



## Biological Sciences

# Mosses (Bryophyta) of the north-western region of Marambio (Seymour) Island, Antarctica

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### Abstract

Marambio (Seymour) Island is located in the James Ross Archipelago east of the Antarctic Peninsula. Although several research groups have carried out studies on the biodiversity on the island for decades, surveys of bryophytes have not been developed. That is why there are currently only six species of mosses recorded in the northern part of the island. During the 2021–2022 summer Antarctic field trip, 15 mosses species were surveyed in Marambio Island. Of the total number of collected species, nine are reported for the first time for Marambio Island. For the remaining four species, their distributions are now expanded to Marambio Island.

**Key words:** *Aloina*, biodiversity survey, *Bryoerytrophillum*, bryophytes, *Bryum*, *Ceratodon*, James Ross Archipelago, *Schistidium*, *Syntrichia*

### Introduction

Antarctica has been the object of study by biologists since the beginning of the nineteenth century. The first record of bryophytes was made by William Smith on the merchant ship *Williams* from England in 1819. Since then, numerous works related to the moss flora of different Antarctic regions have been published. Some of these publications are of particular importance, such as Cardot & Thériot (1900) and Ochyra *et al.* (2008). The last mentioned work represents the more exhaustive synthesis of the Antarctic muscinal flora. There are also later studies that mention particular taxa or form part of ecological studies, such as Araneda *et al.* (2021).

Marambio (Seymour) Island is part of the James Ross Archipelago, located 100 km south-east of the Antarctic Peninsula, in the Weddell Sea. The archipelago is made up of five islands: James Ross (the largest), Vega, Snow Hill, Cockburn and Marambio. Marambio Island has an approximate surface area of 20 km long (in a south-west to north-east direction) and a maximum width of 8 km (in a north-west to south-east direction). This island, unlike other islands in the archipelago, lacks glaciers and permanent accumulations of snow during the summer. The plateau relief inclines slightly to the east, up to an elevation of 190 m above sea level (m.a.s.l.), and the flanks of the plateau are instead abrupt, conforming inclinations that reach values of 45°. The surface water system consists of a series of small watercourses with a transient regime, active only during the

summer, which flow towards the basins and with drainage towards the Weddell Sea. The activity of the watercourses is variable even within the same season, strongly depending on the meteorological conditions (Busso 2003). Despite the existence of numerous palaeontological and bird monitoring studies, among others, knowledge of the diversity of mosses is scarce and is restricted to the record of six species: *Aloina brevirostris* (Hook. & Grev.) Kindb., *Bryum pseudotriquetrum* (Hedw.) G. Gaertn., B. Mey. & Scherb., *Encalypta* cf. *rhaptocharpa* Schwägr., *Grimmia plagiopodia* Hedw., *Hennediella heimii* (Hedw.) R.H. Zander and *Syntrichia caninervis* var. *caninervis* Mitt. They were identified from materials from the north-western region of the island, called Cape Withman (Ochyra *et al.* 2008). The records for the remaining islands of the archipelago are notably more abundant: James Ross, 39 species (Goga *et al.* 2018); Vega, 10 species; Snow Hill, 3 species (Ochyra *et al.* 2008); and Cockburn, 12 species (Cottet *et al.* 2024). Given this difference in records, it is considered relevant and necessary to carry out studies that contribute to reporting the diversity of mosses on Marambio Island. For this reason, the objective of this work was to contribute to the knowledge of the moss richness of this island.

