

***Acromastigum lamyi* sp. nov.
(Lepidoziaceae, Marchantiophyta), a new liverwort
species from New Caledonia**

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Abstract – The genus *Acromastigum* is well represented in New Caledonia with 15 species and varieties known to date. We report, describe and illustrate here a new species from this French Overseas Territory. It is characterized by 1) transversely inserted, longitudinally plicate in a right angle, asymmetrical leaves, the dorsal leaf lobes being smaller than the ventral ones, 2) leaf cells thick-walled with inconspicuous trigones, 3) asymmetrical trifold underleaves and 4) stems with seven ranks of enlarged thick-walled cortical cells and five of thin-walled medullary cells. We discuss its belonging to the section *Subcomplicata* of the genus and provide the main distinctive features in relation to locally known species.

Lepidoziaceae / Marchantiophyta / New Caledonia / Pacific region

Résumé – Le genre *Acromastigum* est particulièrement abondant en Nouvelle-Calédonie avec 15 espèces et variétés connues à ce jour. Nous décrivons et illustrons ici une nouvelle espèce de ce Territoire français d’outremer. Elle est caractérisée par 1) des feuilles insérées transversalement et pliées longitudinalement à angle droit, asymétriques avec le lobe dorsal plus petit que le ventral, 2) des cellules foliaires à parois épaisses avec des trigones peu distincts, 3) des amphigastres trifides, asymétriques et 4) des tiges formées d’un cortex de sept rangs de cellules élargies à parois épaisses et d’une moëlle de cinq rangs de cellules à paroi mince. Nous discutons son appartenance à la section *Subcomplicata* du genre et donnons les principaux caractères distinctifs par rapport aux autres espèces locales.

Lepidoziaceae / Marchantiophyta / Nouvelle-Calédonie / région Pacifique

INTRODUCTION

The genus *Acromastigum* A.Evans (1900) was created based on a distinctive feature of some *Mastigobryum* species, especially *M. integrifolium* Austin, which showed a special branching mode of the flagelliform branches: in *Acromastigum*, the ventral microphyllous branches are exogenous in origin (terminal) instead of endogenous (intercalary) like in *Bazzania*, and arise at one side of an underleaf instead of the middle. In addition, nearly all the *Acromastigum* species are small to minute plants, have bilobed to bidentate, rarely entire leaves and entire to trilobed underleaves as well as differentiated stem cortical cells. Then Evans (1934) described

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28 species of *Acromastigum* arranged in four sections: *Squarrosa*, *Exilia*, *Subcomplicata* and *Inaequalitera*. In New Caledonia, according to Kitagawa (1985), the genus *Acromastigum* is well represented with twelve species and one variety, including three new species described by Kitagawa himself in the same paper: *A. adaptatum* Hürl., *A. caledonicum* (Steph.) Grolle, *A. capillare* (Steph.) A.Evans, *A. colensoanum* (Mitt.) A.Evans ex Reimers, *A. exiguum* (Steph.) A.Evans, *A. filum* (Steph.) A.Evans var. *filum*, *A. filum* var. *papillosum* N.Kitag., *A. homodyction* (Herzog.) Grolle, *A. moratii* N.Kitag., *A. pusillum* N.Kitag., *A. stellare* N.Kitag., *A. subechinatiforme* Hürl. and *A. tenax* (Steph.) A.Evans. Furthermore Schuster (1997) described a new species, *A. rigidum* R.M.Schust., and considered five sections, the four Evans' sections with addition of section *Triandrophyllosis* arranged in three subgenera: *Acromastigum*, *Subcomplicatae* and *Inaequaliterae*. With the addition of two more species recorded before the Kitagawa's study but rejected by this author for which no New Caledonian vouchers were found, *A. bancanum* (Sande-Lac.) A.Evans and *A. echinatum* (Gottsche) A.Evans, Thouvenot *et al.* (2011) give a total number of 15 species and one subspecies in New Caledonia, where this genus shows a high endemic rate. In fact, 2/3 of the species are endemic to the island and their overall range does not exceed Australasia, Pacific Islands and Indo-Malayan region, which is the main distribution range of the genus.

