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# The bryological flora of Isola dei Cavoli (SE-Sardinia, Italy)

**Abstract**

Cogoni, A., Flore, F. & Scrugli, A.: The bryological flora of Isola dei Cavoli (SE-Sardinia, Italy). — Fl. Medit. 14: 115-127. 2004. — ISSN 1120-4052.

Given herein are the results of bryological explorations conducted on Isola dei Cavoli, a small island off the southeastern tip of Sardinia. Thirty-three specie in seven families belonging to the *Musci* and *Hepaticae* classes were found. Besides some ecological and phytogeographical evaluations, the cartographic representation on the U.T.M. grid of the distribution of species over the island is also given, together with an analysis of the chorological elements.

## Introduction

Already at the beginning of the 19th century, Sardinia was the site of bryological explorations by Müller (1829) and Moris (1829). The first research works on the bryological flora of Sardinia's minor islands were conducted between 1869 and 1914 (De Notaris 1869; Barbey 1884; Fleischer 1893; Massari 1897; Herzog 1905-1907; Terraciano 1909; Zodda 1914). It was necessary to wait for the contribution by Cortini Pedrotti & Aleffi (1995) to have a study on the "State of bryological knowledge and biogeographical considerations on Sardinia's satellite islands". In particular, the references to Isola dei Cavoli are limited to those of Massari (1897) and Cortini Pedrotti & Aleffi (1995) who reported the presence of five species [*Pseudocrossidium revolutum* (Brid.) R.H. Zander, *Schistidium apocarpum* Hedw., *Weissia controversa* Hedw., *Tortella flavovirens* (Bruch) Broth. and *Tortella humilis* (Hedw.) Jenn.].

Starting from 1975, Isola dei Cavoli has been the subject of study by researchers from the University of Cagliari who, believing that it would be an interesting place for training future researchers and conducting scientific research, set up the "Centro Interdipartimentale di Ricerche sulle Coste e sull'Ambiente Marino" (C.I.R.C.A.M.) in 1990; today, this biotope of great naturalistic value is part of the recently inaugurated "Area Marina Protetta di Capo Carbonara". The study of the bryophytes on these lands goes to complete knowledge of the flora and vegetation made known by Mossa & Tamponi (1978) and Mossa & Fogu (1987) respectively.

## Area of the study

The Isola dei Cavoli (Southeastern Sardinia), is off the coast in front of the Capo Carbonara promontory at a distance of some 700 metres (Fig. 1). Its geographic position is: 39° 04' 54" and 39° 05' 22" latitude N and 9° 31' 38" and 9° 32' 36" longitude E of Greenwich (Plate no. 567, Section II - Capo Carbonara, I.G.M.). It is almost entirely made up of compact granites interrupted by black or white dikes of the same nature at different stages of crystallization, sometimes modelled into characteristic forms (tafoni) by wave and marine aerosol erosion. Variations in sea level during the Upper Quaternary were the cause of important morphogenetic processes on the sea bottom around the island. The geomorphology of the part above sea level is characterized by the presence of two hills rising to 40 metres above sea level connected by a small valley representing the most important hydrographic basin, which terminates in the NW at "Cala di Ponente".

The bioclimate is of the "Mediterranean oceanic seasonal rain" type, with mean annual rainfall of 561.5 mm and a mean annual temperature of 17.8°C. From an analysis of the bioclimatic indices emerges a lower thermo-Mediterranean thermotypical horizon and a lower dry ombrotypical horizon (Rivas-Martínez & al. 1999). The prevailing winds (northwest and northeast) contribute to accentuating aridness, which is attenuated by the relative humidity (Scrugli & Cogoni 1995).

The phanerogamous flora is composed of 251 entities belonging to 163 genera and 50 families. The marked aridness and windiness of the island are underscored by the high percentage of terophytes (54%) and hemicryptophytes (21%); soil deterioration is revealed by the value of geophytes (8.76%). The chorological analysis, as well as confirming the Mediterranean nature of the land, also shows a fair presence of the western Atlantic component. The study of the vegetation revealed only two formations: the first, *Crithmo-Limonietum retiramei* Mossa & Tamponi 1978 corr., grows in the rocky indentations of the steep coastal belt; the second, *Myrto-Lentiscetum*, also including the subass. *brassicetosum* Mossa & Tamponi 1978, occupies almost the entire land. The existence of areas with *Cistus monspeliensis* L., *Carlina corymbosa* L. and *Artemisia arborescens* L. are tangible signs of anthropic reworking (fires, grazing, agricultural activities). Finally, the presence of *Juniperus turbinata* Guss., located on the southern coast suggests that in the remote past there may have been vegetational formations connected with this species (Mossa & Fogu 1987).

## Material and methods

The sampling of bryophytes was performed from July 1994 to July 2000. The exsiccata are stored at the CAG Herbarium of the Department of Botanical Sciences of the University of Cagliari. Grolle's (1983) nomenclature was adopted for the liverworts and Corley's & al. (1981) and Corley & Crundwell's (1991) for the mosses. The chorological elements (Düll 1983; 1984; 1985) were grouped into the six main groups (Sérgio & al. 1994) and their relative percentages were calculated.

The ecological characteristics of the species were identified taking into account the indices proposed by Ellemberg & al. (1991).

