lugduno Batavum 4 (1869) 286; Christ, Bull. Herb. Boissier 6 (1898) 142. — *Humata hymenophylloides* Copel., Publ. Bur. Sci. Gov. Lab. Philipp. 28 (1905) 51. — Type: *Blume s.n.* (L, 909.30-141), Java, Mt Burangrang.

[*Leucostegia affinis* John Sm., J. Bot. 3 (1841) 416, nom. nud.] — *Davallia affinis* Hook., Sp. Fil. (1846) 158, t. 52B; Kunze, Bot. Zeitung (Berlin) 6 (1850) 236; Harrington, J. Linn. Soc. Bot. 16 (1877) 26. — *Microlepia affinis* Presl, Epim. Bot. (1851) 97. — *Acrophorus affinis* Moore, Proc. Linn. Soc. London 2 (1854) 286; Index Fil. (1857) 1. — *Humata affinis* Mett., Fil. Hort. Bot. Lips. (1856) 102, t. 27 f. 5, 6. — Type: *Cuming 117* (iso BM, K, L, P), Philippines.

Microlepia tenuifolia Presl, Epim. Bot. (1851) 97. — *Cuming 215* (iso BM, K, L, PNH), Luzon. *Cystopteris dalhousiana* Fée, Mém. Foug. 8 (1857) 108. — Type: *Lady Dalhousie* (G-DEL; iso K), Penang (acc. to Fée Ceylan!).

Rhizome without the scales 3–20 mm diam.; scales light brown, membraneous, evenly narrowed towards the acute apex, often curled backwards, 4–7 mm long. Stipes dark brown, 9–45(–65) cm long. Lamina tripinnate, elongate, often narrowed towards base, glabrous (or nearly so), 20–80 cm long, 6–50(–90) cm broad. Longest petiolules 2.5–30 mm long. Longest pinnae 4–30(–44) cm long, 1.5–15(–18) cm broad. Longest pinnules or pinnalobes 10–80 mm long, 5–20 mm broad. Ultimate segments linear-oblong. Sori facing midveins at the bending point of a vein. Indusium scale-like, attached at the narrow cordate base only, reniform, wider than long, 0.1–0.4 mm long, 0.4–0.7 mm broad.



Fig. 5. *Araiostegia hymenophylloides* (Blume) Copel. (*Ueda & Darnaedi B 8740*).

Distribution – Ceylon many coll., S India (Western Ghats 7 coll.); Malesia: Sumatra 7 coll., Malay Peninsula, Java, and Borneo many coll., Philippines (Luzon many coll., Mindanao 7 coll., Mindoro 2 coll., Biliran 1 coll.).

Habitat & Ecology – Epiphytic or epilithic, rarely terrestrial, usually in shaded places. Altitude 500–2200 m.

3. *Araiostegia multidentata* (Hook.) Copel.

Araiostegia multidentata (Hook.) Copel., Philipp. J. Sci. 34 (1927) 241; Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 295. — [*Aspidium multidentatum* Wall., Cat. (1828) 346, nom. nud.] — *Davallia multidentata* Hook. in Hook. & Baker, Syn. Fil. (1868) 91; C. B. Clarke, Rev. Ferns N. India (1880) 442. — *Leucostegia multidentata* Bedd., Ferns Brit. India (1869) t. 313 (n.v.); Handb. Ferns Brit. India (1888) 50. — *Humata multidentata* Diels in E. & P., Nat. Pflanzenfam. 1, 4 (1899) 209. — *Paradavallodes multidentatum* Ching, Acta Phytotax. Sin. 11 (1966) 20. — Type: Wallich 346 (K; iso BM), Nepal, 1821.

Microlepia pteropus Bedd., Ferns Brit. India (1869) t. 313, n.v., acc. to Ching (1959).

[*Acrophorus thomsonii* Moore, Ind. Fil. (1857) 4, nom. nud.: Hook. f. & Thomson 316].

Rhizome without the scales 5 mm diam. (with scales c. 10 mm); scales light brown, evenly narrowed towards the acute apex, 6 mm long. Stipes when dry pale or dark brown, 17–25 cm long. Lamina tripinnate, deltoid and broadest towards base, glabrous, 30–45 cm long, 17–34 cm broad. Longest petiolules 8–10 mm long. Longest pinnae 10–19 cm long, 6–9 cm broad. Longest pinnules or pinnalobes 40–70 mm long, 15–30 mm broad. Ultimate pinnules linear oblong, lobed halfway towards midrib. Ultimate segments 2–4 mm long, 1 mm broad, often shallowly lobed. Hairs on leaf axes 0.1–0.2 mm long. Sori facing midveins at the forking point or at the bending point. Indusium scale-like, attached at the narrow, cordate base only, reniform, wider than long, 0.5 mm long, 0.6–0.8 mm broad.

Distribution – N India (Manipur 1 coll., W Bengal, Assam 5 coll.), Nepal 1 coll., Thailand (Prachunburi 1 coll.), China (Yunnan, Shweli Salwin Divide 3 coll.).

4. *Araiostegia pulchra* (D. Don) Copel. — Figs. 1e, f, 6

Araiostegia pulchra (D. Don) Copel., Philipp. J. Sci. 34 (1927) 241; Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 288; Tagawa & Iwatsuki, Acta Phytotax. Geobot. 24 (1970) 180. — *Davallia pulchra* D. Don, Prodr. Fl. Nepal. (1825) 11; C. B. Clarke, Rev. Ferns N. India (1880) 444; Baker, Kew Bull. 1895 (1895) 53. — *Leucostegia pulchra* John Sm., London J. Bot. 1 (1842) 426; Bedd., Handb. Ferns Brit. India (1883) 52. — *Davallia chaerophylla* Wall. [Cat. (1828) 259, nom. nud.] ex Presl, Tent. Pterid. (1836) 129; Hook., Sp. Fil. (1846) 157, t. 51 A; Fée, Mém. Foug. 5, Gen. Filic. (1852) 329. — *Leucostegia chaerophylla* John Sm., London J. Bot. 1 (1842) 426. — *Acrophorus chaerophyllus* Moore, Proc. Linn. Soc. London 2 (1854) 286. — *Humata chaerophylla* Mett., Fil. Hort. Bot. Lips. (1856) 102, t. 27 f. 9, 10. — *Acrophorus pulcher* Moore, Index Fil. (1857) 3; Bedd., Ferns S. India (1863) t. 10. — *Humata pulchra* Diels in E. & P., Nat. Pflanzenfam. 1, 4 (1899) 209. — Type: Wallich 259 (K; iso BM, L, P), Nepal, 1821.

Cystopteris dimidiata Decne. in Jacquem., Voy. Inde 4 (1844) 178, t. 178. — Type: Jacquemont (P).

Cystopteris squamata Decne. in Jacquem., Voy. Inde 4 (1844) 178, t. 178. — Type: Jacquemont (P).

