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BRYOPHYTES OF THE REPUBLIC OF EQUATORIAL GUINEA (WEST CENTRAL AFRICA) VII. NEW RECORDS AND RANGE EXTENSIONS OF LIVERWORTS FROM RÍO MUNI

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Abstract: Río Muni (Muni region) is the continental and largest part of the Republic of Equatorial Guinea, extending over 26000 of its 28000 km², placed between Cameroon and Gabon. The territory is quite homogeneous from a vegetation point of view: 99% of the area is covered by forest, around 20% of which is still primary. The lowland rainforest is most typical; only on the most mountainous areas is a less dense submontane forest developed. The current knowledge of the Río Muni bryoflora is still poor: 181 taxa (107 liverworts and 74 mosses) have been recorded so far. Data on 19 liverwort species in the families Cephaloziellaceae, Frullaniaceae, Lejeuneaceae, Lepidoziaceae, Metzgeriaceae and Porellaceae are offered. Six of them are new additions for the country of Equatorial Guinea, and seven are new for the Muni region (Río Muni). For each species, geographical distribution, altitudinal range, ecological information and accompanying bryophyte species are given.

Keywords: Equatorial Guinea, Africa, liverworts, Río Muni

INTRODUCTION

Río Muni (Muni region) is the continental and largest part of the Republic of Equatorial Guinea, extending over 26000 of its 28000 km², and is located between Cameroon and Gabon, in a latitude 1–2° N. Río Muni is within the guineo-congolese phytogeographic region (Mayaux *et al.* 2013), where the most extensive African rainforests are found, including West and Central Africa, reaching Angola to the South and the Ruwenzori to the East.

The territory consists of two morphological parts: to the West, a coastal part below 300 m in altitude and lying on sedimentary substrates; and to the East, the Congo craton comprising a mountain range (Cadena de Niefang, 1200 m high) and a large plain on granitic substrate. Average annual temperature ranges from 24°

to 25°C, and the rainfall is between 1000–1500 mm, with a maximum of 3000 mm in the Muni estuary.

The territory is quite homogeneous from a vegetation point of view: 99% of the area is covered by forest, around 20% of which is still primary. The lowland rainforest is most typical; only on the most mountainous areas is a less dense submontane forest developed. Mangroves cover the estuaries of the biggest rivers (Ntem, Uoro and Muni).

The current knowledge of the Río Muni bryoflora is still poor: 181 taxa (107 liverworts and 74 mosses) have been recorded so far (Heras and Infante 2001). Data on 19 liverwort species are offered here.

MATERIALS AND METHODS

Specimens collected by the authors during several prospecting trips from 1993 to 2003 have been identified, using the pertinent literature available. Specimens are deposited in herbarium VIT (Álava Natural History Museum, Vitoria, Spain). African distributions are based on Wigginton (2004, 2018) and Fischer (2013).

RESULTS

Species are listed by families in alphabetical order.
Localities and specimens are identified as follows: municipality (province), toponymes, geographical coordinates, altitude in meters above sea level, macrohabitat, microhabitat, *collectors (legit),* collection date, specimen number.
Localities are ordered by province from West (coastal area) to East (interior plains).
Species new for the country of Equatorial Guinea are indicated by two preceding asterisks (**), and those new to Río Muni territory by one asterisk (*).

CEPHALOZIELLACEAE

Cylindrocolea chevalieri (Steph.) R.M.Schust. (*Figure 1*)

Niefang (Centro-Sur), Monte Alén, between Ayene and Moka. 1°39.95'N, 10°18.86'E. 806 m. West-facing granitic cliffs surrounded by primary forest. *Heras and Infante* 15/08/03. VIT 30887, 30892.

Ecology. Saxicolous at the base of a cliff under *Aframomum* sp. This species usually grows near streams, intermittent or permanent, so its occurrence at the base of a frequently irrigated cliff is not surprising.

Distribution. West Africa: endemic to this area, Ghana, Nigeria, Congo, Gabon. New to Equatorial Guinea.

Cylindrocolea kiaeri (Austin) Váňa (*Cephaloziella kiaeri* (Austin) Douin) (*Figure 1*)

Evinayong (Centro-Sur), Monte Alén, El Mirador. 1°39'N, 10°18'E. 1100 m. Primary submontane forest with *Drynaria laurentii* (H.Christ ex De Wild. & Durand) Hieron. On mossy humid granitic rock with *Begonia* sp. and *Trichomanes crispiforme* (Alston) Exell. *Heras and Infante* 13/08/03. VIT 30763 (*Bazzania nitida*) p.p.

Evinayong (Centro-Sur), Monte Alén, Moka. 1°39.57'N, 10°18.79'E. 800 m. Primary forest on a hill. North-facing granitic rocks, at their base. Saxicolous. *Heras* 24/07/94. VIT 17695 (*Plagiochila terebrans*) p.p. Propagules.