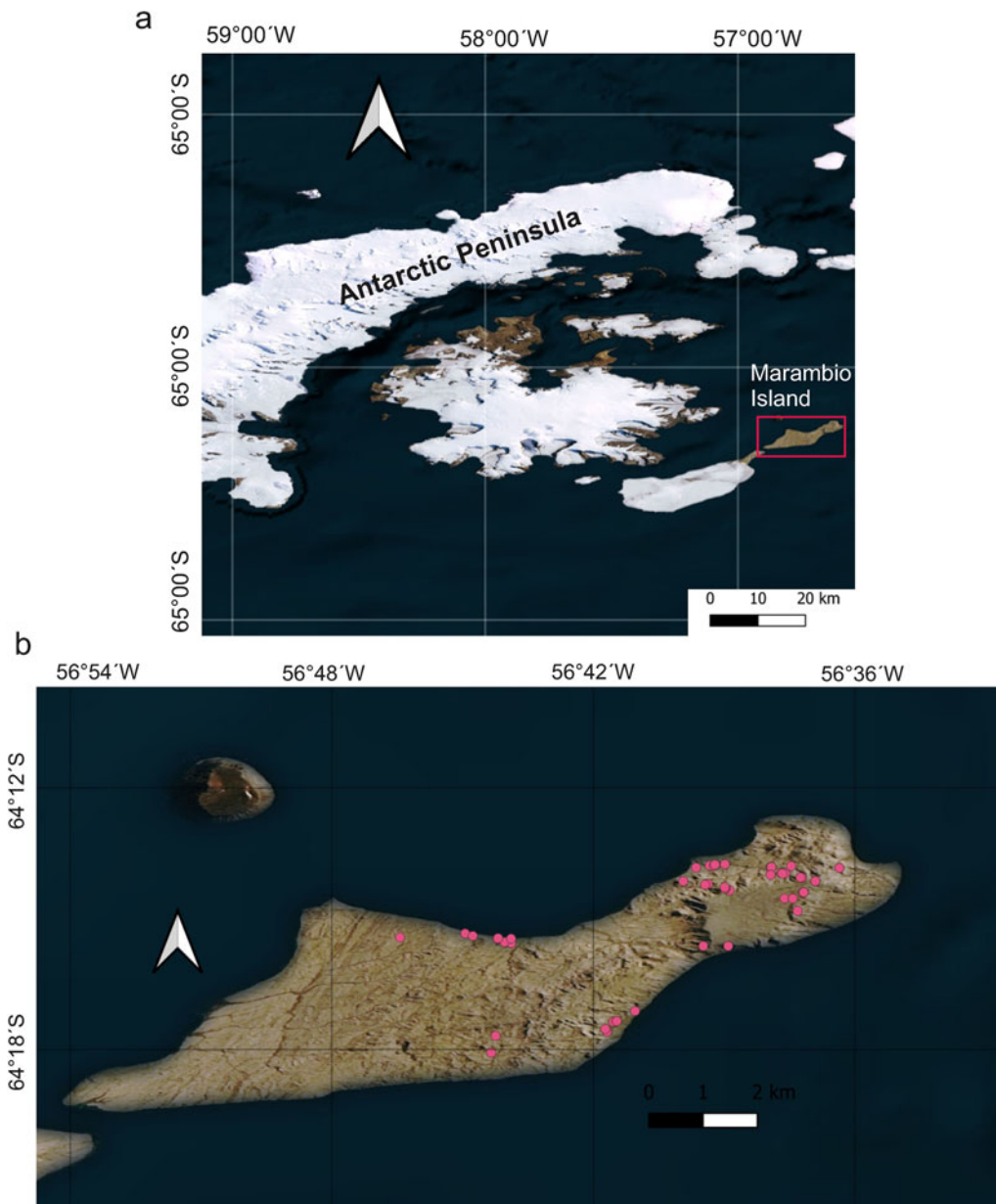
### Materials and methods

Within the framework of the Campaña Antártica de Verano 2021–2022, Instituto Antártico Argentino (IAA), Dirección Nacional del Antártico (DNA), Argentina, plant collections were carried out in the north-western region of Marambio Island (Fig. 1). A total of 95 samples were collected, which were taken in the region of the island with the most human activity: in the surroundings of the Base Aérea Vicecomodoro

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**Cite this article:** Cottet AC, Messuti MI, Ansaldo M, Dopchiz LP (2025). Mosses (Bryophyta) of the north-western region of Marambio (Seymour) Island, Antarctica. *Antarctic Science* 1–8. <https://doi.org/10.1017/S0954102024000464>

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**Figure 1.** Location of the study area. **a.** Map of Antarctica showing the location of the northern Antarctic Peninsula and Marambio (Seymour) Island (red box). **b.** Marambio (Seymour) Island. Pink points show sampling sites.

Marambio, in the research camps located on the west and east coasts and in the penguin colony area where monitoring is carried out. For the identification of the moss species present in each sample, the morphology and anatomy of the different structures, of the gametophyte (e.g. leaf or cells) and, when present, of the sporophyte (e.g. capsule, operculum or calyptra) were observed (Gradstein *et al.* 2001). The observations on general aspects were made under a stereoscopic microscope (Olympus BX50) in both dry and hydrated states. The cuts for the anatomical study were made under a magnifying glass and free-handed, using razor blades. Water was used for mounting fresh mounts (Frahm 2003). For the identification and distribution of the taxa, the following bibliography was used: Ochyra *et al.* (2008), Gallego *et al.* (2011) and Sollman (2015). The collected specimens were sent to the IAA repository, and duplicates were deposited in the Herbarium of the Centro Regional Universitario Bariloche

(BCRU). Specific names have been updated according to the Missouri Botanical Garden database (<http://www.tropicos.org>).

## Results

A total of 15 species were identified, of which nine are new mentions for the island. An annotated list of the species is provided below in alphabetical order, with citations for descriptions and iconography, habitat and distribution, comments and examined material. Asterisks (\*) refer to new records for the island. The examined materials of each species are presented in the Appendix.

### *Aloina brevirostris* (Hook. & Grev.) Kindb. [Pottiaceae]

#### *Description and iconography*

Ochyra *et al.* (2008).

### Distribution and habitat

*Aloina brevirostris* has a bipolar distribution and in arid areas has been reported growing either in dry or temporally moist habitats. This species grows on stones and boulders, gravelly silt and soil or in rock crevices (Ochyra *et al.* 2008). Within the study area, it was found on the plateau and on the slope growing on soil sites both protected by rocks and on exposed zones. This species, together with *Bryum pseudotriquetrum*, was observed more frequently and formed larger plots, reaching 20 m<sup>2</sup>. In most cases, it was observed growing alone or with lichens; however, it was also found growing together with other bryophytes.

### Comments

*Aloina brevirostris* is the only species of the genus reported from Antarctica. The species is characterized by having broadly ligulate leaves with strongly inflexed margins that cover the photosynthetic filaments and the cuculate apex (Ochyra *et al.* 2008).

