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Bryological Note

New national and regional bryophyte records, 32

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1. ***Anoectangium stracheyanum*** Mitt.

Contributors: P. Sollman and A. Schäfer-Verwimp

Canada: British Columbia, Vancouver Island, Barclay Sound, 49°04'N, 125°09'W, damp cliff near cascade near head of Effingham Inlet, 30 October 1970, *leg.* W. B. Schofield *43525*, *det.* P. Sollman (original *det. A. aestivum*) (L); British Columbia, Two Waterfall area, from Kathlyn Glacier on Hudson Bay, Mt Smithers, chartreuse tufts in cliff crevices, 22 July 1974, *leg.* W. B. Schofield *56711*, *det.* Sollman (original *det. A. aestivum*) (GRO, L). **USA:** Hawaii, Kilauea, NE ledge, *ca* 19°14'N, 155°16′W, 1219 m a.s.l., 25 December 1961, *leg.* V. J. Krajina *s.n.*, *det.* P. Sollman 2012 (*det.* O. Lee as *A. euchloron*), (KRAM, L). **Mexico:** Hidalgo, near Honey Station, mixed with *Hymenostylium recurvirostrum*, 17 June 1908, *sin. coll. s.n.*, *det.* P. Sollman (*det.* Cardot as *Hymenostylium recurvirostrum* (Hedw.) Dixon) (L); Tennessee, Ladera, Norte Mont Le Conte, Sevier Co., bosque deciduo, sobre declive de roca, lugares sombreados y húmedos, *leg.* C. Delgadillo M. *1558*, *det.* P. Sollman (*det.* R. H. Zander, 1982 as *A. aestivum*) (U, L). **Costa Rica:** Prov. de Cartago, along Inter American Highway, Bamboo brake about 8 km NW of summit at La Ascencion, 9°37′N, 83°47′W, 3200 m a.s.l., on vertical shaded rock base, 15 March 1973, *leg.* M. R. & C. A. Crosby *8631*, *det.* P. Sollman (*det.* M. R. Crosby as *A. aestivum*) (L); Prov. de San José, Páramo Cerro de la Muerte near the American Highway, 9°34.204′N, 83°45.220′W, 3350 m a.s.l., in waterfall along the Highway, 28 March 2010, *leg.* H. van Melick *21.44.41*, *det.* P. Sollman (*herb*. H. van Melick); Cordillera de Talamanca, San Gerardo de Dota, [*ca* 9°33′N, 83°48′W], Weg von Ferienanlage Chacon zu 'Las Cruzes' am Rio Savegre, im Primärwald an sickerfeuchter Felswand, 1900 m a.s.l., 25 December 1999, *leg.* A. Schäfer-Verwimp & I. Holz *SV/H-0115*, *det.* P. Sollman (INB, JE, L, STU, *herb*. Schäfer-Verwimp). **Ecuador:** Prov. Cotopaxi, road Angamarca — El Corazon, ravine with high montane forest, rather dry type, 78°59′W, 1°08′S, 2950 m a.s.l., 7 July 1979, *leg.*

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L. Holm-Nielsen & R. Andrade *18529*, *det.* P. Sollman 2012 (*det.* W. C. Steere as *A. aestivum*), (U, L). **Peru:** In peruviae meridion oriental valli Sandia, June 1854, *leg.* J. K. Hasskarl *s.n.*, *det.* P. Sollman [original *det. Hymenostylium kunzeanum* (Müll.Hal.) Müll.Hal.] (L). **Bolivia:** Cochabamba, a Felsen in den 'Estradillas' bei Incacorral, *ca* 2800 m, January 1908, *leg.* T. Herzog *s.n.*, *det.* P. Sollman (original *det. A. lineare*) (KRAM); same locality and date, *leg.* T. Herzog *70*, *det.* P. Sollman (L); La Paz, Prov. Larecaja, canyon 1 km E of Cachipato, SE of Sorata, 15°48.5′S, 68°36′W, 3250 m a.s.l., waterfall ravine, 6 April 1979, *leg.* M. Lewis *79-1624*, *det.* P. Sollman (*det.* R. H. Zander, 1981 as *A. aestivum*) (L, *herb*. Frahm). **Papua New Guinea:** E. Highlands, Mt Wilhelm, Bogonata Ridge, N. facing slope, *ca* 3600–3800 m a.s.l., on dry, rather exposed, vertical, non-calcareous rock face, 4 July 1968, *leg.* B. O. van Zanten *68.715*, *det.* P. Sollman, 2011 (GRO, L); N. facing slope, *ca* 3600–3800 m a.s.l., on earth and dry rocks at base of non-calcareous cliff, more or less shaded, 5 July 1968, *leg.* B. O. van Zanten *68.732*, *det.* P. Sollman, 2011 (GRO, L).

These are the first records of *A. stracheyanum* for Canada, Mexico, Costa Rica, Ecuador, Peru, Bolivia, Hawaii, and Papua New Guinea. This species has long been thought to occur only in SE Asia (Japan, China, Taiwan, Korea, Nepal, India, Sri Lanka, and Myanmar) (Noguchi, 1988; Li *et al.*, 2001; O'Shea, 2002). Gangulee (1972) also listed it from North and South Vietnam, and Touw (1968) recorded it from northern Thailand. It was also reported by Ignatova (2009), from a wide range of localities in Russia, where it had earlier been misidentified as *Anoectangium thomsonii* Mitt. Recently, it had also been recognized from eastern North America (Zander & Eckel, 2007) where it was previously regarded as synonymous with *Anoectangium aestivum* (Hedw.) Mitt. *A. aestivum*, *A. stracheyanum*, and *A. thomsonii* are well illustrated and discussed by Saito (1975), who included a key to distinguish the three species. The new records of *A. stracheyanum* from Papua New Guinea, North, Central and South America, and Oceania, demonstrate its wide geographical and altitudinal range. In Costa Rica, it occurs from near sea level to 3350 m a.s.l., and in Papua New Guinea between 3600 and 3800 m a.s.l.

2. ***Barbula amplexifolia*** (Mitt.) A.Jaeger

Contributor: J. Kučera

Macedonia: Municipality of Tetovo, Šar Planina Mts, Popova Šapka, valley of a brooklet at the eastern slope of Mt Popova Šapka, shaded, slightly base-rich soil below the edge of a pine wood, 42°0′43.4″N, 20°52′30.1″E (WGS-84), 1780 m a.s.l., 14 July 2010, *leg.* and *det.* J. Kučera *13775* (CBFS).

Barbula amplexifolia was described from the Indian Himalaya and later recorded across a broad area in eastern to central Asia, North America, and Greenland. Only recently it was discovered in Europe (Köckinger & Kučera, 2007), where it was reported from numerous localities in the eastern Austrian Alps and a single locality in Switzerland. The authors expected further discoveries to be made in other calcareous alpine regions. Subsequently, the species has been found in Germany (Offner, 2006) and France (Skrzypczak, 2007). The Šar Mountains, located at the boundaries of Albania, Macedonia, and Kosovo, represent a southern extension of the Dinaric Alps, and share with the Alps many high-alpine elements. This has been documented, for example, by Martinčič (2009). Therefore, this record of *B. amplexifolia* is not entirely surprising and will probably be followed by further discoveries of the species in the Dinaric Alps and possibly other Balkan mountain ranges.

3. ***Brachythecium subpilosum*** (Hook.f. & Wilson) A.Jaeger

Contributors: F. Lara and L. Pertierra

South Shetland Islands: Livingston Island, Byers Peninsula, plateau near Limnopolar Lake, 62°39′26.2″S, 61°06′35.7″W, *ca* 120 m a.s.l., biological soil crusts dominated by gelatinous lichens on exposed slopes, 1 February 2010, *leg.* L. Pertierra *s.n.* (MAUAM).

Brachythecium subpilosum was considered to be very rare in Antarctica, since it had been recorded only once, from the northern maritime Antarctic over 100 years ago, at Davis Coast in West Antarctic Peninsula (Ochyra *et al.*, 2008). However, after revision by Ochyra *et al.* (2008), this moss is now regarded as an amphiatlantic temperate species, mainly found in Tierra de Fuego, Patagonia and the Valdivian region and also occurring in subantarctic South Georgia, and the Kerguelen Archipelago.

