



Coryphopteris gymnopoda (Baker) Holttum. Plant growing on the Kamborangah ridge of Mt. Kinabalu at 2200 m, showing the arborescent habit characteristic of this genus (phot. R. E. Holttum, 1972).

STUDIES IN THE FAMILY THELYPTERIDACEAE
X. THE GENUS CORYPHOPTERIS ʝ

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SUMMARY

All known species of this genus are described, with synonymy for each and a key for identification. Seventeen new species are described: *C. andersonii*, *C. andreae*, *C. arthrotricha*, *C. atjehensis*, *C. athyrioides*, *C. borealis*, *C. brevipilosa*, *C. hubrechtensis*, *C. iwatsukii*, *C. kolombangarae*, *C. meibasis*, *C. microlepigera*, *C. seemannii*, *C. subbipinnata*, *C. tahanensis*, *C. tanggamensis*, *C. vitiensis*. All other species, except *C. hirsutipes*, *C. pectiniformis*, and *C. viscosa*, are transferred from other genera to *Coryphopteris*. The following names are reduced to synonymy: *Dryopteris megalocarpa* v. A. v. R., *D. indochinensis* Chr., *D. subviscosa* v. A. v. R., *D. supravillosa* C. Chr., *D. kinabaluensis* Copel., *D. linearis* Copel., *D. villosipes* Gepp, *D. rigidifolia* v. A. v. R.; *Lastrea ridleyi* Bedd., *L. robinsonii* Ridl.; *Nephrodium macgregorii* Bak.; *Thelypteris angulariloba* Ching, *T. simozawae* Tagawa, *T. herbacea* Holttum, *T. subglanduligera* Ching. New varieties are described in *C. viscosa*, *C. gymnopoda*, *C. pectiniformis*, and *C. pubirachis*.

CORYPHOPTERIS

Coryphopteris Holttum, *Blumea* 19 (1971) 33. — *Parathelypteris* sect. *Melanostipes* Ching, *Acta Phytotax. Sinica* 8 (1963) 301, p.p.

Caudex erect, commonly 15—30 cm tall, bearing roots throughout as in *Cyathea*, stipes dark throughout or paler distally, in a few species bearing spreading septate hairs near the base, always with rather broad scales which in most species lack acicular hairs. *Lamina* commonly 20—40 cm long, rarely to 80 cm, apex never pinna-like; lowest pinnae not or little reduced (several pairs gradually much reduced in *C. fasciculata* and *C. squamipes*), narrowed towards their bases and often wider at their middle than other pinnae, basal acroscopic lobe often enlarged and dentate with some forked veins, sometimes free; aerophores at bases of pinnae somewhat swollen; pinnae always deeply lobed, one or more basal lobes sometimes free; veins in lobes simple or rarely once forked, both basal veins to edge above base of sinus; lower surface of rachis, costae, costules, and veins always bearing reduced scales (smallest filiform); spreading acicular hairs usually present on lower surface of axes of frond (sometimes replaced by short capitate hairs), in some cases longer hairs which may be septate; sessile resinous glands (which may collapse on drying) in many species ± abundant on lower surfaces; costa always grooved on upper surface; hairs on upper surface of rachis and costae always acicular, normally unicellular, in a few species septate; sessile glands or capitate or acicular hairs sometimes present on upper surface between veins. *Sori* usually with rather large indusia (absent in *C. engleriana*) which may be glandular or hairy, distal sori (rarely all) sometimes ± asymmetric as in *Athyrium*; sporangia short-stalked, never with glands or hairs near annulus, sometimes

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with a sessile gland on the stalk (in *C. badia* non-glandular hairs of several cells in this position); spores usually pale, translucent, with a \pm continuous wing and a few cross-wings (in *C. klossii* many small wings).

Type species: *Coryphopteris viscosa* (Baker) Holttum, l.c. 1971.

Distribution: mountains of the Malayan region (except Java and the Lesser Sunda Islands) and some island-groups of the Pacific including New Caledonia; N. E. India to southern China and Japan.

Cytology: $n=32$ (*C. pectiniformis*; Manton in Holttum, Rev. Fl. Malaya 2, 1955: 624, fig. 8.).

In 1971 (l.c. pp. 18, 19) I compared *Thelypteridaceae* with *Cyathea* (*sensu lato*), pointing out similarities. Assuming the relationship to be a real one, the following characters in *Coryphopteris* may be regarded as primitive: erect caudex; presence in some species of septate acicular hairs on upper surface of rachis and costae; almost sessile sporangia without appendages near annulus. Plants of all species are small in stature, with simply pinnate fronds (partly bipinnate in *C. habbemensis* and *C. stereophylla* in New Guinea) and, as in all *Thelypteridaceae*, a much simpler vascular system than that of *Cyathea*. But of all the Old World members of *Thelypteridaceae* they look to me most like a primitive group — a group which has doubtless changed in the course of evolution but has preserved a uniform arborescent habit. In the New World and Africa the comparable genus is *Amauropelta* Kunze, most species of which are very similar in habit to *Coryphopteris* though they mostly have gradually reduced lower pinnae and a few have developed a prostrate rhizome. *Amauropelta* certainly represents a quite distinct evolutionary line, as shown for example by its peculiar spores. Among the other Old World genera of the family as recognized by me in 1971, few have species of arborescent habit, and in none is such habit present in a majority of species. The genus *Trigonospora*, which alone in *Thelypteridaceae* has trilete spores, has uniformly a short erect caudex which never attains any considerable height. This is doubtless due to the peculiar habitat of all species, which grow on rocks in and beside stream-beds where plants are liable to periodic flooding with swiftly-flowing water. The African *Menisorus* is related and has a similar habitat.

The habitat of *Coryphopteris* is also distinctive but quite different, being confined to the rather low (sometimes mossy) forest of the crests of ridges of higher mountains (1000—3000 m altitude) where the soil is much leached and plants need to be adapted to a mineral-deficient water-supply and probably also to high acidity. It is notable that no species occur in Java, where all high mountains are volcanoes and where volcanic ash replenishes the mineral nutrients in almost all soils. It may be that *Coryphopteris* owes its survival to this adaptation, which allows its species to flourish under conditions where few other plants can compete. In the Pacific, species of *Coryphopteris* only occur where mountains of sufficient height and age provide the right soil conditions (Solomons, Fiji, Samoa, New Caledonia, Marquesas, Tahiti, Austral Islands).

The 47 species here recognized are nearly all Malesian, with their greatest diversity in New Guinea, where there is the greatest development of high mountains. It is quite possible that further new species exist in all the islands; these plants have rarely been collected with sufficient attention to detail. In mainland Asia there is only one variable species (*C. hirsutipes*) which is widely distributed, and *C. petelotii* which appears to be a distinct local ally in Tonkin. But in mainland Asia also there other species included in *Parathelypteris* by Ching; these have slender creeping rhizomes, but sporangia and spores similar to those of *Coryphopteris*. The sessile glands on the lamina of the two genera have a rather different aspect, but to distinguish them clearly would need more recondite techniques than are available to the herbarium botanist. I do not doubt that *Parathelypteris*

(as typified by *P. glanduligera* Ching) and *Coryphopteris* are related genera. The American species *Thelypteris simulata* (Davenp.) Nieuwl., certainly close to *P. glanduligera*, has $n=32$ (R. M. & A. Tryon, Amer. Fern Journ. 63, 1973: 68), agreeing with the only observation on a species of *Coryphopteris*. But *Parathelypteris beddomei* (Baker) Ching and *P. nipponica* (Fr. & Sav.) Ching have a different frond-form and the former has a different chromosome number $n=31$.

Coryphopteris plants mostly grow in places which are only accessible by much physical effort, and probably most of those that exist are in places never yet visited by botanical collectors. Anyone who wished to make a general study of them would need to be very energetic and also have considerable resources for travel at his disposal. But some localities where they exist (notably in Malaya) are easily accessible and it is to be hoped that their peculiar habitat-conditions, and their response to such conditions, may be studied. Owing to their peculiar needs, which are not yet understood, no plants have ever made new growth when transplanted to Kew. Attempts to establish them in cultivation would have to be made near a natural habitat, and perhaps would only be successful when some of the more important characteristics of the habitat are understood, especially the acidity and mineral content of the soil water.

At least one species, *C. badia*, grows (always?) in moss-cushions, sometimes on the branches of small trees in the dwarf moss-forest of high ridges, and plants of several species have been found as epiphytes. The bases of stipes of *C. badia* are covered with slender hairs which seem indistinguishable from root-hairs, and probably have the same function; they are slender, shrivelled but glossy golden brown when dry, with usually few irregular septa (the sporangia of *C. badia* are also peculiar in having non-glandular hairs of several cells on their stalks). It is possible that 'root-hairs' occur on the bases of stipes of other species when the plants grow in moss, though I have not noted this in herbarium specimens. The much stouter multiseptate hairs, almost white and opaque, which occur at the bases of stipes in a few other species (see key) perhaps do not have the same function as the hairs of *C. badia*; similar but shorter hairs occur on the upper parts of fronds of some of these plants.

Plants of this genus have much the same general aspect in all species, whether living or as dried specimens, and it is not easy to see how to distinguish clearly between species, though undoubtedly many distinct species exist. Basal pinnae are always deflexed (this is not an artefact due to drying for the herbarium). In some cases characters of bases of pinnae, especially basal ones, are distinctive (stalked or not, basal lobes free, enlarged, dentate or not); in most species the basal pinnae are longest and widest but in a few there is a gradual reduction of lower pinnae; whether this is a character of young plants of some species is not clear. The presence and distribution of rather large sessile glands on the surface of stipe, rachis, and pinnae is always important but sometimes difficult to observe on dried specimens, as the glands (perhaps due to heat in drying) are often shrivelled; immersion in hot water usually swells the glands and makes them clearly visible. At a certain stage of development the glands look like drops of semi-liquid resin. They seem to be more like the glands of *Amauropelta* than any others known to me and certainly differ from the quite spherical glossy glands of *Sphaerostephanos*. The glands of *Oreopteris limbosperma* (All.) Holub, well known to British field botanists, also appear different, they produce a fragrant odour when bruised. E. Brown observed a resinous odour from the glands of *C. quaylei* in the Marquesas Islands, but I do not know of another similar observation.

Scales are more abundant on the lower surfaces of costae and costules in this genus than in most *Thelypteridaceae* (*Mesophlebion* and *Cyclosorus* s. str. also have many scales). The shape of these scales is characteristic in different species. There is a gradual reduction in

size of scales from the base of the stipe upwards, the smallest scales on the lower surface of costules and veins consisting of a few cells only, thus hair-like in form but quite distinct from the erect acicular and capitate hairs which show no transition to scales. In *C. viscosa* all scales on the lower surface of costae are linear, at most 2 cells wide at the base, but in some other species (especially in New Guinea and the Pacific) quite broad scales occur in this position. *C. viscosa* and *C. athyriocarpa* are distinguished by very narrow stipe-scales with dilated bases formed of cells of a different shape. The rigid narrow scales of *C. kolombangaræ* in the Solomon Islands are also distinctive, and the hairy or glandular scales of *C. seemannii* and *C. iwatsukii* also.

To me one of the specially interesting features of this genus is the presence in several species of septate acicular hairs on various parts of the frond. Where these occur on the upper surface of rachis and costae they are closely similar to hairs in this position in *Cyathea* (including *Alsophila sensu* Tryon in Contr. Gray Herb. 200, 1972: 25). I do not know of another genus in *Thelypteridaceae* in which septate hairs occur abundantly on the upper surface of rachis and costae. Such hairs on the lower surface of costae are more frequent, and in *Coryphopteris* (as in *Cyathea*) they are more variable. Iwatsuki (Mem. Coll. Sci. Univ. Kyoto B, 31, 1964: 32 has stated that *Sphaerostephanos* 'is characterized by having seemingly articulated, long multicellular hairs on the main axis' but I cannot find such hairs on the type species *S. polycarpus* (Bl.) Copel. and he gives no evidence of having examined other species.

The following key to the species is based largely on the distribution of glands which seems to provide the best basis for division, though in some cases it probably separates related species. In one case (*C. viscosa* and its var. *borneensis*) I place plants with and without glands on the upper surface in the same species. In *C. obtusata* there appears to be much variation in the relative abundance of sessile glands and very short capitate hairs, the two forms of trichome perhaps intergrading. As above noted, glands are sometimes difficult to observe on old or badly dried specimens, but they are distinct enough on the living plant as seen with a hand lens. Accurate observation of septate or short capitate hairs can only be effected by use of a magnification of at least $\times 25$. It is probable that good field characters could be discovered for local use, and certainly in any area, apart from New Guinea, it should be possible for local workers to learn to distinguish species without resorting to high magnification. A. F. Braithwaite collected with separate numbers two sets of plants growing together on a mountain in the Solomon Islands because they were different in aspect when living; but in the herbarium the only character I can see which clearly distinguishes them is the scales both on stipe and on pinnae.

The present account is based on all specimens found over a period of seven years in many herbaria, amounting to about 340 numbered collections (many represented in several herbaria) in addition to some unnumbered. The majority are from collections made in the past 50 years; 15 collections from New Guinea made by the late L. J. Brass include specimens of 9 species. Unfortunately, it has not been possible to assemble together all specimens from all herbaria at one time and place, and some of my earlier notes may have been defective. Besides herbarium specimens I have been able to see several species in the field in Malaya, Borneo, and New Guinea in recent years.

As in former monographs of this series, I have tried to choose new specific epithets which do not duplicate those of any existing species in the family, so that transfers to *Thelypteris* may be made without change of epithet.

In the synonymy, names in each paragraph are based on the same type, which is cited at the end of the paragraph. It may be that later workers will wish to question my concept of species; the types will provide a guide to the use of names where subdivision of species here recognized is called for.

