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Cryptogams of the Reserva Biológica San Francisco (Province Zamora-Chinchipe, Southern Ecuador) II. Lichens

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Abstract – In a first inventory of the lichen flora of the Reserva Biológica San Francisco (1800-3150 m) in the Andes of Southern Ecuador we report 214 species of which 55 are new records for the country. Apparently four species are new to science. About 55% of the species are widespread in the tropics (21% neotropical and 34% pantropical), 14,5% have a temperate origin and 5% are restricted to the Andes. Endemism with only 2% is low. A preliminary list with data on the biogeography, habitats and substrates of the species is provided.

Lichens / Ecuador / Neotropics / phytogeography / tropical montane region

Resumen – En un primer inventario de la flora liquénica en la Reserva Biológica San Francisco (1800-3150 m), en los Andes al Sur de Ecuador, registramos 214 especies, de las cuales 55 son nuevas citas para el país. Aparentemente hay cuatro especies nuevas para la ciencia. Un 55% de las especies están ampliamente distribuídas en los trópicos (21% neotropicales y 34% pantropicales), 14,5% tienen un origen templado y 5% están restringidas a los Andes. El endemismo, solo un 2%, es bajo. Presentamos una lista preliminar de las especies con datos biogeográficos, de hábitats y substratos.

Líquenes / Ecuador / Neotropico / fitogeografía / región montano tropical

INTRODUCTION

The northern Andes, extending from Venezuela to northern Peru, are considered to be one of the world´s most species rich areas (Barthlott *et al.*, 1996; Myers *et al.*, 2000). Cryptogamic plants including lichens are a conspicuous feature

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of its mountain forests and paramo habitas. For the northern Andes over 2000 species of lichens have been estimated (Sipman, 2002).

The lichen flora of Ecuador is still very imperfectly known. Floristic investigations on lichens of mainland Ecuador were published by Krempelhuber (1861), Müller-Argoviensis (1879), Zahlbruckner (1905) and Arvidsson (1986, 1991). Weber (1986) and Hendrickson & Weber (1994) studied the lichen flora of the Galapagos islands. In addition, specimens collected in Ecuador are occasionally cited in monographs and revisions (see Arvidsson, 1991). Taxonomic treatments including a considerable amount of Ecuadorean material are e. g. by Nash *et al.* (1987), Galloway & Arvidsson (1990), Yoshimura & Arvidsson (1994), Diederich (1995), Bjerke (2002) and Jørgensen & Arvidsson (2002). In the internet Sipman (1997) provided a key to the Ecuadorian Cladoniaceae and Feurer (2001a, b) a checklist and an overview of publications referring to Ecuadorian species. In view of the increasing anthropogenic disturbance of the mountain forests of Ecuador, an inventory of the lichens of this region is becoming more and more urgent.

In a series of publications dealing with the cryptogamic flora of the Reserva Biológica San Francisco in southern Ecuador (Nöske *et al.*, 2003), this paper presents a preliminary survey of the lichen flora of the area. The study was carried out within the framework of the multidisciplinary DFG-project "Functionality in a tropical mountain forest: diversity, dynamic processes and use-potential under ecosystem aspects".

MATERIAL AND METHODS

The study site is the 1000 hectare comprising Reserva Biológica San Francisco (1800-3150 m), Province Zamora-Chinchipe, southern Ecuador. For a description of its location, geology, soils and vegetation see Nöske *et al.*, 2003. Fieldwork in the reserve has been carried out in 2001 and 2002. An inventory of the lichen flora was conducted at all elevations between 1800 to 3150 m, with special attention to epiphytic lichens of the lower montane forest belt.

RESULTS AND DISCUSSION

In a first study of the lichen flora of the Reserva Biológica San Francisco 214 species have been recorded including 55 species new to Ecuador (Appendix 1, Table 1). The majority of the species (166) are from the lower montane belt, the area of main focus of investigation. 60 species are from the upper montane and paramo belt.

The majority of the species are foliose lichens (42%) followed by crustose (32%), fruticose (22%) and squamulose species (4%).

