Cryptogamie, Bryologie, 2015, 36 (4): 343-348

Macromitrium larrainii, a new species of *Macromitrium* (Orthotrichaceae, Bryophyta) from New Caledonia

Louis THOUVENOT[a] & Kien-Thai YONG[b]*

[a]11 rue Saint Léon, 66000 Perpignan, France

[b]Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

Abstract – The moss *Macromitrium larrainii sp. nov*. from Mt Panié, the highest summit of New Caledonia, is described and illustrated. This species is characterised by 1) the hairy appearance of branches due to the long aristate leaves arranged irregularly, not spirally, 2) the narrow leaf lamina asymmetrical above, 3) leaf cells consistently smooth, and 4) upper leaf cells irregular in shape and basal ones linear with a straight lumen. Comparison with similar *Macromitrium* species in neighbouring countries confirms that it is a new species, likely endemic.

Musci / Orthotrichaceae / New Caledonia / Pacific region

Résumé – *Macromitrium larrainii sp. nov.*, une nouvelle espèce de mousse, récoltée sur le Mont Panié, le plus haut sommet de Nouvelle-Calédonie, est décrite et illustrée. Cette espèce se distingue par 1) l'aspect hérissé des rameaux à cause des feuilles longuement aristées, dirigées en tous sens, non spiralées, 2) les feuilles étroites et asymétriques en haut, 3) des cellules toujours lisses, 4) les cellules foliaires supérieures de forme irrégulière, les inférieures linéaires à lumière droite. La comparaison avec les *Macromitrium* des régions avoisinantes confirme qu'il s'agit d'une nouvelle espèce, probablement endémique.

Mousse / Orthotrichaceae / Nouvelle-Calédonie / Région Pacifique

INTRODUCTION

New Caledonia has a wealth of a thousand bryophyte species or infraspecific taxa including 540 mosses and 485 liverworts and hornworts (Thouvenot *et al*, 2011; Thouvenot & Bardat, 2013; Müller & Tan, 2013; Thouvenot & Reeb, 2014; Thouvenot, 2015). In New Caledonia, the genus *Macromitrium* (Orthotrichaceae) is very well represented, where a total of 43 names including one subspecies and 10 varieties have been reported (Thouvenot & Bardat, 2010). Within the Pacific and the adjacent regions, the genus has been revised for Australia (Vitt & Ramsay, 1985), New Zealand (Vitt, 1983) and Papua New Guinea (Vitt *et al.*, 1995) and is recorded

* Corresponding author: thouloup@club-internet.fr

doi/10.7872/cryb/v36.iss4.2015.343

in the regional flora of the Society Islands (Whittier, 1976). In the course of the revision of this genus for New Caledonia, the first author examined a large number of specimens gathered recently by Juan Larraín during the 2012 Field Museum of Chicago expedition to New Caledonia. Two specimens were very different from all the species known to this territory. The piliferous aristae present on vegetative leaves in these specimens are found on only a handful of *Macromitrium* species that occur in New Caledonia and neighbouring regions. As the New Caledonian bryophyte flora has a close affinity to that of Australasia, Indo-Malaysia and the Pacific (Iwatsuki, 1990; Miller & Whittier, 1990; Thouvenot *et al*, 2011), this unusual species of *Macromitrium* was carefully checked and compared with aristate examples from nearby territories.

