



## New national and regional bryophyte records, 48

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# New national and regional bryophyte records, 48

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1. *Andreaea rothii* F.Weber & D.Mohr subsp. *rothii*

**Contributors:** J. Csiky, D. Kovács, D. Purger, A. Alegro, V. Segota and J. Deme

**Croatia:** Papuk Mountains, Sokolina, Stražemanka stream at Doljanci village, 539 m a.s.l., 45.493154°N, 17.607493°E, on gneiss rocks, 18 July 2015, *leg.*

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Kovács, D., Csiky, J., Deme, J. & Purger, D., *det.* Csiky, J. & Erzberger, P. (JPU). Repeated collection on 16 October 2015, *leg.* Alegro, A. & Šegota, V. (ZA).

*Andreaea rothii* has been recorded for the first time in Croatia. It is a boreo-temperate suboceanic species (Hill *et al.*, 2007) relatively rare in SE Europe, since it is known only from Romania (Ellis *et al.*, 2014d), Slovenia and Serbia (Sabovljević *et al.*, 2008; Hodgetts, 2015).

The species was found in the Papuk Mountains, situated in the mainly lowland area of NE Croatia. In this region Papuk is the largest and highest mountain range, with peaks between 800 and 900 m a.s.l. They are characterized by high geological diversity dominated by metamorphic rocks, such as different types of schists, as well as granites. The climate is temperate, moderately warm without an explicit dry period. About 60% of the almost totally forested area is covered by different communities of beech forests.

The well-developed black patches of *A. rothii* cover an area ca 2 m × 0.5 m on a steep north-facing cliff on the edge of an acidothermophilic sessile oak (*Quercus petraea* agg.) forest. The specimens of *A. rothii* grew on the bare rock with the following bryophyte species: *Cynodontium polycarpon* (Hedw.) Schimp., *Dicranella heteromalla* (Hedw.) Schimp., *Dicranum scoparium* Hedw., *Polytrichum piliferum* Schreb. ex Hedw. and *Rhabdoweisia* (cf.) *fugax* (Hedw.) Bruch & Schimp. The population is very small with an extremely high risk of extinction, therefore we propose CR as Red List status for the taxon in Croatia. According to the last checklist of the moss flora of Croatia (Sabovljević, 2006), only *Andreaea rupestris* Hedw., collected from just one locality in 1927 (Horvat, 1932 and ZA), was reported for the genus.

The locality is very interesting from the point of view of the vegetation of Croatia, because it is within 100 m of the second stand of *Fagus sylvatica* L.-*Sphagnum quinquefarium* (Braithw.) Warnst. forest (Alegro *et al.*, 2015). The second occurrence of *Dicranum spurium* Hedw. (Ellis *et al.*, 2014d) and *Rhabdoweisia fugax* (Papp *et al.*, 2013) in Croatia are also found here. Another interesting moss is *S. capillifolium* (Ehrh.) Hedw., that forms small red patches within the thick carpets of *S. quinquefarium* under the open boulder scree forest in the neighbourhood.

2. *Austrofossombronia peruviana* (Gottsche & Hampe) R.M.Schust. ex Crand.-Stotl., Stotler & A.V.Freire

**Contributors:** S. R. Gradstein, C. Reeb and F. Osorio

**Northern Chile:** Région Tarapaca, bofedal Collahuasi, between *Oxychloa andina* Phil., almost frozen, 4614 m a.s.l., 52°86'94"S, 76°76'917"W, 2014, leg. Felipe Osorio *s.n.*, c. andr. (PC).

*Austrofossombronia* R.M.Schust. is a small southern-hemispheric genus of three species, one of which, *A. peruviana*, occurs at high elevations in the tropical Andes, from Bolivia to Venezuela (Schuster, 1994; Crandall-Stotler *et al.*, 1999; Gradstein *et al.*, 2001). The species is characteristic of mires in páramo and humid puna vegetation of the Andes, between 3600 and 4750 m, where it usually grows submerged and in extensive, pure mats. In spite of its rather wide distribution in the Andes the species is nowhere common,

being known from less than a dozen collections. The record from northern Chile is the southernmost locality of the species and the first one from this country. The species was found very sparsely in “bofedal” (alpine wetland) vegetation dominated by *Oxychloa andina* Phil. Characteristic of *A. peruviana* are the broad, fleshy axis and the densely imbricate, succubous and rather fleshy, wing-like leaves that are strongly folded inwards and together, and possess undulate-crested margins. The thallus morphology could be clearly observed by bleaching the plants with a sodium hypochlorite solution as proposed for thalloid liverworts by Rico (2011). In cross section, the leaves are 4–6 cells thick in the lower half, becoming thinner in the upper half. The Chilean plants were mostly sterile; one plant was male and contained several groups of 10–12 “naked” antheridia on the surface of the midrib, near the thallus apex and well-protected by the strongly folded leaves.

Preliminary molecular work on Fossombroniaceae found *A. peruviana* in a nested position in *Fossombronia* Raddi suggesting that the genus should be returned to *Fossombronia* (Crandall-Stotler *et al.*, 2009). In the latter case the correct name of the species becomes *Fossombronia peruviana* Gottsche & Hampe.

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

**Contributors:** S. Poponessi, M. Aleffi and R. Venanzoni

**Italy:** Umbria Region, Province of Terni, “Parco Fluviale del Nera” Regional Park, Marmore Waterfall, “Petrifying springs with tufa formation (*Cratoneurion*)”, 42°33.212'N, 12°42.802'E, ca 307 m a.s.l., on dripping stones, 13 November 2015, leg./det. S. Poponessi *s.n.* (PERU).

This record is in a Site of Community Importance (SCI) IT5220017 and a Special Area of Conservation (SAC) of the Natura 2000 EU-wide network due to the presence of the 72.20\* “Petrifying springs with tufa formation (*Cratoneurion*)” Annex I priority habitat (<http://vnr.unipg.it/habitat/>).

*Barbula bolleana* is a new species for the Umbria Region (Aleffi & Tacchi, 1998). It is very rare in Italy, recorded only for Trentino-Alto Adige (Pokorny *et al.*, 2006), Lombardy (Giacomini, 1950), Sardinia (Cortini Pedrotti & Troiano, 1985) and Sicily (Brullo *et al.*, 1989; Dia *et al.*, 2003). Its presence in the Tuscany Region has not been confirmed (Renauld, 1880). This species is widespread in the Mediterranean basin: Algeria, Balearic Islands, Crete, Croatia, Cyprus, Egypt, France, Greece, Iberian Peninsula, Israel, Jordan, Lebanon, Libya, Malta, Morocco, Portugal, Syria, Tunisia and Turkey (Ros *et al.*, 2013). It occurs also in sub-Saharan Africa (O'Shea, 2006) and North America (Zander, 2007).

*Barbula bolleana* is a hygrophilous and calcareous moss often confused with *Didymodon tophaceus* (Brid.) Lisa, which generally has smaller leaf cells (9–12 µm wide) in fewer longitudinal rows (10–15 for *D. tophaceus*, 20–30 for *B. bolleana*), and generally with long-decurrent leaf margins (Zander, 2007).

The species is very abundant in this habitat, which consists of a dripping stone wall, with chalky incrustations at its base, suggesting it takes an active part in the formation of tufa.

#### 4. *Brachythecium rivulare* Schimp.

**Contributors:** R. Gupta, A. K. Asthana and V. J. Singh

**India:** Central India, Madhya Pradesh, Pachmarhi Biosphere Reserve, on the way to Chota Mahadev, 22°21'10"N, 78°39'55"E, on soil covered rocks, ca 793 m a.s.l., 29 November 2006, leg. V. Sahu & V. Awasthi (LWG227636, LWG227638 B).

Gangulee (1978–80) reported 13 species of genus *Brachythecium* Schimp. from Eastern Himalaya. Vohra (1983) reported 33 species from India, of which 15 were stated as endemic. Presently the genus is represented in India by 37 taxa (Lal, 2005). Nearly all the species of *Brachythecium* found in India are reported from the Western and Eastern Himalayas, with very few being known from Central India. *Brachythecium rivulare* is here reported as a new taxon for this region.

The prostrate, irregularly branched, pale, yellowish-green shoots formed dense mats. Their lax, concave leaves possessed a strong costa, which occupied ca three quarters of the leaf length. At the base of the leaves were the characteristic slightly inflated alar cells.

#### 5. *Bryoerythrophyllum rubrum* (Jur.) P.C.Chen

**Contributor:** H. Bednarek-Ochyra

**Antarctica, South Shetland Islands, King George Island:** Maxwell Bay, NW side of Marian Cove, Weaver Peninsula terminating North Spit, lat. 62° 12.341'S, 58°48.062'W, alt. 11 m a.s.l., on beach with boulders in the lichen and moss community, associated with *Distichium capillaceum* (Hedw.) Bruch & Schimp., *Sanionia georgicouncinata* (Müll.Hal.) Ochyra & Hedenäs, *Pohlia cruda* (Hedw.) Lindb. and *Platydictya jungermannioides* (Brid.) H.A.Crum, 3 March 2009, leg. L. E. Kurbatova L124-14 (KRAM).

*Bryoerythrophyllum* P.C.Chen is not a prominent constituent of the moss flora in the austral polar regions and so far only three species of this genus have been recorded from this biome. In the subantarctic, *B. recurvirostrum* (Hedw.) P.C.Chen occurs occasionally on Macquarie Island (Seppelt, 2004) and South Georgia (Ochyra et al., 2002a) and *B. rubrum* (Jur.) P.C.Chen was found in Îles Kerguelen (Sollman, 2016). In the Antarctic, *Bryoerythrophyllum* is absent from most areas of this icy continent. Until recently all Antarctic material of

this genus was considered to be *B. recurvirostrum* (Ochyra & Zander, 2002; Ochyra et al., 2008a), but recently Sollman (2015) showed that three species of the genus occur here. Namely, the endemic *B. antarcticum* (L.I.Savicz & Smirnova) Sollman and the bipolar *B. recurvirostrum* and *B. rubrum*. The latter was recorded for the first time in the southern hemisphere and it was found in the Vestfold Hills in the Princess Elizabeth Land in continental Antarctica as well as on Signy Island in the South Orkney Islands, King George Island in the South Shetland Islands and Alexander Island in the maritime Antarctic.

*Bryoerythrophyllum rubrum* is closely related to *B. recurvirostrum* but it is distinct in having a strong, percurrent to excurrent costa, 100–130 µm wide at the base, a dioicous sex condition and distinctly curled distally lanceolate leaves with a pronounced sheathing base reaching half the leaf length. Sollman (2015) reported this species from King George Island, the largest island in the South Shetland Islands archipelago, but without details of the collection. These are supplied in the present note. In fact, this material was reported earlier from this island as *B. recurvirostrum* (Ellis et al., 2012b). King George Island has the richest and best known moss flora in the Antarctic biome. Ochyra (1998) recorded 61 species in the island's flora but since then four species have been added: *Schistidium lewis-smithii* Ochyra (Ochyra, 2003), *S. leptoneurum* Ochyra (Ochyra, 2004), and *Drepanocladus longifolius* (Mitt.) Paris, which was formerly known in Antarctica only from Signy Island, and Livingston Island in the South Shetland Islands, and James Ross Island on the east coast of the Trinity Peninsula (Ochyra et al., 2008a, 2008b; Li et al., 2009), and herein *Bryoerythrophyllum rubrum*.

#### 6. *Bucegia romanica* Radian

**Contributor:** K. Damsholt

**Greenland:** (1) East coast of Peary Land, Kap København area, at base camp, 82°24'N, 21°11'W, July 1983, leg. G.S.Mogensen 83-206 (C); (2) N of Mudderbugten, NE of Kochs cairn, 82°29'N, 21° 06'W, August 1983, leg. G.S.Mogensen 83-629 (C).

*Bucegia romanica* is new to Greenland, both collections being originally identified as *Preissia quadrata* (Scop.) Nees, which it was originally described as being very similar to. According to Konstantinova et al. (2014) the only other location in the Arctic is in Svalbard. Cross-sections of the thallus show air-chambers without filaments and a V-shaped (triangular) thallus section as illustrated by Konstantinova et al. (2014). See also discussion below under *Lophozia decolorans*.

