

XIV. OBSERVATIONS ON DRYNARIOID POLYPODIACEAEIN PAPUA NEW GUINEA

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The drynarioid Polypodiaceae consist of about 30 usually epiphytic species confined to the Palaeotropics. They belong to *Drynaria* (c. 16 spp.) and a number of smaller genera, e.g. *Aglaomorpha*, *Merinthosorus*, or monotypic ones, e.g. *Drynariopsis*, *Holostachyum*. The generic delimitations as well as the phylogenetic relationships of the taxa are part of a project on the Systematics of the Polypodiaceae carried out in Utrecht.

New Guinea is of special interest for the drynarioid ferns because nine species occur on that island (see table 1). Of these seven were found during a recent trip in Papua New Guinea made by myself in 1983 in cooperation with Mr. J.R. Croft (LAE), Rev. N.E.G. Cruttwell (Goroka) and Mr. R.J. Johns (Unitech, Lae). Visits were made to the Eastern Highlands (Goroka, Mt Gahavisuka Provincial Nature Park and Mt Michael, 25 km East of Lufa) and the Morobe Province (Aseki Divide, 60 km West of Bulolo; Boana, 50 km Northwest of Lae; Gumi, 45 km West of Bulolo; Kaiapit; Kaisinik, 25 km South of Wau; Lae; Bulolo, the Bulolo Valley and the hot water springs 10 km East of the town; Mt Kaindi; Mt Missim, 25 km Southeast of Bulolo; Mt Susa, 10 km Southwest of Bulolo; Mumeng; Oomsis, 20 km West of Lae; Wampit, 40 km Southwest of Lae; Wau).

The three species of *Drynaria* are widely distributed and grow in a variety of habitats, e.g. in or near towns and plantations, whereby they are quite well-known. *Drynaria sparsisora* was common on trees in Lae, just as I saw them some years ago in Jambi, Sumatra. *Drynaria rigidula* was slightly less common and grows at higher altitudes. Its habit which is quite different from that of *D. sparsisora* makes it less conspicuous but it was nevertheless found in many places.

Drynaria quercifolia was not met but Mr. Croft (pers. comm.) has observed it in the monsoon area around Port Moresby. He has said that all three species occur there. It is interesting to note that according to him the foliage fronds of *D. sparsisora* have much narrower lobes there than seen around Lae. Similar narrow lobes are found in Queensland specimens of the latter species and in the Philippine endemic *D. descensa*.

Drynaria rigidula and *D. sparsisora* are strikingly different in habit and habitat. The first shows a large altitudinal range (750-2000+ m) growing in exposed sites, usually epiphytically, at higher altitudes also epilithically. The rhizome horizontally encircles the bole or branches of the host many times, each time at a larger distance from the substrate whereby huge clumps are formed. Numerous spreading to erect, closely inserted and imbricate base fronds form a humus collecting basket. The foliage fronds are scattered throughout this, they are obliquely erect at

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TABLE 1. — Survey of the New Guinea species of drynarioid Polypodiaceae and the localities where found in Papua New Guinea in 1983.

<i>Aglaomorpha novoguineensis</i>	New Guinea, endemic. Gumi, 1200 m.
<i>Drynaria quercifolia</i>	India to Macronesia, Australia. Not found.
<i>D. rigidula</i>	India to Polynesia, Australia. Goroka, Lufa, Mumeng, Oomsis, Wampit, 750-1200 m.
<i>D. sparsisora</i>	India to Polynesia, Australia. Kaiapit, Lae, below 100 m.
<i>Drynariopsis heraclea</i>	Malesia, everwet areas. Wau, 800 m.
<i>Holostachyum buchananii</i>	N. Moluccas, New Guinea, Vanuatu, Louisiades. Boana, Bulolo, Gumi, Kaisinik, 650-1500 m.
<i>Merinthosorus drynarioides</i>	Malesia, everwet areas. Aseki Divide, Boana, Bulolo, Gumi, Wau, 800-1500 m.
<i>M. hieronymi</i>	New Guinea, endemic. Boana, Bulolo, Gumi, 1000-1500 m.
<i>Thayeria nectarifera</i>	New Guinea, Vogelkop, endemic. Not found.

first, then bend downward and have a thin appearance. When the species is epilithic the mass of the much-branched, brittle rhizomes form a crust on the substrate to which it is then extremely strongly attached. The numerous, erect base fronds form a similar basket but the foliage fronds appear to be firmer than in the epiphytic forms.