In all descriptions of species, characters are dealt with in the same sequence. In all cases fronds are narrowed gradually to the apex, and the upper pinnae merge with a lobed apical lamina. In a description, 15 pairs of pinnae means 15 pairs which are separately attached to the rachis (the number can only be stated approximately, but does give useful informaton). The distance between costules is important because it indicates the spacing of the pinna-lobes: the figure cited is the distance between costules of the larger suprabasal pinnae.

KEY TO THE SPECIES OF CORYPHOPTERIS

- 1a. Base of stipe bearing pale, firmly cylindrical, multiseptate hairs. 2
- b. Base of stipe not bearing such hairs; very slender, occasionally septate hairs (brown and shrivelled when dry) like root-hairs sometimes present 5
- 2a. Stipe and abaxial surface of rachis throughout densely covered with spreading hairs many of which are septate; pinnae to 18 × 2.5 cm 1. *C. unidentata*
- b. Stipe above base and abaxial surface of rachis less densely hairy or with few septate hairs; pinnae smaller 3
- 3a. Indusia glandular 2. *C. multisora*
- b. Indusia bearing acicular hairs 4
- 4a. Pinnae to 1.5(—2) cm wide; veins 4—6 pairs; acroscopic lobe of lower pinnae entire 3. *C. hirsutipes*
- b. Pinnae to more than 2 cm wide; veins 8—10 pairs; at least basal basisopic lobe of lower pinnae strongly dentate. 4. *C. petelotii*
- 5a. Sessile spherical glands abundant between veins on upper surface. 6
- b. Sessile glands lacking or rare on upper surface of pinnae 15
- 6a. Scales on lower surface of costae at most 2 cells wide at base 7
- b. Scales on lower surface of costae widened at base 12
- 7a. Stipe-scales thin, less than 1 mm wide above base; lower surface of costae bearing many acicular hairs 8
- b. Stipe-scales firm, 1 mm or more wide; lower surface of costae bearing short capitate hairs and glands, acicular hairs few or lacking 10
- 8a. Pinnae to 2.5 cm long, nearly all deflexed. 5. *C. plumosa*
- b. Pinnae to 5.5 cm long, a few basal ones deflexed. 9
- 9a. Pinnae to 25 pairs or more; pinna-lobes mostly subentire. 6. *C. viscosa* var. *viscosa*
- b. Pinnae 12—18 pairs; pinna-lobes mostly crenate. 6. *C. viscosa* var. *poiensis*
- 10a. Upper surface of pinnae lacking acicular hairs between veins 7. *C. gymnopoda* var. *gymnopoda*
- b. Upper surface of pinnae bearing acicular hairs between veins 11
- 11a. Lower surface between veins, and indusia, lacking acicular hairs 7. *C. gymnopoda* var. *bintangensis*
- b. Lower surface of pinnae bearing copious short erect acicular hairs between veins. 7. *C. gymnopoda* var. *humilis*
- 12a. Upper surface of pinnae lacking acicular hairs between veins 13
- b. Upper surface of pinnae bearing acicular hairs between veins 8. *C. obtusata*
- 13a. Scales on lower surface of costae broadly ovate. 9. *C. klossii*
- b. Scales on lower surface of costae linear with ± widened base 14
- 14a. Indusia bearing copious acicular hairs; stipe-scales to 3 × 0.75 mm, firm, with many spherical outgrowths on dorsal surface 10. *C. iwatsukii*

- b. *Indusia* lacking acicular hairs; stipe-scales to 7×1.5 mm, thin, smooth dorsally
- 11. *C. atjehensis***
- 15a. Sessile glands present on lower surface generally, or at least on costules 16
- b. Sessile glands lacking on lower surface except in *C. fasciculata* which may have a few glands on costae 42
- 16a. Sori distinctly supramedial **12. *C. diaphana***
- b. Sori medial to inframedial 17
- 17a. Basal half of lower pinnae bearing free or separately adnate pinnules
- 13. *C. habbemensis***
- b. At most free pinnules present near base of largest pinnae. 18
- 18a. Lower pinnae bearing 2 pairs of free pinnules **14. *C. subbipinnata***
- b. At most acroscopic basal lobe of lower pinnae free 19
- 19a. Many septate hairs present on upper surface of rachis and costae 20
- b. Septate hairs absent or rare on upper surface of rachis and costae. 22
- 20a. Septate hairs on upper surface of rachis and costae less than 0.5 mm long; stipe-scales c. 3 mm long. **15. *C. arthrotricha***
- b. Septate hairs on upper surface of rachis and costae 1 mm or more long; stipe-scales much longer 21
- 21a. Stipe-scales to 10×3 mm, thin; hairs on upper surface or rachis and costae commonly 1—1.5 mm long. **2. *C. multisora***
- b. Stipe-scales to 7×1 mm, rigid, hair-pointed; hairs on upper surface of rachis and costae not over 1 mm long **16. *C. tahanensis***
- 22a. Sori mainly along one side of a vein, rarely reniform. **17. *C. athyrioides***
- b. Sori mainly reniform, distal ones sometimes \pm athyrioid. 23
- 23a. All pinna-lobes entire except sometimes the small basal basispic lobes of lower pinnae 24
- b. At least basal acroscopic lobes of middle pinnae dentate. 26
- 24a. Pinnae thin, copiously hairy on costae beneath; costal scales few 25
- b. Pinnae rigid; costae sparsely hairy beneath but bearing many small scales
- 28. *C. andersonii***
- 25a. Hairs on lower surface of costules and veins unicellular.
- 18. *C. pectiniformis* var. *pectiniformis***
- b. Hairs on lower surface of costules and veins to 1.5 mm long, septate
- 18. *C. pectiniformis* var. *hirsuta***
- 26a. Lamina to 15 cm long; largest pinnae 3.0×0.8 cm. **19. *C. andreae***
- b. Lamina always much larger; largest pinnae in most species at least 5×1 cm 27
- 27a. Scales on lower surface of costae sometimes \pm widened at base but not broadly ovate 28
- b. Largest scales on lower surface of costae ovate. 41
- 28a. Lower pinnae, at least 2 pairs, reduced, basal pair not wider than those next above them. 29
- b. Basal pinnae wider and not or little shorter than those above them. 31
- 29a. Six or more pairs lower pinnae gradually reduced, lowest 1.5—2 cm long; stipe commonly to 10 cm long. **20. *C. squamipes***
- b. 2—4 pairs lower pinnae reduced, lowest longer; stipe 20—25 cm long. 30
- 30a. Fertile pinnae to 4.5×1.2 cm; stipe-scales to 2.5 mm wide **21. *C. borealis***
- b. Fertile pinnae to 8.5×1.7 cm; stipe-scales 1 mm wide. **22. *C. meibasis***
- 31a. Basal acroscopic lobe of basal pinnae free 32
- b. Basal acroscopic lobe of basal pinnae not free 38

- 32a. Pinnae to 5.0 × 1.2 cm; costules 2—2.5 mm apart; pinna-lobes mostly entire. **23. *C. vitiensis***
- b. Pinnae usually much larger; costules 3—4 mm apart; pinna-lobes mostly dentate 33
- 33a. Stipe-scales 2.5 × 0.5 mm, rigid; scales on costae rigid, opaque **24. *C. kolombangarae***
- b. Stipe-scales at least 1 mm wide, not rigid; costal scales thin 34
- 34a. Stipe-scales 1 mm wide, hairy on back; pinna-lobes entire or nearly so **25. *C. seemannii***
- b. Stipe-scales 1.5—2 mm wide, not hairy; pinna-lobes mostly dentate 35
- 35a. Glands on lower surface usually confined to costules and veins; no hairs between veins on upper surface 36
- b. Glands present between veins on lower surface and hairs between veins on upper surface 37
- 36a. Lamina to c. 25 cm long; pinnae c. 12—15 pairs. **26. *C. pubirachis* var. *pubirachis***
- b. Lamina to c. 40 cm long; pinnae to 20 pairs. **26. *C. pubirachis* var. *major***
- 37a. Basal pinnae to 9 × 2 cm. **26. *C. pubirachis* var. *philippinensis***
- b. Basal pinnae to 6 × 1.2 cm. **26. *C. pubirachis* var. *sulawesica***
- 38a. Stipe-scales less than 1 mm wide above dilated base 39
- b. Stipe-scales at least 1 mm wide 40
- 39a. Pinnae to 18 pairs; lower surface of rachis bearing capitate hairs only; upper surface with many short capitate hairs between veins **27. *C. athyriocarpa***
- b. Pinnae to 25 pairs; lower surface of pinna-rachis bearing acicular hairs; no hairs between veins on upper surface. **26. *C. viscosa* var. *borneensis***
- 40a. Pinna-lobes, except basal one, entire; glands present between veins on lower surface **28. *C. andersonii***
- b. Pinna-lobes all distinctly dentate; no glands between veins on lower surface **29. *C. tanggamensis***
- 41a. Costules 2.5—3 mm apart; veins not forked; scales on lower surface of rachis and costae not abundant. **30. *C. quaylei***
- b. Costules to 4.5 mm apart; veins on basisopic side of costules often forked; broad scales abundant on lower surface of rachis and costae **31. *C. diversisora***
- 42a. *Indusia* lacking **32. *C. engleriana***
- b. *Indusia* present 43
- 43a. Several pairs of free pinnules present on lower pinnae. **33. *C. stereophylla***
- b. At most basal pair of pinna-lobes free 44
- 44a. Upper surface bearing hairs between veins 45
- b. Upper surface between veins normally glabrous (sometimes a few capitate hairs in *C. fasciculata*) 47
- 45a. Hairs on upper surface between veins acicular 46
- b. Hairs on upper surface between veins capitate. **35. *C. propria***
- 46a. Stipe bearing copious hairs 1 mm long. **34. *C. horizontalis***
- b. Stipe bearing hairs 0.5 mm long in groove only. **37. *C. microlepigera***
- 47a. Lower surface of rachis bearing acicular hairs, costae usually also. 48
- b. Lower surface of rachis and costae lacking (or almost lacking) acicular hairs 51
- 48a. Some hairs on upper surface of costae consisting of 2 cells. **36. *C. lauterbachii***
- b. Hairs on upper surface of costae unicellular 49
- 49a. Several pairs lower pinnae gradually reduced, longest to 5.5 cm long, lowest 1—2 cm long **38. *C. fasciculata***
- b. Lower pinnae not or only slightly reduced 50

- 50a. Texture rigid; pinnae to 3 cm long; hairs on lower surface of rachis 0.5 mm long
39. *C. hubrechtensis*
 b. Texture thin; pinnae to 6.5 cm long; hairs on lower surface of rachis 0.2 mm long
40. *C. brevopilosa*
- 51a. Short capitate hairs present on lower surface of costae and costules and on indusium
41. *C. oligolepia*
 b. Capitate hairs lacking or rare on lower surface and indusia 52
- 52a. Sori supramedial; stipe-scales 8—10 mm long. **42. *C. coriacea***
 b. Sori medial or inframedial; stipe-scales not over 5 mm long. 53
- 53a. Sori mostly athyrioid; pinnae up to *c.* 2.5 cm long. **43. *C. ledermannii***
 b. Sori mostly not athyrioid; pinnae longer 54
- 54a. Basal pinnae sessile. **44. *C. dura***
 b. Basal pinnae (usually others also) with stalks 1 mm or more long. 55
- 55a. Texture rather thin; basal acroscopic lobes free on several pairs of lower pinnae;
 some other lobes distinctly crenate to dentate 56
 b. Texture thick, rigid when dry; basal acroscopic lobe at most free on lower pinnae,
 other lobes entire. **45. *C. badia***
- 56a. Pinnae distinctly caudate; scales on lower surface of costae ovate-acute
46. *C. platyptera*
 b. Pinnae short-pointed; scales on lower surface of costae a little widened near base only
47. *C. subnigra*

1. *Coryphopteris unidentata* (Bedd.) Holttum, *comb. nov.*

Lastrea unidentata Bedd., Handb. Suppl. (1892) 53. — *Dryopteris monodonta* C. Chr., Ind. Fil. (1905) 278; Gard. Bull. Str. Settl. 4 (1929) 388; not *D. unidentata* (Hook. & Arn.) C. Chr. — *Thelypteris unidentata* Holttum, Rev. Fl. Malaya 2 (1955) 251. — T y p e: *Kunstler 7434*, Perak, Gunong Bubu (K).

Stipe 60 cm long, bearing throughout spreading septate hairs 1 mm or more long; basal scales to 10×1.5 mm. *Lamina* to 80 cm long; pinnae *c.* 2.5 pairs; basal pinnae narrowed to base, basal acroscopic lobe enlarged, dentate, free, some other lobes with a single tooth at basisopic base; largest pinnae 18.5×2.6 cm, sessile, lobed to 1 mm from costae, lobes entire except basal ones; costules to 5 mm apart; veins to 10 pairs; lower surface of rachis and costae bearing septate hairs; sessile glands present on costae, costules, and veins, fewer between veins, narrow scales on costae and costules; upper surface of costae bearing septate hairs, few hairs on costules, no glands. *Sori* medial; indusia bearing short capitate hairs.

Distribution: only known from G. Bubu and G. Inas in Perak.

Note: The presence of a single large tooth at the basisopic base of lobes of basal pinnae, which is denoted by the name *unidentata*, occurs only in the type collection. The others are somewhat smaller (the smallest frond has pinnae to 12×1.8 cm) but otherwise do not differ. The septate hairs at base of stipe are shorter than those of *C. hirsutipes*.

2. *Coryphopteris multisora* (C. Chr.) Holttum, *comb. nov.*

Dryopteris multisora C. Chr., Gard. Bull. Str. Settl. 7 (1934) 241. — *Lastrea multisora* Copel., Gen. Fil. (1947) 139. — *Thelypteris multisora* Reed, Phytologia 17 (1968) 295. — T y p e: *Holttum 25523*, Mt. Kinabalu, Sabah, 2100 m (BM; iso in BO, SING).