7. *Bucklandiella heterostichoides* (Cardot) Bednarek-Ochyra & Ochyra

**Contributor:** H. Bednarek-Ochyra



**Chile**, X Región Los Lagos, Provincia de Osorno: (1) inside the crater of Volcán Casablanca about 90 km east of the city of Osorno, *ca* 1590 m a.s.l., 40°46'38"S, 72°09'59"W, on pumice rocks in the high alpine ericaceous heath, 27 March 1981, *leg.* Marian Kuc *s.n.* (KRAM B-210198, KRAM B-207025, with sporophytes); (2) Parque Nacional Puyehue, *ca* 74 km east of the city of Osorno, Parque Nacional Puyehue, forest mainly of *Nothofagus* Blume spp. and *Eucryphia cordifolia* Cav., *ca* 500 m a.s.l., 40°40'36"S, 72°09'28"W, Mirador, alpine zone, on rock, 20–25 February 1971, *leg.* Leslie R. Landrum 641 (MO); (3) Parque Nacional Puyehue, Antillanca, 40°40'10"S, 72°09'29"W, alpine zone, on rock, 20 February 1971, *leg.* Leslie R. Landrum 580 (COLO, KRAM).

A characteristic feature of many South American cool-adapted bryophyte species is their penetration northwards into lower latitudes along the Andean chain where they occur at high elevations. *Bucklandiella heterostichoides* is a typical example of this distribution pattern. It is frequent in southern and western Patagonia of Chile in the XII Región de Magallanes y de la Antártica Chilena (Roivainen, 1955; Matteri, 1985; Matteri & Schiavone, 2002). Then, the species extends to Llanquihue Province in the X Región de Los Lagos (Müller, 2009), which until now was the northernmost locality for the species at latitude *ca* 41°06'S in the South American mainland. Herein, its known range is extended to more northerly localities in Osorno Province in the Region X, and the locality in the Puyehue National Park at latitude 40°40'10"S is currently the northernmost one in South America. It is worth noting that the northernmost site of *B. heterostichoides* in its whole range is on Gough Island in the South Atlantic Ocean at latitude *ca* 40°32'S (Ellis *et al.*, 2012a). The record of *B. heterostichoides* from Tristan da Cunha proved to be based upon a misdetermination of the voucher material, which should be referred to *B. striatipila* (Cardot) Bednarek-Ochyra & Ochyra (Bednarek-Ochyra & Ochyra, 2010).

*Bucklandiella heterostichoides* is an austral amphiatlantic species, which is a vicariant of the closely related Australasian *B. seppeltii* Bednarek-Ochyra, Ochyra, Sawicki & Szczecińska (Bednarek-Ochyra *et al.*, 2014). It has optimum occurrence on South Georgia in the South American sector of the subantarctic (Bell, 1974) and in Îles Kerguelen and on Heard Island (Ellis *et al.*, 2014b) in the African sector of this biome, with an intermediate occurrence on Gough Island in the cool-temperate zone where it occurs only at high elevations (Ellis *et al.*, 2012a). Additionally, the species is frequent in southern and western Patagonia and in the Falkland Islands (for the global distribution map see Ochyra *et al.*, 2015a).

The distinct amphiatlantic distribution pattern is shown by a relatively small group of southern temperate and southern cool-adapted species, such as *Bryum orbiculatifolium* Cardot & Broth. (Ochyra & Singh, 2008), *Bucklandiella membranacea* (Mitt.) Bednarek-Ochyra & Ochyra (Ellis *et al.*, 2013c; Ochyra *et al.*, 2015a), *B. orthotrichacea* (Müll.Hal.) Bednarek-Ochyra & Ochyra (Bednarek-Ochyra & Ochyra, 2012a), *B. pachydietyon* (Cardot) Bednarek-Ochyra & Ochyra (Ellis *et al.*, 2015a), *Ditrichum conicum* (Mont.) Mitt. (Ochyra & Lewis Smith, 1998; Ochyra & Bednarek-Ochyra, 2013), *Notoligotrichum trichodon* (Hook. & Wilson) G.L.Sm. (Ellis *et al.*, 2012d), *Sematophyllum lebouvieri* Ochyra (Ochyra, 2010), and *Syntrichia saxicola* (Cardot) R.H.Zander (Ochyra *et al.*, 2014b).

8. *Bucklandiella lamprocarpa* (Müll.Hal.) Bednarek-Ochyra & Ochyra

**Contributors:** H. Bednarek-Ochyra and V. Plášek

**Chile:** XI Región Aysén del General Carlos Ibáñez del Campo, Provincia de Capitán Prat: near the bridge on Río El Salto, *ca* 25 km south of Cochrane and 5 km south of Lago Esmeralda along Ruta 7, the bridge on Río El Salto, 266 m a.s.l. 47°19.969'S, 72°39.440'W, submerged in swiftly flowing water in the cascade, associated with *Vittia pachyloma* (Mont.) Ochyra, 15 January 2015, *leg.* H. Bednarek-Ochyra, R. Ochyra & V. Plášek 474/15 (KRAM).

*Bucklandiella lamprocarpa* is a peculiar species, easily recognized by features of both the gametophyte and sporophyte. The most remarkable of these are the structure of the leaf lamina and anatomy of the costa. The leaf lamina is variously 1–4-stratose distally and bordered by 2–5-stratose fleshy marginal limbidia of variable width. These extend from the leaf base to the apex, where they are confluent with the costa and merge imperceptibly with the laminal cells in the upper part. The costa is strong, multistratose, prominently convex dorsally, and in the proximal portion reniform on the ventral side. Similar leaf structure may be found in many species of moss growing in streams, brooks and waterfalls with swiftly flowing water. For example, in *Koponenia holoneuron* (Herzog) Ochyra (Ochyra, 1985a), *Hypnobartlettia fontana* Ochyra (Ochyra, 1985b), *Limbella tricostata* (Sull.) E.B.Bartram (Ochyra, 1987), *Neckeropsis touwii* Ochyra & Enroth (Ochyra & Enroth, 1989), *Platyhypnum mutatum* (Ochyra & Vanderpoorten) Ochyra (Ochyra & Vanderpoorten, 1999), *Schistidium deguchianum* Ochyra & Bednarek-Ochyra (Ochyra & Bednarek-Ochyra, 2011), and *Handeliobryum sikkimense* (Paris) Ochyra (Ochyra & Shevock, 2012), where it protects the mosses against the destructive action of water currents. In Chile, *B. lamprocarpa* has a continuous range from the VII Región de Maule to the XII Región de Magallanes,

but in some regions it has been recorded only from a single province (Müller, 2009). In the XI Región de Aysén this species has so far been recorded only from Provincia de Aysén and Provincia de Coyhaique and here it is reported from Provincia de Capitán Prat.

*Bucklandiella lamprocarpa* has a wide panholantarctic range which covers some subantarctic and cool-temperate islands in the Southern Ocean (Bednarek-Ochyra & Ochyra, 1998; Ochyra *et al.*, 2015a), southern South America (Bednarek-Ochyra & Ochyra, 2012a) and the Cape region in South Africa (Bednarek-Ochyra & Ochyra, 2012b; Ochyra & van Rooy, 2013). Additionally, it appears at disjunct localities in the central and northern Andes (Blockeel *et al.*, 2002; Bednarek-Ochyra, 2015) and in the East African mountains (Ochyra *et al.*, 1988).

9. *Bucklandiella striatipila* (Cardot) Bednarek-Ochyra & Ochyra

**Contributors:** H. Bednarek-Ochyra and V. Plášek

**Chile:** XI Región Aysén del General Carlos Ibáñez del Campo, Provincia de Coyhaique: Ruta 608 from Coyhaique to Lago Portales, 20 km SW of Coyhaique, large stone west of Los Huemules opposite the small peninsula on the northern shore of Lago Atrovesado, 360–370 m a.s.l., 45°41.386'S, 72°16.914'W, stone entirely covered with a carpet of bryophytes, in dry and exposed sites associated with *Bucklandiella heterostichoides* (Cardot) Bednarek-Ochyra & Ochyra, *B. didyma* (Mont.) Bednarek-Ochyra & Ochyra, *Racomitrium lanuginosum* (Hedw.) Brid. and *Acroschisma wilsonii* (Hook.f. & Wilson) A.Jaeger, 18 January 2015, *leg.* H. Bednarek-Ochyra, R. Ochyra & V. Plášek 725/15 (KRAM).

*Bucklandiella striatipila* is a distinct species, characterized by having leaves with a long 1–2-seriate basal marginal border composed of 15–25 pellucid and straight-walled cells in the outer row, esinuose and strongly porose basal laminal cells, and a very broad costa with 6–10 enlarged guide cells on the ventral side. Bednarek-Ochyra & Ochyra (2011) suggested that this species should be named *B. subcrispipila* (Müll.Hal.) Bednarek-Ochyra & Ochyra since they neotypified *Grimmia subcrispipila* Müll.Hal., the basionym of *B. subcrispipila*, with a specimen that clearly matched the concept of *B. striatipila*. However, the subsequent discovery of the undoubted original material of *G. subcrispipila* necessitated superseding the neotype. Because the lectotype of the latter name clearly belongs within the *B. subsecunda* (Harv.) Bednarek-Ochyra & Ochyra complex, a species known from Brazil and central and northern Andean countries (Bednarek-Ochyra *et al.*, 1999; Blockeel *et al.*, 2001), *B. striatipila* still has to be used as the correct name for this species (Stryjak-Bogacka *et al.*, 2016).

*Bucklandiella striatipila* is widespread in Chile, ranging from Provincia de Ñuble in the VIII Región de Bío Bío to Provincia de la Antártica Chilena in the XII Región de Magallanes y de la Antártica Chilena on the mainland and extending to the Juan Fernández Islands in Provincia de Valparaíso in the V Región de Valparaíso (Müller, 2009). Additionally, the species extends to the Falkland Islands (Ochyra *et al.*, 2015a), subantarctic South Georgia (Bell, 1974) and the volcanic Deception Island in the maritime Antarctic (Ellis *et al.*, 2013a). Although the species was reported from all regions from Bío Bío to Magallanes, in some of them it is known only from a single province. In the XI Región de Aysén *B. striatipila* has hitherto been known from Provincia de Aysén and herein it is reported from Provincia de Coyhaique.

*Bucklandiella striatipila* is an Afro-American species. This distribution pattern is primarily exhibited by a large number of tropical lowland and montane moss species (Ochyra *et al.*, 1992, 2002b; Ochyra & Ireland, 2004, 2016), but is also represented by a relatively small group of southern cool-adapted mosses of which *B. striatipila* is a classical example. It occurs on the cool-temperate islands in the South Atlantic Ocean (Tristan da Cunha and Gough Island), on subantarctic islands in the South Indian Ocean (Îles Crozet and Îles Kerguelen), and extends to the Cape region on mainland Africa (Bednarek-Ochyra & Ochyra, 2013).

10. *Calypogeia azurea* Stotler & Crotz

**Contributor:** K. Damsholt

**Denmark:** Faeroe Isles, Streymoy, Leynavatn, Mjåuvøtn, near Leynavatn, 62°07'N, 07°01'W, 4 July 1973, on the shores of a small lake, *leg. & det.* H. Hürlimann, K. Damsholt & D. A. J. Vogelpoel; Streymoy, Porkerisvatn, S of Árgir/Tórshavn, 61°58'N, 06°47'W, 9 July 1973, *leg. & det.* K. Damsholt KD 73-186 (C).

In 2014 and 2015 Kell Damsholt (KD) and Tomas Hallingbäck (TH) collected bryophytes in the Faeroe Isles. Some of the species they found are new to the 18 Faeroe Islands, and when checking the herbarium in Copenhagen (C), the present contributor (KD) found some additional species new to these islands, adding up to 129 species and subspecies of liverworts. The new records contributed by KD and TH are distributed under their specific names throughout this edition of the new records column.

The present record, *Calypogeia azurea*, was discussed in Boesen *et al.* (1975), and the plant with bluish oil-bodies was at that time considered *C. trichomanis* (L.) Corda. However, it is now called *C. azurea*, and is new to the Faeroe Isles.

11. *Catagonium brevicaudatum* Müll.Hal. *ex* Broth.

