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Noteworthy orophilous mosses from Mount Etna (Sicily)

Abstract

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Ten orophilous taxa found in high mountain localities on Mt Etna are discussed. Among them, *Brachythecium collinum*, *Desmatodon latifolius*, *Grimmia donniana*, and *Dicranoweisia crispula* are new records for Sicily; other taxa are rare on the island, or new for Mt Etna. The phytogeographical interest of the Sicilian orophilous mosses is discussed.

Introduction

In the frame of a survey of the bryoflora and bryovegetation of Mt Etna (Sicily), we found many orophilous taxa, at higher altitudes, that are interesting from a phytogeographical point of view. The most significant of those that we have so far collected are presented in this paper. Some are new records for Sicily, some have but rarely been recorded from Italy.

Mt Etna is a volcano arising in the centre of the Mediterranean basin, between 37°30'N and 37°56'N and between 14°44'E and 15°14'E. It is characterized by many inactive secondary craters (e.g. Mts Silvestri, Mt Palestra, Mts Rossi) surrounding the central, main crater. The whole of Mt Etna extends over approximately 60 km from north to south and 40 km from east to west; it peaks at 3336 m a.s.l., and its lava flows cover an area of about 1600 km².

The origin of the volcano dates back to the early Pleistocene, about 600,000 years ago, when it arose out of the large and shallow sea, called "Pre-etnean gulf", that covered its present location. Today Mt Etna is the highest and most active volcano of Europe.

The climate is of a Mediterranean type, with temperatures and rainfall being strongly influenced by topography, by altitude, and slope exposition. The temperatures generally decrease with altitude, while precipitation is highest on the eastern and northern slopes. Based on available temperature data it is possible to distinguish, in the upper zone, a supra-mediterranean, an oro-mediterranean and, at the very top, a crioro-mediterranean thermometric belt (Rivas Martínez 1981).

Although Mt Etna is a prominent landmark, it has not yet been subject to a comprehensive bryological investigation. The literature data on its bryoflora are fragmentary up to now. The first important contribution was by Strobl (1880-1888) who mentioned about fifty bryophytes from the volcano. Some further additions were reported by Brizi (1890), Zodda (1908, 1911), Lo Giudice & Privitera (1979, 1981, 1983), Privitera & Lo Giudice (1979, 1986), and others.

In this paper, we shall present the ten most important orophilous taxa found by us on Mt Etna. For phytogeographical data, we have relied on Düll (1984-1985) in matters of general distribution and on Cortini Pedrotti (1992) with regard to the distribution in Italy; ecological preferences are accepted as given by Amann & Meylan (1918) and Boros (1968). The surveyed moss localities are mapped in Fig. 1.

All specimens are kept in the herbarium of the Botanical Institute, Catania (CAT).

***Brachythecium collinum* (Müll. Hal.) Bruch & al.**

An arctic-alpine species found in spring 1991 at the top of Mt Palestra at 1900 m of altitude, where it grows in small, green, soft and silky webs on soil among pulvinate shrubs of *Astracantha sicula* (Raf.) Greuter. This rare species was found in the sterile state, mixed with *Ceratodon purpureus* (Hedw.) Brid., *Tortula ruralis* (Hedw.) P. Gaertn. & al., and *Polytrichum juniperinum* Hedw.

Brachythecium collinum is a xerophilous, terricolous species and is indifferent to the pH of the substratum. It is fairly widespread in Europe, and also occurs in Asia, N. and Central America. In Italy it was only known from some northern districts (Val d'Aosta, Piedmont, Lombardy, Trentino-Alto Adige, Veneto), and there is no record so far for the central and southern ones. It represents a new record for Sicily.

***Desmatodon latifolius* (Hedw.) Brid.**

The species belongs to the subarctic-subalpine phytogeographical element. It was found in spring 1991, on soil, in two sites of the Mts Silvestri, at 1900 m of altitude, together with *Polytrichum piliferum* Hedw., *Ceratodon purpureus*, *Tortula subulata* Hedw., *Bartramia ithyphylla* Brid., and *Pohlia nutans* (Hedw.) Lindb. The plants were growing in green, gregarious tufts and bore capsules.

Desmatodon latifolius is a xerophilous, photophilous, terricolous and humicolous species preferring calcareous substrata but also found on neutral or acidic soils. It is widespread in Europe, and moreover occurs in Asia, N. Africa and N. America. In Italy it has been collected in some northern and central districts (Val d'Aosta, Lombardy, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Emilia-Romagna, Tuscany, Marche, Abruzzo). It represents a new record for Sicily.