Stipe to 45 cm, dark, bearing sessile glands throughout and long septate hairs near the base also distally in the groove; scales thin, to 10×3 mm. *Lamina* to 55 cm long; pinnae

to 25 pairs; basal pinnae to 2.1 cm wide in the middle, narrowed to base with basal acroscopic lobe enlarged, dentate to deeply lobed, almost free, rarely to 15 mm long. Pinnae above base to 11 × 1.8 cm, acuminate; lobes not falcate, entire or nearly so; costules 3.5–4 mm apart; veins 6–7 pairs; glands present on lower surface of rachis, costae, and costules, sparse septate hairs on rachis and costae (sometimes absent), many very narrow scales on costae and costules; upper surface of rachis bearing septate hairs 1–1.5 mm long, similar but shorter hairs on costae and costules, sometimes a few glands on costae and costules. *Sori* large, somewhat inframedial, filling lower surface at maturity; indusia glandular.

Distribution: Mt. Kinabalu, Sabah, 1350–3000 m. Other specimens are *Holtum* 5 (1972), 25417; *Clemens* 27970, 28098, 32235; *Kokawa & Hotta* 4535.

Notes. Long septate hairs are not present at the base of stipes in all specimens (possibly lost in gathering or drying); the species therefore appears in two places in the key. Christensen wrongly stated that glands are absent on lower surface of rachis and costae.

3. *Coryphopteris hirsutipes* (Clarke) Holtum

C. hirsutipes (Clarke) Holtum in Nayar & Kaur, Comp. to Bedd. Handb. (1974) 203. — *Nephrodium gracilescens* var. *hirsutipes* Clarke, Trans. Linn. Soc. II Bot. 1 (1880) 514, t. 67, f. 1. — *Lastrea gracilescens sensu* Bedd., Handb. (1883) 234, p.p. — *Lastrea hirsutipes* Bedd., Handb. Suppl. (1892) 52, excl. var. *didymochlaenoides*. — *Thelypteris hirsutipes* Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 314. — *Parathelypteris hirsutipes* Ching, Acta Phytotax. Sinica 8 (1963) 303. — **Lectotype:** Clarke 18968, Assam, Khasya Hills, 1400 m (K).

Dryopteris indochinensis Chr., Journ. de Bot. (Morot.) 21 (1908) 263. — *Thelypteris indochinensis* Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 327; Tard. & C. Chr. in Lec., Fl. Gén. Indoch. 7, pt. 2 (1941) 361, fig. 43, 1–2. — *Lastrea indochinensis* Tagawa, Acta Phytotax. Geobot. 16 (1956) 78. — *Parathelypteris indochinensis* Ching, Acta Phytotax. Sinica 8 (1963) 304. — **Type:** Eberhardt s.n., Tonkin, Massif du Tam Dao, 900 m (P).

Dryopteris gracilescens (Bl.) var. *chinensis* Chr., Notul. Syst. 1 (1909) 40. — **Type:** Henry 10, 111, Yunnan (P; iso in K).

Dryopteris megalocarpa v. A. v. R., Bull. Jard. Bot. Btzg III, 5 (1922) 199. — *Thelypteris megalocarpa* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 252. — **Type:** Lörzing 7134, Sumatra, Patjoer-batoe near Lake Toba, 1400 m (BO).

Thelypteris angulariloba Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 323; Iwatsuki, Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 160. — *Lastrea angulariloba* Tagawa, Acta Phytotax. Geobot. 16 (1956) 78. — *Parathelypteris angulariloba* Ching, Acta Phytotax. Sinica 8 (1963) 304. — **Type:** N. K. Chun 42, 644, Kwangtung (PE, not seen).

Thelypteris simozawae Tagawa, Acta Phytotax. Geobot. 6 (1937) 157. — *Lastrea simozawae* Tagawa, Acta Phytotax. Geobot. 15 (1953) 14. — *Parathelypteris simozawae* Ching, Acta Phytotax. Sinica 8 (1963) 304. — **Type:** Simozawa s.n., 17–10–1936, Taiwan, Tyurei (KYO, not seen).

Thelypteris herbacea Holtum, Gard. Bull. Singap. 11 (1947) 268; Rev. Fl. Malaya 2 (1955) 254, fig. 145. — **Type:** Holtum 20571, Malaya, Gunong Tahan, S. Reriang, 915 m (SING; iso in K).

Nephrodium repentulum sensu Tutchet, Fl. Kwangt. & Hongkong (1912) 346, not *Dryopteris repentula* Chr.

Stipe 20–30(–45) cm long, dark at base only, distal part and rachis pale rufo-stramineous; spreading septate hairs 1–3 mm long at base; scales small, setose. **Lamina** 25–35 cm long, pinnae 15–20 pairs; basal pinnae narrowed near base, basal acroscopic lobe almost free but not elongate; texture thin. Largest pinnae commonly 7 × 1.5 cm (largest seen 10 × 2 cm), acuminate, lobes oblong, entire or sometimes slightly toothed at ends of distal veins; costules 3.5–4.5 (–5.5) mm apart; veins 4–6 pairs; lower surface of rachis and costae bearing copious acicular hairs which are sometimes unicellular (types of *L. hirsutipes*, *D. megalocarpa*, *T. herbacea*) but sometimes few or many are elongate and septate; glands on lower surface absent or few (types of *L. hirsutipes* and *T. herbacea*), rarely abundant; some hairs on upper surface of rachis and costae always septate, slender

unicellular hairs often present between veins. *Sori* medial or inframedial; indusia hairy, hairs sometimes septate.

D i s t r i b u t i o n: S. Japan, Ryukyu Isl., Taiwan, S. China to N.E. India, Thailand, Malaya, Sumatra.

N o t e s. Iwatsuki discussed the variability of this species in Mem. Coll. Sci. Univ. Kyoto B, 31 (1965) 161. I have not seen the type of *T. angulariloba* but at Kew are two specimens from Hong Kong cited by Ching; these and others from Hong Kong and Kwangtung show much variability in the abundance of long septate hairs on the lower surface, though these hairs are always less abundant than in the type of *D. indochinensis*. Ching stated that the type of *T. angulariloba* lacked glands, but some Hong Kong specimens (including one cited by Ching) have a few. Sumatra specimens are varied both in presence of glands and of septate hairs on lower surface.

4. *Coryphopteris petelotii* (Ching) Holttum, *comb. nov.*

Thelypteris petelotii Ching, Bull. Fan Mem. Inst. Biol. Bot. 6 (1936) 326; Tard & C. Chr. in Lec., Fl. Gén. Indoch. 7, pt. 2 (1941) 359, fig. 42, 1—2. — *Lastrea petelotii* Tagawa, Acta Phytotax. Geobot. 16 (1956) 78. — *Parathelypteris petelotii* Ching, Acta Phytotax. Sinica 8 (1963) 303. — T y p e: *Pételot 3630*, Tonkin, Chapa, 1500 m (US; iso in BM, P).

Stipe to 30 cm, dark, base bearing dense long septate hairs, paler and subglabrous upwards. *Lamina* to 40 cm long, pinnae *c.* 20 pairs; basal pinnae a little narrowed to base, basal acroscopic lobe elongate, strongly dentate, almost free. Largest pinnae 10 × 2—2.5 cm, acuminate, lobed almost to costa, lobes close, patent, oblong, often strongly serrate; costules 3.5—4 mm apart; veins 8—10 pairs; lower surface of rachis glabrous, lamina bearing many glands; costae, costules, and veins bearing rather long septate hairs, short erect unicellular hairs between veins; upper surface of rachis and costae bearing septate hairs, short appressed unicellular hairs between veins. *Sori* medial; indusia bearing long septate hairs.

D i s t r i b u t i o n: only known from type locality. It seems possible that this is an extreme form of the variable *C. hirsutipes*.

5. *Coryphopteris plumosa* (C. Chr.) Holttum, *comb. nov.*

Dryopteris plumosa C. Chr., Dansk Bot. Ark. 9, 3 (1937) 65. — *Lastrea plumosa* Copel., Gen. Fil. (1947) 139. — *Thelypteris plumosa* Reed, Phytologia 17 (1968) 305. — T y p e: *Mjöberg 7*, Sarawak, Mt. Murud, 2700 m (BM).

Stipe 6—10 cm, base very dark with copious reddish firm scales 7 × 0.75 mm, upper part paler and finely short-hairy, rachis almost stramineous. *Lamina* 20 cm long, pinnae nearly 30 pairs, nearly all deflexed, middle ones largest; basal pinnae 2 cm long, slightly narrowed to the basisopic base, basal acroscopic lobe a little enlarged, dentate and free; texture firm. Largest pinnae 2.5 × 0.8 cm, lobes entire; costules 2 mm apart; veins 3—4 pairs, pale and prominent both sides; lower surface of rachis and costae bearing pale acicular hairs over 0.5 mm long, small capitate hairs present on costae, costules, and veins, some glands between veins, a few very narrow scales on costae; upper surface of costae hairy as lower, veins and costules with small capitate hairs, glands throughout. *Sori* supramedial; indusia small, thin, with capitate hairs.

Only known from type collection.

6. *Coryphopteris viscosa* (Baker) Holttum

C. viscosa (Bak.) Holttum, Blumea 19 (1971) 33 — *Lastrea viscosa* J. Sm. in Hook. J. Bot. 3 (1841) 412, *nom. nud.* — *Nephrodium calcaratum* (Bl.) Hook., Spec. Fil. 4 (1862) 93, var. *β tantum*.] — *Nephrodium viscosum* Bak., Syn. Fil. (1867) 264, excl. plant. Philip. — *Lastrea viscosa* Bedd., Ferns Brit. India (1870) t. 334; Handb. (1883) 238; Ridley, Journ. Mal. Br. R. As. Soc. 4 (1926) 65, *p.p.*; Copel., Fern Fl. Philip. (1960) 324, excl. plant. Philip. — *Dryopteris viscosa* Kuntze, Rev. Gen. Pl. 2 (1891) 814; v. A. v. R., Handb. (1908) 186, *p.p.*; C. Chr., Gard. Bull. Str. Settl. 4 (1929) 380, *p.p.*; *ibid.*, 7 (1934) 240, *p.p.* — *Thelypteris viscosa* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 215; Holttum, Rev. Fl. Malaya 2 (1955) 252, *p.p.* — *Parathelypteris viscosa* Ching, Acta Phytotax. Sinica 8 (1963) 304. — T y p e: *Cuming 401*, Malacca, Mt. Ophir (K; iso in BM).

var. *viscosa*

Stipe 15—20 cm long, dark at base, paler upwards, basal scales 4×0.5 mm, thin; rachis dull reddish throughout. *Lamina* to 30 cm long, tapering very gradually distally, thin, pinnae to 25 pairs or more, closely placed, a few lower pinnae deflexed; basal pinnae to 1.4 cm wide, narrowed to base, basal acroscopic lobe little or not dentate, not free. Largest pinnae 5.5×1.2 cm, sessile; base truncate with acroscopic lobe sometimes a little elongate, apex short-pointed, obtuse; lobes mostly entire; costules 2.5 mm apart; veins to 6 pairs; lower surface of rachis and costae bearing copious acicular hairs 0.5 mm long with some short capitate hairs and glands; scales on costae 1—2 cells wide; glands abundant between veins; hairs of upper surface of costae unicellular, scattered hairs on costules and veins, glands throughout upper surface. *Sori* medial, distal ones \pm athyrioid; indusia thin, with a few glands.

D i s t r i b u t i o n: Mt. Ophir; Mt Poi in western Sarawak.

var. *poiensis* Holttum, *var. nov.*

A *typo speciei* differt: *pinnis* 12—18-jugatis, *lobis pinnarum* plerisque crenatis.

T y p e: B. L. Burt & P. J. B. Woods 2828, Sarawak, G. Rumpit, Poi Range, 1430 m (K). Also from Poi Range: Clemens 20456, J. W. Anderson 206 (K).

N o t e. These specimens are very much alike; but there is at BM a specimen sent by Mjöberg to Christensen with locality 'Mt. Poi, foot', which appears to me exactly like the typical form of *C. viscosa*, otherwise only known from Mt. Ophir. Further collections from Mt. Poi are desirable to show range of variation. 'Mt. Poi, foot' perhaps means foot of a particular peak in the Poi range.

var. *borneensis* Holttum, *var. nov.*

A *typo speciei* differt: *pagina superiori* eglandulosa.

T y p e: P. W. Richards 1702, Sarawak, Mt. Dulit (K).

Also from Mt. Dulit: C. Hose 335 (K), Mjöberg 8 (BM); Brooks *s.n.*, Mt. Penrissen (BM); Brooks 3, Mt. Bengkaram, Indonesian Borneo.

7. *Coryphopteris gymnopoda* (Baker) Holttum, *comb. nov.*

Nephrodium gymnopodum Baker, Trans. Linn. Soc. II Bot. 4 (1894) 252. — *Dryopteris gymnopoda* C. Chr., Ind. Fil. (1905) 269; Gard. Bull. Str. Settl. 7 (1934) 240. — *Dryopteris viscosa sensu* C. Chr., Gard. Bull. Str. Settl. 4 (1929) 380, *p.p.* — *Thelypteris viscosa sensu* Holttum, Rev. Fl. Malaya 2 (1955) 252, *p.p.* — T y p e: Haviland 1486, Mt. Kinabalu, 3200 m (K).

Lastrea ridleyi Bedd., Kew Bull. (1909) 423. — *Dryopteris ridleyi* C. Chr., Ind. Fil. Suppl. (1913) 38. — T y p e: Ridley 7849, Selangor, Bukit Hitam, 1000 m (K).

