

EAST AFRICAN BRYOPHYTES XXX. NEW LIVERWORT AND HORNWORT RECORDS.

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*New East African liverwort records
Comoros, Kenya, Tanzania, Madagascar, Réunion*

Abstract. *Records of 45 liverwort and one hornwort species new to or very rare in East African countries. Among them the occurrence of *Leptolejeunea subrotundifolia* is new to Africa, *Anthoceros punctatus*, *Cephaloziella anthelioides*, *Diplasiolejeunea cobrensis*, *Marsupella sparsifolia*, *Tritomaria camerunensis* and *Plagiochila rodriguezii* are new to tropical East Africa while *Cephaloziella tenuissima*, *C. transvaalensis*, *Chiloscyphus muhavurensis*, *Cololejeunea inflectens*, *C. magillii*, *C. peponiformis*, *Diplasiolejeunea hamata*, *D. rudolphiana*, *Harpalejeunea filicuspis*, *Lopholejeunea sphaerophora* and *Syzygiella colorata*, to the bryoflora of Madagascar. Finally *Cephalozia connivens* var. *fissa*, *Solenostoma onraedtii*, *Plagiochila incerta*, *P. repanda*, *P. stricta*, *Colura dusenii* and *Diplasiolejeunea kraussiana* are new to the flora of Comoro Islands. The new combination of *Drepanolejeunea pentadactyla* var. *dactylophoroides* is also presented.*

INTRODUCTION

During the past 45 years many scattered records from East African countries including the western Indian Ocean Islands have accumulated. In this paper we communicate *Cephaloziaceae*, *Cephaloziellaceae*, *Gymnomitriaceae*, *Adelanthaceae*, *Lophocoleaceae* *Solenostomataceae*, *Geocalyceaceae* and *Lophoziaceae* identified by J. Váňa and *Anthocerotaceae*,

Frullaniaceae, Geocalycaceae, Plagiochilaceae and Lejeuneaceae identified by T. Pócs, if not otherwise stated. Only records that are new to a country or island, or very rare according to the checklists by Wigginton (2009), Ah Peng et al. (2012) and by Marline (2012) are included and annotated here.

ENUMERATION OF SPECIES

Cephaloziaceae

Cephalozia connivens (Dicks.) Lindb. ssp. *fissa* Váňa

COMOROS: Ndzouani Island, cloud forest on the SE summit ridge of Mt. N'Tingui, 1590 m, on decaying wood. Coll. Pócs & Magill 9274/J, 7 Aug. 1992 (EGR). – Distrib.: Very widespread in tropical Africa, and may occur in Australia too (Váňa 1988), new to the Comoro Islands.

Odontoschisma jishibae (Steph.) L. Söderstr. & Váňa

Syn.: *Iwatsukia jishibae* (Steph.) N. Kitag. (Váňa et al., 2013).

TANZANIA: Kilimanjaro Mts. Uru W forest section on the S slope, at 1980–2200 m alt. On *Ocotea usambarensis* bark in montane rainforest with *Ocotea*, *Podocarpus* and *Afrocrania*. Coll. Pócs & Shayo 90015/AS, 25. Jan. 1990 (EGR). – Distrib.: Palaeotropic species widely distributed in Asia and in the Indian Ocean islands (Grolle 1995, Pócs 1995), scattered in mainland Africa (Bioko, Malawi, Wigginton 2009), new to Tanzania.

Cephaloziellaceae

Cephaloziella anthelioides S.W. Arnell

TANZANIA: Mt. Kilimanjaro, montane evergreen forest along Machame Route at 2000–2200 m, on soil. Coll. Pócs 6975/O, 4 & 9. Apr. 1984 (EGR, PRC). – Distrib.: New to continental East Africa, previously only known from South Africa and Réunion island (Wigginton 2009).

Cephaloziella tenuisissima (Lehm. et Lindenb.) Steph.

MADAGASCAR: Prov. Toamasina, Between Adrovoranto and Ambila-Lemaitso, ericaceous heath on white sand between Panganales canal and Indian Ocean coast, 10 m, on peaty soil. Coll.: Pócs & Szabó 9886/E, 24. Aug. 1998 (EGR, TAN). – Distrib.: Hitherto known only from South Africa and Leshoto (Wigginton 2009).

***Cephaloziella transvaalensis* S. Arnell**

MADAGASCAR: Réserve Forestière Andasibe (Périnet) 100 km E of Antananarivo. Logged submontane rainforest S and W of the railway station, at 910-940 m, on earth banks and roadcut surface. Coll. *Pócs 90105/N*, 16-17 March 1990 (EGR, PRC); COMOROS: Ndzouani Island, Col de Moya, 650–770 m, on roadcut surface. Coll. *Pócs 9165/E*, 23 March 1991 (EGR, PRC); Ndzouani Island, Mt. Pomouni E of M'rijou village, 500 m, on the soil of ylang-ylang plantation. Coll. *Pócs 9281/D*, 14 Aug. 1992 (EGR, PRC)– Distrib.: New to Madagascar and the Comoros, known from South and East Africa and the Mascarene Islands (Wigginton 2009).

***Cephaloziella umtaliensis* S.W. Arnell**

TANZANIA: Mt. Kilimanjaro, along Umbwe Route, Podocarpus-*Erica arborea* forest and ericaceous heath at 2850-3450 m alt. On lava rocks. Coll. *Pócs 89235/AP, 89236/W and AF*, 24-28 Nov. 1989 (EGR, PRC). Mt. Kilimanjaro, NE slope of Mawenzi WSW of Tareka village, in Nesikiria River gorge at 2600-2700 m alt. On dry volcanic *cliff* with *Senecio johnstonii* and *Lobelia deckenii*. Coll. *Pócs 90023/AP*, 31. Jan. 1990 (EGR, PRC); Morogoro Region, S Uluguru Mts., Lukwangule Plateau above Mgeta Falls, at 2350-2450 m alt. On soil of secondary *Panicum lukwangulense* grassland scattered with *Agauria salicifolia* trees. Coll. *Pócs, Ochyra & Bednarek-Ochyra 88111/V*. 8-9 June 1988 (EGR, PRC).– Distrib.: New to Tanzania, known from Mt. Cameroon, Uganda, South-east Africa and Réunion (Wigginton 2009).

