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On a bryophyte collection from the Maltese Islands

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ABSTRACT
During a recent visit of the Maltese Islands Malta and Gozo in January 2018, some 200 collections of bryophytes have been done representing one species of hornworts, 14 species of liverworts and 49 species of mosses, among these six first records (*Riccia ciliata* Hoffm., *Targionia lorbeeriana* Müll.Frib., *Amblystegium serpens* (Hedw.) Schimp., *Cheilothela chloropus* (Brid.) K.Saito, *Ephemerum recurvifolium* (Dicks.) Boulay, and *Tortula cuneifolia* (Dicks.) Turner). *Riccia ciliifera* Link ex Lindenb., *Riccia crozalsii* Levier and *Acaulon muticum* (Hedw.) Müll.Hal. have been redetected after more than 100 years, and the occurrence of three very recently reported species (*Cephaloziella baumgartneri* Schiffn., *Astomum crispum* (Hedw.) Hampe and *Tortula vahliana* (Schultz) Mont.) has been confirmed.

KEY WORDS
Malta,
Gozo,
bryophytes,
new records.

RÉSUMÉ
Sur une collection de bryophytes des Îles maltaises
Lors d'une récente excursion dans les Iles maltaises Malte et Gozi en janvier 2018, quelques 200 bryophytes ont été collectés, soit une espèce d'anthocérotes, 14 d'hépatiques et 49 de mousses. *Riccia ciliata* Hoffm., *Targionia lorbeeriana* Müll.Frib., *Amblystegium serpens* (Hedw.) Schimp., *Cheilothela chloropus* (Brid.) K.Saito, *Ephemerum recurvifolium* (Dicks.) Boulay, et *Tortula cuneifolia* (Dicks.) Turner sont nouveaux pour la région. *Riccia ciliifera* Link ex Lindenb., *Riccia crozalsii* Levier et *Acaulon muticum* (Hedw.) Müll.Hal. ont été retrouvés, 100 ans après leur dernière récolte. La présence de *Cephaloziella baumgartneri* Schiffn., *Astomum crispum* (Hedw.) Hampe and *Tortula vahliana* (Schultz) Mont. a été confirmée.

MOTS CLÉS
Malte,
Gozo,
bryophytes,
signalements nouveaux.

INTRODUCTION

The Maltese Islands belong bryologically to still undercollected or even neglected regions in Europe. This may be due to the monotonous geological texture (flat limestone plate) and the low elevations (highest point in Malta 253 m, in Gozo 195 m above sea level). Beside, the natural vegetation has been nearly completely disturbed by human influence, no natural forests remain, and the islands are densely populated with 467 000 inhabitants on 312 km² that means about 1500 inhabitants per km² (Statistics data from internet). Bryologically interesting localities are very limited in number and restricted to more or less deep valleys, the so-called "wieds" (permanently or intermittently dry riverbeds). However, part of these are not or hardly accessible because these are fully cultivated or otherwise in private use.

A complete listing of our collections may be justified not only because relatively few data on the bryophyte flora are available but also because there are sometimes differences between historical collections and recent ones – see comments given below some selected species. Nomenclature follows Söderström *et al.* (2016) for liverworts and Guerra & Cros (2006-2018) for mosses. Voucher specimens are deposited in the private herbarium of the first author which will be housed later on in JE.

MATERIAL AND METHODS

Abbreviation

* new to the Maltese Islands.

List of localities

Some of the localities given by Frahm & Lüth (2008) have been revisited. All collection sites have been accessed by public traffic.

1. Malta, Floriana at southwestern edge of La Valletta, public park, 35-45 m, 35°53.4-7'N, 14°30.4-7'E, 18.I.2018 [collection numbers 38420-38427];

2. Malta, northern slope between Mdina and Rabat, 170-180 m, 35°51.1-2'N, 14°24.0'E, 19.I.2018 [38428-38430]

3. Malta, moat of Mdina, 190 m, 35°51.1'N, 14°24.1'E, 19.I.2018 [38431];

4. Malta, St. Paul's Bay near Bugibba, shrubby vegetation along the coast, 10 m, 35°57.4'N, 14°25.2'E, 20.I.2018 [38432-38440];

