

A contribution to the moss flora of Ecuador

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Abstract: An annotated list of new records or otherwise interesting species from Ecuador is presented. The occurrence of rhizoidal tubers is reported for the first time in *Anoetangium aestivum*, *Brachymenium chilense* and *Bryoerythrophyllum campylocarpum*.

Introduction

Churchill (1994) compiled a provisional checklist of the mosses of Ecuador including the Galapagos Islands, based on the literature review of Steere (1948), and publications since that time, including several revisionary studies. The checklist comprises 874 species distributed among 233 genera and 62 families. Churchill's checklist was incorporated into LATMOSS, a catalogue of Neotropical mosses compiled by Delgadillo et al. (1995). However, the Galapagos Islands are treated here separately from mainland Ecuador. In July 1991, the first author collected bryophytes in the Andean provinces of Ecuador. The study of the mosses revealed several interesting species which are listed here in alphabetic order. Additions to the moss flora of Ecuador not including the Galapagos Islands are indicated

with *. All cited specimens are deposited in the personal herbarium of the first author and duplicates of most specimens in QCA.

The checklist still suffers from the lack of critical taxonomic studies for several of the larger genera. It can therefore not be excluded that some of the species reported here as first records are represented under a different name in the checklists.

Annotated list of records

Aloinella catenula Card.

Prov. Cotopaxi: Volcán Cotopaxi, along the road near the Museo, alt. 3600-3700 m, sterile, leg. Arts Ec. 23/216-b, 23 July 1991.

A rare species previously reported from Ecuador and Mexico (Delgadillo 1975)

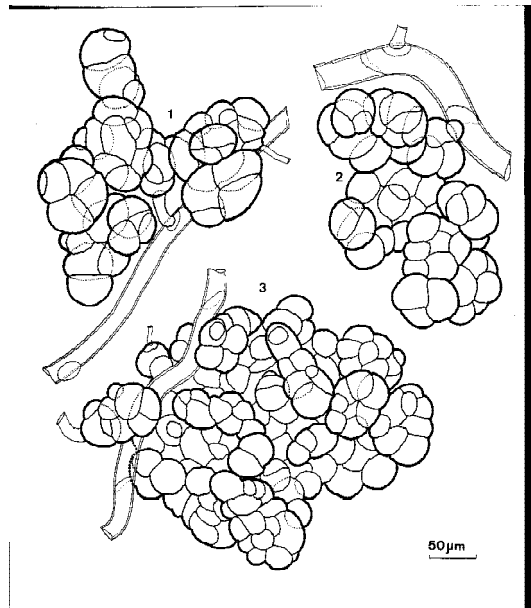


Fig. 1: *Anoectangium aestivum* (Hedw.) Mitt.: rhizoidal tubers. Leg. Arts Ec. 21/101.

***Anoectangium aestivum* (Hedw.) Mitt. (fig. 1)**
Prov. Cotopaxi: between La Mana and Pilaló, western slope of western Cordillera, on earth layer, dry rocky slope, alt. 1350 m, with rhizoidal tubers, fruiting, leg. Arts Ec.21/101 and Ec.21/109, both 21 July 1991

A cosmopolitan (sub)alpine species known from all continents except Antarctica. Rather common in Ecuador. The specimens mentioned above are characterized by the occurrence of rhizoidal tubers and by rounded obtuse leaf apices. This form was formerly recognized as a distinct taxon: *A. euchloron* (Schwaegr.) Mitt., which was reduced to synonymy with *A. aestivum* by Zander (1977b). However, based on morphological as well as ecological observations Eddy (1990) treated them as distinct species. In Ecuador I observed forms of *A. aestivum* growing in compact cushions in moist to permanently wet places at higher altitudes, lacking rhizoidal tubers, whereas forms of *A. euchloron* were growing in loose turfs at temporary dry places at altitudes below 1500 m. The rhizoidal tubers are not abundant in the latter and consist of an irregular shaped cell mass, 150-300 µm in diameter, brown, opaque, with protruding outer cell walls.

