

FLORAE MALESIANAE PRECURSORES XLIV
THE FERN-GENUS ELAPHOGLOSSUM IN MALESIA,
WITH DESCRIPTIONS OF NEW SPECIES

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During the preparation of a monograph of the genus *Elaphoglossum* for Flora Malesiana, I have recognized twenty-three new species; these are here described. I take this opportunity also for publishing a few comments on the genus. In both these matters I wish to acknowledge the work of Mr P. R. Bell, who began a series of morphological studies of *Elaphoglossum* some years ago, primarily based on species he had seen in tropical America (see Bibliography); Mr Bell also made a quite intensive study of scales and other characters of some species from Malesia, and has handed over his notes for my use; two of the species here described as new were so recognized and named by him. Most of the new species here dealt with are from New Guinea, which indoubtedly has a much larger and more varied representation of the genus than any other part of Malesia. The most important New Guinea collections are those of Dr. L. J. Brass, on successive Archbold Expeditions. In spite of the wealth of this material, we really need much more if we are to have a satisfactory understanding of the genus in that area; several of the new species are described from single collections, and such may not give a true idea of the possible range of variability (due to age of plant and to environmental factors) within a species. As I know from personal experience, *Elaphoglossum* plants, growing on tree-branches with other epiphytes, are easy to overlook; their simple fronds are often very like leaves of orchids when seen at a distance. Probably all species of *Elaphoglossum* produce fertile fronds seasonally, presumably as a result of a climatic stimulus, but the nature of the stimulus has not been proved. By analogy with behaviour of other ferns which I have had under frequent observation, I think it most probable that a spell of drier weather (which quickly affects epiphytes) is the stimulus, and probably different species respond in different ways. Though most species are epiphytes, a few are reported as terrestrial, in some cases perhaps casually so; one (*E. resiniferum*) is reported as growing on wet rocks in a stream-bed. Collectors usually do not make specimens from sterile plants, but good sterile material is usually quite distinctive. I wish I had myself realized this when I had the opportunity of seeing these plants in their native environment.

Distribution. The genus as a whole is pantropic, and is believed to comprise more than 400 species, the majority in the New World. The present study of Malesian species brings the total in Malesia to almost 50, which indicates that the genus is more diversified in this region than in any other part of the Old World, though undoubtedly more species of mainland Asia remain to be recognized. A few Malesian species are quite widely distributed [*E. angulatum* (Bl.) Moore in Réunion, Ceylon, and throughout Malesia; *E.*

callifolium (Bl.) Moore throughout Malesia and apparently to Fiji], but many appear to be rather local; however, it may be that further collections will show that some of the latter are more widely distributed than is at present known. My recent studies have indicated such cases, which will be reported in Flora Malesiana.

Relationship to other ferns. Christensen (1938, p. 549) regarded this genus as a very isolated one. When preparing a fern flora of Malaya (Holttum, 1954) I was struck by the resemblance between young plants of *Elaphoglossum* and of *Lomariopsis*, and suggested that this indicated a relationship between the two genera (Holttum, 1947, pp. 146—149). Copeland, working independently (1947, p. 120) placed *Elaphoglossum* after the *Lomariopsis* group of genera, but doubted a near relationship. Cytological studies (T. G. Walker, 1966, p. 211) indicate a base number 41, which is in agreement with all other genera placed by me in the *Lomariopsis* group (Roy & Manton, 1966). Most species of *Lomariopsis* have simple, entire fronds when they are young, and some West African species have such fronds always when adult. Such a simple-fronded *Lomariopsis* is only distinguishable from *Elaphoglossum* by the lack of phyllopodia, which are outgrowths from the rhizome to which the fronds are jointed. Bell (1951b, p. 348) has described the anatomical changes that occur at the junction of the base of a stipe with its phyllopodium. There is no absciss layer at this junction and when an old frond breaks off it does not leave a clean scar. The phyllopodium of *Elaphoglossum* is thus different in structure from that of *Oleandra*, in which the absciss layer is quite distinct, and it seems likely that the two genera have evolved frond-shedding mechanisms on different evolutionary lines; that is, the phyllopodia of *Elaphoglossum* and *Oleandra* are probably not homologous structures, but the same term is used for both as a matter of convenience. The development of a mechanism for shedding of leaves is common among epiphytes of very diverse kinds, and is an adaptation to the epiphytic condition. In *Lomariopsis* the stems are high-climbing but remain rooted in the ground; the pinnae of pinnate fronds are jointed and are shed when old, but the terminal lamina of a frond is not jointed at its base. The stipes of the related genus *Teratophyllum* are rather crudely jointed at their junction with the rhizome, but there is no elongate phyllopodium.

