

Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXXI. *Merrillibryum* (Myriniaceae, Musci)

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We report on New Guinea occurrences of the genus *Merrillibryum*, previously thought to be endemic to the Philippines. The New Guinea plants are named *M. taniannum* D.H. Norris, T.J. Kop. & W.R. Buck, *sp. nova*. They differ from the Philippine *M. fabronioides* Broth. in their larger size, relatively broader leaves, the more elongate cells of the median leaf, and in the number of cells in the uniseriate leaf apex. The paper includes a key, descriptions, illustrations and distributional data for the two species of the genus.

Key words: *Merrillibryum*, Fabroniaceae, mosses, Myriniaceae, taxonomy

This paper is the 71st part of the Huon Peninsula project published in *Annales Botanici Fennici* and in *Acta Botanica Fennica*. Two immediately preceding papers (Numbers 69 and 70) dealt with several genera of the Sematophyllaceae (Tan *et al.* 2005, 2007).

We report here on one of the many mosses that have baffled us in our study of the very large collection of Huon Peninsula mosses by Koponen and Norris (1983). This small and sparingly branched plant grows in somewhat shaded areas, primarily as an epiphyte. Its color is so bleached whitish-green as to perhaps suggest *Leucomium* but the very narrow cells of the median lamina and the length/width ratio of the leaves suggest a radically different determination. Recently, the third author (W. R. Buck) assigned the plant to the poorly known Philippine genus, *Merrillibryum*.

This genus seems to have been collected from only three localities, all in the Philippines (Brotherus 1908, 1910, Brotherus 1913, Tan & Iwatsuki 1991). Our specimens from New Guinea number 29, and they display a considerable ecological amplitude and geographic range in New Guinea.

Merrillibryum may at first seem rather featureless: lanceolate leaves with an inconspicuous costa, and with leaf cells long, prosenchymatous and smooth. However, several features of the two species of *Merrillibryum* allow easy identification to genus. The plant has crassiserrulate leaves but this is not accompanied by proration of the median cells. Casual inspection shows a moss with an inconspicuous limbidium but more careful inspection shows that the limbidium is composed of cells markedly longer than the interior cells but of a similar width to those interior

cells. The false appearance of narrow marginal cells is produced by the tendency for the most marginal single row of cells to be incurved along the entire margin. That close pattern of curving begins at a single cell at the extreme basal margin. That single cell constitutes a minute auricle defined by a plication that extends along the length of the leaf margin. A final feature is the leaf buttress composed of a single series of enlarged but isodiametric cells. These cells of the leaf buttress have a proximal portion that is in the stem cortex but that row of cells continues distally as part of the leaf base. That single row of cells across the leaf base remains in place with leaf removal and makes up a shelf-like extension from the denuded stem.

Merrillibryum was originally placed in the Fabroniaceae by Brotherus (1908), and a similar placement is given by Crosby and Magill (1977). Buck and Crum (1978) state that the Fabroniaceae as constituted by Fleischer (1923) "lacks homogeneity" and are a "miscellaneous assemblage of unusually slender pleurocarps with erect capsules". For this reason, they moved to the Myriniaceae those members with essentially unreduced hypnanean peristomes. In contrast, the narrowly defined Fabroniaceae usually lack an endostome. Thumbnail sketches of the families of mosses are provided in Buck and Goffinet (2000). The Fabroniaceae–Myriniaceae portion of that work, updated from Buck and Crum (1978), describes the Myriniaceae peristome as "mostly variously reduced"; and it describes the Fabroniaceae peristome as "often reduced". Modern articles (Buck & Crum 1978, Buck 1980) separately treat most of the genera of the Fabroniaceae and the Myriniaceae. *Merrillibryum* in those papers is assigned to the Myriniaceae but is not otherwise discussed.

