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**Contribution to the bryophyte flora  
of New Caledonia IV. Species new to the country,  
new localities together with taxonomic notes**

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# Contribution to the bryophyte flora of New Caledonia IV. Species new to the country, new localities together with taxonomic notes

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## ABSTRACT

Thirteen liverworts and the same number of mosses are reported from recent collections in New Caledonia and from some type specimens kept in PC. Among them, 13 are new to this French overseas territory (seven liverworts and six mosses, including the new genus *Rhaphidostichum* M.Fleisch.). *Ectropothecium papillosulum* Thér. is a new synonym of *E. sodale* (Sull.) Mitt. and *Isopterygium sarasinii* Thér. is proposed as a synonym of *I. albescens* (Hook.) A.Jaeger. *Hymenostomum francii* Thér. is transferred to *Weissia* Hedw. as *W. francii* (Thér.) Thouvenot comb. nov. and *H. aristatum* Broth. & Paris is transferred to *Trichostomum* Bruch as *T. tonghouensis* Thouvenot nom. nov. The occurrences in New Caledonia of nine species are confirmed. That includes three liverworts and one moss only known from their types, one liverwort only known from the types of synonyms, one liverwort and one moss new to North Province, and a new locality for the liverwort *Cololejeunea morobensis* (Pócs) Pócs that complement single earlier report. As a result, New Caledonian bryophyte flora includes 1064 species or infraspecific taxa (522 mosses, 528 liverworts and 14 hornworts). All the species involved are commented, three of them are described, seven illustrated and a key to the New Caledonian *Myurium* Schimp. species is provided.

**KEY WORDS**  
Anthocerotophyta,  
Bryophyta,  
Marchantiophyta,  
new records,  
new localities,  
new names,  
New Caledonia,  
Pacific region

## RÉSUMÉ

*Contribution à la flore de Nouvelle-Calédonie IV. Espèces nouvelles pour le pays, nouvelles localités accompagnées de notes taxonomiques.*

Treize hépatiques et autant de mousses sont rapportées à partir de récoltes récentes en Nouvelle-Calédonie et de quelques types conservés à PC. Parmi ces espèces, 13 sont nouvelles pour ce territoire français d'outre-mer (sept hépatiques et six mousses, incluant le nouveau genre *Rhaphidostichum* M.Fleisch.). *Ectropothecium papillosulum* Thér. est un nouveau synonyme de *E. sodale* (Sull.) Mitt. et *Isopterygium sarasinii* Thér. est proposé comme synonyme de *I. albescens* (Hook.) A.Jaeger. *Hymenostomum francii* Thér. est transféré dans le genre *Weissia* Hedw. sous le nom de *W. francii* (Thér.) Thouvenot comb. nov. et *Hymenostomum aristatum* Broth. & Paris est transféré dans le genre *Trichostomum* Bruch sous le nom de *T. tonghouensis* Thouvenot nom. nov. Les occurrences en Nouvelle-Calédonie de neuf espèces sont confirmées. Cela concerne trois hépatiques et une mousse connues

**MOTS CLÉS**  
 Anthocerotophyta,  
 Bryophyta,  
 Marchantiophyta,  
 nouvelles espèces,  
 nouvelles stations,  
 nouveaux noms,  
 Nouvelle-Calédonie,  
 région Pacifique.

seulement de leurs types, une hépatique connue seulement par les types de ses synonymes, une autre hépatique et une mousse nouvelles pour la Province Nord et une nouvelle station pour l'hépatique *Cololejeunea morobensis* (Pócs) Pócs qui complète l'unique mention connue jusqu'à présent. Avec ces nouvelles données, la flore bryologique de Nouvelle-Calédonie est riche de 1064 espèces et taxons infrasécifiques dont 522 mousses, 528 hépatiques et 14 anthocérotes. Des commentaires sont faits pour chaque espèce concernée, trois sont décrites, sept illustrées et une clé vers les espèces néocalédoniennes de *Myurum* Schimp. est fournie.

## INTRODUCTION

The New Caledonian bryophyte flora has been documented by many authors since 1853 (review in Thouvenot & Bardat 2010; Thouvenot *et al.* 2011). Pursell & Reese (1982) recorded 631 specific and infraspecific taxa of mosses but, because of the taxonomic reviews undergone during the following 28 years, this number was reduced to 520 (Thouvenot & Bardat 2010), whereas Thouvenot *et al.* (2011) listed 14 hornworts and 468 liverworts. Later, many reviews and notes were published (e.g. Renner 2016; Thouvenot & Müller 2016; Thouvenot *et al.* 2018; Thouvenot 2019) and these counts must be updated. In the present paper we report 13 species new to New Caledonia (seven liverworts, six mosses) including *Rhaphidostichum* M.Fleisch., a moss genus hitherto unknown in New Caledonia, we confirm the presence of nine poorly documented species (one hornwort, six liverworts, three mosses) and we propose taxonomic revisions for four moss species, leading to two synonymies, one new combination and one new name. As a result, in New Caledonia, we now recognize 1064 bryophyte species and infraspecific taxa including 522 mosses, 528 liverworts and 14 hornworts.

## MATERIAL AND METHODS

Recently collected specimens together with historic herbarium specimens kept in PC, NOU and REN were checked and determined by the authors using optical microscopes and relevant documents referenced below. Fieldwork occurred in 2001 and 2003 (F. Müller) and between 2008-2019 (L. Thouvenot). Reference samples of the collections by L. Thouvenot are deposited in PC; the samples collected by F. Müller are in DR.

Species new to New Caledonia are marked by an asterisk.

Gatherings were made following the collecting permits of North Province (number 60912-2012, 609011-45-2019) and South Province (number 1238-2012, 2825-2019) Environment Departments.

## RESULTS AND DISCUSSION

Division MARCHANTIOPHYTA Stotler & Crand.-  
 Stotler  
 Family ACROBOLBACEAE E.A.Hodgs.

## Genus *Saccogynidium* Grolle

### \**Saccogynidium rigidulum* (Nees) Grolle

**SPECIMEN EXAMINED.** — **New Caledonia.** North Province, Hienghène, Payolé, Panié Massif, on the bark at the trunk base of a tree in cloud forest, 1400 m, 9.X.2012, *Thouvenot NC2564* PC[(PC0712102)]. *Saccogynidium muricellum*: **New Caledonia.** North Province, Tango plateau, Napupwa, on dead wood in a degraded wet forest, 506 m, 20.IX.2019, *Thouvenot NC2831* PC[(PC0779845)].

### COMMENTS

The only *Saccogynidium* hitherto known in New Caledonia was *S. muricellum* (De Not.) Grolle from which *S. rigidulum* can be separated by the larger underleaves, 2-3× the stem width, the free surface of the cell walls densely papillose with papillae higher and narrower, and strong globose trigones at the cell angles. This specimen complements the geographical range of this species, new to New Caledonia, which covers a large area of the Eastern and Southern Pacific: Japan, Taiwan, Indonesia, Philippines, Melanesia, Oceania (Piippo 1985).

## Family ANEURACEAE H.Klinggr.

### Genus *Lobatirricardia* (Mizut. & S.Hatt.) Furuki

### \**Lobatirricardia alterniloba* (Hook.f. & Taylor) Furuki

**SPECIMENS EXAMINED.** — **New Caledonia.** North Province, Poindimié, Tango plateau, Hoeène upper valley, 20°58'44"S, 165°5'53"E, on rock of small waterfall in a gallery forest, 347 m, 11.X.2019, *Thouvenot NC3028* PC[(PC0712110)]; South Province, Païta, Mt Ouin, along the path to the summit, on dead wood in a wet forest in ultramafic massif, 1000-1025 m, 19.IX.2016, *Thouvenot NC2097*.

### COMMENTS

*Lobatirricardia coronopus* (De Not. *ex* Steph.) Furuki subsp. *coronopus* was the single species of the genus hitherto reported from New Caledonia (Thouvenot *et al.* 2011). *Lobatirricardia alterniloba* can be recognized from the later by the remotely toothed thallus margins, female branches with scale-like to fimbriate paraphyses without unicellular cilium, male branches with dorso-lateral wings 2-3 cells wide, not cili-

ate. The distribution of *L. alterniloba*, reported from New Zealand, Australia, Tasmania and Vanuatu (Preussing *et al.* 2010) is consistently expanded to New Caledonia, in both provinces of Grande Terre.

Family BALANTIOPSISIDACEAE H.Buch.  
Genus *Balantiopsis* Mitt.

\**Balantiopsis montana* (Colenso) J.J.Engel & G.L.Merr.

SPECIMENS EXAMINED. — **New Caledonia.** North Province, Pouébo, Diahoué, Tooliwök, 20°29'8"S, 164°41'19"E, on rocks aside a waterfall, mixed with *Flatbergium novo-caledoniae*, 710 m, 10.XI.2019, *Laudereau NC2780* (PC0712105); South Province, La Foa, Koghis, along the path to Mt Moné, on an earthy slope in a clearing, 545 m, 15.IX.2012, *Thouvenot NC1477* (PC0779857); Mount Mou near Païta, along the path from the sanatorium over Poudio to the summit, montane rainforest, on forest floor, 1150 m, 10.IX.2001, *Müller NC371*; Sarraméa, along the path from Sarraméa to Plateau de Dogny, 21°37'S, 165°52'E, earthy slopes, c. 500 m, 05.IX.2003, *Müller NC816*; Nouméa 12 km NNE, along the path from Auberge de Koghi to Cascade de Koghi, humid rainforest, on rocky slopes, 550 m, 08.IX.2001, *Müller NC26*.

#### COMMENTS

Two *Balantiopsis* species were hitherto known in New Caledonia: *Balantiopsis neocaledonica* Pearson and *B. diplophylla* (Hook.f. & Taylor) Mitt. Engel (1968) treated *B. diplophylla* in a broad sense, but in a more recent publication (Engel & Smith Merrill 1997) the authors give a description of *B. diplophylla* in a narrower sense. The species is characterized by cells typically scattered in the distal third of the ventral lobe, not in evident transverse rows, the median cells are polygonal to rather short-rectangular (c. 2.5:1), the ventral lobes are rather broadly elliptic to broadly ovate. Following these authors, the range of *B. diplophylla* outside New Zealand must be reassessed and we suspect that most of what has been so far given as *B. diplophylla* from New Caledonian collections actually belong to *B. montana*. The specimens of *B. diplophylla* reported from New Caledonia must be checked in order to ensure the presence of this species in the country.

Our material of *Balantiopsis* collected in New Caledonia does not match the characters of *B. diplophylla*. Here we add *B. montana* to the New Caledonian flora. It is separated from *B. diplophylla* by 1) the shape of the leaf lobes, more elongated, 2× longer than wide; 2) the arrangement of leaf cells which are transversally aligned in the upper half of the leaf lobes; and 3) the median cells elongate-rectangular (to 4:1) (Fig. 1M, N). Based on the diagnose by Pearson (1922), *B. neocaledonica* can be distinguished by the underleaves bifid vs deeply bifid to trifid, the leaf lobes with mostly entire margins and apices less ciliate, but this species is only known from the type (not seen) and its taxonomic status needs more investigation. *B. montana* was hitherto stated to be endemic to New Zealand (Engel & Smith Merrill 1997), but it also occurs in North and South Provinces of New Caledonia.

