

# An updated Bryophytes Check-list of the Region of Murcia (Southeastern Spain)

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## Resumen

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*Catálogo actualizado de los briófitos de la Región de Murcia (Sureste de España).*

Se actualiza el catálogo de los briófitos de la Región de Murcia. Para este territorio se aceptan 200 especies y 15 taxones infraespecíficos (77 géneros) de musgos y 32 especies de hepáticas (20 géneros). *Grimmia tergestina* se confirma en el territorio. *Aschisma cuynetii*, *Brachytheciastrum dieckii*, *Brachythecium albicans*, *Brachythecium rutabulum*, *Brachythecium salebrosum*, *Bryum alpinum*, *Bryum elegans*, *Campyliadelphus chrysophyllus*, *Campylopus pilifer* y *Didymodon eckeliae* son nuevas citas para Murcia. *Bryum tenuisetum*, *Entosthodon attenuatus* y *Fissidens bryoides* se excluyen del catálogo.

**Palabras clave:** Briófitos, Catálogo, Murcia, SE España.

## Abstract

An updated checklist of the bryophytes of the Region of Murcia is provided. Bryophyte diversity in Murcia consists of 200 species and 15 infraespecific taxa (77 genera) of mosses and 32 species (20 genera) of liverworts. *Grimmia tergestina* is confirmed in the territory. *Aschisma cuynetii*, *Brachytheciastrum dieckii*, *Brachythecium albicans*, *Brachythecium rutabulum*, *Brachythecium salebrosum*, *Bryum alpinum*, *Bryum elegans*, *Campyliadelphus chrysophyllus*, *Campylopus pilifer* and *Didymodon eckeliae* are new reported for Murcia. *Bryum tenuisetum*, *Entosthodon attenuatus* and *Fissidens bryoides* are excluded from the check-list.

**Key words:** Bryophytes, Check-list, Murcia, SE Spain.

## Introduction

The first bryophyte checklist of the Region of Murcia (Cano et al. 2004) consisted of 200 taxa (74 genera) of mosses and 32 taxa (20 genera) of liverworts. In the last six years there has been a considerable increased in the knowledge of South-eastern bryophytes, mostly due to the publication of the taxonomic treatments, carried out for Spanish and Portuguese bryologists within the "Flora Briofítica Ibérica" project (Guerra et al. 2006, Brugués et al. 2007, Guerra et al. 2010). In addition, the project PEPLAN: Recursos fitogenéticos

(subproject S5-E005-7: "Libro Rojo de la flora vascular Amenazada") from the Consejería de Universidades, Empresa e Innovación from Regional Government of Murcia give us an opportunity to collect in unexplored or poorly collect areas in the study territory. The result has been a considerable number of additions, nomenclatural changes or exclusion of previous reported species.

The aim of this work is to update the catalogue of bryophytes for the Region of Murcia. This checklist will be the first step for carrying out a Bryophytic Flora of Murcia as well as the red list of bryophytes and the designation of priority

areas of conservation in the Region of Murcia in which our research group are involved.

## Material and Methods

This checklist is based on intensive field-work in poorly collected areas in the studied territory. In addition we have checked herbarium specimens, and compiled the recent bibliography references. The resulting list is arranged in alphabetic order of genus and species. For the generic circumscription and synonyms of mosses, we have mainly followed Hill et al. (2006), with those modifications later established. For liverworts, we have mainly followed Grolle & Long (2000). In Cano et al. (2004) a list of representative material of each species was published. In order to avoid unnecessary repetitions, we have summarized the studied material in a single collection by taxa. If possible, this collection is represented by new material. The main habitats where the species occur are provided. When the taxon was reported under a different name, this is indicated. Excluded or doubtful records and a list of synonyms are provided at the end of the checklist. New records are marked with asterisk.

## Results

### Mosses

#### *Acaulon casasianum* Brugués & H. A. Crum

Selected material studied: Lorca, pr. La Paca, 870m, 14-XII-2008, *Cano 4793* (MUB 28780).

On gypsiferous soils.

Previous records: Guerra (2003); Cano et al. (2004).

#### *Acaulon dertosense* Casas, Sérgio, Cros & Brugués

Selected material studied: Mazarrón, Cabezo Peñado, 80m, 18-I-2009, *Cano 4843* (MUB 28934).

Clayey, gypsiferous open soils, sometimes nitrified.

Previous records: Ros & Guerra (1987, 1988); Casas et al. (1989); Cano et al. (2004).

#### *Acaulon fontiquerianum* Casas & Sérgio

Material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de la Tía Ginesa, 30S XG5190, 1000m, 6-III-2007, *Ros & Werner s.n.* (MUB 22294).

Open soil in *Quercus rotundifolia* Lam. forest.  
Previous record: Ros & Werner (2010).

#### *Acaulon triquetrum* (Spruce) Müll. Hal.

Selected material studied: Sierra de Carrascoy, rambla de Roy, 960m, 1-III-2009 *Cano 4925* (MUB 29112).

On open soil, including clay.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Casas et al. (1989); Cano et al. (2004).

#### *Aloina aloides* (Koch ex Schultz) Kindb.

Selected material studied: La Unión, proximidades Llano del Beal, 30SXG9065, 250m, *Sánchez Moya s.n.* (MUB 15091).

On bare soils, and soil accumulated at the base of calcareous rocks.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999), Cano et al. (2004).

#### *Aloina ambigua* (Bruch & Schimp.) Limpr.

Selected material studied: Cartagena, carretera Portman-Los Belones, 30SXG96, 50m, *Ros s.n.* (MUB 118).

On bare soils, and accumulated soil at the base of calcareous rocks.

Previous records: Alcaraz et al. (1982) sub *Aloina aloides* var. *ambigua*; Ros & Llimona (1984); Ros & Guerra (1987) sub *A. aloides* var. *ambigua*; Guerra et al. (1993); Sánchez-Moya & Cano (1999); Cano et al. (2004).

#### *Aloina bifrons* (De Not.) Delgad.

Selected material studied: Murcia, Sierra del Puerto, carretera Murcia-San Javier, 30SXG7091, 180m, 18-II-1984, *Ros s.n.* (MUB 4198).

On gypsiferous soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

#### *Aloina brevirostris* (Hook. & Grev.) Kindb.

Material studied: Las Torres de Cotillas, Los Pulpites urbanización al oeste de la urbanización Los Romeros, 20-IV-2002, *Werner s.n.* (MUB 12966).

On nitrified bare soil.

Previous records: Gallego & Cano (2000); Cano et al. (2004); Guerra et al. (2006).

#### *Aloina rigida* (Hedw.) Limpr.

Selected material studied: Cartagena, Isla Plana, cortijo del Mojón, 50m, 18-I-2009, *Cano 4839*

(MUB 28930).

On bare soils, and soils accumulated at the base of calcareous rocks.

Previous records: Casas (1973); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Rams et al. (2000).

***Anomodon viticulosus*** (Hedw.) Hook. & Taylor

Selected material studied: Moratalla, Sierra de los Álamos, Cenajo del Agua Cernida, 30SWH8829, 1000m, 30-IV-1983, *Ros s.n.* (MUB 887).

On calcareous rocks.

Previous record: Ros & Guerra (1988).

***Antitrichia californica*** Sull.

Material studied: Alhama de Murcia, Sierra de Carrascosy, rambla de Roy, 900m, 2-IV-1996, *Cano & Ros s.n.* (MUB 6043).

Epiphytic on trunk of *Quercus rotundifolia*.

Previous record: Ros et al. (1996).

***Aschisma carniolicum*** (F. Weber & D. Mohr) Lindb.

Selected material studied: entre Yecla y Calasparra, 20-II-1973, *Casas* (BCB 290).

Open soils.

Previous records: Casas (1973) sub *Aschisma carniolicum* var. *speciosum*; Casas et al. (1985); Ros & Werner (2010).

**\**Aschisma cuynetii*** (Bizot & R. B. Pierrot) J. Guerra & M. J. Cano

Material studied: Abanilla, Sierra del Cantón, 800m, 24-IV-2010, *Cano 5642* (MUB 32403). Águilas, playa de la Carolina, 20m, 28-III-2010, *Cano 5558* (MUB 32324).

Open soils, and soils accumulated at the base of calcareous rocks.

New record for Murcia. It is an Iberic endemism, considered as a vulnerable species in the last Spanish red list of bryophytes published (Sérgio et al. 2007). According to Guerra et al. (2006), this species is known from few localities of Alicante, Almería, Gerona, Baixo Alentejo, Beira Litoral and Estremadura.

***Barbula bolleana*** (Müll. Hal.) Broth.

Selected material studied: Calasparra, Cañave-roza, 293m, 26-X-2002, *Cano 1026* (MUB 14027).

On stream banks or wet rocks.

Previous records: Allorge & Allorge (1946) sub *Barbula ehrenbergii*; Alcaraz et al. (1982) sub *B. ehrenbergii*; Ros & Llimona (1984) sub *B. ehrenbergii*; Gil & Ruiz (1985) sub *B. ehrenbergii*; Ros & Guerra (1987) sub *B. ehrenbergii*; Casas et al. (1989) sub *B. ehrenbergii*; Cano et al. (2004); Garilleti (2005); Guerra et al. (2006).

***Barbula convoluta*** Hedw. var. *convoluta*

Selected material studied: Moratalla, Casas del Portal, 1120m, 30-V-2010, *Cano 5675* (MUB 32528).

Open soils and fissures of calcareous rock with accumulated soil.

Previous records: Ade & Koppe (1942); Ros & Guerra (1987); Sánchez-Moya & Cano (1999).

***Barbula convoluta*** var. *sardoa* Bruch & Schimp.

Material studied: Jumilla, Sierra del Carche, 30SWH6056, 1100m, 8-XII-1983, *Ros s.n.* (MUB 3200).

Fissure of calcareous rock with accumulated soil.

Previous record: Ros & Guerra (1987) sub *Barbula convoluta* var. *commutata*.

***Barbula unguiculata*** Hedw.

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5697* (MUB 34057).

Open soils and fissures of calcareous rock with accumulated soil.

Previous records: Ade & Koppe (1942); Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004); Garilleti (2005); Guerra et al. (2006).

***Bartramia stricta*** Brid.

Material studied: Lorca, Sierra de la Torrecilla, Los Majales, 30SXG0372, 600m, 3-III-1984, *Ros s.n.* (MUB 3945).

On accumulated soil at the base of acidic rocks.

Previous records: Ros & Guerra (1987); Casas et al. (1992).

**\**Brachytheciastrum dieckii*** (Roll) Ignatov & Huttunen

Material studied: Murcia, Moratalla, Sierra de Villafuerte, fuente de Cantalar, 30SXH7222, 1400m, 30-V-2009, *Guerra et al. s.n.* (MUB 30084).

On rock with accumulated soil.

New record for Murcia. This is a Mediterranean

species that mainly occurs on rocks, soils or trunks in deciduous forests (cf. Orgaz et al. 2010). In the Iberian Peninsula it is known for the Central range, Baetic Cordillera, Iberian System and the Pyrenees.

***Brachytheciastrum velutinum*** (Hedw.) Ignatov & Huttunen var. *velutinum*

Selected material studied: Moratalla, Sierra del Buitre, 16-V-2010, *Cano 5663* (MUB 32437).

Humiferous soils, calcareous rocks and base of trunks.

Previous records: Ros & Llimona (1984) sub *Brachythecium velutinum*; Ros & Guerra (1987) sub *B. velutinum*; Cano et al. (2004) sub *B. velutinum*.

***Brachytheciastrum velutinum*** var. *salicinum* (Schimp.) Ochyra & Żarnowiec

Selected material studied: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 1900m, 7-III-2004, *Cano 1431* (MUB 16671).

Humiferous soils, calcareous rocks or with soil accumulated on rocks.

Previous records: Ros & Llimona (1984) sub *Brachythecium velutinum* var. *salicinum*; Ros & Guerra (1987) sub *B. velutinum*; Cano et al. (2004) sub *B. velutinum* var. *salicinum*.

**\**Brachythecium albicans*** (Hedw.) Schimp.

Material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de la Tía Ginesa, 30SXG5089, 26-II-1984, *Ros s.n.* (MUB 3971). Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900m, 7-III-2003, *Cano 1429* (MUB 16669). Mula, Sierra de Ponce, barranco del Horcajo, 30SXH1401, 800m, *Ros s.n.* (MUB 3530).

On accumulated soil at the base of calcareous rocks and humiferous soils.

New record for Murcia. This species is widespread in the Iberian Peninsula growing on wet soils on forest. The samples MUB 3971 and 3530 were previously identified as *Brachythecium glareosum* (Bruch ex Spruce) Schimp. by Ros & Guerra (1987).

***Brachythecium glareosum*** (Bruch ex Spruce) Schimp.

Selected material studied: Mula, Sierra del Cambrón, pico La Selva, 30SXG1498, 1387m, 7-XII-2002, *Cano 1048* (MUB 14137).

Humiferous soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

**\**Brachythecium rutabulum*** (Hedw.) Schimp.

Material studied: Moratalla, Salinas del Zacatín, 30-V-2009, *Guerra et al. s.n.* (MUB 34086). Moratalla, Sierra de Villafuerte, nacimiento de Cantalar, 21-V-2005, *Guerra s.n.* (MUB 18507).

Banks near to streams, between grass.

New record for Murcia. This is a very common species on tree bases, slopes in forest, rocks, and in general in shaded and wet habitats with a widespread distribution in the Iberian Peninsula.

**\**Brachythecium salebrosum*** (Hoffm. ex F. Weber & D. Mohr) Schimp.

Material studied: Alhama de Murcia, Sierra Espuña, puente del Aire, 815m, 31-I-2010, *Cano 5509* (MUB 31028). Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5701* (MUB 34058). Moratalla, Sierra del Zacatín, pr. Rincón del Sastre, 1420m, 31-V-2009, *Cano 4970* (MUB 29403).

Slopes and humiferous soils in pine forest.

New record for Murcia. This is a widespread species in the Iberian Peninsula growing on soils or as epiphytic on base trees.