### \**Bryoerythrophyllum antarcticum* (L.I. Savicz & Smirnova) P. Sollman [Pottiaceae]

#### Description and iconography

Ochyra & Zander (2002).

### Distribution and habitat

This species is considered endemic to Antarctica, with a large distribution on the continent. *Bryoerythrophyllum antarcticum* has been found in diverse environments, ranging from dry to humid, on loamy, sandy and rocky soils, along meltwater streams and on lake margins (Sollman 2015). In the study area, it was found on the plateau and in the slope zone, growing on soil protected by rocks as well as in exposed sites. The species was found both growing alone and with other bryophytes.

### Comments

It differs from other species in the genus also present in Antarctica by its compact and low cushion shape (1.0–2.0 cm), having ovate leaves, entire at the apex, and small leafy shoots, arising especially from the upper part of the stems; rhizoids are scattered throughout the stem; and the leaves curved when dry, not crisp. The species found differs from its congeneric species *Bryoerythrophyllum recurvirostrum* because it has a toothed apex, more or less contorted leaves and the rhizoids are restricted to the basal portion of the stem. Also, *B. antarcticum* is easily confused with another species present in the study area, *Didymodon brachyphyllus*; however, the former is larger, with thin walls and loose basal cells, and the upper cells are densely covered with hol-low papillae (Sollman 2015).

### \**Bryoerythrophyllum recurvirostrum* (Hedw.) P.C. Chen [Pottiaceae]

#### Description and iconography

Ochyra *et al.* (2008).

### Distribution and habitat

A cosmopolitan species with a wide range of habitats, both in dry and humid situations (Ochyra *et al.* 2008). In the survey area, it was found growing on the ground at exposed sites, exclusively in sloping zones together with other bryophytes.

### Comments

See comments for *Bryoerythrophyllum antarcticum*.

### \**Bryum argenteum* Hedw. [Bryaceae]

#### Description and iconography

Ochyra *et al.* (2008).

### Distribution and habitat

*Bryum argenteum* has a cosmopolitan distribution, often associated with disturbed sites. In Antarctica, this species has been reported in maritime and continental areas, growing mainly in open sites in drainage areas and meltwater puddles; it also grows in places protected by rocks or recesses in the ground (Ochyra *et al.* 2008). In the study area, it was found growing on soil protected by rocks, exposed soil and soil associated with waterfowl nests. Gametophytes were found on the plateau, the slope and the coast. It was occasionally found growing alone, although usually it grew together with other bryophytes.

### Comments

*Bryum argenteum* is distinguished from other species of the genus by having small gametophytes, being silvery and julaceous in appearance and presenting hyaline apical cells (Sharp *et al.* 1994).

### *Bryum pseudotriquetrum* (Hedw.) G. Gaertn., B. Mey. & Scherb. [Bryaceae]

#### Description and iconography

Ochyra *et al.* (2008).

### Distribution and habitat

This species is a bipolar moss with intermediate occurrences at high elevations. In Antarctica, it is considered to be frequent and widely distributed. *Bryum pseudotriquetrum* grows in a great diversity of both exposed and protected habitats. It is a common species in places with thaw runoff, growing between rocky mounds (Ochyra *et al.* 2008). This species was found growing on soil protected by rocks, exposed soil and soil associated with waterfowl nests. Gametophytes of the species were found on the plateau, the slope and the coast. In relative terms, this species, together with *A. brevirostris*, was found more frequently and formed larger patches, reaching 20 m<sup>2</sup>. It was observed growing alone or with other bryophytes.

### Comments

This species is characterized by broad, long decurrent leaves, short excurrent costa, small distal lamina cells and red basal leaves. In the climatic conditions of Antarctica, the species presents great phenotypic variations; thus, the specimens of this species were often confused with other species (Ochyra *et al.* 2008).

### \**Ceratodon purpureus* (Hedw.) Brid. [Ditrichaceae]

#### Description and iconography

Ochyra *et al.* (2008).

### Distribution and habitat

It is considered a cosmopolitan moss; however, in tropical areas, it is restricted to elevated areas. In Antarctica, the species is, like *B. pseudotriquetrum*, pan-Antarctic. It has a large ecological distribution and occurs in open and protected areas (Ochyra *et al.*

2008). In the study area, it was found growing on the ground in both protected and exposed sites and across the three regions of the island: plateau, slope and coast, growing alone or with other bryophytes.

#### Comments

The gametophytes of *C. purpureus* can be confused with those of species included in the family Pottiaceae. However, this species is characterized by having strongly recurved or revolute leaf margins, irregularity of the edge towards the apex, absence of papillae and cells of the apical portion of the lamina being subquadrate to rounded (Ochyra *et al.* 2008).

#### \**Didymodon brachyphyllus* (Sull.) R.H. Zander [Pottiaceae]

##### Description and iconography

Ochyra *et al.* (2008).

##### Distribution and habitat

*Didymodon brachyphyllus* has a bipolar distribution and is considered pan-Antarctic. This species occurs both in dry and humid habitats, often in sheltered sites such as crevices and rocky ledges (Ochyra *et al.* 2008). In the study area, it was found growing on the ground in the plateau and slope zones, mostly growing alone, but it was also encountered with other bryophytes.

