

Malayan Fern Notes

By BETTY MOLESWORTH ALLEN

FOLLOWING are descriptions of two ferns which previously have not been recorded for Malaya, so far as I am aware. They are from the Cameron Highlands district of Pahang, where I spent my last few weeks in Malaya. I concentrated on a small area which is quite well known botanically, where I found besides these two, another not on the Malayan list (*Dryopteris hirtipes*) and several very rare species. This goes to show how important specialised field work still is, even in places previously collected over for the above mentioned fern, at least, is almost surely a result of Malaya's changing vegetation.

BLECHNUM Linn.

B. patersonii (R. Br.) Mett. in Christ, Farnk. de Erde, 176. Basynym: *Stegania patersoni* R. Br. Habitat in Malaya: (a) on more or less vertical banks of broken rock, covered thinly by earth, growing together with *Thelypteris* sp. (5005)* and moss; on floor of tall moss-draped forest. Locally common at 6,200 feet (c. 2,700 metres); 4.6.63 (5005). (b) on a vertical rock face in a narrow ravine above a rocky river; very dark wet place under tall trees. Circa 5,800 feet (c. 1,940 metres); 6.6.63, not collected.

Both localities from the slopes of Gunong Batu Brinchang, Cameron Highlands district, Pahang; in the forest above and below the road, near the 46½ mile.

It would appear that *Blechnum patersonii* has not previously been collected in Malaya, which is surprising, for it seems to be common where it does occur here, and is large enough to be easily seen. Of course they do grow in very dark places which, especially if the sun is obscured, are in continual twilight, and so dark green plants merge into the gloom.

Van Alderwerelt van Rosenburgh (14; 1, p. 379) and Miss Crookes (8; p. 280) do include Malaya in their distribution of this species, but it is not in Beddome (2), nor in Holttum (9).

The following description is taken from the Malayan collection. *Rhizome* short creeping, rather flat, with fronds close together, and on large plants the old rhizome often remains on, at a different angle from the newer one, and is beset with old stipe bases about 5-10 mm. long. Rhizome roots covered with medium-brown spreading hairs. Scales on rhizome about 6 mm. long by 3 mm. wide at base, dark brown, thick, shiny, entire and slightly bullate, evenly tapered from a wide base to a narrow apex which has a slightly obtuse tip.

* The numbers refer to my specimens which have been distributed to: Singapore Herbarium, Kew, British Museum, Smithsonian Institution, Chicago Nat. Hist. Museum, Arnold Arboretum, Swedish Museum Nat. Hist. and spores to Dr. Chambers Melbourne.

*Fronde*s simple to pinnatifid, all stages seen on a mature plant; on young plants, they are at first simple, entire, about 2.5 cm. wide and often reaching a length of 26 cm. before a lobe is developed. These fronds are lanceolate and tapered to a rather long, acuminate tip, or sometimes abruptly narrowed at the tip, and slightly narrowed at the base or lobe base. Margins are entire and stipes thin, up to 9 cm. long; other juvenile fronds have from one to several well developed lobes. New fronds are deep rose-pink and are very thin in texture. *Adult* fronds have stipes which are glabrous except at the very base where the scales are similar to those on the rhizome, but usually paler and with a very pale base, and slightly larger in size, to about 9 mm. long. Stipes, pinkish, drying stramineous or pinkish; smooth, but channelled above, to about 35 cm. long and winged in the upper part; wing undulate about 5 mm. wide in widest part, gradually becoming auricles which continue, quite widely separated, to within about 7 cm. of stipe base. *Sterile fronds* drooping when living, very dark green and shiny above, paler and dull below; texture thick, brittle, almost fleshy and drying to a rather dull blackish-green above. Lamina to about 50 cm. long often less; rachis and costae glabrous, and on the underside costae are much paler than the lamina. Mature fronds usually pinnatifid, widest about, or just above, the middle, and lobed to within 4 mm. of the rachis wing; up to about 8 pairs of entire lobes (usually less) and a similar apical one. Lobes rather lanceolate each about 14 x 2 cm. on the large fronds, and up to 26 x 2 cm. on the largest. Lobes slightly widest about the middle, tapered to a narrow acuminate tip, and narrowing near the base where it is adnate (which forms the wing to the next lobe), margins entire, pale and narrowly curled under in dried material. Lamina wing uneven, not more than 75 mm. wide from the basioscopic side of the lobe, and tapering to about 2 mm. in width.

