STUDIES IN THE FAMILY THELYPTERIDACEAE IV.

The genus Pronephrium Presl

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This genus was re-described in Blumea 19 (1971) 34. It comprises the Thelypteroid ferns of the Old World which have basal pinnae unreduced, all pinnae crenate to shallowly lobed, with anastomosing veins; it also includes a few species with simple entire lamina.

The present account is based on a study of type material of almost all species, and of all specimens in the herbaria at Kew, British Museum, Leiden, Florence, Geneva, Paris, Bogor, Singapore, Lae, and the U.S. National Herbarium. Thanks are expressed to the Directors and staff of these and other herbaria for their cooperation.

The following new species are described: *P. brauseanum*, *P. buwaldae*, *P. crenulatum*, *P. kjellbergii*, *P. micropinnatum*, *P. millarae*, *P. minahassae*, *P. nitidum*, *P. nothofageti*, *P. palopense*, *P. peramelense*, *P. womersleyi*. Almost all other species are here transferred for the first time to the genus *Pronephrium*.

Synonymy will be listed in full for Malesian species when the account of the whole family is published in Flora Malesiana. Here only basionyms are cited, both of the specific names adopted and of synonyms. Almost all specific epithets have been transferred to various other genera; these can be found by reference to Christensen's Index Filicum and its Supplements. Descriptions are limited to essential characters not mentioned in the keys, especially where species have been consistently misinterpreted (e.g. the generic type *P. lineatum*, and in sect. 2 *P. affine*, *P. amboinense* and *P. articulatum*). Many other species have been variously misinterpreted or confused by different authors, and published descriptions have often failed to mention characters which I believe to be important diagnostically. A list of all numbered collections of specimens of *Thelypteridaceae* is being prepared, and it is intended to circulate this list later.

KEY TO THE SECTIONS OF PRONEPHRIUM

1. Hooked hairs absent from all parts of the plant.
   2. Apical lamina pinna-like, or if much larger than pinnae, not widened and lobed towards its base; fertile pinnae usually not much smaller than sterile ones; spherical glands usually lacking, present in a few cases on sporangia . . . . . Sect. 1. **Pronephrium**
   2. Apical lamina not pinna-like, always ± widened and lobed towards its base; fertile pinnae often smaller than sterile; spherical glands present on lower surface and/or on sporangia in many species. Sect. 2. **Dimorphopteris**
1. Hooked hairs present on rhizome and usually on other parts of the plant, including sporangia. Sect. 3. **Grypothrix**

Sections 2 and 3 both appear to be related to section 1, but not closely to each other. The species *P. nudatum* and *P. asperum* are perhaps nearest to the ancestral condition of

the genus; one of these species would have been a better generic type, but they were not mentioned by Presl. The generic type *P. lineatum* is a lowland species of Java, few times collected and not very clearly characterized, possibly now almost extinct.

The spores of almost all species are as described in Blumea 19 (1971) 34, but in a few cases they are finely papillose. Two such cases are *P. nudatum* and *P. nitidum*, in both of which the spores appear to provide distinctive specific characters.

Two African species are doubtfully referable to this genus, and need further study; they are not formally transferred in the present paper, but are mentioned at the end of it. No species are known from the Mascarene islands, which is one reason for hesitation to include these two. In both the other major genera of Malesian *Thelypteridaceae (Sphaerostephanos* and *Pneumatopteris)* a few species certainly occur in Africa and also on the Mascarene islands.

Section 1. Pronephrium

Young plants of most species in this section have at first fronds with a simple lamina. Later fronds have pinnae in progressively increasing numbers and often have a progressively smaller apical lamina. Most species have rather few pinnae as compared with other Malesian genera in the family. In a few Malesian species the pinnae are always small, and the terminal lamina remains the principal part of the frond; the new species *P. micropinnatum* is an extreme example. Another trend is reduction in the number of pinnae; *P. acanthocarpum* has only one (quite large) pair. Two species never develop free pinnae, one in each of sections 1 and 3.

Dryopteris peltochlamys C. Chr. has pinnae very similar to those of *Pronephrium asperum* (no. 19) but it also has a variable number of reduced basal pinnae, for which reason it is excluded from the present monograph. Its status will be considered in a later communication.

KEY TO THE SPECIES OF SECTION PRONEPHRIUM

1. Sori exindusiate.
   2. Buds present at bases of the single pair of pinnae . . . . . **1. P. acanthocarpum**
   2. No buds present.
      3. No free pinnae; sometimes one pair broadly adnate. . . . . **2. P. beccarianum**
      3. Free pinnae present.
         4. Pinnae under 2 cm long.
            5. Fertile pinnae stalked . . . . . **3. P. brauseanum**
            5. Fertile pinnae sessile.
               6. Terminal lamina 1.7—3.5 cm wide; sori spreading along veins; sporangia glandular.
                  7. Apical lamina to 20 × 3.5 cm. . . . . **4. P. womersleyi**
                  7. Apical lamina to 6 × 1.7 cm . . . . . **5. P. melanophlebium**
               6. Terminal lamina to 1.1 cm wide; sori mostly round, sporangia setose. **6. P. micropinnatum**
         4. Pinnae longer.
            8. Veins to 5 pairs; pinnae not over 12 cm long.
               9. Pinnae 1 or 2 pairs, lobed ¼—½ towards costa, base not auricled. **7. P. pentaphyllum**
               9. Pinnae 6 or more pairs, entire to crenulate, base auricled . . **8. P. aquatiloides**
            8. Veins usually 10 or more pairs; pinnae to at least 20 cm long.
               10. Sporangia setiferous.
                  11. Pinnae *c.* 15 pairs, lower ones narrowly cuneate at base. **9. P. stenopodum**

11. Pinnae *c.* 6 pairs.
12. Rhizome long-creeping; veins very oblique, strongly S-curved; sporangia short-stalked, several acicular hairs on stalk . . . . . **10. P. nitidum**
12. Rhizome short; veins at a broad angle to costule, little curved; sporangia long-stalked with one club-shaped hair on stalk . . . . . **11. P. repandum**
10. Sporangia not setiferous.
13. Pinnae 4—6 cm wide, veins to 20 pairs.
14. Rhizome creeping; N. India to S. China. . . . . **12. P. lakhimpurense**
14. Rhizome erect; Admiralty Is to Fiji . . . . . **13. P. rubrinerve**
13. Pinnae to 3½ cm wide; veins 8—11 pairs.
15. Frond drying reddish; costules 3—3½ mm apart.
16. Pinnae commonly 2 cm wide, strongly crenate-serrate. **14. P. penangianum**
16. Pinnae 2½—3½ cm wide, irregularly sinuous to slightly crenate. **15. P. rubidum**
15. Fronds drying green; costules 4½—5½ mm apart . . . **16. P. gardneri**

1. Sori indusiate.
17. No lateral pinnae; lamina with truncate or cordate base. . . . . **17. P. menisciicarpon**
17. Lateral pinnae present.
18. Veins 12—15 pairs or more; pinnae to 15 cm or more long.
19. Pinnae to 12 pairs, sharply crenate-serrate; veins thick, pale, prominent on lower surface; spores minutely spinulose . . . . . **18. P. nudatum**
19. Pinnae not over 8 pairs; veins thin; spores with distinct wings, many or few.
20. Upper surface between veins glabrous.
21. Rhizome short-creeping; pinnae 6—8 pairs; spores with one median wing and some cross-wings . . . . . **19. P. asperum**
21. Rhizome long-creeping; pinnae 4—5 pairs; spores with many separate wings. **20. P. gymnopteridifrons**
20. Upper surface between veins densely appressed-hairy . . . **21. P. euryphyllum**
18. Veins not over 10 pairs; pinnae rarely to 15 cm long.
22. Pinnae to *c.* 10 × 1 cm . . . . . **8. P. aquatiloides**
22. Pinnae proportionately much wider.
23. Bases of pinnae (at least sterile ones) broadly truncate,lower ones often slightly auricled. **17. P. menisciicarpon**
23. Bases of pinnae cuneate, not auricled; pinnae 2 or 3 pairs. . . **22. P. lineatum**

1. **Pronephrium acanthocarpum** (Copel.) Holtt., *comb. nov.* — *Dryopteris acanthocarpa* Copel., Philip. J. Sci. 6 (1911) Bot. 136, pl. 17. Type: *Brooks 54*, Penrissen, Sarawak, on moist rocks at 900 m (MICH; BM).

Distribution. Western Sarawak; only known from two collections.

2. **Pronephrium beccarianum** (Cesati) Holtt., *comb. nov.* — *Meniscium beccarianum* Cesati, Rend. Ac. Napoli 16 (1877) 27, 30. Type: *Beccari*, Andai, W. New Guinea (FI, Herb. Beccari 12727; K, st.). — *Dryopteris oblanceolata* Copel., Philip. J. Sci 9 (1914) Bot. 3. Type: *C. King 394*, Papua (MICH; SING). — *Phegopteris rutteniana* v. A. v. R., Bull. Jard. Bot. Btzg II, 28 (1918) 36. Type: *Kornassi 725*, Ceram (BO).

Distribution. Ceram, New Guinea, Guadalcanal, Fiji, mostly below 1000 m.

3. **Pronephrium brauseanum** Holtt., *spec. nov.* — *Dryopteris canescens* var. *novo-guineensis* Brause, Bot. Jahrb. 49 (1912) 22. Type: *Schlechter 18844*, Bismarck Mts, 1100 m (B; K, L).