#### Comments

*Didymodon brachyphyllus* can be confused with small gametophytes of *B. antarcticum*. However, the former is green to brown, with leaves 0.5–1.1 mm long, ovate to ovate-lanceolate, and often cuculate at the apex, the apical cells are never smooth, and the axillary hairs have brown basal cells and axillary buds, while the latter does not have these features (Ochyra & Zander 2002).

#### *Encalypta cf. rhamnoides* Schwägr. [Encalyptaceae]

##### Description and iconography

Ochyra *et al.* (2008).

##### Distribution and habitat

*Encalypta rhamnoides* has a bipolar distribution. In Antarctica, it is more frequent in maritime regions (islands) and grows in exposed or protected sites, near streams or thaw cracks (Ochyra *et al.* 2008). It exclusively grows on the plateau in exposed soil, accompanied by other bryophytes.

#### Comments

Identifying *E. rhamnoides* with mature sporophytes is not difficult if the capsules - the most distinctive features of the species - are prominently ribbed with straight ribs. However, when the plant is sterile, it can be confused with *Encalypta proserpina*; the absence of axillary propagules in *E. rhamnoides* allows us to distinguish between these two species (Ochyra *et al.* 2008).

#### *Grimmia plagiopodia* Hedw. [Grimmiaceae]

##### Description and iconography

Ochyra *et al.* (2008).

##### Distribution and habitat

A bipolar species, mostly occurring in dry habitats on rocks, boulders, ledges, rock crevices and occasionally on gravel and soil and less often found in wet habitats on rocks at the edge of late snow and on rocks used as bird perches (Ochyra *et al.* 2008). In the study area, it was found in the three regions of the island: plateau, slope and coast. It was found growing on soil and rock from bird nests, as well as soil and rock from sites far from nesting areas. It mostly grows alone or with other mosses.

#### Comments

The gametophytes of this species are characterized by their concave-oval to oblong-oval leaves, with blunt apices with a slightly decurrent serrated hyaline hair that gives the plant a whitish appearance. In cross-section, the leaves are concave in the shape of a 'u' and never keeled (Ochyra *et al.* 2008).

#### *Hennediella heimii* (Hedw.) R.H. Zander [Pottiaceae]

##### Description and iconography

Ochyra *et al.* (2008).

##### Habitat and distribution

This species has a strict bipolar distribution. In Antarctica, is a widely distributed species. *Hennediella heimii* grows particularly near marine areas; it also develops in places without marine influence. It develops in dry and humid environments as well as in open or protected sites (Ochyra *et al.* 2008). In the study area, representatives of the species were found growing on the ground in exposed sites and sheltered by rocks in all three zones of the island: plateau, slope and coast. It grows alone and in association with other bryophytes.

#### Comments

*Hennediella heimii* is characterized by having leaves that are more or less toothed or serrated towards the apex, which can be acute or acuminate; leaf margins indistinctly edged and flat; apical lamellar cells that are densely papillose; and upper lamellar cells that are translucent (Ochyra *et al.* 2008).

#### \**Ptychostomum pallescens* (Schleich. ex Schwägr.) J.R. Spence [Bryaceae]

##### Description and iconography

Ochyra *et al.* (2008).

##### Distribution and habitat

A bipolar species, with some intermediate occurrences, it can be found in dry or wet areas, sheltered or open sites, on clayey, sandy or rocky soil, gravel, humus or in rock crevices (Ochyra *et al.* 2008). In the study area, representatives of *P. pallescens* were found growing on soil in exposed sites. This species is found only in the coastal region of the island, growing alone or with other bryophytes.

#### Comments

This species, despite usually being sterile in Antarctica, is distinguished from its congeners by the twisting of its leaves into a spiral when dry. In addition, it has oblong lanceolate leaves with an excurrent costa on a long hair; and lamina cells are

small rhomboid to oblong rhomboid cells, generally less than three times as long as they are wide (Ochyra *et al.* 2008).

**\*Schistidium antarctici (Cardot) L.I. Savicz & Smirnova [Grimmiaceae]**

*Description and iconography*  
Ochyra *et al.* (2008).

*Distribution and habitat*

Endemic to Antarctica, *S. antarctici* is associated with rocky sites, both dry and wet and exposed or protected (Ochyra *et al.* 2008). Representatives of this species were found growing on soil in exposed sites in the study area, located only in the coastal region of the island.

*Comments*

Sterile plants of this species are distinguished by having closely overlapping leaves in three to four rows, the costa is semi-terete and tristratose below, the leaf margin is bistratose and the leaves lack a hyaline basal margin (Ochyra *et al.* 2008).

**Syntrichia caninervis Mitt. var. caninervis [Pottiaceae]**

*Description and iconography*  
Ochyra *et al.* (2008).

*Distribution and habitat*

A bipolar species, with some intermediated occurrences. *Syntrichia caninervis* var. *caninervis* grows on dry, fine, friable soil stabilized by mosses (Ochyra *et al.* 2008). In the coastal region of the island, representatives of *S. caninervis* var. *caninervis* were found growing on rock in exposed sites.