On Byers Peninsula, *B. subpilosum* has been found forming part of a bryophyte–lichen assemblage that colonizes exposed upland terrains. This cryptogamic community is dominated by the cyanolichen *Leptogium puberulum* Hue, and in the sample studied, *B. subpilosum* and *Sanionia uncinata* (Hedw.) Loeske were the predominant mosses, although they were scarcely noticeable at first sight. Other associated mosses were *Bartramia patens* Brid., *Polytrichastrum alpinum* (Hedw.) G.L.Sm., *Schistidium lewis-smithii* Ochyra, and *Pohlia cruda* (Hedw.) Lindb., all of which are common in diverse habitats in the area (Sancho *et al.*, 1999; Ochyra *et al.*, 2008; Putzke & Pereira, 2001).

4. ***Bryoerythrophyllum inaequifolium*** (Taylor) R.H.Zander

Contributors: P. Sollman and R. Ochyra

Rwanda: Western Province, Rubavu District, Gisenyi, mine at Gikungu, 1°40′S, 29°16′E, alt. *ca*

2000 m, on stony blocks by the wayside in the secondary montane forest, associated with *Bryoerythrophyllum campylocarpum* (Müll.Hal.) H.A.Crum, 24 July 1974, *leg*. J. L. De Sloover *18534A* (KRAM, L).

Bryoerythrophyllum inaequifolium is a pantropical montane species, weakly penetrating to the warm temperate zone of North Carolina in south-eastern North America (Zander, 1978), Macaronesia (Crundwell *et al.*, 1978; Long *et al.*, 1981; Düll, 1992; Frahm *et al.*, 1996), the Eastern Pyrenees of Spain in Europe (Lloret, 1988), and the Sino-Himalayan region in Asia (Li *et al.*, 2001; Aziz & Vohra, 2008). In the tropics, it seems to be frequent only in the New World, ranging from Mexico to Peru (Zander, 1978; Churchill *et al.*, 2000), whereas in Asia, it is frequent in southern India (Aziz & Vohra, 2008) and very rare in Malesia (Eddy, 1990). Likewise, the species is rare in East Africa where it was hitherto recorded from Ethiopia and Tanzania (O'Shea, 2006), and on Réunion Island in the South Indian Ocean (Arts, 2005). Herein, *B. inaequifolium* is recorded for the first time from Rwanda in Central Africa.

5. ***Bryum bessonii*** Renauld & Cardot

Contributors: P. Bansal and V. Nath

India: Eastern Himalaya: Meghalaya, Elephant Falls, Shillong, grows epiphytically, 8 April 1965, *leg.* S. Chandra *s.n.* (LWG no. 201229).

Lal (2005) listed 33 species, one subspecies and four varieties of *Bryum*, distributed through a wide cross-section of India. He also listed another 13 species, one subspecies and three varieties which were endemic to southern India.

Bryum bessonii was described by Renauld and Cardot (Renauld, 1909), and is mainly distributed in Madagascar and Nepal. In India, the species is confined to southern India and the Western Himalaya. Gangulee (1974–1977) reported the species in the Palni hills and Phatak *et al.* (2007) from the Rivona and Zambaulim area of southern Goa. Tewari and Pant (1994) recorded *B. bessonii* from the Nainital district (Kumaun Himalayas), and Bansal *et al.* (2010) from Mussoorie (Garhwal Himalayas).

Plants in this new collection were densely tufted, reddish brown, with subfloral innovations. The leaves were imbricate, erect, lanceolate, reddish at the apex, $\pm 1.8–2.6 \times 0.47–0.53$ mm, with entire, revolute margins, and a strong, slender costa that ended in a long arista. Apical laminal cells were thick-walled, rhomboid-hexagonal to narrowly rhomboid-hexagonal, $48–55 \times 6.4–8.6$ μm, and the median laminal cells were $55–70 \times 4.3–8.6$ μm. At the leaf margin, the cells were narrower but did not form a distinct border, and in the leaf base, the laminal cells were reddened, quadrate to sub-rectangular.

6. ***Bryum canariense*** Brid.

Contributor: J. van Rooy

Mozambique: Maputo Province: 12 km from Ponta de Ouro to Zitundo, Cele River, dry riverine forest, on sand, 15 July 1971, *leg.* M.F. Correia & A. Margues *2181* (PRE); between Ponta Malongane and Ponta Madejanine, closed woodland with trees up to 12 m high, 10 July 1973, *leg.* M.F. Correia & A. Margues *2946* (PRE). Gaza Province, Bilene, 11 km from Praia de São Martinho do Bilene to Macia, terrestrial, dry and closed forest, 6 November 1969, *leg.* M.F. Correia & A. Margues *1403* (PRE).

This species prefers Mediterranean and adjacent coastal areas in Europe, North Africa and South-west Asia, North and South America, and western and southern Africa. In southern Africa, *Bryum canariense* is known from South Africa, Lesotho, Swaziland, Zimbabwe, Zambia, and Tanzania (O'Shea, 2006), and now also from sandy soils in dry coastal forests of Mozambique.

7. ***Bryum dichotomum*** Hedw.

Contributor: J. van Rooy

Mozambique: Maputo (Lourenço Margues), Mission Grounds, 26 November 1917, *leg.* H.A. Junod *CH3906* (PRE).

This material was collected in 1917 by Henri-Alexandre Junod, a missionary stationed at the evangelists' school at Rikatla, about 30 km north of Lourenço Margues (Glen & Germishuizen, 2010). The specimen was incorporated into the T.R. Sim Herbarium and originally filed under another name. *Bryum dichotomum* is sub-cosmopolitan in distribution and occurs throughout southern Africa (O'Shea, 2006; Ellis *et al.*, 2011c), often in disturbed places.

8. ***Cephalozia macrostachya*** Kaal. var. ***spiniflora*** (Schiffn.) Müll.Frib.

Contributor: V. Hugonnot

France: Puy-de-Dôme, Réserve naturelle de Chastreix-Sancy, Chastreix (Suchère), 1150 m a.s.l., 2°44′22.-668″W, 45°29′18.24″N, and 2°44′33.612″W, 45°29′12.-12″N, 13 September 2011 (*Herb*. Conservatoire Botanique National du Massif Central and E).

The status of *Cephalozia macrostachya* var. *spiniflora* has long been debated. Although it was initially described as a new species, *Cephalozia spiniflora* Schiffn., it was then reduced to a variety of *C. macrostachya* (Müller, 1912). The development of antheridia and archegonia is frequently abnormal (Paton *et al.*, 1996), a situation which prompted some authors to postulate a teratological origin of the var. *spiniflora* (Meinunger & Schröder, 2007c).

In constrast with *C. macrostachya* var. *macrostachya*, which is widely spread in western Europe, and to a lesser extent in central Europe and northeastern USA, *C. macrostachya* var. *spiniflora* has a very narrow distribution, being rarely recorded from localities in Poland (Szweykowski, 1958) where the *locus classicus* is. It has been rather rarely cited from

Britain (Paton *et al.*, 1996; Hill *et al.*, 1991) and Ireland (Holyoak, 2003), Germany (Meinunger & Schröder, 2007c), the Nordic countries (Norway and Sweden: Damsholt, 2002), and Latvia (Söderström *et al.*, 2002a). Nevertheless, the distribution of var. *spiniflora* may have been underestimated owing to the wide species concept indistinctly encompassing both varieties. For example, Bouman (1993) describes (and pictures) *C. macrostachya* from the Netherlands as sometimes having distinctly dentate male bracts, which is a character of the var. *spiniflora*.

The variety has been recently collected in the Massif Central of France, in a *Sphagnion medii* M.Kästner & Flössner 1933 raised bog, dominated by ericaceous vegetation [mostly *Calluna vulgaris* (L.) Hull] and Sphagna. The vegetation was characterized by an almost regular alternation of hummocks and hollows, with generally rare lawns of *Sphagnum magellanicum* Brid. Hummocks were mostly made of *Sphagnum capillifolium* (Ehrh.) Hedw., whereas *S. compactum* Lam. & DC. and *S. tenellum* (Brid.) Pars. ex Brid. were found at the margins of wet hollows. *C. macrostachya* var. *spiniflora* was observed growing on or among the Sphagna, mostly *Sphagnum capillifolium*, or directly on eroded peat. Associated bryophytes included other Sphagna-inhabiting liverworts, like *Kurzia pauciflora* (Dicks.) Grolle, *Mylia anomala* (Hook.) Gray, *Odontoschisma sphagni* (Dicks.) Dumort., *O. denudatum* (Mart.) Dumort., and *Cephalozia connivens* (Dicks.) Lindb.