Our New Guinea collections of *Merrillibryum* represent a many-fold increase in the known herbarium holdings of the genus, and they provide an opportunity to amplify our knowledge of the genus. We are comfortable with the placement of *Merrillibryum* in the Myriniaceae but we await molecular analysis for future suggestions of placement. In the meantime, Hedenäs (1989, 1995) provided insight that may direct the selection of plants used in such future genetic comparisons. Hedenäs (1989) classified many

of the pleurocarpous mosses into four groups according to eight types of morphologic expressions. "Group I" in the Hedenäs classification (*Plagiothecium* and its look-alikes) seems quite appropriate to *Merrillibryum*: rhizoids purplish; branches easily detached, forming an acute angle with the stem; stomata long-pored, exostome pale yellow, gradually narrowed from base to apex. This "Group I" of Hedenäs is, however, not fully appropriate for *Merrillibryum* because membership in Group I calls for a long-cylindric and arcuate capsule, narrow endostome processes, and axillary rhizoids. More work is definitely required for the placement of *Merrillibryum* but the gross resemblance of its gametophyte to that of *Plagiothecium* should not be ignored.

Hedenäs (1995) provided a very large matrix of morphological characters which allow for a cladistic analysis of a broad selection of pleurocarpous mosses. *Merrillibryum* is not analyzed by Hedenäs but he speaks of the Plagiotheciaceae, as a "sister clade" of the Hypnaceae. He calls for "further evaluation of taxa" before "exact circumscription" of the family.

Genus *Merrillibryum* Broth.

Plants small, pale green with yellow to pale green stems, complanate and irregularly branched with stems prostrate but with branches erect to decumbent, secondary branches constricted at their bases and easily detached. Stem cross-section leptodermous and homogeneous, without central strand. Pseudoparaphyllia narrowly linear-lanceolate. Rhizoids brown to purplish, verruculose to smooth, sparingly fasciculate at abaxial leaf insertion. Stem leaves to 2 mm long, narrowly lanceolate, broadest near base, 8–15: 1 including long acumen; margins with 1 row of cells inconspicuously raised above plane of leaf with only a few scattered and inconspicuous crassiserrulate teeth; median laminal cells smooth, thin-walled and prosenchymatous; cells of alar region poorly differentiated, marginally narrowed and elongate in a single row; costa almost invisible but present and extending to middle of some stem leaves, sometimes absent in branch leaves.

Autoicous. Perichaetia restricted to older prostrate axes with bracts markedly shorter than

adjacent vegetative leaves, erect with spreading acumina, ecostate and without alar differentiation, about 1.5 mm long, elliptic below, but abruptly contracted at about middle into a very narrow acumen. Setae to 20 mm long, smooth, erect, yellow-brown. Capsules ovoid, erect and nearly symmetrical, blackening with age; exothelial cells not mammillose, thick-walled, in regular rows, 20–25 μm broad, isodiametric to short rectangular with many rows of suboral cells transversely elongate; stomata on base of urn, long- and vertical-pored; operculum conic-rostrate; peristome double; exostome teeth triangular, without shoulders, hyaline to pale yellow, striate with ventral trabeculae; endostome shorter than exostome, with keeled segments. Spores smooth to inconspicuously papillose, 12–14 μm in diameter. Calyptrae cucullate, neither plicate nor hairy, sheathing most of capsule.

Key to the species of *Merrillobryum*

1. Median leaf cells at the level of the acumen base 4–6:1; leaves with acumen including a uniseriate portion of 2 or more cells in length; plant very small with broadest portion of vegetative leaves mostly less than 0.25 mm wide; plants of the Philippines *M. fabronioides*
1. Median leaf cells at the level of the acumen base more than 8:1; leaves with acumen comprising about 1/2 of leaf and with that acumen very narrow but mostly without a uniseriate apex; branch leaves mostly about 0.3–0.4 mm wide; plants of New Guinea .. *M. taniumum*

Merrillobryum fabronioides Broth. (Fig. 1)

Philippine J. Sci. C3: 25. 1908. — HOLOTYPE: The Philippines, Benguet Subprovince, Mount Data, *Merrill 4921* (H-BR!; isotype NY!, S).

