

New bryological data for the Balearic Islands. III.

Llorenç Sáez^{1,2}, Samuel Pinya³ & Francisco Lara^{4,5}

1 Sistemàtica i Evolució de Plantes Vasculares, Unitat Associada al CSIC, Botànica, Facultat de Biociències, Universitat Autònoma de Barcelona, ES-8193 Bellaterra, Barcelona, España.

2 Societat d'Història Natural de les Illes Balears, c. Margarida Xirgu, 16, ES-07003 Palma de Mallorca, Islas Baleares, España.

3 Interdisciplinary Ecology Group. Biology Department. Universitat de les Illes Balears, Carretera de Valldemossa, km 7.5, 07122 Palma, Illes Balears, España.

4 Centro de Investigación en Biodiversidad y Cambio Global (CIBC-UAM), ES-28049 Madrid, España.

5 Departamento de Biología (Botánica). Universidad Autónoma de Madrid, C/ Darwin, 2, ES-28049 Madrid, España.

Resumen

Nuevos datos briológicos para las Islas Baleares. III.

Se aportan datos corológicos para 27 briófitos de las Islas Baleares. La mayoría de las citas de esta contribución corresponden a especies relativamente raras de áreas montañosas de las Islas Baleares (principalmente de Mallorca), para las cuales, la información sobre su distribución en el archipiélago es escasa y poco actualizada. Se cita por primera vez la presencia en el archipiélago balear de *Hypnum resupinatum*, *Lewinskya fastigiata* y *Ptychostomum kunzei*. Por otro lado, *Epipterygium tozeri* constituye novedad para Mallorca. Son destacables las nuevas localidades en Mallorca de *Plagiochasma appendiculatum*, una especie amenazada en Europa.

Palabras clave: Briófitos; Islas Baleares; Distribución; Región Mediterránea.

Abstract

Chorological data on 27 bryophytes from the Balearic Islands are presented. Most of the bryological records included in this contribution correspond to relatively rare species limited to mountain areas in the Balearic Islands (mainly in Mallorca), for which the information about their distribution in the archipelago is scarce and outdated. The presence within the Balearic archipelago of *Hypnum resupinatum*, *Lewinskya fastigiata* and *Ptychostomum kunzei* is reported for the first time. Additionally, *Epipterygium tozeri* is new record for Mallorca. Special mention deserves the new localities in Mallorca for *Plagiochasma appendiculatum*, an endangered species in Europe.

Key words: Bryophytes; Balearic Islands; Distribution; Mediterranean Region.

Correspondence

L. Sáez

E-mail: gymnesicum@yahoo.es

Received: 31 August 2020

Accepted: 9 October 2020

Published on-line: 19 January 2021

Introduction

Although the diversity of vascular plants and knowledge about its detailed distribution in the Balearic Islands are rather well known, the distribution patterns of bryophytes in the archipelago are still poorly documented. This lack of knowledge about the detailed distribution of the Balearic bryophytes is largely due to the fact that scientific publications of a floristic nature tend to document the novelties for a concrete island, so further data on the distribution of these species are usually not published, becoming practically inaccessible for the scientific community, naturalists and biodiversity managers. This has negative consequences on the knowledge of the distribution, ecology and IUCN (2012) Red List assessments for bryophytes at regional level. In order to correct this lack of chorological data we provide new bryological data for the Balearic Islands. Although some new species are reported for the Balearic archipelago or for some islands, most of the records provided correspond to rare bryophytes previously documented from some islands. Most of the bryological records included in this contribution correspond to species restricted to the mountain area of northern and western Mallorca (Serra de Tramuntana), which presents the most diverse bryophyte flora in the Balearic archipelago (Pinya *et al.* 2013, Sáez 2019), reaching more than 80% of the bryophytes reported for the Balearic Islands (L. Sáez, unpubl. data).

Materials and methods

The floristic data here presented are the result of fieldwork and herbarium research by the authors. The description of the localities where the specimens were collected follows the next order: Island, municipality, specific locality, UTM coordinates, altitude in meters above sea level, habitat, collecting date, collectors, and herbarium accession number. The names of the localities are based on the Balearic topographic maps (IDEIB, <https://ideib.caib.es/visor/>). Voucher specimens are preserved in BCB, MAUAM or in the private herbaria of the authors. Taxa are arranged following an alphabetical order for genera and species within the two groups established: liverworts and mosses. Nomenclature follows Hodgetts *et al.* (2020).

Results

Liverworts

Mannia androgyna (L.) A.Evans

Mallorca: Escorca, Torrent de Lluc, 31SDE8710, 285 maslm, shady calcareous rocks, 18-IV-2018, *S. Pinya* (L. Sáez herb. pers.).

The only occurrence in Mallorca goes back to 1965, where the species was collected in a mountain area, between 900 and 1,000 maslm in Comafreda, Puig de Massanella (Sloover 1967; voucher at BCB 2401). *Mannia androgyna* was also recently reported from a single collection site in Menorca (Pericàs *et al.* 2016). Its distribution in the Balearic Islands is in all probability more widespread than records indicate.

Oxymitra incrassata (Brot.) Sérgio & Sim-Sim

Mallorca: Palma de Mallorca, entre Can Pastilla i s'Arenal, 31SDD7576, 2 maslm, on bare depressed flats flooded in winter, IV-1995, *L. Sáez* (BCB 50876); Palma, Xorrigo, 31SDD8579, 125 maslm, open calcareous soil, 13-IV-2002, *L. Sáez* (BCB 54201); Marina de Lluçmajor, Son Mutet, 31SDD8467, 150 maslm, on bare depressed flats flooded in winter, 17-IV-2003, *L. Sáez* (BCB 54665).