Ecological data are scarce in the literature owing to the rarity of the variety. From a survey of available publications, it appears to be a plant with similar ecological requirements to the type variety of *C. macrostachya* (Paton *et al.*, 1996; Damsholt, 2002). A slight difference in microhabitat preference is suggested in Paton *et al.* (1996), where var. *macrostachya* is reported as restricted to 'saturated bogs', and var. *spiniflora* to 'damp heathland and from peat in cut-over bogs'. In France, var. *macrostachya* was remarkably absent from the raised bog colonized by var. *spiniflora*, whereas it was very abundant in other sites situated in the vicinity, occupying the wettest lawns composed of *Sphagnum fallax* (H.Klinggr.) H.Klinggr. and *S. magellanicum*. Noticeably there, associated liverworts were *Cladopodiella fluitans* (Nees) Buch and *Gymnocolea inflata* (Huds.) Dumort., indicating far wetter conditions. From a general point of view, Sphagna-inhabiting species of *Cephalozia* surely have ecologically distinct optima that are still poorly documented in the literature (Váňa & Kučera, 2002).

Our material agreed in all major characters with that described and pictured in Damsholt (2002), Paton *et al.* (1996), and Paton (1999). Characteristics included — the yellowing of the stem medullary cells, small leaf cells (20–30 μm wide), long male spikes, strongly dentate male bracts, variable inflorescence (male individuals were frequent, autoicous, and paroicous ones too), and an absence of perianths while female bracts (and archegonia) were formed. In our material, the gemmae were about 18 μm wide, slightly smaller than those mentioned in the literature.

9. ***Chionoloma bombayense*** (Müll.Hal.) Sollman

Contributors: P. Sollman and R. Ochyra

Burundi: slopes of Karera near Mwishanga, chutes de la Karera, alt. *ca* 1500 m a.s.l., on roots emerging from soil in shady site, 24 September 1974, *leg*. J. L. De Sloover *19304* (KRAM, L).

Chionoloma bombayense is a palaeotropical species, of greatest abundance in Asia, where it penetrates extensively into the temperate zone in Japan and China (Sollman, 2000). It reaches its northernmost extent in the Tian Shan in north-west China (Li *et al.*, 2001). In the east, *C. bombayense* extends to the Hawaiian Islands in the Pacific Ocean (Staples *et al.*, 2004). The species is widespread in sub-Saharan Africa, ranging from Sierra Leone and Ethiopia in the north (O'Shea, 2006) to Lesotho and KwaZulu-Natal in South Africa (Hodgetts *et al.*, 1999), and extending to the Mascarene Islands in the South Indian Ocean (O'Shea, 2006). It was recorded from all countries in Central and East Africa except for Burundi, and the present discovery fills this gap in its African distribution.

10. ***Colura calyptrifolia*** (Hook.) Dumort.

Contributors: B. Cykowska, H. Bednarek-Ochyra, R. Ochyra, J. Váňa, and M. Lebouvier

Île Amsterdam: below the cliff between Mont Le Pignon and Mont de La Dives above Les Grandes Ravines, 37°51′16.456″S, 77°32′27.319″E, alt. 748 m a.s.l.; on shoot of *Polytrichastrum formosum* (Hedw.) G.L.Sm., 22 December 2006, *leg.* M. Lebouvier *B06-7a* (EGR, KRAM).

The Lejeuneaceae is the largest family of liverworts that exhibits the greatest diversity in the tropics. Only occasionally species of this family penetrate into the cool and cold regions of the globe, for example *Lejeunea alaskana* (R.M.Schust. & Steere) Inoue & Steere in the Nearctic (Steere & Inoue, 1978). In the southern polar regions, the only species extending to the Subantarctic is *Colura calyptrifolia*, which is known from the Prince Edward Islands and Îles Crozet in the Kerguelen Province of this biome (Grolle, 2002). This is a bipolar species, principally with an amphiatlantic south-temperate range in the southern hemisphere. It is widely scattered in South America, extending from Tierra del Fuego to the Juan Fernandez Islands and Bolivia (Gradstein *et al.*, 1983; Hässel de Menéndez & Rubies, 2009), with an isolated station in the Serra de Itatiaia in SE Brazil (Schäfer-Verwimp, 1996). Northwards, it extends to

the Dominican Republic (Schäfer-Verwimp & Pócs, 2009) and Cuba (Reyes, 1979) in the West Indies. In contrast, in Africa, the species is occasional and localized in the mountains from KwaZulu-Natal to Uganda (Wigginton, 2009). It is also known from intermediate Afro-American stations in Tristan da Cunha in the middle of the Atlantic Ocean (Váňa & Engel, 2012). In the northern hemisphere, *C. calyptrifolia* has a Eurasian distribution, occurring in Macaronesia and, in the areas of Western Europe with a hyperoceanic climate such as north-western France, Britain and Ireland (Birks, 1991). It then reoccurs at remote stations in Asia, including Nepal in the Himalayas (Zhu & Long, 2003) and Sri Lanka (Onraedt, 1979).

Gradstein *et al.* (1983) indicated, on a map of the global distribution of *C. calyptrifolia*, its occurrence on Mauritius in the Indian Ocean and referred this record to Jones (1979). This is apparently an error, as the latter author made no mention of this species in his paper. Nevertheless, *C. calyptrifolia* does occur in the temperate zone of the South Indian Ocean and it was recently recorded on Réunion Island (Ah-Peng *et al.*, 2008). Here it is reported for the first time from Île Amsterdam. A few plants of this minute hepatic were found at high elevation on the island, on shoots of *Polytrichastrum formosum* (Hedw.) G.L.Sm. This highly isolated and orphaned island is still poorly known bryologically. Grolle (2002) reported only 15 species of liverwort, and an additional five species were reported in Blockeel *et al.* (2009) and Váňa *et al.* (2010). Including the present record, the hepatic flora of Île Amsterdam now consists of 21 species.

11. ***Cylindrocolea atroviridis*** (Sim) Váňa

Contributor: N. Phephu

Swaziland: Hhohho District, Malolotja Nature Reserve, Mhlangamphepha road, small wattle forest near top of Mhlangamphepha valley, 26°10′05″S, 31°03′45″E, '5300 ft.'[1615 m] a.s.l., in sour grassland, full shade, on well drained earth banks above road, loamy soil, 10 March 1993, *leg.* K. P. Braun *1458* (PRE).

This new regional record of a leafy liverwort was discovered subsequent to the publication of the latest checklist of South African liverworts (Perold, 2006). Plants in the collection were light, brownish, or reddish green, with stems lacking stolons. The leaves were succubous, laterally inserted on the stem, and bilobed; underleaves were lacking, and the seta possessed a central strand surrounded by four large, thin-walled cells (Arnell, 1963; Gradstein *et al.*, 2001). This species is known in Africa from the Central African Republic, Cameroon, Côte d'Ivoire, Ghana, Lesotho, Madagascar, Mozambique, Nigeria, Rwanda, South Africa, Sierra Leone, Uganda, Democratic Republic of Congo, and Zimbabwe (Wigginton, 2009).

12. ***Didymodon tectorum*** (Müll.Hal.) K.Saito

Contributors: P. Sollman and R. Ochyra

Africa, Rwanda: Rugege forest, Uwinka refuge, alt. *ca* 2440 m a.s.l., on a concrete vertical wall of the barrack foundation, 20 December 1971, *leg*. J. L. De Sloover *12525* (KRAM, L).

