

Taxonomic studies of Asiatic species of Aneuraceae (Hepaticae). IV. *Lobatiriccardia lobata* (Schiffn.) Furuki

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Abstract *Lobatiriccardia lobata* (Schiffn.) Furuki is redescribed, illustrated and discussed for the southeast Asian plant. The four taxa, *Aneura coronopus*, *A. kowaldiana*, *A. lobata* var. *angustisecta* and *A. lobata* fo. *papulosa* are reduced to synonyms.

Kew word: Hepaticae, Aneuraceae, *Lobatiriccardia lobata*.

Riccardia lobata was originally described by Schiffner (1989) from Java and Sumatra, then Furuki (1991) proposed a new genus *Lobatiriccardia* for this species and several others. *Lobatiriccardia lobata* (Schiffn.) Furuki has a wide range of distribution in tropical southeast Asia and Australasia. The variation in size and shape of the thallus in New Zealand has been discussed by Schuster (1964, 1985) and Brown (1989), and Schuster (1985) separated New Zealand plants of *L. lobata* from Asian ones as subspecies *L. lobata* subsp. *australis* Schust. During the course of monographic studies on Asian Aneuraceae, some superfluous name for *L. lobata* were found and four taxa are treated as synonyms of *L. lobata* below.

Lobatiriccardia lobata (Schiffn.) Furuki
(Figs. 1–28)

Lobatiriccardia lobata (Schiffn.) Furuki, J. Hattori Bot. Lab. (70): 319 (1991) = *Riccardia lobata* Schiffn., Denkschr. Math.-Nat. Cl. Akad. Kais. Wiss. Wein 67: 178 (1898) = *Aneura lobata* (Schiffn.) Steph., Spec. Hepat. 1: 271 (1899) = *Trichostylium lobata* (Schiffn.) Schust., Bryologist 61: 53 (1958). Type: Java, Prov. Batavia, in monte Salak, Schiffner 245-syntype (PR!, PRC!, W!), 247-syntype (JE!), 248-syntype (L!, W!).

Aneura pinguis (L.) Dum. var. *pinnatiloba* Schiffn., Nova Acta K. L. Deutsch. Akad. Naturf. 60: 274 (1893). Type: Java, Sudseite

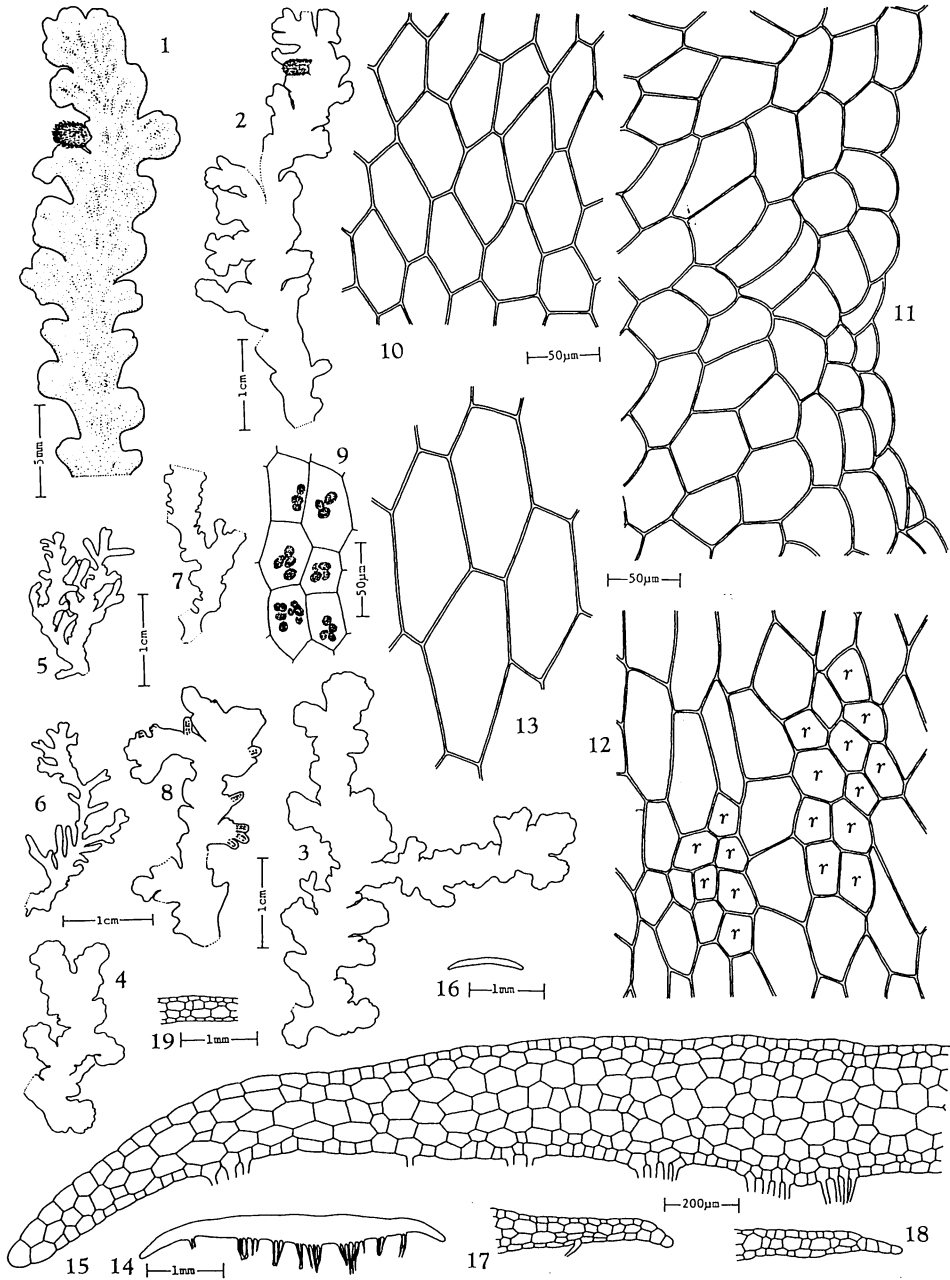
des Pangerango, Karsten-holotype (n.v.).
Aneura coronopus De Not. in Steph., Hedwigia 32: 19 (1893), syn. nov. Type: Borne, Beccari, s.n.-holotype (G! 24124).

