

## NEW SPECIES OF MALAYSIAN FERNS

by

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(Issued 31. XII. 1962)

The present paper includes descriptions of several new species of ferns found among recent collections from various parts of Malaysia; also two new combinations of names of species which are of interest on account of their taxonomic history.

### *Cyathea dicksonioides* Holttum, sp. nov.

*Caudex* 3 m altus, 20 cm diametro, frondes 20—24, c. 90 cm longas, verticillis duobus dispositas ferens. *Stipes* ad 10 cm longus, inermis, paleis vestitus; paleae  $4\frac{1}{2}$  cm longae, basi 2 mm latae, castaneae, nitidae, marginibus fragilibus pallidioribus praeditae, rigidae, tortae. *Pinnae* infimae 8—10 cm longae, pinnae maximae 17—20 cm longae. *Pinnulae* confertae, sessiles, ad 3.5 cm longae, praeter basin dilatam 5 mm latae, omnino pinnatae; costulae 2 mm inter se distantes. *Foliola tertiaria* fere triangularia, integra, infimis ad 4 mm longis lobatis exceptis, marginibus valde reflexis; venae 4-jugatae, inferiores furcatae, subtus prominentes, supra planae. *Sori* in quoque foliolo 2—4; indusium pallidum, cuculliforme, marginem versus apertum; receptaculum tumidum; paraphyses nullae. *Rhaches* omnes costaeque subtus minute verrucosae, glabrescentes, supra pilis antrorsis pallidis vestitae; costulae foliolorum paleis minutis brunneis acuminatis praeditae.

NEW GUINEA, Western Highlands, in tree-fern grassland at 2600—2900 m altitude, infrequent: *Hoogland & Schodde 7171*, type, in L. Also *Hoogland & Schodde 7506* at K, L.

Hoogland reports that two whorls of fronds are usually present, the stipes of those of the younger whorl bent downwards near the base and thus appearing below those of the outer whorl, the rest of the frond curved rather abruptly upwards. Presumably this downward curvature of the stipes changes as the fronds become mature. The general aspect of the fronds is much like that of *C. macgregori* F. v. Muell., but the indusia are quite different, being hemitelioid, in shape and substance very much like the inner indusia of *Dicksonia*.

### *Cyathea vandeusenii* Holttum, sp. nov.

*Caudex* ad 2 m altus; frondes c. 10, patentes, 80—100 cm longae. *Stipes* 12—18 cm longus, omnino paleis dense vestitus; paleae ad 4 cm longae, 1— $1\frac{1}{2}$  mm latae, pallidae, rigidae, marginibus fragilibus angustis praeditae; paleae minores tenues, brunneae, setiferae. *Pinnae* infimae 12—15 cm longae, maximae 23 cm longae. *Pinnulae* maximae 5.0 cm longae, basi 15 mm latae,

apicem versus sensim angustatae; costulae  $3\frac{1}{2}$  mm inter se distantes; venae ad 7-jugatae; segmenta laminae rigida, valde crenata, marginibus in sicco reflexis. *Sori* paleis ex toto circumclusi; indusium poculiforme, margine integrum. *Rhaches* omnes costae costulaeque infra paleis tenuibus brunneis margine pilis multis crispatis setisque praeditis vestitae; venae infra pilis pallidis crispatis praeditae.

TERRITORY OF NEW GUINEA, Eastern Highlands District, 3700 m alt.: *Brass* 29989 (type in L, dupl. in K). Frequent in edges of patches of subalpine forest at second lake in Piunde-Aunde valley.

Mr H. M. van Deusen, whose name is given to this species, was mammologist on the 6th Archbold Expedition (also on previous expeditions of 1948 and 1953) and gave considerable help to Mr L. J. Brass in his plant collection, especially at the higher elevations.

*Cyathea vandeusenii* is related to *C. percrassa* C. Chr., but has much larger, softer, finely fringed scales on lower surfaces of leaflets.

*Cyclosorus jacobsii* Holttum, sp. nov.