Family FRULLANIACEAE Lorch  
Genus *Frullania* Raddi

*Frullania kitagawana* S.Hatt.

SPECIMEN EXAMINED. — **New Caledonia.** North Province, Poum, south of mount Arama, 20°16'38"S, 164°11'33"E, on small branches in a thicket of *Melaleuca quinquinervia* (Cav.) S.T.Blake and *Acacia spirorbis* Labill., 391 m, 13.IX.2019, *Thouvenot NC2985*.

#### COMMENTS

This endemic species was only known from the type collection in South Province (Dogny) (Hattori 1984). This plant is distinguished by the reddish-brown colour, no differentiation of small-leaved pinnate branches, the lobules galeate, with beak confluent to the ventral margin of the lobe, free margin infolded, hidden in the lobule, the underleaves widely rounded reniform, flat, with an apex shortly incised and margins entire, the lobes rounded, entire, inflexed. The new specimen matches all the characters of the type described by Hattori (1984) and extends its distribution to North Province where it grows as an epiphyte in a dry thicket on metamorphic mountains at low elevation, a sunny and very harsh environment.

Family HAPLOMITRIACEAE Dědeček  
Genus *Haplomitrium* Nees

*Haplomitrium monoicum* J.J.Engel

SPECIMENS EXAMINED. — **New Caledonia.** South Province, Yaté, Chakéké lake, 22°6'29"S, 166°54'29"E, on bare soil on the banks of a dry creek, alt. 402 m, 4.X.2019, *Thouvenot NC2587PC*[(PC0699830)], *NC2588* (herb. Thouvenot); 22°5'58"S, 166°54'44"E, small dry creek, 4.X.2019, *Laudereau NC2589* (herb. Thouvenot).

#### COMMENTS

This New Caledonian endemic was only known from the type locality in Montagne des Sources (Engel 1981, Bartholomew-Began 1991) and its sporophyte was unknown. The two nearby new localities at Yaté, also in South Province, show similar ecological features but at lower elevation (400 m vs 950 m) and fertile plants allow us to describe the sporophyte after the specimen *Thouvenot NC2588*. The specimens from Chakéké Lake are well characterized being the only monoicous species in the genus and the fertile specimen contains shoots of both sexes arising from the same rhizome, antheridia whitish, dehisced, sessile, 2(-3) grouped at the axil of leaves in the upper part of the shoot, but not terminal, archegonia reddish-brown, located like the antheridia, fertilized gynoecia developing long cylindrical calyptra, 3 mm long. More distinctive features were observed: 1) smaller size; 2) erect leafy shoots simple, up to 7 mm high; 3) conspicuous leaf border of 1(-2) cells thicker-walled and somewhat larger than the submarginal ones; and 4) median cells large, (35-55) × (60-75) μm, 5) leaf base area bistratose up to ¼ the leaf length.

*Sporophyte* (Fig. 2)

Long exserted, about twice the calyptra length, seta 6-7 mm long, capsule sublinear, 2.5 mm long, 0.3 mm wide, cells long rectangular, with a single longitudinal thickening. Elaters and spores not seen.

The plants were growing scattered on ultramafic bare soil on the banks of intermittent creeks, shaded by small trees of a gallery forest inside a shrubland typical of the large South Caledonian ultramafic massif. The species still can be viewed as endemic to this massif.

Family LEJEUNEACEAE Cas.-Gil  
Genus *Cololejeunea* (Spruce) Schiffn.

*Cololejeunea morobensis* (Pócs) Pócs

SPECIMEN EXAMINED. — New Caledonia. North Province, Touho, Massif des Lèvres, Tipéléi upper valley, 20°50'11"S, 165°8'31"E, epiphyllous on fern in lowland rain forest, 315 m, 12.X.2012, *Thouvenot NC2224* PC[(PC0712103)].

COMMENTS

Originally described as *Aphanolejeunea morobensis* Pócs from Papua-New Guinea (Pócs & Piippo 1999), this Lejeuneaceae has been subsequently reported from the South Province of New Caledonia (Pic du Grand Kaori) by He & Christenhusz (2009). Our collection extends its distributional range to North Province. This species may have been overlooked because of its very small size (leaves 170 µm long, shoots 300 µm wide) and of the under-collection of epiphyllous bryophytes in New Caledonia.

Genus *Diplasiolejeunea* (Spruce) Schiffn.

*Diplasiolejeunea cavifolia* Steph.

SPECIMEN EXAMINED. — New Caledonia. North Province, Touho, Massif des Lèvres, Tipéléi upper valley, 20°50'11"S, 165°8'31"E, epiphyllous in lowland rain forest, 315 m, 12.X.2012, *Thouvenot NC2161*.

COMMENTS

This pantropical species was only reported twice from South Province by Tixier (1972) and Hürlimann (1999). It has been collected also in North Province, in the sedimentary Massif des Lèvres, where it grows as epiphyte mixed with the dominant *Leptolejeunea amphioptalma* Zwickel.

Genus *Lejeunea* Lib.

*Lejeunea leratii* (Steph.) Mizut.

SPECIMEN EXAMINED. — New Caledonia, North Province, Poindimié, Amoa valley, Tipwadabwé, 20°59'14"S,

165°13'45"E, on volcano-sedimentary rocks aside a flooded creek, along the GR trail, 211 m, 13.X.2019, *Thouvenot NC2741* PC[(PC0712104)].

COMMENTS

*Lejeunea leratii* occurs in Indomalesia (Java, Papua-New Guinea, Malaysia [North Borneo Island], GBIF.org 2020 and Chuah-Petiot 2011) and in New Caledonia from where it was only known by the types of *Hygrolejeunea leratii* Steph. and *H. gottscheana* Steph. (Thouvenot *et al.* 2011). The former has been collected near Poindimié in North Province, the latter lack indications for collector and locality. The main characters of these plants (Fig. 1I-L) are: 1) the very large reniform underleaves, 300–400 µm long, 600–800 µm wide, as wide or wider than the corresponding leaves, the margins entire to retuse at apices; 2) the leaves oval, entire, with a small and inflated lobule, 1/6× the lobe width, with a single one-celled tooth, and 3) the leaf cells relatively large, 25 × 37 µm, with large trigones and intermediate thickenings. The discovery of the new specimen in the municipality where the type had been collected confirms its presence in North Province.

Family LEPIDOZIACEAE Limpr.  
Genus *Acromastigum* A. Evans

\**Acromastigum inaequilaterum*  
(Lehm. & Lindenb.) A. Evans

SPECIMEN EXAMINED. — New Caledonia. South Province, La Foa, Dogny Plateau, 950 m, 21°37'27"S, 165°52'25"E, on dead wood in wet forest, volcano-sedimentary massif, 24.X.2019, *Thouvenot NC2669* PC[(PC0699831)].

FURTHER SPECIMEN EXAMINED. — *Acromastigum echinatum*: New Caledonia. South Province, Yaté, Forêt du Mois de Mai, on trunk in hygrophilous forest, 300 m, 22.VI.1951, *Baumann-Bodenheim 13945* PC[(PC0763166)].

COMMENTS

This widely distributed species, taken for quite variable by Evans (1934), was hitherto unreported from New Caledonia. It is easily separated from most of the species included in the subgenus *Inaequilatera* (Schiffn.) Grolle by a single strong papillose wart on the free wall of the leaf and underleaf cells and the unequal leaf lobes. Furthermore, cell walls evenly thickened separated it from the morphologically close *A. echinatum* (Gottsche) A. Evans which has thinner walls between prominent trigones. The genus *Acromastigum* A. Evans is well represented in New Caledonia with a high endemic rate (2/3) and the addition of *A. inaequilaterum* to this flora increases the number of species and varieties to 17 (Thouvenot 2018). Thus, New Caledonia hosts the richest diversity of this genus behind Malaysia (18 species, Chuah-Petiot 2011) and before Australia (12 species, Brown & Renner 2014).

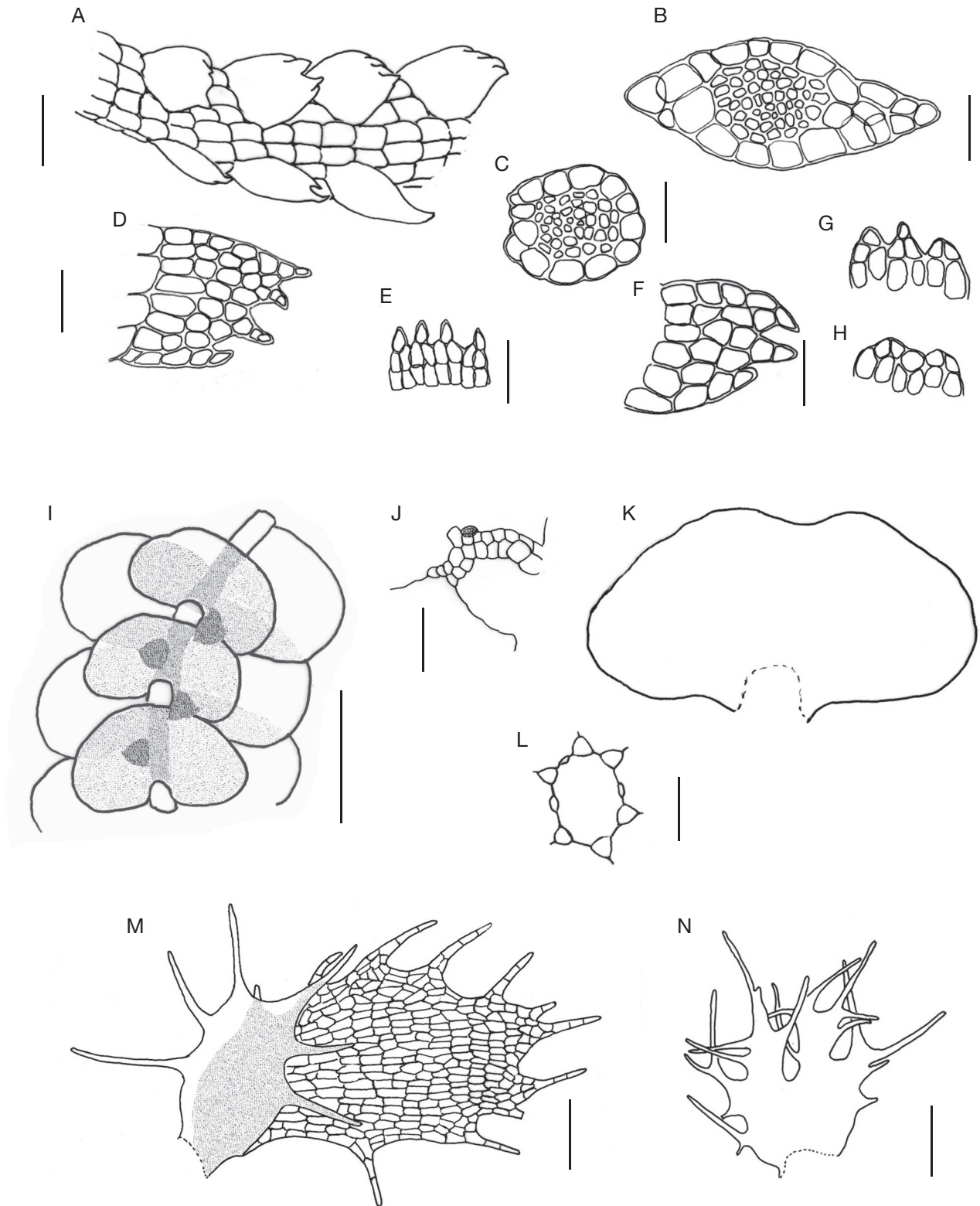


FIG. 1. — **A-H:** *Telaranea parvifolia* (Steph.) J.J.Engel & G.L.Merr. **A**, shoot, dorsal view; **B, C**, stem transverse sections; **D**, main stem leaf; **E**, main stem underleaf; **F**, branch leaf; **G, H**, branch underleaves. From *Thouvenot NC2617*. **I-L:** *Lejeunea leratii* (Steph.) Mizut. **I**, shoot, ventral view; **J**, lobule ventral view; **K**, underleaf; **L**, leaf cell. From *Thouvenot NC2741*. **M, N:** *Balantiopsis montana* (Colenso) J.J.Engel & G.L.Merr. **M**, leaf, dorsal view (lobule cells omitted); **N**, underleaf. From *Laudereau NC2780*. Scale bars: A, M, N, 200  $\mu$ m; B-H, J, L, 100  $\mu$ m; I, 500  $\mu$ m; K, 20  $\mu$ m.