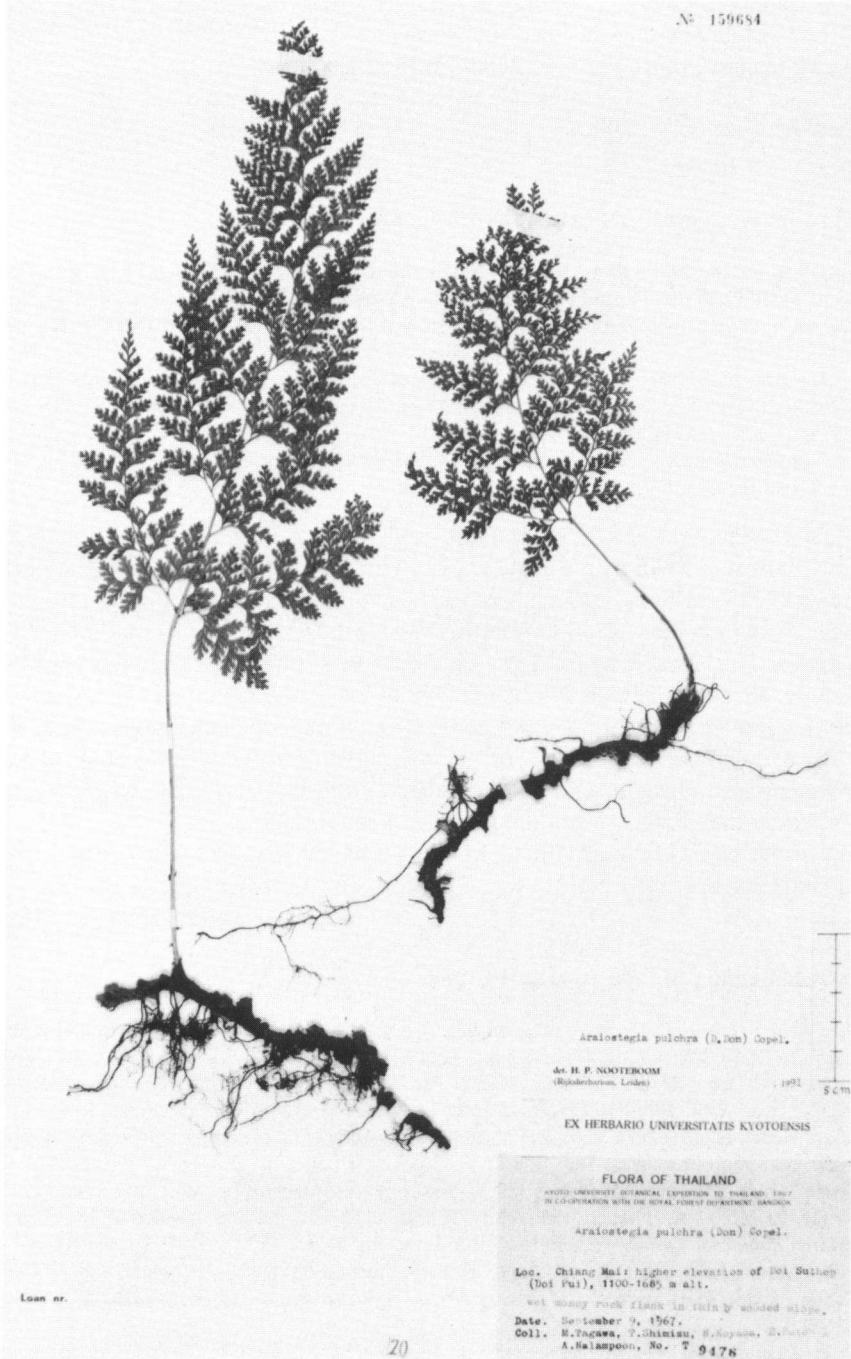


Fig. 6. *Araiostegia pulchra* (D. Don) Copel. (Tagawa et al. T 9478).

- Davallia pseudocystopteris* Kunze, Bot. Zeitung (Berlin) 6 (1850) 68. — *Acrophorus pseudocystopteris* Bedd., Ferns Brit. India. (1865) t. 92. — *Davallia pulchra* var. *pseudocystopteris* C.B. Clarke, Rev. Ferns N. India (1880) 444. — *Leucostegia pseudocystopteris* Bedd., Handb. Ferns Brit. India (1883) 54. — *Araiostegia pseudocystopteris* Copel., Philipp. J. Sci. 34 (1927) 241; Tagawa & Iwatsuki, Acta Phytotax. Geobot. 24 (1970) 181. — Type: *Colonel Dyas* (K), Dalhousie.
- Davallia pulchra* var. *delavayi* Bedd. ex C.B. Clarke et Baker, J. Linn. Soc. Bot. 24 (1888) 410. — *Leucostegia delavayi* Ching in C. Chr., Index Filic. Suppl. 3 (1934) 120. — *Araiostegia delavayi* Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 289. — Type: *Delavay* (K; iso BO), China, Yunnan.
- Davallia yunnanensis* Christ, Bull. Herb. Boissier 6 (1898) 970. — *Araiostegia yunnanensis* Copel., Philipp. J. Sci. 34 (1927) 241; Tagawa & Iwatsuki in S.K. Basu & G. Panigrahi, J. Econ. Taxon. Bot. 5 (1984) 850. — *Leucostegia yunnanensis* C. Chr., Index Filic. Suppl. 3 (1934) 121. — *Humata yunnanensis* Ching, Bull. Fan Mem. Inst. Biol. ser. II, 1 (1949) 296. — Type: *Henry 10333 A* (K), China, Yunnan, Mengtze.
- Davallia beddomei* Hope, J. Bomb. Nat. Hist. Soc. 12 (1899) 527, t. 1. — *Araiostegia beddomei* Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 288. — Lectotype: *Bliss* ex Hope herb. (BM), India, Simla, Mt Kamalhari.
- Davallia athamantica* Christ, Bull. Soc. Bot. France 52 Mém. 1 (1905) 65. — *Araiostegia athamantica* Copel., Philipp. J. Sci. 34 (1927) 241. — Lectotype (here chosen): *Delavay 1155* (K; iso P), China, Yunnan.
- Davallia rigidula* Baker, Kew Bull. 1906 (1906) 8. — Lectotype (here chosen): *Henry 10333* (K), China, Yunnan, Sjemen.
- Araiostegia imbricata* Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 376; Tagawa & Iwatsuki, Acta Phytotax. Geobot. 24 (1970) 180. — Type: *C.W. Wang 78372* (KUN), China, Yunnan, Cheh Li Hsien.
- Paradavallodes kansuense* Ching, Acta Phytotax. Sin. 11 (1966) 20. — Type: *Hsu, Y. B. 1726* (n.v.), China, Kansu, Wen Hsien.

Rhizome without the scales 2–6 mm diam.; scales light brown (often greyish), broad, ovate to oblong-subdeltoid with round to acute apex, appressed, usually crisped, 2–5 mm long. Stipes pale, 10–20 cm long. Lamina tripinnate or quadripinnate, deltoid and broadest towards base, or elongate and then often narrowing towards base, glabrous, 12–50 cm long, 7–40 cm broad. Longest petiolules 3–20 mm long. Longest pinnae 5–21 cm long, 3–12 cm broad. Longest pinnules or pinnalobes 25–70 mm long, 10–35 mm broad. Ultimate leaflets linear oblong, lobed almost to the midrib (each lobe bilobed again), 0.5–3 mm long, 0.6–1 mm broad. Sori facing midveins at the forking point of vein or at the bending point. Indusium scale-like, attached at the narrow, cordate base only, reniform or semicircular, wider than long, 0.5–0.8 mm long, 0.5–1 mm broad.

