

New national and regional bryophyte records, 39

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1. *Andreaea alpestris* (Thed.) Schimp.

Contributor: L. Thouvenot

Andorra: Encamp, Ensagents, 42°31'07"N, 1°38'41"E, 2520 m a.s.l., on the top of granitic rock in alpine meadow, 17 July 2006, *leg.* L. Thouvenot 3086 (BCB 58238).

According to Casas (2005) this species was previously unrecorded in Andorra (Eastern Pyrenees) although it is known in the neighbouring countries of France (Cerdagne) (Aicardi, 2007) and Spain (Pallars Sobirà, Baixa Cerdanya) (Cros & Sérgio, 2007).

2. *Andreaea australis* Mitt.

Contributor: H. Bednarek-Ochyra

South Georgia: (1) Barff Peninsula, Lönnberg Valley, ca 100 m (=300 ft) a.s.l., north-east facing

rock ledge, GR 147112, 2 February 1964, *leg.* R. E. Longton 390 (KRAM); (2) approximately 1 mile east of The Crutch, ca 85 m (=250 ft) a.s.l., crevices of north facing rocks above scree, GR 132135, 14 December 1967, *leg.* S. W. Greene CG 550 (KRAM).

Andreaea Hedw. is well represented on South Georgia, and Greene (1968) recognised nine species on this subantarctic island. As a result of subsequent studies, three more species have been added to the island's bryoflora, *A. obovata* Thed. (Ochyra *et al.*, 2002), *A. mutabilis* Hook.f. & Wilson (Blockeel *et al.*, 2003) and *A. nitida* Hook.f. & Wilson (Ellis *et al.*, 2011b). Murray (2006) indicated that one more species, *A. australis* Mitt., occurs on South Georgia but did not cite any specimens. This species was indeed collected several times on that island and here two specimens are cited to substantiate this. Prior to this discovery *A. australis* was considered to be an

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Australasian temperate species known from SE Australia, Tasmania and New Zealand (including the Auckland Islands) (Schultze-Motel, 1970). Murray (2006) stated that the species also occurred on subantarctic Macquarie Island but Seppelt (2004) does not include it in the moss flora of this island. Interestingly, when quoting specimens examined for *A. alpina* Hedw. he stated that one of them grew associated with *A. australis* and *A. nitida* but no further comment on the former species is found in his treatment.

The discovery of *Andreaea australis* on South Georgia has changed its phytogeographical status and now it should be considered as an amphipacific temperate species. Considering the present record as well as recent additions (Ochyra *et al.*, 2002; Blockeel *et al.*, 2003, 2005, 2007b; Ellis *et al.*, 2011b; Bednarek-Ochyra & Ochyra, 2012a), the moss flora of South Georgia now comprises over 120 species. This makes it the second richest moss flora in the Subantarctic, after Îles Kerguelen.

3. *Andrewsianthus marionensis* (S.W.Arnell) Grolle

Contributor: J. Vána

South Georgia: North shore of North Bay, Prince Olav Harbour (54°20' S, 36°40' W), south facing dry rocks, ca 85 m (=250 ft), 2 February 1961, *leg.* S. W. Greene 01695A, *det.* G. G. Hässel de Menéndez as *A. australis*, *teste* J. Vána (AAS); Cumberland West Bay, below Spencer Peak, 54°20' S, 36°40' S, wet rocks by waterfall, 350 ft., 11 February 1961, *leg.* S. W. Greene 01918B, *det.* G. G. Hässel de Menéndez as *Andrewsianthus* sp., *det.* J. Vána (AAS); Bay of Isles, Paul Beach, northern peak of Murphy Wall, above corrie, 54°33' S, 36°67' W, crevice of north-east facing rocks, 1000 ft, 23 January 1961, *leg.* S. W. Greene 01207A, *det.* J. Vána (AAS); Stromness Bay, west side of Olsen Valley, opposite Ruby Peak, east facing rock faces, 100 ft, 17 March 1961, *leg.* S. W. Greene 02975E, *det.* J. Vána (AAS); area to south of Shallop Cove, inland of un-named cove, 20–250 ft., 30 December 1970, *leg.* R. I. Lewis Smith 01072D, *det.* J. Vána (AAS); ridge between upper Husdal and Karakatta valleys, rock crevice, 600 m, 28 November 1991, *leg.* R. I. Lewis Smith 08334 as *Anthelia* sp., *det.* J. Vána (AAS); on south-western shore of Maivatn on ground near the lower of two waterfalls from Lancetes Lake into Maivatn 54°15.665' S, 36°30.149' W, near waterfall, 6 November 2011, *leg.* K. Newsham 137, *det.* J. Vána (AAS).

Andrewsianthus marionensis is a relatively variable species with a circum-subantarctic distribution. It was known from Australasia as *Andrewsianthus squarrosus* (R.M.Schust.) R.M.Schust., and from South America as *Andrewsianthus australis* J.J.Engel (Vána *et al.*, 2013). Hitherto, the known distribution of this species included Chile (Magallanes region: Ultima Esperanza

and Magallanes provinces), Argentina (Tierra del Fuego province), Falkland Is., Tristan da Cunha, Gough Island, Marion Island, Crozet Is. (Possession Island), Kerguelen Is., Australia (New South Wales, Victoria and Tasmania) and New Zealand (Stewart Island, South Island, North Island) (Engel & Glenny, 2008; Hässel de Menéndez & Rubies, 2009; Vána & Engel, 2013); it has never been collected in the Antarctic. The above mentioned reports from South Georgia fill one gap in the subantarctic distribution of this species.

4. *Anomobryum bavaricum* (Warnst. in Hamm.) Holyoak & Köckinger

Contributors: O. M. Afonina and H. Köckinger

Asian Russia: Southern Siberia, Zabaikalsky Territory, Kalar district, Yuzhno-Muisky range, canyon of Koyra creek, 56°13'59.5"N, 115°52'17.9"E, 594 m a.s.l., on detritus in non-shaded crevice of calcareous rock outcrop in the low forest belt composed of *Larix dahurica* Turcz., *Betula platyphylla* Sukaczew, *Pinus sylvestris* L., *Populus tremula* L. and *P. suaveolens* Fisch., 5 August 2012, *leg. & det.* O. M. Afonina *s.n.*, *confirm.* H. Köckinger (LE).

Hitherto, *A. bavaricum* has been known only from the European Alps (Holyoak & Köckinger, 2010). It was described by Warnstorf as *Bryum bavaricum* in Hammerschmid (1906) but later synonymized with *Anomobryum concinnum* (Spruce) Lindb. (Loeske, 1933). Several recent authors (Düll, 1994; Schlüsslmayr, 2005; Meinunger & Schröder, 2007c; Köckinger *et al.*, 2008) assigned this plant more or less tentatively and under various ranks to *Anomobryum cuspidatum* (J.J.Amann) J.J.Amann, a more recent synonym. Its nomenclature and taxonomy were clarified by Holyoak & Köckinger (2010).

A. bavaricum differs from the similar *A. concinnum* by its golden colouration (*vs.* more silvery green in the latter), an acuminate (*vs.* acute) leaf apex, a mostly excurrent (*vs.* usually percurrent) costa, more numerous, reddish-brown bulbils with leaf primordia mostly confined to the upper half (*vs.* less numerous, green bulbils, only brownish at base, with leaf primordia usually also arising from the basal part). In most characters the Siberian material agrees well with those of the European plants, and we have no doubt concerning its placement in *A. bavaricum*. There are, however, some bulbils with leaf primordia also from the base but, as this is a rather variable character even in the Alps, it seems to be without major importance.

The species is new to the Asian continent, but its occurrence is not surprising, as an important part of the recent flora of the Alps originates from northern Central Asia, especially the Altai region. Moreover, such tiny bulbiliferous Bryaceae have been largely ignored world-wide until now. The Siberian material

of *A. bavaricum* was found in small, loose tufts, directly associated with *Distichium capillaceum* (Hedw.) Bruch & Schimp. and some non-fruiting *Bryum* sp. and *Encalypta* sp. On the same rock outcrop, *Barbula amplexifolia* (Mitt.) A.Jaeger, *Didymodon ferrugineus* (Schimp. ex Besch.) M.O.Hill, *Encalypta procera* Bruch, *Hymenostylium recurvirostrum* (Hedw.) Dixon and *Plagiopus oederianus* (Sw.) H.A.Crum & L.E.Anderson, were also collected. Excluding the Nordic *Encalypta procera*, all these species may also occur in the vicinity of *A. bavaricum* in the Alps. According to Schlüsslmayr (2005) these species may occur in the Austrian Alps in the association *Plagiopodo oederi-Orthothecietum rufescentis*. Not surprisingly, *A. concinnatum* was also found nearby, as this is a rather common pioneer species in Southern Siberia showing a much wider ecological amplitude.