For a long time, *Didymodon tectorum* was considered to be an Asian species but it was subsequently found in North America (Zander & Ochyra, 2001) and this discovery changed its phytogeographical status, making it an East Asian−North American species. The main centre of its occurrence is on mainland Asia in temperate China, where it ranges from Heilongjiang Province in the northeast to Guizhow and Yunnan Provinces in the south to eastern Xizang Province in the west (Li *et al.*, 2001). Recently, its range was extended to Pakistan (Sollman, 2008), and it has been recorded from the two Japanese islands of Kyushu and Shikoku (Saito, 1975), but these latter stations require confirmation. Although Noguchi (1988) questioned the correctness of these records, Iwatsuki (2004) maintained *D. tectorum* as a member of the Japanese moss flora. In North America, the species is widely distributed but scattered in the western part of the continent, occurring in Colorado and New Mexico in the USA and Baja California Norte in north-western Mexico. While in eastern North America, it has been found only in Maryland, USA (Zander & Ochyra, 2001). The species was subsequently discovered at a very disjunct station on Réunion Island in the South Indian Ocean (Arts, 2005). Herein, it is recorded from Rwanda and this is the first discovery of *D. tectorum* from mainland Africa. The plants were sterile but produced brown, spherical tubers in profusion. The discovery of *D. tectorum* in tropical Africa makes the range of this species very anomalous and indicates that further discoveries of this species may be expected in tropical mountain areas.

13. ***Diplophyllum obtusifolium*** (Hook.) Dumort.

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

Portugal: Minho, Braga, Terras de Bouro, Vilar da Veiga, road from Portela de Leonte to Cabeços de Cancelo, 29TNG7025, 959 m a.s.l., on a wet slope of shale area, with *Pogonatum nanum* (Hedw.) P.Beauv., 7 June 2010, *leg.* C. Sérgio, C. Garcia & S. Stow *s.n.* (LISU248138).

Diplophyllum obtusifolium is a pioneer species of open acidic soil, occurs on slopes or edges of paths, and is found in areas that have recently suffered a fire. It can be confused with *Diplophyllum albicans* (L.) Dumort., but is easily identified, as it is monoicious (paroicous) and without a typical vitta. It should be noted that this liverwort was reported from Switzerland also associated with *Pogonatum nanum* (Itten & Urmi, 2002).

Diplophyllum obtusifolium had been erroneously reported from Portugal in Ros *et al.* (2007), but this record is based on phytosociological *relevés* from the Serra da Estrela and on revision of this material, it was confirmed to be *D. taxifolium* (Wahlenb.) Dumort. Therefore, this new collection of *D. obtusifolium* in the Minho province becomes its first locality for Portugal.

14. ***Ditrichum gracile*** (Mitt.) Kunze

Contributors: A. Alegro, V. Šegota and M. Sabovljević

Croatia: Velika Kapela Mt, Samarske stijene, *ca* 1200 m a.s.l., exp 300°, 45°13′28″N, 14°57′09″E, on the limestone rocks, 4 August 2010, *leg*. A. Alegro & V. Šegota *s.n*., *det.* A. Alegro, M. Sabovljević (BEOU 6008, ZA 3152).

Ditrichum gracile was recorded during a vegetation survey of spruce forests. A new record made in the locality Samarske stijene (strongly protected as a botanical reserve) in the Velika Kapela Mountain is the first report of this species for Croatia. According to Sabovljević (2006) and Sabovljević *et al.* (2008), it was not known from Croatia. However, it has been recorded from other Balkan countries, and some of these records are also recent or new: Albania, Bulgaria, Bosnia-Herzegovina, Montenegro, Romania, Slovenia, and Serbia (Sabovljević *et al.*, 2008; Blockeel *et al.*, 2009; Papp & Erzberger, 2009, 2010). It has also been recorded recently in neighbouring Hungary (Erzberger, 2001).

The area of Samarske stijene is characterized by cool and long winters, covered in snow for 70–100 days, with *ca* 3000 mm of annual precipitation and an average annual temperature of 4–6°C. The natural vegetation consists mainly of beech, fir, and spruce forests.

Ditrichum gracile occurred within forests of common spruce belonging to the community *Hyperico grisebachii - Piceetum*, which inhabits distinctly rocky peaks, ridges, and high, steep, and exposed slopes (Vukelić *et al.*, 2010). The moss inhabited shaded limestone rocks on the forests floor, forming distinct patches of several square decimetres. Other most commonly occurring moss and liverwort species were: *Ctenidium molluscum* (Hedw.) Mitt., *Dicranum scoparium* Hedw., *Tortella tortuosa* (Hedw.) Limpr., *Fissidens dubius* P.Beauv., *Rhytidiadelphus loreus* (Hedw.) Warnst., *Polytrichum formosum* Hedw., and *Plagiochila porelloides* (Nees) Lindenb.

The plants were of typical appearance, medium to robust, in reddish green to purplish black, rarely green, patches. The species is widely, but sparsely distributed over the northern hemisphere, so its presence in Croatia was expected, considering both its occurrence in neighbouring areas and the poorly bryologically studied Balkan area.

15. ***Ephemerum crassinervium*** (Schwägr.) Hampe subsp. ***rutheanum*** (Schimp.) Holyoak

Contributor: V. Hugonnot

France: Ardéche, Le Teil, Île de la Barcasse, 67 m a.s.l., 04°41′49.632″W, 44°31′44.76″N, 13 October 2010, *leg.* Hugonnot *s.n.* (*Herb*. Conservatoire Botanique National du Massif Central).

Ephemerum rutheanum Schimp. was considered as a European endemic in the recent taxonomic revision by Holyoak (2010). It is known from very scarce records in Poland, the Netherlands, Germany, Ireland (as *Ephemerum hibernicum* Holyoak & V.S. Bryan), and France. Some costate specimens of *Ephemerum*, with intermediate characters between *Ephemerum sessile* and *E. rutheanum*, or between these taxa and *E. crassinervium*, were also collected in Europe (Holyoak, 2010). Hence, this author proposed a taxonomic system treating *Ephemerum sessile* (Bruch) Müll.Hal., E. crassinervium, and *E. rutheanum* as subspecies of *E. crassinervium*. Out of these three subspecies, known to occur in Europe, only the type subspecies remains unrecorded in France. *Ephemerum crassinervium* subsp. *sessile* (Bruch) Holyoak is known from numerous records, notably in the Mediterranean region.

In France, *E. crassinervium* subsp. *rutheanum* was apparently only known from several old records in Saône-et-Loire (Boulay, 1884; Husnot, 1884–1890). The new locality is located in the Rhône valley, at a distance of more than 200 km from the localities in Saône-et-Loire, which suggests that the species could be more widely distributed in south-eastern France, notably along large river valleys like that of the Rhône.

Ecological data are scarce in the literature owing to the rarity of the subspecies. In France, according to herbarium labels, *E. crassinervium* subsp. *rutheanum* was collected in flooded sites in the inundation zones of lakes. This appears to be concordant with literature data (Holyoak & Bryan, 2005; Meinunger & Schröder, 2007a; Holyoak, 2010). Contrarily, our new record occurred in alluvial *Bromus erectus* Moris and *Brachypodium pinnatum* (L.) P.Beauv. grasslands, subject to periodic flooding, but which totally dry out during summer. This suggests wider ecological amplitude than previously realized.

Our material had leaves with a well-developed costa, smooth laminal cells running in straight lines, and occasional large marginal spines. The capsules had a straight apiculus. The sporophytes were not completely developed at the time of collection, hence the characters of the spores could not be assessed.

16. ***Fissidens adianthoides*** Hedw.

Contributors: F. Salimpour, M. Behroozmand Motlagh, F. Sharifnia, A. Mazooji, and S. Akhoondi Darzikolaei

Iran: Gilan province, between Parresar and Asalem, Gisoum Forest, 49°00′E, 37°40′N, 25 m a.s.l., in moist soil, *leg.* F. Salimpour, M. Behroozmand

Motlagh, F. Sharifnia, A. Mazooji & S. Akhoondi Darzikolaei *0361B* (TEH).

Despite their similarities, *Fissidens adianthoides* Hedw., *F. dubius* P.Beauv. [*F. cristatus* Wilson ex Mitt. (Watson, 1955; Smith, 2004)], and *F. osmundioides* Hedw. (Pursell, 2007) were shown by Kürschner (2008), to differ in features such as their leaf length, layers of leaf cells, the width and thickness of their laminal cells, their bands of marginal cells, the diameter of their spores, and their habitats. Small forms of *F. adianthoides* may be confused with *F. dubius* (Smith, 2004), and it seems that its distinction from *Fissidens crispus* Mont., which occupies similar habitats, has also been problematic.