Distribution – Ceylon 2 coll., India throughout many coll., Nepal many coll., Sikkim 2 coll., Bhutan 4 coll., Burma 5 coll., N Thailand many coll., Annam 1 coll., China (Yunnan many coll., Szechuan 1 coll.), ?Singapore.

Habitat & Ecology – Epiphytic or epilithic, from deep shade to rather sunny places.

DUBIOUS SPECIES

Araiostegia gymnocarpa Copel., Univ. Calif. Publ. Bot. 12 (1931) 398. — Type: *Kerr 6318* (P), Thailand, Doi Inthanon; alt. 2100 m. — Type not seen.

EXCLUDED FROM ARAIOSTEGIA

Araiostegia wardii (Baker) Tard.-Blot, *Adansonia* 5 (1965) 493. — *Nephrodium wardii* Baker in Hook. & Baker, *Syn. Fil. ed. II* (1874) 500. — *Polystichopsis wardii* Tard.-Blot, *Notul. Syst. (Paris)* 15 (1956) 176. — Syntypes: *Ward, Neville, Horne* (K), Seychelles = *Dryopteris wardii* (Baker) O. Kuntze.

Araiostegia yaklaensis (Bedd.) Nayar & Kaur, *Companion Beddome's Handb. Ferns Brit. India* (1974) 17. — *Leucostegia yaklaensis* Bedd., *Suppl. Ferns Brit. India* (1892) 13. — *Davallia yaklaensis* C. Chr., *Index Filic.* (1906) 215 = *Athyrium andersonii* (C.B. Clarke) Panigrahi & Basu, *Bull. Bot. Surv. India* 27 (1985) 115. — Lectotype: *C.B. Clarke 27426* (K).

DAVALLODES

Davallodes Copel., *Philipp. J. Sci.*, C 3 (1908) 33; *Philipp. J. Sci.* 34 (1927) 251, t. 4; *Gen. Fil.* (1947) 87; *Fern Fl. Philipp.* (1958) 168; Ching, *Fl. Reipubl. Popul. Sin.* 2 (1959) 281; *Holtum, Kew Bull.* 27 (1972) 245; Kato, *J. Fac. Sci. Univ. Tokyo, sect. 3 Bot.*, 13 (1985) 564. — *Microlepia* sect. *Davallodes* Copel., *Publ. Bur. Sci. Gov. Lab. Philipp.* 28 (1905) 55. — Type: *D. hirsutum* (John Sm. ex Presl) Copel.

Rhizome bearing only scales. Roots restricted to the ventral side of lateral buds. Scales yellowish, light brown, or nearly black, with pale border extending from base to apex, quickly diminishing or disappearing into the apex, or without pale border, not bearing multiseptate hairs, lacking marginal setae (or with marginal setae in *D. novoguineense*), entire, smooth on the adaxial surface, peltate, or basifixed with cordate base with much overlapping lobes (in *D. viscidulum* and *D. urceolatum*). Stipe articulated on phyllopodia, grooved, bearing hairs and/or scales when young. Lamina compound, pinnate with strongly dissected pinnae or bipinnate towards base and in the middle part, elongate and narrowed towards base, bearing multicellular hairs, not or slightly dimorphous. Hairs between veins on either surface present or not. Pinnae linear-triangular. Pinnulae or pinnalobes linear oblong. Ultimate segments obtuse, without a dominant tooth. Pinnules of at least the larger pinnae catadromous (except in *D. membranulosum*). Rachis adaxially raised. Leaf axes, at least rachises, hairy. Veins in ultimate lobes simple or forked, not reaching the margin. False veins wanting. Sori indusiate, separate, frequently single on a segment, facing midveins at the forking point of veins or (rarely) at the bending point. Indusium scale-like, attached at the narrow cordate base only, or attached at the base and only part way up at the sides, or also attached along the sides, pouch-shaped, or attached at the broad base and hardly or not at the sides, or very small, inconspicuous.

Distribution — One species in mainland Asia (Nepal, N Thailand, Yunnan) and 6 species restricted to Malesia.

Notes — *Holtum* (1972) dealt with the genus (with a key but without species descriptions), but in my opinion rather provisionally. He excluded *D. membranulosum*, which he placed in *Araiostegia*, and omitted *D. chingiae*, a synonym of *D. membranulosum*. He also overlooked the cordate, basally attached scales of *D. viscidulum* and *D. urceolatum* and described for the genus the scales as peltate. *Davallodes mem-*

branulosum differs from the other species of the genus by having tapering rhizome scales which thus are not acicular. The scales are peltate, however, and the species is better placed indeed in *Davallodes*, as Kato pointed out. *Davallodes gymnocarpum* Copel. is an extreme form with very small indusia, as in *D. hirsutum*, where it is here included. *Davallodes burbridgei* C. Chr. & Holttum was separated from *D. dolichosorum* by the length of the hairs and by the lamina between the veins being copiously hairy versus glabrous. Both characters vary so much that the distinction is illusory. Copeland, apparently holding a very narrow species concept, also described *D. grammatosorum*, *D. congestum*, *D. laxum*, and *D. dolichosorum*. They all are part of the quite variable *D. hirsutum* and described on the shape of the indusium or on differences in indument and leaf incisions. All these characters are very variable in *D. hirsutum*.

KEY TO THE SPECIES

- 1a. Scales evenly narrowed towards the apex, pinnules opposite or anadromous
3. *D. membranulosum*
- b. Scales distinctly acicular or flat and nearly acicular, pinnules catadromous . . . 2
- 2a. Indusium scale-like, attached at the narrow cordate base only 3
- b. Indusium attached at the base and only part of the sides or also attached along the sides and pouch-shaped, or only attached at the broad base and hardly or not at the sides, or very small and inconspicuous 4
- 3a. Leaves usually bipinnate. Indusium semicircular or oblong; scales basifixed with cordate base and much overlapping lobes, longest petiolules 1 mm long, longest pinnules or pinnalobes 15–32 mm long and 3–10 mm broad, indusium longer than wide or about as wide as long **7. *D. viscidulum***
- b. Leaves usually pinnate with strongly dissected pinnae. Indusium reniform, wider than long; scales peltate; longest petiolules 2–3 mm long; longest pinnules or pinnalobes 12–17 mm long and 3–5 mm broad **1. *D. borneense***
- 4a. Indusium attached at the broad base and hardly or not at the sides, semicircular, wider than long; scales with pale border from base to apex or this quickly diminishing or disappearing towards the apex, flat and nearly acicular
4. *D. novoguineense*
- b. Indusium attached at the base and only part of the sides or also attached along the sides, pouch-shaped, or very small, inconspicuous, more or less triangular to rhomboid or oblong, longer than wide or about as wide as long; scales without pale border, distinctly acicular 5
- 5a. Indusium very small, inconspicuous **2. *D. hirsutum***
- b. Indusium conspicuous, attached at the base and only part of the sides or also attached along the sides, pouch-shaped. 6
- 6a. Scales basifixed with cordate base and much overlapping lobes
6. *D. urceolatum*
- b. Scales peltate 7
- 7a. Indusium longer than wide with free, pointed upper half at least as long as basal half **5. *D. seramense***
- b. Indusium longer than wide or about as wide as long without free, pointed upper half **2. *D. hirsutum***

