
The Bryophyte Flora of the Maltese Islands

Jan-Peter Frahm & Michael Lüth

Abstract: A list of all liverworts and mosses reported from the Maltese Islands with references has been compiled from the literature, which includes 23 species of liverworts and hornworts as well as 96 taxa of mosses. The list is completed by the results of a bryological fieldtrip in March 2008. During this trip, 14 species of liverworts and 40 species of mosses were collected, of which *Cephaloziella baumgartneri*, *Didymodon luridus*, *Fissidens gracilifolius*, *Fossombronina echinata*, *Funaria pulchella*, *Riccia cavernosa* and *Weissia fallax* are new to Malta. This raises the number of species known from the Maltese Islands to 23 horn- and liverworts and 100 mosses.

The Maltese Islands (Malta, Gozo and Comino) form a small archipelago between Tunisia and Sicily, 300 km away from the African continent. It is part of the African plate and consists completely of a flat limestone plate from the Tertiary, mainly Globigerina limestone. Until 12.000 years ago, it was connected with Europe and Africa by a landbridge. The higher vegetation is much disturbed by human influence. The islands were colonized about 9000 years ago, were heavily deforested and are densely populated today. There are about 390.000 inhabitants on only 312 square kilometres. As a consequence, there are only between 25 and 30 individual trees left from the native forest tree species (*Quercus ilex*), some about 1000 years old (Weber & Kendzior 2006). Low elevation, geological uniformity, lack of forests and long during human influence reduce the biodiversity much. There are about 800 indigenous species of flowering plants, with few African elements and endemics, in garigue, maquis, steppe, rock, freshwater and coastal habitats.

The Maltese Islands are a bryologically much neglected region. Although political independent and part of the European Union, well delimited as island in the Mediterranean, it has not even regarded in the checklists of European bryophytes. Although Weber & Kendzior (2006) indicate 300 lichens and 180 mosses, including some endemic ones", neither Düll (1984) nor Söderström et al. (2002) mentioned it. Düll does not list Malta as floristic region, Söderström, who even lists the Channel Islands separately, included it in Sicily. Reason is that the checklists for Sicily (Dia et al. 1985, 1987) include Malta. Only the most recent European liverwort checklist (Ros et al. 2007) lists Malta separately. There is, however, no equivalent for mosses.

To fill the gap of knowledge, a short survey of the liverworts and mosses of the Maltese Islands is presented here. The list of liverworts (and hornworts) is based on Ros et al. (2007), that of mosses on the checklists for Sicily (Dia et al. 1985, 1987).

A brief survey of the history of the bryophyte flora of the Maltese Islands is given by Gradstein (1972).

The bryophyte flora of the Maltese Islands includes 26 species of horn- and liverworts and 100 taxa of mosses. Conspicuously, only two of the liverworts (*Southbya nigrella* and *Leiocolea turbinata*) are foliose, all others thallose. The majority of mosses consists of acrocarpous species, only a few (*Brachthecium rutabulum*, *Calliergonella cuspidata*, *Eurhynchium hians*, *E. praelongum*, *E. schleicheri*, *E. speciosum*, *Isothecium striatulum*, *Rhynchostegiella curviseta*, *R. tenella*, *Rhynchostegium megapolitanum*, *Scleropodium illecebrum*, *Scorpiurium circinatum*, *S. deflexifolium*, and the doubtful *Vesicularia galarulata*) are pleurocarps.