The Parmeliaceae dominate the known flora with 39 species. Further well-represented groups are Cladoniaceae (24 spp.), Physciaceae (21 spp.), Lobariaceae (14 spp.), Collemataceae (10 spp.) and Graphidaceae (9 spp). The most speciose genera are *Cladonia* (19 spp.), *Heterodermia* (14 spp.),

APPENDIX 1

List of Lichen species recorded from the Reserva Biológica San Francisco

Localities (Loc.): I = montane forest (1800-2150 m), II = upper montane forest (2150-2650 m), III = subalpine dwarfforest and páramo (2650-3150 m), IV = old field (former pasture), open vegetation (1900 m).

Habitat (Hab.): b = bark, s = soil, r = rock.

Geographical distribution (Distr.): A = Andean, cA = Central Andean, mostly restricted to Ecuador and Peru, C = Central American and/or Carribbean, E = endemic to Ecuador, N = Neotropical, nA = northern Andean (Costa Rica to northern Peru), T = wide Temperate, nT = northern Temperate, sT = southern Temperate, W = widetropical (= pantropical, sometimes extended to oceanic areas of the temperate zones).

Selected vouchers: Nö = leg. N. M. NÖSKE & H. J. M. SIPMAN, Fr = A. FRISCH, He = E. HERTEL, Kü = H. KÜRSCHNER, Ri = M. RICHTER; Up to 4 vouchers per species cited; existence of additional vouchers indicated by an asterisk. Specimens are deposited in the herbaria LOJA and QCA, with duplicates in B.

The generic division of the Graphidaceae follows Staiger (2002).

	Loc	*Hab*	*Distr*	*Selected vouchers*
Acanthothecis hololeucoides (Nyl.) Staiger & Kalb	IV	b	N	Fr 96/Eq936
Anzia americana Yoshim. & Sharp	II	b	N	Nö 216
Anzia leucobates (Nyl.) Müll. Arg.	II	b	nA	Nö 1, 2, 3008
Anzia parasitica (Fée) Zahlbr.	II	b	nA	Nö 2075
Arthonia cinnabarina (DC.) Wallr.	IV	b	W	Nö 170, 255
Arthonia cf. *ilicina* Taylor	I	b	–	Nö 251
Arthonia sp.	IV	b	–	Nö 1205
Bacidia sp.	IV	b	–	Nö 248
Brigantiaea leucoxantha (Spreng.) R. Sant. & Hafellner	I, IV	b	W	Nö 211, 224, 249, 1116*
Buellia leptocline A. Massal.	I	r	nT	Nö 218
Buellia sp.	I	b	–	Nö 1149
Bulbothrix goebelii (Zenk.) Hale	I, IV	b	W	Nö 1168, 1395, 3019, 3020*
Bulbothrix suffixa (Stirt.) Hale	I	b	W	Nö 2296, 2298, 2999, 3009*
Bunodophoron melanocarpum (Sw.) Wedin	II	b	W	Nö 3, 108, 2076
Candelariella sp.	I, IV	b	–	Nö 4, 5
Canoparmelia sp.	IV	r	–	Fr 96/Eq844
cf. *Catillaria* sp.	I	b	–	Nö 208
Chrysothrix chlorina (Ach.) Laundon	IV	r	T	Nö 230
Chrysothrix xanthina (Vain.) Kalb	IV	r	W	Nö 6, 984
Cladia aggregata (Sw.) Nyl.	II, III	s	W	Nö 7, 147
Cladina arbuscula ssp. bolivana (Ahti) Ahti	II	s	A	Nö 138, 154, 159
Cladina arcuata (Ahti) Ahti & Follm.	II	s	A	Nö 139, 143, 153, 158*
Cladina confusa f. *bicolor* (Mull. Arg.) Ahti	II	s	W	Nö 11, 146, 148, 160*
Cladina sp. nov.	II	s	E	Nö 144, 152
Cladonia andesita Vain.	III	s	W	Nö 140
Cladonia calycantha Delise ex Nyl.	II, III	s	cA	Nö 9, 141, 2110
Cladonia ceratophylla (Sw.) Spreng.	I	s	W	Nö 10, 191
Cladonia coccifera (L.) Willd.	II	s	T	Nö 156
Cladonia crispata (Ach.) Flot.	II	s	T	Nö 150, 151
Cladonia dactylota Tuck.	II	s	W	Nö 19
Cladonia didyma (Fée) Vain.	II	s	W	Nö 14, 16, 20
Cladonia granulosa (Vain.) Ahti	I	s	N	Nö 13

