

THE FERN-FAMILY THELYPTERIDACEAE IN MALAYA

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SUMMARY

The genera and species of Thelypteridaceae in Malaya are here arranged as in a monograph of the family prepared for *Flora Malesiana*, Series II (Pteridophyta) Vol. 1, part 5, which is in process of publication simultaneously with the present paper. New names and new combinations will date from *Flora Malesiana* and not from the present paper, the object of which is to indicate the necessary corrections in Holttum, *A Revised Flora of Malaya* Vol. 2 (dated 1954 but published early in 1955, second edition 1968) to which reference is made under every species. Apart from changes in generic concepts, the principal new information concerns the species named *Thelypteris vicosa*, *Cyclosorus stipellatus* and *Cyclosorus ferox* in 1955. New descriptions are only provided where those in the book are defective.

INTRODUCTION

The family Thelypteridaceae comprises about 1000 species, about 8% of all known ferns. About 430 species are now known in Malesia. Early descriptions of species were rarely adequate to identify specimens, and several names were used confusedly in the 19th century. As a basis for the present work, types of almost all species were examined and re-described; all specimens in some major herbaria have also been studied, and many recent unnamed collections. This resulted in the discovery that some species had been wrongly named in the book of 1955; also more critical study and new collections in Malaya indicated that a few species should be subdivided. In 1971 I published a new scheme of genera in the family, to which the Malayan species are here allocated. Subsequently I published a series of monographs of most of the genera, except the largest (*Sphaerostephanos*). Some taxonomists prefer to regard all species in the family as members of the genus *Thelypteris*; the correct name for each species in that genus, if published, is here indicated.

A CONSPECTUS OF THE GENERA

It was evident to me that the system of genera adopted in the book of 1955 was not a natural one; for example, the species there named *Thelypteris immersa* and *Cyclosorus extensus* are closely allied and should not be in different genera; similarly, the species named *Abacopteris lineata* is closely related to *Cyclosorus glandulosus*. Within both *Thelypteris* and *Cyclosorus* is a mixture of species of diverse relationships. Ching established some new genera in 1963, but some of them are wholly or mainly in mainland Asia, and in Malesia there are very numerous additional species which need to be fitted into the picture. My treatment was thus more elaborate than Ching's. The following conspectus shows how I think the genera are related. It is not easy to show this in a way that will also serve as a key by which specimens may be allocated to their correct genera; an artificial key for this purpose (covering Malayan genera only) follows. The inter-relations of the groups are still very uncertain, and need to be considered in the context of the whole family which is world-wide in distribution with the greatest abundance of species in the wet tropics.

1. Group of *Phegopteris* (Holttum, Gard. Bull. Singap. 29:145, with key to species. 1977).

Fronds bipinnate or pinnate with deeply lobed pinnae; veins often branching, not reaching margins of leaflets; upper surface of costae prominent, not grooved; indusium present or absent; chromosome numbers 30, 31, 35.

Genera: (*Phegopteris*, not in Malaya), *Pseudophegopteris*, *Macrothelypteris*, *Metathelypteris*.

2. Group of *Coryphopteris*.

Fronds pinnate with deeply lobed pinnae and simple free veins which all reach the margin; sporangia short-stalked, lacking hairs or glands distally; indusia present; small spherical resinous glands usually present on lower surface of pinnae; some acicular hairs in some species consisting of several cells; caudex erect (*Coryphopteris*), or slender and long-creeping (*Parathelypteris*). Chromosome number 31 or 32.

3. Group of *Trigonospora*.

Caudex erect; fronds pinnate with deeply lobed pinnae and free veins (except one species in Burma); indusia present; sporangia lacking glands or hairs distally; spores trilete with discontinuous perispore of minute papillae; plants of rocky stream-beds; chromosome number 36.

Genera: *Trigonospora* (Asia and W. Malesia), *Menisorus* (Africa).

4. Group of *Thelypteris*.

Caudex prostrate, short or long; fronds simply pinnate with lobed pinnae; no reduced basal pinnae; veins free or anastomosing, simple except in *Thelypteris*, all reaching the margin; persistent scales, often broad, present on lower surface of costae; sori indusiate or not; sporangia lacking glands or hairs distally but bearing a large spherical red gland at the end of a hair on sporangium-stalk, similar glands sometimes present on lower surface of pinnae; chromosome number 36 (35 in *Thelypteris*).

Genera: *Thelypteris* (not Malayan), *Cyclosorus*, *Ampelopteris*, *Mesophlebion*.

5. Group of *Chingia*.

Caudex massive, erect (sometimes short-creeping in *Plesioneuron*); long narrow scales at base of stipe, often throughout stipe and rachis; fronds pinnate, pinnae variously lobed; no reduced basal pinnae; veins in *Chingia* always oblique, several pairs passing to the sides of a long sinus-membrane which is always prominent on the lower surface; sori close to costules in *Chingia*, often exindusiate; sporangia often bearing small capitate hairs or small spherical glands; chromosome number 36.

Genera: *Chingia*, *Plesioneuron* (in Eastern Malesia and the Pacific).

6. Group of *Sphaerostephanos*.

Caudex erect or short-creeping (long-creeping in *S. unitus* only); fronds simply pinnate, pinnae deeply lobed to entire; reduced pinnae present, sometimes very

small with long aerophores, except *Pronephrium*; veins anastomosing in the less deeply lobed species, sinus membranes usually distinct, short or long; sessile spherical glands or small capitate hairs present on sporangia of many species and often also on surface of pinnae; spores with many separate small thin wings or with a median translucent wing and cross-wings; chromosome number 36.

Genera: *Pneumatopteris*, *Sphaerostephanos*, *Pronephrium*.

7. Group of *Christella*.

Caudex erect or short- to long-creeping; fronds simply pinnate; pinnae deeply to shallowly lobed; lower pinnae in *Christella* gradually reduced but the basal ones never very small; swollen aerophores lacking or rare; glandular hairs on pinnae, if present, $\pm$ elongate; sporangia lacking glands or hairs distally, in *Christella* always with an elongate unicellular gland on the stalk; perispore consisting of rather thick tubercles or ridges; chromosome number 36.

Genera: *Christella*, *Amphineuron*.

KEY TO THE GENERA

1. Upper surface of costae not grooved; veins not reaching margin
 2. Fronds bipinnate
 3. Slender septate acicular hairs present on lower surface of axes of frond 1. *Macrothelypteris*
 3. Acicular hairs on axes of frond all unicellular ... 2. *Pseudophegopteris*
 2. Fronds simply pinnate
 4. Sporangia bearing setae 2. *Pseudophegopteris*
 4. Sporangia lacking setae 3. *Metathelypteris*
1. Upper surface of costae grooved; veins all reaching margin
 5. Much-reduced basal pinnae lacking, or 1–2 pairs inconstantly present or absent
 6. Veins all free
 7. Caudex slender, long-creeping 4. *Parathelypteris*
 7. Caudex erect or short-creeping, not slender
 8. Caudex quite erect; basal basiscopic vein of each group arising from costule, not from costa
 9. Fronds commonly more than 100 cm long; copious minute yellow glands on lower surface of veins ... 15. *Amphineuron*
 9. Fronds rarely over 50 cm long; glands on lower surface, if present, otherwise
 10. Plants of mountain ridges; resinous glands usually present on lower surface of pinnae 5. *Coryphopteris*

- 10. Plants of rocky stream-beds; no glands present 6. *Trigonospora*
- 8. Caudex short-creeping; basal basisopic vein of each group arising from costa, not from costule 7. *Mesophlebion*
- 6. Veins anastomosing
 - 11. Plants of wet places; caudex long-creeping; flat scales present on lower surface of costae, at least on young fronds
 - 12. Plants of open swamps; fronds not proliferous; indusia present 8. *Cyclosorus*
 - 12. Plants of banks of streams or ditches; fronds freely proliferous; indusia lacking 9. *Ampelopteris*
 - 11. Plants not growing in wet places; caudex erect or short-creeping; no flat scales on lower surface of costae
 - 13. Caudex erect; stiff narrow scales at base of stipe; sori close to costules; a long prominent sinus-membrane present 10. *Chingia*
 - 13. Caudex short-creeping; scales otherwise; sori rarely close to costules; no long sinus-membrane prominent on lower surface
 - 14. Pinnae crenate 13. *Pronephrium*
 - 14. Pinnae distinctly lobed
 - 15. In larger pinnae, at least 3 pairs of veins anastomosing or passing to sides of sinus-membrane; a few spherical yellow glands present on lower surface of costules and veins 12. *Sphaerostephanos*
 - 15. In larger pinnae, at most 2 pairs of veins thus; glands, if present, otherwise
 - 16. Copious hairs 1 mm long on lower surface; elongate red glands present on lower surface of veins 14. *Christella*
 - 16. Most hairs much shorter; glands on veins usually abundant, small and colourless or minute and yellow 15. *Amphineuron*
- 5. Much-reduced basal pinnae present; transition from normal to reduced pinnae abrupt or gradual
 - 17. Spherical yellow glands present, at least on indusia or sporangia, in most species throughout lower surface of pinnae 12. *Sphaerostephanos*
 - 17. Spherical yellow glands lacking
 - 18. A few pairs of lower pinnae gradually reduced ... 14. *Christella*
 - 18. An abrupt transition from normal to reduced pinnae at base of frond 11. *Pneumatopteris*

1. MACROTHELYPTERIS CHING

1. **Macrothelypteris torresiana** (Gaud.) Ching; Holttum, Gard. Bull. Singap. 29 (1977) 148.