Dryopteris subviscosa v. A. v. R., Bull. Jard. Bot. Btzg II, 26 (1915) 14; Handb. Suppl. (1917) 153. — T y p e: Beccari 429, Sumatra, G. Singgalang, 1700 m (BO; iso in FI, K).

Dryopteris kinabaluensis Copel., Philip. J. Sci. 12C (1917) 55. — T y p e: Topping 1719, Mt. Kinabalu, Pakka Cave (MICH, not seen).

Lastrea robinsonii Ridl., Journ. F. M. S. Mus. 10 (1920) 156; Journ. Mal. Br. R. As. Soc. 4 (1926) 65, *p.p.* —

Dryopteris robinsonii C. Chr., Gard. Bull. Str. Settl. 4 (1929) 381. — *Thelypteris robinsonii* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 254. — T y p e: F. M. S. Mus. Collector s.n., Perak, Gunong Kerbau (K).

Dryopteris viscosa var. *kamborangana* C. Chr., Gard. Bull. Str. Settl. 7 (1934) 240. — T y p e: *Holtum 25472*, Mt. Kinabalu, Kamborangah, 2130 m (BM; iso in BO, K, SING).

var. ***gymnopoda***. *Stipe* 15—20 cm long; scales 6—8 × 1—1.5 mm, dark and firm, bases not dilated. *Lamina* 25—30 cm long; pinnae 15—18 (rarely to 25) pairs, texture firm, well spaced; lowest pinnae wider than next, in largest fronds more than 2 cm wide with almost all lobes dentate, in smaller fronds lobes crenate. Suprabasal pinnae commonly 6 × 1.5 cm, on largest fronds 10 × 2 cm, acuminate to subcaudate, lobes mostly crenate; costules 3—3.5 mm apart; veins 6—7(—9) pairs; lower surface of rachis bearing some acicular hairs, of costae bearing many glands and capitate hairs, sometimes a few acicular hairs, glands present throughout lower surface; acicular hairs on upper surface of rachis 0.5 mm long, rather thick, a little shorter on costae, few on costules and veins distally, abundant glands throughout surface. *Sori* medial, basal ones sometimes a little elongate and asymmetric, distal ones rarely athyroid; indusia bearing short capitate hairs and glands.

Distribution: Sabah (Mt. Kinabalu, many collections), Sarawak; in Malaya on Gunong Tahan (*Ridley 15969*, *Haniff & Nur 7949*, *Holtum 20765*) and at scattered localities on the Main Range, perhaps only in rather open places; Sumatra, Peninsular Thailand.

Note. *Lastrea ridleyi* and *L. robinsonii* appear to differ from the rest only in their small size. The type is a single small frond which has lost almost all its basal scales, but the identity with it of the many other collections from the type locality (where no other species occurs) cannot be doubted.

var. ***bintangensis*** *Holtum*, var. *nov.*

Lastrea robinsonii Ridl., Journ. Mal. Br. R. Asiatic Soc. 4 (1926) 65, p.p.

A typo speciei differt: pagina superiori omnino pilis acicularibus inter venas vestita.

T y p e: C. B. Kloss s.n., June 1917, Gunong Bintang on Kedah-Perak boundary (K). Only known from type collection.

var. ***humilis*** *Holtum*, var. *nov.*

A typo speciei differt: frondibus minoribus; pagina superiori et pagina inferiori omnino pilis brevissimis erectis acicularibus vestita.

T y p e: B. Molesworth Allen 1026, Pahang, Cameron Highlands, Gunong Perдах, 2130 m (K).

Note. The type and another specimen from Cameron Highlands (*Wyatt-Smith Kep. 63682*) have pinnae to 2.5 × 0.6 cm, with most pinna-lobes entire. It seems possible that this small size is due to growth in an exposed position. I also found similar small plants (*Holtum 23310*) in an exposed place which was probably near the Wyatt-Smith locality.

8. *Coryphopteris obtusata* (v. A. v. R.) *Holtum*, comb. *nov.*

Dryopteris obtusata v. A. v. R., Bull. Jard. Bot. Btzg II, 28 (1918) 22. — *Thelypteris obtusata* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 253. — T y p e: C. J. Brooks 339 S, Sumatra, Benkoelen, Lebong Simpang (BO; iso in BM).

Dryopteris supravillosa C. Chr., Gard. Bull. Str. Settl. 7 (1934) 241. — T y p e: *Holtum 25471*, Mt. Kinabalu, 1800 m (BM; iso in K, SING).

Stipe 15—25 cm long, dark at base, short-hairy throughout; scales to 5×1.5 mm; upper part of stipe and rachis dull reddish. *Lamina* to 20—35 cm long, pinnae 15—18 pairs; basal pinnae somewhat reduced on smaller fronds, narrowed to base, basal acroscopic lobe dentate, not free. Largest pinnae $6-7.5 \times 1.3-1.5$ cm, short-acuminate; basal lobes dentate, others sometimes with slight teeth at ends of distal veins; costules on type to 4 mm apart, on other specimens closer; veins 5—6(—8) pairs; lower surface of rachis densely hairy, costae less so, glands present on all parts of lower surface, those between veins sometimes small (type) or replaced by capitate hairs, scales on lower surface of costae widened at the base; upper surface densely covered with short acicular hairs, some capitate hairs or glands also present. *Sori* medial to inframedial, distal ones sometimes asymmetric where small; indusia bearing glands and capitate hairs.

Distribution: Sumatra, Borneo, New Guinea.

Note. The type of *D. obtusata* has small sessile glands between veins on lower surface; another specimen from Sumatra (*Surbeck 815*) has normal glands, and another (*Alston 14934*) from a neighbouring locality has only small capitate hairs in this position. A New Guinea specimen (*L. E. Cheesman 1428A*, Japen Isl.) is very like the Sumatran type. *Womersley 9342A*, from N. E. New Guinea, Sepik District, has rather few glands and capitate hairs; *Brass 23058* from Mt. Dayman, Papua, is similar. The type of *D. supravillosa* is a rather small specimen (lamina 20 cm long) and has small capitate hairs between veins on lower surface.

9. *Coryphopteris klossii* (Ridl.) Holttum, *comb. nov.*

Lastrea klossii Ridl., Trans. Linn. Soc. II Bot. 9 (1916) 257; Copel., Philip. Journ. Sci. 78 (1951) 428. — *Dryopteris klossii* v. A. v. R., Handb. Suppl. (1917) 501. — *Thelypteris klossii* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 252. — *Type*: C. B. Kloss *s.n.*, Western New Guinea, Wollaston Exped. to Mt. Carstensz, Camp VIc, 1800 m (BM; iso in K).

Stipe 20—30 cm long, dark, bearing glands but not hairs except in the groove; scales $3-4 \times 1-1.5$ mm. *Lamina* to 30 cm or more long; pinnae c. 20 pairs separated by half their width; basal pinnae a little reduced or not, narrowed in basal third, basal acroscopic lobe a little enlarged and strongly crenate; texture rather rigid when dry. Largest pinnae of type 3.3×1.0 cm, of another specimen 6×1.3 cm; lobes slightly falcate, edges sinuate to toothed at ends of distal veins; costules 2.5—3.5 mm apart; veins 5—6(—7) pairs, thick and slightly prominent; lower surface of rachis and costae bearing rather sparse acicular hairs (most abundant near apices of costae), many ovate scales to 1 mm long on costae, smaller scales on costules, glands scattered generally; upper surface of rachis and costae bearing short acicular hairs, glands and short capitate hairs on surface between veins. *Sori* medial; indusia large, thin, bearing capitate hairs and glands, usually all symmetric.

Distribution: throughout New Guinea on mountains at 1800—3200 m.

Notes. Glands on the type specimen have mostly collapsed but can be seen abundantly on some pinnae; the broad scales are distinctive.

Other specimens from western New Guinea are: *Docters van Leeuwen 10881, 10878A*, Nassau Mts.; *Eyma 4850*, Wissel Lake region; *Brass 9062*, Lake Habbema. From eastern New Guinea: *Vink 17565*, W. Sepik Dist.; *Kalkman 4744, Vink 17207*, Southern Highlands, Papua.

10. *Coryphopteris iwatsukii* Holttum, *sp. nov.*

Caudex gracilis; *stipes* usque 20 cm longus, basi atropurpureus, omnino minute hirsutus; *paleae* rigidae, c. 3 mm longae, basi 0,75 mm latae, dorso excrescentiis sphaericis ornatae.

Lamina 25 cm longa, textura tenuis; pinnae c. 15-jugatae, paulo dissitae; pinnae infimae basin versus paulo angustatae, lobo infimo acroscopico libero, dentato, non elongato. Pinnae suprabasales usque 6×1.4 cm, acuminatae; lobi rectangulare patentes, fere omnes dentati, sinibus 1,5 mm latis separati; costulae 3,5 mm inter se distantes; venae 5—6-jugatae; rachis subtus pilis 0,5 mm longis vestita, costae pilis sparsis glandulisque ornatae, paleae majores costarum basi dilatatae, lamina inter venas glandulis paucis pilisque minutis erectis praedita; rachis costaeque supra pilis acicularibus unicellularibus multis vestitae, costulae venaque pilis paucis, pagina inter venas glandulis multis praedita. *Sori* mediales; indusia tenuia, pilis brevissimis tenuibus acicularibus vestita.

T y p e: *K. Iwatsuki et al. S. 1012*, Sumatra, Atjeh, G. Kemiri, 1800—2500 m, in mossy forest (K).

11. *Coryphopteris atjehensis* Holttum, *sp. nov.*

C. iwatsukio affinis, differt: paleis stipitium usque $7 \times 1,5$ mm, dorso laevibus; pinnis usque $9,5 \times 1,9$ cm, lobis plerumque integris; costulis 4—4,5 mm inter se distantibus; indusiis glabris vel pilis minutis capitatis praeditis.

T y p e: *K. Iwatsuki et al. S. 854*, Sumatra, Atjeh, G. Kemiri, 900—1600 m, on humus-rich ground in evergreen forest (K).

12. *Coryphopteris diaphana* (Brause) Holttum, *comb. nov.*

Dryopteris diaphana Brause, Bot. Jahrb. 56 (1920) 80. — *Thelypteris diaphana* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 251. — *Lastrea diaphana* Copel., Philip. J. Sci. 78 (1951) 427. — *T y p e*: *Ledermann 8903*, N. E. New Guinea, Sepik Dist., 850 m, on moss cushions (B; iso in BM).

Stipe 10—15 cm long, dark, glossy, sparsely hairy; scales 2— 3×0.75 mm, dark, rigid. *Lamina* to 25 cm long; pinnae 15—18 pairs; basal pinnae not or little reduced, a little narrowed at base, basal acroscopic lobe almost free, dentate, not enlarged. Suprabasal pinnae to 4.5×1.2 cm, short-acuminate; lobes oblique, basal ones strongly dentate, rest \pm toothed at ends of veins; costules 2.5—3 mm apart; veins 5—6 pairs; lower surface of rachis and costae with short spreading acicular hairs, glands on costae, costules, and veins, a few dark narrow scales on costae; upper surface of costules and veins with scattered hairs, no glands nor hairs between veins. *Sori* supramedial; indusia glabrous.

D i s t r i b u t i o n: only known from type collection and *Brass 13294* from Idenburg River at 900 m, on ground in Agathis forest.

N o t e. The *Brass* specimen differs in having 2—3 pairs of lower pinnae distinctly reduced, and somewhat broader scales on lower surface of costae.

13. *Coryphopteris habbemensis* (Copel.) Holttum, *comb. nov.*

Dryopteris habbemensis Copel., Univ. Cal. Publ. Bot. 18 (1942) 216. — *Ctenitis habbemensis* Copel., Gen. Fil. (1947) 124; Philip. J. Sci. 78 (1951) 411, pl. 15. — *T y p e*: *Brass 9304*, N. W. New Guinea, Lake Habbema, 3225 m (MICH; iso in BM).

Stipe 25—30 cm, base dark with short brown hairs, reddish distally; scales thin, 5×1.5 mm. *Lamina* to 30 cm long; pinnae c. 18 pairs; basal pinnae not much narrowed at base. Largest pinnae 7×2 cm, pinnate in basal half; 2—3 pairs pinnules quite free, rest \pm adnate to costa, lobes on distal half of pinna connected by a very narrow wing; pinnules 7—12 mm long, 2—3 mm wide, larger ones deeply lobed near their bases and crenate distally; costules 3.5—4 mm apart; veins 5—8 pairs, forked in basal lobes of larger pinnules; lower surface of rachis and costae copiously short-hairy, also on costae thin clathrate scales, the

larger ones ovate; some sessile glands and smaller scales on costules; acicular hairs on upper surface of costae and bases of costules, no glands. *Sori* medial; indusia thin, glabrous.

Distribution: mountains from middle to east of New Guinea at 1800—3200 m; see also *C. stereophylla* (no. 33) from western New Guinea.

14. *Coryphopteris subbipinnata* Holttum, *sp. nov.*

Caudex usque 45 cm altus. *Stipes* 30 cm, basi tantum niger, sursum pallidus; paleae tenues usque $10 \times 1,5$ mm. *Lamina* usque 45 cm longa; pinnae 24-jugatae; pinnae infimae medio 1,9 cm latae, basi 1,0 cm, lobis infimis 2-jugatis liberis lobisque 2—3-jugatis disjuncte adnatis. Pinnae suprabasales usque $12 \times 1,7$ cm, breviter acuminatae; lobi falcati, fere omnes valde dentati, lobi infimi ambo liberi; costulae 3,5 mm inter se distantes; venae 8-jugatae; rachis subtus pilis 0,5 mm longis paleis multis linearibus 3—4 mm longis vestita; costae subtus similiter vestitae, paleis usque 1 mm longis basi dilatatis, costae costulae venaeque glandulis praeditae; rachis supra pilis longioribus paleisque multis vestita, costae costulaeque pilosae, glandulae nullae. *Sori* mediales, omnes symmetrici; indusia tenuia, glandulis pilisque acicularibus vestita.