***Bryoerythrophyllum recurvirostrum*** (Hedw.) P.C. Chen

Selected material studied: Sierra Espuña, casas de Malvariche, 960m, 29-X-2005, *Cano 2554* (MUB 19201).

Ledges of calcareous rocks and soil under *Quercus rotundifolia*.

Previous records: Cano et al. (2004); Gallego (2005); Guerra et al. (2006).

**\**Bryum alpinum*** Huds. ex With.

Material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Puerto Alto, 1460m, 27-VI-2010, *Cano 5705* (MUB 34060). Moratalla, pr. Puerto Hondo, 11-VII-2010, 1390m, *Cano 5708* (MUB 34092). Moratalla, Zaén de Arriba, 1300m, 30-V-2010, *Cano 5683* (MUB 32536).

On wet slopes and at the edge of irrigation channels.

New record for Murcia. According to Guerra et al. (2010), it is a widespread species in the Iberian Peninsula which grows preferably in acidic soils

in banks of streams, or flooded places.

***Bryum argenteum*** Hedw.

Selected material studied: Moratalla, Collado Letur, 1340m, 8-XII-2003, *Cano 1376* (MUB 15874).

On soil and soil accumulated on rocks, frequent in disturbed areas.

Previous records: Alcaraz et al. (1982); Guerra & Puche (1984) sub *Bryum argenteum* var. *lanatum*; Ros & Llimona (1984); Ros & Guerra (1987) sub *B. argenteum* var. *argenteum* and var. *lanatum*; Rams et al. (2000); Cano et al. (2004).

***Bryum caespiticium*** Hedw.

Selected material studied: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 1900m, 7-III-2003, *Cano 1432* (MUB 16657).

On soil and soil covered rocks.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Bryum canariense*** Brid.

Selected material studied: Cehegín, Sierra de Lavia, 1100m, 11-IV-2009, *López s.n.* (MUB 34044).

Humiferous soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004) sub *Rosulabryum canariense*.

***Bryum capillare*** Hedw.

Selected material studied: La Unión, 170m, 28-II-2010, *Cano 5523* (MUB 32014).

Humiferous soils and soil in rock fissures.

Previous records: Simó (1976); Alcaraz et al. (1982); Ros & Guerra (1987) sub *Bryum capillare* and *B. capillare* f. *longipilum*; Sánchez-Moya & Cano (1999); Cano et al. (2004) sub *Rosulabryum capillare*.

***Bryum dichotomum*** Hedw.

Selected material studied: Mazarrón, pr. Bolnuevo, playa Cueva de Lobos, 2-XI-2008, *Cano 4779* (MUB 28667).

On soil and soil accumulated on rocks, frequent in disturbed areas.

Previous records: Alcaraz et al. (1982) sub *Bryum bicolor* and *B. versicolor*; Guerra & Puche (1984) sub *B. dunense*; Ros & Llimona (1984) sub *B. bicolor*; Ros & Guerra (1987) sub *B. bicolor*, *B. dunense* and *B. versicolor*; Sánchez-Moya &

Cano (1999) sub *B. bicolor* and *B. dunense*; Rams et al. (2000) sub *B. bicolor*; Cano et al. (2004).

***Bryum donianum*** Grev.

Selected material studied: Cartagena, Sierra de la Muela, subida a la sierra, 30SXG6862, 200m, 7-III-1984, *Ros s.n.* (MUB 3960).

Soils and accumulated soil on rocks.

Previous records: Allorge & Allorge (1946); Ros & Guerra (1987); Cano et al. (2004) sub *Rosulabryum donianum*.

**\**Bryum elegans*** Nees

Material studied: Moratalla, Macizo de Revolcadores, pr. pico Revolcadores, 1950m, 11-VII-2010, *Cano 5810* (MUB 34089).

New record for Murcia. In Southeastern Spain it has been only reported in Granada and Almería. According to Guerra et al. (2010), it is a species frequent on calcareous rocks in high mountains.

***Bryum gemmilucens*** R. Wilczek & Demaret

Selected material studied: pr. Los Alcazares, 14-II-2010, *Cano 5515* (MUB 32006).

On bare soils.

Previous records: Ros & Guerra (1987, 1988); Cano et al. (2004).

***Bryum klinggraeffii*** Schimp.

Material studied: Bullas, fuentes del río Mula, 630m, 6-II-1983, *Ros s.n.* (MUB 3624).

On vertical wall.

Previous records: Ros & Guerra (1987, 1988); Cano et al. (2004).

***Bryum moravicum*** Podp.

Selected material studied: Cartagena, Sierra de la Muela, 30SXG6862, 250m, 7-III-1984, *Ros s.n.* (MUB 3974).

On trunk.

Previous records: Ros & Guerra (1987, 1988) sub *Bryum flaccidum*; Sánchez-Moya & Cano (1999) sub *Bryum capillare* var. *flaccidum*; Cano et al. (2004) sub *Rosulabryum laevifilum*.

***Bryum pseudotriquetrum*** (Hedw.) P. Gaertn., B. Mey & Scherb.

Selected material studied: Moratalla, Sierra de Villafuerte, 30SWH7223, 1200m, 26-IV-2002, *Guerra et al. s.n.* (MUB 15030).

Banks with seeping water, sometimes partially submerged.

Previous record: Ros & Guerra (1987).

***Bryum radiculosum*** Brid.

Selected material studied: Murcia, La Fuensanta, 22-III-1960, *Runbgy s.n.* (C).

Rocks and banks with accumulated soil.

Previous records: Casas (1973) sub *Bryum muro-rum*; Ros & Guerra (1987); Rams et al. (2000).

***Bryum torquescens*** Bruch & Schimp.

Selected material studied: Cartagena, Tallante, collado de la Cruz, 260m, 18-X-2009, *Cano 5480* (MUB 30360).

All kind of soils, mainly humiferous.

Previous records: Casas (1973) sub *Bryum capillare* subsp. *torquescens*; Alcaraz et al. (1982); Guerra & Puche (1984); Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004) sub *Rosulabryum torquescens*.

***Campylostelium pitardii*** (Corb.) E. Maier

Selected material studied: Murcia, El Valle, 30-III-2003, *Cano 1107* (MUB 15032).

On open soils, occasionally gypsiferous soils.

Previous records: Casas (1973) sub *Grimmia pitardii*; Casas et al. (1985) sub *Grimmia pitardii*; Ros & Guerra (1987) sub *Grimmia pitardii*; Cano et al. (2004); Cros et al. (2010).

**\**Campyliadelphus chrysophyllus*** (Brid.) R. S. Chopra

Material studied: Moratalla, Sierra del Zacatín, pr. Rincón del Sastre, 1420m, 31-V-2009, *Cano 4971* (MUB 30166).

Slopes in pine forest.

New record for Murcia. This species was already reported by Alcaraz et al. (1982) and Ros & Guerra (1987). However after revision of the only (badly preserved) specimen kept at MUB, the specimen was referred to *Brachythecium sp.* and therefore excluded of the checklist of Murcia (Cano et al. 2004). The new records support the presence of this species in the territory.

**\**Campylopus pilifer*** Brid.

Material studied: La Unión, 170m, 28-II-2010, *Cano 5522* (MUB 32013). On acidic soils.

On exposed and acidic soils.

New record for Murcia. A widespread species in the Iberian Peninsula.

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

Selected material studied: Moratalla, Cañada de la

Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5698* (MUB 34061).

Open soils.

Previous record: Ros & Werner (2010).

***Cratoneuron filicinum*** (Hedw.) Spruce

Selected material studied: Moratalla, Sierra de los Álamos, cortijo del Manco, 30SXH9128, 1090m, 2-V-2002, *Cano 893* (MUB 14108).

Banks and rocks at the edges of streams.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Gil & Ruiz (1985); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004); Fuertes et al. (2007).

***Crossidium aberrans*** Holz. & E. B. Bartram

Selected material studied: Lorca, Sierra de Almenara, cerro Merceja, 760m, 10-XII-2005, *Cano 2577* (MUB 19618).

Screes, accumulated soil at the base of calcareous rocks and open soils.

Previous records: Ros & Guerra (1986, 1987); Cano et al. (2004).

***Crossidium crassinerve*** (De Not.) Jur.

Selected material studied: Murcia, Sierra Altaona, 30SXG7600, 395m, 28-III-2004, *Cano 1440* (MUB 16686).

Screes, accumulated soil at the base of calcareous rocks and bare soils.

Previous records: Casas (1973) sub *Crossidium chloronotos*; Alcaraz et al. (1982); Fuertes (1983); Ros & Llimona (1984); Casas (1986); Ros & Guerra (1987); Guerra et al. (1993); Sánchez-Moya & Cano (1999); Rams et al. (2000); Pócs et al. (2004) sub *Crossidium laxefilamentosum*; Cano et al. (2004); Guerra et al. (2006); Cros et al. (2010).

***Crossidium laevipilum*** Thér. & Trab.

Material studied: Fuente Álamo, Las Palas, pico Cebolla, 250m, 11-III-2007, *Cano 3343* (MUB 22195).

Bare soils.

Previous record: Cano et al. (2004).

***Crossidium squamiferum*** (Viv.) Jur.

Selected material studied: Mazarrón, sierra del Algarrobo, pico Algarrobo, 700m, 27-XI-2005, *Cano 2576* (MUB 19423).

Taluses, accumulated soil on calcareous rocks and open soils.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Ctenidium molluscum*** (Hedw.) Mitt.

Selected material studied: Moratalla, Sierra del Buitre, 1200m, 16-V-2010, *Cano 5662* (MUB 32436).

On calcareous rocks.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Dicranella heteromalla*** (Hedw.) Schimp.

Selected material studied: La Unión, Monte Sancti Spiritu, 30SXG8864, 350 m, 10-III-1998, *Sánchez-Moya s.n.* (MUB 15082).

Soil on slate rocks.

Previous records: Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Dicranella howei*** Renauld & Cardot

Selected material studied: Cehegín, Sierra de Burete, 665m, 8-VI-2010, *Cano et al. 5687* (MUB 34052).

Banks and open soils.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Rams et al. (2000).

This species was reported under the genus *Anisothecium* by Alcaraz et al. (1982), Ros & Llimona (1984) and Ros & Guerra (1987). Apparently this combination was never formally published.

***Didymodon acutus*** (Brid.) K. Saito

Selected material studied: Moratalla, Casas del Portal, 1120m, 30-V-2010, *Cano 5676* (MUB 32529).

Soils on schists or calcareous rocks and open soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Didymodon australasiae*** (Hook. & Grev.) R. H. Zander

Selected material studied: Moratalla, Benizar, Rincón de las Cuevas, 30SWH8835, 950m, 11-IV-2003, *Cano et al. s.n.* (MUB 15422).

Open soils.

Previous records: Guerra & Ros (1987) sub *Didymodon aaronis* and *D. trivialis*; Rams et al. (2000); Jiménez (2004); Cano et al. (2004); Jimé-

nez et al. (2005a); Guerra et al. (2006).

**\**Didymodon eckeliae*** R. H. Zander

Studied material: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 824* (MUB 13052).

New record for Murcia. This taxon can be distinguished from the other species of the *Didymodon* section *Vinealis* by its crenulate and bistratose in 1-2 rows leaf margins. The species is known from Spain, California and British Columbia in North America (Zander 2007). In Spain it has been reported from Alicante (Puche et al. 2006a), Guadalajara (Puche et al. 2006b), Jaén and Madrid (Guerra et al. 2010). In Cano et al. (2004), this specimen was identified as *Didymodon insulanus* (De Not.) M. O. Hill.

***Didymodon erosus*** J. A. Jimenez & J. Guerra

Material studied: Sierra Espuña, *Romera Belchí & Pedreño Gonzalo s.n.* (MUB 6722).

Previous record: Werner et al. (2010).

***Didymodon fallax*** (Hedw.) R. H. Zander

Selected material studied: Sierra Espuña, casas de Malvariche, 960m, 29-X-2005, *Cano 2555* (MUB 19202).

Open soils.

Previous records: Ade & Koppe (1942) sub *Barbula fallax*; Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004); Jiménez et al. (2005b); Cros et al. (2010).

***Didymodon insulanus*** (De Not.) M. O. Hill

Selected material studied: Moratalla, Macizo de Revolcadores, pr. pico Revolcadores, 1950m, 11-VII-2010, *Cano 5811* (MUB 13052).

On calcareous rocks and accumulated soil on rocks.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004).

***Didymodon luridus*** Hornch. ex Spreng.

Selected material studied: Moratalla, Sierra del Buitre, 1200m, 16-V-2010, *Cano 5665* (MUB 32439).

On calcareous rocks and open soils.

Previous records: Casas (1973) sub *Didymodon trifarius*; Ros & Llimona (1984) sub *D. trifarius*; Ros & Guerra (1987) sub *D. trifarius*; Rams et al. (2000); Cano et al. (2004).

***Didymodon rigidulus*** Hedw.

Selected material studied: Lorca, Sierra de la Torrecilla, rambla del Hortillo, 30SXG0270, 700m, 11-V-2002, *Cano 898* (MUB 13002).

Open soils.

Previous records: Rungby (1962) sub *Barbula rigidula*; Ros & Llimona (1984); Ros & Guerra (1987); Guerra et al. (1993); Sánchez-Moya & Cano (1999); Jiménez (2004); Cano et al. (2004); Guerra et al. (2006).

***Didymodon sicculus*** M. J. Cano, Ros, García-Zamora & J. Guerra

Selected material studied: La Unión, Cabezo Rajao, 30SXG8565, 180m, 22-III-1998, *Sánchez-Moya s.n.* (MUB 15088).

On open soils, mainly saline.

Previous records: Sánchez-Moya & Cano (1999); Rams et al. (2000); Cano et al. (2004).

***Didymodon tophaceus*** (Brid.) Lisa

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Puerto Alto, 1460m, 27-VI-2010, *Cano 5706* (MUB 34063).

Talus with seeping water and banks by streams.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004); Jiménez et al. (2005b).

***Didymodon vinealis*** (Brid.) R. H. Zander

Selected material studied: Alhama de Murcia, Sierra de Carrascoy, pr. repetidor T.V., 30SXG5290, 1050m, 21-X-2001, *Cano s.n.* (MUB 11949).