***Cylindrocolea abyssinica* (Gola) Vána**

TANZANIA: Mt. Meru, S slope, Sokoine University Training Forest, along road to Laikinoi, at 1950 m alt. On soil of *Grevillea* plantation. Coll. *Pócs 88292/C*, 13. Dec. 1988 (EGR, PRC). – Distrib.: Widespread in tropical Africa, new to Tanzania (Wigginton 2009).

Gymnomitriaceae

***Marsupella sparsifolia* (Lindb.) Dumort.**

KENYA: Mt. Kenya, Naro Moru Track, on exposed rocks at 3750 m altitude. Coll. *Chuah-Petiot, Nm 1004*, 27. Jan. 2003 (EGR). – Distrib.: Bipolar, Arctic-Alpine species occurring in N America, Europe, Macaronesia, Caucasus, South Africa, Australia, New Zealand and the Subantarctic.

tic Islands (according to Váňa et al.2010, the species was erroneously reported before from tropical East Africa).

Gymnomitrium subintegrum (S.W. Arnell) Váňa

Syn.: *Marsupella subintegra* S. Arnell. (Váňa et al. 2010)

TANZANIA: Mt. Kilimanjaro, Machame Route, *Erica arborea* heath and subalpine streamside vegetation at 2960–3800 m, on lava rocks and on bare soil. Coll. *Pócs 6979/E, 6981/D*, 5-7. Apr. 1984; *S. Pócs et al. 87175/T*, 22-23. June 1987 (EGR, PRC); Mt. Meru, SW slope of summit area at 3300–3400 m, on irrigated lava rocks. Coll. *Pócs 8687/AX, 8687/BB*, 15. June 1986 (EGR, PRC). – Distrib.: Altimontane species in Tropical Africa, India, Malesia, Papuasia, Amsterdam I., new to Tanzania (Wigginton 2009, Váňa et al., 2010, Váňa et al. 2012).

Adelanthaceae

Syzygiella colorata (Lehm.) K. Feldberg, Váňa, Henschel et J. Heinrichs

Syn.: *Jamesoniella colorata* (Lehm.) Schiffn. (Feldberg et al. 2010).

MADAGASCAR: Prov. Antsiranana, Réserve Intégrale Nationale de Marojezy. Tussock grassland on the main summit at 1900–2130 m alt. On granitic cliff. Coll. *Pócs, Randrianasolo, Magill & LaFarge-England 90117/C*, 28. March 1990 (EGR, MO, TANA). – Distrib.: A southern temperate species distributed in South America, the Subantarctic islands, southern Australia, New Zealand, and South Africa (Grolle 1975, map in Engel 1990). New to Madagascar.

Lophocoleaceae

Chiloscyphus muhavurensis S.W. Arnell

MADAGASCAR: Prov. Antsiranana, Réserve Intégrale National de Marojezy, in subalpine bush below the summit at 2050 m, on soil. *Pócs, Magill & LaFarge-England 90116/R*, 28 March 1990 (EGR, TAN). – Distrib.: An Afroalpine species hitherto only known from the high mountains of Kenya, Tanzania and Uganda (Wigginton & Grolle 1996), new to Madagascar. May be conspecific with the widespread and very variable Neotropical *Lophocolea trapezoidea* Montagne = *Chiloscyphus breutelii* (Gott.) Engl & Schust. (Gradstein et al. 1984).

Solenostomataceae

Solenostoma onraedtii (Váňa) Váňa, Hentschel et J. Heinrichs

COMOROS: In a remnant of lowland rainforest at Lingoni Falls, 200 m, on wet cliff. Coll. *Pócs & Magill 9282/U*, 15 Aug. 1992 (EGR). Distrib.– Known from Madagascar and Réunion (Váňa 1974) only, new to the Comoro Islands.

Geocalycaceae

Notoscyphus lutescens (Lehm. et Lindenb.) Mitt.

TANZANIA: Nguru Mountains, Dikurura Valley 3 km W of Mhonda, on seeping cliff at 900 m. Coll. *Pócs 8910/B*, 27 March 1989 (EGR). – Distrib.: Palaeotropical species widespread in tropical Africa (Wigginton 2009) but unknown from Tanzania.

Lophoziaceae

Tritomaria exsectiformis Breidl. ssp. *camerunensis* S.W. Arnell ex Váňa

TANZANIA: Mt. Kilimanjaro, S slope of Kibo, 3900–4000 m, on irrigated rocks of Karanga Valley. Coll. *Pócs 6992/Q*, 4. March 1985 (EGR, PRC); SW face of Kibo summit at 4100 m alt. Dripping, S facing cliff at the head of Barranco Valley. Coll. *Pócs 89240/B*, 26. Nov. 1989 (EGR, PRC). – Distrib.: Previously known only from Mt. Cameroon in West Africa (Arnell 1958, Váňa 1982).

Plagiochilaceae

Plagiochila drepanophylla Sande Lacoste

TANZANIA: North Pare Mts., Kindoroko Forest reserve W of Ndorwe village, montane rainforest at 1860–2100 m, on bark. Coll. *Pócs 90072/AD*, 4 May 1990 (EGR); Uluguru Mts., elfin forest on the crest of Lupanga peak at 2100–2140 m, on bark. Coll. *Pócs 86108/A*, 7 July 1986 (EGR). – Distrib.: Madagascar, Réunion (Grolle 1995). In continental Africa it was previously only known from the Usambara mountains in Tanzania (Jones 1981, Pócs 1985).