The entities found are listed in alphabetical order in a general table in which are indi-

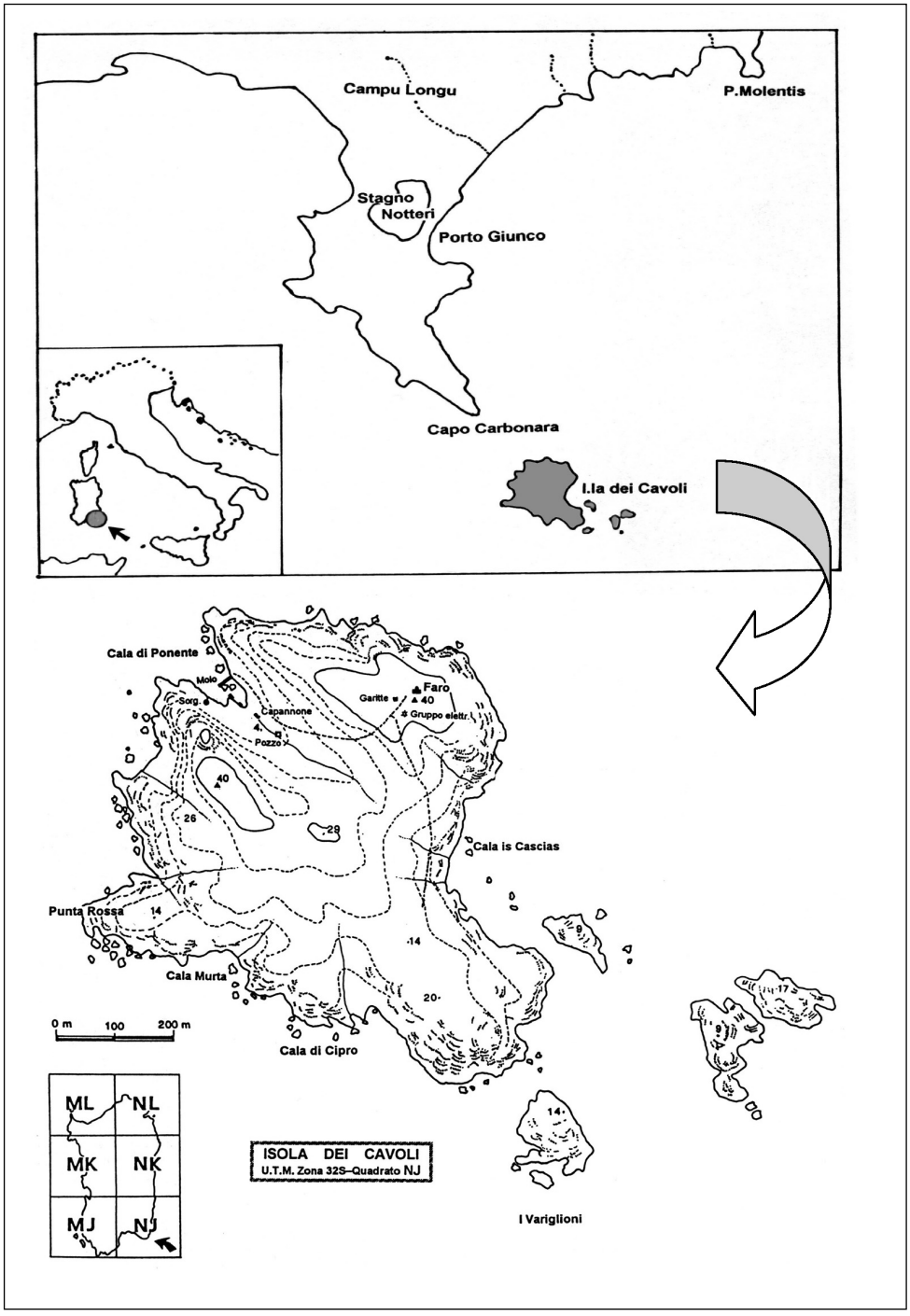


Fig. 1. Geographic position of the “Isola dei Cavoli”.

Table 1. List of species.

## MUSCI

***Brachytheciaceae***
*Rhynchostegium megapolitanum* (Weber & D. Mohr) Bruch & al.. - submed
*Rhynchostegiella tenella* (Dicks.) Limpr. var. *litorea* (De Not.) Rich. & E.C. Wallace - oc-med

***Bryaceae***
*Bryum bicolor* Dicks. - submed
*Bryum capillare* Hedw. - temp
*Bryum radiculosum* Brid. - suboc-med

***Fissidentaceae***
*Fissidens bryoides* Hedw. - temp
*Fissidens incurvus* Starke - submed
*Fissidens viridulus* (Sw.) Wahlenb. - submed

***Grimmiaceae***
*Grimmia pulvinata* (Hedw.) Sm. - submed
*Grimmia trichophylla* Grev. - temp(-mont)

***Pottiaceae***
*Acaulon fontiquerianum* Casas & Sérgio - cw-med
*Aloina ambigua* (Bruch & Schimp.) Limpr. - submed
*Barbula convoluta* Hedw. - temp
*Barbula unguiculata* Hedw. - temp
*Didymodon luridus* Hornsch. - submed
*Pottia starckeana* (Hedw.) Muell. Hal. - submed
*Pottia truncata* (Hedw.) Bruch & Schimp. - temp
**Pseudocrossidium revolutum* (Brid.) R.H. Zander - suboc-submed
*Tortella flavovirens* (Bruch) Broth. - suboc-submed
*Tortella inflexa* (Bruch)Broth. - suboc-submed
**Tortella humilis* (Hedw.) Jenn. - submed
*Tortula atrovirens* (Sm.) Lindb. - submed-suboc
*Tortula canescens* Mont - suboc-med (-mont)
*Tortula muralis* Hedw. var. *muralis* - temp
*Tortula muralis* Hedw. var. *aestiva* Hedw. - temp
*Trichostomum crispulum* Bruch - temp-mont
*Weissia brachycarpa* (Nees & Hornsch) Jur. - temp
*Weissia condensa* (Voit) Lindb. - submed-mont
*Weissia controversa* Hedw. - temp
*Weissia longifolia* Mitt. - s.temp