5. Malta, Bugibba, Salina park, 10 m, 35°56.6'N, 14°25.2'E, 20.I.2018 [38441-38442];

6. Malta, Mosta, Wied Tal Isperanza at NW edge of the city, 60-70 m, 35°54.4-6'N, 14°24.8'-25.1'E, 21.I.2018 [38443-38455];

7. Malta, Mosta, Wied il Ghasel NE of Rotunda church, limestone ravine, 50-60 m, 35°54.85'55.0'N, 14°25.5-6'E, 21.I.2018 [38456-38470];

8. Gozo, Xlendi valley up to Fontana, 1-55 m, 36°01.9'-02.2'N, 14°12.4'-13.1'E, 22.I.2018 [38471-38477];

9. Gozo, Gharb, Wied il Mielah, 30-50 m, 36°04.2-5'N, 14°12.4-5'E, 22.I.2018 [38478-38479];

10. Malta, Qrendi SW of La Valletta, sinkhole Maqluba, 80-90 m, 35°49.9'N, 14°27.4'E, 23.I.2018 [38480-38491];

11. Malta, Qrendi SW of La Valletta, path to Blue Grotto passing cultivated land, 80 m, 35°49.8'N, 14°27.5'E, 23.I.2018 [38492-38495];

12. Malta, Zurrieq SW of La Valletta, Wied Babu, 50-70 m, 35°49.5'N, 14°27.6'E, 23.I.2018 [38496-38502] – Fig. 1.

13. Malta, Mosta, Targa Gap, public garden along "Victoria Line", 70 m, 35°55.2'N, 14°25.2'E, 24.I.2018 [38503-38513];

14. Malta, Mosta, open rocky vegetation along "Victoria Line" W of Targa Gap to N of Mdina, 80-150 m, 35°54.5'-55.0'N, 14°23.8'-24.6'E, 24.I.2018 [38514-38520];

15. Malta, Haz Zebbug S of La Valletta, Wied Quirda SE of the town, 50-60 m, 35°52.1-5'N, 14°26.8'-27.5'E, 25.I.2018 [38521-38533];

16. Malta, Siggiewi SW of La Valletta, Wied il Hesri, 70 m, 35°51.7'N, 14°26.4'E, 25.I.2018 [38534-38538];

17. Malta, Tal Pieta at NW edge of La Valletta, public parc, 20 m, 35°53.540'N, 14°29.935'E, 25.I.2018 [38539];

18. Malta, Mellieha, northern slope with shrubby vegetation below the church, 90 m, 35°57.720'N, 14°21.617'E, 26.I.2018 [38540-38541];

19. Malta, Mellieha, Wied Quasam Barrani at western edge of the town, 60-100 m, 35°57.3-5'N, 14°21.5'E, 26.I.2018 [38542-38552];

20. Malta, Mistra Valley S of Mellieha, open N-exposed slope and reafforestation of *Pinus halepensis* W of Xemxija, 30-50 m, 35°57.0-1'N, 14°22.6-8'E, 26.I.2018 [38553-38561];

21. Malta, surroundings of Bingemma Chapel at Victoria Line N of Rabat, 170-190 m, 35°54.2'N, 14°22.7'E, 27.I.2018 [38562-38575] – Fig. 2.

22. Malta, Ta Quali between Mdina and Mosta, public park at National Stadium, 100 m, 35°53.7'N, 14°25.1'E, 27.I.2018 [38576-38579];

23. Malta, Wied Sabtan (incl. abandoned olive plantation) between Gudja and Birzebbuga S of La Valletta, 40-50 m, 35°50.2'N, 14°30.7-9'E, 28.I.2018 [38580-38593; olive plantation: 38587-38593];

24. Malta, N-exposed rocky slope above Gnejna Bay at NW coast, 85 m, 35°55.029'N, 14°20.448'E, 29.I.2018 [38594-38597];

25. Malta, Mosta, Wied il Ghasel, NE part of the limestone gorge, 35 m, 35°55.2'N, 14°25.7'E, 29.I.2018 [38598-600] ;

26. Malta, Madliena – Swieqi, Triq Sta Caterina, St. Pauls Garden (private garden), 120 m, 35°55.2'N, 14°27.8'E, 30.I.2018 [38601-38606];

27. Malta, Wied near Madliena along road to Gharghur, 70 m, 35°55.71'N, 14°27.65'E, 30.I.2018 [38607-38613];

28. Malta, Pieta between Sliema and La Valletta, Ta Braxia Cemetery, 20 m, 35°53.4'N, 14°29.9'E, 31.I.2018 [38614-38625].