Veins fairly inconspicuous when dry and raised on the upper side of the lamina; usually free but well developed fronds may show slight anastomosis (as in *B. fraseri*, see M-Allen (13), otherwise single or forked once or twice; forkings uneven, vein-ends almost reaching the lobe margin but often concealed by the reflexed edge (in young fronds which often have flat margins, the veins show clearly ending in hydathodes). *Fertile fronds* much contracted (occasionally fertile lobes on upper half of a sterile frond, or fertile only at lobe-tips). Fronds stiffly erect and thus higher than the sterile, with about 7-9 uneven pairs of narrow pinnae-like lobes, and a similar apical one; largest lobes are about 18 x .5 cm. when living (width less when dry). Sori acrostichoid, elongate along both sides of the costae and covering all except this when mature; margins strongly reflexed when dry. When living, lobes are dark green above, with the sori below, fawn-coloured; sori often continuing along the adnate (or winged) part, and occasionally a few auricles soriferous on the stipe nearest the lamina. Indusium linear, thin almost membraneous, light brown, fracturing at intervals and almost concealed when sori is mature.

General distribution: From India through to the Pacific including Australia and New Zealand.

It is interesting that another *Blechnum* belonging to the subgenus *Lomaria* has turned up in Malaya; this makes the third species, for the other three belong to *Blechnum* proper. The Malayan habitat of *B. patersonii* seems to be typical but the plants a little larger than those I have seen on Mt. Kinabalu, in Borneo at about 5,500 feet, and with fewer pairs of lobes than recorded by Holttum (5) from this area; closer I think, to the New Zealand plants.

In the Malayan habitat over 25 plants were growing in one area, above and alongside a rocky stream. Fairly recently some large trees had fallen causing a slip on the opposite side so that the *Blechnum* plants were now in the sun and I was able to photograph them without added light. Whether the colony will survive now that it is in such an open place (although the ground was still damp) remains to be seen. The plants were on a steeply sloping bank of broken rock covered with a thin layer of humus, liverworts and mosses. In the loose earth was a species of *Thelypteris* which Dr. Holttum suggests is near *T. herbacea* Holtt. At intervals were tall moss-draped trees, and on the bank near the *Blechnum* were plants typical of this kind of wet forest floor. They included small (young) *Cyathea latebrosa*, *Asplenium unilaterale*, *Trichomanes obscurum*, *Arisaema* sp., *Begonia pavonina*, *Medinella* sp., *Didymocarpus* possibly *albinella* and above, on the more stable, less steep ground were a few fertile plants of *Woodwardia auriculata*, whilst by the streamside were *Athyrium amplissimum*, *A. asperum*, *Cyclosorus ecallosis*. A small waterfall nearby was entirely clothed in many places with *Asplenium unilaterale*, but no *Blechnum patersonii*, which was however, growing on the bank to the left (on the opposite side of the first patch). There were about 15 plants here; these were in deep shade in wet places, and immediately above, where the forest opened out somewhat and was lighter, were many plants of *Blechnum fraseri* var. *philippinense*. Perhaps worth noting here is that none of these was fertile, yet all the *B. patersonii* had fertile fronds at all different stages. In Malaya different species of an acrostichoid genus frequently become fertile at the same time, and often only once a year, but although I looked in the other localities I know of, I found no *B. fraseri* fertile, (but have done so in August), and *B. vestitum*; the other *Lomaria* had only very old fertile fronds.