Plants of *F. crispus* are mostly small, less than 5 mm long. The leaves have a thin border formed by 1–2 rows of elongated cells that are present on all three laminae but not continuous with the costa (the leaves are unbordered in *F. adianthoides*). The leaf base is not distinctly decurrent, and the laminal cells are mostly 48 μm diameter, bulging from both leaf surfaces (Kürschner, 2008). *F. osmundoides* is distinguished by its papillose rhizoids, evenly crenulate–serrulate leaf margin, broadly acute to obtuse and sometimes apiculate leaf apex, a costa that ends well before the leaf apex, and terminal sporophytes. It is most likely to be confused with *F. adianthoides*. In the latter, plants are 3–10 cm long, occurring in damp or wet habitats in flushes (Kürschner, 2008). The leaves lack limbidia, but have a band of pale marginal cells and an irregularly serrate apex. The lamina is unistratose and pellucid, with cells 14–20 μm in diameter. Rhizoids are smooth, and sporophytes are produced in the axils of proximal leaves (Pursell, 2007). In contrast, plants of *F. dubius* are found on shaded soil and rocks and reach 1–3 cm long, and their lamina is partly bistratose and opaque with cells 6–12 μm in diameter.

The family Fissidentaceae is remarkable for medical treatments in many countries, such as China and Egypt, and some parts of Europe and North America. For example, *F. osmundoides* has been used as an antibacterial agent to treat sore throats in Bolivia and several Asian countries. The Chinese use *F. adianthoides* to encourage hair growth, and the native Nitinaht people of Vancouver Island, Canada, use it to bandage wounds (Glime, 2007). This newly reported specimen of *F. adianthoides* adds to the 15 species of *Fissidens* hitherto recorded from Iran (Akhani & Kürschner, 2004; Frey & Kürschner, 2010). The nearest previous discoveries of the species include collections from Israel and Turkey (Kürschner, 2008).

17. ***Fissidens monguillonii*** Thér.

Contributor: R. D. Porley

Portugal: Algarve, Ribeira Upper Azenha, near Carascalhino, 29S 0523827/4135944, *ca* 115 m a.s.l., on rock (greywacke) in channel of river in a *Rhododendron* L. ravine, in a zone splashed by water, with *Rhamphidium purpuratum* Mitt. and *Riccardia multifida* (L.) Gray, and on exposed rootlets of alder growing in splash zone of cascade a few metres further downstream, 14 January 2012, *leg*. R. D. Porley *s.n.*, *det*. Bruggeman-Nannenga (LISU and *Herb*. R. D. Porley).

Small hydrophilous, limbate specimens of *Fissidens* are notoriously variable and present considerable identification difficulties. *Fissidens monguillonii* has often been characterized by its long and narrow perichaetial leaves, but this is a rather variable character (Bruggeman-Nannenga, pers. comm.). The key characters for the species are the wide peristome teeth at insertion (45–60 μm), large mid-dorsal laminal cells (10–18 (20) μm), and the dull rufous brown colour of the cell walls, nerve, and limbidia (Bruggeman-Nannenga, 1985).

F. monguillonii is an oceanic southern-temperate species, and considered rare in Europe (ECCB, 1995), being known from Belgium, Britain (Near Threatened, Hodgetts, 2011), France, Germany, Ireland (Near Threatened, Lockhart *et al.*, 2012), Luxembourg (Vulnerable, Werner, 2003), and Spain (Data Deficient, Sérgio *et al.*, 2006). It is also known from Madeira.

18. ***Frullania fragilifolia*** (Taylor) Gottsche, Lindenb. & Nees

Contributors: L. Liepina, A. Mežaka, L. Strazdiņa, L. Madžule, and I. Rēriha

Latvia: Slitere National Park 57°37′48.5″N 22°17′38.7″E in the Latvia ancient shoreline of the Baltic Ice lake Slīteres Zilie kalni (Blue Hills), 1 August 2008, *leg.* L. Liepiņa *s.n.* (RIG); Vidale, 22°31′25.1″N 57°36′59.6″E, 28 July 2009, *leg*. L. Liepiņa *s.n.* (RIG); Alsunga, 56°56′1.7″N 21°25′46.6″E, 4 October 2010, *leg.* I. Rēriha *s.n.* (RIG).

In 2008, *Frullania fragilifolia* was newly discovered in Latvia. This species was described (Grolle & Long, 2000) as a liverwort from areas of medium exposure or from shady places in natural forests, developing preferentially on granitic rock, but also occurring on trees and shrubs, such as *Arbutus unedo* L., *Betula celtiberica* Rothman. & Vasc., *Castanea sativa* Mill., *Crataegus monogyna* Jacq., *Ilex aquifolium* L., *Olea europaea* L., *Pinus halepensis* Mill., and *Quercus robur* L., generally in high mountainous zones (Sim-Sim, 1999). Düll (1983) described *F. fragilifolia* as a suboceanic mountainous species, a recent colonist of Northern Europe (Fennoscandia), and Central and Southern Europe. It has also been recorded in the north of Russia, in Macaronesia, Canary Islands, and the Azores. In Slovakia, *F. fragilifolia* is a rare species (Šoltes, 2000) and grows on the bark of *Fraxinus* L. and *Corylus* L. species. In 2008, the species was found for the first time in Turkey, in very wet habitats in the

mountains (Ezer *et al.*, 2008). In the British Isles, the species commonly occurs on steep or vertical surfaces of acid to base-rich rocks and boulders but rarely on limestone (Paton, 1999).

In Latvia, *F. fragilifolia* was found in black alder forests, commonly on trees with smoother bark: *Alnus glutinosa* (L.) Gaertn., *Sorbus aucuparia* L., and *Ulmus glabra* Mill., at a height of 0.5–2.5 m.

The smooth mats *F. fragilifolia* were from 0.5 to 5.0 cm in circumference. According to Jonsson and Söderström (1988), field observations of *Frullania*, *Metzgeria*, and *Radula* in Flanders (using photography of patches) suggested growth rates of about 10–12 mm/year. For *F. fragilifolia*, this implied a population age of 30 years, with a good capacity for regeneration.

Six accompanying bryophyte species were found on the same trees with *F. fragilifolia*: *Hypnum cupressiforme* Hedw., *Radula complanata* (L.) Dumort., *Dicranum montanum* Hedw., *Ulota crispa* (Hedw.) Brid., *Neckera complanata* (Hedw.) Hübener, and *Isothecium myosuroides* Brid. Lichen species were also present on the trees with *F. fragilifolia*: *Thelotrema lepadinum* (Ach.) Ach., *Phyictis argena* (Ach.) Flotow, *Pertusaria amara* (Ach.) Nyl., *P. leioplaca* DC., *P. pertusa* (Weigel) Tuck., *Arthonia spadicea* Leighton, *Graphis scripta* (L) Ach., *Lecidella elaeochroma* (Ach.) M.Choisy, *Melanelia olivacea* (L.) Essel., and *Cladonia coniocraea* (Flörke) Spreng.

Frullania fragilifolia is a rare species in Latvia, with a maritime distribution. Further investigations are necessary for a more thorough evaluation of the distribution.

19. ***Hedwigia stellata*** Hedenäs

Contributors: P. Erzberger and T. Pócs

Tanzania: Mt Kilimanjaro, surroundings of Horombo hut, *Erica* L. scrub with *Senecio kilimanjari* Mildbr., on soil between vulcanic rocks and boulders, associated with *Hedwigia integrifolia* P.Beauv., 03°08′18.4″S, 037°26′22.0′E, 3740 m a.s.l., 2 February 2012, *leg.* & *det*. P. Erzberger *s.n.* (B. Erzberger 14982, 15021, 15023).

Since the description of *Hedwigia stellata* by Hedenäs (1994), the species has been reported from various parts of Europe (Crundwell, 1995; Erzberger, 1996), western North America (Buck & Norris, 1996), Asia (Turkey: Kürschner *et al.*, 1997), and Africa (Morocco: Jiménez *et al.*, 2002; Kenya: Chuah-Petiot, 2003; Ellis *et al.*, 2010). The Moroccan record (Jiménez *et al.*, 2002) was published as new to Africa, and Townsend's record from Mt Kenya (Ellis *et al.*, 2010) as new to Kenya. However, Townsend had overlooked the bryophyte flora of Kenya by Chuah-Petiot (2003), where *H. stellata* is recorded, and also illustrated, from Mt Elgon and Mt Kenya. There is an interesting illustration in De Sloover (2003, Plate 92), under the name of *Hedwigia ciliata* (Hedw.) P.Beauv., of a specimen collected in Rwanda that obviously represents *H. stellata*. A duplicate of this specimen in EGR was recently revised as *H. stellata* by T. P., as well as several other specimens from Kenya (Aberdare Mts, Mt Elgon, and Mt Kenya) and Tanzania (Pócs, unpublished). The Tanzanian specimens (from Mt Kilimanjaro) were earlier published as *H. ciliata* (Pócs, 1994), prior to the description of *H. stellata*, but they do in fact represent the latter species.