Rhizome short-creeping. Sterile fronds: stipe 1½—3 cm, frond 7 cm long; terminal lamina 5—6 × 1.7—2.1 cm, deeply crenate; pinnae 1 or 2 pairs, to 2.0 × 1.0 cm, crenate, sessile. Fertile fronds: stipe 10 cm, frond 9—12 cm long, terminal lamina 5½ × 1½ cm; pinnae 2 pairs, widely spaced, alternate, to 12 × 6 mm, stalked 1 mm, subentire, lower pair largest; sori a little elongate, exindusiate, sporangia setose.

Distribution. N.E. New Guinea, Goodenough Isl., by streams at 1100—1750 m.

This species differs from *Gymnogramma canescens* Bl. in the absence of reduced pinnae. It is most nearly related to *P. pentaphyllum;* both are similar in aspect to Philippine species of *Haplodictyum* Pr., but the latter have indusiate sori and glands on lower surface of pinnae.

4. Pronephrium womersleyi Holtt., *spec. nov.* — *Cyclosorus beccarianus sensu* Holttum & Roy, Blumea 13 (1965) 134.

P. beccariano affinis, differt: fronde pinnis liberis 2—10-jugatis, 5—10 mm longis, 7—8 mm latis, praedita; sporangiis glandulis solum ornatis.

Type: *Floyd & Womersley NGF 6308*, N.E. New Guinea, Eastern Highlands, 2200 m (LAE; BM).

Distribution. N.E. New Guinea, 1500—2400 m; Guadalcanal.

This is closely related to *P. beccarianum*, but is more restricted in distribution and occurs at higher altitudes. The sporangia of *P. beccarianum* bear both glands and setae. The plant cultivated at Kew gave a chromosome count of n = 72 (tetraploid).

5. Pronephrium melanophlebium (Copel.) Holtt., *comb. nov.* — *Dryopteris melanophlebia* Copel., Philip. J. Sci. 6 (1911) Bot. 147. Type: *Merrill 6959*, Canlaon Volcano, Negros (MICH; K, L, E, BO, SYD).

Distribution. Philippines (Negros, Mindanao; Luzon?).

6. Pronephrium micropinnatum Holtt., *spec. nov.*

Caudex brevis erectus, frondes fasciculatas gerens. Stipites 1—3 cm longi. Frondes ad 20 cm longae, lamina terminali et pinnis alternis 1—3-jugatis constructae. Lamina terminalis 16—18 cm longa, 1.0 cm lata, basin et apicem versus angustata, crenata, apice obtusa, basi asymmetrica, costulis 4 mm inter se distantibus, venis 5-jugatis inferioribus anastomosantibus; costae costulaeque subtus pilis patentibus vestitae; lamina inter venas subtus omnino pilis erectis minutis praedita; sori parvi, orbiculares, exindusiati; sporangia setis tenuibus ornata. Pinnae omnes steriles, maximae 1 mm longae, 2 mm latae, inferiores minores, venulis liberis.

Type: *Darbyshire & Hoogland 8014*, N. E. New Guinea, Sepik Dist., on shaded river bank, alt. 30 m (CANB; BM, L, LAE). Also *Jermy 8244*, Bewani Mts, on sandstone walls of gorge, alt. 300 m (BM; K cult.).

7. Pronephrium pentaphyllum (Rosenst.) Holtt., *comb. nov.* — *Dryopteris pentaphylla* Rosenst. in Fedde, Rep. 12 (1913) 529. Type: *Keysser 186*, Sattelberg 1400—1500 m, N.E. New Guinea (S-PA; BM, UC).

Distribution. N.E. New Guinea, in forest 1200—2000 m.

8. Pronephrium aquatiloides (Copel.) Holtt., *comb. nov.* — *Dryopteris aquatiloides* Copel., Philip. J. Sci. 7 (1912) Bot. 59. Type: *Brooks 9*, Bongo Range, Sarawak (MICH; BM). — *Cyclosorus jacobsii* Holtt., Blumea 11 (1962) 530. Type: *Jacobs 5186*, Mt Penrissen, Sarawak, 900—1000 m, on rocks in gorge (L; K, G).

This species has very small glabrous indusia, which appear to be caducous, so that it is included in the key among both indusiate and exindusiate species.

9. Pronephrium stenopodum P. Chandra, Kew Bull. 26 (1971) 81. Type: *Chandra 81109*, Assam, Haflong (K; LWG).

Only known from the original collection.

10. Pronephrium nitidum Holtt., *spec. nov.* — *Dryopteris urophylla* var. *nitida* Holtt., Gard. Bull. S.S. 7 (1934) 249, 251. Type: *Holttum 25592*, Menetendok, Mt Kinabalu, Sabah, in open among grass (SING; K).

Differs from *P. repandum*: rhizome long-creeping; upper surface of pinnae glossy, lower surface not pustular when dry; veins closer, very oblique and strongly S-curved; sporangia short-stalked, stalk bearing acicular hairs; spores closely and minutely papillose; grows in open places and light secondary forest.

Distribution. Banka, Borneo, N. & Central Celebes, Philippines (Sulu Archipelago and Mindanao).

11. Pronephrium repandum (Fée) Holtt., *comb. nov.* - *Polypodium cuspidatum* Roxb., Calc. Journ. Nat. Hist. 4 (1844) 491. Type: Penang (BR). — *Goniopteris repanda* Fée, Gen. Fil. (1852) 251. Type: *Gaudichaud*, Penang (H. Webb., FI). — *G. dalhousiana* Fée, 8e Mem. (1857) 92. Type: *Lady Dalhousie*, Penang (orig?; dupl. K). — *Phegopteris urophylla* Mett., Farngatt. IV (1858) 26, excl. syn. and var. Type: *Wallich 299*, Penang (B; K). — *Polypodium pinwillii* Bak., Ann. Bot. 5 (1891) 460. Type: *Pinwill*, Malacca (K).

Distribution. Malay Peninsula, north to Moulmein, S. Thailand, Tonkin; Sumatra, Riouw, Lingga, Anamba Isls, W. Java.

This species, much confused with others, has long been known by the epithet *urophyllum* which was given by Wallich to specimens distributed by him. But three other names were published before Mettenius validated Wallich's. Of these, *Polypodium cuspidatum* Roxb. cannot be used, as it duplicates Blume's *Aspidium cuspidatum* (in *Pronephrium* sect. 3). There is a Gaudichaud specimen from Penang labelled *G. repanda* Fée in Herb. Webb.; this is surely part of the type collection. Fée described the setose sporangia and the peculiar shape of the pinnae, and no other similar species occurs on Penang island. Lady Dalhousie's specimen, though unlocalized, must also have come from Penang, where she collected many plants. In describing it, Fée did not mention his earlier name *G. repanda*; this was probably an oversight as the two descriptions are very similar. Mettenius failed to cite *G. repanda* Fée in his monograph of the genera *Phegopteris* and *Aspidium* (1858); this also must surely have been an oversight, as his description of *Phegopteris urophylla* is in similar terms and his type was also from Penang. Hooker failed to mention the setose sporangia, a character which he evidently thought unimportant. He used Wallich's name, which he regarded as having precedence, but he failed to examine Wallich's specimen critically, so that he included in the species specimens of both *P. asperum* (which is indusiate and has pinnae of a different shape) and *P. cuspidatum* (which has elongate sori and hooked hairs). This confusion begun by Hooker misled later authors and was not finally resolved until Ching's publication of 1938 on *Abacopteris*. A full description of this species, under the name *A. urophylla*, is in Holttum, Rev. Fl. Malaya 2 (1954) 296, fig. 172. On account of the confusions between this and other species, most previous statements on distribution are wrong. This species does occur in West Java, but I see no evidence that it was known to Blume. The statement that *Aspidium repandum* Bl. = *Dryopteris urophylla* (Ind. Fil., 1905) is not true. *Pronephrium repandum* is a species of lowland forest, not of open places, and is now perhaps almost extinct in Java.

12. Pronephrium lakhimpurense (Rosenst.) Holtt., *comb. nov.* — *Dryopteris lakhimpurensis* Rosenst., Meded. Rijksherb. 31 (1917) 7. Type: *G. Mann*, Lakhimpur Dist. Assam (L). — *Meniscium cuspidatum* var. *longifrons* Clarke, Trans. Linn. Soc. II Bot. 1 (1880) 572. Type: *Wallich 60*, Assam (K). — *Dryopteris rubra* Ching, Bull. Fan Mem. Inst. Biol. 2 (1931) 198, t. 12. Type: *C. B. Clarke 19330*, Khasya (K).

Rhizome long-creeping, to 2 cm diam. in large plants; frond with stipe to 3 m tall, often much smaller but fertile; pinnae 8—10 pairs, commonly 20—30 × 4—6 cm, entire, drying reddish; veins 12—20 pairs, almost all anastomosing, excurrent veins often free; sori exindusiate, either almost circular or spreading along veins; sporangia lacking setae.

Distribution. N.E. India, S.W. China, Tonkin, N. Thailand.

Hooker included this, with *P. cuspidatum*, in *Polypodium urophyllum*. Beddome separated it from *urophyllum* but included it in *Meniscium cuspidatum*. The Indian fern is, however, much larger than Blume's Malesian species, and the latter has hooked hairs; the two are certainly very distinct.

13. Pronephrium rubrinerve (Mett.) Holtt., *comb. nov.* — *Phegopteris rubrinervis* Mett. in Kuhn, Linnaea 36 (1869) 116. Lectotype: *Turner*, New Ireland (B).