The second area in which *B. patersonii* was seen, was well below the first, but possibly where the upper rocky stream would eventually run, about half a mile away and fully 500 feet lower. Here a rocky river runs through a deep ravine about 10 feet wide whose rock walls, are almost vertical for about 50 feet. Immediately in front of a narrow tall waterfall (which had little water otherwise it would have been impossible to get at) on rock walls in the perpetual gloom and constant spray, *B. patersonii* was very common indeed. I counted over 40 plants, and with it, but much rarer was

Monachosorum, another fern not on the Malayan list, some young gingers, similar to *Achasma* sp., but little else on the bare wet rock. Where the ravine widened and the rock became less steep, there was more vegetation and the *Blechnum* became much rarer, and the *Monachosorum* more common; the plant association here is discussed under the latter fern.

It is probable that *Blechnum patersonii* will be found to occur in many more places along our main range at about 5,000 to 6,500 feet in altitude, for there are many deep gorges and waterfalls which maintain a high humidity together with a cool temperature which is apparently what this fern requires.

MONACHOSORUM Kunze Bot. Zeit. 6. 1848; 119.

M. subdigitatum (Bl.) Kuhn. in Christ, Farn. d. Erde, 76 (fig. 199). Basynym: *Aspidium subdigitatum* Blume; Synonyms: *Polypodium subdigitatum* Bl., *Phegopteris subdigitata* (Bl.) Bedd., *Polypodium davallioides* Mett., *Monachosorum davallioides* (Mett.) Kunze, *Anogramma davallioides* (Mett.) Fée, *A. subdigitata* (Bl.) Posth.

Habitat in Malaya: On bare wet rocks or on rocks with shallow covering of earth, in narrow ravine in dark places. In tall forest above and below the road near 46½ mile, on the slopes of Gunong Batu Brinchang, Cameron Highlands district, Pahang. At about 5,800 feet and 6,000 feet; 4 & 6.6.63 (5009). I am grateful to Dr. R. E. Holttum for his identification of this fern, and for his help.

In *Ferns of Malaya* (9) Holttum does not include *Monachosorum*, but there are two sheets at Kew labelled "Malayan Peninsula", and I am indebted to the Director of Kew Gardens for this, and the following information about them. These sheets were collected by Sir William Norris who was in Malaya from 1836 to 1847. The material was cited by Hooker (11) p. 256, under *Polypodium davallioides* and is presumably the basis for the record from the Malayan Peninsula under *P. subdigitatum* in the *Synopsis Filicum*, and under *Phegopteris subdigitata* in Beddome (2).

As Holttum points out (in a letter to me) the only label on the specimens was a general one put on by Kew when Norris's collection was received. So without further evidence that it was actually found in Malaya (and not, for instance, sent to him from another botanist) Holttum quite rightly omitted it from his systematic account. If the fern was from Malaya, then it appears that it was not found again until my collection in 1963.

The description is taken from my material: *Rhizome* short-creeping and shallow rooted, with fronds close together, and long thin brown rootlets radiating from the rhizome amongst the stipe bases, often as long as 30 cm., and branched and sparsely hairy. Rhizome green when living, drying blackish. Very small plants of the same fern, not more than 5 cm. high, often growing on the top of the rhizome and wedged between the stipe bases, rather resembling *aphlebia*. Rhizome hairs similar to those on the stipe bases,

pale, brown, septate and abundant, scales present, but rare, flat (in the living plant, shrivelling somewhat on drying) and very pale, scattered amongst the finer hairs. *Stipes* about 44-100 cm. long on mature fronds. not articulated to the rhizome; in living plants, shiny and rounded below and pubescent above, deep green except at the stipe base which is almost black and covered on both sides with pubescence which becomes sparser towards the stipe apex. *Rachis* deep green when living (pale when dry), shiny to slightly pubescent, grooved above with raised edges, rounded below with scattered pubescence.