***Grimmia donniana* Sm.**

A northern suboceanic mountain species, with a general distribution encompassing several countries of Europe, Asia, and America, plus the Canary Islands, Madeira, and Antarctica. In Italy it has been recorded only from some northern and central districts (Val d'Aosta, Piedmont, Lombardy, Trentino-Alto Adige, Veneto, Emilia Romagna, Tuscany, Sardinia). It is a xerophilous, saxicolous, acidophilous species.

Grimmia donniana represents a new record for Sicily, where we found in summer 1992, with capsules, on exposed rocks at “I Dammusi” (1650 m a.s.l.), growing in dense, hoary, dark green tufts together with *Grimmia ovalis* (Hedw.) Lindb., *Grimmia trichophylla* Grev., and *Ceratodon purpureus*.

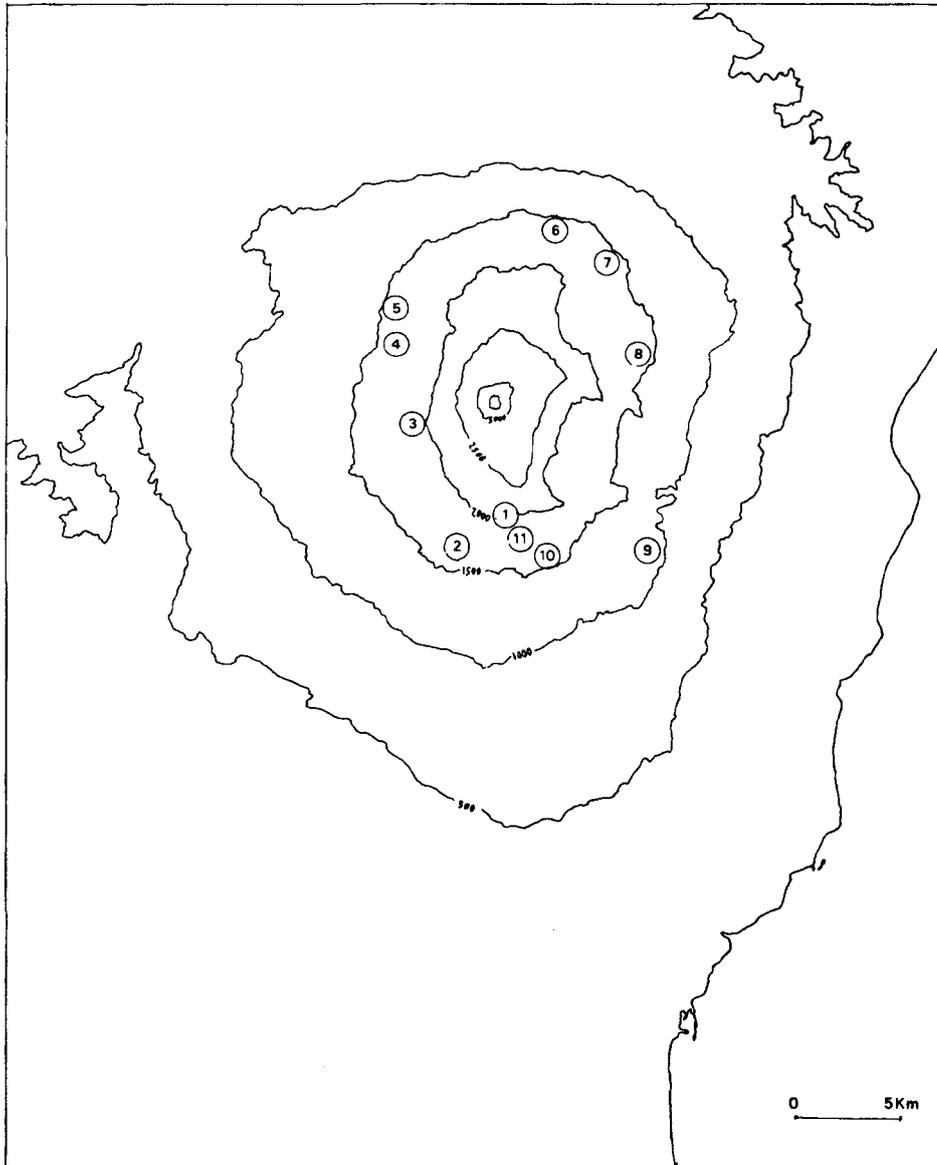


Fig. 1. Map showing the surveyed localities. – 1, Mts Silvestri; 2, Etna Botanical Garden “Nuova Gussonea”; 3, Mt Palestra; 4, Mt Maletto; 5, Mt Spagnolo; 6, “Cave Palombe”; 7, “I Dammusi”; 8, “Citelli Refuge”; 9, Mt Arcimis; 10, Cassone; 11, “Cave Faggi”.