*Rhizoma* repens, 2 mm diametro; *stipites* c. 5 mm inter se distantes, c. 12 cm longi, paleis parvis fuscis ciliiferis conspersis praediti, omnino pilos erectos unicellulares ferentes; *lamina* pinnata, 11—14 cm longa; *pinnae* 3—4-jugatae, breviter stipitulatae, 5.5—7 cm longae, 7—10 mm latae, basi acroscopice auriculatae, marginibus cetera integris vel crenulatis, apice acuminatae; *lamina* terminalis 8—9 cm longa, 10 mm lata, basi inaequaliter cuneata, marginibus leviter sinuatis; *costae* utroque dense pilosae, pilis pallidis antrorsis; *venae* primariae 3 mm inter se distantes, supra laeves, infra leviter pilosae; *venae* secundariae utroque laeves, c. 3-jugatae, omnes anastomosantes; *venae* intermediae excurrentes valde sinuosae; *sori* pauci, exindusiati, interdum paribus coalescentes; sporangia inermia.

SARAWAK, First Div., North slopes of Mt Penrissen, 900—1000 m, terrestrial on moist sandstone rock in wet shady gorge: *M. Jacobs* 5086, type in L, dupl. at K, SAR, G, US, B, S-PA.

*Cyclosorus oligodictyus* (Bak.) Holttum, comb. nov. — *Acrostichum oligodictyon* Bak., Journ. Linn. Soc. Bot. 24 (1887) 261. — *Leptochilus oligodictyus* C. Chr., Ind. Fil. (1905) 14, 387; v. A. v. R., Handb. Mal. Ferns (1908) 735. — *Dryopteris oligodictya* C. Chr., Mitt. Inst. Hamb. 7 (1928) 148. — *Syngamma angusta* Copel., Philip. Journ. Sci. 3 C (1909) 348.

This species is one of the few ferns of the *Thelypteris* alliance which has its fronds reduced to a simple lamina. In this case there is also extreme reduction in the fertile frond, which has a lamina only 5 mm wide, together with loss of indusia and complete confluence of sori, so that an acrostichoid condition results. *C. oligodictyus* has been found only in lowland forest in Sarawak and Brunei, and only three collections are represented at Kew. The latest is by M. Jacobs (no 5600), from Brunei, near the junction of the rivers Temburong and Belalang, "in river-bed below the regular high-water level, in shade, on rocks sheltered against strong current".

Though the habit and frond-form of this species agree closely with *Bolbitis* (a genus formerly united with *Leptochilus*), its true alliance is clearly indicated by its unicellular hairs (both on the surface of the fronds and on the surface

of scales) and by its venation. This species appears to be an isolated one, and I cannot at present suggest to which pinnate species it is most nearly related.

*Pteris simplex* Holttum, sp. nov.

*Caudex* brevis, apice cum basibus stipitum paleis atrobrunneis integris 2—3 mm longis,  $\frac{1}{8}$  mm latis vestitus. *Stipites* fasciculati, pallidi, glabri, tenues, frondium sterilium ad 5 cm longi, frondium fertile 12—18 cm longi. *Frondesteriles* simplices vel paucipinnatae; lamina simplex vel lamina terminalis 8—13 cm longa, 1.8—2.5 cm lata, apice acuta vel (frondium minorum) rotundata, basi late cuneata vel rotundata vel subcordata, margine cartilaginea irregulariter dentata et crispata; venae liberae, prope costam furcatae, ramis interdum furcatis; pinnae 1—2-jugatae, 1.5—2.5 cm longae, 0.8—2.0 cm latae, asymmetricae, breviter stipitulatae. *Frondefertiles* simplices, 8—19 cm longae,  $2\frac{1}{2}$ —3 mm latae; indusium 1 mm latum; sporae brunneae, papillosoe.

E. NEW GUINEA (Papua), Radeki, alt. 450 m, on ground and rocks near stream in dense rain-forest in gully: *Crutwell* 985, type in K. Also *Crutwell* 971, Gwavet, 550 m.