**Contributors:** E. Rodríguez-Quiel, C. Arrocha and A. Benitez

**Panamá:** Chiriquí, Las Nubes, Cerro Punta, buffer zone of Parque Internacional La Amistad (PILA), 8° 52'55.85"N, 82°36'31.20"W, 2110–2211 m a.s.l., epiphytic in primary montane rain forest, 5 March 2010, *leg. & det.* E. Rodríguez-Quiel & D. Gómez 284 (UCH), *conf.* C. Arrocha; same locality, 28 April 2010, E. Rodríguez-Quiel & D. Gómez 298 (UCH, PMA); near remnants of tropical montane forest in PILA, 8°52'52.68"N 82°36'26.54"W, 2330 m a.s.l., epiphytic together with *Bazzania cuneistipula* (Gottsche, Lindenb. & Nees) Trevis. and *Zelometeorium patulum* (Hedw.) Manuel, in lower part of buffer zone of montane rain forest, 28 April 2010, *leg.* E. Rodríguez-Quiel & D. Gómez 720 (UCH).

*Catagonium brevicaudatum* is readily distinguished by its piliferous-recurved leaf apices. The species is widespread in tropical America, previously known from Brazil, Bolivia, Colombia, Ecuador, Peru and Venezuela, between 950 and 4100 m a.s.l. (Churchill *et al.*, 2000; Ramirez & Churchill, 2002; Peralta *et al.*, 2008). However, in Central America, this species was previously known only from Costa Rica, Guatemala, Honduras, Jamaica and Mexico between 1700 and 3930 m a.s.l., growing on soil, rock and epiphytic on tree trunks (Sharp *et al.*, 1994; Allen, 2010). The collection from the buffer zone of the Parque Internacional La Amistad (PILA) is the first record of *C. brevicaudatum* for Panamá. Despite its wide distribution in the Neotropics, it is usually a rarely collected species. *Catagonium brevicaudatum* is the only species of *Catagonium* Müll.Hal. *ex* Broth. reported from Central America.

12. *Cephaloziella kiaeri* (Austin) Douin

**Contributors:** V. A. Bakalin and Yu. S. Mamontov

**Russian Federation (Southern Far East):** Primorskij Territory, Khasansky District, Kedrovaya Pad' State Reserve, upper source of Vtoroj Zolotoj stream, 43° 05'38"N, 131°30'35"E, 500 m a.s.l., partly shaded mesic cliffs in hemiboreal mixed broadleaved-coniferous forest, 18 May 2007, *leg.* V. A. Bakalin *s.n.* (VBGI: P-3-25-07, P-3-5a-07).

**Republic of Korea:** Jeollabuck-do Province, Deokgyu National Park, Chileon Falls area, 35°50'14"N, 127° 42'17"E, 640 m a.s.l., partly shaded cliffs in cool-temperate broadleaved forest, 27 June 2008, *leg.* V. A. Bakalin *s.n.* (VBGI: Kor-13-13-08); Jeonnam Prov., Cheongon Mt., 34°32'08"N 125°54'43"E, 730 m a.s.l., partly shaded moist cliffs in cool-temperate broadleaved forest, 19 May 2011, *leg.* V. A. Bakalin *s.n.* (VBGI: Kor-17-14-11, Kor-17-41-11).

The species has a generally palaeotropical suboceanic distribution, extending from Central to South Africa, Madagascar, South and South East Asia, and stretching eastward to Papua New Guinea, New Caledonia, Solomon Islands and Samoa (Váña,

1992). In East Asia, the species penetrates northward as far as Honshu in Japan (Yamada & Iwatsuki, 2006) and Hunan and Liaoning in China (Piippo, 1990). The present records are for the Russian Federation and Republic of Korea. The northernmost locality lies *ca* 5° north of previously known records and may be regarded as having a relict nature. The record of *Cephaloziella spinigera* (Lindb.) Jørg. by Choe & Yamada (1997, as *C. subdentata* Warnst.), from "roots of ferns near cliff at moisty site" (l.c.: 57) may also belong to *C. kiaerii*. Unfortunately, we were unable to find the specimens on which this record was based in NICH, where the collections of Dr. K. Yamada are housed.

13. *Cephaloziella spinigera* (Lindb.) Warnst.

**Contributor:** K. Damsholt

**Denmark:** Faeroe Isles: Viðoy; Villingadalsfjall, southern slopes of the mountain, 62°22'N, 06°33'W, in *Sphagnum capillifolium* Dozy & Molk. turf together with *Cephalozia pleniceps* (Austin) Lindb., *C. bicuspidata* (L.) Dumort., and *Calypogeia muelleriana* (Schiffn.) Müll.Frib., 24 June 2015. *Leg. & det.* K. Damsholt KD 15-082 (C).

New to the Faeroe Isles. Discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above).

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

**Contributors:** H. Bednarek-Ochyra and M. Lebouvier

**Îles Crozet, Île de la Possession:** eastern coast, Pointe Lieutard, Port Alfred Faure station above Baie du Marin, fellfield near the chapel toward the seashore, 46°25'55.89"S, 51°51'36.68"E, 120 m a.s.l., on wet bare soil on banks of a hollow, in exposed sites, 9 November 2006, *leg.* R. Ochyra no's. 1/06, 6/06 & 12/06 (KRAM).

*Ceratodon purpureus* is generally considered to be a cosmopolitan weedy species, although in some regions, for instance in the tropics it is mainly restricted to montane elevations, and in the large lowland expanses of Amazonia it is virtually absent (Churchill, 1988). The species is very common in the maritime Antarctic and in most ice-free coastal areas in continental Antarctica (Ochyra *et al.*, 2008a), but it is rare and occasional on subantarctic islands. For example, it has not hitherto been recorded in the Prince Edward Islands (Ochyra & Smith, 2004) or from Îles Crozet. This gap in its distribution in the subantarctic is now filled, as the species is herein recorded from Île de la Possession. *C. purpureus* was observed on this island in the research station growing on disturbed ground. The plants are in fine fruiting condition and it is likely that this population represents a recent introduction. For example, all Antarctic populations of *C. purpureus* are sterile, except for a single population discovered on the volcanic



Deception Island after the 1970 eruption of the volcano (Ochyra *et al.*, 2008a). Likewise, the majority of subantarctic populations of this species are sterile and fruiting plants are known only from the former whaling base on South Georgia and Macquarie Island (Seppelt, 2004). *Ceratodon purpureus* is a not unexpected addition to the bryophyte flora of Îles Crozet, as they are still the least studied bryologically of all subantarctic islands and a number of species which could be expected in this archipelago have yet to be recorded. The moss flora of Îles Crozet currently consists of over 70 species, and more than 30 of these have been discovered during recent decades (e.g. Blockeel *et al.*, 2006a, 2007; Cano, 2008; Ellis *et al.*, 2013b, 2013d, 2014c; Ochyra *et al.*, 2015b).

15. *Chenia ruigtevleia* Hedd. & R.H.Zander

**Contributors:** J. G. Segarra-Moragues and F. Puche

**Spain:** Valencia, Serra, Porta-Coeli, near picnic area close to hospital, CV331 road, 39°39'33.86"N, 0°28'50.96"W, 213 m a.s.l., 19 February 2015, *leg.* J.G. Segarra Moragues & F. Puche *s.n.* (VAL-Brief 11.480).

The genus *Chenia* R.H.Zander (Pottiaceae) includes four species of which only *C. leptophylla* (Müll.Hal.) R.H.Zander was thought to occur in the northern hemisphere (Hedderson & Zander, 2008). In the course of the study of the bryological flora of the Sierra Calderona mountain range (eastern Iberian Peninsula, Spain), specimens of a moss belonging to the genus *Chenia* were found. The specimens differed most saliently from *C. leptophylla*, the single species of this genus known to the Mediterranean area (Ros *et al.*, 2013), by the presence of papillae on the cells of the lamina, and on the costa. In *C. leptophylla*, the lamina is smooth except for the cells at the distal margin (Hedderson & Zander, 2008). Accordingly, the specimens were identified as *C. ruigtevleia*, hitherto a South African endemic and the only species of *Chenia* with papillose laminal cells. The sporophyte of *C. ruigtevleia* is unknown, and similarly to *C. leptophylla*, it is thought to spread vegetatively, and probably by human agency, owing to its easily detachable leaves and abundant production of rhizoidal brood bodies (Hedderson & Zander, 2008). Our specimens were likewise sterile. Our finding represents the third record for the species and a novelty for the northern hemisphere. However, sharing the same vegetative reproductive mechanisms and ecological requirements as *C. leptophylla* and the South African populations of *C. ruigtevleia* suggests it has the potential ability, like *C. leptophylla*, to become a weedy species of shaded, humid ruderal habitats. Thus, it is likely that *C. ruigtevleia* is much more widespread than the present disjunct distribution indicates.

The plants were found growing on the soil of a small shaded ravine together with other annual or ruderal bryophytes such as *Acaulon dertosense* Casas, Sérgio,

Cros & Brugués, *Bryum dichotomum* Hedw., *Didymodon fallax* (Hedw.) R.H.Zander, *Lunularia cruciata* (L.) Lindb., *Microbryum floerkeanum* (F.Weber & D.Mohr) Schimp., and *M. starckeanum* (Hedw.) R.H.Zander.

16. *Clasmatocolea rigens* (Hook.f. & Taylor) J.J.Engel.

**Contributor:** B. Cykowska-Marzencka

**Bolivia:** Dept. Santa Cruz, prov. Caballero, East Cordillera, Siberia region near La Palma village, 17°49'12"S, 64°40'28"W, 2582 m a.s.l., on the ground in montane cloud forest, 12 December 2004, *leg.* A. Flakus *s.n.* (KRAM, LPB).

*Clasmatocolea rigens* is an amphiatlantic south-cool-temperate species, ranging along the western fringes of southern South America from central Chile to Tierra del Fuego, the Falkland Islands and subantarctic South Georgia (Engel, 1980; Hässel de Menéndez & Rubies, 2009), discovered on subantarctic islands in the South Indian Ocean Province, including Heard Island (Grolle, 2002; Váňa & Gremmen, 2005), Îles Kerguelen and Îles Crozet (Váňa & Gremmen, 2006), Marion Island (Ellis *et al.*, 2013a) and Prince Edward Island (Váňa *et al.*, 2009; Ochyra *et al.*, 2014a), and known from two small islands in the South Sandwich Islands archipelago in the maritime Antarctic (Bednarek-Ochyra *et al.*, 2000; Váňa *et al.*, 2014). This Bolivian record is now the northernmost locality for the species (see distribution map in Ochyra *et al.*, 2014a).

Many new bryophyte records for Bolivia have been recorded recently (Blockeel *et al.*, 2009a, 2010; Ellis *et al.*, 2012c, 2013a, 2014a, 2015b; Cykowska, 2014) and despite a summary by Churchill *et al.* (2009), the Bolivian bryoflora remains poorly understood and requires additional study. *Clasmatocolea rigens* is the second species of its genus to be recorded for Bolivia.

17. *Conocephalum salebrosum* Szweykowski, Buczkowska & Odrzykoski

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, for example: Eysturoy, Gjógv; along a small waterfall, E of the settlement, 62°19'N, 06°56'W, 19 June 2014. *Leg. & det.* K. Damsholt KD 14-081 (C).

New to the Faeroe Isles, but with many extant localities, this species was discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above). *Conocephalum salebrosum* was formerly included in *C. conicum* (L.) Underw. *s. l.* and seems to be widespread in the Faeroe Isles. The true *C. conicum* has not been confirmed from these isles.

**Contributors:** S. Poponessi and M. Aleffi

**Italy:** Sass Negher, province of Belluno, Veneto Region, near Serrai di Sottoguda Natural Reserve

and Marmolada Glacier. 46°25.743'N, 11°56.601'E, ca 1397 m a.s.l., in a moist gorge, 22 December 2015, *leg./det.* S. Poponessi *s.n.* (PERU).

This constitutes the first record of *Conocephalum salebrosum* for the Veneto Region. It was known hitherto from only three regions in Italy: Marche (Tacchi *et al.*, 2009), Friuli-Venezia Giulia (Privitera *et al.*, 2010) and Umbria (Poponessi *et al.*, 2014).

In the Mediterranean area, the species is quite rare, reported only from Bosnia-Herzegovina and France according to Ros *et al.* (2007). Only recently described by Szwejkowski *et al.* (2005) as a separate species from *Conocephalum conicum* (L.) Dumort., the new species is, in some areas of Europe, more common than *C. conicum* and it is impossible to know which species is meant by the latter name prior to 2005. *Conocephalum salebrosum* will certainly turn out to be more widespread in the Mediterranean area (Ros *et al.*, 2007).