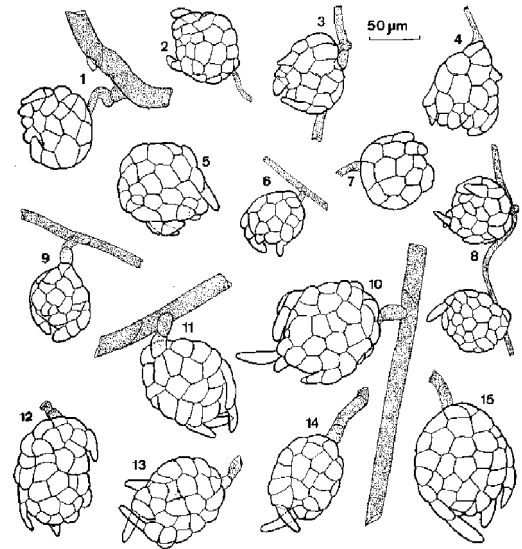


Fig. 2: *Brachymenium chilense* Ochi & Mahú.: rhizoidal tubers. 1-9: from nature; 10-15: from agar culture. Leg. Arts Ec. 16/051a.

****Brachymenium chilense* Ochi & Mahú (fig. 2)**

Prov. Napo: Papallacta, on earth layer, on rock slope, alt. 3200 m, with rhizoidal tubers, fruiting, leg. Arts Ec.16/036 and 16/051, both 16 July 1991.

Hitherto reported only from Chile (Ochi & Mahú 1988). The plant is characterized by its achlorophyllose, silvery shining leaves with a yellowish to reddish tint. Rhizoidal tubers are abundant on yellowish to brownish densely papillose rhizoids. Tubers are easily detached from the rhizoids, subspherical, multicellulose, about 60-100 µm in diameter, dark reddish brown, opaque, with pale more or less protruding apical leaf primordia. The tubers are similar, but slightly larger and darker coloured than those reported in *Brachymenium robertii* Broth. (Ochi 1982). In agar culture protonematal gemmae similar to the rhizoidal tubers, but slightly larger and with more conspicuous leaf primordia are readily produced. The occurrence of rhizoidal tubers was not mentioned by Ochi & Mahú (1988), however careful investigation of the holotype (leg. Mahú no. 21852, herb. HIRO) revealed the presence of similar tubers as those

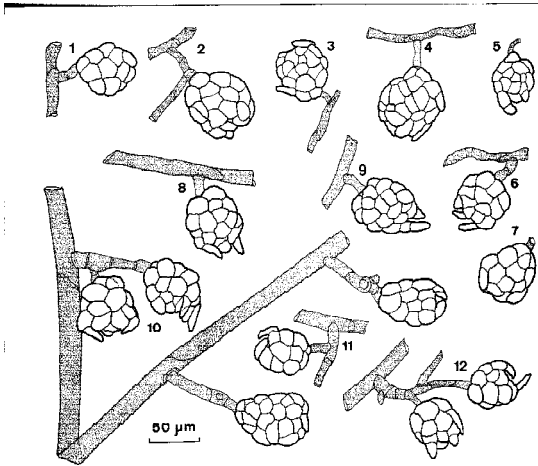


Fig. 3: *Brachymerium robertii* Broth.: rhizoidal tubers. 1-7: from nature; 8-12: from agar culture. Leg. Arts Ec. 12/002.

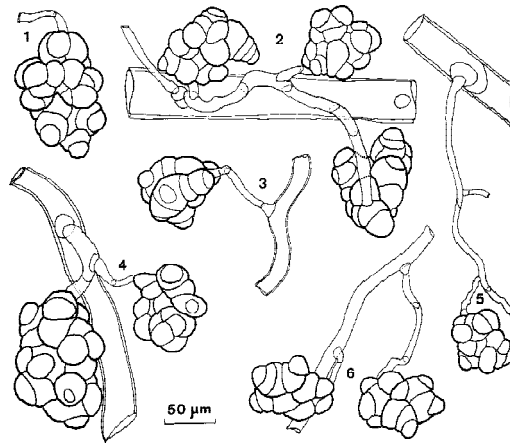


Fig. 4: *Bryoerythrophyllum campylocarpum* (C. Müll.) Crum: rhizoidal tubers. Leg. Arts Ec. 22/138b.

observed in the records from Ecuador.

****Brachymerium robertii* Broth. (Fig. 3)**

Prov. Imbabura: Lago San Pablo, on rock boulder along the road, alt. 2700 m, with rhizoidal tubers, sterile, leg. Arts Ec.12/002, 12 July 1991. Hitherto reported only from Argentina, Chile and Peru (Ochi 1982). The small plants are characterised by the occurrence of spherical rhizoidal tubers. Because of the absence of sporophytes the plant is easily overlooked in the field.

****Breutelia chrysea* (C. Müll.) Jaeg.**

Prov. Carchi: Páramo El Angel, on soil in páramo, alt. 3400 m, sterile, leg. Arts Ec.14/013-a, 14 July 1991; **Prov. Cotopaxi:** Volcán Cotopaxi, along the road near the Museo, alt. 3600 - 3700 m, sterile, leg. Arts Ec.23/209, 23 July 1991.