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

Contributor: H. Bednarek-Ochyra, N. Gremmen and V. R. Smith

Heard Island: (1) north-eastern coast of the island, inland of Skua Beach, 53°05'40"S, 73°43'E, 35 m a.s.l., forming large cushions between fluvioglacial boulders, very localised, 29 January 2001, *leg.* N.J.M. Gremmen *H-1184 & H-1185* (KRAM); (2) same area, plateau above western part of Skua Beach, 53°05'55"S, 71°40'15"E, 110 m a.s.l., forming large cushions between rocks in the *Usnea* Dill. ex Adans. vegetation on exposed edge of plateau, 28 January 2001, *leg.* N.J.M. Gremmen *H-868* (KRAM).

Bucklandiella heterostichoides is a distinct species; its plants have a characteristic branching pattern that gives them a cristate appearance. Creeping stems are closely attached to the rocky substrate and possess many ascending short lateral branchlets. The leaves are narrowly ovate-lanceolate, tapering to a short or long, smooth hyaline hair-point. They are bordered at the base by a row of hyaline pellucid cells and have a narrow costa consisting of 2–3 enlarged ventral epidermal cells. The laminal cells are usually strongly pseudopapillose, and in the distal part mostly bistratose at the margin, although they do not form a bulging border. Interestingly, the species occurs mainly in the barren state and only a few populations with immature capsules are known.

For over a century *Bucklandiella heterostichoides* was known only from southern South America, being restricted in its distribution to Tierra del Fuego and the Falkland Islands (Cardot, 1908; Cardot & Brotherus, 1923; Roivainen, 1955). It had been reported from Tristan da Cunha in the South Atlantic Ocean (Dixon, 1960) but the voucher specimen proved to be *B. striatipila* (Cardot) Bednarek-Ochyra & Ochyra (Bednarek-Ochyra & Ochyra, 2010,

2011; Ellis *et al.*, 2011b). Meanwhile, *B. heterostichoides* has proved to be very widespread on South Georgia, a subantarctic island in the South American sector of this biome (Bell, 1974). Exploration of other islands and archipelagoes in the Southern Ocean resulted in the discovery of the species on Gough Island in the south-cool-temperate zone (Ellis *et al.*, 2012b) and on Îles Kerguelen in the Subantarctic (Blockeel *et al.*, 2009b). These discoveries established *B. heterostichoides* as a subantarctic amphiatlantic species. Herein, the range of *B. heterostichoides* in the Kerguelen biogeographical province is extended to Heard Island. This isolated and heavily glaciated island is situated about 500 km south-east of Îles Kerguelen and is among the most remote places on the globe. For this reason it was seldom visited by biologists and its moss flora was rather poorly known. Selkirk *et al.* (2008) reported some 40 species from this island but since then no fewer than 13 species have been added to the island's bryoflora (Blockeel *et al.*, 2008; Ellis *et al.* 2010, 2011a,b, 2012a,b, 2013a,b), including three species of *Bucklandiella* Roiv., namely *B. lamprocarpa* (Müll.Hal.) Bednarek-Ochyra & Ochyra, *B. sudetica* (Funck) Bednarek-Ochyra & Ochyra and *B. orthotrichacea* (Müll.Hal.) Bednarek-Ochyra & Ochyra.

6. ***Bucklandiella orthotrichacea*** (Müll.Hal.) Bednarek-Ochyra & Ochyra

Contributor: H. Bednarek-Ochyra and M. Lebouvier

Îles Crozet, Île de la Possession: (1) Pointe Lieutard, fellfield south of the chapel in the Alfred Faure station, 46°26'01.59"S 51°51'59.05"E, 75 m a.s.l., forming fairly large patches on dry stony ground associated with *Polytrichum juniperinum* Hedw., 9 November 2006, *leg.* R. Ochyra No. 72a/06 (KRAM); (2) rock outcrops 300 m south of Alfred Faure Station, 51°51.513'E 46°26.132'S, 100 m a.s.l.; under overhanging rock in shaded and moist situation; forming small cushions, 16 November 2012, *leg.* R. Ochyra 2772/12 (KRAM); (3) rock outcrops 100 m north of Alfred Faure base by road to Cirque du Navire, 46°25.859'S 51°51.551'E, 90 m a.s.l., on ground at foot of cliff in the fernbrake dominated by *Blechnum penna-marina* (Poir.) Kuhn. and *Acaena magellanica* (Lam.) Vahl. forming large monospecific patches in somewhat shaded and dry situation, 22 November 2013, *leg.* R. Ochyra 3132/12 (KRAM).

Bucklandiella orthotrichacea is one of the most frequently occurring species of the genus in the Kerguelen biogeographical province. Hitherto, it has been recorded from Îles Kerguelen, from where it was originally described (Müller, 1883, 1889), Marion Island in the Prince Edward Islands archipelago (Ochyra & Hertel, 1990) and recently it was recorded from Heard Island (Ellis *et al.*, 2013b). The species has also been recorded from the two largest islands of

the Îles Crozet archipelago, namely Île de l'Est and Île de la Possession (Hébrard, 1970a,b). Unfortunately, voucher material from the first island was unavailable for study, whereas the specimen collected in 'Port Alfred on Île de la Possession in February 1969 by J.-P. Hébrard' (PC) proved to be misnamed and correctly represented *Schistidium cupulare* (Müll.Hal.) Ochyra, a species only recently collected on this island (Ellis *et al.*, 2013c). *Bucklandiella orthotrichacea* is a locally frequent species on Île de la Possession, forming large patches between stones and boulders in the fellfield vegetation and in the fernbrakes. Its occurrence on the island is confirmed by some exemplary specimens cited herein.

Bucklandiella orthotrichacea has optimum occurrence in the subantarctic and it is additionally known from South Georgia in the American sector of this biome (Ochyra *et al.*, 2002). The records of the species from the Antarctic (Ochyra *et al.*, 1998) proved to be incorrect and actually the material refers to *B. didyma* (Mont.) Bednarek-Ochyra & Ochyra (Ochyra *et al.*, 2008a,b). Phytogeographically, *B. orthotrichacea* has to be considered as an amphiatlantic subantarctic species, penetrating into the *Nothofagus* Blume zone in southern South America where it ranges from Tierra del Fuego to central Chile (Bednarek-Ochyra & Ochyra, 2012b).

Although *Bucklandiella orthotrichacea* is a distinct species, it is likely to be confused with *B. ochracea* (Müll.Hal.) Bednarek-Ochyra & Ochyra, a common species in the fellfields on Île de la Possession (Ellis *et al.*, 2013d). The two species share the strongly pseudopapillose laminal cells, bistratose distal leaf margins and distinct basal margins composed of pellucid, straight-walled cells arranged in two, or occasionally even three rows. However, *B. orthotrichacea* can be immediately distinguished from *B. ochracea*. It possesses larger capsules, 1.2–1.6 mm long, with an operculum concolourous with the urn, and the basal margins of the leaves are strongly recurved, usually obscuring the differentiated marginal border. In the shape of its leaves and capsules, as well as in its broad and obvious costa, *B. orthotrichacea* is also likely to be mistaken for *B. lamprocarpa* (Müll.Hal.) Bednarek-Ochyra & Ochyra. This species is known from some islands in the Kerguelen biogeographical province (Bednarek-Ochyra & Ochyra, 1998; Ellis *et al.*, 2010, 2011b) and subantarctic Macquarie Island (Blockeel *et al.*, 2007a). It is also reported from South Africa (Bednarek-Ochyra & Ochyra, 2012c; Ochyra & van Rooy, 2013) and southern South America (Bednarek-Ochyra *et al.*, 1996; Blockeel *et al.*, 2002, 2009a). However, this species has entirely smooth laminal cells and lacks the differentiated basal marginal border.

7. *Campylopus flexuosus* (Hedw.) Brid.

Contributors: P. Erzberger and C. Németh

Hungary: Veszprém County, Bakony Mountains, (Sümeg-Tapolca Ridge), 9070.3 (Central European Mapping Scheme), gravel hills above the valley of the stream Lesence-patak near Sümeg-Uzsa, on acidic soil over siliceous gravel in deciduous mixed forest, 46°55'45.5" N, 017°20'24.1" E, ca 184 m a.s.l. 29 June 2013, *leg.* and *det.* P. Erzberger & C. Németh (B Erzberger 16484; *Herb.* Németh 4964; BP), 46°54'04.4" N, 017°20'55.4" E, ca 180 m a.s.l., 9 October 2013, *leg.* and *det.* P. Erzberger & C. Németh (B Erzberger 16783, 16784; *Herb.* Németh 5113; BP) and 46°54'06.5" N, 017°20'54.3" E, ca 160 m s.l., 9 October 2013, *leg.* and *det.* P. Erzberger & C. Németh (B Erzberger 16791; BP). (All determinations conf. L. Meinunger & W. Schröder).

