

THE FERN GENUS *TECTARIA* CAV. IN MALAYA

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SUMMARY

A new key to the species of *Tectaria* in Malaya is presented, with information supplementary to that in Holttum, **Ferns of Malaya** (1955; second edition, with Appendix II, 1968). Earlier names for six species described in 1955 are cited, with a fuller synonymy, and six additional species are described, namely *T. herpetocaulos* Holttum, *T. melanocaula* (Bl.) Copel., *T. decurrens* (Presl) Copel., *T. tricuspis* (Bedd.) Copel., *T. simonsii* (Bedd.) Ching, *T. fauriei* Tagawa, and *T. cherasica* Holttum *sp. nov.* Six of these additional species are still only known in Malaya from single collections.

INTRODUCTION

The present paper is compiled from information gathered during a recent attempt to survey all species of *Tectaria* described from specimens originating in Asia, Malesia, and the Pacific, based mainly on specimens and literature available at Kew, also on a study of Presl's herbarium at Prague (1967) and on notes made in the herbaria at Singapore and Bogor in 1978.

The material is presented as an addition to that recorded in Holttum, **Ferns of Malaya** 1955 (issued in January 1955 though the printed date is 1954). Earlier names have been discovered for six of the species described in 1955 and much additional information on synonymy. Descriptions published in works on the floras of neighbouring countries are cited, including fuller references to Beddome who included Malaya in his *Handbook* to the ferns of India (1883 and Supplement 1892); one species named and described by Beddome in 1892 (*T. tricuspis*) was overlooked when my book of 1955 was prepared because the type collection is not represented in the Singapore herbarium. A fuller statement on known distribution is provided for all the species dealt with in 1955.

A second edition of my book was published in 1968 (the printed date is 1966) containing, in Appendix II (pp 629-638), further information, especially concerning additional species discovered by Mrs. Betty Molesworth Allen; three of these additional species belong to the genus *Tectaria*, namely *T. decurrens*, *T. herpetocaulos*, and *T. melanocaula*. These three species, briefly characterized in 1968, are here more fully described, also a further species (*T. simonsii*) also discovered by Mrs. Allen, another (*T. cherasica*) recently collected by Mrs. A.G. Piggott in Pahang, the forgotten species named by Beddome, and another species, *T. fauriei*, which I also overlooked in preparing my book. A new key covering all species now known in Malaya is provided.

Of the additional species, only *T. decurrens* is represented by several earlier collections made in Malaya (all in Perak). *T. herpetocaulos*, *T. melanocaula*, and *T. simonsii* are still only known in Malaya from specimens collected in the forest near the road to the Cameron Highlands at altitudes between 2000 and 3000 feet. So far as I know *T. tricuspis* has not been collected again in Malaya since Kunstler found it nearly one hundred years ago, though specimens (given another name) have since been found in western Sarawak. Mrs. Piggott's specimen from limestone on Bukit Cheras in Pahang

appears to be unique. Under *T. amplifolia* is an indication that there is perhaps a distinct allied species on limestone in Pahang and Kelantan still not named. All this shows how much more there is to be known about *Tectaria* in Malaya. More field work by trained observers is needed.

The drawings published in Holttum 1955 show the kind of details which need to be observed when learning to recognize these plants in the field. For most purposes a hand lens is sufficient, though to see indusia clearly a higher magnification is necessary. Indusia shrivel on old sori and young fronds should be looked for which show them more clearly. Scales at the base of stipes may yield distinctive characters, but many herbarium specimens do not show them. Buds at the bases of pinnae or at the bases of some main veins in the terminal lamina only develop on older fronds (in *T. siifolia* apparently only on sterile ones), so it is important to look for these.

There is no clear indication of the occurrence of natural hybrids in Malaya, though such may occur; one is recorded in Ceylon. Experimental hybridization might yield interesting results. Of six species examined cytologically by Prof. Manton from Malayan plants, only one (*T. barberi*) proved to be tetraploid (see Holttum 1955, p.626) but a tetraploid form of *T. devexa* has been found in New Guinea.

Synonymy. The synonyms are arranged in paragraphs, in each of which all names are dependent on one type specimen, the type and its location being stated at the end of the paragraph. In most cases I have seen holotypes or isotypes; those which I have not seen are so marked. In the case of Fée, whose specimens were dispersed, I have seen none of those which he himself studied, but in most cases here dealt with he cited collections which are represented by isotypes at Kew, and from his descriptions and his excellent figures there is no doubt as to his meaning. I have examined microfiche photographs of Willdenow's types; these give adequate information for the species here dealt with. Some authors in the 19th century attempted to distinguish species which have peltate indusia from those with reniform indusia; the latter were placed in a genus *Sagenia*. Most species have more or less distinctly reniform indusia and it does not appear that those with truly peltate indusia form a natural group, so that the genus *Sagenia* is now not recognized. Fée and Presl both attempted to distinguish genera on vein patterns; it is possible that some of these names may be useful for subdivisions of the genus, but some are not clearly defined and all are generally now disregarded.

KEY TO THE MALAYAN SPECIES OF *TECTARIA*

1. Veins all free 1. *T.ingens*.
1. Veins anastomosing, at least to form costal areoles
 2. Veins forming areoles along costae and a variable number of other areoles; free included veinlets in areoles few except in *T. barberi*, none in costal areoles
 3. Lamina hairy between veins on upper surface
 4. Veins anastomosing in costal and costular areoles only 2. *T.devexa*
 4. Veins more amply anastomosing 3. *T. coadunata*

3. Lamina not hairy between veins on upper surface
 5. Sori in a single row on each side of costae or costules; indusia distinct
 6. Fertile fronds much contracted; lamina to 25 cm long 4. *T. brachiata*
 6. Fertile fronds not or little contracted, to 60 cm long 5. *T. griffithii*
 5. Sori scattered, small, with inconspicuous indusia . . . 6. *T. barberi*
2. Veins forming many areoles, the largest ones with included free veinlets, often branched; free veinlets also present in costal areoles
 7. Fronds simple, entire 7. *T. singaporeana*
 7. Fronds deeply pinnatifid or pinnate or bipinnate
 8. Sori small, very irregularly arranged and shaped, some much elongate 8. *T. semipinnata*
 8. Sori uniform or nearly so, none greatly elongate
9. Fronds pinnatifid to a wing along the rachis; stipe also winged
 10. Lower lobes of frond much smaller than middle lobes 9. *T. grandidentata*
 10. Lower lobes of frond not reduced
 11. Sori in two rows between main veins, immersed 10. *T. decurrens*
 11. Sori in more than two rows, not immersed
 12. Indusia conspicuous, persistent, hairy on upper surface 11. *T. tricuspis*
 12. Indusia small, caducous, not hairy 12. *T. vasta*
9. Fronds of mature plants with at least one pair of free pinnae
 13. Sori in one row on each side of main veins, sometimes with additional ones where pinnae are deeply lobed
 14. Sori large, mostly on free veins in areoles
 15. Basal pinnae lacking free pinnules 13. *T. crenata*
 15. Basal pinnae of well-grown plants bearing at least one pair of free pinnules

