

Taxonomic Studies of Pteridophytes of Ambon and Seram (Moluccas) Collected on Indonesian–Japanese Expeditions XII*. *Coryphopteris* and *Plesioneuron* (Thelypteridaceae)

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Abstract This paper reports eight species of *Coryphopteris* and nine species of *Plesioneuron* of Thelypteridaceae from Seram and Ambon Islands, east Indonesia, based on our collections. Among them, *Coryphopteris seramensis*, *Plesioneuron murkelense* *P. saxocola*, and *P. translucens* var. *seramense*, are new taxa and the other species are new records at least to Seram.

Key words: Ambon, *Coryphopteris*, fern flora, *Plesioneuron*, Seram, taxonomy, Thelypteridaceae.

Introduction

This paper, following Kato (1997), deals with a second part of Thelypteridaceae, the largest of the fern families of Seram Island and Ambon Island, based mainly on examination of specimens collected during the Indonesian–Japanese expeditions of 1983, 1984–85, and 1986 to Ambon and Seram Islands, the Moluccas, east Indonesia. We collected about 690 species of pteridophytes, mostly from Seram Island (Kato, 1990). The island, along with Ambon Island, is geographically close to, and also geologically closely related to, New Guinea east of it, so the pteridophyte flora of Seram resembles that of New Guinea with a remarkable number of pteridophytes (ca. 2000 species), a source area, much more strongly than any other adjacent island (e.g., Sulawesi west of it) (Kato, 1990). Not surprisingly, further field research will discover many, elsewhere known or unknown species, because the three expeditions were made for in total less than eight months and botanized scattered spots, which together account for a very small portion of the whole island. Seram Island has an area of 18,000 km², which is

as large as Shikoku Island of Japan, but its species number exceeds that of islands or regions in tropical or temperate Asia with considerably larger areas, e.g., Java, Malaya (peninsular Malaysia), Thailand, Taiwan, and Japan (Holtum, 1968; Tagawa and Iwatsuki, 1979; Kato, 1990; Iwatsuki, 1992; Hsieh *et al.*, 1994). It indicates high species diversity or density of the Seram pteridophytes.

The taxonomy and systematics of Thelypteridaceae have been thoroughly revised by Holtum in a series of papers (1969, 1970, 1971, 1972, 1973a, 1973b, 1974, 1975a, 1975b, 1976a, 1976b, 1977a, 1977b, 1979, 1981). Holtum (1981) recognized 22 genera of Malesia. Among the two genera of Thelypteridaceae reported here, the plants of *Coryphopteris* are medium-sized with erect rhizomes and prefer the mossy ground in montane forests, as described by Holtum (1981). There are limestone-epipetric species in *Plesioneuron*, e.g., *P. dryopteroides*, as limestone areas are widespread throughout Seram Island from lowlands through high mountains (ca. 3000 m). Genera *Pneumatopteris* and *Sphaerostephanos*, the largest genus of the family, remain to be reported. Identification in this

* Continued from Kato (1997).

paper was based on the taxonomic work of Holtum (1981). Some species were identified tentatively and others remain unidentified. The specimens were collected by M. Kato and colleagues.

Key to the genera of Seram and Ambon Islands

The form of fronds, particularly whether narrowed or not at the base, and venation are easily visible, but these differences exist within single genera. Therefore, dichotomies 3 and 7 are not useful to separate most genera; they appear in both branches of dichotomies 3 and 7.

1. Costae not grooved on upper surface; veins not reaching margin.
2. Fronds simply pinnate *Methathelypteris*
2. Fronds bipinnate *Macrothelypteris*
1. Costae grooved on upper surface; veins reaching margin.
3. Lower pinnae not conspicuously reduced.
4. Fronds proliferous; sori exindusiate; riparian plants *Ampelopteris*
4. Fronds not or rarely proliferous, if proliferous hairs on sporangia hooked; sori indusiate or exindusiate; plants of various habitats.
5. Caudex erect; fronds not proliferous; sporangia sessile, lacking glands or hairs; plants of mountain ridges *Coryphopteris*
5. Not this combination of characters.
6. Caudex thick, erect; scales narrow, rigid, spine-like, brittle; sori costular, exindusiate *Chingia*
6. Not this combination of characters.
7. Veins free.
8. Basal basiscopic vein arising from costa far from base of costule; sporangium-stalk bearing hairs with red glands at apex *Mesophlebion*
8. Basal basiscopic vein arising near or above base of costule; hairs on sporangium-stalk otherwise.
9. Fronds bearing terminal pinnae or very abruptly narrowed to apex, rigid *Plesioneuron*
9. Fronds gradually narrowed to apex, herbaceous *Nannothelypteris*
7. Veins anastomosing.
10. Basal pinnae lobed, much narrowed at base *Amphineuron*
10. Basal pinnae entire to lobed, if lobed not much narrowed at base.
11. Pinnae or simple fronds subentire; lower surface between veins often pustular *Pronephrium*
11. Pinnae deeply lobed; surface between veins not pustular *Sphaerostephanos*
3. Lower pinnae gradually reduced or an abrupt change to small pinnae at base of fronds.
12. Sporangia sessile or short-stalked; veins free.
13. Caudex erect *Coryphopteris*
13. Rhizome long-creeping *Parathelypteris*
12. Sporangia stalked; veins free or anastomosing.
14. Pinnae entire to crenate *Pronephrium*
14. Pinnae lobed.
15. Basal scales broad or deltoid; upper surface between veins glabrous; lower surface of costae glabrous.
16. Lamina between veins not pustular when dry *Nannothelypteris*
16. Lamina between veins pustular when dry *Pneumatopteris*
15. Basal scales narrow; upper surface between veins often bearing hairs and/or glands; lower surface of costae usually with copious hairs.