Basionym: *Polystichum torresianum* Gaud. in Freycinet Voy. Bot. (1824) 333.

Name in Holttum 1955: *Thelypteris uliginosa* (Kunze) Ching, p. 241.

Correct name in *Thelypteris*: *T. torresiana* (Gaud.) Alston, Lilloa 30 (1960) 111.

Status in Malaya: as Holttum 1955.

2. PSEUDOPHEGOPTERIS CHING

1. **Pseudophegopteris rectangularis** (Zoll.) Holttum, Blumea 17 (1969) 19; Gard. Bull. Singap. 29 (1977) 149.

Basionym: *Polypodium rectangulare* Zoll., Syst. Verz. (1854) 37, 48.

Name in Holttum 1955: *Thelypteris oppositipinna* (v.A.v.R.) Ching, p. 239.

Correct name in *Thelypteris*: *T. rectangularis* (Zoll.) Nayar & Kaur, Comp. to Beddome (1974) 72.

Status in Malaya: as Holttum 1955.

2. **Pseudophegopteris paludosa** (Bl.) Ching; Holttum, Gard. Bull. Singap. 29 (1977) 149.

Basionym: *Polypodium paludosum* Bl., Fl. Jav. Fil. (1851) 192.

Name in Holttum 1955: *Thelypteris brunnea* (Wall.) Ching; p. 240.

Correct name in *Thelypteris*: *T. paludosum* (Bl.) K. Iwats., Acta Phytotax. Geobot. 19 (1961) 11.

Status in Malaya, with note on synonym: as Holttum 1977, l.c.

3. METATHELYPTERIS CHING

1. **Metathelypteris flaccida** (Bl.) Ching; Holttum, Gard. Bull. Singap. 29 (1977) 147.

Basionym: *Aspidium flaccidum* Bl., Enum., Pl. Jav. (1828) 161.

Name in Holttum 1955: lacking.

Correct name in *Thelypteris*: *T. flaccida* (Bl.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 336.

Status in Malaya: increasing, on bare earth banks by roadsides in sheltered places at Cameron Highlands, c. 1500 m. See notes on the two forms of this species in Holttum 1977.

Distribution: W. Java, Sumatra (?), Ceylon & S. India, N.E. India to Yunnan.

2. **Metathelypteris gracilescens** (Bl.) Ching, Acta Phytotax. Sinica 8 (1963) 305.

Basionym: *Aspidium gracilescens* Bl., Enum. Pl. Jav. (1828) 155.

Name in Holttum 1955: lacking.

Correct name in *Thelypteris*: *T. gracilescens* (Bl.) Ching, Bull. Fan. Mem. Inst. Biol. Bot. 6 (1936) 327.

Misidentified as *M. decipiens* (Clarke) Ching in Holttum 1977: 147.

Status in Malaya: known only from a single collection from G. Batu Brinchang.

This species occurs in Mainland Asia from the Darjeeling district in N. Bengal to southern Japan, and has been found in Malesia on mountains at about 1800 m from Sumatra to New Guinea, usually (as on G. Batu Brinchang) on wet rocks near a waterfall. *M. decipiens* (at Darjeeling) differs from Malesian specimens of *M. gracilescens* in having shorter fronds (those of the latter in Malesia commonly 25–30 cm long) with fewer pinnae, the basal pinnae largest, and veins mostly forked. The Malayan specimen (Molesworth Allen 5005) has more forked veins than is usual in Malesian specimens but otherwise does not differ. There are not many places in Malaya where wet rocks by waterfalls occur at 1800 m.

3. **Metathelypteris dayi** (Bedd.) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 205; Holttum, Gard. Bull. Singap. 29 (1977) 148.

Basionym: *Nephrodium dayi* Bedd., Journ. Bot. 25 (1877) 323.

Name in Holttum 1955: *Thelypteris singalanensis* (misidentification), p. 243.

Correct name in *Thelypteris*: *T. dayi* (Bedd.) Nayar & Kaur, Comp. to Beddome (1974) 59.

Status in Malaya: as Holttum 1955.

Distribution: throughout Malesia except E. Java and Lesser Sunda Islands.

4. **PARATHELYPTERIS CHING, ACTA PHYTOTAX. SINICA 8 (1963) 300.**

The type of this genus is *P. glanduligera* (Kunze) Ching, a species based on a specimen collected near Canton. The lower pinnae of its fronds are not reduced. It appears to be related to *Coryphopteris* but has a long slender creeping rhizome. Ching has also included in this genus two species with lower pinnae gradually much reduced: the Malayan *P. beddomei* and *P. nipponia* (Fr. & Sav.) Ching from China and Japan. There are two species in North America, one like *P. beddomei* in habit, the other like *P. glanduligera*. I think that two genera are here confused; comparative studies of plants from Asia and N. America are needed to resolve this situation.

1. **Parathelypteris beddomei** (Bak.) Ching, Acta Phytotax. Sinica 8 (1963) 302.

Basionym: *Nephrodium beddomei* Bak., Syn. Fil. (1867) 267.

Correct name in *Thelypteris* and name in Holttum 1955, p. 240: *T. beddomei* (Bak.) Ching.

Status in Malaya: now frequent at Cameron Highlands by roadsides which are sheltered by forest, in places where there is a seepage of water.

5. CORYPHOPTERIS HOLTUM, BLUMEA 19 (1971) 33; 23 (1976) 18-47.

The type of this genus is *C. viscosa* (Bak.) Holttum, of which the type specimen was collected near the top of Mt Ophir by Hugh Cuming in 1839. The genus comprises about 47 species almost all of which occur in Malesia, on mountain ridges where the soil is peaty and very acid. All species have an erect caudex and free veins, the basal pinnae not or little reduced; almost all have red resinous glands on one or both surfaces of pinnae (not easy to see on dried specimens). In 1955 I treated *Thelypteris viscosa* very broadly, mentioning variation among the specimens so named; here they are divided into four species.

KEY TO THE SPECIES IN MALAYA

1. Base of stipe bearing pale, firmly cylindrical septate hairs
 2. Stipe and abaxial surface of rachis densely covered with spreading hairs many of which are septate
 3. Pinnae to 18 x 2.5 cm 1. *C. unidentata*
 3. Pinnae c. 5.5 x 1.2 cm 2. *C. tahanensis*
 2. Stipe above base and abaxial surface of rachis less densely hairy with few septate hairs 3. *C. hirtipes*
1. Base of stipe not bearing such hairs
 4. Sessile glands present between veins on upper surface of pinnae
 5. Stipe-scales thin, less than 1 mm wide above base; lower surface of costae bearing many acicular hairs 4. *C. viscosa*
 5. Stipe-scales firm, 1 mm or more wide; lower surface of costae bearing short capitate hairs 5. *C. gymnopoda*
 6. Upper surface of pinnae lacking hairs between veins var. *gymnopoda*
 6. Upper surface of pinnae bearing acicular hairs between veins
 7. Lower surface between veins, and indusia, lacking acicular hairs var. *bintangensis*
 7. Lower surface between veins bearing copious short erect acicular hairs var. *humilis*
 4. Sessile glands lacking between veins on upper surface of pinnae
 8. Acicular hairs present on lower surface of costae; glands present, at least on costae
 9. Septate hairs present on upper surface of rachis and costae
 10. Septate hairs on upper surface of rachis and costae less than 0.5 mm long; stipe-scales 3 mm long, thin 6. *C. arthrotricha*

- 10. Septate hairs on upper surface of rachis and costae 1 mm or more long; stipe-scales to 7 x 1 mm, rigid, hair-pointed 2. *C. tahanensis*
- 9. Septate hairs absent on upper surface of rachis and costae 7. *C. pectiniformis*
- 11. Hairs on lower surface of costae unicellular, less than 1 mm long var. *pectiniformis*
- 11. Hairs on lower surface of costae septate, to 1.5 mm long var. *hirsuta*
- 8. Acicular hairs lacking or rare on lower surface of costae; no glands present on lower surfaces 8. *C. badia*

1. **Coryphopteris unidentata** (Bedd.) Holttum, Blumea 23 (1976) 26.

Basionym: *Lastrea unidentata* Bedd., Handb. Suppl. (1892) 53.

Name in Holttum 1955, p. 251, correct in *Thelypteris*: *T. unidentata* (Bedd.) Holttum.

Status in Malaya: known only from G. Bubu, G. Bintang and G. Inas in Perak (not found at Cameron Highlands, wrongly so reported in Holttum 1955).

2. **Coryphopteris tahanensis** Holttum, Blumea 23 (1976) 33.

Name in Holttum 1955: *Thelypteris viscosa*, in part.

Correct name in *Thelypteris*: none published.

Differs from *C. viscosa*: scales at base of stipe 7–8 x 1 mm, rigid, acuminate; glands lacking on upper surface of pinnae; upper surface of rachis and costae, at least near apex of frond, bearing septate hairs 1 mm long, multicellular hairs 1.5 mm long sometimes also present on lower surface. One specimen from G. Tahan has the lower surface of rachis and costae covered with hairs almost 2 mm long.

Three collections from c. 1800 m on G. Tahan, one from G. Batu Brinchang and one from G. Lari Tembakau.

3. **Coryphopteris hirsutipes** (Clarke) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 203.

Basionym: *Nephrodium gracilescens* var. *hirsutipes* Clarke, Trans. Linn. Soc. II Bot. 1 (1880) 514, t. 67.

Name in Holttum 1955: *Thelypteris herbacea* Holttum, p. 254.

Correct name in *Thelypteris*: *T. hirsutipes* (Clarke) Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 314.