Genus *Telaranea* Spruce ex Schiffr.

*Telaranea parvifolia* (Steph.) J.J.Engel & G.L.Merr.  
(Fig. 1A-H)

SPECIMENS EXAMINED. — **New Caledonia**. South Province, La Foa, Dogny Plateau, 21°37'27"S, 165°52'27"E, in a wet forest at the top of a small valley, 950 m, 24.X.2019, *Thouvenot NC2617* PC[(PC0712107)]; Parc Provincial de la Rivière Bleue, along the path from the Refuge de la Rivière Bleue to Haute Pourina, rainforest, on rotten wood, c. 800 m, 06.IX.2001, *Müller NC178*.

DESCRIPTION

based on the specimen *Thouvenot NC2617* (Fig. 1A-H)

*Habit*

Plant growing in very dense mats made of interwoven stems frequently branching, primary stems producing ventral intercalary secondary stems (*Bazzania*-type branching); all kinds of stem leafy and in turn densely pinnate, with lateral branches of *Frullania*-type often whiplike.

*Stem*

Somewhat dorsi-ventrally flattened, with a strong differentiation: the single external layer of larger cortical cells, 35–65 µm wide, firm walled, sharply distinct from the numerous medullary cells, thicker walled, smaller, 6–25 µm wide.

*Leaves*

Fully developed stem leaves 4-lobed, convex, 200–250 µm long, 250 µm wide, incubous, inserted in a straight line, the two homologous leaves widely separated abaxially by two lines of epidermal cells, the leaf discs transversally rectangular, 8 cells wide, 3–4 cells high, short rectangular, moderately thick-walled, the marginal cells smaller, the leaf lobes small, the ventral smallest, erect or somewhat curved, made of one file of 1–3 cells short rectangular, 1- or 2-celled at bases, the terminal cells narrowly rounded at apices; the branch leaves variable, typically imbricate or erecto-patent, oblong to oval, 3-lobed, lobes 1–2 celled.

*Underleaves*

Fully developed stem underleaves about as wide as the stem, 100–120 µm long, 250 µm wide, the disc 1–2 cells high, with four small lobes, 1–2 cells long; the branch underleaves variable, when fully developed, disc 1–2 cells high, with three 1-celled lobes.

COMMENTS

This endemic Lepidoziaceae was only known from the type collected by Mrs Louise Le Rat in July 1909 in the Dogny Massif (PC0102356). The observation of a fresh specimen allows to complete the description by Engel & Smith-Merrill (2004) and to provide illustrations. The species is noteworthy by the width of the stems that occupy not less than half the whole leafy shoots, so that the leaves are inconspicuous at naked eyes, slightly projecting beyond the stem edge.

Genus *Zoopsis*

(Hook. f. & Taylor) Gottsche, Lindenb. & Nees

\**Zoopsis setigera* Goebel

SPECIMENS EXAMINED. — **New Caledonia**. South Province, Yaté, Parc de la Rivière Bleue, sentier des Méliphages, 22°06'S, 166°39'E, c. 180 m, 30.XI.2010, *Reichel NC887* (DR); Mont-Dore, Mouirange, leaf litter in lowland wet forest, 500–550 m, 19.IX.2019, *Thouvenot NC2866*.

COMMENTS

*Zoopsis setigera* is very similar to *Zoopsis setulosa* Leitg. The New Caledonian plants of this species were treated for a long time as *Z. rigida* Pearson, but this species was synonymized with *Z. setulosa* by Grolle & Piippo (1984). *Zoopsis setulosa* is well represented among our collections, but besides this, we have found two distinctive specimens that we could attribute to *Z. setigera* according to the characters given in Schuster (1999) and Grolle & Piippo (1984). The two basal cells of the leaf rudiment at their base are united for only  $\frac{1}{8}$ – $\frac{1}{4}$  ( $-\frac{2}{5}$ ), their apex is slightly more narrowly rounded and especially the cortical cells of the ventral merophytes are narrowly rectangular and only about 22–27 µm wide (Fig. 4). *Z. setigera* is known from Indonesia (West Irian, Kalimantan), Papua New Guinea, Malaysia (Sabah) and the Solomon Island (Grolle & Piippo 1984, Menzel 1988).

Family LOPHOCOLEACEAE Vanden Berghen  
Genus *Heteroscyphus* Schiffr.

\**Heteroscyphus diestianus* (Sande Lac.) Piippo

SPECIMEN EXAMINED. — **New Caledonia**. South Province, Nouméa 45 km N, Mont Humboldt, ascend from the mountain hut below the summit to the summit, 21°53'S, 166°25'E, epiphytic in shrubland, c. 1600 m, 31.VIII.2003, *F. Müller NC803* (DR, herb. Thouvenot).

COMMENTS

The species is characterized by large, reniform, convex, unlobed underleaves, merely with two short and distant teeth at the apex and with larger teeth at lateral margins. The underleaves are connate with the leaves and the apex is distinctly recurved. The teeth of the leaves are (almost) restricted to leaf bases, otherwise, the leaves are entire. The leaf cells are characterized by very large trigones and distinct pores, and they are clearly mammillose (Piippo 1989).

The species was hitherto known from Indonesia (Borneo, Banca, Sumatra), Malaysia (Sabah), and Papua New Guinea (Piippo 1993). The type locality is in Banca Island near Sumatra. With the record in New Caledonia, the distribution area is expanded to Oceania.



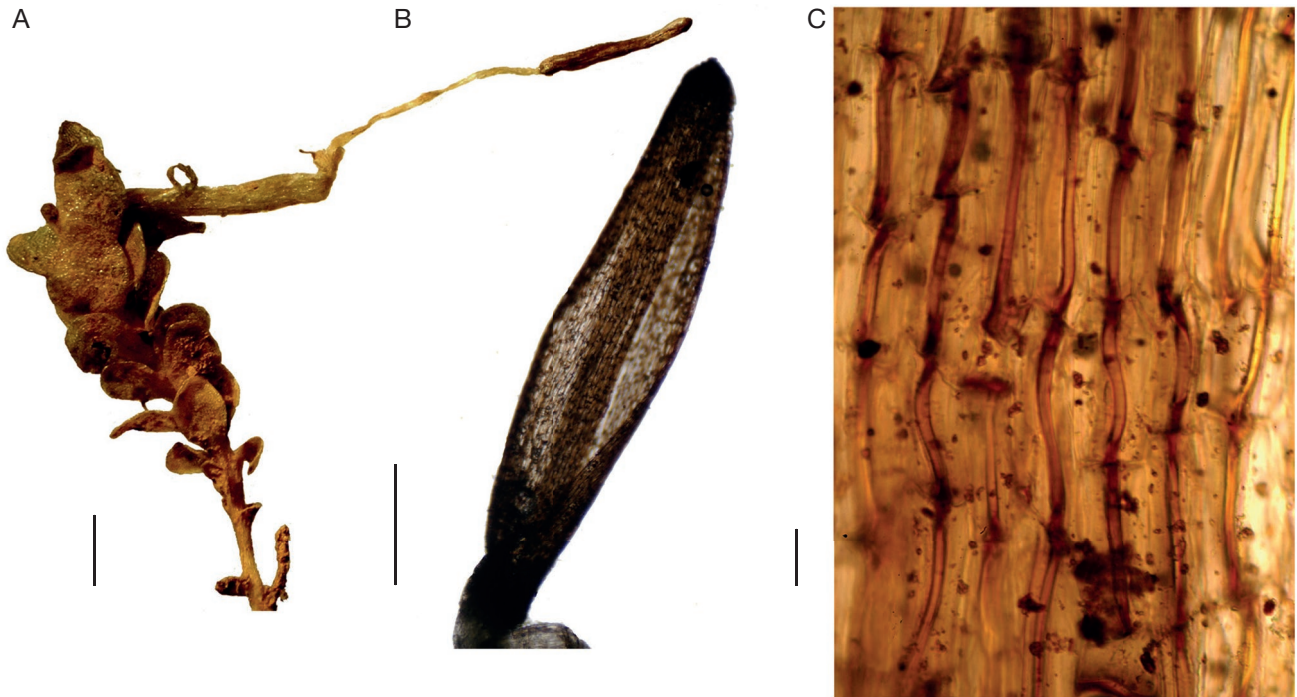


FIG. 2. — *Haplomitrium monoicum* J.J.Engel: **A**, female shoot with sporophyte; **B**, dehiscent capsule; **C**, capsule wall cells. All from Thouvenot NC2588. Scale bars: A, 1 mm; B, 0.5 mm; C, 20 µm.

Family RICCIACEAE Rchb.  
Genus *Riccia* L.

\**Riccia hasskarliana* Steph.

SPECIMEN EXAMINED. — New Caledonia. South Province, Sarraméa, along the hiking trail from Sarraméa to the Plateau de Dogny, 21°38'S, 165°52'E, on wet open soil along the trail, together with *Physcomitrium minutulum* Müll.Hal., c. 200 m, 05.IX.2003, Müller NC872 (DR).

#### COMMENTS

The genus *Riccia* L. is represented in New Caledonia by *R. crinita* Taylor and *R. numeensis* Steph., doubtful records exist for *R. fluitans* L. and *R. junghuhniana* Nees & Lindenb. (Thouvenot *et al.* 2011). *Riccia crinita* and *R. numeensis* both are belonging to sect. *Riccia*; the latter one is endemic to New Caledonia and was described by Stephani based on sterile material.

The specimen Müller NC872 belongs to subgenus *Ricciella*. The thallus cross-section shows regularly large air chambers (Fig. 3D, E). The capsules are bulging into spherical structures on the ventral surface. The inner thallus cells are thick-walled. The spores are about 60 µm in diameter and clearly reticulate on both faces with 7-8 alveolae across diameter on distal face and a small wing (Fig. 3A-C).