	Loc	*Hab*	*Distr*	*Selected vouchers*
Cladonia microscypha Ahti & S. Stenroos	II	s	nA	Nö 156
Cladonia lopezii S. Stenroos	II	s	N	Nö 21, 22
Cladonia novochlorophaea (Sipman) Brodo & Ahti	II	s	T	Nö 156
Cladonia pyxidata (L.) Hoffm.	I, II	b	T	Nö 8, 25, 26
Cladonia ramulosa (Withering) J. R. Laundon	I	r	T	Nö 23
Cladonia rappii A. Evans	I	s	W	Nö 24
Cladonia signata (Eschw.) Vain.	II	s	N	Nö 15, 155
Cladonia sphacelata Vain.	II	s	N	Nö 157
Cladonia squamosa Hoffm.	I	s	T	Nö 18
Cladonia subradiata (Vain.) Sandst.	I, IV	b	W	Nö 303, 311, 1619, 1623*
Cladonia subsquamosa Kremp.	I	b	W	Nö 17, 195, 2185
Coccocarpia domingensis Vain.	I, IV	b	N	Nö 1280, 2161, 3015, 3021*
Coccarpia erythroxyli (Spreng.) Swinscow & Krog	I, IV	b	T	Nö 28, 1151, 2131, 3013*
Coccocarpia palmicola (Spreng.) L. Arvidss. & D. J. Galloway	I, IV	b	W	Nö 223, 326, 535, 3018*
Coccocarpia pellita (Ach.) Müll. Arg.	I, IV	b	W	Nö 318, 327, 1816, 3042,*
Coccocarpia stellata Tuck.	I	b	W	Nö 3043
Coenogonium linkii Ehrenb.	I	b	W	Nö 29, 30, 242
Coenogonium sp.	I	b	–	Nö 187
Collema sp.	IV	b	–	He H13
Cryptothecia rubrocincta (Ehrenb.) Thor	I, II, IV	b	W	Nö 33, 355, 394, 461*
Cryptothecia sp. A	I	b	–	Nö 3006, 3032
Cryptothecia sp. B	I	b	–	Nö 213
Dibaeis columbiana (Vain.) Kalb & Gierl	III	s	N	Nö 35
Dibaeis fungoides (Sw.) Kalb & Gierl	III, IV	s, r	N	Nö 34, 2099
Dibaeis holstii (Müll. Arg.) Kalb & Gierl	III, IV	s, r	W	Nö 36, 2104
Dichosporidium nigrocinctum (Ehrenb.) Thor.	II, IV	b	N	Nö 237, 2084
Dictyonema glabratum (Spreng) D. L. Hawksw.	I, IV	b, s	N	Nö 38, 1201, 1480, 2279*
Dictyonema sericeum Johow	I, II	b	W	Nö 40, 41, 2073
Dictyonema zahlbruckneri (Schiffner) Marcano	II	b	N	Nö 42
Diploschistes muscorum (Scop.) R. Sant.	I	s	T	Nö 43
Dirinaria picta (Swartz) Clements & Shear	IV	b	W	Nö 1521
Erioderma mollissimum (Samp.) DR.	IV	b	W	Nö 244
Erioderma verruculosum Vain.	I, IV	b	N	Nö 174, 1299, 1372, 1396*
Everniastrum cirrhatum (Fr.) Hale ex Sipman	III	b	W	Ri 3000 m
Everniastrum vexans Hale	II	b	W	Nö 45, 47, 236, 2097*
Glyphis cicatricosa Ach.	IV	b	W	Nö 2500, 3016
Graphis cf. *acharii* Fée	IV	b	–	Kü 534/3-1
Graphis elegans (Sm.) Ach.	IV	b	W	Kü 534/3-1
Graphis subcinerea ad int.	IV	b	W	Nö 228, 266
Gyalidea hyalinescens (Nyl.) Vezda	IV	r	T	Fr 96/Eq, 910, 912
Haematomma collatum (Stirt.) Dodge	I, II, IV	b	W	Fr 96/Eq933; Nö 961
Hemithecium oryzaeforme (Fée) Staiger	I	b	N	Nö 345
Heterodermia barbifera K. P. Singh	I, IV	b	W	Nö 49, 3017
Heterodermia casarettiana (A. Massal.) Trevis.	IV	b	W	Nö 166, 259, 520, 1719*
Heterodermia circinalis (Zahlbr.) W.A. Weber	III	b	N	Ri 3000 m
Heterodermia corallophora (Taylor) Skorepa	I, IV	b	N	Nö 521, 1288, 1919, 3040*
Heterodermia flabellata (Fée) Awas.	I	b	W	Nö 51, 171, 1610, 2255*
Heterodermia galactophylla (Tuck.) W. Culb.	IV	r	W	Fr 96/Eq845d
Heterodermia isidiophora (Vain.) Awas.	IV	b	W	Nö 3041
Heterodermia japonica (Sato) Swinscow & Krog	I, IV	b	W	Fr 96/Eq908; Nö 479
Heterodermia leucomela (L.) Poelt	I	b	W	Nö 53, 55, 1301, 2041*
Heterodermia lutescens (Kurok.) Follm. & Redón	I	b	W	Nö 52, 2128, 2239, 3034*
Heterodermia speciosa (Wulfen) Trevis.	IV	b	W	Fr 96/Eq752
Heterodermia squamulosa (Degel.) W. Culb.	I	b	W	Nö 678, 834, 2260