## HEPATICAE

***Conocephalaceae***
*Conocephalum conicum* (L.) Underw. - subbor-mont

***Ricciaceae***
*Riccia beyrichiana* Hampe ex Lehm. - oc-submed
*Riccia sorocarpa* Bisch. temp

* Species previously reported but not found during this research

cated: date gathered, U.T.M. coordinates, exposure, altitude and habitat (Table 2). Considering the naturalistic importance and the use of the island as a geo-marine park, it was deemed useful to calculate the index of rarity of the species (R.S.P., Gehu & Gehu

Table 2. UTM coordinates and habitats of species recorded.

| SPECIES | DATE | COOR. UTM | EXP. | ALT. | HABITAT | R.S.P. |
|---|---|---|---|---|---|---|
| *Acaulon fontiquerianum* | 24/01/98 | 4620 2670 | | 10 | maquis of *Artemisia arborescens* | 97.47 |
| *Acaulon fontiquerianum* | 19/07/99 | 4620 2660 | | | clearing of *Asparagus stipularis* | |
| *Aloina ambigua* | 17/07/97 | 4620 2660 | NE | 5 | in a crevice of Tirreniano | 94.93 |
| *Aloina ambigua* | 31/01/98 | 4620 2690 | | 35 | maquis of *A. arborescens* on soil | |
| *Aloina ambigua* | 31/01/98 | 4590 2680 | NNE | 15 | " " " | |
| *Aloina ambigua* | 20/07/99 | 4580 2670 | | | " " " | |
| *Barbula convoluta* | 14/06/98 | 4590 2680 | | 10 | maquis *of A. arborescenson* | 96.20 |
| *Barbula convoluta* | 20/07/99 | 4580 2670 | NE | | on soil in a rock ravine | |
| *Barbula convoluta* | 19/07/00 | 4600 2700 | | | *A. arborescens* vegetation | |
| *Barbula unguiculata* | 21/07/94 | 4600 2680 | NW | 10 | pseudosteppe vegetation | 92.40 |
| *Barbula unguiculata* | 30/01/98 | 4610 2690 | N | 30 | maquis of *A. arborescens* | |
| *Barbula unguiculata* | 31/01/98 | 4590 2680 | NNE | 15 | maquis of *Pistacia lentiscus* | |
| *Barbula unguiculata* | 05/09/98 | 4590 2670 | NNE | 20 | " " | |
| *Barbula unguiculata* | 30/01/98 | 4620 2660 | | 10 | pseudosteppe vegetation | |
| *Barbula unguiculata* | 19/07/99 | 4600 2690 | | | clearing of *A. arborescens* | |
| *Bryum bicolor* | 17/07/97 | 4600 2670 | E | 10 | maquis of *A. arborescens* | 87.34 |
| *Bryum bicolor* | 18/07/98 | 4580 2650 | | 10 | maquis of *P. lentiscus* | |
| *Bryum bicolor* | 31/01/98 | 4600 2650 | | 15 | maquis of Cistus monspeliensis | |
| *Bryum bicolor* | 31/01/98 | 4610 2640 | | 10 | maquis of *A. arborescens* | |
| *Bryum bicolor* | 30/01/98 | 4620 2670 | | | on soil among A. arborescens | |
| *Bryum bicolor* | 20/07/99 | 4580 2680 | N | | maquis of *P. lentiscus* and *Brassica insularis* | |
| *Bryum bicolor* | 28/07/00 | 4590 2630 | WNW | | among *A. arborescens* | |
| *Bryum bicolor* | 27/07/00 | 4610 2650 | | | clearing of *A. arborescens* and *P. lentiscus* | |
| *Bryum bicolor* | 28/07/00 | 4590 2650 | | | on soil between *A. arborescens* and *P. lentiscus* | |
| *Bryum bicolor* | 22/07/00 | 4600 2700 | N | 20 | garigue of *A.stipularis* and *Limonium retirameum* | |
| *Bryum capillare* | 27/07/94 | 4600 2680 | | | edge of a footpath | 81.00 |
| *Bryum capillare* | 19/07/97 | 4600 2640 | | 10 | maquis of *P. lentiscus* | |
| *Bryum capillare* | 31/01/98 | 4630 2620 | NNE | 5 | maquis *of P. lentiscus* and *B. insularis* | |
| *Bryum capillare* | 31/01/98 | 4610 2660 | | 10 | maquis of *A. arborescens* | |
| *Bryum capillare* | 31/01/98 | 4610 2680 | | | on soil | |
| *Bryum capillare* | 15/07/99 | 4590 2690 | | | on a spider's hole | |
| *Bryum capillare* | 17/07/99 | 4620 2680 | | | among *A. arborescens* | |
| *Bryum capillare* | 17/07/99 | 4600 2690 | | | clearing of *A. arborescens* | |
| *Bryum capillare* | 19/07/99 | 4620 2660 | | | among *A. stipularis* | |
| *Bryum capillare* | 22/07/99 | 4630 2630 | | 5 | on soil close to *P. lentiscus* | |
| *Bryum capillare* | 22/07/99 | 4580 2680 | N | 5 | maquis of *P. lentiscus* and *B. insularis* | |
| *Bryum capillare* | 19/07/00 | 4620 2640 | | | edge of *P. lentiscus* | |
| *Bryum capillare* | 22/07/00 | 4620 2670 | | | on soil near *Asparagus* sp. | |
| *Bryum capillare* | 28/07/00 | 4590 2640 | N | | vegetation of *P. lentiscus* and *A. arborescens* | |
| *Bryum capillare* | 28/07/00 | 4590 2660 | | | vegetation of *A. arborescens* and *Asparagus* sp. | |