*Riccia hasskarliana* is very similar to *R. junghuhniana* and *R. multifida* (Steph.) Steph. *Riccia junghuhniana* is a larger plant with branches 1.25-2.5 mm wide, with narrow airchambers (Meijer 1958) and the sporophytes are not as prominent on ventral surface. *Riccia hasskarliana* differs from the Australian *R. multifida* by spores with a less prominent wing and a lower number of alveolae across diameter on the distal face of the spores (6-8 vs 8-12) (Cargill *et al.* 2016).

*Riccia hasskarliana* was hitherto known from Indonesia (Java, Kalimantan, Sumatra) (Meijer 1958) and India (Singh 2014).

Division BRYOPHYTA Schimp.

Family BRYACEAE Rchb.

Genus *Gemmabryum* J.R.Spence & H.P.Ramsay

\**Gemmabryum dichotomum* (Hedw.) J.R.Spence & H.P.Ramsay

SPECIMEN EXAMINED. — New Caledonia. South Province, ascend from the south to Mont Humboldt, around the mountain hut below the summit, 21°53'S, 66°25'E, on open soil, c. 1400 m, 30.VIII.2003, Müller NC866 (DR).

#### COMMENTS

*Gemmabryum dichotomum* (*Bryum dichotomum* Hedw.) is a nearly cosmopolitan species with the nearest known records in Australia (e.g. Spence & Ramsay 2019). In New Caledonia the species was found on the man-made substrate around a much-visited mountain hut.

Family HOOKERIAEAE Schimp.

Genus *Distichophyllum* Dozy & Molk.

*Distichophyllum semimarginatum* Thér.

SPECIMENS EXAMINED. — New Caledonia. North Province, Mont Panié, ascend along the hiking trail from the street RPN 3 to the

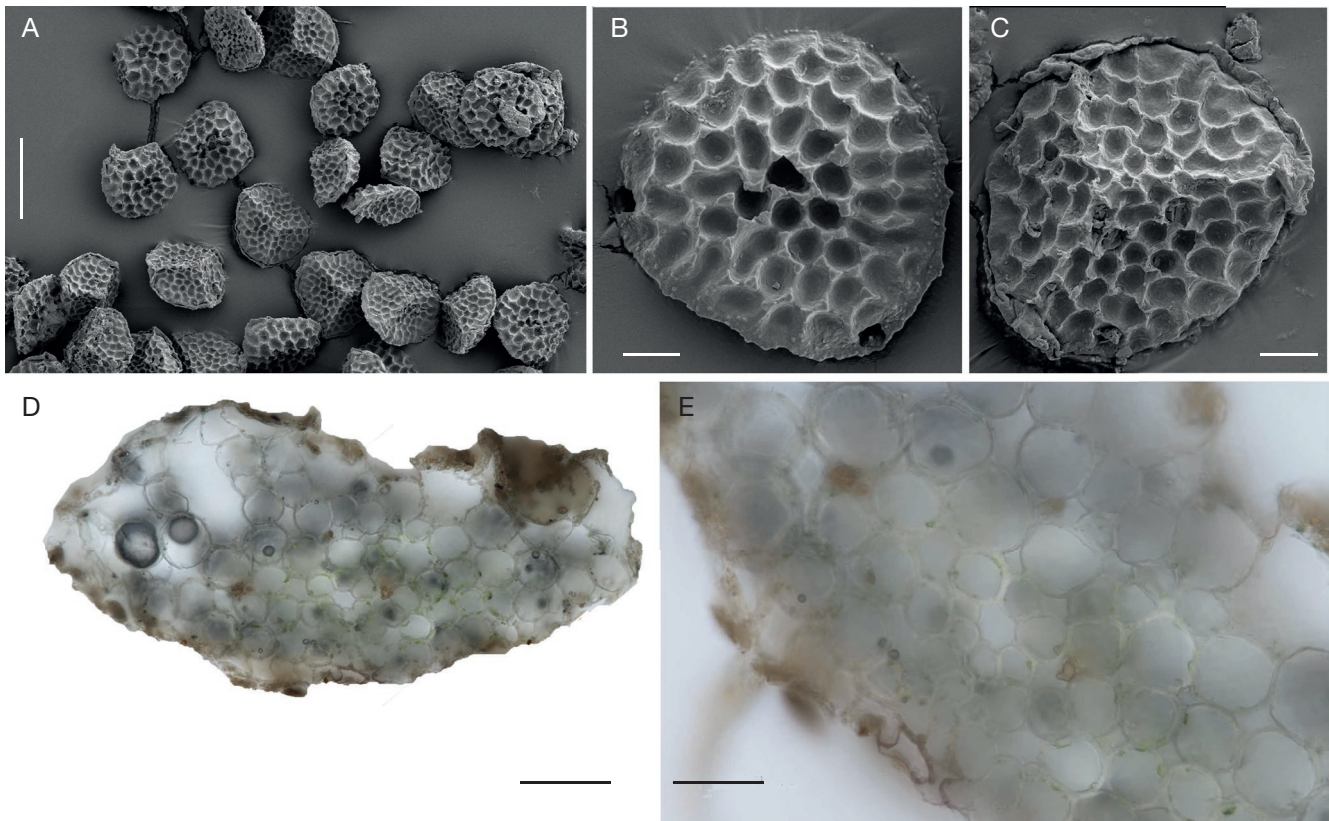


FIG. 3. — *Riccia hasskariiana* Steph.: **A**, spores; **B**, spore in distal view; **C**, spore in proximal view; **D**, thallus cross section; **E**, detail of thallus cross section showing the thick-walled interior cells. All from F. Müller NC872. Scale bars: A, E, 50 µm; B, C, 10 µm; D, 100 µm.

summit, c. 1300 m, very humid rainforest, on wet boulders along a brook, 13.IX.2001, Müller NC56 (DR).

#### COMMENTS

The species was described by Thériot (1910a) from “Mont Koghis, sur l’écorce des arbres.”, collected by Isidore Franc. In PC, TRH, L, S, BM there are specimens collected here by Franc and determined by Thériot between 1909-1913, type material is in PC, S, and BM. We are unaware of any newer collection apart from these old specimens from the type locality. With the new specimen Müller NC56, we can confirm the presence of this species, endemic to New Caledonia, newly reported for North Province. The species is unique among the genus by leaves bordered only in the lower half and denticulate all around (Fig. 5).

Family HYPNACEAE Schimp.  
Genus *Ectropothecium* Mitt.

#### *Ectropothecium sodale* (Sull.) Mitt.

*Journal of the Linnean Society, Botany* 10: 180 (1868).

*Ectropothecium papillosulum* Thér. *Revue Bryologique* 48: 54 (1921). — Type: New Caledonia, “in ditione Poindimié, prope Vagap, II-1910, Le Rat “s.n. (Reliq. E.G.Paris). (lecto-, here designated: “1763. *Ectropothecium papillosulum* Thér. n.sp. mél. à *Rhynchostegium javanicum* v *majus*”, PC[PC0775281!]) **syn. nov.**

#### COMMENTS

Higuchi & Iwatsuki (1994) wrote that they were unable to check the type specimen of *Ectropothecium sodale*. Fortunately, the type specimen was recovered at PC by Lionel Kervran from a pack of returned specimens.

The morphology of this specimen matches the corresponding characters of *E. sodale*. Thériot distinguished his new species only by the less falciform leaves and their wider apices, but the degree of expression of these characters is very variable in a single specimen, both in the type and in all specimens seen in New Caledonia. The type specimen is sterile and its sexuality discussed by Thériot (1921). Finally, *E. papillosulum* is proposed as a synonym of *E. sodale*, a species widely occurring in tropical Asia, Australia, Melanesia and the Pacific Islands (Biju *et al.* 2017 and GBIF 2020).

#### DESCRIPTION FROM THE LECTOTYPE.

##### *Habit*

Shoots remotely pinnate, with leaves secund, slightly concave near base, contiguous to slightly imbricate.

##### *Stem*

Main stems 170 µm wide, with a central strand and thick cortical tissue, pseudoparaphyllia linear foliose, at most two cells wide.

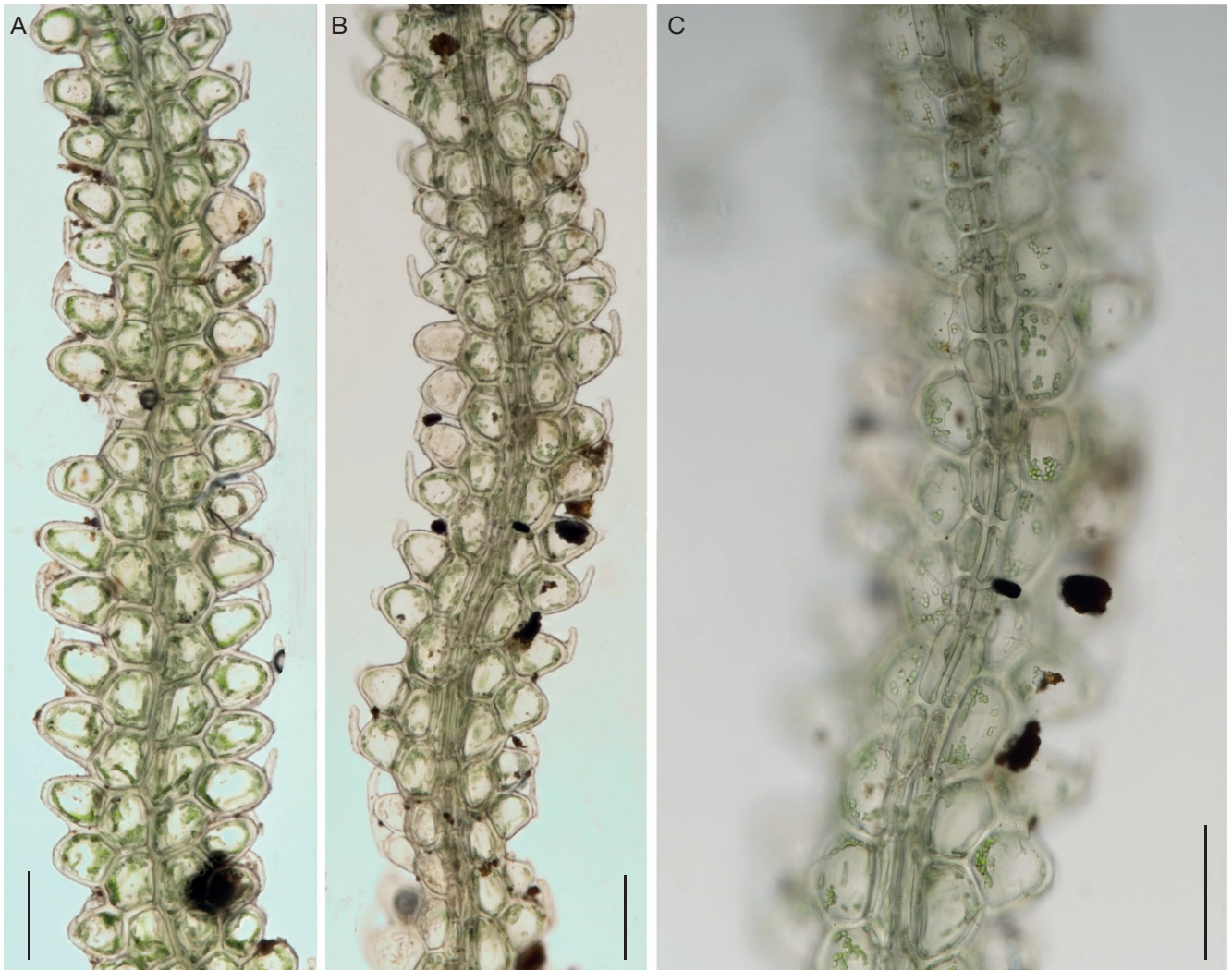


FIG. 4. — *Zoopsis setigera* Goebel: **A**, part of plant, dorsal aspect; **B**, part of plant, ventral aspect; **C**, detail of ventral merophyte with cortical cells narrowly rectangular and only about 22–27  $\mu\text{m}$  wide. All from K. Reichel NC887. Scale bars: A–C, 100  $\mu\text{m}$ .

