REMARKS ON THE BRYOPHYTES OF THE CANARY ISLANDS

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With 5 figures

ABSTRACT. From 1984 onwards, about 15,000 bryophyte collections (UTM grid-based) have been made on the Canary Islands. The collections served in preparing a checklist.

The bryophyte flora of the Canary Islands to date, consists of 449 species, including 140 hepatica and 309 mosses. The checklist reports 40 species (9% of the flora) as new to the Canary Islands (among them, 15 are new to Macaronesia); it excludes 61 species (13%).

Plagiochila dubia Lindenb. et Gott. is confined to dry laurel forests. It was hitherto known from northern South America, the West Indies and the southern United States.

Goniomitrium seroi Cas. de Puig was only known from its type locality in Spain. On the Canary Islands it is widespread in dry localities, as yet ignored by bryologists.

The study of the bryophytes of the Canary Islands contributes to the taxonomy of Macaronesian and European bryophytes. Grid-based collecting guarantees a representative collection which allows the preparation of distribution maps and a flora.

This paper reports on the state of knowledge of the bryophyte flora of the Canary Islands. The account is based on numerous field trips, taxonomical research, and the study of literature. Since 1990 there has been cooperation with the University of La Laguna (Tenerife, Canary Islands).

In 1984 I started collecting and studying the bryophytes of the Canary Islands. First on the classical sites of northern Tenerife: such as Monte de las Mercedes, Pico del Inglés, Vueltas de Taganana, Aguamansa, and the like. In 1985 collecting was made UTM grid-based. A UTM grid square measures 5 X 5 km^2. The grid is indicated on the Spanish military maps. Since 1988 the collecting trips were planned to have all UTM grid squares represented in the collections. The grid-based exploration forces one to collect also in less favorable

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places. For example, the great number of squares in the sun-baked southern parts of the islands, which were hitherto greatly ignored by bryologists, as well as many alpine squares.

From 1984 onwards, all islands were sampled during 1-4 weeks, mainly in spring (Fig. 1). The northern and southern parts got equal attention. Tenerife was visited in 1984, 1985, 1986, 1987, 1988, 1990, and 1993; GOMERA in 1986, 1988, and 1993; Gran Canaria in 1989 and 1993; HIERRO in 1990; La Palma in 1991 and 1992; Fuerteventura in 1992; Lanzarote in 1994. The driest places of Tenerife, Fuerteventura, and Lanzarote were visited in late winter (February). Both Gran Canaria and Fuerteventura are still under-recorded. However, it should be noted that MALME (1988) contributed impressively to the exploration of Fuerteventura.

About 15,000 collections have been made. They have been packetted and stored in two private herbaria. All collections have been studied more than once. The collections served as a basis for a checklist of bryophytes of the Canary Islands, and will serve in preparing a bryophyte flora.

In addition, many old collections were studied. A great deal of them appeared to be misidentified. Some collections were not to be found. For these reasons and some other, about 60 species had to be erased from the list. Which is about 13% of the flora.

The checklist of EGGERS (1982) reports 436 bryophytes for the Canary Islands: 136 hepatics and 300 mosses. The recently published new checklist of the Canary Islands (DIRKSE et al. 1993) enumerates 449 bryophytes, consisting of 140 hepatics and 309 mosses. These figures are about 3% higher than those presented by EGGERS (1982).

The identification of the bryophytes often proved difficult because of the lack of easy accessable litterature or a confusing taxonomy. Confusing taxonomy concerned several species also occurring in Europe, for example: *Radula holtii* Spruce (BOUMAN & DIRKSE 1992), *Homalia lusitanica* Schimp. (DIRKSE 1987), *Lejeunea eckloniana* Lindenb. (DIRKSE et al. 1993), *Anoectangium aestivum* (HEDW.) MITT. (DIRKSE et al. 1993), and *Isothecium algarvicum* NICH. et DIX. To solve these problems, the study of type specimens was necessary, which lead to several new synonyms. Since 1984, the identification efforts revealed about 40 species new to the Canary Islands, accounting for about 9% of the flora.

Most species added are rare: for example the hepatics *Plagiochila dubia*, *Lejeunea laetevirens* Nees et Mont., and *Riella cossoniana* Trab. P. dubia and L. laetevirens are small, inconspicuous plants, confined to banks, boulders or trees in sheltered places in rather dry laurel forests on steep N-facing slopes. Both species have their main range in northern South America, the West Indies, and the southern United States. Their presence on the Canary Islands means a large eastern extension of their range. P. dubia is peculiar in that it abundantly produces minute, leafy propagules from the back of its leaves. Riella cossoniana occurs on Gran Canaria, on submerged stones, pebbles or mud in slowly fleeting, shallow, periodic streams or small waterfalls. It is often obscured by masses green algae. Outside the Canary

Islands it is known from Central-Asia, Israel, Algeria, and Spain (ROS ESPIN 1987, LIPKIN & PROCTOR 1975). The Canary Islands mean a western extension of this range.