Caudex erect (*fide Kajewski 858*, Aneiteum); frond with stipe to 200 cm or more; pinnae to 18 pairs, drying reddish, largest 30—40 × 4—6 cm, crenate-serrate; veins 15—20 pairs; surfaces glabrous; sori exindusiate, sporangia not setose.

Distribution. New Ireland, Aneiteum, Fiji.

Specimens from Aneiteum and New Ireland have larger and thinner pinnae than those from Fiji, but I see no other distinction; Aneiteum specimens were from "mountain woods", one from Fiji from "swampy land" at 850 m.

14. Pronephrium penangianum (Hook.) Holtt., *comb. nov.* — *Polypodium penangianum* Hook., Spec. Fil. 5 (1863) 13. Type: *Wallich*, "Penang" (K). — *Polypodium lineatum* Colebr. *ex* Hook., Spec. Fil. 5 (1863) 12. Type: *Wallich 300*, Nepal. — *Nephrodium costatum* Bedd., Ferns Brit. India (1867) t. 220. Type: *Stewart*, Gurhwal (K). — *N. rampans* Bak., Journ. Bot. 27 (1889) 177. Type: *Henry 7844*, Hupeh (K). — *Aspidium porphyrophyllum* Chr., Bull. Acad. Int. Geogr. Bot. 13 (1904) 117. Type: *Cavalerie 1225*, Kweichow (P; E). — *Dryopteris pseudocuspidata* Chr., Bot. Gaz. 51 (1911) 357. Type: *E. H. Wilson 2603*, Szechuan (A; P, K). — *Dryopteris subcuspidata* Rosenst. Meded. Rijksherb. 31 (1917) 7. Type: *Cavalerie*, Pin-fa (L; wrongly cited as *Zippel*, New Guinea).

Rhizome creeping, 5 mm diam.; fronds with stipe 120 cm or more; pinnae to at least 18 pairs, commonly to 20 × 2 cm (type to 3 cm wide), edges crenate-serrate, drying reddish; veins to 8 pairs, very oblique; lower surface minutely hairy on axes or glabrous, when young bearing small flat scales; sori exindusiate, sporangia not setose.

Distribution. N. India from Kashmir eastwards, widely in China; reported by Matthew as growing on wet river banks.

The Wallich specimens labelled Penang on which Hooker based the name *penangianum* are thin and 3 cm wide, but not otherwise distinctive. As this species has never since been found in Penang, nor even in Burma or Thailand, it is certain that the specimens were wrongly labelled; Nepal is a more likely origin, as pointed out by Ching.

15. Pronephrium rubidum (J. Sm. *ex* Hook.) Holtt., *comb. nov.* — *Polypodium rubidum* J. Sm. *ex* Hook., Spec. Fil. 5 (1863) 12. Type: *Cuming 415*, Luzon (K; BM, E).

Stipe to 100 cm, frond to 100 cm long; pinnae to 20 pairs, to 21 × 2½—3½ cm, drying very dark red, sides parallel for most of length, apex cuspidate, edges entire to slightly crenate; veins 9—11 pairs, excurrent veins mostly free; surfaces glabrous; sori close to costules, not elongate, exindusiate, sporangia not setose.

Distribution. Luzon; Waigeu Isl. (W. New Guinea).

Most specimens so named from the Philippines are *P. cuspidatum*; the only collection seen other than the type is *Ramos 5032*, Zambales Prov., Luzon. *Cheesman 1240, 1241, 1242, 1243* (BM) from Waigeu were found on limestone, just above the sea; the species may be confined to limestone. It differs from *P. cuspidatum* in shape of pinnae, lack of hooked hairs and of buds on rachis.

16. Pronephrium gardneri Holtt., Kew Bull. 26 (1971) 81. Type: *Gardner 1137* (K).

Included in *Meniscium urophyllum* by Beddome (*Pronephrium repandum*) but differing in shape of pinnae, thin almost glabrous lamina, sporangia lacking setae; only known from Ceylon.

17. Pronephrium menisciicarpon (Bl.) Holtt., *comb. nov.* — *Aspidium menisciicarpon* Bl., Enum. Pl. Jav. (1828) 142 (not of Mett., Farngatt. IV, 1858, 121). Type: *Blume*, W. Java (L, no. 908, 333—724). — *Nephrodium latifolium* Presl, Epim. Bot. (1851) 45; Holtt., Novit. Bot. Univ. Carol. Prag. (1968) 40. Lectotype: *Cuming 298*, Leyte (PRA; K). — *Abacopteris truncata* Fée, Gen. Fil. (1852) 310. Type: *Cuming 298*. — *Polypodium borneense* Hook., Spec. Fil. 5 (1863) 11. Type: *T. Lobb*, Labuan (K). — *Dryopteris holophylla* C. Chr., Ind. Fil. (1905) 271. Type: *C. Hose 242*, Niah, Sarawak (K). — *Dryopteris mirabilis* Copel., Philip. J. Sci. 6 (1911) Bot. 137, pl. 19. Type: *Brooks 16a*, Bidi, Sarawak (MICH; BM). — *Phegopteris cordifolia* v. A. v. R., Bull. Jard. Bot. Btzg II, 11 (1913) 19, t. 5. Type: *Amdjah 322*, N. Borneo (BO; K, L). — *Dryopteris korthalsii* Rosenst., Meded. Rijksherb. 31 (1917) 5. Type: *Korthals*, Sumatra (L; K). — *Dryopteris verruculosa* var. *sumatrana* v. A. v. R., Bull. Jard. Bot. Btzg III, 2 (1920) 151. Type: *Brooks 157/S*, Lebong Tandai, Sumatra (BO; BM). — *D. urophylla* var. *peraspera* v. A. v. R., Bull. Jard. Bot. Btzg III, 5 (1922) 203. Type: *Lam 666, 677*, W. New Guinea, in forest, alt. 10 m (BO; L).

Young plants have a simple entire lamina narrowed to a ± cordate base; in some cases (types of *D. holophylla* and *P. cordifolia*) this lamina may be quite large. Later fronds have up to 7 pairs pinnae; base of pinnae broadly truncate, often a little auricled, usually widest towards abruptly short-pointed apex; lower surface short-hairy throughout; fertile pinnae usually smaller than sterile; indusia small, setose; sporangia usually with 1—3 setae.

Distribution. Java, Sumatra, Malaya, Borneo, Philippines, W. New Guinea.

Plants growing on stream-banks may be quite small, with 2 or 3 pairs pinnae; such have grown to a large size when transplanted. In Borneo some plants were found in marshy ground. The type of *D. urophylla* var. *peraspera* has pinnae to 15 × 3 cm (sterile) and sporangia lacking setae.

18. Pronephrium nudatum (Roxb.) Holtt., *comb. nov.* — *Polypodium nudatum* Roxb., Calc. Journ. Nat. Hist. 4 (1844) 491. Type: *Roxburgh 2395* (BR). — *P. multilineatum*

Wall. *ex* Hook., Spec. Fil. 5 (1863) 11; *Nephrodium moulmeinense* Bedd., Ferns Brit. Ind. Suppl. (1876) 18. Type: *Wallich 147*, Sylhet (K).

Rhizome creeping, fronds 2—3 cm apart; frond with stipe to 180 cm; pinnae to 12 pairs, largest 18 × 2.5 — 37 × 5 cm, widest near base then very gradually tapering, base broadly cuneate, apex acuminate, edges sharply crenate, strongly cartilaginous; veins 15—20 pairs, free excurrent veins rare; lower surface pustular, variously hairy; upper surface hairy on costa only; sori small, round, medial; indusia small with few hairs; sporangia not setose; spores dark with many very short spines.

Distribution. India, Burma, Thailand, Tonkin, China.

19. Pronephrium asperum (Presl) Holtt., *comb. nov.* — *Polypodium asperum* Presl, Rel. Haenk. (1825) 24, t. 3, f. 4, *non* Linn. — *Goniopteris aspera* Presl, Tent. Pterid. (1836) 183. Type: *Haenke*, Philippines (PRA). — *Abacopteris philippinarum* Fée, Gen. Fil. (1852) 310, t. 18. Type: *Cuming 16*, Philippines (orig?; K, BM). — *Meniscium kennedyi* F. v. M. Fragm. 4 (1864) 165. Type: *Dallachey & Kennedy*, Rockingham Bay (MEL; K). — *Dryopteris urophylla* var. *novoguineensis* Rosenst., Fed. Rep. 10 (1912) 336. Type: *G. Bamler 80*, Sattelberg (Ros. Fil. novoguin. exsic. 174, L, BM). — *Abacopteris multilineata* var. *malayensis* Holtt., Rev. Fl. Mal. 2 (1954) 297, fig. 173 (varietal name illegit.).

Distribution. Throughout Malesia; N. Queensland.

This species has been much confused with *P. repandum* (under the name *Dryopteris urophylla*). Sporangia on specimens from Western Malesia lack setae, but setae are sometimes present in eastern Malesia and Queensland.

20. Pronephrium gymnopteridifrons (Hayata) Holtt., *comb. nov.* — *Dryopteris gymnopteridifrons* Hayata, Ic. Pl. Formos. 8 (1919) 148, fig. 75, 76. Type: *T. Soma s.n. 1912*, Formosa (not seen). — *Cyclosorus pustulosus* Copel., Philip. J. Sci. 81 (1952) 37. Type: *Copeland 218*, Lamao River, Bataan Prov. Luzon (MICH). — *Polypodium urophyllum* var. *uniseriale* Hook., Spec. Fil. 5 (1863) 10. Type: *Urquhart*, Hong Kong (K).

Distribution. S. China, Luzon.