It was previously reported from northern and eastern Mallorca (Koppe 1965, Sáez *et al.* 1999) and Menorca (Pericàs *et al.* 2016). The chorological data provided above expand the known range of this rare species in Mallorca.

Plagiochasma appendiculatum Lehm. & Lindenb.

Mallorca: Fornalutx, Torrent de Na Mora, 31SDE7707, 90-120 maslm, shady calcareous rocks, 4-VII-2017, *S. Pinya* (L. Sáez herb. pers.); Escorca, Torrent de Muntanya, 31SDE9411, 210 maslm, on shady damp rocks, 25 May 2018, *S. Pinya* (L. Sáez herb. pers.).

The only known localities of this phytogeographically interesting species in Europe and the Mediterranean region are found in northern Mallorca (Cros *et al.* 2005), so that the Majorcan populations define a striking disjunction. So far, the presence of *P. appendiculatum* in Mallorca was known from two karstic gorges: Torrent de Comafreda and Torrent de Pareis (Cros *et al.*

2005, Nieuwkoop 2016, Sáez *et al.* 2019). With the data provided above its distribution area in Mallorca (Fig. 1) is significantly expanded. The presence of this species in the deep gorge of Torrent de Pareis has also been confirmed by one us (30-VIII-2018, S. Pinya). In the Balearic Islands, *P. appendiculatum* is currently known from a narrow area in Serra de Tramuntana, Mallorca. All the Majorcan localities of which *P. appendiculatum* is known are shady and damp compact calcareous rocks (sometimes tufa depositions) along karstic gorges. The species has been evaluated as “Vulnerable” at both a national (Spain) and European level (Sáez *et al.* 2019, Hodgetts & Lockhart 2020). Although the new collection sites represent a significant expansion of the area of this species in Mallorca, *P. appendiculatum* can still be assigned to the IUCN (2012) “Vulnerable” category, because it shows a narrow distribution in Mallorca, it is known from fewer than five locations (four karstic gorges), and the species is potentially threatened by the anthropic impact (canyoning and water abstraction). Monitoring programs and research activities are recommended in order to better understand the population trend of this species and its ecology and biology.

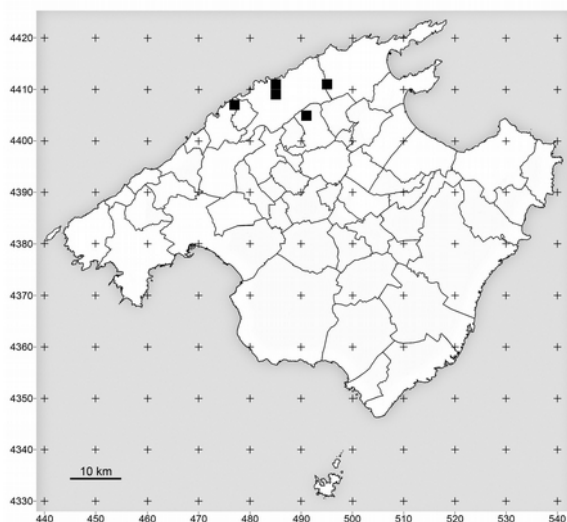


Figura 1. Área de distribución de *Plagiochasma appendiculatum* Lehm. & Lindenb. en las Islas Baleares con cuadrículas UTM de 2 x 2 km.

Figure 1. Distribution area of *Plagiochasma appendiculatum* Lehm. & Lindenb. in the Balearic Islands based by UTM 2 x 2 km squares.

***Riccia bicarinata* Lindb.**

Menorca: Ciutadella, Lloc de Son Toni Martí,

bassa del Mal Lloc, 31SEE8028, 112 maslm, 12-II-2003, *P. Balaguer* (BCB 56880).

This is the third Balearic locality for the species; it was previously reported from eastern Menorca (Montserrat 1953) and northern Mallorca (Pericàs *et al.* 2009).

***Riccia ciliata* Hoffm.**

Menorca: Ferreries, Turó de s'Ermita, 31SEE8726, 183 maslm, 28-IV-2002 *P. Balaguer* & *L. Sáez* (BCB 54974, BCB 54975).

This is the third Minorcan locality for the species. It was previously reported from l'Enclusa (Montserrat 1953) and S'Albufera des Comte (Pericàs *et al.* 2016). The species is also known from Mallorca (Sáez *et al.* 1999).

***Riccia crystallina* L.**

Mallorca: Palma de Mallorca, entre Can Pastilla i s'Arenal, 31SDD7576, 2 maslm, on bare depressed flats flooded in winter, IV-1995, *L. Sáez* (BCB 54166); Marina de Lluçmajor, Son Mutet, 31SDD8467, 150 maslm, on bare depressed flats flooded in winter, 17-IV-2003, *L. Sáez* (BCB 54670).

The only occurrence in Mallorca goes back to Casas de Puig (1956), when the species was collected in the eastern part of the island, Manacor. Several occurrences are known from Menorca (Sáez *et al.* 2006, Pericàs *et al.* 2016). In Son Mutet, *R. crystallina* was found growing together with *Physcomitrium pyriforme* (Hedw.) Bruch & Schimp.

***Riccia trabutiana* Steph.**

Mallorca: Escorca, Coll de l'Arena, Miner Gran, 31SDE9409, 620 maslm, exposed soil, 13-IV-1992, *L. Sáez* (BCB 54216); Palma de Mallorca, entre Can Pastilla i s'Arenal, 31SDD7576, 2 maslm, on bare depressed flats flooded in winter, IV-1995, *L. Sáez* (BCB 54173).