Table 2. Continued.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Bryum radiculosum* | 30/01/98 | 4620 2680 | ESE | 20 | pseudosteppe vegetation | 88.60 |
| *Bryum radiculosum* | 30/01/98 | 4590 2680 | | | on soil under *A. arborescens* | |
| *Bryum radiculosum* | 30/01/98 | 4620 2690 | | | in a clearing on soil | |
| *Bryum radiculosum* | 31/01/98 | 4620 2660 | W | 5 | maquis of *A. arborescens* | |
| *Bryum radiculosum* | 15/07/99 | 4600 2690 | | | clearing of *A. arborescens* | |
| *Bryum radiculosum* | 22/07/99 | 4630 2630 | | 0 | on soil close *to P. lentiscus* | |
| *Bryum radiculosum* | 19/07/00 | 4620 2670 | W | | on rock | |
| *Bryum radiculosum* | 19/07/00 | 4580 2650 | | | maquis of *P. lentiscus* | |
| *Bryum radiculosum* | 19/07/00 | 4590 2650 | WNW | | A. arborescens vegetation | |
| *Didymodon luridus* | 19/07/97 | 4620 2660 | | 5 | pseudosteppe vegetation | 97.47 |
| *Didymodon luridus* | 31/01/98 | 4590 2680 | NNE | 15 | maquis of *A. arborescens* | |
| *Fissidens bryoides* | 30/01/98 | 4590 2680 | NNE | 15 | " " | 91.14 |
| *Fissidens bryoides* | 30/01/98 | 4610 2680 | | 20 | " " | |
| *Fissidens bryoides* | 31/01/98 | 4620 2690 | NW | 30 | " " | |
| *Fissidens bryoides* | 31/01/98 | 4610 2660 | | 10 | " " | |
| *Fissidens bryoides* | 31/01/98 | 4630 2640 | | 5 | maquis of *A. arborescens* and *P. lentiscus* | |
| *Fissidens bryoides* | 31/01/98 | 4630 2620 | NNE | 5 | maquis of *P. lentiscus* | |
| *Fissidens bryoides* | 20/07/99 | 4580 2670 | NE | | on soil in a rock ravine | |
| *Fissidens incurvus* | 19/07/97 | 4600 2670 | W | 10 | pseudosteppe vegetation | 87.34 |
| *Fissidens incurvus* | 30/01/98 | 4590 2680 | | 15 | maquis of *A. arborescens* | |
| *Fissidens incurvus* | 31/01/98 | 4620 2660 | W | 10 | " " | |
| *Fissidens incurvus* | 31/01/98 | 4610 2640 | | 10 | maquis of *P. lentiscus* | |
| *Fissidens incurvus* | 14/05/98 | 4620 2690 | NW | 30 | maquis of *A. arborescens* | |
| *Fissidens incurvus* | 19/07/99 | 4620 2680 | | | among *A. arborescens* | |
| *Fissidens incurvus* | 19/07/00 | 4590 2660 | | | on soil | |
| *Fissidens incurvus* | 28/07/00 | 4580 2640 | N | | *P. lentiscus* and *A. arborescens* vegetation | |
| *Fissidens incurvus* | 28/07/00 | 4580 2660 | | | *A. arborescens* and *Asparagus* sp. vegetation | |
| *Fissidens incurvus* | 28/07/00 | 4590 2640 | | | on soil | |
| *Fissidens viridulus* | 22/07/94 | 4590 2680 | | 15 | maquis of *A. arborescens* | 89.87 |
| *Fissidens viridulus* | 27/07/94 | 4600 2680 | | | edge of a footpath | |
| *Fissidens viridulus* | 30/01/98 | 4620 2680 | ESE | 20 | maquis of *A. arborescens* | |
| *Fissidens viridulus* | 31/01/98 | 4620 2670 | | 10 | " " | |
| *Fissidens viridulus* | 20/07/99 | 4580 2670 4590 | NNE | | on soil among rocks | |
| *Fissidens viridulus* | 12/07/00 | 2670 | WSW | 15 | maquis of *P. lentiscus* | |
| *Fissidens viridulus* | 22/07/00 | 4630 2630 | | | on soil close to *P. lentiscus* | |
| *Fissidens viridulus* | 22/07/00 | 4590 2690 | | | maquis of *A. arborescens* | |
| *Grimmia pulvinata* | 19/07/97 | 4600 2690 | NE | 25 | maquis of *P. lentiscus* and wild-olive tree | 97.47 |
| *Grimmia pulvinata* | 06/09/98 | 4590 2670 | | 30 | " " " | |
| *Grimmia trichophylla* | 19/07/97 | 4600 2690 | NE | 25 | " " " | 98.73 |
| *Pottia starckeana* | 29/01/98 | 4610 2680 | | 10 | maquis of *A. arborescens* | |
| *Pottia starckeana* | 31/01/98 | 4590 2680 | NNE | 15 | maquis of *P. lentiscus* | 96.20 |
| *Pottia starckeana* | 31/01/98 | 4620 2660 | | 5 | maquis of *A. arborescens* | |