During 2016 fieldwork in New Caledonia, I collected a specimen of *Acromastigum* which had features unusual among then-known species and I extensively checked literature published on the genus in the surrounding regions (i.e. Grolle 1964, 1978; Piippo 1991, Engel & Smith Merrill 1994, Meagher 2009, Brown & Renner 2014). David Meagher and Rui-Liang Zhu kindly examined photos and parts of the specimen and confirmed that it does not resemble any species described from Australasia or Asia. I therefore describe below a new species, bringing the total number of *Acromastigum* species and variety to 16 in New Caledonia.

DESCRIPTION

Acromastigum lamyi Thouvenot, *sp. nov.*

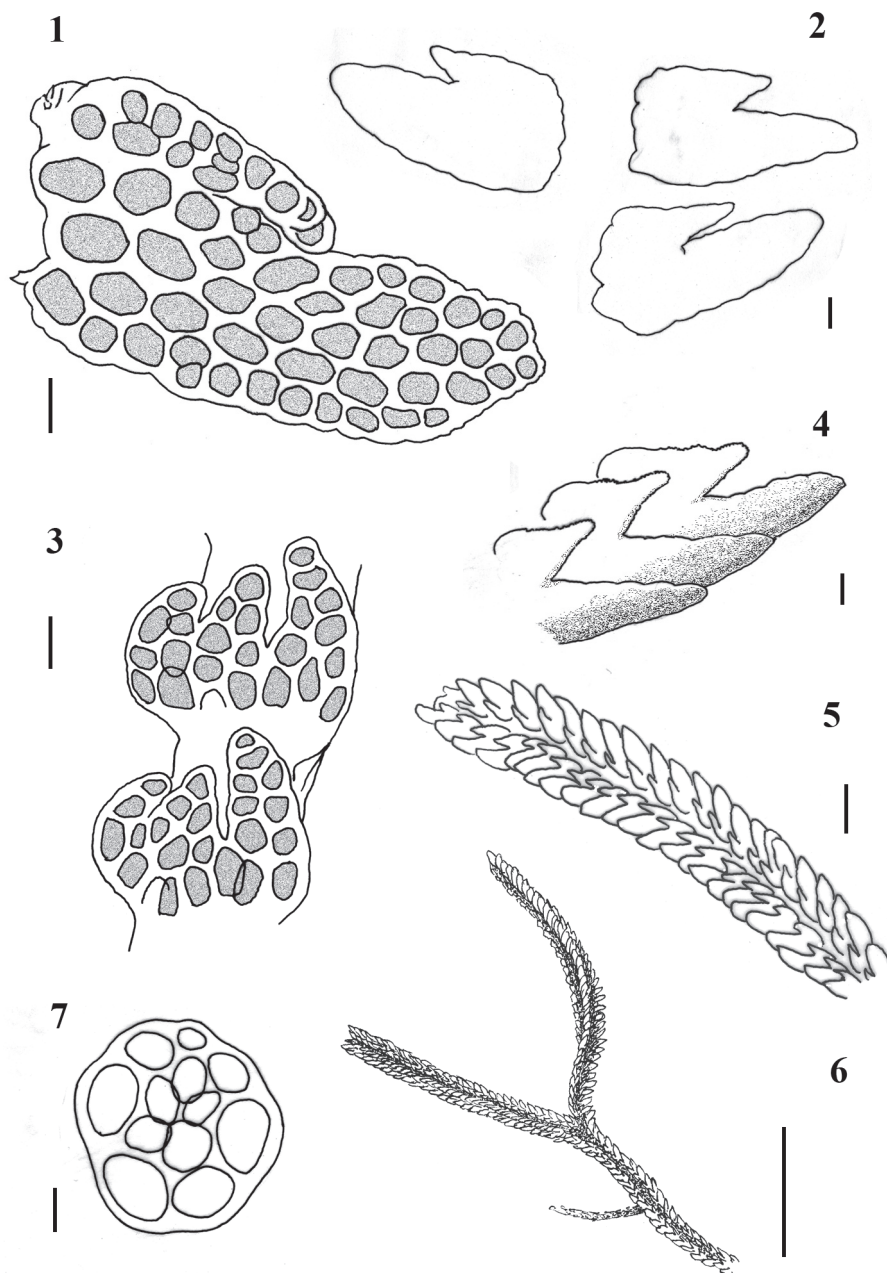
Figs 1-15

Diagnosis: Plant small, stem with seven longitudinal rows of thick-walled cortical cells and five smaller, thin-walled medullar cells, leaves transversely inserted, sub-complicated, bifid, with dorsal lobe smaller, triangulate, and ventral lobe