17. Body of sporangium lacking hairs or glands; an elongate unicellular glandular hair on sporangium-stalk *Christella*
 17. Body of sporangium usually bearing sessile spherical glands or setae; hairs on sporangium-stalk multicellular *Sphaerostephanos*

Enumeration

Coryphopteris Holttum

Blumea **19**: 33, 1971; Blumea **23**: 18, 1976; Allertonia **1**: 195, 1977; Fl. Males. ser. 2, **1**(5): 354, 1981.

Distribution. Malesia, Pacific islands, north-east India to southern China, Japan.

Note. This genus, characterized by erect rhi-

zomes with bipinnatifid fronds fascicled at the apex, is rather common on often mossy ridges or slopes in lower to middle montane forests. It comprises 47 species, most of which are Malesian (Holttum, 1976a). In Seram Island most species are terrestrial, and *C. badia* is an epiphyte. Probably no collection of this genus has been made from Seram.

Key to the species

1. Acicular hairs abundant between veins on upper surface of pinnae 5. *C. obtusata*
 1. Acicular hairs absent or rare between veins on upper surface of pinnae.
 2. Sessile glands present on lower surface generally, or at least on costules.
 3. Sori distinctly supramedial 3. *C. diaphana*
 3. Sori medial to inframedial.
 4. Six or more pairs of lower pinnae gradually reduced, lowest 1.5–2 cm long 7. *C. squamipes*
 4. A few basal pinnae reflexed, slightly reduced, lowest 4 cm long 6. *C. seramensis* (sp. nov.)
 2. Sessile glands lacking on lower surface.
 5. Lower surface of rachis bearing acicular hairs, costae usually also.
 6. Hairs on lower surface of rachis ca. 0.2 mm long 2. *C. brevipillosa*
 6. Hairs on lower surface of rachis ca. 0.5 mm long 4. *C. hubrechtensis*
 5. Lower surface of rachis and costae lacking (or almost lacking) acicular hairs.
 7. Pinnae sessile, almost equally truncate at base, thin 8. *C. subnigra*
 7. Pinnae short-stalked, unequal at base, acroscopic base truncate, basiscopical base cuneate, thick 1. *C. badia*

1. *Coryphopteris badia* (Alderw.) Holttum, Blumea **23**: 44, 1976; Fl. Males. 2, **1**(5): 369, f. 4g–h, 1981.

Central Seram (Manusela National Park): between Wae (=River) Huhu and Owae Puku, 2000–2800 m, *C-3814*.

Habitat. Epiphytic with leaves hanging in upper montane forest.

Distribution. Seram (new record); Sumatra, Malaya, Sarawak, Sabah, Sulawesi, New Guinea.

Note. This species grows in mossy forests, in mossy cushions on tree-branches, or epiphytic in its wide distribution region (Holttum, 1981), and

the Seram plant is epiphytic. The species occurs at the highest altitudes among the congeners.

2. *Coryphopteris brevipillosa* Holttum, Blumea **23**: 43, 1976; Fl. Males. 2, **1**(5): 368, 1981.

Central Seram (Manusela National Park): Muselleinan Pass, ca. 1300 m, *C-14133*.

Habitat. On mossy ground in mossy forests.

Distribution. Seram (new record); West New Guinea.

3. *Coryphopteris diaphana* (Brause) Holt-

tum, *Blumea* **23**: 32, 1976; Fl. Males. 2, **1**(5): 363, 1981.

West Seram: between Tihulale and Gunung (Mt.) Totaniwel, 1000–1200 m, *C-13610*. Central Seram (Manusela National Park): between Wae Nua and Gunung (Mt.) Mapahuwe, southern slope of Murkele Ridge, 400–1000 m, *C-6828*; between Wae Nua and Gunung (Mt.) Mapahuwe, southern slope of Murkele Ridge, 200–800 m, *C-11627*.

Habitat. On mossy ground in mossy forests.

Distribution. Seram (new record); New Guinea.

Note. This species differs from the congeners of Seram in the superamedial sori. *C-13610* is glandular on the lower surface of the costae, but the two other specimens are eglandular.

3A. *Coryphopteris* cf. *diaphana* (Brause) Holttum

West Seram: between Tanahgoyang and Gunung (Mt.) Tiang Bendera, 400–1000 m, *C-12983*.

Habitat. On mossy mountain slope in deep shade.

Note. This is similar to *C. diaphana* in the length of the stipe and the size, shape and cutting of the lamina, but differs in the sessile glands lacking on the lower surface of the costae and the sori being medial to supramedial.