Type: *A. F. Braithwaite 4757*, Solomon Islands, Guadalcanal, Mt. Popomanatsu, 1700 m, in mossy forest (K).

15. *Coryphopteris arthrotricha* Holttum, *sp. nov.*

Stipes usque 30 cm longus, basi atropurpureus, paleis 3 mm longis praeditus, sursum pallidior et in sulco tantum hirsutus. *Lamina* vulgo 25—35 cm (usque 45 cm) longa; pinnae 20-jugatae, non sese contingentes; pinnae infimae basi valde angustatae, lobo infimo acroscopico fere libero non aucto. Pinnae suprabasales vulgo $8 \times 1,6$ cm (usque 12×2 cm) breviter caudato-acuminatae; lobi plerumque dentati; costulae 3,5—4 mm inter se distantes; venae 6—7(—10)-jugatae; rachis subtus pilis acicularibus minutis pilisque capitatis brevibus praedita, costae costulaeque etiam glandulis paleisque linearibus praeditae, glandulae inter venas paucae; rachis costaeque supra pilis 1—3-septatis vix 0,5 mm longis vestitae, venae pilis paucis interdum septatis praeditae, pagina inter venas vel calva vel pilis brevibus acicularibus capitatisque praedita. *Sori* mediales; indusia parva, pilis brevibus capitatis interdum etiam glandulis ornata.

Type: *Holttum 23345*, Pahang, Cameron Highlands, 1500 m (K).

Distribution: Malaya, Sumatra, in forest at 1220—1520 m. This is the common species of *Coryphopteris* on the Main Range in Malaya; in my book on the ferns of Malaya (1955) I did not distinguish it from *C. viscosa*.

16. *Coryphopteris tahanensis* Holttum, *sp. nov.*

C. arthrotricha affinis, differt: paleis stipitis usque 7×1 mm, rigidis, longe acuminatis; lobis pinnarum praeter infimis fere integris; rachi costisque versus apicem frondis subtus pilis 1,5 mm longis pluricellularibus patentibus praeditis; rachi costisque supra pilis 1 mm longis septatis vestitis.

Type: *Holttum 20694*, Pahang, Gunong Tahan, 1800 m, in dwarf forest (K; iso in SING). Also from G. Tahan: *Holttum 20742*, *Ridley 15970* (K); no other collections.

Note. This species is intermediate between *C. arthrotricha* and *C. multisora*; it differs from the latter in narrower rigid stipe-scales, lack of hairs at base of stipe, shorter hairs on upper surface of rachis and costae.

17. *Coryphopteris athyrioides* Holttum, *sp. nov.*

Stipes usque 20 cm longus, basi niger, sursum leviter rufescens, omnino breviter pilosus, basi paleis tenuibus ovatis $3—4 \times 1,5$ mm vestitus. *Lamina* 30 cm longa; pinnae

18—20-jugatae; pinnae infimae interdum leviter reductae, lobo infimo acroscopico non libero. Pinnae maximae 6,7 × 1,7 cm, breviter acuminatae; lobi falcati leviter dentati; costulae usque 4 mm inter se distantes; venae 7—8-jugatae, subtus prominentes; rachis costaeque subtus pilis patentibus brevibus paleisque filiformibus dense vestitae; pagina inferior omnino glandulis rubris ornata; costae costulaeque supra pilosae, venae pilis paucis praeditae, pagina superior glandulis destituta. *Sori* plurimi asplenioidi, longitudinem venarum fere totam occupantes, nonnulli more generis *Athyrii* hamati, raro reniformes; indusia glandulis et interdum pilis paucis brevibus praedita.

T y p e: *Brass 24722*, Papua, Goodenough Island, on mossy rock (BM; iso in L, LAE).

N o t e. In its sori this is very similar to *Asplenium decurtatum* Kunze ex Link of South America, which is also a Thelypteroid fern.

18. *Coryopteris pectiniformis* (C. Chr.) Holttum

C. pectiniformis (C. Chr.) Holttum, *Webbia* 30 (1976) 20. — *Dryopteris pectiniformis* C. Chr., *Gard. Bull. Str. Settl.* 4 (1929) 379. — *Thelypteris pectiniformis* Ching, *Bull. Fan Mem. Inst. Biol. Bot.* 10 (1941) 253; Holttum, *Rev. Fl. Malaya* 2 (1955) 253, fig. 144. — *Parathelypteris pectiniformis* Ching, *Acta Phytotax. Sinica* 8 (1963) 304. — *T y p e*: *G. F. Hose 293*, Perak (P; iso in K). *Thelypteris subglandulosa* Ching, *Bull. Fan Mem. Inst. Biol. Bot.* 6 (1936) 323. — *T y p e*: *Wray 367*, Perak, G. Batu Puteh (US; iso in CAL, L). (Locality mis-spelled by Ching).

var. *pectiniformis*

Stipe dark at base with thin setiferous scales to 7 × 1 mm, distally stramineous, throughout covered with short unicellular hairs. *Lamina* 40—45 mm long, texture thin; pinnae 15—20 pairs, well spaced; basal pinnae narrowed near base, basal acroscopic lobe not enlarged, sometimes a little dentate. Suprabasal pinnae to 10 × 1.6 cm, acuminate; lobes entire, slightly falcate; costules to 3 mm apart; veins 7—8 pairs, very oblique; lower surface of rachis, costae, and costules bearing short pale acicular hairs, glands and short erect acicular and capitate hairs on surface between veins; upper surface of costae bearing copious pale unicellular hairs more than 0.5 mm long, few hairs on costules and veins, no other hairs, no glands. *Sori* medial; indusia with abundant capitate hairs, sometimes also a few acicular hairs.

Distribution: Malaya, on Taiping Hills (common on Gunong Hijau) and northern part of Main Range, also Gunong Padang in Trengganu.

var. *hirsuta* Holttum, var. *nov.*

A typo speciei differt: minore (pinnis usque 6,5 cm longis); costulis venisque subtus pilis usque 1,5 mm longis septatis vestitis; indusiis pilis tenuibus unicellularibus usque 0,5 mm longis dense vestitis.

T y p e: *Holttum 21547*, Pahang, Pine-tree Hill (near Fraser's Hill), 1460 m (K; iso in SING).

N o t e. In 1969 I found this not uncommon, growing with *C. arthrotricha*, on the path from Fraser's Hill to Pine-tree Hill; only known from this locality. In 1955 I gave a provisional name var. *hirsuta* but no Latin description; such a description was later given by C. F. Reed (*Phytologia* 17, 1968: 302) but he did not cite a type specimen. The other provisional varietal name given by me in 1955, var. *eglandulosa*, should lapse; I think all specimens are glandular, but in some the glands have become very much shrivelled.

19. *Coryphopteris andreae* Holttum, sp. nov.

Stipes 5—6 cm longus, basi niger, sursum pallidior, omnino brevi-pilosus, paleis tenuibus c. 2×1 mm non setiferis vestitus. *Lamina* c. 14 cm longa; pinnae 12—15-jugatae; pinnae infimae 2—3 pares deflexae, basin versus angustatae, lobis infimis acroscopicis leviter auctis, dentatis, fere liberis; pinnae maximae $3,0 \times 0,8$ cm, breviter acutae, fere ad costam lobatae; lobi integri vel paulo dentati; costulae 2 mm inter se distantes; venae 4-jugatae; rachis costaeque subtus pilis brevibus erectis dense vestitae, paleis minutis etiam praeditae; pagina inferior glandulis resinosis ornata; costa supra pilis antrorsis vestita, pagina superior cetera glabra vel \pm hirsuta. *Sori* mediales; indusia magna, tenuia, interdum pilis brevibus capitatis vestita.

Type: Millar & Holttum NGF 15768, N. E. New Guinea, Morobe Dist., Wau Subdist., Otibanda Creek, 2150 m, in moss forest (LAE; iso in K). Also found by me abundantly on Mt. Kaindi, near the type locality, in 1969 (Holttum NGF 40182).

Notes. The upper surface of pinnae is very variable in hairiness.

The epithet *andreae* refers to Andrée Millar, to whom I am grateful for much help during my travels in 1963.

20. *Coryphopteris squamipes* (Copel.) Holttum, comb. nov.

Dryopteris squamipes Copel., Philip. J. Sci. 56 (1935) 99, pl. 5. — *Lastrea squamipes* Copel., Fern Fl. Philip. (1960) 325. — *Thelypteris squamipes* Reed, Phytologia 17 (1968) 315. — **Type:** Ramos & Edaño BS 38525, Mindanao, Bukidnon Prov., Mt. Lipa, 2000 m (BO, MICH, US).

Stipe of type 5—8 cm long, dark at base, paler distally; scales thin, to 5 mm long, to 2.5 mm wide at base. *Lamina* to 28 cm long; pinnae more than 20 pairs; 6—8 pairs lower pinnae gradually reduced, lowest 1.5—2 cm long. Largest pinnae $3,5 \times 0,9$ cm, short-acuminate; lobes oblong, mostly crenate, basal ones dentate; costules 2—2.5 mm apart; veins to 5 pairs; lower surface of rachis and costae bearing stiff unicellular hairs to 1 mm long, on costae many small scales, glands present on costules, veins, and surface; upper surface sometimes with a few glands on and near veins. *Sori* medial, distal ones mostly symmetric; indusia glabrous or with a few glands.

Distribution: Mindanao, several collections.

Note. This species is near *C. fasciculata* (no. 38) differing in smaller size, broader stipe-scales, copious glands on lower surface. The type specimen has numerous scales on lower surface of costae, these scales being widened at their bases, but on other specimens only very narrow scales have been seen. It seems possible that intermediates exist between this species and *C. pubirachis* var. *philippinensis*.

21. *Coryphopteris borealis* Holttum, sp. nov.

Caudex usque 30 cm altus; *stipes* 20—25 cm longus, basi atropurpureus sursum fusco-ruber; paleae usque $4 \times 2,5$ mm. *Lamina* usque 45 cm longa; pinnae 20-jugatae vel plures; pinnae inferiores 2—4-jugatae leviter reductae, infimae 2,5—3 cm longae. Pinnae maximae fertiles $4,5 \times 1,2$ cm, steriles $5,0 \times 1,3$ cm, apice abrupte angustatae; lobi leviter obliqui, subtruncati, apice (praecipue fertiles) ad apices venarum dentati, lobis infimis frondis fertilis valde lobatis; costulae 3—3,5 mm inter se distantes; venae 4-jugatae; rachis costaeque subtus pilis fere 1 mm longis vestitae, paleae costarum omnes perangustae, costulae venaque glandulis parvis praeditae; rachis costaeque supra hirsutae, pilis ad venas raris, pagina inter venas glabra. *Sori* inframediales; indusia magna, glabra.

Type: M. Jacobs 7588, Northern Luzon, Mt. Tabayoc, 2300—2400 m, on ridge in shade (K; iso in L).

22. *Coryphopteris meiobasis* Holttum, sp. nov.

Stipes usque 25 cm longus, pilis tenuibus pallidis vestitus; paleae vix ultra 1 mm latae. *Lamina* usque 40 cm longa; pinnae c. 20-jugatae, inferiores 3-jugatae sensim reductae, infimae 3,5—4,5 × 1,1—1,3 cm, lobo infimo acroscopico non aucto. Pinnae maximae 9 × 1,9 cm (steriles), 8,5 × 1,7 cm (fertiles), acuminatae; lobi obliqui, valde dentati; costulae 4,5—5,5 mm inter se distantes; venae usque 7-jugatae; rachis subtus pilis copiosis 1 mm longis vestita, costae subtus pilis similibus brevioribus paleisque perangustis vestitae, costulae venaeque glandulis sessilibus praeditae, glandulis inter venas paucis; costulae venaeque supra pilis paucis praeditae, pagina inter venas glabra, eglandulosa. *Sori* infra-mediales, orbiculares; indusia pallida, tenuia, pilis paucis brevibus praedita.

Type: T. G. Walker 8730, N. E. New Guinea, Morobe Dist., trail from Sewe to Freyburg Pass, 2300—2450 m (BM).

23. *Coryphopteris vitiensis* Holttum, sp. nov.

Stipes usque 20 cm longus, basi atropurpureus, sursum fusco-ruber, brevi-pilosus, in juventute paleis tenuibus multis vestitus; paleae usque 4 mm longae, 1 mm vel paulo ultra latae, dorso glabrae. *Lamina* usque 23 cm longa; pinnae 18-jugatae; pinnae infimae leviter reductae, medio 9—11 mm latae, basin versus angustatae, lobo infimo acroscopico libero, valde dentato, leviter elongato. Pinnae suprabasales 4,2—5 cm longae, 0,9—1,2 cm latae, brevi-acuminatae; lobus infimus acroscopicus elongatus, dentatus, lobi ceteri fere rectangulare patentis, plerique integri; costulae 2 mm inter se distantes; venae 6-jugatae, vix prominentes; rachis costaeque subtus pilis acicularibus 0,25 mm longis vestitae, costae etiam paleis usque 1 mm longis basi dilatatis glandulisque praeditae, pagina inter venas glandulifera; rachis costaeque supra pilis 0,5 mm longis vestitae, costulae venaeque pilis dispersis praeditae, lamina inter venas nuda. *Sori* inframediales, symmetrici; indusia glandulis paucis tantum ornata.

Type: G. Brownlie 1777, Fiji, Viti Levu, Mt. Victoria, 1320 m, common on summit ridge (K). Only known from this locality.