Fig. 1. — Wied Babu near Zurrieq (Loc. 12)

Fig. 2. — Victoria Line at Bingemma Chapel, with old fortifications (Loc. 21)

LIST OF SPECIES

Hornworts

Sterile thalli of hornworts have often been seen, only once with immature sporophytes at Loc. 28, 38614, as "Anthocerotae" (no spores seen, cultivation at home failed). Sommier & Caruana Gatto (1915) considered *Phymatoceros bulbiculosus* (Brot.) Stotler, W.T.Doyle & Crand.-Stotl. (as *Anthoceros dichotomus* Raddi) a frequent species on Malta and Gozo. *Phaeoceros laevis* (L.) Prosk. has been reported by Gradstein (1972, however, mentioning *Anthoceros dichotomus* as synonym), and Frahm & Lüth (2008) reported two collections of *Phaeoceros laevis* which may represent the single record for the Maltese Islands.

Liverworts

Cephaloziella baumgartneri Schiffn.

Material examined. — Loc. 12, 38499; Loc. 16, 38537/B, sparsely between *Fossombronia caespitiformis*; Loc. 19, 38548; Loc. 21, 38563, 38571; Loc. 23, 38588; Loc. 24, 38597, c. per.; Loc. 27, 38609.

Remarks

Though firstly reported by Frahm & Lüth (2008) from a single small specimen, this species seems not to be rare on Malta. However, January or early February may be the best time to detect this tiny liverwort. From Sicily only once reported (Dia *et al.* 1985).

Fossombronia caespitiformis (Nees) De Not.

Material examined. — Loc. 2, 38430/A; Loc. 4, 38434, 38440; Loc. 6, 38451; Loc. 7, 38457, 38469; Loc. 10, 38489; Loc. 13, 38503, 38505; Loc. 14, 38514; Loc. 16, 38537/A; Loc. 20, 38561/A; Loc. 21, 38567; Loc. 23, 38580/B; Loc. 24, 38596; Loc. 26, 38601/C; Loc. 28, 38623.

Remarks

A very common species on the Maltese Islands, as already indicated by Sommier & Caruana Gatto (1915); no other member of *Fossombronia* could be collected. Possibly, other species may develop sporophytes somewhat later in the year and therefore have not been collected. Interestingly, exactly one year ago in second half of January 2017, abundant *Fossom-*

bronia have been seen in northern limestone part of Cyprus, however, no single sporophyte could be detected there.

Lunularia cruciata (L.) Dumort.

Material examined. — Loc. 7, 38465 p.p.; Loc. 15, 38528; Loc. 26, 38605; Loc. 28, 38625.

Mesoptychia turbinata (Raddi) L.Söderstr. & Váňa

Material examined. — Loc. 12, 38500.

Remarks
Seen only once; it may belong to the rather scattered or even rare species of the Maltese Islands though Sommier & Caruana Gotto (1915, as *Jungermannia turbinata* Raddi) stated "*non rara*".

Oxymitra incrassata (Brothero) Sérgio & Sim-Sim

Material examined. —Loc. 12, 38496; Loc. 23, 38584.

Remarks
Seems nowadays belong to the rather rare or at most scattered species (only once seen by Frahm & Lüth, 2008). Sommier & Caruana Gatto (1915, as *Tessellina pyramidata* Dumort.) found it abundant and noted that *Oxymitra* appears later in the year when most *Riccia* species are desintegrated.

Petalophyllum ralfsii (Wils.) Nees & Gottsche

Material examined. — Loc. 7, 38460, c. spor., 38468, c. spor.; Loc. 12, 38502, c. spor.; Loc. 14, 38516; Loc. 20, 38554, c. spor., 38561, c. spor.; Loc. 21, 38568.