Niefang (Centro-Sur), Monte Televisión. 1°41.63'N, 10°17.10'E. 1.000 m. Primary forest, on northeast-facing granite rocks. Saxicolous. *Heras* 26/07/94. VIT 17826, propagules; VIT 17825 (*Lepidozia succida*) p.p.; VIT 17827 (*Plagiochila pectinata*) p.p.

Aconibe (Wele-Nzás), Kukumankoc, Mungum inselberg. 1°18.95'N, 10°48.84'E. 791 m. Saxicolous. *Heras and Infante* 28/08/03. VIT 31267. Propagules.

Ecology. Strictly associated with granitic areas in the interior (Monte Alén and Kukumankoc) at altitudes from 790 to 1100 m. In primary forests, naturally not too dense due to the rocky substrate. Always accompanying *Lepidozia succida* Mitt., other less frequent accompanying species are *Bazzania decrescens* (Lehm. & Lindenb.) Trevis., *Plagiochila terebrans* Nees & Mont. and *P. pectinata* Lindenb.

Distribution. West Africa: Bioko (Pic Basilé 2840–3010 m, Müller 2006), Cameroon (Mount Cameroon 2600 m, and Mbani massif 1700–2000 m). Rest of Africa: montane regions from DR Congo and Ethiopia south to South Africa, Madagascar, Réunion and Seychelles. New to Río Muni. The continental Equatoguinean specimens reinforce the presence of this species in West Africa, where it could extend to all mountain massifs under a continental influence, even at moderate altitudes (from 800 m upward).

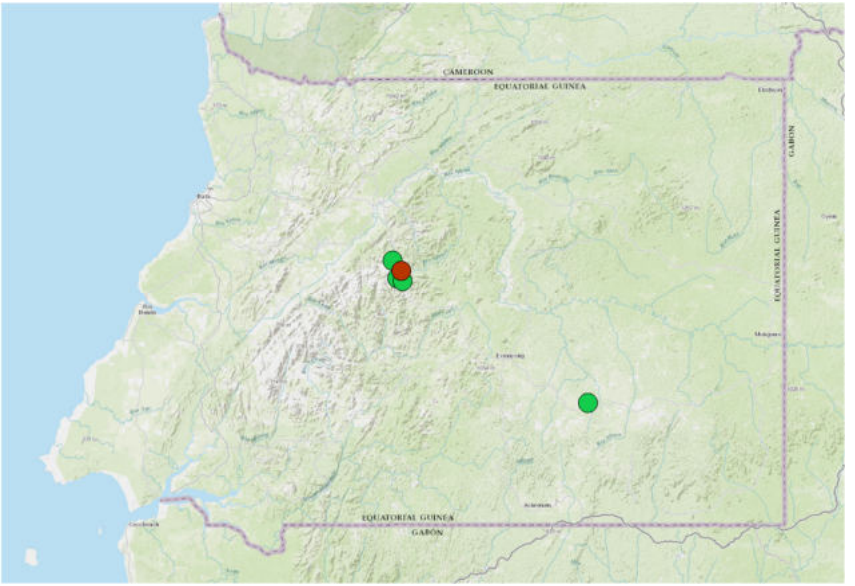

Figure 1. Distribution in Río Muni of: *Cylindrocolea chevalieri* (Steph.) R.M.Schust. (brown dot); *C. kiaeri* (Austin) Váňa (green dot).

FRULLANIACEAE

Frullania apiculata (Reinw., Blume & Nees) Nees

Mbini (Litoral), river Mitomo between Emamengó and Nkó. 1°22'N, 9°49'E. 160 m. Saxicolous on granite rocks by a stream. *Heras* 24/01/98. VIT 21587. Female gametangia.

Evinayong (Centro-Sur), Monte Alén, río Uoro. 1°41.38'N, 10°7.81'E. 250 m. On trunk by river rapids on granites. Corticolous. *Heras* 21/07/94. VIT 17645.

Ecology. Corticolous on tree branches of riparian forests or in the photic zone of giant trees (*Aucoumea klaineana* Pierre, *Erythrophleum ivorense* A.Chev.), or saxicolous on quartzites and granites by streams. Up to an altitude of 250 m. Frequent accompanying species: *Marchesinia excavata* (Mitt.) Schiffn., *Frullania apicalis* Mitt., *F. purpurea* Steph.

Distribution. West Africa: widespread from Guinea-Conakry to Gabon and D.R. Congo, including São Tomé. Rest of Africa: Rwanda, Madagascar, Mauritius, Réunion, Seychelles and Comoros.

Rather frequent in the south of Litoral province in Río Muni (in the primary forests by rivers Mitong and Congüe) (Infante and Heras 1998); the new localities extend the known area of the species to the North.

****Frullania eplicata*** Steph.

Nsoc (Wele-Nzás), inselberg near Asoc. 1°27.09'N, 11°19.54'E. 662 m. Shrub fringe on the North end of the inselberg, with *Afrotrilepis pilosa* (Boeckeler) J.Raynal and *Euphorbia letestui* J.Raynal. *Infante and Heras* 22/08/03. VIT 31070.

Ecology. Epiphytic on dead trunk of *Euphorbia letestui* in full sun.