20. ***Jungermannia exsertifolia*** Steph. subsp. ***cordifolia*** (Dumort.) Váňa

Contributors: C. Garcia, M. Sim-Sim, S. Stow and C. Sérgio

Portugal: Trás-os-Montes e Alto Douro, Bragança, Alimonde, 29TPG7528, 751 m a.s.l., immersed, on rocks in the river, 1 February 2012, *leg.* C. Garcia, M. Sim-Sim & S. Stow *s.n.* (LISU248236).

Jungermannia exsertifolia subsp. *cordifolia* has been recorded for the first time in Portugal. This aquatic foliose liverwort was found completely submerged on river rocks in Trás-os-Montes e Alto Douro province. Although it had never been recorded in Portugal, this plant is relatively common in Spain, found in the northern half of the Iberian Peninsula and in the Sierra Nevada (Casas *et al.*, 2009). It is a species of least concern according to the Iberian Peninsula Red List (Sérgio *et al.*, 2006). At the European level, it is also widely distributed (Söderström *et al.*, 2002b, 2007).

A wide variety of compounds, including antimycobacterialones, have been discovered in this species (Nagashima *et al.*, 1996; Scher *et al.*, 2010) and it is used in studies concerning physiological variations in response to ultraviolet (UV) radiation (Martinez-Abaigar *et al.*, 2002; Arroniz-Crespo *et al.*, 2006; Nuñez-Olivera *et al.*, 2009; Fabon *et al.*, 2010).

The population found was abundant and in good condition, owing to the quality of the habitat, which has a high floristic richness.

21. ***Lophozia ascendens*** (Warnst.) R.M.Schust.

Contributors: M. V. Dulin and D. A. Philippov

Russian Federation: I. Vologda Region, (1) Ust'-Kubenskiy district, 3 km to NW of the village of Markovskaya, near lake Susel'skoe, 60°04′60.9″N, 39°02′23.0″E, *ca* 145 m a.s.l., in a pine-birch herb and sedge-rich and forest, on rotten log, with *Calypogeia muelleriana* (Schiffn.) Müll.Frib., *Chiloscyphus pallescens* (Ehrh. ex Hoffm.) Dumort., *Lophocolea heterophylla* (Schrad.) Dumort., *Ptilidium pulcherrimum* (Weber) Vainio, and *Riccardia latifrons* (Lindb.) Lindb., plants with gemmae, 2 July 2009, *leg*. D.A. Philippov *09-211* (IBIW); (2) Vytegra district, 22 km to N of the settlement of Yanishevo, Andomskaya height, 4 km to SE of lake Soydozero, near mire Il'inskoe, 61°26′45.6″N, 37°33′09.2″E, *ca* 240 m a.s.l.,

in *Calamagrostis*-cowberry 10–12 year cutover area, on rotten spruce log, with *Lophocolea heterophylla*, 17 August 2010, *leg*. D.A. Philippov *10-742* (IBIW, SYKO); (3) Vytegra district, 23 km to N of the settlement of Yanishevo, Andomskaya height, 5 km to SE of lake Soydozero, the Soyda river bank, 61°26′72.1″N, 37°33′36.8″E, *ca* 205 m a.s.l., spruce-fern-rich in herbs forest, on rotten spruce log, with *Blepharostoma trichophyllum* (L.) Dumort., *Riccardia latifrons*, *Cephalozia bicuspidata* (L.) Dumort., *Cephalozia lunulifolia* (Dumort.) Dumort., *Crossocalyx hellerianus* (Nees ex Lindenb.) Meyl., *Calypogeia muelleriana,* and *Ptilidium pulcherrimum*, 17 August 2010, *leg*. D.A. Philippov *10-783b* (IBIW, SYKO). **II. Komi Republic,** Troitsko-Pechorsky district, the Pechora-Ilych Reserve, 4 km to north of the mouth of the Ichetlyaga river, the left bank of Ilych river, 62°31′N, 58°57′E, in birch-aspen herb forest on a slope in the limestone rock basin, on rotten log, with *Blepharostoma trichophyllum*, *Lophocolea heterophylla*, *Lophozia guttulata* (Lindb. & Arnell) A.Evans, and *Ptilidium pulcherrimum*, plants with gemmae, perianth and sporogon, 5 June 2003, *leg*. M.V. Dulin, *323mvd* (SYKO).

This is the first report of *Lophozia ascendens* from the Vologda Region. It is a boreal circumpolar species, which occurs sporadically in the boreal coniferous forest zone in the Holarctic region (Bakalin, 2005), and is classed as rare in the *Red Data Book of European Bryophytes* (ECCB, 1995).

Lophozia ascendens is known from several countries in Europe, from some localities in North America (Damsholt, 2002), and from various localities in Russia. In the European part of Russia, it is recorded from the Murmansk Region (Shljakov & Konstantinova, 1982), Leningrad Region (Potemkin & Andrejeva, 1999), Nizhniy Novgorod Region (Konstantinova, 2004), Tver Region (Ignatov *et al.*, 1998), Karelia Republic (Bakalin, 1999, 2005), Komi Republic (Zheleznova, 1985; Dulin, 2007, 2008), Udmurt Republic (Lozhkina, 1976), and also from the Caucasus (Váňa, 1982; Ignatova *et al.*, 2008), Northern Urals (Konstantinova & Bezgodov, 2006), Eastern Siberia (Zhukova, 1986; Kazanovsky & Potemkin, 1995; Váňa & Ignatov, 1996; Bakalin *et al.*, 2001), Kamchatka (Bakalin, 2009), and Sakhalin (Kitagawa, 1965). The record of this obligate epixylous species from Arctic Yakutia (Sofronova, 2005) is dubious (Konstantinova *et al.*, 2009). For some regions of Russia, *L. ascendens* has been recorded in Red Data Books, e.g. Karelia Republic (Ivanter & Kuznetsov, 2007), and Komi Republic (Taskaev, 2009).

22. ***Orthotrichum moravicum*** Plášek & Sawicki

Contributors: V. Plášek and L. Číhal

Tajikistan: 30 km NE of Dushanbe town, Varzob village, S slopes of Gissar mountain range, Varzob Mountain Botanical Garden, loc. Kvak, on bark of tree (*Acer*), GPS coordinates (WGS 84): *ca* 38°46.85'N, 68°57.97'E, 1850 m a.s.l., 29 April 1959, *leg.* U.K. Mamatkulov *s.n.* (*Herb.* of Tajik Academy of Science, Dushanbe; duplicate in OP).

Until now, 16 taxa of *Orthotrichum* had been reported from Tajikistan (Mamatkulov *et al.*, 1998; Ignatov *et al.*, 2006; Blockeel *et al.*, 2009; Ellis *et al.*, 2011a). The specimen cited above is a new epiphytic moss, not only for the bryoflora of Tajikistan, but also for the whole continent of Asia. *Orthotrichum moravicum* was described only recently as a new species (Plášek *et al.*, 2009). Initially, it was considered as endemic to the area of the Moravskoslezské Beskydy Mountains in the Czech Republic, but was later recorded in neighbouring Slovakia (Ellis *et al.*, 2011b). In Tajikistan, the species was first collected in the Varzob Mountain Botanical Garden by Mamatkulov in 1959. The herbarium specimen, originally identified by U.K. Mamatkulov as *Orthotrichum affine* Brid., was re-determined during revision of specimens housed in the herbarium of the Tajik Academy of Science in Dushanbe, as recently as 2011.

23. ***Phaeoceros carolinianus*** (Michx.) Prosk.

Contributor: R. Natcheva

Bulgaria: Vratsa District: (1) south-east of the village of Liutadzik, along the road to Parshevitsa locality, on wet loamy soil, 23°25′25.5″E, 43°11′37.0″N, 384 m a.s.l., 8 July 2006, *leg.* & *det.* R. Natcheva *s.n.* (SOM-B 9415); (2) along river Cherna, south of the village of Liutadzik, on wet loamy soil in a ditch in beech forest, 23°24′51.3″E, 43°11′13.8″N, 438 m a.s.l., 7 July 2006, *leg.* & *det.* R. Natcheva *s.n.* (SOM-B 9416).