Plagiochila fusifera Taylor

SEYCHELLES: Mahé Island, Morne Seychellois Nat. Park, Congo Rouge, montane rainforest, 500–720 m, on rocks and bark. Coll.: *Pócs 9318/AJ and 9319/K*, 8 Aug. 1993; Morne Blanc, mossy cloud forest,

590–670 m, on ground. Coll.: *Pócs 9323/J and 9362/M*, 12 and 4 Sept. 1993 (EGR); Trois Frères ridge, montane mossy forest, 740–770 m, on bark and rocks. Coll.: *Pócs 9342/A and B*, 22 Aug. 1993 (EGR). COMOROS: Ngazidja Island, N slope of Karthala volcano, montane rainforest at 700–770 m, on bark. Coll. *Pócs 9150/AW*, 16 March 1991 (EGR); Ndzuouani Iland, Col du Moya, degraded rainforest at 740–760 m, on rocks. Coll. *Pócs, Magill & Rupf 9278/B and W*, 12 Aug. 1992. – Distrib.: Widespread in the mountains of continental Africa (Jones 1962, Wigginton 2009) but new to the East African islands.

***Plagiochila heterostipa* Steph.**

TANZANIA: Nguru Mts. in Turiani District. Submontane rainforest in Duale Valley at 600–900 m alt. On twigs. Coll. *Pócs & Schlieben 6435/G*, 19. Aug. 1971 (EGR). – Distrib.: Widespread in tropical Africa, new to Tanzania (Jones 1962).

***Plagiochila incerta* Gottsche**

COMORES: Ngazidja Island. W slope of Mt. Karthala along the path from Boboni sawmill to “Convalescence” at 1150–1600 m alt. On bark in mossy cloud forest. Coll. *Pócs, Magill & Rupf 9268/AA*, 1-3 Aug. 1992 (EGR). – Distrib.: Endemic in western Indian Ocean Islands, known from Madagascar, Mauritius and Réunion (Grolle 1995), new to the Comores.

***Plagiochila pectinata* Willd. ex Lindenb.**

TANZANIA: West Usambara Mts., Shume Nature Forest Reserve, montane evergreen forest, on bark. Coll. *Pócs 88306/A*, 19 Dec. 1988 (EGR). – Distrib.: Widespread in tropical African mountains, (Wigginton 2009), new to Tanzania.

***Plagiochila punctata* (Nees) Steph.**

RÉUNION: Col de Bébour, rocky heath at 1450 m, on volcanic cliff. Coll.: *Pócs 00114/P*, 22 June 2000 (EGR). – Distrib.: Widespread in the Neotropics, scattered in the Canary Islands and on the Atlantic coast of Europe, previously known by the illegitimate name *Plagiochila subalpina* from tropical Africa Steph. from: Bioko, Zaire, Tanzania, Uganda, Comoros and Madagascar (Jones 1962, Vanden Berghen 1981) and synonymized by Heinrichs et al. (2005). New to Réunion Island.

Plagiochila repanda (Schwaegr.) Lindenb.

TANZANIA: Uluguru Mts., Bondwa peak, elfin forest at 1950–2000 m alt. On mossy ground. Coll. *Pócs & Gibbon 6052/AV*, 12. Oct. 1969 (EGR), det. E.W. Jones; Uluguru Mts., Kinole, 900–1000 m. On wet rock in submontane rainforest. Coll. *Pócs & Harris 6166/F*, 30. Apr. 1970 (EGR); COMOROS: Forêt du Moya, montane rainforest, 1070 m, on bark. Coll.: *Pócs & Magill 9276/AJ*, 11 Aug. 1992 (EGR). – Distrib.: Widespread in Indian Ocean islands (Vanden Berghen 1981), scattered in mainland Africa (Kenya, Malawi, Wigginton 2009), new to Tanzania and the Comoros.

Plagiochila rodriguezii Steph.

TANZANIA: East Usambara Mts., Amani, behind “Forest Houses” at 920 m alt. On twigs in submontane rainforest. Coll. *Jones & Pócs 6377/G*, 10. Jan. 1971 (EGR, Hb. E.W. Jones), det. E.W. Jones; Uluguru Mts., N slope of Bondwa peak at 1500 m alt. On well lit, recently felled tree. Coll. *Jones 2057, Pócs 6305/D* 13. Dec. 1970 (EGR, Hb. E.W. Jones), det. E.W. Jones; Southern Highlands, Mufindi District. On planted *Cupressus lusitanica* trees near Mufindi village. Coll. *Jones 2075, Pócs 6320/L*, 16. Dec. 1970 (EGR, Hb. E.W. Jones), det. E.W. Jones – Distrib.: Hitherto only known from the western Indian Ocean islands: Comores, Madagascar, Réunion, ? Rodrigues Isls. (Vanden Berghen 1981, Grolle 1995, Müller & Pócs 2002), new to mainland Africa.

Plagiochila stricta Lindenb.

COMORES: Ngazidja Island. Elfin forest around “Convalescence” on W slopes of Karthala volcano caldera rim at 1600–1850 m alt. On ericaceous bark. Coll. *Pócs, Magill & Rupf 9269/B*, 1-3 Aug. 1992 (EGR). – Distrib.: Widespread in tropical America and quite recently discovered at single location only E of Antananarivo in Madagascar (Lindner et al. 2004, Gradstein 2013). Therefore its occurrence on Comoro Islands has great significance and suggests it might also occur on other East African islands.