#### Leaves

Triangular-lanceolate, 0.8 mm long, 0.2 mm wide, costa short and double, margins denticulate, at least near apices or bases.

#### Cells

Leaf cells linear, thin-walled, dorsally prorate, 32–57  $\mu\text{m}$  long, 5  $\mu\text{m}$  wide, angular cells few, short rectangular to quadrate, with a single inflate cell short decurrent.

Genus *Isopterygium* Mitt.

*Isopterygium albescens* (Hook.) A.Jaeger

*Bericht über die Thätigkeit der St. Gallischen Naturwissenschaftlichen Gesellschaft* 1876–77: 433 (Gen. Sp. Musc. 2: 1251) (1878).

*Isopterygium sarasinii* Thér. *Nova Caledonia, Forschungen in Neu-Caledonien und auf den Loyalty-Inseln, B. Botanik* 1: 31 (1914). — Type: Loyalty Islands, Lifou, 1912, *Sarasin & Roux* 768, 769, (holo-, PC[PC0094059!]) *syn. nov.*

#### COMMENTS

Thériot (1914) described the new species *Isopterygium sarasinii* as intermediate between *I. neocaledonicum* Thér. and *I. austropusillum* (Müll.Hal.) A.Jaeger, that both became synonyms of *I. albescens*, together with *I. minutirameum* (Müll.Hal.) A.Jaeger, also recorded for the country (Iwatsuki & Ramsay 2009). Indeed, our observation of the type of *I. sarasinii* at PC, with the vegetative and perichaetial leaf shapes, the sporophyte characters and the sizes of all parts being included in the variability of *I. albescens*, lead us to reduce it in synonymy with the latter species.

The specimen kept in PC is handwritten by Thériot, annotated “sp. nov.” and “fig.,” meaning a drawing by the author (unpublished). It was sent by the Zurich Botanical Museum in order to determine the mosses collected in New Caledonia by K.F. Sarasin during a Swiss mission with J. Roux in 1911–1912. In the publication of the results, Thériot (1914) designated this specimen as the type but not the herbarium localisation. The specimen in PC (PC0094059) is most likely the only plant used by Thériot for its description of the new species and, therefore, the holotype.

Finally, in New Caledonia there is only one species of the genus *Isopterygium*. The two more reported *Isopterygium*, *I. arquifolium* (Bosch et Sande Lac.) Jaeger and *I. textorii* var. *latifolium* Cardot & Thériot, now belong to a different genus (see below: *Pseudotaxiphyllum pobliaecarpum*).

Genus *Pseudotaxiphyllum* Z. Iwats.

*Pseudotaxiphyllum pobliaecarpum* (Sull. & Lesq.) Z. Iwats.

**SPECIMENS EXAMINED.** — *Isopterygium textorii*, **New Caledonia**. South Province, Dogny, 1055 m, VII.1909, *L. Le Rat* s.n. (PC[PC0096550]); North Province, Poindimié, Amoa Valley, Tipwadabwé, 20°59'23"S, 165°13'51"E, on wet soil in volcano-sedimentary massif, in mesophilous forest, 252 m, 13.X.019, *Thouvenot NC2724*; **Viet Nam**. Tam-Dao, 950 m, 7.VI.1925, *V. Demange* s.n. (PC[PC0763231]); *Rhynchostegium textori* Sande Lac. **Japan**. "in Hiogo ad rupes montis Kimbosan", *Textor Stebold* s.n. (original specimen in the herbarium J. Cardot) (iso-, PC[PC0693391]).

**COMMENTS**

When Müller & Tan (2013) reported *Pseudotaxiphyllum pobliaecarpum* in New Caledonia, they were surprised that this species was not yet reported from the area. Indeed, the presence of this species in New Caledonia, as *Isopterygium textorii* (Sande Lac.) Mitt. and *Isopterygium arquifolium* (Bosch & Sande Lac.) A. Jaeger, were troublesome since Pursell & Reese (1982) reported it in New Caledonia according to Brotherus (1911), but there was no mention of the species there. Subsequently, Thouvenot & Bardat (2010) mention only *I. textorii* var. *latifolium* Cardot & Thér., after Thériot (1911), but erroneously too since the record of this plant was from Japan. Recently, we recovered in PC a specimen collected in 1909 in South Province by Mrs Le Rat, identified by E.G. Paris as *I. textorii* and annotated by himself as new to the island. The ancient presence of *P. pobliaecarpum* in New Caledonia is consequently documented.

Family MYURIACEAE Broth. ex M. Fleisch.  
Genus *Myurium* Schimp.

*Myurium rufescens* (Reinw. & Hornsch.)  
M. Fleisch. subsp. *rufescens*

**SPECIMENS EXAMINED.** — *M. rufescens* subsp. *rufescens*: **New Caledonia**. North Province, Poindimié, Amoa Valley, on the trail to Goro Até Mèkébo, 20°56'5"S, 165°10'33"E, on volcano-sedimentary rock, in dwarf wet forest, 724 m, 12.X.2019, *Thouvenot NC2637*; Mont Panié, along the hiking trail from the street RPN 3 to the summit, very humid rainforest, epiphytic, c. 850 m, 13.IX.2001, *Müller NC142*. North Province, Mt Panié, c. 800 m, on tree trunk, 29.VII.1982, *Iwatsuki 176* (*Bryophyta exsiccata*, fasc. 4 (1983), NOU as *Oedocladium rufescens*)

**OTHER SPECIMENS EXAMINED.** — *M. rufescens* var. *neocaledonicum*: **New Caledonia**. North Province, Tao, in forest, 100-600 m, I.1910, *Franc* s.n. (PC[PC0695564, PC0695565]); *M. rufescens* subsp. *purpuratum*: **New Caledonia**. South Province, Yaté, on trunk in mountain mesophilous forest, on the top of hills between Rivière Bleue and Rivière Blanche, 500 m, 14.VI.1951, *Hürlimann 2689* (PC); *M. quinquefarium*: **New Caledonia**. South Province, Dogny Plateau, I.1911, *Franc* s.n. (holo-, PC[PC0695570]).

**COMMENTS**

In New Caledonia, this species is known from two collections by Le Rat in South Province (Dogny and Pic Pembai) (Brotherus 1911, Maschke 1976) and one by Iwatsuki in North Province (Mt Panié) (Iwatsuki & Mizutani 1983 as *Oedocladium rufescens* [Reinw. & Hornsch.] Mitt.). Here we report two new specimens from North Province that allow us to confirm the presence of the subsp. *rufescens* versus subsp. *purpuratum*. *M. rufescens* subsp. *purpuratum* (Mitt.) Maschke was collected in South Province (Yaté) by Hürlimann and in North Province (Tao) by Franc (as its synonym *M. rufescens* var. *neocaledonicum* Thér. [Thériot 1910b]). The third taxa present in New Caledonia, *Myurium quinquefarium* Thér., is only known from the type kept at PC.

KEY TO THE NEW CALEDONIAN *MYURIUM* TAXA (MODIFIED FROM MASCHKE 1976)

- 1. Leaves shorter, up to 1.5 mm long, not plicate, evenly five ranked in the branch upper parts ..... *M. quinquefarium*
- Leaves larger, up to 5 mm long, not plicate, unevenly set along the branches ..... 2
- 2. Leaves 4-5 mm long, gradually tapered, usually dark red; upper margins more or less bluntly toothed ..... *M. rufescens* subsp. *purpuratum*
- Leaves usually less than 3 mm long, sharply narrowed in a subulate point, variously coloured; upper margins sharply toothed ..... *M. rufescens* subsp. *rufescens*

Family ORTHOTRICHACEAE Arn.  
Genus *Macromitrium* Brid.

\**Macromitrium macrosporum* Broth.

**SPECIMEN EXAMINED.** — **New Caledonia**. North Province, Poindimié, Tango Plateau, alt. 300 m, on a fallen branch in a quarry, 11.X.2019, *Thouvenot NC2920* (PC[PC0712108]).

**DESCRIPTION**

*Habit*

Plant growing in dense mats, stems long creeping, densely branched; branches short, erect, 10 mm long, 2 mm wide, rusty brown, the youngest part light green, when dry curly, with leaves individually twisted, the apices incurved to coiled, when wet with leaves erect-patent, the apices incurved, costa strongly prominent abaxially, making a groove adaxially in upper part.