During a short fieldtrip to the Maltese Islands together with Norbert Stapper and Felix Schumm, the authors collected some bryophytes, which are included here in the checklist. They were collected at the following localities:

1. Malta, Mellieha, Oasam Barrani, Schlucht W des Ortes, 80m, 14°21.088,35° 57.485, 11.03.2008
2. Malta, Mellieha, Ghadica Nature Reserve, Umgebung des Naturschutzgebietes, 5m, 11.03.2008
3. Malta, Mellieha, SW Xenxija, Pinus halepensis Forst, 60m, 14° 37.299,35° 94.643, 12.03.2008
4. Malta, Bingemma Chapel S Zebbiegh, Kalksteinschlucht, 170m, 14°22.637, 35° 54.220, 12.03.2008
5. Malta, Buskett Gardens E von Dingli, Park mit Bachlauf, 200m, 14° 23.920,35° 51.595,13.03.2008
6. Malta, Nordküste E Bugibba gegenüber Ghallis Rock, Salzwiesen, 2m, 13.03.2008
7. Malta, Wied Dabu SW Zurriq, Kalksteinschlucht, 50-90m, 14° 27.940,35° 49.653,14.03.2008
8. Malta, Wied tas Saptan S Gudja, Olivenhain, 85m, 14° 30.728,35° 50242,14.03.2008
9. Malta, Wied Quirda SW Zebbug, Kalksteinschlucht, 54m,14° 27.297,35° 52.094,15.03.2008
10. Malta, Paradise Bay N Mellieha, Küstenfelsen, 15m,14° 19.822,35° 58.929,15.03.2008
11. Gozo, Westspitze, Fungus Rock W San Lawrence, Küstenfelsen, 30m,14° 11.433,35° 02.902,16.03.2008
12. Gozo, Xaghira, Ggantia Tempel, Ruinengelände, 120m,14° 16.140,36° 02.842,16.03.2008
13. Malta, Mellieha, along stream W of Hotel Panorama, 12.3.2008
14. Malta, Dingli, Cave Dwellings, 13.3.2008.

Hornworts and Liverworts

The nomenclature follows the checklists (Ros et al. 2007, Dias et al. 1985, 1987).

* = New to the Maltese Islands

Cephaloziella baumgartneri

Loc. 1, discovered on a small limestone pebble in a specimen of *Pottia davalliana* and *Sphaerocarpos michelii*. It is the only species of *Cephaloziella* growing on limestone as indicated by Müller (1955) accompanied by *Gymnostomum calcareum*, *Southbya nigrella*, *Gyroweisia tenuis* and *Tortula marginata*. The plants are tiny, only 1-2 mm long and c. 160 µm wide and can easily be overlooked. Such small plants have been described as *Cephaloziella vaucherioides* Pereira. There is a doubtful record of the arctic-alpine *Marsupella boeckii* by Müller (1954-57), which might refer to this species.