DESCRIPTION

Macromitrium larrainii Thouvenot *et* K.T.Yong, ***sp. nov.*** **Figs 1-15**

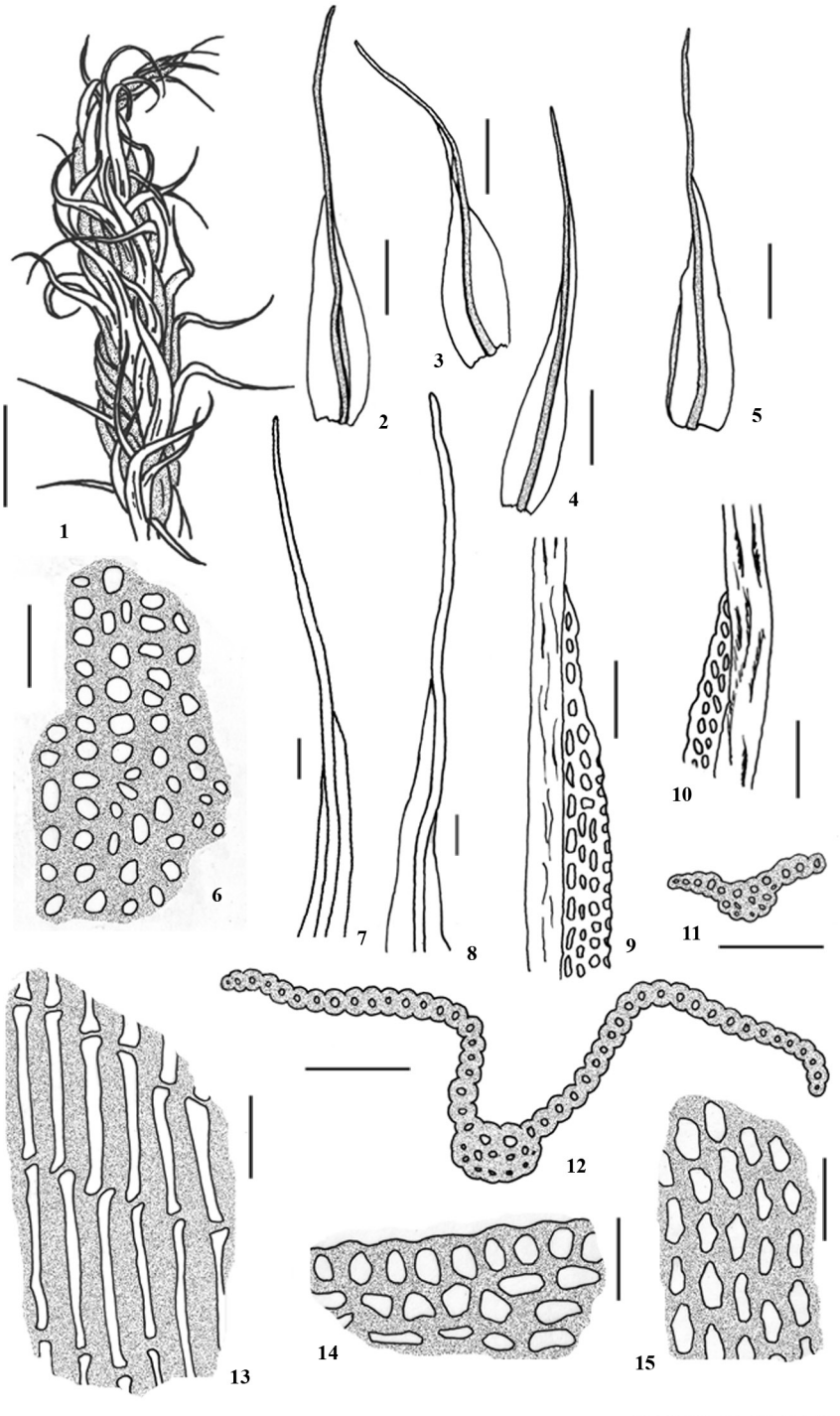
Plants appear hairy due to long piliferous aristae, branch leaves irregularly not spirally arranged, narrow lanceolate; lamina widest at base, gradually narrowing above, slender upper part asymmetrical; upper leaf cells smooth, irregular in shape; basal leaf cells linear, smooth, with a straight lumen.

Typus: NEW CALEDONIA, Province Nord, Hienghène, summit of Mont Panié, lat. 20° 35’ 19” S, long. 164° 46’ 12” E; alt. ca. 1640 m, 9 Oct. 2012, *J. Larraín 35846* (holotype PC0167650, isotypes NOU, KLU, F, CONC, NY, S, hb. L. Thouvenot)

Plants medium sized, shiny light green above and light brown below.. **Stems** creeping, relatively sparsely pinnate branching, **branches** erect, up to 25 mm long, branch leaves loosely erect to flexuose-twisted, irregularly but not spirally arranged around the axis when dry, erect to patent, incurved when moist. **Branch leaves** lanceolate, lamina widely carinate below, narrow, slender and asymmetrical above, 0.2-0.5 mm wide, 1.2-2.7 mm long including a concolorous arista up to 1.0 mm long, somewhat flexuose; apex acute ending in a single row of cells at the base of the arista; margin entire; costa prominent abaxially, 35-45 µm wide, long excurrent, filling the arista. **Cells** smooth throughout; upper leaf cells unistratose, in more or less regular longitudinal rows, irregular in shape and size, from rounded quadrate to oblong, 5-12 µm long, 5-7 µm wide, thick walled; extreme marginal row made of small, regular cells, isodiametric to oblate; median leaf cells oblong, with thick walls, straight to only slightly sinuous; basal leaf cells linear, evenly thick-walled, with regularly straight and narrow lumina, 50-60 µm long, 8 µm wide.

Dioicous (?). **Perichaetial leaves** similar to vegetative ones, slightly longer but not distinctively differentiated. **Vaginulae** glabrous. **Setae** smooth, 8-10 mm long (or more). **Capsule** and **calyptra** not seen.

