Preliminary checklist for the liverworts and hornworts of El Salvador

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Abstract: Schäfer-Verwimp, A. & Winter, G. (2024): Preliminary checklist for the liverworts and hornworts of El Salvador. *Frahmia* 41:1-17*
A brief summary of the geology, physical features, climate and vegetation is given, followed by the checklist and a compilation of 13 further (previously unpublished) records based on herbarium specimens from various herbaria. The checklist includes **18 families, 34 genera and 104 species of liverworts**, but no species of hornwort is known from the country. Four species are considered dubious or doubtful. A list of synonyms mentioned from El Salvador follows.

Key words: Bryophytes, Central America, Neotropics

Fig. 1. Cloud forest near summit of Los Esesmiles. Photo from the 1941 - 1942 El Salvador expedition of the University of California, where J.M. Tucker was the botanist and collected among others liverworts. [From Marshall 1943, *The Condor* 45(1):29]

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1. Introduction

El Salvador is the smallest country in Central America, with an area of 21,041 km^2. It lies between 13°09' - 14°26' north and 87°42' - 90°15' west. It is bordered by the Pacific Ocean (307 km of coastline), Guatemala, and Honduras (a total of 515 km of land borders). It is roughly rectangular in shape, 300 km long and 100 km wide, and extends in a WNW direction. El Salvador is the only country in Central America that does not have a coastline on the Caribbean Sea.

Geology: El Salvador is one of the most seismologically active regions on earth, sitting on top of three of the major tectonic plates that constitute the earth's surface. The motion of these plates causes the area's earthquake and volcanic activity. The country has a long history of destructive earthquakes and volcanic eruptions. It has over twenty volcanoes, although only two, San Miguel and Izalco, have been active in recent years.
(https://worldfacts.us/El-Salvador-geography.htm - accessed 30 July 2024).

Physical features: Two parallel mountain ranges cross El Salvador east to west with a central plateau between them and a narrow coastal plain hugging the Pacific.
The northern range of mountains, the Sierra Madre, forms a continuous chain along the border with Honduras. Elevations in this region range from 1,600 to 2,200 meters. The area was once heavily forested, but overexploitation led to extensive erosion, and it has become semibarren. As a result, it is the country's most sparsely populated zone, with little farming or other development.
The southern range of mountains is actually a discontinuous chain of more than twenty volcanoes, clustered into five groups. The westernmost group, near the Guatemalan border, contains Izalco and Santa Ana, which at 2,365 metres is the highest point in El Salvador (according to other sources, the highest mountain in the country is Cerro El Pital on the border with Honduras, which reaches 2,730 metres). Between the cones lie alluvial basins and rolling hills eroded from ash deposits. The volcanic soil is rich, and much of El Salvador's coffee is planted on these slopes.
The central plateau constitutes only 25 percent of the land area but contains the heaviest concentration of population and the country's largest cities. This plain is about 50 kilometers wide and has an average elevation of 600 meters. Terrain here is rolling, with occasional escarpments, lava fields, and geysers. A narrow plain extends from the coastal volcanic range to the Pacific Ocean. El Salvador has over 300 rivers, the most important of which is the Rio Lempa.
(https://worldfacts.us/El-Salvador-geography.htm - accessed 30 July 2024).

Climate: El Salvador has a tropical climate with distinct wet and dry seasons. Temperatures vary mainly with elevation and show little seasonal variation. The Pacific lowlands are uniformly hot; the central plateau and mountain areas are more moderate. The rainy season, known locally as invierno, or winter, extends from May to October. Almost all the annual rainfall occurs during this time, and yearly totals, particularly on southern-facing mountain slopes, can be as high as 200 centimeters. Protected areas and the central plateau receive lesser, although still significant, amounts. Although hurricanes occasionally form in the Pacific, they seldom affect El Salvador.
From November through April, the northeast trade winds control weather patterns. During these months, air flowing from the Caribbean has had most of the precipitation wrung out of it passing over the mountains in Honduras. By the time this air reaches El Salvador, it is dry, hot, and hazy. This season is known locally as verano, or summer.
Temperatures vary little with season; elevation is the primary determinant. The Pacific lowlands are the hottest region, with annual averages ranging from 25°C to 29°C. San Salvador is representative of the central plateau, with an annual average temperature of 23°C. Mountain areas are the coolest, with annual averages from 12°C to 23°C and minimum temperatures sometimes approaching freezing.
(https://worldfacts.us/El-Salvador-geography.htm - accessed 30 July 2024).

