

Studies on the Bryophyte Flora of Vanuatu. 2. Calymperaceae (Musci)

Len ELLIS¹

This paper deals with taxa of the family Calymperaceae occurring in Vanuatu, with particular reference to collections made by Dr. M. Higuchi in 1996, and by Mr. K. Sugimura in 1997.

CALYMPERACEAE

Higuchi (1996) lists five genera and 23 species in the family Calymperaceae as occurring in Vanuatu. A further six species are recorded by Streimann and Reese (2001). Some taxa have been lost to the flora owing to taxonomic revision, but determination of the recent collections detailed below has added six species to the inventory. These new records include *Calymperes afzelii* Sw., *Calymperes boulayi* Besch., *Exostratum blumei* (Hampe) L. T. Ellis, *Exodictyon incrassatum* (Mitt.) Cardot ex Paris, *Mitthyridium luteum* (Mitt.) H. Rob., and *Syrrhopodon croceus* Mitt. Following Higuchi (1996) with regard to the classification of genera within families, the Calymperaceae recorded for Vanuatu presently includes 32 species in seven genera.

Key to the genera of Calymperaceae in Vanuatu

- 1 Costa composed of large, thin-walled hyaline cells and small, thick-walled chlorophyllose cells; leaf lacking extensive, continuous chlorophyllose lamina.....2
Costa usually largely composed of stereids with a median layer of guide cells and/or distal part of leaf with extensive, continuous, unistratose chlorophyllose lamina5
- 2 Surface of costa formed solely by hyaline cells, chlorophyllose cells of costa internal.....3
Surface of costa formed by chlorophyllose cells, or both chlorophyllose and hyaline cells.....4
- 3 Costa in cross-section with chlorophyllose cells forming a single layer between dorsal and ventral bands of hyaline cells**Octoblepharum*
Costa in cross-section with chlorophyllose cells forming three layers (dorsal, median and ventral) within a framework of hyaline cells*Arthrocnemum*
- 4 Surface of costa formed by small, thick-walled chlorophyllose cells lying in a network between large hyaline cells*Exodictyon*
Surface of costa formed by a continuous layer of thick-walled chlorophyllose cells ...*Exostratum*
- 5 Shoots prostrate, creeping, usually with short, erect branches.....*Mitthyridium*
Shoots erect, branched or simple.....6
- 6 Margin of hyaline lamina in the leaf base formed by a narrow rib of thick-walled, linear cells*Syrrhopodon*

¹Department of Botany, The Natural History Museum, Cromwell Road, London, SW7 5BD, U.K.

Margin of hyaline lamina in leaf base formed by subrectangular to irregularly polygonal, thin-walled hyaline cells (a rib of thick-walled linear cells intramarginal or lacking), or margin of hyaline lamina formed by broad band of shortly rectangular, chlorophyllose cells with walls thickened at angles.....*Calymperes*

**Leucophanes* and *Leucobryum* (in this series of papers included in the family Leucobryaceae) may key out with *Octoblepharum*. The latter can be distinguished from *Leucobryum* by its rather flattened, broadly rounded leaf apices. In *Leucobryum* the leaves have acute-subacute apices. *Leucophanes* is unique in having a narrow longitudinal rib of stereids immersed within the largely hyaline costa.

1. *Arthrocormus schimperi* Dozy & Molck., Musci frond. ined. Archip. indici: 75 (1846).

Specimen examined. Espiritu Santo Isl., Butmas, 510 m alt., Oct. 23, 1997 (Sugimura 1707).

Distribution. Sri Lanka, Malay Peninsula, Indonesia, Philippines, Australia, Oceania.

Notes. The leaves in this species are arranged on the shoot in 3 neat ranks. They consist of a thick subula extending from a subelliptical hyaline base. The subula is usually broken off at the apex, and uniquely, is composed of several layers of large empty hyaline cells that support three internal unistratose networks (dorsal, ventral and a median) of small chlorophyllose cells. Throughout its Indo-Pacific range, *Arthrocormus schimperi* is often a common component of corticolous moss communities, especially in lowland tropical rainforest. However, the specimen examined here (Sugimura 1707) was collected in lower montane forest at 510 m alt.