Plants small and glossy, pale green with yellow to pale green stems, irregularly branched with stems prostrate but with branches erect to decumbent; branches densely foliate, homomalous, constricted at their bases and easily detached. Stem and branch surfaces with cortical cells to 10 μm wide, to 5:1, obscurely prorate at each end and bulging-inflated giving a crenate surface to stem cross-sections. Stem cross-section leptodermous and homogeneous, without central strand. Axillary hairs of only 2 cells, deliquescent, to 40 μm long, thin-walled and of

constant diameter from base to apex, inserted at adaxial leaf axils. Pseudoparaphyllia sparse, linear, to 100 μm long, 3–4 cells long, to 4 cells wide at base, mostly with entire margins. Rhizoids pale brown to purplish, mostly smooth or lightly verruculose, fasciculate at abaxial leaf insertion, long and monopodially branched. Line of leaf insertion transverse, perpendicular to long axis of stem. Branch leaves homomalous, to 2 mm long, narrowly lanceolate, broadest near base, 10–15:1 including awn, loosely-erect when moist, slightly distorted when dry; stem leaves distantly inserted and somewhat reduced in size; apices very long-acuminate, ending in a flexuose awn, uniseriate for 6–10 cells; margins appearing plane throughout but, with close inspection, having a single row of narrowed marginal cells erect and raised above level of plane of leaf. Leaves with small crassiserrulate teeth distantly and irregularly placed, and these teeth appearing twisted inward from margin; median laminal cells smooth, thin-walled and prosenchymatous, not vermiform, mostly 5–8:1, to 7 μm broad; cells of alar region shorter (4–8:1) than those of median lamina but not otherwise different; basal cells enlarged and isodiametric in a single row, with proximal insertion on stem but with distal insertion on base of leaf; median basal cells to 18 μm broad, quadrate with some wall thickening, without basal coloration; cells of apical region mostly continuous in morphology with marginal row of cells; costa very inconspicuous but typically ascending beyond mid-leaf, sometimes demonstrable only in a leaf cross-section, in section homogeneous and thin-walled, often only a few cells in length.

Autoicous. Perichaetia restricted to older prostrate axes with bracts shorter than adjacent vegetative leaves, erect and somewhat sheathing base of seta, reflexed in area of awn; inner perichaetial bracts ecostate and without alar differentiation, about 1.5 mm long, lanceolate below, but abruptly contracted at about middle into a convolute channeled very narrow acumen that is partially uniseriate. Setae to 15 mm long, smooth, erect, yellow-brown. Operculate capsules ovoid, erect and nearly symmetrical, yellow-brown to brown or even black in older material, to 1.5 mm long, about 2:1, neither sulcate nor strangulate; exothelial cells not mammillose, thick-walled