*Comments*

This species is similar to a common species in Antarctica, *Syntrichia magellanica*; however, it is distinguished from the latter by the presence of a hyaline hair on the leaf and a papillose dorsal surface of the costa. In addition, *S. caninervis* var. *caninervis* has recurved leaf margins and bifurcated, pedicelate papillae (Ochyra *et al.* 2008). Furthermore, this species is distinguished from *S. caninervis* var. *gypsophila*, a variety found in Antarctica, as it has irregularly bistratose laminal cells in the distal hairs of the leaves. Finally, the upper leaves are larger and have thinner walls (Ochyra *et al.* 2008).

**\*Syntrichia magellanica (Mont.) R.H. Zander [Pottiaceae]**

*Description and iconography*  
Ochyra *et al.* (2008).

*Distribution and habitat*

This species is considered Antarctic/sub-Antarctic, growing in a wide variety of habitats, from dry to humid and from exposed to sheltered (Ochyra *et al.* 2008). *Syntrichia magellanica* was found growing in the studied area on exposed soil and rock at coastal and hillside sites, either alone or with other bryophytes.

*Comments*

This species is distinguished from others of the genus by having an excurrent costa in a long, smooth hair, recurved lamina

margins without edges, a smooth dorsal surface and no hydroids in cross-section (Gallego *et al.* 2011).

**\*Syntrichia sarconeurum Ochyra & R.H. Zander [Pottiaceae]**

*Description and iconography*  
Ochyra *et al.* (2008).

*Distribution and habitat*

This species is endemic to the continent and pan-Antarctic. *Syntrichia sarconeurum* grows in wet and dry habitats and on exposed and sheltered sites (Ochyra *et al.* 2008). In the study area, representatives of this species were found exclusively in the slope zone, growing on the ground in both exposed and rock-protected sites. It was found growing alone or with other species.

*Comments*

Although *S. sarconeurum* is easily distinguished from most other Antarctic species, it is often confused with two closely related species: *Tortella fragilis* (Drumm.) Limpr. and *Tortella alpicola* Dixon. However, *S. sarconeurum* is characterized by having a single dorsal steroid band and a gradual differentiation between chlorophyll cells and basal hyaline cells (Ochyra *et al.* 2008).

**Discussion**

Over the years, the flora and fauna of Antarctica have attracted the attention of naturalists and biologists from around the world. However, the information is still scarce and incomplete for some groups such as bryophytes. Although vegetation surveys have been carried out on other islands of the archipelago, such as Cockburn, James Ross and Vega islands (Lewis Smith 1993, Ochyra 1999, Barták *et al.* 2015, Goga *et al.* 2018), there have been no such studies on Marambio (Seymour) Island. These types of studies still need to be conducted, particularly considering that the island is a central logistical site in the region. The need to carry out censuses and monitor the evolution of the flora is imperative given the particularities of the Antarctic region, where plant diversity is low. These plants fulfil key ecological roles such as soil consolidation and function as micro-niches for fungi, bacteria, algae and microarthropods (Ardiles Huerta *et al.* 2008, Nelson *et al.* 2018), thus making them of great importance to the overall ecosystem. Here it was observed that of the 15 surveyed species, most had a restricted distribution to polar zones (nine are bipolar and three are endemic to the Antarctic region). The three species considered endemic to Antarctica are *B. antarcticum*, *S. antarctici* and *S. sarconeurum* (Ochyra *et al.* 2008, Sollman 2015).

Of the total recorded species, only three were found to have a sporophyte. This is consistent with the typical absence of sexual reproduction in environments with extreme conditions, such as those of the Antarctic islands (Ochyra *et al.* 2008).

Regarding the type of site in which the different species occur, two were found exclusively in the slope area, not being found on the plateau or the coast (*B. recurvirostrum* and *S. sarconeurum*). Exclusively in the coastal area, only three species were found (*P. pallescens*, *S. antarctici* and *S. caninervis* var. *caninervis*). Four species developed on the plateau and slope area (*A. brevirostris*, *B. antarcticum*, *D. brachyphyllus* and *S. magellanica*); one species on the slope and coastal area (*E. cf. rhaptocarpa*); and five species in all three zones (*B. argenteum*, *B. pseudotriquetrum*, *C. purpureus*, *G. plagiopodia* and *H. heimii*). These results coincide with the fact that the slope areas have canyons in which the organisms can

find sites protected from the wind, snowmelt and mass removals (Busso 2003).

Based on the results obtained in the 2021–2022 Antarctic Summer Campaign (IAA-DNA), the importance of conducting studies to prepare species list is evident in order to clearly and precisely evaluate the state of biodiversity conservation in peculiar ecosystems, such as Antarctica.

**Acknowledgements.** The authors thank the Marambio Station work group collaboration and the Instituto Antártico Argentino for logistical support. ACC and MIM thank Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET) and Universidad Nacional del Comahue (UNComahue). MA and LPD are the managers of the project to which the present work belongs. The authors thank the reviewers for their comments.

**Author contributions.** The material was collected by ACC and LPD. The identifications were made by ACC. All authors commented on and edited previous versions of the manuscript. All authors approved the final version for publication.