Base of stipe bearing spreading septate hairs 1–3 mm long; some septate hairs also present on upper surface of rachis and costae; hairs on lower surface very variable, sometimes all unicellular; glands present on lower surface of Sumatran specimens, not on Malayan ones.

In Malaya, known from three collections: G. Tahan, near Wray's Camp (915 m); G. Padang, Trengganu; G. Hijau at 1370 m, "locally abundant" (Molesworth Allen).

4. ***Coryphopteris viscosa*** (Bak.) Holttum, *Blumea* 19 (1971) 33.

Basionym: *Nephrodium viscosum* Bak. Syn. Fil. (1867) 264.

Name in Holttum 1955: *Thelypteris viscosa* (Bak.) Ching, p. 252, in part.

Status in Malaya: only known with certainty from Mt Ophir.

Stipe-scales c. 4 x 0.5 mm, thin; lamina to 30 cm long, tapering gradually distally; pinnae 25 pairs or more, closely placed; basal pinnae to 1.4 cm wide, narrowed towards their bases; largest pinnae 5.5 x 1.2 cm, lobes nearly entire; glands present on both surfaces between veins; acicular hairs present on lower surface of rachis and costae, also very narrow scales; distal sori often $\pm$ asymmetric.

There are apparently distinct varieties of this species in Western Sarawak. Some specimens from the Main Range in Malaya which I have named *C. gymnopoda* are perhaps intermediate between that species and typical *C. viscosa*.

5. ***Coryphopteris gymnopoda*** (Bak.) Holttum, *Blumea* 23 (1976) 29.

Basionym: *Nephrodium gymnopodum* Bak., Trans. Linn. Soc. II Bot. 4 (1894) 252.

Name in Holttum 1955: *Thelypteris viscosa*, in part.

Correct name in *Thelypteris*: none published.

Synonyms: *Lastrea ridleyi* Bedd. and *L. robinsonii* Ridl.

Var. ***gymnopoda*** differs from *C. viscosa* as follows: stipe-scales firm, dark, 1–1.5 mm wide; pinnae 15–18 (rarely to 25) pairs, well spaced; pinna-lobes mostly crenate; lower surface of costae bearing capitate hairs and glands, acicular hairs usually lacking; distal sori rarely asymmetric.

Status in Malaya: found on G. Tahan and at scattered localities on the Main Range, especially in open places. The type came from Mt Kinabalu, where this species is abundant at 1800 m and higher. The types of *Lastrea ridleyi* and *L. robinsonii* are small plants.

Var. ***bintangensis*** Holttum, *Blumea* 23 (1976) 30. Upper surface between veins covered with very short acicular hairs in addition to glands.

Status in Malaya: only known from the type collection on G. Bintang.

Var. ***humilis*** Holttum, *Blumea* 23 (1976) 30. Fronds small; both upper and lower surfaces between veins covered with short acicular hairs.

Status in Malaya: several collections from exposed places at Cameron Highlands at about 1500 m; their condition is possibly due to exposure; more study is needed.

6. **Coryphopteris arthrotricha** Holttum Blumea 23 (1976) 33.

Name in Holttum 1955: *Thelypteris viscosa*, in part.

Correct name in *Thelypteris*: none published.

Stipe dark at base, paler distally; scales at base of stipe c. 3 mm long, thin; lamina 25–45 cm long; pinnae c. 20 pairs, well spaced, commonly 8 x 1.6 cm; pinnalobes entire to dentate; lower surface of rachis and costae bearing minute acicular and capitate hairs, on costae also red glands and linear scales; few glands between veins; hairs on upper surface of rachis and costae hardly 0.5 mm long but many of them septate (2–4 cells), upper surface between veins glabrous or with a few short hairs, not glands.

Status in Malaya: this is the common species on the Main Range, in ridge forest at 1200–1500 m; known also from Sumatra.

7. **Coryphopteris pectiniformis** (C. Chr.) Holttum Blumea 23 (1976) 34.

Basionym: *Dryopteris pectiniformis* C. Chr. Gard. Bull. Str. Settl. 4 (1929) 379.

Name in Holttum 1955, p. 253, and correct name in *Thelypteris*: *T. pectiniformis* (C. Chr.) Ching.

Status in Malaya: in forest on Taiping Hills at 1250–1400 m; a few records from the Main Range and G. Padang in Trengganu.

Var. **hirsuta** Holttum, Blumea 23 (1976) 34. Differs from the typical form of the species as follows: fronds smaller with pinnae to 6.5 cm long; lower surface of costules and veins bearing acicular hairs 1.5 mm long which are septate; hairs on indusia 0.5 mm long.

Status in Malaya: only known from the ridge connecting Fraser's Hill to Pine Tree Hill.

8. **Coryphopteris badia** (v.A.v.R.) Holttum, Blumea 23 (1976) 44.

Basionym: *Dryopteris badia* v.A.v.R., Bull. Jard. Bot. Btzig II, 16 (1914) 9.

Correct name in *Thelypteris*: *T. badia* (v.A.v.R.) Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 250.

Stipe dark, glossy, at base often bearing a tangled mass of slender hairs which are golden brown when dry; lamina of frond variable according to habitat, 10–65 cm long; pinnae thick and rigid when dry, nearly all distinctly stalked, basal acroscopic lobe free or nearly so, lower surface quite glabrous apart from a few hair-like scales on costae, no glands; upper surface of costae bearing rigid dark brown hairs, no other hairs on upper surface and no glands; indusia glabrous.

Status in Malaya: known only from one small plant found on G. Ulu Kali at 1800 m by Mrs A.G. Piggott; other collections from N. Sumatra, Sarawak, Sabah, Sulawesi and New Guinea, at 1400–2500 m, usually growing in moss-cushions, sometimes on branches of trees in moss-forest. The largest known fronds are from an epiphytic plant collected in N. Sumatra.

6. TRIGONOSPORA HOLTTUM, BLUMEA 19 (1971) 29.

Plants of rocky stream-beds; caudex short, erect; basal pinnae not reduced; veins free; sori indusiate; sporangia lacking glands or hairs; spores trilete.

This is a genus of about 10 species, mostly in mainland S.E. Asia and Ceylon.

1. *Trigonospora ciliata* (Benth.) Holttum, Blumea 19 (1971) 29.

Basionym: *Aspidium ciliatum* Benth., Fl. Hongkong. (1861) 455.

Name in Holttum 1955, p. 250, correct in *Thelypteris*: *T. ciliata* (Benth.) Ching.

Correction to Holttum 1955. The type of this species is a specimen from Hong Kong described by Benthham, who adopted a name given by Wallich to a plant from Nepal.

Status in Malaya: on rocks in stream-beds in the flood-zone, at many places on the Main Range, also Taiping Hills and G. Tahan, from low altitudes to 1500 m; formerly abundant above the Parit Falls at Cameron Highlands.

7. MESOPHLEBION HOLTTUM, BLUMEA 19 (1971) 29,

EXCL. SUBG. *PLESIONEURON*.

This group of species is described in Holttum 1955 as the group of *Thelypteris crassifolia*. Apart from changes in nomenclature, the only difference in the present treatment is recognition of *M. beccarianum* as a species distinct from *M. chlamydophorum*. This is an interesting genus which would be worth a detailed cytotaxonomic study. As reported in 1955, two Malayan species are tetraploid; a diploid has recently been found in Sarawak (a new species, not known in Malaya).

KEY TO THE SPECIES IN MALAYA

1. Stipe and lower part of rachis bearing many stiff spreading scales 1. *M. trichopodium*
1. Upper part of stipe and rachis lacking large scales
 2. Sterile pinnae lobed not more than half-way to costa 2. *M. motleyanum*
 2. Sterile pinnae lobed more than half-way to costa
 3. Indusia firm, glabrous, covering the sorus almost to maturity; fertile pinnae lobed to 1–1.5 mm from costa 3. *M. beccarianum*
 3. Indusia $\pm$ hairy, in most cases not covering the sori to maturity; pinnae lobed less deeply
 4. Fronds rarely dimorphic; pinnae thin, rarely more than 2 cm wide; indusia always conspicuous 4. *M. chlamydophorum*
 4. Fronds usually dimorphic; pinnae rigid, fertile to 3 cm, sterile to 4 cm wide; indusia varied, thin and shrivelled when dried 5. *M. crassifolium*

1. **Mesophlebion trichopodum** (C. Chr.) Holttum, Blumea 72 (1975) 226.

Basionym: *Dryopteris trichopoda* C. Chr., Ind. Fil. (1905) 298, new name for *Nephrodium polytrichum* Bak., Journ. Bot. 29 (1891) 107, non Schrad. 1824.

Name in Holttum 1955: *Thelypteris paleata* (Copel.) Holttum, p. 249.

Correct name in *Thelypteris*: none published.

The description of 1955 needs no revision for Malayan plants. These are smaller than the type specimen of *N. trichopodum* from Sarawak but otherwise not different. More collections are needed from Sarawak and Sumatra; possibly distinct varieties exist in Sarawak.

In Malaya known from few places, mostly beside streams in forest: Penang Hill at 650 m (Richmond Pool); Taiping Hills; by the Sungei Tahan at K. Teku, 50 m; by the Sungei Jeriau below Fraser's Hill at 1070 m; on G. Angsi at 600 m.

2. **Mesophlebion motleyanum** (Hook.) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 209.

Basionym: *Nephrodium motleyanum* Hook., Syn. Fil. (1867) 266.

Name in Holttum 1955, correct in *Thelypteris*: *T. motleyanum* (Hook.) Holttum, p. 247.

