Two New Species of *Tectaria* from Limestone in Peninsular Malaysia, with Comments on Some Other Species

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**SUMMARY**

*Tectaria curtisi* and *T. translucens* are described as new species, with comments on *T. coadunata* (J. Sm.) C. Chr., *T. brachiata* (Zoll. & Mor.) Morton and *T. variolosa* (Hook.) C. Chr. Evidence is presented that the type specimen of *Pteridrys acutilimna* Ching was probably collected on limestone and that the single collection of *Hypodematum* on limestone in Kelantan represents the species *Hypodematum glabrius* (Copel.) Holttum, **comb. nov.**

**THE NEW SPECIES**

**Tectaria curtisi** Holttum **sp. nov.**

Stipes usque 70 cm longus, basin versus castaneus, paleis angustis fuscis vestitus, sursum pallidior, minuto pilosus; lamina usque 60 cm longa, tenuis, pinnis stipitatis 3-paribus etiam sessilibus vel adnatis 3-paribus constituta; pinnae infima usque 30 mm longae, longe stipitatae, pinnulas liberis unijugatae ferens. Pinnula infima basiscopica 20 × 7 cm, profunde lobata, lobis acuminatis lobulatis, lobo infimo libero; pinnae supraablales 30 cm longae, pinnulis liberis unijugatis subacqualibus praeeditae; venae in areolis angustis costalibus et costularibus ordinatae, venulis retrosirs inclusis, areoli allii ut in *T. coadunata* sed paeucioribus et nonnullis venulis brevisibus liberis instructis; costae, costularum venaceae subitus pilis patentibus tenuibus 0.2-0.3 mm longis vestitae, pagina inter venas pilis erectis multis brevioribus praeditae; costae supra pilis brevisibus dense vestitae, pilii ad et inter venas rares, margines (sinus inclusis) pilis destitutae; sori plicato ad venas breves in areolis terminales; indusia tenuia, glabra.

Typus: near Ipoh, on limestone, *C. Curtis* 3376, December 1895 (holotypus K; isotypus SING). No other specimen is known.

This species differs from the small Peninsular plants of *Tectaria coadunata* (J. Sm.) C. Chr. in having much larger and more amply branched fronds with abundant hairs between veins on the lower surface and practically glabrous on the upper surface (hairs are lacking even at the sinuses). The new species differs also in the presence of small free veinlets arising from the outer veins of the costal areoles and directed towards the costae; such veinlets are absent in *T. coadunata*. Short free unbranched veinlets are also present in other areoles, often directed towards the costa; branched included veinlets have not been noticed.

**Tectaria translucens** Holttum **sp. nov.**

Caudex brevis, erectus; stipes usque 35 cm longus, modice castaneus, sparsim brevipilosus, basi paleis usque 15 × 1 mm, apice capillaceus, vestitus; lamina usque 40 cm longa, tenuis, translucens, pinnis stipulatis 2jugatis etiam sessilibus vel adnatis 2jugatis constituta; pinnae infimae usque 19 cm longae, pinnulis unijugatis praeditae, pinnula infima basiscopica 12 cm longa, basin versus profunde lobata; venae in areolis angustis costalibus et costularibus venulis liberis retroversis inclusis ordinatae, venulae liberae etiam in areolis allii pteraeque costam versus currentae, raro lucatæ, adsunt; axes frondis subitus sparsim brevipilos, pagina inter venas utrinque glabra; sori pterique ad venas exteriore costularum, in lobis pinnarum distaliter ad venas liberae terminales siti; indusia tenuia, pilis brevibus interdum praedita.
Typus: Pahang, Taman Negara; on limestone, B.S. Parris and P.J. Edwards 10450 (K).

Young plants may have some hairs between veins on both surfaces.

A distinctive feature of these two new species is the presence of free veinlets in the costal areoles. Such veinlets occur also in *T. cherasica* (Holttum 1981, p. 141) and in *T. brachiata* (discussed below). This character distinguishes all four species from *T. coadunata*, which has the basic vein-pattern on which Presl (1836) based his genus *Sagenia*. Another difference is that in *T. coadunata* free veinlets in non-costal areoles are few, unbranched and outwardly directed, whereas in the other species many free veinlets are directed towards the costa and in some cases are branched. Branched veinlets are frequent in the sterile fronds of *T. brachiata* but rare in *T. cherasica* and *T. translucens* and they have not been noted in *T. curtisii*. Apart from these species there is, within *Tectaria*, a rather clear distinction between the species which show the *Sagenia* pattern and those which have abundant branched free veinlets in areoles (see Holttum 1983, p. 108 and fig. 1). It is notable that in SE Asia there is a species (*T. fiuctipes* (Bedd.) C. Chr.) which has *Sagenia*-type venation in sterile fronds but free veins in fertile ones. This bridges the gap between species with anastomosing veins and those with free veins which Ching and others have included in a genus *Ctenitopsis*. A majority of such free-veined species occur in mainland SE Asia and the Philippines. Combining this information with the fact that there are far more species of *Tectaria* in the Palaeotropics than in the Americas, I suggest that the genus *Tectaria* originated in SE Asia. Taxonomically, it is unfortunate that the type species of the genus is a West Indian one.

**Tectaria variolosa and T. brachiata**

In Holttum 1981, p. 137, the name *T. variolosa* is placed as a synonym of *T. brachiata*, but in fact the type specimens of the two differ in venation, and the characters specified for *T. brachiata* in the key on pp. 133-134 are those of *T. variolosa*.

In both species the pinnae of fertile fronds are contracted as compared with sterile ones (intermediate fronds may sometimes occur), and in both the only hairs between veins on the upper surface are small ones near the sinuses between pinnalobes. The pinnae of sterile fronds of *T. brachiata* are much less deeply lobed than those of *T. variolosa* and there are many free and branched veinlets both in costal and some other areoles (Fig. 1).