Aneura kowaldiana Steph., Spec. Hepat. 1: 255 (1899), not *Riccardia kowaldiana* sensu Hewson, Proc. Linn. Soc. NSW. 95: 99 (1970), syn. nov. Type: New Guinea, Mt. Yule, Kowald 123-holotype (G! 12060), isotype (JE!).

Aneura lobata var. *angustisecta* Herz., Mitt. Inst. Allg. Botanik Hamburg 7: 184 (1931), syn. nov. Type: West-Borneo, Winkler 3343-holotype (JE!).

Aneura lobata forma *papulosa* Herz., Mitt. Inst. Allg. Botanik Hamburg 7: 184 (1931), syn. nov. Type: West-Borneo, Winkler 3331-holotype (JE!).

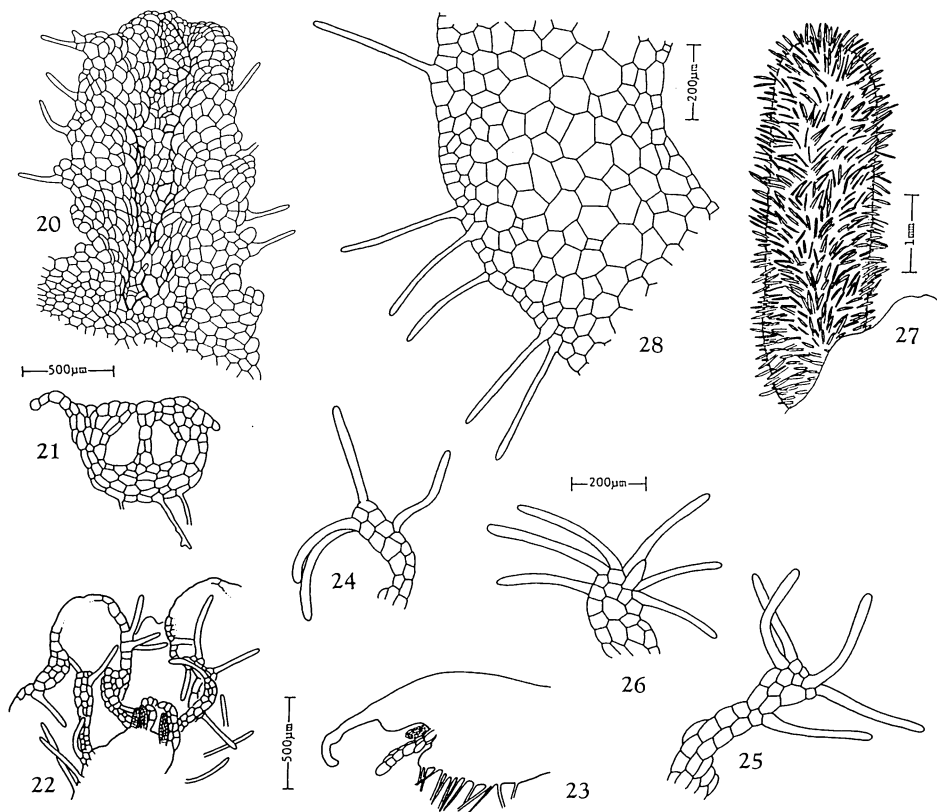
Anatomy. Thalli large, dark brown when dry, pinnately to bipinnately branched, bifid at apices, wrinkle-surfaced in appearance, mammilose and incurved with 2–4 cells wide unistratose alar along margin. Main axes 1–10 cm long, 0.5–4 mm wide, 8–12 cells (250–400 μm) thick. Pinnae to 5 mm long, 1–4 mm wide, 4–8 cells (75–300 μm) thick. Epidermal cells and marginal cells of thallus thin-walled, 25–35 \times 35–100 μm , 1/3–1/2 of the inner cells in size. Inner cells 50–80 \times 125–200 μm . Oil bodies in all epidermal and inner cells, ovoidal, brown, consist of minute grobules; (1)3–15 in each epidermal cell, 2.5–10 \times 5–12.5 μm ; 10–20 in each