Distribution. West Africa: Ghana. Rest of Africa: D.R. Congo, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, South Africa.
New to Equatorial Guinea.

****Frullania grossiclava*** Steph.

Nsoc (Wele-Nzás), inselberg near Dumu. 1°21.93'N, 11°19.31'E. 820 m. Open granitic slopes with *Afrotrilepis pilosa* and *Euphorbia letestui*. Saxicolous. *Heras and Infante* 21/08/03. VIT 31009.

Ecology. Saxicolous on granitic slopes in full sun.

Distribution. West Africa: new to the area. Rest of Africa: D.R. Congo, from Zaire, Tanzania, Mozambique to Zimbabwe; Madagascar and Réunion. New both to Equatorial Guinea and West Africa.

****Frullania obscurifolia*** Mitt. (*Figure 2*)

Bata (Litoral), Asonga, gardens of the Cooperación Española office. 1°51'N, 9°46'E. 15 m. Corticolous on coconut tree trunks. *Heras* 22/01/98. VIT 21567.
Niefang (Centro-Sur), Ncohomidji, road between Bata and Niefang. 1°49.29'N, 10°05.99'E. 230 m. Secondary forest (bicoro) by the road. Corticolous on the buttress of a giant *Ceiba* tree. *Infante and Heras* 15/08/03. VIT 30941. Perianths.
Nsoc (Wele-Nzás), Dumu. 1°21'N, 11°19'E. 675 m. In the village, corticolous on trunk of atanga (*Pachylobus edulis* G.Don). *Infante and Heras* 22/08/03. VIT 31102.

Ecology. Corticolous in secondary forests (bicoro) and trees in villages, in altitudes up to 675 m. Frequent accompanying species: *Frullania spongiosa* Steph.

Distribution. West Africa: from Sierra Leona to Zaire and Angola. Rest of Africa: widespread in the East and South, and Madagascar and Indian islands.
In Equatorial Guinea already known from Annobón (Arnell 1956); a widespread African species, new to Río Muni.

Frullania purpurea Steph. (*Figure 2*)

Nsoc (Wele-Nzás), Inselberg near Asoc. 1°27.09'N, 11°19.54'E. 662 m. Shrub fringe on the N end of the inselberg, with *Euphorbia letestui* and *Afrotrilepis pilosa*. Epiphytic on *Euphorbia*, trunks and low branches. *Infante and Heras* 22/08/03. VIT 31056.

Ecology. Already known from the estuary of river Muni (Infante and Heras 1998), where it occurs on trunks in the photic area of giant trees and riparian forests; its distribution is enlarged to the East; epiphytic on *Euphorbia letestui* in full sun. Up to 662 m in altitude.

Distribution. West Africa: Nigeria, Sierra Leona, Río Muni, São Tomé. Rest of Africa: Madagascar and Indian islands.

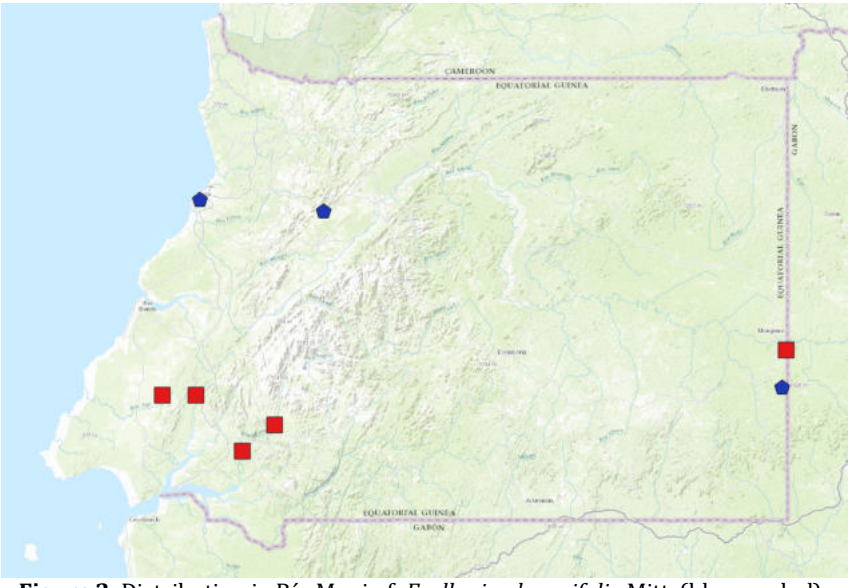

Figure 2. Distribution in Río Muni of: *Frullania obscurifolia* Mitt. (blue symbol); *F. purpurea* Steph. (red square).

*****Frullania rio-janeirensis*** (Raddi) Ångstr.

Nsoc (Wele-Nzás), Asoc, 2 km S of the village. 1°27.88'N, 11°19.25'E. 670 m. Cocoa plantation. *Infante and Heras* 22/08/03. VIT 31037, 31048.

Ecology. Corticolous on trunks and main branches of *Theobroma cacao* L. in a cocoa plantation. At an altitude of 670 m.