In Flora Malesiana *Elaphoglossum* will be treated as one of the *Lomariopsis* group of genera, and it is intended to describe all genera of this group in the next part of Series II, Volume I.

Subdivision of the genus. In his monograph of *Elaphoglossum* (1899), Christ attempted a subdivision of the genus, based primarily on venation, but his arrangement is not a practicable one. I believe that the only possible basis of subdivision is on characters of the scales on the surface of fronds. On such a basis one can clearly distinguish a large group of species allied to *E. muscosum* (Sw.) Moore, in which the scales have marginal hairs each consisting of a single, acicular, thick-walled cell, glandular marginal hairs being absent. Some species of this group do produce a spot of resin around the base of a scale [e.g. *E. petiolatum* (Sw.) Urban], but it appears to me that this is formed from cells of the lamina of the scale, near its base. However, this needs careful examination from fresh material. In contrast to *E. muscosum*, the frond-scales of *E. conforme* (Sw.) J. Sm. and its allies have marginal glandular cells, often at the ends of short hairs. The other group of species which have distinctive scales may be typified by *E. spathulatum* (Bory) Moore; these have bristle-like scales, narrow with reflexed edges. Bell has shown that such scales in two species have short glandular hairs attached near their bases (1951b, p. 355, fig. 8; 1955, pp. 185, 187); it seems probable therefore that this group should be regarded as allied

to that of *E. conforme*. The species with bristle-scales seem to me to form a natural group, not a series of separate developments from the condition of *E. conforme*, though Bell appears to imply the possibility of this. I would therefore tentatively suggest the following subdivision:

- 1. Frond-scales with glandular marginal hairs group of *E. conforme*
 - 2. Scales flat sub-group of *E. conforme*
 - 2. Scales bristle-like subgroup of *E. spathulatum*
- 1. Frond-scales with acicular, not glandular, marginal hairs group of *E. muscosum*

The group of *E. muscosum* appears to consist of somewhere near 100 species, of which at least two-thirds are American and most of the rest are in Africa and the islands of the Indian Ocean; the Malasian share of this group is small, and I have seen no species east of New Guinea, though there is one in Hawaii. The sub-group of *E. spathulatum*, somewhat smaller than the *E. muscosum* group, is also predominantly American, with about eight species in Africa and the Mascarene islands and none in Malasia.

The great majority of species in Asia, Malasia, and the Pacific belong to the sub-group of *E. conforme*, and the Old World total of this sub-group is not greatly less than that of the New World. In distribution therefore this looks like the basic part of the genus, and it is appropriate that *E. conforme* (native in St Helena and southern Africa) has been chosen as type species of the whole genus. It looks to me as though the sub-group of *E. spathulatum* and the group of *E. muscosum* originated in tropical America after the genus had achieved a pantropic distribution. But there is need for a comparative study of New World species to discover how the transition from the *E. conforme* type of frond-scale to that of *E. muscosum* may have occurred. There are a number of New World species of which the frondscales are very small and scanty; such I have provisionally assigned to the *E. conforme* sub-group, and I may have been mistaken.

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Elaphoglossum angustifrons Holtum, *sp. nov.*

Rhizoma breve; paleae fuscae, nitidae, planae, ad 6 mm longae et 2 mm latae, subintegrae, non acuminatae; phyllopodia 2—3 cm longa. *Frons sterilis*: stipes 5—10 cm longus, pallidus, primo paleis patentibus eis rhizomatis similibus ornatus, demum paleis minutis,

atrobrunneis, interdum fimbriatis, solum vestitus; lamina tenuis, in sicco fusca, 25—35 cm longa, 1.5—2.3 cm lata, basi anguste cuneata et \pm decurrens, apice breviter acuminata; costa subtus pallida, prominens; venae distinctae, utrinque leviter prominentes, pleraeque apice incrassatae, interdum prope marginem anastomosantes; squamulae paginae inferioris minutae, fuscae, pilis pluricellularibus marginalibus praeditae. *Frons fertilis*: stipes 10—15 cm longus; lamina 16—20 cm longa, 12—15 mm lata.

Typus: *Womersley 11272*, N. E. New Guinea, Western Highlands, 12 miles N. of Minj, 2130—2440 m (LAE; dupl. at A, K).