A Neotropic species hitherto reported from Colombia, Costa Rica, Dominican Republic, Mexico, Peru and Venezuela. Recorded for Ecuador (the Galapagos Islands) by Churchill (1994).

****Breutelia jamaicensis* (Mitt.) Jaeg.**

Prov. Cotopaxi: between La Mana and Pilaló, Western slope of Western Cordillera, on steep rocky slope along the road, alt. 1350 m, sterile, leg. Arts Ec.21/105, 21 July 1991.

A Neotropic species hitherto reported from Central America, Mexico and The West Indies. Recorded for Ecuador (the Galapagos Islands) by Churchill (1994).

***Bryoerythrophyllum bolivianum* (C. Müll.) Zand.**

Prov. Cotopaxi: near Zumbahua, along the road from Pujili to Pilaló, alt. 3600 m, sterile, leg. Arts Ec.21/210, 21 July 1991; idem, Volcán Cotopaxi, near Sindipamba in dry páramo vegetation, Alt. 4100 m, sterile, leg. Arts Ec.23/029, 23/034, both 23 July 1991; idem, Volcán Cotopaxi, Laguna de Limpiopungo, alt. 3830 m, sterile, leg. Arts Ec. 23/123, 23 July 1991.

A Neotropic species previously reported from Bolivia, Mexico, Peru (Zander 1978a, Menzel 1992) and Ecuador (O'Shea et al. 1997).

***Bryoerythrophyllum campylocarpum* (C. Müll.) Crum (fig. 4)**

Prov. Azuay: at the pass of the Eastern Cordillera, between Gualaceo and General L. Plaza, rock slope along the road, alt. 3300 m, leg. Arts Ec.30/219, 30 July 1991; **Prov. Carchi:** Páramo El Angel, on earth edge along the road in páramo, alt. 3400 m, fruiting, Arts Ec.14/039, 14/050, 14/053, 14/057 and 14/079, all 14 July 1991; **Prov. Napo:** Papallacta, on earth layer on rock boulder in meadow, alt. 3200 m, with rhizoidal tubers, fruiting, leg. Arts Ec.16/012-b, 16 July 1991; **Prov. Pichincha:** Pasochoa National Park, about 25 Km South of Quito, alt. 2850 m, with rhizoidal tubers, fruiting, leg. Arts Ec.22/106-a and 22/138-b, both 22 July 1991. Zander (1978a) reduced *Bryoerythrophyllum campylocarpum* into synonymy with *B. jamesonii* (Tayl.) Crum, but after reevaluation Zander (1986) came to the conclusion that they are distinct species. The two species are well represented in Ecuador. Recorded for Ecuador (the Galapagos Islands) by Churchill (1994). Rhizoidal tubers were observed in one specimen from the province Napo (Arts No. Ec.16/012-b) and the two specimens from the province Pichincha (Arts No. Ec.22/106-a and Ec. 22/138-b). Tubers occur singly or in clusters at the end of fine rhizoid branches of variable length; tubers irregularly ovate, multicellular with protruding outer cells, about 50-80(110) µm wide and 60-100(130) µm long, orange-red to reddish brown, tuber cells 15-40 µm in diameter with more or less thickened outer cell walls. In agar culture protonematal gemmae similar in shape and colour, but smaller than the rhizoidal tubers are produced.

***Bryum sauteri* B.,S.& G.**

Prov. Pichincha: Pasochoa National Park, about 25 Km South of Quito, on earth edge along path, alt. 2850 m, with rhizoidal tubers, sterile, leg. Arts Ec.22/102-b, 22 July 1991.

This is a first record for South America, already reported by Arts (1995a), it proves to be a subcosmopolitan species recently known from all continents except North America and Antarctica.

****Calliergonella cuspidata* (Hedw.) Loeske**

Prov. Carchi: Páramo El Angel, in grass páramo, alt. 3400 m, sterile, leg. Arts Ec.14/001-a and 14/002, both 14 July 1991; **Prov. Cotopaxi:**

Volcán Cotopaxi, Laguna de Limpiopungo, in wet grass-land, alt. 3830 m, sterile, leg. Arts Ec.23/107, 23 July 1991.

A common moss from damp grassy temperate places, widely distributed in Asia, Europe, North Africa and North America; reported from scattered localities in Australia, New Zealand, Jamaica and in South America from Brazil and Peru and Southern South America (Düll 1985). Most probably an introduced species.