The area in which our new discovery of the species was made was at the base of a rocky wall in a moist gorge, in coniferous forest. It is near a hiking path that goes up to the deserted villages of Vallier and Albe. The liverwort was growing with *Mnium spinosum* (Voit.) Schwägr.

The geographical range of *Conocephalum conicum* is probably restricted to Europe, whereas *C. salebrosum* has a wider Holarctic distribution. Both occur in moist, shaded and usually calcareous habitats. When growing together they exhibit only slight differences in microhabitat preferences and *C. salebrosum* appears to be more tolerant to xeric habitats than *C. conicum* (Odrzykoski, 1987, 1995).

18. *Cyrto-hypnum sharpii* (H.A.Crum) W.R.Buck & H.A.Crum

**Contributors:** E. Rodríguez-Quiel, C. Arrocha and A. Benitez

**Panamá:** Chiriquí, Cerro Punta, Sendero Los Quetzales, Parque Nacional Volcán Barú, 8°50'57.2"N, 82°31'26.5"W, 2351 m a.s.l., growing on bark of *Wercklea* Pittier & Standl. trees, associated with *Homaliodendron flabellatum* (Sm.) M.Fleisch, 30 October 2013, *leg.* E. Rodríguez-Quiel PMVB-b039 (UCH); buffer zone of PILA, 8°53'24.61"N, 82°36'34.63"W, 2156–2193 m a.s.l., epiphytic at base of trees in fragments of tropical montane forest, together with *Rhynchostegiopsis costaricensis* H.Rob. & D.G.Griffin, *Toloxis imponderosa* (Taylor) W.R.Buck, *Metzgeria albinea* Spruce, *Aerolindigia capillacea* (Hornsch.) M.Menzel, *Porotrichum longirostre* (Hook.) Mitt., *Prionodon densus* (Hedw.) Müll.Hal. and *Thuidium delicatulum* (Hedw.) Schimp., 5 March 2010, *leg.* E. Rodríguez-Quiel & D. Gómez 289 (UCH), *det.* C. Arrocha; same locality and associated with *Macromitrium scoparium* Mitt., *Porotrichum longirostre*, *Prionodon densus* and *Pterobryon densum* Hornsch., 17

May 2009, *leg.* E. Rodríguez-Quiel & D. Gómez 196 (UCH).

The genus *Cyrto-hypnum* is currently represented in Panamá by five species (Crosby, 1969; Breen & Reese, 1971), although there may be more in the country. *Cyrto-hypnum sharpii* occurs on the bases of trees at altitudes from 1100 to 3100 m a.s.l. and is known from México, Guatemala, Puerto Rico and the Dominican Republic (Sharp *et al.*, 1994; Holz *et al.*, 2002), and also from Bolivia (Fuentes & Churchill, 2005). This constitutes the first record of *C. sharpii* from Panamá.

19. *Diphyscium longifolium* D.G.Griffin

**Contributors:** E. L. dos Santos, D. M. Carmo and D. F. Peralta

**Brazil:** Paraná state, municipality of Morretes, Parque Estadual do Marumbi, 25°26'55"S, 48°54'54"W, trilha vermelha, caminho para ponta do tigre, Mata Atlântica com afloramentos rochosos, 1200 m a.s.l., 23 July 2014, *leg.* D. F. Peralta 15791 with D. M. Carmo, E. L. Santos & R. Ristow (SP).

This species was described and illustrated in a revision by Magombo (2003), and its distribution is reported as the tropical areas of America and Asia. It is cited for the Brazilian states of Amazonas, Rio de Janeiro, Rondônia and São Paulo, all tropical areas. The present record, from a south temperate region of Brazil, is the first report outside the tropical range of this species and means a considerable geographical extension.

20. *Ditrichum lineare* (Sw.) Lindb.

**Contributor:** Cs. Németh

**Hungary:** Borsod-Abaúj-Zemplén County, [7494.4] (Central European Mapping Scheme), Zemplén Mountains, on the hill Tegda-bérc ca 2 km northwest of the village of Füzérkomlós, on acidic soil between rhyolite rocks, ca 360 m a.s.l., 48°31'33.0"N, 21°25'36.1"E, 27 August 2015, *leg. & det.* Cs. Németh, *conf.* P. Erzberger, W. Schröder (Herb. Cs. Németh 7232). Associated bryophytes: *Diphyscium foliosum* (Hedw.) Mohr, *Diplophyllum obtusifolium* (Hook.) Dumort., *Scapania parvifolia* Warnst., *Lophozia longidens* (Lindb.) Macoun, and *L. excisa* (Dicks.) Dumort.

*Ditrichum lineare* is an inconspicuous moss growing on disturbed acidic soil, rarely producing sporophytes (capsules are, however, common in Scandinavia and eastern North America). It is distinguished from the closely related *D. pusillum* (Hedw.) Hampe, which grows in similar habitats, by the three-ranked, erect, more or less appressed leaves, 2–4 times as long as wide (longer in *D. pusillum*), with one or both margins recurved.

It has a predominantly northern distribution in Europe, becoming infrequent towards the south, where it grows mostly in mountain regions (Porley &

Blockeel, 2014). Among the countries surrounding Hungary, it has been found in Austria, Slovenia, Serbia, Romania (CR) and Slovakia (VU) (Hodgetts, 2015). Outside Europe, the species occurs in eastern Asia, Japan, and eastern North America south to Florida (Porley & Blockeel, 2014). *Ditrichum lineare* is missing from the latest checklist of Hungarian bryophytes (Papp *et al.*, 2010).

21. *Entosthodon hungaricus* (Boros) Loeske

**Contributors:** M. S. Sabovljević, N. Nikolić and A. D. Sabovljević

**Montenegro:** Salt collecting area of the salt factory “Bajo Sekulić”, on soil, by the trails that separate the salt basin from the freshwater wetlands of a bird protection area, 41.920345°N 19.273299°E, 02 June 2015. *leg./det.* Marko S. Sabovljević, Nada Nikolić & Aneta D. Sabovljević *s.n.* (BEOU bryophyte collections *s/n*).

*Entosthodon hungaricus* (syn. *Funaria hungarica* Boros) was described from continental salt areas in Hungary (Boros, 1924). It was long considered a European endemic with a scattered distribution, until it was later found in countries outside Europe. *Entosthodon hungaricus* was considered a typical species of the central European steppes, with an Aral-Caspian distribution (Pisarenko *et al.*, 2001). However, in Europe it has quite a strange distribution, extending from the Mediterranean to central-eastern Europe, similar to some other species often considered as xerothermic (Pócs *et al.*, 2004). It has been reported from central-eastern European localities with suitable continental dry saline areas in Austria, Germany, Hungary, Romania, Serbia, Slovakia and the Ukraine (Pisarenko *et al.*, 2001), and also in many peri-Mediterranean territories such as Algeria, the Canary Islands, Greece, Israel, Malta, Morocco, Sicily and Spain (Ros *et al.*, 2013). Therefore it is not surprising that it should also occur in suitable habitats in Montenegro during wet spring periods. With reference to Sabovljević *et al.* (2008) and Ros *et al.* (2013), it is a new moss in the bryophyte flora of Montenegro.

Despite its widespread European distribution, populations are scattered and its range is highly discontinuous and fragmented. The ephemeral habit, specialized ecology and habitat type (on gypsum and saline substrates) of the species have contributed to its classification under different categories of threat. Thus, it has been classed as rare and threatened in Europe (ECCB, 1995). Additionally, it has been included in the Red Lists from several European countries (Soltes *et al.*, 2002; Sabovljević *et al.*, 2004; Sauer & Ahrens, 2005; Sérgio *et al.*, 2006; Papp, 2008) and therefore it has been studied in bryophyte conservation initiatives (Sabovljević *et al.*, 2012).

22. *Eucladium verticillatum* (With.) Bruch & Schimp.

**Contributor:** I. Jukonienė

**Lithuania:** Elektrėnai municipality, about 300 m SW from the village Kragžliai, by the River Bražuolė, in the crevice of moist shaded limestone, 54°45'14.7"N, 24°56'53.09"E, 13 September 2006, *leg. et det.* I. Jukonienė B15090 (BILAS).

*Eucladium verticillatum* is a basiphytic species preferring moist or wet basic rocks (Dierßen, 2001). In Lithuania, a very small population of a few individuals was recorded in a shallow crevice of limestone rock exposed by the river. The plants were sterile. The species was recognized by their leaves, being dentate in the border zone between the hyaline leaf base and green lamina.

*Eucladium verticillatum* is a circumpolar species distributed from tropical to southern boreal zones (Dierßen, 2001). It is quite widely distributed in western, central and southern Europe. Nevertheless, in many northern or eastern European regions, e.g. Iceland, Finland, Northern Russia and Belarus, it has not been recorded (Hodgetts, 2015). The most north-eastern records of the species are from Latvia and Estonia. In both Baltic countries, *E. verticillatum* is Red Listed. In Latvia, the species is rare (Abolina, 2006), while in Estonia it is thought to be extinct (Vellak *et al.*, 2009). Owing to the rarity of suitable substrata (calcareous outcrops) in Lithuania, the species is likely to be very rare in the country.

23. *Fissidens crispus* Mont.

**Contributor:** P. Erzberger

**Hungary:** Pest County (8079.2, Central European Mapping Scheme), Börzsöny Mountains, south of the settlement of Kemence-Királyháza, on moist rocks at the bank of the stream Dosnya-patak, ca 360–700 m a.s.l., in an area outlined by approximately 47°58'–59'N, 18°55'–56'E, 30 June 1956, *leg. & det.* L. Vajda *s.n.* (as *Fissidens pusillus*, rev. P. Erzberger, 9 February 2016) (BP 49725/b). Associated bryophyte: *Thamnobryum alopecurum* (Hedw.) Gangulee; Pest County, [8079.2] Börzsöny Mts, south of the settlement of Kemence-Királyháza, in the valley of the stream Rózsás-patak, in crevices of (andesitic) rock, ca 450–700 m a.s.l., in an area outlined by approximately 47°58'–59'N, 18°57'–58'E, 3 June 1957, *leg. & det.* L. Vajda *s.n.* (as *Fissidens mildeanus*, rev. P. Erzberger, 8 February 2016) (BP 58911).

The original specimen labels read: “Herbarium Musei Hist. Nat. Hung. Budapest Flora Hungarica Fissidens pusillus Wils. Comit. Nógrád. In rupibus humidis ad margines rivi Dosnyapatak pr. Királyháza, mtes Börzsöny 30. VI. 1956 Leg.: Det.: L. Vajda (BP 49725/b); and “Herbarium Musei Hist. Nat. Hung. Budapest Flora Hungarica Fissidens Mildeanus Schpr. c.fr. Comit. Nógrád. In rupium fissuris vallis rivi Rózsapatak, prope



Királyháza, montes Börzsöny 3/VI 1957 Leg. et det. L. Vajda (BP 58911)”.

The two stream valleys where *F. crispus* was collected are tributaries of the stream Kemence-patak in the central caldera of the volcanic Börzsöny Mountains, which represent a hot spot for *Fissidens* Hedw. diversity in Hungary. Apart from common species such as *F. pusillus* (Wilson) Milde, *F. bryoides* Hedw., *F. viridulus* (Sw. ex anon.) Wahlenb., *F. exilis* Hedw., *F. dubius* P. Beauv., *F. crassipes* Wilson ex Bruch & Schimp., and *F. taxifolius* Hedw., and some less common ones like *F. arnoldii* R. Ruthe (leg. J. Nagy, 2015), *F. bambergeri* Schimp., and *F. incurvus* Starke ex Röhl, two extremely rare species of *Fissidens* were collected near these streams in Börzsöny Mountains. *Fissidens curvatus* Hornsch. (*F. algarvicus* Solms) was found at the bank of the Kemence-patak in 1955 by L. Vajda. The banks of the Dosnya-patak are the only locality of *F. exiguus* Sull., collected by L. Vajda in 1958 and originally named *F. košaninii* Latzel, but later revised to *F. exiguus* by Pilous (Vajda, 1958, 1975). As neither species was found again at their respective collection sites, in spite of several searches, it will be a challenge for future field work to refind *F. crispus*.