Vegetation: Lauer (1954) provided a map of the natural vegetation of El Salvador (**Fig. 2**). He also noted that much of the original vegetation had been destroyed by human activity, mainly agricultural land use and human settlements.
The location on the Pacific Ocean results in a marked alternation between the rainy season and excessive drought. In this respect, the alternately humid El Salvador stands in stark contrast to the ever-humid coastal areas on the Caribbean side of Central America. Accordingly, no tropical rainforest has developed in El Salvador. It is replaced near the coast by an evergreen, hot and humid coastal forest (Lötschert 1959).
An overview on the different vegetation types of the Tierra Calienta (0-800[-1000] m), Tierra Templada (800[1000]-1800[2000] m) and Tierra Fria (above 1800[2000] m) is given by Lötschert (1959).
The cloud forest is one of the most impressive vegetation types, not only from a bryological point of view, with predominant oak trees of 25-30 m in height, densely covered with epiphytes of various kinds **(Fig. 1).**
The low scrub and paramo-like vegetation ("Ericaceen-Windbusch" in Lötschert 1959) in the summit regions is particularly interesting for liverworts, as epiphyllous species are abundant here though even more so in the cloud forest (Winkler 1967). And on the ground thick patches of *Sphagnum* are conspicuous (Lötschert 1959). Winkler (1967) has described in detail where epiphyllous liverworts have been seen.

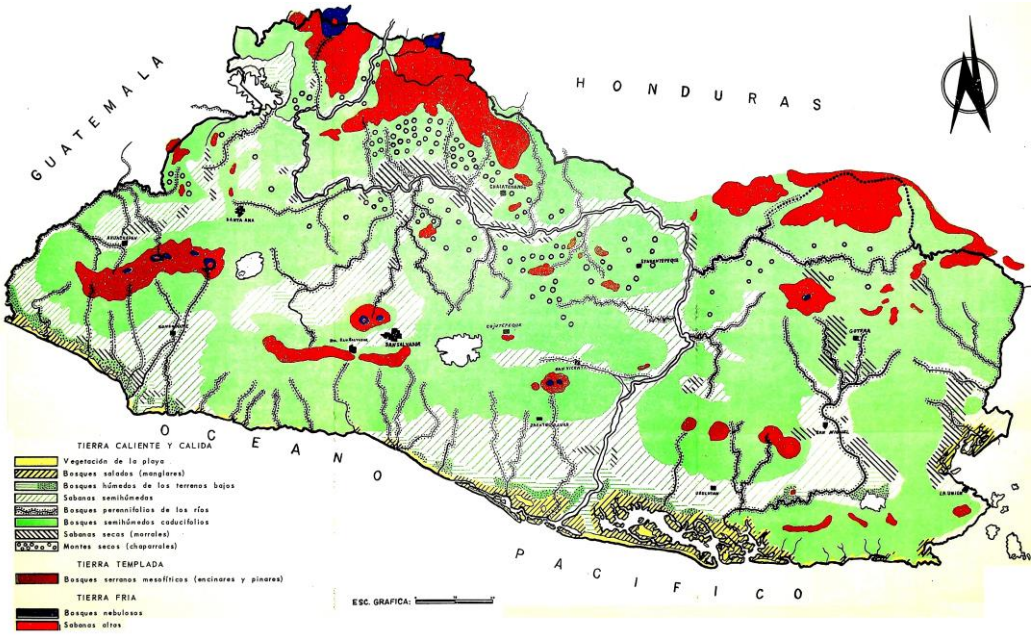


Fig. 2. Vegetation map of El Salvador (from Lauer 1954).

2. Discussion

Literature on the liverworts of El Salvador is very scarce. The most important contribution to the liverwort flora is that of Winkler (1967) who studied the epiphyllous bryophytes and reported 60 species of liverworts, six of which were new to science (*Brachiolejeunea acuta*, *Crossotolejeunea rotundata*, *Diplasiolejeunea involuta*, *D. montecristensis*, *Leucolejeunea nana*, and *Ptychocoleus reflexus*); however, all of these remain dubious, disappeared in synonymy, or there are serious

doubts about the value of the taxon. Until then, only a small list by Evans (1925) with 7 liverwort species (and one genus) was known. More recently, Winter & Schäfer-Verwimp (2024) re-examined a small, 70-year-old collection and added 12 more liverwort species. Only a few single records of other species could be found in the scattered literature.

The overall scarcity of scientific production was analysed by Morales-Marroquin et al. (2022), who found significant discrepancies between the low scientific production of the northern Central American countries (Guatemala, El Salvador, Honduras, and Nicaragua), the prolific production of the southern countries (Costa Rica and Panama), and how this relates to democratic stability.