- 16. Fronds dimorphous; lower surface quite glabrous 4. *T. brachiata*
- 16. Fronds little or not dimorphous; lower surface of costae hairy 14. *T. cherasica*
- 14. Sori not on free veinlets in areoles, mostly small
 - 17. Fronds dimorphous; indusia inconspicuous; buds present at bases of sterile pinnae 15. *T. siifolia*
 - 17. Fronds not dimorphous; indusia conspicuous; no buds . . . 16. *T. amplifolia*
- 13. Sori scattered or in several rows between main veins
 - 18. Pinnae and pinnules c. 10 times as long as wide 17. *T. semibipinnata*
 - 18. Pinnae and pinnules proportionately much wider
 - 19. Stipe and rachis almost black; no buds at base of veins on apical lamina
 - 20. Pinnae deeply lobed; sori indusiate 18. *T. melanocaula*
 - 20. Pinnae not lobed; sori exindusiate 19. *T. simonsii*
 - 19. Stipe and rachis not black; or, if black, buds present at bases of veins of apical lamina
 - 21. Middle pinnae broadly rounded at base on basisopic side
 - 22. Caudex erect; buds present at bases of some veins on apical lamina 20. *T. angulata*
 - 22. Caudex long-creeping; no buds on apical lamina 21. *T. herpetocaulos*
- 21. Middle pinnae narrowly cuneate on both sides at base
 - 23. Pinnae not decurrent at their bases to form rachis-wings; no buds present at bases of pinnae 22. *T. oligophylla*
 - 23. Pinnae decurrent to form narrow rachis-wings which almost reach the next lower pinnae; buds present at the bases of pinnae 23. *T. fauriei*

1. ***Tectaria ingens*** (Atkinson) Holttum 1955: 503, fig. 296. *Nephrodium ingens* Atkinson ex Clarke, Trans. Linn. Soc. II Bot. 1 (1880) 526, pl. 73.
 Type: C. B. Clarke 9295, Darjeeling (K).

Nephrodium setulosum Bak., Journ. Bot. 28 (1890) 265.—*Ctenitopsis setulosa* (Bak.) C. Chr., Notul. Syst. 7 (1938) 87; Ching, Bull. Fan Mem. Inst. Biol. Bot. 8 (1938) 321; Tard. & C. Chr. in Fl. Gen. Indochine 7: 2 (1941) 352. — Type: Balansa 1836, Tonkin (K, isotype).

Aspidium cardieri Christ, Journ. de Bot. 19(1905)62.—*Tectaria cadieri* (Christ) C. Chr., Ind. Fil. Suppl. III (1934) 177. — Type: Cadiere 85, Annam, valley of river Song Gianh, 19° 17' N. (K, isotype).

Dryopteris raciborskii v.A.v.R., Handb. Malayan Ferns (1908) 197, 816, new name for *Aspidium sagenioides sensu* Racib. Fl. Btzg. 1(1898)179, *non* Mett.—Type: Raciborski s.n., G. Salak, Java (BO; isotype K).

Tectaria matthewii Ching, Bull. Fan Mem. Inst. Biol. Bot. 2(1931)199, t.13.—*Ctenitopsis matthewii* Ching, *ibid.* 8 (1938) 319. — Type: C. G. Matthew s.n. 12 Dec. 1907, Kwangtung, Lienchow, Mong-si Hap, in a ravine in deep shade (K).

In Malaya this species is still only known from two collections made on Gunong Brinchang, Cameron Highlands, at about 1500 m, in the forest. I believe that the types of all the above cited species are conspecific with Clarke's original; they indicate a wide distribution but, except near Darjeeling, few specimens apart from the types have been collected. As it occurs in Java, it may be expected also on mountains in Sumatra.

Dr W.A. Sledge (Kew Bull. 27 (1972) 415), stated that in his opinion this species does not differ significantly from *Tectaria paradoxa* (Fée) Sledge of Sri Lanka except in its larger size. But the two differ also in the character of the scales at the bases of stipes; in *T. ingens* these are more than 10 mm long, their marginal cells not thin-walled, but in *T. paradoxa* the scales are shorter and have a distinct margin of thin-walled cells. Dr Sledge also included *T. fuscipes* (Wall.) C. Chr. as a synonym of *T. paradoxa*, in spite of Clarke's comments on its distinctive characters. I agree with Clarke that its very dark scales and narrower fronds are sufficient to establish its distinctness. It is distributed from Sikkim to southern Burma (also in Thailand, Vietnam, and Hainan) and might occur in northern Malaya.

2. *Tectaria devexa* (Kunze ex Mett.) Copel., Philip. J. Sci. 2C (1907) 475; Holttum 1955: 505, fig. 297. — *Aspidium devexum* Kunze, Bot. Zeit. 6 (1848) 255, *nom. nud.*; Kunze ex Mett., Ann. Mus. Bot. Lugd. — Bat. 1 (1864) 237, *in obs.* — *Aspidium intermedium* Mett., Farnghatt. IV (1858) 119, *non* Willd. 1810. — Type: Zollinger 2717, Java (LZ, destroyed; isotype not seen).

Aspidium giganteum var. *minor* Hook., Spec. Fil. 4(1862)50.—*Sagenia gigantea* var. *minor* Bedd., Ferns S. India (1864) 81, t. 243. — Type: Thwaites C.P. 1358, Ceylon (K; BM).

Aspidium membranaceum Hook., Spec. Fil. 5(1864)105.—*Pleocnemia membranacea* (Hook.) Bedd., Ferns Br. India Suppl. (1876) 15. — Lectotype (selected here): Cuming s.n. (wrongly labelled 277), Philippines (K).

Christensen regarded *Aspidium devexum* Kunze 1848 as a valid name, but it was not. The first description of the species was published by Mettenius in 1858 under the name *Aspidium intermedium* which was illegitimate, being a later homonym; he cited *A. devexum* as a synonym. In 1864 however he evidently recognized the error and stated that the species described was *A. devexum* Kunze, which name thus acquired validity. But in 1864 Hooker also redescribed the same species, mainly from a Philippine specimen, under the name *A. membranaceum*. As it is uncertain which name was earlier, I prefer to retain the epithet *devexa*, which has been current for many years.

