ON THE HABITATS AND FREQUENCIES OF SOME MADEIRA BRYOPHYES

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These notes on the habitats and frequencies of some Madeira bryophytes apply only to the southern side of the island up to 4500 ft (circa 1390 m.). The data were obtained from January to March, 1909.

GEOGRAPHY AND GEOLOGY

Madeira, one of the Atlantic Islands, lies 320 miles (circa 530 km.) off the coast of Africa; Funchal, on the south, is situated in lat. 32° 37' N., and long. 17° W. The island is about thirty miles long and twelve broad (50 x 20 km.), and is the top of a huge volcanic mountain rising from the bed of the ocean which here attains a depth of 13,000 ft (3,900 m.). The gradient is extremely steep everywhere, the island rising as one mountain block, culminating in a number of peaks from 5000 to 6000 ft (circa 1540-1840 m.) high at a distance of only six miles from the sea.

The island is chiefly composed of a dark coloured basalt. Where the rock decomposes, forming the mountain soil, it is called "escola." The rock sections on the lofty sea-cliffs, some of them reaching 1800 ft sheer out of the sea, are well seen from the small steamers plying from one port to another. An almost destitute arrangement of volcanic rocks is shown, coloured red, yellow, brown and purple. The rocks are seen throughout with narrow vertical dykes of grey igneous material. The soil on the lower slopes of the island and on the volcanic hills near the coast is a very fertile tufa, called "Pedra molle." It is red, yellow, or deep crimson in colour and is particularly suitable for vine culture.

CLIMATIC AND EDAPHIC FACTORS.

The mountain sides are screened with precipitous ravines. The mean annual rainfall is 30 inches (circa 75 cm.), most of it falling in the winter months and owing to the steepness, much of the disintegrating rock and soil is yearly washed into the sea. After a few hours of heavy rain the sea is coloured red for some distance out from Funchal roadstead.

The mean winter temperature is 60° F. (circa 16° C.).

The north and south sides of the island differ considerably in climate. Clouds laden with moisture roll up from the sea on the north and condense on the mountain tops, producing much rain on the north side. Here the population is scanty, and the vegetation is more in the primeval condition which obtained throughout the uninhabited island when it was discovered by Portuguese navigators in 1419. They named it "Madeira," Portuguese for "wood," from its forest-clad aspect. In the steep northern ravines some of the ancient indigenous forest remains, Hollies, Junipers and several trees of the Laurel type. On the south the Portuguese colonists cleared and burnt it, replanting with Oak and Sweet Chestnut. Almost all these trees have been cut down for fuel and timber work, and now on every available mountain slope the quick-growing maritime Pine (Pinus pinea) is planted to supply the needs of the thickly populated south side.

During winter the rain-clouds and mists constantly roll down from the mountain tops (where snow lies for a couple of months) on to the south side, veiling the summits above 1000 ft and rendering impossible the investigation of the northern side, as the passes are very high.

BRYOPHYTIC COMMUNITIES.

The distribution of the Bryophyta will be considered under the following zonal divisions:

I. Sea-level to 1500 ft (450 m.). There are very few bryophytes in this zone; owing to the dryness of the soil and the elaborate cultivation, every yard of land that can be is terraced and cropped with food plants; but shady walls carry a few species.

II. 1500–3000 ft (450-900 m.). Here we have wayside and woodland species along the paths and tracks leading up to the higher region and in the aforesaid areas.

III. The Ravines (Ribeiras), 1000 to 4000 ft (310-1230 m.). Here are found some of the most interesting rock and stream-bed species, but owing to the extremely precipitous character of the sides of the ravines, the absence of tracks, and the difficulty of climbing about in them, much of these narrow gorges is inaccessible.

IV. Open mountains, 2000–4500 ft (620-1390 m.). The turf and rock-growing species of open drier country are met with here, also epiphytes on trees and shrubs.