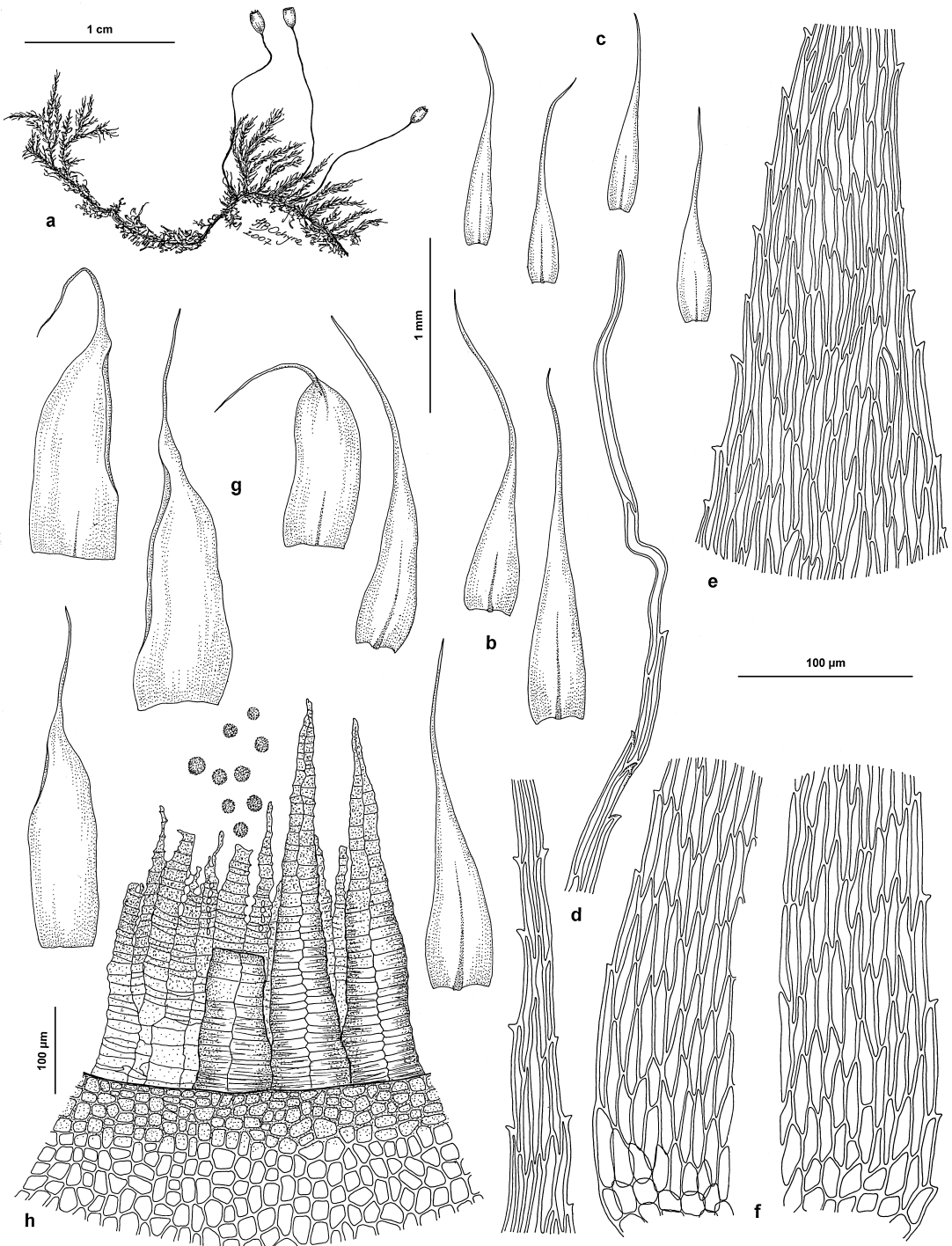


Fig. 1. *Merrilliobryum fabronioides* (from Merrill 4921, isotype, NY). — a: Habit. — b: Stem leaves. — c: Branch leaves. — d: Leaf apex in two pieces. — e: Laminal cells in lower part of subula. — f: Basal leaf cells at margin. — g: Perichaetial leaves. — h: Portion of peristome and spores.

with lumen:wall ratio about 4:1, not collenchymatous, in regular rows, to 25 μm broad, quadrate to short rectangular, 1–1.5:1 with 4–8 rows of suboral cells transversely elongate, 1:2; stomata inconspicuous and poorly developed, long-pored and vertical, restricted to short neck and to base of urn; operculum conic-rostrate, about 1/3 as long as urn; annulus not differentiated; exostome inserted slightly above capsule mouth, to 750 μm long, 4–5:1, without shoulders, hyaline to pale yellow, low striate with prominent ventral trabeculae, not cribose along zig-zag median commissural line; endostome as long as exostome, with narrow and lightly keeled segments, lightly papillose, cilia single or absent, basal membrane short, comprising less than 1/4 of endostome length. Calyptra thick and cucullate, smooth, sheathing most of capsule. Spores smooth to inconspicuously papillose, 12–14 μm in diameter.

DESCRIPTIONS AND ILLUSTRATIONS: Bartram 1939 (pl. 21, fig. 362); Del Rosario 1986 (228, fig. 46).