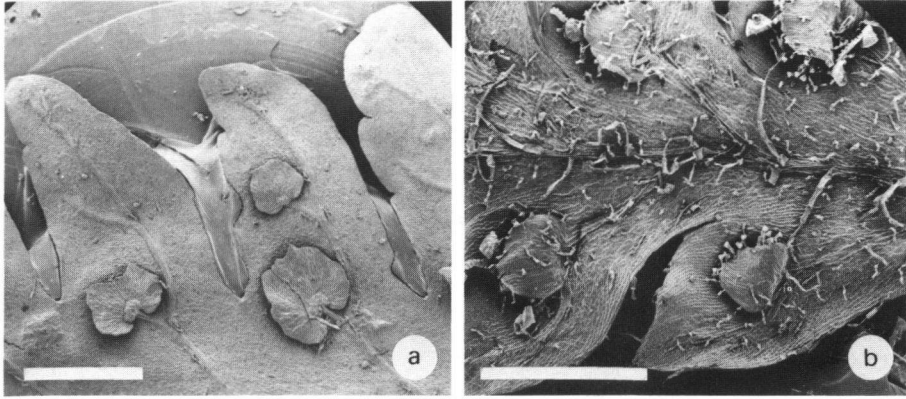


Fig. 7. *Indusia* (SEM); scale bar = 1 mm. — a. *Davallodes borneense* (Hook.) Copel. (Kato 6203). — b. *Davallodes membranulosum* (Wall. ex Hook.) Copel. (Tagawa T 9991).

1. *Davallodes borneense* (Hook.) Copel. — Fig. 7a

Davallodes borneense Copel., Sarawak Mus. J. 2 (1917) 336; Philipp. J. Sci. 34 (1927) 250; C. Chr., Gard. Bull. Straits Settlement. 7 (1934) 230, p.p; Holttum, Kew Bull. 27 (1972) 246. — *Lastrea borneensis* Hook., Icon. Pl. (1854) t. 993. — *Nephrodium borneensis* Hook., Sp. Fil. 4 (1862) 111. — *Leucostegia borneensis* John Sm., Ferns Brit. For. (1866) 77. — *Davallia borneensis* Kuhn, Ann. Mus. Bot. Lugduno Batavum 4 (1869) 286. — *Dryopteris borneensis* Kuntze, Revis. Gen. Pl. 2 (1891) 812; Alderw., Malayan Ferns (1909) 198; Rosenstock, Feddes Repert. Spec. Nov. Regni Veg. 10 (1912) 324. — Type: *Lobb* (K), Borneo, 1857.

Davallia nephrodioides Baker, J. Linn. Soc. Bot. 24 (1887) 257. — *Humata nephrodioides* Alderw., Malayan Ferns (1909) 295. — *Leucostegia nephrodioides* Copel., Sarawak Mus. J. 2 (1917) 336. — *Davallodes nephrodioides* Copel., Philipp. J. Sci. 34 (1927) 249. — Type: *Charles Hose s.n.* (K; iso BM, P), Niah, Sarawak.

Rhizome without the scales 5–10 mm diam.; scales nearly black, with pale border quickly diminishing or disappearing towards the apex or without pale border, distinctly acicular or flat and nearly acicular, lacking marginal setae or setae rare, peltate, 5–13 mm long. Stipes 9–30 cm long. Lamina compound, pinnate with strongly dissected pinnae towards base and in the middle part, bearing multicellular hairs, 16–75 cm long, 9–26 cm broad, lower pinnae not very small, about one third to about as long as longest ones. Hairs between veins on either surface absent or nearly so. Longest petiolules 2–3 mm long. Longest pinnae 5–14 cm long, 1.5–4 cm broad. Longest pinnules or pinnalobes 12–17 mm long, 3–5 mm broad. Hairs on leaf axes 0.5 mm long. Indusium scale-like, attached at the narrow cordate base only, reniform, wider than long, 0.3–0.5 mm long, 0.75–1 mm broad.

Distribution — Malesia: Borneo, Kalimantan Timor c. 15 coll., Kalimantan Selatan 3 coll., Sarawak 11 coll., Sabah 7 coll.

Habitat & Ecology — On tree trunks in wet places, along rivers etc. in deep shade. Altitude from sea-level up to 1500 m.

2. Davallodes hirsutum (John Sm. ex Presl) Copel. — Figs. 8a–e, 9

- Davallodes hirsutum* Copel., Philipp. J. Sci., C 3 (1908) 33; Philipp. J. Sci. 34 (1927) 247; Fern Fl. Philipp. (1958) 169; Holttum, Kew Bull. 27 (1972) 248; Hoshizaki, Baileya 21 (1981) 44, t. 2. — [*Leucostegia hirsuta* John Sm., J. Bot. 3 (1841) 416, nom. nud.] — *Davallia ciliata* Hook., Sp. Fil. (1845) 184, t. 60 A; Baker, J. Bot. (1879) 39; Trans. Linn. Soc. London II, Bot. 4 (1879) 251, non Presl (1822). — *Microlepia hirsuta* Presl, Epim. Bot. (1851) 97. — *Davallia hirsuta* Presl, Epim. Bot. (1851) 97; Alderw., Malayan Ferns (1908) 299; Pérez Arbeláez, Nat. Gruppe Davall. (1928) 28, f. 6. — *Microlepia ciliata* Copel., Publ. Bur. Sci. Gov. Lab. Philipp. 28 (1905) 55. — Type: *Cuming 174* (iso BM, K, L), Luzon.
- Davallodes grammatosorum* Copel., Philipp. J. Sci., C 3 (1908) 34, t. 6; Alderw., Malayan Ferns Suppl. (1917) 228; Copel., Philipp. J. Sci. 34 (1927) 248; Fern Fl. Philipp. (1958) 169; Holttum, Kew Bull. 27 (1972) 249. — *Microlepia grammatosora* C. Chr., Index Filic. Suppl. (1913) 50. — Type: *Copeland 1724* (iso BM, P), Mindanao, San Ramon.
- Davallodes gymnocarpum* Copel., Philipp. J. Sci., C 3 (1908) 34, t. 5; Philipp. J. Sci. 34 (1927) 246; Fern Fl. Philipp. (1958) 170; Holttum, Kew Bull. 27 (1972) 247. — *Microlepia gymnocarpa* C. Chr., Index Filic. Suppl. (1913) 50. — *Leucostegia gymnocarpa* C. Chr., Index Filic. Suppl. 3 (1934) 120. — Type: *Copeland 2075* (n.v.; 196 in K is probably part of the type), Negros, Mt Canlaon, 600 m.
- Davallodes laxum* Copel., Philipp. J. Sci. 34 (1927) 246, t. 3, f. 1; Fern Fl. Philipp. (1958) 169 — Type: *Merrill 957* (n.v.), Luzon, Benguet.
- Davallodes congestum* Copel., Philipp. J. Sci. 34 (1927) 247, t. 3, f. 2; Fern Fl. Philipp. (1958) 169. — Type: *Copeland 1481* (iso BM), Mindanao, Todaya, on slopes of Mt Apo.
- Davallodes dolichosorum* Copel., Philipp. J. Sci. 34 (1927) 248; Holttum, Kew Bull. 27 (1972) 248; Hovenkamp & De Joncheere, Blumea 33 (1988) 409. — Type: *Schlechter 17857* (iso K, L), Kaiser Wilhelmsland, Rani Geb. 25-VI-1908.
- Davallodes burbridgei* C. Chr. & Holttum, Gard. Bull. Straits Settlem. 7 (1934) 230. — Type: *Burbridge* (K; iso A), Borneo, Kinabalu.