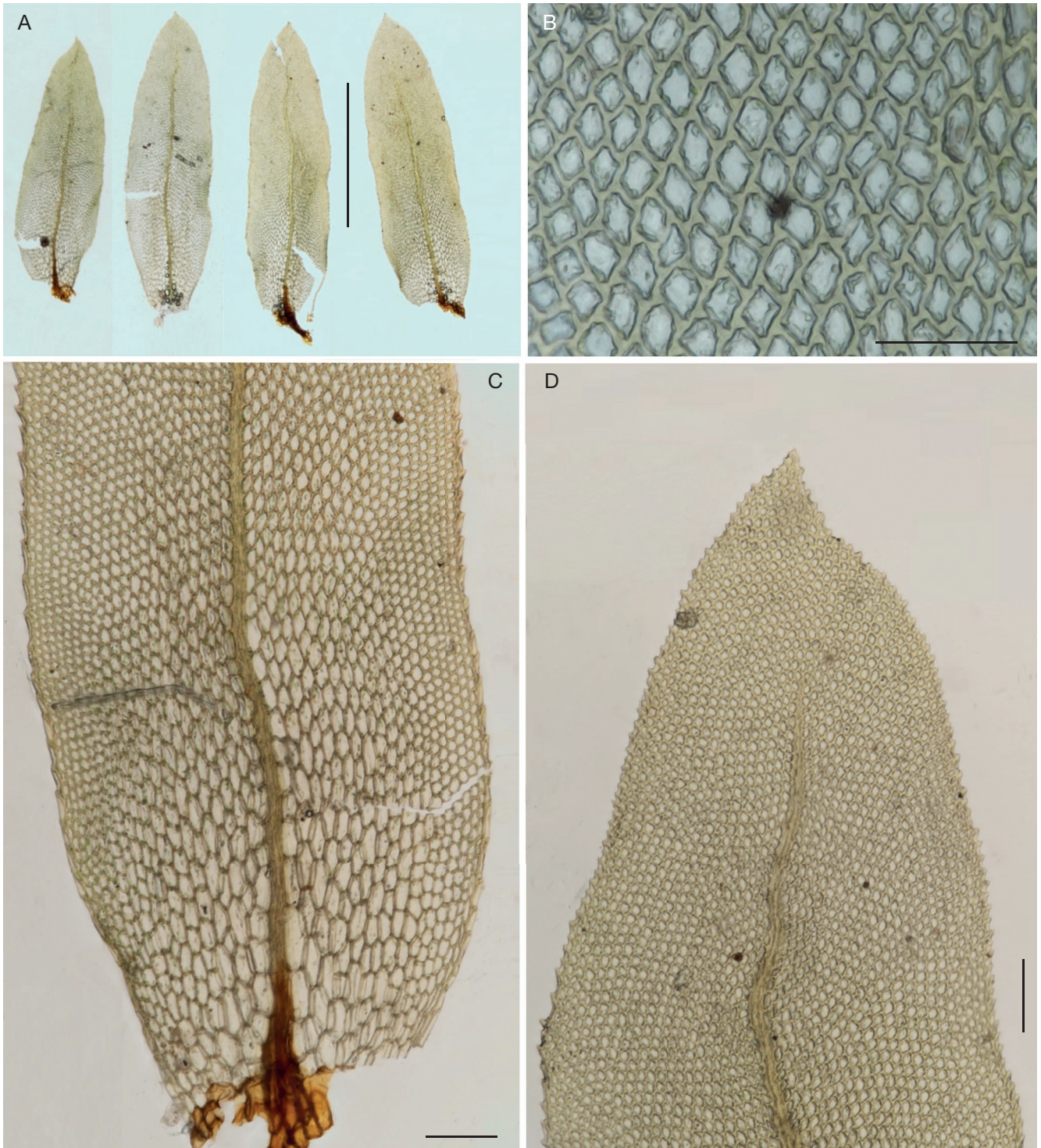


FIG. 5. — *Distichophyllum semimarginatum* Thér.: **A**, leaves; **B**, leaf cells in upper part of leaf; **C**, basal part of leaf; **D**, upper part of leaf. All from *F. Müller* NC56. Scale bars: A, 1 mm; B, 50 µm; C, D, 100 µm.

#### Leaves

Narrowly lanceolate acuminate, 2.00-2.75 mm long, 0.35-0.45 mm wide near base, the bases slightly wider, evenly decreasing to the narrowly acuminate to shortly acute apices, at the end the lamina reduced to 1-2 ranks of cells along the costa, percurrent to very shortly excurrent, basal parts of leaf

differentiated by elongate cells very short,  $\frac{1}{10}$  the whole leaf length, margins entire, recurved on one side in basal part.

#### Cells

Upper laminal cells 10-15 µm wide, lumina rounded, thick walled, bulging, mammillose, median and lower laminal

cells lined up, the median oblong, occupying a large part of the leaf length, with single rounded papillae, the lower ones elongate, 40–50 µm long, 10 µm wide, thick walled, porose, with narrow straight lumina and frequent single high papillae.

*Perichaetial leaves*

Erect, not sheathing, shorter than the normal leaves, up to 1.8 mm long, sub-triangular, costae excurrent in short points, areolation like normal branch leaves.

*Sporophytes*

Seta to 10 mm long, smooth, straight, capsules small, ovoid, without neck, rim narrow, plicate, red-brown, peristome reduced to a whitish membrane, vaginula and calyptra naked.

COMMENTS

During a field trip in 2019, one of us (LT) collected a *Macromitrium* specimen that matched none of the species hitherto reported from New Caledonia (Thouvenot 2019). The checked characters match the description of *M. macrosporum* (Brotherus 1898, Vitt *et al.* 1995) from which it differs only by perichaetial leaves smaller than the vegetative ones. This only character is insufficient to define a different species since the other characters in a whole are similar. We were unable to observe male organs nor dwarf male plants on these fertile female plants which lack fresh sporophyte and the sexual status of this species remains unknown (Vitt *et al.* 1995).

This plant occurs at high elevation in Papua-New Guinea (Vitt *et al.* 1995) while it grows at lower elevation in New Caledonia. This ecological difference may be explained by the higher latitude and lower elevation of the highest ranges, capped at 1600 m asl in the latter country. The discovery of this species in New Caledonia increases the number of *Macromitrium* species in New Caledonia up to 25 and extends the range of *M. macrosporum* hitherto known from Papua-New Guinea, Indonesia and Philippines (Vitt *et al.* 1995). It also confirms the affinity of the bryophyte flora in New Caledonia with Indo-Malaya.

Family POTTIACEAE Hampe  
Genus *Chionoloma* Dixon

\**Chionoloma tenuirostre* (Hook. & Taylor) M.Alonso,  
M.J.Cano & J.A.Jiménez var. *tenuirostre*

SPECIMENS EXAMINED. — **New Caledonia**. North Province, Poya 15 km NE, limestone massif Roche d'Adio, 21°14'S, 165°15'E, on limestone rockface, c. 200–250 m, 06.IX.2003, Müller NC464 (DR).

COMMENTS

In New Caledonia, three species of the genus *Chionoloma* Dixon were hitherto known, namely *Chionoloma dubium* (Thér.) M.Alonso, M.J.Cano & J.A.Jiménez, *C. orthodontum* (Müll.Hal.) M.Alonso, M.J.Cano & J.A.Jiménez, and *C. schlimii* (Müll.Hal.) M.Alonso, M.J.Cano & J.A.Jiménez (Alonso *et al.* 2019). Record details of our own collections of

*C. dubium* and *C. schlimii* (as *C. crassicostratum* (D.H.Norris & T.J.Kop.) M.Alonso, M.J.Cano & J.A.Jiménez) are given in Thouvenot *et al.* (2018). Here we report a fourth species of the genus, *C. tenuirostre*, as new for New Caledonia. This species is most similar to *C. orthodontum*, but is differing by its leaf basal marginal cells, which do not extend up the margin to form a V-shaped pattern, and its dorsal stereid band of the costa, which is usually larger than the ventral band (Alonso *et al.* 2019). *Chionoloma tenuirostre* var. *tenuirostre* has a cosmopolitan distribution, except for arctic regions (Alonso *et al.* 2019), the nearest known records are in Australia, New Zealand and Papua New Guinea.

Genus *Hydrogonium* (Müll. Hal.) A.Jaeger

\**Hydrogonium javanicum* (Dozy & Molk.) Hilp.

SPECIMEN EXAMINED. — **New Caledonia**. North Province, Forêt Plate 10 km SW, 21°06'S, 164°59'E, rocks along a brook, 07.IX.2003, Müller NC579 (DR).

COMMENTS

The species, confirmed by Ph. Sollman, is widely distributed in East and SE Asia (Japan, China, India, Ceylon, Philippines, Papua New Guinea) (Norris & Koponen 1989) and was recently reported also from Fiji (Müller 2012).

Genus *Trichostomum* Bruch

*Trichostomum tonghouensis* Thouvenot, nom. nov.

*Hymenostomum aristatulum* Broth. & Paris *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar* 51A (17): 11 (1909).

TYPE. — **New Caledonia**. Tonghoué, ad viam inter Nouméa et Païta, VII.1905, *Le Rat s.n.*; (iso-, PC[PC0697667!]).

OTHER SPECIMENS EXAMINED. — **New Caledonia**. South Province, Yahoué, alt. 150 m, VII.1910, *Franc s.n.* (PC[PC0735859]); Dogny plateau, alt. 900 m, I.1911, *Franc s.n.* PC[(PC0735862)].

DESCRIPTION FROM THE ISOTYPE IN PC

*Habit*

Plant small, gametophyte 2–3 mm high in dry condition, 4 mm high when wet, with sporophyte 8–10 mm high. When dry, leaves erect incurved to circinate, concave to canaliculate, costae conspicuous on the back; when wet, patent, straight above the recurved sheathing base.

*Stem*

Simple, shorter, 0.15 mm wide, cortical cells well defined, 1–2 layers of cells, smaller and thicker walled and orange-brown tinged, central strand present.

*Leaves*

Somewhat different in size and shape, the lower smaller 1.4–1.5 mm long, 0.4–0.45 mm wide, ligulate obtuse, mucronate, wider above middle, the upper 1.8–2.4 mm long, 0.45–0.6 mm

wide, ligulate to lanceolate, acute, aristate, aristae up to 150 µm long, basal part relatively short, oblong-rectangular, hyaline, upper part slightly concave, opaque, margins plane, sub-entire; costae strong, excurrent, ventral cells like the laminal, costa section ovate-reniform, 58 µm wide, 32 µm high, ventral epidermis present, verrucose, dorsal epidermis null, four guide cells, dorsal stereid band larger than the ventral.

#### Cells

Upper cells opaque, 5-7 µm wide, quadrate-hexagonal, firm walled, slightly bulging on both sides, with many low papillae; basal cells smooth, translucent, wide rectangular-elongate, thin-walled, narrower and thicker-walled toward margins, transitional cells smooth, short rectangular, thick-walled, not ascending along the margins.

#### Perichaetial leaves

Like the upper vegetative.

#### Sporophyte

Setae 6-7 mm long, capsules elliptical, stegocarpous, opercula rostrate, rostra oblique 0.6 mm long, urns 1.5 µm long, peristome null; spores 18-22 µm, finely verrucose.

#### COMMENTS

As the genus *Hymenostomum* is now a synonym of *Weissia* (Chen, 1941 *ex* Zander, 1993), we have checked the types of the New Caledonian species still linked to *Hymenostomum*, in order to evaluate their transfer towards *Weissia* versus other Trichostomoideae (*Trichostomum*, *Chionoloma*, *Hyophila*). But this species does not match with *Weissia* characters, lacking crispate leaves in dry condition and involute margins. We transfer it to the genus *Trichostomum*, on the basis of the following characters: dry leaves erect incurved, concave, margins plane, entire, transition of the basal parts gradual, not ascending along margins, costal section with dorsal stereid band larger than the ventral. It differs from other New Caledonian *Trichostomum* species by the absence of peristome and the aristate upper leaves. *Trichostomum* species have usually obtuse to sub-acute, mucronate leaf apices and peristome with 16 short narrow teeth. *T. noumeanum* (Thér.) Thouvenot is quite similar but is a smaller plant, with leaves up to 1.5 mm long and setae up to 1.7 mm long.

The name *Trichostomum aristatulum* Broth. being already published for an Australian species (Brotherus 1916), we choose the name *Trichostomum tonghoueensis* for the New Caledonian plants, after the name of the type locality (article 6.11 of the International Code of Botanical Nomenclature of Shenzhen, Turland *et al.* 2018).

Genus *Weissia* Hedw.

*Weissia francii* (Thér.) Thouvenot, comb. nov.

*Hymenostomum francii* Thér. *Bulletin de l'Académie Internationale de Géographie Botanique* 19: 21 (1909).

*Hymenostomum clausum* Broth. & Paris *Öfversigt af Finska Vetenskaps-Societeten Förhandlingar* 51A(17): 11. 1909. — Type: New Caledonia. "Ad latera humida semitae ad Ouen Toro et ad Yahoué", 17.VI.1908, *A. Le Rat s.n.* (isosyn-, PC[PC0735856, PC0735857]).

TYPE. — New Caledonia. Vallée de la Nondoué (Nouméa), 17.VIII.1908, *Franc s.n.* (lecto-, selected here: PC[PC0697624]).