TOTAL RANGE: As 4: Philippines.

Merrillibryum tanianum D.H. Norris, T.J. Kop. & W.R. Buck, *sp. nova* (Figs. 2 and 3)

Differt a Merrillibryo fabronioide statura majore, foliis relative latioribus, cellulis mediani folii elongatioribus et numero cellularum minore in apice folii uniseriatio.

Plants small, pale green with yellow to pale green stems, irregularly branched with stems prostrate but with branches erect to decumbent; branches densely foliate, homomallous, constricted at their bases and easily detached. Axillary hairs deliquescent, to 40 μm long, thin-walled and of constant diameter from base to apex, inserted at adaxial leaf axils. Pseudoparaphyllia sparse, linear, to 100 μm long, 3–4 cells long, to 4 cells wide at base, mostly with entire margins. Stem and branch surfaces with cortical cells to 10 μm wide, to 5:1, obscurely prorate at each end and bulging-inflated giving a crenate surface to stems. Stem cross-section leptodermous and homogeneous, without central strand. Rhizoids pale brown to purplish, mostly smooth

or lightly verruculose, fasciculate at abaxial leaf insertion, long and monopodially branched. Line of leaf insertion transverse, perpendicular to long axis of stem.

Branch leaves homomallous, to 2 mm long, narrowly lanceolate, broadest near base, about 8:1 including awn, loosely-erect when moist, slightly distorted when dry; stem leaves distantly inserted and somewhat reduced in size; leaf apices very long acuminate, narrowed at apex but seldom uniseriate for more than 2 cells; margins appearing plane throughout but, with close inspection, with a single row of narrowed marginal cells erect and raised above level of plane of leaf, Leaves with small crassiserrulate teeth distantly and irregularly placed, and with these teeth appearing twisted inward from margin; median laminal cells smooth, thin-walled and prosenchymatous, not vermiform, mostly 10–15:1, to 7 μm broad; cells of alar region shorter (4–8:1) than those of median lamina but not otherwise different; basal cells enlarged and isodiametric in a single row with proximal insertion on stem but with distal insertion in base of leaf; median basal cells to 18 μm broad, quadrate with some wall thickening, without basal coloration. Cells of apical region mostly continuous in morphology with marginal row of cells. Costa very inconspicuous but typically ascending beyond mid-leaf, sometimes demonstrable only in a leaf cross-section, in section homogeneous and thin-walled, often of as few as 4–5 cells. Autoicous. Perichaetia restricted to older prostrate axes with bracts shorter than adjacent vegetative leaves, erect and somewhat sheathing base of seta, reflexed in area of awn; inner perichaetial bracts ecostate and without alar differentiation, about 1.5 mm long, elliptic below, but abruptly contracted at about middle into a convolute channeled very narrow acumen. Setae to 15 mm long, smooth, erect, yellow-brown. Capsules ovoid, erect and nearly symmetrical, yellow-brown to brown or even black in older material, to 1.8 mm long, about 2:1, neither sulcate nor strangulate; exothecial cells not mammillose, thick-walled with lumen:wall ratio ca. 4:1, not collenchymatous, in regular rows, to 25 μm broad, quadrate to short rectangular, 1–1.5:1 with 4–8 rows of suboral cells transversely elongate, 1:2; stomata inconspicuous and poorly developed, long-pored and vertical, restricted to