larger, lingulate-oval, leaf cells thick-walled, trigones inconspicuous, underleaves asymmetrically trifid, female branches ventral intercalary, short, without vegetative leaves, bracts and bracteole similar, bifid, perianth elongate with ciliate mouth.

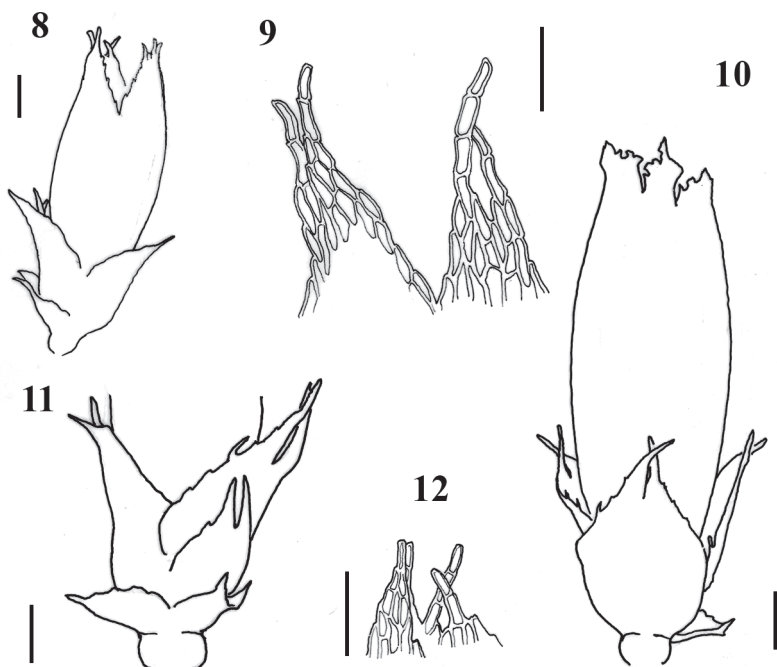
Type: New Caledonia, Province Sud, Dumbéa, natural reserve of Montagne des Sources, 950 m, rain forest on ultramafic rocks, coordinates UTM 58K 0665439E, 7553475N, on living tree bark, *L. Thouvenot NC2012* (holotype: PC0733748, isotype in private herbarium).

Plants small, interwoven shoots forming dense mat, olive green, the young growths light green; leaved shoots 250-300 µm wide, triangular in section, the antical face plane, the two ranks of opposite leaves leaving the stem naked in a thin middle band.

Stems rigid, vegetative branching terminal, repeatedly pseudo-dichotomous, half leaves antical, ovate, postical flagelliform branches common; transverse section of