Distribution. West Africa: From Guinea Conakry to Cameroon, São Tomé and Príncipe. Rest of Africa: Angola, D.R. Congo, Gabon, Ethiopia, Tanzania. New to Equatorial Guinea.

Frullania spongiosa Steph. (*Figure 3*)

Evinayong (Centro-Sur), Bicurga, Kem inselberg. 1°34.7'N, 10°27.8'E. 780 m. Shrub formation on the upper part of the inselberg. Humi-lignicole on dead trunk on the floor. *Heras and Infante* 30/08/03. VIT 31377.

Niefang (Centro-Sur), Monte Alén, road between Ayene and Moka. 1°39'N, 10°18'E. 750 m. Secondary forest by the road. On fallen tree of *Macaranga barteri* Müll. & Arg. *Infante and Heras* 31/08/03. VIT 31459 (*Ceratolejeunea calabariensis*) p.p.; VIT 31445; 31477; 31489.
Aconibe (Wele-Nzás), village of Kukumankoc. 1°17.66'N, 10°49.01'E. 715 m. Corticolous on trunk of *Cocos nucifera* L. and *Persea americana* Mill. *Infante and Heras* 29/08/03. VIT 31349; 31351.
Nsoc (Wele-Nzás), Asoc, 2 km S of the village. 1°27.88'N, 11°19.25'E. 670 m. Cocoa plantation. Corticolous on the upper trunks and main branches of cocoa trees. *Infante and Heras* 22/08/03. VIT 31037 (*Frullania rio-janeirensis*) p.p.; VIT 31042; 31043; 31050. Perianths.
Nsoc (Wele-Nzás), Dumu. 1°21'N, 11°19'E. 675 m. Corticolous on trunk of atanga (*Pachylobus edulis*). *Infante and Heras* 22/08/03. VIT 31102 (*Frullania obscurifolia*) p.p.
Nsoc (Wele-Nzás), inselberg near Dumu. 1°21.93'N, 11°19.31'E. 820 m. Saxicolous forest on the inselberg summit, on granitic substrate. Corticolous on trunks and branches. *Heras and Infante* 21/08/03. VIT 30962; 30985; 30988.

Ecology. Corticolous on cocoa, coconut, atanga and avocado trees in plantations and villages; secondary forests and shrub formations in altitudes between 680 and 820 m. Frequent accompanying species: *Ceratolejeunea cornuta* (Lindenb.) Steph., *Frullania obscurifolia, F. rio-janeirensis, Lejeunea* spp.

Distribution. West Africa: from Ivory Coast to Nigeria, Cameroon and Gabon, including São Tomé. Rest of Africa: scattered in East Africa, Madagascar, Réunion and Seychelles.
Already known in Río Muni from Monte Alén and nearby Monte Televisión (Infante and Heras 1998); the new localities extend the species to the interior of the region.

LEJEUNEACEAE

Caudalejeunea lehmanniana (Gottsche) A.Evans

Nsoc (Wele-Nzás), inselberg near Asoc. 1°27.09'N, 11°19.54'E. 662 m. Shrubby fringe on the N end of the inselberg with *Euphorbia letestui* and *Afrotrilepis pilosa*. *Infante and Heras* 22/08/2003. VIT 31063.

Ecology. Epiphytic on *Euphorbia letestui*, in full sun, at an altitude of 662 m.

Distribution. West Africa: sparse from Guinea Bissau, Benin, Sierra Leona, Príncipe, Nigeria to Cameroon. Absent by rest of Africa: some areas in the East (Mozambique, Zaire and Zimbabwe).
New to Río Muni. In Equatorial Guinea; already known from Bioko (Müller and Pócs 2007).

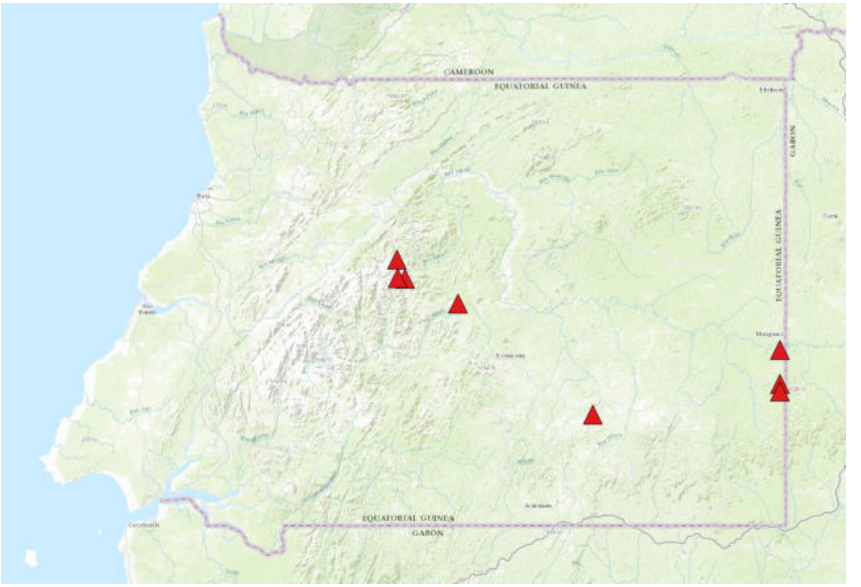

Figure 3. Distribution in Río Muni of *Frullania spongiosa* Steph.