The available data for this species in the Balearic Islands date back more than six decades. Casas de Puig (1956) provided the only specific localities known for this species in Mallorca: Sóller, Son Rapinya and Cala Millor. *Riccia trabutiana* was also reported from Formentera, without precise locality (Jovet-Ast & Bischler 1976). This species may be somewhat overlooked due to its occurrence in poorly studied habitats and its relatively short life cycle.

Scapania aspera M.Bernet & Bernet

Mallorca: Escorca, al E del Coll dels Coloms, 31SDE8504, 770 maslm, shady rocks, 1993, *L. Sáez* (BCB 54866); Puig den Galileu, c. casa de Neu, 31SDE8707, 1,105 maslm, shady crevices in north-facing cliffs, 1993, *L. Sáez* (*L. Sáez herb. pers.*); Estellencs, Puig de Galatzó, 31SDE5587, 1,000 maslm, humid and shady crevices in north-facing cliffs, I-994, *L. Sáez* (*L. Sáez herb. pers.*); Bunyola, Serra d'Alfàbia, 31SDD7739, 1,050 maslm, humid crevices on steep north-facing slope, 1-IX-1997, *L. Sáez* (*L. Sáez herb. pers.*); northern face of Tossals Verds, 31SDE8403, 1,080 maslm, shady rocks, 31-XII-2005, *L.G. Valle & L. Sáez* (*L. Sáez herb. pers.*); Puig Roig, 31SDE8812, 950 maslm, humid crevices on steep north-facing slope, 12-IV-2006, *L.G. Valle & L. Sáez* (*L. Sáez herb. pers.*); Serra des Teixos, 31SDE8606, 1,200 maslm, shady rocks, 13-VI-2006, *L. Sáez* (*L. Sáez herb. pers.*); Escorca, Penyal des Migdia, 31SDE8105, 1,350 maslm, shady rocky places, 10-VIII-2007, *B. Company & L. Sáez* (*L. Sáez herb. pers.*); Escorca, Puig de Sa Rateta, 31SDE8102, 980 maslm, shady crevices in north-facing cliffs, 3-VII-2020, *E. Guasp & L. Sáez* (*L. Sáez herb. pers.*).

Casas et al. (2009) attributed to this species a strongly papillose leaf cuticle. Our samples show some variability with respect to cuticle papillosity, being in some cases not dense, which could raise doubts about their identity. Nevertheless, even the samples with less papillosity belong to *S. aspera*, according to Alexey Potemkin (in litt., 28 Nov 2018).

The new occurrences contributed here suppose a not unexpected extension to the range of this rare species in the Balearic Islands (Fig. 2), which was already reported from scattered localities in northern Serra de Tramuntana, Mallorca (Nicholson 1907, Rosselló, 1981).

Mosses

Alleniella besseri (Lobarz.) S.Olsson, Enroth & D.Quandt

Mallorca: Escorca, northern face of Puig Tomir, 31SDE9310, 1,000 maslm, shady rocky places, 25-XII-1993, *L. Sáez* (*L. Sáez herb. pers.*); Puig Major, northeastern face, clotades, 31SDE8206, 1,390 maslm, shady rocky places, X-1994, *L. Sáez* (*L. Sáez herb. pers.*); *Andratx*, Puig de S'Es-

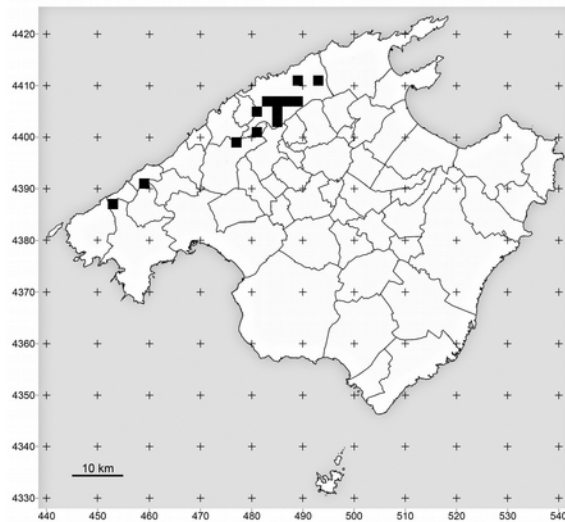


Figura 2. Área de distribución de *Scapania aspera* M.Bernet & Bernet en las Islas Baleares con cuadrículas UTM de 2 x 2 km.

Figure 2. Distribution area of *Scapania aspera* M.Bernet & Bernet in the Balearic Islands based by UTM 2 x 2 km squares.

clop, 31SDD5286, 800 maslm, karst cavity, shady rocky places, 3-I-2006, *L.G. Valle & L. Sáez* (*L. Sáez herb. pers.*); Escorca, Puig Major, Volat des Voltor, 31SDE8206, 1,300 maslm, humid and shady crevices in north-facing cliffs, 11-IV-2006, *L.G. Valle & L. Sáez* (*L. Sáez herb. pers.*); Serra de Na Plana, 31SDE8406, 900 maslm, karst cavity, 21-III-2005, *L.G. Valle & L. Sáez* (*L. Sáez herb. pers.*); northern face of Serra des Teixos, 31SDE8606, 1,100 maslm, humid and shady crevices in north-facing cliffs, VIII-2006, *B. Company & L. Sáez* (*L. Sáez herb. pers.*); Torrent des Gorg Blau, Pas des Duro, 31SDE8508, 390-430 maslm, 24-VIII-2006, *L.G. Valle, X. Manzano & L. Sáez*; Penyal des Migdia, 31SDE8105, 1,350 maslm, humid and shady crevices in north-facing cliffs, 10-VIII-2007, *B. Company & L. Sáez* (*L. Sáez herb. pers.*); Escorca, Puig Major, 31SDE8206, 1,300 maslm, karst cavity, 21-VI-2019, *J.M. González & L. Sáez* (*L. Sáez herb. pers.*).