*Fissidens crispus* (syn. *F. limbatus* Sull.) is characterized by small laminal cells, 6–10 µm wide, strongly bulging on both faces and about twice as high as wide in transverse section, arranged in ± discernible rows (Pursell, 2007). The small leaf cells of the specimen BP 58911 had already been noted by the collector, L. Vajda, because he included a note reading “Levélsajtjai csak 8–10µ nagyok. Középér és erős szegély a hegy előtt elenyészik, levélszárnya a levéltövétől ér. Felső levelek tövében paraphysisek vannak” (laminal cells only 8–10 µm. Costa and strong border vanish below apex. Dorsal lamina extends to leaf insertion. At the base of upper leaves there are paraphyses). Among European congeners similarly small leaf cells are found in *F. ovatifolius* R. Ruthe, however, the leaves of that species are broadly ovate-elliptic to oblong, <2.5 times as long as wide, with the dorsal lamina not reaching the leaf base, whereas in *F. crispus* the leaves are oblong to ovate-lanceolate, >2.5 times as long as wide, and the dorsal lamina usually extends to leaf insertion (Guerra & Ederra, 2015).

In Europe, *F. crispus* is found in Mediterranean and Atlantic countries, but also in the Ukraine, Crimea, Romania, and surrounding the Black Sea. The species occurs in all countries adjacent to Hungary except Austria (Hodgetts, 2015). Its presence in Hungary could therefore be expected. Outside Europe, *F. crispus* occurs in western Asia and Macaronesia (Smith, 2004), south-western North America, Central and South America (Pursell, 1994).

*F. crispus* is missing from the latest checklist of Hungarian bryophytes (Papp et al., 2010).

#### 24. *Fissidens rufulus* Bruch & Schimp.

**Contributors:** S. Poponessi, M. Aleffi and R. Venanzoni

**Italy:** Umbria Region, Province of Terni. “Parco Fluviale del Nera” Regional Park, Marmore Waterfall, “Petrifying springs with tufa formation (*Cratoneurion*)”, 42°33.212'N, 12°42.802'E, ca 307 m a.s.l., on limestone at or below the water level, 13 November 2015, leg./det. S. Poponessi s.n. (PERU).

This record is in a Site of Community Importance (SCI) IT5220017 and a Special Area of Conservation (SAC) of the Natura 2000 EU-wide network due to the presence of the 72.20\* “Petrifying springs with tufa formation (*Cratoneurion*)” Annex I priority habitat (<http://vnr.unipg.it/habitat/>).

During a bryological survey of the Marmore Waterfall, the species *Fissidens rufulus* was identified and constitutes the first record for the Umbria Region. In Italy, according to Aleffi et al. (2008), it was hitherto known from only four regions: Friuli-Venezia Giulia (Tacchi, 2013), Emilia Romagna (Zangheri, 1959), Marche (Cortini Pedrotti, 1970; Aleffi & Tacchi, 1998) and Sardinia (Cortini Pedrotti & Troiano, 1985).

Nearly endemic to Europe, *F. rufulus* is an uncommon plant, listed as Nationally Scarce in Britain, Endangered in Switzerland and Luxembourg, Vulnerable in Austria, Near Threatened in the Czech Republic, Data Deficient in Sweden, Germany and Spain, and ‘very rare and susceptible’ in the Netherlands. It is also known from France, Croatia, Greece and Russia (Lockhart et al., 2012). In Europe, it is assigned to the Temperate floristic element (Smith, 2004).

*Fissidens rufulus*, in common with all congeners, has its leaves arranged in two opposing ranks, each leaf with a sheathing lamina and a strong costa. Like some of the other aquatic species of *Fissidens*, the leaves have a strongly thickened border, composed of several layers of long, thin cells. The border does not, however, join with the costa at the leaf apex. It can usually be distinguished from *F. crassipes* by the smaller leaf cells (6–10 µm), and fertile material has shorter archegonia and peristome teeth (Lockhart et al., 2012).

*Fissidens rufulus* was abundant in the area in which it was discovered, colonizing intermittently submerged limestone rocks. In the Marmore Waterfall site, the gorge and waterfall creates a very special microclimate that allowed the establishment of *F. rufulus*.

#### 25. *Gymnomitrium apiculatum* (Schiffn.) Müll.Frib.

**Contributor:** K. Damsholt.

**Denmark:** The Faeroe Isles: Eysturoy, Ljósa, SE of Eiði, 62°16'N, 07°01'W, on a rock at 600 m a.s.l., 12



August 1961, *leg.* Bot. Invest. *s.n.*, *det.* K. Damsholt (C).

New to the Faeroe Isles, the liverwort was part of a specimen stored in C under *Marsupella sparsifolia* (Lindb.) Dumort. (corr. to *M. emarginata* (Ehrh.) Dumort.), but was found to be *Gymnomitrium apiculatum*.

26. *Gymnomitrium verrucosum* W.E. Nicholson

**Contributors:** Yu. S. Mamontov and A. D. Potemkin

**Japan:** Honshu Island, Nagano Prefecture, on ridge of Yatsu Mountains, (ca 35°59'N, 138°23'E), 2700 m a.s.l., on andesite rocks, 11 August 1952, *leg.* D. Shimizu, *det.* S. Hattori as *Marsupella commutata* (Limpr.) Bernet (No. 432 of *Hepaticae Japonicae*, Ser. 9, 1958; in herb. LE).

*Gymnomitrium verrucosum* was known from the type locality in NW Yunnan (Nicholson *et al.*, 1930; Piippo, 1990), which is more southerly (about 27° 52'N) and from a higher elevation (3800–4050 m a.s.l.) than this Japanese record. The collection from NW Yunnan was made from mica schist (“Glimmerschieferfelsen”), whereas in Japan the species was collected from andesite. The present record resulted from an investigation of the *Hepaticae Japonicae* exsiccatae already studied by many bryologists. This indicates how easy it is to overlook *G. verrucosum*, as its characteristic, but often indistinct hyaline papillae may only be distinguished along leaf margins or in leaf cross-sections. New data on the distribution of this species are expected.

27. *Hymenoloma dryptodontoides* (Müll.Hal.) Ochyra

**Contributors:** H. Bednarek-Ochyra and N. J. M. Gremmen

**Heard Island, eastern part:** (1) E slope of Scarlet Hill, on red consolidated scoriae and lava, exposed, 53°06'18"S, 73°38'23"E, 340 m a.s.l., large group on sandy deposits between rocks, associated with *Bucklandiella pachydietyon* (Cardot) Bednarek-Ochyra & Ochyra, 27 January 2001, *leg.* N. J. M. Gremmen H-0995A (KRAM); (2) South Barrier, 53° 08'40"S, 73°35'24"E, 900 m a.s.l., 22 January 2001, associated with *Bucklandiella pachydietyon*, *leg.* Paul Scott for N. J. M. Gremmen H-0848A (KRAM); **western part:** (3) Wharf Point, Atlas Cove, at 53° 00'50"S, 73°23'53"E, 25 m a.s.l., small cushions on coastal lava rocks, 5 February 2001, *leg.* N. J. M. Gremmen H-1263 (KRAM).

*Hymenoloma dryptodontoides* is a subantarctic species endemic to the Kerguelen Biogeographical Province. For a long time it remained a poorly understood and forgotten species known only from the type collection from Îles Kerguelen. It was subsequently discovered on Prince Edward Island in the Prince Edward Islands archipelago and herein it is recorded for the first time from Heard Island. This is a small

subantarctic island situated about 550 km to the southeast of Îles Kerguelen, with three quarters of its surface being at present covered with ice. This implies that glaciers probably extended beyond the present coastline during the Last Glacial Maximum and, additionally, the island has been affected during the Quaternary by geomorphological changes owing to volcanism and tectonics (Hall, 2004). Although the impact of these changes on the island's flora and vegetation is difficult to evaluate, it is rather improbable that plants could have survived throughout the Pleistocene glaciations in ice-free areas as it has happened in other periantarctic and subantarctic islands (Birkenmajer *et al.*, 1985; Van der Putten *et al.*, 2004, 2009, 2010). Much more credible is the hypothesis that the present-day flora was established via long distance dispersal. The moss flora of Heard Island is the poorest one of all subantarctic islands and it consists of only about 55 species (Selkirk *et al.*, 2008; Blockeel *et al.*, 2008; Ellis *et al.*, 2012a, 2012b, 2013a, 2013b, 2016a).

28. *Isopterygiopsis mulleriana* (Schimp.) Z.Iwats.

**Contributors:** C. Cacciatori and C. Sérgio

**Portugal:** Serra de Sintra, Tapada do Mouco, 38° 46'53"N, 9°24'10"W, 395 m a.s.l., on soil in a heavily managed woodland, 23 October 2014, *leg.* Cecilia Cacciatori *s.n.* (LISU262593).

During surveys in 2014 in the woodlands of the Serra de Sintra, central Portugal, a specimen of *Isopterygiopsis mulleriana* was discovered in an area undergoing heavy forest management. This specimen is the first record of this species for Portugal. Hitherto, the only species of the genus *Isopterygiopsis* Z.Iwats. recorded in Portugal was *I. pulchella* (Hedw.) Z.Iwats., although with no new collections since 1965 (Allorge, 1974).

*Isopterygiopsis mulleriana* has a widespread distribution through Europe and appears to occur mainly in temperate and Mediterranean regions, with some scattered records in Norway and Sweden (Frey *et al.*, 2006).

The specimen collected in the Serra de Sintra was growing on soil in an exposed situation, at the edge of a patch of forest made up mainly by *Acacia melanoxylon* R.Br. and *Pinus pinaster* Aiton. The ground close to the spot where the specimen was discovered was covered by wood shavings put there as part of management operations, but the species seems to be quite tolerant of human disturbance.

The discovery of this species in the Serra de Sintra confirms the importance of this region as a bryophyte hotspot (Cacciatori *et al.*, 2015), not only for Macaronesian species spreading towards mainland Europe, but also for species whose distributional area is expanding from continental Europe towards its western edge.

29. *Jungermannia sphaerocarpa* Hook.**Contributor:** K. Damsholt**Denmark:** Faeroe Isles, Eysturoy, Slætтарatindur, 62°17'N, 07°00'W, 7 July 1973. *leg.* K. Damsholt 73-118 (C), *det.* J. Vána & K. Damsholt.New to the Faeroe Isles. This specimen was collected in 1973, but stored under *Solenostoma hyalinum* (Lyell) Mitt. in the Copenhagen herbarium (C).30. *Lophozia debiliformis* R.M.Schust. & Damsh.**Contributor:** K. Damsholt**Denmark:** Faeroe Isles. Eysturoy, Slætтарatindur, 62°17'N, 07°00'W, 22 June 2015, *leg.* T. Hallingbäck & K. Damsholt KD 15-012 (C); KD 15-015 (C), *det.* K. Damsholt; Eysturoy, Slætтарatindur, 62°17'N, 07°00'W, 7 July 1973, *leg.* & *det.* K. Damsholt KD 73-120 (C).New to the Faeroe Isles. Discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above). *Lophozia debiliformis* was described by Schuster and Damsholt (1987) from material collected in south Greenland and illustrated in detail by Schuster (1988). It is an Arctic-alpine species with a wide distribution in the Scandinavian mountains, but has been considered by some authors to fall within the boundaries of *L. sudetica* (Huebener) Grolle. It seems to be widespread also in Alaska and northern Russia. It has now been collected at eight localities in the Faeroe Isles.31. *Lophozia decolorans* (Limpr.) Steph.**Contributor:** K. Damsholt**Greenland:** Along the air-strip, Mestersvig, Kong Oscars fjord, NE Greenland 72°12'N, 23°50'W, August 2014, *leg.* T. Ebbensgaard s.n. (C).*Lophozia decolorans* is new to Greenland. Only a few plants were found in a mixed collection with other bryophytes and lichens. The discovery of this leafy liverwort along with the thalloid *Bucegia romana* Radian in the same part of NE Greenland suggests the possibility that they could be additional remnants of pre- or inter-glacial times, not previously found in Greenland (Damsholt, 2013). *Lophozia decolorans* has only been found once in western North America (Schuster, 1995), but is known from southern Norway e.g. from the isolated mountain, Tronden, on the south-facing alpine side, below the supposedly glaciated summit area.The flora of NE-Greenland was thoroughly investigated at the beginning of the 1930s and the vascular plant results were published by Gelting (1934). An important observation was “if one studies the Greenland plants and their sometimes very peculiar occurrence in enclaves, the idea of the interglacial survivors suggests itself with a force that carries conviction.” The interpretation of the presence of the Sword moss, *Bryoxiphium norvegicum* (Brid.) Mitt.,

in North America (Steere, 1937), was based on its occurrence in NE Greenland (Breien, 1934; Holmen, 1971) and the possibility suggested of its having survived in the ‘driftless-area’ of Wisconsin and later dispersed from there, as well as independent survival in southern Iceland, as well as in NE Greenland.