***Elaphoglossum apiculatum* Holttum, sp. nov.**

Rhizoma breve; paleae fuscae, nitidae, latae (omnes incompletae); phyllopodia 15—20 mm longa. *Frons sterilis*: stipes vix 2 cm longus; lamina tenuiter coriacea, ad 30 cm longa (basi aliformi incluso), 4.7 cm lata, elliptica, basi abrupte angustata et longe decurrens (alas 12 cm longas efficiens), apice apiculo 5 mm longo praedita; margo non pallida; costa subtus prominens; venae utrinque leviter prominentes, prope marginem anastomosantes; squamulae laminae non visae; squamulae paginae inferioris costae minutae, irregulariter stellatae, cellulis globosis glandulosis deficientibus. *Frons fertilis* normalis non visa; adest frons partim sterilis, partim (apicem versus) fertilis; pars fertilis 2.3 cm lata.

Typus: *Brass 13624*, W. New Guinea, 4 km SW of Bernhard Camp, Idenburg River, rare low epiphyte in rain forest at 900 m (G).

This species is near *E. archboldii* Copel., but appears distinct in the form of the sterile frond; plants also are much smaller than the type of *E. archboldii*.

***Elaphoglossum apoense* Holttum, sp. nov.**

Rhizoma breve; paleae fere nigrae, rigidae, nitidae, leviter tortae, c. 5 mm longae, 0.5 mm latae, anguste acuminatae, marginibus pilis rigidis brevibus praeditae; phyllopodia 10 mm longa. *Frons sterilis*: stipes pallidus, 22 cm longus, paleis multis ad 5 mm longis vestitus; lamina tenuiter coriacea, 19.5 \times 3.0 cm, oblanceolata, apice rotundata, basin versus sensim angustata; margo tenuis pallida perangusta; costa subtus prominens, teres; venae utrinque distinctae; squamulae superficiales utrinque facie numerosae, fuscae, nitidae, angustissimae, pleraeque 1—2 mm longae, marginibus pilis rigidis brevibus patentibus praeditae (pilis ex cellulo uno elongato, fusco, et cellulo uno parvo hyalino constitutis); squamulae multae prope marginem laminae 1 mm longae fimbriiformes. *Frons fertilis* ignota.

Typus: *Edaño PNH 710*, Mindanao, Mt Apo, in mossy forest, 2100 m (MICH).

The only other species known to me having similar scales on the frond is *E. vepiferum* from N. E. New Guinea, here also described as new.

***Elaphoglossum arachnoideum* Holttum, sp. nov.**

Rhizoma breve; paleae 10 mm longae, 1½ mm latae, acuminatae, brunneae, rigidae, fere integrae, leviter tortae; phyllopodia 10 mm longa. *Frons sterilis*: stipes 20 cm longus, paleis eis rhizomatis similibus sed tenuioribus praeditus; lamina tenuiter coriacea, 21 cm longa, 5.8 cm lata, fere elliptica, basi breviter decurrens, apice anguste rotundata; costa subtus basin versus tantum prominens; venae subtus non distinctae; pagina inferior squamulis coactis vestita, squamulae majores 2—3 mm longae, angustissimae, pallide brunneae, marginibus pilis paucis praeditae, squamulae minores etiam multae. *Frons fertilis*: stipes 22 cm longus; lamina 12 cm longa, 3 cm lata.

Typus: *Brass 24541*, Papua, Goodenough Island, high on trees in oak forest, 1600 m (A).

Elaphoglossum favigerum* Holttum, *sp. nov.

Rhizoma breve; paleae atrobrunneae, tenues, c. $5 \times 1\frac{1}{2}$ mm, non acuminatae, cellulis \pm sexangulatis (non elongatis) constructae; phyllopodia 1.5 mm longa. *Frons sterilis*: stipes 10 cm longus; lamina tenuiter coriacea, ad 40 cm longa et 4.5 cm lata, fere elliptica, basi cuneata et breviter decurrens, apicem versus sensim angustata, apice acuta; margo tenuior angusta, reflexa; costa subtus valde prominens; venae supra distinctae; squamulae superficiales minutae (haud $\frac{1}{2}$ mm diametro), \pm stellatae. *Frons fertilis*: stipes 14 cm longus; lamina 22 cm longa, 2.5 cm lata, basi abrupte angustata.

Typus: *Brass 13440*, W. New Guinea, 6 km SW of Bernhard Camp, Idenburg River, occasional low epiphyte at 1200 m (G; dupl. at MICH). *Brass 13042*, from same locality, appears to be the same species, but the rhizome scales are not well preserved.

Elaphoglossum heterostipes* Holttum, *sp. nov.