Rhizome without the scales 3–7 mm diam.; scales nearly black, without pale border, distinctly acicular, lacking marginal setae or setae rare, peltate, 10–20 mm long. Stipes 2–20 cm long. Lamina compound, pinnate with strongly dissected pinnae, or bipinnate towards base and in the middle part, bearing multicellular hairs, 20–100 cm long, 6–28 cm broad, gradually narrowed towards its base and with lower pinnae very small, or (rarely) lower pinnae not very small, about one third to about as long as longest ones. Hairs between veins on either surface present (rarely absent). Longest petiolules 0–3 mm long. Longest pinnae 4–14 cm long, 1.2–4 cm broad. Longest pinnules or pinnalobes 6–20 mm long, 2–6 mm broad. Hairs on leaf axes 0.5–1.5 mm long. Indusium attached at the base and only part of the sides, or also attached along the sides, pouch-shaped, or very small and inconspicuous, more or less triangular to rhomboid or oblong, longer than wide or about as wide as long (often with ciliate free upper part), 0.2–0.8 mm long, 0.2–0.6 mm broad. Indusium lips truncate, separated from or even with laminar margin, or triangular, separated from laminar margin.

Distribution – Malesia: Sumatra, E Coast 3 coll.; Borneo, Kalimantan Barat 2 coll., Kalimantan Timur 5 coll., Sabah 7 coll.; Philippines, Luzon 15 coll., Mindanao 11 coll., Negros 1 coll., Samar 1 coll.; Sulawesi 16 coll.; New Guinea, Papua (incl. Bismarcks, Bougainville, Goodenough I.) 18 coll., West, S of Manokwari 1 coll.

Habitat & Ecology – Epiphytic, also in secondary and open forest. Altitude 350–1900 m.

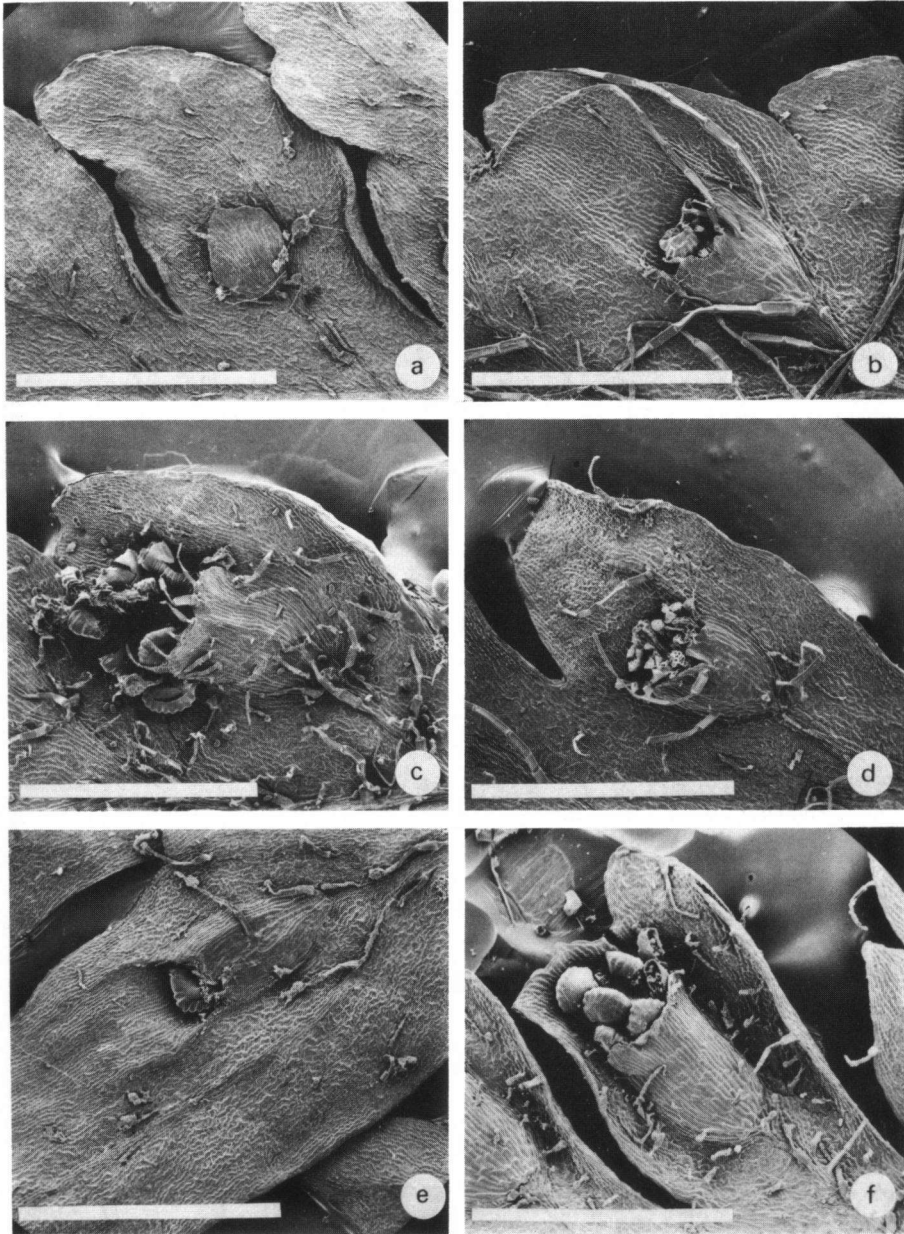


Fig. 8. Indusia (SEM); scale bar = 1 mm. — a. *Davallodes hirsutum* Copel. (Darnaedi 2033); b. idem (LAE 68328); c. idem (Kinbag 27); d. idem (Price & Hernaez 104); e. idem (Clemens 34041). — f. *Davallodes urceolatum* Copel. (Lörzing 13801).



Fig. 9. *Davallodes hirsutum* Copel. (LeRoy Topping 1767).