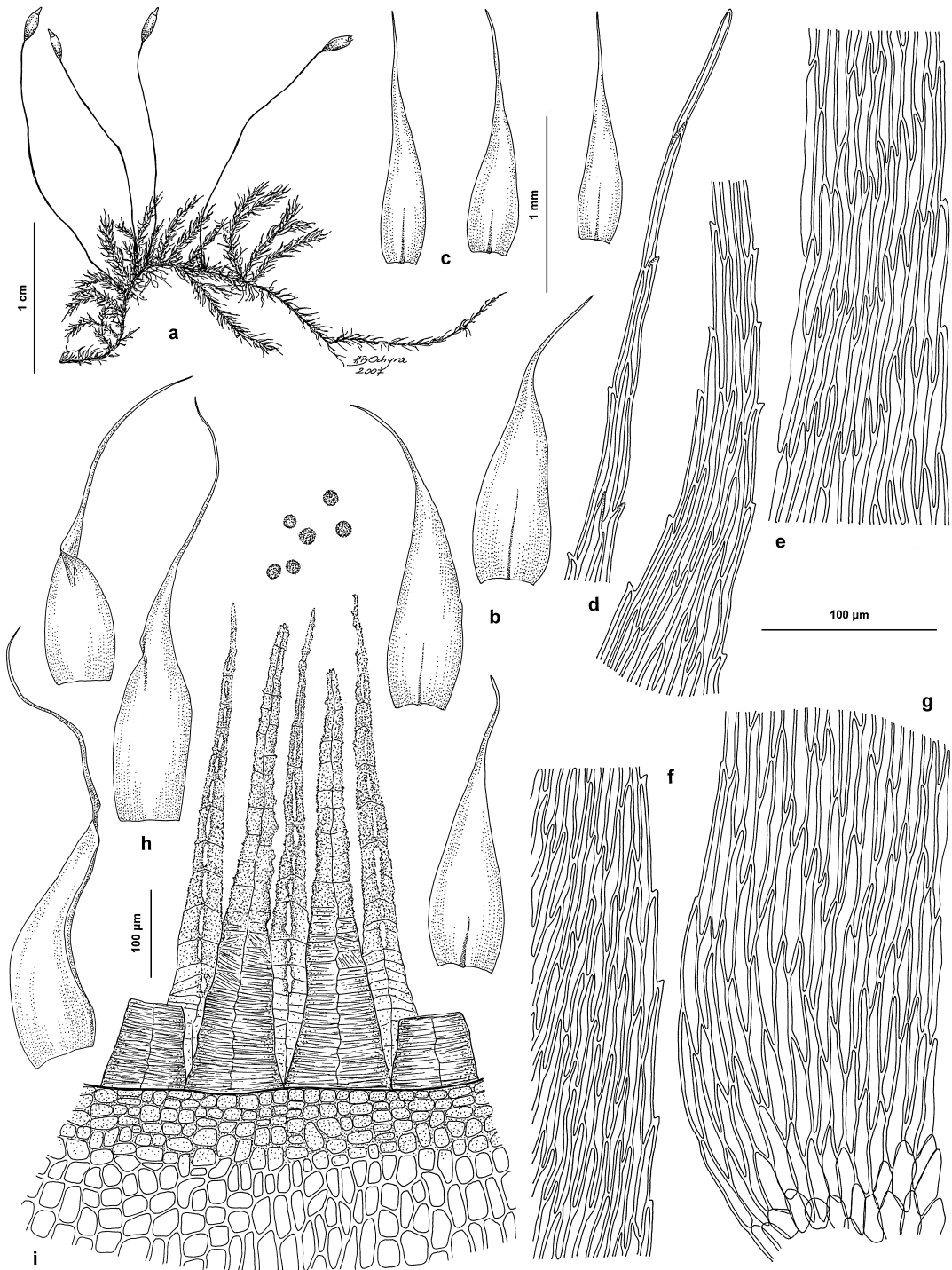


Fig. 2. *Merrilliobryum taniaum* (from Koponen 29447, isotype, KRAM). — **a:** Habit. — **b:** Stem leaves. — **c:** Branch leaves. — **d:** Leaf apex in two pieces. — **e:** Mid-leaf cells at margin. — **f:** Upper leaf cells at margins. — **g:** Basal leaf cells at margin. — **h:** Perichaetial leaves. — **i:** Portion of peristome and spores.

short neck and to base of urn; operculum conico-rostrate, about 1/3 as long as urn; annulus not differentiated; exostome inserted slightly above capsule mouth, to 850 μm long, about 5:1, without shoulders, hyaline to pale yellow, low-striate with prominent ventral trabeculae, not cribose along zig-zag median commisural line; endostome as long as exostome, with narrow and lightly keeled segments, lightly papillose, cilia single or absent, basal membrane short, comprising less than 1/4 of endostome length. Calyptra thick and cucullate, smooth, sheathing most of capsule. Spores smooth to inconspicuously papillose, 12–14 μm in diameter.