***Grimmia montana* Bruch & Schimp.**

A xerophilous, sciaphilous, saxicolous, acidophilous species, belonging to the suboceanic-montane phytogeographic element. Its general distribution area comprises several countries of Europe, and also N. Africa, N. and Central America, N.E. and E. Asia, and Macaronesia. In Italy it has been recorded only from the north (Val d'Aosta, Piedmont, Trentino-Alto Adige, Veneto) and, once before, from Sicily on Mt Etna at "Cave Faggi" (1600 m a.s.l.), later destroyed by a lava flow during the eruption of 1983. In summer 1992 we rediscovered *Grimmia montana* growing in small, compact, sometimes hoary cushions on rock faces at "I Dammusi" (1650 m a.s.l.), where it was accompanied by *Coscinodon cribrosus*, *Racomitrium heterostichum* (Hedw.) Brid., *Dicranoweisia crispula*, *Schistidium apocarpum* var. *confertum*, and *Ceratodon purpureus*.

Grimmia montana is often mistaken for the related *G. alpestris* (Weber & D. Mohr) Schleich. ex Hornsch., from which it mainly differs in the median cells and the longer beaked capsule lid. We also found some specimens with intermediate characteristics between *G. montana* and *G. alpestris*, which require further study.

***Cynodontium bruntonii* (Sm.) Bruch & al.**

A suboceanic-montane species. The known Italian distribution is limited to some northern and central districts (Piedmont, Lombardy, Trentino-Alto Adige, Emilia-Romagna, Tuscany, Latium, Sardinia), plus two mountain localities in Sicily (Bottini 1907, Zodda 1913). It had not been collected on Mt Etna previously; in summer 1992 we found it in green cushions on shady rocks at "I Dammusi" (1650 m a.s.l.) together with *Bartramia ithyphylla*, *Pohlia cruda* (Hedw.) Lindb., and *Brachythecium velutinum* (Hedw.) Bruch & al.

Cynodontium bruntonii is widely distributed in Europe and has also been recorded from N. Africa, S.W. Asia, the Azores, and the Canary islands. It is a mesophilous, sciaphilous, saxicolous species that prefers neutral or acid substrata.

***Amphidium mougeotii* (Bruch & Schimp.) Schimp.**

This mesophilous and sciaphilous species belongs to the suboceanic-montane phytogeographic element. It occurs in many countries of Europe, in Asia, Macaronesia, and N. America. It is quite widespread in N. and Central Italy, but has not been reported from the southern parts except in Sicily where it was collected only on Mt Etna at "Cave Faggi" and at "Cave Palombe" (Lo Giudice & Privitera 1981, 1983). We found it again in rocky cavities and fissures on Mts Silvestri (1900 m a.s.l.), together with *Pohlia cruda* and *Ceratodon purpureus*; and on Mt Spagnolo at 1600 m of altitude, in less shady conditions, mixed with *Racomitrium lanuginosum* (Hedw.) Brid., *Bartramia pomiformis* Hedw., *Polytrichum piliferum*, and *Hypnum cupressiforme* Hedw.

***Dicranoweisia crispula* (Hedw.) Milde**

A boreal-montane xerophilous, saxicolous, acidophilous species, occurring in Europe, Asia, N. Africa and on the Azores. It has been reported from several districts of N., Central and S. Italy, but was not so far known from Sicily, for which island it represents a

new record. We discovered it on fairly sheltered rocks in two localities: at “I Dammusi” (1650 m a.s.l.) in summer 1992, and at the top of Mt Palestra (1900 m a.s.l.) in spring 1991. In the former place it grew mixed with *Grimmia montana*, *Coscinodon cribrosus*, *Racomitrium heterostichum*, *Ceratodon purpureus*, and *Schistidium apocarpum* var. *confertum*; in the latter, with *Coscinodon cribrosus*, *Racomitrium heterostichum*, *Didymodon vinealis* (Brid.) R. H. Zander, and *Didymodon luridus* Hornsch.