The species was only reported from a non-concrete locality of Puig Major mountain (*Sáez et al.* 2002). Most of the records provided here are from elevations above (800-900 maslm); however, this species occurs as low as 390-430 maslm in Torrent de Gorg Blau. The distribution of *A. besseri* in the Balearic archipelago coincides with the areas with the highest rainfall and the reason for occurrence of *A. besseri* at low altitude in Torrent de Gorg Blau is probably related to high atmospheric humidity of this extremely deep karst

ravine. The plants are not exposed to direct sunlight, but they grow in diverse environments. In most localities the species occurs on shady rocky places, where it forms pure loose patches or is associated with *Alleniella complanata* (Hedw.) S.Olsson, Enroth & D.Quandt, *Cololejeunea rosettiana* (C.Massal.) Schiffn., *Ctenidium molluscum* (Hedw.) Mitt., *Exsertotheca crispa* (Hedw.) S.Olsson, Enroth & D.Quandt and *Thamnobryum alopecurum* (Hedw.) Gangulee. In Torrent des Gorg Blau, located at low altitude, *A. besseri* occurs on *Phillyrea latifolia* L. bark, growing together with common epiphytic liverworts such as *Frullania dilatata* (L.) Dumort., *Lejeunea cavifolia* (Ehrh.) Lindb., *Radula complanata* (L.) Dumort. and the extremely rare *Marchesinia mackaii* (Hook.) Gray.

The present data shows that the distribution of *A. besseri* in Mallorca is much wider than previously understood (Fig. 3). Presumably, further field research will increase the number of localities although a significant increase in its extent of presence is unlikely.

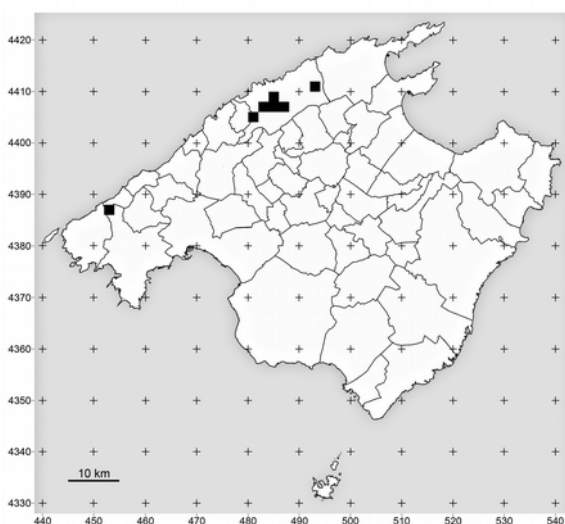


Figura 3. Área de distribución de *Alleniella besseri* (Lobarz.) S.Olsson, Enroth & D.Quandt en las Islas Baleares con cuadrículas UTM de 2 x 2 km.

Figure 3. Distribution area of *Alleniella besseri* (Lobarz.) S.Olsson, Enroth & D.Quandt in the Balearic Islands based by UTM 2 x 2 km squares.

Alleniella complanata (Hedw.) S.Olsson, Enroth & D.Quandt

Mallorca: Estellencs, Puig de Galatzó, 31SDE5587, 1,000 maslm, humid and shady crevices in north-facing cliffs, I-1994, L. Sáez (BCB 52009); Ibidem; 950 maslm, 25-XII-2000,

L. Sáez (BCB 52031); Ibidem; 980 maslm, 1-I-2004, L. Sáez (BCB 54919); Bunyola, Serra d'Alfàbia, 31SDD7739, 1,050 maslm, humid crevices on steep north-facing slope, 1-IX-1997, L. Sáez (L. Sáez herb. pers.); Andratx, Puig de 'Esclop, 31SDD5286, 800 maslm, karst cavity, shady rocky places, 3-I-2006, L.G. Valle & L. Sáez (L. Sáez herb. pers.); Deià, Puig des Teix, northern face of Es Teixot, 31SDD7198, 1,040 maslm, on *Crataegus monogyna* bark, 24-XII-2005, L.G. Valle & L. Sáez (L. Sáez herb. pers.); Escorca, Puig Major, Es Bufador, Volat des Voltor, 31SDE8206, 1,300 maslm, humid and shady crevices in north-facing cliffs, 11-IV-2006, L.G. Valle & L. Sáez (L. Sáez herb. pers.); Penyal des Migdia, 31SDE8105, humid crevices on steep north-facing slope, 1,350 maslm, 10-VIII-2007, B. Company & L. Sáez (L. Sáez herb. pers.).

It was previously reported from few localities in northern and central Serra de Tramuntana, Mallorca (Rosselló 1986, Sáez *et al.* 1999, 2006). The chorological data here provided expand the known range of this rare species in Mallorca; the presence of two relatively isolated sites in western Mallorca (southern Serra de Tramuntana) is noticeable.

Amblystegium serpens (Hedw.) Schimp.

Mallorca: Escorca, Puig Major, northeastern face, 31SDE8206, 1,300 maslm, karst cavity, 21-VI-2019, J.M. González & L. Sáez (L. Sáez herb. pers.).