3. ***Tectaria coadunata*** (J.Sm.) C. Chr., Contr. U.S.Nat. Herb. 26 (1931) 331; Ching, Sinensia 2(1931) 18, pl. 1 & 2; Sledge, Kew Bull. 27 (1972) 418. — *Sagenia coadunata* J.Sm. in Hook. J. Bot. 4 (1841) 184, new name for *Aspidium coadunatum* Hook. & Grev., Ic. Fil. (1831) t. 202, non Kaulf. 1824. — *Sagenia macrodonta* Fée, Gen. Fil. (1852) 313, t. 24, nom. nov. superfl. — *Tectaria macrodonta* (Fée) C. Chr., Ind. Fil. Suppl. III (1934) 181; Holtum 1955: 505. — Type: Wallich 377, Nepal (K).

Aspidium pinfaense Christ, Bull. Geogr. Bot. Mans.20(1909) Mem. 169.—Type: Cavalerie 872, Kweichow, Pin-fa (K, isotype).

This species is widely distributed from N.E. India to S.W. China and southwards to Burma and Thailand. As noted in Holtum (1955) there are only a few small specimens from the north of Malaya. Those at Kew were growing on limestone, which might account for their small size: Henderson 21383 (Langkawi) and Kiah 35315 (Perlis). Christ identified Philippine specimens with this species (Philip. J. Sci. 2C: 187) but they are distinct and were later named *T. christii* Copel.

4. ***Tectaria brachiata*** (Zoll. & Mor.) Morton, Contr. U.S. Nat. Herb. 38 (1973) 217. — *Aspidium brachiatum* Zoll. & Mor., Nat. en Geneesk. Archief Ned. Ind. 1 (1844) 399; v.A.v.R. Handb. (1908) 252. — Lectotype (Morton): Zollinger 655 (G, L).

Aspidium zollingerianum Kunze, Bot. Zeit. 4(1846) 462: Bedd., Ferns Br. India (1867) t. 251. — *Nephrodium zollingerianum* Bak., Syn. Fil. (1867) 298. — Type: as *A. brachiatum*.

Aspidium variolosum Wall. ex Hook., Spec. Fil. 4(1862)51; Bedd., Suppl. Ferns Br. India (1876) t. 365 & Handb. (1883) 216; v.A.v.R. Handb. (1908) 248. — *Tectaria variolosa* (Hook.) C. Chr., Contr. U.S.Nat.Herb. 26 (1931) 289; Ching, Sinensia 2 (1931) 21, pl. III; Backer & Posth., Varenfl. Java (1939) 76; Holtum 1955: 506, fig. 298; De-Vol, Fl. Taiwan 1 (1975) 346. — Lectotype (Ching): Wallich 379, N.E.India (K).

Aspidium immersum Hook., Spec. Fil. 4(1862)58, non B1. 1828.—Type: Wallich s.n., without locality (K).

Phlebogonium impressum Fée, Gen. Fil. (1852)314, t.24A, fig.2.—Type:Griffith 34, India (not seen).

Distribution: N.E. India to S. China and Taiwan; Thailand, Vietnam, northern Malaya, Java.

Fertile fronds are much contracted as compared with sterile ones, and have simpler venation, with one sorus-bearing vein in each areole (see figure in Holtum, 1955). The species is adapted to a climate with a seasonal dry period; its distribution is matched by many angiosperms which are similarly adapted.

As pointed out by Morton, the epithet *brachiata* has precedence over *variolosa*, though Backer & Posthumus placed the former as a synonym of the latter. Van Alderwerelt treated them as two species, but his descriptions only differ in the texture of the fronds which is not clearly definable; he had seen no type specimens.

5. ***Tectaria griffithii*** (Bak.) C. Chr., Ind. Fil. Suppl. III (1934) 180; Tard. & C. Chr. in Fl. Gen. Indoch. 7: 2 (1941) 411; Holtum 1968:636. — *Nephrodium griffithii* Bak., Syn. Fil. (1867) 300. — *Sagenia griffithii* (Bak.) Bedd., Ferns Br. India (1870) t. 337. — *Aspidium griffithii* (Bak.) Bedd. *ibid.* Suppl. (1876) 15. — Type: Griffith s.n. Burma (K).

Nephrodium multicaudatum Clarke, Trans. Linn. Soc. Bot. 1 (1880) 540, t.77. — *Aspidium multicaudatum* (Clarke) Bedd., Handb. (1883) 222; v.A.v.R., Handb. (1908) 250. — *Tectaria multicaudata* (Clarke) Ching, Sinensia 2 (1931) 20; Holttum 1955: 507, fig. 299. — Type: Clarke 18427, Sylhet (K).

Aspidium malayense Christ, Philip. J. Sci. 2C (1907) 187. — *Tectaria malayensis* (Chr.) Copel. *ibid.* 416 & Fern Fl. Philip. (1960) 305. — Several Philippine specimens cited, no lectotype.

Distribution: Assam, Burma, Thailand, Vietnam, Malaya, Sumatra, Borneo, Philippines.

6. ***Tectaria barberi*** (Hook.) Copel., Philip. J. Sci. 2C (1907) 414; Holttum 1955: 508, fig. 300. — *Polypodium barberi* Hook., Spec. Fil. 5 (1864) 100. — *Dictyopteris barberi* (Hook.) Bedd., Ferns Br. India (1869) t.322 & Handb. (1883) 515; v.A.v.R., Handb. (1908) 515. — *Phegopteris barberi* (Hook.) Mett. in Kuhn, Linnaea 36 (1869) 125. — Type: Wallich s.n., Penang (K).

Aspidium kunstleri Bedd., Handb. Suppl. (1892) 44. — Type: Kunstler 405, Gopeng, Perak (K).

Phegopteris polycarpa Mett. in Kuhn, Linnaea 36 (1869) 124. — *Aspidium kuhnii* C. Chr., Ind. Fil. (1905) 78, *nom. nov.* (not *A. polycarpum* Bl.). — *Polypodium polycarpum* (Mett.) Bak., Syn. Fil. ed. 2 (1874) 506. — *Dictyopteris polycarpa* (Mett.) Bedd., Ferns Br. India Suppl. (1876) 20 & Handb. (1883) 300. — Type: Jagor s.n., Malacca (B, seen by C. Chr.)

Distribution: Malaya, Borneo, Sumatra (specimens seen in Herb. BO).

Manton showed that this species is tetraploid (all others examined in Malaya are diploid); see Holttum 1955: 626. It may thus be of hybrid origin, with doubling of chromosomes, but I cannot suggest a likely parentage. Among species which have no branched free veinlets in the areoles, it is peculiar in the number of its simple free veinlets, all excurrent. Hooker and Beddome did not see the indusia.

7. ***Tectaria singaporeana*** (Wall. ex Hook. & Grev.) Copel., Sarawak Mus. Journ. 2 (1917) 368; Holttum 1955: 512. — *Aspidium singaporeanum* Wall. ex Hook. & Grev., Ic. Fil. (1827) t. 26; Bedd., Ferns Br. India (1866) t. 168; v.A.v.R., Handb. (1908) 235. — Type: Wallich 374, Singapore (K).