This species appears to be allied to *P. cretica* L., but is very distinct in its simple fertile fronds and the short pinnae of sterile fronds.

*Rheopteris asplenioides* Holttum, sp. nov.

*Rhizoma* breve repens, radices nigras multas ferens; *stipites* arcte fasciculati, atrobrunnei, 5—13 cm longi, laeves; *lamina* bipinnata-tripinnatifida, 6—10 cm longa; *pinnae* c. 5-jugatae, maximae 4.5 cm longae, ascendentes; *pinnulae* 3—4-jugatae, inferiores profunde trilobatae, superiores bifidae, maximae 15—17 mm longae, basi inaequaliter anguste cuneatae, tenues; *venae* liberae vel raro anastomosantes, in lobis minoribus simplices, in lobis latioribus furcatae vel bis furcatae; *sori* elongati, 2—5 mm longi, dorso venarum inserti, interdum furcati; sporangia primo paraphysibus multis tecta; paraphyses filiformes, pluricellulares, apicem versus incrassatae; sporae triletae, laeves.

S.W. NEW GUINEA, 5 km N.E. from junction Iwur River and East Digul; on stones in clear rapidly running brooklet, during high water inundated; very common: *Kalkman*, *BW* 8528; type in L.

Alston based the genus *Rheopteris* on the species *R. cheesmaniae* (Nova Guinea New Ser. 7:3, 1956) from the Torricelli mountains in N.E. New Guinea. As regards habitat, the published description has only "2000 ft, on trunk of fallen tree". The herbarium label however bears the statement "growing on trunk of a fallen tree brought down by flood in the bed of a mountain torrent". My recollection is that Mr Alston told me that the name *Rheopteris* was adopted because of this stream-bed habitat. It is notable that the present new species also grows in running water.

Alston stated (of *R. cheesmaniae*) "though this plant resembles *Lindsaya* superficially, the clathrate scales are quite unlike those of *Lindsaya*". The fronds of *R. cheesmaniae* are elongate and simply pinnate, with many quite small pinnae, the sori being almost circular. The new species, being more amply divided, with more elongate leaflets, has more characters which can be used for comparison with other genera. The exindusiate sori running along the veins (sometimes spreading unequally along both branches of a vein beyond

a fork) resemble the condition of *Coniogramma* and *Syngramma*. The way in which the sporangia are at first covered with a dense growth of paraphyses is exactly as in *Taenitis blechnoides*, and the paraphyses are almost exactly like those of the latter species (see Holttum in Amer. Fern Journ. 50 : 110, 1960). The rachis-branches are grooved on the upper surface, the grooves interrupted to receive smaller branches or leaflets, the basiscopic edge of a leaflet decurrent on the edge of the groove. This is the condition of *Pityrogramma*, *Cheilanthes* and other genera. Trilete spores are also found on all the genera above mentioned. I think there can be no doubt that *Rheopteris* belongs to the subfamily *Gymnogrammoideae* of Christensen's scheme in Verdoorn's Manual of Pteridology (1938, p. 537). I believe that Copeland was wrong in associating these genera with *Lindsaya*; Manton has produced cytological evidence supporting this belief (Journ. Linn. Soc. Bot. 56 : 73—91, 1958).

The Gymnogrammoid ferns are a complex group, and their inter-relations need much more study. The rather thin clathrate scales of *Rheopteris cheesmaniae* are not very near those of *Cheilanthes*, and are very different from the bristles of *Taenitis* and *Syngramma*. They are nearer to the scales of the Vittarioid ferns, which seem possibly allied to the Gymnogrammooids. I have not found scales on the specimens of *R. asplenioides*; there may be some on the bases of the stipes in the middle of the dense tufts, but these cannot be seen without breaking the specimens rather seriously.

Manton (l. c.) has found that the basic chromosome number of most of the Gymnogrammoid and Vittarioid ferns is 29 or 30; but that of *Taenitis blechnoides* is 44. It would thus be of interest to know the chromosome number of *Rheopteris*, which appears to combine soral characters of *Taenitis* with vegetative characters more generally resembling the more typical Gymnogrammooids.