Status in Malaya: as in Holttum 1955 for lowland plants, but I now think that mountain plants, smaller and firmer in texture than lowland ones (mentioned under *T. crassifolia* in 1955) probably belong to this species; more study is needed.

3. **Mesophlebion beccarianum** (Cesati) Holttum, Blumea 22 (1975) 230.

Basionym: *Nephrodium beccarianum* Cesati, Atti Acad. Napoli 7, no 8 (1876) 23.

Name in Holttum 1955: *Thelypteris chlamydophora*, in part, p. 246.

Correct name in *Thelypteris*: *T. beccariana* (Cesati) Reed, Phytologia 17 (1968) 263.

Fronds firm; lower pinnae with stalks 6–10 mm long; pinnae 12–18 cm long, 1.3–2.5 cm wide (sterile ones largest), lobed to 1–1.5 mm from costa; basal basiscopic vein arising from costa near its costule; lower surface of costae usually hairless but with some scales which are early caduous; sori inframedial; indusia large, firm, glabrous, covering the sori almost to maturity; spores papillose.

Status in Malaya: specimens from Ulu Langat, in hill forest at 750 m, and from G. Angsi, are closely similar to the type and other Bornean specimens; some specimens from Perak and Penang differing in having some short acicular hairs on the lower surface of costae and on indusia may be hybrids. In Sarawak, the species seems to be very uniform.

4. **Mesophlebion chlamydophorum** (C. Chr.) Holttum, Blumea 22 (1975) 321.

Basionym: *Dryopteris chlamydophora* C. Chr., Gard. Bull. Str. Settl. 4 (1929) 384.

Name in Holttum 1955, correct in *Thelypteris*: *T. chlamydophora* (C. Chr.) Ching, p. 246.

Status in Malaya: as in Holttum 1955.

The spores are papillose, as in *M. beccarianum*.

5. **Mesophlebion crassifolium** (Bl.) Holttum, Blumea 22 (1975) 232.

Basionym: *Aspidium crassifolium* Bl., Enum. Pl. Jav. (1828) 158.

Name in Holttum 1955, correct in *Thelypteris*: *T. crassifolia* (Bl.) Ching, p. 246.

In mountain forest in Malaya at 700–1800 m, variable; pinnae of sterile fronds are usually much wider than those of fertile fronds; stalks of lower pinnae very variable in length; indusia thin, with short hairs, sometimes rather large, sometimes small; spores with small wings, as in *M. motleyanum*. There may be hybrids between this and *M. motleyanum* and *M. beccarianum*; one specimen from Fraser's Hill has spores intermediate between winged and papillose, and rather large, thin, short-hairy indusia.

8. **CYCLOSORUS** LINK, HORT. REG. BOT. BEROL. 2 (1833) 128.

A genus of few species, pantropic, always in open places in freshwater swamps. A characteristic feature is the presence of a large red glandular cell at the end of a hair on the stalks of sporangia; similar glandular cells also occur on the lower surface of pinnae.

1. **Cyclosorus interruptus** (Willd.) H. Ito, Bot. Mag. Tokyo 51 (1937) 714, nomen tantum.

Basionym: *Pteris interrupta* Willd., Phytographia (1794) 13, t. 10, fig. 1.

Name in Holttum 1955: *Cyclosorus gongylodes* (Schkuhr) Link, p. 261.

Correct name in *Thelypteris*: *T. interrupta* (Willd.) K. Iwats., J. Jap. Bot. 38 (1963) 314 nomen tantum.

Status in Malaya: as Holttum 1955.

The type of this species, in the Willdenow Herbarium at Berlin, was collected in Southern India. The species has had many names; see Holttum, Amer. Fern Journ. 63 (1973) 81. Unfortunately Willdenow's type has in recent years been wrongly identified with the species here named *Amphineuron terminans*.

9. **AMPELOPTERIS** KUNZE, BOT. ZEIT. 6 (1848) 114.

This is a monotypic genus, occurring throughout the wetter parts of the tropics from West Africa to N.E. Australia and New Caledonia.

1. **Ampelopteris prolifera** (Retz.) Copel., Gen. Fil. (1947) 144.

Basionym: *Hemionitis prolifera* Retz., Obs. Bot. 6 (1791) 38.

Name in Holttum 1955: *Ampelopteris prolifera* (Retz.) Copel., p. 298.

Correct name in *Thelypteris*: *T. prolifera* (Retz.) Reed, Phytologia 17 (1968) 306.

Sori exindusiate; between the sporangia are conspicuous red glands which are borne at the ends of hairs on sporangium-stalks, as in *Cyclosorus* and *Mesophlebion*; broad scales present on the lower surface of costae of young fronds, soon lost; forked or branched hairs, often sparse, present on lower surface of costae and rachis; see also description in Holttum 1955.

Status in Malaya: as in Holttum 1955; see also Molesworth Allen, Gard. Bull. Singapore 17 (1959) 261 for reports of this species by the Muda and Kinta rivers. There have been few collections in other parts of Malaya; conditions necessary for establishment of growth of prothalli and sporophytes need to be studied.

10. CHINGIA HOLTTUM, BLUMEA 19 (1971) 31

Caudex erect, usually massive on well-grown plants; stipes covered, at least near base, with long narrow scales; basal pinnae not reduced; pinnae lobed up to half-way to costa; veins all oblique, 1–2 pairs anastomosing and usually several pairs passing to the sinus-membranes which are prominent on the lower surface; sori near costules; indusia small or lacking; sporangia sometimes bearing capitate hairs or small glands; spores black, minutely tuberculate.

A genus confined to Malesia and the Pacific (to Tahiti); 18 species known. Corrections are here made to the description of the previously-known Malayan species, and an additional one is described.

KEY TO THE MALAYAN SPECIES

1. Stipe and at least the lower part of abaxial surface of rachis bearing copious stiff scales or their persistent bases; pinnae thin, bearing variously abundant small sessile glands on their lower surface 1. *C. sakayensis*
1. Stipe scaly near base only; pinnae rigid; more or less abundant short capitate hairs present on lower surface 2. *C. perrigida*
1. ***Chingia sakayensis*** (Zeiller) Holttum, Flora Malesiana.

Basionym: *Nephrodium sakayense* Zeiller.

Name in Holttum 1955: *Cyclosorus ferox*, p. 265.

Correct name in *Thelypteris*: *T. sakayensis* (Zeiller) Reed, Phytologia 17 (1968) 311.

The type of this species, at Paris, is the upper part of a frond of a young plant, partly fertile; it was collected near Ipoh. In 1955 I had not seen it, and made no reference to the species. A complete young plant collected by Mrs A. G. Piggott on G. Telapak Burok, Negri Sembilan, along with mature plants, closely matches Zeiller's type. As noted in 1955, Malayan plants named *Cyclosorus ferox* differ in several ways from the type of *Aspidium ferox* Bl. from Java. Important differences are the distinctly flat scales on the rachis, the presence of small indusia and of copious small sessile glands on the lower surface of pinnae between veins.

2. **Chingia perrigida** (v.A.v.R.) Holttum, Kalikasan 3 (1974) 27.

Basionym: *Dryopteris perrigida* v.A.v.R., Bull. Jard. Bot. Btzg II, 10 (1914) 27.

Correct name in *Thelypteris*: none published.

Plants smaller than those of *C. sakayensis*, with rigid fronds having veins prominent on the lower surface; stipe-scales abundant near base only, no scales on rachis; pinnae to 30 x 2.3 cm, lobed 1/3 towards costa or a little more deeply; lower surface of pinnae bearing short capitate hairs on all parts and a variable number of acicular hairs on costules and veins; sori with small indusia.

Status in Malaya: only known from open places by roadsides on G. Ulu Kali (Genting Highlands) at 1500–1700 m, first collected by Mrs A. G. Piggott in 1974. The type of the species was collected on G. Merapi, near Bukit Tinggi, in Sumatra.

11. PNEUMATOPTERIS NAKAI, BOT. MAG. TOKYO 47 (1933) 179.

A genus of about 80 species, confined to the tropics of the Old World apart from one aberrant species in New Zealand; mainly forest plants, a few confined to limestone; differing from *Sphaerostephanos* in lacking spherical yellow glands, in lacking also abundant acicular hairs on lower surfaces; small capitate hairs are present on lower surfaces and/or sporangia of some species; the lower surface of dried specimens, between veins, is $\pm$ pustular; aerophores are always somewhat swollen, much elongate in a few species, including the type, *P. callosa*.

KEY TO THE MALAYAN SPECIES

1. Reduced pinnae at base of frond all distinctly leafy
 2. Reduced pinnae 6–10 pairs, the upper ones not auricled 1. *P. truncata*
 2. Reduced pinnae 2–3 (–4) pairs, strongly auricled on their acroscopic side 2. *P. ecallosa*
1. Reduced pinnae represented by prominent aerophores, each with a very narrow rim at its base 3. *P. callosa*

1. **Pneumatopteris truncata** (Poir.) Holttum, Blumea 21 (1973) 314.

Basionym: *Polypodium truncatum* Poir., Encycl. Meth. 5 (1804) 534.

Name in Holttum 1955: *Cyclosorus truncatus* (Poir.) Farwell, p. 266.

Correct name in *Thelypteris*: *T. truncata* (Poir.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto, B, 31 (1964) 33.

Status in Malaya: as Holttum 1955.

The type specimen of this species is labelled Brazil, and I accepted this statement in 1955, but no species of *Pneumatopteris* is known from the New World. The distribution of *P. truncata* is: S. India and Ceylon (where it is tetraploid), Western Malesia and the Philippines. Plants in Northern India are diploid, with smaller fronds, more strongly toothed pinna-lobes and rather large capitate hairs on sporangia.