This appears to be somewhat intermediate between *P. asperum* and *P. nudatum*, but is usually smaller than either; lower pinnae are often rather small. The rather slender creeping rhizome and spores may be distinctive. Sori are sometimes confluent on the lower veins (hence Hooker's varietal name) but this is not constant; sporangia are usually setose. This species needs further study, both in China and Luzon.

21. Pronephrium euryphyllum (Rosenst.) Holtt., *comb. nov.* — *Dryopteris euryphylla* Rosenst., Meded. Rijksherb. 31 (1917) 7. Type: *Korthals*, Sumatra (L).

Only known from the type collection (several sheets); similar to *P. asperum* and with similar spores, but smaller and with densely appressed-hairy upper surface, as in some species of sect. *Dimorphopteris*.

22. Pronephrium lineatum (Bl.) Presl, Epim. Bot. (1851) 259. — *Aspidium lineatum* Bl., Enum Pl. Jav. (1828) 144. Type: *Blume*, Java (L, no. 909, 27—60). — *Alsophila fragilis* Zol. & Moritz., Nat. Geneesk. Arch. N.I. 1 (1844) 400. Type: *Zollinger 1019*, Tjikoya River (L). — *Dryopteris verruculosa* v. A. v. R., Bull. Jard. Bot. Btzg II, 11 (1915) 12. Type: *Backer 3954*, Pasuruan (BO). — Not *Aspidium lineatum sensu* Mett. 1858, nor *Dryopteris lineata sensu* C. Chr. 1905, nor *Abacopteris lineata sensu* Holttum 1954.

Pinnae 2 or 3 pairs, sterile 8—12 × 3 cm, fertile to 7 × 2 cm, widest above middle, base abruptly cuneate, apex short-acuminate, edges subentire to crenate; veins 7—9 pairs; sparse hairs on costae and veins of lower surface; sori inframedial, indusia small with a few short hairs and sometimes glands; sporangia with setae or glands near annulus.

Distribution. Java (4 known collections), Sabah.

The specimen from Sabah (*Kloss 19083*, SING, K) has fertile pinnae of the same size as sterile, agreeing otherwise with the type. Mettenius included *A. affine* Bl. as a synonym of *A. lineatum*, and his description is mainly based on the former.

Section 2. Dimorphopteris

Pronephrium articulatum, which occurs only in mainland Asia, may perhaps be regarded as indicating the ancestral form of this section, most Malesian species being reduced in size and otherwise diversified. The upper part of the fronds of *P. articulatum* is much like the same part of *Aspidium megaphyllum* Mett. (which I propose to place in the genus *Sphaerostephanos*), for which reason the two were confused by Hooker and others, though *A. megaphyllum* is very distinct in having a large number of reduced basal pinnae. *Pronephrium articulatum* also, like *A. megaphyllum*, bears superficial sessile spherical glands, though these are not easy to detect on old fronds and were not noted by Ching. The origin of *P. articulatum* presents a problem, as it is so isolated. Could it have originated through hybridization between such a species as *P. asperum* with an early representative of *Sphaerostephanos*? The Malesian *P. glandulosum* is very like *P. articulatum*, but much smaller and more densely glandular; in both species there is some dimorphism of fertile and sterile fronds. Some other Malesian species show greater dimorphism, the extreme case being *P. moniliforme*, the type of this section, originally named *Dimorphopteris moniliformis*. A majority of species in this section have spherical sessile glands on lamina, indusia or sporangia, but some do not. I suggest that the presence of glands is basic in this section, and that the glandless condition may have arisen through a series of crossings within Malesia with members of section *Pronephrium*. Apart from *P. articulatum*, all species of the section are Malesian.

There are a few Malesian species which belong to this section according to the character of unreduced basal pinnae but which have deeply lobed pinnae like most species assigned to *Sphaerostephanos* in Blumea 19 (1971) 39. In such cases there are sometimes plants which have a few minute, irregularly and widely spaced, reduced pinnae at the base of the fronds. For example, *Nephrodium diversifolium* Pr. has pinnae very deeply lobed; in most cases reduced basal pinnae are lacking, but one or two pairs of very small ones sometimes occur. I have omitted such species from the present treatment of *Pronephrium*. It seems possible that they owe their origin to crosses between members of the present section and species of *Sphaerostephanos*; their genetic status however can only be demonstrated by experimental work.

KEY TO THE SPECIES OF SECTION DIMORPHOPTERIS

1. Sori exindusiate.
   2. Pinnae to 3 cm long.
      3. Free pinnae 2 or 3 pairs, with much longer apical lamina.
         4. Lower surface not glandular; pinnae to 2.8 × 1 cm. . . . . **23. P. buwaldae**
         4. Lower surface glandular; pinnae to 8 mm long. . . . . **24. P. diminutum**
      3. Free pinnae *c.* 8 pairs; apical lamina comparatively short.
         5. Upper surface short-appressed-hairy; sori elongate. . . . . **25. P. millarae**
         5. Upper surface glabrous; sori not elongate . . . . . **26. P. peramelense**

2. Pinnae longer.
6. Fertile pinnae much narrower than sterile . . . . . **27. P. moniliforme**
6. Fertile pinnae not much narrower than sterile.
7. Surfaces glabrous between veins.
8. Pinnae little over 1 cm wide; sporangia setose . . . . . **28. P. palopense**
8. Pinnae 2 cm or more wide; sporangia glandular . . . . . **29. P. firmulum**
7. Surfaces both short-hairy between veins . . . . . **30. P. simillimum**

1. Sori indusiate.
9. Pinnae to 20 or more pairs.
10. Sterile pinnae more than 10 cm long . . . . . **31. P. articulatum**
10. Sterile pinnae not over 5 cm long.
11. Costules and veins on lower surface thick, pale, prominent; lower surface of costae with minute hairs only . . . . . **32. P. exsculptum**
11. Costules and veins on lower surface thin, concolorous; costae with rather sparse but conspicuous hairs . . . . . **33. P. merrillii**
9. Pinnae not over 15 pairs.
12. Lower surface between and/or on veins bearing sessile spherical glands.
13. Veins free; pinnae to 1.5 cm long. . . . . **34. P. kjellbergii**
13. Veins anastomosing; pinnae to 3.5 cm or more long.
14. Free pinnae *c.* 5 pairs, under 2 cm wide . . . . . **35. P. clemensiae**
14. Free pinnae more numerous or wider.
15. Lower pinnae with stalks 1—2 mm long.
16. Glands on lower surface confined to costules and veins.
17. Pinnae to 6.5 × 1.8 cm, lobed ¼ towards costa; sporangia glandular. **36. P. elmerorum**
17. Pinnae to 4 × 1.4 cm, lobed 2/5; sporangia not glandular. **37. P. tibangense**
16. Glands not confined to costules and veins.
18. Pinnae to 6 × 1.5 cm, lower ones more widely spaced; glands on lower surface sparse . . . . . **38. P. nothofageti**
18. Pinnae larger, lower ones deflexed but not more widely spaced; glands beneath copious. . . . . **39. P. glandulosum**
15. Lower pinnae sessile.
19. Fronds little dimorphous; hairs on lower surface of costae and costules stiff and spreading. . . . . **40. P. debile**
19. Fronds strongly dimorphous; hairs on lower surface of costae and costules slender, appressed . . . . . **41. P. minahassae**
12. Lower surface between and on veins lacking spherical glands.
20. Glands present on sporangia, in some cases setae also.
21. Fertile pinnae 2½—4 mm wide; sterile 10 mm wide . . . . . **42. P. celebicum**
21. Fertile pinnae 1 cm or more wide, little dimorphism.
22. Pinnae *c.* 5 × 1 cm, commonly 15 pairs. . . . . **33. P. merrillii**
22. Pinnae larger, not over 10 pairs.
23. Pinnae 6—10 pairs . . . . . **29. P. firmulum**
23. Pinnae 3—4 pairs. . . . . **43. P. granulosum**
20. Sporangia lacking glands, setae usually present.
24. Fertile pinnae less than 1.5 cm long . . . . . **44. P. samarense**
24. Fertile pinnae to at least 3 cm long.
25. Pinnae on both young and mature plants ± dilated and irregularly lobed distally. **45. P. xiphioides**
25. Pinnae not thus dilated and irregularly lobed.
26. Lower pinnae narrowed towards their bases both sides, not auricled. **46. P. amboinense**
26. Lower pinnae not thus narrowed, in most cases auricled.
27. Sterile pinnae 3½—5 × 1 cm; fertile 4—6 mm wide.
28. Sterile pinnae to 5 cm long, gradually narrowed in distal third. **47. P. hosei**
28. Sterile pinnae to 3.5 cm long, abruptly blunt-pointed. **48. P. rhombeum**
27. Sterile pinnae longer on well-grown plants; fertile pinnae wider.
29. Sterile pinnae acuminate; sporangia setose . . . **49. P. palauense**
29. Sterile pinnae abruptly short-pointed; sporangia in most cases lacking setae . . . . . **50. P. affine**

23. Pronephrium buwaldae Holtt., *spec. nov.*

Rhizoma breve repens. Stipites ad 8 cm longi, pallidi, pilis brevibus vestiti, paleis angustis setiferis 5 mm longis basi praediti. Frondes tenues, translucentes, 16 cm longae, lamina terminali acuminata profunde lobata 13 cm longa 2 cm lata pinnisque adnatis 2-jugatis etiam pinnis liberis 2- vel 3-jugatis constructae. Pinnae inferiores leviter reductae deflexae basiscopice angustatae; pinnae maximae 2.8 cm longae, 1.0 cm latae, sessiles, basi late cuneatae non auriculatae, apice obtusae, margine $\frac{1}{3}$ costam versus lobatae, lobis subtriangularibus vix falcatis; costulae 3 mm inter se distantes; venae 3- vel 4-jugatae, pari infimo anastomosanti; costae costulae venaeque subtus pilis variis usque $\frac{2}{3}$ mm longis vestitae, lamina subtus inter venas pilis tenuibus erectis velutina; pagina superior ut inferior vestita. Sori pinnarum inframediales, sori lobarum laminae terminalis supramediales, parvi, exindusiati; receptaculum setiferum; sporangia brevistipitata, prope annulum nec glandulis nec setis praedita.