To date, the single collection site of the species in the Balearic Islands is in Puig de Massanella, font de s'Avenc, Mallorca (leg. Cano, MUB 55377) (Jiménez 2018). In Puig Major, *A. serpens* was found at the bottom of a karst cavity, growing together with *Lejeunea cavifolia* (Ehrh.) Lindb., *Alleniella besseri* and *Thamnobryum alopecurum* (Hedw.) Gangulee. The known localities of the species in the Balearic Islands correspond to the same type of habitat: bottom of karst cavities, in very shady and humid places.

Campylopus introflexus (Hedw.) Brid.

Mallorca: Calvià, Serra de Son Camps, Pujol des Gat, 31SDD6282, 480 maslm, on decayed *Pinus halepensis* Mill. wood in north-facing cliffs, 480 m, 6-I-2006, L.G. Valle & L. Sáez (BCB 56869).

A new locality for this invasive species, already known from Mallorca and Menorca (Sáez

et al. 1998, Pericàs *et al.* 2016).

***Ceratodon purpureus* (Hedw.) Brid. subsp. purpureus**

Mallorca: Escorca, Coma de Son Torrella, 31SDE8003, 900 maslm, exposed soil, 30-VI-2016, L. Sáez (L. Sáez, herb. pers.).

This is the third Balearic locality for the species. It was previously reported from northern Mallorca: Cúber towards l'Ofre and Puig d'en Galileu (Pericàs & Rosselló 2009). In all probability new investigations will increase the number of localities.

***Dicranum scoparium* Hedw.**

Mallorca: Escorca, Puig de Massanella, c. coll des Prat, 31SDE8706, 1,220 maslm, growing under *Hypericum balearicum*, 1993 L. Sáez (L. Sáez herb. pers.); Estellencs, Puig de Galatzó, 31SDE5587, 980 maslm, humid and shady crevices in north-facing cliffs, I-1994, L. Sáez (L. Sáez herb. pers.); Bunyola, Serra d'Alfàbia, 31SDD7739, 1,065 maslm, humid crevices on steep north-facing slope, 1-IX-1997, L. Sáez (BCB 54884); Deià, Puig des Teix, Es Teixot, 31SDD7198, 1040 m, shady crevices in north-facing cliffs, 24-XII-2005, L.G. Valle & L. Sáez (L. Sáez herb. pers.); Escorca, northern face of Tossals Verds, 31SDE8403, 1,000 maslm, rocky slopes, 31-XII-2005, L.G. Valle & L. Sáez (L.

Sáez herb. pers.); Escorca, northern face of Penyal de Migdia, 31SDE8105, 1,200 maslm, open rocky slopes, 10-VIII-2007, B. Company & L. Sáez (L. Sáez herb. pers.).

A not unexpected extension to the range of this rare species in Mallorca (Fig. 4), which was already known from scattered localities in central and northern Serra de Tramuntana: Puig Major, Serra des Teixos, Puig Tomir and Puig Roig (Rosselló 1986). In the Balearic Islands *D. scoparium* is not currently threatened according to IUCN (2012) criteria at regional level. However, some southern or peripheral subpopulations (Galatzó, Puig des Teix and Alfàbia) have reduced coverage and are more susceptible to potential threats (trampling and nitrification due to feral goats) because they grow in suboptimal environmental conditions.

***Distichium capillaceum* (Hedw.) Bruch & Schimp.**

Mallorca: Escorca, northern face of Tossals Verds, 31SDE8403, 1,000 maslm, shady rocky places, 12 Oct 1993, L. Sáez (BCB 52002); Escorca, Puig Major, northern face of Serra de Na Rius, 31SDE8207, 1,170 maslm, shady rocky places, 12-VIII-2005, L. Sáez (L. Sáez herb. pers.); Escorca, Puig Major, Es Bufador, Volat des Voltor, 31SDE8206, 1,300 maslm, humid and shady crevices in north-facing cliffs, 11-IV-2006, L.G. Valle & L. Sáez (L. Sáez herb. pers.); northern face of Serra des Teixos, 31SDE8606, 1,200 maslm, wet shady rocks, 13-VI-2006, L. Sáez (L. Sáez herb. pers.); Escorca, Penyal de Migdia, 31SDE8105, 1,320 maslm, shady crevices in north-facing cliffs, 10-VIII-2007, B. Company & L. Sáez (L. Sáez herb. pers.).

In the Balearic Islands, the only known concrete locality of the species is from Puig de Massanella, Mallorca (Rosselló 1986). An unconfirmed report from Sóller area (Hermann 1913) probably corresponds to a high mountain area. Suitable habitats for future investigation are also in other mountain regions of northern Mallorca.

***Eipterygium tozeri* (Grev.) Lindb.**

Mallorca: Fornalutx, Torrent de Na Mora, 31SDE7707, 110 maslm, shady calcareous rocks, 4-VII-2017, S. Pinya (L. Sáez herb. pers.).

New to Mallorca. The species was previously reported from Menorca (Montserrat 1953, Pericàs

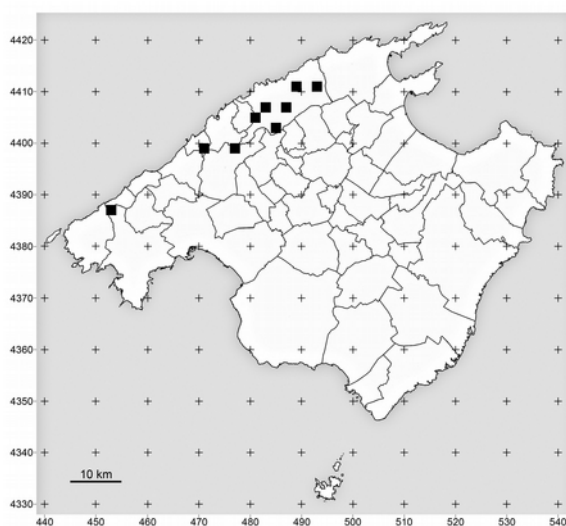


Figura 4. Área de distribución de *Dicranum scoparium* Hedw. en las Islas Baleares con cuadrículas UTM de 2 x 2 km.