2. **Pneumatopteris ecallosa** (Holtum) Holtum, Blumea 21 (1973) 310.

Basionym and name in Holtum 1955: *Cyclosorus ecallosus* Holtum, Gard. Bull. Singap. 11 (1947) 269.

Correct name in *Thelypteris*: *T. ecallosa* (Holtum) Reed, Phytologia 17 (1968) 274.

Status in Malaya: now abundant in thickets by small streams at Cameron Highlands; collected also at Genting Highlands at 1500 m.

3. **Pneumatopteris callosa** (Bl.) Nakai, Bot. Mag. Tokyo 47 (1933) 179.

Basionym: *Aspidium callosum* Bl., Enum. Pl. Jav. (1828) 152.

Name in Holtum 1955: *Cyclosorus dicranogramma* (misidentified, p. 267).

Correct name in *Thelypteris*: *T. callosa* (Bl.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto, B, 31 (1964) 34.

Status in Malaya: collected only three times, at Cameron Highlands and at Genting Highlands, at 1500 m, near stream in forest.

Very young fronds are covered with a layer of mucilage through which the aerophores project.

12. SPHAEROSTEPHANOS J. SM. IN HOOK. GEN. FIL. (1839) T. 24.

The type species of this genus is *S. asplenoides* J. Sm. (= *S. polycarpus*), of which John Smith had a defective specimen; he thus made a wrong statement as to the structure of the indusium. Later he corrected this statement and remarked that the species did not differ significantly from others, which he named *Nephrodium*, apart from its elongate sorus. For the same reason I transferred *S. polycarpus* to *Cyclosorus* in 1955. In 1971, when breaking up *Cyclosorus* as defined by Ching and Copeland, I limited *Sphaerostephanos* to a group of species characterized by the presence of spherical yellow sessile glands, which occur usually on the lower surface of pinnae, sometimes confined to costules and veins, or to indusia or sporangia. Similar glands occur in some species of *Pronephrium*, but the latter differ in having almost entire normal pinnae and no reduced pinnae at the base of fronds. One Malayan species, *S. norrisii*, has only 1-2 pairs of very small basal pinnae on its larger fronds, none on smaller ones. *S. peltochlamys* has almost entire pinnae like those of *Pronephrium* but several pairs of reduced basal pinnae; it may be of hybrid origin.

KEY TO THE MALAYAN SPECIES

1. Sori distinctly elongate

2. Reduced pinnae 6-12 pairs, normal pinnae lobed $1/4 - 1/3$ towards costa 1. *S. larutensis*

2. Reduced pinnae many pairs; normal pinnae lobed more than half-way to costa 2. *S. polycarpus*

1. Sori not or little elongate
 3. Spherical glands abundant on lower surface of pinnae
 4. Hairs on lower surface of costae and costules appressed or distinctly antrorse
 5. Caudex slender, long-creeping; hairs on lower surface of costae not closely appressed 3. *S. unitus*
 5. Caudex erect; hairs on lower surface of costae closely appressed 4. *S. porphyricola*
 4. Hairs on lower surface of costae and costules erect or nearly so
 6. Pinnae lobed less than half-way to costa; 2-3 pairs of veins anastomosing 5. *S. penniger*
 6. Pinnae lobed at least half-way; only one pair of veins truly anastomosing
 7. Lower surface of costae and rachis glabrous; lowest normal pinnae not or little narrowed at their bases 6. *S. latebrosus*
 7. Lower surface of rachis and costae bearing short erect hairs; lower normal pinnae much narrowed towards their bases 7. *S. heterocarpus*
 3. Spherical yellow glands lacking or rare on lower surface of pinnae
 8. Lower surface of costae and costules covered with slender appressed hairs
 9. Rachis of sterile fronds bearing thick curved brown hairs on both surfaces; basal veins not always anastomosing
 10. Pinnae lobed less than half-way to costa; basal pair of veins often anatomosing 8. *S. pterosporus*
 10. Pinnae lobed 3/5 - 2/3 to costa; basal veins rarely anastomosing var. *altilobus*
 9. Hairs on rachis pale; basal veins always anastomosing 9. *S. hendersonii*
 8. Lower surface of costae and costules not covered with appressed hairs
 11. Normal pinnae entire or crenate 10. *S. peltochlamys*
 11. Normal pinnae lobed 2/5 towards costa 11. *S. norrisii*

1. **Sphaerostephanos larutensis** (Bedd.) C. Chr., Ind. Fil. Suppl. III (1934) 172.

Basionym: *Nephrodium larutense* Bedd., Handb. Suppl. (1892) 73.

Name in Holttum 1955: *Cyclosorus larutensis* (Bedd.) Ching, p. 284.

Correct name in *Thelypteris*: *T. larutensis* (Bedd.) Reed, *Phytologia* 17 (1968) 286.

Status in Malaya: as Holttum 1955.

2. ***Sphaerostephanos polycarpus*** (Bl.) Copel., *Univ. Cal. Publ. Bot.* 16 (1929) 60.

Basionym: *Aspidium polycarpum* Bl., *Enum. Pl. Jav.* (1828) 156.

Name in Holttum 1955: *Cyclosorus polycarpus* (Bl.) Holttum, p. 283.

Correct name in *Thelypteris*: *T. polycarpa* (Bl.) K. Iwats., *Mem. Coll. Sci. Univ. Kyoto B*, 31 (1964) 32.

Status in Malaya: as Holttum 1955.

There is a variety with long hairs on the lower surface of costae, collected on Taiping Hills. Plants at 1500 m on Genting Highlands appear little different from lowland plants.

3. ***Sphaerostephanos unitus*** (L.) Holttum, *Journ. S. Afr. Bot.* 40 (1974) 165.

Basionym: *Polypodium unitum* L., *Syst. Nat. ed. 10*, 2 (1759) 1326 excl. syn.

Name in Holttum 1955: *Cyclosorus unitus* (L.) Ching, p. 260.

Correct name in *Thelypteris*: *T. unita* (L.) Morton, *Amer. Fern Journ.* 49 (1959) 113.

Status in Malaya: as Holttum 1955.

There are two varieties of this species, one distributed in East Africa, Mascarene Islands, Ceylon and Western Malesia, the other from Borneo and the Philippines eastwards to Fiji.

4. ***Sphaerostephanos porphyricola*** (Copel.) Holttum, *Kalikasan* 4 (1975) 59.

Basionym: *Dryopteris porphyricola* Copel., *Philip. J. Sci.* 7C (1912) 60.

Name in Holttum 1955: *Cyclosorus porphyricola* (Copel.) Ching, p. 271.

Correct name in *Thelypteris*: *T. porphyricola* (Copel.) Ching, *Bull. Fan Mem. Inst. Biol. Bot.* 6 (1936) 287.

Status in Malaya: as Holttum 1955, but exclude reference to plants from Kinabalu.

The fertile pinnae of this species are up to 14 x 2.5 cm (sterile ones sometimes larger), with abruptly short-acuminate apex.

5. ***Sphaerostephanos penniger*** (Hook.) Holttum in Nayar & Kaur, *Comp. to Beddome* (1974) 209.

Basionym: *Nephrodium pennigerum* Hook., *Spec. Fil.* 4 (1862) 82.

Name in Holttum 1955: *Cyclosorus megaphyllus* (Mett.) Ching, p. 268.

Correct name in *Thelypteris*: *T. megaphylla* (Mett.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1964) 34.

Status in Malaya: as Holttum 1955; but caudex is never truly erect.

Blume wrongly gave the name *Aspidium pennigerum* (based on *Polypodium pennigerum* Forster; a New Zealand species) to plants of the present species in Java. Hooker copied his description but recognized that Blume has misused Forster's name. In so doing, Hooker in effect created a new name; he retained Forster's name for the New Zealand plant, still in *Polypodium* because it had no indusia. The name *Thelypteris pennigera* (Forst.) H. H. Allan applies to the New Zealand fern, so that the later epithet *megaphylla* (given by Mettenius to correct Blume's mistake) has to be used if this species is transferred to the genus *Thelypteris*.

6. ***Sphaerostephanos latebrosus*** (Mett.) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 209.

Basionym: *Aspidium latebrosum* Mett., Farngatt. IV (1858) 104.

Synonym: *Nephrodium glaucostipes* Bedd., Handb. Suppl. (1892) 80.

Name in Holttum 1955: *Cyclosorus heterocarpus* var. *glaucostipes*, p. 271.

Correct name in *Thelypteris*: *T. latebrosa* (Mett.) Reed, Phytologia 17 (1968) 287.

When writing my book of 1955 I had not seen specimens with the base of fronds intact. Such specimens from the type collection, at Calcutta, show that the basal normal pinnae are hardly narrowed at their bases, and the reduced pinnae are all much larger than in *S. heterocarpus*. This species is still known in Malaya only from two collections in Perak: near Gopeng, and at the foot of G. Idong, both in lowlands. The type of *A. latebrosum* Mett. was from Java.

7. ***Sphaerostephanos heterocarpus*** (Bl.) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 280.

Basionym: *Aspidium heterocarpon* Bl., Enum. Pl. Jav. (1828) 155.

Name in Holttum 1955: *Cyclosorus heterocarpus* (Bl.) Ching, p. 269.

Correct name in *Thelypteris*: *T. heterocarpa* (Bl.) Morton, Amer. Fern Journ. 49 (1959) 113.

Status in Malaya: as Holttum, except that I think the plants mentioned which had young fronds covered with mucilage belonged to another species, perhaps *S. latebrosus*.