T y p e: *Buwalda 4979*, Aru Islands, Pulau Kobroör, in forest (L).

24. Pronephrium diminutum (Copel.) Holtt., *comb. nov.* — *Dryopteris diminuta* Copel., Philip. J. Sci. 40 (1929) 298. T y p e: *Copeland Nov. 1911*, San Ramon, Mindanao, 1200 m (MICH).

Only known from one collection; a very reduced species with somewhat dimorphous fronds; sporangia setiferous with a spherical gland on the stalk.

25. Pronephrium millarae Holtt., *spec. nov.*

Caudex brevis, suberectus. Stipites frondium sterilium 7—8 cm, frondium fertilium 15 cm longi. Frondes steriles c. 13 cm longae, fertiles ad 20 cm; lamina terminalis 3—4 cm longa, deltoidea; pinnae c. 8-jugatae, infimae vix reductae, maximae steriles 2.5 × 1.0 cm stipitulis $1\frac{1}{2}$ mm longis sustentae (stipitulis pinnarum fertilium $2\frac{1}{2}$ mm longis), basi subtruncatae, apice obtusae, margine irregulariter crenatae; costulae $2\frac{1}{2}$ mm inter se distantes; venae 3-jugatae, basales solum anastomosantes; rhachis costae costulae venaeque subtus dense breviter hirsutae, pilis costularum antrorsis; pagina inferior laminae (praecipue frondis sterilis) inter venas pilis tenuibus adpressis vestita, glandulis carentibus; pagina superior omnino adpresse-hirsuta. Sori exindusiati, elongati (praecipue in venis inferioribus); sporangia glandulifera.

T y p e: *Womersley & Millar NGF 8500*, N.E. New Guinea, Morobe Dist., Wau-Salamaua Road, alt. 1650 mm (LAE).

26. Pronephrium peramalense Holtt., *spec. nov.*

Rhizome repens, $2\frac{1}{2}$ mm diametro; stipites 5 mm vel ultra inter se distantes, 10—20 cm longi, fusci, breviter pilosi, paleis angustis 3—4 mm longis rigidis. Frondes herbaceae, ad 15 cm longae; pinnae 5—8-jugatae, fertiles sterilesque conformes, infimae leviter deflexae, stipitulatae 1—$1\frac{1}{2}$ mm, interdum leviter auriculatae; lamina apicalis late deltoidea, basin versus lobata. Pinnae maximae ad 3.0 × 1.3 cm, basi truncatae, apice abrupte angustatae obtusae, margine crenulatae vel subintegrae; costulae ad 4 mm inter se distantes; venae 2-jugatae, anastomosantes; membrana sinus non manifesta; rachis subtus pilis nigris rigidis patentibus $\frac{1}{4}$ mm longis dense vestita, pagina inferior cetera glabra; costae supra prope basin pinnarum hirsutae, pagina superior cetera glabra. Sori inframediales, exindusiati; sporangia brevistipitata, prope annulum nec glandulis nec setis praedita.

T y p e: *Pulle 415*, W. New Guinea, Perameles bivouac, 1000 m (BM; L).

27. Pronephrium moniliforme (Tagawa & Iwats.) Holtt., *comb. nov.* — *Dimorpho-*

pteris moniliformis Tagawa & Iwats., Acta Phytotax. Geobot. 19 (1961) 8, fig. 14—16. Type: *Harada s.n. 30 June 1944*, Halmahera (KYO).

Only known from the type collection. Certainly related to *P. celebicum* but exindusiate, with much-reduced fertile pinnae. Dr Iwatsuki informs me that the sporangia bear glands.

28. Pronephrium palopense Holtt., *spec. nov.*

Caudex brevis, suberectus. Stipites frondium sterilium ad 17 cm, fertilium ad 40 cm longi, glabrescentes. Frondes herbaceae, 22 cm longae; pinnae 12—15-jugatae, frondium fertilium inferiores remotiores, infimae deflexae basin versus leviter angustatae; lamina terminalis acuminata. Pinnae maximae 5—6 cm longae, ad 1.2 cm latae, sessiles, basi truncatae et interdum (praecipue fertiles) leviter auriculatae, apice acuminatae, margine crenatae, crenis acutis; costulae 2½—3 mm inter se distantes; venae 4- vel 5-jugatae, 1—1½ paribus anastomosantibus, pari sequenti ad membranum sinus transienti; lamina subtus pustulosa, rachis glabrescens, costae costulaeque minute et sparsim puberulae; costae supra brevissime hirsutae. Sori inframediales, exindusiati, ± oblongi; sporangia setis plurimis tenuibus ornata.

Type: *Kjellberg 1999*, Celebes, Palopo Dist., Lamasie, sea-level, in forest (BO).

29. Pronephrium firmulum (Bak.) Holtt., *comb. nov.* — *Polypodium firmulum* Bak Kew Bull. (1893) 211. Type: *C. Hose 295*, Mt Dulit, Sarawak (K).

Distribution. Sarawak, Sabah, on rocks by streams, 300—1200 m.

Kinabalu specimens have thinner broader pinnae (to 15 × 3.3 cm) than those from Dulit. A small glabrous indusium has been seen on some specimens, but is often not detectable; sporangia often bear yellow or red glands near the annulus.

30. Pronephrium simillimum (C. Chr.) Holtt., *comb. nov.* — *Dryopteris simillima* C. Chr., Ind Fil. (1905) 292; new name for *Nephrodium simulans* Bak., Journ. Bot. 26 (1888) 325, *non* Bak. 1874. Type: *G. F. Hose 231*, Limestone hills, Sarawak (K).

Distribution. Borneo, Celebes, on limestone.

31. Pronephrium articulatum (Houlst. & Moore) Holtt., *comb. nov.* – *Nephrodium articulatum* Houlst. & Moore, Gard. Mag. Bot. (1851) 293. Type: *cult. Hort. Bot. Kew.* origin Ceylon (BM; K). — *Nephrodium glandulosum* var. *laete-strigosum* Clarke, Trans. Linn. Soc. II Bot. 1 (1880) 532, t. 74, fig. 2. Type: *Clarke 19900*, Burkul, Chittagong (K).

Caudex erect; stipe to 80 cm, frond to 100 cm long; pinnae *c.* 20 pairs, lower ones narrowed in basal 3 cm, largest to 20 × 2½—3 cm, base truncate, edges deeply crenate; veins 9—12 pairs, 3 or 4 pairs anastomosing, 2 or 3 pairs to sides of sinus-membrane; lower surface bearing scattered sessile glands, hairs on costae and costules appressed; upper surface ± copiously appressed-hairy throughout; indusia glabrous; sporangia bearing a sessile yellow gland on the stalk; spores with many small wings.

Distribution. India and Ceylon; Burma, N. Thailand, W. China.

Plants of this species were sent from Ceylon to Kew by G. Gardner in 1845, and a number of specimens taken from plants cultivated at Kew and elsewhere, over a period of at least fifteen years, have been preserved. In 1857 Lowe published an illustration under the name *Aspidium articulatum* (*non* Sw.). Hooker ignored the original publication and Lowe's, though he had a good specimen of a complete frond in his herbarium (he

named it *Nephrodium acrostichoides*, cited in Species Filicum as a synonym of *N. lineatum*). Hooker cited Ceylon specimens from Gardner and Thwaites under *Nephrodium abruptum* (Spec. Fil. 4: 77, 78); under this name he also cited specimens of several other species. Beddome accepted the name for plants from southern India and published an illustration (Ferns S. Ind. t. 86). Under *N. abruptum* Hooker also cited *Aspidium pennigerum* Bl. as a synonym, but later (p. 82) he recognized this as a distinct species, copying Blume's description; he did not cite specimens from India or Ceylon.

In *Synopsis Filicum* however Baker appears to have enlarged Hooker's concept of *N. pennigerum*, abandoning the name *N. abruptum* (Bl.) and including *N. articulatum* Houlst. & Moore as a synonym, and this concept of *N. pennigerum* was accepted by Beddome in his Handbook (p. 277). Baker failed to cite the place of publication of *N. articulatum*, so that the name was ignored by all later authors and not included in Christensen's Index Filicum. When Beddome saw Malesian specimens named *N. pennigerum* by Hooker and Baker, he realized that they were quite distinct from the Indian fern he knew; his (wrong) solution was to adopt the name *N. pennigerum* for the Indian species and Wallich's (unpublished) name *multilineatum* for the Malesian one (Handb. Suppl. 73, 80). A consequence was that Beddome had to find a new name for *Polypodium multilineatum* Wall. *ex* Hook. (*Pronephrium nudatum, supra*). The epithet *pennigerum* was taken by Blume from *Polypodium pennigerum* Forst., but Forster's New Zealand plant is quite different (in genus *Pneumatopteris* of my treatment). Hooker recognized this, and gave the name *Nephrodium pennigerum* to Blume's species (retaining Forster's as *Polypodium pennigerum*) so that *Nephrodium pennigerum* Hook. is the oldest name for the Malesian species which has long been known as *Aspidium megaphyllum* Mett.