- Fossombronia caespitiformis*
Barsali 1914, Sommier & Caruana Gatto (1915), Sommier (1916), loc. 1,4,7,8,11,13.
Most common liverwort on the islands, often in masses.
- **Fossombronia echinata*
Loc. 7, in loamy soil of a trail bank in the shade of a high cliff.
- Fossombronia husnotii*
Sommier & Caruana Gatto (1915). Not included in Ros et al. 2007.
- Fossombronia pusilla*
Listed by Ros et al. (2007) but not in Dia et al. (1985). Perhaps confused with *F. husnotii*.
- Leiocolea turbinata*
Sommier & Caruana Gatto (1915), Sommier (1916). loc. 4,9.
- Lunularia cruciata*
Sommier & Caruana Gatto (1915). loc. 5,7,9,11.
- Marchantia polymorpha*
Ros et al. (2007).
- Oxymitra palaeacea*
Sommier & Caruana Gatto (1915), Sommier (1916). loc. 8.
- Pellia endiviifolia*
Sommier & Caruana Gatto (1915), Sommier (1916).
- Petalophyllum ralfsii*
Barsali 1914, Jovet-Ast & Bischler (1971), Müller (1954-57), Sommier & Caruana Gatto (1915), Zodda (1934), Sommier (1916). loc. 7,8.
- Phaeoceros bulbiculosus*
Sommier & Caruana Gatto (1915), Sommier (1916).
- Phaeoceros laevis*
This species was not recorded for the Maltese Islands by Dia et al. (1985) but has been recorded by Gradstein (1972). loc. 5,8.
- Riccia beyrichiana*
Jovet-Ast & Bischler (1971), Massalongo (1930), Müller (1954-57), Sommier & Caruana Gatto (1915), Zodda (1934), Sommier (1916).
- Riccia bicarinata*
Jovet-Ast & Bischler (1971), Massalongo (1930), Müller (1954-57), Sommier & Caruana Gatto (1915), Zodda (1934), Sommier (1916).
- **Riccia cavernosa*
Loc. 2, with *R. crystallina* on loamy soil of an abandoned field.
- Riccia crozalsii*
Jovet-Ast & Bischler (1971), Müller (1954-57), Sommier & Caruana Gatto (1915), Zodda (1934), Sommier (1916).
- Riccia crystallina*
Sommier & Caruana Gatto (1915), Sommier (1916). loc. 2, 5, 7, 9. One of the most common species of *Riccia* today but recorded earlier only twice.
- Riccia glauca*
Sommier & Caruana Gatto (1915), Sommier (1916).
- Riccia lamellosa*
Sommier (1916). loc. 7.
- Riccia melitensis*
This species is only known from the type specimen, which was collected by Sommier on April 14, 1896 in the valley „Xlendi“ auf Gozo (Jovet-Ast 1983). It was cited later by different authors such as Massalongo (1930), Müller (1954-57), Sommier & Caruana Gatto (1915), Zodda (1934), Sommier (1916). Jovet-Ast (1983) studied the type, gave a very complete description including SEM pictures of the spores and concluded that this

species cannot be confused with any other species of the genus from Europe because of the presence of white wings along the thallus. It is related to *R. gougettiana* and *R. ciliifera*.

Riccia sorocarpa

Sommier & Caruana Gatto (1915), Sommier (1916). loc. 2.

Riella helicophylla

Ros et al. (2007).

Southbya nigrella

Sommier & Caruana Gatto (1915), Sommier (1916). Loc. 9.

Sphaerocarpos michelii

Sommier & Caruana Gatto (1915), Sommier (1916). loc. 1,5,7,9

Targionia hypophylla

Sommier & Caruana Gatto (1915), Sommier (1916). Perhaps a dubious record because this species is calcifuge and the Maltese Islands are built up by limestone. The record is perhaps referable to *T. lorbeeriana*, which has been described first in 1940.

Mosses

Acaulon muticum

Baur (1891), Baur (1892), Bottini (1907), Sommier (1916)

Acaulon triquetrum

Bottini (1907), Sommier (1916)

Aloina aloides

Sommier (1916)

Aloina ambigua

Sommier (1916)

Aloina rigida

hb. Lanfranco, loc. 3.

Barbula ehrenbergii

Bottini (1907), Sommier & Caruana Gatto (1915), Podpera (1954), Sommier (1916)

Barbula unguiculata

hb. Lanfranco, Bottini (1907), Sommier & Caruana Gatto (1915), loc. 1,9.

Brachythecium rutabulum

Bottini (1907), Gradstein (1972), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 4,8.

Bryum argenteum

Brizi (1890), Sommier (1916)

Bryum argenteum var. *hirtellum* (= *B. lanatum* ?)

Bottini (1907), Cooke (1895), Sommier & Caruana Gatto (1915)

Bryum bicolor (*B. barnesii*)

Baur (1891), Baur (1892), Bottini (1907), Lanfranco (1967), Sommier (1916), Sommier & Caruana Gatto (1915), loc. 9.

Bryum caespiticium

hb. Lanfranco, hb. Wallace, Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 14.

Bryum capillare

Bottini (1907), Sommier & Caruana Gatto (1915), Lanfranco (1967), Bottini (1907), Sommier (1916), Lanfranco (1982)

Bryum donianum

Baur (1891), Baur (1892), Bottini (1907), Brizi (1890), Gradstein (1972), Sommier & Caruana Gatto (1915), Paris (1904-1906), Sommier (1916), loc. 3,7,8,13.