Lowland plants are all small, with pinnae less than 1.5 cm wide, lobed about half-way to the costa; I cannot see a sharp distinction between these and mountain plants which have wider more deeply lobed pinnae; more field study is needed.

8. ***Sphaerostephanos pterosporus*** (v.A.v.R.) Holttum, Flora Malesiana.

Basionym: *Dryopteris pterospora* v.A.v.R.

Name in Holttum 1955: *Cyclosorus stipellatus*, in part, p. 272.

Correct name in *Thelypteris*: *T. pterospora* (v.A.v.R.) Reed, *Phytologia* 17 (1968) 307.

In Holttum 1955 this species and *S. hendersonii* were confused with *S. stipellatus* (Bl.) Holttum; all three species lack glands on the lower surface of pinnae, have appressed hairs on lower surface of costae and long thick aerophores at the bases of pinnae. The true *S. stipellatus*, in Java and Sumatra, has less deeply lobed pinnae. *S. pterosporus* is distinguished by thick hairs on both surfaces of the rachis. There are two varieties, as distinguished by the above key.

Var. **pterosporus**: pinnae lobed rather less than half-way to costa; basal veins sometimes meeting to form excurrent veins, sometimes just touching each other at the base of a sinus-membrane. This variety has been found at low altitudes in the southern parts of Malaya: near Malacca (an old collection by Pinwill), near Kajang in Trengganu (Corner) and at low altitudes on G. Pulai and G. Muntahak in Johore. The type came from Sumatra; there are specimens also from G. Matang in Sarawak.

Var. **altilobus** Holttum, *Flora Malesiana*: pinnae deeply lobed; veins rarely anastomosing. Known only from two collections from Taiping Hills at 750–900 m (Kunstler and Molesworth Allen), the recent one found along the pipeline path near the Tea Gardens.

9. **Sphaerostephanos hendersonii** Holttum, *Flora Malesiana*.

Name in Holttum 1955: *Cyclosorus stipellatus*, in part, p. 272.

This species agrees with *S. pterosporus* in most characters but has pale hairs on the rachis and more deeply lobed pinnae. The basal veins are always at a wide angle to the costule and always anastomose to form an excurrent vein to the sinus. Three collections are known from forest at Cameron Highlands at 1500 m; one from North Sumatra appears to be conspecific.

10. **Sphaerostephanos peltochlamys** (C. Chr.) Holttum, *Flora Malesiana*.

Basionym: *Dryopteris peltochlamys* C. Chr.

Name in Holttum 1955: *Abacopteris peltochlamys* (C. Chr.) Holttum, p. 295.

Correct name in *Thelypteris*: *T. peltochlamys* (C. Chr.) Reed, *Phytologia* 17 (1968) 303.

Status in Malaya: still known only from one collection from low country in Kelantan.

I have now seen many collections from Sumatra. Glands are often present on sporangia and sometimes on indusia; indusia are always large and usually glabrous but sometimes have a few hairs; small fronds usually lack reduced basal pinnae, but several of these are always present on large fronds. This species is anomalous both in *Sphaerostephanos* and in *Pronephrium* (*Abacopteris*); as above noted, it might be of hybrid origin.

11. **Sphaerostephanos norrisii** (Rosenst.) Holttum, Flora Malesiana.

Basionym: *Dryopteris norrisii* Rosenst. (type from Malaya).

Name in Holttum 1955: *Cyclosorus toppingii*, p. 280 (misidentification).

Synonym: *Nephrodium pennigerum* var. *malayense* Bedd., Handb. Suppl. (1892) 74.

Correct name in *Thelypteris*: none published.

Status in Malaya: as Holttum 1955.

The locality at which the type was collected by Norris is not recorded, but probably it came from the Taiping Hills like the specimens cited by Beddome and two more recent ones, at about 1000 m. The only other collection is my own from Cameron Highlands in forest near the path leading down from Robinson's Falls to the Ringlet valley.

Additional information: glands are usually present on the lower surface of costules and veins in the pinna-lobes, sometimes also on indusia and sporangia; reduced basal pinnae are present only on large fronds.

Distribution outside Malaya: the type of *Dryopteris falcinella* v.A.v.R. from Sumatra is quite identical with that of *D. norrisii*; specimens from Mindanao agree in essentials with those of Malaya and Sumatra but differ in producing fertile fronds of a much smaller size and in the hairs on the upper surface between veins being short and suberect; a few specimens from Borneo are like those from Mindanao. *Dryopteris toppingii* Copel. from Mt Kinabalu differs in a total lack of glands and of reduced pinnae, and in glabrous indusia. A few collections of *D. toppingii* have been made in other parts of Borneo. Copeland gave the name *Sphaerostephanos toppingii* to a quite different species; another name has therefore to be found for the Kinabalu plant which in 1955 I confused with *S. norrisii*.

13. **PRONEPHRIUM** PRESL, EPIM. BOT. (1851) 258.

Caudex short-creeping; fronds lacking reduced basal pinnae; pinnae sub-entire or crenate, usually with several pairs of anastomosing veins; lower surface between veins often pustular when dry; spherical glands like those of *Sphaerostephanos* sometimes present on lower surfaces of pinnae or on sporangia; in section *Grypothrix* hairs on the lower surface and on sporangia are hooked and the sori are exindusiate; the species *P. repandum* is intermediate, with exindusiate sori and sporangia bearing many long stiff straight hairs.

This genus, as at present arranged, may be composite; more study of species over a wider area is needed; 57 species are known in Malesia and several more in mainland Asia.

KEY TO THE MALAYAN SPECIES

1. No hooked hairs on any part of the plant
2. Sori indusiate (indusia in some cases small)

- 3. Pinnae to 30 cm long, not or little dimorphous; veins 12–15 pairs 1. *P. asperum*
- 3. Pinnae much shorter; fronds dimorphous; veins not over 10 pairs
 - 4. Lower surface of pinnae between veins bearing glands 2. *P. glandulosum*
 - 4. Lower surface of pinnae between veins lacking glands
 - 5. Pinnae 4–5 pairs, their bases not or little auricled 3. *P. menisciicarpum*
 - 5. Pinnae to 10 pairs, distinctly auricled 4. *P. pletatum*
- 2. Sori exindusiate 5. *P. repandum*
- 1. Hooked hairs present, at least on caudex
 - 6. Caudex slender, long-creeping
 - 7. Fronds trifoliate 6. *P. triphyllum*
 - 7. Pinnae more than one pair, irregular 7. *P. X parishii*
 - 6. Caudex thicker, short-creeping with fronds close together
 - 8. Pinnae to 2 cm wide, their bases narrowly cuneate 8. *P. salicifolium*
 - 8. Pinnae much wider, their bases broadly cuneate 9. *P. rubicundum*

1. **Pronephrium asperum** (Presl) Holttum, Blumea 20 (1972) 112.

Basionym: *Goniopteris aspera* Presl, Tent. Pterid. (1836) 183.

Name in Holttum 1955: *Abacopteris multilineata* var. *malayensis*, p. 297.

Correct name in *Thelypteris*: *T. aspera* (Presl) Reed, Phytologia 17 (1968) 261.

Status in Malaya: as Holttum 1955.

2. **Pronephrium glandulosum** (Bl.) Holttum, Blumea 20 (1972) 118.

Basionym: *Aspidium glandulosum* Bl., Enum. Pl. Jav. (1828) 144.

Name in Holttum 1955: *Cyclosorus glandulosus* (Bl.) Ching, p. 278.

Correct name in *Thelypteris*: *T. malayensis* (C. Chr.) Reed, Phytologia 17 (1968) 291.

Status in Malaya: as Holttum 1955.

The name *Thelypteris glandulosa* belongs to a tropical American species, listed by Christensen as *Dryopteris glandulosa* in his Index Filicum, 1905; he there proposed a new epithet for the Malayan species.

3. **Pronephrium menisciicarpon** (Bl.) Holttum, Blumea 20 (1972) 111.

Basionym: *Aspidium menisciicarpon* Bl., Enum. Pl. Jav. (1828) 142.

Name in Holttum 1955: *Abacopteris menisciicarpa* (Bl.) Holttum, p. 290.

Correct name in *Thelypteris*: *T. menisciicarpa* (Bl.) K. Iwats., Acta Phytotax. Geobot. 21 (1965) 171.

Status in Malaya: as Holttum 1955.

4. **Pronephrium peltatum** (v.A.v.R.) Holttum, Flora Malesiana.

Basionym: *Dryopteris peltata* v.A.v.R.

Name in Holttum 1955: *Abacopteris lineata*, p. 292 (misidentification)

Correct name in *Thelypteris*: *T. peltata* (v.A.v.R.) Reed, Phytologia 17 (1968) 303.

Status in Malaya: as Holttum 1955 but excluding the specimens from Patani, which are *Pronephrium affine* (Bl.) Holttum (a species not found in Malaya). *P. affine* has thinner fronds, crenate pinnae and much larger indusia; it occurs in the lowlands of Java and Sumatra, apparently on rocks by streams.

The type of *P. peltatum* was collected in Sumatra. It differs from Malayan specimens in having distinctly crenate pinnae and small glabrous indusia. In Flora Malesiana the Malayan plants are named var. *peninsulare* Holttum; they are tetraploid. The true *Pronephrium lineatum* (Bl.) Presl does not occur in Malaya.

5. **Pronephrium repandum** (Fée) Holttum, Blumea 20 (1972) 109.

Basionym: *Goniopteris repanda* Fée, Gen. Fil. (1852) 251.

Name in Holttum 1955: *Abacopteris urophylla*, p. 296.

Correct name in *Thelypteris*: none published.

Status in Malaya: as Holttum 1955.