Open soils, accumulated soils on calcareous rocks, once on base of *Quercus rotundifolia* trunk.

Previous records: Allorge & Allorge (1946) sub *Barbula vinealis*; Casas (1973) sub *B. vinealis*; Ros & Llimona (1984); Ros & Guerra (1987); Jiménez (2004); Cano et al. (2004).

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

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 26-IV-2002, *Guerra et al. s.n.* (MUB 13809).

Fissures of calcareous rocks.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Ditrichum flexicaule*** (Schwägr.) Hampe

Selected material studied: Yecla, Sierra de Sa-

linas, pr. Cerro Laurel, 30SXH7263, 1160m, 27-IV-2003, *Cano 1177* (MUB 15142).

Fissures and ledges of calcareous rocks.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987) sub *Ditrichum flexicaule* f. *densum* (Bruch & Schimp.) Mönk. and *D. flexicaule*; Casas et al. (1992); Cano et al. (2004).

***Encalypta streptocarpa*** Hedw.

Selected material studied: Moratalla, Rincón de los Huertos, 30SWH8233, 1280m, 2-V-2002, *Cano 862* (MUB 14069).

Fissures, ledges and sheltered talus of calcareous rocks.

Previous records: Allorge & Allorge (1946) sub *Encalypta contorta*; Ros & Guerra (1987); Cano et al. (2004).

***Encalypta vulgaris*** Hedw.

Selected material studied: Sierra de Carrascoy, rambla de la Tía Ginesa, 960m, 1-III-2009, *Cano 4918* (MUB 29105).

Soil, ledges, fissures and talus on calcareous rocks.

Previous records: Alcaraz et al. (1982); Casas (1973); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Entosthodon commutatus*** Durieu & Mont.

Material studied: Cartagena, carretera Cartagena-Los Urrutias, 30SXG8876, 0m, 27-III-1997, *Ros & Schumacker s.n.* (MUB 7903).

On open soils.

Previous records: Brugués et al. (2010); Guerra et al. (2010).

***Entosthodon convexus*** (Spruce) Brugués

Selected material studied: La Unión, Monte Sancti Spíritu, 300m, 25-IV-2004, *Cano & Sánchez-Moya 1517* (MUB 16839).

Soil on slate rocks.

Previous record: Cano et al. (2004).

***Entosthodon durieui*** Mont.

Selected material studied: Cartagena, Sierra de la Muela, subida a la sierra, 30SXG6862, 200m, 7-III-1984, *Ros s.n.* (MUB 3962).

Open soils and talus on schists.

Previous records: Ros & Guerra (1987) sub *Entosthodon pallescens*; Brugués (1998); Casas et al. (1996); Cano et al. (2004); Guerra et al. (2010).



***Entosthodon hungaricus*** (Boros) Loeske

Selected material studied: Cartagena, Salinas del Rasall, Calblanque, 30SXG9964, 0m, 6-III-1998, *Cano & Ros s.n.* (MUB 7202).

Saline soils.

Previous records: Cano et al. (1999); Cano et al. (2004).

Ros & Cano (2008) included *Entosthodon hungaricus* as synonym of *E. longicolle* (Trab.) Ros & M. J. Cano, however the latter name is a homonym illegitimate, because there is a priority name, *Entosthodon longicollis* Mitt. The rescue of the epithet "hungaricus" contribute to the nomenclatural stability since it has widely been used in bryophyte literature.

***Entosthodon pulchellus*** (H. Philib.) Brugués

Selected material studied: Moratalla, Sierra de los Álamos, 847m, 8-VI-2010, *Cano et al. 5692* (MUB 34056).

Fissures and soil accumulated on calcareous rocks.

Previous records: Ros & Guerra (1987) sub *Funaria pulchella*; Casas et al. (1996) sub *Funaria pulchella*; Rams et al. (2000) sub *Funaria pulchella*; Cano et al. (2004).

***Epipterygium tozeri*** (Grev.) Lindb.

Material studied: La Unión, Monte Sancti Spiritu, 30SXG8864, 350m, 10-III-1998, *Sánchez-Moya s.n.* (MUB 15079).

Soil on slate rocks.

Previous records: Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Eucladium verticillatum*** (Brid.) Bruch & Schimp.

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 15022).

Talus with seeping water and soil banks along streams.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Eurhynchiastrum pulchellum*** (Hedw.) Ignatov & Huttunen

Selected material studied: Cehegín, La Lavia, 30SXH1104, 6-II-1982, 950m, *Ros & García Rowe s.n.* (MUB 457).

On submerged trunk of *Ulmus minor* Mill. and on

pine cone.

Previous records: Ros & Llimona (1984) sub *Eurhynchium pulchellum*, Cano et al. (2004) sub *Eurhynchium pulchellum*.

***Fabronia pusilla*** Raddi

Selected material studied: Mula, Sierra Espuña, Risco del Portillo, 30SXG2194, 800m, 12-V-2002, *Jiménez s.n.* (MUB 12972).

Base of trunks of *Pinus* sp. and *Pistacia terebinthus* L.

Previous records: Ros & Llimona (1984); Casas et al. (1985); Ros et al. (1996), Cano et al. (2004).

***Fissidens crassipes*** subsp. ***warnstorffii*** (M. Fleisch.) Brugg.-Nann.

Selected material studied: Cieza, Cañón de Almadenes, 30SXH2633, 200m, 2-XI-2003, *Cano et al. 1363* (MUB 15699).

On banks and on rocks of streams and at the edge of irrigation chanel.

Previous records: Allorge & Allorge (1946) sub *Fissidens warnstorffii*; Gil & Ruiz (1985); Ros & Guerra (1987) sub *F. crassipes* and sub *F. crassipes* var. *philibertii*; Cano et al. (2004).

***Fissidens dubius*** P. Beauv.

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 15034).

Fissures, ledges and sheltered talus of calcareous rocks.

Previous records: Alcaraz et al. (1982) sub *Fissidens cristatus*; Ros & Llimona (1984) sub *F. cristatus*; Ros & Guerra (1987) sub *F. cristatus*; Cano et al. (2004).

***Fissidens grandifrons*** Brid.

Selected material studied: Sierra Espuña, 15-IV-1935, *Allorge & Allorge s.n.* (PC).

Submerged in clean water.

Previous records: Potier de la Varde (1945); Allorge & Allorge (1946); Gil & Ruiz (1985); Ros & Guerra (1987); Cano et al. (2004).

***Fissidens viridulus*** (Sw. ex anon.) Wahlenb. var. ***viridulus***

Selected material studied: Murcia, El Valle, 30SXG6399, 150m, 30-I-1998, *Ros & Cano s.n.* (MUB 15458).

Soil in fissures or on talus of rocks.

Previous records: Ros (1984) sub *Fissidens*

*viridulus*; Ros & Guerra (1985) sub *F. viridulus*; Ros & Guerra (1987, 1988) sub *F. viridulus* and *F. viridulus* var. *bambergeri*; Ros & Werner (2010).

***Fissidens viridulus*** var. *incurvus* (Starke ex Röhl.) Waldh.

Selected material studied: Cartagena, Sierra de la Muela, 30SXG6861, 500m, 6-III-1983, *Ros s.n.* (MUB 3735).

Soil in fissures or on talus of rocks.

Previous records: Ros & Guerra (1987, 1988) sub *Fissidens incurvus*; Ros & Werner (2010).

***Fontinalis antipyretica*** Hedw.

Selected material studied: Cehegín, río Argos, *Aboal s.n.* (MUB 13771).

Submerged in clean water.

Previous records: Gil & Ruiz (1985); Ros & Guerra (1987); Cano et al. (2004).

***Fontinalis duriaei*** Schimp.

Selected material studied: Calasparra, Cañaverosa, 30SXH1335, 10-VII-2002, *Sánchez-Fernández s.n.* (MUB 16207).

Submerged in clean water.

Previous records: Ros & Guerra (1985, 1987) sub *Fontinalis hypnoides* var. *duriaei*; Cano et al. (2004).

***Funaria hygrometrica*** Hedw.

Selected material studied: Moratalla, Sierra de Villafuerte, pr. fuente de Cantalar, 30SXH7222, 1400m, 8-V-2004, *Cano 1553* (MUB 16880).

Nitrified soils.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004).

***Funariella curviseta*** (Schwägr.) Sérgio

Selected material studied: Cartagena, Los Belones, Cabezo de la Fuente, 30SXG9665, 11-III-2000, *Murcia s.n.* (MUB 10248).

Ledges and fissures of rocks.

Previous records: Allorge & Allorge (1946) sub *Funaria curviseta*; Ros & Guerra (1987, 1988) sub *Enthostodon curvisetus*; Cano et al. (2004); Guerra et al. (2010).

***Gigaspermum mouretii*** Corb.

Material studied: Cartagena, Isla del Ciervo, 30SXG9970, 20-II-1983, *Ros s.n.* (MUB 730).

Open soils and accumulated soil between rocks.

Previous records: Ros (1984); Casas et al. (1985); Ros & Guerra (1987); Cano et al. (2004); Guerra et al. (2010).

***Grimmia anodon*** Bruch & Schimp.

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5703* (MUB 34064).

Open soils and soil in fissures of rocks.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Grimmia crinita*** Brid.

Selected material studied: Moratalla, Casas del Portal, 1120m, 30-V-2010, *Cano 5677* (MUB 32530).

On calcareous and sandstone rocks.

Previous records: Ros & Guerra (1987); Casas et al. (1989); Cano et al. (2004).

***Grimmia dissimulata*** E. Maier

Material studied: Abanilla, Sierra de Quibas, 30SXH6441, 950m, 9-III-2002, *Cano 745* (MUB 12768).

On calcareous rocks.

Previous record: Cano et al. (2004).

***Grimmia laevigata*** (Brid.) Brid.

Selected material studied: Lorca, pr. cortijo del Tío Penón, 30SWG9571, 650m, 15-IV-2002, *Cano 801* (MUB 12933).

On acidic rocks.

Previous records: Ros & Guerra (1988); Cano et al. (2004).

***Grimmia orbicularis*** Bruch ex Wilson

Selected material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de Roy, 960m, 1-III-2009, *Cano 4926* (MUB 29110).

On exposed calcareous or acidic rocks.

Previous records: Allorge & Allorge (1946); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Grimmia pulvinata*** (Hedw.) Sm.

Selected material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de Roy, 960m, 1-III-2009, *Cano 4924* (MUB 29111).

On exposed calcareous or acidic rocks.

Previous records: Ade & Koppe (1942); Casas (1973) sub *Grimmia pulvinata* var. *africana*;

Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Grimmia tergestina*** Tomm. ex Bruch & Schimp.

Material studied: Moratalla, Zaén de Arriba, 1300m, 30-V-2010, *Cano 5686* (MUB 34049).

On rocks.

Ros & Guerra (1988) reported this species for Murcia based on material without sporophytes. According to Muñoz (1999), *G. tergestina* belongs to a complex of taxa that can only be confidently determined from sporophytic material, so it was reported as *Grimmia* aff. *tergestina* by Cano et al. (2004). The above material was found with sporophytes and support the report of this species in Murcia.

***Grimmia trichophylla*** Grev.

This species was recently reported by Ros & Werner (2010) as newly for Murcia [Moratalla, proximidades de Casicas del Portal, 30SWH8633, roca en paramera de *Juniperus phoenicea* L., 1200m, 14-IV-2009, *Ros s.n.* (MUB 30387)]. Unfortunately, we have not able to study the specimen in order to confirm the report.

***Gymnostomum calcareum*** Nees & Hornsch.

Selected material studied: Moratalla, Benizar, Rincón de las Cuevas, 30SWH8835, 900m, 11-IV-2003, *Guerra & Cano s.n.* (MUB 15602).

Talus with seeping water and wet rocks.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano et al. (2004).

***Gymnostomum lanceolatum*** M. J. Cano, Ros & J. Guerra

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Guerra et al. s.n.* (MUB 13807).

Talus and soil accumulated on rocks.

Previous record: Cano et al. (2004).

***Gymnostomum viridulum*** Brid.

Selected material studied: Tallante, collado de la Cruz, 260m, 18-X-2009, *Cano 5481* (MUB 5481).

Talus, fissures and soil accumulated on rocks.

Previous records: Casas et al. (1985) sub *Gymnostomum luisieri*; Ros & Llimona (1984) sub *G. luisieri*; Ros & Guerra (1987) sub *G. luisieri*; Cano et al. (2004).

***Habrodon perpusillus*** (De Not.) Lindb.

Material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de Roy, 30SXG5190, 900m, 2-IV-1996, *Cano & Ros s.n.* (MUB 6036).

On trunk of *Quercus rotundifolia*.

Previous records: Ros et al. (1996); Cano et al. (2004).

***Hedwigia ciliata*** (Hedw.) P. Beauv.

Material studied: Bullas, lomas de la Atalaya, 30SXH1310, 720m, 1-XI-2003, *Cano 1360* (MUB 15697).

Base of *Pinus halepensis* Mill.

Previous record: Cano et al. (2004).

***Homalothecium aureum*** (Spruce) H. Rob.

Selected material studied: Abarán, Sierra de la Pila, pico Caramucel, 1023m, 26-XI-2006, *Cano 3261* (MUB 21747).

Humiferous soils, mainly in *Quercus rotundifolia* formations.

Previous records: Allorge & Allorge (1946) sub *Camptothecium aureum*; Alcaraz et al. (1982); Casas et al. (1985); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Homalothecium lutescens*** (Hedw.) H. Rob.

Selected material studied: Moratalla, Cenajo Agua Cernida, 30SWH8829, 900m, 14-III-1984, *Ros s.n.* (MUB 3311).

Humiferous soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Homalothecium sericeum*** (Hedw.) Schimp.

Selected material studied: Sierra del Algarrobo, pico Algarrobo, 700m, 27-XI-2005, *Cano 2575* (MUB 19422).