2. *Calymperes afzelii* Sw., Jahrb. Gewachsk. 1: 3 (1818).

Specimens examined. Espiritu Santo Isl., Matantas, ca. 2 m alt., Nov. 18, 1996 (Higuchi 31943 pro parte; 31948 pro parte).

Distribution. Pantropical. New to Vanuatu.

Notes. Leaves in *C. afzelii* are lingulate, with a distal, chlorophyllose limb that has a thickened, polystratose, denticulate margin. The distinct proximal region of the leaf is largely composed of thin-walled hyaline cells and possesses a narrow intramarginal unistratose rib composed of thick-walled linear cells. Here, the margin is formed by a unistratose band of thin-walled, subquadrate to shortly subrectangular hyaline cells, 3- >5 cells wide. Some leaves on most shoots in this species possess specially modified gemmiferous leaves. These produce a linear proboscis at the leaf apex, and gemmae are produced from the ventral surface at its tip.

Many features of *C. afzelii* resemble those of the more robust species *Calymperes taitense* (Sull.) Mitt., which also occurs in Vanuatu. However, the costa in leaves of *C. taitense* is smooth, and in cross-section, is seen to incorporate two rows of guide cells. In *C. afzelii*, the leaves have scabrous costae, and incorporate a single row of guide cells.

The two specimens representing this first record of *C. afzelii* in Vanuatu were collected from tree trunks and occurred in association with *Calymperes graeffeanum* Müll.Hal.

3. *Calymperes boulayi* Besch., Ann. Sci. Nat. Bot. sér. 8, 1: 278 (1895).

Specimens examined. Espiritu Santo Isl., Mt. Vutimele - Peavot, 300 m alt., Nov. 26, 1996 (Higuchi 32317); Peavot, 300 m alt., Nov. 27, 1996 (Higuchi 32321 pro parte; 32324; 32351). Efate Isl., 10 km

east of Port Vila, 5 m alt., 27, Oct. 1996 (Higuchi 31435).

Distribution. Sri Lanka, Nicobar Islands, Thailand, Malay Peninsula, Sumatra, Java, Borneo, Sulawesi, Moluccas, Irian Jaya, Papua New Guinea, Bismarck Archipelago, Solomon Islands, Micronesia, Gilbert's, Tuvalu, Samoa. New to Vanuatu.

Notes. The costa in leaves of *C. boulayi* is unusual in *Calymperes*, in having an inflated appearance, and in cross-section is seen to be largely composed of hyaline cells rather than stereids. Also unusual, the margin of the chlorophyllose lamina is undifferentiated and unistratose. This species has strongly dimorphic leaves, gemmiferous and nongemmiferous. Nongemmiferous leaves are up to 3.5 mm long, lingulate and spreading, while gemmiferous leaves are about 4 mm long, linear and erect with cowl-shaped apices cupping the gemmae.

Within its Indo-Pacific distribution *C. boulayi* is widespread and common. Its newly discovered presence in Vanuatu is not unexpected. The specimens cited above occurred at low altitude on a wide variety of substrates, including soil, boulders, decaying logs, and the trunks and roots of trees.

4. *Calymperes crassinerve* (Mitt.) A.Jaeger, Gen spec. musc. 1: 329 (1873).

Specimen examined. Espiritu Santo Isl., Tangoa, 20 m alt., Oct. 12, 1997 (Sugimura 1457).

Distribution. Malay Peninsula, Java, Borneo, Oceania, Australia

Notes. *Calymperes crassinerve* is distinguished by its possession of tiny lingulate leaves (1–2 mm long) that fold ventrally in upon themselves when dry. Many leaves have modified, cowl-shaped, gemmae-bearing apices. The material examined here (Sugimura 1457) was collected from an exposed root and has the typical habit of small, erect shoots closely packed into a thin, rough mat.