Drynaria sparsisora is mainly found below 100 m growing epiphytically in shaded places from ground level to 25 m high. Its rhizome extends vertically or slightly spirally along the trunk and main branches of its host attaching itself entirely to the latter's bark. The base fronds are usually densely set and cover large parts of the host. They are appressed to the substrate and cover each other like shingles, but when epilithic they may be nearly absent as was observed by Croft (pers. comm.) in exposed places near Sogeri. The foliage fronds are scattered along the rhizome, here and there closer together, and are spreading to pendulous often obscuring the base fronds.

Drynariopsis heraclea and *Merinthosorus drynarioides* are also widely distributed, but I only saw cultivated specimens of the first species in the Wau Ecology Institute. The growth habit of this giant is similar to that of the second species. This one is fairly common between 800 and 1500 m throughout the region visited, often as an epiphyte high-up on large or emergent trees or on Pandanus and then from breast height up to 5 m high. This is possibly due to light conditions as the canopy is then more open. Its rhizome horizontally encircles the bole or main branches of its host only once at most. The sessile, obliquely erect fronds are

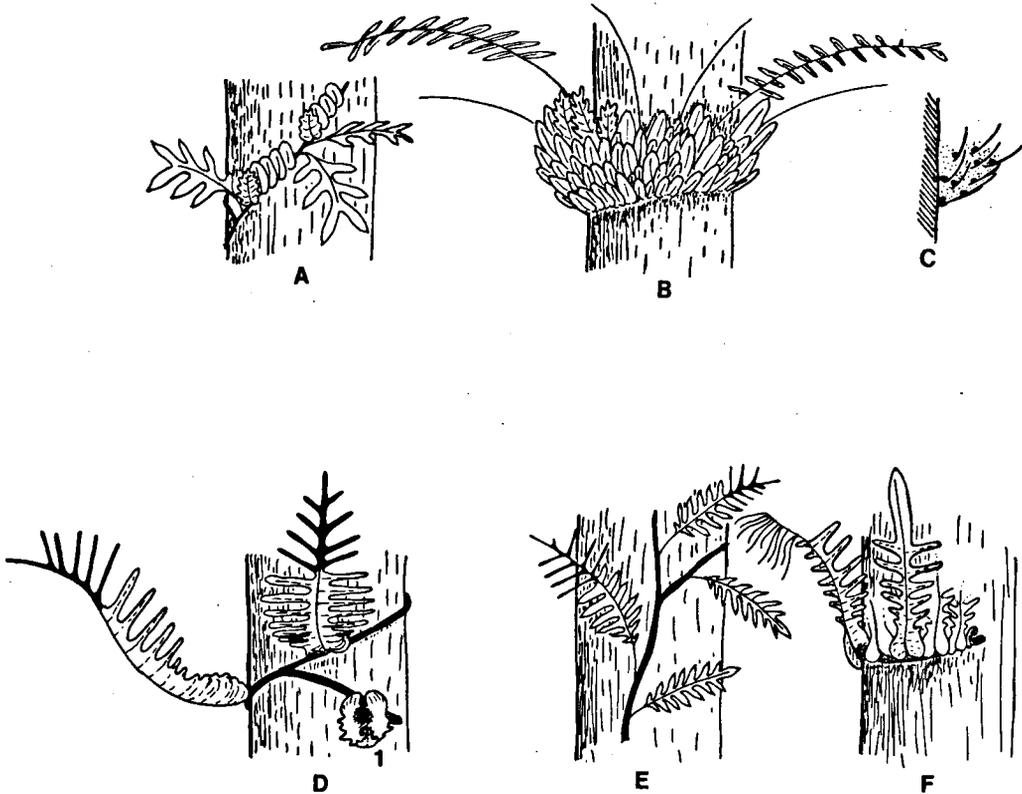


Fig. 1. Growth habit of New Guinea drynarioid ferns. These are all conspicuously characterized by the pinnatifid or pinnate fertile fronds with articulated, deciduous lobes or pinnae and a usually persistent rachis. A. *Drynaria sparsisora*. B. *Drynaria rigidula*. Note the naked rachis. C. *Idem*. Cross section of the basket. The black dots represent the rhizome. D. *Aglaomorpha novoguineensis*; 1: a young circinnate frond with the basal part filled with detritus. E. *Merinthosorus hieronymy*. F. *Merinthosorus drynarioides*.

densely set, less than 10 cm apart, their broadened bases overlap and are appressed to the substrate forming a basket around the host.

