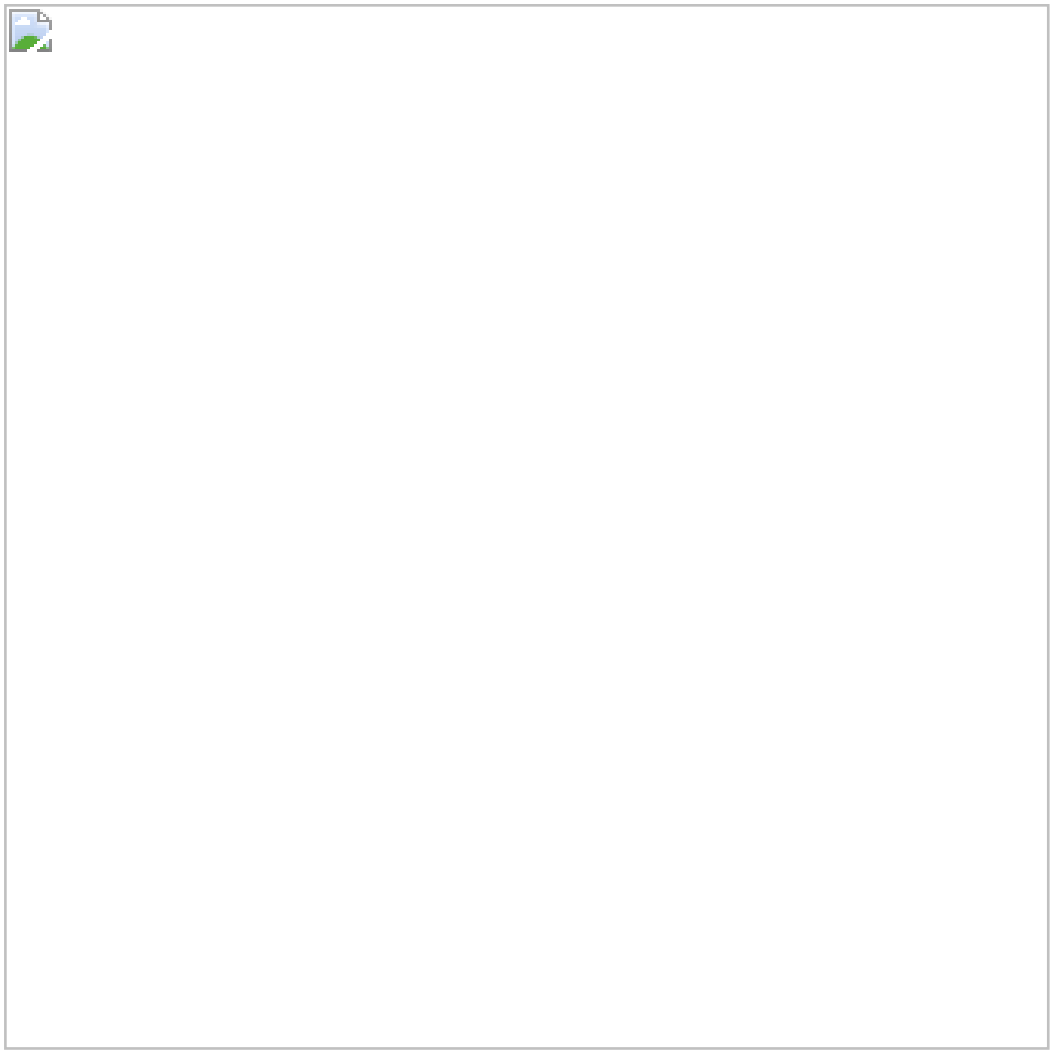

New liverwort (Marchantiophyta) records based on specimens housed in the National Herbarium of Ecuador (QCNE): notes on the Bryophytes of Ecuador VI

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New liverwort (Marchantiophyta) records based on specimens housed in the National Herbarium of Ecuador (QCNE): notes on the Bryophytes of Ecuador VI

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Lepicolea ochroleuca is newly recorded for Ecuador and *Plagiochila cuneata* is new to continental Ecuador, previously known only from the Galapagos Islands. Seventy-seven new provincial records of 62 liverwort species distributed among 15 provinces are presented. The uneven knowledge of the distribution of liverworts in Ecuador is briefly discussed and some observations on collections by non-bryologists are made.

Keywords: distribution, diversity, Ecuador, hepatics, *Lepicolea ochroleuca*

The National Herbarium of Ecuador (QCNE) was founded in 1977 as the Botanical Department of the National Institute of Biodiversity of Ecuador (INABIO). It houses one of the most extensive plant collections in the country with about 245 000 specimens, of which 180 000 data sets are accessible online (URL-1). These include approximately 5600 specimens of bryophytes, comprising 4200 specimens of mosses, 1400 liverworts and about 10 of hornworts. From 2012 to 2016, the author, as Associate Investigator of the herbarium, revised large parts of the bryophyte collections and remarkable liverwort specimens constituting new or otherwise noteworthy records for the Ecuadorian liverwort flora are presented here.

Material and methods

Identification of the collections was carried out applying traditional microscopic techniques using a wide range of literature (Evans 1925, Fulford 1963, 1966, 1976, Gradstein 1994, Heinrichs et al. 1999, Müller et al. 1999, Heinrichs 2002, Dauphin 2003, Costa 2008, Heinrichs et al. 2004, Reiner-Drehwald and Schäfer-Verwimp 2008, Gradstein and Schäfer-Verwimp 2012). All specimens cited here were determined, revised or confirmed by the author. The heterogeinity of the original label information necessitated the partial translation and standardization to the following format: province, canton, locality, coordinates, elevation, ecological information, date, collector, collection-number (herbarium number QCNE). Original label data are available online (URL-1). The list runs in alphabetic order, providing additional information on the distribution of the species. In the framework of the forthcoming checklist of liverworts and hornworts of Ecuador (Burghardt et al. unpubl.), the distributional data presented in this study base on the evaluation of original data published with particular emphasis on localities and coordinates (e.g. descriptions of new taxa, revisions, monographs and floristic works). A very recently published checklist (Gradstein 2020) includes several additional records. However, the lack of references and the unavailability of 'Liverworts and Hornworts of Colombia and Ecuador' (Gradstein in press) at the time (September–October 2020) hampered their verification. Therefore, these records are listed for completeness' sake only. The nomenclature follows Söderström et al. (2016) with updates from Gradstein (2020) where required. Abbreviations of provinces applied here include AZU (Azuay), BOL (Bolivar), CAÑ (Cañar), CAR (Carchi), CHI (Chimborazo), COT (Cotopaxi), ELO (El Oro), ESM (Esmeraldas), GAL (Galápagos), GUA (Guayas), IMB (Imbabura), LOJ (Loja), LOS (Los Rios), MAN (Manabí), MOR (Morona-Santiago), NAP (Napo) ORE (Orellana), PAS (Pastaza), PIC (Pichincha), SAN (Santo Domingo de Los Tsáchilas), SUC (Sucumbíos), TUN (Tungurahua) and ZAM (Zamora-Chinchipe).