Rhizoma breve; paleae brunneae, tenues, 5—7 mm longae, basi $1\frac{1}{2}$ —2 mm latae, apicem versus angustatae sed non acuminatae, subintegrae; phyllopodia 10 mm longa. *Frons sterilis*: stipes 0—5 cm longus; lamina tenuiter coriacea, ad 38 cm longa et 4.8 cm lata, oblanceolata, apice acuta (non acuminata), basi longe decurrens; margo tenuior angusta, in sicco non pallida; costa subtus leviter prominens; venae utrinque distinctae et leviter prominentes, marginem versus incrassatae, liberae; squamulae paginae inferioris laminae minutae, \pm stellatae. *Frons fertilis*: stipes 25—30 cm longus; lamina 25 cm longa, 2.0 cm lata, basi longe decurrens, apice acuta.

Typus: *Endert 4424*, Central Indonesian Borneo, W. Kutai, Mt Kemul, 1800 m (BO).

The sterile fronds are much like those of *E. melanostictum* (Bl.) Moore in shape, but have very different scales; the long stipe of the fertile frond is also distinctive.

Elaphoglossum idenburgensis* Holttum, *sp. nov.

Rhizoma breve; paleae fuscae, rigidae, nitidae, ad 4 mm longae et 2 mm latae; phyllopodia 12—17 mm longa. *Frons sterilis*: stipes nullus; lamina 21.5 cm longa, 1.8 cm lata, rigida, apicem acuminatum et basin anguste decurrentem versus sensim angustata; margo tenuis perangusta, haud pallida, in sicco reflexa; costa subtus prominens, teres; venae vix conspicuae; squamulae superficiales paucae, furvae, adpressae, pleraeque integrae. *Frons fertilis*: stipes 6 cm longus; lamina 12 cm longa, 1.1 cm lata, basi decurrens, apice obtusa.

Typus: *Brass 12283*, W. New Guinea, 15 km SW of Bernhard Camp, Idenburg River, in mossy forest on old log, 1800 m (G; dupl in MICH).

This species is near *E. archboldii* Copel., but much smaller and with sterile lamina decurrent quite to junction with phyllopodium.

Elaphoglossum indrapurae* Holttum, *sp. nov.

Rhizoma crassum, breve; paleae pallide brunneae, tenues, ad 10 mm longae, 2—3 mm latae, non acuminatae; phyllopodia 2 cm longa. *Frons sterilis*: stipes 14—18 cm longus; lamina tenuiter coriacea, 35—55 cm longa, 3—5 cm lata, anguste elliptica, apicem versus sensim angustata, apice anguste rotundata, basi cuneata et breviter decurrens; margo pallida angusta, reflexa; costa subtus basin versus prominens, sursum plana; venae distinctae, supra leviter prominentes; squamulae superficiales non visae. *Frons fertilis*: stipes 38 cm longus; lamina 33 cm longa, 3 cm lata; sporae eis *E. sumatranum* similes.

Typus: *Alston 14275*, Sumatra, vicinity of G. Kerintji, Sungei Tandok (BM).

This species is very close to *E. sumatranum*, but the very much longer, thinner fronds seem distinctive. It is notable that Alston also collected typical *E. sumatranum*, though

not at the same locality. The specific epithet *indrapuræ* refers to the name Peak of Indrapura which is an alternative name for Gunong Kerintji.

Elphoglossum latemarginatum Holttum, *sp. nov.*

Rhizoma breve; paleae 8—10 mm longae, c. 1½ mm latae, tenues, acuminatae, apice leviter tortae, marginibus pilis conspersis praeditae; phyllopodia 5 mm longa. *Frons sterilis*: stipes non alatus c. 1 cm longus; lamina tenuiter coriacea, 19—23 cm longa, 2.6—3.3 cm lata, oblanceolata, basin versus sensim angustata, apice breviter acuminata; margo tenuis laminae pallida, ½ mm lata; costa pallida, subtus non prominens; venae subtus distinctae; squamulae superficiales utrinque adpressae, ± stellatae, diametro (radii inclusis) haud 1 mm. *Frons fertilis*: stipes c. 4 cm; lamina 17 cm longa, 1.6 cm lata, margine pallida 1 mm lata.

Typus: *Brass 24896*, Papua, Goodenough Island, common low epiphyte on mossy trees, 1600 m (A).

Elphoglossum malayense Holttum, *sp. nov.* — *E. callifolium* sensu Holttum, *Rev Fl. Malaya* 2 (1954) 459, *p.p. max.*

Rhizoma crassum, breve; paleae ad 25 mm longae et 3 mm latae, pallide rufo-brunneae, planae, firmae, acuminatae, plerumque integrae; phyllopodia 15 mm longa. *Frons sterilis*: stipes plantarum juvenilium brevis, plantarum adultarum 5—10 cm longus; lamina tenuiter coriacea, ad 40 cm longa et 5 cm lata, apice breviter acuminata, basi sensim angustata et in alam 5 cm vel ultra longam decurrens; margo tenuior angusta, reflexa; costa utrinque prominens; venae distinctae sed vix prominentes; squamulae superficiales minutae, stellatae, pleraeque caducae. *Frons fertilis*: stipes 8—15 cm longus; lamina ad 24 cm longa et 2.2 cm lata, basi decurrens vel cuneata.

