

## CYATHEA LAMOUREUXII (CYATHEACEAE): A REMARKABLE NEW SPECIES FROM THE PAPUAN PENINSULA OF NEW GUINEA

W. TAKEUCHI

Arnold Arboretum and the Herbaria of Harvard University,  
c/o PNG National Forest Authority,  
P.O. Box 314, Lae, Morobe Province 411, Papua New Guinea

### SUMMARY

*Cyathea lamoureuxii* is described from recent exploratory surveys in Papua New Guinea. The new fern is unique among eastern Malesian congeners for its undivided pinnae, and is also the only member of its subgenus with manifestly pinnate leaves. The manner in which the novelty combines diagnostic features across infrageneric lines underscores the difficulties in drawing absolute separations at the subgenus and sectional levels.

**Key words:** *Cyathea*, *Schizocaena*, *Sphaeropteris*, ultrabasics.

### INTRODUCTION

*Cyathea* tree ferns are among the most prominent and photogenic elements in the Papuan flora. The genus is common at all elevations and provides the defining component for at least one landscape formation (i.e., the subalpine tree fern savannah; Fig. 1).

In the generic circumscription adopted by Holttum (1963), 78 species are recognized for the New Guinea mainland. Tryon's (1970) newer classification increases the difficulties present in *Cyathea* taxonomy, and has not been followed in this paper.

Peridology has rarely been a focus of botanical exploration in New Guinea. Except for the activities of a few specialists (e.g., J. Croft, J.S. Croxall, A.C. Jermy, T. Nakaïke,



Fig. 1. *Cyathea* tree fern savannah from the Kaijende Highlands of Enga Province, Papua New Guinea. *Cyathea dicksonioides* and *C. atrox* var. *inermis* are codominants in the subalpine community. Photo by W. Takeuchi.

and B.S. Parris) collecting has been primarily inconsequential and opportunistic. Although floristic documentation has improved in most respects, the historical malaise for ferns has become especially acute in recent years. With *Cyathea* in particular, the current inactivity can be partly attributed to the large size of most species and the corresponding difficulty in making effective collections. The impediments and disincentives are comparable to the situation for palms, another group where non-specialist field workers are understandably reluctant to expend special effort.

Despite their common perception as 'tree ferns', *Cyathea* is not always composed of large plants. A fair number of Malesian species are short statured (1–2 m tall), in marked contrast to the arborescent representatives for which the genus is characteristically associated. Not surprisingly, the smaller taxa (e.g., *C. microphyloides*, *C. perpelvigera*) are usually better represented in herbaria. The following account presents a new and distinctive member of this latter assemblage and briefly discusses the implications of its unexpected discovery.

### DESCRIPTION

***Cyathea lamoureuxii*** W. Takeuchi, *spec. nov.* — Fig. 2, 3; Map 1

Inter species subgeneris *Cyathea* singularis ob folia valde pinnata. — Typus: *Takeuchi, Ama, Siga & Kavua 16190* (holo LAE; iso A, L), Papua New Guinea, Morobe Province, Siboma Bay, alt. 50 m, 25 April 2002.

Terrestrial fern. *Caudex* erect, c. 7 cm tall, cylindrical, unbranched, cicatricatous on the lower part, furnished with persisting stipe bases near the top, leaves tufted at the summit. *Stipes* 12–17(–24) cm by 3–5 mm, conspicuously channelled on the dorsal side, rounded beneath, pallid; vasculature of numerous strands in 3 elongate arcs, upwardly coalescing into  $\pm$  continuous bands; pneumathodes interrupted, arranged in