32. *Lunularia cruciata* (L.) Lindb.**Contributors:** K. Damsholt and T. Hallingbäck**Denmark:** Faeroe Isles, Streymoy, Tórshavn, Vidarlundin, at Hanare á (rivulet), 62°00'N, 06°46'W, on soil below large stones at a bend of the rivulet, 27 June 2015, *leg.* T. Hallingbäck & K. Damsholt KD 15-122 (C), *det.* K. Damsholt.*Lunularia cruciata* is new to the Faeroe Isles. Discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above). This appears to be the northernmost occurrence known for this species. Since it is a species benefiting from a warmer climate, it is most probably introduced by man, taking advantage of the mild winters of the Faeroe Isles.33. *Mannia triandra* (Scop.) Grolle**Contributors:** E. A. Borovichev, A. A. Vilnet and N. A. Konstantinova**Russian Federation:** South Siberia, Kemerovo Province, Kuznetskiy Alatau State Nature Reserve, 54°48'N, 88°27'E, 612 m a.s.l., very dry rocks on right bank of the Kiya River, in deep and narrow crack, on fine soil, 3 June 2000, *leg.* N. Konstantinova #82-3-00 (KPABG 106134); *ibidem*, in deep and narrow crack on soil, 3 June 2000, *leg.* N. Konstantinova #82-1-00 (KPABG 106132); *ibidem*, on fine-soil in niche under plant cover, 3 June 2000, *leg.* N. Konstantinova #82-2-00 (KPABG 106133).All collections cited above were previously identified as *Mannia gracilis* (F.Weber) Schill & D.G.Long [= *Asterella gracilis* (F.Weber) Underw.], but while sequencing plants from these specimens we found them to be *Mannia triandra* (Borovichev *et al.*, 2015). *Mannia triandra* is often confused with other species of Cleveaceae and Aytoniaceae. The species is characterized by (1) a very lacunose upper surface of the thallus (usually becoming so with age); (2) thallus margins usually without secondary pigmentation; (3) thalline air-chambers empty, without free secondary filaments; (4) antheridia aggregated in the circular disc.This is the first report of *Mannia triandra* for Kemerovo Province. The species is predominately montane and generally distributed in calcareous areas in the mountains of North America, Europe and Asia (Schuster, 1992; Söderström *et al.*, 2002; Schill, 2006). For a long time, *M. triandra* was

known in Russian Asia from a single locality in the lower Indigirka River, Chukotka (Konstantinova *et al.*, 2009), and recently the species was recorded from the Krasnoyarsk Territory (Putorana Plateau) (Schill, 2006).

34. *Marsupella spiniloba* R.M.Schust. & Damsh.

**Contributor:** K. Damsholt

**Denmark:** Faeroe Isles, Eysturoy, Slættaratindur, 62°17'N, 07°00'W, on the southern slopes, where it grew together with: *Anthelia juratzkana* (Limpr.) Trev., *Marsupella emarginata* (Ehrh.) Dumort., *Nardia scalaris* S.F.Gray, *Lophozia ventricosa* (Dicks.) Dumort., 22 June 2015, *leg. & det.* K. Damsholt *KD 15-014* (C).

*Marsupella spiniloba* is new to the Faeroe Isles. Discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above). Slættaratindur is the highest mountain in the Faeroe Isles.

35. *Nyholmiella gymnostoma* (Bruch *ex* Brid.) Holmen & E.Warncke

**Contributors:** T. Kiebacher and M. Lüth

**Greece:** Epirus, Ioannina, Metsovo, in the centre of the town near the Church of Aghios Georgios, 39° 46'20.1"N 21°10'56.6"E, 1150 m a.s.l., solitary tree at the border of a street, epiphytic on stem bark of *Juglans regia* L., 10 June 2015, *leg.* T. Kiebacher & M. Lüth (priv. herb. T. Kiebacher, priv. herb. M. Lüth).

*Nyholmiella gymnostoma* is most common in boreal Europe (Hill & Preston, 1998; Lara & Estébanez, 2014) while in central and eastern Europe the species is rare (Nebel & Philippi, 2001). The few records from Mediterranean countries were all collected during the last 15 years and include Albania, Bulgaria, France, Italy, Slovenia and Turkey (Lara *et al.*, 2004; Sabovljević *et al.*, 2008; Ellis *et al.*, 2012b, as *Orthotrichum gymnostomum* Brid.; Ros *et al.*, 2013).

The most frequent phorophytes of the species are poplar trees (*Populus* L. sp.) (Lara *et al.*, 2004). During a one week stay in the Ioannina district of Epirus province we searched for *N. gymnostoma*, checking several poplar trees at different sites. The locality mentioned above was the only place where we found a few cushions of the species on a single trunk of a poplar tree.

The characteristically involute leaf margins make it easy to separate *N. gymnostoma* from the only congeneric species *N. obtusifolia* which has a panpalaearctic distribution (Lara & Estébanez, 2014).

36. *Odontoschisma sphagni* (Dicks.) Dumort.

**Contributors:** B. Cykowska-Marzencka, M. Węgrzyn and P. Wietrzyk

**Svalbard:** NW Spitsbergen, the Oscar II Land, Kaffiøyra, Irenebreen glacier marginal zone: (1) 78° 39'39.11"N, 12°3'5.17"E, 120 m a.s.l., on immature soil on glacier moraine, 15 July 2012, *leg.* M. Węgrzyn *s.n.* (KRAM); (2) same locality, 78° 39'35.35"N, 12°2'33.73"E, 110 m a.s.l., on immature soil on glacier moraine, 20 July 2012, *leg.* M. Węgrzyn *s.n.* (KRAM); (3) same locality, 78° 39'33.57"N, 12°2'18.43"E, 110 m a.s.l., on immature soil on glacier moraine, 21 July 2012, *leg.* M. Węgrzyn *s.n.* (KRAM).

*Odontoschisma sphagni* was found during work on the phytosociology and succession of glacier moraine communities of Oscar II Land (Węgrzyn *et al.*, 2013; Chrapusta *et al.*, 2015; Węgrzyn & Wietrzyk, 2015; Wietrzyk *et al.*, 2016). The species was previously reported from Svalbard by Summerhayes & Elton (1923) but Frisvoll & Elvebakk (1996) rejected the record and the species was omitted from the island's bryophyte checklist (Hodgetts, 2015). *Odontoschisma sphagni* is known to occur throughout the greater part of Europe: from Iceland, Scandinavia (western Norway, south-western Sweden, Denmark) and the Faroes, south through Britain and Ireland, to central and western Europe (Germany, Czech Republic, Slovakia, Poland, Austria, Switzerland, Belgium, Netherlands, France, Italy, Corsica, Andorra, Spain, Portugal, also from Madeira and the Azores) to south European Bulgaria, Romania, Slovenia, and to the east to Lithuania, Latvia and Russia from Kaliningrad (Damsholt, 2002; Osyczka *et al.*, 2007; Cykowska-Marzencka, 2013; Gradstein & Ilkiu-Borges, 2015). Outside Europe, the species has been confirmed from eastern and western North America (Canada and USA), the tropical part of Mexico, the Greater Antilles (Cuba, Jamaica) and Bermuda (Schuster, 1974; Gradstein & Ilkiu-Borges, 2015).

Two other species of *Odontoschisma*: *O. elongatum* (Lindb.) A.Evans. and *O. macounii* (Austin) Underw., are known from Svalbard, but these very clearly differ from *O. sphagni*. Only *O. sphagni* has an inflexed leaf margin with 1–2 rows of radially elongate thick-walled cells, forming an indistinct border. With the discovery of *O. sphagni* the liverwort flora of Svalbard has expanded to 103 species (Hodgetts, 2015).

37. *Orthotrichum pamiricum* Plášek & Sawicki

**Contributors:** V. Plášek, Z. Skoupá, M. Nobis and H. Bednarek-Ochyra

**China:** NW Xinjiang Province, NW Borohoro Shan Mountains (N part of Tien Shan), 48 km SW of Wenquan town, Tomur Peak National Nature Reserve, GPS coordinates (WGS 84): 44°46'54.96"N, 80°24'01.27"E, 2267 m a.s.l., 24 August 2014, *leg.* M. Sulayman *s.n.* (Herbarium of Xinjiang University #24462, duplicate in PE), *det.* V. Plášek.



A total of 33 species and two varieties of the broadly understood genus *Orthotrichum* Hedw. have so far been reported from China (Lewinsky-Haapasaaari & Long, 1996; Yu *et al.*, 2011; Ellis *et al.*, 2014c). Ten taxa of *Orthotrichum* have been recorded from Xinjiang Province in the north-west part of China (Yu *et al.*, 2011) and herein one more species is added to the moss flora of this province. The specimen cited above was collected by Mamtimin Sulayman in 2014 and it was identified by Q. H. Wang as *Orthotrichum crenulatum* Mitt. Subsequent re-examination of this specimen by the senior author during his visit to the Chinese National Herbarium in Beijing (PE) in 2015 revealed that it actually represented *O. pamiricum*, an epiphytic species which is a new addition to the moss flora of China. This species was only recently described from the western foothills of the Pamir Mountains in Central Asia where it was collected at several sites on the Tajik–Afghan border (Plášek *et al.*, 2014).

Based on a superficial view of the cushions, *Orthotrichum pamiricum* could be confused with Asian populations of *Nyholmiella obtusifolia* (Brid.) Holmen & E. Warncke. Although the two species share ovate-obtuse leaves, *O. pamiricum* differs in having immersed stomata and an endostome of 16 segments. *Orthotrichum pamiricum* is similar to *O. crenulatum* in gametophyte characters, including an obtuse and crenulate leaf apex, but it can be easily distinguished from the latter mainly by having 16 papillate endostome segments. Moreover, it has stomata arranged in two rows in the upper part of the urn, whereas in *O. crenulatum* they are concentrated in the median part. In addition, a prostome was observed in *O. pamiricum*, but it is absent from *O. crenulatum*. At the base of the endostome segments in *O. pamiricum* some short rudimentary appendages occasionally occur, but this should not lead to confusion with *O. moravicum* Plášek & Sawicki (Plášek *et al.*, 2009) which was also recently reported from Central Asia (Ellis *et al.*, 2012c).

38. *Oxyrrhynchium clinocarpum* (Taylor) Broth.

**Contributors:** W. R. Buck, J. Enroth and E. Fuertes

**Uruguay:** Maldonado Department, Arroyo Zanja Honda, en la ruta de Montevideo a Rocha, km 118, 34°46'S 55°20'W, 30 m a.s.l., 3 July 2008, *leg.* E. Fuertes *s.n.* (MACB 108259, H, NY).

Plants slender, from 5 to 15 cm long, stems procumbent or arcuate and distally irregularly branched; branches straight, spreading or erect when moist, complanate or subcomplanate. Leaves patent to spreading when moist; stem leaves somewhat wider and larger than branch leaves, but of the same shape. Stem leaves patent to spreading, ovate to ovate triangular, acuminate, not complanate, 0.60–0.80 × 0.30–0.40 mm; lamina cells rhomboidal or narrowly

rhomboidal, ± similar throughout; alar cells conspicuous, quadrate. Branch leaves ovate-lanceolate, apex acuminate, base not decurrent, margin plane, sharply denticulate, nerve extending 1/2–4/5 way up leaf. Autoecious or synoecious. Seta 20–25 mm long, papillose; capsule obloid to ovate, cernuous, 2.0 × 0.5–0.6 mm; lid with long subulate and curved beak. (Illustrations: Brotherus 1909, Figure 815: A–F.)

*Oxyrrhynchium clinocarpum* grows as dispersed green mats, on muddy ground and tree bases by streams in evergreen forests. It is a mesophilous, hygrophilous and subnitrophilous species. Distribution: apparently widespread in the Neotropics, known from Guyana, Venezuela, Ecuador and Brazil (Brotherus, 1909) and Uruguay (this report).