	Loc	*Hab*	*Distr*	*Selected vouchers*
Heterodermia vulgaris (Vain.) Follmann & Redón	I	b	N	Nö 32, 1531
Heterodermia sp. nov.	I	b	E	Nö 50
Hypotrachyna chlorina (Müll. Arg.) Hale	I, IV	b	N	Nö 58, 553, 1226, 1227*
Hypotrachyna costaricensis (Nyl.) Hale	I	b	W	Nö 56
Hypotrachyna croceopustulata (Kurok.) Hale	III	r	N	Nö 2100
Hypotrachyna dactylifera (Vain.) Hale	IV	r	N	Fr 96/Eq658
Hypotrachyna degelii (Hale) Hale	I	r	N	Nö 64
Hypotrachyna everniastroides Sipman	III	b	nA	Nö 2107
Hypotrachyna imbricatula (Zahlbr.) Hale	II	b	W	Nö 61
Hypotrachyna microblasta (Vain.) Hale	I	b	W	Nö 201
Hypotrachyna reducens (Nyl.) Hale	II	b	W	Nö 62, 63
Hypotrachyna rockii (Zahlbr.) Hale	I, IV	b	W	Nö 258, 260, 552, 2049*
Hypotrachyna sp. nov.	I	b	E	Nö 59
Hypotrachyna sp.	I	b, s	–	Nö 57, 60
Icmadophila adversum (Nyl.) Rambold & Hertel	III	s	N	Nö 65, 2109
Lecanactis epileuca (Nyl.) Tehler	I	b	N	Nö 210
Lecanora sp.	I	b	–	Nö 179, 212, 220, 247*
Leioderma glabrum	I	b	N	Nö 44
Leioderma sorediatum D. J. Galloway & P. M. Jørg.	I	s	W	Nö 3044
Lepraria cf. *umbricola* Tønsberg	I	b	–	Nö 66
Lepraria sp.	II	b	–	Nö 2079
Leprocaulon arbuscula (Nyl.) Nyl.	I	b	W	Nö 67, 68
Leptogium cochleatum (Dickson) P. M. Jørg	I	b	W	Nö 1293
Leptogium coralloideum (Meyen & Flot.) Vain.	I	b	W	Nö 602, 3001
Leptogium cyanescens (Rabenh.) Körb.	I, IV	b	W	Nö 1540, 1557, 1715, 1865*
Leptogium diaphanum (Sw.) Nyl.	IV	r	N	Nö 70, 1580
Leptogium digitatum (Massal.) Zahlbr.	I	b	W	Nö 3002
Leptogium laceroides De Lesd.	I, IV	b, r	T	Fr 96/Eq920; Nö 606, 1539, 1548
Leptogium olivaceum (Hook.) Zahlbr.	IV	b	N	Nö 73, 74, 1415
Leptogium phyllocarpum (Pers.) Mont.	I, IV	b	W	Nö 69, 75, 597, 607*
Leptogium vesiculosum (Sw.) Malme	IV	b	W	Nö 71
Lobaria subdissecta (Nyl.) Vain.	I, IV	b	N	Nö 78, 624, 1289, 1859*
Lobariella crenulata (Hook. in Kunth) Yoshim.	I, IV	b	N	Nö 188, 626, 1352, 1936*
Lobariella exornata (Zahlbr.) Yoshim.	I	b	N	Nö 621, 623, 1452
Lobariella pallida (Hook.) Yoshim.	IV	b	N	Nö 72
Lobariella subexornata (Yoshim.) Yoshim.	I	b	N	Nö 261, 620, 622
Lopezaria versicolor (Fée) Kalb & Haffelner	IV	b	N	Nö 253
Malcolmiella sp.	IV	b		He I1
Megaloblastenia marginiflexa var. *dimota* (Malme) Sipman	IV	b	N	Fr 96/Eq747
Megalospora admixta (Nyl.) Sipman	IV	b	N	Fr 96/Eq905a
Megalospora sulphurata var. *nigricans* (Müll. Arg.) Riddle	I, IV	b	W	Nö 88, 89, 654, 2068*
Megalospora tuberculosa (Fée) Sipman	II	b	W	Nö 80, 658
Megalospora sp. nov.	II	b	E	Nö 207
Melaspilea diplasiospora (Nyl.(Müll. Arg.	I, IV	b	W	Nö 263, 264, 265
Menegazzia terebrata (Hoffm.) Massal.	II	b	T	Nö 231, 2071, 2072
Micarea sp.	IV	b, r	–	Fr 96/Eq917; Nö 182, 208
Myriotrema hartii (Müll. Arg.) Hale	I	b	W	Nö 81, 205, 221, 222
Myriotrema sp.	I	b	–	Nö 169, 173
Normandina pulchella (Borrer) Nyl.	I, IV	b	T	Nö 1995, 3011, 3046, 3047*
Ocellularia amplior (Nyl.) Redgr.	I	b	N	Nö 82, 215
Ocellularia sp. A	I	b	–	Nö 87
Ocellularia sp. B	I	b	–	Nö 176
Ochrolechia sp.	IV	b	–	Nö 225
Opegrapha sp.	IV	b	–	Nö 3045