***Calymperes pallidum* Mitt.**

Prov. Los Rios: Centro científico Río Palenque, at the base of oil-palm tree, alt. 300 m, with gemmae at leaf apex, leg. Arts Ec.20/050, 20 July 1991.

A common species from tropical Africa, widely distributed but rare elsewhere. Reported from Indonesia, The West Indies, Florida and South America: Brazil, Colombia, French Guiana, Peru and Suriname (Buck 1994, Reese 1993). This is a first record for Ecuador, but already reported by (Reese 1993).

***Chenia leptophylla* (C. Müll.) Zand.**

Prov. Imbabura: Ibarra, garden of the Hosteria Chorlavi, with rhizoidal tubers, leg. Arts Ec.15/009, 15 July 1991.

This is a first record for Ecuador, but already reported by (Arts & Sollman 1992). A subcosmopolitan but often overlooked species.

****Chrysoblastella chilensis* (Mont.) Reim.**

Prov. Carchi: Páramo El Angel, on earth edge in wet páramo, alt. 3400 m, sterile, leg. Arts Ec.14/070-b, 14 July 1991.

A southern hemisphere disjunct moss taxon occurring in New Zealand, Australia, Tasmania, Macquarie Island, South America (Bolivia, Brazil, Chile, Colombia, Peru) and the West Indies (Dominican Republic).

****Dicranella cardotii* (R. Br. ter.) Dix. (fig. 5)**

Prov. Napo: About 10 Km West of Papallacta, along the road to Quito, on wet rock wall, alt. 3600 m, with rhizoidal tubers, sterile, leg. Arts Ec.16/221, 16 July 1991.

A southern hemisphere disjunct moss taxon occurring in The Antarctic Islands: Campbell Island, Falkland Island, Kerguelén, Macquarie Is-

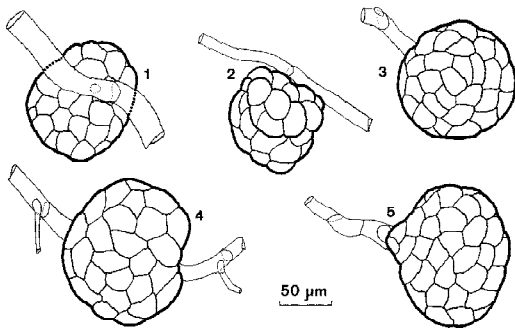


Fig. 5: *Dicranella cardotii* (R. Br. ter.) Dix. : rhizoidal tubers. Leg. Arts Ec. 16/221.

land; New Zealand, Australia, Tasmania, South Africa and South America (Chile, Colombia, Venezuela). The specimen is characterised by the occurrence of spherical rhizoidal tubers such as reported by Ochyra & Newton (1985).

***Didymodon laevigatus* (Mitt.) Zand.**

Syn.: *Barbula laevigata* (Mitt.) Jaeg. (Zander 1993)

Prov. Azuay: at the pass of the Eastern Cordillera, between Gualaceo and General L. Plaza, rock slope along the road, alt. 3300 m, fruiting, leg. Arts Ec.30/122 and 30/215, both 30 July 1991; **Prov. Cotopaxi:** Volcán Cotopaxi, Laguna de Limpiopungo, on moist earth ridge near the lagoon, fruiting, alt. 3830 m, Arts Ec.23/114, 23/122, both 23 July 1991; **Prov. Napo:** About 10 Km West of Papallacta, along the road to Quito, alt. 3600 m, sterile, leg. Arts Ec.16/212 and 16/214, both 16 July 1991.

A rather rare Neotropic species, hitherto reported from the Dominican Republic, Colombia, Peru and Ecuador. Also present in Papua New Guinea, at higher altitudes (Sollman 1994).

***Didymodon pruinosa* (Mitt.) Zand.,**

Syn. *Barbula pruinosa* (Mitt.) Jaeg. (Zander 1993)

Prov. Cotopaxi: Volcán Cotopaxi, in joints of old wall along the road near the Museo, alt. 3600 - 3700 m, sterile, leg. Arts Ec.23/204, 23 July 1991; **Prov. Chimborazo:** Pungalá, valley of