The three collection sites are situated within a distance of ca 3 km from each other. The area north-east of Uzsa is geologically varied, the main formations being Pannon gravel sandstone (in the formations of Kisbér and of Kállya) and dolomite from the upper Triassic (MFGI 2012+). It is one of the rare places in Hungary where acidic soil supports an acidophytic flora, with *Betula pubescens* Ehrh., *Calluna vulgaris* (L.) Hull, and *Vaccinium myrtillus* L.; remarkable terricolous bryophytes include *Dicranum spurium* Hedw., *D. polysetum* Sw., *Leucobryum glaucum* (Hedw.) Ångstr. and *L. juniperoideum* (Brid.) Müll.Hal., and *Buxbaumia aphylla* Hedw. *Paraleucobryum longifolium* (Hedw.) Loeske, and the rare *Ulota hutchinsiae* (Sm.) Hammar with its only currently known occurrence in the country occurring on sandstone outcrops. *C. flexuosus* was found in close association with *Dicranum scoparium* Hedw., *Bryum moravicum* Podp., *Cephaloziella divaricata* (Sm.) Schiffn.

In Europe, *C. flexuosus* has a suboceanic distribution, thus it is rather frequent in western European countries but becomes rare towards more continental regions in the east. In Britain, and even more clearly in Germany, this western predominance is evident from the detailed maps (Hill *et al.*, 1992; Meinunger & Schröder, 2007b).

According to the most recent checklist (Papp *et al.*, 2010), *C. flexuosus* is new to Hungary, but is known in some neighbouring countries. It has been found in Austria (Grims, 1999), Slovenia (Martinčič, 2003), Croatia (Düll *et al.*, 1999; Sabovljević *et al.*, 2008), Romania (red-list status: LC=least concern, Ștefănuț & Goia, 2012), Slovakia (red-list status: VU=vulnerable, Kubinská *et al.*, 2001), whereas it seems to be absent from Serbia (Sabovljević *et al.*, 2008) and the Ukraine (Ignatov *et al.*, 2006).

In contrast to the neophytic *Campylopus introflexus* (Hedw.) Brid., which in Europe appears to be

continuously spreading from west to east and has also recently been added to the Hungarian species list (Blockeel *et al.*, 2007c), *C. flexuosus* does not in general exhibit this type of behaviour. It is considered native in Britain (Hassel & Söderström, 2005), but it might be a recent introduction in Hungary. It can be argued against the other possibility, that it had simply been overlooked previously, because Boros and Vajda explored the area near Uzsa quite thoroughly during several visits, and published nearly all the species that are found there today (and some that so far have not been re-found), so that it is hard to believe that *C. flexuosus* would have escaped their attention.

8. *Cephaloziella varians* (Gottsche) Steph. var. *variens*

Contributors: P. Erzberger and L. Meinunger

Hungary: Heves County, Mátra Mts, 8186.1 (Central European Mapping Scheme), Parád, Sas-kő, north facing shaded steep andesitic rocks in beech forest, ca 47°52'25"N, 020°01'44"E, ca 860 m a.s.l., 4 August 2000, leg. P. Erzberger and B. Papp (B Erzberger 6299), det. L. Meinunger, 21 November 2013.

In the interests of improving our knowledge of the distribution of bryophytes in Hungary, P.E. sent an undetermined specimen of *Cephaloziella* to L.M., who found it to contain *C. varians* and *Scapania praetervisa* Meyl. (see below), two species hitherto not known from Hungary (Papp *et al.*, 2010). The collection site forms one of the richest montane siliceous rock groups in the Kékes-massif, at the highest elevation in Hungary. Other interesting bryophytes collected in the vicinity on the same occasion include *Taxiphyllum densifolium* (Lindb. ex Broth.) Reimers, *Fissidens dubius* P.Beauv., *Bartramia ithyphylla* Brid., *Dichodontium pellucidum* (Hedw.) Schimp., *Amphidium mougeotii* (Schimp.) Schimp., *Rhabdoweisia fugax* (Hedw.) Bruch & Schimp., *Reboulia hemisphaerica* (L.) Raddi, *Metzgeria conjugata* Lindb., and *Lophocolea minor* Nees. Some of these species clearly indicate the base-rich nature of the substrate of volcanic origin. This is of some importance, since *C. varians* is one of the few species of the genus that grow exclusively on calcareous or base-rich substrates (Damsholt, 2002; Meinunger & Schröder, 2007a). The Hungarian plants are not fertile, but have many characteristic red gemmae and some underleaves on well-developed sterile shoots. In Germany, this long-neglected species proved to be rather frequent (Meinunger & Schröder, 2007a), therefore more records might be expected in Hungary as well.

9. *Didymodon eckeliae* R.H.Zander

Contributor: C. A. Garcia and C. Sérgio

Portugal: Trás-os-Montes e Alto Douro: Vinhais, 29TPG6333, 600 m a.s.l., 2002, leg. C. Sérgio s.n. (LISU240057); Mirandela, Ponte de Abreiro, 29TPF

4478, 175 m, 2008, leg. C. Garcia s.n. (LISU231963) conf. J. A. Jiménez; Vila Real, Alijó, S. Lourenço, 29TPF3672, 165 m a.s.l., 2008, leg. C. Garcia s.n. (LISU231921); Chaves, Roriz, 29TPG4486, 780 m a.s.l., 2011, leg. C. Sérgio s.n. (LISU244588); Beira Alta: Figueira de Castelo Rodrigo, Nossa Senhora de Aguiar, 29TPF7332, 420 m a.s.l., 2010, leg. C. Sérgio s.n. (LISU240045); Penedono, Beselga 29TPF3233, 420 m a.s.l., 2010, leg. C. Sérgio s.n. (LISU240055); São Pedro do Sul, São Cristovão de Lafões, 29TNF6912, 200 m a.s.l., 2010, leg. C. Sérgio s.n. (LISU240053); Sernancelhe, 29TPF2628, 760 m a.s.l., 2010, leg. C. Sérgio s.n. (LISU240056); Nelas, Senhorim, 29TPE0084, 187 m a.s.l., 2011, leg. C. Sérgio & C. Garcia s.n. (LISU232921); Gouveia, Ribamondego, 29TPE1791, 2011, ±280 m a.s.l., leg. C. Sérgio & C. Garcia s.n. (LISU244412); Mangualde, Cunha de Baixo, 29TPE0787, 2011, ±228 m a.s.l., leg. C. Sérgio & C. Garcia s.n. (LISU244411); Beira Baixa: Pampilhosa da Serra, Fajão, 29TNE9145, 2002, 800 m a.s.l., leg. C. Sérgio s.n. (LISU240683); Baixo Alentejo: Alvito, Ribeira de Odivelas, 29SNC9235, 2006, leg. C. Sérgio s.n. (LISU240051).

Spain: Lugo: Lugo, muralhas, 29TPH1762, 460 m a.s.l., 2005, leg. C. Sérgio s.n. (LISU240059). Salamanca: La Alberca, 29TQE4459, 1070 m a.s.l., 2010, leg. C. Sérgio s.n. (LISU240060 and LISU240061).-

Didymodon eckeliae was initially considered to be endemic to California, but was later found in British Columbia (Zander, 2001, 2007), and subsequently reported, for the first time outside America, in Alicante, Spain (Puche *et al.*, 2006a). These last authors provide a map of the currently known distribution, a description and drawings. There were further records of this species in Spain from Guadalajara (Puche *et al.*, 2006b), in Jaén and also from Madrid (Guerra *et al.*, 2010) and more recently from Murcia (Cano *et al.*, 2010).

It has now been found in new areas in Spain and for the first time, in four provinces of Portugal, usually occurring in rock crevices or on walls and artificial substrates, often in anthropogenic areas.

This species has distinctive morphological characteristics that facilitate correct identification, such as the possession of very longly acuminate leaves with crenulated and notched margins. In the upper two thirds or three quarters of the leaf the lamina is bistratose.

After revising all recent Iberian collections in the LISU herbarium, we found that this species is frequent in the Portuguese flora and more widely distributed in Spain than previously thought. According to our new records, *Didymodon eckeliae* grows in the central, northern and eastern Iberian

Peninsula, although its distribution is likely broader but overlooked owing to under-collection.

10. *Didymodon erosus* J.A. Jiménez & J. Guerra

Contributors: C. Sérgio, C. A. Garcia and S. Stow

Portugal: Beira Litoral, Buçaco, Fonte Fria, calcareous stones with *Fissidens ovatifolius* R. Ruthe, 29TNE5369, ca 325 m a.s.l., 2010, leg. C. Sérgio, C. Garcia & S. Stow s.n. (LISU 240048).