Calcareous rocks and base of trunk of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946) sub *Homalothecium sericeum* f. *robustum*; Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Hygroamblystegium humile*** (P. Beauv.) Vanderp., Goffinet & Hedenäs

Selected material studied: Murcia, La Flota, 30SXH6507, 30m, *Ros & Aboal s.n.* (MUB 648).

At the edge of an irrigation channel.

Previous records: Ros & Guerra (1987, 1988) sub *Leptodictyum kochii*; Cano et al. (2004) sub *Leptodictyum humile*.

***Hygroamblystegium tenax*** (Hedw.) Jenn.

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 15027).

Rocks in streams.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Hymenostylium recurvirostrum*** (Hedw.) Dixon

Selected material studied: Alhama de Murcia, Sierra Espuña, río Espuña, 30SXG2791, 900-1000m, 30-I-1982, *Ros s.n.* (MUB 3996).

Stream banks.

Previous records: Ros & Llimona (1984) sub *Gymnostomum recurvirostrum*; Ros & Guerra (1987) sub *G. recurvirostrum*; Cano et al. (2004); Guerra et al. (2006).

***Hypnum cupressiforme*** Hedw. var. *cupressiforme*

Selected material studied: Lorca, Sierra de la Torrecilla, rambla del Hortillo, 30SXG0270, 700m, 11-V-2002, *Cano 907* (MUB 13010).

On rocks and soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Hypnum cupressiforme*** var. *filiforme* Brid.

Selected material studied: Lorca, Sierra de Ponce, 30SXH0899, 1000m, 9-V-1981, *Ros s.n.* (MUB 254).

On trunk of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Hypnum cupressiforme*** var. *lacunosum* Brid.

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 819* (MUB 13047).

On rocks and calcareous soils.

Previous record: Ros & Llimona (1984) sub *Hypnum cupressiforme* var. *tectorum*; Cano et al. (2004).

***Leptobarbula berica*** (De Not.) Schimp.

Selected material studied: Moratalla, Benizar, Rincón de las Cuevas, 30SWH8835, 900m, 11-IV-

2003, *Guerra s.n.* (MUB 15058).

Calcareous walls.

Previous records: Ros & Guerra (1987, 1988); Cano et al. (2004); Guerra (2004).

***Leptodictyum riparium*** (Hedw.) Warnst.

Selected material studied: Caravaca de la Cruz, Archivel, Fuentes del Marqués, 30SWH9818, 650m, 19-VI-1982, *Ros s.n.* (MUB 3273).

Submerged in irrigation channels.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Leptodon smithii*** (Hedw.) F. Weber & D. Mohr

Selected material studied: Moratalla, Sierra de la Muela, 1300m, 1-V-2006, *Cano 2648* (MUB 21227).

Calcareous rocks and epiphytic on trunks of *Juniperus oxycedrus* L. and *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Casas et al. (1992); Cano et al. (2004).

***Leptophascum leptophyllum*** (Müll. Hal.) J. Guerra & M. J. Cano

Material studied: Murcia, Jardín La Seda, *Rams & Imbernón s.n.* (MUB 10427).

Nitrified soils.

Previous records: Casas & Brugués (1995) sub *Phascum leptophyllum*; Rams et al. (2000); Guerra (2003); Cano et al. (2004).

***Leucodon sciuroides*** (Hedw.) Schwägr. var. *sciuroides*

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1375m, 2-V-2002, *Cano 828* (MUB 13056).

Calcareous rocks and epiphytic on trunk of *Quercus rotundifolia*.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Fuertes et al. (1997).

***Leucodon sciuroides*** var. *morensis* (Schwägr.) De Not.

Selected material studied: Abarán, Sierra de La Pila, collado de Los Perdiñales, 30SXH5437, 800m, 3-IV-1980, *Alcaraz s.n.* (MUB 14).

Calcareous rocks.

Previous records: Alcaraz et al. (1982); Ros & Guerra (1987); Fuertes et al. (1997).

***Microbryum curvicollum*** (Hedw.) R. H. Zander

Selected material studied: Murcia, Moratalla, Salinas del Zacatín, 30-V-2009, *Guerra et al. s.n.* (MUB 34085).

Open soils.

Previous records: Casas (1973) sub *Phascum curvicolle*; Ros & Llimona (1984) sub *Ph. curvicolle*; Ros & Guerra (1987) sub *Ph. curvicolle*; Casas et al. (1989) sub *Ph. curvicolle*; Carrión et al. (1990) sub *Ph. curvicolle*; Guerra et al. (1991) sub *Ph. curvicolle*; Cano et al. (2004); Guerra et al. (2006).

***Microbryum davallianum*** (Sm.) R. H. Zander

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 15026).

Open soils.

Previous records: Casas (1973) sub *Pottia davalliana*; Ros & Llimona (1984) sub *P. starckeana* subsp. *conica*; Ros & Guerra (1985, 1987) sub *P. commutata*, *P. starckeana* subsp. *conica* and *P. starckeana* subsp. *minutula*; Cano et al. (2004); Guerra et al. (2006).

***Microbryum floerkeanum*** (F. Weber & D. Mohr) Schimp.

Selected material studied: San Javier, carretera Cartagena-Alicante, cruce a Los Narejos, 30SXG9084, 0m, 2-III-1985, *Ros s.n.* (MUB 2980).

On open soils, sometimes gypsiferous.

Previous records: Ros & Guerra (1987, 1988) sub *Phascum floerkeanum*; Cano et al. (2004); Guerra et al. (2006).

***Microbryum starkeanum*** (Hedw.) R. H. Zander

Selected material studied: Águilas, Cabo Cope, 130m, 16-III-2003, *Cano 1069* (MUB 14979).

Open soils.

Previous records: Casas (1973) sub *Pottia starkeana*; Ros & Guerra (1987) sub *Pottia mutica*; Rams et al. (2000) sub *P. starkeana*; Cano et al. (2004); Guerra et al. (2006).

***Orthotrichum acuminatum*** H. Philib.

Selected material studied: Bullas, Sierra de Burete, 30SXH1009, 780m, 8-XII-2002, *Cano 1051* (MUB 14140).

Epiphyte on bases, branches or trunks of *Acer granatense* Boiss., *A. monspessulanum* L., *Juglans regia* L., *Juniperus oxycedrus*, *J.*

*phoenicea*, *Pinus halepensis*, *Populus nigra* L., *Quercus faginea* Lam. and *Q. rotundifolia*.

Previous records: Ros et al. (1996); Cano et al. (2004).

***Orthotrichum affine*** Schrad. ex Brid.

Selected material studied: Alhama de Murcia, Sierra de Carrascoy, pr. repetidor T.V., 30SXG5290, 1050m, 21-X-2001, *Cano s.n.* (MUB 11950).

Epiphyte on trunks of *Acer granatense*, *Juniperus phoenicea*, and *Quercus rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum anomalum*** Hedw.

Selected material studied: Abanilla, Sierra de Quibas, 30SXH6441, 950m, 9-III-2002, *Cano 739* (MUB 12762).

On calcareous rocks and epiphytic on bases of *Pistacia lentiscus* L. and trunk of *Acer granatense*.

Previous records: Ros & Llimona (1984); Cano et al. (2004).

***Orthotrichum cupulatum*** Hoffm. ex Brid.

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 15025).

Calcareous rocks and epiphytic on trunks of *Juglans regia*, *Juniperus oxycedrus* and bases of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946); Alcaraz et al. (1982) sub *Orthotrichum cupulatum* var. *sardagnanum*; Ros & Llimona (1984) sub *O. cupulatum* and *O. cupulatum* var. *sardagnanum*; Ros & Guerra (1987); Cano et al. (2004).

***Orthotrichum diaphanum*** Schrad. ex Brid.

Selected material studied: Abanilla, Sierra de Quibas, 30SXH6441, 950m, 9-III-2002, *Cano 738* (MUB 12760).

Epiphytic on bases or trunks of *Arbutus unedo* L., *Acer granatense*, *Juglans regia*, *Juniperus oxycedrus*, *Populus nigra*, *Quercus coccifera* L., *Q. faginea* and *Q. rotundifolia*.

Previous records: Ros & Llimona (1984); Cano et al. (2004).

***Orthotrichum lyellii*** Hook. & Taylor

Selected material studied: Yecla, Sierra de Salinas, pr. Cerro Laurel, 30SXH7263, 1160m, 27-IV-2003, *Cano 1174* (MUB 15139).

Epiphytic on trunks of *Acer granatense*, *Populus*

*nigra* and *Quercus rotundifolia*.

Previous record: Ros & Llimona (1984); Cano et al. (2004).

***Orthotrichum macrocephalum*** F. Lara, Garilleti & Mazimpaka

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 842a* (MUB 13072).

Epiphytic on trunks of *Juglans regia*, *Quercus faginea* and *Q. rotundifolia*.

Previous records: Ros et al. (1996); Cano et al. (2004).

***Orthotrichum pallens*** Bruch ex Brid.

Selected material studied: Yecla, Sierra de Salinas, pr. Cerro Laurel, 1160m, 27-IV-2003, *Cano 1176* (MUB 15141).

Epiphytic on trunks of *Juglans regia*, *Quercus faginea* and *Q. rotundifolia*.

Previous record: Ros & Werner (2010).

***Orthotrichum pumilum*** Sw.

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 838a* (MUB 13071).

Epiphyte on trunks or bases of *Quercus faginea* and *Q. rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum rupestre*** Schleich. ex Schwägr.

Selected material studied: Moratalla, Sierra de los Álamos, Arroyo de la Celada, 30SWH9226, 1250m, 2-V-2002, *Cano 888* (MUB 14097).

Rocks and epiphyte on trunk of *Acer granatense*.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Orthotrichum scanicum*** Gronwall

Studied material: Alhama de Murcia, Sierra Espuña, pr. E.V.A. 13, 30SXG2592, 1500m, 9-I-1999, *Cano & Sánchez-Moya s.n.* (MUB 9044).

Trunk of *Juniperus oxycedrus*.

Previous record: Cano et al. (2004).

***Orthotrichum schimperi*** Hammar

Selected material studied: Bullas, Sierra de Burete, 30SXH1009, 780m, 8-XII-2002, *Cano 1054* (MUB 14143).

Epiphytic on trunks of *Acer granatense*, *Juglans regia* and *Quercus rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum speciosum*** var. *brevisetum* F. Lara, Garilleti & Mazimpaka

Selected material studied: Moratalla, Sierra de los Álamos, arroyo de la Celada, 30SWH9226, 1250m, 2-V-2002, *Cano 904b* (MUB 14104).

Epiphyte on trunk of *Acer granatense* and *Quercus rotundifolia*.

Previous records: Draper et al. (2003); Cano et al. (2004).

***Orthotrichum striatum*** Hedw.

Selected material studied: Bullas, Las Hoyuelas, 30SXH1209, 700m, 10-X-2002, *Sánchez-Moya s.n.* (MUB 15071).

Epiphyte on trunks of *Acer granatense*, *Pinus halepensis* and *Quercus rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum tenellum*** Bruch ex Brid.

Selected material studied: Lorca, Sierra de la Torreçilla, rambla del Hortillo, 30SXG0270, 700m, 11-V-2002, *Cano 908* (MUB 13011).

Epiphytic on trunks of *Acer granatense*, *Pinus halepensis*, *Quercus faginea* and *Q. rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum tortidontium*** F. Lara, Garilleti & Mazimpaka

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 839* (MUB 13067).

Epiphytic on trunk of *Quercus rotundifolia*.

Previous record: Cano et al. (2004).

***Orthotrichum vittii*** F. Lara, Garilleti & Mazimpaka

Selected material studied: Mula, Sierra del Cambrón, pico La Selva, 30SXG1498, 1387m, 7-XII-2002, *Cano 1046* (MUB 14130).

Epiphyte on trunks of *Juglans regia* and *Quercus rotundifolia*.

Previous record: Cano et al. (2004).

***Oxyrhynchium hians*** (Hedw.) Loeske var. *hians*

Selected material studied: Moratalla, Zaén de Arriba, 1300m, 30-V-2010, *Cano 5685* (MUB 32538).

Stream banks.

Previous records: Allorge & Allorge (1946) sub

*Oxyrhynchium swartzii* var. *meridionale*; Ros & Guerra (1987) sub *Eurhynchium hians*; Rams et al. (2000) sub *E. hians*; Cano et al. (2004) sub *E. hians* and *E. hians* var. *rigidum*.

***Oxyrhynchium speciosum*** (Brid.) Jur.

Selected material studied: Cieza, salto Almadenes (MUB 891).

Soil accumulated at the edge of irrigation channels and soil accumulated on rocks with seeping water, once on stump of *Ulmus minor*.

Previous records: Ros & Llimona (1984) sub *Eurhynchium speciosum*; Ros & Guerra (1987) sub *E. speciosum*; Cano et al. (2004) sub *E. speciosum*.

***Palustriella commutata*** (Hedw.) Ochyra

Selected material studied: Moratalla, Benizar, fuente de Benizar, 30SWH8836, 970m, 11-IV-2003, *Cano 1211* (MUB 15429).

Streams banks and talus with seeping water.

Previous records: Ros & Llimona (1984) sub *Cratoneuron commutatum*; Ros & Guerra (1987) sub *C. commutatum*; Cano et al. (2004).

***Phascum cuspidatum*** Hedw. var. *cuspidatum*

Selected material studied: Sierra Espuña, ladera O del Morrón, 1440m, 10-V-2009, *Cano 4967* (MUB 29502).

Open soils.

Previous records: Casas (1973); Ros & Guerra (1987); Guerra et al. (1991); Rams et al. (2000); Cano et al. (2004).

***Phascum cuspidatum*** var. *papillosum* (Lindb.) G. Roth

Selected material studied: Alhama de Murcia, Sierra de Carrascoy, rambla de la Tía Ginesa, 960m, 1-II-2009, *Cano 4845* (MUB 3567).

Acidic open soils.

Previous records: Guerra et al. (1991) sub *Phascum cuspidatum* subsp. *papillosum*; Cano et al. (2004).

***Phascum cuspidatum*** var. *piliferum* (Hedw.) Hook & Taylor

Selected material studied: Jumilla, Sierra del Carche, barranco del Revolcador, 30SXH6057, *Ros s.n.* (MUB 3436).