Some species added appear to be common, such as Crossidium geheebii (Broth.) Broth. and Goniomitrium seroi (Fig. 2). These tiny plants stayed unnoticed because they grow in the unexplored southern parts of the islands. C. geheebii grows on dry gravelly or loamy soil under a xerophytic vegetation of Kleinia neriifolia Haw., and Euphorbia regis-jubae WEBB et BERTH. (DIRKSE & BOUMAN 1995). It mainly occurs between 500-1000 m, on all islands. It is known from New Zealand, S. Australia, and Egypt (DELGADILLO 1975, FREY & KÜRSCHNER 1988). The Canary Islands mean a large western extension of this range. G. seroi is often found associated with both Riccia trabutiana Steph. and Lavandula canariensis Mill. It is common below 500 m in the southern parts of the western islands and Gran Canaria. It inhabits extremely dry, sheltered places (often in the vicinity of bazaltic rocks) in grassy and shrubby Euphorbia-vegetations. When fresh, it smells of cucumber. It was described as a Spanish endemic (CASAS DE PUIG 1972) and only known from its type locality. Now, the Canary Islands constitute its most important area.

Two species were new to science: *Radula jonesii* Bouman et al. (BOUMAN et al. 1988), very rare on Tenerife and Madeira; and *Grimmia curviseta* Bouman (BOUMAN 1991), a high mountain species, common on rocks in the Cañadas del Teide (Tenerife) and on the highest parts of La Palma.

Two other species added merit attention, because the Canary Islands form an important part of their range: *Gigaspermum mouretii* Corb. and *Oedipodiella australis* (WAG. et DIX.) DIX. Although rare and always local, *G. mouretii* occurs in the sun-baked south of all islands except Lanzarote. It mostly grows on very thin soil on N-facing slopes with sparse vegetation, below 1000 m. Only on Fuerteventura it occurs abundantly on dry loamy soil, among grasses and *Bubonium sericeum*, above 600 m. It may resemble *Bryum argenteum* Hedw., but the subterranean system of rhizome-like stems easily separates *G. mouretii*. It is reported from a few places around the Mediterranean Sea. The Canary Islands have the highest density of localities. However, it should be noted that *G. mouretii* is hardly separable from its relative *G. repens*, occurring in South Africa and Australia. *O. australis* is much rarer and more difficult to find than *G. mouretii*. It is less than 2 mm high and grows always gregarious or among other mosses, on thin soil, in open, dry localities. When dry, it strongly shrivels, readily becomming covered with soil or debris. It was found on La Palma and in a few places above 600 m on Fuerteventura. Its disjunct distribution area includes South Africa and Spain. The Canary Islands form part of a connection between these separated ranges.

Thanks to the grid-based collecting trips, distribution maps become possible, bringing to light the local geography of bryophytes.

Because of the marked difference between the high western islands (Hierro, La Palma, Gomera, Tenerife, and Gran Canaria) and the low eastern islands (Fuerteventura,

and Lanzarote), bryophyte distributions reflecting this difference are to be expected. *Crossidium crassinerve* (DE NOT.) Jur. and *C. squamiferum* (VIV.) JUR. show this type of distribution (Fig. 3). Both species are much more common on the eastern islands than on the western islands. On the western islands these species are confined to the dry, southern parts (DIRKSE & BOUMAN 1995). It is surprizing, that not all species from dry places are more common on Fuerteventura and Lanzarote than on the other islands. *Goniomitrium seroi*, for example, is confined to the driest places of the southern parts of Hierro, La Palma, Gomera, Tenerife, and Gran Canaria. It seldomly grows higher than 600 m. Yet, it is absent from both Fuerteventura and Lanzarote.

Species that normally grow above 1000 m are, of course confined to the western islands, Gran Canaria included. *Anacolia webbii* (MONT.) SCHIMP., for example, is common in mountainous areas. And thus absent from both Fuerteventura and Lanzarote, although it could be expected to grow in some deep fissure in the highest N.-facing rocks of the Jandía peninsula of Fuerteventura.

Some species of *Grimmia* like *G. montana* B.S. and *G. ovalis* (HEDW.) LINDB., seldom occur below 2000 m. Hence their distribution is limited to the highest peaks of La Palma, Tenerife, and Gran Canaria (Fig. 4). *G. anodon* and *G. curviseta* behave like true alpine species and are restricted to peaks well above 2000 m, only occurring on Tenerife and La Palma.

Species of laurel forests of course are almost confined to the northern slopes of the four western islands. *Isothecium algarvicum* NICH. et DIX., for example, grows on stones and boulders in sheltered places in rather dry laurel forests or *Erica Myrica*-woodlands. It is frequently distributed on the northern parts of Hierro, La Palma, and Tenerife (Fig. 5). On Gomera it is probably more widespread than indicated on the map, because of the inaccessibility of the woodlands on this island. *Asterella africana* (MONT.) EVANS, *Tetrastichium fontanum* (MITT.) CARD., *Fissidens serrulatus* Brid., *Lejeunea ulicina* (TAYL.) GOTT. et al., and many other species show distribution paterns related to those of *Isothecium algarvicum*. The more moisture they demand, the rarer they are, except for *A. africana* which prefers to grow on sheltered rocks with dripping water but is as widespread as *I. algarvicum* from much dryer sites. The explanation for this is that *A. africana* is not confined to laurel forests but also grows on sheltered wet rocks in pine forests and other shaded localities.