Typus: *Henderson 17765*, Malay Peninsula, Cameron Highlands, 1370 m (K; dupl. at SING). Other specimens: *King's Collector 6374*, Larut, 1070—1220 m; *Molesworth Allen 1622*, 1899, Fraser's Hill; *Ridley 5168*, G. Jerai; *Haniff 627*, G. Jerai, 1220 m; *Henderson F. M. S. Mus. 11277*, Fraser's Hill; *Eryl Smith 887*, Fraser's Hill.

This species has been called *E. callifolium*, but differs strikingly from typical *E. callifolium* in its much larger flat rhizome-scales and proportionately narrower and more rigid fronds. In scales it differs little from *E. spongophyllum* Bell of the present paper, but the latter has thicker fronds with rounded apices. Small plants of *E. malayense* have fronds with much-decurrent bases and short stipes, and such may sometimes bear fertile fronds. In the type collection one specimen has fertile fronds with stipe 8 cm and lamina 18 × 2.0 cm, base narrowly decurrent, the other has stipe 15 cm, lamina 24 × 2.2 cm, base rather abruptly narrowed and not decurrent.

Elphoglossum melanochlamys Holttum, *sp. nov.*

Rhizoma breve; paleae fere nigrae, rigidae, nitidae, 5 mm longae, vix 1 mm latae, apice capilliformes, marginibus pilis rigidis pluricellularibus praeditae; phyllopodia ad 10 mm longa. *Frons sterilis*: stipes 3—5 cm longus, pallidus, paleis eis rhizomatis similibus vestitus; lamina rigida, in sicco pallida, 15—21 cm longa, 1.6 cm lata, loriformis, apice anguste rotundata, basi abrupte angustata, non decurrens; margo tenuis pallida, ½ mm lata; costa subtus lata, pallida, leviter prominens; venae vix distinctae; squamulae paginae inferioris multae, paleis stipitis similibus sed minores, pleraeque 1—3 mm longae. *Frons fertilis*: stipes 5 cm longus; lamina 15 cm longa, 14 mm lata.

Typis: *Eyma 5408*, W. New Guinea, Wissel Lake Region (BO).

***Elaphoglossum negrosensis* Holtum, sp. nov.** — *E. conforme sensu* Copel., in Elmer Leaf. Philip. Bot. 2 (1908) 417. — *E. angulatum sensu* Copel., Fern Fl. Philip. (1960) 278, p.p.

Rhizoma breve; paleae pallide brunneae, ad 7 mm longae et 2½ mm latae, acuminatae, pilis marginalibus paucis ornatae; phyllopodia 10 mm longa. *Frons sterilis*: stipes 2—8 cm longus, primo paleis eis rhizomatis similibus ornatus; lamina tenuiter coriacea, 11—17 cm longa, 2.7—3.3 cm lata, elliptica vel leviter ovata, apicem versus sensim angustata, apice anguste rotundata, basi abrupte angustata et in alam 2 cm longam decurrens; margo tenuior pallida, vix ½ mm lata, in sicco non reflexa; costa subtus lata, non prominens; venae tenues, utrinque distinctae, apice liberae et incrassatae; squamulae superficiales non visae. *Frons fertilis*: stipes 10—12 cm longus, paleis persistentibus ornatus; lamina 8—11 cm longa, 13—15 mm lata.

Typus: *Elmer 9885*, Negros Oriental, 1400 m (MICH; dupl. at BO).

The rhizome-scales of this species somewhat resemble those of *E. angulatum* (Bl.) Moore, but the rhizome of *E. negrosensis* is short and the veins do not anastomose to form a thickened line just within the margin as they do in *E. angulatum*.

***Elaphoglossum nesioticum* Holtum, sp. nov.**

Rhizoma breve; paleae fuscae, nitidae, rigidae, c. 7 mm longae, vix 1 mm latae, leviter crispatae, pilis marginalibus paucis; phyllopodia 10 mm longa. *Frons sterilis*: stipes 6—8 cm longus; lamina tenuis, 30—37 cm longa, 3.5—3.8 cm lata, basin et apicem versus sensim angustata, apice leviter acuminata, basi decurrens; margo tenuior reflexa, angusta; costa subtus leviter prominens; venae leviter prominentes, prope marginem interdum anastomosantes; squamulae non visae. *Frons fertilis*: stipes 8 cm longus; lamina 19 cm longa, 1.5 cm lata.