OTHER SPECIMENS EXAMINED. — New Caledonia. South Province, "au pied du Mont Mou, sur la terre du chemin, en plein soleil, 300 m", 18.VII.1909, *Franc s.n.* PC[(PC0735860)]; "Bois du Sud, sur la terre", IX.1915, *Franc s.n.* PC[(PC0735852)]; "Mt Coffin, près Nouméa, 50 m", 20.IX.1910, *Franc s.n.* PC[(PC0735855)].

#### DESCRIPTION FROM THE LECTOTYPE

##### Habit

Plant small, gametophyte 1 mm high, with sporophyte 3 mm high. When dry, leaves erect incurved, involute tubular; when wet, patent spreading, somewhat recurved.

##### Stem

Simple, shorter, 0.1 mm wide, cortical cells poorly defined, 1-3 layers of cells like the medullar but a little smaller and orange-brown tinged, central strand present.

##### Leaves

0.9-1.1 mm long, 0.2-0.3 mm wide, narrowly lanceolate with lower parts sub-sheathing, hyaline, rectangular, margins plane, sharply narrowed by the inward winding of the margins in upper part, margins above strongly involuted, confluent in cucullate apices with acute mucrones. Costae strong, excurrent in acute mucrones, ovate-reniform in section, 40 µm wide, 30 µm high, ventral epidermis present, papillose, dorsal lacking, 2-3 guide cells, ventral stereid band weak, dorsal stereid band large.

##### Cells

Upper laminal cells opaque, 6-8 µm wide, quadrate-hexagonal, firm walled, strongly to slightly bulging or not, with many furcate papillae; basal ones smooth, translucent, wide rectangular, thin-walled, walls narrower and thicker toward margins, transitional cells smooth, progressively smaller and thick-walled, not ascending along the margins.

##### Perichaetial leaves

Similar to vegetative ones.

##### Sporophyte

Setae 1.5 mm long, twisted to the left, capsules rostrate, ovoid, cleistocarpous., urns 450 µm long, 300 µm wide, rostra 350 µm long; spores 20-25 µm, finely verrucose.

#### COMMENTS

Since genus *Hymenostomum* is now a synonym of *Weissia* (see above, under *Trichostomum tonghoueensis*), this species can be transferred to the genus *Weissia*, according to the following characters: dry habit crispate, margins strongly involute, capsules cleistocarpous. It differs from the other *Weissia* species in

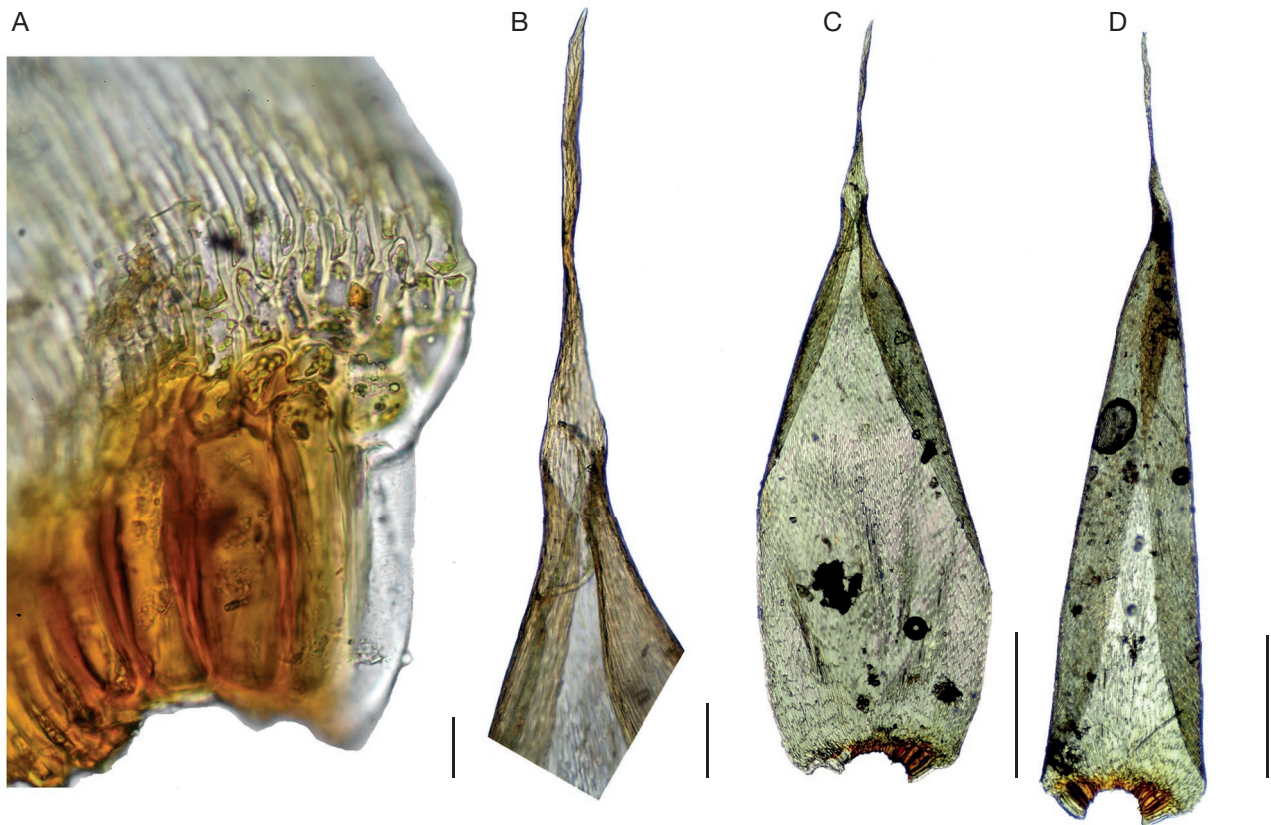


FIG. 6. — *Rhabdostichum piliferum* (Broth.) Broth: **A**, leaf alar cells; **B**, leaf acumen; **C**, **D**, leaves. From Thouvenot NC2774. Scale bars: A, 20 µm; B, 100 µm; C, D, 500 µm.

New Caledonia by the small size, the cleistocarpous capsules, the leaf costae with weakly developed ventral stereid bands.

Family SEMATOPHYLLACEAE Broth.  
Genus *Rhabdostichum* M.Fleisch.

**\**Rhabdostichum piliferum* (Broth.) Broth.**

SPECIMEN EXAMINED. — New Caledonia. North Province, Hienghène, Pwé Hwa Wéc river, 20°38'23"S, 164°52'10"E, on rocks of creek bank in rain forest, metamorphic bedrocks, 630 m, 22.IX.2019, *Thouvenot NC2774* PC[(PC0712111)].

COMMENTS

The genus *Rhabdostichum* M.Fleisch. is reported first from New Caledonia. It is characterized by smooth leaf cells, ecostate and concave leaves, abruptly narrowed in piliform acumens, with inflated alar cells of *Acroporium*-type (Tan *et al.* 2011). Among the species present in South Asian and Malesian regions, *R. piliferum* is a robust plant, with branches 20–40 mm long, leaves erecto-patent to spreading both in dry and wet conditions, margins entire throughout. *R. loriforme* (Broth. & Geheeb) Broth. is distinguished mainly by margins serrulate in upper part including the acumen and a slender habit. Although the New Caledonian specimen (Fig. 6) exhibits smaller leaf size and relatively shorter acumen, we take it

as a small form of *R. piliferum* with whom it shares branches 3–4 mm broad with leaves, leaf margins entire, rarely minutely serrulate at leaf shoulders, shining yellowish-green colour. The specimen is sterile and was growing on rocks mixed with *Ectropothecium sodale* (Sull.) Mitt., *Heteroscyphus deplanchei* (Steph.) Schiffn., *Zoopsis setulosa* Leitg., *Podomitrium marginatum* (Steph.) Hürl. The new locality extends to the south the range of this species previously known from South Asia and Solomon Islands (Tan *et al.* 2011).

Family STEREOPHYLLACEAE W.R.Buck & Ireland  
Genus *Stereophyllum* Mitt.

**\**Stereophyllum radiculosum* (Hook.) Mitt.**

SPECIMENS EXAMINED. — New Caledonia. North Province, Poya 14 km NE, limestone massif Grottes d'Adio, 21°15'S, 165°15'E, on limestone boulders, c. 200 m, 06.IX.2003, *Müller NC885* (DR); Koumac 15 km NNE, limestone rocks along the street RPN7, 20°27'S, 164°22'E, on limestone boulders, c. 200 m, 08.IX.2003, *Müller NC886* (DR).

COMMENTS

The species is widely distributed in the tropics and it was described under many synonyms, the next records are in north-eastern Queensland (Klazenga 2012). From New Caledonia,



there was described *Stereophyllum neocaledonicum* Broth. & Paris (Brotherus 1909), an insufficiently known species not included in recent revisions. Based on the protologue this species could also fall in the synonymy of *S. radiculosum*, but further evaluation of the type is necessary prior to do this with certainty.