*****Caudalejeunea yangambiensis*** (Vanden Bergh.) E.W.Jones
Nsoc (Wele-Nzás), Asoc, 2 km S of the village. 1°27.09'N, 11°19.54'E. 670 m. Cocoa plantation. *Infante and Heras* 22/08/2003, VIT 31039. Propaguliferous shoots.

Ecology. Epiphytic and corticolous on the upper trunks and main branches of cocoa trees in a plantation at 670 m.

Distribution. West Africa: Ghana and Cameroon. Rest of Africa: Angola, Ethiopia, DR Congo, Rwanda and Uganda.
New to Equatorial Guinea.

*****Colura dusenii*** Steph.
Evinayong (Centro-Sur), Monte Alén, pass between Ayene and Moka. 1°39'N, 10°18'E. 750 m. Secondary forest by the road Niefang-Evinayong. *Heras and Infante* 13/08/2003, VIT 30726.

Ecology. Corticolous on fallen assas (*Macaranga barteri*) by a road at 750 m. Accompanied by *Diplasiolejeunea cavifolia, Cheilolejeunea surrepens, Lopholejeunea* sp. and *Ceratolejeunea* sp.

Distribution. West Africa: Sparse from Sierra Leona to Cameroon, absent on the islands of the Gulf of Guinea. Rest of Africa: some areas in the East (Kenya, Tanzania and Malawi); Comoros. New to Equatorial Guinea.

LEPIDOZIACEAE

Bazzania decrescens (Lehm. & Lindenb.) Trevis. subsp. ***molleri*** (Steph.) E.W.Jones (*Figure 4*)

Evinayong (Centro-Sur), Monte Alén, El Mirador. 1°39'N, 10°18'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. Humi-saxicolous on rocky humid wall. *Heras and Infante* 13/08/03. VIT 30763; 30757.

Evinayong (Centro-Sur), Bicurga, río Laña 2 km S of the village. 1°34.15'N, 10°27.70'E. 660 m. Riparian forest. Humi-lignicolous on fallen tree by the water. *Heras and Infante* 30/08/03. VIT 31397; 31403.

Aconibe (Wele-Nzás), Kukumankoc, Mungum inselberg. 1°18.95'N, 10°48.84'E. 791 m. Base of granitic cliffs shaded by saxicolous forest. Saxicolous on the wall. *Heras and Infante* 28/08/03. VIT 31264.

Aconibe (Wele-Nzás), Kukumankoc, Mungum hills. 1°17.6'N, 10°49.0'E. 760 m. Primary forest around an intermittent stream with *Cyathea cameroooniana* Hook. Humi-lignicolous on fallen tree. *Infante and Heras* 29/08/03. VIT 31289.

Aconibe (Wele-Nzás), Kukumankoc, river Ncoho. 1°17.6'N, 10°49.0'E. 690 m. Primary riparian forest. Corticolous on branch over the river. *Infante and Heras* 29/08/03. VIT 31320.

Nsoc (Wele-Nzás), inselberg near Dumu. 1°21'N, 11°19'E. 650 m. Primary forest at the base of the inselberg. Humi-corticolous on buttresses. *Heras and Infante* 23/08/03. VIT 31120.

Ecology. Humi-corticicolous, humi-lignicolous or saxicolous on branches, trunks, buttresses and granitic walls. Under saxicolous and riparian primary forests, mangroves or in the photic zone in the canopy of primary lowland forests. From sea level to 1100 m.

Distribution. In Equatorial Guinea, Müller (1996) cited the typical subspecies and later on, subspecies *pumila* (Mitt.) Pócs (Müller 2006), both in the Southeast of Bioko island. Subspecies *molleri* is also known from Bioko (Infante *et al.* 1997), and Annobón (Arnell 1956) (where it was not refound during an expedition in the year 2000). West Africa: Sparse from Ivory Coast and Sierra Leona to Gabon and Congo, including all islands in the Gulf of Guinea. Rest of Africa: some areas in the East (Mozambique, Malawi, Zaire and Zimbabwe).

In Río Muni already known from Cogo (Litoral province) and Monte Alén (Centro-Sur) (Infante and Heras 1998); the new localities extend its presence to almost all the region, from the coast to Gabon border.

Bazzania nitida (F.Weber) Grolle (*Figure 4*)

Evinayong (Centro-Sur), Monte Alén, El Mirador. 1°39'N, 10°18'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. *Heras and Infante* 13/08/03. VIT 30763.