Lamina finely dissected, lacy, quadri-pinnate to 5 pinnatifid, long deltoid with lowest pinnae the largest. Frond apparently not becoming fertile until the plant is large and the fronds tall. Fertile laminae from about 50-90 cm. long or more, and 60-75 cm. wide at the base. Fronds when living, very deep bluish-green, veins black, texture thin almost membranous; when dry fronds are deep olive green to blackish, and veins pellucid; lamina glabrous except on the veins. *Pinnae* overlapping, about 22 or more subopposite, non-articulated pairs on a lamina of 80 cm. long; basal pinnae 9-11 cm. apart on the same side, others decreasing gradually in spacing and size to the apical portion, where the pinnae are all, very small, less dissected and gradually becoming reduced to single lobes about 2-3 cm. from the apex. The two lowest pairs of pinnae are the largest, the basal being to about 35 cm. long by 23 cm. wide with a stalk up to 2 cm. long; it is widened where it joins the rachis. Primary pinnule of basal pinna, roughly deltoid with pointed apex, and 16 or more alternate pairs to a pinna, sometimes overlapping, the middle pinnules largest (to about 11 x 5 cm.) and with short stalks. Secondary pinnules (on largest primary pinnule) to about 14 alternate, short stalked pairs, the largest being below the middle and about 2.5 x 1 cm. in size; these are again divided into about 5 alternate pairs of pinnules (tertiary) which are up to 6 x 4 cm. and stalked, except in the upper-most which are adnate; they do not overlap the next segment. The basal which are the largest may have up to 5 or 6 lobes, the basal acroscopic lobe (or ultimate segment) being cut nearly, or quite, to the base. Lobes measure up to about 2 x 1 mm. with apices either blunt and rounded or pointed, and are narrowed towards their bases. Each lobe has a simple or forked *vein* which does not reach the margin; veins bear scattered, light-brown hairs below, and to a lesser extent, above. *Sori* round or roundish, exindusiate and solitary or, very rarely, two together, usually placed at the vein ends but sometimes veins can be seen projecting just beyond a sorus. Sporangia cream-coloured when mature, ripening to a pale brown, amongst which are a few hairs.

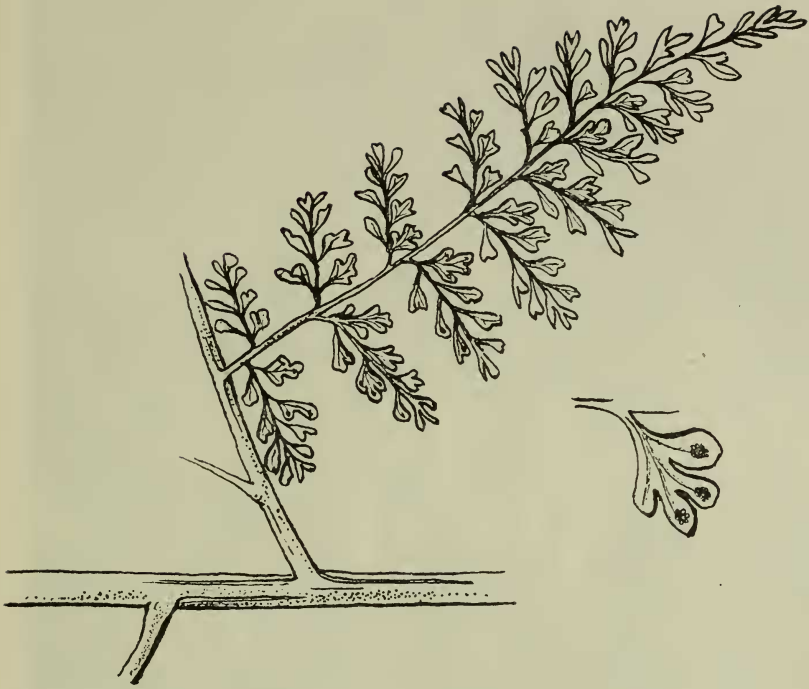
General distribution (of the species): S. China and Formosa; N. E. Himalayas to Siam and Indochina. In Malesia, Philippine Is., Borneo and Java (Sumatra?).