Typus: *Brass 24882*, Papua, Goodenough Island, epiphyte in heavily mossed forest, 1600 m (A). Other specimens, all from Goodenough Island: *Brass 24490* (fertile lamina 19 × 1.0 cm); *Brass 24609* (fertile lamina 23 × 1.3 cm); *Brass 24608*.

***Elaphoglossum nigripes* Holtum, sp. nov.**

Rhizoma breve, frondes approximatas ferens; paleae fuscae, nitidae, c. 3 × 1 mm, apice non acuminatae; phyllopodia 5 mm longa. *Frons sterilis*: stipes 5 cm longus, squamulis adpressis fuscis integris vestitus; lamina tenuiter coriacea, 25—40 cm longa, 2—2.5 cm lata, apicem et basin versus sensim angustata, apice anguste rotundata; margo anguste reflexa, non pallida; costa tenuis, subtus prominens; venae vix prominentes; squamulae costae parvae, adpressae, ovato-acutae, fuscae, nitidae; squamulae laminae minores, paucae, pilis patentibus 2—3-cellularibus praeditae. *Frons fertilis*: stipes 10 cm longus; lamina 25 cm longa, 10—13 mm lata, apice abrupte angustata, obtusa.

Typus: *Pulle 493*, W. New Guinea, Mt Perameles, 1100 m (BM; dupl. at U, L, BO).

The specimens were distributed as *E. stelligerum* (a specific epithet not yet legitimately transferred to the present genus, type from S. India), which is nearly related to *E. petiolatum* (Sw.) Urban, but the scales on the frond of *E. nigripes* are very different from those of the *E. petiolatum* group.

***Elaphoglossum pallescens* Holtum, sp. nov.**

Rhizoma breve; paleae atrobrunneae, nitidae, 10 mm longae, 1½ mm latae, rigidae, planae, apice capilliformes, marginibus denticulatae et pilis tenuibus paucis praeditae; phyllopodia 10 mm longa. *Frons sterilis*: stipes 9—12 cm longus, pallidus, glabrescens; lamina rigida, in sicco pallescens, 19—21 cm longa, 2.8 cm lata, apicem et basin versus

aequaliter attenuata, apice leviter acuminata, basi breviter decurrens; margo pallida angusta, reflexa; costa utrinque lata et leviter prominens; squamulae paginae inferioris minutae, stellatae (radiis pluricellularibus). *Frons fertilis*: stipes 15 cm longus; lamina 2.5 cm lata, basi abrupte angustata et breviter decurrens.

Typus: *Brass 22879*, Papua, Milne Bay District, Mt Dayman, 2230 m, low on a mossy tree in forest (A). Other specimen: *Clemens 7616*, N. E. New Guinea, Morobe District, Sambanga, 1520—1830 m (B).

The fertile frond of the type lacks the apical part; that of *Clemens 7616* is 15 cm long, its sterile fronds being 4 cm wide.

***Elaphoglossum planicosta* Holttum, sp. nov.**

Rhizoma breve; paleae pallide brunneae, tenues, 10 mm longae, 2—2½ mm latae, apicem versus sensim angustatae, pilis marginalibus ornatae; phyllopodia ad 10 mm longa. *Frons sterilis*: stipes pallidus vel rufescens, 6—9 (—13) cm longus, sursum (2—3 cm) anguste alatus; lamina coriacea, in sicco rigida, 11—15 cm longa, 2.7—3.4 cm lata, fere elliptica, apice abrupte obtusangulata, basi anguste cuneata et decurrens; margo tenuis ¾ mm lata; costa supra lata, pallida, plana, subtus fere plana; venae inconspicuae, apice incrassatae vel bifurcatae, interdum anastomosantes; squamulae superficiales minutae, adpressae, stellatae (radiis pluricellularibus), c. ½ mm diametro (radiis inclusis). *Frons fertilis*: stipes 15 cm longus; lamina 11 cm longa, 3 cm lata.

Typus: *Jermy 4216*, N.E. New Guinea, Madang District, Finisterre Mts, 2750 m (BM). Also *Jermy 4218*, same locality, with narrower fronds (both sterile and fertile).

