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New Bryological Data from the Balearic Islands. II.

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Abstract – Based on recent bryophyte collections, 21 new records are added to the bryophyte flora of the Balearic Islands, which increases the number of known species to 308 (2 hornworts, 67 liverworts, 239 mosses). The presence within the Balearic archipelago of the following bryophytes is reported for the first time: *Cephaloziella stellulifera* (Spruce) Schiffn., *Fossombronia maritima* (Paton) Paton, *F. wondraczekii* (Corda) Lindb., *Frullania riparia* Hampe ex Lehm., *Marchesinia mackaii* (Hook.) S. Gray, *Riccia beyrichiana* Lehm., *R. bifurca* Hoffm., *R. gougetiana* Durieu & Mont., *R. macrocarpa* Levier, *Bryum gemmiferum* R. Wilczek & Demaret, *B. laevifilum* Syed., *Encalypta spathulata* Müll. Hal., *Isopterygiopsis pulchella* (Hedw.) Z. Iwats, *Physcomitrium pyriforme* (Hedw.) Hampe, *Protobryum bryoides* (Dicks.) J. Guerra & M.J. Cano, *Rhynchostegiella durieui* (Mont.) Allorge & Perss., *R. teesdalei* (Schimp.) Limpr., *Thuidium delicatulum* (Hedw.) Schimp., *Tortula cuneifolia* (Dicks.) Turner, *T. freibergii* Dixon & Loeske and *Weissia rutilans* (Hedw.) Lindb. The presence within the Balearic archipelago of *Cephaloziella divaricata* (Sm.) Schiffn. is excluded.

Mosses / Liverworts / floristics / chorology / Balearic Islands / Spain

Resumen – Sobre la base de recientes prospecciones briológicas, 21 nuevas especies se añaden al catálogo briofítico de las Islas Baleares, incrementando el número conocido de especies a 308 (2 antocerotas, 67 hepáticas, 239 musgos). Los siguientes briófitos constituyen una novedad para el archipiélago balear: *Cephaloziella stellulifera* (Spruce) Schiffn., *Fossombronia maritima* (Paton) Paton, *F. wondraczekii* (Corda) Lindb., *Frullania riparia* Hampe ex Lehm., *Marchesinia mackaii* (Hook.) S. Gray, *Riccia beyrichiana* Lehm., *R. bifurca* Hoffm., *R. gougetiana* Durieu & Mont., *R. macrocarpa* Levier, *Bryum gemmiferum* R. Wilczek & Demaret, *B. laevifilum* Syed., *Encalypta spathulata* Müll. Hal., *Isopterygiopsis pulchella* (Hedw.) Z. Iwats, *Physcomitrium pyriforme* (Hedw.) Hampe, *Protobryum bryoides* (Dicks.) J. Guerra & M.J. Cano, *Rhynchostegiella durieui* (Mont.) Allorge & Perss., *R. teesdalei* (Schimp.) Limpr., *Thuidium delicatulum* (Hedw.) Schimp., *Tortula cuneifolia* (Dicks.) Turner, *T. freibergii* Dixon & Loeske y *Weissia rutilans* (Hedw.) Lindb. Se excluye la presencia de *Cephaloziella divaricata* (Sm.) Schiffn. en las Islas Baleares.

Musgos / Hepáticas / florística / corología / Islas Baleares / España

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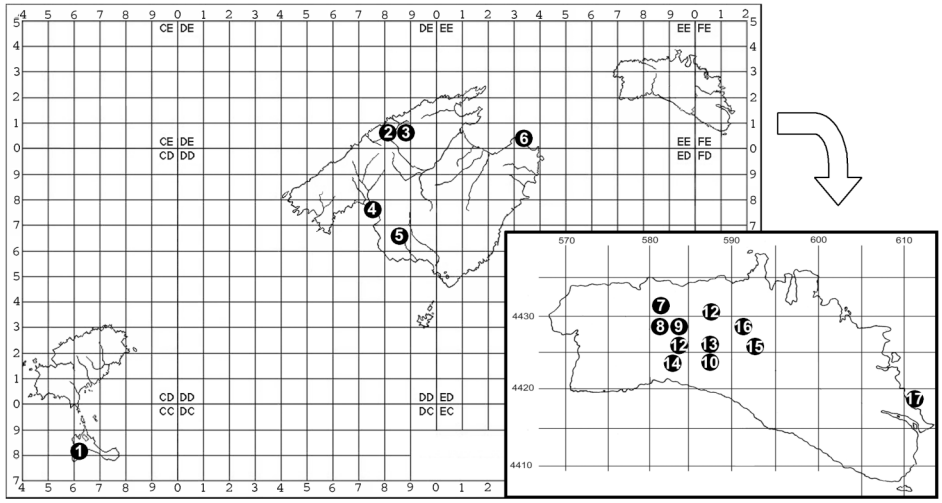