The name *urophylla*, adopted in 1955, is later than *repanda* so a change to the latter is made; the types of both names came from Penang and undoubtedly represent the same species.

6. **Pronephrium triphyllum** (Sw.) Holttum, Blumea 20 (1972) 122.

Basionym: *Meniscium triphyllum* Sw. in Schrad. Journ. Bot. 1800 2 (1801) 16.

Name in Holttum 1955: *Abacopteris triphylla* (Sw.) Ching, p. 287.

Correct name in *Thelypteris*: *T. triphylla* (Sw.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 190.

Status in Malaya: as Holttum 1955.

7. **Pronephrium X parishii** (Bedd.) Holttum, Blumea 20 (1972) 123.

Basionym: *Meniscium triphyllum* var. *parishii* Bedd., Handb. (1883) 399.

Name in Holttum 1955: *Abacopteris triphylla* var. *parishii*, p. 287.

Name in *Thelypteris*: *T. triphylla* var. *parishii* K. Iwats. l.c., p. 191.

Status in Malaya: on river banks; S. Kerling in Perak, S. Cheka in Pahang.

The specimens are variable in the number, size and spacing of pinnae, and have the appearance of hybrids, one parent being *P. triphyllum*, the second unknown. Similar plants have been found in Peninsular Thailand, southern Burma and southern Vietnam; I have seen none with ripe sporangia. Plants from Pahang cultivated in Singapore retained their variable character.

8. **Pronephrium salicifolium** (Hook.) Holttum, Blumea 20 (1972) 123.

Basionym: *Meniscium salicifolium* Hook., Ic. Pl. 10 (1854) t. 990.

Name in Holttum 1955: *Abacopteris salicifolia* (Hook.) Holttum, p. 288.

Correct name in *Thelypteris*: *T. salicifolia* (Hook.) Reed, Phytologia 17 (1968) 311.

Status in Malaya: as Holttum 1955.

This is certainly related to *P. triphyllum* and *T. rubicundum*, but has hooked hairs only on the caudex and bases of stipes; the fronds are almost glabrous.

9. **Pronephrium rubicundum** (v.R.v.R.) Holttum, Blumea 20 (1972) 123.

Basionym: *Phegopteris rubicunda* v.A.v.R., Bull. Jard. Bot. Btzg III, 2 (1920) 162.

Name in Holttum 1955: *Abacopteris rubicunda* (v.A.v.R.) Holttum, p. 292.

Correct name in *Thelypteris*: *T. rubicunda* (v.A.v.R.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 195.

Status in Malaya: as Holttum 1955.

14. **CHRISTELLA** LEV., FL. DE KOUY-TCHEOU (1915) 472;

HOLTTUM, TAXON 20 (1971) 533.

Caudex erect or short-creeping; fronds in all species except *C. parasitica* with a few pairs of lower pinnae gradually decrescent, lowest not very small; aerophores not or little evident; pinnae always bearing many acicular hairs (very short in two species) and in some species elongate glandular or short capitate hairs; veins anastomosing in all Malayan species; sori indusiate; sporangia lacking glands or hairs distally but bearing on their stalks elongate yellow or reddish unicellular glandular hairs; perispore consisting of thick tubercles or ridges.

A genus of about 50 species in the warmer parts of the Old World, with a group in the New World and Africa which still needs correlating with the former. A full account of species in the Old World is given in Holttum, Kew Bull. 31 (1976) 293 ff.

KEY TO THE MALAYAN SPECIES

1. Caudex long-creeping; reduced lower pinnae not auricled 1. *C. arida*
1. Caudex not long-creeping; lower pinnae, if reduced, distinctly auricled
 2. Hairs on lower surface of costa and costules all minute, hardly distinguishable with a X 10 lens
 3. Caudex erect; reduced pinnae c. 8 pairs, broad and deeply lobed 2. *C. papilio*
 3. Caudex short, suberect; reduced pinnae fewer, not deeply lobed 3. *C. subpubescens*
 2. Hairs on lower surface of costae and costules distinct, usually of varied length
 4. Pinnae lobed much more than half-way to costa; hairs on lower surface of costae commonly 1 mm or more long
 5. Basal pinnae not or little reduced; red glands present on lower surface of costules and veins 4. *C. parasitica*
 5. Basal pinnae gradually decrescent and more widely spaced; no red glands on lower surface 5. *C. hispidula*
 4. Pinnae lobed half-way to costa or a little more deeply; hairs on lower surface of costae rarely 0.5 mm long 6. *C. dentata*

1. **Christella arida** (D. Don) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 206.

Basionym: *Aspidium aridum* D. Don, Prodr. Fl. Nepal (1825) 4.

Name in Holttum 1955: *Cyclosorus aridus* (D. Don) Ching, p. 259.

Correct name in *Thelypteris*: *T. arida* (D. Don) Morton, Amer. Fern Journ. 49 (1959) 113.

Status in Malaya: as Holttum 1955.

The most distinctive features of this species are the elongate glands on veins in the pinna-lobes, and the lack of acroscopic basal auricles on the reduced pinnae. This species is reported to be diploid in northern India.

2. **Christella papilio** (Hope) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 208.

Basionym: *Nephrodium papilio* Hope, Journ. Bombay Nat. Hist. Soc. 12 (1899) 625, t. 12.

Name in Holttum 1968: *Cyclosorus papilio* (Hope) Ching, p. 633.

Correct name in *Thelypteris*: *T. papilio* (Hope) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 175.

Status in Malaya: known from Cameron Highlands (below Ringlet), Bukit Hitam and Ginting Simpah, in forest at 300–900 m.

The massive, quite erect, caudex is distinctive. Specimens from Malaya and Thailand all have large ellipsoid red glands on the lower surface of costules and veins; in other respects they agree with the type from northern India.

3. **Christella subpubescens** (Bl.) Holttum, Webbia 30 (1976) 193: Kew Bull. 31 (1976) 323.

Basionym: *Aspidium subpubescens* Bl., Enum. Pl. Jav. (1828) 149.

Names in Holttum 1955: *Cyclosorus sumatranus* (v.A.v.R.) Ching, p. 275; *C. latipinna* (Benth.) Tard., p. 276.

Correct name in *Thelypteris*: *T. subpubescens* (Bl.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 173.

Status in Malaya: as Holttum 1955, but see note below on union of the two species.

The common Singapore fern described as *Cyclosorus sumatranus* in 1955 agrees with the types of both *Dryopteris sumatrana* v.A.v.R. (1908) and of *Aspidium subpubescens* Bl. (1828), also with specimens named *D. sumatrana* by van Alderwerelt at Bogor. Plants named *Cyclosorus latipinna* in 1955 were from stream-banks in low country in Perak and Pahang; in this situation they are washed away by floods before they attain their full growth. Similar plants away from streams (and cultivated plants taken from stream-banks) are larger, and most of them have fronds stiffer in growth than the Singapore plants; some of them also have elongate red glands on the lower surface of veins (a gland-bearing plant has also been found in Singapore). Bentham's type and other specimens of *latipinna* from Hong Kong lack glands and are closely similar to some stream-bank plants from Perak. A cytotaxonomic study of cultivated plants taken from various sources is needed to clarify the situation. It should be noted that a Singapore plant cultivated at Leeds was found to be tetraploid; it probably had one parent in common with *C. dentata* which is also a tetraploid.

4. **Christella parasitica** (L.) Lev., Fl. de Kouy-tchéou (1915) 475.

Basionym: *Polypodium parasiticum* L., Spec. Plant. (1753) 1090.

Name in Holttum 1955: *Cyclosorus parasiticus* (L.) Farw., p. 281.

Correct name in *Thelypteris*: *T. parasitica* (L.) K. Iwats., Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 172.

Status in Malaya: as Holttum 1955.

Plants in Ceylon similar to those in Malaya proved to be tetraploid. It is probable that hybrids between this species and *C. dentata* occur in Malaya.

5. **Christella hispidula** (Decne) Holttum, Kew Bull. 31 (1976) 312.

Basionym: *Aspidium hispidulum* Decne, Nouv. Ann. Mus. Hist. Nat. Paris 3 (1834) 346.

Name in Holttum 1955: *Cyclosorus contiguus* (Rosenst.) Ching, p. 282.

Correct name in *Thelypteris*: *T. hispidula* (Decne) Reed, Phytologia 17 (1968) 283.

Status in Malaya: as Holttum 1955, and 1968 p. 633.

Aspidium hispidulum, based on a specimen from Timor at Paris, is the oldest name for this pantropic diploid species, which is somewhat variable in different countries. In Malaya the lower pinnae are distinctly decrescent and more widely spaced. Plants from Ceylon have been hybridized with the tetraploids *C. dentata* and *C. parasitica*.

6. **Christella dentata** (Forsk.) Brownsey & Jermy, Brit. Fern Gaz. 10 (1973) 338.

Basionym: *Polypodium dentatum* Forsk., Fl. Aegypt. — Arab. (1773) 185.

Name in Holttum 1955: *Cyclosorus subpubescens*, p. 273 (misidentification).

Correct name in *Thelypteris*: *T. dentata* (Forsk.) E. St John, Amer. Fern Journ. 26 (1936) 44.

Status in Malaya: rather common everywhere in somewhat exposed places, not in forest.

This is a very variable and widely distributed tetraploid; in Malaya it probably hybridizes with both *C. parasiticus* and *C. subpubescens*.

15. **AMPHINEURON** HOLTUM, BLUMEA 19 (1971) 45; 23 (1977) 205.