HOLOTYPE: Papua New Guinea, Morobe Prov.: In montane rain forest on steep W-facing slope of Mt. Buruman E of Wantoap River ca. 9 km NNW of Wantoat, alt. 1600–1800 m, 6°06'S, 146°26'E, on tree trunk at 1 m (collection site no. 3b), 28.V.1981 *Koponen 29447* (H; isotypes KRAM, LAE, NY, UC).

Merrillibryum tanianum was collected on the Huon Peninsula at 1100–2900 m (Fig. 3). Most specimens were taken in undisturbed very wet montane rain forest, some of them approaching moss forest (12 specimens). Four specimens came from second growth or badly disturbed rain forests. Another habitat is forests dominated by large *Pandanus* trees, these also badly disturbed (5 specimens). More open habitats are open rainforests on crests of ridges, and patches of rain forest surrounded by open *Miscanthus* grassland (4 specimens). *Merrillibryum tanianum* is mostly epiphytic in shady habitats on bark or trunk of tree (11 specimens), trunk of tree fern (5), trunk of *Pandanus* (2), on *Cordyline* of garden fence (1), stump (1), tree root (2), soil of roadbank (1), and cliff (10).

RANGE of *Merrillibryum tanianum* on the Huon Peninsula (paratypes in H and UC). The coding of the collecting localities is given in the first part of the series (Koponen & Norris 1983): 2b. 33600. 2i. 34113. 2m. 34274. 2o. 34324. 2r. 64145, 64146. 2w. 64423, 65454. 2x. 64570. 2y. 64651, 64730, 64741. 2A. 64986. 3b. 29447 (holotype). 3k. 60850. 3l. 60926, 60956. 4b. 616. 4e. 66481. 4i. 67072. 6q. 33137. 6z. 63558, 63559. 6A. 63777. 7a. 65341, 65419. 7d. 65718. 8g. 31360, 10a. 28428.

TOTAL RANGE: As 4: Papua New Guinea, Morobe Province.

ETYMOLOGY: This plant is named in honor of Dr. Benito C. Tan, whose experience uniquely includes extensive work

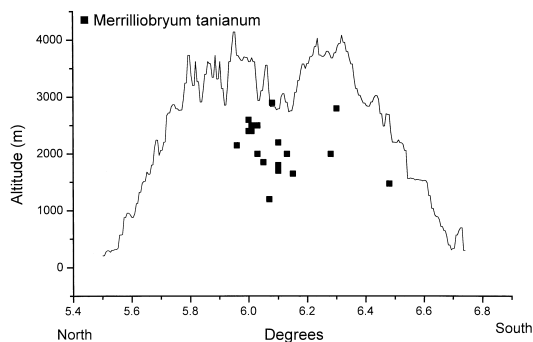


Fig. 3. The altitudinal distribution of *Merrillibryum tanianum* on the Huon Peninsula.

on mosses of both the Philippines and New Guinea. The similarity of the Philippine and New Guinea moss floras has already been repeatedly commented upon (Tan 1984, 1992, Tan & Engel 1990). Piippo and Koponen (1997, 2003) recorded 264 species of mosses that occur both in Western Melanesia and in the Philippines.

It is surprising that a plant so frequently encountered in our own collections seems previously not to have been collected in New Guinea. Our material comes from six quite separate localities on the Huon Peninsula. Distributional data of this type is regularly seen in tropical regions. Most of these anomalous patterns of distributions are surely the product of inadequate past patterns of collection. The need for more collection in tropical countries cannot be too strongly emphasized.

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