The checklist contains **34 genera and 104 species of liverworts**, but no species of hornwort is known from the country. Four species are considered dubious or doubtful. The liverworts of El Salvador are still very poorly known (except for the epiphyllous species). The fact that 60 species of epiphyllous liverworts are known, indicates that the number of liverworts in the country could be considerably higher than the 104 species currently known.

The majority of the species are widespread in the Neotropics, but it seems to be too early for a bryogeographic analysis. Further studies particularly on liverworts are urgently needed as deforestation and associated habitat loss and extinction continue. In Mesoamerica, one of the tropical forest hotspots, the annual rate of deforestation is very high at 2.13% (average for Mexico, Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, and Panama from 1990-1995), exceeded only by the Philippines and some islands of the Greater Antilles (Brooks et al. 2002).

More recent data on forest cover, deforestation and biodiversity analysis in El Salvador are provided by Rodriguez & Dreikorn (2018), along with a compilation of natural protected areas, their ecosystems and characteristics, and the known numbers of some animal and plant groups (in Annex 4).

Nevertheless, recent studies have highlighted the important process of forest recovery that has been favoured by the socio-political changes recently experienced in the country. Valencia et al. (2011) studied the process of forest regrowth at the local level in the natural area of Cinquera between 1942 and 2004, and Hecht & Saatchi (2007) documented the changes in forest cover in areas where the rural population density exceeded 250 people per square kilometre. They were able to document a 22% increase in the area with more than 30% tree cover and a 7% increase in the area with more than 60% tree cover.

3. Synopsis of the orders, genera and families

The classification of liverworts is based on Crandall-Stotler et al. (2009). Only orders, families and genera are listed here (the number of species is given in brackets, including the species listed in Chapter 5).

MARCHANTIALES

Marchantiaceae
Marchantia (4)

Aytoniaceae
Asterella (2)

Cyathodiaceae
Cyathodium (2)

Targioniaceae
Targionia (1)

Monocleaceae
Monoclea (1)

Dumortieraceae
Dumortiera (1)

PALLAVICINIALES

Pallaviciniaceae
Symphyogyna (2)

METZGERIALES

Metzgeriaceae
Metzgeria (3)

PORELLALES
- **Porellaceae**
  - *Porella* (1)
- **Radulaceae**
  - *Radula* (4)
- **Frullaniaceae**
  - *Frullania* (8)
- **Lejeuneaceae**
  - *Anoplolejeunea* (1)
  - *Bryopteris* (1)
  - *Ceratolejeunea* (3)
  - *Cheilolejeunea* (3)
  - *Cololejeunea* (9)
  - *Colura* (1)
  - *Dicranolejeunea* (1)
  - *Diplasiolejeunea* (7)
  - *Drepanolejeunea* (13)
  - *Harpalejeunea* (1)
  - *Lejeunea* (10)
  - *Marchesinia* (1)
  - *Microlejeunea* (6)
  - *Odontolejeunea* (1)
  - *Rectolejeunea* (1)

JUNGERMANNIALES
- **Trichocoleaceae**
  - *Leiomitra* (2)
- **Herbertaceae**
  - *Herbertus* (1)
- **Lepidoziaceae**
  - *Bazzania* (2)
  - *Lepidozia* (3)
- **Lophocoleaceae**
  - *Lophocolea* (2)
- **Cephaloziaceae**
  - *Fuscocephaloziopsis* (1)
  - *Odontoschisma* (1)
- **Plagiochilaceae**
  - *Plagiochila* (4)

4. Checklist of the liverworts of El Salvador

Literature given in **bold = specimen based records**
Other literature is cited where El Salvador is mentioned in the distribution of a species. The genera and species are listed in alphabetical order.
The nomenclature follows Brinda & Atwood (2024) "The Bryophyte Nomenclator" - except that "Prantl" is not accepted as the author of a species.

Anoplolejeunea conferta (C.F.W. Meissn. ex Spreng.) A. Evans
Winkler 1967.

Bazzania stolonifera (Sw.) Trevis.
Winkler 1967 as *B. liebmanniana.*

Bryopteris filicina (Sw.) Nees
Evans 1925 as *B. fruticulosa*; **Stotler & Crandall-Stotler 1974** as *B. fruticulosa* ssp. *fruticulosa;* **Gradstein 1994**; Lücking 1995; **Winter & Schäfer-Verwimp 2024**.