Notes. Dr. Brownlie informs me that the summit of Mt. Victoria is kept cleared for survey purposes, which may explain the close placing of costules and dense scaliness of the specimen. It is certainly distinct from the other species of Fiji, here named *C. seemannii*.

24. *Coryphopteris kolombangarae* Holttum, sp. nov.

C. pubirachi affinis, differt: paleis stipitis rigidis, opacis, c. 0,5 mm latis; lamina usque 35 cm longa; pinnis usque 23-jugatae, pinnis inferioribus 3—4-jugatis gradatim reductis, infimo vulgo 3 cm longo; paleis paginae abaxialis costarum rigidis, opacis; pilis costarum longioribus.

Type: A. F. Braithwaite 4377, Solomon Islands, New Georgia Group, Kolombangara, 1650 m, in moss forest (K). Also found at same locality by Whitmore & Grubb, BSIP 2094. Not other collections.

25. *Coryphopteris seemannii* Holttum, sp. nov.

Stipes 20 cm longus, basi atropurpureus, sursum pallidior, pilis brevissimis paleisque angustis hirsutis 4 mm longis vestitus; rachis pallide rubra. *Lamina* usque 32 cm longa; pinnae c. 20-jugatae, tenues; pinnae infimae non reductae, medio 1,7 cm latae, basi paulo angustatae, lobo infimo acroscopico libero, dentato, non elongatae. Pinnae suprabasales usque 7 cm longae, fertiles 1,3 cm, steriles 1,6 cm latae, acuminatae; lobi leviter obliqui lobo infimo dentato ceteris fere integri; costulae 3—3,5 mm inter se distantes; venae usque 7-jugatae;

rachis costaeque subtus pilis 0,25—0,33 mm longis vestitae, costae paleis basi dilatatis praeditae, glandulae sessiles ad costulas et inter venas dissitae; rachis costaeque supra pilis 0,5 mm longis vestitae, costulae venaque fere glabrae. *Sori* inframediales (inferiores leviter divergentes); indusia reniformia, glandulis paucis ornata.

Type: Seemann 741, Fiji, Viti Levu, Voma Peak (K). Also from Viti Levu: A. C. Smith 5154, 1290—1320 m; Brownlie 2145, path to Mt. Voma, 900 m; Gillespie 2746. From Vanua Levu: A. C. Smith 1669, summit of Mt. Seatura, 700—830 m, epiphyte.

26. *Coryphopteris pubirachis* (Baker) Holttum, *comb. nov.*

Nephrodium pubirachis Baker, Journ. Bot. 14 (1876) 344. — *Dryopteris pubirachis* C. Chr., Ind. Fil. (1905) 287; Bishop Mus. Bull. 177 (1943) 82. — *Lastrea pubirachis* Copel., Gen. Fil. (1947) 139. — *Thelypteris pubirachis* Reed, Phytologia 17 (1968) 307. — *Type*: Whitmee 202, Samoa (K).

Dryopteris mataanae Brause, Notizbl. Bot. Gart. Berlin 8 (1922) 1939. — *Type*: Vaupel 460, Samoa (B; iso in BM).

Dryopteris viscosa sensu Copel., Bishop Mus. Bull. 59 (1929) 41.

var. *pubirachis*

Stipes 15—20 cm long, dark throughout; scales to 5×1.5 mm, thin, lacking acicular hairs; rachis dark to light reddish. *Lamina* to 25 cm long; pinnae 12—15 pairs, well spaced; basal pinnae wider than next pair, narrowed towards base on basiscopic side, basal acroscopic lobe free and strongly dentate, not elongate. Suprabasal pinnae to 7.5×1.8 cm, short-acuminate, lobes slightly oblique, almost all toothed at ends of veins, basal acroscopic lobe usually longer than rest; costules 4 mm apart; veins 6—7 pairs; lower surface of rachis and costae with slender acicular hairs less than 0.5 mm long, glands present on costae, costules, and veins, not or few between veins, a few narrow scales widened at base present on costae; hairs on upper surface of rachis and costae longer and thicker, a few on costules and veins, not elsewhere. *Sori* inframedial, basal ones a little divergent; distal sori smallest, sometimes a little asymmetric; indusia bearing glands, a few hairs sometimes also present.

Distribution: Samoa, Tahiti (*Grant* 3761 at 1830 m).

var. *major* Holttum, *var. nov.*

A type speciei differt: majore, lamina usque 40 cm longa, pinnis usque 20-jugatis; pinnis maximis suprabasalibus usque 10×1.8 cm.

Type: A. F. Braithwaite 4378, Solomon Islands, New Georgia Group, Kolombangara, 1650 m, in mossy forest. (K).

Distribution: Solomon Islands, Bougainville, New Guinea.

var. *philippinensis* Holttum, *var. nov.*

Lastrea viscosa sensu Copel., Fern Fl. Philip. (1960) 324.

A typo speciei differt: majore; pagina inferiore inter venas glandulosa; pagina superiore inter venas \pm hirsuta; lobis pinnarum, praeter inferiores, fere integris.

Type: Ramos & Edaño BS 37959, Luzon, Mt. Masapilid, Bontoc Subprov. (K).

Distribution: throughout Philippines, on mountains.

Note. This variety grows along with *C. squamipes* in Mindanao, but when well grown is very distinct, both in its large fronds and also its very large basal pinnae. However, *DeVore & Hoover* 327 from Mindanao (K, MICH) is somewhat intermediate. *Coryphopteris* plants are apparently not abundant in the Philippines, perhaps because many mountains are volcanic.

var. *sulawesica* Holttum, var. nov.

A typo speciei differt: pinnis maximis usque 1,2 cm latis; pagina inferiori inter venas glandulosa; pagina superiori inter venas pilis acicularibus et capitatis praedita.

Type: T. G. Walker 12, 354, Celebes, on ridge above River Pasir, 2000—2200 m (BM). Only known from type collection.

Note. This is similar in pubescence and glands to the Philippine variety, but, quite large fronds have much narrower pinnae.

27. *Coryphopteris athyriocarpa* (Copel.) Holttum, comb. nov.

Dryopteris athyriocarpa Copel., Philip. J. Sci. 3C (1908) 344; Sarawak Mus. Journ. 2 (1917) 353, 359. — Type: Brooks & Hewitt 2, Sarawak, Bongo Mts. (MICH).

Stipe to 21 cm, base very dark, dark red distally; scales to 5 mm long, base dilated with isodiametric cells, above base less than 1 mm wide, cells elongate. Lamina of type 20 cm long, pinnae c. 18 pairs; basal pinnae largest, 5.5 × 1.8 cm. Suprabasal pinnae to 4 × 1.2 cm, short-acuminate; both acroscopic and basiscopic basal lobes deeply dentate, other lobes mostly ± crenate; costules 3 mm apart; veins 4—5 pairs, very oblique; lower surface of rachis bearing short capitate hairs, costae bearing glands, capitate hairs, and very narrow scales; upper surface of rachis with acicular hairs 0.5 mm long, shorter on costae, isolated on costules and veins, between veins many short capitate hairs and a few short acicular hairs, no sessile glands. Sori medial; distal sori usually ± athyroid; indusia with a few glands, no hairs.

Distribution: Only known from type and Hans Winkler 534, Pontianak, Kapuas River (BM).

Note. This has the narrow scales of *C. viscosa* but smaller fronds and a different distribution of hairs and glands. It might better rank as a variety of *C. viscosa*; more evidence is needed.

28. *Coryphopteris andersonii* Holttum, sp. nov.

Caudex usque 30 cm altus; stipes 20 cm longus, basi atrocastaneus, sursum pallide castaneus, omnino brevi-pilosus, basi paleis fuscis 4—5 × 1—1,5 mm vestitus; rachis straminea. Lamina usque 25 cm longa, subcoriacea, in sicco rigida; pinnae 15-jugatae; pinnae infimae non reductae, basi leviter angustatae, lobo infimo acroscopico interdum dentato, non libero. Pinnae suprabasales usque 5 × 1,2 cm, brevi-acuminatae; lobi obliqui (c. 60°), vix falcati, apice rotundati, basales tantum leviter dentati; costulae 2 mm vel paulo ultra inter se distantes; venae 6-jugatae, valde obliquae, utroque latere pallidae et prominentes; rachis subtus pilis c. 0,25 mm longis vestita, costae pilis paucis vel nullis, paleis multis anguste linearibus vel basi dilatatis praeditae, venae et pagina inter venas glandulosae; rachis costaeque supra pilis 0,5 mm longis vestitae, pagina superior cetera glabra. Sori mediales, symmetrici; indusia tenuia, glabra.

Type: J. A. R. Anderson 4535, Sarawak, Baram Dist., G. Mulu, 2000 m (L; iso in K).

Note. Only known from the type collection; it has the aspect of *C. pectiniiformis* but has much smaller, rigid, less hairy fronds and copious wider scales on costae.

29. *Coryphopteris tanggamensis* Holttum, sp. nov.

Caudex usque 30 cm altus; stipes 30 cm longus, laevis, basi atropurpureus sursum fusco-ruber; paleae 5 × 1,25 mm. Lamina usque 35 cm longa; pinnae 22-jugatae, valde dissitae; pinnae inferiores 2-jugatae deflexae non reductae; pinnae infimae basi leviter

angustatae, lobo infimo acroscopico elongato dentato non libero. Pinnae suprabasales usque $7 \times 1,5$ cm, acuminatae; lobi obliqui, falcati, marginibus deorsum dentatis, apice rotundato integro; costulae 3,5 mm inter se distantes; venae 6—7-jugatae; rachis subtus pilis brevibus capitatis multis pilisque acicularibus paucis, costae pilis capitatis vel glandulis parvis paleisque linearibus praeditae; glandulae inter venas non certe visae; rachis supra pilis copiosis 0,65 mm longis, costae pilis brevioribus vestitae, costulae venaeque pilis sparsis praeditae, lamina inter venas glabra eglandulosa. *Sori* inframediales, distales plerique symmetrici; indusia pilis capitatis praedita.

Type: *M. Jacobs 8255*, South Sumatra, G. Tanggamus, 2000 m, in mossy forest (L; iso in K).

30. *Coryphopteris quaylei* (E. Brown) Holttum, *comb. nov.*

Dryopteris quaylei E. Brown, Bishop Mus. Bull. 89 (1931) 28, fig. 9. — *Thelypteris quaylei* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 254. — **Type:** *Quayle 1144*, Marquesas Isl., Uapou, 1200 m (BISH).

Stipe at least 17 cm, dark at base only; scales not seen. *Lamina* 30 cm long; pinnae to 25 pairs; basal pinnae slightly reduced, little narrowed at base. Largest pinnae 6×1.4 cm; lobes slightly oblique, not falcate, basal ones dentate, others sometimes slightly so; costules to 3 mm apart; veins to 7 pairs; lower surface of rachis and costae with rather long hairs, some ovate scales on costae, glands abundant on and between veins; neither glands nor hairs between veins on upper surface. *Sori* medial, distal ones often athyrioid; indusia firm, with many glands.

Distribution: only known from type.

Note. E. Brown figures a closely spinulose spore, but I found nothing like the figure among spores from the type specimen; the figure looks more like a spore of *Plesioneuron* (see Holttum, *Blumea* 22: 223—250). E. Brown also writes 'costules and branches thinly covered with deciduous setose scales'. I could not find such scales; those on the lower surface of costae are all entire. E. Brown reports that the fronds had a resinous odour, attributed to the glands.

31. *Coryphopteris diversisora* (Copel.) Holttum, *comb. nov.*

Dryopteris diversisora Copel., Occas. Pap. Bish. Mus. 14 (1938) 54, pl. 6. — *Lastrea diversisora* Copel., Gen. Fil. (1947) 138. — *Thelypteris diversisora* Reed, Phytologia 17 (1968) 273. — **Type:** *H. St John et al. 15660*, Austral Isl., Rapa, on ridge at 620 m (BISH; iso in K).

Stipe 20—30 cm long, dark at base, dull reddish upwards, covered with very short hairs; scales thin, to 6×2 mm, not setose. *Lamina* to 35 cm long; pinnae c. 12 pairs; basal pinnae 2.2 cm wide, narrowed near base, middle lobes on basicopic side longer than on acroscopic. Suprabasal pinnae to 8×1.8 cm, short-acuminate; lobes oblique, crenulate to crenate-lobate, distal ones entire; costules to 4.5 mm apart; veins 7—8 pairs, those on basicopic side of costules often forked; rachis and costae beneath bearing copious acicular hairs 0,5 mm long and many thin clathrate scales, scales on costae ovate to lanceolate, to 10 cells or more wide at base, glands scattered all over lower surface; hairs on upper surface of rachis and costae a little shorter, scattered hairs on costules and veins, no glands. *Sori* medial, only basal ones reniform, rest athyrioid; indusia small, glabrous or with a few hairs.

Distribution: only known from type and one other collection from Rapa Island (*St John & Fosberg 15723*) in which fewer veins are forked.

32. *Coryphopteris engleriana* (Brause) Holttum, *comb. nov.*

Dryopteris engleriana Brause, Bot. Jahrb. 49 (1912) 19. — *Lastrea engleriana* Copel., Gen. Fil. (1947) 138. — *Thelypteris engleriana* Reed, Phytologia 17 (1968) 274. — Type: *L. Schultzze* 330, N. E. New Guinea, Sepik Dist. (B).

Stipe and rachis dark; base of stipe not seen. *Lamina* to 50 cm long; pinnae c. 18 pairs, widely spaced; basal pinnae not reduced, narrowed gradually in basal half, basal pair of lobes free, not enlarged, not dentate. Suprabasal pinnae to 10.8 × 1.6 cm, with stalks 1 mm long, narrowly acuminate; middle lobes somewhat falcate with rounded ends, separated by rather wide sinuses, edges slightly crenate; costules 4.5 mm apart; veins 7 pairs; lower surface lacking acicular hairs, costae bearing narrow scales (often uniseriate), no glands; upper surface with coarse brown hairs on rachis and costae, no others. *Sori* inframedial except basal ones; no indusia; spores with many small wings.