Frullaniaceae

Frullania gabonensis Vanden Berghen

SEYCHELLES: Mahé Island, Congo Rouge, mossy elfin forest, 640–720 m, on *Plagiochila*. Coll.: *Pócs 9319/K*, 8 Aug. 1993. – Distrib.:

Cameroun, Gabon, Madagascar (Vanden Berghen 1976, Wigginton & Grolle 1996), new to the Seychelles.

Lejeuneaceae

***Cololejeunea inflectens* (Mitt.) Benedix**

MADAGASCAR: Prov. Toamasina, Coastal dune forest 1 km W of Antanambe, at 5 m, on bark. Coll.: *Pócs & Szabó 9875/AY*, 12 Aug. 1998 (EGR, TAN). – Distrib.: A widespread Indomalasian–Pacific species reaching Africa at the Indian Ocean islands only. Known to the Comoros and the Seychelles, new to Madagascar.

***Cololejeunea magillii* Pócs**

MADAGASCAR: Prov. Antsiranana, Réserve Intégrale National de Marojezy, very humid rainforest N of Andampibe Falls, 800–900 m, epiphyllous. Coll. *Pócs, Magill & LaFarge-England 90113/EJ*, 24 and 29 March, 1990 (EGR, TAN). – Distrib.: Known from its type locality in the Comoros from Mayotte Island only, new to Madagascar (Pócs 1993).

***Cololejeunea peponiformis* Mizut.**

MADAGASCAR: Prov. Antsiranana, Réserve Intégrale Nationale de Marojezy. Montane rainforest on ridge N of Andampibe Falls, at 780–1050 m, on decaying wood. Coll.: *Pócs 90113/CX*, 24–29 March 1990 (EGR, TANA). – Distrib.: Comoro, Seychelles, Réunion, Malaysia: Sabah, new to Madagascar (Tixier 1985, Wigginton 2009).

***Colura berghenii* Ast**

TANZANIA: Nguru Mountains, elfin forest on summit above Spirit Lake near Mhonda, at 2260 m, on *Erica* twigs. Coll. *Pócs & Orbán 89168/AE*, 1 June 1989 (EGR). – Distrib.: Known from Mt. Kilimanjaro and Mt. Rungwe in Tanzania, from Rwanda and from Ethiopia: Bale Mts only. (Jovet-Ast 1954, Tixier 1995, Bizot & Pócs 1979, Pócs 1990, Fischer 2013).

***Colura calyptrifolia* (Hook.) Dum.**

KENYA: Taita Hills, NW slope of Yale summit above Lushangani village, remnants of montane rainforest, 1650–1780 m, epiphyllous. Coll. *Pócs & Malombe 04039/BG*, 31 March 2004 (EGR). – Distrib.: Southern

temperate species, penetrating into tropical, subtropical mountains and atlantic Europe (Gradstein et al. 1984, map 43), new to Kenya.

Colura dusenii (Steph.) Steph.

COMOROS: Ngazidja Island, W slope of Karthala volcano around “Convalescence” at 1730 m, on bark. Coll. *Pócs & Magill 9269/BF*, (EGR). – Distrib.: Scattered in mainland Africa, new to the East African Islands.

Colura saroltae Pócs

KENYA: Taita Hills, Vuria top, elfin forest at 2200 m, on *Erica* and other twigs. Coll. *Pócs Chuah-Petiot & Malombe 04042/AO*, 1 Apr. 2004 (EGR); TANZANIA: West Usambara Mountains: Sagara Ridge, on twigs in ericaceous heath at 1900–1920 m. Coll. *Pócs and staff of the Botany Department of Helsinki University, 88080/G*, 21 May 1988 (EGR, H); Nguru Mts., elfin forests W of Spirit Lake above Mhonda Mission, 2100–2250 m, on twigs. Coll. *Pócs & Orbán 89165/X, 89168/AD and 89173/D*, 2 June 1989 (EGR). – Distrib.: Known from Mt. Kilimanjaro and Mt. Rungwe in Tanzania and from Rwanda only (Jones & Pócs 1987, Pócs 1994, Fischer 2013), new to Kenya.

Colura usambarica E.W. Jones

TANZANIA: S-Pare Mts., Ranji Plateau at 1900–2000 m, ericaceous heath, on *Erica* bark. – Coll. *Pócs and Helsinki University students, 89250/P*, 4. Dec. 1989 (EGR). – Distrib.: Previously known from Usambara Mts. in Tanzania, from Mulanje Mts. in Malawi and from Taita Hills in Kenya only (Jones & Pócs 1987, Wigginton 2009).

Diplasiolejeunea cobrensis Gottsche ex Steph.

TANZANIA: Mafia Island, *Rhizophora* mangrove near Utende village, N of the lodge, on bark, 2 m. Coll. *Pócs & Krog 89210/H*, 11 Aug. 1989 (EGR). Distrib.: Pantropical, although very scattered and rare. In Africa known to Ghana, Sierra-Leone and Madagascar only (Wigginton 2009), new to Tanzania.

Diplasiolejeunea hamata Tixier

MADAGASCAR: Prov. Fianarantsoa, Ranomafana Nat. Park, S side ridge of Mt. Namatoana, 1.6 km E of Ambatovaku Avaratra village, montane rainforest, 1250 m, epiphyllous. Coll. *Pócs & Tuba 04130/CA*, 31

July 2004 (EGR, TAN). Previously known from its type near Vohiparara in the same province only (Tixier 1979).

Diplasiolejeunea kraussiana (Lindenb.) Steph.

COMORES: Ngazidja (Grande Comore) Island. On 15 year old lava flow above Singani village at 150–300 m alt. Epiphyllous on shrubs. Coll. *Pócs 9461/J*, 26. July 1994 (EGR). – Distrib.: Scattered throughout tropical Africa, new to the Comores (Wigginton 2009).