Ceratolejeunea cornuta (Lindenb.) Steph.
Winkler 1967, Lücking 1995, both as *C. maritima*; Fulford & Sharp 1990 as *C. variabilis* and *C. maritima.*

Ceratolejeunea fallax (Lehm. & Lindenb.) Bonner
Winter & Schäfer-Verwimp 2024.

Ceratolejeunea filaria (Taylor ex Lehm.) Steph.
Winkler 1967 as *C. multiocellata*.

Cheilolejeunea filiformis (Sw.) W. Ye, R.L. Zhu & Gradst.
Winkler 1967, Lücking 1995, both as *Omphalanthus*; **Bastos 2017**; **Winter & Schäfer-Verwimp 2024**.

Cheilolejeunea ovalis (Lindenb. & Gottsche) W. Ye, R.L. Zhu & Gradst.
Winter & Schäfer-Verwimp 2024.

Cheilolejeunea xanthocarpa (Lehm. & Lindenb.) Malombe
Winkler 1967, Fulford & Sharp 1990, both as *Leucolejeunea*.

Cololejeunea antillana Pócs
Winkler 1967, Lücking 1995, Eggers et al. 1998, 2004, Dauphin et al. 2006, Campos & Uribe-M. 2006, all as *Aphanolejeunea longifolia*.

Cololejeunea cardiocarpa (Mont.) A. Evans
Winkler 1967 as *Leptocolea*.

Cololejeunea crenata (A. Evans) Pócs
Winkler 1967, Fulford & Sharp 1990, Lücking 1995, all as *Aphanolejeunea*.

Cololejeunea diaphana A. Evans
Winkler 1967.

Cololejeunea gracilis (Jovet-Ast) Pócs
Winkler 1967, Lücking 1995, Eggers et al. 1998, Dauphin et al. 2006, all as *Aphanolejeunea*; Schäfer-Verwimp 1999 as *Aphanolejeunea angustissima*; Schäfer-Verwimp & Pócs 2009.

Cololejeunea microscopica (Taylor) Schiffn. var. ***africana*** (Pócs) Pócs & Bernecker
Winkler 1967, Schäfer-Verwimp 1999, both as *Aphanolejeunea verrucosa*.

Cololejeunea microscopica (Taylor) Schiffn. var. ***exigua*** (A. Evans) Pócs
Winkler 1967, Fulford & Sharp 1990, both as *Aphanolejeunea exigua*.

Cololejeunea obliqua (Nees & Mont.) Schiffn.
Winkler 1967 as *Leptocolea scabriflora*; Lücking 1995.

Cololejeunea papillosa (K.I. Goebel) Mizut.
Winkler 1967, Schäfer-Verwimp 1999, both as *Aphanolejeunea cyathiphylla*; Eggers et al. 2004 as *Aphanolejeunea angustissima*.

Colura tenuicornis (A. Evans) Steph.
Winkler 1967; Lücking 1995.

Cyathodium cavernarum Kunze ex Lehm.
Salazar Allen 2006.

Cyathodium spruceanum Prosk.
Salazar Allen 2006.

Dicranolejeunea axillaris (Nees & Mont.) Schiffn.
Kruijt 1988; **Gradstein 1994**; Fuertes 2019.

Diplasiolejeunea alata Jovet-Ast
Winkler 1967; Schäfer-Verwimp 1992, 1999, 2004.

Diplasiolejeunea cavifolia Steph.
Winkler 1967 as *D. brachyclada*.

Diplasiolejeunea johnsonii A. Evans var. ***mexicana*** Jovet-Ast
Winkler 1967; Gradstein et al. 1994.

Diplasiolejeunea malleiformis (A. Evans) Tixier
Winkler 1967, Reyes 1982, both as *D. pellucida* var. *malleiformis*.

Diplasiolejeunea pauckertii (Nees) Steph.
Winkler 1967, Gradstein et al. 1994, Morales & Gradstein 1995, Eggers 2001, Schäfer-Verwimp 2004, Schäfer-Verwimp et al. 2006, Schäfer-Verwimp & Pócs 2009, all as *D. involuta*; Schäfer-Verwimp et al. 2015 as *D. involuta* subsp. *andicola*; Robinson 2019.

Diplasiolejeunea pellucida (C.F.W. Meissn. ex Spreng.) Schiffn.
Winkler 1967; Lücking 1995; Reyes 1982.

Diplasiolejeunea unidentata (Lehm. & Lindenb.) Schiffn.
Winkler 1967, Reyes 1982.

Drepanolejeunea araucariae Steph.
Winkler 1967.