Figs. 1-19. *Lobatirricardia lobata* (Schiffn.) Furuki. 1-8: Plants. 9-10: Dorsal epidermal cells of median part of thallus; 9 with oil bodies. 11: Marginal cells of main axis. 12: Ventral epidermal cells of median part of main axis; r shows rhizoid. 13: Inner cells of median part of main axis. 14, 15: Cross-sections of main axis. 16-18: Cross-sections of pinnae. 19: Longitudinal section of pinnae. 1, 2, 10, 11 were drawn from Schiffner 248 (W); 3, 12-15 from Schiffner 245 (W); 4 from Winkler 3331 (JE); 5, 6, 16-19 from Winkler 3343 (JE); 7 from Beccari, s.n. (G); 8 from Mizutani 3608 (NICH); 9 from Akiyama 10382 (KYO).

inner cell, 5-15×7.5-20 µm. Rhizoids numerous all over ventral surface, lacking only along margin. Gemmae unknown.

Dioicous. Male branches short, lateral on main axis or pinnae, having antheridial chamber on dorsal surface in 2 regular rows, 450-



Figs. 20–28. *Lobatiriccardia lobata* (Schiffn.) Furuki. 20, 21: Male branches; 21 cross-section. 22, 23: Female branches; 23, longitudinal section. 24–26: Paraphyses. 27, 28: Calyptrae; 28, cross-section. 22–25 were drawn from Schiffner 245 (W); 26 from Winkler 3343 (JE); 20, 21, 27, 28 from Mizutani 3608 (NICH).

600 μm thick, 800–1500 μm wide; aperture 50–100 μm in diam., 2–4 cells between apertures; margin ciliate with unicellular hairs; hairs 250–300 μm long. Female branches mound-like, situating at lateral notches of thallus. Paraphyses clavate with unicellular hairs; hairs 300–400 μm long. Calyptrae to 6 mm long, 1.5–2 mm wide, covered with unicellular hairs all over the surface, 10–15 cells (500–600 μm) thick in cross-section; hairs to 300–400 μm long.

Setae 12–14 cells in cross section. Spore 14–16 μm in diam. Thickenings of the outer cell-layer of capsule on the adaxial and abaxial radial walls and the inner tangential walls. Thickenings of the inner cell-layer of capsule on the adaxial and abaxial radial walls and the inner tangential walls.

Distribution range. Philippines, Malaysia, Indonesia and Papua New Guinea. Subsp. *australis* Schust. in New Zealand. Stephani (1900)

and Hürlimann (1976) also reported this species from New Caledonia.