Phaeoceros carolinianus is reported here as new to Bulgaria. A revision of Bulgarian collections identified as *Phaeoceros laevis* (L.) Prosk. in SOM revealed another location in the country for this species. The specimens (SOM-B 19, 20, 21, and 22) were collected by S. Petrov on 18 July 1960 in the south-western part of Bulgaria on Mt Belasitsa, growing on wet soil, in *Castanea* forest, in the valley of the river Kliuch, Petrich District, *ca* 520 m a.s.l. (published in Petrov, 1963). Thus, it may be suggested that *P. carolinianus* is more widespread in Bulgaria, but generally overlooked.

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

Contributors: R. D. Porley and N. G. Hodgetts

Portugal: Algarve, Barragem da Bravura, to the south of Serra de Monchique, 29S 0524704/4120731, 88 m a.s.l., gently sloping (10–15°) reservoir margin with an aspect of 25° on silty mud among a mat of *Agrostis stolonifera* L. with *Fossombronia* Raddi sp., *Pseudephemerum nitidum* (Hedw.) Loeske, and *Riccia glauca* L. var. *ciliaris* Warnst., 9 March 2012, *leg*. N. G. Hodgetts & R. D. Porley (LISU, *Herb*. N. G. Hodgetts and *Herb*. R. D. Porley).

A genus new to Portugal, this is the second report of *Physcomitridium readeri* in Europe, having been recently discovered in England (Hooper *et al.*, 2010). The Portuguese plants match the English material in all respects. R. D. Porley visited Barragem da Bravura on the 27 November 2009 and collected a cleistocarpous moss which was abundant on an extensive draw-down zone very close to where the present collection was made. It was identified as *Physcomitrella patens* (Hedw.) Bruch & Schimp. and was published new to Portugal in *Flora briofítica Ibérica* Vol. IV (Guerra *et al.*, 2010). However, re-examination of the 2009 collection revealed that *Physcomitrella* was recorded in error and the collection is indeed *P. readeri*. Therefore, *Physcomitrella patens* should be excluded from the Portuguese list.

Physcomitridium readeri has been shown to be the correct name for what has been called *Physcomitrella readeri* (Müll.Hal.) I.G.Stone & G.A.M.Scott, *Physcomitrella patens* (Hedw.) Bruch & Schimp. subsp. *readeri* (Müll.Hal.) B.C.Tan and *Ephemerella readeri* Müll.Hal. (Goffinet & Buck, 2011). *P. readeri* is distinct from *Physcomitrella patens* in both gametophytic and sporophytic characters. In *Physcomitridium*, the nerve extends at the most to two-thirds of the leaf length and the leaf is oblanceolate, spathulate, or obovate with a short apiculus, whereas in *Physcomitrella*, the nerve extends into the leaf apex and the leaves are distinctly narrower (lanceolate or ovate-lanceolate) with a short apiculus. In sporulating *Physcomitridium*, the capsules are slightly emergent while the capsules in *Physcomitrella* are more or less sessile and therefore immersed. Thus, although both taxa are superficially similar and grow in habitats experiencing periodic inundation, they can be distinguished in the field with some confidence.

Physcomitridium readeri is known from Australia, New Zealand, North America, Japan, and England; its discovery in Portugal suggests that it may be overlooked elsewhere in Europe.

25. ***Plagiothecium nitidifolium*** (Mitt.) A.Jaeger

Contributor: R. Ochyra

Ethiopia: Bale Mountains: (1) above Rira, west of Aduka Range, 6°43′N, 39°42′E, 3250 m a.s.l., upper montane *Philippia-Hagenia* forest, on 30° S-facing slope, epiphyte on tree trunk, 10 February 1990, *leg*. Georg and Sabine Miehe *2202* (KRAM); (2) same locality, 3560 m a.s.l., ericaceous belt, *Philippia* woodlands and thicket on fire-safe 15° SW-facing slope, on inclined branches, 12 February 1990, *leg*. Georg and Sabine Miehe *2430* (KRAM); (3) same locality, 3560 m a.s.l., ericaceous belt, *Philippia* woodland and thicket, multistemmed trees of *P. keniensis* S.Moore forming 5 m tall undisturbed woodlands on rocky 38° SSW-facing slope, epiphytic at the base of trunks, 12 February 1990, *leg*. Georg and Sabine Miehe *2459* (KRAM); (4) Gorba Guracha, 6°52′N, 39°49′E, alt. 3990 m a.s.l., ericaceous belt, *Philippia* woodlands and thicket, relic grove of *P. keniensis* trees, 4 m tall, on 40° ENE-facing scree, on ground at base of tree trunks, 28 February 1990, *leg*. Georg and Sabine Miehe *2973* (KRAM).

Plagiothecium nitidifolium is an African endemic species, which is widely scattered on the mainland, and so far, has been recorded from Bioko in West Africa and Rwanda and Tanzania in East Africa (O'Shea, 2006). Moreover, it was discovered once on Réunion Island in the South Indian Ocean (Ellis *et al.*, 2011c). Here the range of the species is extended to Ethiopia where it seems to occur frequently in the alpine ericaceous belt in the Bale Mountains.

26. ***Plagiothecium standleyi*** E.B.Bartram

Contributor: R. Ochyra

Ethiopia: Bale Mountains: (1) above Rira, west of Aduka Range, 6°43′N, 39°42′E, 3400 m a.s.l., upper montane *Philippia-Hagenia* forest, 8 m high on 30° NNW-facing slope, on ground, 8 February 1990, *leg*. Georg and Sabine Miehe *2037* (KRAM); (2) same locality, 3270 m a.s.l., upper montane *Philippia-Hagenia* forest with *Schefflera volkensii* (Engl.) Harms on 5° SSW-facing slope, epiphytic moss, common, 10 February 1990, *leg*. Georg and Sabine Miehe *2252a* (KRAM); (3) same locality, 3480 m a.s.l., ericaceous belt, *Philippia* woodland and thicket, 5 m tall *P. keniensis* S.Moore trees forming woodlands on 15° W-facing rocky slope, fairly undisturbed owing to difficult access and fire shelter between rocks, epiphytic moss on lower branches, common, 12 February 1990, *leg*. Georg and Sabine Miehe *2471* (KRAM); (4) Finchaya Habera, 7°00′N, 39°44′E, 3510 m a.s.l., secondary heathland and pastures: *Erica-Philippia* thicket on boulders, 20° NW-facing slope, dominant ground moss, 27 December 1989, *leg.* Georg and Sabine Miehe *251* (KRAM).

Plagiothecium standleyi is an Afro-American montane species. It is common in Central America and in the northern Andes of Colombia and Venezuela from where it was reported as *P. drepanophyllum* (Buck & Ireland, 1989). As the type material of the latter was misinterpreted and correctly represents *Lepidopilum scabrisetum* (Schwägr.) Steere, the correct name for this species is *P. standleyi* (Ochyra & Buck, 2002). It had been reported from the Ruwenzori Mountains and Mt Elgon in Uganda (Ochyra *et al.*, 2002) and here its range is extended to Ethiopia. The Ethiopian material was initially reported as *P. neckeroideum* Schimp. var. *javense* M.Fleisch. (Miehe & Miehe, 1994), but a re-examination of the voucher specimens revealed that they correctly belong to *P. standleyi*. The two species differ in their leaf areolation. *Plagiothecium standleyi* has broader and longer mid-leaf cells, 7–17 × 100–220 μm, whereas those in

P. neckeroideum are narrower and shorter, 5–6 × 50–100 μm.

27. ***Pohlia elongata*** Hedw.

Contributors: T. A. Hedderson and A. J. Shaw

La Réunion: Commune St-Benoit, Sentier Piton des Neiges, from La Plaine de Palmistes, Couteau Maigre, 21°05′01.7″S, 55°31′26.8″E, 1980 m a.s.l., on tree fern stump in wet forest on NE-facing slope, 24 March 2008, *leg.* T.A. Hedderson *16621* (BOL).