Fig. 1. Geographical situation of the studied localities. **1**: Cap de Berberia – **2**: Escorca, puig Major de Son Torrella – **3**: Escorca, Torrent des Gorg Blau – **4**: Entre can Pastilla i s'Arenal – **5**: Marina de Llucmajor, Can Mutet – **6**: Artà, Talaia Moreia – **7**: Ciutadella, Bassa Verda d'Algaiarens – **8**: Ciutadella, Son Toni Martí – **9**: Ciutadella, Turó de Coll Roig – **10**: Ferreries, barranc d'En Fide – **11**: Ferreries, barranc de Sant Antoni de Ruma – **12**: Ferreries, Son Gornés – **13**: Ferreries, turó de s'Ermita – **14**: Ferreries, barranc d'Algendar – **15**: Es Mercadal, penya de s'Indi – **16**: Es Mercadal, Llinàritx – **17**: Binisarmenya.

INTRODUCTION

We present the main chorological results of extensive fieldwork throughout the Balearic Islands between 2002 and 2003, as well as the revision of herbarium specimens. This contribution is a continuation of the research initiated by some of the authors on Balearic bryophytes (Sáez *et al.*, 2002). Different areas of the Balearic archipelago were studied (Fig. 1). Ongoing collecting efforts in Menorca clearly indicate that this island is not well explored bryologically. Findings reported here demonstrate that there is still incomplete knowledge of the bryophyte diversity in the Mallorca mountainous region (Serra de Tramuntana). This orographic complex is the main centre of diversity of the Balearic archipelago. The great difference in altitude between the summits of the high mountains and the sea, the presence of diverse mountainous habitats (gorges, rock walls, shafts, gullies, exokarstic morphologies), and the important forested areas give northern Mallorca the most varied bryophyte flora of the Balearic Islands.

Our collections comprise twenty one (21) taxa that have not so far been recorded for the Balearic Islands (Fig. 1). Within hepatics and mosses we have followed an alphabetical sequence for genera and species. Localities are specified with a 1 km grid UTM reference. Comments, mainly chorological and ecological, are presented for all taxa. Chorological data have been specified according to Düll (1983, 1984, 1985).

HEPATICS

Cephaloziella stellulifera (Spruce) Schiffn.

Menorca: Between Fornells and Maó, on siliceous rocks, 1982, *Álvarez* (BCB 1242, sub *C. divaricata*).

Cephaloziella divaricata (Sm.) Schiffn. was reported for Menorca by Casas & Brugués (1983). The voucher specimen (BCB 1242) corresponds to *C. stellulifera*. This temperate species is widespread in the Iberian Peninsula and several Mediterranean Islands.

Fossombronia maritima (Paton) Paton

Menorca: Ciutadella, Bassa Verda d'Algaiarens, 31TEE8033, 138 m, on siliceous soil, near bare depressed flats flooded in winter, February 2003, *Balaguer* (BCB 54399).

This rare oceanic-mediterranean species has been reported from scattered localities in the northeastern Iberian Peninsula (Sérgio *et al*. 1996). It is found mostly on wet places with maritime influence, on acid substrate. This is the first report of this species for a Mediterranean island. In our opinion, the distribution of *F. maritima* is only partially known due to confusion with other species of the genus, and it likely has a wider distribution in Menorca.

Fossombronia wondraczekii (Corda) Lindb.

Formentera: Cap de Berberia, 31SCC68, 100 m, on calcareous stony soil, April 1987, *Cros* (BCB 22657).

This temperate species is broadly distributed in the Iberian Peninsula. It likely has a wider distribution in the Balearic Islands.

Frullania riparia Hampe ex Lehm.