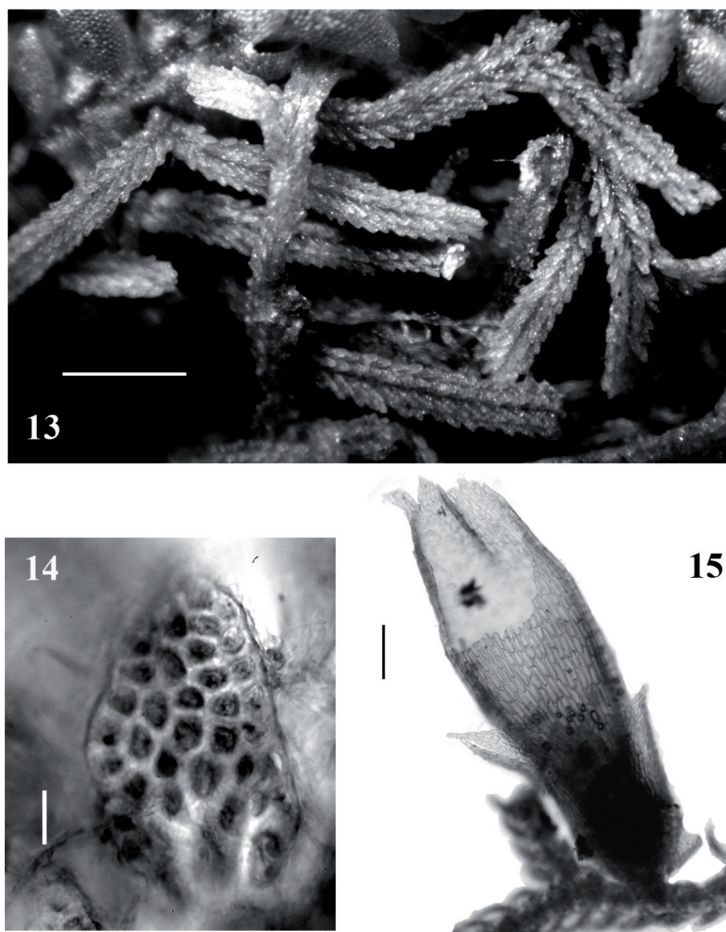


Figs 1-7. *Acromastigum lamyi*. 1 & 2. Flattened leaves. 3. Two successive underleaves. 4. Leaves in place in antical view. 5. Antical view of a branch. 6. Habit. 7. Transversal section of a stem. (Scale bars. 1, 3 & 7: 20 μ m; 2 & 4: 20 μ m; 5: 0.1 mm; 6: 1 mm. All drawn from the type specimen.)



Figs 8-12. *Acromastigum lamyi*. **8.** Female branch with entire perianth. **9 & 12.** Parts of the ciliate perianth mouth. **10.** Broken perianth with bracts and bracteoles. **11.** Bracts and bracteoles. (Scale bars. 8, 10 & 11: 0.2 mm; 9 & 12: 0.1 mm. All drawn from the type specimen.)

the stem 100 μm wide, with seven cortical cells in one rank, thick-walled, wider than the five thin-walled medullar cells. **Leaves** imbricate, transversely inserted, erectopatent, concave, 150 μm long, 110 μm wide, bifid with very unequal lobes, subcomplicate with each lobe in a plane situated at right angle to one another, the dorsal lobe smaller, forward directed, usually twice shorter than the ventral, triangular, 7-10 celled, three cells wide at base, two uniseriate cells in apex, the ventral lobe larger, lingulate to long oval, the apex rounded; **leaf cells** oblong to isodiametric, rounded, evenly thick-walled, with inconspicuous trigone, if any, the walls 2.5-4 μm wide, basal cells larger, walls 4 μm wide, lumina oblong, 10-17 μm wide, 22-25 μm long, not obviously vitta forming, progressively decreasing towards upper cells 10-17 μm wide, 15-20 μm long, less thick-walled, one rank of marginal and apical cells smaller, lumina more or less isodiametric, 10 μm wide, 10-15 μm long; cuticule verrucose, especially in the dorsal lobe, to nearly smooth. **Underleaves** at most as wide as the stem, imbricate, trifid, usually asymmetrical with one external lobe conspicuously longer, 75-100 μm long, 82-110 μm wide, basal lamina 1/3-1/2 of the whole length, two cells high, six cells wide, lobes linear lanceolate 1-2 cells at base, in 1-2(-3) ranks, ending in 1-2 uniseriate cells, **underleaf cells** with walls 2.5 μm thick without trigone, laminal cell lumina oblong 10-12 μm wide, 15-17 μm long, lobe cell lumina rounded 10 (-12) μm wide.



Figs 13-15. *Acromastigum lamyi*. **13.** Habit. **14.** Half- leaf on the postical side of a terminal branch. **15.** Female branch with perianth. (Scale bars. 13: 0.5 mm. 14: 20 μ m. 15: 0.2 mm. All from the type specimen.)