Ecology. Humi-saxicolous on mossy granitic walls with *Trichomanes crispiforme* at an altitude of 1100 m. Accompanying species: *Bazzania decrescens* subsp. *molleri*, *Telaranea diacantha* (Mont.) J.J.Engel & G.L.Merr., *Lepidozia succida* Mitt. and *Plagiochila* spp.

Distribution. Known in Equatorial Guinea from Bioko (Müller 1996). West Africa: Cameroon and São Tomé. Rest of Africa: Eastern mountains (D.R. Congo, Malawi, Rwanda, Burundi, Zimbabwe, Tanzania and Uganda), South Africa and Eastern Islands (Madagascar, Comoros, Mauritius, Réunion).

A montane species new to Río Muni, being the third locality of the species in West Africa.

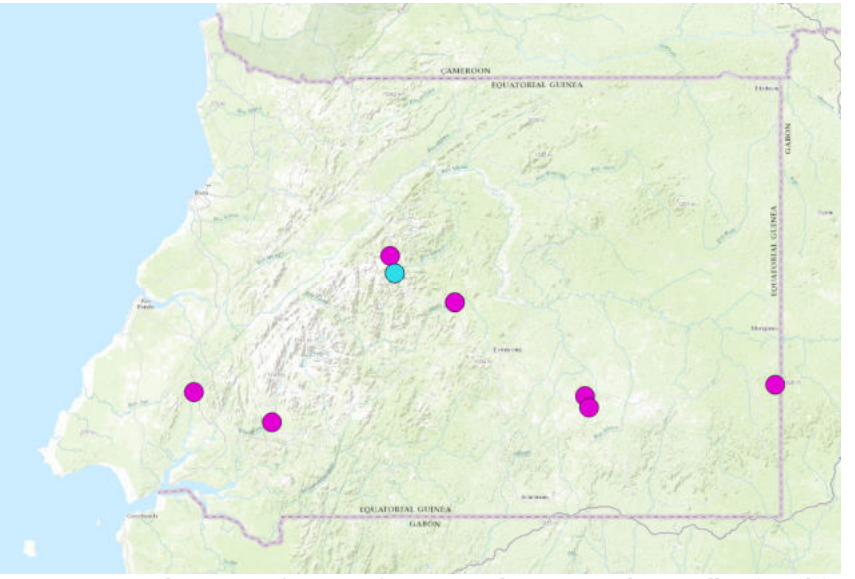

Figure 4. Distribution in Río Muni of: *Bazzania decrescens* subsp. *molleri* (Steph.) E.W.Jones (violet circles); *Bazzania nitida* (F.Weber) Grolle (blue circle).

Lepidozia succida Mitt. (*Figure 5*)

Mbini (Litoral), River Mitomo between Emamengó and Nkó. 1°22'N, 9°49'E. 160 m. Stream cascade, on a rotting log, terri-lignicolous. *Heras* 24/01/98. VIT 21601.

Evinayong (Centro-Sur), Bicurga, río Laña, 2 km S of the village. 1°34.15'N, 10°27.70'E. 660 m. Riparian forest. *Heras and Infante* 30/08/03. VIT 31397 (*Bazzania decrescens* subsp. *molleri*) p.p.; VIT 31403; 31412.

Evinayong (Centro-Sur), Bicurga, Inselberg Kem. 1°34.7'N, 10°27.8'E. 780 m. Saxicolous forest on the summit of the inselberg. Humi-saxicolous. *Heras and Infante* 30/08/03. VIT 31367.
Evinayong (Centro-Sur), Monte Alén, El Mirador. 1°39'N, 10°18'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. On rocky mossy humid wall. *Heras and Infante* 13/08/03. VIT 30765 (*Bazzania decrescens* subsp. *molleri*) p.p.; VIT 30764.
Evinayong (Centro-Sur), Monte Alén, mount Ekon. 1°39.50'N, 10°18.46'E. 780 m. Primary forest on rocky slopes. Corticolous on trunk. *Infante and Heras* 12/08/03. VIT 30713.
Niefang (Centro-Sur), Monte Alén, between Ayene and Moka. 1°39.95'N, 10°18.86'E. 806 m. Granitic West-facing cliffs surrounded by saxicolous primary forest. *Heras and Infante* 15/08/03. VIT 30877.
Aconibe (Wele-Nzás), Kukumankoc, Mungum inselberg. 1°18.95'N, 10°48.84'E. 791 m. Granitic cliffs surrounded by saxicolous forest. *Heras and Infante* 28/08/03. VIT 31273 (*Bazzania decrescens* subsp. *molleri*) p.p.; VIT 31255; 31334; 31342.
Añisoc (Wele-Nzás), road between Añisoc and Mongomo, 2 km E of Milong. 1°46.64'N, 10°54.25'E. 590 m. Secondary forest (bicoro). On trunk of *Macaranga spinosa* Müll. & Arg. *Infante and Heras* 24/08/03. VIT 31191.
Nsoc (Wele-Nzás), Dumu, inselberg near the village. 1°21'N, 11°19'E. 670 m. Secondary forest with yucca cultures. Lignicolous on rotting wood and terricolous. *Heras and Infante* 21/08/03. VIT 31020; 31029.
Nsoc (Wele-Nzás), Dumu, inselberg near the village. 1°21'N, 11°19'E. 650 m. Primary forest at the base of the inselberg. Saxicolous on granitic rocks. *Heras and Infante* 23/08/03. VIT 31134; 31142; 31143; 31153.