4. *Coryphopteris* *hubrechtensis* Holttum, *Blumea* **23**: 42, 1976; Fl. Males. 2, **1**(5): 367, 1981.

Central Seram (Manusela National Park): between Wae (River) Mamahala and Solea via Gunung (Mt.) Kobipoto summit, 1300–1500 m, *C-1798*.

Habitat. On mountain ridge in mossy forest.

Distribution. Seram (new record); West New Guinea.

Note. The Seram plant has shorter (ca. 25 cm) stipes and longer (ca. 40 cm) lamina, compared to New Guinean plants with stipes to 35 cm long and lamina 20 cm long. This species is similar to Seram *C. brevipilosa* in the costae and costules

lacking sessile glands on the lower surface, but differs from it in the glossy dark stipe and rachis, larger lamina, and longer hairs on the lower surface of rachis and costae.

5. *Coryphopteris* *obtusata* (Alderw.) Holttum, *Blumea* **23**: 30, 1976; Fl. Males. 2, **1**(5): 362, 1981.

West Seram: between Tanahgoyang and Gunung (Mt.) Tiang Bendera, 400–1000 m, *C-12987*; between Tihulale and Gunung (Mt.) Totaniwel, 1000–1200 m, *C-13604*. Central Seram (Manusela National Park): between Wae (River) Mamahala and Solea via Gunung (Mt.) Kibipoto summit, 1300–1500 m, *C-1799*; above Piliana on southern slope of Murkele Ridge, 700–1200 m, *C-746*, *C-924bis*, *C-1019*; between Gunung (Mt.) Eseli and Wae (River) Mamahala, 1000–1300 m, *C-1743*; Wae (River) Wasan Hotun on northern slope of Gunung (Mt.) Binaya, 1000–1100 m, *C-1594*; between Kanikeh and Wae (River) Ansela, 600–1300 m, *C-1398*, *C-3243*; between Wae Ansela and Wae Huhu, 1300–2000 m, *C-3543*; between Goa (Cave) Pohon Damar and Gunung (Mt.) Roihelu, 1000–1100 m, *C-5382*, 1100–1500 m, *C-5676*; between Wolu and Batu Kokan, southern slope of Manusela Ridge, 400–1000 m, *C-6827*; between Wae Puo and Kali Ili, 800–1200 m, *C-5344*; between Hatumete and Gunung (Mt.) Hoale Besar, 500–1300 m, *C-14297*; between Wae Nua and Gunung (Mt.) Mapahuwe, southern slope of Murkele Ridge, 900–1000 m, *C-11725*; trail (Jl. Lelesiru) between Piliana and Gunung (Mt.) Ohae, southern slope of Murkele Ridge, 900–1600 m, *C-12077*; trail (Jl. Pipileina) between Piliana and Gunung (Mt.) Sinaunia, southern slope of Murkele Ridge, 1000–2000 m, *C-12851*; between Hunisi and Muselleinan Pass, 600–1300 m, *C-14059*; above Wae Waule on trail from Kanikeh to Gunung (Mt.) Binaia summit, ca. 1000 m, *Parris 11136*.

Habitat. On mossy ground/slope, usually in shade, in mossy forests; in light gaps in open ridge crest oak forest.

Distribution. Seram (new record); Sumatra, Borneo, New Guinea.



Fig. 1. *Coryphopteris seramensis*; holotype (Kato et al. C-12834). Bar in inset=5 mm.

6. *Coryphopteris seramensis* M. Kato, sp. nov. [Fig. 1]

Coryphopteris borealis paleis ovatis vel delta-to-ovatis, laminis lanceolatis, costis glandulosis imiles, sed squamis clathratis, minoribus, pilis brevioribus differt.

Typus. Central Seram (Manusela National Park): trail (Jl. Pipileina) from Piliana to Gunung (Mt.) Sinaunia, southern slope of Murkele Ridge, 1000–2000 m alt., M. Kato, K. Ueda & Z. Fanani C-12834 (TI; iso BO, L, MO).

Other specimens. Central Seram (Manusela National Park): trail (Jl. Pipileina) between Piliana and Gunung (Mt.) Sinaunia, southern slope of Murkele Ridge, 1000–1400 m, C-12421; trail (Jl. Pipileina) from Gunung (Mt.) Sinaunia to Piliana, 1000–2000 m, C-12845. trail (Jl. Lelesiru) from Piliana to Gunung (Mt.) Ohae, 400–1000 m, C-11778 (dubious; eglandular large leaves).

Caudex ca. 5 cm tall, with leaves fascicled at apex. Stipes dull brown, to 10–20 cm long, sparsely scaly with scales dark-brown, ovate, deltoid-ovate or ovate-lanceolate, to 2.5–3 × 1.5 mm, irregularly toothed, clathrate, hairy or pilose with hairs pale-brown, 0.3–0.5 mm long, rather soft. Lamina lanceolate, bipinnatifid, to 30 × 8 cm, widest below middle, acuminate to apex, slightly narrowed to base, chartaceous. Pinnae 20–25 pairs, lower pinnae reflexed, shorter, to 4 × 0.9 cm; middle pinnae sessile, patent, deeply lobed to costal wing 0.5 mm wide or wider, oblong, truncate at base, short-acuminate or acute at apex, longest pinnae to 5(–7.5) × 1(–1.3) cm; lower pinna-lobes oblong, 4–5 mm long, 1.5–2(–2.5) mm wide, crenate, 0.8–1(–1.2) mm apart. Rachis with rare small scales, densely hairy on upper and lower sides with hairs pale-brown, not patent, ca. 0.5 mm long; costae sparsely hairy with shorter (ca. 0.2 mm) hairs on upper side, moderately hairy with hairs ca. 0.3 mm long and some sessile glands on lower side; costules and veins sparsely hairy and glandular; acicular hairs lacking between veins on upper and lower surfaces of lamina; lateral veins 4 or 5 pairs, usually simple. Sori inframedial, ca.