32. Pronephrium exsculptum (Bak.) Holtt., *comb. nov.* — *Acrostichum exsculptum* Bak., Journ. Bot. 26 (1888) 326. Type: *C. Hose 244*, Niah, Sarawak (K). — *Meniscium stenophyllum* Bak., Journ. Bot. 29 (1891) 108. Type: *G. F. Hose 20*, Sarawak (K).
Distribution. Sarawak (on limestone?).

The type of *M. stenophyllum* differs in having shorter pinnae with obtuse tips. Sporangia in this species are not setose.

33. Pronephrium merrillii (Chr.) Holtt., *comb. nov.* — *Dryopteris merrillii* Chr., Philip. J. Sci. 2 (1907) Bot. 201. Type: *Foxworthy 742*, Palawan (P). — *D. hewittii* Copel., Philip. J. Sci. 3 (1909) Bot. 344. Type: *Brooks & Hewitt Feb. 1908*, Bongo Mts, Sarawak (MICH). — *D. compacta* Copel., Philip. J. Sci. 6 (1911) Bot. 137, pl. 18. Type: *Brooks 4*, Bongo Range (MICH; BM).
Distribution. Sarawak, Palawan, on rocks by streams, low alt.

The type of *D merrillii* has pinnae nearly twice as large as those of *D. hewittii*; both have about 15 pairs of pinnae. The type of *D. compacta* has pinnae about as *D. merrillii*, more than 20 pairs. There is little dimorphism between sterile and fertile fronds; sporangia sometimes bear a gland.

34. Pronephrium kjellbergii Holtt., *spec. nov.*
Rhizome breviter repens; stipites fasciculati, frondium sterilium 3—4 cm, fertilium 10 cm longi. Frondes herbaceae, 8 cm longae; pinnae 7-jugatae, inferiores remotiores leviter auriculatae; pinnae maximae steriles 15 mm, fertiles 10 mm longae, omnes ad 6 mm latae, basi truncatae, apice obtusae, margine crenatae; venae 2-jugatae, liberae; rachis

costae costulae venaeque subtus pilis ½ mm longis sparsis praeditae, pagina inferiore omnino glandulis ornata; pagine superior omnino pilis brevibus adpressis vestita, costis venisque pilis longioribus praeditis. Sori basales; indusia glandulis pilisque praedita; sporangia glandula prope annulum saepe ornata.

Type: *Kjellberg 2638*, Celebes, Mt. Porema, 1400 m (BO).

35. Pronephrium clemensiae (Copel.) Holtt., *comb. nov.* — *Dryopteris clemensiae* Copel., Philip. J. Sci. 46 (1931) 213. Type: *Clemens 16490*, Mt Moises, Luzon (UC; US). — *Dryopteris canescens* var. *degener* Chr., Philip. J. Sci. 2 (1907) Bot. 199. Lectotype: *Loher March 1906*, Montalban, Luzon (P). — *Cyclosorus degener* (Chr.) Copel., Fern Fl. Philip. (1960) 356.

Distribution. Luzon.

36. Pronephrium elmerorum (Copel.) Holtt., *comb. nov.* — *Dryopteris elmerorum* Copel., Philip. J. Sci. 40 (1929) 295, pl. 2. Type: *Copeland Nov. 1911*, San Ramon, Mindanao, 1000 m (MICH).

Only known from type collection.

37. Pronephrium tibangense (C. Chr.) Holtt., *comb. nov.* — *Dryopteris tibangensis* C. Chr., Dansk. Bot. Ark. 9, 3 (1937) 66. Type: *Mjöberg Oct.-Dec. 1925*, Mt Tibang, Sarawak, 1400—1700 m (BM; S-PA).

Only known from the type collection; very near *P. elmerorum*.

38. Pronephrium nothofageti Holtt., *spec. nov.*

Rhizoma breve repens. Stipites puberuli, frondium fertilium ad 30 cm longi, sterilium breviores. Frondes c. 20 cm longae; pinnae 8—10-jugatae, alternae, inferiores remotiores 1—2 mm stipitulatae, infimae basi leviter auriculatae; pinnae maximae steriles 4.5—6 cm longae, 1.2—1.5 cm latae, basi late cuneatae, apice acutae, margine lobatae c. ⅓ costam versus, lobis obliquis leviter dentatis; venae 3—5-jugatae, pari infimo anastomosanti, sequenti vel ad membranam sinus vel ad marginem transienti; rhachis subtus copiose breve pilosa, costae costulaeque pilis brevibus rigidis leviter antrorsis vestitae, lamina inter venas glandulis sparsim ornata; lamina supra omnino pilis brevibus adpressis vestita, venis etiam pilis longis sparsim praeditis. Pinnae fertiles quam steriles leviter minores; sori mediales; indusia parva glandulis pilisque ornata; sporangia plerumque seta tenui praedita; sporae ala translucenti alisque paucis transversalibus praeditae.

Type: *Walker 8788*, Finisterre Range, N.E. New Guinea, at 2400 m, in *Nothofagus* forest; also *8668—8671*, *8786*, *8787* (all BM).

39. Pronephrium glandulosum (Bl.) Holtt., *comb. nov.* — *Aspidium glandulosum* Bl., Enum. Pl. Jav. (1828) 144. Type: *Blume*, W. Java (L, no. 908, 337—89). — *Dryopteris iridescens* v. A. v. R., Bull. Jard. Bot. Btzg II, 11 (1913) 11. Type: *Matthew 517*, Padang Pandjang, Sumatra (BO). — *D. excrescens* Copel., Univ. Cal. Publ. Bot. 14 (1929) 374. Type: *Rahmat si Toroes 142*, Sumatra (UC; L). — *D. bartlettii* Copel., ibid. Type: *Bartlett 6692*, Sumatra (UC).

Distribution. Java, Sumatra, Malaya.

There is a considerable range in size of fronds, and in depth of crenation of pinnae.

40. Pronephrium debile (Bak.) Holtt., *comb. nov.* — *Nephrodium debile* Bak., Journ. Bot. 18 (1880) 212, not *Phegopteris debilis* Mett. Type: *Beccari 433*, G. Singgalang, Sumatra,

1700 m (K, FI). — *Nephrodium pilosiusculum* Racib., Fl. Buitenz. 1 (1898) 189; not *Aspidium pilosiusculum* Mett. Type: *Raciborski s.n.*, Tjiapoes, W. Java (BO; L, K).

Distribution. Sumatra, Java, Flores, on rocky stream-banks.

41. Pronephrium minahassae Holtt., *spec. nov.*

Caudex brevis erectus. Stipites frondium sterilium 15 cm, fertilium 30 cm longi, minute puberuli. Frondes dimorphae, herbaceae, ad 25 cm longae; pinnae c. 10-jugatae; lamina terminalis ad 10 cm longa, fere pinniformis. Pinnae steriles maximae 4.5 cm longae, 1.4 cm latae, sessiles, basi truncatae leviter auriculatae (saltem inferiores), apice abrupte acutae, margine crenatae; venae 6—7-jugatae, inferiores 1½-jugatae anastomosantes, pari sequenti ad membranam sinus transienti; rhachis subtus glabra vel subglabra, costae costulae venaeque pilis tenuibus adpressis vestitae, lamina inter venas copiose glandulifera; lamina supra omnino pilis tenuibus adpressis vestita. Pinnae fertiles maximae 2.8 cm longae, 7—9 mm latae, ut steriles crenatae, subtus soris ex toto obtectae; indusia hirsuta; sporangia glandulifera.

Type: *Alston 16570*, N. Celebes, G. Manembo-nembo (BM).

42. Pronephrium celebicum (Bak.) Holtt., *comb. nov.* — *Acrostichum celebicum* Bak., Kew Bull. (1901) 145. Lectotype: *de la Savinière 61*, N. Celebes (K; P). — *Dryopteris acrostichoides* v. A. v. R., Handb. Suppl. Corr. (1917) 49, excl. var. *rhombea* and var. *lanceola*, not O. Ktze 1891. Lectotype: *Koorders 17153*, Celebes (BO).

Distribution: Celebes, Sumba, Tenimbar Isl., Ceram, W. New Guinea.

Baker cited also a cultivated specimen from Hort. Veitch., origin Celebes. The width of pinnae on fertile fronds is variable.

43. Pronephrium granulosum (Presl) Holtt., *comb. nov.* — *Polypodium granulosum* Presl, Rel. Haenk. (1825) 24, pl. 4, fig. 2. Type: Haenke, Philippines (PRA). — *Dryopteris chamaeotaria* Chr., Philip. J. Sci. 2 (1907) Bot. 203. Lectotype: *Whitford 1369*, Mt Mariveles, Luzon (now lost?); neolectotype: *Elmer 6970*, same locality (K). — *D. maquilingensis* Copel., Philip. J. Sci. 56 (1935) 103, pl. 8. Type: *Copeland Nov. 1932*, Mt Maquiling (not found); neotype: *Elmer 18169*, same locality (L, K). — *Cyclosorus subdimorphus* Copel., Philip. J. Sci. 81 (1952) 38. Type: *Edaño PNH 13925*, Palawan (MICH). — *C. edanyoi* Copel., ibid. 37. Type: *Edaño BS 46065*, Panay (UC).

Distribution. Luzon, Palawan, Panay.