Table 2. Continued.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Pottia truncata* | 31/01/98 | 4630 2620 | | 5 | maquis of *P. lentiscus* | 98.73 |
| *Rhyncostegiella tenella* | 14/05/98 | 4610 2690 | N | 20 | under *B. insularis* | 98.73 |
| *Rhynchostegium megapolitanum* | 27/07/97 | 4610 2690 | N | 20 | " " | 94.93 |
| *Rhynchostegium megapolitanum* | 05/09/98 | 4590 2670 | | 20 | maquis of *P. lentiscus* and *A. arborescens* | |
| *Rhynchostegium megapolitanum* | 19/07/99 | 4610 2670 | | | on soil | |
| *Rhynchostegium megapolitanum* | 22/07/00 | 4620 2670 | | | terophytic meadow | |
| *Tortella flavovirens* | 15/07/94 | 4600 2680 | W | | on soil under a rock | 67.08 |
| *Tortella flavovirens* | 30/01/98 | 4600 2690 | | 20 | maquis of *P. lentiscus* | |
| *Tortella flavovirens* | 31/01/98 | 4620 2690 | E | 30 | maquis of *A. arborescens* | |
| *Tortella flavovirens* | 31/01/98 | 4620 2680 | ESE | 20 | maquis of *P. lentiscus* | |
| *Tortella flavovirens* | 14/05/98 | 4610 2690 | | 20 | under *B. insularis* | |
| *Tortella flavovirens* | 19/07/98 | 4600 2650 | | | on stones among *C. monspeliensis* | |
| *Tortella flavovirens* | 19/07/99 | 4620 2650 | | | footpath facing 1° variglione | |
| *Tortella flavovirens* | 20/07/99 | 4620 2660 | NE | 5 | crevice of Tirreniano | |
| *Tortella flavovirens* | 20/07/99 | 4570 2680 | W | 5 | on a rock sheltered from western winds | |
| *Tortella flavovirens* | 20/07/99 | 4580 2670 | NNE | | on soil among rocks | |
| *Tortella flavovirens* | 20/07/99 | 4580 2680 | N | 5 | maquis of *B. insularis* and *P. lentiscus* | |
| *Tortella flavovirens* | 20/07/99 | 4570 2670 | | 5 | meadow of *Daucus carota* and *Asparagus* sp. | |
| *Tortella flavovirens* | 22/07/99 | 4620 2630 | | 15 | on soil | |
| *Tortella flavovirens* | 22/07/99 | 4630 2630 | | 5 | on soil close to *P. lentiscus* | |
| *Tortella flavovirens* | 12/07/00 | 4590 2690 | | | maquis of *P. lentiscus* | |
| *Tortella flavovirens* | 17/07/00 | 4620 2670 | | | *Oleo-lentiscetum* | |
| *Tortella flavovirens* | 19/07/00 | 4620 2640 | | | on soil | |
| *Tortella flavovirens* | 19/07/00 | 4600 2670 | WSW | 15 | clearing of *A. arborescens* | |
| *Tortella flavovirens* | 22/07/00 | 4600 2700 | NNW | | on soil, edge of *Chritmo-Limonietum* | |
| *Tortella flavovirens* | 22/07/00 | 4590 2700 | | | on soil | |
| *Tortella flavovirens* | 22/07/00 | 4610 2700 | | | on soil close to *P. lentiscus* | |
| *Tortella flavovirens* | 23/07/00 | 4570 2650 | N | | garigue of *Asparagus* sp. | |
| *Tortella flavovirens* | 23/07/00 | 4570 2660 | N | | among *A. arborescens* and *P. lentiscus* | |
| *Tortella flavovirens* | 23/07/00 | 4580 2690 | | | on soil in a rock ravine | |
| *Tortella flavovirens* | 28/07/00 | 4590 2640 | N | | among rocks in *Chritmo-limonietum* | |
| *Tortella flavovirens* | 28/07/00 | 4580 2660 | N | 5 | among *P. lentiscus* | |
| *Tortella inflexa* | 06/09/94 | 4610 2680 | | 15 | maquis of *A. arborescens* | 92.40 |
| *Tortella inflexa* | 20/07/97 | 4600 2690 | | 20 | " " | |
| *Tortella inflexa* | 31/01/98 | 4600 2650 | | 15 | maquis of *C. monspeliensis* | |
| *Tortella inflexa* | 14/05/98 | 4620 2690 | NW | 30 | maquis of *A. arborescens* | |
| *Tortella inflexa* | 05/09/98 | 4600 2660 | | 20 | maquis of *P. lentiscus* | |
| *Tortella inflexa* | 06/09/98 | 4580 2660 | | 20 | maquis of *A. arborescens* | |
| *Tortula atrovirens* | 19/07/99 | 4620 2660 | | | on soil along a footpath | 97.47 |
| *Tortula atrovirens* | 28/07/00 | 4590 2650 | WNW | | *A. arborescens* vegetation | |
| *Tortula canescens* | 20/07/97 | 4590 2680 | | 20 | maquis of *A. arborescens* | 94.93 |
| *Tortula canescens* | 30/01/98 | 4610 2680 | N | 15 | " " | |