5. *Calymperes graeffeanum* Müll.Hal., J. Mus. Godeffroy 3 (6): 64 (1874).

Specimens examined. Espiritu Santo Isl., Tangoa, 20 m alt., Oct. 12, 1997 (Sugimura 1454). Efate Isl., Nagar Resort (northern part of Efate Isl.), 2 m alt., Oct. 27, 1996 (Higuchi 31438); Port Vila, Irikeri Isl., 5 m alt., Dec. 8, 1996 (Higuchi 32365).

Distribution. Cameroon, Seychelles, Chagos Archipelago, Rodrigues, India, Sri Lanka, Andaman Islands, Nicobar Islands, China, Thailand, Malay Peninsula, Sumatra, Java, Borneo, Moluccas, Philippines, New Guinea, Solomon Islands, Australia, Micronesia, Tuvalu, Vanuatu, Samoa, Society Islands, Tuamotu Islands, Pitcairn Island.

Notes. *Calymperes graeffeanum* has similar dimensions and appearance to *Calymperes boulayi* Besch. Both species have broadly to narrowly lingulate, dimorphic leaves (gemmiferous and nongemmiferous). Unlike *C. boulayi*, the leaves in *C. graeffeanum* usually possess a polystratose, denticulate marginal rib and a costa incorporating stereids. Apart from a strange absence of records between West Africa and the Seychelles, this species appears to occur relatively frequently throughout its Palaeotropical distribution.

As in most collections of *C. graeffeanum*, those from Vanuatu examined here (Higuchi 31438, 32365, Sugimura 1454) have abundant gemmiferous leaves, but lack sporophytes.

6. *Calymperes serratum* A.Braun ex Müll.Hal., Syn. musc. frond. 1: 527 (1849).

Specimens examined. Espiritu Santo Isl., Mt. Tabwemasana, 1000 m alt., Nov. 8, 1996 (Higuchi 31520, 31836).

Distribution. China, Thailand, Malay Peninsula, Philippines, Sumatra, Java, Borneo, New Guinea,

Solomon Islands, Australia, New Ireland, New Caledonia, Vanuatu, Fiji, Samoa.

Notes. *Calymperes serratum* is a corticolous species with long, strap-shaped leaves (often > 20 mm long) set on a very short to virtually undetectable stem. As yet, *C. serratum* is the sole representative of the long-leafed species of *Calymperes* recorded in Vanuatu. Other species within the genus with a similar growth form, such as *Calymperes lonchophyllum*, have an abrupt transition between the hyaline lamina of the leaf base and the chlorophyllose lamina above. In leaves of *C. serratum*, this transition from hyaline to chlorophyllose lamina is gradual.

The material examined here (Higuchi 31836), possesses sporophytes typical of *Calymperes*. The long cylindrical capsules lack a peristome and, enclosed within a persistent calyptra, have the appearance of a rolled umbrella. Spore dispersal is effected by way of longitudinal slits in the calyptra.

7. *Calymperes tenerum* Müll.Hal., *Linnaea* 37: 174 (1872).

Specimens examined. Espiritu Santo Isl., Luganville, 5 m alt., Oct. 31, 1996 (Higuchi 31447); Kerepua - Mt Tabwemasana, 200 m alt., Nov. 4, 1996 (Higuchi 31478); Tangoa, 20 m alt., Oct. 12, 1997 (Sugimura 1456). Efate Isl., Port Vila, Iririki Isl., 5 m alt., Dec. 8, 1996 (Higuchi 32360, 32367); Erakor Isl., 3 m alt., Oct. 4, 1997 (Sugimura 1422).

Distribution. Pantropical.