Mallorca: Talaia Moreia, Artà, 31SED3003, 370 m, on shaded calcareous rocks, January 2002, *Sáez* (BCB 54664).
Menorca: Llinàritx, Es Mercadal, 31SEE9128, 50 m, at base of shaded calcareous boulders, April 2003, *Balaguer* (BCB 54663).

In the eastern Iberian Peninsula this relict submediterranean-alpine species is known from a single locality in the eastern Pyrenees (Sim-Sim *et al*., 1999). *Frullania riparia* is related morphologically to *F. dilatata*, although the former can easily be separated from the latter by its smaller and filiform stylus, 2-4 cells wide at base, and by having underleaves with subacute or blunt lobes. See Sim-Sim *et al.* (1999: 220) for detailed diagnostic characters of *F. riparia, F. azorica* and the *F. dilatata* complex.

In the Balearic Islands *F. riparia* is associated primarily with *Lejeunea* cavifolia (Ehrh.) Lindb. and *Radula complanata* (L.) Dum. We believe that *F. riparia* has a wider distribution in the archipelago.

Marchesinia mackaii (Hook.) S. Gray

Mallorca: Torrent des Gorg Blau, Sa Fosca, between Pont Natural and el Pas des Duro, 31SDE8508, 470 m, on shaded calcareous rocks beside a stream, April 2003, *Sáez* (BCB 54666).

In the Mediterranean region *M. mackaii* is a rare species restricted to a few stations that have special ecological attributes such as the absence of high and low temperatures, frosts, and high light intensity (Geissler, 1995; Bischler, 2004). This is the first report of this oceanic-mediterranean species for a Mediterranean island.

In the Balearic Islands *M. mackaii* is restricted to a karstic canyon that is located in the northern part of Mallorca (Serra de Tramuntana), which is the highest region of the island. It has a reduced population and is currently known in an area of less than 15 m^2 that never receives direct sunlight, where it was found growing together with *Homalia lusitanica* Schimp. and *Thamnobryum alopecurum* (Hedw.) Gangulee. This karstic canyon has an interestingly relict vascular flora (Trias & Ramon, 2000; Pérez-Obiol *et al*., 2003), with the dominant trees *Laurus nobilis* L. and *Acer opalus* Mill. subsp. *granatense* (Boiss.) Font Quer & Rothm., and the scrub *Viburnum tinus* L. Although the conservation state of this karstic canyon is rather good, the adventure sport of gully-trekking nowadays attracts large numbers of visitors and threatens to overwhelm the loading capacity of this fragile ecosystem (Ginés & Mayol, 1995).

Riccia beyrichiana Lehm.

Menorca: Without precise locality, 1951, *Montserrat* (BCB 33164).

This oceanic-submediterranean species is broadly distributed in the Iberian Peninsula.

Riccia bifurca Hoffm.

Mallorca: Between Can Pastilla and S'Arenal, 31SDD77, 2 m, on calcareous soil depressions of sandy texture, April 1995, *Sáez* (BCB 54158).

Riccia bifurca is a submediterranean species broadly distributed in the Iberian Peninsula. This species has a presumably wider distribution in the Balearic Islands, and it probably also occurs in Menorca and Western Balearic Islands.

Riccia gougetiana Durieu & Mont.

Menorca: Es Mercadal, sa Penya de s'Indi, 31SEE9325, 150 m, on siliceous soil depressions within *Isoetes* communities, April 2002, *Balaguer* (BCB 55482).

This submediterranean species is broadly distributed in the Iberian Peninsula. In Menorca *Riccia gougetiana* grows together with *Corsinia coriandrina* (Spreng.) Lindb.

Riccia macrocarpa Levier

Menorca: Ferreries, Son Gornés, 31SEE8426, 129 m, on siliceous soil depressions of sandy texture, April 2002, *Balaguer & Sáez* (BCB 54671).

In the Iberian Peninsula this submediterranean species occurs mainly in the southwestern and western parts of the territory (Casas *et al*., 1992). Other populations have been reported from eastern Spain (Casas *et al*., 1998; Puche *et al*., 1987).

In Menorca *R. macrocarpa* grows together with *Fossombronia angulosa* (Dicks.) Raddi, *Campylopus brevipilus* Bruch & Schimp., *Entosthodon attenuatus* (Dicks.) Bryhn and *E. obtusus* (Hedw.) Lindb.