Ecology. A frequent species occupying roots, trunks and branches, rotting wood in primary lowland and submontane forests, secondary forests, shaded bases of cliffs in inselbergs, streams, in submontane and lowland, primary and secondary forests. Up to an altitude of 1100 m.

Distribution. West Africa: from Guinea Conakry to Cameroon and Gabon, including the islands of the Gulf of Guinea (São Tomé, Bioko, Príncipe). Rest of Africa: Central African Republic, Congo-Brazzaville, D.R. Congo, Rwanda, Uganda, Angola, Madagascar and Comoros.

In Río Muni already known from the south of Litoral province and Monte Alén, the new localities enlarge its distribution to the East up to the Gabon border.

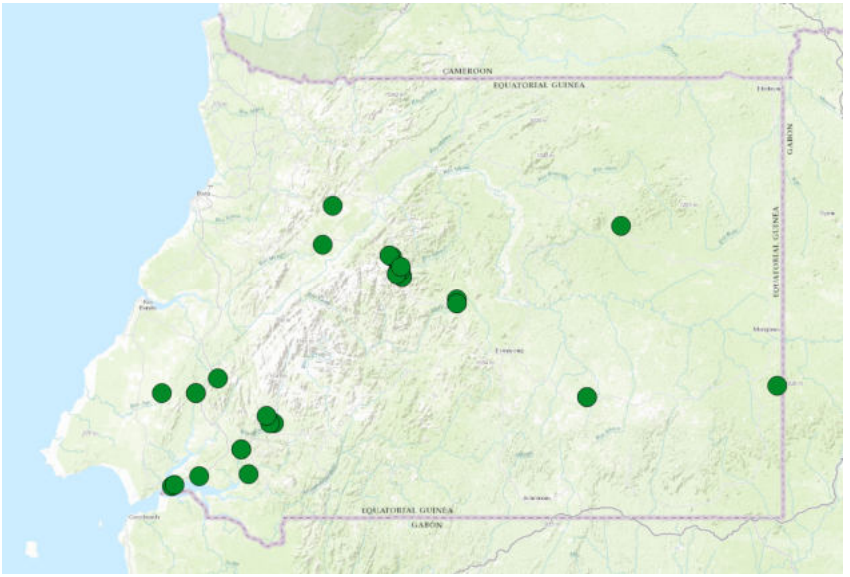

Figure 5. Distribution in Río Muni of *Lepidozia succida* Mitt.

Telaranea nematodes (Gottsche ex Austin) M.Howe (*Figure 6*)
Evinayong (Centro-Sur), Monte Alén, El Mirador. 1°39'N, 10°18'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. On granitic walls. *Heras and Infante* 13/08/03. VIT 30751; 30762; 30765.
Evinayong (Centro-Sur), Bicurga, Inselberg Kem. 1°34.7'N, 10°27.8'E. 780 m. Saxicolous forest on the summit of the inselberg. Humi-saxicolous on granites. *Heras and Infante* 30/08/03. VIT 31367.
Evinayong (Centro-Sur), Bicurga, río Laña, 2 km S of the village. 1°34.15'N, 10°27.7'0E. 660 m. Riparian forest, on the edge of the river. *Heras and Infante* 30/08/03. VIT 31403.
Nsoc (Wele-Nzás), inselberg near Asoc. 1°27.09'N, 11°19.54'E. 662 m. Shrubby fringe on the N end, with *Euphorbia letestui* and *Afrotrilepis pilosa*. On mossy soil under the shrubs. *Infante and Heras* 22/08/03. VIT 31076.

Ecology. Humicolous on mossy floor in submontane primary forests and shrubby fringe of inselberg, or riparian forest. Between 662 and 1.100 m in altitude. Accompanying species: *Bazzania decrescens* subsp. *molleri*, *B. nitida*, *Lepidozia succida, Riccardia* sp. and *Plagiochila* sp. Fertile, with capsules.

Distribution. West Africa: Spreading from Sierra Leona and Ghana to Gabon, including the islands of Bioko and São Tomé. Rest of Africa: in the Eastern mountains Ethiopia, Kenya, Burundi, Malawi, Tanzania, Rwanda, Uganda, Zaire, Zimbabwe and Zambia), South Africa, Madagascar and Eastern islands.

In Equatorial Guinea, it was previously known from Bioko (Infante *et al.* 1997) and Monte Alén in Río Muni (Infante and Heras 1998). The new localities expand its distribution to the East in the interior of the country.