**Financial support.** This work was wholly funded by Instituto Antártico Argentino (PICTA 0091).

**Competing interests.** The authors declare no competing or financial interests.

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## Appendix: Material examined from the 15 species mentioned on Marambio (Seymour) Island, Antarctica

### *Aloina brevirostris* (Hook. & Grev.) Kindb. [Pottiaceae]

Examined material: Antarctica, Marambio Island, going down from the plateau towards Caleta Larsen (64°13'53.8'S; 56°36'27.97"W; 84 m.a.s.l.), on unprotected ground, 15.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5671); *ibid.*, descending from the plateau towards the west coast, from the Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°13'49.00'S; 56°37'54.73"W; 23 m.a.s.l.), on unprotected ground, 17.1.2022, A.C. Cottet (BCRU 5688); *ibid.*, Streamlet La Tradición (64°13'58.01'S; 56°37'35.76"W; 53 m.a.s.l.), on unprotected soil, 17.1.2022, A.C. Cottet (BCRU 5691); *ibid.*, descending from the plateau towards the west coast by stream from the end of the track (64°14'12.08"S; 56°39'22.03"W; 46 m.a.s.l.), on unprotected ground, 19.1.2022, A.C. Cottet (BCRU 5696); *ibid.*, streamlet from the end of the runway (64°14'13.49"S; 56°39'56.16"W; 12 m.a.s.l.), on unprotected ground, 19.1.2022, A.C. Cottet (BCRU 5700); *ibid.*, Streamlet La Tradición (64°13'59.70"S; 56°37'55.92"W; 36 m.a.s.l.), on unprotected soil, 19.1.2022, A.C. Cottet (BCRU 5706); *ibid.*, on the plateau on the way to La Remota (64°14'48.62"S; 56°38'16.22"W; 191 m.a.s.l.), on soil protected by rocks, 21.1.2022, A.C. Cottet (BCRU 5710); *ibid.*, west coast, near Casa de Botes, streamlet zone to the north (64°15'39.60"S; 56°43'57.97"W; 18 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5730); *ibid.*, streamlet zone to the south (64°15'33.37"S; 56°43'53.08"W; 16 m.a.s.l.), on unprotected soil, 30.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5736).

### \**Bryoerythrophyllum antarcticum* (L.I. Savicz & Smirnova) P. Sollman [Pottiaceae]

Examined material: Antarctica, Marambio Island, descending from the plateau towards the west coast from Las Cruces (64°13'50.70"S; 56°36'21.17"W; 188 m.a.s.l.), on unprotected ground, 16.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5675); *ibid.*, on the plateau in La Chacarita next to transport (64°14'32.26"S; 56°37'25.32"W; 191 m.a.s.l.), on soil protected by rocks, 20.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5709).

### \**Bryoerythrophyllum recurvirostrum* (Hedw.) P.C. Chen [Pottiaceae]

Examined material: Antarctica, Marambio Island, west coast, near Casa de Botes, streamlet zone to the north (64°15'39.60"S; 56°43'57.97"W; 15 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5731).

### \**Bryum argenteum* Hedw. [Bryaceae]

Examined material: Antarctica, Marambio Island, going down to the east from the Casa de Emergencia (64°14'23.73"S; 56°37'10.34"W; 185 m.a.s.l.), on soil protected by rocks, 12.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5661); *ibid.*, descending from the plateau towards Caleta Larsen (64°13'53.8'S; 56°36'27.97"W; 84 m.a.s.l.), on unprotected ground, 15.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5671); *ibid.*, descending from the plateau towards the west coast from Las Cruces (64°13'50.70"S; 56°36'21.17"W; 180 m.a.s.l.), on soil protected by rocks, 16.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5677); *ibid.*, descending from the plateau towards the west coast, Streamlet La Tradición (64°13'57.18"S; 56°37'41.34"W; 26 m.a.s.l.), on unprotected ground, 17.1.2022, A.C. Cottet (BCRU 5690); *ibid.*, descending from the plateau towards the west coast by stream from the end of the track (64°14'18.82"S; 56°38'58.06"W; 120 m.a.s.l.), on unprotected ground, 19.1.2022, A.C. Cottet (BCRU 5692); *ibid.*, Streamlet La Tradición (64°13'46.85"S; 56°39'13.96"W;

3 m.a.s.l.), on soil protected by rocks, 19.1.2022, A.C. Cottet (BCRU 5702); *ibid.*, on the plateau on the way to La Remota (64°14'48.62"S; 56°38'16.22"W; 191 m.a.s.l.), on soil protected by rocks, 21.1.2022, A.C. Cottet (BCRU 5711); *ibid.*, east coast, stream prior to La Pingüinera area (64°17'31.56"S; 56°41'43.62"W; 8 m.a.s.l.), on unprotected soil, 21.1.2022, A.C. Cottet (BCRU 5715); *ibid.*, seagull nest area (64°17'20.90"S; 56°41'27.74"W; 9 m.a.s.l.), on soil protected by rocks surrounding the seagull nest, 21.1.2022, A.C. Cottet (BCRU 5722); *ibid.*, west coast, near Casa de Botes, streamlet area to the north (64°15'33.37"S; 56°43'53.08"W; 13 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5733).