Table 2. Continued.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Tortula canescens* | 14/05/98 | 4620 2690 | W | 30 | " " | |
| *Tortula canescens* | 20/07/99 | 4580 2670 | NE | | on soil in a ravine | |
| *Tortula muralis* var. *aestiva* | 26/07/00 | 4620 2670 | | | meadow | 97.47 |
| *Tortula muralis* var. *aestiva* | 28/07/00 | 4590 2650 | WNW | | *A. arborescens* vegetation | |
| *Tortula muralis* var. *muralis* | 22/07/99 | 4620 2630 | | 15 | on rock | 97.47 |
| *Tortula muralis* var. *muralis* | 19/07/00 | 4620 2640 | | | " | |
| *Trichostomum crispulum* | 19/07/99 | 4590 2670 | | | under *A. arborescens* | 68.35 |
| *Trichostomum crispulum* | 19/07/99 | 4620 2650 | | | along a footpath facing 1° variglione | |
| *Trichostomum crispulum* | 19/07/99 | 4620 2660 | | | along a footpath | |
| *Trichostomum crispulum* | 19/07/99 | 4600 2680 | | | on soil clearing of *A. arborescens* | |
| *Trichostomum crispulum* | 20/07/99 | 4570 2680 | NNW | | on soil among rocks | |
| *Trichostomum crispulum* | 20/07/99 | 4580 2670 | | 20 | " " | |
| *Trichostomum crispulum* | 20/07/99 | 4580 2680 | WNW | | on rock | |
| *Trichostomum crispulum* | 22/07/99 | 4620 2630 | | 15 | " | |
| *Trichostomum crispulum* | 22/07/99 | 4610 2640 | | 10 | on soil | |
| *Trichostomum crispulum* | 22/07/99 | 4630 2630 | | 5 | on soil near *P. lentiscus* | |
| *Trichostomum crispulum* | 12/07/00 | 4690 2690 | | 15 | maquis of *P. lentiscus* | |
| *Trichostomum crispulum* | 19 /07/00 | 4620 2670 | WSW | | on rocks with a heap of soil | |
| *Trichostomum crispulum* | 19/07/00 | 4620 2640 | E | | edge of *P. lentiscus* | |
| *Trichostomum crispulum* | 22/07/00 | 4590 2680 | | | terophytic meadow | |
| *Trichostomum crispulum* | 22/07/00 | 4610 2700 | | | on soil | |
| *Trichostomum crispulum* | 22/07/00 | 4610 2690 | | | " | |
| *Trichostomum crispulum* | 22/07/00 | 4620 2690 | | | footpath | |
| *Trichostomum crispulum* | 22/07/00 | 4570 2650 | | | footpath among *C. monspeliensis* | |
| *Trichostomum crispulum* | 22/07/00 | 4580 2660 | | | edge of *P. lentiscus* | |
| *Trichostomum crispulum* | 27/07/00 | 4600 2660 | | | under foliage of *Stipa* sp. | |
| *Trichostomum crispulum* | 27/07/00 | 4600 2640 | | | terophytic meadow | |
| *Trichostomum crispulum* | 27/07/00 | 4610 2650 | | | clearing of *A. arborescens* | |
| *Trichostomum crispulum* | 28/07/00 | 4590 2640 | N | | *A. arborescens* and *P. lentiscus* vegetation | |
| *Trichostomum crispulum* | 28/07/00 | 4590 2650 | | | on soil | |
| *Trichostomum crispulum* | 28/07/00 | 4590 2660 | | | *A. arborescens* and *Asparagus* sp. vegetation | |
| *Weissia brachycarpa* | 31/01/98 | 4610 2640 | | 10 | maquis of *A. arborescens* | 97.47 |
| *Weissia brachycarpa* | 31/01/98 | 4630 2620 | NNE | 5 | maquis of *P. lentiscus* | |
| *Weissia condensa* | 27/07/94 | 4600 2680 | N | | on soil under a rock | 87.34 |
| *Weissia condensa* | 20/07/97 | 4610 2670 | NNW | 15 | maquis of *A. arborescens* | |
| *Weissia condensa* | 20/07/97 | 4600 2670 | W | | under *A. arborescens* | |
| *Weissia condensa* | 31/01/98 | 4620 2690 | E | 30 | maquis of *A. arborescens* | |
| *Weissia condensa* | 31/01/98 | 4610 2680 | N | 15 | " " | |
| *Weissia condensa* | 31/01/98 | 4610 2660 | | 10 | " " | |
| *Weissia condensa* | 31/01/98 | 4600 2650 | | 10 | maquis of *C. monspeliensis* | |
| *Weissia condensa* | 31/01/98 | 4610 2640 | | 5 | maquis of *P. lentiscus* | |
| *Weissia condensa* | 31/01/98 | 4640 2630 | E | 5 | " " | |
| *Weissia condensa* | 04/09/98 | 4590 2680 | | 20 | maquis of *A. arborescens* | |

Table 2. Continued.