The other species of *Merinthosorus*, *M. hieronymy*, is nearly always found together and intermingled with the first one, but the latter often occurs without the first. The rhizome of *M. hieronymy* then extends vertically along the bole of the host crossing the baskets of *M. drynarioides*. The stalked, spreading fronds lack a broadened base and stand more remotely (15-50 cm apart) and form no basket.

Holostachyum buchananii is also fairly common. Several times it, too, was found associated with the *Merinthosori*. Its gross morphology and growth habit are similar to that of *M. hieronymy*: the rhizome is vertical and the fronds are stalked without a broadened base.

The fact that these three species may grow together on the same host is very interesting. From herbarium studies one would expect *H. buchananii* to be a high-epiphyte, perhaps a low one or an occasional terrestrial but in three localities it turned out to be a dominant terrestrial: near Kaisinik in a rather dense *Pinus* woodland and on the slope of an adjacent roadside, near the hotwater springs in the Bulolo Valley on the slope of a roadside under young, secondary vegetation, and near the summit of Mt Susa in a quite dense, primary *Araucaria* forest.

In these places over an area of nearly an acre hundreds of erect, shiny, dark green fronds dominated the undergrowth of the forest floor. Being in the shade they were rather thin, nearly glabrous, 40-100 cm long with at least 5 pairs of lobes, and without lime-scales. Specimens growing on exposed slopes of roadsides, on the other hand, have fronds that are either erect or, on very steep slopes, pendulous, dull greyish or yellowish green, firm, pubescent, 15-45 cm long, many with only 3 or 4 pairs of lobes, and usually with lime-scales. The rhizome creeps half-submerged through the thin layer of humus on the stony soil and when possible it climbs up trunks. The terrestrial rhizomes are strikingly thicker than the epiphytical ones, c. 2 cm vs. 1 cm \emptyset . The terrestrial plants had only sterile fronds, many young and circinnate, fertile fronds were only seen on exposed places and on rhizomes which had just started to climb up the trunks. These specimens, however, had not developed a flush of circinnate young fronds.

Mr. Croft (pers. comm.) some years ago saw a specimen of *H. buchananii* which was in cultivation near Lae that had formed a fertile frond, but never did so again. He had also found a number of fertile fronds in the locality near Kaisinik some years ago, but during the present trip only two rather old fertile fronds were collected from rhizomes that had just started to climb up. Near the hotwater springs some more fertile fronds were collected. All these as well as those from high, epiphytic ones had a rather old, gnawed appearance. It would therefore seem that this species forms rather long-lasting fertile fronds only at long intervals. This is also suggested by the behaviour of a cultivated plant in Utrecht.

Aglaomorpha novoguineensis is not common. A few metres above the ground its rhizome spirally climbs along the trunk of its host. The fronds are 20-40 cm apart, spreading, the upper part bending upward. As in *D. heraclea* and *M. drynarioides* their bases are broadened but not imbricate, nor are they appressed to the substrate, instead they are free and shell-shaped, each one forming a single basket. The mechanism whereby humus is collected was shown by a young, meristematic frond where the basal part was already filled with detritus very difficult to remove, as it was already fixed by roots and rootlets.

Thayeria nectarifera is known only from Beccari's type collection from the Vogelkop. Whether it is really distinct from *Th. cornucopia* from the Philippines is not yet clear.

Although it has little to do with the subject of this note I would like to commemorate one of the most impressive things seen during this trip: along the road between Lae to Bulolo were a great number of rain trees (*Samanea saman*) decorated by numerous mature specimens of *Platycerium wandae*, the New Guinea giant staghorn fern, a truly majestic sight.