Figure 4. Distribution area of *Dicranum scoparium* Hedw. in the Balearic Islands based by UTM 2 x 2 km squares.

et al. 2016) and Eivissa (Cros 1982). Presumably, further field research will increase the number of localities in Mallorca.

***Eurhynchium striatum* (Hedw.) Schimp.**

Mallorca: Escorca, Puig Major, Coma Fosca, 31SDE8206, 1,280 maslm, shady rocky places, 19-VI-2019, *L. Sáez* (*L. Sáez* herb. pers.).

This is the third Balearic locality for the species. It was previously reported from two localities in northern Mallorca: Son Torrella (Blockeel & Crundwell 1987) and Pla de Cúber (Pericàs *et al.* 2009). Likely, further investigations will increase the number of localities of the species.

***Flexitrichum gracile* (Mitt.) Ignatov & Fedosov**

Mallorca: Escorca, Tossals Verds, 31SDE8403, 1,050 maslm, shady crevices in north-facing cliffs, 31-XII-2005, *L.G. Valle & L. Sáez* (BCB).

The species was previously reported from northern Mallorca: Puig Tomir (*Sáez et al.* 2002) and Puig den Galileu (Pericàs *et al.* 2009). The distribution of *F. gracile* in the Balearic Islands is probably incompletely known due to confusion with *F. flexicaule* (Schwägr.) Ignatov & Fedosov, which is known from six localities in northern Mallorca.

***Hypnum resupinatum* Taylor**

Mallorca, Escorca, Puig Major, Es Bufador, 31SDE8206, 1,330 maslm, on *Taxus baccata* L. bark, 18-VI-2018, *L. Sáez* (*L. Sáez* herb. pers.).

New to the Balearic Islands. This species has a wide distribution in the Iberian Peninsula (Ríos Poveda 2017, sub *H. cupressiforme* var. *resupinatum* (Taylor) Schimp.), so its occurrence in the Balearic Islands was expected. New searches in suitable habitats will reveal additional records for the Balearic archipelago.

***Lewinskya fastigiata* (Bruch ex Brid.) Vigalondo, F.Lara & Garilleti**

Mallorca: Escorca, Puig Major, Clotades, 31SDE8206, 1,330 maslm, on *Sorbus aria* L. bark, 21-VI-2019, *L. Sáez* (MAUAM).

New for the Balearic Islands. This species was found on a well-developed specimen of *Sorbus aria* located within a deep karst cavity difficult to access. The accompanying species were: *Lewin-*

ska striata (Hedw.) F.Lara, Garilleti & Goffinet (21-VI-2019, *L. Sáez*, MAUAM); *L. speciosa* (see below) and *Orthotrichum pumilum* Sw. ex anon. (2-VII-2020, *L. Sáez*, MAUAM). The latter species has been collected (2-VII-2020, *L. Sáez*, MAUAM) for the second time in Balearic Islands, although the record do not represent a significant extension of its area in Mallorca (Pericàs 2008).

Lewinskya fastigiata is a closely related species to *L. affinis* (Schrad. ex Brid.) F.Lara, Garilleti & Goffinet (Vigalondo *et al.* 2019, 2020). The latter species was reported from three localities in the central sector of Serra de Tramuntana (Rosselló 1987, Cano *et al.* 2001) where it occurs on *Pinus halepensis* Mill. and *Quercus ilex* L. bark at medium altitude zones (500-900 masml). The geographical ranges of both species, due to misidentifications but mainly to the fact that few recent taxonomic treatments account recognize *L. fastigiata* at any taxonomical level, remains to be studied.

***Lewinskya speciosa* (Nees) F.Lara, Garilleti & Goffinet**

Mallorca: Escorca, Puig Major, Clotades, 31SDE8206, 1,330 maslm, on *Sorbus aria* L. bark, 21-VI-2019, *L. Sáez* (MAUAM).

The species was previously reported from Puig Major (Nicholson, 1907) and Puig de Massanella (Rosselló, 1986). In both mountains the species was collected growing on an unusual phorophyte, *Salvia rosmarinus* (L.) Schleid., given that *L. speciosa* usually occurs in montane forests with moderate summer drought (Lara & Garilleti 2014). The confirmation of the presence of *L. speciosa* in Puig Major is indicative of the uniqueness of this mountain, in the context of the Balearic Islands, in terms of number of species included within Orthotrichaceae Arn., with 19 taxa documented in this archipelago (Hodgetts & Lockhart 2020), which are all those reported for the Balearic Islands.

***Plagiomnium affine* (Blandow ex Funck) T.J.Kop.**

Mallorca: Escorca, northern face of Tossals Verds, 31SDE8403, 1,080 maslm, shady rocks, 31-XII-2005, *L.G. Valle & L. Sáez* (*L. Sáez* herb. pers.).

A few occurrences are documented in the Balearic Islands, all of them corresponding to the central sector of the Serra de Tramuntana (Koppe

1965, Pericàs & Rosselló 2009, Fuertes 2010).

***Plagiomnium rostratum* (Schrad.) T.J.Kop.**

Mallorca: Banyalbufar, Mola de Planici, 31SDE5991, 900 maslm, shady rocky places, 27-XII-2003, L. Sáez (BCB 54922); Estellencs, Puig de Galatzó, 31SDE5687, 1,000 maslm, humid and shady cervices in north-facing cliffs, 1-I-2004, L. Sáez (BCB 54923).