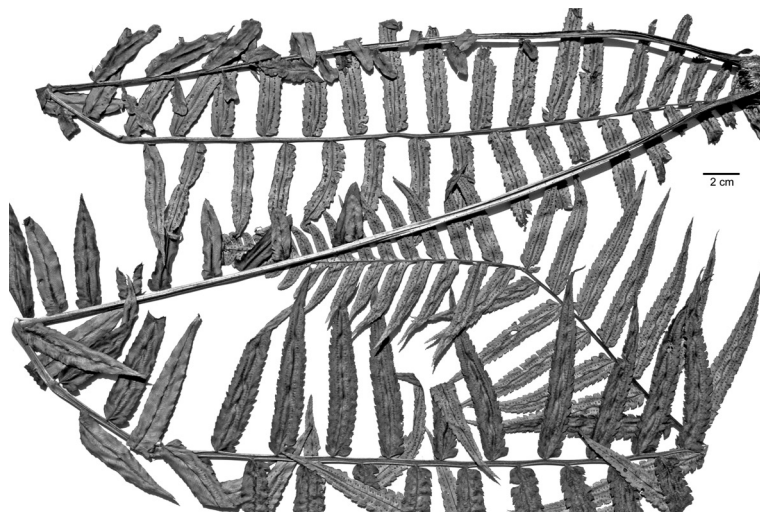


Fig. 2. *Cyathea lamoureuxii* W. Takeuchi. Unmounted duplicate (caudex removed) showing two whole fronds (*Takeuchi et al. 16190*).

2 longitudinal lines per side, pallescent, obscure; scale indument: scales linear, 7–10.5 by 0.4–1.2(–2.2) mm, firm, appressed or not, bicolorous, median sections dark brown, margins hyaline, flabelloid, paleae congested on lower parts of the stipe, distally lax, falling early, bases persisting as a muricate-conoidal residue; hair indument: hairs setiform, subulate, septate, antrorsely arcuate, mostly confined to the dorsal channel, shining, dark brown. *Rachis* 77–90 cm long, indument as the stipe but hairs denser in channels; scales elongate, crispate, transitional in form to setiferous scales. *Lamina* pinnate, 26–32 pinnae per side, decrescent, widest at the middle; apical part pinnatisect, narrowly deltate, 9.5–16 by 6–8.5 cm, lobes obtuse. *Basal pinna* 12–24 by 6–9 mm, sessile, truncate, with or without an auriculiform acroscopic lobule, margins parallel, subentire, apex obtuse or acute. *Largest pinna* 110 by 15 mm; base sessile or obscurely (< 0.5 mm) stipitate, truncate or oblique, wider on the acroscopic side; margins notched 1/4 the distance to costae or less, crenations asymmetric, extrorse, falcately acute, shallowly toothed; passing gradually to a prolonged and serrulate apex; upper surfaces proximally provided with setiform hairs on costae, glabrescent; undersurfaces glabrous or with scattered linear-dendritic scales. *Venation* catadromous, simple or pinnatifid, free, reaching the margin or nearly so, vein groups (2–)4–10(–13)-nerval, uni- or binerval at pinnae apices, never confluent with adjacent groups, basal basisopic veins emerging directly from costae, (0.2–)1–2 mm away from costules, each crenation served by one vein group; costae prominent on both surfaces, higher order nervation bifacially prominulous. *Sori* superficial on simple veins or in axils of bifurcating veins, seated on capitate or ellipsoid receptacles, globose, forming 1 (or 2) rows on either side of the midrib, (1–)2–4(–5) per vein group; filiform-paraphysate, the filaments compressed, catenate, eglandular, dark brown, numerous. *Indusia* chaffy, hyaline, fragile, at first a complete envelope closely appressed to sporangia, later open at the summit, finally rupturing irregularly nearly to the base, persisting as a scarios residue after spore discharge.