Didymodon erosus was originally described by Jiménez *et al.* (2004) on the basis of material from two localities in Salamanca in the north-central part of Spain. In the *Flora Briofítica Ibérica* it is referred only to these locations (Jiménez, 2006), but some years later it was discovered in several localities in the mountainous area of Sierra Espuña in southern Spain, Murcia (Cano *et al.*, 2010; Werner *et al.*, 2010). It was also reported and mapped in Portugal, Austria, Germany and France in this study.

Records mentioned in the above publication were the basis of a molecular study which included one specimen from Portugal (Mata do Buçaco, leg. J. Vaña). The species has recently been rediscovered in the same park on the calcareous stones of the old staircase of Fonte Fria cascade. This discovery does not extend the distribution of this rare species but confirms its presence in Buçaco Mountain and consequently in Portugal.

11. *Didymodon giganteus* (Funck) Jur.

Contributor: V. Fedosov

Russia: Krasnoyarsk Territory, Taimyr Autonomous Distr., Ereechka River upper course near mouth of Nyamakit-Daldyn Creek, NE slope of limestone plateau near to map mark 308 m, 71°14'29"N; 105°35'56"E, ca 220 m a.s.l., *Eriophorum*-dominated wet-spotted tundra, on hummocks with *Cinclidium arcticum* Bruch & Schimp., *Ditrichum flexicaule* (Schwägr.) Hampe, *Orthothecium chryseon* (Schwägr.) Schimp., *Pseudocalliergon turgescens* (T. Jensen) Loeske (on bare loamy spots with *Seligeria oelandica* C.E.O. Jensen & Medelius, *Meesia uliginosa* Hedw. and *Bryum wrightii* Sull. & Lesq.), 15 July 2013, leg. V. Fedosov (MW ## 13-3-0110, 13-3-0133).

This species was first found in Russia by Nilson-Ehle in 1898 in the lower course of the Lena River. As it was not refound during a modern exploration of that territory in 2006, it was listed in the Red Data Book of Plants of Russia (Afonina, 2008a) as apparently extinct. Subsequently, the species was found in two collections from Chukotka: Vrangeli Island and Krause Cape (Kučera *et al.*, 2012), the closest of these ca 2500 km distant from the present locality. The wide, disjunctive distribution of the species and its lack of sporophytes throughout its range (excepting Himalayas) could indicate the relict nature of its localities in Europe, North Asia and North America (see discussion below under *Seligeria*

oelandica). Contrarily, Kučera *et al.* (2012) proposed, that the present distribution of the species was caused by vegetative propagation from the Himalayan region during the quaternary, i.e. by modern colonization.

12. *Didymodon sinuosus* (Mitt.) Delogne

Contributors: C. Sérgio and C. A. Garcia

Portugal: Beira Litoral, Serra de Sicó, Alvaizere, Venda do Negro, 350–360 m a.s.l., 29TNE4129, 2001, leg. C. Garcia *et al.* s.n. (LISU 220046); Estremadura, Serra de Montejunto, Quinta da Serra, 29SMD9535, ca 600 m a.s.l., 2004, leg. C. Sérgio *et al.* 13354 (LISU 236826); Serra de Sintra, Parque da Pena, 29SMC6593, ca 450 m a.s.l., 2011, leg. C. Sérgio & M. Alves s.n. (LISU 241923); Serra de Sintra, Capuchos, 29SMC6193, ca 300 m a.s.l., 2011, leg. C. Sérgio *et al.* s.n. (LISU 241927); Ribatejo, Santarém, Omnias, 29SND2739, 9 m a.s.l., 2011, leg. C. Garcia s.n. (LISU 244603).

Plants of *Didymodon sinuosus* are distinctively large, and the species is considered by some authors to belong in a different genus, as *Oxystegus sinuosus* (Mitt.) Hilp. However, the morphological similarity and phylogenetic affinities with *Didymodon* Hedw. were confirmed by Werner *et al.* (2005) based on molecular data. Morphologically it is recognized by its flexuous, fragile leaves with sinuose margins (Casas *et al.*, 2006).

D. sinuosus is widespread, occurring throughout Europe, Central Asia and Turkey, and also in Alaska, frequently growing on calcareous rocks. It is a common moss in Spain, reported in more than twelve provinces (Jiménez, 2006); however, this species had not been recorded in Portugal until now.

Didymodon sinuosus was found in mountains in the central-west of Portugal (Montejunto, Sicó and Sintra). These three mountain areas have an extremely strong oceanic influence and an altitude range of ca 300–600 m. The newly discovered populations of *D. sinuosus* in Montejunto were growing on tree bases and calcareous rocks in a woodland area with *Quercus faginea* Lam., and were in association with *Gymnostomum calcareum* Nees & Hornsch. var. *atlanticum* Sérgio. In Serra de Sicó they were found on *Quercus rotundifolia* Lam., associated with *Tortella nitida* (Lindb.) Broth., and in Sintra, on a wall associated with *Gymnostomum calcareum* var. *atlanticum* and some minute forms of other *Didymodon* species. *D. sinuosus* has also been found on bark (of *Fraxinus angustifolia* Vahl) on the banks of the river Tagus near Santarém.

13. *Dumortiera hirsuta* (Sw.) Nees

Contributor: J. van Rooy

Zambia: Nyika National Park, Manyenjere Forest, 10°35'S, 33°39'E, 2136 m a.s.l., on bank of stream through the forest, 5 April 2000, leg. P.S.M. Phiri 3874 (PRE).

This large thallose liverwort is easily recognised by its thin, translucent, dark green thalli lacking a dorsal epidermis, air pores and air chambers; the thalli have undulate, sparsely hirsute margins (Perold, 1999). It grows on wet soil or rock in sheltered, wooded, shaded and damp areas such as stream banks and waterfalls in forests. *D. hirsuta* is subcosmopolitan in distribution and found throughout tropical and subtropical Africa and the East African Islands (Wigginton, 2009).

14. *Encalypta rhaptocarpa* Schwägr.

Contributor: P. Erzberger

Hungary: Heves County, Bükk Mountains, 8087.2 (Central European Mapping Scheme), Szarvaskő, Castle Hill, on shaded rocks, ca 46°59'23"N, 020°19'46"E, ca 250 m a.s.l., 2 June 1960, as admixture to a specimen of *Bryum elegans* Brid., leg. L. Vajda s.n. (BP 63744), det. P. Erzberger 12 March 2012.

During a revision of *Bryum* specimens in BP (Erzberger & Schröder, 2013), some fruiting plants of *Encalypta* were detected in a specimen identified as *Bryum elegans* Nees, with the original label: '*Bryum elegans* c.fr. Comit. Heves. In rupibus umbrosis montis Várhegy prope pag. Szarvaskő, 2. VI. 1960 leg. L. Vajda'. The determination as *B. elegans* was made by S. Orbán, who had also noted the presence of an *Encalypta*, but not investigated further. Apart from *B. elegans*, which was correctly named, the following species were found in the collection: *Bryum capillare* Hedw., *Hypnum cupressiforme* Hedw., *Tortella tortuosa* (Hedw.) Limpr., *Porella platyphylla* (L.) Pfeiff., *Barbilophozia barbata* (Schreb.) Loeske, *Encalypta vulgaris* Hedw. and only a few plants of *Encalypta rhaptocarpa* Schwägr. These differ from the plants of *E. vulgaris* present in the specimen in possessing upper leaves with a hyaline hair point and furrowed capsules with longitudinal ribs. On two capsules remnants of once well-developed, but now much damaged, brown peristome teeth could be detected. This feature excluded *E. trachymitria* Ripart (syn.: *E. rhaptocarpa* var. *leptodon* Lindb.), in which the peristome is yellow, sometimes hyaline, often fragile and reduced (Nyholm, 1998; Mogensen, 2001). W. Schröder kindly confirmed the determination of the *Encalypta*.

Encalypta rhaptocarpa is missing from the most recent checklist of Hungarian bryophytes (Papp *et al.*, 2010), and was considered doubtful in the earlier checklist (Erzberger & Papp, 2004). Boros (1968) mentions two species of *Encalypta* with doubtful occurrence in Hungary: *E. alpina* Sm. from the Pilis Mountains, and *E. rhaptocarpa* collected by Latzel from near Kőszeg (sterile) and found with sporophytes by Boros in the Bükk Mountains (Bétkő, Uppony). However, these plants differed from typical

E. rhaptocarpa by the lack of peristome and capsule striae, hence the uncertainty about their true identity (Boros, 1968). Unfortunately, the corresponding specimens of *Encalypta* in BP could not be found, they were probably sent on loan a long time ago and never returned (B. Papp, personal communication), so at present it is not possible to determine the validity of these earlier records.