This very widespread species (Shaw, 1982) is known in Africa from mountainous areas in the east, central, and southern parts of the continent (O'Shea, 2006). The habitat is unusual as the species usually grows on thin soil or in rock crevices. However, the species reportedly occurs as an epiphyte in New Guinea (Shaw, 1982).

28. ***Sphagnum subfulvum*** Sjörs

Contributors: Daniel Spitale and Adam Hölzer

Italy: Province of Trento, Adamello-Brenta Natural Park, Madonna di Campiglio, C5, N46°14′47″ E10°49′28″, 1943 m a.s.l. *leg.* and *det.* D. Spitale, *conf.* A. Hölzer & K.I. Flatberg; Madonna di Campiglio, C11, 46°15′22″N, 10°49′25″E, 1950 m a.s.l., 6 July 2011, *leg.* and *det.* D. Spitale, *conf.* Adam Hölzer & Kjell I. Flatberg; 25 km southward of Madonna di Campiglio, near the Valbona Lakes, 46°03′N, 10°39′E, *ca* 2050 m a.s.l., July 2000, *leg.* G. Philippi *s.n.*, *det.* A. Hölzer, *conf.* K.I. Flatberg (KR).

Sphagnum subfulvum is mainly a sub-Arctic to northern boreal species in Europe, largely confined to Fennoscandia and the Baltic coast of Russia. It is closely related to *S. subnitens* Russow & Warnst., and many records are based on misidentifications of the latter species (Daniels & Eddy, 1985). However, the large hyalocysts on the convex surface, near the apex of the branch leaves, clearly distinguish *S. subfulvum* from *S. subnitens* (Flatberg, 1985). In a recent checklist of *Sphagnum* in Europe and Macaronesia (Seneca & Söderström, 2009), the species was confirmed for Norway, Sweden, Finland, Estonia, Latvia, Lithuania, Russia, Poland, and Bulgaria. In the Alps, it was formerly reported only for Switzerland (in Canton Ticino, Quinto municipality, at 1917 m a.s.l., and in Canton Grigioni, Mesocco municipality, at 1944 m a.s.l.; information provided by the National Inventory of Swiss Bryophytes, www.nism.uzh.ch). These two Swiss sites are about 125–165 km to the west of the Italian records reported here.

S. subfulvum forms loose mats or low hummocks in mesotrophic to moderately eutrophic mires (usually with *Carex lasiocarpa* Ehrh. or *C. rostrata* Stokes), but it is mostly found along pool margins (Daniels & Eddy, 1985; Hölzer, 2010). In the two mires located near Madonna di Campiglio (C5 and C11), the species was found in carpets at similar depths in the water (0 and –4 cm, values referred to 6 July 2011). The degree of acidity and the quantities of dissolved ions in the water were quite different at the two sites: in C5 pH=4.6, EC=10.8 μS/cm; in C11 pH=5.9, EC=30.6 μS/cm. These distinct hydrochemical characteristics determine somewhat different species assemblages (species ordered by rank of abundance in a rectangle 50 × 30 cm): C5, *Carex pauciflora* Lightf., *C. echinata* Murray, *Drosera rotundifolia* L., *Eriophorum angustifolium* Honck., *Molinia caerulea* (L.) Mönch, *S. subfulvum*, *S. subnitens*, *S. platyphyllum* (Braithw.) Warnst., *S. subsecundum* Nees, *S. compactum* Lam. & DC., *Cladopodiella fluitans* (Nees) Buch, and *Odontoschisma elongatum* (Lindb.) Evans. In C11, the species were: *Carex rostrata* Stokes, *C. paupercula* Michx., *C. dioica* L., *Drosera rotundifolia*, *Warnstorfia sarmentosa* (Wahlenb.) Hedenäs, *Straminergon stramineum* (Brid.) Hedenäs, *Scorpidium cossoni* (Schimp.) Hedenäs, and *S. subfulvum*.

The third site for *S. subfulvum* (near Valbona lakes) was noticed by Georg Philippi during one of his numerous bryological excursions in Italy. However, the species remained undiscovered until recently, when A. Hölzer, re-examining the Philippi's bryophyte collection (now deposited in Staatliches Museum für Naturkunde, Karlsruhe, Germany), revealed the real identity of the specimen.

In the Alps, *S. subfulvum* is a rare species confined above the subalpine plane, in poor (pH 4.4–5.5) to intermediate fens (pH 5.0–7.0) and forming carpets near the water table. It is interesting to note that the Italian sites are located in the Southern Adamello, a presumed refugial area for silicicolous vascular plants (Schönswetter *et al.*, 2002). Thus, we propose the hypothesis that *S. subfulvum* in the Alps would be the remnant of an ancient population, the main distribution of which is now confined to the sub-Arctic and north boreal region in Europe.

28. ***Telaranea europaea*** Engel & Merr.

Contributors: C. Garcia, C. Sérgio, and D. Claro

Portugal: Beira Litoral, Figueiró dos Vinhos, Fragas de São Simão, 29SNE5818, 250 m a.s.l., on a wet slope of shale rocks, on the north face, with *Cephalozia bicuspidata* (L.) Dumort., *Pallavicinia lyellii* (Hook.) Carruth., 12 April 2011, C. Garcia & C. Sérgio *s.n.* (LISU248070, LISU 247482).

This new Portuguese locality for *Telaranea europaea* is an extension of its known distribution within the country, as it was only previously reported from Serra do Gerês. It had not been recorded since 1931 (Allorge & Allorge, 1944) and was thought to be a regionally extinct taxon in Portugal.

Recently, it was found in the central part of the country, in an interesting area with a strong oceanic influence. In this area, the most southern locality for other species of the Iberian Peninsula, it was found in

its typical ecological habitat associated with a *Sphagnum* community on dripping, shaded rocks.

Keçeli & Abay (2007) revised the European distribution of *T. europaea*, confirming its presence in Europe and Macaronesia. Infante (2000) recorded it in various regions of northern Spain. In the Iberian Red List, it is considered to be a vulnerable liverwort [VU B2ab(ii,iii,iv)] (Sérgio *et al.*, 2006).

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

Contributors: A. Stebel and G. Vončina

Poland, Western Carpathians: (1) Pieniny Range: Pieniny Centralne, Krościenko nad Dunajcem, above Stolarzówka glade, 49°25′37″N; 20°25′08″E, 700 m a.s.l., on shaded north-facing limestone rock in the *Abies alba* Mill. forest, 6 November 2010, *leg.* G. Vončina *s.n.* (SOSN); (2) Silesian Beskid Range: Bielsko-Biała Wapienica, north-western slope of Mt Szyndzielnia, Żydowski stream valley, 49°45′53.8″N; 18°59′43.6″E, 685–690 m a.s.l., on shaded sandstone, 27 June 2002, *leg*. A. Stebel *s.n.* (SOSN).

In Europe, *Thamnobryum neckeroides* has been recorded from the Czech Republic and Italy (Mastracci, 2003), Germany (Mastracci, 2003; Meinunger & Schröder, 2007b), and Switzerland (Online Atlas of Swiss Bryophytes: http://www.nism.uzh.ch/map/map-en.php). Interestingly, the overwhelming majority of its localities were discovered in recent years. Especially curious was the record from Pieniny, the moss flora of which was elaborated in detail only a few years ago (Stebel *et al.*, 2010). *T. neckeroides* was found here near the earlier known localities for *T. alopecurum.* This situation inspired us to revise recently collected specimens of the latter species from the Polish part of the Carpathians, which resulted in the discovery of another locality for *T. neckeroides* in Silesian Beskid.

30. ***Trichostomum brachydontium*** Bruch

Contributors: P. Sollman and R. Ochyra

Rwanda: Northern Province, Musanze District, Ruhengeri, on SE slope of Mt Gahinga in the Virunga Mountains, 1°23′S, 29°38′E, *ca* 2500 m a.s.l., on stony blocks in stream, 11 October 1974, *leg*. J. L. De Sloover *19380* (KRAM, L).

This nearly cosmopolitan species is widespread and locally common in sub-Saharan Africa where it has been recorded from most countries (O'Shea, 2006). One of the few states in which *Trichostomum brachydontium* had not yet been recorded was Rwanda. The present discovery fills this gap in its range in Central Africa. Surprisingly, *T. brachydontium* has yet to be recorded from Uganda and Burundi.

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Taxonomic Additions and Changes: Nil.

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