Remarks
In Sicily considered as near-threatened taxon (Campisi *et al.* 2003); on Malta, however, it seems not to be rare and producing regularly sporophytes. Sommier & Caruana Gatto (1915) reported it from a single locality and considered it to be a rare species, Lanfranco (1989) considered it "not rare in the Maltese islands".

****Riccia ciliata*** Hoffm.

Material examined. — Loc. 20, 38557.

Remarks
Known from atlantic and subatlantic Europe, but mainly mediterranean region, North Africa, Israel, Turkey and Bulgaria (detailed distribution in Jovet-Ast 1986); not rare in Sicily (Dia *et al.* 1985), but new to the Maltese Islands.

Riccia ciliifera Link ex Lindenb.

Riccia melitensis Massalongo (1913 : 52)

Material examined. — Loc. 10, 38482, 38491; Loc. 11, 38495; Loc. 13, 38504; Loc. 15, 38526, 38533; Loc. 21, 38574/B; Loc. 25, 38600; Loc. 27, 38607, 38613; Loc. 28, 38620.

Remarks
Riccia melitensis, known only from the type locality on Gozo, has recently been synonymized under *R. ciliifera* (Hugonnot 2015). Surprisingly, *R. melitensis/ciliifera* has never been found again on the Maltese Islands though it seems to belong there together with *Riccia sorocarpa* to the most frequent member of this genus, sometimes occurring in large mats of up to more than 1 m^2. At its type locality in Xlendi valley on Gozo (Loc. 8) however, it could not be relocated.

Riccia crozalsii Levier

Material examined. — Loc. 23, 38583, 38591/A.

Remarks
Apparently a rare species on Malta (lacking in Sicily, Dia *et al.* 1985), so far known only from a few old collections (Sommier & Caruana Gatto 1915); confirmed after more than 100 years.

Riccia crystallina L.

Material examined. — Loc. 1, 38420; Loc. 22, 38579.

Remarks
Seen only twice in small quantity; it seems to be better developed somewhat later in the year as Frahm & Lüth (2008) stated: "One of the most common species of *Riccia* today but recorded earlier only twice."

Riccia sorocarpa Bisch.

Material examined. — Loc. 1, 38425; Loc. 6, 38452; Loc. 11, 38494; Loc. 14, 38515; Loc. 15, 38525, 38532; Loc. 19, 38545; Loc. 21, 38570, 38574/A; Loc. 23, 38580/A; Loc. 27, 38608; Loc. 28, 38619.

Remarks
Probably the most common species of *Riccia* together with *Riccia ciliifera*.

Southbya nigrella (De Not.) Henr.

Material examined. — Loc. 23, 38589.

Remarks
Only once seen by us, also by Frahm & Lüth (2008); otherwise reported only by Sommier & Caruana Gatto (1915) from several localities who considered it not to be a rare species. Seemingly a species that is in decline. Interestingly, there is no record of *Southbya nigrella* from Sicily (Dia *et al.* 1985).

Sphaerocarpos michelii Bellardi

Material examined. — Loc. 1, 38421, 38426; Loc. 3, 38431; Loc. 8, 38473; Loc. 10, 38481; Loc. 19, 38552; Loc. 22, 38576; Loc. 26, 38606; Loc. 28, 38618.

Remarks
A frequently seen species, and already Sommier & Caruana Gatto (1915) considered it to be very common.

****Targionia lorbeeriana*** Müll.Frib.

Material examined. — Loc. 7, 38461; Loc. 10, 38490.

Remarks
So far, this species has not been recorded from the Maltese Islands though seven old records of *T. hypophylla* L. from Malta and Gozo (Sommier & Caruana Gatto 1915) may refer here (Frahm & Lüth 2008). Obviously, *Targionia* has not been found again since more than 100 years ago and may be in decline.

Mosses

Acaulon muticum (Hedw.) Müll.Hal.

Material examined. — Loc. 22, 37579/A, sparse.

Remarks
Known only from a single collection made by Sickenberger in 1876 (Baur 1891; Sickenberger 1892); included in the Red Data Book by Lanfranco (1989), and here confirmed after more than 140 years.

Aloina ambigua (Bruch & Schimp.) Limpr.