	Loc	*Hab*	*Distr*	*Selected vouchers*
Oropogon sp.	II	b	–	Nö 236, 237
Pannaria rubiginosa (Ach.) Bory	I	b	T	Nö 214
Pannaria tavaresii P. M. Jørg.	I	b	W	Nö 189
Pannaria sp.	I	b	–	Nö 83
Parmeliella pannosa (Sw.) Müll. Arg.	I, II, IV	b, r	W	Fr 96/Eq857; Nö 84, 90, 23
Parmelinopsis minarum (Vain.) Elix & Hale	I	b	T	Nö 3031
Parmelinopsis horrescens (T. Tayl.) Elix & Hale	I	b	T	Nö 2240
Parmotrema conformatum (Vain.) Hale	IV	s	N	Fr 96/Eq659, 96/Eq919
Parmotrema cf. *eciliatum* (Nyl.) Hale	II	b	–	Nö 86
Parmotrema mellissii (C. W. Dodge) Hale	IV	r	W	Fr 96/Eq660
Parmotrema overeemii (Zahlbr.) Elix	II	b	W	Ri s.n. 2200m
Parmotrema cf. *robustum* (Degel.) Hale	I	b	–	Nö 702
Parmotrema viridiflavum (Hale) Hale	IV	b	C	Fr 96/Eq907
Peltigera dolichoriza (Nyl.) Nyl.	I, IV	s	sT	Nö 92, 93, 2098
Peltigera laciniata (Merr. ex Riddle) Gyeln.	IV	s	N	Nö 91, 137
Pertusaria velata Nyl.	I	b	T	Nö 95, 268
Pertusaria sp. A	I	b	–	Nö 183, 238
Pertusaria sp. B	II	b	–	Nö 2081
Phaeographis scalpturata (Ach.) Staiger	I	b	N	Nö 344
Phaeophyscia hispidula (Ach.) Moberg	IV	b	W	Nö 3045
Phlyctella andensis (Nyl.) Nyl.	IV	b	W	Nö 1138
Phyllobaeis erythrella (Mont.) Kalb	IV	s	nA	Nö 37
Phyllobaeis imbricata (Hook.) Kalb & Gierl	III	s	nA	Nö 3005
Phyllopsora sp. A	I, II	b	–	Nö 97, 2078
Phyllopsora sp. B	IV	b	–	Nö 3048
Phyllopsora sp. C	I	b	–	Nö 192, 2231
Physcia erumpens Moberg	IV	b	N	Nö 1823
Physcia integrata Nyl.	IV	b	W	Nö 1804
Platygramme caesiopruinosa (Fée) Fée	I, IV	b	W	Nö 270, 1156, 2059
*Platythecium grammitis (*Fée) Staiger	I	b	N	Nö 96
Polychidium dendriscum (Nyl.) Henssen	I	b	T	Nö 1668, 3030
Polymeridium sp.	I, IV	b	–	Nö 197, 252, 254
Porina sp.	I	b	–	Nö 98, 740
Pseudocyphellaria arvidssonii D. Gallow.	I, IV	b	cA	Nö 101, 741, 1171, 1357*
Pseudocyphellaria aurata (Ach.) Vainio	IV	b	T	Nö 100, 1881, 1944, 1981*
Pseudocyphellaria crocata (L.) Vain.	I	b	T	Nö 749, 1678
Pseudoparmelia sp.	I	b	–	Nö 209
Psilolechia lucida (Ach.) M. Choisy	IV	r	T	Nö 103
Punctelia columbiana Sérus.	IV	b	N	Nö 1203, 1239, 1737
Pyrenula dermatodes (Borrer) Schaer.	I	b	nT	Nö 204, 256
Pyrenula sp. A	I	b	–	Nö 185
Pyrenula sp. B	I	b	–	Nö 104
Pyxine eschweileri (Tuck.) Vain.	IV	b	N	Nö 3003, 3013
Ramalina sp. A	IV	b	–	Nö 243, 1190, 1926, 2009
Ramalina sp. B	IV	b	–	Nö 244
Rhizocarpon sp.	IV	r	–	Fr 96/Eq918
Rimelia cetrata (Ach.) Hale & A. Fletcher	I, IV	b	W	Nö 670, 709, 1387, 1567*
Rimelia reticulata (T. Taylor) Hale & Fletcher	I, IV	b	W	Nö 715, 724, 1236, 1731*
Rimelia subisidiosa (Müll. Arg.) Hale	I, IV	b	W	Nö 257, 711, 1739, 1821*
Siphula fastigiata (Nyl.) Nyl.	II, III	s	N	Nö 2108
Siphula sp.	II, III	s	–	Nö 105, 106, 107, 3033
Stereocaulon ramulosum (Sw.) Räusch.	I, III, IV	s	T	Nö 110, 230
Stereocaulon tomentosum Th. Fr.	IV	r	T	Nö 109
Sticta fuliginosa (Dicks.) Ach.	I	b	T	Nö 117, 832, 845, 1422*
Sticta. humboldtii Hook.	I, IV	b	nA	Nö 245, 608, 1305, 1318*