In this situation, even the scarce specimen mentioned above, interestingly also collected in the Bükk Mountains, although not from limestone but from diabasic rocks (Szarvaskő basaltic formation, MFGI 2012+), should serve as a voucher for the reinstatement of *E. rhaptocarpa* as an obviously very rare member of the Hungarian bryoflora.

15. *Entosthodon hungaricus* (Boros) Loeske

Contributor: C. Sérgio

Portugal: Estremadura, Vila Franca de Xira, Companhia das Lezírias Sul, on open saline soil, included in *Phragmites* Adans. communities, 29SNC0299, 2 m a.s.l., 8 October 2013, leg. C. Sérgio s.n. (LISU254840).

When considering its current distribution, *Entosthodon hungaricus* cannot be designated a rare species since it is relatively widespread. It was thought in the past to be a typical species of the central European steppes but is now known to have a strongly discontinuous range in the northern hemisphere from Hungary to Austria, Kazakhstan, Romania, Slovakia, Ukraine, Serbia, Germany, Israel, Spain, Greece (Papp, 2002) and Sicily (Privitera & Puglisi, 2006). The species reaches into North Africa in Morocco, where it is described as *E. maroccanus* (Meyl.) Hebr. & Lo Giudice, and in addition more recently, Ros & Cano (2008) synonymized the Algerian *Physcomitrium longicolle* Trab. with this species.

However, this member of the Funariaceae is scattered throughout its range, with highly fragmented and dispersed populations and thus has been considered as rare and threatened in Europe (ECCB, 1995). It has been included in the Red-Lists of several European countries (Papp, 2008). To implement new strategies and actions to protect this important moss, Sabovljević *et al.* (2012) developed a methodology of *ex situ* conservation through axenic culture *in vitro*.

The sample cited here represents the first report of *E. hungaricus* in Portugal. It occurred in a saline area in the Natural Park of Tagus Estuary, where the plants were growing in a small population on salt marsh sediments, in a dense community of *Phragmites australis* (Cav.) Steud. The new record extends the known range of this species to ca 550 km westward of its closest Spanish locality (Brugués *et al.*, 2013).

16. *Fuscocephaloziopsis loitlesbergeri* (Schiffn.) Váňa & L.Söderstr.

Contributors: P. Górski and P. Pawlikowski

Poland: NE Poland, Lithuanian Lake District, open mire in the lower Rospuda river valley, E of the river, W of the village of Szczebra, 53°54.585'N, 22°56.708'E, 123 m a.s.l., 11 September 2013, *leg.* P. Górski, P. Pawlikowski *s.n.*, *det.* P. Górski, *conf.* J. Váňa (POZNB 1749); Western Carpathians, Western Tatra Mountains, NW part of the Toporowy Staw Wyżni lake, 49°16.756'N, 20°01.758'E, 1120 m a.s.l., 28 September 2011, *leg.*, *det.* P. Górski, *conf.* J. Váňa (POZNB 507).

Fuscocephaloziopsis loitlesbergeri has been rediscovered in both the mountains and the lowlands of Poland after 100 and 75 years respectively. The locality in the Tatra Mountains is identical with the last historical record made in 1912 by Lilienfeldówna (1914), while the locality of the Rospuda River valley provided an entirely new record for the Polish lowlands, where the species was last observed in 1938 (Dietzow, 1938). This is an extremely rare species, which is threatened with extinction in the majority of Central-European countries. In Poland it was known from only five localities: two in the mountains (in the Western Carpathians and the Sudety Mountains; Lilienfeldówna, 1914; Szweykowski, 1953) and three in the northern lowlands (Müller, 1912–1916; Wiśniewski & Rejment, 1935; Dietzow, 1938). The lowland records of the species appear to be historical – both F. Hintze's locality in Western Pomerania and the locality in Wigry National Park have not been confirmed despite field surveys in the 1960s (Szweykowski & Koźlicka, 1969) and the 2000s (Wiercholska *et al.*, 2010). Noteworthy herbarium specimens from these two localities were stored in the herbaria of Adam Mickiewicz University in Poznań and the University of Warsaw. The specimens in question have recently been confirmed as belonging to *F. loitlesbergeri* (*conf.* P. Górski).

Fuscocephaloziopsis loitlesbergeri is a boreal-montane species known to occur in acidic mires (Damsholt, 2009), but owing to its scarcity very little is known about its microhabitat preferences. In both the present localities in Poland the species grew in hummocks of *Polytrichum strictum* Brid. In the Tatra Mountains the habitat was strongly acidic, which is generally in agreement with the data from the mountains of the Czech Republic, where *F. loitlesbergeri* is considered to be a 'clearly upland species of open, acidic raised bogs' (Váňa & Kučera, 2002). In contrast, in the Rospuda valley *F. loitlesbergeri* grew in percolating rich fen (Jabłońska *et al.*, 2011), together with *Sphagnum fimbriatum* Wilson, *Fuscocephaloziopsis pleniceps* (Austin) Váňa & L.Söderstr. and *Cephaloziella spinigera* (Lindb.) Warnst. on a hummock of *Polytrichum* that was situated within vegetation dominated by *Sphagnum teres* (Schimp.) Ångstr., *S. angustifolium* (C.E.O.Jensen *ex* Russow) C.E.O.Jensen, *Oxycoccus*

palustris Pers., *Carex chordorrhiza* Ehrh. *ex* L.f. and *C. dioica* L. The surface water chemistry confirmed the existence of minerotrophic conditions (pH=6.50, corrected conductivity=78.9 $\mu\text{S cm}^{-1}$, Ca^{2+} concentration=2.8 mg dm^{-3}) This seems to be the first record of *F. loitlesbergeri* in a moderately rich, weakly acidic fen.

17. *Lejeunea wightii* Lindenb. in Gott., Lindenb. & Nees

Contributors: R. Gupta, V. Nath and A. K. Asthana

India: Central India, Madhya Pradesh, Chhindwara, Pachmarhi Biosphere Reserve, on way to Chota Mahadev, 22°46'N 78°43'E epiphytic, ca 854 m a.s.l., 29 November 2006, *leg.* V. Sahu & V. Awasthi *s.n.* (LWG 227630A).

The genus *Lejeunea* Libert. is represented by 41 species in India (Asthana & Saxena, 2011; Asthana & Sahu, 2012; Verma & Rawat, 2013). Among these, 30 have been reported from the eastern Himalayas, eight from the western Himalayas and 22 from southern India. Hitherto, only *L. aloba* Sande Lac. and *L. obfusca* Mitt. have been reported from the central Indian bryo-geographical region (Asthana & Sahu, 2012). *L. wightii* Lindenb. collected from Pachmarhi Biosphere Reserve can now be added to these. Although *Lejeunea* is a well represented genus in other bryo-geographical zones of India, it has a meagre presence in the central Indian region. *L. wightii* was previously reported from western Himalayas and southern India. Outside of India it is known only from China (Mizutani, 1964; Pippo, 1990).

The plants of *L. wightii* were dull green, leafy, up to 5.5 mm long by 0.4 mm wide, rarely branched, and bearing a few scattered rhizoids. The leaves were imbricate, incubous, obliquely inserted, distant, 0.35 × 0.30 mm, with a rounded apex and entire margins, trigones were present. The lobules of the leaves were ovate, and about a third of the size of the leaf. Under leaves were broadly ovate-orbicular, bifid and up to half the length of the leaves.

18. *Leptopterigynandrum decolor* (Mitt.) M.Fleisch.

Contributors: A.K. Asthana and V. Sahu

India: Western Himalayas: Uttarakhand, Uttarkashi, Govind Wild Life Sanctuary, 1 km towards Ruin Sara, epiphytic, 31°07'6.8"N, 78°21'15.8"E, ca 2687 m a.s.l., 3 April 2013, *leg.* Vinay Sahu *s.n.* (LWG 265011), Osla to Taluka, Epiphytic, 31°06'41.9"N, 78°19'44.2"E, ca 2712 m, a.s.l., 4 April 2013, *leg.* Vinay Sahu *s. n.* (LWG 265033A).

Four species of *Leptopterigynandrum* have been reported from India (Vohra, 1983; Lal 2005), among them, *L. decolor* was known from Sikkim and stated to be endemic to the eastern Himalayas. Plants newly

recorded from the western Himalayas, were bright green, prostrate, 16–22 mm long, and irregularly pinnately branched. The leaves were ovate, with two short costae and entire margins (a distinguishing feature), composed of incrassate rhomboidal cells, but with clearly differentiated quadrate to shortly rectangular alar cells, in several rows, rising obliquely up the leaf for some distance.