Figs 1-15. *Macromitrium larrainii* Thouvenot *et* K.T.Yong. **1.** Upper part of branch: habit. **2-5.** Branch leaves. **6.** Upper leaf cells. **7-10.** Apex of branch leaves. **11.** Transverse section of leaf apex. **12.** Transverse section of leaf basal part. **13.** Basal leaf cells. **14.** Upper marginal leaf cells. **15.** Median leaf cells. (Scale bar: 1: 1 mm; 2-5: 0.5 mm; 6: 20 µm; 7-8: 0.1 mm; 9-12: 50 µm; 13-15: 20 µm; all drawn from the type specimen). ▶


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Etymology: The specific epithet is based on the name of the Chilian bryologist Juan Larraín who collected these specimens during the Chicago Field Museum expedition to New Caledonia in 2012.
Ecology: This species grows on bark of shrubs in mountain cloud forest and open bushy vegetation, with *Agathis montana* de Laub. and *Araucaria schmidii* de Laub., on the summit of Mount Panié, the tallest mountain on the main island of New Caledonia, 1640 m a.s.l.
Distribution: So far known only from Mt Panié, in the North Province of New Caledonia.
Additional specimen seen (paratype): NEW CALEDONIA, Province Nord, Hienghène, summit of Mont Panié, lat. 20°35'19"S, long. 164°46'12"E; alt. ca. 1640 m, 9 Oct. 2012, *J. Larraín 35865* (NOU, F, CONC, NY, S, hb. L. Thouvenot).

DISCUSSION

Macromitrium larrainii is characterised by 1) distinctively slender lanceolate leaves, lamina widest near base, narrow and asymmetrical above, 2) a distinctive habit due to the long, thin aristae and excurrent costae of the branch leaves irregularly not spirally arranged, 3) cells smooth throughout the leaves, and 4) upper leaf cells irregular in shape and size and basal ones linear and evenly thick-walled, with the luminae straight.

Macromitrium larrainii cannot be confused with any other species reported for New Caledonia. *M. rufipilum* Cardot and *M. pulchrum* var. *aristatum* Thér. are the two species that are known to have a long excurrent nerve and both are endemic to the island (Thouvenot & Bardat, 2010). *M. rufipilum* is distinguished from the present species by its ligulate leaves with obtuse apex and reddish arista. *M. pulchrum* var. *aristatum* has fairly broad leaves that are oblong-lanceolate to ligulate in shape, with the costa ending as a short arista that never attains the length in *M. larrainii*. Neither of these has the asymmetric upper lamina present in *M. larrainii.* In addition, both *M. rufipilum* and *M. pulchrum* var. *aristatum* are known to have strongly papillose upper leaf cells and a very long seta, usually reaching 2 cm or longer, whereas the setae in *M. larrainii* are never longer than1 cm.

In the Pacific and the adjacent regions, the species that are known to have piliferous leaves and attain the size of *Macromitrium larrainii* are *M. piliferum* Schwaegr. from Hawaï and Sandwich Islands (Bartram, 1933), *M. dielsii* Vitt. *et* Ramsay and *M. funiforme* Dixon from continental Australia and *M. peraristatum* Broth. from Lord Howe Island (Vitt & Ramsay, 1985), *M. ochraceoides* Dixon from Borneo (Dixon, 1935), *M. longipilum* A.Braun *ex* Müll.Hal., *M. crinale* Broth. *et* Geh. and *M. cuspidatum* from Malesia (Eddy, 1996; Vitt *et al.,* 1995). Most of the above species have papillose basal leaf cells and can easily be distinguished from *M. larrainii* that has consistently smooth basal leaf cells. The only four species that might be confused with the new species perhaps are *M. cuspidatum*, *M. peraristatum*, *M. dielsii* and *M. funiforme*, which share similar leaf and cell characters.

Without careful examination, *Macromitrium larrainii* might be considered a poorly developed form of *M. cuspidatum* but *M. cuspidatum* has the luminae sigmoid-curved in basal leaf cells, because of the uneven thickened wall. In addition, *M. cuspidatum* has more abruptly acuminate leaf apices and spreading-recurved leaves when moist. In *M. larrainii* the luminae of basal leaf cells are straight, the

leaf apex narrows gradually, usually ending in an uniseriate row of a few cells at the base of the excurrent arista, and the leaves are often erect to patent and incurved when moist.