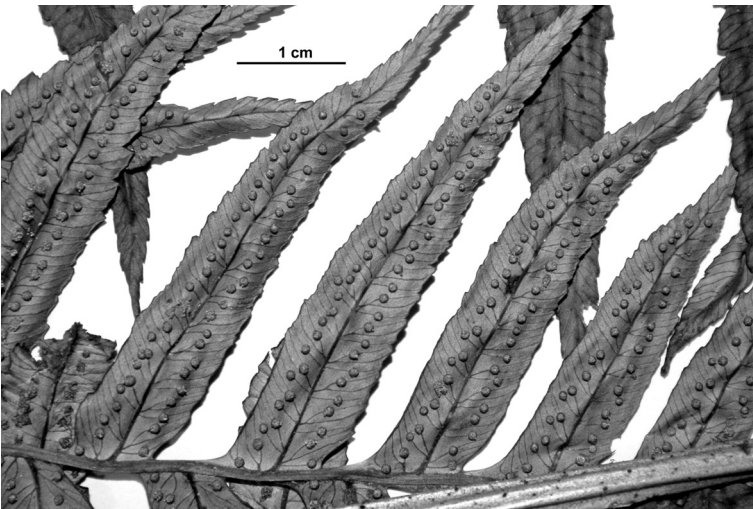
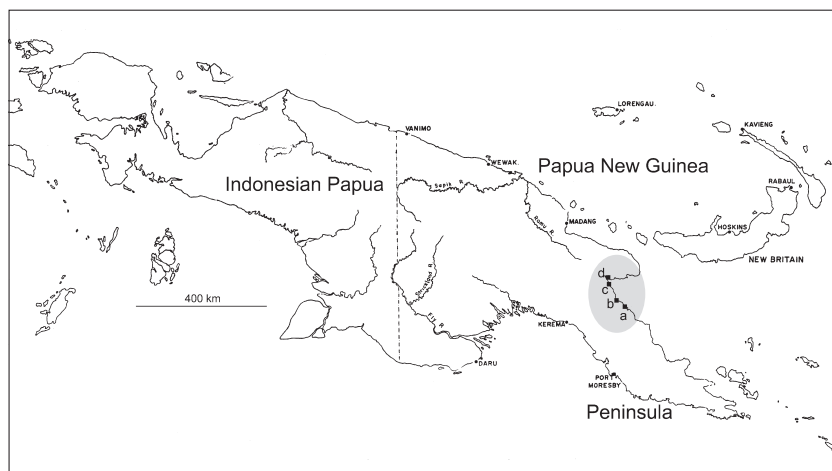


Fig. 3. *Cyathea lamoureuxii* W. Takeuchi. Pinnae detail from a subapical leaf section (Takeuchi et al. 16190).



Map 1. Island of New Guinea. Localities mentioned in the text. a. Siboma; b. Kui-Lababia boundary; c. Salamaua; d. Lae-Markham subdistrict.

Field notes — Fronds obliquely ascending or cernuous; stipes greenish brown; lamina subcoriaceous, dark dull green above, pale green beneath.

Distribution — Known only from the type locality.

Habitat & Ecology — Understory umbrophile in coastal forest selectively logged during the 1970s. Occurring in remnant stands uncut by the earlier operations.

Etymology — The epithet commemorates the life and contributions of Prof. Charles Lamoureux (1933–2000), the late pteridologist and educator from the University of Hawaii.

Notes — 1. In overall aspect, leaf structure, indument, and venation, the new species is similar to congeners from the *moluccana* group of section *Schizocaena*, subgenus *Sphaeropteris*. The once-pinnate leaves and the position of basal basicopic nerves (emerging directly from costae) should ordinarily indicate affinity to *C. moluccana* and its allies (spp. 152–155 in Holttum, 1963). However with stipe scales that are obviously flabelloid, *C. lamoureuxii* is clearly to be placed in section *Cyathea*, within which it is immediately distinguished by its *Schizocaena*-like features. In several key respects, the novelty is a composite of character states from otherwise separate sectional facies (Table 1). The absence of sharp infrageneric divisions in *Cyathea* argues against the reassignments proposed by Tryon (1970) for Malesian taxa. Holttum (1981) summarizes some of the difficulties.

2. Within Papuasia, *C. lamoureuxii* is the only member of the genus with clearly undivided pinnae. In *C. klossii* and *C. ascendens* the pinnae are technically simple, but the lamina is so deeply bipinnatisect (divided 1–2 mm from costae) as to appear decompound. Among the dimorphic species in section *Gymnosphaera*, the sterile leaves of *C. biformis* are also once-pinnate, but the species is bipinnate when fertile, and has so many other contrasting characters (e.g., a climbing habit, exindusiate sori, vein groups without separately inserted costal nerves) that it could never be mistaken for *C. lamoureuxii*.