3. *Davallodes membranulosum* (Wall. ex Hook.) Copel. — Fig. 7b

Davallodes membranulosum Copel., Philipp. J. Sci. 34 (1927) 245. — *Davallia membranulosa* Wall. [Cat. (1828) 255, nom. nud.] ex Hook., Sp. Fil. (1846) 159; C.B. Clarke, Rev. Ferns N. India (1880) 442. — *Acrophorus membranulosus* Moore, Proc. Linn. Soc. London 2 (1854) 286. — *Leucostegia membranulosa* Bedd., Ferns Brit. India (1865) t. 98; Hook. & Baker, Syn. Fil. (1868) 91; John Sm., Hist. Fil. (1875) 84; Bedd., Handb. Ferns Brit. India (1883) 50. — *Humata membranulosa* Diels in E. & P., Nat. Pflanzenfam. 1, 4 (1899) 209. — *Paradavallodes membranulosum* Ching, Acta Phytotax. Sin. 11 (1966) 20, t. 21, f. 7, 8. — *Araiostegia membranulosa* Holttum, Kew Bull. 27 (1972) 230. — Type: *Wallich 255* (K), Nepal, 1821.

Davallodes chingiae Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 375. — *Paradavallodes chingiae* Ching, Acta Phytotax. Sin. 11 (1966) 20. — Type: *K.M. Feng 13127* (KUN), 9 Nov. 1947, Yunnan, Marliipo, 1300–1500 m, on rock in mixed forests.

Rhizome without the scales 3–4 mm diam.; scales light brown, red brown, or nearly black, with pale border from base to apex, evenly narrowed towards the apex, lacking marginal setae or setae rare, peltate, 5–6 mm long. Stipes pale, 3–15 cm long. Lamina compound, bipinnate towards base and in the middle part, bearing multicellular hairs, 12–27 cm long, 5–14 cm broad; lower pinnae not very small, about one third to about as long as longest ones. Hairs between veins on either surface present or not. Longest petiolules 0.5–1.5 mm long. Longest pinnae 2.6–7 cm long, 1–3 cm broad. Longest pinnules or pinnalobes 6–15 mm long, 2–4 mm broad. Hairs on leaf axes 0.4–0.6 mm long. Indusium attached at broad base and hardly or not at the sides, semicircular or oblong (to orbicular), longer than wide to wider than long, 0.5–0.8 mm long, 0.5–0.8 mm broad.

Distribution — SE Asia: N India (Kumaon 3 coll., Saharanpur 1 coll.); Nepal, Sikim 1 coll., Burma 2 coll.; N Thailand 10 coll.; Tonkin, Chapa 1 coll.; China, Yunnan 8 coll., Sichuan 1 coll.

Habitat & Ecology — Altitude 600–2000 m.

4. *Davallodes novoguineense* (Rosenstock) Copel. — Fig. 1a

Davallodes novoguineense Copel., Univ. Calif. Publ. Bot. 12 (1931) 400; Holttum, Kew Bull. 27 (1972) 247. — *Davallia viscidula* var. *novoguineensis* Rosenstock, Feddes Repert. Spec. Nov. Regni Veg. 12 (1913) 526. — Type: *Keysser 195* (iso BM), Sattelberg.

Davallia borneensis auct. non Hook.: Rosenstock, Feddes Repert. Spec. Nov. Regni Veg. 10 (1912) 324.

Rhizome without the scales 5–7 mm diam.; scales light brown or nearly black, with pale border from base to apex, or this quickly diminishing or disappearing towards the apex (often at base with a broad pale border tapering upwards), flat and nearly acicular, with marginal setae at least in distal part, peltate, 3–8 mm long. Stipes 9–26 cm long. Lamina compound, pinnate with strongly dissected pinnae, or (usually) bipinnate towards base and in the middle part, bearing multicellular hairs, 25–55 cm long, 9–38 cm broad, lower pinnae not very small, about one third to about as long as the longest one. Hairs between veins on either surface present or not. Longest petiolules 1–2.5 mm long. Longest pinnae 6–19 cm long, 2–6 cm broad. Longest pinnules or pinnalobes 20–40 mm long, 6–16 mm broad. Hairs on leaf axes 0.2–0.4 mm long. Indusium attached at the broad base and hardly or not at the sides, semicircular (sometimes ciliate), wider than long, 0.3 mm long, 0.5–0.8 mm broad.

Distribution – Malesia: West New Guinea, Lake Habbema, 1 coll.; Papua New Guinea, many coll.

Habitat & Ecology – Terrestrial or epiphytic. Altitude 1500–3000 m.

Note – Some collections are intermediate with *D. hirsutum*, especially in the shape of the indusium.

5. *Davallodes seramense* Kato

Davallodes seramense Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 14 (1989) 222. — Type: Kato et al. C-5624 (TI, holotype; BO, K, KYO, L, MO), Ceram.

Rhizome without the scales 5–15 mm diam.; scales nearly black, without pale border, distinctly acicular, lacking marginal setae or setae rare, peltate, 6–10 mm long. Stipes 14–25 cm long. Lamina compound, bipinnate towards base and in the middle part, bearing multicellular hairs, 30–66 cm long, 14–28 cm broad, lower pinnae not very small, about one third to about as long as the longest one. Hairs between veins on either surface present. Longest petiolules 1–1.5 mm long. Longest pinnae 10–17 cm long, 2.4–3.5 cm broad. Longest pinnules or pinnalobes 12–20 mm long, 3–5 mm broad, pinnatifid. Hairs on leaf axes 0.1–1 mm long. Indusium attached at the base and only along part of the sides, pouch-shaped, free for the ciliate elongate upper half, oblong, longer than wide, 1 mm long, 0.3 mm broad; indusium lips triangular, separate from lamina margin.

Distribution – Malesia: Central Ceram, rather common.

Habitat & Ecology – Epiphytic or epilithic in deep shade. Altitude 500–1300 m.

Note – This species is very near to *D. hirsutum*; from the collections with pouch-shaped indusia of the latter species it only differs in the longer free distal halves of the indusium.

6. *Davallodes urceolatum* Copel. — Fig. 8f

Davallodes urceolatum Copel., Philipp. J. Sci. 34 (1927) 248; Holttum, Kew Bull. 27 (1972) 249. — Type: Yates 526 (iso A), Sumatra, Berastagi.

Rhizome without the scales 4–7 mm diam.; scales nearly black without pale border, distinctly acicular, in distal part without or with marginal setae, basifixed with cordate base and much overlapping basal lobes, 15 mm long. Stipes dark brown, 5–19 cm long. Lamina compound, bipinnate towards base and in the middle part, 20–80 cm long, 8–12 cm broad, bearing multicellular hairs, lower pinnae not very small, about one third to about as long as the longest pinnae. Hairs between veins on both surfaces. Longest petiolules 1 mm long. Longest pinnae 5–9 cm long, 1.5–2.5 cm broad. Longest pinnules or pinnalobes 8–15 mm long, 3–5 mm broad. Hairs on leaf axes 0.2–1 mm long. Indusium also attached along the sides, pouch-shaped, oblong, longer than wide or about as wide as long, 0.7 mm long, 0.5–0.6 mm broad. Indusium lips truncate, separated from or even to laminar margin.

Distribution – Sumatra, Karo Plateau near Berastagi, 4 coll.

Note – Two of the four collections were identified by Holttum as *D. hirsutum*, from which this species differs in the cordate basally attached rhizome scales and the longer lowest pinnae.

7. *Davallodes viscidulum* (Mett.) Alderw.