There are intermediates between this and another species (*P. rhombeum* ?); see no. 45, *P. xiphioides*. The type of *C. edanyoi* has rather deeply lobed pinnae, sometimes widened towards their apices; sporangia are not in good condition, and I have not seen glands on them.

44. Pronephrium samarense (Copel.) Holtt., *comb. nov.* — *Cyclosorus samarensis* Copel., Philip. J. Sci. 81 (1952) 35. Type: *Gachalian PNH 15240*, Samar (MICH; SING).

Known from two collections; a much-reduced species. Small indusia are present.

45. Pronephrium xiphioides (Chr.) Holtt., *comb. nov.* — *Dryopteris xiphioides* Chr., Philip. J. Sci. 2 (1907) Bot. 201. Type: *Copeland April 1905*, San Ramon, Mindanao

(lost?; not found at P). Lectotype to be selected at MICH. — *D. rhombea sensu* Copel., Philip. J. Sci. 56 (1935) 102, pl. 6, *p.p.*

I place here, tentatively, plants with pinnae of irregular form (best seen on young plants) which are apparently intermediate between *P. granulosum* and *P. rhombeum*. Sporangia are in all cases copiously setose.

46. Pronephrium amboinense (Willd.) Holtt., *comb. nov.* — *Aspidium amboinense* Willd., Sp. Pl. ed. 4, 5 (1810) 228. Type: *Ventenat*, Amboina (Herb. Willd. no. 19751, B). — *Aspidium canescens* forma *nephrodiiformis* Chr., Ann. Jard. Bot. Btzg 15 (1898) 131 *quoad Sarasin 975*. — *Dryopteris subconfluens* C. Chr., Bot. Jahrb. 66 (1933) 47. Type: *Kjellberg 1999*, Celebes, Lamasie, Palopo (BO).

This species was misinterpreted by Blume and by every subsequent author; I therefore give a brief new description, based in part on the specimens of Sarasin and Kjellberg, which are better than the original.

Stipe 25—30 cm, frond 23 cm long, pinnae 12 pairs; lower pinnae narrowed towards their bases both sides, not auricled, upper ones with truncate slightly auricled base, largest 4.5 × 1.7 cm, sessile, crenate; veins 4 pairs, 1½ pairs anastomosing; lower surface sparsely short-hairy; upper surface bearing sparse hairs between veins; sori medial, indusium small, hairy; sporangia setose.

Distribution. Amboina, central and S.E. Celebes.

The specimen which Blume described as *A. amboinense* (Enum. Pl. Jav. 148) is a small plant which I identify as *Nephrodium latipinna* Hook. (genus *Christella*). Mettenius (Farngatt. IV; 105) described a similar specimen, mentioning the glandular hairs on the lower surface and citing only *Zollinger 1601* from Java (dupl. in Herb. Webb., Fl), not Willdenow's type; he may have been misled by Kunze (Bot. Zeit. 6: 261), who had seen the type and believed *Zollinger 1601* to resemble it. Hooker (Spec. Fil. 4: 75, Syn. Fil. 292) included specimens of *N. latipinna* and two or three allied species, also *Cuming 317* which belongs to the genus *Pneumatopteris*. Beddome took up the name with varietal status under *Nephrodium molle*, including in the variety the type specimen of *Nephrodium zeylanicum* Fée. Van Alderwerelt van Rosenburgh's description applies to *Aspidium subpubescens* Bl. Backer and Posthumus place *A. amboinensis auct.* (without reference to the original) as a synonym of *Dryopteris subpubescens*.

47. Pronephrium hosei (Bak.) Holtt., *comb. nov.* — *Meniscium hosei* Bak., Journ. Linn. Soc. Bot. 22 (1886) 230. Type: *G. F. Hose 160*, river banks, Sarawak (K).

Distribution. Borneo (many collections); Mindanao?

I have not seen the specimens from Mindanao mentioned by Copeland (Fern Fl. Philip. 352). The var. *sumbensis* described by v. A. v. R. (Handb. 510) is perhaps *P. celebicum*; I did not find the type at Bogor.

48. Pronephrium rhombeum (Chr.) Holtt., *comb. nov.* — *Dryopteris diversifolia* var. *acrostichoides* subvar. *rhombea* Chr., Philip. J. Sci. 2 (1907) Bot. 200; *Dryopteris rhombea* Copel., Philip. J. Sci. 56 (1935) 102, pl. 6, excl. drawings of separate pinnae. Type: *Cuming 149*, Luzon (orig. *PNH* destroyed; dupl. K). — *D. diversifolia* subvar. *lanceola* Chr., l.c.; *D. lanceola* Copel., l.c. Type: *Copeland 250*, Mt Mariveles, Luzon (orig. PNH destroyed; dupl. K).

Distribution. Philippines, Celebes,

The Kew specimens of the type collections cited differ slightly from each other, but not in the way specified by Copeland's key in Fern Fl. Philip. (p. 335). This species certainly hybridizes with one or more others; I place specimens with pinnae of varied abnormal shape in *P. xiphioides* (no. 45).

49. Pronephrium palauense (Hosok.) Holtt., *comb. nov.* — *Meniscium palauense* Hosok., Trans. Nat. Hist. Soc. Formos. 28 (1938) 148. Type: *Hosokawa 9265*, Palau, in forest (TAI).

Pinnae to 9 pairs; sterile to 8.5 × 1.8 cm, fertile to 4.5 × 1.0 cm; lower surface with spreading hairs on rachis and costa, no glands; upper surface hairy on costa only; indusia and sporangia setose.

50. Pronephrium affine (Bl.) Presl, Epim. Bot. (1851) 259. — *Aspidium affine* Bl., Enum. Pl. Jav. (1828) 148. Type: *Blume*, W. Java (L, no. 908, 333—740). — *Gymnogramme macrotis* Kunze, Bot. Zeit. 6 (1848) 114. Type: *Zollinger 324*, Java (L). — *Dryopteris peltata* v. A. v. R., Bull. Jard. Bot. Btzg II, 16 (1914) 12. Type: *Matthew 632*, G. Tandikat, Sumatra (BO). — *D. lineata* var. *subacrostichoides* v. A. v. R., Handb. Corr. (1917) 50. Type: *Cramer*, Kota Agoeng, Sumatra (BO). — *D. zippelii* Rosenst., Meded. Rijksherb. 31 (1917) 6. Type: *Zippel*, Java (L). — *D. tenompokensis* C. Chr., Gard. Bull. S.S. 7 (1934) 248. Type: *Holttum 25388*, Kinabalu (SING; BM, K).

Distribution. Java, Sumatra, Borneo, Malaya, Peninsular Thailand.

Mettenius placed *A. affine* Bl. as a synonym under *A. lineatum* Bl.; his description applies mainly to the former, and almost all subsequent descriptions under the name *lineatum* apply in fact to *affine*. There is a good deal of variation between different collections, mountain plants having usually larger pinnae than lowland ones. A mountain plant from Malaya was found to be tetraploid (n = 72); lowland plants have not been found in Malaya. Two collections from Mt Kinabalu have setose sporangia.

Section 3. Grypothrix

This well-defined section consists of six clearly distinct species, two having a wide distribution (*P. triphyllum* from India and China to Queensland, *P. cuspidatum* almost throughout Malesia), two restricted to Western Malesia, and two to southern China and Tonkin. In addition, four other specific names have been given to plants from India and China which have the appearance of being hybrids of *P. triphyllum* with other species in parts of its wide range. I here include these as species of *Pronephrium*, as they appear to be recognizable entities, but two of them (*P. thwaitesii* and *P. insularis*) have a lobed apical lamina that is not pinna-like, and surely represent hybrids with other genera.

Dried specimens of most species of this section are ± reddish in colour, and in this they agree with some species of sect. *Pronephrium* (*P. rubidum*, *P. rubrinerve*, *P. lakhimpurense*). Partly for this reason, *P. cuspidatum* and *P. lakhimpurense* have been confused, so that *P. cuspidatum* has been credited with a distribution extending to India. The hooked hairs of sect. *Grypothrix* are very distinctive, but probably the section has an origin in common with sect. *Pronephrium*. Perhaps the central species of sect. *Grypothrix* is *P. cuspidatum*. *P. triphyllum* is more widely distributed, but this fact is due to its adaptability to more exposed situations.

KEY TO THE SPECIES OF SECTION GRYPOTHRYX

1. Rhizome long-creeping with well-spaced fronds.
  2. Frond simple with cordate or hastate base, rarely with a pair of small free pinnae. **51. P. simplex**
  2. Fronds at least trifoliate on mature plants.
    3. Fronds trifoliate . . . . . **52. P. triphyllum**
    3. Fronds of mature plants with more than one pair of pinnae.
      4. Lowest pinnae distinctly reduced; all pinnae abruptly cuspidate, cusp 2—4 cm long. **53. P. megacuspe**
      4. Lowest pinnae usually longest; pinnae not abruptly long-cuspidate.
        5. Apical lamina distinctly lobed throughout.
          6. Lowest pinnae lobed throughout. . . . . **54. P. thwaitesii**
          6. Lowest pinnae slightly lobed distally . . . . . **55. P. insulare**
        5. Apical lamina subentire (at most crenate) throughout.
          7. Pinnae not over 9 × 2 cm, all about equal . . . . . **56. P. longipetiolatum**
          7. Pinnae to 15 × 2—3 cm, basal ones longest. . . . . **57. P. parishii**
1. Rhizome short-creeping, fronds close.
  8. Pinnae narrowly cuneate at base, fertile usually 1 cm wide, quite glabrous; hooked hairs on rhizome and bases of stipe and on scales . . . . . **58. P. salicifolium**
  8. Pinnae less narrowly cuneate, fertile always wider; some hooked hairs usually present on frond and on sporangia.
    9. Pinnae 1—3 pairs, 3—3½ times longer than wide, to 24 × 7 cm . . . **59. P. rubicundum**
    9. Pinnae on mature plants over 3 pairs, proportionately narrower, to 15 × 3 cm.
      10. Pinnae almost glabrous beneath, drying reddish; buds present in axils of upper pinnae. **60. P. cuspidatum**
      10. Pinnae olivaceous when dry, hairy beneath throughout; no buds on rachis. **61. P. crenulatum**

51. Pronephrium simplex (Hook.) Holtt., *comb. nov.* — *Meniscium simplex* Hook.. Lond. J. Bot. 1 (1842) 294, t. 11. Type: *Hinds*, Hong Kong (K).