Open soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Phascum cuspidatum*** var. *retortifolium* J. Guerra & Ros

Selected material studied: Cartagena, Los Belones, rambla de la Carrasquilla, 30SXG9465, 100m, 14-II-1987, *Ros s.n.* (MUB 3566).

Open soils.

Previous records: Guerra et al. (1991); Cano et al. (2004).

***Phascum vlassovii*** Laz.

Material studied: Lorca, Sierra de la Torrecilla, rambla del Hortillo, 30SXG0371, 3-III-1984, *Ros s.n.* (MUB 2963).

Open soil.

Previous records: Jiménez et al. (1989); Guerra et al. (1991); Cano et al. (2004).

***Philonotis fontana*** (Hedw.) Brid.

Selected material studied: Caravaca de la Cruz, Las Oicas, río Argos, 30SWH8915, 18-III-1984, *Ros s.n.* (MUB 6153).

Talus with seeping water.

Previous record: Cano et al. (2004).

***Plagiomnium undulatum*** (Hedw.) T. J. Kop.

Selected material studied: Moratalla, Sierra de los Álamos, Cenajo del Agua Cernida, 30SWH8829, 1000m, 30-X-1982, *Egea & Ciller* (MUB 841).

Peaty soils.

Previous records: Ros et al. (1996); Gómez-Menor et al. (1999); Cano et al. (2004).

***Plasteurhynchium meridionale*** M. Fleisch. ex Broth.

Selected material studied: Moratalla, Sierra del Buitre, 1200m, 16-V-2010, *Cano 5668* (MUB 32442).

On ledges or on calcareous rocks.

Previous records: Alcaraz et al. (1982) sub *Eurhynchium meridionale*; Ros & Llimona (1984) sub *E. meridionale*; Ros & Guerra (1987) sub *E. meridionale*; Cano et al. (2004) sub *E. meridionale*; Cros et al. (2010).

***Platyhypnidium riparioides*** (Hedw.) Dixon

Selected material studied: Moratalla, Benizar, Rincón de las Cuevas, 30SWH8835, 950m, 11-IV-2003, *Cano 1213* (MUB 15431).

Stream banks and submerged in water.

Previous records: Ros & Llimona (1984) sub *Rhynchostegium riparioides*; Ros & Guerra

(1987) sub *R. riparioides*; Cano et al. (2004).

***Pleuridium acuminatum*** Lindb.

Selected material studied: Los Alcázares, 30SXG8878, 0m, 18-II-1984, *Ros s.n.* (MUB 13139).

Acidic open soils.

Previous record: Cano et al. (2004).

***Pleurochaete squarrosa*** (Brid.) Lindb.

Selected material studied: Abanilla, Sierra de Quibas, 30SXH6441, 950m, 9-III-2002, *Cano 740* (MUB 12763).

Soils and soil accumulated on calcareous rocks.

Previous records: Ade & Koppe (1942); Rungby (1962); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Pohlia cruda*** (Hew.) Lindb.

Material studied: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900m, 7-III-2004, *Cano 1434* (MUB 16659).

Soil accumulated on rocks.

Previous record: Cano et al. (2004).

***Pohlia melanodon*** (Brid.) A. J. Shaw

Selected material studied: Caravaca de la Cruz, huerta de Caravaca de la Cruz, 30SWH9916, 19-VI-1982, *Ros s.n.* (MUB 723).

Stream banks, edge of irrigation channels, rocks in streams.

Previous records: Ros & Llimona (1984) sub *Mniobryum delicatulum*; Ros & Guerra (1987) sub *M. delicatulum*; Cano et al. (2004).

***Pohlia wahlenbergii*** (F. Weber & D. Mohr) A. L. Andrews

Selected material studied: Calasparra, Cañaverosa, 30SXH1335, 10-III-2002, *Velasco s.n.* (MUB 12962).

Stream banks.

Previous records: Rams et al. (2000); Cano et al. (2004).

***Pottiopsis caespitosa*** (Bruch) Blockeel & A. J. E. Sm.

Selected material studied: Alhama de Murcia, Gebas, 420m, 26-IV-2009, *Cano 4935* (MUB 29475).

Open soils, talus and accumulated soil between rocks.

Previous records: Casas (1973) sub *Trichostomum caespitosum* and *T. triumphans* var. *pallidisetum*; Ros & Llimona (1984) sub *T. triumphans* var. *pallidisetum*; Ros & Guerra (1987) sub *Pottia caespitosa* and *T. triumphans* var. *pallidisetum*; Cano et al. (2004) sub *Pottiopsis caespitosa* and *T. triumphans*.

***Protobryum bryoides*** (Dicks.) J. Guerra & M. J. Cano

Selected material studied: Sierra de Carrascoy, rambla de la Tía Ginesa, 960m, 1-III-2009, *Cano 4913* (MUB 29114).

Open soils.

Previous records: Ros & Guerra (1985, 1987) sub *Pottia bryoides*; Cano et al. (2004).

***Pseudocrossidium hornschurchianum*** (Schultz) R. H. Zander

Selected material studied: Moratalla, Casas del Portal, 1110m, 30-V-2010, *Cano 5673* (MUB 32526).

Soil accumulated on rocks, ledges and fissures with soil, open soils.

Previous records: Casas (1973) sub *Barbula hornschurchiana*; Ros & Llimona (1984); Ros & Guerra (1987); Guerra et al. (1993); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Pseudocrossidium obtusulum*** (Lindb.) H. A. Crum & L. E. Anderson

Selected material studied: Lorca, Zarcilla de Ramos, rambla de los Chillidos, 30SWH7423, 28-II-2003, *Guerra s.n.* (MUB 17640).

Accumulated soil on rocks and exposed soil.

Previous records: Cano et al. (2004); Guerra et al. (2006).

***Pseudocrossidium revolutum*** (Brid.) R. H. Zander

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2002, *Cano 5700* (MUB 34065).

Accumulated soil on rocks.

Previous records: Rungby (1964) sub *Barbula revoluta*; Casas (1973); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Pseudoscleropodium purum*** (Hedw.) M. Fleisch.

Selected material studied: Alhama de Murcia, Sierra Espuña, puente del Aire, 815m, 31-I-2010, *Cano 5507* (MUB 31029).



Humiferous soils.

Previous records: Alcaraz et al. (1982); Ros & Guerra (1987); Cano et al. (2004).

***Pterogonium gracile*** (Hedw.) Sm.

Selected material studied: Mula, Sierra del Cambrón, pico La Selva, 30SXG1498, 1387m, 7-XII-2002, *Cano 1043* (MUB 14132).

Calcareous rocks and epiphytic on trunk of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946) sub *Pterogonium ornithopodioides*; Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Pterygoneurum lamellatum*** (Lindb.) Jur.

Selected material studied: Bullas, río Mula, Salto Lucero (Usero), 30SXH1709, 600m, 8-IV-1984, *Ros s.n.* (MUB 2914).

Open soils.

Previous records: Ros & Guerra (1987, 1988); Carrión et al. (1995); Guerra et al. (1995); Cano et al. (2004); Guerra et al. (2006).

***Pterygoneurum ovatum*** (Hedw.) Dixon

Selected material studied: Moratalla, Collado Letur, 1340m, 8-XII-2003, *Cano 1375* (MUB 15873).

Open soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987, 1988); Casas et al. (1989); Guerra et al. (1995); Rams et al. (2000); Cano et al. (2004); Guerra et al. (2006).

***Pterygoneurum sampaianum*** (Guim.) Guim.

Studied material: Lorca, pr. El Rincón (MUB 6139).

Open soils.

Previous records: Ros & Guerra (1987, 1988); Carrión et al. (1995); Guerra et al. (1995); Cano et al. (2006).

***Pterygoneurum subsessile*** (Brid.) Jur.

Material studied: Sierra de Carrascoy, rambla de la Tía Ginesa, 960m, 24-III-2009, *Cano et al. 4913* (MUB 32444).

Open soil.

Previous record: Cano et al. (2004).

***Rhynchostegiella curviseta*** (Brid.) Limpr.

This species was recently reported by Ros & Werner (2010) as newly for Murcia [Aledo, Estrecho de la Arboleja, rambla de Lebor,

30SXG2382, sobre pared húmeda y oscura, 550m, 9-V-2009, *G. López Vélez s.n.* (MUB 30344)]. Unfortunately, we have not able to study the specimen in order to confirm the report.

***Rhynchostegiella litorea*** (De Not.) Limpr.

Selected material studied: Sierra de Ponce, La Selva, 9-V-1985, *Ros s.n.* (MUB 279).

Taluses and soil accumulated on rocks or at their base.

Previous records: Ros & Llimona (1984) sub *Rhynchostegiella tenella* var. *litorea*; Ros & Guerra (1987) sub *R. tenella* var. *litorea*; Cano et al. (2004).

***Rhynchostegiella tenella*** (Dicks.) Limpr.

Selected material studied: Moratalla, Sierra de los Álamos, Cenajo del Agua Cernida, 30SWH8829, 1000m, 30-IV-1983, *Ros s.n.* (MUB 2878).

Rock fissure.

Previous record: Cano et al. (2004).

***Rhynchostegium megapolitanum*** (Blandow ex F. Weber & D. Mohr) Bruch & Schimp.

Selected material studied: Mazarrón, Cabezo Pelado, 80m, 18-I-2009, *Cano 4841* (MUB 28932).

Humiferous soils and talus on schists.

Previous records: Allorge & Allorge (1946); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Schistidium crassipilum*** H. H. Blom

Selected material studied: Fortuna, Sierra de la Pila, 30SXH5837, 22-III-2002, *Fernández-Martínez et al. s.n.* (MUB 12979).

Calcareous rocks and accumulated soil on rocks.

Previous record: Cano et al. (2004).

***Schistidium helveticum*** (Schkuhr) Deguchi

Selected material studied: Abanilla, Sierra de Quibas, 30SXH644, 1950m, 9-III-2002, *Cano 742* (MUB 12765).

Fissures with soil and calcareous rocks or schistes.

Previous record: Cano et al. (2004) sub *Schistidium singarense*.

***Scleropodium touretii*** (Brid.) L. F. Koch

Selected material studied: Cartagena, Atamaría, Monte de las Cenizas, 15-XI-1988, *Guerra s.n.* (MUB 13772).

Talus on calcareous or metamorphic rocks.

Previous records: Allorge & Allorge (1946) sub *Scleropodium illicebrum*; Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Scorpiurium circinatum*** (Brid.) M. Fleisch. & Loeske

Selected material studied: Abanilla, Sierra de Quibas, 30SXH6441, 950m, 9-III-2002, *Cano 743* (MUB 12766).

Talus and fissures with accumulated soil and on rocks.

Previous records: Allorge & Allorge (1946); Rungby (1964); Ros & Llimona (1984); Ros & Guerra (1987); Casas et al. (1989); Cano et al. (2004).

***Seligeria acutifolia*** Lindb.

Selected material studied: Moratalla, Rincón de los Huertos, 30SWH8234, 1265m, 2-V-2002, *Cano 843* (MUB 14052).

Calcareous rocks.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Syntrichia calcicola*** J. J. Amann

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 836a* (MUB 13073).

Basic soils and on base of trunk of *Quercus rotundifolia*.

Previous records: Ros & Llimona (1984) sub *Tortula calcicolens*; Ros & Guerra (1987) sub *T. calcicolens*; Gallego et al. (2002a); Cano et al. (2004).

***Syntrichia caninervis*** Mitt var. *caninervis*

Selected material studied: Lorca, cercanía de Coy, Los Prados, 870m, 4-IV-2009, *López s.n.* (MUB 34161).

Talus and accumulated soil at the base of rocks, mainly gypsiferous.

Previous records: Casas et al. (1985) sub *Tortula caninervis*; Ros & Guerra (1985, 1987) sub *T. caninervis*; Gallego (2002); Gallego et al. (2002b); Cano et al. (2004); Guerra et al. (2006).

***Syntrichia caninervis*** var. *gypsophila* (J. J. Amman ex G. Roth) Ochyra

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5696* (MUB 34066).

Open soils, sometimes gypsiferous.

Previous records: Gallego et al. (2002b); Cano et al. (2004).

***Syntrichia laevipila*** Brid.

Selected material studied: Bullas, Las Hoyuelas, 30SXH1209, 700m, 10-X-2002, *Sánchez-Moya s.n.* (MUB 15069).

Epiphyte on trunks of *Quercus rotundifolia* and base of *Pinus halepensis*.

Previous records: Ros et al. (1996) sub *Tortula laevipila* and *Tortula pagorum*; Gallego et al. (2004); Cano et al. (2004).

***Syntrichia montana*** Nees var. *montana*

Selected material studied: Lorca, Sierra del Gigante, 30SWG9077, 990m, 15-IV-2002, *Cano 802* (MUB 12934).

On calcareous rocks.

Previous records: Allorge & Allorge (1946) sub *Tortula montana*; Alcaraz et al. (1982) sub *Tortula intermedia*; Ros & Llimona (1984) sub *T. intermedia*; Ros & Guerra (1987) sub *T. intermedia*; Cano et al. (2004).

***Syntrichia papillosissima*** (Copp.) Loeske

Selected material studied: Moratalla, Sierra de Villafuerte, fuente de Cantalar, 30SXH7222, 30-V-2009, *Guerra et al. s.n.* (MUB 34105).

Basic soils.

Previous records: Gallego (2002); Gallego et al. (2002a); Cano et al. (2004); Guerra et al. (2006).

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

Selected material studied: Jumilla, Sierra del Carche, Morra de la Mina, 1350m, 2-XI-2008, *Cano 4780* (MUB 28669).

Talus on schists, accumulated soils on calcareous rocks and epiphyte on trunk of *Quercus rotundifolia*.

Previous records: Ros & Llimona (1984) sub *Tortula princeps*; Ros & Guerra (1987) sub *T. princeps*; Cano et al. (2004).

***Syntrichia ruralis*** (Hedw.) F. Weber & D. Mohr var. *ruralis*

Selected material studied: Moratalla, Sierra de Villafuerte, fuente de Cantalar, 30SXH7222, 30-V-2009, *Guerra et al. s.n.* (MUB 34104).