1 mm diam.; indusia conspicuous, reniform, glabrous.

Habitat. On mossy ground in mossy forests in light shade on mountain ridge.

Note. This new species is similar to *C. borealis* in the scales being ovate or deltoid-ovate, the lamina lanceolate and slightly narrowed to base, and the costae and costules with sessile glands. It differs in having clathrate, smaller (to 2.5 × 1.5 mm) scales and shorter (0.3–0.5 mm) hairs.

7. *Coryphopteris squamipes* (Copel.) Holttum, Blumea **23**: 35, 1976; Fl. Males. 2, **1**(5): 364, 1981.

Central Seram (Manusela National Park): between Hatumete and Maraina via Hoale Pass, 800–1800 m, C-1345, C-14400; between Gunung (Mt.) Eseli and Wae (River) Mamahala, 1000–1300 m, C-1730; between Goa (Cave) Pohon Damar and Gunung (Mt.) Roihelu, 1100–1500 m, C-5672bis; between Hatumete and Gunung (Mt.) Hoale Besar, southern slope of Murkele Ridge, C-14373.

Habitat. Terrestrial on mossy ground in light or deep shade on mountain ridge or top in mossy forests.

Distribution. Seram (new record); Philippines, New Guinea.

Note. C-14373 and C-14400 have short (to 0.2 mm) hairs and no sessile glands on the lower surface of costae and costules, and inframedial sori. But they are similar to other specimens in the stipe being relatively short and the lamina being longer than the stipe and gradually narrowed to base.

8. *Coryphopteris subnigra* (Brause) Holttum, Blumea **23**: 45, 1976; Fl. Males. 2, **1**(5): 369, 1981.

Central Seram (Manusela National Park): between Wae Anselu and Wae Huhu, 1300–2000 m, C-3501; between Goa (Cave) Pohon Damar and Gunung (Mt.) Roihelu, 1100–1500 m, C-5660, C-5672; between Hatumete and Hoale Pass, 600–1800 m, C-1293, C-1996, C-7717; between Maneoratu and Gunung (Mt.) Nusamutuwa,

700–1000 m, *C-14448*; between Hatumete and Gunung (Mt.) Hoale Besar, southern slope of Murkele Ridge, 1300–1800 m, *C-13586*, *C-14373bis*, 1600–1900 m, *C-12146*; trail (Jl. Lelesiru) from Piliana to Gunung (Mt.) Ohae, 900–1600 m, *C-12045*; trail (Jl. Pipileina) from Gunung (Mt.) Sinaunia to Piliana, 1000–2000 m, *C-12834bis*; between Wae Waule and Owaë Huhu, c. 1800 m, *Parris 11208*; above Wae Waule on trail from Kanikeh to Gunung (Mt.) Binaia summit, c. 1100 m, *Parris 11131*.

Habitat. On mossy ground in mossy forests.

Distribution. Seram (new record), Papua New Guinea, Misima I.

Plesioneuron Holttum

Blumea **22**: 232, 1975; *Allertonia* **1**: 186, 1977; *Fl. Males. ser. 2*, **1**(5): 397, 1981.

Distribution. N Borneo (1 sp.), Moluccas (2 spp.), Philippines (2 spp.), New Guinea (28 spp.), Pacific, to Tahiti (9 spp.) (Holttum, 1975a).

Note. This genus comprises 39 species, most of which are distributed in east Malesia, particularly New Guinea, and Pacific islands (Holttum, 1975a). Two species, *P. translucens* and *P. savaiense*, have been recorded from Ambon Island. Based on our collections I report here nine species from Seram Island and Ambon Island, all of our collections being new species and a new variety or new records to Seram