Distribution. S. China, Tonkin.

52. Pronephrium triphyllum (Sw.) Holtt., *comb. nov.* — *Meniscium triphyllum* Sw. in Schrad. J. Bot. 1800, 2 (1801) 16. Type: no details (S-PA).

Distribution. India and Ceylon, Burma, Thailand, China, Japan, Malesia, Queensland.

53. Pronephrium megacuspe (Bak.) Holtt., *comb. nov.* — *Polypodium megacuspe* Bak., Journ. Bot. 28 (1890) 266. Type: *Balansa 47*, Tonkin (K). — *Polypodium sampsonii* Bak., Ann. Bot. 5 (1891) 471. Type: *Sampson*, Kwangtung (Herb. Hance; not found at BM).

Pinnae 5 pairs, to 14 × 3.5 cm, elliptic with abruptly caudate apex 2—4 cm long, entire; veins *c.* 12 pairs, excurrent veins mostly free; lower surface glabrous or with sparse hooked hairs on costae and costules; sori supramedial, confluent. A specimen from Tonkin has slender straight hairs on lower surface, in addition to shorter hooked hairs.

Distribution. S. China, Tonkin.

54. Pronephrium thwaitesii (Hook.) Holtt., *comb. nov.* — *Meniscium thwaitesii* Hook., Fil. Exot. (1859) sub t. 83. Type: *Thwaites 3145*, Ceylon (K).

Apical lamina deeply lobed towards its base, grading to upper pinnae which are ± adnate to rachis; free pinnae 1—3 pairs; basal pinnae largest, 7—10 × 1.3—1.8 cm, on stalk 1 mm, edges crenate to shallowly lobed, veins to 7 pairs; lower surface of rachis and costae hairy, shorter hairs hooked; sparse hooked hairs on upper surface of costae; sori on lower veins elongate, on distal veins circular; sporangia bearing hooked hairs (only young ones seen).

Distribution. Ceylon, S. India.

This is probably a hybrid between *P. triphyllum* and a species with lobed pinnae. No specimens have been collected since about 1880. A similar fern has been found in Assam (*J. Day s.n. 1880*, Jhansi River, K, P), differing in larger fronds with up to 5 pairs pinnae free; this is doubtless another local hybrid of *P. triphyllum*.

55. Pronephrium insularis (K. Iwats.) Holtt., *comb. nov.* — *Abacopteris insularis* K. Iwats., Acta Phytotax. Geobot. 18 (1959) 6, fig. 5. Type: *Tagawa & Iwatsuki 2248*, Ryukyu Isl. (KYO; K, BM, E).

This is very similar to *P. thwaitesii*. Iwatsuki reports that meiosis is irregular (Mem. Coll. Sci. Univ. Kyoto, B, 31: 196. 1965).

56. Pronephrium longipetiolatum (K. Iwats.) Holtt., *comb. nov.* — *Abacopteris longipetiolata* K. Iwats., Acta Phytotax. Geobot. 18 (1959) 11, fig. 6. Type: *Tagawa 2593*, Taiwan, Prov. Taito, 800 m (KYO).

57. Prohneprium parishii (Bedd.) Holtt., *comb. nov.* — *Meniscium parishii* Bedd., Ferns Brit. India (1866) t. 184. Type: *Parish 135*, Moulmein (K).

Distribution. Ceylon, Assam southwards to Malaya; Tonkin

In Malaya there are intermediates between this and *P. triphyllum*.

58. Pronephrium salicifolium (Wall. *ex* Hook.) Holtt., *comb. nov.* — *Meniscium salicifolium* Wall. *ex* Hook., Ic. Pl. 10 (1854) t. 990. Type: *Wallich 63*, Penang (K).

Distribution. Malaya, Borneo, Sumatra; in flood zone on stream-banks.

59. Pronephrium rubicundum (v. A. v. R.) Holtt., *comb. nov.* — *Phegopteris rubicunda* v. A v. R., Bull. Jard. Bot. Btzg III, 2 (1920) 162. Type: *Brooks 232/S*, Lebong Tandai, Sumatra (BO; BM).

Distribution. Sumatra, Malaya, in lowland forest.

60. Pronephrium cuspidatum (Bl.) Holtt., *comb. nov.* — *Meniscium cuspidatum* Bl., Enum. Pl. Jav. (1828) 114. Type: *Blume s.n.*, Java (L). — *Dryopteris ramosii* Chr., Philip. J. Sci. 2 (1907) Bot. 203. Type: *Ramos 1792*, Rizal (dupl. K). — *Meniscium liukiuense* Chr. in Matsum. Bot. Mag. Tokyo 24 (1910) 240. Type: *Onnah*, Liukiu Arch. (P). — *Dryopteris burchardii* Rosenst., Meded. Rijksherb. 31 (1917) 3. Type: *Rosenst. Fil. Sumatr. exsic. no. 3a, leg. Burchard* (not seen; *no. 44*, so named by Rosenstock, *leg. Burchard*, is a small sterile plant of *P. cuspidatum*). — *D. amaiensis* Rosenst., Meded. Rijksherb. 31 (1917) 6. Type: *Hallier 3157*, Borneo (L).

Distribution. Almost throughout Malesia excluding the Peninsula; Solomon Isls, Ryukyu Isls, Taiwan.

61. Pronephrium crenulatum Holtt., *spec. nov.*

Rhizoma repens, 5 mm diametro, frondibus c. 1 cm inter se distantibus. Stipites c. 44 cm longi, straminei, glabri, basi paleis angustis 5 mm longis praediti. Frondes firmiter herbaceae, c. 30 cm longae; pinnae 8-jugatae, infimae 2 mm stipitulatae basin versus asymmetrice angustatae. Pinnae maximae 8.5—10 cm longae, 2.3 cm latae, basi rotundatae, apice breviter cuspidatae, margine crenatae (steriles) vel subintegrae (fertiles); costulae 2.5 mm inter se distantes sub angulo 60° abeuntes: venae 7—8-jugatae, 3—4-paribus anastomosantibus interdum meniscioideis; lamina subtus pustulosa, rachis costaeque pilis brevibus hamatis dense vestitae, costulae venae laminaque similiter sed minus dense

pilosae; costa supra hirsuta, pagina superior praeter pilos paucos prope marginem glabra. Sori mediales vel supramediales, interdum coalescentes, exindusiati; sporangia pilis brevibus hamatis ornata.

Type: *Eberhardt s.n. 1896*, Lang bian, Minh-thuan, near Dalat, Vietnam (P). Also: *Eberhardt 119*, without locality; *Hayata s.n. June 1921*, Dalat (P).

African species doubtfully referable to Pronephrium

1. Cyclosorus blastophorus Alston, Bol. Soc. Brot. Ser. 2, 30 (1956) 12; Ferns W. Trop. Africa (1959) 62.

Pinnae to 12 pairs, broad, subentire; rachis and costae minutely hairy on both surfaces; sori exindusiate; sporangia not setiferous; spores not seen; a bud present on rachis near base of terminal lamina.

Distribution. W. Tropical Africa, Fernando Po.

In general aspect this is very similar to *Goniopteris poiteana* (Bory) Ching of the West Indies, and I suggest that it may be related to *Goniopteris* rather than to the *Pronephrium* species of Asia. All hairs on the frond are very short and straight; I cannot find any forked or branched hairs on any part of the plant. The small broad scales have few hairs on them.

2. Meniscium pauciflorum Hook., Spec. Fil. 5 (1864) 164. — *Menisorus pauciflorus* (Hook.) Alston, Bol. Soc. Brot. Ser. 2, 30 (1956) 20; Ferns W. Trop. Africa (1959) 63.

Caudex short, erect; stipe to 30 cm, frond to 50 cm; apical lamina pinna-like with a bud at its base; pinnae 15—25 pairs, largest 10 cm long, less than 1 cm wide, serrate, glabrous except for upper surface of costae; veins 2 pairs; sori spreading along veins, exindusiate; sporangia not setose; spores pale, minutely sparsely papillose, laesura always short, some spores almost spherical.

Distribution. Tropical Africa, widely, on rocks beside streams.

This species resembles *Pronephrium salicifolium* in habit, but the resemblance is probably due to adaptation in both cases to a stream-bank habitat where periodically a sudden rush of flood-water occurs. The spores of *M. pauciflorum* are very similar to the trilete spores of *Aspidium ciliatum* Benth. which grows in similar habitats. As currently interpreted, *A. ciliatum* is a very variable species. Ching has segregated *Thelypteris zeylanica* from it, and I suggest a comparison of this with *M. pauciflorum*. The Ceylon fern is however smaller, and lacks a bud on the rachis.

INDEX

New names are in **bold type**. Numbers refer to the species (or sections) under which the names are mentioned.