Drepanolejeunea bidens (Steph.) A. Evans
Winkler 1967.

Drepanolejeunea biocellata A. Evans
Winkler 1967.

Drepanolejeunea campanulata (Spruce) Steph.
Winkler 1967.

Drepanolejeunea dissitifolia A. Evans
Winkler 1967.

Drepanolejeunea evansii Bischl. ex L. Söderstr., A. Hagborg & von Konrat
Winkler 1967.

Drepanolejeunea fragilis Bischl. ex L. Söderstr., A. Hagborg & von Konrat
Winkler 1967.

Drepanolejeunea inchoata (C.F.W. Meissn. ex Lehm.) Steph.
Winkler 1967; Lücking 1995.

Drepanolejeunea infundibulata (Spruce) A. Evans
Winkler 1967; Lücking 1995.

Drepanolejeunea lichenicola (Spruce) Steph.
Winkler 1967; Lücking 1995; Schäfer-Verwimp 1999; Schäfer-Verwimp & Pócs 2009.

Drepanolejeunea orthophylla (Nees & Mont.) Bischl.
Winkler 1967 as *Leptolejeunea stenophylla*.

Drepanolejeunea spinosa Herzog
Winkler 1967.

Drepanolejeunea trigonophylla Steph.
Winkler 1967.

Dumortiera hirsuta (Sw.) Nees
Evans 1925; **Bischler-Causse et al. 2005**.

Frullania atrata (Sw.) Nees ex Mont.
Winter & Schäfer-Verwimp 2024.

Frullania brasiliensis Raddi
Winter & Schäfer-Verwimp 2024.

Frullania convoluta Lindenb. & Hampe
Winter & Schäfer-Verwimp 2024.

Frullania ericoides (Nees) Mont.
Winter & Schäfer-Verwimp 2024.

Frullania gibbosa Nees
Winter & Schäfer-Verwimp 2024.

Frullania intumescens var. ***closterantha*** (Spruce) Gradst. & Pócs
Winkler 1967 as *F. closterantha*.

Frullania montagnei Gottsche
Winter & Schäfer-Verwimp 2024.

Frullania peruviana Gottsche
Winter & Schäfer-Verwimp 2024.

Harpalejeunea subacuta A. Evans
Winkler 1967; Schäfer-Verwimp 1999; Schäfer-Verwimp & Pócs 2009.

Herbertus juniperoideus (Sw.) Grolle
Winter & Schäfer-Verwimp 2024.

Leiomitra argentea (Herzog) T. Katag.
Winkler 1967 as *Trichocolea*.

Leiomitra flaccida Spruce
Winkler 1967 as *Trichocolea*.

Lejeunea caracensis Lindenb.
Winkler 1967, Fulford & Sharp 1990, both as *Taxilejeunea*.

Lejeunea caripensis Lindenb. & Gottsche
Winter & Schäfer-Verwimp 2024.

Lejeunea cyathophora Mitt.
Winkler 1967.

Lejeunea flaccida Lindenb. & Gottsche
Winkler 1967 as *Taxilejeunea lusoria*.

Lejeunea flava (Sw.) Nees
Winkler 1967; Lücking 1995.

Lejeunea intricata J.B. Jack & Steph.
Winkler 1967 as *Crossotolejeunea rotundata*; Reiner-Drehwald & Goda 2000; Holz et al. 2001; Schäfer-Verwimp & Pócs 2009; Schäfer-Verwimp et al. 2013; Schäfer-Verwimp 2014.

Lejeunea subsessilis Spruce
Winkler 1967.

Lejeunea tonduzana (Steph.) M.E. Reiner
Winkler 1967 as *Hygrolejeunea*.

Lejeunea trinitensis Lindenb.
Winkler 1967 as *Cheilolejeunea pililoba*.

Lepidozia cupressina (Sw.) Lindenb.
Fulford 1966, Fulford & Sharp 1990, both as *L. caespitosa*.

Lophocolea coadunata (Sw.) Mont.
Fulford 1976.

Marchantia chenopoda L.
Evans 1925; **Bischler 1984**, *Tucker 1010*; **Bischler-Causse et al. 2005**.

Marchantia inflexa Nees & Mont.
Bischler 1984; **Bischler-Causse et al. 2005**.

Marchantia paleacea Bertol.
Evans 1925 as *M. domingensis*.

Marchantia polymorpha L.
Bischler 1984, *Tucker 1019*; **Bischler-Causse et al. 2005**.

Marchesinia brachiata (Sw.) Schiffn.
Gradstein 1994.