Notes. *C. tenerum* has shortly lingulate leaves in which the margin of the hyaline lamina in the leaf base is formed by a broad band of shortly rectangular chlorophyllose cells with walls thickened at the corners. Most leaves in *C. tenerum* have an excurrent costa and are often gemmiferous. Gemmae are produced from all around the costal apex, characteristically forming a tiny, pale green ball on the leaf tip. Confusingly, *Calymperes motleyi* (recorded for Vanuatu by Streimann and Reese (2001)) has leaves in which the basal margin is identical to that in *C. tenerum*. However, leaves in *C. motleyi* are more obviously dimorphic. Some are nongemmiferous and have a plane, broadly acute apex, while others are gemmae bearing. In the latter, the lamina abruptly narrows into the leaf apex and forms a narrow border around the tip of the costa. Gemmae are produced from the ventral surface of the costal tip.

The six collections of *C. tenerum* examined here were corticolous, one (Sugimura 1456) included sporophytes, another (Sugimura 1422) occurred in association with *Calymperes graeffeanum*.

8. *Exodictyon incrassatum* (Mitt.) Cardot ex Paris, *Index bryol. Suppl.* 154 (1900).

Specimens examined. Espiritu Santo Isl., Peavot - Mt. Vutimele (40 km north of Mt. Tabwemasana), 600 m alt., Nov. 21, 1996 (Higuchi 31981); 650 m alt., Nov. 21, 1996 (Higuchi 31987); Mt. Vutimele (40 km north of Mt. Tabwemasana), 1100 m alt., Nov. 25, 1996 (Higuchi 32288); Along Pialapa River, 240 m alt., Oct. 15, 1997 (Sugimura 1495); 560 m alt., Oct. 19, 1997 (Sugimura 1676); Butmas, 560 m alt., Oct. 23, 1997 (Sugimura 1739).

Distribution. New Guinea, Bismarck Archipelago, Solomon Islands, Samoa. New to Vanuatu.

Notes. *E. incrassatum* has erect to recurved leaves with a subelliptical, semisheathing basal region that narrows into a thick subula with an obtuse, rounded apex. A terete, polystratose rib of hyaline and chlorophyllose cells forms the leaf margin.

This species is closely related to *Exodictyon dentatum*, which also occurs in Vanuatu. In *E. dentatum* the leaf apices are acute, and the marginal rib at the shoulders of the leaf are flattened and often unistratose towards their outer edge.

The six specimens of *E. incrassatum* examined here were collected from a variety of substrates,

including rotting logs, tree trunks and humus. These new records of *E. incrassatum* in Vanuatu represent a southerly extension of its narrow Malesian-Pacific range.

9. *Exostratum blumei* (Hampe) L.T.Ellis, *Lindbergia* 11: 25 (1985).

Specimen examined. Espiritu Santo Isl., Mt. Vutimele (40 km north of Mt. Tabwemasana), 1100 m alt., Nov. 25, 1996 (Higuchi 32254).

Distribution. India, Sri Lanka, North Vietnam, Thailand, Malay Peninsula, West Sumatra, Java, Borneo, Sulawesi, Moluccas, Taiwan, Batan Islands, Philippines, New Guinea, Australia, Fiji, Samoa, Tahiti. New to Vanuatu.

Notes. *Exostratum blumei* is the most widespread species of the genus, and superficially resembles *Exostratum asperum* (Mitt.) L.T.Ellis, also recorded in Vanuatu. The leaves of *E. blumei* consist of a slender subula that extends from a narrowly subelliptical semisheathing base. The surface of the subula is scabrid with short, simple, acute projections. At the shoulders of the leaf (adjacent to the distal leaf base) the margin supports a row of short spines. In *E. asperum* the subula is rough with coronate-papillose projections, and the margins at the shoulders of the leaves are papillose, lacking spines. *Exostratum blumei* is common throughout most of its Indo-Pacific range. The new record in Vanuatu (Higuchi 32254) was collected in association with *Syrrhopodon perarmatus* from the trunk of a palm tree.