Results

Species list

***Anastrophyllum auritum* (Lehm.) Steph.**
Chimborazo: Canton Penipe, Sangay National Park, edge of the trail to volcano Altar, 01°32′S, 78°28′W, 3000–3600 m a.s.l., humid montane forest, trunk epiphyte on *Polylepis*, *Gynoxys* or *Llerasia*, 28 Nov 1996, leg. C. Cerón and C. Montalvo 33322 (QCNE-178788).

Distribution in Ecuador: AZU (Parolly and Kürschner 2005), CAR (León-Yánez et al. 2006), COT (Herzog 1942), LOJ (Spruce 1885), PIC (Taylor 1846a), TUN (Spruce 1885), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include NAP. New to CHI.

***Archilejeunea nebeliana* Gradst. et Schäf.-Verw.**
Morona-Santiago: Canton Limón Indanza, Cordillera del Condor, Community Warints, 03°13′S, 78°15′W, 1165 m a.s.l., trunk epiphyte, 13 Dec 2002, leg. E. Toapanta 1608 (QCNE-178460).

Distribution in Ecuador: ZAM (Gradstein and Schäfer-Verwimp 2012). New to MOR.

***Blepharostoma trichophyllum* (L.) Dumort.**
Carchi: Canton Huaca, Guandera Biological Station, 01°43′N, 77°45′W, 3450 m a.s.l., on soil along the trail, 24 Apr 2009, leg. A. Iglesias 097 (QCNE-233332).

Distribution in Ecuador: COT (Burghardt 2019), LOJ (Burghardt 2019), PIC (Parolly and Kürschner 2005). New to CAR.

***Bryopteris filicina* (Sw.) Nees**
Imbabura: Canton Cotacachi, Community Santa Rosa, Intag Reserve, Ecological trail, 0°22′N, 78°28′W, 1850 m a.s.l., disturbed montane forest, shade epiphyte on a branch, 4 Mar 2002, leg. J. Caranqui 941, det. E. Toapanta (QCNE-178290). Manabí: Canton Manta, Parrish San Lorenzo, Sector Zacotal, 01°03′S, 80°53′W, 150 m a.s.l., on wood in humid forest, 8 May 1999, leg. M. Cuascota 129 (QCNE-131039).

Distribution in Ecuador: BOL (Spruce 1884), ELO (Benitez and Gradstein 2011), ESM (Gottsche et al. 1845), GAL (Hooker 1847), GUA (Gradstein 1994), LOJ (Benitez and Gradstein 2011), LOS (Gradstein 1994), MOR (Gradstein 1994), ORE (Gradstein 1994), PAS (Gradstein 1994), PIC (Gradstein 1994), SAN (Gradstein 1994), TUN (Spruce 1884), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include CHI and NAP. New to IMB, and MAN.

***Ceratolejeunea cornuta* (Lindenb.) Steph.**
Tungurahua: Canton Baños, Llanganates National Park, El Topo, 01°21′S, 78°08′W, 2550 m a.s.l., evergreen primary upper montane forest, on branch, 27 Nov 2001, leg. E. Toapanta and J. Caranqui 1239 (QCNE-131475).

Distribution in Ecuador: CHI (Fulford 1945), ESM (Weis 2001), GAL (Fulford 1945), GUA (Schäfer-Verwimp et al. 2013), LOS (Dauphin 2003), MAN (Stephani 1895), MOR (Schäfer-Verwimp et al. 2013), NAP (Dauphin 2003), ORE (Schäfer-Verwimp et al. 2013), PAS (Spruce 1884), PIC (Dauphin 2003), ZAM (Schäfer-Verwimp et al. 2013). Other records in Gradstein (2020) include AZU. New to TUN.

***Cheilolejeunea jackii* (Prantl) W.Ye, R.L. Zhu et Gradst.**
Guayas: Canton Naranjal, Manglares-Churute Ecological Reserve, 02°27′S, 79°40′W, 590–610 m a.s.l., epiphyte in dry tropical and premontane forest, 15 Aug 1992, leg. C. Cerón et al. 20258 (QCNE-178643).

Distribution in Ecuador: GAL (Clark 1953), LOS (Herzog 1952), PIC (Burghardt 2020). Other records in Gradstein (2020) include BOL, CAÑ, ELO and MAN. New to GUA.

***Cheilolejeunea trifaria* (Reinw., Blume et Nees) Mizut.**
Pastaza: Canton Pastaza, Pastaza Experimental Station, km 32 via Puyo-Macas, 01°30′S, 77°56′W, 1040 m a.s.l., secondary forest, 15 Feb 2002, leg. J. Caranqui 915 (QCNE-178104).

Distribution in Ecuador: GUA (Schäfer-Verwimp et al. 2013), GAL (Clark 1953), MOR (Schäfer-Verwimp et al. 2013), ORE (Schäfer-Verwimp et al. 2013), PIC (Burghardt 2020) and ZAM (Parolly et al. 2004). Other records in Gradstein (2020) include AZU and ELO. New to PAS.

***Drepanolejeunea cutervoensis* (Prantl) Grolle**
Carchi: Canton Tulcán, Parrish Tufiño, El Ángel Ecological Reserve, Sector El Voladero, 00°42′N, 77°53′W, 3700 m a.s.l., corticolous in shrubby vegetation, 10 Aug 2005, leg. J. Rojas 092 (QCNE-233236).

Distribution in Ecuador: AZU (Schäfer-Verwimp et al. 2013), LOJ (Schäfer-Verwimp et al. 2013), ZAM (Arnell 1962). Other records in Gradstein (2020) include COT. New to CAR.

***Frullania aculeata* Taylor**
Esmeraldas: Canton Quinindé, Bilsa Biological Station, 00°21′N, 79°44′W, 630 m a.s.l., on bark in humid tropical forest, 14 Feb 2002, leg. E. Toapanta 1342 (QCNE-178049).

Distribution in Ecuador: AZU (Taylor 1846b), BOL (Spruce 1884), COT (Arnell 1962), ELO (Schäfer-Verwimp et al. 2013), GAL (Taylor 1846b), LOS (Herzog 1952), PIC (Hentschel et al. 2009), ZAM (Arnell (1962). Other records in Gradstein (2020) include CHI and LOJ. New to ESM.

***Frullanoides densifolia* Raddi**
Morona-Santiago: Canton Morona, road from Proaño to 9 de Octubre, 02°16′S, 78°11′W, 956 m a.s.l., trunk epiphyte on Inga sp., 22 Aug 2002, leg. E. Toapanta et al. 1475 (QCNE-131863).

Distribution in Ecuador: AZU (van Slageren 1985), BOL (Spruce 1884), CAR (Gradstein 1994), CHI (van Slageren 1985), LOJ (Schäfer-Verwimp et al. (2013), PIC (Herzog 1957), TUN (Spruce 1884) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include GAL and NAP. New to MOR.