- Davallodes viscidulum* Alderw., Bull. Jard. Bot. Buitenzorg II, 4 (1911) 6; Copel., Philipp. J. Sci. 34 (1927) 249; Backer & Posth., Varenfl. Java (1939) 102; Holttum, Kew Bull. 27 (1972) 247. — *Davallia viscidula* Mett. in Kuhn, Linnaea 36 (1869) 145; Kuhn, Ann. Mus. Bot. Lugduno Batavum 4 (1869) 286. — *Humata viscidula* Alderw., Malayan Ferns (1908) 294. — Type: *Blume 1451* (L), Java.
- Davallia kingii* Baker in Hook., Icon. Pl. (1886) t. 1622. — *Davallodes kingii* Copel., Philipp. J. Sci., Bot. 6 (1911) 147; Alderw., Malayan Ferns (1917) 228; Copel., Philipp. J. Sci. 34 (1927) 250. — Type: *Forbes in herb. King 657* (K; iso BM, L), Java, Mt Waringin.

Rhizome without the scales 5–7 mm diam. Scales nearly black, with pale border from base to apex, or with pale border quickly diminishing or disappearing towards the apex, flat and nearly acicular, marginal setae rare or absent, basifixed with cordate base and much overlapping basal lobes, 6–12 mm long. Stipes 6–22 cm long. Lamina compound, pinnate with strongly dissected pinnae, or (usually) bipinnate towards base and in the middle part, bearing multicellular hairs, 26–70 cm long, 16–45 cm broad; lower pinnae not very small, usually about one third to about as long as longest pinnae; hairs between veins on either surface absent or nearly so (a few scattered hairs present). Longest petiolules 1 mm long. Longest pinnae 8–18 cm long, 2.5–6 cm broad. Longest pinnules or pinnalobes 15–32 mm long, 3–10 mm broad. Hairs on leaf axes 0.2–0.5 mm long. Indusium scale-like, attached at the narrow cordate base only, semicircular or oblong, longer than wide or rarely about as long as wide, 0.5–1 mm long, 0.3–0.5 mm broad.

Distribution – Malesia: Sumatra, Aceh 2 coll., W Coast, G. Kerinci 2 coll., Bengkulu 2 coll.; Java throughout many coll.; Bali 2 coll.; SW Sulawesi 2 coll.

Habitat & Ecology – Epiphytic and terrestrial, also on dry places. Altitude 100–2000 m, mostly at higher altitudes.

Note – A sterile collection from Thailand, *M. Tagawa c.s. T 5565*, Nakawn Sri Tamarat, probably belongs to this species.

LEUCOSTEGIA

- Leucostegia* Presl, Tent. Pterid. (1836) 94, pl. 4, f. 11; Copel., Philipp. J. Sci. 34 (1927) 252; Gen. Fil. (1947) 86; Holttum, Revis. Fl. Malaya 2, sec. ed. (1966) 351; Copel., Fern Fl. Philipp. (1958) 167; Ching, Fl. Reipubl. Popul. Sin. 2 (1959) 296; De Vol & Yang, Fl. Taiwan 1 (1975) 278; Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 13 (1985) 564; Tryon & Lugardon, Spores of the Pteridophyta (1991) 374. — Type: *L. immersa* Presl.

Rhizome bearing scales and hairs or only scales. Roots borne on all sides of rhizome. Scales glabrous or bearing multiseptate hairs, basifixed, base not cordate. Stipes articulated at the base to phyllopodia, grooved or not, glabrous. Lamina compound, tripinnate or quadripinnate (rarely in small plants bipinnate) towards base and in the middle part, deltoid and broadest towards base, glabrous (sometimes minute hairs present), not or slightly dimorphous (often fertile leaves more strongly dissected). Pinnae deltoid or narrowly triangular. Pinnules of at least the larger pinnae anadromous. Pinnules or pinnalobes narrowly ovate. Rachis adaxially grooved. Leaf axes glabrous (sometimes a few minute hairs present). Veins in ultimate lobes simple, not

reaching the margin. False veins not present. Sori indusiate, frequently single on a segment, terminal on the veins. Indusium scale-like, either attached at the narrow cordate base only, or attached at the base and only part of the sides.

Note – From the spores it would appear that *L. immersa* in the Philippines and New Guinea is diploid, although the chromosome reports indicate that the examined plants from India and Taiwan are haploid. The spores of *L. pallida* are small, indicating the plants being haploid. It could well be that the greatly varying size, from plants of less than 20 cm to well over 1 m, in both species, is due to polyploidization. More research is needed. The distribution of the two species is an indication that they might represent two varieties. The differences are very small, and mainly occur in the indusium.

1. *Leucostegia immersa* Presl

Leucostegia immersa Presl, Tent. Pterid. (1836) 95, t. 4, f. 11; Bedd., Sarawak Mus. J. (1863) t. 11; Hook. & Baker, Syn. Fil. (1868) 91; Bedd., Handb. Ferns Brit. India (1883) 51; Copel., Philipp. J. Sci. 34 (1927) 252; Holttum, Gard. Bull. Straits Settle. 9 (1937) 131; Copel., Fern Fl. Philipp. (1958) 167; Holttum, Revis. Fl. Malaya 2, sec. ed. (1966) 352; Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 14 (1989) 220. — *Davallia immersa* Wall. [Cat. (1828) 256, nom. nud.] ex Hook., Sp. Fil. (1846) 156; C.B. Clarke, Rev. Ferns N. India (1880) 443; Christ, Bull. Herb. Boissier 6 (1898) 142. — *Acrophorus immersus* Moore, Proc. Linn. Soc. London 2 (1854) 286. — *Humata immersa* Mett., Fil. Hort. Bot. Lips. (1856) 102; Copel., Publ. Bur. Sci. Gov. Lab. Philipp. 28 (1905) 51. — Type: *Wallich 256* (K, L, P), Nepal, 1821.

Cystopteris dimidiata Decne. in Jacquem., Voy. Inde 4 (1844) 177, t. 178. — Type: *Jacquemont* (P).

Davallia immersa var. *amplissima* Christ, Verh. Naturf. Ges. Basel 2 (1897) 6. — Type: *Sarasin 144* (n.v.), Sulawesi, Klabat Station I, 1500 m, 22-IX-1893.

Humata immersa var. *nana* Copel., Philipp. J. Sci. 1, Suppl. (1906) 147. — Type: *Copeland 1830* (P), Luzon, Benguet.

Humata dryopteridifrons Hayata, Icon. Pl. Formos. 4, 6 (1916) 159. — *Davallia dryopteridifrons* Hayata, l.c. — Type: *Faurie 615* (L, P), Arisan, at 2500 m.

Rhizome without the scales 2–15 mm diam., bearing scales and hairs. Scales narrowed evenly towards the apex, very hairy on the inner base, at least when older. Stipes pale or dark brown, 8–115 or more cm long. Lamina 6–120 or more cm long. Longest petiolules 8–40 mm long. Ultimate leaflets rhomboid, only shallowly lobed. Ultimate segments (lobes) 0.5–3 mm long. Indusium scale-like, attached at the narrow, cordate base only (sometimes the base rather broad), semicircular, 1–1.5 mm long, 1–2 mm broad.