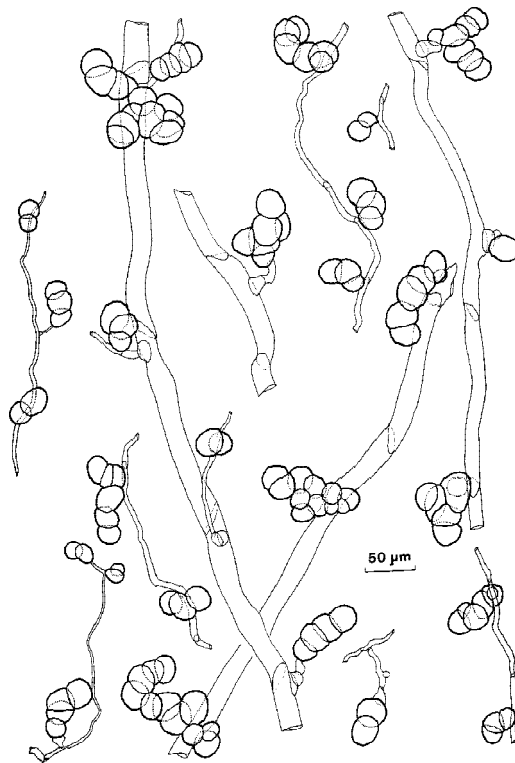


Fig. 6: *Didymodon tophaceus* (Brid.) Lisa: rhizoidal tubers. Leg. Arts Ec. 12/007.

Río Alao, about 20 Km South of Riobamba, on rock outcrop and on earth slope with stones, alt. 2930 m, sterile, Arts Ec.28/005 and Ec.28/016, both 28 July 1991; **Prov. Imbabura:** Lago Cuicocha, on earth slope with rock outcrops, alt. 3100 m, fruiting, leg. Arts Ec.13/004, 13 July 1991.

A rare South American endemic species, hitherto reported only from Ecuador and Peru.

****Didymodon rigidulus* Hedw. emend. Zand.**

Prov. Chimborazo: near Chambo, about 10 Km South - East of Riobamba, on earth slope, alt. 2550 m, fruiting, leg. Arts Ec. 28/101, 28 July 1991; **Prov. Pichincha,** Quito, Parque El Ejido and garden of the Universidad Católica, on earth edge in the garden, alt. 2850 m, sterile, leg. Arts

Ec.11/004, 11 July 1991.

A subcosmopolitan species, in South America reported from Brazil and Peru.

****Didymodon tophaceus* (Brid.) Lisa (fig. 6)**

Prov. Imbabura: Lago San Pablo, on earth edge, alt. 2700 m, with rhizoidal tubers, fruiting, leg. Arts Ec.12/007, 12 July 1991.

The specimen represent a small terrestrial form, without peristome, but characterized by the occurrence of small rhizoidal tubers. *Didymodon tophaceus* is a variable subcosmopolitan species, in South America reported from Bolivia and Peru. The recorded for Ecuador by Churchill (1994) refers to the Galapagos Islands.

****Ditrichum cylindricum* (Hedw.) Grout**

Prov. Pichincha: Paschoa National Park, about 25 Km South of Quito, on earth edge, alt. 2850 m, with rhizoidal tubers, sterile, leg. Arts Ec.22/106-e, 22 July 1991.

A subboreal species widespread in the northern hemisphere but in the southern hemisphere reported only from New Zealand (Beever et al. 1992). Collected in very small quantities intermingled with several other terrestrial mosses. Characterised by the occurrence of 1-3-celled rhizoidal tubers.

***Ditrichum difficile* (Duby) Fleisch.**

Prov. Carchi, Páramo El Angel, on earth edge in páramo and shadowed earth edge along the roadside, fruiting, alt. 3400 m, leg. Arts Ec.14/040 and 14/069, both 14 July 1991; **Prov. Morona-Santiago:** Eastern slope of the Eastern Cordillera, between Gualaceo and General L. Plaza, on rock boulder in mountain rivulet, alt. 2730 m, fruiting, leg. Arts Ec.30/134, 30 July 1991.

A widely distributed subtropical species, hitherto reported from Ecuador as *D. rufescens* (Hampe) Hampe, synonymised by Allen (1994).

****Ditrichum punctulatum* Mitt.**

Prov. Azuay: at the pass of the Eastern Cordillera, between Gualaceo and General L. Plaza, rock slope along the road, alt. 3300 m, fruiting, leg. Arts Ec.30/201, 30 July 1991; **Prov. Morona-Santiago:** Eastern slope of the Eastern Cordillera, between Gualaceo and General L.

Plaza, on dripping rock along the road, alt. 2730 m, sterile, leg. Arts Ec.30/131, 30 July 1991.