***Fulfordianthus pterobryoides* (Spruce) Gradst.**
Sucumbios: Canton Gonzalo Pizarro, Lumbaqui, 00°04′N, 77°18′W, 780 m a.s.l., disturbed oldgrowth forest, on fallen tree, 28 May 2002, leg. D. Suárez 1064 (QCNE-178451).

Distribution in Ecuador: MAN (Stephani 1885), NAP (Schäfer-Verwimp et al. 2013), PAS (Spruce 1884) and PIC (Burghardt 2020). Other records in Gradstein (2020) include ESM and ORE. New to SUC.

***Herbertus pensilis* (Taylor) Spruce**
Santo Domingo de los Tsáchilas: Canton Santo Domingo, km 59 of the road to Chiriboga, Bosque Protector 'Río Guajalito', trail 'El Español', 00°14′27″S, 78°48′08″W, 2080 m a.s.l., disturbed montane forest, corticolous, 21 Dec 2003, leg. A. Freire V. 007 (QCNE-178832).

Distribution in Ecuador: BOL (Spruce 1884), CAR (Feldberg and Heinrichs 2006), GAL (Gradstein and Weber 1982), LOJ (Burghardt 2019), PIC (Taylor 1846b), TUN (Stephani 1909), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include CHI and NAP. New to SAN.

***Leiomitra tomentosa* (Sw.) Lindb.**
Esmeraldas: Canton San Lorenzo, Awa Ethnic and Forest Reserve, Rió Bogotá, Community School, 00°59′N, 78°34′W, 600 m a.s.l., epiphyte on trunks and branches in disturbed vegetation, 6 Feb 2002, leg. E. Toapanta 1359 (QCNE-178278). Imbabura: Canton Cotacachi, Comunity Santa Rosa de Pucurá, Intag Private Reserva, Ecological trail, 00°22′N, 78°28′W, 2200 m a.s.l., on soil in montane forest, 7 Mar 2002, leg. J. Caranqui 951 (QCNE-178278). Santo Domingo de los Tsáchilas: Canton Santo Domingo, km 59 of the road to Chiriboga, Bosque Protector 'Río Guajalito', trail 'El Español', 00°14′13″S, 78°48′26″W, 2000 m a.s.l., disturbed montane forest, corticolous, 21 Dec 2003, leg. R. L. Chuquirima-Poma 10 (QCNE-178976).

Distribution in Ecuador: COT (Müller and Frahm 1998), LOJ (Schäfer-Verwimp et al. 2013), MOR (Stephani 1923), PAS (Spruce 1885), PIC (Schäfer-Verwimp et al. 2006), TUN (Spruce 1885), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include NAP. New to ESM, IMB and SAN.

***Lejeunea debilis* (Lehm. et Lindenb.) Nees et Mont.**
Esmeraldas: Canton Quinindé, Bilsa Biological Station, 00°21′N, 79°44′W, 630 m a.s.l., hanging epiphyte on a branch in decomposition in humid tropical forest, 14 Feb 2002, leg. E. Toapanta 1338 (QCNE-178522).

Distribution in Ecuador: ELO (Schäfer-Verwimp et al. 2013), GAL (Gradstein and Weber 1982), PIC (Burghardt 2020). Other records in Gradstein (2020) include LOJ and ZAM. New to ESM.

***Lejeunea laetevirens* Nees et Mont.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo de los Tsáchilas, Biological Station 'Gustavo Orcés', 0°16′S, 79°15′W, 460 m a.s.l., trunk epiphyte in disturbed forest, 20 Aug 2004, leg. E. Jaramillo C. 042 (QCNE-233036).

Distribution in Ecuador: ELO (Schäfer-Verwimp et al. 2013), ESM (Burghardt 2019), GAL (Clark 1953), GUA (Schäfer-Verwimp et al. 2013), LOJ (Benitez and Gradstein 2011), LOS (Herzog 1952), MOR (Drehwald 2003), ORE (Schäfer-Verwimp et al. 2013), PIC (Burghardt 2020), SUC (Schäfer-Verwimp et al. 2013), TUN (Spruce 1884), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include AZU, CHI, NAP and PAS. New to SAN.

***Lejeunea osculatiana* De Not.**
Imbabura: Canton Cotacachi, Comunity Santa Rosa de Pucurá, Intag Private Reserve, Ecological trail, 00°22′N, 78°28′W, 2200 m a.s.l., trunk epiphyte in montane forest, 07 Mar 2002, leg. J. Caranqui 946 (QCNE-178288), det E. Toapanta as *Macrolejeunea lancifolia* (Steph.) Herzog.

Distribution in Ecuador: LOJ (Benitez and Gradstein 2011), MOR (Reiner-Drehwald and Schäfer-Verwimp 2008), NAP (Schäfer-Verwimp et al. 2006), PIC (Schäfer-Verwimp et al. 2006), SUC (Arnell 1962), ZAM (Parolly et al. 2004). Other records in Gradstein (2020) include PAS and TUN. New to IMB.

***Lejeunea pallescens* Mitt.**
Cotopaxi: Canton Sigchos, western side of the volcanoes Ilinizas, 00°38′S, 78°49′W, 2900–3300 m a.s.l., on soil and epiphytic in humid montane forest, 28 Dec 1993, leg. C. Cerón et al. 25425 (QCNE-185083). Imbabura: Canton Ibarra, volcano Imbabura, trail from San Antonio to the summit, 00°17′N, 78°12′W, 3100 m a.s.l., epiphyte in humid montane scrub, 28 Feb 1998, leg. C. Cerón et al. 35444 (QCNE-178578).

Distribution in Ecuador: AZU (Schäfer-Verwimp et al. 2013), CHI (Spruce 1884), LOJ (Reiner-Drehwald and Schäfer-Verwimp 2008), PIC (Mitten 1851), TUN (Spruce 1884). Other records in Gradstein (2020) include CAR. New to COT and IMB.

***Lejeunea parviloba* Ångstr.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo de los Tsáchilas, Scientific station 'Gustavo Orcés', km 11.5, on road to Quevedo, 0°19′S, 79°13′W, 600 m a.s.l., disturbed tropical forest, 27 Nov 1999, leg. D. M. Fernández 92 (QCNE-131738). Identified as *Lejeunea tapajosensis* Spruce which is currently considered a synonym of *L. parviloba* (Gradstein 2020).

Distribution in Ecuador: ESM (Schäfer-Verwimp et al. 2006), ORE (Schäfer-Verwimp et al. 2013), ZAM (Nöske et al. 2003). New to SAN.

***Lejeunea reflexistipula* (Lehm. et Lindenb.) Lehm. et Lindenb.**
Esmeraldas: Canton San Lorenzo, Awa Ethnic and Forest Reserve, Rió Bogotá, Community School, boundary Segundos Saltos, 00°59′N, 78°34′W, 600 m a.s.l., epiphyte on branches in disturbed vegetation, 07 Apr 2002, leg. E. Toapanta 1376B (QCNE-178492).

Distribution in Ecuador: CAR (Schäfer-Verwimp et al. 2006), LOJ (Benitez et al. 2012), MOR (Schäfer-Verwimp et al. 2013), NAP (Weis 2001), PAS (Arnell 1962), PIC (Reiner-Drehwald 2005), TUN (Spruce 1884), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include ORE. New to ESM.