10. *Mitthyridium fasciculatum* (Hook. & Grev.) H.Rob., *Phytologia* 32: 43 (1975).

Specimens examined. Espiritu Santo Isl., Mt. Tabwemasana, 1000 m alt., Nov. 6, 1996 (Higuchi 31542, 31588); Mt. Tabwemasana, 1000 m alt., Nov. 8, 1996 (Higuchi 31588, 31805); Peavot - Mt. Vutimele (40 km north of Mt. Tabwemasana), 750 m alt., Nov. 21, 1996 (Higuchi 31995).

Distribution. Mauritius, Seychelles, Andaman Islands, Nicobar Islands, Thailand, China, Malay Peninsula, Philippines, Sumatra, Java, Borneo, New Guinea, Solomon Islands, Australia, Moluccas, Oceania.

Notes. Forming large tufts on tree trunks, this is one of the more robust species of *Mitthyridium*. It has lingulate leaves up to 5 mm long, which broaden slightly from the leaf base then narrow abruptly above the distal extreme of the hyaline lamina, forming characteristically flared 'shoulders'. Above the shoulders the chlorophyllose limb gradually narrows to a broadly acute apex. The specimens examined here, collected at 750 m alt. and 1000 m alt., occurred at the high end of the altitudinal range recorded for this generally lowland species.

11. *Mitthyridium fasciculatum* subsp. *obtusifolium* (Lindb.) M.Menzel in M.Menzel & W.Schultze-Motel, *Willdenowia* 19 (2): 502 (1990).

Specimen examined. Espiritu Santo Isl., Mt. Tabwemasana, 950 m alt., Nov. 6, 1996 (Higuchi 31507).

Distribution. Andaman Islands, Malesia?, New Caledonia, Vanuatu, Cook Islands, Fiji, Gambier Islands, Marquesas, Society Islands, Pitcairn Island.

Notes. This subspecies apparently consistently differs from the subsp. *fasciculatum* by its possession of leaves with an obtuse rather than acute apex, and the shoulders of the leaves are often less notably flared than in the type subspecies. In some parts of its geographical range, particularly some Malesian localities, the critical features of the subspecies are barely evident or weakly expressed. However, in the material examined here (Higuchi 31507) the distinguishing features are well marked.

12. *Mitthyridium luteum* (Mitt.) H. Rob., *Phytologia* 32: 434 (1975).

Specimen examined. Espiritu Santo Isl., along Pialapa River, 280 m alt., Oct. 19, 1997 (Sugimura 1696).

Distribution. Fiji, Samoa. New to Vanuatu.

Notes. *Mitthyridium luteum* has been confused with the more widely distributed Malesian-Pacific species *Mitthyridium papuanum* (Broth.) H. Rob. Following Nowak (1980) and Reese (1994), *M. luteum* appears to be distinct in having most leaves narrowing gradually from above the semisheathing hyaline base to the leaf apex, and possessing finely multipapillose cells in the chlorophyllose lamina. In *M. papuanum*, the margins in most leaves run parallel from above the hyaline base to shortly below the leaf apex, and the cells of the hyaline lamina are obscurely unipapillose. The collection determined here (Sugimura 1696) has features more closely resembling those of *M. luteum*, and notwithstanding possible taxonomic revision, is properly regarded as a new record for Vanuatu.

13. *Syrrhopodon croceus* Mitt., *J. Linn. Soc. Bot. Suppl.* 1: 41 (1859).

Specimens examined. Espiritu Santo Isl., Mt. Tabwemasana, 1000 m alt., Nov. 6, 1996 (Higuchi 31543); 1650 m alt., Nov. 7, 1996 (Higuchi 31704, 31716); Mt. Vutimele (40 km north of Mt. Tabwemasana), 1200 m alt., Nov. 23, 1996 (Higuchi 32148).

Distribution. Seychelles, Sri Lanka, Indochina, Malaysia, Philippines, Borneo, Java, Sumatra, New Guinea, Australia, Solomon Islands, Oceania.