Material examined. — Loc. 4, 38436; Loc. 8, 38477; Loc. 11, 38493/A; Loc. 13, 38509; Loc. 15, 38522, 38531/A; Loc. 24, 38594; Loc. 26, 38603; Loc. 27, 38610; Loc. 28, 38622.

Remarks
Apparently the most common member of *Aloina* on Malta; the other two species (*A. aloides* and *A. rigida*) known have not been seen.

****Amblystegium serpens*** (Hedw.) Schimp.

Material examined. — Loc. 8, 38476, on temporarily wet calcareous tuff inside the fountain Il Kbira.

Remarks
Widespread in Europe, Asia, Canary Islands, America, Australia, New Zealand, North and Central Africa, and also known from Sicily (Dia *et al.* 1987). First record for the Maltese Islands.

Astomum crispum (Hedw.) Hampe

Material examined. — Loc. 6, 38450/A; Loc. 7, 38464/C; Loc. 18, 38540; Loc. 19, 38542; Loc. 20, 38559/A; Loc. 23, 38592; Loc. 26, 38602. All c. spor.

Remarks
Seems not to be a really rare species on Malta though there is only a single record from Malta from a Holyoak collection by Mifsud (2012, as *Weissia longifolia* Mitt.).

Barbula unguiculata Hedw.

Material examined. — Loc. 2, 38430/B; Loc. 13, 38512; Loc. 15, 38531/C; Loc. 24, 38594p.p.; Loc. 26, 38601/A.

Remarks
Common.

Brachythecium rutabulum (Hedw.) Schimp.

Remarks
We visited the two localities from where Frahm & Lüth (2008) cited this species but could not relocate it there; at both localities there have been seen abundant *Rhynchostegium megapolitanum* (sometimes growing very similar to *B. rutabulum* but occasionally with smooth seta which readily excludes the latter). A re-examination of the two specimens cited in Frahm & Lüth (2008) by M. Lüth revealed that both in fact belong to *R. megapolitanum*. Another specimen cited by Gradstein (1972) has been re-examined and renamed as *R. megapolitanum* by H. Siebel. Further specimens from Malta have not been seen though it was cited from there also by Bottini (1907), Sommier & Caruano Gatto (1915) (both in sterile condition), and Mifsud (2012).

Bryum argenteum Hedw.

Remarks
It has been seen in very small quantity at Loc. 22, but not collected (it was the "normal" phenotype, not the "*lanatum* phenotype"). Mifsud (2012) reported *Bryum argenteum* from numerous sites in urban areas.

Bryum dichotomum Hedw.

Material examined. — Loc. 15, 38524/A.

Remarks
Probably not rare, but rarely seen with axillary bulbils.

Bryum caespiticium Hedw.

Material examined. — Loc. 23, 38586, c. spor.

Bryum donianum Grev.

Material examined. — Loc. 20, 38553, c. spor.

Bryum torquescens Bruch & Schimp.

Material examined. — Loc. 21, 38566, c. spor.

Remarks
Several collections of *Bryum* remain unidentified (sterile, no gemmae seen).

****Cheilothela chloropus*** (Brid.) Lindb.

Material examined. — Loc. 23, 38593.

Remarks
First record for the Maltese Islands. A widespread Mediterranean species, known also from several localities in Sicily (Dia *et al.* 1987). *Cheilothela* is easily recognised by the leaf cells with large mamillae.

Dicranella howei Ren. & Card.

Material examined. — Loc. 2, 38430, c. spor.; Loc. 6, 38447; Loc. 10, 38487; Loc. 14, 38519, c. spor.; Loc. 15, 38530/C; Loc. 20, 38558, c. spor.; Loc. 24, 38594 p.p.

Remarks
All *Dicranella* specimens collected belong here, *D. varia* (Hedw.) Schimp. have not been seen.

Didymodon acutus (Brid.) K.Saito

Material examined. — Loc. 16, 38536; Loc. 23, 38580/C; Loc. 26, 38601/B; Loc. 27, 38612.

Didymodon luridus Hornsch. ex Sprengel

Material examined. — Loc. 1, 38423; Loc. 5, 38441; Loc. 7, 38466; Loc. 15, 38530/A.