Distribution: Malaya, Sumatra, Borneo.

Christensen has described a fern from West Kalimantan as *Tectaria pandurifolia*. It differs from *T. singaporeana* in having the lamina of the fronds abruptly narrowed at the base but decurrent as a narrow wing almost to the base of the stipe, also in the presence of short hairs on the upper surface of the midrib which in *T. singaporeana* is quite glabrous; I have not seen specimens.

8. ***Tectaria semipinnata*** (Roxb.) Morton, Contr. U.S. Nat. Herb. 38 (1974) 286. — *Acrostichum semipinnatum* Roxb., Calcutta J. Nat. Hist. 4 (1844) 480. — Type: Roxburgh 2367 (or 2337), "Malay Islands", probably Penang (BM, BR).

Polypodium semipinnatum Roxb., Calcutta J. Nat. Hist. 4 (1844) 486; Morton, Contr. U.S. Nat. Herb. 38 (1974) 360. — Type: W. Roxburgh Jr. s.n., probably from Penang (BR).

Gymnogramma maingayi Bak., Syn. Fil. ed 2 (1874) 517. — *Selliguea maingayi* (Bak.) Bedd., Ferns Br. India Suppl. (1876) 24 & Handb. (1883) 392. — *Hemionitis maingayi* (Bak.) Ridl., J. Mal. Br. R. Asiatic Soc. 4 (1926) 106. — *Aspidium maingayi* (Bak.) Holtum, Gard. Bull. S.S. 5 (1931) 207, fig. 1–8. — *Tectaria maingayi* (Bak.) C. Chr., Ind. Fil. Suppl. III (1934) 182; Holtum 1955: 513, fig. 302. — Type: Maingay 1809, Malacca (K).

Polypodium heterosorum Bak., Syn. Fil. ed. 2 (1874) 506. — *Dictyopteris heterosora* (Bak.) Bedd., Ferns Br. India Suppl. (1876) 20. — Type: Griffith s.n., Malacca, "Pulo Bissar" = Pulau Besar (K).

Phegopteris subdecurrens Luerss., Bot. Centralbl. 11 (1882) 30. — *Aspidium subdecurrens* (Luerss.) C. Chr., Ind. Fil. (1905) 94 & Gard. Bull. S.S. 4 (1929) 393. — Type: Kehding 2960, Singapore, Pulau Ubin (seen by C. Chr.)

Campylogramma trollii Goebel, Flora 125 (1931) 282, fig. 1–4. — Type: W. Troll, Sumatra, Pulau Berhala, cult. Munchen (M).

Distribution: Malaya, Sumatra, Borneo, Anamba Islands.

The irregular form and distribution of the sori suggests hybridity, but the only plant examined cytologically was diploid.

9. ***Tectaria grandidentata*** (Cesati) Holtum 1955: 514. — *Polypodium dilatatum* var. *grandidentatum* Cesati, Atti. Acad. Napoli 7, no. 8 (1876) 27. — *Polypodium grandidentatum* (Cesati) Bak., Ann. Bot. 5 (1891) 479; v.A.v.R., Handb. (1908) 661. — *Pleopeltis grandidentata* v.A.v.R., Handb. Suppl. (1917) 597; — Type: Beccari s.n., Jan. 1866, Sarawak, G. Matang (FI, K).

Distribution: Sarawak, Malaya, Lingga Archipelago, Sumatra.

This species agrees with *T. singaporeana* in having fronds decrescent towards their bases, and in completely glabrous fronds. It is very local in occurrence, in low country, usually on rocks but not by streams.

10. ***Tectaria decurrens*** (Presl) Copel. in Elmer, Leafl. Philip. Bot. 1(1907) 234; Ching, Sinensia 2 (1931) 22; Backer & Posth., Varenfl. Java (1939) 73; Copel., Fern Fl. Philip. (1960) 315; Molesworth Allen, Gard. Bull. Sing. 22 (1967) 177 with phot.; Sledge, Kew Bull. 27 (1972) 420. — *Aspidium decurrens* Presl, Rel. Haenk. (1825) 28; Bedd., Handb. (1883) 219; v.A.v.R., Handb. (1908) 247; Holtum, Novit. Bot. Inst. Bot. Univ. Carol. Prag. 1968 (1969) 9. — *Segenia decurrens* (Presl) Moore, Ind. Fil. (1857) 86; Racib., Fl. Btsg. 1 (1898) 247. — Type: Haenke s.n., Luzon (PRC).

Aspidium pteropus Kunze, Bot. Zeit. 4 (1846) 462; Mett., Farngatt. IV (1858) 120. — *Segenia pteropus* (Kunze) Moore, Ind. Fil. (1858) 89; Bedd., Ferns S. India (1863) t.82. — Type: Cuming 148, Luzon (LZ destroyed; isotype K).

Cardiochlaena alata Fée, Gen. Fil. (1852) 315. — Type: Cuming 148, Luzon.

Aspidium alatum Ridl., Trans. Linn. Soc. Bot. 9 (1916) 256, *non* Brack. 1854. — *Aspidium ridleyanum* v.A.v.R., Handb. Suppl. (1917) 505, *nom. nov.* — *Tectaria ridleyana* (v.A.v.R.) C. Chr., Ind. Fil. Suppl. III (1934) 184. — Type: Kloss s.n., W. New Guinea, Mt. Carstensz Exp., Canoe Camp (K).

Caudex erect. Stipe winged almost to the base, wing at the top 5–10 mm wide each side, narrowing downwards; scales on abaxial side many, to 10 mm long, 1.5–2 mm wide at base, firm, entire. *Lamina* to 60 cm long consisting of 2–7 pairs of lobes joined by a wing 5–10 mm wide each side of the rachis; lobes entire or sinuous or with oblique lobules at ends of main veins, somewhat narrowed at the base, acuminate; basal lobes sometimes forked near their bases; apex of lamina wider than the lateral lobes and more narrowed towards its base; small veins distinct, forming areoles with free included veinlets; *lower surface* of midribs and main veins bearing short hairs, upper surface glabrous. *Sori* mostly in free veins in areoles, in a row on each side of main veins, in depressions in the surface which form convexities on the upper surface; indusia large, glabrous.

Distribution: very wide in mainland Asia, throughout Malesia and in the Pacific eastwards to Tahiti. In Malaya, only collected in Perak: Scortechini without locality; Matthew s.n., 25 Dec. 1911, Batu Kurau; Molesworth Allen 4486, Gopeng, on rocky wet ground near stream, locally abundant.

11. *Tectaria tricuspis* (Bedd.) Copel., Sarawak Mus. Journ. 2 (1917) 369. — *Aspidium tricuspis* Bedd., Handb. Suppl. (1892) 44. — Type: Kunstler 975, Perak, Gopeng (K).