39. *Oxyrrhynchium hians* (Hedw.) Loeske

**Contributors:** R. Gupta, A. K. Asthana and V. J. Singh

**India:** Central India, Madhya Pradesh, Chhindwara, Pachmarhi Biosphere Reserve, near Chota Mahadev, 22°21'10"N, 78°39'55"E, on soil covered rock, ca 950 m, a.s.l., 19 December 1993, *leg.* V. Nath & A. K. Asthanan *s.n.* (LWG205707); near Jambu Dweep, 22°46'N, 78°43'E, on rocks, ca 792 m a.s.l., 29 November 2006, *leg.* V. Sahu & V. Awasthi *s.n.* (LWG227645).

*Oxyrrhynchium hians* was previously reported from the Khasi hills in the Eastern Himalaya (Gangulee 1978–80) and Simla in the Western Himalaya (Lal, 2005). The present report therefore extends the range of this moss to central India.

The plants were characterized by a prostrate, profusely branched yellowish-green, glossy habit. The complanate leaves were slightly heterophyllous, oblong-ovate, gradually acute to acuminate, ca 1.3 × 0.5 mm, with a slightly dentate margin, and the costa reaching three quarters of the leaf length.

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

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, Eysturoy, Gjógv, along Dalsá, 62°19'N, 06°56'W, along small streams on moist soil, 21 June 2015, *leg.* K. Damsholt & T. Hallingbäck *KD 15-007* (C), *det.* K. Damsholt; Streymoy, Norðradalur, Dalággjogv, 62°02'N, 06°55'W, 20 June 2014, *leg.* K. Damsholt & T. Hallingbäck *KD 14-104* (C), *KD 15-095* (C), *det.* K. Damsholt.

*Pellia endiviifolia* was discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above). *Pellia endiviifolia* is new to the Faeroe Isles and recorded from 3 sites. It can be recognized by its solely ventral, more than 2-celled apical hairs.

41. *Plagiochasma appendiculatum* Lehm. & Lindenb.

**Contributor:** J. A. W. Nieuwkoop



**Spain:** Mallorca, Serra de Tramuntana, Sa Calobra, Torrent de Pareis, 0.5–2 km from the coast, 39° 51'02"N 2°48'36"E, 20–100 m a.s.l., on rockwalls, boulders and loamy banks in the riverbed, 20 August 2015, *leg.* J. A. W. Nieuwkoop 2015141 (priv. herb. J. A. W. Nieuwkoop).

*Plagiochasma appendiculatum* was reported new to Europe by Cros *et al.* (2005). They reported the species from the Torrent des Guix and the Gorg dels Ferrerets on Mallorca. Here the plants grew in a karstic canyon between 280 and 320 m a.s.l. in two small populations.

In August 2005 the species was discovered in the big canyon of the Torrent de Pareis, close to Sa Calobra, a popular tourist destination. The plants were seen between 500 and 2000 m from the coast in well-developed populations in about twenty places, occurring in large patches up to 0.5 m diam. Here *Plagiochasma appendiculatum* occurred on a thin layer of loam on limestone rock walls and boulders in the riverbed, as well as on loamy banks along the river. In summer the river is dried up, but in winter huge amounts of water pass through the canyon. *P. appendiculatum* often grows close to, or even together with, *P. rupestre* (J.R.Forst. & G.Forst.) Steph. and sometimes thalli of the two species are mixed. They are easily separated by colour: bluish green for *P. rupestre* and bright green for *P. appendiculatum*. Apart from colour, the appendages on the scales in the latter enables an easy discrimination. Accompanying species were the hygrophilous, calcicole *Homalia lusitanica* Schimp., *Eucladium verticillatum* (With.) Bruch & Schimp., *Gymnostomum calcareum* Nees & Hornsch., *Pellia endiviifolia* (Dicks.) Dumort., *Conocephalum conicum* (L.) Underw., *Lunularia cruciata* (L.) Lindb., and *Scorpiurium deflexifolium* (Solms) M.Fleisch. & Loeske as well as *Fumariella curviseta* (Schwägr.) Sérgio and the fern *Adiantum capillus-veneris* (L.) Hook.

The new location confirms the presence of this liverwort in Europe and judging by the many and thriving populations, some of them with sporophytes, it seems to be doing well.

#### 42. *Polytrichum piliferum* Hedw.

**Contributors:** H. Bednarek-Ochyra and I. Parnikoza

**Antarctica, Argentine Islands:** Galindez Island, 30 m inland from Crystal Bay in the southern part of the extensive moss peat bank dominated by *Polytrichum strictum* Brid., on slope with NW exposition, 14 m a.s.l., 65°14.886'S, 64°15.060'W, in skua nest in tufts of *P. strictum*, 28 January 2014, *leg.* I. Parnikoza *s.n.* (KRAM).

The discovery of *Polytrichum piliferum* has been expected in the Argentine Islands, because there seems to be no phytogeographical or other reason why it should not appear in this archipelago, as it does in adjacent unglaciated areas of the western

coast of the Antarctic Peninsula and its offshore islands (Ochyra *et al.*, 2008a). The species is widely distributed in the northern maritime Antarctic, but becomes increasingly rare and widely scattered towards the south. Likewise, it is frequent on subantarctic South Georgia (Greene, 1973), but very rare and localized on the islands of the Kerguelen Biogeographical Province (including the Prince Edward Islands (van Zanten, 1971) and Îles Kerguelen (Blockeel *et al.*, 2009b)), and absent from Macquarie Island (Seppelt, 2004). The present collection of *P. piliferum* from the Argentine Islands was made in a nest of the south-polar skua during a study of nest building material (Parnikoza *et al.*, 2012). Along with the recent discoveries of *Leptobryum pyriforme* (Hedw.) Wilson (Blockeel *et al.*, 2006b), *Pohlia drummondii* (Müll.Hal.) A.L.Andrews (Ellis *et al.*, 2016a) and *Bryum pseudo-triquetrum* (Hedw.) P.Gaertn., B.Mey. & Scherb. (Ellis *et al.*, 2016b), the moss flora of the Argentine Islands consists of 36 species.

#### 43. *Porella obtusata* (Taylor) Trevis.

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, Eysturoy, crevices below rocks at Mølin, E of Eiði, 62°18'N, 07°04'W, 25 May 1896, *leg.* C. Jensen *s.n.* (C), *det.* C. Jensen/K. Damsholt 2014/T. Hallingbäck; Vágur, Miðvágur, on rocks at Sørvágsvatn, 62°03'N, 06°54'W, 10 June 1922, *leg.* O. Hagerup *s.n.* (C), *det.* O. Hagerup/K. Damsholt; Nólsoy, N–NE-facing slopes below Kagið/Eggjarklettur, 61°59'N, 06°39'W, growing below rock-walls in a cave at the shore, 15 July 2000, *leg.* & *det.* K. Damsholt KD 20-086 (C); Suðuroy, Økslin, S of Hvalba, N-facing slopes above Heygsvatn, 61°35'N, 06°57'W, 13 July 2000, *leg.* & *det.* K. Damsholt KD 20-060 (C).

*Porella obtusata* is new to the Faeroe Isles. According to old literature (Jensen, 1901; Müller 1912–16; Arnell, 1956) *P. laevigata* (= *P. arboris-vitae*) had been recorded from the Faeroe Isles based on a collection made by Jensen in 1896. However, when checking herbarium material the identity of this specimen appeared to be *P. obtusata*. A revision of herbarium material stored in C revealed further three occurrences of this species in the Faeroe Isles.

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

**Contributor:** V. E. Fedosov

**Tadjikistan:** Tuyuntau ridge, Karyz area 15 km northward from Chilichor-Chashma Spring, 37° 25'N, 68°03'E, ca 650 m a.s.l., on rocks, 22 April 1966, *leg.* U. K. Mamatkulov # 8263 (LE, duplicate in MW).

This species is associated with xeric areas of the Holarctic. Until recently, it has been known from Europe (Sweden, Spain, Andorra, Germany,

Sicily and Turkey), western North America (Arctic Alaska to California), and in western Greenland and Ellesmere Island (Nyholm, 1989; Eckel *et al.*, 1996; Cano, 2006; Natcheva *et al.*, 2008). Recent discovery of the species on the Anabar Plateau, northern Siberia (Fedosov & Ignatova, 2006) and consequent revision of collections, attributed to *Pseudocrossidium hornschurchianum* (Schultz) R.H.Zander and *P. revolutum* (Brid.) R.H.Zander, from Russia and adjacent territories showed that the species occurs in Rostov Province (European Russia), Perm Province (Ural Mountains), as well as in subarctic Yakutia. This study also revealed two localities for the species in Middle Asia, in Turkmenistan. The specimens from Tajikistan have not been studied, but the presence of the species in this country was suggested by Mamatkulov (1990), who noted that among specimens of *P. hornschurchianum* there were plants with markedly short leaves. In the course of our molecular-phylogenetic study, focused on the taxonomic position of the genera *Brachydontium* and *Campylostelium* we studied the specimen of *Campylostelium pitardii* (Corb.) E.Maier (Isotype of *Usmania campylopoda* Laz.) from Tajikistan and found it included a sufficient admixture of these plants, which were confirmed to represent *P. obtusulum* and placed in MW. Differentiation of *P. obtusulum* from other species of the genus known in Middle Asia is considered in Fedosov & Ignatova (2006).

45. *Pylaisiella falcata* (Schimp.) Ando

**Contributors:** C. Arrocha and A. Benitez

**Panamá:** Chiriquí, Boquete, at the eastern slope of the Barú volcano, Parque Nacional Volcán Barú, 8° 48'26.4"N, 82°32'09.2"W, 3100 m a.s.l., on bark of solitary trees along the Fogones trail, 23 April 1991, *leg. & det.* C. Arrocha 1368 (UCH).

The relatively large size of the falcate leaves and the cordate base with few subquadrate alar cells are the most remarkable features of *Pylaisiella falcata* (Sharp *et al.*, 1994). This species occurs in Guatemala, Costa Rica and Mexico on *Quercus* L. in montane forests between 1600 and 3600 m a.s.l. (Sharp *et al.*, 1994). *Pylaisiella falcata* is reported here for the first time for Panamá. Therefore, the distributional range of the species is considerably extended in Central America.

46. *Racomitrium pruinosum* (Wilson) Müll.Hal.

**Contributor:** J. Larraín

**Chile:** Región de Magallanes, Provincia de Magallanes, Comuna San Gregorio, Parque Nacional Pali Aike, por sendero hacia el cráter Morada del Diablo, sobre rocas cerca del cráter, 200 m a.s.l., 52°06'45.6"S, 69°41'39.9"W, 21 January 2016, *leg.* J. Larraín 34977, with K. Elliott (CONC); en afloramientos rocosos, *leg.* J. Larraín 34979, with K. Elliott (CONC).

*Racomitrium pruinosum* can be distinguished from other species of *Racomitrium* sect. *Racomitrium* (*vide* Larraín *et al.*, 2013) by the shape of the teeth on the margins of the leaves, which are very sharp and oriented at angles of less than 45°, extending from the leaf base to the end of the decurrent hyaline awns. The distal portions of the teeth are smooth, whereas in the other taxa of this group they are variously papillose. The leaf tips are decurrent and have an untidy look that contrast with plants of *R. lanuginosum* (Hedw.) Brid. or *R. geronticum* Müll.Hal., its most closely related species.

When describing *R. lanuginosum* var. *pruinosum* from New Zealand, Wilson (1854) included South America in its distribution range. Consequently, his concept of the taxon has been followed by many authors who have reported *R. pruinosum* from South America including Chile. However, examination of all the vouchers for these records have shown that none belong to *R. pruinosum*, but belong to other taxa within *R.* sect. *Racomitrium* (Larraín, 2012). The only three good collections of this taxon known from South America all come from the Argentinian side of the southern Andes, including the type of *R. austrocanescens* Dusén (Larraín, 2012), as has already been noticed by Vitt & Marsh (1988).

*Racomitrium pruinosum* is a common species in New Zealand (Sainsbury, 1955), rare in southern Australia (Scott & Stone, 1976) and also present in Tasmania (Dalton *et al.*, 1991). In South America it was previously known from a few collections from the Argentinian province of Santa Cruz, between 48° and 50°S, in the land between Perito Moreno and Los Glaciares National Parks (Larraín, 2012). This new record would be the southernmost occurrence of the taxon in South America and the first found in Chile.