Distribution: only known from type and *Schultzze* 304 from same locality.

Note. Near *C. subnigra* (no. 47) but larger and exindusiate.

33. *Coryphopteris stereophylla* (v. A. v. R.) Holttum, *comb. nov.*

Dryopteris stereophylla v. A. v. R., Nova Guinea 14 (1924) 17. — *Thelypteris stereophylla* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 254. — Type: *H. J. Lam* 1785, W. New Guinea, Doormantop, 3200 m, in shady ravine (L).

Stipe to 30 cm, base dark, rest flushed with red; hairs very short, thick, brownish; scales c. 3 × 1 mm, dark. *Lamina* to 25 cm long with 15–20 pairs of well-spaced pinnae; texture thick, rigid when dry; lowest pinnae not reduced, narrowed a little at basiscopic base. Suprabasal pinnae to 7.5 × 1.5 cm, with 4–8 pairs of free or separately adnate pinnules in basal part, apical part lobed almost to costa; pinnules and lobes 1–2 mm wide, almost all crenulate, separated by wide sinuses; costules 3 mm apart on type, to 4 mm on *Pulle* 883; veins 4–5 pairs, grooved on upper surface; lower surface of rachis covered with brown hairs 0.25 mm long and thin scales, costae with similar hairs and ovate-acute to lanceolate clathrate scales 1 mm long, no glands; upper surface bearing very short erect hairs on edges of grooved costa. *Sori* medial; indusia small, thin, glabrous.

Distribution: only known from type and *Pulle* 883 from Mt. Hellwig, 2600 m (L).

Note. This species is closely related to *C. habbemensis*, differing from the latter in more coriaceous texture, usually narrower pinnules, and lack of glands on lower surface. If the two were united, the name *stereophylla* has priority.

34. *Coryphopteris horizontalis* (Rosenst.) Holttum, *comb. nov.*

Athyrium horizontale Rosenst., Nova Guinea 8 (1912) 722. — *Dryopteris horizontalis* v. A. v. R., Bull. Jard. Bot. Btzg II, 11 (1913) 10; Handb. Suppl. (1917) 151. — Type: *von Roemer* 1136, W. New Guinea, Hellwig Mts., 1350–1600 m (S–PA; iso in BO).

Stipe 15 cm long, dark, densely covered with hairs 1 mm long and thin scales 3 × 1.5 mm. *Lamina* to 40 cm long; pinnae 18–20 pairs; lowest pinnae a little reduced and narrowed to base. Suprabasal pinnae to 7 × 1.5 cm, sessile, short-acuminate; lobes oblong, serrate-crenate, basal lobes most strongly so; costules to 4 mm apart; veins 6–7 pairs; rachis beneath bearing acicular hairs 1 mm long, shorter hairs on costae, sparse on costules, no glands; linear scales, sometimes dilated at base, on costules; hairs on upper surface of

rachis as lower, on costae shorter, copious short hairs on surface between veins. *Sori* inframedial, mostly not athyrioid; indusia thin, short-hairy.

Distribution: only known from type and *Pulle* 633, Mt. Dromaderis, 1250 m (L).

35. *Coryphopteris propria* (v. A. v. R.) Holttum, *comb. nov.*

Dryopteris propria v. A. v. R., Bull. Jard. Bot. Btzg II, 16 (1914) 10; Handb. Suppl. (1917) 152. — **T y p e:** *Rachmat* 496, Central Celebes, Tondo-Tondo (BO, iso in L).

Stipe to 13 cm long, dark; scales *c.* 3×1 mm, thin. *Lamina* to 14 cm long; pinnae 10 pairs; basal pinnae largest, to 4×1.3 cm, a little narrowed at base, basal acroscopic lobe enlarged, dentate, free. Suprabasal pinnae to 3.5×1.1 cm, short-acuminate, lobes entire or with slight teeth at ends of distal veins; costules to 3 mm apart; veins 4 pairs; abundant very short capitate hairs on lower surface of rachis, costae, and surface between veins, sparse very short acicular hairs on costae, costules, veins, and surface between veins; sparse short acicular and many short capitate hairs on upper surface of costae, very short acicular hairs on costae and veins, short capitate hairs between veins. *Sori* medial, basal ones often somewhat athyrioid; indusia bearing many capitate hairs and sometimes a few acicular ones.

Distribution: only known from type collection.

36. *Coryphopteris lauterbachii* (Brause) Holttum, *comb. nov.*

Dryopteris lauterbachii Brause, Bot. Jahrb. 49 (1912) 18. — *Lastrea lauterbachii* Copel., Gen. Fil. (1947) 139. — *Thelypteris lauterbachii* Reed, Phytologia 17 (1968) 287. — **T y p e:** L. Schultze 273, N. E. New Guinea Sepik Dist. (B).

Stipe to 25 cm, dark, upper part and rachis dull reddish; soft pale hairs on abaxial surface; scales $3-4 \times 1$ mm, thin. *Lamina* to 43 cm long; pinnae to 24 pairs; basal pinnae a little reduced, slightly narrowed at base, basal lobe not free. Suprabasal pinnae 7.5×1.7 cm, sessile, base truncate and a little dilated both sides, acuminate; lobes slightly oblique, slightly crenate; costules 3.5 mm apart; veins to 8 pairs; rachis and costae beneath bearing short acicular hairs, few on costules, very small capitate hairs on surface between veins, many small scales on costae and costules; hairs on upper surface of costae longer, some consisting of 2 cells, sparse hairs on costules and veins. *Sori* medial; indusia large, thin, short-hairy.

Distribution: only known from type collection.

37. *Coryphopteris microlepigera* Holttum, *sp. nov.*

Stipes usque 15 cm longus, atropurpureus, in sulco adaxiali pilis 0,5 mm longis vestitus; paleae 2—3 mm longae, tenues; rachis fusco-rubra. *Lamina* usque 28 cm longa; pinnae *c.* 20-jugatae; pinnae inferiores 1—3-jugatae leviter reductae. Pinnae maximae $5,5 \times 1,1$ cm, breviter acuminatae; lobi infimi manifeste dentati, ceteri \pm sinuati; costulae 3 mm inter se distantes; venae 4—5-jugatae; rachis subtus pilis brunneis 0,5—0,75 mm longis vestita, costae pilis acicularibus brevioribus, costulae venaeque pilis brevissimis capitatis praeditae, paleae costarum lanceolatae, basi cellulis 5—10-seriatis constructae; rachis supra ut subtus vestita, pili costarum breviores, pagina inter venas pilis acicularibus brevibus vestita. *Sori* leviter supramediales, interdum leviter athyrioides; indusia glabra.

T y p e: *Pulle* 1078, W. New Guinea, Mt. Treub, 2300 m (L; iso in BM).

Distribution: Western New Guinea; Amboina? A second New Guinea collection from Mt. Nettoti at 1800 m (*van Royen & Sleumer 8226*) differs in shorter narrower pinnae with few hairs between veins on upper surface; a specimen collected by Teysmann on Mt. Toena, Amboina (BO) is similar.

38. *Coryphopteris fasciculata* (Fourn.) Holttum, *comb. nov.*

Aspidium fasciculatum Fourn., *Ann. Sci. Nat.* V, 18 (1873) 295. — *Nephrodium fasciculatum* Bak., *Ann. Bot.* 5 (1891) 320. — *Dryopteris fasciculata* C. Chr., *Ind. Fil.* (1905) 264. — *Thelypteris fasciculata* Ching, *Bull. Fan Mem. Inst. Biol. Bot.* 10 (1941) 251; Brownlie in Aubrév., *Fl. Nouv. Cal.* 3 (1969) 210, pl. xxvii. — **T y p e:** *Balansa 3568*, New Caledonia, Mt. Humboldt (P).
Nephrodium macgregorii Bak., *Ann. Bot.* 5 (1891) 320. — *N. simulans* Bak., *Journ. Bot.* 28 (1890) 106, non Bak. 1874 nec Bak. 1888. — *Dryopteris conterminoides* C. Chr., *Ind. Fil.* (1905) 258, *nom. nov. superfl.* — *Lastrea macgregorii* Rjdl., *Trans. Linn. Soc. II Bot.* 9 (1916) 257. — *Dryopteris macgregorii* C. Chr., *Ind. Fil. Suppl.* III (1934) 90. — *Lastrea conterminoides* Copel., *Philip. J. Sci.* 78 (1951) 424. — *Thelypteris conterminoides* Reed, *Phytologia* 17 (1968) 269. — **T y p e:** *W. McGregor 18*, Papua, Mt. Knutsford (K).
Dryopteris engleriana var. *hirta* C. Chr., *Brittonia* 2 (1937) 296. — **T y p e:** *Brass 5032*, Papua, Mt. Tafa, 2400 m (BM; iso in K, NY).

Stipe 12–20 cm long, dark at base only, reddish upwards, bearing hairs 1 mm long; scales 3×1 mm or somewhat larger. **Lamina** 30–40 cm long; pinnae 25–30 pairs; up to 8 pairs lower pinnae deflexed and gradually reduced, lowest 1–2 cm long. Largest pinnae 4–5.5 \times 0.8–1.3 cm, short-acuminate; lobes \pm dentate at vein-ends, basal lobes most strongly; costules 2.5–3 mm apart; veins 3–4 pairs; lower surface of rachis and costae bearing rather thick acicular hairs 1 mm long, linear scales present on costae and costules, rarely a few glands on costae only, short erect hairs sometimes present between veins; copious acicular hairs on upper surface of rachis and costae, few on costules and veins, sometimes short capitate hairs present between veins. **Sori** inframedial; indusia thin with short capitate hairs and few to many short acicular hairs.

Distribution: New Caledonia, New Guinea, Celebes, at 1800–3000 m.

Note. The type of *N. macgregorii* Bak. is a poor specimen with basal pinnae lacking; it agrees well with other specimens in pubescence. Some specimens from both east and west New Guinea have a few glands on lower surface of costae, others agree with the type in having none. All Celebes specimens have some short hairs between veins on both sides; they are: *Eyma 621*, Enrekang; *Eyma 1624, 1625*, Menado; *Jerry 7308*, Rante Mario, in Agathis forest, 2300 m.

39. *Coryphopteris hubrechtensis* Holttum, *sp. nov.*

Stipes usque 35 cm longus, pro parte maxima niger, nitidus, glaber, sursum sordide rufescens; paleae non visae. **Lamina** 20 cm longa; pinnae c. 18-jugatae, rigidae, inferiores plurimae deflexae, infimae 1–2-jugatae leviter reductae. Pinnae maximae 3 cm longae, usque 1 cm latae, apice obtusae; lobi plerique fere integri, lobo infimo acroscopico tantum paulo aucto, fere libero, leviter dentato; costulae 2,5 mm inter se distantes; venae 4–5-jugatae, in lobo infimo acroscopico interdum furcatae; rachis subtus pilis acicularibus 0,5 mm longis copiosis vestita; costae subtus paleis angustis 0,5–0,75 mm longis, costulae venaeque paleis minutis uniseriatis praeditae, glandulae nullae; pagina superior praeter costae glabra. **Sori** prope costulas siti; indusia sat magna, glabra.

T y p e: *Versteeg 2433*, W. New Guinea, Mt. Hubrecht, 3000 m (BM; iso in L).

Distribution: known also from two other collections from western New Guinea: *Pulle 1004*; *Brass 9062*, Lake Habbema.

40. *Coryphopteris brevopilosa* Holttum, *sp. nov.*

Stipes 16—24 cm longus, atropurpureus, sursum pallidior, pilis 0,25 mm longis vestitus; paleae c. 3×1 mm, tenues. *Lamina* usque 30 cm longa, textura tenuis; pinnae 15—18-jugatae; pinnae infimae non vel paulo reductae, 1,8 cm latae, lobo infimo acroscopico libero, valde dentato. Pinnae suprabasales usque $6,5 \times 1,5$ cm, stipitulo alato 1 mm longo suffultae, acuminatae; lobi fere omnes dentati, praesertim infimi, sinus distinctis separati; costulae 3,5 mm inter se distantes; venae 6-jugatae; rachis costaeque subtus pilis 0,2 mm longis vestitae, costae etiam pilis glandulosis subsessilibus paleisque angustis praeditae, pagina inferior cetera glabra; rachis supra pilis 0,5 mm longis, costae pilis 0,2 mm longis vestitae. *Sori* mediales, superiores saepe athyrioidei; indusia tenuia, glabra.

Type: *Pulle* 532, W. New Guinea, Mt. Perameles, 900 m, on limestone (L).

Note. This specimen was named *Dryopteris horizontalis* by Alston, but is very different in pubescence. The limestone habitat and rather low altitude are notable. The plant is likely to have been rooted in a mass of humus and mosses, not directly in contact with the limestone.

41. *Coryphopteris oligolepia* (v. A. v. R.) Holttum, *comb. nov.*

Dryopteris oligolepia v. A. v. R., Nova Guinea 14 (1924) 17. — *Thelypteris oligolepia* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 253. — *Type*: *Lam* 1977, W. New Guinea, Doormantop, 2520 m, epiphyte (L).

Stipes 12—20 cm long, dark, glossy, scales $2-3 \times 1$ mm. *Lamina* to 25 cm long; pinnae c. 20 pairs; lowest pinnae deflexed and reduced, basal lobes free and dentate. Largest pinnae 4×1.3 cm with stalk hardly 1 mm long, short-acuminate; lobes oblique, crenulate; costules 3—4 mm apart; veins 3—5 pairs; lower surface of rachis castaneous, glabrous, all other lower surfaces bearing scattered very small capitate hairs, some linear scales on costae; upper surface hairy on edges of groove of rachis and costae, few hairs on costules. *Sori* near costules, sometimes asymmetric; indusia small with some capitate hairs.