Tectaria celemensiae Copel., Brittonia 1 (1931) 73. — Type: M.S. Clemens 22078, Sarawak, Lundu, Mt Gadin (UC, K, NY).

Caudex thick, erect or suberect. *Fronde* trilobed with a wing extending halfway down the stipe (in a Sarawak specimen one pair of unlobed pinnae is connected to the trilobed apical lamina by a winged rachis); *stipe* 35–40 cm long with a wing 2–8 mm wide each side in its upper part; scales at base of stipe 10 x 1.5 mm, firm and dark with distinct pale edges of thin-walled cells. *Midlobe of apical lamina* to at least 30 x 10 cm (sterile) or 23 x 6.5 cm (fertile), rather evenly elliptic with short acuminate apex and entire margins; lateral lobes 22 x 8 cm (sterile) or 13 x 4.5 cm (fertile), shape as apical lobe but widened on basiscopic side of midrib; main veins of sterile lateral lobes 10 mm apart, of fertile lobes 6 mm, at 45° to midrib, almost straight except near margin; crossveins almost straight, smaller veins between them very slender, forming 2–3 rows of irregular areoles containing branched free veinlets; *lower surface* of midrib and main veins bearing very short erect hairs, upper surface densely covered with thick hairs, other parts of surfaces glabrous; a *bud* present at the base of each lateral lobe. *Sori* in two rows between the crossveins (4–5 irregular rows between the main veins), on veins which surround areoles; indusia rather large, apparently peltate, bearing many hairs c. 0.3 mm long on the upper surface.

In Malaya, this species is still only known from the original collection, which is not represented in the Singapore herbarium, for which reason I overlooked it when writing my book. Apart from the indusia and the buds at the base of the main lobes, this species is distinguished from *T. vasta* by the elliptic shape of the lateral lobes of the lamina; in *T. vasta* these lobes are little narrowed at their bases.

12. *Tectaria vasta* (Bl.) Copel., Philip. J. Sci. 2C (1907) 411; Backer & Posth., Varenfl. Java (1939) 74; Holttum 1955: 512. — *Aspidium vastum* Bl., Enum. Pl. Jav. (1828)

142; Beddome, Handb. (1883) 212; v.A.v.R., Handb. (1908) 247. — Type: Blume, Java (L).

Aspidium alatum Wall. ex Hook. & Grev., Ic. Fil. (1831) t.184; Hook., Spec. Fil. 4 (1862) 47. — Type: Wallich 378, Sylhet (K).

Distribution: Assam, Burma, Nicobar Islands, Thailand, Vietnam, Malaya, Sumatra, Java, Borneo, Celebes, Moluccas, New Guinea.

13. *Tectaria crenata* Cav., Descr. Pl. Lec. publ. 1801 (1802) 250; C. Chr., Dansk Bot. Ark. 9:3 (1937) 14 & Bishop Mus. Bull. 177 (1943) 102; Holttum 1955: 510; Copel., Fern Fl. Philip. (1960) 312. — Type: Nee, Mariana Islands (MA, seen by C. Chr.).

Aspidium repandum Willd., Sp. Pl. 5 (1810) 216; Mett., Farngett. IV (1858) 126; v.A.v.R. Handb. (1908) 238. — Type: no collector cited, Philippines (B. Herb. Willd. no. 19734).

Aspidium pachyphyllum Kunze, Bot. Zeit. 6 (1848) 259; Hook., Spec. Fil. 4 (1862) 56; v.A.v.R. Handb. (1908) 252. *Sagenia pachyphylla* (Kunze) Moore, Ind. Fil. (1857) 86; Racib., Fl. Btzg. 1 (1898) 195. — Type: Zollinger 580, Java (not seen).

Distribution: Throughout Malesia and extending to Samoa. *T. dimorpha* St John (Occ. Pap. Bishop Mus. 21 (1954) 185, fig. 4), described from a specimen from Rotuma Island, is at least very closely allied. *T. crenata* is closely allied to *T. decurrens* and the two appear to hybridize in the Philippines.

14. *Tectaria cherasica* Holttum, sp. nov. forma et statura *T. coadunato* (J. Sm.) C. Chr. similis, ab ea differt pagina supra inter venas glabra; venulis liberis brevibus multis in areolis costalibus venarum inclusis, venulis liberis furcatis in areolis aliis etiam interdum praesentibus; indusiis supra pilis tenuibus brevibus praeditis; paleis ad basin stipitum non cellulis pallidis marginatis. Typus: A.G. Piggott 2027, Bukit Cheras, Panching, Pahang, on limestone ridge, 24 Jan. 1977 (K).

Caudex stout, short-creeping. *Stipe* 27 cm long, stramineous or slightly flushed with red above the base, copiously minutely hairy at base, glabrous upwards apart from short hairs in the groove, basal scales to c. 7 x 1.5 mm, thin and translucent, light castaneous, marginal cells uniform with the rest. *Lamina* (fertile) thin but firm, 40 cm long, 20 cm wide, consisting of an apical portion and four pairs of upcurved pinnae, the basal ones not greatly longer than those next above them; *apical portion* 15 cm long, ovate-deltoid in outline, base short-decurrent, lobed to 10 mm from its axis, basal lobes to 8 x 2 cm, lobulate less than halfway to their costae, upper lobes progressively shorter and less deeply lobulate; *first pair of pinnae* adnate to rachis, 10 x 3 cm, lobed to 4 mm from costa, lobes falcate, obtuse and entire; *second pair of pinnae* short-stalked, 12 cm long with basal basispic lobe 3.2 x 1.2 cm shallowly lobulate, acroscopic lobe a little shorter, other lobes subentire; *third pair of pinnae* 16 cm long with one pair of subequal free pinnules 4.5 cm long; *basal pinnae* to 18 cm long (including stalk 1.5 cm), free basispic pinnule 8 cm long, acroscopic one 5.5 cm long, both deeply lobed with crenulate lobes, rest of pinnae like frond apex but somewhat asymmetric; *areoles* along midribs of pinnae rather irregular with frequent short included veinlets, the larger non-costular areoles also often with included veinlets which in a few cases are forked; *lower surface* of pinna midribs and costules of lobes bearing slender pale hairs to 0.3 mm long, short and more sparse hairs on smaller veins; *upper surface* more densely hairy on midribs of pinnae, no hairs present between veins except very few near sinuses. *Sori* mostly on

short free veins in areoles, in one row each side of costules of smaller pinna lobes, more irregular on larger lobes; indusia rather large, rather thin, slightly reniform, with many very slender hairs 0.1 – 0.2 mm long on the upper surface.