***Coscinodon cribrosus* (Hedw.) Spruce**

A boreal-montane, xerophilous, saxicolous, acidophilous species found in several countries of Europe and Asia, and also in N. Africa and N. America. The Italian distribution concerns some northern, central and southern districts, including Sicily where it is known only from Mt Etna (Bottini 1907, Reimers 1956, Strobl 1880-1888). We found it again, forming hoary, dense cushions on exposed rocks in numerous localities: Cassone (1550 m a.s.l.), together with *Bryum argenteum* Hedw. and *Ceratodon purpureus*; Mts Silvestri (1900 m a.s.l.), mixed with *Racomitrium heterostichum*, *Dicranoweisia crispula*, *Didymodon vinealis*, and *Didymodon luridus*; “Citelli Refuge” (1750 m a.s.l.), with *Pohlia cruda*; “I Dammusi” (1650 m a.s.l.), with *Grimmia montana*, *Racomitrium heterostichum*, *Ceratodon purpureus*, and *Schistidium apocarpum* var. *confertum*; Mt Arcimis (1150 m a.s.l.), with *Racomitrium heterostichum*, *Polytrichum piliferum*, and *Ceratodon purpureus*.

***Isopterygiopsis pulchella* (Hedw.) Z. Iwats.**

A boreal-montane species growing prevalently on shady limestone rocks. It is widely distributed in Europe and also recorded from Asia, N. Africa, N. America, Australia, New Zealand, and Antarctica. In Italy it is known from some northern and central districts (Val d’Aosta, Piedmont, Lombardy, Trentino-Alto Adige, Veneto, Friuli-Venezia Giulia, Umbria, Tuscany) and from Mt Etna in Sicily, where it was collected at “Cave Palombe” (Lo Giudice & Privitera 1983). There it can be found growing on humid rocks in markedly sciaphilous conditions, together with *Philonotis arnellii* Husn., *Isothecium myosuroides* Brid., and *Scleropodium purum* (Hedw.) Limpr.

***Schistidium apocarpum* var. *confertum* (Funck) H. Möller**

A subboreal-montane, xerophilous, saxicolous taxon known from several countries of Europe and also from N. and tropical Africa, Macaronesia, and Antarctica. It is quite widespread in N. and Central Italy, and has been recorded from Mts Madonie in Sicily by Bottini (1907). We found it on rocky substrata in some Etnean localities: Mt Maletto (1650 m a.s.l.), together with *Grimmia ovalis*, *Grimmia decipiens* (Schultz) Lindb., *Ceratodon purpureus*, and *Bryum caespitium* Hedw.; “I Dammusi” (1650 m a.s.l.), with *Grimmia montana*, *Racomitrium heterostichum*, *Dicranoweisia crispula*, *Coscinodon cribrosus*, and *Ceratodon purpureus*; and at the Etna Botanical Garden “Nuova Gussonea” (1700 m a.s.l.), mixed with *Grimmia ovalis*, *Ceratodon purpureus*, and *Tortula ruralis*.

Discussion

Mt Etna being a Mediterranean mountain, the occurrence, among the orophilous mosses, of boreal-montane and oceanic-montane species (*Grimmia montana*, *Grimmia donniana*, *Amphidium mougeotii*, *Dicranoweisia crispula*, *Isopterygiopsis pulchella*) is of considerable phytogeographical interest. Even more noteworthy are the arctic-alpine and subarctic-subalpine species (*Brachythecium collinum*, *Desmatodon latifolius*) since they add to the exiguous number of alpine taxa occurring in Sicily. The subarctic-subalpine element is very poorly represented in the Sicilian bryoflora, with about 2 % (Dia & Not 1991). The arctic-alpine element is even less prominent, consisting of only two moss species one of which is doubtful. A further interesting taxon, belonging to the carpathic-alpine element, has recently been found by Dia (1991).

The occurrence of alpine species in Sicily, and also of boreal-montane ones, can probably be explained by Quaternary climate changes. It is possible that these species migrated southward from high latitudes during the glacial phases of the Pleistocene, while in the interglacial phases they found refuge on the top of high mountains. At present, these species are the most interesting glacial relics among the Sicilian moss flora.

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