19. *Lophozia silvicola* H. Buch

Contributor: S. Ștefănuț

Romania: Eastern Carpathians, Călimani Mountains, Negoiu Românesc, Suceava County, Călimani National Park, 47° 07' 09.2" N, 25° 13' 47.1" E, 1695 m a.s.l., on soil, 20 September 2013, *leg.* S. Ștefănuț *s.n.*, *det.* S. Ștefănuț (BUCA B4587, B4588).

Lophozia silvicola was collected from the subalpine zone in the Călimani Mountains, at the side of the trail from the stone quarry to Reșițiș Peak. It occurred in the *Pinus mugo* Turra and *P. cembra* L. area, along with other bryophytes, such as *Dicranum scoparium* Hedw., *Brachythecium rutabulum* (Hedw.) Schimp., *Plagiothecium laetum* Schimp. and *Pleurozium schreberi* (Willd. ex Brid.) Mitt.

L. silvicola was reported from Romania, without locality (in forest, July 1900, *leg.* A. Schmidt (LE)) (Bakalin, 2005; Söderström *et al.*, 2007), but owing to the lack of locality and its age, this record is doubtful. This is the first confirmed report of *Lophozia silvicola* in Romania and the Eastern Carpathians (Ștefănuț, 2008). The nearest other localities for this species are in Hungary (Bakalin, 2005; Söderström *et al.*, 2007), but these also need confirmation. As *L. silvicola* could be mistaken for *L. ventricosa* (Dicks.) Dumort., the conservation status of *L. silvicola* remain DD (Data Deficient) until the next reports (Ștefănuț & Goia, 2012).

In Europe, *L. silvicola* has been reported from Svalbard, Faeroe Islands, Norway, Sweden, Finland, Denmark, Northern Ireland, Britain, France, Netherlands, Luxembourg, Germany, Switzerland, Austria, Poland, Czech Republic, Slovakia, Spain, Italy, Hungary, Romania, Estonia, Lithuania, Novaya Zemlya, Franz Josef Land and Russia (Söderström *et al.*, 2002, 2007).

20. *Micropterygium duidae* Reimers

Contributors: S. R. Gradstein and A. Benitez

Ecuador: Zamora Chinchipe, Palanda, La Canela, northern slope of Cerro Plateado, 4°36'S 78°46'W, in rather low and open woody vegetation, ca 2300 m a.s.l., on moist soil, 22 August 2012, *leg.* A. Benitez 557 (HUTPL, PC).

Micropterygium duidae is a rare neotropical species that was hitherto known only from a few localities in the Guyana Highland of Venezuela (Fulford, 1966; Rico & Pócs, 2004). The species typically grows on

soil or wet rock at the base of sandstone escarpments, at elevations between about 1800–2300 m. The collection from Cerro Plateado is the first record of *M. duidae* from Ecuador and the first from the Andes. Cerro Plateado (2900 m) is the highest peak in the Cordillera del Cóndor, a mountain range situated between the Amazon basin and the eastern Andean cordillera along the border of Ecuador and Peru. These mountains are built of sandstone and limestone sediments, and their vascular flora closely resembles that of the Guyana Highland. The bryophyte flora of these mountains is still poorly known (Churchill *et al.*, 2009; Gradstein & Benitez, 2014). The discovery of *M. duidae* lends further support to the similarities of the floras of the Guyana Highland and the Cóndor region.

21. *Mielichhoferia mielichhoferiana* (Funck) Loeske

Contributors: J. Pantović, A. Sabovljević and M. S. Sabovljević

Macedonia: Kičevo, pr. stat Izvoz, supra Suhi Dol, 42°45'N 22°25'E, in *Quercetis*, 19 July 1945, *leg.* Oleg Grebenščikov, *det.* Teodor Soška as *Didymodon rubellus* Bruch & Schimp.; *rev.* J. Pantović, A. Sabovljević, M. S. Sabovljević (BEO *s.n.*).

During the revision of a small historical bryophyte collection deposited in the Natural History Museum in Belgrade (BEO), we came across the small sample cited above. After careful identification, it was clear that sample represented *Mielichhoferia mielichhoferiana*. Unrecorded by Cekova (2005), Sabovljević *et al.* (2008) and Ros *et al.* (2013), this species is new to Macedonia (FYR).

Species of the genus *Mielichhoferia* have long been considered as 'copper mosses', and widely associated with greater than average amounts of heavy metals in their substrates (Brassard, 1969). This should lead one to consider all occurrences of these plants as possible locations of useful deposits of minerals. Indeed, the town of Kičevo (618 m a.s.l.), and the surrounding area is famous for mineral mining (manganese, copper, molybdenum, iron). The town is situated in a valley, surrounded by many forested mountains. It is a very interesting area geologically since many minerals intermingle (e.g. magnetite, ilmenite, hematite, molybdenite). Copper mosses, including *Mielichhoferia* species, are considered as copper hyper-accumulating species with a preference for metal-rich soils, lithosols or rocks as their substrates (Aikawa *et al.*, 1999). However, some authors consider the uniqueness of copper mosses not in their hyper-accumulation ability for some minerals, but in their ability to tolerate very low substrate pH and high concentration of sulphate ions in the peculiar microclimate regimes of their niches (Wilkins, 1977). Thus, the occurrence of this species in the area of Kičevo is not surprising. It is also

present in neighboring Bulgaria and in Slovenia in the Balkans (Sabovljević *et al.*, 2008). This species is rare and sporadically distributed (highly disjunct across huge distances) throughout the northern hemisphere, although the genus shows its highest diversity in South America with *ca* 15 species (Shaw & Rooks, 1994; Shaw, 2000). Shaw (1994a, 2000) showed the paraphyletic origin of *M. mielichhoferiana*, the complex infraspecific phylogenetic patterns within a morphological uniformity, and hybridization with the related *M. elongata* (Hoppe & Hornsch. *ex* Hook.) Nees & Hornsch. (Shaw, 1994b).

There are no available data on its conservation status in Europe, where it is considered as a data deficient species (ECCB, 1995). Nevertheless, it should be considered for conservation owing to its obviously very restricted range, the few known recent populations, and the evidence of its decline in many countries (*e.g.* Ludwig *et al.*, 1996; Müller, 1997; Kučera & Váňa, 2003; Schnyder *et al.*, 2004; Natcheva *et al.*, 2006; Sergio *et al.*, 2006; Sotiaux *et al.*, 2007; Preston, 2010; Hodgetts, 2011).

22. *Orthotrichum crenulatum* Mitt.

Contributors: V. Plášek, M. Nobis, A. Nowak, L. Číhal and J. Sawicki

Kyrgyzstan: Issyk-Kul Basin, NE edge of Issyk-Kul Lake, 2.5 km E of Chong Oruktu town, on bark of tree (*Prunus* L. sp.), GPS coordinates (WGS 84): 42°44.28'N, 77°49.16'E, 1680 m a.s.l., 12 June 2013, leg. V. Plášek *s.n.* (OP).

A total of 15 taxa in *Orthotrichum* Hedw. (including those in *Nyholmiella* Holmen & E. Warncke) have previously been reported from Kyrgyzstan (Lazarenko, 1938; Rakhmatulina, 1970, 1990; Lewinsky-Haapasaari, 1994; Mamatkulov *et al.*, 1998; Ignatov *et al.*, 2006). *Orthotrichum crenulatum* is an epiphytic moss new to the bryoflora of this middle Asian country. The species had been known from nearby Afghanistan, India, Pakistan, Tibet, Turkestan and Kazakhstan (Lewinsky, 1992; Schäfer-Verwimp & Gruber, 2002), and was found in Tajikistan in 2008 (Ellis *et al.*, 2011c).

In Kyrgyzstan, *O. crenulatum* was first collected during the Czech-Polish Expedition, 2013 in the northeastern part of the Issyk-Kul Basin. This area is more humid than the western part of the country (Lazkov & Sultanova, 2011). It was found near a public road on the bark of *Prunus* sp. The moss cushions were 1.4–1.8 m above the ground, with a southern exposure. All of the populations were richly fertile. Examples of associated species include *Orthotrichum speciosum* Nees and *O. anomalum* Hedw.

O. crenulatum can be distinguished from the similar *O. pallens* Brid. by its ligulate to oblong-lanceolate

leaves with an obtuse, often crenulate apex, and by its endostome with only eight segments.

23. *Phaeoceros udarii* Asthana & Nath

Contributors: R. Gupta, V. Nath and A. K. Asthana

India: Central India, Madhya Pradesh, Chhindwara, Pachmarhi Biosphere Reserve, Jambu Dweep, 22°46'N 78°43'E, on soil over rocks, *ca* 900 m a.s.l., 17 December 1993, leg. V. Nath & A.K. Asthana *s.n.* (LWG 205605).