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- Bryum dunense*
hb. Lanfranco, loc. 1,3,9.
- Bryum erythrocarpum*
Baur (1891), Baur (1892), Sommier & Caruana Gatto (1915)
- Bryum intermedium*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Bryum laevifilum*
Bottini (1907), Sommier & Caruana Gatto (1915)
- Bryum mildeanum*
Bottini (1907), Sommier & Caruana Gatto (1915)
- Bryum pallescens*
Bottini (1907), Sommier & Caruana Gatto (1915)
- Bryum bimum*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915)
- Bryum radiculosum*
Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915)
- Bryum torquescens*
Bottini (1907), Sommier & Caruana Gatto (1915), Lanfranco (1967), Sommier (1916), loc. 3.
- Calliergonella cuspidata*
Bottini (1907), Sommier & Caruana Gatto (1915), Gradstein (1972), Sommier (1916)
- Crossidium crassinerve*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Brotherus (1924-5), Paris (1904-1906), Podpera (1954), Sommier (1916), Bilewsky (1965)
- Dicranella howei*
hb. Lanfranco, loc. 13. An underrecorded species, perhaps due to its sterile condition and because it has previously been included in *D. varia*.
- Dicranella varia*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Didymodon acutus*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco
- Didymodon fallax*
hb. Lanfranco
- **Didymodon luridus*
Repeatedly on dry limestone blocks on open pastures (loc.2) and in rocks in a periodically inundated stream (loc. 9).
- Didymodon rigidulus*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Didymodon tophaceus*
hb. Wallace, Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915), loc. 9.
- Didymodon vinealis*
Baur (1891), Baur (1892), Bottini (1907), Podpera (1954), Sommier & Caruana Gatto (1915), Paris (1904-1906), Sommier (1916), loc. 3,9. Quite common.
- Didymodon insulanus*
hb. Wallace
- Entosthodon attenuatus*
hb. Lanfranco
- Entosthodon curvisetus*
hb. Lanfranco, Sommier (1916), loc. 1.

- Entosthodon fascicularis*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Entosthodon pallescens*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 11.
- Eucladium verticillatum*
hb. Lanfranco, Baur (1891), Baur (1892), Bottini (1907), Gradstein (1972), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 5,9.
- Eurhynchium hians*
hb. Lanfranco, Bottini (1907), Sommier & Caruana Gatto (1915)
- Eurhynchium praelongum*
hb. Lanfranco
- Eurhynchium schleicheri*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Eurhynchium speciosum*
hb. Lanfranco
- Fissidens bryoides*
loc. 1.
- Fissidens crispus* (=limbatus)
hb. Lanfranco Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Brotherus (1924-5), Levier (1906), Paris (1904-1906), Sommier (1916), loc. 1,9.
- **Fissidens gracilifolius*
Loc. 4, on shaded limestone block at the bottom of a small ravine.
- Fissidens incurvus*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco
- Fissidens tamarindifolius*
Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915)
- Fissidens taxifolius*
hb. Lanfranco
- Fissidens viridulus*
hb. Lanfranco, Gradstein (1972), loc. 4.
- Funaria convexa*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Funaria hygrometrica*
hb. Wallace, Bottini (1907), Sommier & Caruana Gatto (1915), Lanfranco (1967), Sommier (1916), 155, Lanfranco (1982)
- Funaria hygrometrica* var. *calvescens*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915)
- Funaria muhlenbergii* (incl. var. *patula*)
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915)
- **Funaria pulchella*
On shady limestone rock (loc. 1) and in hollows of horizontal, sunny rocks (loc. 14).
- Gymnostomum calcareum*
Baur (1891), Baur (1892), Bottini (1907), Gradstein (1972), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco, loc. 4,10,11. Very common,
- Gyroweisia reflexa*
Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915)
- Isoetecium striatulum*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Paris (1904-1906), Podpera (1954), Sommier (1916), loc. 4,9.