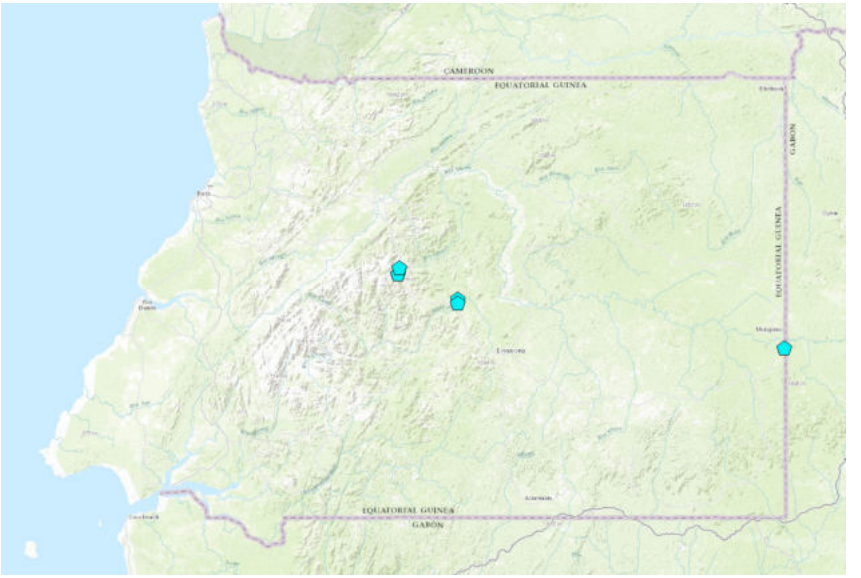

Figure 6. Distribution in Río Muni of *Telaranea nematodes* (Gottsche ex Austin) M.Howe.

METZGERIACEAE

Metzgeria furcata (L.) Dumort.

Evinayong (Centro-Sur), Monte Alén, mount Ekon summit. 1°39'N, 10°17'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. Corticolous on trunk. *Infante and Heras* 14/08/03. VIT 30836.

Nsoc (Wele-Nzás), inselberg near Dumu. 1°21'N, 11°19'E. 650 m. Primary forest at the base of the inselberg. Saxicolous on shaded rocks. *Heras and Infante* 23/08/03. VIT 31141.

Ecology: In primary forests from 650 to 1100 m in altitude.

Distribution. West Africa: from Sierra Leona to Cameroon, including the islands of the Gulf of Guinea (Annobón, São Tomé, Bioko). Rest of Africa: Angola, D.R. Congo, Ethiopia, Burundi, Uganda, Kenya, Tanzania, Malawi, South Africa; Madagascar and Eastern Indian Islands.

Already known from Bioko (Müller and Pócs 2007), new for Río Muni.

Metzgeria lindbergii Schiffn. (*M. saxbyi* Pearson)
Evinayong (Centro-Sur), Monte Alén, mount Ekon. 1°39.50'N, 10°18.46'E. 780 m. Primary forest on rocky slopes. Corticolus on treelets. *Infante and Heras* 12/08/03. VIT 30701.
Evinayong (Centro-Sur), Monte Alén, mount Ekon summit. 1°39'N, 10°17'E. 1100 m. Submontane primary forest with *Drynaria laurentii*. Epiphyllous. *Infante and Heras* 14/08/03. VIT 30853.
Aconibe (Wele-Nzás), Kukumankoc, Mungum hills. 1°17.6'N, 10°49.0'E. 760 m. Primary forest around an intermittent stream. Corticolous on liane. *Infante and Heras* 29/08/03. VIT 31299.

Ecology: In primary forests from 760 to 1100 m in altitude, corticolous and epiphyllous.

Distribution. West Africa: Ghana, Cameroon, Bioko, Príncipe. Rest of Africa: Uganda, Mozambique, Zimbabwe, Swaziland, South Africa. Also in tropical Asia and South America. New to Río Muni. Already known from Bioko (Arnell 1956).

PORELLACEAE
Porella subdentata (Mitt.) Steph. var. ***subdentata***
Evinayong (Centro-Sur), Bicurga, Inselberg Kem. 1°34.7'N, 10°27.8'E. 780 m. Saxicolous forest on the summit of the inselberg. *Heras and Infante* 30/08/03. VIT 31361.

Ecology. Humi-corticolous on dry dead trunk at 780 m in altitude.

Distribution. West Africa: from Guinea Conakry to Cameroon and Gabon, including the islands Principe and São Tomé. Rest of Africa: Central African Republic, D.R. Congo, Ethiopia, Uganda, Rwanda, Zambia, Kenya, Tanzania, Angola, Malawi, Zimbabwe.
New to Río Muni, already known from Bioko (Müller 1996).

DISCUSSION

The new identifications have resulted in range extensions of 19 species, including six new species records of Equatorial Guinea and seven new to the Muni region. In all, the number of species known from Río Muni increases from 181 to 194 (120 liverworts and 74 mosses).

Although the knowledge on the Río Muni bryoflora is still very incomplete, it is notable how that a large number of the recorded species are restricted to the interior plains of the territory (*Frullania eplicata, F. grossiclava, F. rio-janeirensis, Caudalejeunea lehmanniana, C. yangambiensis, Porella subdentata*).

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