***Lepicolea ochroleuca* (Spreng.) Spruce**
Carchi: Canton Tulcan, Tufiño, slopes of volcano Chiles, Aguas Hediondas, 00°49′N, 77°53′W, 3450 m a.s.l., Espeletia-páramo, epiphyte in shade, 02 May 1998, leg. C. Cerón et al. 35976 (QCNE-178563). Tungurahua: Canton Baños, Llanganates National Park, 01°21′S, 78°08′W, 2740 m a.s.l., primary evergreen upper montane forest, epiphyte in mats on trunk bases, 28 Nov 2001, leg. E. Toapanta and J. Caranqui 1303 (QCNE-132682).

This species occurs disjunctly in South Africa (Sprengel 1827), Central and South America (Fulford 1963). New to Ecuador.

***Lepicolea pruinosa* (Taylor) Spruce**
Carchi: Canton San Pedro de Huaca, Guandera Biological Station, El Guanderal, 00°36′N, 77°43′17″W, 3080 m a.s.l., very humid montane forest, terricolous, 6 Dec 2002, leg. S. Tinajero-T. 26 (QCNE-178030). Chimborazo: Canton Guamote, new road Guamote-Macas, Sangay National Park, 3500 m a.s.l., upper montane forest and páramo, epiphyte in mats on bark of Escallonia, 22 Jun 2002, leg. E. Toapanta and J. Caranqui 1397 (QCNE-185006). Cotopaxi: Canto Pujili, road Pilalo-Latacunga, western slopes of Andes, 78°58′W, 0°57′S, 3400 m a.s.l., upper montane forest near timberline, terricolous in small springs, 6 Jul 1968, leg. L. Holm-Nielsen and S. Jeppsen 1439 (QCNE-80976), det. H. Robinson.

Distribution in Ecuador: AZU (Fulford 1963), LOJ (Arnell 1962), MOR (Schäfer-Verwimp et al. 2013), NAP (Løitnant and Molau 1982), PAS (Spruce 1885), PIC (Taylor 1846b), TUN (Spruce 1885), ZAM (Nöske et al. 2003). New to CAR, CHI and COT.

***Lepidolejeunea sullivantii* (Gottsche) M.E.Reiner**
Carchi: Cantón San Pedro de Huaca, Guandera Biological Station, Clusia trail, 0°36′01″N, 77°41′41″W, 3500 m a.s.l., very humid montane forest, terricolous, 6–8 Dec 2002, leg. R. K. Benavides 013 (QCNE-178020).

Distribution in Ecuador: TUN (Spruce 1884) and ZAM (Parolly et al. 2004). New to CAR.

***Lepidozia cupressina* (Sw.) Lindenb.**
Carchi: Cantón San Pedro de Huaca, Guandera Biological Station, Clusia trail, 0°36′01″N, 77°41′41″W, 3500 m a.s.l., very humid montane forest, terricolous, 6–8 Dec 2002, leg. R. K. Benavides 019 (QCNE-178077).

Distribution in Ecuador: PIC (Fulford 1966) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include AZU, LOJ, MOR, NAP, PAS and TUN. New to CAR.

***Lepidozia pinnaticruris* Spruce ex Steph.**
Esmeraldas: Canton Quinindé, Bilsa Biological Station, 0°21′N, 79°44′W, 630 m a.s.l., humid tropical forest, hanging trunk epiphyte, 14 Feb 2002, leg. E. Toapanta 1318 (QCNE-178534).

Distribution in Ecuador: BOL (Stephani 1909) and PIC (Burghardt 2020). Other records in Gradstein (2020) include CHI and NAP. New to ESM.

***Lepidozia subdichotoma* Spruce**
Morona-Santiago: Canton Limón Indanza, Cordillera del Condor, Community Warints, Cerro Chanquiñaz, 3°14′S, 78°16′W, 1811 m a.s.l., dwarf forest, terricolous and epiphytic, abundant, 13 Dec 2002, leg. E. Toapanta 1586 (QCNE-178308).

Distribution in Ecuador: AZU (Fulford 1966), LOJ (Schäfer-Verwimp et al. 2013), PAS (Spruce 1885), TUN (Herzog 1957) and ZAM (Schäfer-Verwimp et al. 2013). New to MOR.

***Leptoscyphus cuneifolius* subsp. *fragilis* (J.B.Jack et Steph.) Grolle.**
Carchi: Canton Tulcán, Parrish Tufiño, El Ángel Ecological Reserve, Sector El Voladero, 00°42′N, 77°53′W, 3700 m a.s.l., corticolous in shrubby vegetation, 10 Aug 2005, leg. J. Rojas 092 (QCNE-233236). This species occurs intermixed with *Drepanolejeunea cutervoensis* in the same collection.

Distribution in Ecuador: AZU (Schäfer-Verwimp et al. 2013), LOJ (Schäfer-Verwimp et al. 2013), PIC (Schäfer-Verwimp et al. 2006) and ZAM (Schäfer-Verwimp et al. 2013). León-Yánez et al. (2006) doubted the correct identity of a record from Galapagos (Bartram and Arnell 1961). New to CAR.

***Lophocolea bidentata* (L.) Dumort.**
Carchi: Cantón San Pedro de Huaca, Guandera Biological Station, Clusia trail, 0°36′01″N, 77°41′41″W, 3500 m a.s.l., very humid montane forest, terricolous, 6–8 Dec 2002 leg. R. K. Benavides 016 (QCNE-178021).

Distribution in Ecuador: AZU (Burghardt 2019), CHI (Spruce 1885), COT (Parolly and Kürschner 2005), LOJ (Spruce 1885), MOR (Fulford 1976), PIC (Herzog 1942), TUN (Spruce 1885) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include CAÑ, NAP and ORE. New to CAR.

***Lophocolea liebmanniana* Gottsche**
Pichincha: Canton San Miguel de los Bancos, Mindo, Center for Environmental Education, 0°0′S, 78°45′W, 1680 m a.s.l., evergreen lower montane forest, on roots in decomposition, 7 Aug 2000, leg. E. Toapanta and J. Quishpe 834 (QCNE-131614).

Distribution in Ecuador: ORE (Schäfer-Verwimp et al. 2013) and ZAM (Parolly et al. 2004). New to PIC.

***Lopholejeunea subfusca* (Nees) Schiffn.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo de los Tsáchilas, Biological station 'Gustavo Orcés', 0°16′S, 79°15′W, 460 m a.s.l., disturbed tropical forest, trunk epiphyte, 20 Aug 2004, leg. E. Jaramillo C. 066 (QCNE-233051).

Distribution in Ecuador: ESM (Arnell 1962), GUA (Schäfer-Verwimp et al. 2013), MOR (Schäfer-Verwimp et al. 2013), NAP (Gradstein 1994), ORE (Arnell 1962) and ZAM (Arnell 1962). Other records in Gradstein (2020) include AZU. New to SAN.