Metzgeria epiphylla A. Evans
Winkler 1967.

Metzgeria leptoneura Spruce
Winkler 1967 as *M. hamata*.

Metzgeria myriopoda Lindb.
Costa 2008.

Microlejeunea acutifolia Steph.
Winkler 1967; Lücking 1995 as "*Lejeunea* (*Microlejeunea*) *acutifolia"*; Schäfer-Verwimp 1999.

Microlejeunea bullata (Taylor) Steph.
Winkler 1967; Lücking 1995 as *Lejeunea*.

Microlejeunea diversiloba (Spruce) Müll. Frib.
Winkler 1967, Fulford & Sharp 1990, Schäfer-Verwimp 2014, all as *Microlejeunea stricta*.

Microlejeunea epiphylla Bischl.
Winkler 1967; Lücking 1995 as *Lejeunea*.

Microlejeunea subulistipa Steph.
Winkler 1967.

Microlejeunea valenciana Steph.
Winkler 1967.

Monoclea gottschei Lindb.
Bischler-Causse et al. 2005 as *M. gottschei* subsp. *elongata*.

Odontolejeunea lunulata (F. Weber) Schiffn.
Winkler 1967 as *O. lunulata* and *O. sieberiana*; Lücking 1995.

Plagiochila diversifolia Lindenb. & Gottsche
Winter & Schäfer-Verwimp 2024.

Radula laxiramea Steph.
Castle 1959, 1968**.**

Radula mammosa Spruce
Winkler 1967.

Radula pallens (Sw.) Nees ex Mont.
Evans 1925.

Radula stenocalyx Mont.
Winkler 1967.

Rectolejeunea flagelliformis A. Evans
Winkler 1967.

Symphyogyna aspera Steph. ex F.A. McCormick
Evans 1925a; **Hässel de Menéndez 1961**; Dauphin et al. 1998.

Symphyogyna sinuata (Sw.) Nees & Mont.
Evans 1925.

Targionia hypophylla L.
Evans 1923, **1925**; Bischler-Causse et al. 2005; Svihla 1942; Haupt 1942.

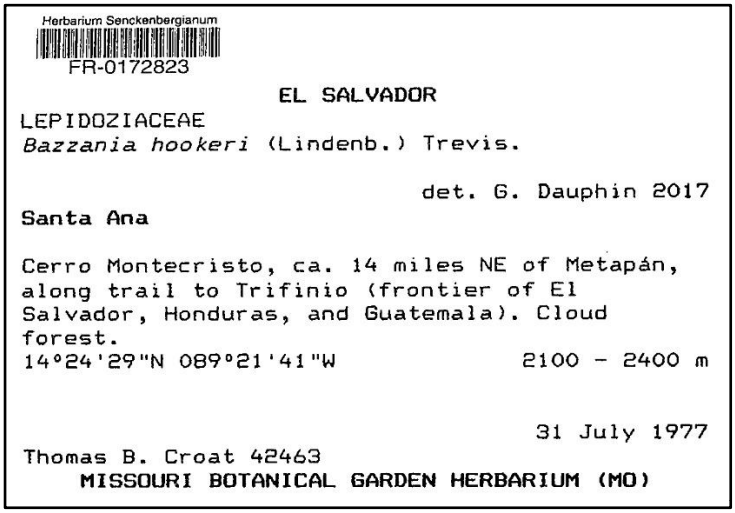
5. Other (unpublished) records based on herbarium specimens from various herbaria

We searched various internet resources for liverwort specimens from El Salvador and found evidence of additional species in various herbaria. Where more than one specimen of a species was found, only one specimen is given as evidence.

Asterella dominicensis S.W. Arnell
El Salvador, La Libertad, Cafetal en colonia Cubres de Cuscatlan
11 Mar 1998, M. A. Renderos et al. MR-00457, det. G. Dauphin & J. Brinda 2017 (MO)

Asterella lateralis M. Howe
El Salvador, Santa Ana, mountains above Monte Christo
13 Aug 2015, J. Johnson s.n., det. J .J. Atwood 2015 (MO-2717086)

Bazzania hookeri (Lindenb.) Trevis.
El Salvador, Santa Ana, Cerro Montecristo, ca. 14 miles NE of Metapán, along trail to Trifinio (frontier of El Salvaor, Honduras, und Guatemala)
31 July 1977, T. B. Croat 42463, det. G. Dauphin 2017 (FR-0172823, dupl. ex MO)
(**Fig. 3)**


Herbarium Senckenbergianum
FR-0172823

EL SALVADOR
LEPIDOZIACEAE
Bazzania hookeri (Lindenb.) Trevis.

det. G. Dauphin 2017
Santa Ana

Cerro Montecristo, ca. 14 miles NE of Metapán, along trail to Trifinio (frontier of El Salvador, Honduras, and Guatemala). Cloud forest.
14°24'29"N 089°21'41"W 2100 - 2400 m

31 July 1977
Thomas B. Croat 42463
MISSOURI BOTANICAL GARDEN HERBARIUM (MO)

Fig. 3.