### **Bryum pseudotriquetrum (Hedw.) G. Gaertn., B. Mey. & Scherb. [Bryaceae]**

Examined material: Antarctica, Marambio Island, going down to the east from the Emergency House (64°14'23.92"S; 56°37'11.55"W; 184 m.a.s.l.), on soil protected by rocks, 12.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5660); *ibid.*, descending from the plateau towards Caleta Larsen (64°13'53.8"S; 56°36'27.97"W; 84 m.a.s.l.), on unprotected ground, 15.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5671); *ibid.*, descending from the plateau towards the west coast from Las Cruces (64°13'50.70"S; 56°36'21.17"W; 180 m.a.s.l.), on soil protected by rocks, 16.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5678); *ibid.*, descending from the plateau towards the west coast from the Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°14'03.28"S; 56°37'14.70"W; 181 m.a.s.l.), on soil protected by rocks, 17.1.2022, A.C. Cottet (BCRU 5682); *ibid.*, Streamlet La Tradición (64°13'49.51"S; 56°37'55.67"W; 26 m.a.s.l.), on unprotected soil, 17.1.2022, A.C. Cottet (BCRU 5685); *ibid.*, descending from the plateau towards the west coast by stream from the end of the track (64°14'18.82"S; 56°38'58.06"W; 120 m.a.s.l.), on unprotected ground, 19.1.2022, A.C. Cottet (BCRU 5692); *ibid.*, Streamlet La Tradición (64°13'46.85"S; 56°39'19.76"W; 4 m.a.s.l.), on soil protected by rocks, 19.1.2022, A.C. Cottet (BCRU 5701); *ibid.*, East coast, stream prior to La Pingüinera area (64°17'35.52"S; 56°41'41.24"W; 14 m.a.s.l.), on unprotected soil, 21.1.2022, A.C. Cottet (BCRU 5712); *ibid.*, west coast, near Casa de Botes, streamlet area to the north (64°15'39.60"S; 56°43'57.97"W; 15 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5731); *ibid.*, streamlet mouth zone (64°15'23.35"S; 56°44'45.90"W; 2 m.a.s.l.), on unprotected soil, 30.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5742).

### **\*Ceratodon purpureus (Hedw.) Brid. [Ditrichaceae]**

Examined material: Antarctica, Marambio Island, plateau of the island, behind the Plant (64°14'32.21"S; 56°37'36.69"W; 197 m.a.s.l.), on unprotected ground, 9.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5659); *ibid.*, going down to the east from the Emergency House (64°14'23.92"S; 56°37'11.55"W; 184 m.a.s.l.), on soil protected by rocks, 12.1.2022, B.C. Cottet and L.P. Dopchiz (BCRU 5660); *ibid.*, going down to the east from La Chacarita (64°14'27.29"S; 56°37'20.42"W; 180 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5664); *ibid.*, descending from the plateau towards the west coast from the Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°13'57.18"S; 56°37'41.34"W; 26 m.a.s.l.), on unprotected ground, 17.1.2022, A.C. Cottet (BCRU 5690); *ibid.*, east coast, a rill prior to the La Pingüinera area, on the coast (64°17'06.93"S; 56°41'02.58"W; 4 m.a.s.l.), on soil protected by rocks, 21.1.2022, A.C. Cottet (BCRU 5727); *ibid.*, west coast, near Casa de Botes, streamlet zone (64°15'33.37"S; 56°43'53.08"W; 10 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5735).

### **\*Didymodon brachyphyllus (Sull.) R.H. Zander [Pottiaceae]**

Examined material: Antarctica, Marambio Island, going down to the east from La Chacarita (64°14'27.29"S; 56°37'20.42"W; 180 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5667); *ibid.*, going down to the east from La Chacarita (64°14'49.33"S; 56°37'18.80"W; 124 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5668); *ibid.*, descending from the plateau towards the west coast from the

Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°14'03.62"S; 56°37'12.47"W; 193 m.a.s.l.), on soil protected by rocks, 17.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5680); *ibid.*, Streamlet La Tradición (64°13'47.64"S; 56°37'27.48"W; 26 m.a.s.l.), on unprotected soil, 17.1.2022, A.C. Cottet (BCRU 5684).

### **Encalypta cf. raptocarpa Schwägr. [Encalyptaceae]**

Examined material: Antarctica, Marambio Island, going down to the east from La Chacarita (64°14'27.29"S; 56°37'20.42"W; 180 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5666).