The presence of *P. rostratum* in Banyalbufar and Estellencs is not surprising; nevertheless, it expands the known range of the species in Serra de Tramuntana. *Plagiomnium rostratum* was previously reported from the central sector of this orographic complex: Gorg Blau (Koppe 1965), Puig de Massanella (Sloover 1967) and Puig Major (Rosselló 1987).

***Ptychostomum kunzei* (Hornsch.) J.R.Spence**

Mallorca: Près de Valldemosa, Mirador de Ses Fites [31SDD69], talus sous bois clair, 400 maslm, 1965, J.L. Sloover (BCB 818, sub *B. caespiticium* var. *imbricatum* Bruch & Schimp., identified as *B. kunzei* by M.T. Gallego, 2009).

As far as we know, this is the first and only report of the species from the Balearic Islands. Flora Briofítica Ibérica (Guerra *et al.* 2010) indicates, without further details, its presence in Mallorca, which was based on the same herbarium material.

Rhizomnium punctatum* (Hedw.) T.J.Kop. var. *punctatum

Mallorca: Escorca, Puig Major, Es Bufador, Volat des Voltor, 31SDE8206, 1,300 maslm, shady crevices in north-facing cliffs, 17-VI-2019, L. Sáez (L. Sáez herb. pers.).

This is an extremely rare species in the Balearic Islands. To date the single collection site of the species in the Balearic Islands is in Avenc des Tossals (Mallorca), where it was found at the bottom of karstic cavity at 1,040 masml (Rosselló 1981). Subsequently, the persistence of *R. punctatum* in the latter locality has not been verified. In the locality of Puig Major, *R. punctatum* occurs on north-facing shady rock crevices with scarce developed soil, together with the mosses *Distichium capillaceum* and *Pohlia cruda* (Hedw.) Lindb., the latter also extremely rare and recently reported for the Balearic Islands (Sáez 2019).

***Syntrichia princeps* (De Not.) Mitt.**

Mallorca: [Escorca] Cúber [31SDE80, c. 750 maslm], 29-III-1956, C. Casas (BCB 19086).

Second report for the Balearic Islands. Previously reported from northern Mallorca (Fornalutx) by Cano *et al.* (2001).

***Tortula caucasica* Broth.**

Menorca: Maó, Cap de Favàritx, 31SFE0828, 12 maslm, on siliceous soils, 29-IV-2002, P. Balaguer & L. Sáez (BCB 54538); Fornells, camí de s'Escorpetar, 31TEE9531, 15 maslm, wet siliceous soil, 14-IV-2003, P. Balaguer (BCB 55062); Sant Lluís, Cala Rafalet, 31SFE1111, coastal rocky places, 26-XII-2003, P. Balaguer (BCB 55392).

To date the single collection site of the species in the Balearic Islands is in S'Enclusa, Ferreries, Menorca (Casas & Brugués 1983).

Acknowledgments

We are indebted to Alexey Potemkin (Komarov Botanical Institute of Russian Academy of Sciences, San Petersburg) who kindly revised some samples of *Scapania aspera*, as well as to Patricia Balaguer, Bernadí Company, Joan Miquel González, Laia G. Valle and Xavier Manzano and for helpful during fieldwork, which sometimes involved using climbing techniques. We are grateful to M. Brugués for her valuable comments on earlier drafts of this article.

References

- Blockeel TL & Crundwell AC. 1987. New bryophyte records from the Balearic Islands. *Journal of Bryology* 14: 519-522.
- Cano MJ, Gallego MT, Garilleti R, Juaristi R, Lara F, Martínez-Abaigar J, Mazimpaka V, Roselló JA, Sánchez-Moya MC & Urdiroz A 2001. Aportaciones al conocimiento de la flora briológica española. Notula XIII: hepáticas y musgos de Mallorca (Islas Baleares). *Boletín de la Sociedad Española de Briología* 18-19: 103-110.
- Casas C, Brugués M, Cros RM, Sérgio C & Infante M. 2009. Handbook of liverworts and hornworts of the Iberian Peninsula and the Balearic Islands. Barcelona: Institut d'Estudis Catalans.
- Casas C & Brugués M. 1983. Contribució a la brioflora de l'illa de Menorca. *Collectanea Botanica* 14:231-234.
- Casas de Puig C. 1956. Aportación a la flora briológica balear. Hepáticas de Mallorca. *Bolletí de la Societat*