Fuscocephaloziopsis crassifolia (Lindenb. & Gottsche) Váňa & L. Söderstr.
El Salvador, Santa Ana, Cerro Monte Cristo, ca. 14 miles NE of Metapán, along trail to Punto Trifinion (frontier of El Salvador, Honduras, and Guatemala)
31 July 1977, T. B. Croat 42457 p.p., det. G. Dauphin 2017 (MO-2948451)

Lejeunea laetevirens Ness & Mont.
El Salvador, Santa Ana, Parque Nacional Montecristo, Cordillera de Metapán
27 Jan 1998, G. Davidse, 37214, det. G. Dauphin 2017 (MO-4287255)

Lepidozia reptans (L.) Dumort.
El Salvador, Santa Ana, Cerro Monte Cristo 14 miles NE of Metapán; along road through cloud forest
31 July 1977, T. B. Croat 42497 p.p., det. G. Dauphin 2017 (MO-2948456)

Lepidozia squarrosa Steph.
El Salvador, Santa Ana, Cerro Monte Cristo 14 miles NE of Metapán; along road through cloud forest
31 July 1977, T. B. Croat 42495, det. by G. Dauphin 2017 (MO-4009742)

Lophocolea muricata (Lehm.) Nees
El Salvador, Sonsonate, near top of Cerro Verde
30 July 1977, T. B. Croat 42225 p.p., det. G. Dauphin 2017 (MO-2948459)

Odontoschisma variabile (Lindenb. & Gottsche) Trevis.
El Salvador, Santa Ana, Cerro Monte Cristo 14 miles NE of Metapán; along trail to Punto Trifinio (frontier of El Salvador, Honduras, and Guatemala)
31 July 1977, T. B. Croat 42457, det. G. Dauphin 2017 (MO-2948096)

Plagiochila cf. ***adianthoides*** (Sw.) Lindenb.
El Salvador, Santa Ana, Parque Nacional Montecristo, Cordillera de Metapán, between Los Planes and main road to summit of mountain. Cloud forest just below summit of Montecristo
27 Jan 1998, G. Davidse, A. K. Monro, K. J. Sidwell, H. Martínez, C. Salazar & et al. 37315, det. J. Heinrichs (MO-4064985)

Plagiochila alternans Lindenb. & Gottsche
El Salvador, Santa Ana, Parque Nacional Montecristo, Cordillera de Metapán
27 Jan 1998, G. Davidse 37228, det. J. Heinrichs (MO-4064996)

Plagiochila distinctifolia Lindenb.
El Salvador, Chalatenango, east slope of Los Esesmiles
31 March 1942, J. M. Tucker 1176 (US-04627117)

Porella crispata (Hook.) Trevis.
El Salvador, Chalatenango, east slope of Los Esesmiles
31 March 1942, J. M. Tucker 1175, det. H. Robinson 1965 as *Porella arborea* (MU B-8691 - MU27185) **(Fig. 4.)**

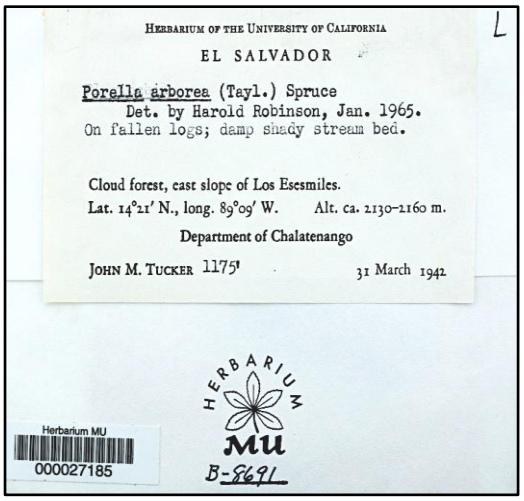


Fig. 4. https://bryophyteportal.org/imglib/storage/mu/bryophytes/000027/000027185_lg.jpg

6. Dubious and doubtful records

Brachiolejeunea acuta S. Winkl. (Winkler 1967)
Should be excluded from *Brachiolejeunea* (van Slageren 1985: 124; Gradstein 1994: 177).