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- Leptobarbula berica*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 1,3,4,9, 13. Quite common on limestone blocks.
- Orthotrichum diaphanum*
Bottini (1907), Sommier (1916)
- Phascum curvicolle*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Phascum cuspidatum*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 11.
- Phascum cuspidatum* var. *piliferum*
Loc. 12.
- Pleurochaete squarrosa*
Bottini (1907), Brizi (1890), Cooke (1895), Sommier & Caruana Gatto (1915), Sommier (1916)
- Pohlia melanodon*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Pohlia wahlenbergii*
hb. Lanfranco
- Pottia commutata*
Bottini (1907), Podpera (1954), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco
- Pottia davalliana*
hb. Lanfranco, Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 1, 12.
- Pottia davalliana* var. *brachyoda*
Baur (1891), Baur (1892), Sommier & Caruana Gatto (1915), Bottini (1907), Sommier (1916)
- Pottia davalliana* var. *conica*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), loc. 1.
- Pottia intermedia*
hb. Lanfranco, Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915)
- Pottia pallida*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Brotherus (1924-5), Sommier (1916), Bilewsky (1965), loc. 6, 11,12.
- Pottia recta*
hb. Lanfranco, Baur (1891), Baur (1892), Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915)
- Pottia starkeana*
hb. Lanfranco, Baur (1891), Sommier & Caruana Gatto (1915), Sommier (1916), Bottini (1907), loc. 1.
- Pottia truncata*
Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco
- Pseudocrossidium hornsuschianum*
hb. Wallace, Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco
- Pseudocrossidium revolutum*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)

- Rhynchostegiella curviseta*
Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- Rhynchostegiella tenella*
hb. Lanfranco, hb. Wallace, Baur (1891), Baur (1892), Brizi (1890), Gradstein (1972), Sommier & Caruana Gatto (1915), Bottini (1907), Nyman (1844), Sommier (1916). Sommier & Caruana Gatto (1915), loc. 1,4,7. Common.
- Rhynchostegium megapolitanum*
hb. Wallace, Sommier (1916), Lanfranco (1982), loc. 4,7,8.
- Rhynchostegium megapolitanum* var. *meridionale*
Bottini (1907), Sommier & Caruana Gatto (1915)
- Scleropodium tourettii* (*S. illecebrum*)
hb. Lanfranco, Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 8.
- Scorpiurium circinatum*
hb. Wallace, Baur (1891), Baur (1892), Bottini (1907), Brizi (1890), Cooke (1895), Gradstein (1972), Sommier & Caruana Gatto (1915), Lanfranco (1984), Sommier (1916), loc. 1,4,5,7,8,9. Most common species of pleurocarpous mosses.
- Scorpiurium deflexifolium*
Sommier & Caruana Gatto (1915)
- (*Thamnobryum cossyrense*)
Sommier (1916). The species was described by Bottini (1907) based on material collected on Pantelleria ("Cossyra") and Malta. The latter was distinguished as var. *melitense*. Both were synonymized with *Scorpiurium circinatum* by Mastracci (2001).
We found material in loc. 9, which fits the description given by Mönkemeyer (1927) in every respect. The specimen is, however, not specifically different from *Scorpiurium circinatum*, but larger and with dendroid branches. The characteristic indicated for *Thamnobryum cossyrense*, the spiny end of the costa, is diagnostic for *Scorpiurium* as well as the serrate upper leaf margins and the leaf shape. The plants grew on humid limestone blocks at the base of a seeping cliff.
- Timmiella barbuloidea*
Baur (1891), Baur (1892), Bottini (1907), Gradstein (1972), Sommier & Caruana Gatto (1915), Sommier (1916), hb. Lanfranco, loc. 7,8,11.
- Tortella flavovirens*
Bottini (1907), Gradstein (1972), Sommier & Caruana Gatto (1915), Lanfranco (1967), Sommier (1916), Lanfranco (1982), loc. 6,10,12.
- Tortella inflexa*
Brotherus (1924-5), Paris (1904-1906), Sommier (1916), Bilewsky (1965), 161
- Tortella nitida*
hb. Lanfranco, Gradstein (1972)
- Tortella tortuosa*
hb. Lanfranco
- Tortula marginata*
hb. Wallace, Baur (1891), Baur (1892), Bottini (1907), Gradstein (1972), Lanfranco (1967), Paris (1904-1906), Sommier (1916), Sommier & Caruana Gatto (1915), loc. 1,3,5,7. Very common and limestone rocks and walls.
- Tortula muralis*
hb. Wallace, Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Lanfranco (1967), Lanfranco (1984), Nyman (1844), 82, Sommier (1916), 136, Lanfranco (1982), loc. 1,8. Common.
- Tortula muralis* var. *aestiva*