***Marchesinia bongardiana* (Lehm. et Lindenb.) Trevis.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo de los Tsáchilas, Biological station 'Gustavo Orcés', 0°16′S, 79°15′W, 460 m a.s.l., disturbed tropical forest, trunk epiphyte, 20 Aug 2004, leg. E. Jaramillo C. 095 (QCNE-233074).

Distribution in Ecuador: BOL (Heinrichs et al. 2009), GAL (Heinrichs et al. 2009), GUA (Schäfer-Verwimp et al. 2013) and LOS (Spruce 1884). Other records in Gradstein (2020) include AZU, ELO and MOR. New to SAN.

***Marchesinia languida* (Nees et Mont.) Steph.**
Esmeraldas: Canton Quinindé, Bilsa Biological Station, 0°21′N, 79°44′W, 630 m a.s.l., humid tropical forest, trunk epiphyte, 14 Feb 2002, leg. E. Toapanta 1353 (QCNE-178050).

Distribution in Ecuador: BOL (Spruce 1884), PIC (Heinrichs et al. 2009) and TUN (Heinrichs et al. 2009). Other records in Gradstein (2020) include CHI and NAP. New to ESM.

***Marchesinia robusta* (Mitt.) Schiffn.**
Morona-Santiago: Canton Morona, Road Proaño-9 de Octubre, 02°16′S, 78°11′W, 956 m a.s.l., epiphyte on trunk of *Inga* sp., 22 Aug 2002, leg. E. Toapanta et al. 1497 (QCNE-178197). Santo Domingo de los Tsáchilas: Canton Santo Domingo, Bosque Protector 'Rio Guajalito', 0°14′N, 79°49′W, 2200 m a.s.l., evergreen lower montane and montane forest, trunk epiphyte, 12 Dec 2003, leg. S. Peñaloza 018 (QCNE-178974).

Distribution in Ecuador: ESM (Heinrichs et al. 2009), PIC (Mitten 1851),TUN (Spruce 1884) and ZAM (Nöske et al. 2003). New to MOR and SAN.

***Metzgeria fruticola* Spruce**
Azuay: Canton Cuenca, Cajas National Park, 30 km W of Cuenca, in Polylepis-woodland on N facing slope of E-W valley to the N of Lake Torreadora, 79°17′S, 2°54′W, 3600–4000 m a.s.l., epiphytic,15-18 Sep 1995, leg. M.J. Price 6 (QCNE-131421).

Distribution in Ecuador: COT (Costa 2008), MOR (Costa 2008), NAP/PIC (Costa 2008), PAS (Spruce 1885), PIC (Spruce 1885), TUN (Spruce 1885) and ZAM (Benitez and Gradstein 2011). New to AZU.

***Metzgeria liebmaniana* Lindenb. et Gottsche**
Azuay: Canton Cuenca, Cajas National Park, 30 km W of Cuenca, in Polylepis-woodland on N facing slope of E-W valley to the N of Lake Torreadora, 79°17′S, 2°54′W, 3600–4000 m a.s.l., epiphytic, 15–18 Sep 1995, leg. M. J. Price 37 (QCNE-131056).

Distribution in Ecuador: CAR (León-Yánez et al. 2006), COT (Parolly and Kürschner 2005) and PIC (Schäfer-Verwimp et al. 2006). Other records in Gradstein (2020) include NAP. New to AZU.

***Metzgeria myriopoda* Lindb.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo, Biological Station 'Gustavo Orcés', 0°16′S, 79°15′W, 460 m a.s.l., disturbed tropical forest, trunk epiphyte, 20 Aug 2004, leg. E. Jaramillo C. 070 (QCNE-233055).

Distribution in Ecuador: GAL (Weber 1975), MOR (Herzog 1952), PIC (Burghardt 2020), SUC (Arnell 1962), TUN (Spruce 1885) and ZAM (Arnell 1962). New to SAN.

***Odontolejeunea lunulata* (F.Weber) Schiffn.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo, Scientific station 'Gustavo Orcés', km 11.5, on road to Quevedo, 0°19′S, 79°13′W, 600 m a.s.l., disturbed tropical forest, epiphyllous on an Araceae, 28 Nov 1999, leg. D. M. Fernández 161 (QCNE-131736).

Distribution in Ecuador: BOL (Gradstein 1994), ELO (Schäfer-Verwimp et al. 2013), ESM (Arnell 1962), LOS (Herzog 1957), MOR (Stephani 1913), NAP (Arnell 1962), ORE (Arnell 1962), PAS (Spruce 1884), PIC (Herzog 1957), SUC (Arnell 1962), TUN (Spruce 1884) and ZAM (Arnell 1962). Other records in Gradstein (2020) include CHI. New to SAN.

***Plagiochila aerea* Taylor**
Carchi: Canton Tulcan, Maldonado, watershed of Rio San Juan, Cerro Altamira, 78°17′W, 0°53′N, 2000 m a.s.l., shade epiphyte in foggy montane forest, 22 May 1999, leg. C. E. Cerón et al. 38487 (QCNE-185034). Guayas: Canton Naranjal, Manglares-Churute Ecological Reserve, 02°27′S, 79°40′W, 590–610 m a.s.l., shade epiphyte in dry tropical premontane forest, 13 Aug 1992, leg. C. Cerón et al. 20101 (QCNE-178671). Imbabura: Canton Cotacachi, Comunity Santa Rosa de Pucurá, Intag Private Reserva, Ecological trail, 00°22′N, 78°28′W, 2200 m a.s.l., primary montane forest, hanging trunk epiphyte, 7 Mar 2002, leg. J. Caranqui 957 (QCNE-178270).

Distribution in Ecuador: AZU (Stephani 1921), BOL (Spruce 1885), ELO (Schäfer-Verwimp et al. 2013), ESM (Taylor 1846a), GAL (Clark 1953), LOJ (Benitez and Gradstein 2011), LOS (Herzog 1952), MOR (Drehwald 2003), NAP (Heinrichs 2002), PAS (Spruce 1885), PIC (Heinrichs 2002), SUC (Arnell 1962), TUN (Spruce 1885) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include CHI. New to CAR, GUA and IMB.

***Plagiochila alternans* Lindenb. et Gottsche**
Chimborazo: Canton Guamote, new road Guamote-Macas, Sangay National Park, 3500 m a.s.l., upper montane forest and páramo, epiphyte on branch of an Asteraceae, 22 Jun 2002, leg. E. Toapanta and J. Caranqui 1410 (QCNE-185007).

Distribution in Ecuador: CAR (Müller et al. 1999), LOJ (Müller et al. 1999), MOR (Stephani 1921), NAP (Müller et al. 1999), PIC (Stephani 1902), TUN (Spruce 1885) and ZAM (Parolly et al. 2004). New to CHI.

***Plagiochila amicta* Steph.**
Imbabura: Canton Cotacachi, Comunity Santa Rosa de Pucurá, Intag Private Reserva, Ecological trail, 00°22′N, 78°28′W, 2200 m a.s.l., corticolous, 7 Mar 2002, leg. J. Caranqui 956 (QCNE-178273).