Diplasiolejeunea montecristensis S. Winkl. (Winkler 1967)
This species is possibly conspecific with *Diplasiolejeunea replicata* (Spruce) Steph. (Schäfer-Verwimp & Pócs 2009; Söderström et al. 2016).

Leucolejeunea nana S. Winkl. (Winkler 1967)
As Gradstein & Geissler (1997) note, the type consists of a mere fragment. The fragment has large lobules, 0.65-0.75 the length of the lobule. Distinct in the very large lobule with "huge, 2-toothed" apex. As noted by Gradstein & Geissler, it may be a mere branch fragment of some other neotropical taxon.

Ptychocoleus reflexus S. Winkl. (Winkler 1967) - nom. dub. fide Gradstein (1994).

7. List of synonyms

Aphanolejeunea angustissima Steph. => *Cololejeunea papillosa*
Aphanolejeunea crenata A. Evans. => *Cololejeunea crenata*
Aphanolejeunea cyathiphylla Herzog => *Cololejeunea papillosa*
Aphanolejeunea exigua A. Evans => *Cololejeunea microscopica var. exigua*
Aphanolejeunea gracilis Jovet-Ast => *Cololejeunea gracilis*
Aphanolejeunea longifolia Jovet-Ast => *Cololejeunea antillana*
Aphanolejeunea verrucosa Jovet-Ast => *Cololejeunea microscopica var. africana*
Bazzania liebmanniana (Lindenb. & Gottsche) Trevis. => *Bazzania stolonifera*
Bryopteris fruticulosa Taylor => *Bryopteris filicina*
Ceratolejeunea maritima (Spruce) Steph. => *Ceratolejeunea cornuta*
Ceratolejeunea multiocellata Herzog => *Ceratolejeunea filaria*
Ceratolejeunea variabilis (Lindenb.) Pearson => *Ceratolejeunea cornuta*

Cheilolejeunea pililoba (Spruce) A. Evans => *Lejeunea trinitensis*
Crossotolejeunea rotundata S. Winkl. => *Lejeunea intricata*
Diplasiolejeunea brachyclada A. Evans => *Diplasiolejeunea cavifolia*
Diplasiolejeunea involuta S. Winkl. => *Diplasiolejeunea pauckertii*
Diplasiolejeunea involuta subsp. *andicola* Pócs => *Diplasiolejeunea pauckertii*
Diplasiolejeunea pellucida var. *malleiformis* A. Evans => *Diplasiolejeunea malleiformis*
Frullania closterantha Spruce => *Frullania intumescens* var. *closterantha*
Hygrolejeunea tonduzana Steph. => *Lejeunea tonduzana*
"Lejeunea (*Microlejeunea*) *acutifolia* Steph." => *Microlejeunea acutifolia*
Lejeunea bullata Taylor => *Microlejeunea bullata*
Lejeunea epiphylla Mitt. => *Microlejeunea epiphylla*
Lepidozia caespitosa Spruce => *Lepidozia cupressina*
Leptocolea cardiocarpa (Mont.) A. Evans => *Cololejeunea cardiocarpa*
Leptocolea scabriflora (Gottsche ex Steph.) A. Evans => *Cololejeunea obliqua*
Leptolejeunea stenophylla (Lindenb. & Gottsche) Schiffn. => *Drepanolejeunea orthophylla*
Leucolejeunea xanthocarpa (Lehm. & Lindenb.) A. Evans => *Cheilolejeunea xanthocarpa*
Marchantia domingensis Lehm. & Lindenb. => *Marchantia paleacea*
Metzgeria hamata Lindb. => *Metzgeria leptoneura*
Microlejeunea stricta (Gottsche, Lindenb. & Nees) Steph. => *Microlejeunea diversiloba*
Monoclea gottschei subsp. *elongata* Gradst. & Mues => *Monoclea gottschei*
Odontolejeunea sieberiana (Gottsche) Schiffn. => *Odontolejeunea lunulata*
Omphalanthus filiformis (Sw.) Nees => *Cheilolejeunea filiformis*
Porella arborea (Taylor) Trevis. => *Porella crispata*
Taxilejeunea caracensis (Lindenb.) Schiffn. => *Lejeunea caracensis*
Taxilejeunea lusoria (Lindenb. & Gottsche) Steph. => *Lejeunea flaccida*
Trichocolea argentea Herzog => *Leiomitra argentea*
Trichocolea flaccida (Spruce) Spruce => *Leiomitra flaccida*

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