#### *Taenitis marginata* Holttum, sp. nov.

*Rhizoma* breve, apice pilis rigidis nitidis atrobrunneis 2 mm longis vestitum. *Frondes* simplices vel paucipinnatae; frondes simplices maximae fertiles, stipitibus 7 cm longis sustentae, 10 cm longae, 1.5 cm latae, basi late cuneatae, apicem versus sensim angustatae, rigidae, margine tenue cartilaginea  $\frac{1}{5}$  mm lata praeditae; frondes pinnatae stipitibus 10—18 cm longis sustentae; pinnae 1—2-jugatae, breviter stipitulatae, 4.5—8.0 cm longae, 8—10 mm latae; venae obscurae, more *T. blechnoides* anastomosantes. *Sori* lineares, prope marginem laminae siti; sporangia paraphysibus multis pluricellularibus tecta.

SUMATRA, "Padang Oberland, Harauschlucht", Pajakumbuh: *Ernst 701*, type in Z, dupl. in K.

This species is distinct from *T. blechnoides* (Willd.) Sw. in the invariably submarginal position of the sori, in the pale edges of the very rigid fronds, and in the invariably small size of the plants. I have seen it growing at the type locality, where Dr W. Meijer also made a collection in 1958. The species grows at the foot of the precipitous side of a deep ravine in sandstone rock, in places where small waterfalls keep the base of the cliff continuously wet most of the time. This habitat provides a soil which is poor in mineral nutrients and is probably very acid. Another fern found only in this habitat is *Cerosora sumatrana* Holttum (Kew Bull. no. 3, 1958, p. 450).

*Taenitis flabellivenia* (Baker) Holttum, comb. nov. — *Polypodium flabellivenium* Bak., Syn. Fil. (1867) 322. — *Holttumia flabellivenia* Copel., Philip. J. Sci. 74 (1941) 153, pl. 1. — *Holttumiella flabellifolia* Copel., Gen. Fil. (1947) 178. — *Polypodium holophyllum* Bak., Journ. Bot. 17 (1879) 43.

In his publication of 1941, Copeland described his new genus as a relative of *Dipteris*; in 1947 he retained its position next to *Dipteris* but stated that "the structure and trichomes of the rhizome are suggestive also of *Taenitis*". The bristles of the rhizome are exactly as in *Taenitis*, also the venation; and the sori have abundant paraphyses of the kind found in *T. blechnoides*. This species in fact differs only in smaller size of fronds, and in their irregularly dentate edges, from *Taenitis obtusa* Hook. (Ic. Pl. t. 994, 1854); Copeland re-described this as *T. drymoglossoides* in Philip. J. Sci. 3 C (1909) Bot. 349, t. 8. With the type of *T. obtusa* are smaller plants, evidently gathered at the same locality (on sandstone rocks in Sarawak) which differ only from *T. flabellivenia* in the entire margins of their fronds. It is possible therefore that all these names should be reduced to *T. obtusa*.

*Cyathea coactilis* Holttum, sp. nov.

*Caudex* 2½ m altus, frondes 10, c. 170 cm longas, verticillis duobus dispositas, ferens. *Stipes* c. 10 cm longus, non spinosus, omnino paleiose vestitus; paleae ad 3.5 cm longae, basi vix 1 mm latae, pallidae, marginibus fragilibus fuscis angustis praeditae; paleae minutae sordidae appressae ciliatae interdum setiferae etiam adsunt, rhachis infra paleis similibus omnino vestita. *Pinnae* infimae c. 6 cm longae, maximae 30 cm. *Pinnulae* maximae 3.7 cm longae, 1.2 cm latae, sessiles, abrupte acuminatae; costulae 3 mm inter se distantes; venae 6—7-jugatae; segmenta laminae crenatae, infima libera vel sublibera, sequentia 2—3-paria ala angusta costale juncta. *Sori* prope costulas siti; indusium late cyathiforme; paraphyses tenues, atrobrunneae. *Rhaches pinnarum* infra omnino paleis minutis coactis breve-ciliatis interdum setiferis vestitae, paleisque paucis angustis pallidis praeditae; paleae costarum planae, fuscae, irregulariter setiferae; paleae costularum planae brunneae pleraequae non setiferae.