Lower pinnae always much narrowed towards their bases; reduced pinnae, one or two pairs, inconstantly present at the base of fronds in some species; pinnae lobed; veins in several species (notably in *A. opulentum*) not constantly anastomosing; glandular hairs on lower surfaces pear-shaped, very small and often pale yellow, or larger and colourless; indusia present; sporangia lacking glands or hairs distally, glandular hairs on stalk apparently variable; spores as in *Christella*.

This is a small genus extending from East Africa to the Pacific.

KEY TO THE MALAYAN SPECIES

1. Basal veins often or always anastomosing; caudex not erect
 2. Pinnae lobed less than half-way to costa; basal veins always anastomosing 1. *A. terminans*
 2. Pinnae lobed more than half-way; basal veins sometimes free 2. *A. opulentum*
1. Basal veins always free; caudex erect 3. *A. immersum*

1. **Amphineuron terminans** (Hook.) Holttum, Amer. Fern Journ. 63 (1973) 82.

Basionym: *Nephrodium terminans* Hook., Spec. Fil. 4 (1862) 73.

Name in Holttum 1955: *Cyclosorus interruptus*, p. 262 (misidentification).

Correct name in *Thelypteris*: *T. terminans* (Hook.) Tagawa & K. Iwats., Acta Phytotax. Geobot. 26 (1975) 169.

Status in Malaya: as Holttum 1955.

Colourless glandular hairs are usually present on the lower surface of veins, the distal ones largest; their presence is sometimes the best way of distinguishing old fronds of this species from those of the true *Cyclosorus interruptus*.

2. **Amphineuron opulentum** (Kaulf.) Holttum, Blumea 19 (1971) 45; 23 (1977) 212.

Basionym: *Aspidium opulentum* Kaulf., Enum. Fil. Chamisso (1824) 238.

Name in Holttum 1955: *Cyclosorus extensus* (Bl.) Ching, p. 264.

Correct name in *Thelypteris*: *T. opulenta* (Kaulf.) Fosberg, Smiths. Contr. Bot. 8 (1972) 3.

Status in Malaya: as Holttum 1955.

3. **Amphineuron immersum** (Bl.) Holttum in Nayar & Kaur, Comp. to Beddome (1974) 203.

Basionym: *Aspidium immersum* Bl., Enum. Pl. Jav. (1828) 156.

Name in Holttum 1955 and correct name in *Thelypteris*: *T. immersa* (Bl.) Ching, p. 243.

Status in Malaya: as Holttum 1955.

LIST OF NAMES IN HOLTUM 1955 AND 1968 WITH EQUIVALENTS IN THE PRESENT PAPER

Abacopteris lineata (Bl.) Ching	= Pronephrium peltatum (v.A.v.R.) Holttum
Abacopteris menisciicarpa (Bl.) Holttum	= Pronephrium menisciicarpum (Bl.) Holttum
Abacopteris multilineata (Hook.) Ching var. malayensis Holttum	= Pronephrium asperum (Presl) Holttum
Abacopteris peltoclamys (C. Chr.) Holttum	= Sphaerostephanos peltoclamys (C. Chr.) Holttum
Abacopteris rubicunda (v.A.v.R.) Holttum	= Pronephrium rubicundum (v.A.v.R.) Holttum
Abacopteris salicifolia (Hook.) Holttum	= Pronephrium salicifolium (Hook.) Holttum
Abacopteris triphylla (Sw.) Ching	= Pronephrium triphyllum (Sw.) Holttum
Abacopteris urophylla (Hook.) Ching	= Pronephrium repandum (Fée) Holttum
Ampelopteris prolifera (Retz.) Copel.	unchanged
Cyclosorus aridus (D. Don) Ching	= Christella arida (D. Don) Holttum

<i>Cyclosorus contiguus</i> (Rosenst.) Copel.	= <i>Christella hispidula</i> (Decne) Holttum
<i>Cyclosorus dicranogramma</i> (v.A.v.R.) Holttum	= <i>Pneumatopteris callosa</i> (Bl.) Nakai
<i>Cyclosorus ecallus</i> Holttum	= <i>Pneumatopteris ecallosa</i> (Holttum) Holttum
<i>Cyclosorus extensus</i> (Bl.) Ching	= <i>Amphineuron opulentum</i> (Kaulf.) Holttum
<i>Cyclosorus ferox</i> (Bl.) Ching	= <i>Chingia sakayensis</i> (Zeiller) Holttum
<i>Cyclosorus glandulosus</i> (Bl.) Ching	= <i>Pronephrium glandulosum</i> (Bl.) Holttum
<i>Cyclosorus gongylodes</i> (Schkuhr) Link	= <i>Cyclosorus interruptus</i> (Willd.) H. Ito
<i>Cyclosorus heterocarpus</i> (Bl.) Ching	= <i>Sphaerostephanos heterocarpus</i> (Bl.) Holttum
var. <i>glaucostipes</i> (Bedd.)	= <i>Sphaerostephanos latebrosus</i> (Mett.) Holttum
<i>Cyclosorus interruptus</i> (Willd.) Ching	= <i>Amphineuron terminans</i> (Hook.) Holttum
<i>Cyclosorus larutensis</i> (Bedd.) Ching	= <i>Sphaerostephanos larutensis</i> (Bedd.) C. Chr.
<i>Cyclosorus latipinna</i> (Hook.) Tard.	= <i>Christella subpubescens</i> (Bl.) Holttum
<i>Cyclosorus megaphyllus</i> (Mett.) Ching	= <i>Sphaerostephanos penniger</i> (Hook.) Holttum
<i>Cyclosorus papilio</i> (Hope) Ching	= <i>Christella papilio</i> (Hope) Holttum
<i>Cyclosorus parasiticus</i> (L.) Farw.	= <i>Christella parasitica</i> (L.) Lév.
<i>Cyclosorus polycarpus</i> (Bl.) Holttum	= <i>Sphaerostephanos polycarpus</i> (Bl.) Copel.
<i>Cyclosorus porphyricola</i> (Copel.) Ching	= <i>Sphaerostephanos porphyricola</i> (Copel.) Holttum
<i>Cyclosorus stipellatus</i> (Bl.) Ching p.p.	= <i>Sphaerostephanos pterosporus</i> (v.A.v.R.) Holttum
stipellatus p.p.	= <i>Sphaerostephanos hendersonii</i> Holttum
<i>Cyclosorus subpubescens</i> (Bl.) Ching	= <i>Christella dentata</i> (Forsk.) Brownsey & Jermy
<i>Cyclosorus sumatranus</i> (v.A.v.R.) Ching	= <i>Christella subpubescens</i> (Bl.) Holttum

<i>Cyclosorus toppingii</i> (Copel.) Ching	= <i>Sphaerostephanos norrisii</i> (Rosenst.) Holtum
<i>Cyclosorus truncatus</i> (Poir.) Farw.	= <i>Pneumatopteris truncata</i> (Poir.) Holtum
<i>Cyclosorus unitus</i> (L.) Ching	= <i>Sphaerostephanos unitus</i> (L.) Holtum
<i>Thelypteris beddomei</i> (Bak.) Ching	= <i>Parathelypteris beddomei</i> (Bak.) Ching
<i>Thelypteris brunnea</i> (Wall.) Ching	= <i>Pseudophegopteris paludosa</i> (Bl.) Ching
<i>Thelypteris chlamydophora</i> (Rosenst.) Ching	= <i>Mesophlebion chlamydophorum</i> (Rosenst.) Holtum
<i>Thelypteris ciliata</i> (Benth.) Ching	= <i>Trigonospora ciliata</i> (Benth.) Holtum
<i>Thelypteris crassifolia</i> (Bl.) Ching	= <i>Mesophlebion crassifolium</i> (Bl.) Holtum
<i>Thelypteris herbacea</i> Holtum	= <i>Coryphopteris hirsutipes</i> (Clarke) Holtum
<i>Thelypteris immersa</i> (Bl.) Ching	= <i>Amphineuron immersum</i> (Bl.) Holtum
<i>Thelypteris motleyana</i> (Hook.) Holtum	= <i>Mesophlebion motleyanum</i> (Hook.) Holtum
<i>Thelypteris oppositipinna</i> (v.A.v.R.) Ching	= <i>Pseudophegopteris rectangularis</i> (Zoll.) Holtum
<i>Thelypteris paleata</i> (Copel.) Holtum	= <i>Mesophlebion trichopodum</i> (C. Chr.) Holtum
<i>Thelypteris pectiniformis</i> (C. Chr.) Ching	= <i>Coryphopteris pectiniformis</i> (C. Chr.) Holtum
var. <i>eglandulosa</i> Holtum	= <i>Coryphopteris pectiniformis</i>
var. <i>hirsuta</i> Holtum	= <i>Coryphopteris pectiniformis</i> var. <i>hirsuta</i> Holtum
<i>Thelypteris singalanensis</i> (Bak.) Ching	= <i>Metathelypteris dayi</i> (Bedd.) Holtum
<i>Thelypteris uliginosa</i> (Kunze) Ching	= <i>Macrothelypteris torresiana</i> (Gaud.) Ching
<i>Thelypteris unidentata</i> (Bedd.) Holtum	= <i>Coryphopteris unidentata</i> (Bedd.) Holtum
<i>Thelypteris viscosa</i> (J. Sm.) Ching p.p.	= <i>Coryphopteris viscosa</i> (J. Sm.) Holtum
viscosa p.p.	= <i>Coryphopteris arthrotricha</i> Holtum
viscosa p.p.	= <i>Coryphopteris gymnopoda</i> (Bak.) Holtum
viscosa p.p.	= <i>Coryphopteris tahanensis</i> Holtum



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