	Loc	*Hab*	*Distr*	*Selected vouchers*
Sticta laciniata Ach.	I	b	N	Nö 112, 114, 190, 849*
Sticta tomentosa (Sw.) Ach.	I	b	W	Nö 115, 226
Sticta weigelii (Isert) Ach.	I	b	T	Nö 116, 811, 813, 1626*
Sticta sp.	I	b	–	Nö 634, 856, 857
Syncesia sp.	I	b	–	Nö 118
Teloschistes flavicans (Sw.) Norm.	I, II, IV	b	W	Nö 3004, 3012
Tephromela atra (Huds.) Haf. s.l.	I, II, IV	b	T	Nö 122, 123, 233, 863*
Trapelia coarcata (Sm. & Sow.) M. Choisy	III	r	T	Nö 2103
Trapeliopsis granulosa (Hoffm.) Lumbsch	III	r	T	Nö 124
Trypetheliaceae sp. A	I	b	–	Nö 126
Trypetheliaceae sp. B	I	b	–	Nö 121, 125
Trypetheliaceae sp. C	I	b	–	Nö 194
Usnea angulata Ach.	I	b	T	Nö 133
Usnea ramillosa Mot.	II	b	N	Nö 127
Usnea rubicunda Stirt.	II	b	T	Nö 132
Usnea strigosa (Ach.) A. Eaton	II	b	T	Nö 130
Usnea sp. A	II	b	–	Nö 129, 230
Usnea sp. B	I	b	–	Nö 135
Usnea sp. C	II	b	–	Nö 236