Diplasiolejeunea rudolphiana Steph.

MADAGASCAR: Prov. Toamasina, Mananara Nord Biosphere Reserve, 1 km W of Antanambe village, at 5 m alt. Coastal dune forest with rich moss layer, on twigs. Coll. *Pócs & Szabó 9875/AT, 9875 BA*, 13. Aug. 1998 (EGR, Hb. Schäfer-Verwimp); Coastal dune forest 5 km SSW of Ambila-Lemaitso, 6–8 m alt., on *Pandanus* stem. Coll.: *Pócs & Szabó 9881/AH*, 19 Aug. 1998 (EGR, TAN). – Pantropical species, common in the Americas and rare in Asia: Sri Lanka, China: Hainan (Zhu & So 2001) and in Africa, where it was known only from Mauritius (Tixier & Guého 1997). New to Madagascar.

Diplasiolejeunea villaumei Steph.

KENYA: Taita Hills, Vuria top, elfin forest at 2200 m, on *Erica* and other twigs. Coll. *Pócs Chuah-Petiot & Malombe 04042/AP*, 1 Apr. 2004 (EGR); MAURITIUS: Mondrain Nat. Reserve at the W edge of the lava plateau, SW of Vacoas, at 480–550 m alt. Ramicolous in degraded montane rainforest. Coll. *Pócs & Florins 00131/M*, 29. June 2000; RÉUNION: Col de Bébour, rocky heath at 1450 m, on volcanic cliff. Coll.: *Pócs 00114/E*, 22 June 2000 (EGR). – Distrib.: Madagascar, Malawi, Tanzania (Wigginton 2009), new to Kenya and the Mascarene archipelago.

Drepanolejeunea cultrella (Mitt.) Steph.

RÉUNION: Réserve Naturelle Mare Longue NW of St. Philippe, 200–250 m, on bark. Coll.: *Pócs 9505/B*, 27 Febr. 1995 (EGR). – Distrib.: Widespread in tropical Africa, new to Réunion.

Drepanolejeunea pentadactyla (Mont.) Steph. var. *pentadactyla*

RÉUNION: Cirque de Cilaos, forêt Mare à Joseph, E from “le Bloc”, montane forest, 1370 m, on decaying wood. Coll.: *Kis 9638/CP*, 10–13

July 1966 (EGR); Between ‘le Bloc’ and the Plateau du Petit Matarum, 1350–1930 m, montane rainforest, on bark. Coll.: *Vojtkó 9639/DC*, 10-13 July 1996. – Distrib.: The species is widespread in tropical Asia. In Africa, previously known as *Drepanolejeunea cambouena* Steph. from the Eastern Arc mountains of Tanzania, Comores, Seychelles, Madagascar and Mauritius (Wigginton 2009, synonymised by Pócs 2011), new to Réunion.

Drepanolejeunea pentadactyla (Mont.) Steph. var. *dactylophoroides* (Herz.) Pócs **comb. nov.** (See figs 1–2).

Basionym: *Drepanolejeunea micholitzii* Steph. var. *dactylophoroides* Herzog 1930, *Annales Bryologici* 7: 79.

MADAGASCAR: Prov. Toamasina, Mt. Maromizaha S of Andasibe-Mantadia Nat. Park, montane rainforest at 1200 m, on *Pandanus* leaf. Coll.: *Pócs 9890/CC*, 26 Aug. 1998 (EGR). – Distrib.: variety known from tropical Asia: Indonesia, Cambodia, Malaysia only (Herzog 1930, Rzhu & So 2001). The variety is distinct by its many acute and long lobe teeth similar to those of *Drepanolejeunea dactylophora* (Nees et al.) Schiffn. which also occurs in Madagascar (Tananarive, Manjakandriana, Lake Mantasoa, 1400 m. Coll.: Tixier (11340), 1978 (G 142407 ex Hb. Tixier 024048), identified by him as *Drepanolejeunea cambouena* Steph. (Pócs 2011:184, not enumerated in Marline et al. 2012). But *D. dactylophora* differs from *D. pentadactyla* by the recurved lobe teeth and toothed perianth wings.

Harpalejeunea filicuspis (Nees) Mizut.

MADAGASCAR: Prov. Toamasina, Coastal dune forest 1 km W of Antanambe, at 5 m, on bark. Coll.: *Pócs & Szabó 9875/AB*, 12 Aug. 1998 (EGR); Ericaceous heath on coastal dunes, 2-3 km N of Andovoranto, on *Erica* twigs. Coll.: *Pócs & Szabó 9882/G*, 22 Aug. 1998 (EGR). – Distrib.: It has Indomalaysian–Pacific distribution, reaching Africa only at the East African islands in Indian Ocean.

Lejeunea obtusata Gottsche

KENYA: Taita Hills, Vuria top, elfin forest at 2200 m, on bark. Coll. *Pócs, Chuah-Petiot & Malombe 04042/Z*, 1 Apr. 2004 (EGR). – Distrib.: Sierra Leone, Ghana, Uganda, Tanzania, Madagascar, Mauritius (Jones 1989), new to Kenya.

***Lejeunea setacea* Steph.**

TANZANIA: Tanga Region, Tongwe Hill SSW of Muheza. On rocks in shady semi-evergreen forest at 400 m alt. Coll. *Pócs & Kornaś 6517/P*, 9. Feb. 1972 (EGR, DSM), det. E.W. Jones. – Distrib. Widespread in tropical Africa, new to Tanzania (Jones 1969).

***Lejeunea villaumei* (Steph.) Grolle**

MAURITIUS: Mt. Cocotte, degraded elfin forest near the summit, 770 m, on bark. Coll.: *Pócs, D. Florens & Probst 9665/AJ*, 1 Aug. 1966 (EGR). Scattered throughout Subsaharan Africa (Wigginton 2009), new to Mauritius.