### **Grimmia plagiopodia Hedw. [Grimmiaceae]**

Examined material: Antarctica, Marambio Island, on the plateau in La Chacarita (64°14'8.17"S; 56°36'54.08"W; 190 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5669); *ibid.*, descending from the plateau towards Caleta Larsen (64°13'53.8"S; 56°36'27.97"W; 84 m.a.s.l.), on unprotected ground, 15.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5670); *ibid.*, descending from the plateau towards the west coast from Las Cruces (64°13'50.70"S; 56°36'21.17"W; 180 m.a.s.l.), on soil protected by rocks, 16.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5677); *ibid.*, descending from the plateau towards the west coast by a stream from the end of the track (64°14'16.73"S; 56°38'59.136"W; 116 m.a.s.l.), on rock, 19.1.2022, A.C. Cottet (BCRU 5694); *ibid.*, on the plateau on the way to La Remota (64°14'48.62"S; 56°38'16.22"W; 191 m.a.s.l.), on soil protected by rocks, 21.1.2022, A.C. Cottet (BCRU 5711); *ibid.*, east coast, stream prior to La Pingüinera area (64°17'35.52"S; 56°41'41.24"W; 14 m.a.s.l.), on unprotected soil, 21.1.2022, A.C. Cottet (BCRU 5712); *ibid.*, rill prior to the area of La Pingüinera (64°17'20.90"S; 56°41'27.74"W; 5 m.a.s.l.), on unprotected soil, 21.1.2022, A.C. Cottet (BCRU 5725); *ibid.*, second descent from the plateau towards the east coast (64°15'37.37"S; 56°38'54.20"W; 119 m.a.s.l.), soil protected by rocks, 21.1.2022, A.C. Cottet (BCRU 5728); *ibid.*, west coast, near Casa de Botes, streamlet zone to the north (64°15'42.01"S; 56°44'02.32"W; 21 m.a.s.l.), on unprotected soil, 29.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5729).

### **\*Henediella heimii (Hedw.) R.H. Zander [Pottiaceae]**

Examined material: Antarctica, Marambio Island, on the plateau in the Laboratorio Antártico Multidisciplinario Marambio (64°14'28.94"S; 56°37'18.32"W; 198 m.a.s.l.), on unprotected soil, 16.1.2022, A.C. Cottet and L.P. Dopchiz, A.C. Cottet (BCRU 5679); *ibid.*, descending from the plateau towards the west coast from the Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°13'57.18"S; 56°37'41.34"W; 26 m.a.s.l.), on unprotected ground, 17.1.2022, A.C. Cottet (BCRU 5690); *ibid.*, Streamlet La Tradición (64°13'58.01"S; 56°37'35.76"W; 53 m.a.s.l.), on unprotected soil, 17.1.2022, A.C. Cottet (BCRU 5691); *ibid.*, streamlet La Tradición (64°13'45.62"S; 56°39'12.46"W; 3 m.a.s.l.), on unprotected soil, 19.1.2022, A.C. Cottet (BCRU 5703); *ibid.*, on the plateau in La Chacarita next to transport (64°14'32.26"S; 56°37'25.32"W; 191 m.a.s.l.), on soil protected by rocks, 20.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5709).

### **\*Ptychostomum pallescens (Schleich. ex Schwägr.) J.R. Spence [Bryaceae]**

Examined material: Antarctica, Marambio Island, Streamlet La Tradición (64°13'45.04"S; 56°38'58.84"W; 7 m.a.s.l.), on unprotected soil, 19.1.2022, A.C. Cottet (BCRU 5704); *ibid.*, east coast, stream prior to La Pingüinera area (64°17'20.90"S; 56°41'27.74"W; 5 m.a.s.l.), on unprotected soil, 21.1.2022, A.C. Cottet (BCRU 5725).

**\*Schistidium antarctici (Cardot) L.I. Savicz & Smirnova [Grimmiaceae]**

Examined material: Antarctica, Marambio Island, Streamlet La Tradición (64° 13'45.04"S; 56°38'58.84"W; 7 m.a.s.l.), on rock, 19.1.2022, A.C. Cottet (BCRU 5705).

**Syntrichia caninervis Mitt. var. caninervis [Pottiaceae]**

Examined material: Antarctica, Marambio Island, east coast, rill prior to the area of La Pingüinera, area of seagull nests (64°17'21.88"S; 56°41'32.39"W; 9 m.a.s.l.), on rock surrounding the seagull nest, 21.1.2022, A.C. Cottet (BCRU 5718).

**\*Syntrichia magellanica (Mont.) R.H. Zander [Pottiaceae]**

Examined material: Antarctica, Marambio Island, descending from the plateau towards the west coast from the Very-High-Frequency

Omnidirectional Range towards Streamlet La Tradición (64°13'47.64"S; 56°37'27.48"W; 26 m.a.s.l.), on unprotected ground, 17.1.2022, A.C. Cottet (BCRU 5684); *ibid.*, east coast, rill prior to La Pingüinera area (64° 17'31.56"S; 56°41'43.62"W; 8 m.a.s.l.), on rock, 21.1.2022, A.C. Cottet (BCRU 5714).

**\*Syntrichia sarconeurum Ochyra & R.H. Zander [Pottiaceae]**

Examined material: Antarctica, Marambio Island, going down to the east from the Emergency House (64°14'23.73"S; 56°37'10.34"W; 185 m.a.s.l.), on soil protected by rocks, 12.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5661); *ibid.*, going down to the east from La Chacarita (64°14'49.33"S; 56° 37'18.80"W; 124 m.a.s.l.), on unprotected soil, 13.1.2022, A.C. Cottet and L.P. Dopchiz (BCRU 5668); *ibid.*, descending from the plateau towards the west coast from the Very-High-Frequency Omnidirectional Range towards Streamlet La Tradición (64°14'03.28"S; 56°37'14.70"W; 181 m.a.s.l.), on soil protected by rocks, 17.1.2022, A.C. Cottet (BCRU 5683).