Calcareous rocks and epiphyte on trunk of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946) sub *Tortula ruralis*; Alcaraz et al. (1982) sub *T. ruralis*; Ros & Llimona (1984) sub *T. ruralis*; Ros & Guerra (1987) sub *T. ruralis*; Gallego (2002); Cano et al. (2004).

***Syntrichia ruralis*** var. ***ruraliformis*** (Besch.) Delogne

Selected material studied: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900m, 7-III-2004, *Cano 1430* (MUB 16670).

Humiferous soils and calcareous rocks.

Previous records: Allorge & Allorge (1946) sub *Tortula ruraliformis*; Ros & Guerra (1987) sub *T. ruraliformis*; Cano et al. (2004).

***Syntrichia subpapillosissima*** (Bizot & R. B. Pierron ex W. A. Kramer) M. T. Gallego & J. Guerra

Selected material studied: Caravaca de la Cruz, Sierra de la Zarza, 30SWG6798, 1285m, 2-V-2002, *Cano 836b* (MUB 13075).

Basic soils and base of trunk of *Quercus rotundifolia*.

Previous records: Ros & Guerra (1987) sub *Tortula ruraliformis* var. *subpapillosissima*; Gallego (2002); Gallego et al. (2002a); Cano et al. (2004); Guerra et al. (2006).

***Syntrichia virescens*** (De Not.) Ochyra

Selected material studied: Moratalla, carretera El Sabinar-Rincón de los Huertos, 30SWH8433, 1350m, 3-III-2002, *Cano et al. 733* (MUB 12756).

Epiphyte on trunk of *Quercus rotundifolia* and soil accumulated under *Q. rotundifolia*.

Previous record: Cano et al. (2004).

***Timmiella barbuloides*** (Brid.) Mönk.

Selected material studied: Cartagena, Peñas Blancas, Rambla del Cañar, 30SXG6062, 100m, 1-IV-1984, *Ros s.n.* (MUB 2895).

On soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004); Soria et al. (2005); Guerra et al. (2006).

***Tortella inclinata*** var. ***densa*** (Lorentz & Molendo) Limpr.

Material studied: Caravaca de la Cruz, Archivel, Puntal La Vieja, 30SWH81, 10-III-1985, *Ros* (MUB 3523).

On soils.

Previous record: Ros & Guerra (1987) sub *Tortella densa*.

***Tortella flavovirens*** (Bruch) Broth. var. ***flavovirens***

Selected material studied: La Unión, 170m, 28-II-2010, *Cano 5526* (MUB 32017).

Open and mainly sandy soils.

Previous records: Rungby (1964); Guerra & Puche (1984); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Tortella flavovirens*** var. ***papillosissima*** Sérgio & Casas

Selected material studied: Cartagena, Peñas Blancas, *Ros s.n.* (MUB 815).

On base of acidic or calcareous rocks and on calcareous rocks.

Previous records: Puche (2004); Cano et al. (2004).

***Tortella humilis*** (Hedw.) Jenn.

Selected material studied: Alhama de Murcia, Sierra Espuña, ladera O del Morrón, 1440m, 10-V-2009, *Cano 4966* (MUB 29501).

Humiferous soils and epiphyte on base of *Juniperus oxycedrus*.

Previous records: Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004); Puche (2004); Casas (2006); Guerra et al. (2006).

***Tortella nitida*** (Lindb.) Broth.

Selected material studied: Cartagena, pr. Cobaticas, 30SXH9664, 200m, 2-III-2003, *Cano 1061* (MUB 14515).

In fissures or on exposed calcareous rocks.

Previous records: Ade & Koppe (1942); Allorge & Allorge (1946); Ros & Guerra (1987); Cano et al. (2004).

***Tortella tortuosa*** (Hedw.) Limpr. var. ***tortuosa***

Selected material studied: Moratalla, Rincón de los Huertos, 1280m, 2-V-2002, *Cano 852* (MUB 14063).

Calcareous rocks.

Previous records: Allorge & Allorge (1946); Rungby (1964); Alcaraz et al. (1982); Ros & Llimona (1984) sub *T. tortuosa* var. *tortuosa* and *T. tortuosa* var. *brevifolia*; Ros & Guerra (1987) sub *T. tortuosa* var. *tortuosa* and *T. tortuosa* var.

*brevifolia*; Cano et al. (2004).

***Tortella tortuosa* var. *fragilifolia*** (Jur.) Limpr.

This species was recently reported by Ros & Werner (2010) as newly for Murcia [Murcia, Sierra Cresta del Gallo, área recreativa Cresta del Gallo, 30SXH6701, roca caliza, 8-IV-2009, *Ros et al. s.n.* (MUB 30344)]. Unfortunately, we have not able to study the specimen in order to confirm the report.

***Tortula atrovirens*** (Turner ex Sm.) Lindb.

Selected material studied: pr. Los Alcazares, 1m, 14-II-2010, *Cano 5516* (MUB 32007).

Talus on acidic or basic rocks and open soils.

Previous records: Ros & Guerra (1985, 1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Tortula brevissima*** Schiffn.

Selected material studied: Lorca, cercanía de Coy, Los Prados, 870m, 4-IV-2009, *López s.n.* (MUB 34043).

Bare soils, mainly gypsiferous.

Previous records: Ros & Guerra (1985, 1987); Rams et al. (2000); Cano et al. (2004).

***Tortula canescens*** Mont.

Studied material: Los Alcázares, 30SXG8878, 0m, 18-II-1984, *Ros s.n.* (MUB 3410).

On acidic soil.

Previous record: Cano et al. (2004).

***Tortula inermis*** (Brid.) Mont.

Selected material studied: Moratalla, Sierra de Villafuerte, fuente de Cantalar, 30SXH7222, 1400m, 30-V-2009, *Guerra et al. s.n.* (MUB 34079).

Talus on calcareous rocks, soil under rocks and epiphyte on base of *Quercus rotundifolia*.

Previous records: Allorge & Allorge (1946); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004); Cano et al. (2005).

***Tortula israelis*** Bizot & F. Bilewsky

Selected material studied: Cartagena, Sierra de la Muela, fuente de la Muela, 30SXG6861, 450m, 11-I-2004, *Cano 1401* (MUB 15950).

On calcareous rocks, fissures and walls.

Previous records: Ros et al. (1989) sub *Tortula muralis* var. *baetica*; Guerra et al. (1992) sub *Tortula baetica*; Sánchez-Moya & Cano (1999);

Rams et al. (2000); Cano et al. (2004).

***Tortula lindbergii*** Broth.

Selected material studied: Lorca, pr. La Paca, 870m, 14-XII-2008, *Cano 4796* (MUB 28783).

Open soils.

Previous records: Ros & Guerra (1987) sub *Pottia lanceolata*; Cano et al. (2004) sub *P. lanceolata*; Guerra et al. (2006) sub *P. lanceolata*.

***Tortula marginata*** (Bruch & Schimp.) Spruce

Studied material: Cartagena, Sierra de la Muela, fuente de la Muela, 450m, 11-I-2004, *Cano 1400* (MUB 15949).

Wet talus and wall.

Previous records: Rams et al. (2000); Cano et al. (2004).

***Tortula mucronifolia*** Schwägr.

Studied material: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900m, 7-III-2004, *Cano 1433b* (MUB 17402).

Soil on calcareous rock.

Previous records: Cano et al. (2004); Cano et al. (2005); Guerra et al. (2006).

***Tortula muralis*** Hedw.

Selected material studied: Moratalla, Sierra de Villafuerte, fuente de Cantalar, 30SXH7222, 1400m, 30-V-2009, *Guerra et al. s.n.* (MUB 34077).

Walls and rocks, occasionally on base of rocks.

Previous records: Allorge & Allorge (1946) sub *Tortula muralis* f. *incana*; Alcaraz et al. (1982) sub *T. muralis* var. *muralis* and *T. muralis* var. *obcordata*; Ros & Llimona (1984); Ros & Guerra (1987) sub *T. muralis* var. *muralis*, *T. muralis* var. *incana* and *T. muralis* var. *obcordata*; Guerra et al. (1992) sub *T. muralis* var. *muralis* and *T. muralis* var. *obcordata*; Rams et al. (2000) sub *T. muralis* var. *muralis* and *T. muralis* var. *obcordata*; Cano et al. (2004).

***Tortula pallida*** (Lindb.) R. H. Zander

Selected material studied: Cartagena, Calblanque, 24-I-2010, *Cano 5505* (MUB 31026).

Saline soils.

Previous records: Guerra & Ros (1988) sub *Pottia pallida*; Cano et al. (2004) sub *P. pallida*; Guerra et al. (2006) sub *P. pallida*.

***Tortula revolvens*** (Schimp.) G. Roth

Selected material studied: Ojós, Sierra del Cajal,

350m, 24-X-2010, *Cano 6090* (MUB 34262).

Gypsiferous soils.

Previous records: Ros & Guerra (1985, 1987) sub *Tortula revolvens* var. *obtusata*; Guerra et al. (1993) sub *T. revolvens* var. *obtusata*; Cano et al. (2004).

***Tortula subulata*** Hedw.

Selected material studied: Moratalla, macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900m, 7-III-2004, *Cano 1433a* (MUB 16658).

Talus on calcareous rocks and soils.

Previous records: Ros & Guerra (1987) sub *Tortula subulata* var. *subulata* and *T. subulata* var. *subinermis*; Cano et al. (2004).

***Tortula vahliana*** (Schultz) Mont.

Selected material studied: Cartagena, salinas de La Manga, 26-XI-1988, *Guerra s.n.* (MUB 2216).

Open, mainly saline soils.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Rams et al. (2000); Cano (2004); Cano et al. (2004); Guerra et al. (2006).

***Tortula viridifolia*** (Mitt.) Blockeel & A. J. E. Smith

Selected material studied: Sierra de Carrascoy, rambla de la Tía Ginesa, 900m, 1-III-2009, *Cano 4923* (MUB 29103).

Open soils.

Previous record: Ros & Werner (2010).

***Trichostomum brachydontium*** Bruch

Selected material studied: Cartagena, Peña del Águila, *Guerra s.n.* (MUB 2397).

Open soils and accumulated soil under rocks.

Previous records: Esteve & Cortés Latorre (1954) and Cortés Latorre (1955) sub *Trichostomum viridulum* var. *unguiculatum*; Rungby (1962) sub *T. mutabile* and *T. mutabile* var. *densum*; Rungby (1964) sub *T. mutabile*; Casas (1973) sub *T. brachydontium* subsp. *mutabile*; Alcaraz et al. (1982) sub *T. brachydontium* subsp. *mutabile*; Ros & Llimona (1984); Ros & Guerra (1987) sub *T. brachydontium* and *T. brachydontium* subsp. *cuspidatum*, *T. brachydontium* subsp. *densum*, *T. brachydontium* subsp. *mutabile*, *T. brachydontium* subsp. *unguiculatum*; Guerra et al. (1993) sub *T. brachydontium* and *T. brachydontium* subsp. *unguiculatum*; Sánchez-Moya & Cano (1999); Guerra (2002); Cano et al. (2004); Guerra et al.

(2006); Cros et al. (2010).

***Trichostomum crispulum*** Bruch

Selected material studied: Cehegín, Sierra de Burete, 800m, 8-VI-2010, *Cano et al. 5691* (MUB 34055).

Open soils, talus, and accumulated soil under rocks.

Previous records: Casas (1973); Ros & Llimona (1984); Ros & Guerra (1987); Guerra et al. (1993); Guerra (2002); Cano et al. (2004); Guerra et al. (2006).

***Weissia brachycarpa*** (Nees & Hornsch.) Jur.

Selected material studied: Moratalla, Cañada de la Cruz, pr. cortijo de Aguas Blancas, 1495m, 27-VI-2010, *Cano 5702* (MUB 34067).

Talus and fissures on calcareous rocks or soil accumulated on schists.

Previous record: Cano et al. (2004).

***Weissia condensata*** (Voit) Lindb. var. *condensata*

Selected material studied: Águilas, Cabo Cope, 130m, 16-III-2003, *Cano 1028* (MUB 14980).

Talus and fissures on calcareous rocks and soils in *Pinus* formations.

Previous records: Allorge & Allorge (1946) sub *Hymenostomum tortile*; Esteve & Cortés Latorre (1954); Cano et al. (2004).

***Weissia condensata*** var. *armata* (Thér. & Trab.) M. J. Cano, Ros & J. Guerra

Selected material studied: Mazarrón, Sierra de las Moreras, 30S, 7-III-2003, *Guerra s.n.* (MUB 15601).

Fissures with soil on calcareous rocks.

Previous record: Cano et al. (2004).

***Weissia controversa*** Hedw. var. *controversa*

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Guerra et al. s.n.* (MUB 13810).

Talus and a tree stump.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Weissia controversa*** var. *crispata* (Nees & Hornsch.) Nyholm

Selected material studied: Moratalla, Sierra de Villafuerte, arroyo Blanco, 30SWH7423, 1100m, 26-IV-2002, *Cano et al. s.n.* (MUB 13805).

Talus on calcareous rocks.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Weisia levieri*** (Limpr.) Kindb.

Selected material studied: Moratalla, Sierra del Buitre, 1200m, 16-V-2010, *Cano 5660* (MUB 32434).

On open soils.

Previous record: Cano et al. (2004) sub *Astomum levieri*.

***Weissia longifolia*** Mitt.

Selected material studied: Cartagena, Punta Brava, cerro El Carmolí, 100m, 14-II-2010, *Cano 5521* (MUB 32012).

On open soils.

Previous records: Casas (1973); Ros & Guerra (1987, 1988); Cano et al. (2004) sub *Astomum crispum*.

***Zygodon rupestris*** Schimp. ex Lorentz

Selected material studied: Yecla, Sierra de Salinas, pr. Cerro Laurel, 30SXH7263, 1160m, 27-IV-2003, *Cano 1173* (MUB 15138).

Epiphyte on trunk of *Quercus rotundifolia*.