Dioicous (?). **Gynoecea** on short postical intercalary branches, vegetative leaves lacking; innermost **bracts** and **bracteole** similar, imbricate, widely ovate, bifid, apex of lobes shortly filiform with 1-4 elongate cells, margin entire to crenulate, very sparsely ciliate, cells elongated, basal and median cells thin-walled, upper cells thick-walled; **perianths** oblong 1.6 mm long, 0.55 mm wide, rounded in section, mouth narrowly lobulated-ciliate. **Androecea** not seen.

Etymology: The specific epithet is based on the name of Denis Lamy to express my gratitude for his confidence and his friendly help in guiding into the considerable documentary resources and working facilities of the Museum national d'Histoire naturelle as well as his efforts in providing valuable issues of *Cryptogamie*, *Bryologie* over the years.

DISCUSSION

Acromastigum lamyi is characterized by 1) small and rigid shoots with leaves transversely inserted, subcomplicate with each lobe in a plane at right angle to each other, 2) bifid leaves with unequal lobes, the smaller dorsal one forward directed and the larger ventral one laterally patent giving to the shoot a striking aspect that enables to determine the species at first glance, 3) asymmetrical trifid underleaves, 4) thick-walled leaf cells without conspicuous trigone and 5) stem sections showing seven thick-walled differentiated cortical cells. It thereby belongs to the section *Subcomplicata* A.Evans (subgenus *Subcomplicatae* (A.Evans) R.M.Schust.) defined by "cortical cells of ordinary vegetative branches in seven longitudinal rows; leaves bifid, transversely attached, subcomplicate; underleaves trifid" (Evans, 1934) and resembles *A. herzogii* Grolle from Borneo by its asymmetrical leaves but the latter has the dorsal leaf lobes broader and the ventral lobes narrowly lanceolate. Furthermore, the underleaves are symmetric, the median lobe longer, whereas in *A. lamyi* the underleaves have one of the lateral lobes conspicuously longer. Schuster (1997) discusses the belonging of *A. herzogii* to the section *Subcomplicata* on the basis of the spreading direction of the leaves and subtransversely inserted leaves. He suggests that it could be a minute species belonging to the subgenus *Inaequilaterae*. In his key to the subgenera he first discriminates the species by the transverse insertion of the leaves, linked to the symmetry of the leaf lobes. Evans did not use the latter character, and its addition by Schuster is based only on the observation of *A. filum* and *A. rigidum*, but the other features of *A. herzogii* as well as *A. lamyi* matches with this subgenus better than with the three others. The finding of a second species with asymmetric leaves in section *Subcomplicata* allows us to consider both species as members of the section *Subcomplicata sensu* A.Evans and reject the symmetry of the leaves as a characteristic feature of the Schuster subgenus. For these reasons, I prefer to use the section name. In New Caledonia, this section contains two species more: *Acromastigum filum*, with two varieties, and *A. rigidum*, which both have symmetric leaves and underleaves. Therefore, they can easily be separated from the new species. The New Caledonian species belonging to different sections cannot be confused with the new species: among the species with transversely inserted leaves, *A. caledonicum*, have entire leaves, *A. stellare* and *A. homodyctyon* have stem cortical cells in more than 10 rows. Each species else has succubous leaves. The ecological conditions with high moisture in undisturbed habitat, the fertility and the vegetative vigour of the plant excludes that it could be a depauperate form of any other species.

Acromastigum lamyi has been found in the natural reserve of Montagne des Sources, in a rain forest with *Araucaria rulei* F.Muell., at the elevation of 950 m. It was growing on trunk in dense mat mixed with *Zoopsis setulosa* Leitg.; the neighbouring bryophytes were *Leucobryum chlorophyllosum* Müll.Hal. and *Bazzania deplanchei* (Gottsche ex Steph.) Ast.

If the most widely distributed *Acromastigum* species are often conspicuous when growing in dense mats, especially on dead wood or barks, the genus in the whole consists mainly of small plants, often mixed with other bryophytes. That allows us the chance to find new species more.

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