PAPUA. Southern Highlands Distr., western summit grasslands of Mt Giluwe, 3000 m alt., in alpine shrubbery, *Schodde 1887* (CANB, type).

Note. In shape of fronds and of sori this species resembles *C. pallidipaleata* Holttum (Kew Bull. 16, 1962, 60) from a similar altitude in S.W. Celebes, but differs in the character of the scales on the pinna-rachis.

*Cyathea pycnoneura* Holttum, sp. nov.

*Stipes* 30 cm vel ultra longus, atrobrunneus, omnino spinosus, spinis ad 3 mm longis; paleae stipitis atrobrunneae, ad 3.5 cm longae, basi 2 mm latae, marginibus fragilibus angustis interdum setiferis praeditae; paleae minutae sordidae etiam adsunt; rhachis fere glabrescens, sparsim spinosa. *Pinnae* maximae 65 cm longae. *Pinnulae* maximae 7.5—10.5 cm longae, 1.5—1.7 cm latae, sessiles; costulae 3—3½ mm inter se distantes; venae ad 13-jugatae; segmenta laminae falcata, crenato-serrata, infima non libera. *Sori* prope costulas siti; indusium cyathiforme, tenue, aequae latum ac altum. *Rhaches pinnarum* infra pallidae, omnino paleis minutis pallidis sub-bullatis

apice setiferis, paleisque paucis angustis fuscis margine setiferis vestitae; paleae costarum latae, acuminatae, setiferae, basi  $\pm$  bullatae; paleae costularum pallidae, bullatae, maximae acuminatae et interdum setiferae; venae infra interdum paleis minutis bullatis praeditae.

TERRITORY OF NEW GUINEA. Eastern Highlands, Goroka Subdistr., Upper Omahaiga Valley, alt. 2340 m, in Podocarpus-Lauraceae forest, *Pullen 562* (CANB, type; BM, L).

Note. A sterile specimen from the Upper Asaro Valley, near Goroka, 2500 m alt. (*Womersley & Sleumer NGF 13972*) appears also to belong to this species.

*Cyathea subtripinnata* Holttum, sp. nov.

*Caudex* 2½ m altus, frondes 18 non verticillatas ferens. *Stipes* 12 cm longus, omnino paleis copiose vestitus, non spinosus; paleae ad 4 cm longae et 1½ mm latae, atrobrunneae, nitidae, tortae, marginibus fragilibus angustis praeditae; paleae minutae pleraeque non-setiferae etiam adsunt; rhachis brunnea, non nitida, minute verrucosa, glabrescens. *Pinnae* infimae 17 cm longae, maximae 40 cm. *Pinnulae* maximae 6.5 cm longae et 1.7 cm latae, fere sessiles, majores foliolis tertiariis c. 6-jugatis praeditae, segmentis ceteris basi solum adnatis, non contiguus; costulae 4 mm inter se distantes; venae 7—8-jugatae, infra impressae; segmenta laminae vel foliola tertiaria (in sicco) rigida, fertilia profunde lobata. *Sori* prope costulas siti; indusium late cyathiforme; sporangia numerosissima. *Rhaches pinnarum* infra glabrescentes, paleis conspersis planis rotundatis integris pallidis, paleisque paucis angustissimis atrobrunneis non-setiferis praeditae; paleae costarum eis rhachidis similes, minores interdum convexae; costulae pleraeque glabrae.

PAPUA. Southern Highlands Distr., Western summit grasslands of Mt Giluwe, 3120 m alt., on margin of alpine grassland and alpine shrubbery, *Schodde 1763* (CANB, type).