Compared with *Macromitrium larrainii* the three Australian species differ as follows: *M. peraristatum* is a more robust plant with larger leaves spirally twisted when dry, the lamina more broadly lanceolate, obtuse to shortly acute. In addition, the upper cells are somewhat papillose, the luminae of mediane and basal cell sigmoid to curved and only perichaetial leaves are long aristate. *M. dielsii* is much more delicate in size with leaves funiculate on the branch when dry, while *M. larrainii* has leaves loosely erect to irregularly twisted on the branch when dry. In *M. funiforme*, the costa is very variable in length, from excurrent in a rigid arista to just filling the acumen, never with branches appearing as in *M. larranii*. Furthermore in *M. funiforme* the basal leaf luminae are either straight or occasionally curved, with papillae present on some leaves (Vitt & Ramsay, 1985). Other characters consistent in *M. larrainii* are the long excurrent costa filling the flexuose arista, and smooth basal leaf cells with straight lumina. Only *M. larrainii* has the asymmetrical leaf lamina.

It is interesting to note here that, like *Macromitrium larrainii* in New Caledonia, the Australian species *M. peraristatum, M. dielsii* and *M. funiforme* are known only from high elevation areas, close to or at the summit of mountains, the first in Lord Howe Island, le latter two in northern Queensland, Australia (Vitt & Ramsay, 1985). Conversely, *M. cuspidatum* has been collected from a wide elevation range, from 300 m to 1400 m above sea level, but is absent from the summit region (pers. comm.; Vitt *et al*., 1995).

CONCLUSION

As high elevation species of *Macromitrium* in New Guinea might be largely endemic in contrast to the lower elevation ones (Vitt *et al.,* 1995), *M. larrainii* is likely endemic to New Caledonia, although only two collection data are reported. It is a morphologically distinct species and its phylogenetic relationship with the few morphologically related species requires future investigation to understand the island biogeography and the evolution within this unique group of *Macromitrium* species that possess piliferous leaves.

Aknowledgments. Juan Larraín is warmly thanked for providing many specimens of *Macromitrium* from New Caledonia. The second author would like to acknowledge University of Malaya and MOHE Malaysia (HIR-F005) in support of the present study. Professor Rui-Liang Zhu and two reviewers are thanked for their very useful comments and corrections.

REFERENCES

BARTRAM E.B., 1933 — Manual of Hawaiian mosses. *Bishop museum bulletin* 101: 1-275.

DIXON H.N., 1935 — A contribution to the moss flora of Borneo. *The Linnean society's journal, botany* (1): 57-140.

EDDY A., 1996 — *A handbook of Malesian mosses*. Vol. 3. London, Natural History Museum, 204 p.

IWATSUKI Z., 1990 — Origin of the New Caledonian bryophytes. *Tropical bryology* 2: 139-148.

MILLER H.A. & WHITTIER H.O., 1990 — Bryophyte floras of the tropical Pacific islands. *Tropical bryology* 2: 167-175.
MÜLLER F. & TAN B.C., 2013 — New bryophyte records from New Caledonia. *Cryptogamie, Bryologie* 34: 367-371.
THOUVENOT L. & BARDAT J., 2010 — Liste actualisée et annotée des mousses de Nouvelle-Calédonie. *Cryptogamie, Bryologie* 31: 163-197.
THOUVENOT L., GRADSTEIN S.R., HAGBORG A., SÖDERSTRÖM L. & BARDAT J., 2011 — Checklist of the liverworts and hornworts of New Caledonia. *Cryptogamie, Bryologie* 32: 287-390.
THOUVENOT L. & BARDAT J., 2013 — Contribution to the bryophyte flora of New Caledonia. I. New taxa and amendments. *Cryptogamie, Bryologie* 34: 37-47.
THOUVENOT L. & REEB C., 2014 — *Riccardia elisabethae*, a new species of Aneuraceae (Marchantiophyta) from New Caledonia. *Telopea* 17: 229-232.
THOUVENOT L., 2015 — Contribution to the bryophyte flora of New Caledonia. II: Taxonomic notes, new taxa and localities. *Cryptogamie, Bryologie* 36: 97-106.
VITT D.H., 1983 — The New Zealand species of the pantropical genus *Macromitrium* (Orthotrichaceae, Musci): taxonomy, phylogeny and phytogeography. *Journal of the Hattori botanical laboratory* 54: 1-94.
VITT D.H. & RAMSAY H.P., 1985 — The *Macromitrium* complex in Australasia (Orthotrichaceae: Bryopsida). Part I. Taxonomy and phylogenetic relationships. *Journal of the Hattori botanical laboratory* 59: 325-451.
VITT D.H., KOPONEN T. & NORRIS D.H., 1995 — Bryophyte flora of the Huon Peninsula, Papua New Guinea. LV. *Desmotheca*, *Groutiella*, *Macrocoma* and *Macromitrium* (Orthotrichaceae, Musci). *Acta botanica Fennica* 154: 1-94.
WHITTIER H.O., 1976 — *Mosses of the Society Islands*. Gainesville, The university presses of Florida, 371 p.