I found the *Monachosorum* with *Blechnum patersonii* (see above) in the lower ravine. Here, near the falls there were only a few plants, and not so high up as the *Blechnum*. Further away from the actual waterfall where the ravine widened somewhat, and the sheer walls gave away to a steep bank, but still very damp, *Monachosorum* became common, especially about 15-20 feet above the stream and here they were fertile. They were growing on rocks, either exposed or with a shallow covering of black sticky earth. Very small plants were on rather bare (not mossy) rocks near the stream level, but none was large nor fertile here, which suggests that they may be periodically swept away. The fertile specimens higher up the bank were intermixed with other ferns and flowering plants, and under very tall trees which made the whole area dark and gloomy. Other ferns included very large specimens of *Microlepia todayense* (stipe nearly 10 feet long and lamina to about 8 feet long); a curious form of *Cyathea latebrosa* looking quite different from the normal species which was here also; large *Cystopteris tenuisecta* was common; a few *Orthiopteris kingii* which is quite high for this fern, and *Asplenium tenerum*, both the latter being within the flood zone. Also, were *Cyclosorus stipellatus*, *C. ecallosis*, *Asplenium unilaterale* and *Microsorium hancockii*, the latter two being common on steep wet rocks. Established on fallen logs were large specimens of *Crypsinus enervis* and *Elaphoglossum callifolium*. In lighter places near the forest edge were *Cyclosorus dicranogramma* and *Woodwardia auriculata* which were in loose earth.

Later I found some more *Monachosorum* in another area which was also a rocky stream, with large slabs of rock lining the banks. These were continually wet yet almost bare, and no small specimens were seen, but as it was late evening these could have been overlooked. *Blechnum patersonii* was not seen either, but it probably occurs as the conditions were favourable, and possibly this stream was yet another tributary of the river below, where both the ferns grow.

Monachosorum is a beautiful fern when seen in the field, and with its dark-green lacy fronds and small exindusiate sori looks rather like a large *Todea* (*Leptopteris*) *hymenophylloides* from New Zealand. It ought to be worth cultivating if the high humidity it undoubtedly requires could be maintained. Like *Acrophorus blumei*, which is a common fern on this mountain, *Monachosorum* seems to provide fertile fronds only when a large size has been attained. The shallow rhizome with the long thin rootlets is a useful adaptation for clinging to thin substrata or to rock when there is no soil.

I did not see any mucilaginous secretion at the apex of the rhizome (see Copeland, 7.), nor viviparous buds on the laminae (Beddome, 2, p. 296). The sori is not always terminal on the veins but occasionally can be seen quite clearly continuing beyond.



A pinnule from a frond of *Monachosorum subdigitatum* ($\times \frac{3}{4}$) (Bl.) Kuhn.
Enlargement: A segment showing three sori.

The grooved rachises with raised edges suggest an affinity with *Dryopteris* but there are only two vascular strands at the stipe base*. It seems to be a fern of uncertain affinities for Christensen (4) places the genus in the subfamily Dryopteridoideae, allied to *Thelypteris*; Bower (3) vol. 3, p. 254, puts it in *genera incertae sedis*, and derived from *Dennstaedtiinae*. Copeland (7) on the other hand puts it in Pteridaceae with a note on its uncertain status, whilst Backer and Posthumus (1) have placed it in Polypodiaceae under the genus *Anogramma*. In the recently published Keys to the genera of the Pteropsida in *Flora Malesiana*, Holttum (10) p. xviii, puts *Monachosorum* into the *Dennstaedtia* group, and this I have followed although he states in a recent letter that he is not at all sure that it should be near this genus.

I am grateful to Dr. Holttum for reading through this account and making some necessary corrections.

* And, as Dr. Holttum points out, it also differs from *Dryopteris* in having the edges of the leaflets decurrent on the edges of the small rachis which bears them.