Fig. 1. Venation in a lobe of a middle pinna of a sterile frond of *A*: *Tectaria variolosa* (*Topin 4183*, Upper Burma) and *B*: *Tectaria brachiata* (*Curtis 1608*, Penang), both × 2.
The name *T. variolosa* (originally in the genus *Aspidium*) was copied from Wallich's catalogue and based on Wallich 379. Under this number Wallich included specimens from NE India (of which Ching selected one as lectotype) and also from Penang. The Penang specimens (of which two sheets are at Kew) are *T. brachiatia*. Accepting Ching's choice of a type, *T. variolosa* occurs from NE India southwards into Burma, Thailand and Vietnam. Specimens so named from Hainan and Taiwan seen by me have broader fertile pinnae with a more ample venation and a greater number of smaller sori; they are more like *T. subtriphylla* (Hook. & Arn.) Copel. and need further study. It is possible that the type of *Phlebignonitum impressum* Fée (Griffith, Pl. Indic. 34, now at Rio de Janeiro; see Windisch 1982, p. 59) is conspecific with the type of *T. variolosa*; if this should be established, Fée's name (1852) is the older and his specific epithet should be substituted for *variolosa*.

*T. brachiatia* is widely distributed, but specimens are known from few localities. There are several collections from Peninsular Thailand and the northern part of Peninsular Malaysia; those for which a habitat is recorded indicate granite rocks, not limestone. The other specimens known to me are from Java (including the type), the Tenimbar Islands (*Buwalda* 4262) and the Cape York Peninsula in Queensland (*Brass* 19445, *Coveney* 7146). The species is evidently adapted to a continuously warm climate with a regular dry season.

Key to the species of *Tectaria* mentioned in this paper

1. Free included veinlets lacking in costal areoles
2. Upper surface bearing many hairs between veins ........................................*T. coadunata*
3. Upper surface lacking hairs between veins except a few near sinuses between pinna-lobes ..................*T. variolosa*

1. Free included veinlets present in costal areoles
3. Fronds dimorphous; free veins present in costal and other areoles in sterile fronds, forked ones frequent; not on limestone ........................................*T. brachiatia*
3. Fronds not or little dimorphous; fewer free veins in areoles, forked ones infrequent; limestone plants
4. Scales at base of stipes thin, light brown, becoming crumpled ........................................*T. cherasica*
4. Scales at base of stipes firm, dark, much narrowed towards their tips
5. Fronds to 60 cm long; a free tertiary leaflet present on basal pinnae; lower surface copiously short-hairy between veins ........................................*T. curtisi*
5. Fronds smaller, no free tertiary leaflet; lower surface between veins glabrous in fronds of mature plants ........................................*T. translucens*

**Pteridrys acutissima** Ching

This species is described in Holttum 1955, p. 531. The type was collected by Mohamed Haniff on a journey to Gunung Korbu with B.H.F. Barnard (Forestry Dept.) in 1909. The route was by way of the Korbu River, G. Yong Blar and G. Bal; thus he passed near limestone hills. The labels on the specimens at Singapore and Kew were written by H.N. Ridley, who named them *Lastrea symatica* and wrote on them the altitude 6000 ft, giving them a number (14142) in his own series. Haniff's labels are lost. No other collection of this species has since been reported. Recently, however, Dr. B.S. Parris collected an almost identical specimen in Gunung Mulu National Park, Sarawak, at an altitude of 100 m, "on slopes of bat guano in cave mouth".

No specimen of this genus has been collected at a high altitude in Malesia, and the related species *P. symatica* (Willd.) C. Chr. & Ching, widely distributed, is nearly always recorded as growing on limestone.
THE GENUS HYPODEMATIUM

There is only one record of the existence of this genus in Peninsular Malaysia; the specimen is M.R. Henderson 29682, from Gua Teja, Kelantan. In Holttum 1955, p. 501, this is named H. crenatum (Forsk.) Kuhn, with a note that it differs from the typical form of that species which was first described from Arabia and is widely distributed in Mainland Asia. On comparison with other specimens in the herbarium at Kew, I find that the Kelantan specimen agrees closely with the type of Dryopteris glabrior Copel., collected by C.J. Brooks at Bidi, Sarawak in 1908. Copeland’s species was not transferred to Hypodematiun by Ching in his paper of 1935 (probably he did not know of it). The fronds are much more open in branching than those of T. crenatum and the leaflets are thin and quite flat when dried. Acicular hairs are rather few, and capititate hairs are also present. The new combination Hypodematiun glabrius (Copel.) Holttum is therefore proposed (basionym: Dryopteris glabrior Copel., Philp. Journ. Sci. 5C (1910) 283).

In Malesia all recorded plants of the genus have been found on limestone, and though they may be locally abundant few specimens have been collected. In the herbarium at Kew are three other specimens from Sarawak, all H. glabrius; from Sumatra are two collections which appear to represent two different species; one specimen from New Guinea which has very abundant very long hairs; and a specimen from the Philippines which appears to be true H. crenatum, said by Copeland to be known from several localities. A new study of the genus in Malesia is desirable, but more field work would first be needed.

The genus is isolated taxonomically and its affinity is uncertain. Chromosome counts show the base numbers 40 and 41. Ching at first suggested an affinity with Cystopteris, but later thought Lastreopsis more likely. The frond-form resembles that of Lastreopsis but hairs and scales are very different. Recently Iwatsuki (1964) suggested an alliance to Athyroid ferns, perhaps nearest (but not near) Woodsia.

LITERATURE CITED