Because of its singular qualities, the novelty can easily be accommodated in Holttum (1963: 77) by adding a new fork to the first couplet for section *Cyathea*:

- 1a. Lamina pinnate, pinna entire or crenato-serrate . . . . . ***Cyathea lamoureuxii***  
 b. Lamina bipinnatisect or divided to higher orders . . . . . to the existing couplet 1

3. The new fern is one of the smallest *Cyathea* in eastern Malesia. Measured from caudex base to the leaf apex, the total length is only 120 cm.

4. The discovery of *C. lamoureuxii* occurred in conjunction with explorations focused on the Papuan ultrabasic flora (Takeuchi, 2003). Although not part of the ultrabasic series, the Siboma vegetation has numerous floristic elements in common with the serpentine formations across the Kui-Lababia contact (see geology in Dow & Davies, 1964). Some investigators (e.g., Heads, 2003; Polhemus, 1996; Van Welzen, 1997) discount the influence of ultrabasic substrates on floristic patterns, regarding any correlations as coincidental to more fundamental and underlying causes connected to tectonics. Irrespective of the real underpinnings for endemic distributions in the Papuan belt, there is no question that the Peninsula comprises a discrete geofloristic unit. This is evident even from casual examination of species distributions within genera such as *Aglaiia* (Pannell, 1992), *Myristica* (De Wilde, 1995), and *Parsonsia* (Middleton, 1997). All the range-limited endemics censused by recent survey at Siboma-Kamiali fail to

Table 1. Comparison of the pinnately-leaved species of Malesian *Cyathea*, with respect to characters regarded by Holttum (1963) as being more or less diagnostic for infrageneric separations. *Cyathea bififormis* (section *Gymnosphaera*) is omitted from the tabulation on account of its bipinnate fertile leaves. The stipe-scale terminology (viz., flabelloid, setiferous) is used in the sense established by Holttum. For purposes of convenience, 'complete' refers to indusia which initially envelop the sorus as a discrete membrane, later tearing into scale-like fragments upon spore release. Where the applicable character state cannot be determined with certainty from the literature, this is explicitly indicated by '?'. Types have not been examined.

| Species                | Section            | Stipe scales | Pinna margin      | Vein groups         | Indusia               | Indument on abaxial costae          |
|------------------------|--------------------|--------------|-------------------|---------------------|-----------------------|-------------------------------------|
| <i>C. ascendens</i>    | <i>Cyathea</i>     | flabelloid   | pinnatisect       | costal vein absent  | exindusiate           | crisped hairs and setiferous scales |
| <i>C. klossii</i>      | <i>Cyathea</i>     | flabelloid   | pinnatisect       | costal vein absent  | complete              | bullate scales                      |
| <i>C. lamoureuxii</i>  | <i>Cyathea</i>     | flabelloid   | crenato-serrate   | costal vein present | complete              | glabrous                            |
| <i>C. angustipinna</i> | <i>Schizocaena</i> | setiferous   | entire to crenate | costal vein present | complete              | glabrous                            |
| <i>C. arthropoda</i>   | <i>Schizocaena</i> | setiferous   | ± entire          | costal vein present | basal ring, or absent | ?glabrous                           |
| <i>C. capitata</i>     | <i>Schizocaena</i> | setiferous   | entire            | costal vein present | complete              | ?                                   |
| <i>C. deminuens</i>    | <i>Schizocaena</i> | setiferous   | pinnatifid        | costal vein present | exindusiate           | hairy, scales absent                |
| <i>C. moluccana</i>    | <i>Schizocaena</i> | setiferous   | ± entire          | costal vein present | complete              | usually glabrous                    |

cross the tectonic boundary at Salamaua. On the basis of known floristic patterns in south Morobe, *C. lamoureuxii* is probably a peninsular endemic. Future collections of this unusual fern should occur to the east, further into the Papuan zone, and are very unlikely to be made west of the Lae-Markham subdistrict.

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