Previous records: Ros & Guerra (1985) sub *Zygodon baumgartneri*; Cano et al. (2004).

## Liverworts

***Athalamia hyalina*** (Sommerf.) S. Hatt.

Material studied: Moratalla, Macizo de Revolcadores, pr. pico El Obispo, 30SWH6514, 1900 m, 7-III-2004, *Cano 1426* (MUB 16666).

In calcareous rock crevices.

Previous record: Cano et al. (2004).

***Athalamia spathysii*** (Lindenb.) S. Hatt.

Selected material studied: Moratalla, cercanías a Benizar, 26-V-1990, *Guerra s.n.* (MUB 3645).

Fissures and ledges on calcareous rocks.

Previous records: Ros & Guerra (1985); Cano et al. (2004).

***Calypogeia fissa*** (L.) Raddi

Material studied: La Unión, Monte Sancti Spíritu, 30SXG8864, 350 m, 10-III-1998, *Sánchez-Moya s.n.* (MUB 15080).

Soil on slate rocks.

Previous records: Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Cephaloziella baumgartneri*** Schiffn.

Selected material studied: Cehegín, Sierra de Burete, 655 m, 8-VI-2010, *Cano et al. 5689* (MUB 34052).

Talus on calcareous rocks.

Previous records: Jovet-Ast & Bischler (1976); Ros & Llimona (1984); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Fossombronia angulosa*** (Dicks.) Raddi

Selected material studied: La Unión, Monte Sancti Spíritu, 30SXG8864, 350 m, 10-III-1998, *Sánchez-Moya s.n.* (MUB 15081).

Soil on slate rocks.

Previous records: Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Fossombronia caespitifformis*** De Not. ex Rabenh.

Selected material studied: Isla Plana, cortijo del Mojón, 50 m, 18-I-2009, *Cano 4840* (MUB 28931).

Open soils.

Previous records: Jovet-Ast & Bischler (1976); Alcaraz et al. (1982); Ros & Guerra (1987); Sánchez-Moya & Cano (1999); Cano et al. (2004).

***Fossombronia pusilla*** (L.) Nees

Studied material: Cartagena, Isla del Ciervo, 30SXG9970, 20-II-1983, *Ros s.n.* (MUB 3766).

Bare soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Frullania dilatata*** (L.) Dumort.

Selected material studied: Cartagena, El Carmolí, 30SXG9073, 100 m, *Aboal et al. s.n.* (MUB 884).

On calcareous or acidic rocks and epiphyte on trunk of *Quercus rotundifolia*.

Previous records: Alcaraz et al. (1982); Cano et al. (2004).

***Jungermannia atrovirens*** Dumort.

Material studied: Moratalla, Rincón de los Huertos, 30SWH8234, 1265 m, 2-V-2002, *Cano 848* (MUB 14055).

Protosoil on calcareous rocks.

Previous record: Cano et al. (2004).

***Leiocolea turbinata*** (Raddi) H. Buch

Selected material studied: Bullas, El Carrascalejo,

30SXH1313, 600 m, 21-I-1980, *Ros s.n.* (MUB 3318).

Edge of irrigation channels, banks of streams, wet talus.

Previous records: Allorge & Allorge (1946); Jovet-Ast & Bischler (1976); Ros & Llimona (1984) sub *Lophozia turbinata*; Ros & Guerra (1987) sub *Lophozia turbinata*; Cano et al. (2004).

***Lunularia cruciata*** (L.) Lindb.

Selected material studied: Murcia, Sierra del Puerto, Puerto de la Cadena, 30SWH6197, 200 m, 2-III-1985, *Ros s.n.* (MUB 3466).

Wet talus and soils near streams, and at edge of irrigation channels.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Mannia androgyna*** (L.) A. Evans

Selected material studied: Cieza, Cañón de Almadenes, 20-II-1997, *Sánchez-Moya s.n.* (MUB 6481).

Fissures with soil accumulated on calcareous rocks.

Previous records: Allorge & Allorge (1946) sub *Grimaldia dichotoma*; Jovet-Ast & Bischler (1976) sub *G. dichotoma*; Alcaraz et al. (1982) sub *G. dichotoma*; Ros & Guerra (1987); Cano et al. (2004).

***Marchantia paleacea*** Bertol.

Selected material studied: Caravaca, 30SWH99-18, 600 m, 2-V-1982, *Aboal s.n.* (MUB 521).

Edge of irrigation channel.

Previous records: Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Metzgeria furcata*** (L.) Dumort.

Studied material: Alhama de Murcia, Sierra de Carrascosy, rambla de Roy, 30SXG5190, 900 m, 2-IV-1996, *Cano & Ros s.n.* (MUB 6037).

Epiphyte on trunk of *Quercus rotundifolia*.

Previous records: Ros et al. (1996); Cano et al. (2004).

***Oxymitra incrassata*** (Broth.) Sérgio & Sim-Sim

Selected material studied: Cartagena, Punta Brava, cerro El Carmolí, 110 m, 14-II-2010, *Cano 5518* (MUB 32009).

On open soils or soil between volcanic rocks.

Previous records: Alcaraz et al. (1982) sub *Tesse-*

*lina pyramidata*; Ros & Guerra (1987) sub *Oxymitra paleacea*; Cano et al. (2004).

***Pellia endiviifolia*** (Dicks.) Dumort.

Selected material studied: Moratalla, Zaén de Arriba, 1300 m, 30-V-2010, *Cano 5681* (MUB 32534).

Talus with seeping water, banks of streams and edge of irrigation channels.

Previous records: Allorge & Allorge (1946) sub *Pellia fabbroniana*; Ros & Llimona (1984) sub *P. endiviifolia* and *P. endiviifolia* f. *furcigera*; Ros & Guerra (1987); Cano et al. (2004).

***Plagiochasma rupestre*** (J. R. Forst. & G. Forst.) Steph.

Selected material studied: Abanilla, Sierra del Cantón, 800 m, 24-IV-2010, *Cano 5641* (MUB 32402).

Ledges and fissures with soil on calcareous rocks.

Previous records: Colmeiro (1889) sub *Plagiochasma aitoniana*; Casares-Gil (1915); Allorge & Allorge (1946); Jovet-Ast & Bischler (1976); Ros & Guerra (1987); Cano et al. (2004).

***Porella platyphylla*** (L.) Pfeiff.

Selected material studied: Moratalla, pr. Puerto Hondo, 1390 m, 11-VII-2010, *Cano 5709* (MUB 34092).

Epiphyte on base of *Juniperus oxycedrus* and fissures and ledges on calcareous rocks.

Previous records: Jovet-Ast & Bischler (1976) sub *Madotheca platyphylla*; Alcaraz et al. (1982) sub *M. platyphylla*; Ros & Llimona (1984) sub *M. platyphylla*; Ros & Guerra (1987); Cano et al. (2004).

***Reboulia hemisphaerica*** (L.) Raddi

Selected material studied: Sierra Espuña, ladera O del Morrón, 1440 m, 10-V-2009, *Cano 4968* (MUB 29503).

Ledges and fissures with soil on rocks.

Previous records: Jovet & Bischler (1976); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Riccia atromarginata*** Levier

Selected material studied: Cartagena, pr. Cobaticas, 30SXH9664, 200 m, 2-III-2003, *Cano 1062* (MUB 14516).

Open soils.

Previous records: Jovet-Ast & Bischler (1976); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Riccia crozalsii*** Levier

Selected material studied: Las Torres de Cotillas, junto urbanización Los Romeros, Los Pulpites, 9-V-1993, Ros & Werner s.n. (MUB 4753).

Open soils.

Previous records: Ros & Guerra (1987, 1988); Cano et al. (2004).

***Riccia crustata*** Trab.

Selected material studied: Jumilla, Sierra del Carche, Cerro de la Sal, 30SXH4360, 600 m, 3-III-1985, Ros s.n. (MUB 2893).

Saline and gypsiferous soils.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Riccia gougetiana*** var. *armatissima* Levier ex Müll. Hal.

Selected material studied: Cartagena, Punta Brava, cerro El Carmolí, 110 m, 14-II-2010, Cano 5519 (MUB 32010).

Soils mainly on volcanic rocks.

Previous records: Alcaraz et al. (1982) sub *Riccia gougetiana* var. *erinacea*; Ros & Guerra (1987); Cano et al. (2004) sub *R. gougetiana*.

***Riccia lamellosa*** Raddi

Selected material studied: Sierra de Carrascoy, rambla de la Tía Ginesa, 960 m, 1-III-2009, Cano 4922 (MUB 29109).

Open soils.

Previous records: Jovet & Bischler (1976); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Riccia michelii*** Raddi

Selected material studied: Sierra Espuña, pico Mariana, 30SXG3491, 400 m, 24-II-1988, Robledo s.n. (MUB 13773).

Open soils.

Previous records: Ros & Guerra (1987, 1988); Cano et al. (2004).

***Riccia nigrella*** DC.

Selected material studied: Cartagena, Punta Brava, cerro El Carmolí, 110 m, 14-II-2010, Cano 5517 (MUB 32008).

Soil on volcanic rocks.

Previous records: Ros & Guerra (1987); Cano et al. (2004).

***Riccia sorocarpa*** Bisch.

Selected material studied: Cartagena, Punta Brava, cerro El Carmolí, 110 m, 14-II-2010, Cano 5520 (MUB 32011).

Open soils.

Previous records: Alcaraz et al. (1982); Ros (1984); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

***Riccia trabutiana*** Steph.

Selected material studied: Cartagena, Isla del Ciervo, 30SXG9970, 28-I-1985, Ros s.n. (MUB 1232).

Open soils.

Previous records: Jovet-Ast & Bischler (1976); Ros & Guerra (1987); Cano et al. (2004).

***Riella cossoniana*** Trab.

Selected material studied: Blanca, El Rellano, 30SXH53, 250 m, Alcaraz & Ríos s.n. (MUB 3626).

In temporary pond.

Previous records: Ros et al. (1996); Cano et al. (2004).

***Southbya nigrella*** (De Not.) Henriq.

Selected material studied: Murcia, El Valle, 30SXH6300, 100 m, 30-I-1998, Ros & Cano s.n. (MUB 15414).

Talus and fissures of rocks.

Previous records: Jovet-Ast & Bischler (1976); Alcaraz et al. (1982); Ros & Guerra (1987); Cano et al. (2004).

***Southbya tophacea*** (Spruce) Spruce

Selected material studied: Murcia, Sierra Altaona, 30SXG7600, 395 m, 28-III-2004, Cano 1441 (MUB 16686).

Soil between rocks, and talus.

Previous records: Alcaraz et al. (1982); Ros & Guerra (1987); Cano et al. (2004).

***Targionia hypophylla*** L.

Selected material studied: Murcia, Sierra del Puerto, Puerto de la Cadena, 30SWH6197, 200 m, 2-III-1985, Ros s.n. (MUB 2830).

Ledge and fissures with soil on calcareous rocks.

Previous records: Ade & Koppe (1942); Jovet-Ast



& Bischler (1976); Alcaraz et al. (1982); Ros & Llimona (1984); Ros & Guerra (1987); Cano et al. (2004).

### Excluded or doubtful reports

#### Mosses

##### *Bryum tenuisetum* Limpr.

This species was reported by Rams et al. (2000) and included in the previous checklist of Murcia (Cano et al. 2004). After the revision of the genus *Bryum* for the "Flora Briofítica Ibérica" project (Guerra et al. 2010), this species must be eliminated of the check-list.

##### *Entosthodon attenuatus* (Dicks.) Bryhn

It was reported by Ros & Guerra (1987, 1988) and Cano et al. (2004) from different localities of the territory. After the revision of the genus *Entosto-*

*don* carried out by M. Brugués for the Iberian Peninsula (Guerra et al. 2010) the specimens proved to be *E. commutatus* or unidentifiable material.

##### *Fissidens bryoides* Hedw.

It was reported by Sánchez-Moya & Cano (1999) and Cano et al. (2004) for including all the species included in the *F. bryoides*-*F. viridulus* complex, following the North American authors which treat all the complex as expressions of *F. bryoides*. Until the revision of the genus *Fissidens* is finished for the "Flora Briofítica Ibérica" project, we follow Hill et al. (2006) treatment, which considered *F. bryoides* different from *F. viridulus* mainly by the antheridia in axillary buds in the former. There is not material at MUB herbarium with the characteristic before cited.

## List of synonyms

#### Mosses

*Aloina aloides* var. *ambigua* (Bruch & Schimp.) = *Aloina ambigua* (Bruch & Schimp.) Limpr.

*Aschisma carniolicum* var. *speciosum* Limpr. = *Aschisma carniolicum* (F. Weber & D. Mohr) Lindb.

*Astomum crispum* (Hedw.) Hampe = *Weissia longifolia* Mitt.

*Astomum levieri* Limpr. = *Weissia levieri* (Limpr.) Kindb.

*Barbula convoluta* var. *commutata* (Jur.) Husn. = *Barbula convoluta* var. *sardoa* Bruch & Schimp.

*Barbula ehrenbergii* (Lorentz) M. Fleisch. = *Barbula bolleana* (Müll. Hal.) Broth.

*Barbula fallax* Hedw. = *Didymodon fallax* (Hedw.) R. H. Zander

*Barbula hornschurchiana* Schultz = *Pseudocrossidium hornschurchianum* (Schultz) R. H. Zander

*Barbula revoluta* Brid. = *Pseudocrossidium revolutum* (Brid.) R. H. Zander

*Barbula rigidula* (Hedw.) Mitt. = *Didymodon rigidulus* Hedw.

*Barbula vinealis* Brid. = *Didymodon vinealis* (Brid.) R. H. Zander

*Brachythecium velutinum* (Hedw.) Schimp. var. *velutinum* = *Brachytheciastrum velutinum* (Hedw.) Ignatov & Huttunen var. *velutinum*

*Brachythecium velutinum* var. *salicinum* (Schimp.) Mönk = *Brachytheciastrum velutinum* var. *salicinum* (Schimp.) Ochyra & Żarnowiec

*Bryum argenteum* var. *lanatum* (P. Beauv.) Hampe = *Bryum argenteum* Hedw.