Key to the species

1. Stipe and rachis bearing more or less conspicuous dark short spines (bases of former scales); scales usually dense; sori exindusiate.
2. Pinnae to 5 × 1 cm, obtuse at apex; pinna-lobes concave beneath; stipe-scales to 4 mm long
..... 6. *P. pullei*
2. Pinnae ca. 20 × 2 cm, acuminate; pinna-lobes not concave beneath; stipe-scales 8 mm or more long
..... 3. *P. dryopteroides*
1. Stipe (except base) and rachis smooth; scales, if present, not spine-like, deciduous; sori indusiate or exindusiate.
3. Sori indusiate.
4. Basal basiscopic pinna-lobes conspicuously reduced; indusia large, firm, bullate, glabrous; sporangia glabrous or glandular 2. *P. attenuatum*
4. Basal basiscopic pinna-lobes not or slightly reduced; indusia small, not bullate, hairy; sporangia hairy.
5. Pinnae short-stalked 1. *P. altum*
5. Pinnae sessile 9. *P. translucens* var. *seramense* (var. nov.)
3. Sori exindusiate.
6. Sporangia not hairy; pneumatophores elongate at base of costae 5. *P. murkelense* (sp. nov.)
6. Sporangia hairy; pneumatophores lacking or small at base of costae.
7. Pinnae 1–3 pairs; pinna-like apical lamina relatively large 4. *P. fulgens*
7. Pinnae to 6 or more pairs; apical pinna pinna-like, not conspicuous.
8. Pinnae short-stalked; pinna-lobes on acroscopic and basiscopic sides oblique, subfalcate.
9. Pinnae 12–18 pairs 1. *P. altum*
9. Pinnae 4–6 pairs 8. *P. saxicola* (sp. nov.)
8. Pinnae sessile; at least acroscopic pinna-lobes patent, straight (exindusiate sori applicable to Seram plants) 7. *P. savaiense*

1. *Plesioneuron altum* (Brause) Holttum, *Blumea* **22**: 241, 1975; *Fl. Males. 2*, **1**(5): 404, 1981.

Indusiate form. Central Seram (Manusela National Park): Muselleinan Pass, ca. 1300 m, *C-14166*; between Hatumete and Gunung (Mt.) Hoale Besar, southern slope of Murkele Ridge, 500–1300 m, *C-14268*.

Habitat. On mossy ground in mossy forest or in limestone rock crevices in light shade.

Exindusiate form. Central Seram (Manusela National Park): between Gunung (Mt.) Eseli and Wae Mamahala on the southern slope of Gunung (Mt.) Kobipoto, 1000–1300 m, *C-1707*; between Hatumete and Hoale Pass, southern slope of Murkele Ridge, 600–1200 m, *C-1120*, *C-7434*; between Hunisi and Muselleinan Pass, 600–1300 m, *C-14058*.

Habitat. Epipetric on limestone cliff, often by stream or terrestrial hanging from steep slope along river.

Distribution. Seram (new record); Papua New Guinea.

Note. This is the second record of this species (which is only known from the type [Holttum, 1981]). Although the type from Papua New Guinea has fugacious indusia (Holttum, 1981), there occur indusiate and exindusiate forms on Seram Island, which are hardly distinguished otherwise. More collection is needed to taxonomically evaluate the variation of indusia in this species.

2. *Plesioneuron attenuatum* (Brack.) Holttum, *Blumea* **22**: 245, 1975; *Fl. Males. 2*, **1**(5): 407, 1981.

Central Seram: Hatu Kapal near Saunulu, 0–80 m, *C-12901*; between Elamata-Maluanaina and Kaloa, *C-4752*; Wae (River) Mika, Hatumete, ca. 150 m, *C-13853*; Manusela National Park, between Wolu and Batu Kokan, southern slope of Manusela Ridge, 0–450 m, *C-6563*. Ambon: along Wae (River) Lela, ca. 6 km N of Poka, 20–40 m, *A-9*, *A-109*.

Habitat. On limestone rocks by river or terrestrial in primary or disturbed lowland forests.

Distribution. Seram and Ambon (new record); from Tahiti to E. Malesia (New Guinea).

3. *Plesioneuron dryopteroideum* (Brause) Holttum var. ***dryopteroideum***; Holttum, *Blumea* **22**: 237, 1975; *Fl. Males. 2*, **1**(5): 401, 1981.

Central Seram (Manusela National Park): trail (Jl. Pipileina) from Gunung (Mt.) Sinaunia to Piliana, 2000–2200 m, *C-12821*.

Habitat. On mossy limestone cliff in light shade in mossy forest.

Distribution. Seram (new record); Eastern New Guinea.

Note. The specimen has scales ca. 8 mm long on the stipe and acicular hairs ca. 0.3 mm long on the lower surface of costae, costules and veins, so is referred to var. *dryopteroideum*. There is another variety, var. *buruense* Holttum, in the Moluccas (Buru Island) characterized by capitate hairs (Holttum, 1981).

4. *Plesioneuron fulgens* (Brause) Holttum, *Blumea* **22**: 238, 1975; *Fl. Males. 2*, **1**(5): 403, f. 1j, 1981.

Central Seram (Manusela National Park): between Wae (River) Mamahala and Solea via Gunung (Mt.) Kobipito summit, 1300–1500 m, *C-1914*; trail (Jl. Lelesiru) from Piliana to Gunung (Mt.) Ohae, southern slope of Murkele Ridge, 900–1600 m, *C-12075*.

Habitat. On limestone rocks in deep shade in mossy forest, or on rock in stream.

Distribution. Seram (new record); E. New Guinea.

Note. The rhizome is short-creeping with short internodes, rather thin (ca. 4 mm) and bears scales dull-brown, rigid, 4–5 × ca. 0.7 mm and acicular-hairy, while other species have short and thicker rhizomes.