Remarks
Still a frequent species on the Maltese Islands, firstly reported by Bottini (1907) and consequently by Sommier & Caruana Gatto (1915), who already considered it to be a frequent species; see also Mifsud (2012).

Didymodon tophaceus (Brid.) Lisa

Material examined. — Loc. 19, 38551.

Remarks
Seen by us only once but seems to be locally more frequent (Mifsud 2012).

Didymodon vinealis (Brid.) R.H.Zander

Material examined. Loc. 1, 38424; Loc. 7, 38467; Loc. 9, 38479.

Entosthodon convexus (Spruce) Brugués

Material examined. — Loc. 2, 38428; Loc. 7, 38462; Loc. 11, 38492, det . M. Brugués; Loc. 14, 38520; Loc. 17, 38539; Loc. 20, 38555, det. M. Brugués; Loc. 21, 38573/B, det. M. Brugués; Loc. 23, 38591; Loc. 26, 38604; Loc. 28, 38617, det. M. Brugués. All c. spor.

Remarks
All cited specimens have been referred here because of the completely flat operculum. However, the leaf shape is not always typical, often being more longly pointed as in *E. pulchellus*, and leaf serration and length of costa are variable. Therefore, it cannot fully ruled out that hybridizations are involved. Following own observations, *Entosthodon convexus* seems to be the most common member of Funariaceae on the Maltese Islands. It has been evaluated as "data deficient" by Hodgetts (2015).

Entosthodon muhlenbergii (Turner)

Remarks
Fife is known from Malta only by some old records (Baur 1891; Sickenberger 1892, as *Funaria calcarea*; Bottini, 1907, as *F. mediterranea* + var. *patula*; Sommier & Caruana Gatto, 1915) and its occurrence there should be confirmed. It is a more northern species penetrating the Mediterranean region only as far as Rome, with a single locality at high altitude in Turkey (Crundwell & Nyholm 1974). In the Iberian Peninsula, *E. muhlenbergii* is restricted to altitudes above 1000 m (Brugués & Ruiz 2010). Its occurrence on the Maltese Islands seems unlikely. Evaluated as "data deficient" by Hodgetts (2015).

Entosthodon pulchellus (H.Philib.) Brugués

Material examined. — Loc. 7, 38456; Loc. 10, 38484/A; Loc. 15, 38529; Loc. 19, 38547; Loc. 24, 38595. All c. spor.

Remarks
All specimens referred here have a conical (or at least centrally conical and marginally flat) operculum, a mostly smooth to slightly serrate leaf margin, longly pointed leaf apex which is, however, sometimes hardly different from specimens cited under *E. convexus*, and variable length of costa. See also the comment under *E. convexus*. Frahm & Lüth (2008) firstly reported this species (as *Funaria pulchella* H.Philib.) from two collections, and Mifsud (2012) added four further localities.

****Ephemerum recurvifolium*** (Dicks.) Boulay

Material examined . — Loc. 4, 38435; Loc. 6, 38449; Loc. 13, 38508; Loc. 19, 38546; Loc. 25, 38598. All c. spor.

Remarks
First record for Malta where it seems to be not really a rare species; however, it is easily overlooked due to its small size and ephemeral appearance. It is readily recognized by the percurrent costa and asymmetrical capsule with oblique apiculus. In Italy, this species seems to be rather scattered, absent in southern Italy and threatened in Siciliy from where it is known from a single locality (Campisi *et al.* 2003; Aleffi *et al.* 2008).

Eucladium verticillatum (Brid.) Bruch & Schimp.

Material examined. — Loc. 8, 38475.

Remarks
Only rarely seen by us but obviously rather frequent on Malta and Gozo (Mifsud 2012).

Fissidens crispus Mont.

Material examined. — Loc. 13, 38513; Loc. 15, 38522/B.

Fissidens viridulus (Sw. ex anon.) Wahlenb. var. ***viridulus***

Material examined. — Loc. 2, 38429; Loc. 7, 38459.

Fissidens viridulus var. ***incurvus*** (Starke ex Röhl.) Wils.

Material examined. — Loc. 4, 38437; Loc. 6, 38446/A, 38454; Loc. 8, 38474; Loc. 10, 38485; Loc. 19, 38544; Loc. 28, 38615. All c. spor.