Distribution in Ecuador: ZAM (Heinrichs 2002). Other records in Gradstein (2020) include TUN. New to IMB.

***Plagiochila canelensis* Steph.**
Sucumbíos: Canton Gonzales Pizarro, Community Cofán-Sinagüe, left bank of the river, 0°08′N, 77°27′W, 700–800 m a.s.l., trunk epiphyte in premontane humid forest, 15 Apr 1993, leg. C. E. Cerón et al. 22147 (QCNE-185073).

Distribution in Ecuador: LOJ (Burghardt 2019), NAP (Heinrichs 2002), PAS (Spruce 1885) and TUN (Spruce 1885). Other records in Gradstein (2020) include PIC. New to SUC.

***Plagiochila cristata* (Sw.) Lindenb.**
Morona Santiago: Canton Limón Indanza, Cordillera del Condor, Comunidad de Warints, Cerro Chanquiñaz, 03°14′S, 78°16′W, 1811 m a.s.l., ramicolous in dwarf forest, 13 Dec 2002, leg. E. Toapanta 1708 (QCNE-178384).

Distribution in Ecuador: PAS (Spruce 1885), ZAM (Heinrichs 2002). Other records in Gradstein (2020) include TUN. New to MOR.

***Plagiochila cucullifolia* J.B.Jack et Steph.**
Tungurahua: Canton Baños, Llanganates National Park, 01°21′S, 78°08′W, 2740 m a.s.l., primary evergreen upper montane forest, trunk epiphyte, 28 Nov 2001, leg. E. Toapanta and J. Caranqui 1253 (QCNE-131620). Morona-Santiago: Canton Limón Indanza, Cordillera del Condor,

Community Warints, 03°14′S, 78°17′W, 2300 m a.s.l., dwarf forest, trunk epiphyte, 14 Dec 2002, leg. E. Toapanta 1665 (QCNE-178456), det. E. Toapanta as Szweykowskia cucullifolia (J.B.Jack et Steph.) Gradst. et E.Reiner.

Distribution in Ecuador: NAP (Heinrichs et al 2003). Other records in Gradstein (2020) include ZAM. New to MOR and TUN.

***Plagiochila cuneata* Lindenb. et Gottsche**
Carchi: Canton San Pedro de Huaca, Guandera Biological Station, Clusia trail, 06.12.2002, 0°33′38″N, 77°41′13″W, 3030–3533 m a.s.l., epiphyte in evergreen secondary upper montane forest, 6–8 Dec 2002, leg. W. E. Defas 029 (QCNE-131941). Napo: Canton Quijos, Biological Reserve Yanayacu above Cosanga, 0°36′16″S, 77°53′16″W, 2000–2100 m a.s.l., very humid lower montane forest, trunk epiphyte, 14 Nov 2005, leg. S.P. Churchill and E. Jaramillo C. 23995 (QCNE-232566).

Distribution in Ecuador: GAL (Inoue and Gradstein 1980). New to CAR and NAP.

***Plagiochila disticha* (Lehm. et Lindenb.) Lindenb.**
Santo Domingo de los Tsáchilas: Canton Santo Domingo, Biological Station 'Gustavo Orcés', 0°16′S, 79°15′W, 460 m a.s.l., trunk epiphyte in disturbed tropical forest, 20 Aug 2004, leg. E. Jaramillo C. 057 (QCNE-233045).

Distribution in Ecuador: ESM (Arnell 1962), LOS (Spruce 1885), MOR (Herzog 1952), NAP (Heinrichs and Gradstein 2000), ORE (Heinrichs and Gradstein 2000). Other records in Gradstein (2020) include PAS, PIC and ZAM. New to SAN.

***Plagiochila dominicensis* Taylor**
Morona-Santiago: Canton Limón Indanza, Cordillera del Condor, Community Warints, across Rio Warints, 03°15′S, 78°15′W, 1165 m a.s.l., on living branches on soil in an igneous rock formation, 12 Dec 2002, leg. E. Toapanta and W. Quizhpe 1563 (QCNE-178013).

Distribution in Ecuador: LOS (Herzog 1952), PAS (Spruce 1885), PIC (Heinrichs 2002). New to MOR.

***Plagiochila fuscolutea* Taylor**
Chimborazo: Canton Guamote, new road Guamote-Macas, Sangay National Park, 3500 m a.s.l., upper montane forest and páramo, branch epiphyte, 22 Jun 2002, leg. E. Toapanta and J. Caranqui 1400 (QCNE-185008).

Distribution in Ecuador: AZU (Stephani 1921), COT (Heinrichs 2002), LOJ (Benitez et al. 2012), PIC (Spruce 1885), TUN (Spruce 1885), ZAM (Parolly et al. 2004). Other records in Gradstein (2020) include CAR, MOR and NAP. New to CHI.

***Plagiochila longispina* Lindenb. et Gottsche**
Imbabura: Canton Otavalo, Antenas de la Cemento Selva Alegre, Rio Blanco, 78°17′W, 0°11′N, 3350 m a.s.l., shade epiphyte in humid montane scrub, 29 Mar 1998, leg. C. Cerón et al. 35569 (QCNE-178559), det E. Topanta (QCNE), 2004.

Distribution in Ecuador: CAR (Schäfer-Verwimp et al. 2006), CHI (Spruce 1885), COT (Heinrichs et al. 2000), NAP (Heinrichs et al. 2000), PIC (Spruce 1885), TUN (Spruce 1885), ZAM (Parolly et al. 2004). Other records in Gradstein (2020) include AZU/MOR. New to IMB.

***Plagiochila montagnei* Nees**
Manabí: Canton Pedernales, Cerro de Pájaro, 15 km SW of Pedernales, 00°02′S, 79°58′W, 450 m a.s.l., on very humid soil in humid premontane forest, 26 Aug 1998, leg. E. Toapanta and C. Robles 60 (QCNE-178152).

Distribution in Ecuador: ELO (Schäfer-Verwimp et al. 2013), ESM (Burghardt 2019), GUA (Arnell 1962), LOS (Heinrichs and Gradstein 2000), MOR (Herzog 1952), NAP (Arnell 1962), ORE (Schäfer-Verwimp et al. 2013), PAS (Arnell 1962), SUC (Arnell 1962), TUN (Arnell 1962) and ZAM (Nöske et al. 2003). New to MAN.

***Plagiochila ovata* Lindenb. et Gottsche**
Carchi: Canton Huaca, Páramo de Guandera, eastern part of the Andean cordillera, Clusia trail to Espeletia-páramo, 0°36′04″N, 77°41′33″W, 3600 m a.s.l., on wood in evergreen upper montane forest, 7 Dec 2002, W. E. Chamorro 028 (QCNE-131994). Chimborazo: Canton Penipe, Sangay National Park, edge of the trail to volcano Altar, 01°32′S, 78°28′W, 3000–3600 m a.s.l., humid montane forest, trunk epiphyte on *Polylepis*, *Gynoxys* or *Llerasia*, 28 Nov 1996, leg. C. Cerón and C. Montalvo 33328 (QCNE-178792).