5. *Plesioneuron murkelense* M. Kato, sp. nov. [Fig. 2]

Plesioneuron belense pneumatophoris elongatis, soris exindusiatis, subcostularis, sporangiis glabris simile, sed pinnis et pinnulis minoribus, rhachidi infra subglabris differt.



Fig. 2. *Plesioneuron murkelense*; holotype (Kato et al. C-14137). Bar in inset=10 mm.

Typus. Central Seram (Manusela National Park): Muselleinan Pass, ca. 1300 m, *M. Kato*, *K. Ueda* and *Z. Fanani* C-14137 (TI; iso BO, L).

Other specimens. Central Seram (Manusela National Park): Wae (River) Wasan Hotun and Kanikeh on the northern slope of Gunung (Mt.) Binaya, 600–1000 m, C-1606; between Goa (= Cave) Pohon Damar and Gunung (Mt.) Musisi summit, 1000–1300 m, C-5655; between Hatumete and Hoale Pass, southern slope of Murkele Ridge, 200–600 m, C-944.

Rhizome short-ascending or erect, to 8 cm tall. Scales dull-brown, rigid, thick, ca. 4×0.7 mm, hairy, hairs on scales 0.1–0.2 mm long. Petioles brown, 30–50 cm long, densely hairy on upper surface, hairs dark-brown, firm, 0.3–0.5 mm long, glabrous on lower surface. Lamina 30–40 cm long, 15–20 cm wide, not or slightly narrowed to base, coriaceous, pustular or more often not pustular on lower surface; pinnae 7–13 pairs, terminal pinnae larger than laterals in small fronds, smaller in large fronds, lateral pinnae all subequal or upper ones shorter, 8–12 cm long, 1.4–2.2 cm wide, linear-oblong, falcate, acuminate or subcaudate, short-stalked, stalk 1.5–3 mm long, lobed to ca. 1.5 mm from costa, bearing pneumatophores to 1 mm long at base of costae; pinna-lobes oblong, 3–4 mm wide, 0.3–1 mm apart, more or less oblique, subfalcate, obtuse, entire. Rachis densely hairy on upper surface, hairs similar to those on stipe, glabrous on lower surface; costae similarly hairy on upper surface, glabrous on lower surface; veins obviously visible, 10–16 pairs, simple. Sori subcostular, exindusiate; sporangia not hairy.

Habitat. Epipetric on mossy limestone rocks in ravines, sometimes by stream.

Note. On Seram and Ambon there are three indusiate species, *P. altum* (indusiate form), *P. attenuatum* and *P. translucens*. Among the other six exindusiate species, this new species differs from *P. dryopteroides* and *P. pullei* in the stipe being nearly glabrous and smooth, and from the remaining species in the glabrous sporangia and prominent pneumatophores. The species is similar to *P. belense* known from West New Guinea

in the elongate pneumatophores, exindusiate, subcostular sori and glabrous sporangia, but differs from it in the pinnae and pinnules being a little smaller and the rachis subglabrous on the lower surface.

6. *Plesioneuron pullei* Holttum, Blumea 22: 236, 1975; Fl. Males. 2, 1(5): 399, 1981.

Central Seram (Manusela National Park): between Wae (River) Huhu and Gunung (Mt.) Owae Puku, 2600–2800 m, C-1532, C-3801.

Habitat. Terrestrial on limestone-rocky slope near mountain ridge in light shade in sparse mossy forest.

Distribution. Seram (new record); New Guinea.

Note. This species is easily distinguished from the congeners of Seram (and also in the whole genus) by the concave pinna-lobes, which, along with dense hairs on the lower surface, may be an adaptation to a dry environment of high mountain ridges.

7. *Plesioneuron savaiense* (Bak.) Holttum, Blumea 22: 240, 1975; Fl. Males. 2, 1(5): 404, f. 9g–i, 1981.

Central Seram (Manusela National Park): between Gunung (Mt.) Eseli and Wae (River) Mamahala, southern slope of Gunung (Mt.) Kopipoto, 1000–1400 m, C-1739; between Wolu and Batu Kokan southern slope of Manusela Ridge, 400–1000 m, C-6835; between Wae (River) Niniyoa and Wae Puo, 200–1000 m, C-5040; between Wae (River) Puo and Kali (River) Ili, C-5340; between Kali (River) Ili and Goa Pohon Damar, 800–1100 m, C-5610; between Goa (= Cave) Pohon Damar and Gunung (Mt.) Musisi summit, 1000–1300 m, C-5697; above Piliiana on southern slope of Murkele Ridge, 700–1200 m, C-910, C-1037; between Hatumete and Hoale Pass, 600–1800 m, C-7726, 500–1300 m, C-1120bis, C-14326.

Habitat. Terrestrial on slope in lower montane forests, or rarely epipetric.

Distribution. Seram (new record); Samoa, New Hebrides, New Guinea, Philippines, Moluc-

cas (Batjan, Tidore, Ambon).

Note. All specimens from Seram, like those from Batjan and Ambon (Holttum, 1981), are exindusiate.

8. *Plesioneuron saxicola* M. Kato, sp. nov.

[Fig. 3]

Plesioneuron alti soris exindusiatis, sporangiis pilosis, pinnis brevipetiolatis simile, sed pinnae 4–6-jugatis differt.