***Leptolejeunea subrotundifolia* Herz. (See figs 3–6).**

MADAGASCAR: Prov. Toamasina, Coastal dune forest 1 km W of Antanambe, at 5 m, mostly on bark of twigs, one specimen epiphyllous. Coll.: *Pócs & Szabó 9875/AZ*, 12 Aug. 1998 (EGR). – Distrib.: Known only from two localities in Indonesia: West Borneo (Herzog 1942) and from southern Thailand (*Pócs & Chantanaorrapint 2014*), new to Africa. A species that is probably more widespread but has avoided attention due to its small size. It typically occurs on bark, is seldom epiphyllous, unlike the majority of *Leptolejeunea* species.

***Lopholejeunea sphaerophora* (Lehm. et Lindenb.) Steph.**

MADAGASCAR: Prov. Fianarantsoa, Montane rainforest near a small waterfall along Fianarantsoa–Ambatolaky road, 1015 m, on twigs. Coll.: *Orbán & Vojtkó 9466/AA*, 27 Sept. 1994 (EGR), det.: *A. Sass-Gyarmati*; Degraded montane rainforest of Mt. Ambatokirijy, S of Andasibe Forest Reserve, at 950–1000 m, on bark. Coll.: *Pócs 9488/AA*, 3 Oct. 1994 (EGR), det.: *A. Sass-Gyarmati*. – Distrib.: Previously known from two localities in Mauritius and by a dubious sterile specimen from Tanzania, Usambara Mts. (Thiers 1983, Vanden Berghen 1984). New to Madagascar.

Anthocerotaceae

***Anthoceros punctatus* L.**

TANZANIA: Uluguru Mts. Abandoned cultivation in the W valley of Mt. Lupanga, above Kileka village, at 1280 m alt., on open ground. *Pócs & van Zanten 86111/A*, 17 July 1986 (EGR). – A widespread cosmopolite

species previously known to western and central tropical Africa and Socotra only, new to East Africa. (Wigginton 2009).

DISCUSSION

It was expected that the very rich Madagascar bryoflora and the lesser known Comoro Islands furnish novelties. We are sure that their further exploration will yield much more. An interesting feature of the bryoflora of the East African Indian Ocean islands, along with their relatively high proportion of endemics, is the presence of tropical Asian (mostly Indomalayan-Pacific) elements, which reach the westernmost limit of their distribution here and do not penetrate (or very rare) in continental Africa. Such elements are according to Pócs (1976, 1992) and Gradstein (2013) and according to the present paper:

Allisoniella nigra (Rodway) R.M. Schust.
Archilejeunea planiuscula (Mitt.) Steph.
Cheilolejeunea ventricosa (Schiffn.) X.-L. He
Cololejeunea hasskarliana (Lehm. et Lindenb.) Schiffn.
Cololejeunea inflectens (Mitt.) Benedix
Cololejeunea peponiformis Mizut.
Cololejeunea raduliloba Steph.
Colura pluridentata Ast
Denotarisia linguifolia (De Not.) Grolle
Drepanolejeunea dactylophora (Nees et al.) Schiffn.
Frullania repandistipula Sande Lac. (also in Tanzania)
Harpalejeunea filicuspis (Steph.) Mizut.
Heteroscyphus splendens (Lehm. et Lindenb.) Grolle (also in Tanzania)
Lejeunea alata Gottsche (also in Tanzania)
Lepidolejeunea bidentula (Steph.) R.M. Schust.
Leptolejeunea subdentata Schiffn. ex Herzog
Leptolejeunea subrotundifolia Herzog
Leptolejeunea vitrea (Nees) Schiffn.
Porella madagascariensis (Nees et Mont.) Trevis
Schiffneriolejeunea tumida (Nees) Gradst.
Wiesnerella denudata (Mitt.) Steph.

These 21 species amount to nearly one third of all Afro-Asian (Palaeotropical) liverwort species enumerated by Gradstein (2013). Most of these occur in more than one island and a few occur sporadically even on the Precambrian crystalline arc mountains of Tanzania. Some are restricted to one island only. The Seychelles are especially prominent from this point of view, as was already noted by Grolle (1978) and Pócs (1992). They are the oldest among the Indian Ocean islands as remnants of a former subcontinent which now is sunk and exists in the form of Seychelles bank. This subcontinent has been close to Indian Plate during the Cretaceous and could be easier accessed by the diasporas (spores or gemmae or other plant fragments) of Indian origin through the air currents, than the rest of the islands (Pócs 1997). In our contribution most elements of this distribution type occur at the eastern coast of Madagascar, usually in dune forests or heath.

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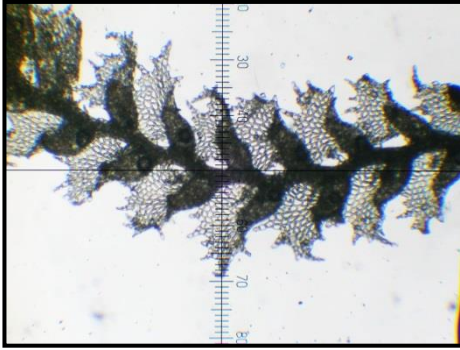
REFERENCES