Funaria hygrometrica Hedw.

Material examined. — Loc. 2, 38430 p.p.; Loc. 15, 38521, c. spor.

Funariella curviseta (Schwägr.) Sérgio

Material examined. — Loc. 7, 38458, 38470; Loc. 10, 38488; Loc. 13, 38511; Loc. 19, 38549; Loc. 20, 38556; Loc. 21, 38572. All c. spor.

Remarks
Seems to be widespread but scattered; most records are old, only a single recent one by Frahm & Lüth (2008), see also Mifsud (2012).

Gymnostomum calcareum Nees & Hornsch.

Material examined. — Loc. 4, 38439.

Remarks
A rather common species, known since Sickenberger collected it in 1876 (Baur 1891; Mifsud 2012).

Leptobarbula berica (De Not.) Schimp.

Material examined. — Loc. 15, 38522/A; Loc. 20, 38559/C; Loc. 28, 38624. All c. spor., partly juvenile.

Microbryum davallianum (Sm.) R.H.Zander

Material examined. — Loc. 5, 38442; Loc. 6, 38444, 38446/B, 38455/B; Loc. 13, 38506/B; Loc. 15, 38523/A, 38531/A; Loc. 16, 38538/A; Loc. 22, 38577, 38581; Loc. 25, 38599/A; Loc. 27, 38611/A. All c. spor.

Microbryum rectum (With.) R.H.Zander

Material examined. — Loc. 20, 38559/D; Loc. 21, 38562/A, 38575/B; Loc. 25, 38599/B; Loc. 26, 38602/B; Loc. 28, 38621/B. All c. spor.

Remarks
A small and easily overlooked species, beside some old records only a single recent one from 1993 (Mifsud 2012).

Microbryum starkeanum (Hedw.) R.H.Zander

Material examined. — Loc. 1, 38427; Loc. 4, 38432, 38438; Loc. 13, 38506/A; Loc. 21, 38562/B, 38575/A; Loc. 24, 38594 p.p.; Loc. 26, 38602/A; Loc. 28, 38621/A. All c. spor.

Phascum cuspidatum Hedw. var. ***piliferum*** (Hedw.) Hook. & Taylor

MATERIAL EXAMINED. — Loc. 6, 38455/A; Loc. 10, 38480; Loc. 15, 38524/B; Loc. 22, 38578. All c. spor.

REMARKS
Because of the longly excurrent costa (often up to 1 mm), all specimens have been referred to var. *piliferum*, though the rectangular superficial ventral cells of the costa may indicate a closer relationship to var. *cuspidatum* (*Flora Briofítica Ibérica III*: 177ff.). *Phascum cuspidatum* has been included in the Red Data Book by Lanfranco (1989: "not recorded since 1876..."), and Frahm & Lüth (2008) found it twice (one cited as *P. cuspidatum*, the second as var. *piliferum*).

Plasteurhynchium striatulum (Spruce) M.Fleisch.

MATERIAL EXAMINED. — Loc. 21, 38569.

REMARKS
Seems to be a rather scattered species on Malta, only a few records available (Mifsud, 2012). Included in the Red Data Book by Lanfranco (1989).

Pohlia melanodon (Brid.) J.Shaw

MATERIAL EXAMINED. — Loc. 8, 38472/A, on humid soil at margin of temporarily wet riverbed.

REMARKS
Only once seen on Gozo, from Malta several actual observations by Mifsud (2012).

Pottia pallida Lindb.

MATERIAL EXAMINED. — Loc. 4, 38433; Loc. 8, 38474/A.

REMARKS
A rather rare species, the known localities are compiled by Mifsud (2012, as *Tortula pallida* (Lindb.) R.H.Zander).

Pseudocrossidium hornschuchianum (Schultz) R.H.Zander

MATERIAL EXAMINED. — Loc. 1, 38422; Loc. 6, 38448; Loc. 11, 38493/B; Loc. 16, 38538/B; Loc. 23, 38582.

REMARKS
Seems to be not a rare species though records are relatively sparse (Mifsud 2012).

Rhynchostegiella tenella (Dicks.) Limpr.