47. *Scapania calcicola* (Arnell & J.Perss.) Ingham

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, Kalsoy, Syðradalur in NE-facing ravine; near the harbour, 62°14'N, 06°57'W, on shaded rocks, 23 June 2015, *leg.* T. Hallingbäck & K. Damsholt KD 15-035 (C), *det.* K. Damsholt.

*Scapania calcicola* is new to the Faeroe Isles, and was discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above).

48. *Scapania hyperborea* Jørg.

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, Viðoy; Villingadalsfjall, along the track to the summit, 62°24'N, 06°33'W, on base rich wet rock, *leg.* T. Hallingbäck & K. Damsholt TH 48240 (S), *det.* T. Hallingbäck.

*Scapania hyperborea* is new to the Faeroe Isles, but was not found with the diagnostic gemmae, the

identity is thus questionable; although the deep brownish pigmentation and the arched keel of the leaves first lead to *S. brevicaulis* Taylor, the decurrency of the ventral lobes, with a narrow strip one cell wide indicated *S. hyperborea* or *S. irrigua* (Nees) Nees. The presence of pink to vinaceous, shortly ellipsoid gemmae would have definitively separated it from the latter (Damsholt, 2013), but otherwise its features were more indicative of *S. hyperborea*.

This specimen of *S. hyperborea* was discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above).

#### 49. *Schistidium helveticum* (Schkuhr) Deguchi

**Contributor:** V. M. Virchenko

**Ukraine:** the Crimea, outskirts of Sudak town, the protected area “Novyi Svit”, 44°51'N, 34°58'E, 40 m a.s.l.; on trunk of juniper in coniferous forest; 16 November 2013, leg. V. M. Virchenko *s.n.*, det. R. Ochrya (KRAM, KW).

*Schistidium helveticum* is known from Europe, Asia Minor and North Africa and it is especially widespread in the Mediterranean (Blom, 1996). In the former USSR, the species has been reported from the southern part of European Russia, Georgia, Kazakhstan, Turkmenistan, and from Kyrgyzstan (Ignatov *et al.*, 2006) and also occurs at an isolated station in Mongolia (Tsegmed, 2010).

During the study of bryophytes in the protected area “Novyi Svit” *S. helveticum* was found near Sudak town in the SE Crimea and this is the first record of the species in this peninsula. *Schistidium helveticum* is principally an epilithic moss of exposed calcareous, less frequently igneous, rocks and wall tops (Dierßen, 2001), but in the Crimea was epiphytic, growing on a juniper trunk in coniferous forest of *Juniperus excelsa* M.Bieb. and *Pinus stankeviczii* (Sukacz.) Fomin. Apart from *S. helveticum*, other epiphytic species of bryophytes have been found at this site, including *Frullania dilatata* (L.) Dumort., *Orthotrichum affine* Brid., *O. lyellii* Hook. & Taylor, *Syntrichia laevipila* Brid., and *Zygodon rupestris* Lorentz. Epilithic mosses are also well represented in this locality and the most frequent ones are *Schistidium crassipilum* H.H.Blom, *Grimmia tergestina* Bruch & Schimp., *Orthotrichum anomalum* Hedw., *O. cupulatum* Brid., *O. rupestre* Schwägr., and *Syntrichia montana* Nees. The bryophyte flora of the protected area “Novyi Svit” consists of 42 species and it also includes some submediterranean species, such as *Pleurochaete squarrosa* (Brid.) Lindb., *Tortula inermis* (Brid.) Mont, and *Bryum torquescens* Bruch & Schimp. A critical revision of the *Schistidium apocarpum* complex in the Crimea is required and additional species of this group will possibly be detected.

#### 50. *Seligeria donniana* (Sm.) Müll.Hal.

**Contributors:** I. Jukonienė and D. Stončius

**Lithuania:** Elektrėnai municipality, about 300 m SW of the village Kragžliai, by the River Bražuolė, on moist shaded limestone 54°45'14.7"N, 24°56'53.09"E, 9 January 2005, leg. D. Stončius B14547, det. I. Jukonienė, (BILAS); 16 October 2008, leg. et det. I. Jukonienė, B17037 (BILAS).

This is the first species of *Seligeria* Bruch & Schimp. found in Lithuania. *Seligeria donniana* differs from other species of the genus by the absence of a peristome and by the denticulate margins in the upper part of its leaves.

*Seligeria donniana* was found on a limestone outcrop (3 m high and 4 m wide) exposed by water erosion and standing vertically in the river bed. The limestone was shaded by deciduous trees and shrubs (*Acer platanoides* L., *Tilia cordata* Mill., *Ulmus glabra* Huds., *Corylus avellana* L. on the slope and *Alnus glutinosa* (L.) Gaertn. along the river). Its exposed surface was oriented NW. The population occupied an area of about one square metre. The specimens collected in October had ripe sporophytes and young sporophytes with a calyptra and immature capsules were also found. Accompanying bryophyte species were *Fissidens osmundoides* Hedw. and *Campylophyllum calcareum* (Crudw. & Nyholm) Hedenäs.

*Seligeria donniana* is distributed in Central and Southern Europe; it is also recorded in Great Britain and Ireland (Hodgetts, 2015). The species is rare in the eastern Baltic region. It has not been recorded in Latvia, even though the bryoflora of the country includes two other species of *Seligeria* (Abolina, 2006). In Estonia, where six species of the genus are known, *S. donniana* is Red Listed as rare (Vellak *et al.*, 2015). The species is Near Threatened in Finland (Laaka-Lindberg *et al.*, 2009), and in Sweden, although the most common species of the genus, it is nevertheless also rare (Hallingbäck *et al.*, 2006).

#### 51. *Sphagnum limbatum* Mitt.

**Contributors:** R. Ríos, C. Arrocha and A. Benitez

**Panamá:** Chiriquí, Boquete, Cerro Pilote, 08°47'34.80"N, 82°24'57.50"W, 1611 m a.s.l., on moist soil along path and sometimes on rocks, 5 September 2008, leg. & det. R. Ríos 19 (UCH), conf. C. Arrocha.

*Sphagnum limbatum* is known from Mexico, Guatemala and Costa Rica, at 1800 m a.s.l. (Allen, 1994; Sharp *et al.*, 1994; Shaw & Cox, 2005) and from Colombia and Venezuela, at 700–4030 m a.s.l. (Churchill & Linares, 1995; Churchill *et al.*, 2000; Ruiz *et al.*, 2006). The species is recorded here for the first time from Panamá.

#### 52. *Streptopogon erythrodontus* (Taylor) Wilson

**Contributors:** C. Arrocha and A. Benitez

**Panamá:** Chiriquí, Boquete, along trail on the eastern slope of the Barú volcano, Parque Nacional



Volcan Barú, 8°48'09.82"N 82°31'12.45"W, 2800 m a.s.l., epiphytic and on dead wood, accompanied by *Daltonia gracilis* Mitt., 15 January 1992, *leg. & det.* C. Arrocha 1662 (UCH).

*Streptopogon erythrodontus* was reported previously in Central America from Costa Rica, Guatemala and Mexico (Allen, 2002; Sharp *et al.*, 1994). Here, *S. erythrodontus* is newly reported for Panamá where it is considered a rare species growing on bark of trees and shrubs in montane forest at elevations from 2000 to 3500 m a.s.l. *Streptopogon erythrodontus* is widespread in South America, known from Argentina, Bolivia, Colombia, Ecuador, Perú and Venezuela at 2200–3500 m a.s.l. (Churchill & Linares, 1995; Matteri & Schiavone, 1998). Prior to this record, only the related *Streptopogon calymperes* Müll.Hal. had been found in Panamá.

53. *Symphyodon imbricatifolius* (Mitt.) S.P.Churchill

**Contributors:** E. L. dos Santos, D. M. Carmo and D. F. Peralta

**Brazil:** Paraná state, municipality of Morretes, Parque Estadual do Marumbi, 25°26'11"S, 48°55'14"W, trilha do rochedinho, cruza o rio Taquaral, Mata Atlântica com margem de riacho, 1200 m a.s.l., 23 July 2014, *leg.* D. F. Peralta 16256 with D. M. Carmo, E. L. Santos & R. Ristow (SP).

This species was described and illustrated in Buck & Ireland (1992) as *Symphyodon machrisianus* (Crum) Buck & Ireland, but as *S. imbricatifolius* by Churchill & Linares (1995) and He & Snider (2000) in their world revision. The distribution range of this species according to He & Snider (2000) included Central America and Central Brazil. They cite it for the Brazilian states of Goiás and Minas Gerais, and Costa & Peralta (2015) added Rio de Janeiro. All of these records are in tropical areas, but the present record is from the south temperate region of Brazil. It is the first outside the tropical range of this species and means a considerable geographical extension.

54. *Tritomaria exsectiformis* (Breidl.) Loeske

**Contributors:** K. Damsholt and T. Hallingbäck

**Denmark:** Faeroe Isles, Eysturoy, Toftir, east of a path with a dam, 62°05'N, 06°56'W, on peaty soil, 22 June 2015, *leg.* T. Hallingbäck & K. Damsholt KD 15-021(C), *det.* K. Damsholt.

*Tritomaria exsectiformis* is new to the Faeroe Isles. It was discovered among the collections made in 2014 and 2015 in the Faeroe Isles by K. Damsholt and T. Hallingbäck (see text under *Calypogeia azurea* above).

55. *Zygodon dentatus* (Limpr.) Kartt.

**Contributor:** S. Ștefănuț

**Romania:** Southern Carpathians: Făgăraș Mountains, on the edge of Avrig Lake, Sibiu County, 45°34'40.85"N, 24°28'57.07"E, 2021 m a.s.l., on rocks, 18 August 2014, *leg.* S. Ștefănuț *s.n.*, *det.* S. Ștefănuț (BUCA B4828).

*Zygodon dentatus* was found on the edge of Avrig Lake along with other bryophytes such as *Clevea hyalina* (Sommerf.) Lindb., *Jungermannia polaris* Lindb., *Bryum pseudotriquetrum* (Hedw.) P.Gaertn. *et al.*, *Distichium capillaceum* (Hedw.) Bruch & Schimp., *Fissidens bryoides* Hedw. and *Oligotrichum hercynicum* (Hedw.) Lam. & DC.

This is the first confirmation of *Z. dentatus* in Romania for almost 100 years. It was reported from Făgăraș Mountains, Topolog Valley, 1700 m a.s.l., 6 October 1916, *leg.* T. Herzog, *det.* N. Malta (Malta, 1925). This was the only record of the species in Romania until now.

The conservation status of *Zygodon dentatus* is changed from CR B1ab(ii,iii)+2ab(ii,iii) (Ștefănuț & Goia, 2012) to CR B2ab(ii,iii).

In Europe it has been reported from Norway, France, Austria, Czech Republic, Germany, Liechtenstein, Luxembourg, Netherlands, Switzerland, Poland, Slovakia, Romania, and the Ukraine and is included in the new Bryophytes Red List for Europe (Hodgetts, 2015).

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# A new species of *Syrrhopodon* (Calymperaceae) from Sarawak

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Ellis (1991) reported on a small series of moss specimens collected by J.M. Camus from the limestone mountains in Gunung Mulu National Park, Sarawak. They appeared to represent a robust, higher altitude form of *Syrrhopodon confertus* Sande Lac. (Calymperaceae), but with leaves bearing some resemblance to those characteristic of *Exostratum* L.T.Ellis, an Indo-Pacific genus of the leucobryoid Calymperaceae. Further consideration of these specimens, and the evaluation of further material from the same locality, suggests that this apparent form is more than a localised aberration of *S. confertus*, and

differs sufficiently to be regarded as a distinct species within *Syrrhopodon* Schwägr.

*Syrrhopodon exostratoides* L.T.Ellis, *sp. nov.*

**Holotype:** Borneo, Sarawak: Gunung Mulu National Park, Gunung Api, trail from Camp 5 to The Pinnacles, 4°6'N 114°53'E, 26 November 1990, leg. J.M. Camus 947a (BM-BM000661449!).

(Figures 1B, 2, 3A–E, 4A)

*Plants* simple or with short branches, reaching 1–3 cm high, forming tufts and mats or growing as scattered shoots. *Leaves* lanceolate, mostly 2–3 mm long, with a suberect semisheathing, narrowly suboblong hyaline base tapering into an erect to spreading, sometimes slightly recurved, finely drawn out chlorophyllose/hyaline limb (occupying slightly less to slightly more

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