In general aspects this is rather intermediate between *T. amplifolia* and *T. coadunata*. It lacks the hairs on the upper surface which are distinctive of the latter and has more free veinlets in areoles, but a much less ample reticulation than the former; scales at the bases of stipes are not narrow and dark as in *T. amplifolia*. As no sterile fronds were found, one cannot be sure whether they would be very different from fertile ones, but the fertile fronds are much less contracted than those of *T. brachiata* and have more amply anastomosing veins, differing also in the rather copious hairs on the lower surface of midribs and in the character of stipe scales. The sori are rather young; the few ripe sporangia have well-formed spores, so that the plant is probably not a hybrid.

15. *Tectaria siifolia* (Willd.) Copel., Philip. J. Sci. 2C (1907) 414; Backer & Posth., Varenfl. Java (1939) 75; Copel., Fern Fl. Philip. (1960) 314. – *Polypodium siifolium* Willd., Sp. Pl. 5 (1810) 196. – *Aspidium siifolium* (Willd.) Mett., Ann. Mus. Bot. Lugd. – Bat. 1 (1864) 237; v.A.v.R., Handb. (1908) 251. – Type: Ventenat, Java (B, Herb. Willd. no. 19689).

Aspidium haenkei Presl, Rel. Haenk. (1825) 30; Holttum, Novit. Bot. Inst. Bot. Univ. Carol. Prag. 1968 (1969) 9. – *Tectaria haenkei* (Presl) Copel., Bishop Mus. Bull. 59 (1929) 50, *nomen tantum*. – Type: Haenke, Mariana Islands (PRC).

Drynaria menisciocarpa J. Sm. in Hook., J. Bot. 3 (1841) 421, *nom. nud.* – *Dryomenis phymatodes* Fée, Gen. Fil. (1852) 225, t. 18A, fig. 1. – *Dryomenis menisciocarpa* Moore, Ind. Fil. (1857) 47. – *Aspidium menisciocarpum* Mett., Farngatt. IV (1858) 121, *non* Bl. 1828. – Type: Cuming 4, Luzon (Fée's specimen not seen; isotype at K).

Aspidium teysmannianum Hook., Spec. Fil. 4 (1862) 41, t. 236. – *A. siifolium* var. *teysmannianum* Christ, Ann. Jard. Bot. Btzg. 15 (1898) 138. – Type: Teysmann s.n., Pulu Pisang, W. Sumatra (K).

Aspidium ternifolium v.A.v.R., Bull. Jard. Bot. Btzg. II, 11 (1913) 3; Handb. Suppl. (1917) 194. – *Tectaria ternifolia* (v.A.v.R.) C. Chr., Ind. Fil. Suppl. III (1934) 185; Holttum 1955: 516, fig. 303. – Type: Matthew 510, Gopeng, foot of Bukit Mensa, on limestone (BO, K).

Aspidium papyraceum v.A.v.R., Bull. Jard. Bot. Btzg. III, 2 (1924) 131. – *Tectaria papyracea* (v.A.v.R.) C. Chr., Ind. Fil. Suppl. III (1934) 183. – Type: Brooks 377/S, Benkoelen, Sumatra (BO, BM).

Comparison of type specimens cited above, and other specimens from many localities from Sumatra to the Philippines and New Guinea, convinces me that they all represent one species. In several cases there are two pairs of pinnae, and in the type of *A. teysmannianum* four pairs. The fronds are always strongly dimorphous; all lateral pinnae are broadly rounded on the basiscopic base (sometimes the base is quite cordate); basal pinnae in smaller fronds are simple, but in larger ones have a large basal basiscopic lobe; on old sterile fronds there are always buds (sometimes quite large) at the bases of pinnae; the sori are on connected veins, in two slightly irregular rows between the main veins, sometimes asymmetric or confluent; the indusia are small and thin apparently soon caducous so that many specimens appear to lack indusia.

16. ***Tectaria keckii*** (Luerss.) C. Chr., Ind. Fil. Suppl. III (1934) 181. — *Aspidium keckii* Luerss., Bot. Centralbl. 11 (1882) 76; v.A.v.R., Handb. (1908) 248. — Type: Kehding 2817, "Klang bei den Gua Batu" = Batu Caves, Selangor (not seen).

Aspidium amplifolium v.A.v.R., Bull. Jard. Bot. Btzg. II, 11 (1913) 2; Handb. Suppl. (1917) 197. — *Tectaria amplifolia* (v.A.v.R.) C. Chr., Ind. Fil. Suppl. III (1934) 176; Holtum 1955: 515. — Type: Matthew 509, Perak, G. Mensa, Gopeng, on limestone (BO, K).

Distribution: Malaya, peninsular Thailand; on limestone only.

Kehding collected plants in N.E. Sumatra and in southern Malaya. Luerssen, when describing *A. keckii*, stated that he did not know whether the locality was in Malaya or Sumatra, and subsequent authors wrote Sumatra only. The limestone habitat and the description indicate clearly that Kehding's specimen and the type of *A. amplifolium* are conspecific.

As noted in my book, Henderson's specimen SFN 22325 from G. Senyum in Pahang (of which a duplicate is at Kew) has many short hairs on the lower surface of the pinna midribs and main veins, whereas these are quite glabrous on most other specimens; the G. Senyum specimens are also very large with pinna lobes strongly lobulate. Mrs A.G. Piggott has recently collected small fertile plants on Bukit Cheras in Pahang which also have many hairs on the lower surface and are more dissected than those of young plants of typical *T. keckii*. Local study is needed to decide whether these hairy plants represent a distinct species.

17. ***Tectaria semibipinnata*** (Wall. ex Hook.) Copel., Sarawak Mus. J. 2 (1917) 371; Holtum 1955: 515. — *Aspidium semibipinnatum* Wall. ex Hook., Spec. Fil. 4 (1862) 59, t.231. — Type: Wallich 388, Penang (K).

Nephrodium nudum Bak., Journ. Bot. 17 (1879) 41. — Type: Burbidge s.n., Sarawak, Lawas River (K).

I suggest that this species would be an interesting subject for experimental study. No one knows how the gametophytes become established on muddy river banks in the tidal zone; how can they withstand regular flooding? Can they grow in a submerged condition, like those of *Ceratopteris*?

Tectaria modesta C. Chr. (Dansk Bot. Ark. 9:3 (1937) 72, t.6, fig. 1) was described from a plant which had narrow simple fertile fronds, much like a single pinna of *T. semibipinnata*, and a slender creeping rhizome (Sarawak Museum Collector 218, Kuching). It is possible that this represents a young stage of the present species which is only known in Malaya and Borneo.