- Bottini (1907), Brizi (1890), Cooke (1895), Sommier (1916), Sommier & Caruana Gatto (1915), loc. 5,9. Frequent on shaded rocks.
- Tortula solmsii*
Bottini (1907), Sommier & Caruana Gatto (1915), Bottini (1907), Podpera (1954), Long & Hill (1982)
- Trichostomum brachydontium*
hb. Lanfranco, hb. Wallace, Baur (1891), Baur (1892), Bottini (1907), Sommier & Caruana Gatto (1915), Nyman (1844), Sommier (1916), loc. 1.
- Trichostomum crispulum* (incl. var. *elatum*)
hb. Lanfranco, hb. Wallace, Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916), loc. 1,3,10.
- Vesicularia galerulata*
This tropical African species was recorded by Reimers (1934) based on a specimen presumably collected by Schweinfurth on Malta in 1872. As argued by Bizot & P. Varde (1952), this record is very doubtful.
- Weissia brachycarpa*
hb. Lanfranco, loc. 3.
- Weissia controversa*
hb. Wallace, Bottini (1907), Sommier & Caruana Gatto (1915), Sommier (1916)
- **Weissia fallax*
Loc. 1, on semi shady horizontal rock. The species is related with *W. controversa* but distinguished by a rudimentary pale peristome and a wider costa.
- Weissia wimmeriana*
Bottini (1907), Sommier (1916), Sommier & Caruana Gatto (1915)

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References

- Barsali, E. 1914. Le Codonie della Flora Italiana. Bull. Soc. Bot. Ital. 1914: 65-75.
- Baur, W. 1891 Beiträge zur Laubmoosflora der Insel Malta. Hedwigia 30: 217-219.
- Baur, W. 1892. A contribution to the Moss Flora of Malta. Medit. Naturalist 1: 151-152.
- Bilewsky, F. 1965. The Moss Flora of Israel. Nova Hedwigia 9: 335-434.
- Bizot, M., Potier de la Varde, R. 1952. Sur l'existence du genre *Vesicularia* en Afrique du Nord. Rev. Bryol. Lichenol. 21: 226-228.
- Bottini, A. 1907. Sulla briologia Italiana. Nuovo Giornale Bot. Ital. 22: 2 Levier (1906)-266.
- Brizi, U. 1890. Notizie. Addenda ad floram italicam. Note di Briologia Italiana. Malphigia 4: 262-282.
- Brotherus, V.J. 1924-5. Bryales in: Engler-Prantl, die Natürlichen Pflanzenfamilien. Leipzig.
- Cooke, J. 1892. Maltese Mosses. Medit. Naturalist 1: 174.
- Dia, M.G., Miceli, G., Not, R. 1985. Check-list delle Epatiche noti in Sicilia. Webbia 39: 163-177.
- Dia, M.G., Miceli, G., Raimondo F.M. 1987. Check-list dei Musci noti in Sicilia. Webbia 41: 61-123.
- Düll, R. 1984. Distribution of the European Mosses, part 1. Bryologische Beitrage Bd. 4, 113 pp.
- Gradstein, S.R. 1972. A note on the bryophytes of the Maltese Islands. Acta Botanica Neerlandica 21:67-70.
- Gradstein, S.R. 1972. A note on the Bryophytes of the Maltese Islands. Acta Bot. Neerlandica Cooke (1892): 67-70.
- Jovet-Ast., S. 1983. Taxons rares ou critiques du genre *Riccia*. Cryptogamie, Bryol. Lich. 4: 315-333.