***Elaphoglossum pullenii* Holttum, sp. nov.**

Rhizoma repens, frondes biseriatas ferens; frondes in quaque serie 1—1½ cm inter se distantes; paleae rhizomatis pallide brunneae, firmae, ovato-acuminatae, c. 5 × 1½ mm, marginibus pilis paucis praeditae; phyllopodia 10—15 mm longa. *Frons sterilis*: stipes tenuis, 14 cm longus, glabrescens; lamina rigida, crassa, ad 12 × 3 cm metiens, fere elliptica, basi leviter decurrens, apice anguste rotundata; margo tenuis pallida, distincta; costa subtus lata, pallida, vix prominens; venae leviter manifestae, non prominentes; squamulae paginae inferioris rufo-brunneae, ad 1 mm longae, angustae, basin versus pilis longis praeditae, squamulae minores stellatae. *Frons fertilis*: stipes 14 cm longus; lamina 8 × 3.3 cm, anguste ovata, basi abrupte contracta et 1 cm decurrens, apice late rotundata.

Typus: *Pullen 5034, partim*, N.E. New Guinea, Western Highlands Distr., Kubor Range south of Minj, 3230 m, epiphyte on low trees in mossy forest (L).

***Elaphoglossum resiniferum* Holttum, sp. nov.**

Rhizoma breve; paleae fuscae, nitidae, 2—3 mm longae, non acuminatae, leviter crispatae; phyllopodia vix 5 mm longa. *Frons sterilis*: stipes 5—7 cm longus, pallidus, omnino paleis adpressis ovatis subintegris vix 1 mm longis resiniferis vestitus; lamina 20—26 cm longa, 8—9 mm lata, apicem caudatum et basin decurrentem versus sensim angustata; margo tenuis laminae angusta, in sicco reflexa; costa subtus prominens, teres; venae subtus distinctae; squamulae paginae superioris parvae, adpressae, rotundatae, marginibus breviter dentatae, pagina inferioris punctis resinosis multis praedita. *Frons fertilis*: stipes 11 cm longus; lamina 18 cm longa, 7 mm lata, basi anguste decurrens, apice non caudata.

Typus: *Wakefield 1466*, Papua, Central District, Astrolabe Range, 2400 m, on wet rocks in creek bed (BM).

This species is related to *E. petiolatum* (Sw.) Urban, but the edges of the scales on stipe and frond have very short unicellular teeth, not conspicuous hairs. The very narrow fronds may also be distinctive. The sterile fronds of the type specimen are not very young; probably the resin-dots which are a conspicuous feature of the lower surface were preceded by small scales which have disappeared. The development of scales of this group of species in Malesia needs to be studied.

***Elaphoglossum spongophyllum* Bell, sp. nov.**

Rhizoma breve; paleae rufo-brunneae, tenues, planae, 15 mm longae, 2½ mm latae, acuminatae, marginibus pilis paucis ornatae; phyllopodia 15—20 mm longa. *Frons sterilis*: stipes 8 cm vel ultra longus; lamina crassa, rigida, in sicco pallide brunnea, rugosa, ad 33 cm longa et 7 cm lata, elliptica vel oblanceolata, basi cuneata et paululum decurrens, apice ± abrupte angustata et rotundata; margo tenuis pallida, angusta; costa subtus pallida, lata, leviter prominens; venae plerumque non distinctae; squamulae superficiales minutae, stellatae. *Frons fertilis*: stipes 15 cm longus; lamina 20—25 cm longa, 3.5—4.5 cm lata, basi abrupte cuneata, apice anguste rotundata.

Typus: *Clemens* 31869, N. Borneo, Mt Kinabalu, upper Kinataki River, 2135 m (BO). Other specimens: *Clemens* 51799 *partim*, locality as type; *Holtum* 25718; *S. Collette* 21527, Kinabalu, 2920 m.

Mr Bell gave the specific epithet on account of the thick layer of spongy mesophyll in the frond of this species. Some specimens from the Malay Peninsula are rather thinner in texture than those from Kinabalu, with less broadly rounded apices of the sterile fronds; they are rather intermediate between typical *E. spongophyllum* and *E. malayense*, but as they agree with the former in rounded frond-tips and broad fertile fronds I refer them here: *Holtum* 20696, G. Tahan; *Wray & Robinson* 5464, G. Tahan; *Wray* 319, G. Batu Puteh.

McClure 20066, from Hainan (distributed as *E. austrosinicum*) also appears to belong here.

***Elaphoglossum stenolepis* Bell, sp. nov.**

Rhizoma breve, crassum; paleae rufo-brunneae, integrae, 10 mm longae, haud 1 mm latae, crispatae, apice capilliformes; phyllopodia 10—12 mm longa. *Frons sterilis*: stipes 5—7 cm longus, sursum alatus; lamina crassa, in sicco rugosa, 17—20 cm longa, 3.5—4 cm lata, oblanceolata, apice obtusangulata vel leviter rotundata, basi ad alam stipitis sensim angustata; margo tenuis perangusta; costa subtus lata, pallida, leviter prominens; venae vix distinctae; squamulae superficiales minutae, stellatae, radiis 3—6 pluricellularibus praeditae. *Frons fertilis*: stipes 11 cm longus; lamina 11 cm longa, 2.2 cm lata, basi abrupte angustata, apice rotundata.