18. ***Tectaria melanocaula*** (Bl.) Copel., Philip. J. Sci. 2C (1907) 416; Backer & Posth., Varenfl. Java (1939) 74; Copel., Fern Fl. Philip. (1960) 306; Holtum 1968: 636; Morton, Amer. Fern Journ. 61 (1971) 148. — *Aspidium melanocaulon* Bl., Enum. Pl. Jav. (1828) 161; v.A.v.R., Handb. (1908) 245. — *Sagenia melanocaulis* (Bl.) Moore, Ind. Fil. (1858) 96; Racib., Fl. Btzg. 1 (1898) 195. — Type: Blume, Java (L).

Aspidium microsorum Presl, Epim. Bot. (1851) 61; Holtum, Novit. Bot. Inst. Bot. Univ. Carol. Prag. 1968 (1969) 28. — Type: Cuming 57, Luzon (PRC, K).

This species, distributed almost throughout Malesia, has been only once collected in Malaya, by Betty Molesworth Allen (no. 3985) in the forest on steeply sloping ground near the road to the Cameron Highlands at 3000 ft altitude.

Caudex short, erect or suberect. *Stipe* 30–60 cm long, black, glossy except near the base which bears many short hairs; basal scales firm; to 12 mm long, to 2 mm wide at the base, marginal cells conform with the rest. *Lamina* to 60 cm long, pale green when living with black rachis and pinna midribs, consisting of a deltoid deeply lobed terminal portion and 1–3 pairs of pinnae; lobes of *apical lamina* more or less deeply lobulate; *middle pinnae* short-stalked, commonly to 18 cm long, lobed halfway towards the midrib, lobes obliquely falcate with rounded to acute tips; *basal pinnae* of large fronds bearing one pair of free (sometimes stalked) pinnules which are lobed like the upper pinnae, the basal basisopic pinnule or lobe always longer than the acroscopic; *lower surfaces* of midrib and main veins sparsely and minutely hairy, upper surface densely covered with thicker hairs. *Sori* small, scattered irregularly, mostly on short free veinlets in areoles; indusia small, shrivelling and mostly persistent, not hairy.

Blume wrote the specific epithet *melanocaulon*, meaning black stem; the latter part of the name is derived from the Greek *kaulos*, which Blume altered to make it conform with a neuter generic name. When transferring the species to *Sagenia*, Moore changed the specific epithet to *melanocaulis*, and in this was followed by Copeland when transferring again to *Tectaria*, but *-caulis* is not correct in Greek. Morton (1971) stated that *melanocaulon* should be treated as invariable, but Blume had already varied it. Backer and Posthumus wrote *melanocaula*, treating the word as a feminine Latin adjective, and I think this is the best solution of the problem.

19. *Tectaria simonsii* (Bedd.) Ching, *Sinensia* 2 (1931) 32. – *Aspidium simonsii* Bedd., *Ferns Br. India Suppl.* (1876) 15, t. 367. – Type: Simons 301, Nuku & Naga Hills, Assam (K).

Sagenia longicruris Christ, *Bull. Acad. Geogr. Bot. Mans.* 16 (1906) 250. – *Aspidium longicrurum* Christ, *ibid.* 20 (1909) Mem. 169. – Type: Cavalerie 268, Kweichow (not seen, but a duplicate of Cavalerie 7294, cited in 1909, is at Kew).

Aspidium subtriphyllum var. *ebenosum* Nakai, *Bot. Mag. Tokyo* 47 (1933) 157. – *Tectaria subtriphyllo* var. *ebenosa* DeVoi, *F1. Taiwan* 1 (1975) 345. – Syntypes: three cited, from Ryukyu Islands, not seen.

Stipe nearly black, to 60 cm long, minutely hairy at base, the rest glabrous; basal scales very firm and dark. *Lamina* to 40 cm long, “dark bluish green” when living (Molesworth Allen), consisting of a deeply trilobed apex and 1–3 pairs of pinnae; *middle pinnae* sessile with subcordate base which is a little dilated, margins subentire; *basal pinnae* of large fronds stalked, with one pair of free pinnules (basisopic pinnule longer than acroscopic), the distal part trilobed with subentire lobes; veins anastomosing to form areoles with many included free veinlets, concolorous but distinct on both surfaces; *lower surface* of midribs of pinnae and main veins bearing scattered minute hairs, longer dense antrorse hairs present on the upper surface. *Sori* small and uneven in shape, sometimes a little elongate, scattered irregularly, usually not on free veins; no indusia seen.

Distribution: Assam to southern China, Taiwan and Ryukyu Islands, Vietnam, Thailand. The only specimen collected in Malaya is Molesworth Allen 4947 from the forest near the 23rd mile, Cameron Highlands Road, at an altitude of 2000 ft.

20. ***Tectaria angulata*** (Willd.) Copel., Sarawak Mus. J. 2 (1917) 370; Holtum 1955: 511, fig.301, excl. syn. *Nephrodium nebulosum* Bak. — *Polypodium angulatum* Willd., Sp. Pl. 5 (1810) 185. — *Aspidium angulatum* (Willd.) Mett., Ann. Mus. Bot. Lugd. — Bat. 1 (1864) 239. — Type: Ventenat s.n., Java (B, Herb. Willd. 19641).

Aspidium pentaphyllum v.A.v.R., Bull. Dep. Agr. Ind. Neerl. 18 (1908) 16, non Willd. 1810. — *Dictyopteris pentaphylla* v.A.v.R., Handb. (1908) 519, nom. nov. — *Aspidium quinquefoliatum* C. Chr., Ind. Fil. Suppl. 1(1913) 9, nom. nov. superfl. — Type: Treub s.n., New Guinea (BO, K).

Aspidium trifolium v.A.v.R., Bull. Jard. Bot. Btzg. II, 7 (1912) 4. — *Tectaria folium* (v.A.v.R.) C. Chr., Bot. Jahrb. 66 (1933) 49; Copel., Fern Fl. Philip. (1960) 307. — Type: Elmer 8239, Luzon (BO, K).

Aspidium terminale Rosenst., Meded. Rijksherb. 31 (1917) 4; C. Chr., Gard. Bull. S.S. 4 (1929) 393. — *Tectaria terminalis* (Rosenst.) C. Chr., Ind. Fil. Suppl. III (1934) 185. — Type: Hallier 1821, Borneo (L, BO).

Distribution: Malesia, Solomon Islands.

21. ***Tectaria herpetocaulos*** Holtum, Dansk Bot. Ark. 23: 2 (1965) 241; Holtum 1968: 636. — Type: B. Molesworth Allen 4454, 22nd mile, Cameron Highlands Road, "in steep rocky forest", 2000 ft (K).