Readily recognizable when dry by the glossy sheen of the plants and the strong longitudinal twisting of the subula. The subula apex is narrow and denticulate with shortly rectangular cells. Likely confused in the past with *D. strictum*, which differs from *D. punctulatum* in having a broad subula apex, strict and when dry little or not twisted leaves, with the leaf base more gradually tapering to the subula. *Ditrichum strictum* also differs by its large spores about 25-40 µm in diameter and short peristome less than 150 µm long (Seppelt 1982).

D. punctulatum is known from Australia, New Zealand and South Africa (Magill 1981). This are first records from the Americas.

****Drepanocladus polygamus* (B.,S.& G.) Hedenäs**

Synonym: *Campylium polygamum* (Schimp.) J. Lange & C. Jens. (Hedenäs 1997).

Prov. Cotopaxi: Volcán Cotopaxi, Laguna de Limpiopungo, in sedge and rush vegetation and wet grass-land along the lake, alt. 3830 m, sterile, leg. Arts Ec.23/108 and 23/120, both 23 July 1991.

A cosmopolitan species, in the tropics restricted to higher elevations. Reported from several South American countries viz. Argentina, Bolivia, Peru and Venezuela.

***Encalypta asperifolia* Mitt.**

Prov. Cotopaxi: Volcán Cotopaxi, Laguna de Limpiopungo, on earth-ridge near the lake, alt. 3830 m, fruiting, leg. Arts Ec.23/119, 23 July 1991.

The specimen closely resembles *E. vulgaris*, but differs from the latter by its scabrous surface of the upper abaxial part of the costa. Endemic to South America, where it is almost restricted to the Andes, reported from Argentina, Bolivia, Ecuador and Peru (Horton 1983).

***Erythrophyllastrum andinum* (Sull.) Zander**

Prov. Napo: Papallacta, on wet rock slope along the road, alt. 3200 m, sterile, leg. Arts Ec.16/039, 16 July 1991; idem, About 10 Km West of Papallacta, along the road to Quito, on wet rock side, alt. 3600 m, sterile, leg. Arts Ec.16/219, 16

July 1991.

A rare South American endemic species, hitherto reported from Bolivia, Colombia, Peru (Zander 1977a) and from the province Cotopaxi in Ecuador (O'Shea et al. 1997).

****Fissidens curvatus* Hornsch.**

Syn.: *F. lindigii* Mitt.

Prov. Pichincha: Quito, Eastern slope of the Volcán Pichincha, Eucalyptus wood, on earthslope along the road, alt. 3000 m, fruiting, leg. Arts Ec.11/011, 11 July 1991.

A widespread species known from western United States, Mexico, the West Indies, South America, Africa, Australia, New Zealand and New Caledonia (Pursell 1994b).

****Fissidens intramarginatus* (Hampe) Jaeg.**

Prov. Los Rios: Centro científico Río Palenque, on earth slope along forest road, alt. 300 m, fruiting, leg. Arts Ec.21/005, 21 July 1991.

A widespread neotropic species from Mexico, the West Indies, Central and South America (Pursell 1994a and 1994b). The recorded for Ecuador by Churchill (1994) refers to the Galapagos Islands.

***Fissidens mollis* Mitt.**

Syn.: *F. macrophyllus* Mitt. (Churchill 1994).

Prov. Pichincha: Tinalandia estate, about 18 Km East of Sto. Domingo de los Colorados, on wet wall near aquaduct, alt. 830 m, with axillary gemmae, fruiting, leg. Arts Ec.19/015, 19 July 1991; **Prov. Los Rios:** Centro científico Río Palenque, on earth edge along forest road and on stones in small forest creek, alt. 300 m, with axillary gemmae, leg. Arts Ec.20/020 and 20/060, both 20 July 1991.

A widespread neotropic species from Mexico, the West Indies, Central and South America (Pursell 1994a). Recorded for Ecuador as *F. macrophyllus* Mitt. in LATMOSS.

***Fissidens papillosus* Lac.**

Prov. Azuay: Western slope of Eastern Cordillera, between Gualaceo and General L. Plaza, at the base of bushes in small ravine with rivulet, alt. 3000 m, fruiting, leg. Arts Ec.30/004-b, 30 July 1991.

A subcosmopolitan (sub-)tropical species, In

South America reported from Chile, Colombia and Ecuador (Pursell et al. 1992).

***Fissidens scalaris* Mitt.**

Prov. Pichincha: Quito, Eastern slope of the Volcán Pichincha, Eucalyptus wood, on ditchside along the road, alt. 3000 m, fruiting, leg. Arts Ec.11/020, 11 July 1991.

A rare species reported from Australia, Mexico and South America: Brazil, Ecuador and Peru. Reported by Mitten (1869) and Steere (1948) from Ecuador based on one collection by Spruce from Chimborazo, however according to Pursell (1994b) the Spruce specimen is referable to *F. curvatus*.