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### REFERENCES

- ALONSO M., JIMÉNEZ J. A. & CANO M. J. 2019. — Taxonomic Revision of *Chionoloma* (Pottiaceae, Bryophyta). *Annals of the Missouri Botanical Garden* 104: 563-632. <https://doi.org/10.3417/2019381>
- BARTHOLOMEW-BEGAN S. E. 1991. — A morphogenetic re-evaluation of *Haplomitrium* Nees (Hepaticophyta). *Bryophytorum Bibliotheca* 41: 1-297.
- BIJU P. M., SREEBHA R. & DANIELS E. A. D. 2017. — *Ectropothecium sodale* (Hypnaceae, Bryophyta) – new to India from the Peninsula. *Acta Botanica Hungarica* 59: 9-12. <https://doi.org/10.1556/034.59.2017.1-2.2>
- BROTHERUS V. F. 1898. — Some new species of Australian mosses described. *Öfversigt af Finska Vetenskap-Societetens Förhandlingar* 40: 159-193.
- BROTHERUS V. F. 1909. — Contribution à la flore bryologique de la Nouvelle-Calédonie II. *Öfversigt af Finska vetenskaps-societetens förhandlingar* 51A (17): 1-31.
- BROTHERUS V. F. 1911. — Contribution à la flore bryologique de la Nouvelle-Calédonie III. *Öfversigt af Finska Vetenskaps-Societetens Förhandlingar* 53A (11): 1-42.
- BROTHERUS V. F. 1916. — Descriptions of some new species of Australian, Tasmanian and New Zealand mosses. *Proceedings of the Linnean Society of New South Wales* 41: 575-596 <https://doi.org/10.5962/bhl.part.15325>
- BROWN E. & RENNER M. A. M. 2014. — The genus *Acromastigum* in Australia. *Telopea* 17: 251-293. <https://doi.org/10.7751/telepea20147708>
- CARGILL D. CH., NEAL W. C., SHARMA I. & GUEIDAN C. 2016. — A preliminary molecular phylogeny of the genus *Riccia* L. (Ricciaceae) in Australia. *Australian Systematic Botany* 29 (3): 197-217 <https://doi.org/10.1071/SB16018>
- CHUAH-PETIOT M. S. 2011. — A checklist of Hepaticae and Anthocerotae of Malaysia. *Polish Botanical Journal* 56: 1-44.
- ENGEL J. J. 1968. — A taxonomic monograph of the genus *Balantiopsis* (Hepaticae). *Nova Hedwigia* 16: 83-130.
- ENGEL J. J. 1981. — *Haplomitrium monoicum*, a remarkable new species of Calobryales (Hepaticae) from New Caledonia, together with a reclassification of subgen. *Haplomitrium*. *Annals of the Missouri Botanical Garden* 68: 668-676. <https://doi.org/10.2307/2398895>
- ENGEL J. J. & SMITH MERRILL G. L. 1997. — Austral Hepaticae. 22. The genus *Balantiopsis* in New Zealand, with observations on extraterritorial taxa and a phylogeny of *Balantiopsis* and the family Balantiopsaceae (Jungermanniales). *Fieldiana Botany* N. S. 37: 1-62.
- ENGEL J. J. & SMITH MERRILL G. L. 2004. — Austral Hepaticae. 35. A taxonomic and phylogenetic study of *Telaranea* (Lepidoziaceae), with a monograph of the genus in temperate Australasia and commentary on extra-Australasia taxa. *Fieldiana: Botany* 44: 1-265.
- EVANS A. W. 1934. — A revision of the genus *Acromastigum*. *Annales Bryologici* supplement 3: 1-178.
- GBIF 2020. — <https://www.gbif.org/fr/species/8244251> accessed on 24 Sept. 2020.
- GROLLE R. & PIIPPO S. 1984. — Bryophyte flora of the Huon Peninsula, Papua New Guinea. V. Lepidoziaceae subfam. Zoopsoideae and Cephaloziaceae subfam. Schiffnerioideae (Hepaticae). *Annales Botanici Fennici* 21 (4): 299-307.
- HATTORI S. 1984. — New Caledonian Frullaniaceae. *Journal of the Hattori Botanical Laboratory* 57: 405-426.
- HE X. & CHRISTENHUSZ M. 2012. — The New Guinean liverwort *Cololejeunea morobensis* newly reported from New Caledonia. *Bryobrotherella* 15: 96-99.
- HIGUCHI M. & IWATSUKI Z. 1994. — New Caledonian *Ectropothecium* (Hypnaceae). *Journal of the Hattori Botanical Laboratory* 75: 85-95.
- HÜRLIMANN H. 1999. — Epiphyll Lebermoose aus neukaledonischen Vegetationsaufnahmen. *Hausknechtia Beiheft* 9: 193-200.
- IWATSUKI Z. & MIZUTANI M. 1983. — *Bryophyta exsiccata*. Fasc. 4 (No 151-200). The Hattori Botanical Laboratory. Japan.
- IWATSUKI Z. & RAMSAY H. P. 2009. — The genera *Isopterygium* Mitt. (Bryopsida, Hypnaceae) and *Isopterygiopsis* (Hedw.) Z. Iwats. (Bryopsida, Plagiotheciaceae) in Australia. *Telopea* 12: 371-384. <https://doi.org/10.7751/telepea20095825>
- KLAZENGA N. 2012. — *Australian Mosses Online 19. Stereophyllaceae*. Australian Biological Resources Study, Canberra. Version 11 May 2012. [http://www.anbg.gov.au/abrs/Mosses\\_online/19\\_Stereophyllaceae.html](http://www.anbg.gov.au/abrs/Mosses_online/19_Stereophyllaceae.html)
- MASCHKE J. 1976. — Taxonomische Revision der Laubmoosgattung *Myurium* (Pterobryaceae). *Bryophytorum bibliotheca* 6: 1-218.
- MEIJER W. 1958. — Notes on species of *Riccia* from the Malaysian region. *Journal of the Hattori Botanical Laboratory* 20: 107-118.
- MENZEL M. 1988. — Annotated catalogue of the Hepaticae and Anthocerotae of Borneo. *Journal of the Hattori Botanical Laboratory* 65: 145-206.
- MÜLLER F. 2012. — Additions to the moss flora of Taveuni Island (Fiji, South Pacific). *Polish Botanical Journal* 57 (1): 197-203.
- MÜLLER F. & TAN B. C. 2013. — New bryophyte records from New Caledonia. *Cryptogamie, Bryologie* 34: 367-371. <https://doi.org/10.7872/cryb.v34.iss3.2013.367>
- NORRIS D. H. & KOPONEN T. 1989. — Bryophyte flora of the Huon Peninsula, Papua New Guinea. XXVIII. Pottiaceae (Musci). *Acta Botanica Fennica* 137: 81-138.
- PARIS E. G. 1908. — Hépatiques de la Nouvelle-Calédonie (2<sup>e</sup> article). *Revue Bryologique* 35: 62.
- PEARSON W. H. 1922. — A systematic account of the plants collected in New Caledonia and the Isle of Pines by Mr R. H. Compton, M.A., in 1914. – Part III. Cryptogams (Hepaticae, Fungi). *Journal of the Linnean Society, Botany* 46: 13-44. <https://doi.org/10.1111/j.1095-8339.1922.tb00474.x>
- PIIPPO S. 1985. — Bryophyte flora of the Huon Peninsula, Papua New Guinea. XII. Geocalyceae (Hepaticae). *Acta Botanica Fennica* 131: 129-167.
- PIIPPO S. 1989. — The Bryophytes of Sabah (North Borneo) with special reference to the BRYOTROP transect of Mount Kinabalu. III. Geocalyceae (Hepaticae). *Willdenowia* 18 (2): 513-527.
- PIIPPO S. 1993. — On the taxonomy and nomenclature of SW

- Asiatic Geocalycaceae (Hepaticae). *Annales Botanici Fennici* 30 (3): 195-203.
- PÓCS T. & PIPPO S. 1999. — Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXIV. *Aphanolejeunea* (Lejeuneaceae, Hepaticae). *Acta Botanica Fennica* 165: 85-102.
- PREUSSING M., OLSSON S., SCHÄFER-VERWIMP A., WICKETT N. J., WICKE S., QUANDT D. & NEBEL M. 2010. — New insights in the evolution of the liverwort family Aneuraceae (Metzgeriales, Marchantiophyta), with emphasis on the genus *Lobatiriccardia*. *Taxon* 59: 1424-1440. <https://doi.org/10.1002/tax.595009>
- PURSELL R. A. & REESE W. D. 1982. — The mosses reported from New Caledonia. *Journal of the Hattori Botanical Laboratory* 53: 449-482.
- RENNER M. A. M. 2016. — Three's a crowd: a revision of the monotypic family Goebeliellaceae (Porellales: Jungermanniosida). *Telopea* 19: 79-97. <https://doi.org/10.7751/telopea10397>
- SCHUSTER R. M. 1999. — Studies on Hepaticae. LXV. Lepidoziaceae subf. Zoopsidaceae (2): *Zoopsis. Nova Hedwigia* 68: 1-63. <https://doi.org/10.1127/nova.hedwigia/68/1999/1>
- SINGH S. K. 2014. — An appraisal of genus *Riccia* in India with a note on diversity and distribution of species. *International Journal of Sustainable Water and Environmental Systems* 5 (1): 35-43. <https://doi.org/10.5383/swes.06.01.0004>
- SPENCE J. R. & RAMSAY H. P. 2019. — Revised keys and additions to the Australian Bryaceae (Bryopsida). *Telopea* 22: 99-134. <https://doi.org/10.7751/telopea13056>
- TAN B., KOPONEN T. & NORRIS D. H. 2011. — Bryophyte flora of the Huon Peninsula, Papua New Guinea. LXXIII. Sematophyllaceae (Musci) 2. *Brotherella*, *Clastobryopsis*, *Clastobryum*, *Heterophyllum*, *Isocladiella*, *Isocladiellopsis*, *Meiotheciella*, *Meiothecium*, *Papillidiopsis*, *Rhaphidostichum* and *Wijkia*. *Acta Bryolichenologica Asiatica* 4: 3-58.
- THÉRIOT I. 1910a. — Diagnoses d'espèces et de variétés nouvelles de mousses (7<sup>e</sup> article). *Bulletin de l'Académie Internationale de Géographie Botanique* 20: 96-104.
- THÉRIOT I. 1910b. — *Diagnoses d'espèces et de variétés nouvelles de mousses* (8<sup>e</sup> article), G.D. Quoist, Le Havre, 8 p.
- THÉRIOT I. 1911. — Diagnoses d'espèces et de variétés nouvelles de mousses (9<sup>e</sup> article). *Bulletin de l'Académie internationale de Géographie botanique* 21: 269-272.
- THÉRIOT I. 1914. — Musci de la Nouvelle-Calédonie et des îles Loyalty et diagnoses d'espèces nouvelles, in SARASIN F. & ROUX J., *Nova Caledonia, Forschungen in Neu-Caledonien und auf den Loyalty-Inseln*, B. *Botanik* 1C.W. Kreidels, Wisebaden: 23-32.
- THÉRIOT I. 1921. — Considérations sur la flore bryologique de la Nouvelle-Calédonie et diagnoses d'espèces nouvelles. *Revue Bryologique* 48: 54-59.
- THOUVENOT L. 2018. — *Acromastigum lamyi* sp. nov. (Lepidoziaceae, Marchantiophyta), a new liverwort species from New Caledonia. *Cryptogamie, Bryologie* 39: 233-239. <https://doi.org/10.7872/cryb/v39.iss2.2018.233>
- THOUVENOT L. 2019. — A review of the genus *Macromitrium* (Orthotrichaceae, Bryophyta) in New Caledonia. *Cryptogamie, Bryologie* 40 (16): 167-217. <https://doi.org/10.5252/cryptogamie-bryologie2019v40a16>
- THOUVENOT L. & BARDAT J. 2010. — Liste actualisée et annotée des mousses de Nouvelle-Calédonie. *Cryptogamie, Bryologie* 31: 163-197.
- THOUVENOT L. & MÜLLER F. 2016. — *Macromitrium humboldtense* (Orthotrichaceae, Bryophyta), a new species from New Caledonia. *Cryptogamie, Bryologie* 37: 295-303. <https://doi.org/10.7872/cryb/v37.iss3.2016.295>
- 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. <https://doi.org/10.7872/cryb.v32.iss4.2011.287>
- THOUVENOT L., MÜLLER F. & GRADSTEIN S.R. 2018. — Contribution to the bryophyte flora of New Caledonia III. New and interesting records, new combinations and new synonyms. *Cryptogamie, Bryologie* 39: 361-376. <https://doi.org/10.7872/cryb/v39.iss3.2018.361>
- TIXIER P. 1972. — Mousses exotiques. *Bulletin du Muséum national d'Histoire naturelle, Botanique*, sér. 3. 4 : 89-98.
- TURLAND N. J., WIERSEMA J. H., BARRIE F. R., GREUTER W., HAWKSWORTH D. L., HERENDEEN P. S., KNAPP S., KUSBER W. H., LI D. Z., MARHOLD K., MAY T. W., MCNEILL J., MONRO A. M., PRADO J., PRICE M. J. & SMITH G. F. (EDS) 2018. — International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. *Regnum Vegetabile*. 159. Glashütten: Koeltz Botanical Books. <https://doi.org/10.12705/Code.2018>
- 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.

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