| | | | | | | |
|---|---|---|---|---|---|---|
| *Weissia controversa* | 27/07/94 | 4590 2690 | | | maquis of *P. lentiscus* | 98.73 |
| *Weissia longifolia* | 17/07/99 | 4620 2680 | | | on soil among *A. arborescens* | |
| *Weissia longifolia* | 19/07/99 | 4620 2660 | | | on soil | 89.87 |
| *Weissia longifolia* | 19/07/00 | 4600 2680 | | | on soil, clearing among *A. arborescens* | |
| *Weissia longifolia* | 22/07/00 | 4630 2630 | | 5 | on soil, near *P. lentiscus* | |
| *Weissia longifolia* | 22/07/00 | 4590 2690 | WSW | 15 | maquis of *P. lentiscus* | |
| *Weissia longifolia* | 22/07/00 | 4580 2670 | | | terophytic meadow | |
| *Weissia longifolia* | 26/07/00 | 4620 2670 | | | meadows among *A. arborescens* | |
| *Weissia longifolia* | 28/07/00 | 4590 2650 | | | on soil | |
| *Conocephalum conicum* | 31/01/98 | 4630 2630 | NE | 5 | maquis of *P. lentiscus* | 97.47 |
| *Conocephalum conicum* | 31/01/98 | 4630 2620 | | 5 | " " | |
| *Riccia beyrichiana* | 31/01/98 | 4640 2630 | | 10 | " " | 98.73 |
| *Riccia sorocarpa* | 31/01/98 | 4620 2650 | | 10 | maquis of *P. lentiscus* and wild-olive tree | 97.47 |
| *Riccia sorocarpa* | 31/01/98 | 4630 2620 | | 10 | maquis of *P. lentiscus* | |

1980) for the purpose of recording over the years the degree of vulnerability to anthropic pressure.

On a map with a U.T.M. grid, the squares were further subdivided into 100-metre squares (Fig. 3) and the number of species found in each square is indicated. This datum allows evaluation of species in the single areas and identification of the ecologically most favourable sites for bryophytes.

**Results and discussion**

The number of entities found in the course of the present research amounts to 31 (30 species and 1 variety), of which 29 not previously reported in this area. To these are to be added those that were not found, but which were mentioned by Massari (1897) [*Pseudocrossidium revolutum* (sub *Barbula revoluta*) and *Schistidium apocarpum* (sub *Grimmia apocarpa* )] and Cortini Pedrotti & Aleffi (1995) (*Tortella humilis*).

With reference to the presence of *Schistidium apocarpum* signaled by Massari is to exclude whereas it is common throughout much of Europe except in the Mediterranean area, where it is restricted to the mountains (Blom 1996).

Therefore, the bryological contingent of the island, also including those not confirmed, consists of 33 entities belonging to 7 families: 30 to the class of the *Musci* and 3 to that of the *Hepaticae* (Table 1).

Of particular importance is the finding of *Acaulon fontiquerianum* Casas & Sergio (Cogoni & Scrugli 2000) the areal of which gravitates on the western Mediterranean. In Italy, before the findings on the Isola dei Cavoli, it was found only in Sicily (Lo Giudice 1995). The Sardinian finding, besides expanding the areal of the species, represents a phytogeographical bridge connecting the western sector (Iberian Peninsula) and the eastern sector (Sicily).

From an analysis of chorological data (Fig. 2) we see the dominance of the temperate

element, which indicates the existence of relatively cool microclimates despite the island's high degree of aridness. The conspicuous presence of sub-Mediterranean species, the xeromorphism of which shows adaptation to periods of prolonged drought, is represented only by the class of the *Musci*.

In the southeastern zone, on the temporarily flooded small meadows of maquis dominated by myrtle, the only three species of liverworts, which "disappear" in the driest season, were found.

As concerns the humidity factor, there is a prevalence of xerophytes over mesophytes, while the hygrophytes are represented by *Conocephalum conicum*, *Riccia beyrichiana, Pottia starkeana* and *Pottia truncata* only.

From an analysis of cartographic data and from R.S.P. values (Table 2) it emerges that the most widespread species are *Tortella flavovirens* (R.S.P. 67.08), *Trichostomum crispulum* (R.S.P. 68.35), *Bryum capillare* (R.S.P. 81.00), *Bryum bicolor* (R.S.P. 87.34), *Fissidens incurvus* (R.S.P. 87.34) and *Weissia condensa* (R.S.P. 87.34), typical of coastal areas exposed to marine aerosol or environments with a high level of nitrification of substrates caused by the presence of numerous colonies of sea birds and anthropic activities connected with the summer holiday season.

On the map with the U.T.M. grid (Fig. 3) the squares which are richest in species are:

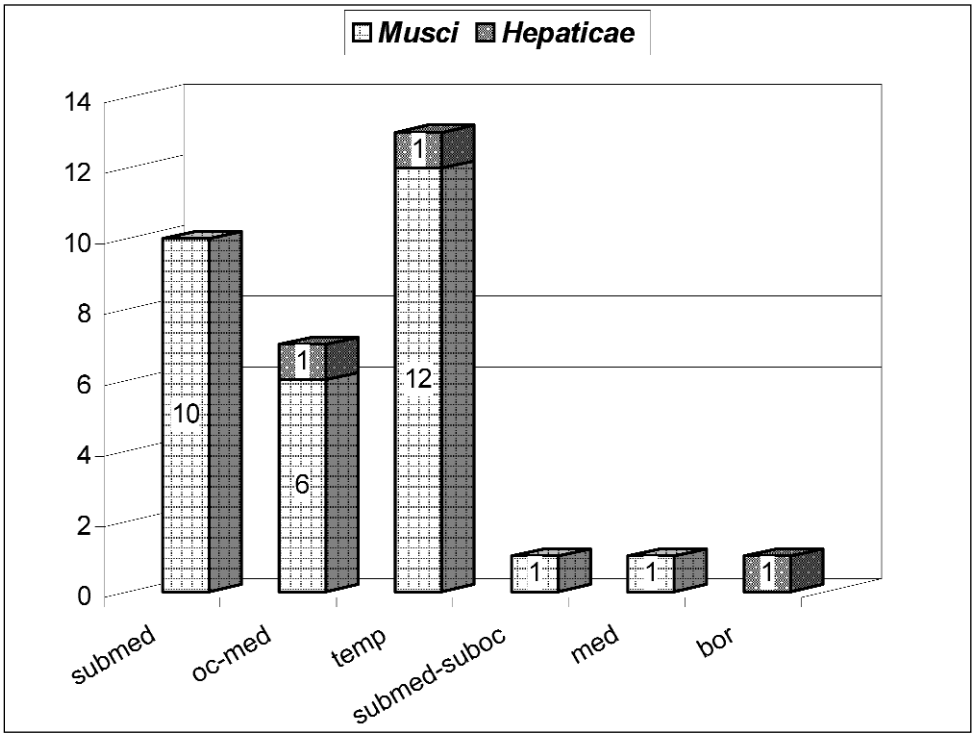


Fig. 2. Chorological spectrum referring to the number of species.

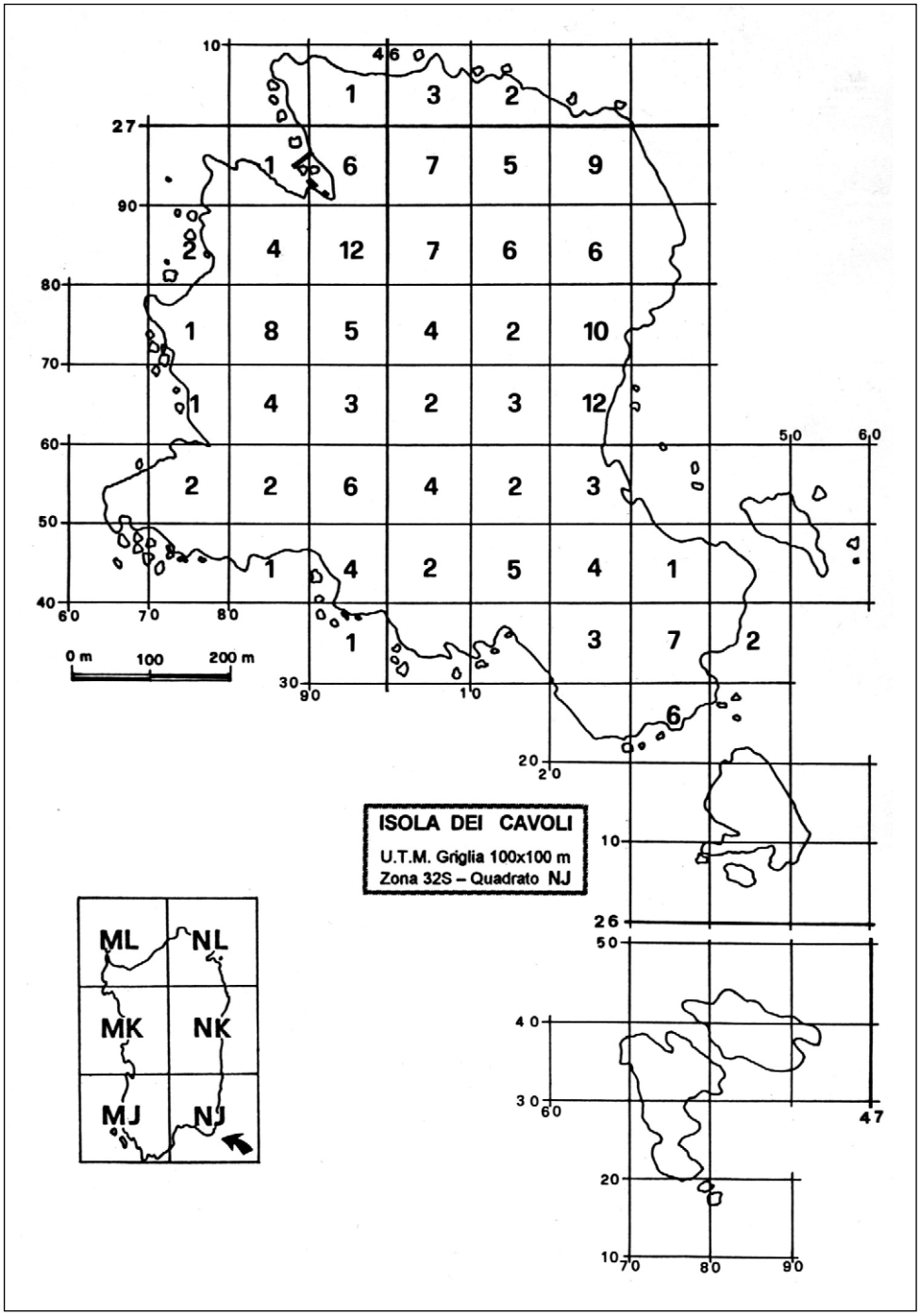


Fig. 3. Number of species found in each of the 100 metre squares.

in the eastern sector 4620 2660, 4620 2670, 4620 2690 and in the western sector 4590 2680, 4580 2670.

**Acknowledgements**

This study was supported by grants from the M.U.R.S.T. and the INTERREG.

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