Typus. Central Seram (Manusela National Park): trail (Jl. Pipileina) from Piliana to Gunung (Mt.) Sinaunia, southern slope of Murkele Ridge, 400–1400 m, *M. Kato*, *K. Ueda* and *Z. Fanani C-14047* (TI; iso BO).

Other specimens. Central Seram (Manusela National Park): trail (Jl. Pipileina) from Piliana to Gunung (Mt.) Sinaunia, southern slope of Murkele Ridge, 400–1400 m, *C-12424*; between Hunisi and Muselleinan Pass, 600–1300 m, *C-12875*.

Rhizome short-ascending. Scales dull-brown, rigid, thick in basal portion, ca. 7×1 mm, hairy, hairs on scales less than 0.1 mm long. Petioles brown, 13–20 cm long, densely hairy on upper surface, hairs dark-brown, firm, 0.1–0.2 mm long, glabrous on lower surface. Lamina 18–23 cm long, 9–11 cm wide, hardly narrowed to base, coriaceous, pustular on lower surface; pinnae 4–6 pairs with terminal pinnae conforming to and slightly larger than laterals, all subequal, 6–7 cm long, 1.1–1.6 cm wide, oblong, falcate, acuminate, short-stalked, stalk 1–1.5 mm long, lobed to 1.5–2 mm from costa, sometimes bearing pneumatophores ca. 0.8 mm long (*C-12875*); pinna-lobes oblong, 3–4 mm wide, more or less oblique, obtuse, entire. Rachis densely hairy on upper surface, hairs similar to those on stipe, glabrous on lower surface; costae glabrous on both surfaces; veins obviously visible, 8–10 pairs, simple. Sori subcostular, exindusiate; sporangia bearing acicular hairs 0.2–0.3 mm long.

Habitat. Epipetric on mossy limestone rocks in ravines, sometimes by stream.

Note. This is similar to *P. altum* in the exindusiate sori, hairy sporangia and shortly-stalked

pinnae, but differs in the smaller fronds with fewer, 4–6 pairs of pinnae. It is one of seven limestone-lithophytes of totally nine species of Seram, which is geologically widely covered by limestone formations and where limestone cliffs and rocks are common and abundant.

9. *Plesioneuron translucens* Holttum (Blumea 22: 240, 1975) var. *translucens*

Distribution. Ambon (only known from the type).

var. *seramense* M. Kato, var. nov. [Fig. 4]

A typo rachichidi, costis, costulis sparsim capitato-pilosis differt.

Typus. Central Seram (Manusela National Park): between Wae (River) Mua and Gunung (Mt.) Mapahuwe, southern slope of Murkele Ridge, near Saunulu, 200–900 m, *M. Kato*, *K. Ueda* & *Z. Fanani C-11636* (TI; iso BO, L).

Other specimens. Central Seram (Manusela National Park): between Wae (River) Niniyoa and Wae Puo, 200–1000 m, *C-5069*; between Goa (Cave) Pohon Damar and Gunung (Mt.) Musisi summit, 1000–1300 m, *C-5370*; between Wae (River) Mua and Gunung (Mt.) Mapahuwe, southern slope of Murkele Ridge, near Saunulu, 900–1000 m, *C-11570*; above Piliana on southern slope of Murkele Ridge, *C-910bis*; above Piliana, southern slope of Murkele Ridge, 700–1200 m, *C-1018*; N of Kanikeh, ca. 600 m, *C-2967*; between Kanikeh and Selumena, 600–800 m, *C-4106*; Muslleinan Pass, ca. 1300 m, *C-14132*; between Hatumete and Gunung (Mt.) Hoale Besar, 500–1300 m, *C-14324*; trail (Jl. Lelesiru) from Piliana to Gunung (Mt.) Ohae, 900–1600 m, *C-12117*; between Hunisi and Muselleinan Pass, 600–1300 m, *C-14097*.

Rhizome short-ascending. Scales dark-brown, rigid, subulate, $10\text{--}15 \times 1\text{--}1.5$ mm, hairy, hairs on scale surface very short. Stipe dull-brown, 30–60 cm long, glabrous. Lamina 40–60 cm long, 20–26 cm wide, hardly narrowed to base, abruptly narrowed to terminal pinna somewhat similar to lateral pinnae, smaller than them, coriaceous, pustular on lower surface; pinnae 10–12 pairs, lowest with unequally reduced basal pinna-lobes,



Fig. 3. *Plesioneuron saxicola*; holotype (Kato et al. C-14137). Bar in inset=5 mm.