MOSSES

Bryum gemmiferum R. Wilczek & Demaret

Menorca: Between Binisarmenya and Cala Mesquida, 31TEE11, 40 m, on siliceous rocks beside a stream, 28-IV-1951, *Montserrat* (BCB 46492, sub *B. bicolor* Dicks.).

This southern-suboceanic species has not been almost reported in Eastern Iberian Peninsula. *Bryum gemmiferum* likely occurs in other areas of northern Menorca, where suitable stations are available.

Bryum laevifilum Syed.

Menorca: Ferreries, Barranc d'Algendar, 31SEE8324, 50 m, on calcareous rocks near wayside, May 2002, *Balaguer* (BCB 54462).

The specimens from Menorca are plants 3 mm high, with numerous filamentous axillary and rhizoidal gemmae. This temperate species occurs in the Iberian Peninsula mainly in northern parts of the territory, where it grows predominantly in dry open places in mountainous areas. In the Minorcan locality this species is associated with *Bryum radiculosum* Brid., *Rhynchostegiella tenella* (Dicks.) Limpr., *Southbya nigrella* (De Not.) Henriques and *Tortella nitida* (Lindb.) Broth. *Bryum laevifilum* has a presumably wider distribution in the Balearic Islands and probably also occurs in Mallorca.

Encalypta spathulata Müll. Hal.

Mallorca: Puig Major de Son Torrella, 31SDE8206, 1400 m, on shaded calcareous rocks, April 2002, *Sáez* (BCB 54888).

As far as we know, this is the first report of this boreal-montane species (Düll, 1992) for a Mediterranean island. In the Iberian Peninsula it is a rare moss, which is found in scattered localities in mountainous areas.

In the Balearic Islands this species is associated with *Timmia bavarica* Hessl. and *Neckera complanata* (Hedw.) Huebener, two rare species restricted to the mountainous area of Serra de Tramuntana. *Encalypta spathulata* likely occurs in other mountains of northern Mallorca, where suitable stations are available.

Isopterygiopsis pulchella (Hedw.) Z. Iwats

Mallorca: Puig Major de Son Torrella, 31SDE8206, 1400 m, on shaded, more or less vertical, calcareous rocks, April 2002, *Sáez* (BCB 54976).

This boreal-montane species occurs in the Iberian Peninsula mainly in northern and northeastern parts of the territory, where it grows predominantly on rocks along stream-banks, ravines and cliffs in mountainous areas. Disjunct populations were reported from Sierra Nevada (southern Spain) by Zafra & Varo (1974).

In the Balearic locality, *I. pulchella* is extremely rare on cracks in the rocks with northern exposures. It grows together with *Taxiphyllum wisgrillii* (Garov.) Wijk & Margad., *Neckera complanata* (Hedw.) Huebener and *Mnium marginatum* (Dicks.) P. Beauv.

Physcomitrium pyriforme (Hedw.) Hampe

Mallorca: Marina de Llucmajor, Can Mutet, 31SDD8467, 150 m, on bare depressed flats flooded in winter, April 2003, *Sáez* (BCB 54921).

It has been reported from several Spanish and Portuguese localities in the northern half of the Iberian Peninsula (Casas *et al.*, 1996). *Physcomitrium pyriforme* is a calcifugous plant that has been found here, uncharacteristically, on a limestone substrate.

This temperate species has a presumably wider distribution in the Balearic Islands and probably also occurs in northern Menorca, where suitable stations, temporary pools on siliceous sandy soil, are available.

Rhynchostegiella durieui (Mont.) Allorge & Perss.

Menorca: Ciutadella, Turó de Coll Roig, 31TEE8129, 96 m, April 2002, on shaded soil in a *Quercus ilex* L. forest, *Balaguer & Sáez* (BCB 54541); Ciutadella, La Vall – Algaiarens, 31TEE8033, 25 m, on shaded siliceous soil in a *Olea europaea* L. var. *sylvestris* scrub, April 2002, *Balaguer* (BCB 54542).

R. durieui is considered to be an oceanic-mediterranean relict species, restricted to scattered localities in the western Mediterranean region and Azores Islands (Sérgio & Hebrard, 1982). It has been reported from the southern part of the Iberian Peninsula (Casas *et al.*, 1985).