Typus: *Clemens* 28019, N. Borneo, Mt Kinabalu, 1800—2150 m (US). Other specimens, all from Mt Kinabalu: *Clemens* 27060 (US *partim*, BO, K; BM specimen is *E. annamense* C. Chr. & Tard.); *Molesworth Allen* 3231; *Holtum* 25427, 25717.

***Elaphoglossum sumatranum* Holtum, sp. nov.**

Rhizoma breve, crassum; paleae pallide brunneae, tenues, 10 mm longae, 2½ mm latae, subintegrae, non anguste acuminatae; phyllopodia 10 mm longa. *Frons sterilis*: stipes 6—7 cm longus, pallidus, paleis patentibus ornatus; lamina crassa, rigida, in sicco pallide viridis, ad 22 cm longa et 5 cm lata, fere elliptica, basi cuneata et breviter decurrens, apicem versus abrupte angustata, apice rotundata; margo pallida angusta, reflexa; costa pallida, utrinque leviter prominens; squamulae superficiales minutae, stellatae. *Frons fertilis*: stipes 20 cm longus; lamina 17 cm longa, 2.5 cm lata; sporae 53—59µ × 33—37µ, perisporio lato, pauciplicato involucreatae.

Typus: *Matthew s.n.*, 21 Jan. 1913, Sumatra, G. Tandikat, 1525 m (K). Also *Alston 15168*, Sumatra, Tapanuli Resid., near Lae Pondon (BM).

The large spores of this species are matched only by those of *E. indrapuræ* (here also described as new) among Malesian species examined by me.

***Elaphoglossum thamnopteris* Holttum, sp. nov.**

Rhizoma breve; paleae 10—15 mm longae, 3—4 mm latae, tenues, pallide brunneae, fere integrae, non acuminatae; phyllopodia 10 mm longa. *Frons sterilis*: stipes nullus; lamina tenuis, ad 57 cm longa (80 cm, teste Brassio) et 5.5 cm lata, oblanceolata, basi sensim et longe decurrens, apice acuminata; margo tenuior laminae c. $\frac{1}{2}$ mm lata, vix pallida; costa subtus prominens; venae distinctae, prope marginem anastomosantes; squamulae superficiales conspersae, pleraeque minutae (vix $\frac{1}{2}$ mm diametro), stellatae, cellulis paucis globosis glandulosis prope basin praeditae. *Frons fertilis*: stipes c. 15 cm longus; lamina 25 cm longa, 2.0 cm lata, basi longe decurrens, apice abrupte obtusa.

Typus: *Brass 22990*, Papua, Mt Dayman, in *Nothofagus* forest, 1650 m (A). Other specimens: *Versteegh BW 12609 partim*, W. New Guinea, Arfak Mts, Mt Antop, 1750 m (L). *Kornasi 608 bis*, Ceram, Hatoemete-pas, 1500—1700 m (BO).

***Elaphoglossum vepriferum* Holttum, sp. nov.**

Rhizoma breve, frondes 7—8 mm inter se distantes ferens; paleae fere nigrae, nitidae, rigidae, 5 mm longae, $\frac{2}{3}$ mm latae, planae, marginibus pilis rigidis patentibus praeditae; phyllopodia 12—15 mm longa. *Frons sterilis*: stipes 15—25 cm longus, paleis multis ad 1 mm longis vestitus; lamina leviter coriacea, 15—20 cm longa, 1.5—2.2 cm lata, oblanceolata, apice anguste rotundata, basi anguste cuneata, breviter decurrens; margo pallida distincta; costa utrinque leviter prominens; venae vix distinctae; squamulae laminae eis *E. apoensis* similes sed breviores, $\frac{1}{2}$ —1 mm longae. *Frons fertilis*: stipes 17 cm longus; lamina 14 cm longa, 1.4 cm lata.

Typus: *Clemens 7417*, N.E. New Guinea, Morobe Distr., Sambanga, 1525—1830 m (B; dupl. at G).

Closely related to *E. apoense*, here also described as new, but less scaly, with smaller scales on lamina and narrower less broadly-tipped fronds. The specific epithet refers to the fringe of small scales with their rigid marginal hairs which interlock and, when magnified, resemble a thorny hedge.