Notes. Mostly corticolous, *Syrrhopodon croceus* possesses leaves composed of a linear limb extending from a short, suboblong basal region. In the most common form of this species, orange-red, shortly rectangular cells with thick, porose walls form the lamina in the distal basal region of the leaf (above the hyaline lamina). This characteristic feature is present in an apparently unpublished collection of *S. croceus* from Aneityum (Anatom) that was made in 1896 (sine coll. 136, Hb. Dixon (BM)). A less common, but widespread form of this species (Ellis 2001) has leaves in which the orange-red cells are absent or poorly developed. The collections determined here (Higuchi 31543, 31704, 31716, 32148) are representative of this form.

14. *Syrrhopodon perarmatus* Broth. in Broth. & Watts, *J. Proc. Roy. Soc. N. S. Wales* 49: 133 (1915).

Specimens examined. Espiritu Santo Isl., Peavot - Mt. Vutimele (40 km north of Mt. Tabwemasana), 800 m alt., Nov. 21, 1996 (Higuchi 32012, 32046); Mt. Vutimele (40 km north of Mt. Tabwemasana), 1100 m alt., Nov. 25, 1996 (Higuchi 32254 pro parte); 2nd Camp - Mt. Vutimele, 540 m alt., Oct. 18, 1997 (Sugimura 1609).

Distribution. New Guinea, Australia, Solomon Islands, Vanuatu, Fiji.

Notes. In this species the leaves possess a linear chlorophyllose limb, with thickened, dentate margins, that extends from a subelliptical hyaline base. Adjacent to the distal region of the hyaline lamina the leaf margin supports a row of long, regularly spaced, closely set spines, resembling the teeth of a comb. In general, within the family Calymperaceae, and in this species in particular, sporophytes are relatively uncommon. However, two of the collections examined here (Higuchi 32012, Sugimura 1609) have shortly cylindrical capsules with setae ca. 7–8 mm long. The poorly developed peristome teeth are similar to those found in other *Syrrhopodon* species, and the species of *Exostratum*, *Exodictyon*, *Leucophanes* and *Arthrocormus*. There are 16 teeth (arising from the inner peristome layer) with finely papillose ridges, most ventral plates have a central, circular, smooth depression.

S. perarmatus appears to be particularly well represented in Vanuatu, occurring on rotting logs and tree trunks.

15. *Syrrhopodon tristichus* Nees ex Schwägr., Sp. musc. frond. suppl. 4: 311b (1842).

Specimens examined. Espiritu Santo Isl., Mt. Tabwemasana, 1400 m alt., Nov. 7, 1996 (Higuchi 31630); Mt. Tabwemasana, 1650 m alt., Nov. 7, 1996 (Higuchi 31722); Peavot - Mt. Vutimele (40 km north of Mt. Tabwemasana), 800 m alt., Nov. 21, 1996 (Higuchi 32008); Peavot - Mt. Vutimele (40 km north of Mt. Tabwemasana), 1000 m alt., Nov. 21, 1996 (Higuchi 32032); Mt. Vutimele (40 km north of Mt. Tabwemasana), 1100 m alt., Nov. 22, 1996 (Higuchi 32056); 2nd Camp - Mt. Vutimele, 1340 m alt., Oct. 16, 1997 (Sugimura 1559); 2nd Camp - Mt. Vutimele, 950 m alt., Oct. 18, 1997 (Sugimura 1645).

Distribution. India, Sri Lanka, Malay Peninsula, Philippines, Sumatra, Java, Borneo, New Guinea, Solomon Islands, Moluccas, Australia, New Caledonia, Vanuatu, New Ireland, Fiji, Samoa, Society Islands.