In studying the following lists it will be observed that a very large proportion both of the mosses and of the liverworts are found in the fruiting condition in Madeira, this is indicated by "c. fr." after the name in mosses and "c. per." in liverworts. The usual frequency symbols are used: a.—abundant, f.—frequent, o.—occasional, r.—rare, v.r.—very rare. An asterisk preceding the name of a moss or hepatic at its first mention indicates that it had not been recorded for Madeira previously.
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(b). In damp places by the Levadas (concreted aqueducts, bringing water for irrigation from high mountain springs).

Mosses:
Philonitis rigida c. fr. f.
Bryum pseudo-triquetrum f.

(c). On open ground and bare earth and banks.

Mosses:

Trichostomum montanum c. fr. f.
Webera Tozerii c. fr. f.
Pogonatum aulodes c. fr. f.
Weasian viridula c. fr. f.
Bryum argenteum o.
B. alpinum v. meridionale o.
Pogonatum nanum c. fr. f.
Pogonatum pumile c. fr. o.

Heptacos:

Aplectania evanulta c. per. o.
Diplophyllum alboaxons c. per. o.
Ancistrocerus dichotomous c. per. o.
Cephalozia bicuspidata r.

III. Rivers (1000-4000 feet).

(a). On the drier rocks.

Mosses:

Ptychodium nigricans c. fr. f.
Bartramia stricta c. fr. a.
Philonitis rigidula c. fr. a.
Ptychodium polyphyllum c. fr. f.
Anomobryum juliforme c. fr. f.
Bryum platyphyllum c. fr. f.
Anoectangium compactum o.
Amphionium curvipes c. fr. o.
Webera Tozerii c. fr. o.

Heptacos:

Targionia hypophylla c. per. a.
Plagiochasma rupestre c. per. f.
Fruhstia polyactica f.
Corinae marchantoides c. per. o.

(b). On the wetter rocks and on stones in the streams.

Mosses:

Fissidens taxifolius f.
Buellia verticillata v. angustifolia o.
Webera Tozerii c. fr. o.
Bryum esamienese c. fr. o.
B. geminatum o.
Hepatics:
Racomitrium angulare c. per. f. 
Antroceros dichotomus c. per. f.
*Rhabdodes semiannulata c. per. f.
*Rhabdodes semiannulata c. per. f.

IV. Open mountains (2000-4500 feet).

(a). On the open turfly stretches.
Mosses:
Racomitrium heterocistum c. fr. a.
Bryum alpinum v. meridionale a.

(b). On mountain rocks and bare open ground.
Mosses:
Grimmia trichiophylla o.
G. azoricola a.

Hepatics:
Aplezia crenulata c. per. o.

(c). Epiphytes.
Mosses; on Lauris Canariensis:

Pterosiphonia polypodifolia c. fr. o.
Ulota calvescens c. fr. o.

On bushes of Vaccinium macrocarpum 3-4 feet high.

Hepatics: on Quercus pubescens, Radula Lindbergii r; on Vaccinium macrocarpum, Frullania germanica v. r.; this rare species is known only from the British Isles and the Faroe Islands. In (1) this plant was named F. Tenerifae.

The thick-tissued frondose hepatic genera, Carinia, Turgonia, Phyllocladium, and dry, tufted mosses such as Grimmia, Racomitrium, Pterosiphonia, and some Trichostomata, are the dwellers on arid rock; on the open uplands the grey cushions of Racomitrium heterocistum are very striking from the excessive development of the long white hair-point of the leaves, useful in checking transpiration: Hymenostegium and several Brya are found on the moist shaded rocks in ravines; Bartramia stricta and Turgonia hypophylla were found on dry basaltic rocks in close proximity, just as in this country they grow together (in Rhiannonshire for instance) in like conditions; the epiphytic species are noteworthy on the infrequent arborescent and fruticose vegetation of the higher mountain slopes: while the distribution of the other forms of mosses and of the foliose and some frondose hepatics closely follows that with which we are familiar here, in woodland and wayside habitats.

LITERATURE.

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