Selected specimens examined. LUZON. Iwatsuki and Sharp, 13717, 16125, 16384, 17168 (NICH). NEGROS. Edano 15821 (L). MALAY PEN. Genting Higlands, Furuki 12647 (CBM). Cameron Highlands, Furuki 12620, 12621 (CBM). BORNEO. Sabah. Mizutani 3028, 3281, 3603, 3608, 3616, 3625, 3649 (NICH); Meijer B 10999, B12069, B12079, B12640 (L). Sarawak. Winkler 3344, 3368 (JE); P. W. R. I. II 32 (NICH); Beccari 16 (L). Kalimantan. Shea 29083 (L). SUMATARA. Wijk 1698 (L). JAVA. Holle, s.n. (L); Sande Lacoste, s.n. (L); Nyman, s.n. (W); Meijer 3471 (L), Meijer, s.n. (JE); van Steenis 12417 (L). SERAM. Akiyama 10201, 10382 (KYO). NEW GUINEA. Epomek-Tal, Hiepko and Schultze-Motel 2460/c (JE); Mt. Antares, van Zanten 269 (JE), 373/b (JE).

Remarks. This species is characterized by (1)

a mammilose margin of the thallus, (2) a ciliate margin of male branches with unicellular hairs, (3) ciliate paraphyses with unicellular hairs at the apex, (4) calyptrae covered with unicellular hairs.

The unicellular hairs along the margins of male branches, at the apices of paraphyses and on the surfaces of calyptrae are very conspicuous and useful for distinguishing this species from the other species of the genus.

The species most similar to *Lobatiriccardia lobata* is *L. alterniloba* (Hook. f. et Tayl.) Furuki, which is distributed in New Zealand, Tasmania and Australia. In *L. alterniloba*, the margins of the thallus and male branches are denticulate, and the paraphyses lack unicellular hairs.

L. lobata is also closely related to *L. yakusimensis*. The differences between *L. lobata* and *L. yakusimensis* were discussed in detail by Furuki (1991).

Discussion

Aneura kowaldiana was described by Stephani (1899), and Hewson (1970) transferred this species to the genus *Riccardia*. Hewson (1970) described the margin of the thallus of *Riccardia kowaldiana* as recurved. According to my examination of the holotype and isotype of *R. kowaldiana*, the mammilose margin of the thallus is incurved. Moreover the type specimens of *R. kowaldiana* have numerous rhizoids all over the ventral surface of the thallus. These characteristics suggest that the type specimens of *R. kowaldiana* are conspecific with *L. lobata*.

However the species concept of *Riccardia kowaldiana* treated by Hewson (1970) belongs to that of the genus *Riccardia*, and does not agree with that of *L. lobata* treated here. I will treat the taxonomic status of *R. kowaldiana* sensu Hewson in another paper.

Schuster (1964, 1985) separated the New Zealand plants of *Lobatiriccardia lobata* as subsp. *australis* Schust. from Asian ones by the following differences: (1) thickness of the thallus (10–15 cells in New Zealand plants vs. 8–11 cells in Japanese plants), (2) number of oil bodies per cell (5–10(12) per cell in New Zealand plants vs. 3–8 in Japanese plants), (3) spore size (16.5–19 μm in New Zealand plants vs. 12–16 μm in Indonesian plants), (4) calyptra size

(2×8–12 mm in New Zealand plants vs. 1.5×5 mm in Indonesian plants), and (5) seta thickness (14–16 cells wide vs. 12–13 cells for Indonesian plants). Among these differences, the former two were compared with those of Japanese plants. The Japanese plants mentioned by Schuster were distinguished from *L. lobata* by Furuki (1991) as a species *L. yakusimensis*. The number of oil bodies of *L. lobata* subsp. *lobata* on Seram Isl. is (1)3–15 in each epidermal cell and 10–20 in each inner cell, and nearly the same as that for the subsp. *australis*. However, the number of cells in a cross-section of the thallus in subsp. *lobata* is less than that of subsp. *australis*. The New Zealand plants may be distinguished from the Asian ones by the size of the calyptrae and spores in accordance with Schuster (1964, 1985). Biochemical investigations will be needed to clarify the relationships between subspecies.

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アジア産スジゴケ科の分類学的研究 IV.
ヤワラゴケ

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東南アジアに産するヤワラゴケ *Lobatirricardia*

lobata (Schiffn.) Furuki について分類学的に研究し、*Aneura coronopus* De Not. 及び *A. kowaldiana* Steph., *A. lobata* var. *angustisecta* Herz., *A. lobata* forma *papulosa* Herz. を本種の異名とした。