Notes. As the name of this species implies, its leaves are set along the stem in three ranks. Each leaf has an erect, narrowly subrectangular, hyaline basal region leading distally into a linear, erect to reflexed chlorophyllose limb. In the latter, the rib forming the leaf margin is dentate, but adjacent to the distal region of the hyaline lamina this rib is characteristically thick and entire, terete in cross-section. *S. tristichus* appears to be common in Vanuatu, occurring on tree trunks, mostly near or above 1000 m alt..

Present status of taxa in the Calymperaceae listed as occurring in Vanuatu by Higuchi (1996) but affected by subsequent taxonomic revision.

Calymperes graeffeanum Müll.Hal., J. Mus. Godeffroy 3 (6): 64 (1874).

Synonym. *Calymperes aongstroemii* Besch.

Calymperes moluccense Schwägr., Sp. musc. frond. suppl. 2 (1): 99 (1824).

Probable synonym. *Calymperes chamaeleonteum* Müll.Hal.

Exostratum asperum (Mitt.) L.T.Ellis, Lindbergia 11: 32 (1985).

Synonym. *Exodictyon subscabrum* (Broth.) Cardot

Mitthyridium fasciculatum subsp. ***obtusifolium*** (Lindb.) M.Menzel in M.Menzel & W.Schultze-Motel, Willdenowia 19 (2): 502 (1990).

Synonyms. *Mitthyridium obtusifolium* (Lindb.) H.Rob., *Mitthyridium samoanum* (W.Schultze-Motel) H.Rob.

Mitthyridium flavum (Müll.Hal.) H.Rob., Phytologia 32: 433 (1975).

Synonym. *Mitthyridium cuspidatum* (M.Fleisch.) H. Rob.

Syrrhopodon japonicus (Besch.) Broth., Nat. Pflanzenfam. 2nd ed., 10: 233 (1924).

Synonym. *Syrrhopodon diversiretis* Broth. & Watts

Syrrhopodon semperi Müll.Hal., *Linnaea* 38: 557 (1874).

Synonym. *Syrrhopodon flammeonervis* subsp. *lilliei* (Broth.) Tixier. (cited in Higuchi (1996), fide Ellis MSS.)

Syrrhopodon tristichus Nees ex Schwägr., *Sp. musc. frond. suppl.* 4: 311b (1842).

Synonyms. *Syrrhopodon kindelii* Broth. & Paris, *Syrrhopodon laevigatus* Mitt.

Acknowledgements

I am grateful to Dr. M. Higuchi (TNS) for allowing me to examine his collections of Calymperaceae from Vanuatu. Collection of plant materials was supported by Grant-in-Aid for Scientific Research Program, No. 08041165, of the Ministry of Education, Culture, Sports, Science and Technology in Japan.

Summary

A key to the seven genera of the family Calymperaceae known to occur in Vanuatu is presented and an account given of the collections of Calymperaceae made in Vanuatu by Higuchi in 1996, and by Sugimura in 1997. Fifteen of the 32 taxa occurring in Vanuatu are noted, six of these are new records. A summary is presented of the taxa included in the checklist of Vanuatu mosses by Higuchi (1996) that have been affected by subsequent taxonomic revision.

References

- Ellis, L.T., 2001. New synonymy in some Asian species of *Syrrhopodon* (Calymperaceae: Musci). *Bull. Natn. Hist. Mus. Lond. (Bot.)* **31** (1): 1-4.
- Higuchi, M., 1996. A checklist of the mosses of Vanuatu. *Bull. Natn. Sci. Mus., Tokyo, Ser. B*, **22** (3): 113-134.
- Nowak, H., 1980. Revision der Laubmoosgattung *Mitthyridium* (Mitten) Robinson für Ozeanien (Calymperaceae). *Bryophytorum Bibliotheca* 20: 1-236.
- Reese, W.D., 1994. The subgenera of *Mitthyridium* (Musci). *J. Hattori Bot. Lab.* 75: 41-44.
- Streimann, H. and W. D. Reese, 2001. Vanuatu moss records. *J. Hattori Bot. Lab.* 91: 295-300.