Distribution in Ecuador: MOR (Müller et al. 1999), NAP (Müller et al. 1999), PIC (Benitez et al. 2012). Other records in Gradstein (2020) include AZU, COT, IMB and ZAM. New to CAR and CHI.

***Plagiochila punctata* (Taylor) Taylor**
Morona-Santiago: Canton Limón Indanza, Cordillera del Condor, Comunidad de Warints, 03°13′S, 78°15′W, 1165 m a.s.l., on stem nodes, 12 Dec 2002, leg. E. Toapanta 1566A (QCNE-178403).

Distribution in Ecuador: AZU (Burghardt 2019), COT (Burghardt 2019), PIC (Parolly and Kürschner 2005), TUN (Spruce 1885), ZAM (Groth et al. 2002). Other records in Gradstein (2020) include CHI, IMB and NAP. New to MOR.

***Plagiochila raddiana* Lindenb.**
Pichincha: Metropolitan District Quito, Orchideological Reserve El Pahuma, road Calacalí-Los Bancos, km 22, 0°01′42″N, 78°37′50″W, 2000 m a.s.l., epiphyte on branches in very humid lower montane forest, 26 Oct 1999, L. Suin et al. 405 (QCNE-131284)

Distribution in Ecuador: ELO (Benitez and Gradstein 2011), ESM (Arnell 1962), GAL (Bartram and Arnell 1961), GUA (Schäfer-Verwimp et al. 2013), MOR (Stephani 1918), SUC (Arnell 1962), TUN (Spruce 1885), ZAM (Arnell 1962). Other records in Gradstein (2020) include AZU, IMB and PAS. New to PIC.

***Plagiochila rutilans* Lindenb.**
Guayas: Canton Naranjal, Manglares-Churute Ecological Reserve, 02°27′S, 79°40′W, 590–610 m a.s.l., shade epiphyte in dry tropical premontane forest, 15 Aug 1992, leg. C. Cerón et al. 20264 (QCNE-233089).

Distribution in Ecuador: MOR (Stephani 1918), PAS (Arnell 1962), PIC (Burghardt 2020), SAN (Heinrichs et al.

2001), SUC (Arnell 1962), TUN (Arnell 1962), ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include ELO, ESM and NAP. New to GUA.

***Plagiochila subplana* Lindenb.**
Guayas: Canton Naranjal, Manglares-Churute Ecological Reserve, 02°27′S, 79°40′W, 590–610 m a.s.l., shade epiphyte in dry tropical premontane forest, 13 Aug 1992, leg. C. Cerón et al. 20109 (QCNE-233088).

Distribution in Ecuador: NAP (Arnell 1962), PAS (Spruce 1885), PIC (Burghardt 2020), LOS (Herzog 1952), SAN (Heinrichs et al. 1999) and Sucumbíos (Arnell 1962). LOS, NAP, PAS, SAN, SUC. Other records in Gradstein (2020) include ESM, GAL, MOR,and ORE. New to GUA.

***Plagiochila superba* (Nees ex Spreng.) Mont. et Nees**
Imbabura: Canton Cotacachi, Comuna Santa Rosa, Reserva Intag, ecological trail, 0°22′N, 78°28′W, 1850 m a.s.l., corticolous in undisturbed montane forest, 7 Mar 2002, leg. J. Caranqui 944 (QCNE-178288).

Distribution in Ecuador: BOL (Spruce 1885), COT (Heinrichs 2002), ELO (Schäfer-Verwimp et al. 2013), LOJ (Schäfer-Verwimp et al. 2013), MOR (Heinrichs 2002), NAP (Heinrichs 2002), PAS (Spruce 1885), PIC (Taylor 1846a), TUN (Spruce 1885) and ZAM (Heinrichs 2002). Other records in Gradstein (2020) include CHI and LOS. New to IMB.

***Plagiochila tabinensis* Steph.**
Morona-Santiago: Canton Limón Indanza, Cordillera del Condor, Community Warints, 03°14′S, 78°17′W, 2300 m a.s.l., trunk epiphyte in dwarf forest, 14 Dec 2002, leg. E. Toapanta 1659 (QCNE-178416). Tungurahua: Canton Baños, Llanganates National Park, El Topo, 01°21′S, 78°08′W, 2550 m a.s.l., epiphyte on trunk base in primary evergreen upper montane dwarf forest, 27 Nov 2001, leg. E. Toapanta and J. Caranqui 1247 (QCNE-131512).

Distribution in Ecuador: PIC (Burghardt 2020), SUC (Arnell 1962) and ZAM (Heinrichs 2002). Other records in Gradstein (2020) include LOJ. New to MOR and TUN.

***Porella brachiata* (Taylor) Spruce**
Cotopaxi: Cantón Sigchos, western side of the volcanoes Ilinizas, 00°38′S, 78°49′W, 2900–3300 m a.s.l., on soil and as epiphyte in humid montane forest, 28 Dec 1993, leg. C. Cerón et al. 25415 (QCNE-233104).

Distribution in Ecuador: LOJ (Benitez et al. 2012) and PIC (Taylor 1847). New to COT.

***Pycnolejeunea decurviloba* Steph.**
Esmeraldas: Canton San Lorenzo, Awa Ethnic and Forest Reserve, Tulubí, 00°59′N, 78°34′W, 600 m a.s.l., epiphyte on canopy branches in disturbed vegetation, 8 Apr 2002, leg. E. Toapanta 1385 (QCNE-178496).

Distribution in Ecuador: MAN (Stephani 1896). New to ESM.

***Stictolejeunea squamata* (Willd.) Schiffn.**
Manabí: Pedernales, San José de Chamanga, Road to Cojimíes, 0°18′S, 79°53′W, 3 m a.s.l., very humid tropical forest, growing on decaying wood, 26 Aug 1998, leg. E. Toapanta and C. Robles 80 (QCNE-178155).

Distribution in Ecuador: BOL (Spruce 1884), ELO (Schäfer-Verwimp et al. 2013), ESM (Arnell 1962), GUA (Schäfer-Verwimp et al. 2013), LOS (Weis 2001), MOR (Gradstein 1994), NAP (Schäfer-Verwimp et al. 2013), ORE (Schäfer-Verwimp et al. 2013), PAS (Spruce 1884), PIC (Gradstein 1994), TUN (Spruce (1884) and ZAM (Arnell 1962). Other records in Gradstein (2020) include AZU and CHI. New to MAN.

***Symphyogyna aspera* Steph. ex F.A.McCormick**
Esmeraldas: Canton Quinindé, Biological Station Bilsa, red trail, 0°21′N, 79°44′W, 630 m a.s.l., humid tropical forest, on root, 14 Feb 2002, leg. E. Toapanta 1314 (QCNE-178016). Tungurahua: Canton Baños, Llanganates National Park, El Topo, 01°21′S, 78°08′W, 2740 m a.s.l., primary evergreen upper montane dwarf forest, terricolous, 28 Nov 2001, leg. E. Toapanta and J. Caranqui 1252 (QCNE-131503).