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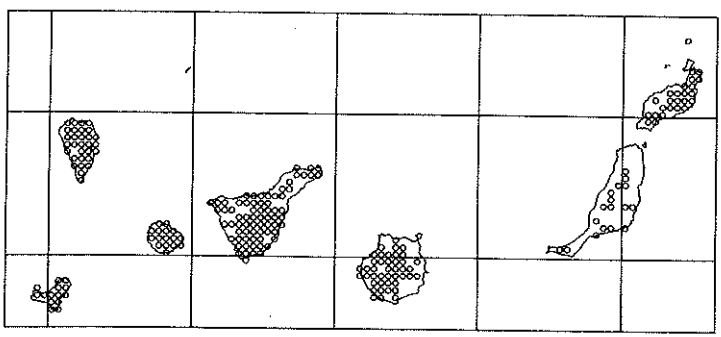

Figure 1 - Canary Islands, UTM squares (5X5 km²) visited (1984-1994).

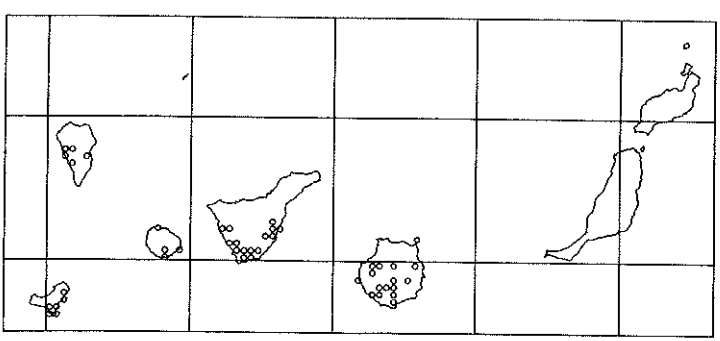

Figure 2 - *Goniomitrium seroi* on the Canary Islands (1984-1994).

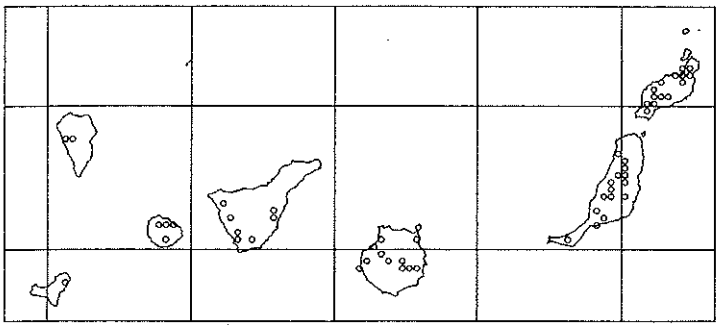

Figure 3 - *Crossidium squamiferum* on the Canary Islands (1984-1994).

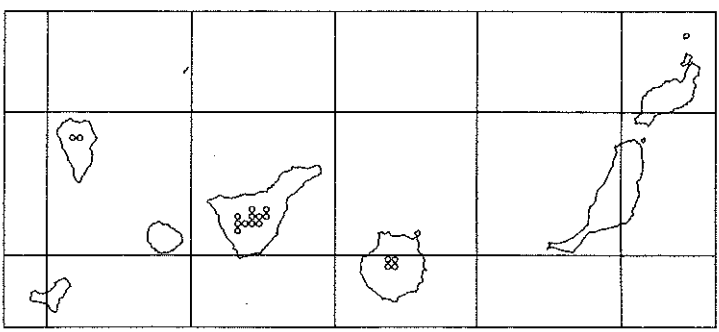

Figure 4 - *Grimmia ovalis* on the Canary Islands (1984-1994).

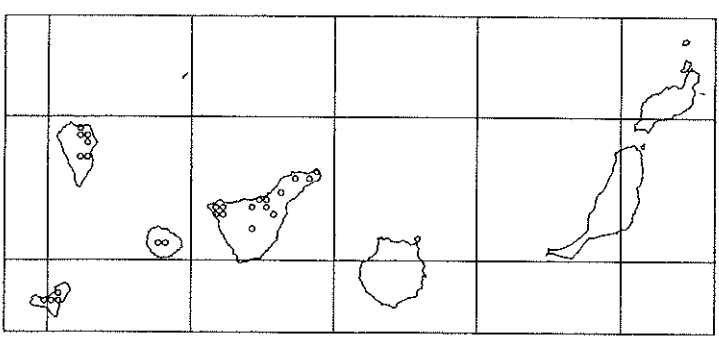

Figure 5 - *Isothecium algarvicum* on the Canary Islands (1984-1994).