***Fissidens wallisii* C. Müll.**

Prov. Pichincha: Pasochoa National Park, about 25 Km South of Quito, on shadowed earth edge, alt. 2850 m, sterile, leg. Arts Ec.22/128-b and Ec.22/139, both 22 July 1991.

This species is characterized by the broad bordered and toothed leaf margins of the vaginant laminae. A neotropic species reported from Mexico, Costa Rica, Brazil, Bolivia, Venezuela and Ecuador (Pursell 1994a).

***Globulinella benoistii* (Thér.) Magill**

Prov. Imbabura: Lago Cuicocha, on rocky earth slope, alt. 3100 m, fruiting, leg. Arts Ec.13/003-a, 13 July 1991.

An extremely rare endemic taxon from Ecuador, known from a single specimen from the prov. Pichincha (Magill 1977).

****Leptodontium araucarieti* (C. Müll.) Par.**

Prov. Carchi: Páramo El Angel, on soil in wet páramo, alt. 3400 m, with axillary gemmae, fruiting, leg. Arts Ec.14/010-a and 14/059, both 14 July 1991; **Prov. Cotopaxi:** Volcán Cotopaxi, along the road near the Museo, on soil, alt. 3600-3700 m, with axillary gemmae, sterile, leg. Arts Ec.23/210 and 23/215, both 23 July 1991.

A rare South American endemic species, hitherto reported only from Bolivia, Brazil and Peru (Zander 1972).

****Leptodontium filicola* Herz.**

Prov. Pichincha, Pasochoa National Park, about 25 Km South of Quito, on rotten tree branch, alt.

2850 m, with axillary gemmae, sterile, leg. Arts Ec.22/103, 22 July 1991; **Prov. Napo:** Papallacta, on rotten tree log in meadow, alt. 3200 m, with axillary gemmae, sterile, leg. Arts Ec.16/026, 16 July 1991.

A widespread neotropic species, reported from Costa Rica, and many South American countries except Ecuador.

***Leptodontium stellaticuspis* Bartr.**

Prov. Napo: Papallacta, alt. 3200 m, on rotten tree log in meadow and on thatched roof at the warm water pools, with gemmae in gemma-cups at the leaf apex, sterile, leg. Arts Ec.16/002-b and 16/054, both 16 July 1991.

A rare South American endemic species, hitherto reported only from Colombia, Ecuador and Venezuela (Zander 1972, Griffin 1975).

****Leucobryum albidum* (P. Beauv.) Lindb.**

Prov. Pichincha: Tinalandia estate, about 18 Km

East of Sto. Domingo de los Colorados, on fallen tree stem along the jungle trail, alt. 830 m, sterile, leg. Arts Ec.18/060-b, 18 July 1991.

A widespread American species from eastern United States, Mexico, the West Indies, Central and South America and the Galapagos Islands. The record for Ecuador by Churchill (1994) refers to the Galapagos Islands.

***Macromitrium perreflexum* Steere**

Prov. Azuay: Western slope of Eastern Cordillera, between Gualaceo and General L. Plaza, small ravine with rivulet, epiphyte on branch of shrub, alt. 3000 m, sterile, leg. Arts Ec.30/011-a, 30 July 1991.

An extremely rare endemic taxon from Ecuador, reported only from two localities in the prov. of Loja (Steere 1982).

****Philonotis cernua* (Wils.) Griffin & Buck**

Prov. Pichincha: Pasochoa National Park, about 25 Km South of Quito, with *Philonotis uncinata* (Schwaegr.) Brid., on earth edge along meadow, alt. 2850 m, fruiting, leg. Arts Ec.22/114, 22 July 1991.

A widespread species, reported from scattered localities in China, Great Britain, eastern United States, Mexico, Costa Rico, Brazil and Peru.

***Pleurozium schreberi* (Brid.) Mitt.**

Prov. Azuay: at the pass of the Eastern Cordillera, between Gualaceo and General L. Plaza, on earthslope along the road, alt. 3300 m, sterile, leg. Arts Ec.30/208, 30 July 1991.

A common species in Asia, Europe and North America, reported from scattered localities in Costa Rica and South America: Colombia, Venezuela, Peru and Bolivia. Reported by Steere (1948) from the provinces Pichincha and Tunguragua in Ecuador.

***Pohlia integra* (Card.) Shaw**

Syn.: *Mniobryum bracteatum* Bartr.