Phaeoceros Prosk. is represented by five species in India, namely *P. carolinianus* (Michx.) Prosk., *P. himalayensis* (Kash.) Prosk., *P. kashyapii* Asthana & Srivast., *P. leavis* Prosk. and *P. udarii* Asthana & Nath. *P. udarii* was described as a new species from Mussoorie (Asthana & Nath, 1993), endemic to the Western Himalayas. The present record from Pachmarhi Biosphere Reserve extends the range of *P. udarii* to central India.

The compact, dull green thalli possessed smooth involucre, *ca* 3.2 mm long. Long capsules had walls 5–6 layers thick and bearing stomata, each with two reniform guard cells. Spores were pale green, minutely papillate and *ca* 37 µm with a prominent triradiate mark on their proximal face; pseudoelaters were dull brownish and 90–120 µm long.

24. *Phycolepidozia exigua* R.M.Schust.

Contributor: S. R. Gradstein

Venezuela: Amazonas, Cerro Duida, south-central portion of the tepui, *Bonnetia* Mart. scrub near falls, 1850 m a.s.l., among *Iwatsukia bifida* (Fulford) R.M.Schust., January 1988, leg. W. R. Buck & C. Brewer 15536, c. gyn. (NY 1666409 p.p.).

Phycolepidozia exigua (Phycolepidoziaceae) is a peculiar, highly reduced liverwort with leafless stems and branches but with leafy gametocia (Schuster, 1966; Gradstein *et al.*, 2001). The species has long been the only member of the genus *Phycolepidozia* R.M.Schust. (a second species has recently been discovered in India; Gradstein *et al.*, 2014), and was only known from a single gathering from the island of Dominica, where it was collected by the late Dr Rudolf M. Schuster in 1966. Attempts to recollect *P. exigua* in the type locality have been unsuccessful and the species has been redlisted as 'Critically Endangered' (Schäfer-Verwimp, 2010; Hallingbäck, 2013). A second locality for the species has now been found at Cerro Duida in the Guyana Highlands of Venezuela, where it was growing in humid scrubby vegetation dominated by the genus *Bonnetia*, in a mat of the leafy liverwort *Iwatsukia bifida*. The discovery suggests that *P. exigua* may be even more widespread in the Neotropics and owing to its minute size this species has undoubtedly been overlooked.

25. *Physcomitridium readeri* (Müll.Hal.) G.Roth

Contributors: C. Sérgio and P. Ministro

Portugal: Beira Litoral, Figueira da Foz, Lagoa da Vela, 29TNE1758, 50 m a.s.l., 3 November 2012, *leg.* P. Ministro *s.n.* (LISU254841).

The specimen cited above is the second record of this moss from Portugal. *P. readeri* is known from North America, Japan, Australia and New Zealand. It was very recently reported for Europe by Hooper *et al.* (2010) from several localities in England, suggesting that its presence in this country may eventually be considered as a recent introduction, given the phylogenetic relationships based on ITS1 of the Australian plants.

Following its first publication as a species new to Europe it was reported from France, Spain and then Portugal. Here, it was first found by R. Porley, whose collection, gathered in the Algarve, in the southern part of the country, was reported as *Physcomitrella patens* (Hedw.) Bruch & Schimp. in *Flora Briofítica Ibérica* (Guerra *et al.*, 2010). Porley and Hodgetts later recognised the material as *Physcomitridium readeri* (Müll.Hal.) G.Roth (Ellis *et al.*, 2012c).

These various new discoveries may indicate that the species has not been overlooked in Europe, but more likely is in expansion, as in Portugal it was found in two very distant localities. A similar opinion is given by Infante and Heras (in Ellis *et al.*, 2013b) who considered the two new areas for *P. readeri* in Spain (Álava) and France (Hautes Pyrénées), as being in more or less recent man-made habitats, or refuges for aquatic birds, and could therefore be recognized as new introductions. Therefore, birds may have been the dispersal vector for this moss to its new localities. Its two new localities in Portugal have comparable ecological conditions. In both cases the moss grows in habitats subject to periodic inundation at the margin of a lagoon or water reservoir.

26. *Plagiothecium membranosulum* Müll.Hal.

Contributor: H. Bednarek-Ochyra

Rwanda: Northern Province, Musanze District, Virunga Massif, Sabyinyo, by road on the southern slope of Kinigi, ca 2600 m a.s.l.; on roots and ground in montane forest mixed with bamboo, 4 February 1972, *leg.* J. L. De Sloover 13316 (KRAM).

Uganda: Ruwenzori Mountains: (1) Mobuku Valley, in mountain rain forest with *Podocarpus* L'Hér. *ex* Pers. trees, 2500 m a.s.l., 19 March 1948, *leg.* O. Hedberg 236b (PC-Potier de la Varde, S); (2) same locality, on rock with oozing water in the upper part of the *Philippia* Klotzsch region, 3800 m a.s.l., 11 April 1948, *leg.* O. Hedberg 745a (PC-Potier de la Varde, S); (3) Nyinabitaba Ridge, 2150–2750 m a.s.l., on soil and rocks in half shade, 28 December 1950, *leg.* G.H.S. Wood 1112 (BM).

Plagiothecium membranosulum is an endemic African species which is currently known to occur

in the Republic of South Africa and Lesotho (O'Shea, 2006), the Kilimanjaro Mountains of Tanzania (Ellis *et al.*, 2012c) and Réunion Island in the Indian Ocean (Ellis *et al.*, 2011a). Herein, the species is added to the bryoflora of two central African countries, Rwanda and Uganda. Like elsewhere, it occurs in the montane rain forests, and the locality in the Ruwenzori Mountains at an altitude of 3800 m is the highest known station for the species.

27. *Scapania praetervisa* Meyl.

Contributors: P. Erzberger and L. Meinunger

Hungary: Heves County, Mátra Mountains, 8186.1 (Central European Mapping Scheme), Parádkő, Sas-kő, north facing shaded steep andesitic rocks in beech forest, ca 47°52'25"N, 020°01'44"E, ca 860 m a.s.l., 4 August 2000, *leg.* P. Erzberger and B. Papp (B Erzberger 6299), *det.* L. Meinunger, 21 November 2013; Pest County, Visegrád Mountains, 8279.4 (Central European Mapping Scheme), Visegrád, near the road from Pilisszentlászló to Visegrád, north slope of elevation Kis-disznó-hegy, on moist soil at base of small vertical andesite rock ledge in open deciduous forest, ca 47°44'16"N, 018°56'24"E, ca 400 m a.s.l., 20 April 2001, *leg.* P. Erzberger (B Erzberger 6949), *det.* L. Meinunger, 20 September 2002.

Absent from the most recent checklist (Papp *et al.*, 2010), this species is new to Hungary. In the first site, in the Mátra Mountains, *S. praetervisa* grew in close association with *Cephaloziella varians* (Gottsche) Steph., another addition to the Hungarian bryoflora (see above for site details). In the second site (Visegrád Mountains) the species was accompanied by *Schistidium lancifolium* (Kindb.) H.H.Blom, *Sciuro-hypnum flotowianum* (Sendtn.) Ignatov & Huttunen, *Pohlia cruda* (Hedw.) Lindb., *Fissidens dubius* P.Beauv., *Plagioclila porelloides* (Nees) Lindenb., and *Barbilophozia barbata* (Schreb.) Loeske.

Among the species of the *S. mucronata* agg., *S. praetervisa* can be identified by its characteristic yellow-brownish gemmae (Meinunger & Schröder, 2007a). These were present in the specimens cited above.

28. *Schistidium boreale* Poelt

Contributors: N. Batan and T. Özdemir

Turkey: Gümüşhane, Torul, Zigana Mountain, 40°39'24.82"N, 39°24'27.83"E, on wet rock, near the stream, ca 1830 m a.s.l., 20 April 2011, *leg.* N. Batan and *det.* N. Batan & T. Özdemir *s.n.* (KTUB 1037).

The latest checklists of Turkish bryophytes (Kürschner & Erdağ, 2005; Uyar & Çetin, 2004), new records for the Turkish moss flora (Yayıntaş, 2008; Blockeel *et al.*, 2009b; Batan *et al.*, 2013), and the recent floristic catalogue for southwest Asia (Kürschner & Frey, 2011) indicate that *Schistidium* Bruch & Schimp is represented by 21 taxa in southwest Asia, of which 20 are reported from

Turkey. Herein, *S. boreale* is added to the moss flora of Turkey and southwest Asia. The nearest other locality for *S. boreale* is in Russia (Altay Mountains) (Ignatov *et al.*, 2006).

Schistidium boreale could easily be confused with *Schistidium trichodon* (Brid.) Poelt, but unlike the latter, the leaves in *S. boreale* have a papillose lamina. *S. boreale* is also related to *Schistidium papillosum* Culm., but *S. boreale* has a shorter peristome and urn, which is lighter coloured; leaves that are more closely imbricate, more longly tapering and with a shorter hair-point, and cell walls in the lamina that are dark red and strongly sinuose. These cells in *S. papillosum* are usually orange or brown.