Distribution: Western New Guinea. Other specimens are: *Docters van Leeuwen* 10787B, Nassau Mts., 2500 m, epiphyte; *van Royen & Sleumer* 8223, Vogelkop Penin., Mt. Nettoti, 1800 m, terrestrial. The latter specimen is largest, and has more widely spaced pinnae than the type, lowest pinnae little reduced.

42. *Coryphopteris coriacea* (Brause) Holttum, *comb. nov.*

Dryopteris coriacea Brause, Bot. Jahrb. 56 (1920) 63. — *Thelypteris coriacea* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 251. — *Lastrea coriacea* Copel., Philip. J. Sci. 78 (1951) 428. — *Type*: *Ledermann* 10965, N. E. New Guinea, Sepik Dist., Hunsteinspitze, 1300 m, in mossy forest (B).
Dryopteris coriacea var. *elata* Brause, l. c. — *Type*: *Ledermann* 11291, same locality, epiphyte (B).

Stipe dark, glossy, 8—12 cm long, hairs on adaxial side short; scales $8-10 \times 1.5-2$ mm; rachis reddish, green towards apex. *Lamina* to 26 cm long; pinnae 12 pairs; lower 3—5 pairs pinnae deflexed and short-stalked, narrowed to base at both sides. Largest pinnae 5.5×1.5 cm (of var. *elata* 8.5×2.0 cm), short-acuminate; lobes oblique (except basal ones) and slightly falcate, almost or quite entire; costules 3.5 mm apart; veins to 6 pairs, grooved above and flat beneath; lower surfaces quite glabrous, some small thick scales present on costae; upper surface hairy on rachis and costae, scattered hairs on margins of lobes. *Sori* near margins; indusia thin, glabrous.

Distribution: only known from type locality.

Note. The specimens named var. *elata* by Brause differ from the type of the species only in size.

43. *Coryphopteris ledermannii* (Hieron.) Holttum, *comb. nov.*

Athyrium ledermannii Hieron., Bot. Jahrb. 56 (1920) 133. — Type: *Ledermann 11906*, N. E. New Guinea, Schraderberg, 2070 m, epiphyte in moss forest (B).

Stipe dark, glossy, hairy in the groove only, 15 cm long. *Lamina* to 20 cm long; pinnae well spaced, to 13 pairs, texture thin; basal pinnae short-stalked, somewhat reduced. Largest pinnae 2.5 × 0.8 cm, apex obtuse, in the middle lobed about half way to costa, towards base more deeply, lobes entire or slightly dentate; costules to 3 mm apart; veins 3—4 pairs in basal lobe, 2 pairs in middle lobes; lower surfaces quite glabrous, no scales seen; upper surface with short hairs on rachis and costae only. *Sori* medial, almost all athyrioid; indusia glabrous.

Distribution: only known from type collection.

44. *Coryphopteris dura* (Copel.) Holttum, *comb. nov.*

Dryopteris dura Copel., Leaf. Philip. Bot. 3 (1910) 805; v. A. v. R., Handb. Suppl. (1917) 148. — *Lastrea dura* Copel., Gen. Fil. (1947) 135; Fern Fl. Philip. (1960) 323. — *Thelypteris dura* Reed, Phytologia 17 (1968) 274. — Type: *Elmer 11674*, Mindanao, Mt. Apo, 2600 m (MICH; iso in BM, E, L).

Stipe dark near base, paler distally, 20—30 cm long, glabrous except for groove of upper part; scales to 5 × 1—2 mm, acuminate. *Lamina* to 25 cm long; pinnae 18 pairs, rather thick; basal pinnae sessile, sometimes slightly reduced, a little narrowed to base, basal acroscopic lobe free, orbicular, a little dentate. Largest pinnae 4.5 × 1.1 cm, apex blunt, lobed at base to 1 mm from costa, less deeply towards apex, lobes rounded, entire except basal acroscopic ones; costules 3—3.5 mm apart; veins 3—4 pairs, slightly prominent on both sides; lower surfaces hairless apart from edges of lobes, scales on costae 2—3 cells or more wide at base; short thick hairs on upper surfaces of rachis and costae. *Sori* near costules; indusia glabrous, sometimes a little athyrioid.

Distribution: Mindanao; eastern New Guinea. From N. E. New Guinea: *Jermy 4172, 4262*, in *Nothofagus-Pandanus* moss forest at 3000 m; from Papua: *Carr 15112*, crest of main range at 2750 m.

45. *Coryphopteris badia* (v. A. v. R.) Holttum, *comb. nov.*

Dryopteris badia v. A. v. R., Bull. Jard. Bot. Btzg II, 16 (1914) 9; Handb. Suppl. (1917) 149. — *Thelypteris badia* Ching, Bull. Fan. Mem. Inst. Biol. Bot. 10 (1941) 250. — *Lastrea badia* Copel., Gen. Fil. (1947) 138. — Type: *C. G. Matthew 674*, Sumatra, Mt. Tandikat (BO; iso in E).

Dryopteris linearis Copel., Philip. J. Sci. 12C (1917) 56. — Type: *Clemens 11069*, Mt. Kinabalu, Marei Parei Ridge (MICH; iso in BO, BM, K).

Dryopteris villosipes Gepp in Gibbs, Dutch N. W. New Guinea (1917) 70. — Type: *L. S. Gibbs 5627*, W. New Guinea, Arfak Mts., 2150—2450 m, epiphyte (BM).

Dryopteris rigidifolia v. A. v. R., Nova Guinea 14 (1924) 18. — *Thelypteris rigidifolia* Ching, Bull. Fen Mem. Inst. Biol. Bot. 10 (1941) 254. — Lectotype: *Lam 1562*, W. New Guinea, Doormantop, 1420—1450 m, in mossy forest, mostly epiphytic (BO).

Stipes varying much in length according to habitat (extremes 10 cm, 70 cm), dark, glossy, with hairs in groove only, at base often bearing a tangled mass of slender hairs which are glossy golden brown when dry; scales narrow, varying with size of frond; rachis also dark throughout. *Lamina* varying from 10 cm long (type of *D. villosipes*) to 65 cm (specimen from Atjeh); pinnae 15 pairs on small plants, to 30 pairs on large ones, texture always thick and rigid when dry; nearly all pinnae distinctly stalked; basal pinnae sometimes a little reduced, little narrowed at base, basal acroscopic lobe free or nearly so.

Largest pinnae commonly 5—6 × 1.2—1.5 cm (extremes 1.7 × 0.5, 8 × 2 cm), lobed to about 1 mm from costa; lobes entire or nearly so, deciduously ciliate on edges; costules less than 2 mm apart in smallest plants, 3—3.5 mm in large ones; veins commonly 4—5 pairs (extremes 2 and 8 pairs), sometimes grooved on both sides; lower surfaces usually quite glabrous apart from hair-like scales on costae and costules; upper surface of rachis and costae bearing rigid dark brown hairs. *Sori* near costules; indusia glabrous; sporangia sometimes bearing 2—3 slender non-glandular hairs on their stalks.

D i s t r i b u t i o n: Malaya, Sumatra, Sarawak, Sabah, Celebes, New Guinea, mostly in mossy forest at 1400—2500 m. *Sleumer & Vink BW 14269* was found 'in shadowed spot in fire vegetation of *Ericaceae* and *Baekia*' on clay soil, W. New Guinea, Anggi-Gigi Lake at 2200 m.

N o t e. The largest specimen seen is *de Wilde 13256* from Atjeh, found in deeply shaded mossy forest, on a tree-trunk, with stipe 70 cm and lamina 65 cm long; but from the same area is *de Wilde 13148* with stipe 12 cm and lamina 25 cm long, pinnae 2.7 × 0.8 cm. The type of *D. villosipes* is only a little smaller than the latter specimen from Atjeh.

46. *Coryphopteris platyptera* (Copel.) Holttum, *comb. nov.*

Dryopteris platyptera Copel., Univ. Cal. Publ. Bot. 18 (1942) 219. — *Lastrea platyptera* Copel., Gen. Fil. (1947) 139; Philip. J. Sci. 78 (1951) 433, pl. 17. — *Thelypteris platyptera* Reed, Phytologia 17 (1968) 304. — **T y p e:** *Brass 11328*, N. New Guinea, Bele River, 2200 m, on rocky banks of stream (MICH; iso in L).

Stipe 20—25 cm, dark and glossy throughout; scales ovate, cordate, *c.* 2 × 1 mm, thin. *Lamina* 30 cm long; pinnae to 18 pairs, well spaced, many distinctly stalked; basal pinnae slightly reduced, stalked 1 mm, basal acroscopic lobe quite free, a little dentate. Largest pinnae 5.5—7 × 1.3—2 cm, caudate-acuminate (cauda 7—15 mm long, entire), deeply lobed throughout, lobes in basal part of pinna ± crenate-dentate; costules 3.5—4 mm apart; veins to 6 pairs; lower surface hairless apart from edges of lobes, ovate-acute scales present on costae, very small filamentous scales on costules and veins; stiff dark hairs on upper surface of rachis and costae. *Sori* inframedial; indusia small, glabrous.

D i s t r i b u t i o n: only known from type collection.

47. *Coryphopteris subnigra* (Brause) Holttum, *comb. nov.*

Dryopteris subnigra Brause, Bot. Jahrb. 56 (1920) 82. — *Thelypteris subnigra* Ching, Bull. Fan Mem. Inst. Biol. Bot. 10 (1941) 254. — *Lastrea subnigra* Copel., Gen. Fil. (1947) 140; Philip. J. Sci. 78 (1951) 427. — **T y p e:** *Ledermann 11962*, N. E. New Guinea, Sepik Distr., epiphyte on moss cushion (B).

Stipe to 24 cm long, very dark, glabrous apart from hairs in groove; scales 3—4 × 1 mm. *Lamina* to 25 cm long; pinnae *c.* 12 pairs, well spaced; lower pinnae stalked hardly 1 mm, narrowed to base on basicopic side, basal acroscopic lobe free (also on all other free pinnae) and dentate. Largest pinnae 5—6 × 1.4 cm, short-acuminate, where sterile lobed to 1 mm from costa, where fertile more deeply; lobes ± dentate, most strongly where fertile, oblique; costules 3—3.5 mm apart; veins to 6 pairs, prominent and slender on both sides; lower surfaces lacking acicular hairs, a few short capitate hairs sometimes on costae, scales with widened base present on costae, uniseriate scales on costules; short acicular hairs on upper surface of rachis and costae. *Sori* near costules; indusia small, glabrous; sporangia often with red glandular cell on stalk.

D i s t r i b u t i o n: many collections in eastern New Guinea; no others reported as epiphytes.

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angulariloba (Ching) Tagawa 3
badia (v. A. v. R.) Copel. 45
conterminoides (C. Chr.) Copel. 38
coriacea (Brause) Copel. 42
diaphana (Brause) Copel. 12
diversisora (Copel.) Copel. 31
dura (Copel.) Copel. 44
engleriana (Brause) Copel. 32
gracilescens sensu Bedd. 3
hirsutipes (Clarke) Bedd. 3
indochinensis (Chr.) Tagawa 3
klossii Ridl. 9
lauterbachii (Brause) Copel. 36
macgregorii (Bak.) Ridl. 38
multisora (C. Chr.) Copel. 2
petelotii (Ching) Tagawa 4
platyptera (Copel.) Copel. 46
plumosa (C. Chr.) Copel. 5
pubirachis (Bak.) Copel. 26
ridleyi Bedd. 7
robinsonii Ridl. 7
simozawae (Tagawa) Tagawa 3
squamipes (Copel.) Copel. 20
subnigra (Brause) Copel. 47
unidentata Bedd. 1
viscosa (Bak.) Bedd. 6, 26

Nephrodium
fasciculatum (Fourn.) Bak. 38
gracilescens
 var. *hirsutipes* Clarke 3
gymnopodium Bak. 7
macgregorii Bak. 38
pubirachis Bak. 26
repentulum sensu Tutcher 3
simulans Bak. 38
viscosum Bak. 6

Parathelypteris

angulariloba (Ching) Ching 3
hirsutipes (Clarke) Ching 3
indochinensis (Chr.) Ching 3
pectiniformis (C. Chr.) Ching 18
petelotii (Ching) Ching 4
simozawae (Tagawa) Ching 3
viscosa (Bak.) Ching 6

Thelypteris

angulariloba Ching 3
badia (v. A. v. R.) Ching 45
conterminoides (C. Chr.) Reed 38
coriacea (Brause) Ching 42
diaphana (Brause) Ching 12
diversisora (Copel.) Reed 31
dura (Copel.) Reed 44
engleriana (Brause) Reed 32
fasciculata (Fourn.) Ching 38
herbacea Holtum 3
hirsutipes (Clarke) Ching 3
indochinensis (Chr.) Ching 3
klossii (Ridl.) Ching 9
lauterbachii (Brause) Reed 36
megalocarpa (v. A. v. R.) Ching 3
multisora (C. Chr.) Reed 2
obtusata (v. A. v. R.) Ching 8
oligolepia (v. A. v. R.) Ching 41
pectiniformis (C. Chr.) Ching 18
petelotii Ching 4
platyptera (Copel.) Reed 46
plumosa (C. Chr.) Reed 5
pubirachis (Bak.) Reed 26
quaylei (E. Brown) Ching 30
rigidifolia (v. A. v. R.) Ching 45
robinsonii (Ridl.) Ching 7
simozawae Tagawa 3
squamipes (Copel.) Reed 20
stereophylla (v. A. v. R.) Ching 33
subglandulosa Ching 18
subnigra (Brause) Ching 47
unidentata (Bedd.) Holtum 1
viscosa (Bak.) Ching 6