- d'Història Natural de les Balears 2: 63-67.
- Cros RM 1982. Algunos briófitos interesantes para la flora balear. *Acta Botánica Malacitana* 7: 141-150.
- Cros RM, Sáez L & Brugués M. 2008. The bryophytes of the Balearic Islands: an annotated checklist. *Journal of Bryology* 30: 74-95. <https://doi.org/10.1179/174328208X282427>
- Fuertes E. 2010. *Plagiomnium* Hedw. In *Flora Briofítica Ibérica*, vol. IV (Guerra J, Brugués M, Cano MJ & Cros RM, eds.). Murcia: Universidad de Murcia-Sociedad Española de Briología, pp. 225-236.
- Guerra J, Gallego MT, Jiménez JA & Cano MJ. 2010. *Bryum*. En *Flora Briofítica Ibérica*, vol. IV (Guerra J, Brugués M, Cano MJ & Ros RM, eds.). Murcia: Universidad de Murcia & Sociedad Española de Briología, pp. 105-178.
- Hermann F. 1913. Einbotanischer Ausflug nach Majorca. *Verhandlungen des Botanischen Vereins der Brandenburg* 54: 239-253.
- Hodgetts N & Lockhart N 2020. Checklist and country status of European bryophytes – update 2020. *Irish Wildlife Manuals*, No. 123. Ireland: National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht.
- Hodgetts NG, Söderström L, Blockeel TL, Caspari S, Ignatov MS, Konstantinova NA, . . . Porley RD. 2020. An annotated checklist of bryophytes of Europe, Macaronesia and Cyprus. *Journal of Bryology* 42: 1-116. <https://doi.org/10.1080/03736687.2019.1694329>
- IUCN 2012. *Red List Categories and Criteria: Version 3.1*. Second edition. Gland, Switzerland and Cambridge.
- Jiménez JA 2018. *Amblystegium*. In *Flora Briofítica Ibérica*, vol. VI (Guerra J, Cano MJ & Brugués M, eds.). Murcia: Universidad de Murcia & Sociedad Española de Briología, pp. 126-131.
- Jovet-Ast S & Bischler H. 1976. Hépatiques de la Péninsule Ibérique: énumération, notes écologiques. *Revue Bryologique et Lichénologique* 42: 931-987.
- Koppe F. 1965. Bryologische Beobachtungen auf der Insel Mallorca. *Botaniska Notiser* 118: 25-48.
- Lara F & R Garilletei 2014. *Orthotrichum*. In *Flora Briofítica Ibérica Volumen V* (Guerra J, Cano MJ & Brugués M, eds.). Murcia: Universidad de Murcia-Sociedad Española de Briología, pp. 50-135.
- Montserrat P. 1953. Algunas briófitas de Menorca (1951). *Anales del Instituto Botánico A.J. Cavanilles* 12: 395-399.
- Nicholson WE. 1907. Contributions to a list of the mosses and hepatics of Majorca. *Revue Bryologique* 34: 1-6.
- Nieuwkoop JAW. 2016. *Plagiochasma appendiculatum* Lehm. & Lindenb. In Ellis *et al.* New national and regional bryophyte records, 48. *Journal of Bryology* 38(3): 248-249. <https://doi.org/10.1080/03736687.2016.1206685>
- Pericàs J. 2008. New bryophyte records from the Balearic Islands. *Cryptogamie, Bryologie* 29: 99-102.
- Pericàs J, Ginés A & Rosselló JA. 2009. New bryophyte records from Majorca (Balearic Islands). *Flora Montiberica* 43: 87-91.
- Pericàs J & Rosselló JA. 2009. New and interesting records to the bryophyte flora of the Balearic Islands. *Cryptogamie, Bryologie* 30(4): 501-505.
- Pericàs J, Fraga P, Mascaró J & Rosselló JA. 2016. New and interesting bryophyte records for Minorca (Balearic Islands, Spain). *Flora Montiberica* 62: 92-99.
- Pinya S, Suárez-Fernández JJ, Sáez L & Castro JM. 2013. *Catàleg de Biodiversitat del Paratge Natural de la Serra de Tramuntana*. *Biota Balear* 3: 5-143.
- Ríos Poveda D. 2017. Revisión taxonómica el género *Hypnum* Hedw.: (Bryophyta, Hypnaceae) en la Península ibérica, Islas Baleares y Macaronesia. Murcia: Universidad de Murcia. Doctoral Thesis.
- Rosselló JA 1981. Notes sobre la brioflora balear. 1. Briófitos nous per Balears. *Bolletí de la Societat d'Història Natural de les Balears* 25: 39-52.
- Rosselló JA. 1986. Notes sobre la brioflora balear. 4. *Acta Botánica Malacitana* 11: 77-82.
- Rosselló JA. 1987. Notas sobre la brioflora balear, 5. *Acta Botánica Malacitana* 12: 81-86.
- Sáez L. 2019. *Pohlia cruda* (Hedw.) Lindb. In Ellis *et al.* New national and regional bryophyte records, 60. *Journal of Bryology* 41: 292-293.
- Sáez L, Casas C, Cros RM & Brugués M. 2002. New Bryological Data from the Balearic Islands. *Cryptogamie, Bryologie* 23: 181-187.
- Sáez L, Casas C, Cros RM & Brugués M. 2006. New Bryological Data from the Balearic Islands II. *Cryptogamie, Bryologie* 27: 387-394.
- Sáez L, Fraga P & Rosselló JA. 1999. New bryophyte records from the Balearic Islands. *Journal of Bryology* 20: 506-508.
- Sáez L, Ruiz E & Brugués M. 2019. Additions, corrections and comments to the Red List of bryophytes from mainland Spain and the Balearic Islands. *Mediterranean Botany* 40: 3-20. <https://doi.org/10.5209/MBOT.60041>
- Sloover JL. 1967. Quelques bryophytes recueillis à Majorque. *Les Naturalistes Belges* 48: 389-394.
- Vigalondo B, Garilletei R, Vanderpoorten A, Patiño J, Draper I, Calleja JA, Mazimpaka V & Lara F. 2019. Do mosses really exhibit so large distribution ranges? Insights from the integrative taxonomic study of the *Lewinskya affinis* complex (Orthotrichaceae, Bryopsida). *Molecular Phylogenetics and Evolution* 140: 106598. <https://doi.org/10.1016/j.ympev.2019.106598>
- Vigalondo B, Draper I, Mazimpaka V, Calleja JA, Lara F & Garilletei R. 2020. The *Lewinskya affinis* complex (Orthotrichaceae) revisited: species description and differentiation. *The Bryologist* 123: 454-481. <https://doi.org/10.1639/0007-2745-123.3.454>