Table 1. Lichen species new to Ecuador.

Acanthothecis hololeucoides	Icmadophila aversum
Anzia americana	Lecanactis epileuca
Arthonia cinnabarina	Leprocaulon arbuscula
Buellia leptocline	Leptogium cochleatum
Bulbothrix suffixa	Leptogium coralloideum
Chysothrix chlorina	Lopezaria versicolor
Chrysothrix xanthina	Megalospora sp. nov.
Cryptothecia rubrocincta	Melaspilea diplasiospora
Cladina sp. nov.	Menegazzia terebrata
Cladonia novochlorophea	Myriotrema hartii
Cladonia pyxidata	Ocellularia amplior
Cladonia ramulosa	Parmelinopsis minarum
Cladonia sphacelata	Parmotrema overeemii
Coenogonium linkii	Parmotrema robustum
Dictyonema zahlbruchneri	Pertusaria velata
Dirinaria picta	Phaeographis scalpturata
Erioderma mollissimum	Platygramme caesiopruinosa
Graphis elegans	Platythecium grammitis
Graphis subcinerea	Phlyctella andensis
Gyalidea hyalinescens	Punctelia columbiana
Haematomma collatum	Pyrenula dermatodes
Hemithecium oryzaeforme	Rimelia cetrata
Heterodermia diademata	Rimelia subisidiosa
Heterodermia squamulosa	Sticta laciniata
Heterodermia sp. nov.	Usnea angulata
Hypotrachyna croceopustulatum	Usnea ramillosa
Hypotrachyna everniastroides	Usnea strigosa
Hypotrachyna sp. nov.	