Distribution – India, throughout many coll.; Sikkim 3 coll.; Bhutan 2 coll.; Burma 5 coll.; N Thailand c. 20 coll.; Indo-China, Dalat 1 coll.; Cambodia 1 coll.; China, Yunnan 7 coll., Taiwan 3 coll. In Malesia: Malay Peninsula, Perak 2 coll.; Sumatra, Kerinci 1 coll.; Java 1 coll.; Lesser Sunda Islands, Bali 1 coll., Timor 2 coll.; Borneo, Sabah, Kinabalu 3 coll., Sarawak, Baram Distr. 3 coll., Kalimantan Timor 1 coll.; Philippines, Luzon, Benguet Prov. c. 10 coll., Abra Prov. 1 coll., Camarines Norte 1 coll., Ilocos Norte 1 coll., Mountain Prov. 2 coll.; Mindanao 6 coll.; Mindoro 2 coll.; Leyte 1 coll.; Negros 1 coll.; Samar 1 coll.; Sulawesi 7 coll.; Moluccas, Ceram 2 coll., Ternate 1 coll., Tidore 1 coll.; New Guinea, W, Idenburg River 1 coll., Papua New Guinea, Morobe Prov. 2 coll..

Habitat & Ecology – Epiphytic and terrestrial. Altitude 1000–2300 m, rarely at low altitudes.

2. *Leucostegia pallida* (Mett.) Copel.

Leucostegia pallida (Mett.) Copel., Philipp. J. Sci. 34 (1927) 252; Fern Fl. Philipp. (1958) 168; Holtum, Revis. Fl. Malaya 2, sec. ed. (1966) 353; Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 14 (1989) 220. — *Davallia pallida* Mett. in Kuhn, Linnaea 36 (1869) 142; Copel., Philipp. J. Sci. 1, Suppl. (1906) 148. — Type: *Cuming 93* (n.v.), Aneitum, New Hebrides.
Davallia mooreana Mast. in Moore, Gard. Chron. (1869) 964, fig. — Type: *Hort. Veitch 1869* (K).

Rhizome without the scales 2–15 mm diam.; scales evenly narrowed towards the apex. Stipes pale or dark brown, 8–115 cm long. Lamina tripinnate or quadripinnate (or bipinnate in small plants) towards base and in the middle part, deltoid and broadest towards base, glabrous (sometimes minute hairs present), 6–120 cm long (or more). Longest petiolules 8–40 mm long. Ultimate leaflets rhomboid, only shallowly lobed. Ultimate segments (lobes) 0.5–3 mm long. Indusium attached at the base and part of the sides, oblong, 1.2–1.5 mm long, 1 mm broad.

Distribution — Burma, Chin Hills 1 coll.; Sumatra, in the mountains of E Coast and W Coast 5 coll.; Malaya, Perak, Maxwell's Hill & Larut 5 coll.; Borneo, Sarawak 5 coll., Kalimantan Timor 3 coll.; Philippines, Luzon, Mt Bulusan 1 coll.; Moluccas, Ceram many coll.; New Guinea, W 6 coll.; Papua New Guinea and New Ireland more than 20 coll.; Pacific, Solomon Is., Bougainville 1 coll., Samoa 9 coll., Tahiti 1 coll., Carolines, Ponape 2 coll., New Hebrides 2 coll.

Note — The rhizome is glabrous according to Kato (1989). However, in some plants I observed hairs on the rhizome, the scales themselves being glabrous.

GYMNOGRAMMITIS

Gymnogrammitis Griffith, Not. Pl. Asiat. 2 (1849) 608; Icon. Pl. Asiat. 2 (1849) pl. 129, f. 1; Ching, Sunyatsenia 5 (1940) 220; Fl. Reipubl. Popul. Sin. 2 (1959) 284; Acta Phytotax. Sin. 11 (1966) 13; Acta Phytotax. Sin. 16 (1978) 16; Kato, J. Fac. Sci. Univ. Tokyo, sect. 3 Bot., 13 (1985) 565. — *Gymnogrammitidaceae* Ching, Acta Phytotax. Sin. 11 (1966) 13. — Type: *Polypodium dareaeforme* Hook.

Rhizome bearing only scales. Roots restricted to the ventral side of lateral buds (sometimes borne all over the ventral side); scales light brown, without pale border, not hairy but with marginal setae at least in distal part, not toothed, smooth on the adaxial surface, basifixed with cordate base and much overlapping basal lobes. Stipes articulated to phyllopodia, grooved, glabrous or with few scales. Lamina compound, tripinnate or quadripinnate towards the base and in the middle part, towards base deltoid and broadest or elongate, often narrowed, glabrous. Lamina not dimorphous. Pinnae linear-triangular. Pinnules of at least the larger pinnae anadromous. Pinnules or pinna-lobes linear-oblong. Ultimate segments or lobes obtuse or acute without a pronounced tooth. Rachis adaxially grooved. Leaf axes glabrous. Veins in ultimate lobes simple, not reaching the margin. False veins not present. Sori exindusiate, frequently single on a segment, facing midveins at the bending point.

Gymnogrammitis dareaeformis (Hook.) Ching in Tard.-Blot & C. Chr.

- Gymnogrammitis dareaeformis* (Hook.) Ching in Tard.-Blot & C. Chr., Notul. Syst. (Paris) 6 (1937) 2. — *Polypodium dareaeforme* Hook., Sec. Cent. Ferns (1860) t. XXIV; Baker in Hook. & Baker, Syn. Fil. (1867) 339. — *Leucostegia dareaeformis* Bedd., Suppl. Ferns Brit. India (1876) 4. — *Davallia dareaeformis* Levinge ex C.B. Clarke, Trans. Linn. Soc. London II, Bot. 1 (1880) 443, p.p. — *Araiostegia dareaeformis* Copel., Univ. Calif. Publ. Bot. 12 (1931) 398. — Type: *Simons 98* (K), Khasya Hill.
- Polypodium dareaeformioides* Ching, Sinensia 1 (1929) 12; Icon. Fil. Sin. 1 (1930) pl. 41. — Type: *R. C. Ching 6054* (n.v.), Kwangsi, Lu-chen, Bing-long.

Rhizome short, without the scales 4–5 mm diam.; scales light brown, evenly narrowed towards the apex, 2–10 mm long. Stipes dark brown, 4–15 cm long. Lamina tripinnate or quadripinnate towards base and in the middle part, deltoid and broadest towards the base, or elongate, often narrowing towards the base, glabrous, 7–37 cm long, 7–22 cm broad. Longest petiolules 2–6 mm long. Longest pinnae 4.5–20 cm long, 1.5–6 cm broad. Longest pinnules or pinnalobes 15–40 mm long, 6–25 mm broad. Ultimate leaflets linear oblong, lobed almost to the midrib. Ultimate segments 0.5–5 mm long, 0.5–1 mm broad. Sori facing midveins at the bending point.

Distribution – India, W Bengal 6 coll., Assam, Khasi Hills many coll., Nagaland 1 coll.; Nepal 1 coll., Bhutan 1 coll.; Sikkim c. 10 coll.; Burma, Chin Hills 4 coll.; N Thailand c. 10 coll.; China: Yunnan many coll., Guangxi 3 coll., Guangdong (Hainan) 2 coll., E Guizhou 2 coll., W Hunan 1 coll.

Habitat & Ecology – Altitude 1200–2500 m.

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