Caudex long-creeping, 6–10 mm diameter when dried, bearing stipes about 1.5 cm apart; scales 5 x 1 mm, base cordate, dark glossy with pale fragile edges. *Stipe* 30–80 cm long, lightly flushed with red, glabrescent, scaly near base, scales as those of caudex but to 10 mm long. *Fronde*s of young plants trifoliate, those of mature plants consisting of an apical lamina and 4 pairs of pinnae; *apical lamina* to 26 x 11 cm (smaller on larger fronds), entire, base cuneate, apex abruptly short acuminate; *upper pinnae* sessile, to 21 x 6 cm, with asymmetric base rounded on the basiscopic side; *basal pinnae* stalked, to 30 cm long and 10 cm wide, asymmetric with a single basiscopic lobe to 20 x 6 cm (largest fronds may have 2' pairs of pinnae with basal lobes); pinnae glabrous apart from rather sparse short hairs on lower surface of midribs and main veins and dense short hairs on their upper surface; *main veins* pale on lower surface, 8–10 mm apart, at a wide angle and upcurved; smaller veins all slightly prominent, forming irregular rather small areoles with included free veinlets. *Sori* mostly not on free veins, rather small, in a single row on each side of the main veins but with additional sori between the rows irregularly present; indusia thin, shrivelling but persistent; perispore consisting of many narrow short projections.

In Malaya still only known from the original collection and no. 9948 from the same locality, "spreading over humus-covered rocks". The species also occurs in Thailand, Burma, and Bangladesh (see list of specimens in Holtum 1965). Several specimens are recorded as growing on limestone.

22. ***Tectaria oligophylla*** (Rosenst.) C. Chr., Ind. Fil. Suppl. III (1934) 183. — *Aspidium oligophyllum* Rosenst., Fedde Repert. 5 (1908) 13; v.A.v.R., Handb. (1908) 237. — Type: Burchard s.n., 1907, Sumatra, Indragiri (L; not seen).

Tectaria polymorpha var. *cuneifolia* Bonap., Notes Pterid. 14 (1923) 50; Holtum 1955: 518, fig. 304. — *T. cuneifolia* Love & Love, Taxon 26 (1977) 326. — Type: Holtum 9566, G. Tampin (P, SING). *Leptochilus rumicifolius* Ridl., J. Mal. Br. R. Asiat. Soc.

4 (1926) 116. — *Tectaria rumicifolia* (Bonap.) C. Chr., Ind. Fil. Suppl. III (1934) 184; Holttum 1955: 519 & Dansk Bot. Ark. 23: 2 (1965) 241. — Type: Ridley s.n. 1921, Klang Gates, Selangor (K).

Distribution: Malaya, Sumatra, Sarawak; in lowland forests.

When writing my book of 1955 I overlooked the description of *Aspidium oligophyllum* in van Alderwerelt's Handbook. Rosenstock's type is presumably at Leiden; I did not find a duplicate at Bogor. His description is good and I cannot doubt that it applies to the Malayan plants which I described as *T. polymorpha* var. *cuneifolia*. He described the indusia as peltate, stating that they were like those of *T. singaporeana*, but I found that the indusia of the latter species are variable and usually not fully peltate. The true *T. polymorpha* is a quite different species with broad-based pinnae.

Ridley described *Leptochilus rumicifolius* from young plants which have fronds rather copiously hairy on both surfaces. Mrs Allen sent similar plants, from rocks at Klang Gates, to Kew; these plants later developed almost hairless fertile fronds. Probably the hairiness of young plants which grow on rocks is due to the habitat. Ridley thought his plant was sterile, but it has a few sori on one of its simple fronds.

23. *Tectaria fauriei* Tagawa, J. Jap. Bot. 14 (1938) 102; Acta Phytotax. Geobot. 10 (1941) 203; J. Jap. Bot. 36 (1961) 208; DeVol & Kuo, Fl. Taiwan 1 (1975) 342; E.H. Walker, Fl. Okinawa (1976) 86. — Type: Faurie 67, Feb. 1914, Taiwan, Prov. Takao (KYO, not seen).

Tectaria gymnosora Holttum, Dansk Bot. Ark. 23 (1966) 308. — Type: Hansen et al. 11225, N. Thailand (C, K).

Tectaria vasta p.p. *sensu* C. Chr., Contr. U.S. Nat. Herb. 26 (1931) 289; *sensu* Holttum 1955: 513, specimens from Thailand.

Caudex stout, erect. *Stipe* 40–60 cm long, narrowly winged in the upper part; basal scales 10 mm or more long, to 2 mm wide at base, firm, with narrow margin of thin-walled cells. *Lamina* firm, to 50 cm long, consisting of a trilobed apex which is narrowly decurrent at the base almost to the attachment of the uppermost pair of pinnae, and 2 or 3 pairs of pinnae, all with similarly narrow-decurrent bases; *buds* present at the base of some pinnae on mature fronds; *middle pinnae* 20–25 cm long, entire or nearly so, gradually narrowed towards their bases, apex narrowly acuminate, sterile pinnae often wider than fertile, to c. 6 cm wide; *basal pinnae* of small fronds narrowed towards their bases on both sides, unlobed but the lamina on the basiscopic side of the midrib wider than on the acroscopic side, of larger fronds with a narrowly winged stalk and a rather long basal basiscopic lobe; pinna midribs and main veins reddish on the lower surface when dried and minutely sparsely hairy, the upper surface glabrous; smaller veins concolorous and distinctly prominent on both sides, forming many areoles which enclose branched free veinlets. *Sori* small, round, in about 4 irregular rows between the main veins, not on free veins; indusia rather small, thin, glabrous, persistent.

Distribution: Assam, northern Shan States and adjacent Yunnan, Taiwan, Ryukyu Islands (Okinawa), N. Thailand, Pahang; in several cases reported as growing on rocky stream banks.

The specimen from Pahang is Holttum 20071, Tahan River, below Kuala Teku, on rocks and earth of river bank. I failed to notice this specimen when writing my book of 1955 and referred to specimens from Thailand erroneously under *T. vasta*.

This species differs from *T. vasta* in its narrow rachis wing which is decurrent from each pair of pinnae but does not reach down to the next lower pair, in the much narrowed bases of pinnae and their more narrowly acuminate apices, in the presence of buds at the bases of some pinnae on old fronds, and in the indusia which are not fringed.

T. fauriei is nearer to *T. oligophylla*, agreeing rather closely in the shape of pinnae and of sori and indusia, differing in the decurrent bases of pinnae and in the presence of buds. *T. oligophylla* also has rather long-stalked basal pinnae on old fronds. *T. oligophylla* is always a fern of forest, not of river banks, in my experience. *T. fauriei* probably occurs on the banks of tributaries of the Kelantan River where natural forest remains; it probably would not persist on exposed river banks from which forest had been felled.

Though I have not seen the type specimen of *T. fauriei*, I have seen a specimen from Thailand identified by Prof. Tagawa, author of the species, and also from his description I feel confident that my identification of the Tahan River plant is correct.



Holttum, R. E. 1981. "The Fern Genus *Tectaria* in Malaya." *The Gardens' bulletin, Singapore* 34, 132-147.

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