- Arnell, S.W. (1958): New Hepaticae from Cameroon Mountain. *Svensk Botanisk Tidskrift* 52: 63-67.
- Ah-Peng C., Bardat J., Pócs T. Söderström L., Staménoff P. & Strasberg D. (2012): Red List of liverworts and hornworts for Réunion (Mascarene archipelago). *Phytotaxa* 68: 1–23.
- Bizot, M. & Pócs, T. (1980): East African Bryophytes, III. *Acta Botanica Academiae Scientiarum Hungaricae* 25: 223-261.
- Chantanaorrapint, S. & Pócs, T. (2014): Southern Thailand bryophytes I, with description of *Cololejeunea ramromensis*. In D. Telnov, (ed.): *Biodiversity, biogeography and nature conservation in Wallacea and New Guinea*. In press.
- Engel, J.J. (1990): Falkland Islands (Islas Malvinas) Hepaticae and Anthocerotophyta: A taxonomic and phytogeographic study. *Fieldiana, Botany*, n. ser. 25: 1-209.
- Feldberg, K., Vána, J., Henschel, J. & Heinrichs, J. (2010): Currently accepted species and new combinations in *Jamesonielloideae* (Adelanthaceae, Jungermanniales). *Cryptogamie, Bryologie* 31(2): 141-146.
- Fischer, E. (2013): Liverworts and hornworts of Rwanda. *Abc Taxa* 14: 1-551.
- Gradstein, S.R. (2013): Afro-American hepatics revisited. *Polish Botanical Journal* 58(1): 149-177.
- Gradstein, S.R., Pócs, T. & Vána, J. (1984): Disjunct Hepaticae in tropical America and Africa. *Acta Botanica Hungarica* 29: 127-171.
- Grolle, R. (1995): The Hepaticae and Anthocerotae of the East African Islands. An annotated catalogue. *Bryophytorum Bibliotheca* 48: 1-178.
- Grolle, R. (1978): Die Lebermoose der Seychellen. *Wissenschaftliche Zeitschrift der Friedrich-Schiller-Universität Jena, Mathematische-Naturwissenschaftliche Reihe* 27: 7-17.
- Heinrichs J., Lindner M., Groth H. & Renker C. (2005): Distribution and synonymy of *Plagiochila punctata* (Taylor) Taylor, with hypotheses on the evolutionary history of *Plagiochila* sect. *Arrectae* (Plagiochilaceae, Hepaticae). *Pl. Syst. Evol.* 250: 105–117.

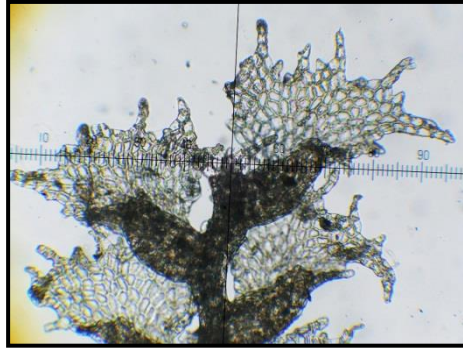
- Herzog, Th. (1942): Revision der Lebermoosgattung *Leptolejeunea* Spr. in der Indomalaya. *Flora* 135: 377-434.
- Jones, E.W. (1962): African Hepatics XV. *Plagiochila* in Tropical Africa. *Transactions of the British Bryological Society* 4: 254-325
- Jones, E.W. (1969): African Hepatics XXI. *Microlejeunea*, *Chaetolejeunea* and *Pleurolejeunea*. *Transactions of the British Bryological Society* 5: 775-789.
- Jones, E.W. (1981, "1980"): African Hepatics XXXIV. Some little-known species and extensions of range. *Journal of Bryology* 11: 311-323.
- Jones, E.W. (1969): African Hepatics XXXIX. Some dioecious species of *Lejeunea*. – *Journal of Bryology* 15: 665-673.
- Jovet-Ast, S. (1954): Le genre *Colura*, Hépatiques, Lejeuneacées, Diplasiae. *Revue Bryologique et Lichénologique* 22: 206-312.
- Lindner, M., Pócs, T., Heinrichs, J. (2004): On the occurrence of *Plagiochila stricta* on Madagascar, new to Africa. *Journal of the Hattori Botanical Laboratory* 96: 261-271.
- Marline, L., Andriamiarisoa, R.L., Bardat, J., Chuah-Petiot, M., Hedder-son, T.A.J., Reeb, C., Strasberg, D., Wilding, N. & Ah-Peng, C. (2012): Checklist of the bryophytes of Madagascar. *Cryptogamie, Bryologie* 33(3): 199-255.
- Müller, F. & Pócs, T. (2002): Contribution to the hepatic flora of Rodrigues (East African islands). *Tropical Bryology* 22: 107-113.
- Pócs T. 1976. Correlation between the tropical African and Asian bryofloras. I. *Journal of the Hattori Botanical Laboratory* 41: 95–106.
- Pócs, T. (1985): East African bryophytes, VII. The Hepaticae of the Usambara Rain Forest Project Expedition, 1982. *Acta Botanica Hungarica* 31: 113-133.
- Pócs T. 1992. Correlation between the tropical African and Asian bryofloras. II. *Bryobrothera* 1: 35–47.
- Pócs, T. (1993): New or little known epiphyllous liverworts, IV. Two new Cololejeuneoideae from the Comoro Archipelago. *Journal of the Hattori Botanical Laboratory* 74: 45-57.
- Pócs, T. (1995): East African Bryophytes, XIV. Hepaticae from the Indian Ocean Islands. - Fragmenta. *Floristica et Geobotanica* 40: 251-277.
- Pócs, T. (1997): The distribution and origin of the foliicolous bryophyta in the Indian Ocean Islands. In: Farkas, E. & Pócs, T. (eds.): *Cryptogams in the Phyllosphaere: Systematics, Distribution, Ecology*