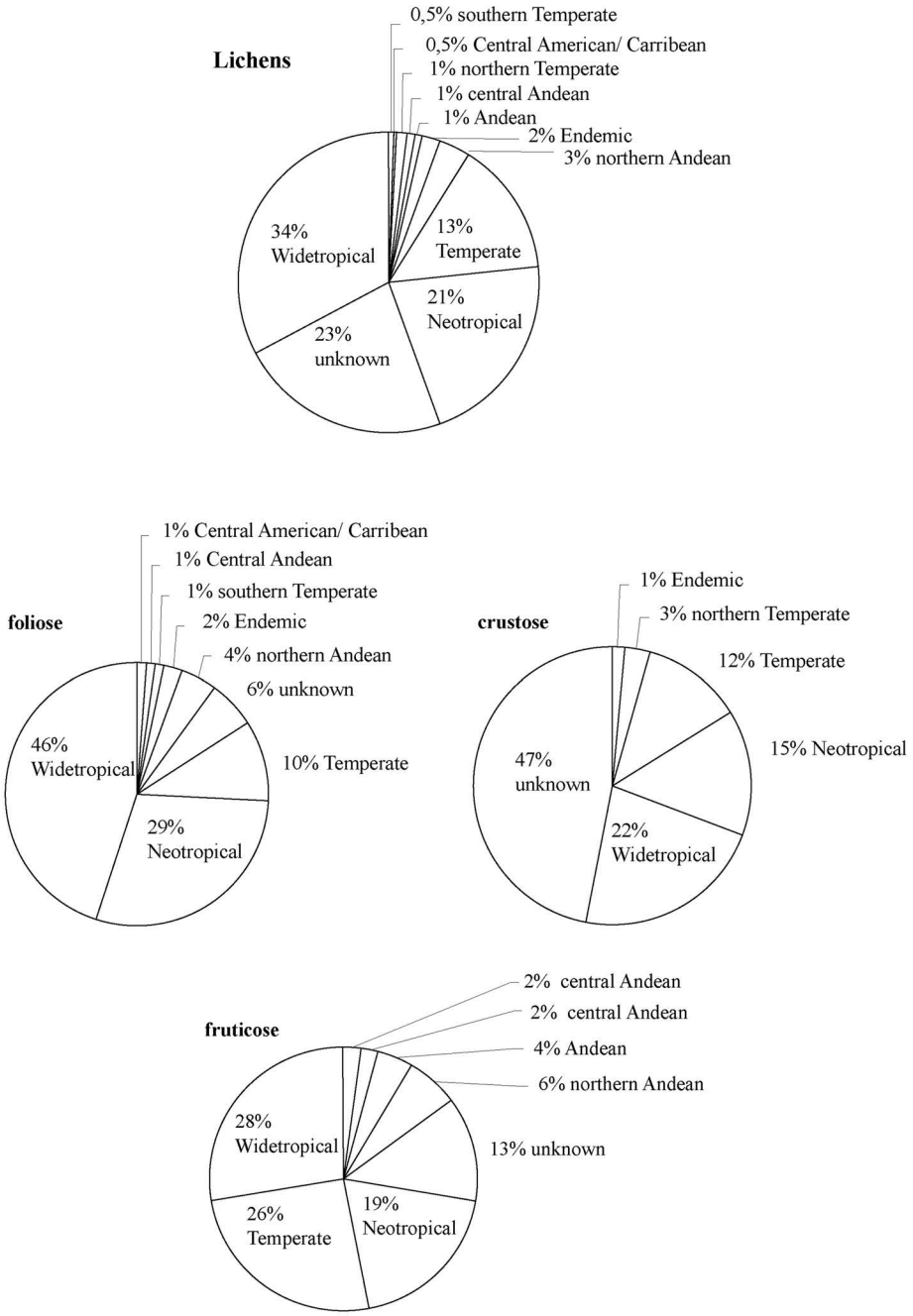

Fig. 1. Phytogeographical elements of the Reserva Biológica San Francisco.

Hypotrachyna (12 spp.) and *Leptogium* (9 spp.). It should be kept in mind that this concerns better known macrolichen groups, of which the available samples have been studied more intensely. Identification of about one fourth of the species was not possible due to lack of adequate taxonomy. Most of the unidentified species are crustose lichens (Fig. 1). Further study of microlichen groups will certainly raise the species numbers for e.g. Graphidaceae, Pertusariaceae or Thelotremataceae. The phytogeographical analysis of the listed species shows that 55% are widespread neotropical or pantropical ones, 14,5% have a temperate origin and 5% are restricted to the Andes (Fig. 1).

Endemism with 2% is low and includes four probably undescribed species: a new species of *Heterodermia* and of *Hypotrachyna* from the montane forest and of *Cladina* and *Megalospora* from the upper montane forest.

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