This species was doubtfully reported from a single locality in northern Mallorca by Hermann (1913), but its presence had not been verified in the Balearic Islands until now.

Rhynchostegiella teesdalei (Schimp.) Limpr.

Menorca: Ferreries, Barranc d'en Fideu, 31SEE8724, 30 m, on calcareous rocks beside a stream, April 2002, *Balaguer & Sáez* (BCB 54552).

This oceanic-submediterranean species has been reported from northern and northeastern Iberian Peninsula (Allorge, 1955, Heras & Infante, 1988; Martínez Abaigar, 1987; Cros, 1985; Casas *et al.*, 2001). In Menorca this species is associated with *Fissidens crassipes* Wils. ex Bruch & Schimp. subsp. *warnstorfii* (M. Fleisch.) Brugg.-Nann.

Thuidium delicatulum (Hedw.) Schimp.

Mallorca: Puig Major de Son Torrella, 31SDE8206, 1350 m, shady meadows on calcareous soil, July 2002, *Sáez* (BCB 54673).

It is a distinctly montane (submediterranean-suboceanic) species, usually growing on shaded soil, humus, rocks, logs, or stumps. It may also be found growing on tree bases. In the Iberian Peninsula it occurs in mountainous areas of the northern half of the territory (Brugués, 1992). Therefore, its find in a Mediterranean island is a chorologically remarkable discovery. This new record can be added to the large list of montane species that have been recorded on the highest mountain of the archipelago.

The Balearic population of *T. delicatulum* is very small and only a single locality is currently known in an area of less than 2 m^2. This species has been seen in the Puig de Massanella (1367 m) and Tossals Verds (1120 m), but, up to date, we have not been able to find new populations.

Tortula cuneifolia (Dicks.) Turner

Menorca: Ferreries, Barranc de Sant Antoni de Ruma, 31TEE8730, 100 m, at the edge of a watercourse on moist siliceous rocks, April 2002, *Balaguer & Sáez* (BCB 54629); Ferreries, Barranc d'Algendar, 31SEE8324, shaded calcareous rocks, 50 m, May 2002, *Balaguer* (BCB 54630); Ciutadella, Binisebani, 31TEE7329, 30 m, on shaded calcareous wall on northern exposures, May 2002, *Balaguer* (BCB 54631).

This suboceanic-submediterranean species, widely distributed in the Iberian Peninsula (Cano, 2004), was doubtfully reported from the locality of Biniguardó (Menorca) by Rodríguez (1904), but its presence in the Balearic Islands had not been verified until now, since no available voucher specimens had been found.

Tortula freibergii Dixon & Loeske

Menorca: Ferreries, Barranc de Sant Antoni de Ruma, 31TEE8730, 100 m, at the edge of a watercourse on moist siliceous rocks, April 2002, *Balaguer & Sáez* (BCB 54632).

It is a rare oceanic-mediterranean species endemic to western Europe and northern Africa (Cano, 2004). It is known from scattered localities in the Iberian Peninsula (Cano, l.c.). As far as we know, this is the first report of the species for a Mediterranean island.

In Menorca *T. freibergii* grows together with *Lunularia cruciata* (L.) Lindb. and *T. cuneifolia*.

Weissia rutilans (Hedw.) Lindb.

Menorca: Ferreries, Turó de s'Ermita, 31SEE8726, 183 m, on siliceous soil in a *Erica scoparia* L. open scrub, April 2002, *Balaguer & Sáez* (BCB 54658); *Ibidem*, 180 m, on siliceous rocks with northern exposures, April 2002, *Balaguer & Sáez* (BCB 54659); Ferreries, Barranc de Sant Antoni de Ruma, 31TEE8730, 100 m, on shady siliceous rocks, April 2002, *Balaguer & Sáez* (BCB 54970).

It is a suboceanic species, relatively rare in north and northeastern Iberian Peninsula, since it is currently known from scattered localities in Girona, Navarra, Asturias and Soria provinces. Its distribution is not completely known, probably due to missidentifications with other species (Guerra, 2002). In the Minorcan locality *W. rutilans* grows together with *Fissidens limbatus* Sull. and *Fossombronia angulosa* (Dicks.) Raddi.

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