- and Use. Proceedings of the IAB & IAL Symposium on Follicolous Cryptogams, 29 August - 2 September 1995, Eger, Hungary. *Abstracta Botanica* 21: 123-134.
- Pócs T. (2011): Type studies of some African Lejeuneaceae. *Acta Botanica Hungarica* **53**(1-2): 181-192.
- Thiers, B.M. (1983): Type studies in the Lejeuneaceae. II. *Brittonia* 35: 81-86.
- Tixier, P. (1995): Résultats taxonomiques de l'expédition BRYOTROP au Zaïre et Rwanda. 30. Bryophytes épiphyllés (récoltes de E. Fischer). *Tropical Bryology* 11: 11-76.
- Tixier, P. (1979): Nouvelles espèces malgaches de *Diplasiolejeunea* (*Diplasiae*). II. *Revue Bryologique et Lichénologique* 45(2): 209-226.
- Tixier, P. & Guého, J. (1997): *Introduction to Mauritian bryology. A check list of mosses and liverworts*. Mauritius Sugar Industry Research Institute, Réduit, 231 pp..
- Váňa, J. (1974): Studien über die Jungermannioideae (Hepaticae) 5. *Folia Geobotanica et Phytotaxonomica* 9: 277-312.
- Váňa, J. (1982): Notes on some African hepatic genera 1–5. *Folia Geobotanica et Phytotaxonomica, Praha*, 17: 63-87.
- Váňa, J. (1988): *Cephalozia* (Dum.) Dum. in Africa, with notes on the genus . (Notes on some African hepatic genera 10). *Beifzug zur Nova Hedwigia* 90: 179-198.
- Váňa, J., Söderström, L., Hagborg, A., Von Konrat, M. & Engel, J.J. (2010): Notes on Early Land Plants Today. 11. Taxonomy, systematics and nomenclature of Gymnomitriaceae. *Phytotaxa*, 11, 1-80.
- Váňa, J., Ochyra, R., Bednarek-Ochyra, H., Cykowska B. & Lebouvier, M.(2012): 6. *Gymnomitrium subintegrum* (S. W. Arnell) Váňa. In: L. T. Ellis et al. (ed.): New national and regional bryophyte records, 33. *J. Bryol.* 34: 283.
- Váňa, J., Söderström, L., Hagborg, A., & Von Konrat, M. (2013): Notes on Early Land Plants Today. 40. Notes on Cehaloziellaceae (Marchantiophyta). *Phytotaxa* 112(1): 1-6.
- Váňa, J., Söderström, L., Hagborg, A., & Von Konrat, M. (2013): Notes on Early Land Plants Today. 41. New combinations and synonyms in Cephaloziaceae (Marchantiophyta). *Phytotaxa*, 112(1), 7-15. doi:10.11646/phytotaxa.112.1.2
- Vanden Berghen, C. (1976): Frullaniaceae (Hepaticae) africanae. *Bulletin de Jardin Botanique National de Belgique* 46: 1-220.

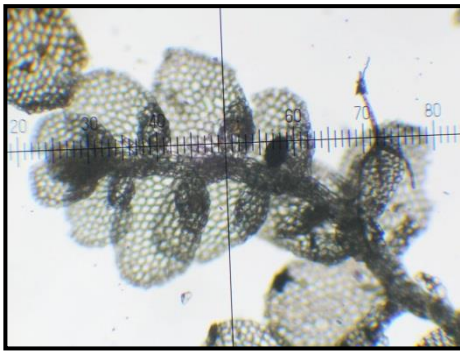
- Vanden Berghen, C. (1981): Le genre *Plagiochila* à Madagascar et aux Mascarenes. *Bulletin du Jardin Botanique National de Belgique* 51: 41-103.
- Vanden Berghen, C. (1984): Le genre *Lopholejeunea* (Spruce) Schiffn. (*Lejeuneaceae*, *Hepaticae*) en Afrique. *Bulletin du Jardin Botanique National de Belgique* 54: 393-464.
- Wigginton, M.J. (2009): Checklist and distribution of the liverworts and hornworts of sub-Saharan Africa, including the East African Islands (edition 3, 24 January 2009). *Tropical Bryology Research Reports* 8: 1-116.
- Wigginton, M.J. & Grolle, R., (supplemented by Gyarmati A.), 1996 – Catalogue of the Hepaticae and Anthocerotae of Sub-Saharan Africa. *Bryophytorum Bibliotheca* 50: 1-267.



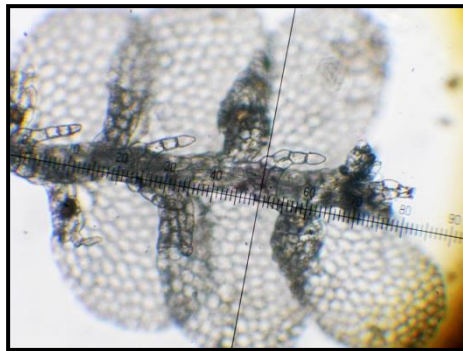
1. *Drepanolejeunea pentadactyla* (Mont.) Steph. var. *dactylophoroides* (Herz.) Pócs, habit



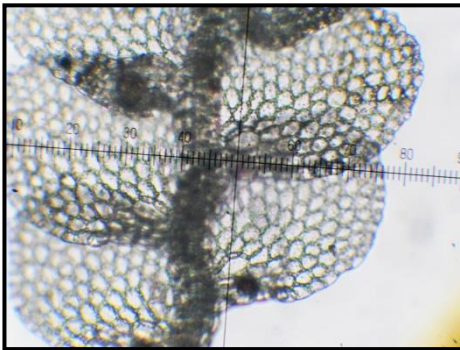
2. Same species, leaves. From Kis 9638/CP. (Scale in fig. 1. by 25 μm , in fig. 2. by 8 μm)



3. *Leptolejeunea subrotundifolia* Herzog, habit (scale by 25 μm), Pócs & Szabó 9875/AZ



4. Same species, ventral view (scale by 8 μm).



5. Same species, dorsal view, with ocelli (scale 25 μm)



6. Same species, underleaf (scale by 2 μm).