Prov. Cotopaxi: about 20 Km North of laticunga, garden of the Hosteria La Cienega, alt. 3000 m, with male and female plants, non fruiting, leg. Arts Ec.22/001-a, 22 July 1991.

A rare neotropic species with rhizoidal tubers disconcertingly similar to those in *Pohlia pyriforme* (Hedw.) Wils. Reported by Arts (1995b) from Mexico and Ecuador.

****Rhabdoweisia fugax* (Hedw.) B., S. & G.**

Prov. Carchi: Páramo El Angel, on earthege along the roadside, alt. 3400 m, fruiting, leg. Arts Ec.14/052 and 14/054, both 14 July 1991.

Widely distributed in Europe and Macaronesia, reported from scattered localities in Asia, Africa, Mexico, Central and South America: Bolivia, Colombia, Peru and Venezuela.

****Scorpidium scorpioides* (Hedw.) Limpr.**

Prov. Cotopaxi: Volcán Cotopaxi, Laguna de Limpiopungo, in sedge and rush moor, alt. 3830 m, sterile, leg. Arts Ec.23/104, 23/110-b and 23/121, all 23 July 1991.

All specimens are straight leaved forms which might be confused with *Pseudocalliergon turgescens* (T. Jens.) Loeske. Widely distributed in Asia, Europe and North America, reported from scattered localities in Costa Rica and South America: Bolivia, Colombia, Peru and Venezuela. According to Hedenäs (personal communication) the species is common in part of the Andes and relatively widespread in Ecuador, where it has been recorded from several Andean provinces: Azuay, Bolívar, Cotopaxi and Napo.

***Sphagnum magellanicum* Brid.**

Prov. Azuay: at the pass of the Eastern Cordillera, between Gualaceo and General L. Plaza, rock slope along the road, alt. 3300 m, sterile, leg. Arts Ec.30/221, 30 July 1991.

A widely distributed boreal species recorded from Asia, Europe, New Zealand, North America, the West Indies, Central and South America. Recorded for Ecuador by Churchill (1994).

***Sphagnum sancto-josephense* Crum & Crosby**

Prov. Morona-Santiago: Eastern slope of the Eastern Cordillera, between Gualaceo and General L. Plaza, along the road, alt. 2730 m, sterile, leg. Arts Ec.30/139, 30 July 1991.

A rare Neotropic species, hitherto reported only from Costa Rica, Bolivia and Colombia. Recorded for Ecuador by Churchill (1994).

****Trichostomum tenuirostre* (Hook. & Tayl.) Lindb. var. *gemmiparus* (Schimp.) Zand.** (fig. 7)

Prov. Pichincha: Tinalandia estate, about 18 Km

East of Sto. Domingo de los Colorados, on earth edge along the jungle trail and near the golf-course, alt. 830 m, with rhizoidal tubers, leg. Arts Ec.18/053, 18 July 1991 and Arts Ec.19/020, 19 July 1991; idem, Toachi river valley at Tinalandia, about 18 Km East of Sto. Domingo, on top of rock boulder and on earth edge along wet forest trail, alt. 800 m, with rhizoidal tubers, leg. Arts Ec.18/117 and 18/118, both 18 July 1991.

This plant is characterised by the occurrence of dark red-brown elliptical to irregularly clavate multicellular rhizoidal tubers, it has been reported by Zander (1978b) from Europe, India, Brazil, Cuba and Mexico.

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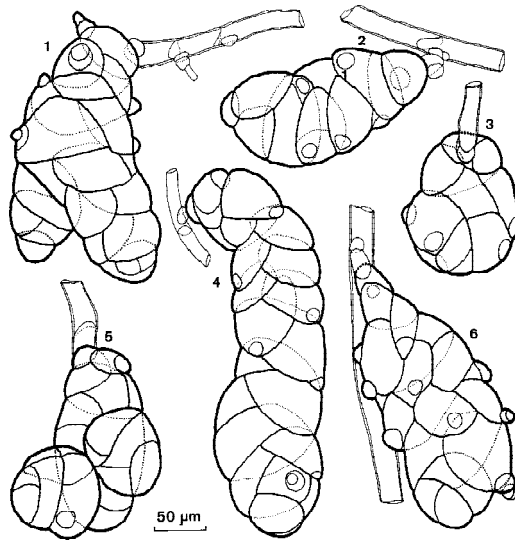


Fig. 7: *Trichostomum tenuirostre* (Hook. & Tayl.) Lindb. var. *gemmiparus* (Schimp.) Zand. : rhizoidal tubers. Leg. Arts Ec. 18/117.

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