The species is known from Austria, Germany, Finland, Norway, Sweden, Switzerland, North America, Canada, Alaska, and Russia (Blom, 1996).

S. boreale is a eutrophic and weakly thermophytic species. Typical habitats are large boulders and cliffs on southern and western slopes within, or at the edge of, conifer and mountain-birch forests (Blom, 1996). It has been characterised as an acidophyte-subneutrophite, xerophyte, photophyte and thermophyte, occurring on calcareous rocks (Dierßen, 2001). The present specimen was collected at the edge of conifer forest (*Picea* A.Dietr. sp. and *Abies* Mill. sp.), on rock near a stream. Accompanying bryophyte species included *Hygrohypnum luridum* (Hedw.) Jenn., *Brachythecium rutabulum* (Jenno.) Schimp., *Schistidium trichodon* (Brid.) Poelt and *Grimmia trichophylla* Grev.

29. *Seligeria oelandica* C.E.O.Jensen & Medelius

Contributor: V. Fedosov

Russia: Krasnoyarsk Territory, Taimyr Autonomous Distr., Ereechka River upper course near mouth of Nyamakit-Daldyn Creek, NE slope of plateau near to map mark 308 m, 71°14'29"N 105°35'56"E, ca 220 m a.s.l., *Eriophorum*-dominated wet-spotted tundra, on small stones, covered by calcareous fine soil in moist areas, 15 July 2013, *leg.* V. Fedosov *s.n.* (MW ## 13-3-0114, 13-3-0119).

Seligeria oelandica was frequent in similar habitats within the studied area (ca 500 km²), with siliceous limestone as underlying bedrock and often associated with *Seligeria polaris* Berggr. and *Bryum wrightii* Sull. (MW ## 13-3-0500, 13-3-0812, 13-3-0818, 13-3-0976). The species is regarded as rare (Hallingbäck *et al.*, 1988; Afonina, 2008b) with a disjunctive amphioceanic distribution. It has been found in Britain (Wales), Ireland, Norway, Sweden, Svalbard, the Czech Republic (Carpathians), Chukotka Peninsula (not Siberia, as cited by Ochya, 1991). In North America it is recorded from Alaska, the Yukon, North Western Territories and eastern Quebec. To date most of its known localities are in coastal areas or in mountains not far from the ocean. In contrast, this

present record is situated in a continental, quite xeric area, distant from both Atlantic and Pacific coasts (ca 4000 and 3000 km respectively), where its closest populations are known. Thus the distribution of the species seems to be implicitly circumarctic with disjunction, caused by survival in unglaciated refugia and/or an edaphic reason such as bedrock composition. The present record does not contradict considering *S. oelandica* as a preglacial survivor (*cf.* Vitt, 1976), as the territory of Anabar Plateau, where it occurred, was not affected by glacial events, at least in the quaternary, and is distant from other localities for the species. Some other species, often considered as glacial survivors, for example, *Tortella densa* (Lorentz & Molendo) Crundw. & Nyholm (Fedosov & Ignatova, 2009), *Pseudocrossidium obtusulum* (Lindb.) H.A.Crum & L.E.Anderson, *Bryoerythrophyllum latinervium* (Holmen) Fedosov & Ignatova, and *Encalypta brevipes* Schljakov, also occur there. On the other hand, extensive exploration of the moss flora of the Anabar Plateau during the last decade (Fedosov *et al.*, 2011) did not reveal the species even though a number of areas with different calcareous bedrock were studied, and none of the studied territory had been glaciated. This fact could indicate that the distribution of *S. oelandica* is limited by its association with a specific rock type. Another rare species, *Didymodon giganteus* (Funck) Jur., discussed in this paper has a similar distribution in the Anabar Plateau and worldwide.

30. *Streptocolea atrata* (Miel.) Ochya & Żarnowiec

Contributor: H. Bednarek-Ochya

Czech Republic, Šumava: Bohemia occidentalis, Stará Psečnice u Domažlic, skály u štoly 'Salka' 1 km jižně obce [Stará Psečnice village near Domažlice town, 49°23'9.8"N 12°53'22.3"E, rocks near mine adit called 'Salka' now considered to be a Nature Monument, 1 km S of the village], 480 m a.s.l., 29 March 1985, *leg.* Karel Sutorý *s.n.* (BRNM, KRAM).

Streptocolea atrata is one of the 'copper mosses' growing on acidic heavy-metal-bearing rocks. It is widely distributed, though scattered in the mountains throughout the Holarctic (Ochya & Bednarek-Ochya, 2004; Blockeel *et al.*, 2006), with highly isolated stations in South America, including Bolivia, Brazil and Colombia (Muñoz, 1999; Ellis *et al.*, 2012b). In continental Europe the species is rare. So far it has been most frequently collected in Austria (Grimms, 1999) and occasionally in Belgium (De Sloover & Demaret, 1968), France (Maier, 2010), Switzerland (Amann, 1918) and in the Czech Republic (Pilous & Duda, 1960). In the latter country it was hitherto known from a single record on the southern slope of Mount Sněžka in the Giant Mountains in the Sudetes on the border with Poland. Herein, the

species is reported from the Šumava, a mountain range in the south-western Czech Republic on the border with Germany.

31. *Thamnobryum subserratum* (Hook. ex Harv.) Nog. & Z.Iwats.

Contributor: T. Hallingbäck

Sweden: Småland province, Kråkshult parish, Kållebäcken (Vadadalen) NE of Vada farm, 57°35'45"N, 15°25'53"E, 2013, *leg.* T. Hallingbäck *s.n.* (S).

In 2008, Dr Massimo Mastracci pointed out in an e-mail to me his discovery that *Porotrichum alopecurum* var. *smoelandicum* Tolf in the herbarium in Helsinki (H) in fact belonged to the species *Thamnobryum subserratum*. *Porotrichum alopecurum* var. *smoelandicum* was described by R. Tolf in the late 19th Century (Tolf, 1891) and he mentioned three localities close to each other in the eastern part of the province of Småland. In 2013, T. Hallingbäck had the opportunity to look for it and refound it successfully at one of its old sites. It was found with ripe sporophytes, in a small population in a canyon on three boulders close to a forest brook. The population was very sparse and the site needs some kind of protection immediately.

32. *Thamnobryum neckeroides* (Hook.) E.Lawton

Contributors: T. Hallingbäck and M. Hagström

Sweden: Småland province, Norrahammar parish, a steep slope just W of the town, 57°42'05"N, 14°06'33"E, 10 April 2013, *leg.* M. Hagström *s.n.* (S).

The material was first determined by T. Hallingbäck and later on confirmed by both Dr Michael Ignatov (Moscow) and Dr Johannes Enroth (Helsinki). *T. neckeroides* is new to Sweden and Scandinavia. The population is very sparse, without any spore capsules and the site needs some kind of protection immediately. It grows on shaded moist ultrabasic rocks along a brook on a steep forest slope.

33. *Weissia controversa* Hedw.

Contributors: G. M. Suárez, J. R. Flores and R. H. Zander.

Paraguay: Paraguari, 3 km al norte de Paraguari, Cerro Hú, 25°36'20"S, 57°08'08"W., 135 m a.s.l., *leg.* G. Suárez, M. Dematteis, E. Meza Torres & A. Vega 1487 (LIL, MO, IBONE).

The bryoflora of Paraguay, as is the case with certain other South American countries (Suárez & Schiavone, 2013), is poorly known. As part of a project 'Studies of the Bryophyte Flora of the Cone Sur (Systematics and Phylogeny)' specimens recently collected in Paraguay were identified as *Weissia controversa* Hedw., a genus and species not previously recorded in this country. Nine genera and 13 species of the family Pottiaceae are recorded in Paraguay (O'Shea & Price, 2008).

Weissia controversa is well known as one of the more characteristic species of *Weissia*. It is widely distributed around the world, and in South America is known from Colombia, Venezuela, Ecuador, Bolivia, Brazil (Delgadillo *et al.*, 1995) and Argentina (Matteri, 2003). In Paraguay it was found growing on soil, in Paraguari (Cerro Hú), an area of the humid Chaco, which has an annual average precipitation range of 500–1200 mm, and temperatures between 20–23°C.

This species is characterized by the long-lanceolate to oblong-lanceolate, mucronate, leaves with incurved margins. In the Paraguayan plants, a peristome in the operculate capsule may be entirely wanting or reduced. *W. controversa* is illustrated by Zander (1993: Plate 59, Figures 1–11) and in *Flora Briofítica Ibérica* by Guerra (2006: Plate 19, Figures a–f).

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