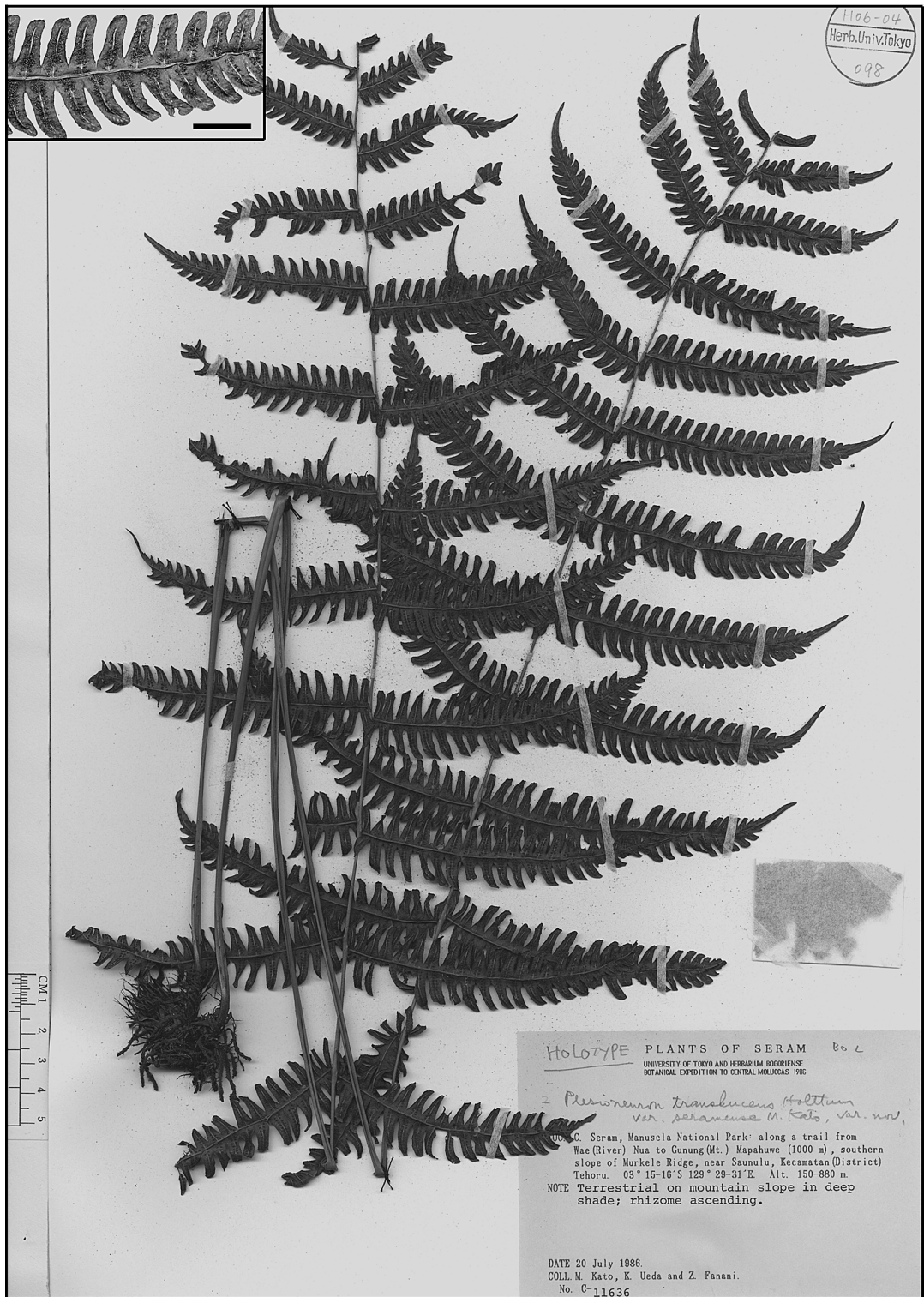


Fig. 4. *Plesioneuron translucens* var. *seramense*; holotype (Kato et al. C-11636). Bar in inset=10 mm.

basal acroscopic lobes 10–12 mm long, basal basiscopic lobes 5–7 mm long; longest pinnae below middle of lamina, 10–15 cm long, 2.5–3 cm wide, oblong, often falcate, acuminate, sessile, lobed to 1.5–2 mm from costa, bearing short pneumatophores; pinna-lobes oblong, 4–5.5 mm wide, 1.5–2 mm apart, more or less oblique, obtuse, entire or weakly undulate, 1–1.5 mm apart. Rachis densely hairy on upper surface, hairs 1–1.3 mm long, pale or brown, sparsely bearing short capitate hairs or subglabrous on lower surface; costae bearing hairs ca. 0.5 mm long on upper surface, bearing sparse short capitate hairs or subglabrous on lower surface; veins 12–15 pairs, simple. Sori costular, indusiate; indusia small, caducous, bearing hairs 0.3–0.5 mm long; sporangia bearing acicular hairs 0.3–0.5 mm long.

Habitat. Terrestrial on mountain slope in lower montane forests; common in central Seram.

Note. *Plesioneuron translucens* was described as a new species in a taxonomic revision of the genus *Plesioneuron* (Holttum, 1975a), but is not seen in the treatment of the Malesian flora (Holttum, 1981). Var. *seramensis* differs from var. *translucens* in the rachis, costae and costules bearing very sparse capitate hairs on the lower surface and the firm coriaceous fronds. In var. *translucens* the capitate hairs wholly cover the lower surface of the rachis, costae and costules and the young frond is thin and translucent (possibly due to juvenile fronds). From indusiate plants of *P. savaiense* outside the Moluccas, this species is distinguished by the larger pinnae (vs. 10–12 × 2–2.5 cm in *P. savaiense*) and the subglabrous rachis, costae and costules. It also differs from *P. altum* in the sessile pinnae.

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