*Bryum bicolor* Dicks. = *Bryum dichotomum* Hedw.

*Bryum capillare* var. *flaccidum* auct. = *Bryum moravicum* Podp.

*Bryum capillare* f. *longipilum* Podp. = *Bryum capillare* Hedw.

*Bryum capillare* subsp. *torquescens* (Bruch ex De Not.) Kindb. = *Bryum torquescens* Bruch & Schimp.

*Bryum dunense* A. J. E. Smith & H. Whitehouse = *Bryum dichotomum* Hedw.

*Bryum flaccidum* auct. = *Bryum moravicum* Podp.

*Bryum murorum* (Schimp.) Berk. = *Bryum radiculosum* Brid.

*Bryum versicolor* (A. Braun) Bruch & Schimp. = *Bryum dichotomum* Hedw.

*Camptothecium aureum* (Spruce) Schimp. = *Homalothecium aureum* (Spruce) H. Rob.

*Cratoneuron commutatum* (Hedw.) G. Roth. = *Palustriella commutata* (Hedw.) Ochyra

*Crossidium chloronotos* auct. = *Crossidium crassinerve* (De Not.) Jur.

- Crossidium laxefilamentosum* W. Frey & Kürschner = ***Crossidium crassinerve*** (De Not.) Jur.  
*Didymodon aaronis* (Lorentz) J. Guerra = ***Didymodon australasiae*** (Hook. & Grev.) R. H. Zander  
*Didymodon trifarius* auct. = ***Didymodon luridus*** Hornch. ex Spreng.  
*Didymodon trivialis* (Müll. Hal.) J. Guerra = ***Didymodon australasiae*** (Hook. & Grev.) R. H. Zander  
*Ditrichum flexicaule* f. *densum* (Bruch & Schimp.) Mönk. = ***Ditrichum flexicaule*** (Schwägr.) Hampe  
*Encalypta contorta* Hoppe ex Lindb. = ***Encalypta streptocarpa*** Hedw.  
*Entosthodon curvisetus* (Schwägr.) Müll. Hal. = ***Funariella curviseta*** (Schwägr.) Sérgio  
*Entosthodon pallescens* Jur. = ***Entosthodon durieui*** Mont.  
*Eurhynchium hians* (Hedw.) Sande Lac. var. *hians* = ***Oxyrhynchium hians*** (Hedw.) Loeske  
*Eurhynchium hians* var. *rigidum* (Boulay) J.-P. Frahm = ***Oxyrhynchium hians*** (Hedw.) Loeske  
*Eurhynchium meridionale* = ***Plasteurhynchium meridionale*** M. Fleisch. ex Broth.  
*Eurhynchium pulchellum* (Hedw.) Jenn. = ***Eurhynchiastrum pulchellum*** (Hedw.) Ignatov & Huttunen  
*Eurhynchium speciosum* (Brid.) Jur. = ***Oxyrhynchium speciosum*** (Brid.) Warnst.  
*Fissidens crassipes* var. *philibertii* Besch. = ***Fissidens crassipes*** subsp. ***warnstorffii*** (M. Fleisch.) Brugg.-Nann.  
*Fissidens cristatus* Wilson & Mitt. = ***Fissidens dubius*** P. Beauv.  
*Fissidens incurvus* Starke ex Röhl. = ***Fissidens viridulus*** var. ***incurvus*** (Starke ex Röhl.) Waldh.  
*Fissidens viridulus* var. *bambergeri* (Schimp.) Waldh. = ***Fissidens viridulus*** (Sw.) Wahlenb. var. ***viridulus***  
*Fissidens warnstorffii* M. Fleisch. = ***Fissidens crassipes*** subsp. ***warnstorffii*** (M. Fleisch.) Brugg.-Nann.  
*Fontinalis hypnoides* var. *duriaei* (Schimp.) Husn. = ***Fontinalis duriaei*** Schimp.  
*Funaria curviseta* (Schwägr.) Milde = ***Funariella curviseta*** (Schwägr.) Sérgio  
*Funaria pulchella* H. Philib. = ***Entosthodon pulchellus*** (H. Philib.) Brugués  
*Grimmia pitardii* Corb. = ***Campylostelium pitardii*** (Corb.) E. Maier  
*Grimmia pulvinata* var. *africana* (Hedw.) Wilson = ***Grimmia pulvinata*** (Hedw.) Sm.  
*Gymnostomum luisieri* (Sérgio) Sérgio ex Crundw. = ***Gymnostomum viridulum*** Brid.  
*Gymnostomum recurvirostrum* Hedw. = ***Hymenostylium recurvirostrum*** (Hedw.) Dixon  
*Homalothecium sericeum* f. *robustum* (Warnst.) Podp. = ***Homalothecium sericeum*** (Hedw.) Schimp.  
*Hymenostomum tortile* (Schwägr.) Bruch & Schimp = ***Weissia condensa*** (Voit) Lindb.  
*Hypnum cupressiforme* var. *tectorum* Brid. = ***Hypnum cupressiforme*** var. ***lacunosum*** Brid.  
*Leptodictyum kochii* (Schimp.) Warnst. = ***Hygroamblystegium humile*** (P. Beauv.) Vanderp., Goffinet & Hedenäs  
*Leptodictyum humile* (P. Beauv.) Ochyra = ***Hygroamblystegium humile*** (P. Beauv.) Vanderp., Goffinet & Hedenäs  
*Mniobryum delicatulum* (Hedw.) Dixon = ***Pohlia melanodon*** (Brid.) A. J. Shaw  
*Orthotrichum cupulatum* var. *sardagnanum* (Venturi) Venturi = ***Orthotrichum cupulatum*** Brid.  
*Oxyrhynchium swartzii* var. *meridionale* (Boulay) Pavletic = ***Oxyrhynchium hians*** (Hedw.) Loeske  
*Phascum leptophyllum* Müll. Hal. = ***Leptophascum leptophyllum*** (Müll. Hal.) J. Guerra & M. J. Cano  
*Phascum curvicolle* Hedw. = ***Microbryum curvicolle*** (Hedw.) R. H. Zander  
*Phascum cuspidatum* subsp. *papillosum* (Lindb.) J. Guerra & Ros = ***Phascum cuspidatum*** var. ***papillosum*** (Lindb.) G. Roth  
*Phascum floerkeanum* F. Weber & D. Mohr = ***Microbryum floerkeanum*** (F. Weber & D. Mohr) Schimp.  
*Pottia bryoides* (Dicks.) Mitt. = ***Protobryum bryoides*** (Dicks.) J. Guerra & M. J. Cano  
*Pottia caespitosa* (Bruch) Müll. Hal. = ***Pottiopsis caespitosa*** (Bruch) Blockeel & A. J. E. Sm.  
*Pottia commutata* Limpr. = ***Microbryum davallianum*** (Sm.) R. H. Zander  
*Pottia davalliana* (Sm.) C. E. O. Jensen = ***Microbryum davallianum*** (Sm.) R. H. Zander  
*Pottia lanceolata* (Hedw.) Müll. Hal. = ***Tortula lindbergii*** Broth.  
*Pottia mutica* Venturi = ***Microbryum starkeanum*** (Hedw.) R. H. Zander  
*Pottia pallida* Lindb. = ***Tortula pallida*** (Lindb.) R.H. Zander  
*Pottia starkeana* (Hedw.) Müll. Hal. = ***Microbryum starkeanum*** (Hedw.) R. H. Zander  
*Pottia starkeana* subsp. *conica* (Schleich. ex Schwägr.) D. F. Chamb. = ***Microbryum davallianum*** (Sm.) R. H. Zander

- Pottia starkeana* subsp. *minutula* (Schwägr.) D. F. Chamb. = ***Microbryum davallianum*** (Sm.) R. H. Zander  
*Pterogonium ornithopodioides* (F. Weber & D. Mohr) Lindb. = ***Pterogonium gracile*** (Hedw.) Sm.  
*Rhynchostegiella tenella* var. *litorea* (De Not.) P. W. Richards & E. C. Wallace = ***Rhynchostegiella litorea*** (De Not.) Limpr.  
*Rhynchostegium riparioides* (Hedw.) Cardot = ***Platyhypnidium riparioides*** (Hedw.) Dixon  
*Rosulabryum canariense* (Brid.) Ochyra = ***Bryum canariense*** Brid.  
*Rosulabryum capillare* (Hedw.) J. R. Spence = ***Bryum capillare*** Hedw.  
*Rosulabryum donianum* (Grev.) Ochyra = ***Bryum donianum*** Grev.  
*Rosulabryum laevifilum* (Syed) Ochyra = ***Bryum moravicum*** Podp.  
*Rosulabryum torquescens* (Bruch ex De Not.) J. R. Spence = ***Bryum torquescens*** Bruch & Schimp.  
*Schistidium singarense* (Schiffn.) Laz. = ***Schistidium helveticum*** (Schkuhr) Deguchi  
*Scleropodium illecebrum* Schimp. = ***Scleropodium touretii*** (Brid.) L. F. Koch  
*Tortella densa* (Lorentz & Molendo) Crundw. & Nyholm. = ***Tortella inclinata*** var. *densa* (Lorentz & Molendo) Limpr.  
*Tortella tortuosa* var. *brevifolia* Breidl. = ***Tortella tortuosa*** (Hedw.) Limpr.  
*Tortula baetica* (Casas & R. Oliva) J. Guerra & Ros = ***Tortula israelis*** Bizot & F. Bilewsky  
*Tortula calcicolens* W.A. Kramer = ***Syntrichia calcicola*** J. J. Amann  
*Tortula caninervis* (Mitt.) Broth. = ***Syntrichia caninervis*** Mitt.  
*Tortula intermedia* (Brid.) De Not. = ***Syntrichia montana*** Nees  
*Tortula laevipila* (Brid.) Schwägr. = ***Syntrichia laevipila*** Brid.  
*Tortula montana* (Nees) Lindb. = ***Syntrichia montana*** Nees  
*Tortula muralis* f. *incana* (Bruch & Schimp.) Sapjegin = ***Tortula muralis*** Hedw.  
*Tortula muralis* var. *baetica* Casas & R. Oliva = ***Tortula israelis*** Bizot & F. Bilewsky  
*Tortula muralis* var. *incana* (Bruch & Schimp.) Wilson = ***Tortula muralis*** Hedw.  
*Tortula muralis* var. *obcordata* (Schimp.) Limpr. = ***Tortula muralis*** Hedw.  
*Tortula pagorum* (Milde) De Not. = ***Syntrichia laevipila*** Brid.  
*Tortula princeps* De Not. = ***Syntrichia princeps*** (De Not.) Mitt.  
*Tortula revolvens* var. *obtusata* Reimers = ***Tortula revolvens*** (Schimp.) G. Roth  
*Tortula ruraliformis* (Besch.) Grout = ***Syntrichia ruralis*** var. *ruraliformis* (Besch.) Delogne  
*Tortula ruraliformis* var. *subpapillosissima* Bizot & R. B. Pierrot ex W. A. Kramer = ***Syntrichia subpapillosissima*** (Bizot & R. B. Pierrot ex W. A. Kramer) M. T. Gallego & J. Guerra  
*Tortula ruralis* (Hedw.) P. Gaertn., B. Mey & Scherb. = ***Syntrichia ruralis*** (Hedw.) F. Weber & D. Mohr  
*Tortula subulata* var. *subinermis* (Bruch & Schimper) Wilson = ***Tortula subulata*** Hedw.  
*Trichostomum brachydontium* subsp. *cuspidatum* (Braithw.) Giacom. = ***Trichostomum brachydontium*** Bruch  
*Trichostomum brachydontium* subsp. *densum* (Bruch & Schimp.) Giacom. = ***Trichostomum brachydontium*** Bruch  
*Trichostomum brachydontium* subsp. *mutabile* (Bruch) Giacom. = ***Trichostomum brachydontium*** Bruch  
*Trichostomum brachydontium* subsp. *unguiculatum* (H. Philib.) Corb. & Jahand. = ***Trichostomum brachydontium*** Bruch  
*Trichostomum caespitosum* (Bruch) Jur. = ***Pottiopsis caespitosa*** (Bruch) Blockeel & A. J. E. Sm.  
*Trichostomum mutabile* Bruch = ***Trichostomum brachydontium*** Bruch  
*Trichostomum mutabile* var. *densum* Bruch & Schimp. = ***Trichostomum brachydontium*** Bruch  
*Trichostomum triumphans* De Not. = ***Pottiopsis caespitosa*** (Bruch) Blockeel & A. J. E. Sm.  
*Trichostomum triumphans* var. *pallidisetum* (Müll. Hal.) Husn. = ***Pottiopsis caespitosa*** (Bruch) Blockeel & A. J. E. Sm.  
*Trichostomum viridulum* var. *unguiculatum* (H. Philib.) Esteve & C. Cortés = ***Trichostomum brachydontium*** Bruch.  
*Zygodon baumgartneri* Malta = ***Zygodon rupestris*** Schimp. ex Lorentz

## Liverworts

- Grimaldia dichotoma* Raddi = *Mannia androgyna* (L.) A. Evans  
*Lophozia turbinata* (Raddi) Steph. = *Leiocolea turbinata* (Raddi) H. Buch  
*Madotheca platyphylla* (L.) Dumort. = *Porella platyphylla* (L.) Pfeiff.  
*Oxymitra paleacea* Bisch. = *Oxymitra incrassata* (Broth.) Sérgio & Sim-Sim  
*Pellia endiviifolia* f. *furcigera* (Hook.) Schiffn. = *Pellia endiviifolia* (Dicks.) Dumort.  
*Pellia fabbroniana* Raddi = *Pellia endiviifolia* (Dicks.) Dumort.  
*Plagiochasma aitoniana* Lindenb. & Nees = *Plagiochasma rupestre* (J. R. Forst & G. Forst) Steph.  
*Riccia gougetiana* var. *erinacea* Schiffn. = *Riccia gougetiana* var. *armatissima* Levier ex Müll. Frib.  
*Tesselina pyramidata* (Willd.) Dumort. = *Oxymitra incrassata* (Broth.) Sérgio & Sim-Sim

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