Distribution in Ecuador: AZU (Evans 1925), ELO (Schäfer-Verwimp et al. 2013), NAP (Schäfer-Verwimp et al. 2013), PIC (Burghardt 2020) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include MOR. New to ESM and TUN.

***Symphyogyna brongniartii* Mont.**
Pichincha: Metropolitan District Quito, Orchideological Reserve El Pahuma, 'Spectacled Bear'-trail, 0°01′13″N, 78°08′08″W, 2800 m a.s.l., Upper montane forest, growing on wood, 14 Dec 2002, leg. D. Castro-Z. 019 (QCNE-178025).

Distribution in Ecuador: CHI (Spruce 1885), LOJ (Burghardt 2019), LOS (Herzog 1952), TUN (Spruce 1885) and ZAM (Nöske et al. 2003). Other records in Gradstein (2020) include ELO, MOR and NAP. New to PIC.

***Symphyogyna marginata* Steph.**
Carchi: Canton San Pedro de Huaca, Biological Station Guandera, northern trail 2 km from the station, 0°37′N, 77°41′W, 3700 m a.s.l., humid upper montane forest, growing on leaf litter, 14 Nov 1999, leg. E. Toapanta and L. Mora 203 (QCNE-178140).

Distribution in Ecuador: PIC (Burghardt 2020) and ZAM (Parolly et al. 2004). Other records in Gradstein (2020) include NAP. New to CAR.

***Trichocolea filicaulis* Steph.**
Esmeraldas: Canton Quinindé, Biological Station Bilsa, 0°21′N, 79°44′W, 630 m a.s.l., humid tropical forest, branch epiphyte, 14 Feb 2002, leg. E. Toapanta 1323 (QCNE-178510).

Distribution in Ecuador: PIC (Burghardt 2020). New to ESM.

Seventy-seven new provincial records of 62 liverwort species are presented (Table 1).

Furthermore, one species, *Lepicolea ochroleuca*, is newly registered for Ecuador. This species exhibits an African–American distribution, and according to Söderström et al. (2010), it does not occur in Tropical Asia. A Tasmanian

record (URL-2) may base on confusion with *L. scolopendra* (Hook.) Dumort. ex Trevis. since Ratkowsky (1987) does not list *L. ochroleuca* for Tasmania. In the tropical Andes, *L. ochroleuca* occurs in Peru (Juslén 2006) and is known from another unconfirmed record from Bolivia (Spruce 1890). *Lepicolea ochroleuca* differs from *L. pruinosa*, a common element in high Andean forest and páramo vegetation, mainly by the absence of stem paraphyllia.

Plagiochila cuneata is newly recorded for continental Ecuador, previously known only from the Gálapagos Islands. Other noteworthy new records of rare or locally distributed liverworts include *Archilejeunea nebeliana*, *Cheilolejeunea jackii*, *Drepanolejeunea cutervoensis*, *Fulfordianthus pterobryoides*, *Lejeunea debilis*, *Lepidolejeunea sullivantii*, *Lepidozia auriculata*, *L. pinnaticruris*, *L. subdichotoma*, *Plagiochila amicta*, *P. cucullifolia*, *Pycnolejeunea decurviloba* and *Symphyogyna marginata*.

In terms of new provincial records, Carchi leads with 12 species, followed by Santo Domingo de los Tsáchilas with ten species, Esmeraldas and Morona-Santiago with nine and Imbabura with eight species.

Species-rich genera like *Frullania*, *Radula* or *Riccardia*, which abound in the collections of QCNE, are not represented in this article due to the lack of appropriate literature for identification at the time.

Discussion

Many of the species reported here are common and widespread, e.g. *Bryopteris filicina*, *Leiomitra tomentosa*, *Lophocolea bidentata*, *Odontolejeunea lunulata*, *Plagiochila aerea* or *Stictolejeunea squamata*. These examples demonstrate the still incomplete knowledge of the distribution of the even more frequent liverworts in Ecuador despite the numerous contributions of the last decades to the floristic exploration (Nöske et al. 2003, Parolly et al. 2004, Schäfer-Verwimp et al. 2006, Benitez and Gradstein 2011, Benitez et al. 2012, Mota de Oliveira and Ter Steege 2013, Schäfer-Verwimp et al. 2013, Gradstein and Benitez 2017, Burghardt 2019, 2020).

Table 1. Numbers of new provincial liverwort records.

	Gradstein (2020)	New records (this study)
Azuay	150	2
Carchi	101	12
Chimborazo	87	5
Cotopaxi	77	3
Esmeraldas	68	9
Guayas	12	4
Imbabura	32	8
Manabí	7	3
Morona Santiago	202	9
Napo	225	1
Pastaza	130	1
Pichincha	312	3
Santo Domingo de los Tsáchilas	-	10
Sucumbíos	41	2
Tungurahua	195	5
Total		77

The significance of the number of new records presented here for the various provinces is challenging to interpret and complicated by factors like the collector's expertise, collection preferences and differences in exploration between the provinces, among others. For example, nine species are newly recorded for Morona-Santiago, while none are reported for Zamora-Chinchipe. They are neighbouring provinces of southern Ecuador, harbouring a rich assemblage of ecosystems from tropical lowland rainforests to humid páramos, with large parts of their territory still covered by natural vegetation. However, Gradstein (2020) lists for Morona-Santiago only 198 liverwort species while 425 liverworts occur in Zamora-Chinchipe. This discrepancy in knowledge is explainable by the factors mentioned above.

Another problem altogether is the application of countries' geopolitical division for biogeographical considerations. It is far from ideal but provides important information for governments to act upon in matters concerning conservation. For example, the foundation of the province of Santo Domingo de los Tsáchilas took place in 2007 (URL-3). However, some authors still recognize it as part of Pichincha, explaining the virtual absence of provincial records (Gradstein 2020). Nevertheless, a few corrections are already available in Burghardt (2020). Doubtlessly there are more records for Santo Domingo de los Tsáchilas still buried under the label 'Pichincha'.

Most of the collections listed here were not made by bryologists but by general botanists and students. Nonetheless, several rarely collected species like *Lejeunea debilis*, *Lepidolejeunea sullivantii*, *Lepidozia pinnaticruris*, *Plagiochila amicta*, *P. cuneata* and *Pycnolejeunea decurviloba* are among the new records. This fact shows that collections by non-specialists can contribute significantly to our understanding of species distribution in underexplored countries holding high biodiversity like Ecuador.

Remarkably, we find among the species listed above, large and showy plants like the various *Plagiochila* species, or large 'holostipous' Lejeuneaceae (e.g. *Bryopteris filicina*, *Marchesinia* spp.) disproportionately well represented. On the other hand, some species-rich, physically small and challenging to identify genera like *Cheilolejeunea*, *Cololejeunea*, *Diplasiolejeunea*, *Drepanolejeunea* and *Lejeunea* are underrepresented not only in this list but also in the collections housed in QCNE. A possible explanation for this phenomenon may be the untrained collector paying more attention to larger and more attractive forms.

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