- Jovet-Ast, S. & Bischler, H. 1971. Les Hépatiques de Tunisie. Enumération, notes écologiques et biogéographiques. Rev. Bryol. Lichénol. 38: 1-125.
- Lanfranco E. 1982 Looking at plants. 10-The mosses. Potamon 10: 143-44.
- Lanfranco, E. 1984. Guida alle escursioni a Malta. Mscr. Sezione Siciliana della Soc. Bot. Ital., 8 pp.
- Lanfranco, E. 1967. Some cryptogams met with during recent excursions. Report for the Natural Society of Malta for 1967: 7-12.
- Levier, E. 1906. A proposito di alcune muscinee rare d'Italia trovate unicamente sui muri die fabbricati. Boll. Soc. Bot. Ital. 1906(1): 7-8.
- Long, D.G., Hill, M.O. 1982. *Tortula solmsii* (Schimp.) Limpr. In Devon and Cornwall, newly recorded in the British Isles. J. Bryol. 12: 159-169.
- Massalongo, C. 1913. Nuovi rappresentati nella Flora italica del genere *Riccia*. Bull. Soc. Bot. Ital. 1895: 154-156.
- Mastracci, 2001. Taxonomic status of *Thamnum cossyrense* and *T. cossyrense* var. *melitense* (Bryopsida). *Annales Botanici Fennici* 38: 45-46.
- Müller, K. 1954-57. Die Lebermoose. Bd. 6 in: L. Rabenhort's Kryptogamenflora. Leipzig.
- Nyman, C.F. 1844. Observationes in Floram Siculam quas itinere anno MDCCCXLIV adnotavit C.F. Nyman. *Linnaea* 18: 625-663.
- Paris, E.G. 1904-1906. Index bryologicus. Paris.
- Podpera, J. 1954. *Conspectus Muscorum Europaeorum*. Prag, 697 SS.
- Reimers, H. 1934. Eine *Vesicularia* im Mediterranen Gebiet. Rev. Bryol. Lich. 7: 306-307.
- Ros, R.M., Mazimpaka, V., Abou-Salama, U., Aleffi, M., Blockeel, T.L., Bruges, M., Cano, M.J., Cros, R.M., Dia, M.G., Dikse, G.M., El Saadawi, W., Erdag, A., Ganeva, A., Gonzalez-Mancebo, J.M., Herrstadt, I., Khalil, K., Kürschner, H., Lanfranco, E., Losada-Lima, A., Refai, M.S., Rodriguez-Nunez, S., Sabovljevic, M., Sergio, C., Shabbara, H., Sim-Sim, M., Söderström, L. 2007. Hepatics and Anthocerotae of the Mediterranean, an annotated checklist. *Cryptogamie, Bryologie* 28: 351-437.
- Söderström, L., Urmi, E., Vana, J. 2002. Distribution of Hepaticae and Anthocerotae in Europe and Macaronesia. *Lindbergia* 27: 3-47.
- Sommier, S. 1916. Osservazioni sulla flora maltese. *Nuovo Giorn. Bot. Ital. n.s. Brocherus* (1924-5): 295-326.
- Sommier, S., Caruana Gatto, A. 1915. *Flora melitensis nova*. Florenz, 502 SS.
- Zodda, G. 1934. Hepaticae in: *Flora Italica Cryptogama*. Soc. Bot. Ital., Rocca S. Casciano.