MATERIAL EXAMINED. — Loc. 7, 38465; Loc. 12, 38497, 38501 (epiphytic on dead wood and at base of tree); Loc. 16, 38534. All c. spor.

REMARKS
The epiphytic occurrence of this usually epilithic moss is notable because epiphytes are very rare on the Maltese Islands (no other epiphyte seen).

Rhynchostegium megapolitanum (Weber & Mohr) Bruch & Schimp.

MATERIAL EXAMINED. — Loc. 9, 38478; Loc. 16, 38535; Loc. 21, 38564.

REMARKS
Rather common, compare Mifsud (2012).

Scorpiurium circinatum (Brid.) M.Fleisch. & Loeske

MATERIAL EXAMINED. — Loc. 6, 38453.

REMARKS
In accordance with Sommier & Caruana Gatto (1915) and Frahm & Lüth (2008) we consider this species as the most common pleurocarpous moss on the Maltese Islands.

Timmiella barbuloides (Brid.) Mönkem.

MATERIAL EXAMINED. — Loc. 10, 38486; Loc. 20, 38560; Loc. 21, 38573/A; Loc. 23, 38587. All c. spor.

REMARKS
Widespread and rather frequent, but seems not to be very common.

Tortella flavovirens (Bruch) Broth.

MATERIAL EXAMINED. — Loc. 21, 38565; Loc. 23, 38590.

REMARKS
A rather common species, numerous localities given in Mifsud (2012).

Tortella inflexa (Bruch) Broth.

MATERIAL EXAMINED. — Loc. 6, 38443; Loc. 7, 38464/B; Loc. 10, 38483; Loc. 12, 38499/A; Loc. 14, 38517; Loc. 20, 38559/B; Loc. 21, 38567/A; Loc. 28, 38616.

REMARKS
Seems to be rather common on the Maltese Islands; already considered as common by Sommier & Caruana Gatto (1915,

as *Trichostomum inflexum* Bruch) and Gradstein (1972). Mifsud (2012) listed several additional localities.

Tortella nitida (Lindb.) Broth.

Material examined. — Loc. 6, 38453p.p.; Loc. 18, 38541.

Remarks
A frequent species, also known from Gozo and Comino (Mifsud 2012).

Tortula cuneifolia (Dicks.) Turner

Material examined. — Loc. 10, 38481/A, only a few plants between *Sphaerocapus michelii*.

Remarks
Mainly a Mediterranean and western European species, but also known from subarctic East Siberia in Russia and North America (Fedosov 2008); known from many localities in Sicily (Dia *et al.* 1987) but so far not reported from the Maltese Islands.

Tortula marginata (Bruch & Schimp.) Spruce

Material examined. — Loc. 10, 38484/B; Loc. 15, 38523/B, c. spor. juv.; Loc. 27, 38611/B.

Tortula muralis Hedw.

Material examined. — Loc. 8, 38471, c. spor.

Remarks
Very common.

Tortula solmsii (Schimp.) Limpr.

Material examined. — Loc. 8, 38472/B.

Remarks
Obviously a rather rare species, known only from one old (Sommier & Caruana Gatto 1915) and one recent record (Mifsud 2012).

Tortula vahliana (Schultz) Mont.

Material examined. — Loc. 4, 38438/A, mixed with *Microbryum starkeanum* and *Barbula unguiculata*; Loc. 13, 38510.

Remarks
So far known only from a single recent collection (Mifsud 2012).

Trichostomum brachydontium Bruch

Material examined. — Loc. 12, 38498, c. spor.; Loc. 14, 38518, c. spor. juv.

Weissia condensa (Voit.) Lindb.

Material examined. — Loc. 6, 38450; Loc. 7, 38464/A; Loc. 19, 38550; Loc. 23, 38585. All c. spor.

Remarks
A rather scattered species, firstly mentioned from Malta by Baur (1891, as *Gymnostomum tortile* Schwägr.), rediscovered by Lanfranco in 1977 who included it in the Red Data Book (Lanfranco 1989), and a recent Holyoak collection is cited in Mifsud (2012).

DISCUSSION

Frahm & Lüth (2008) in their checklist mentioned 26 liverworts and hornworts and 100 mosses, including three varieties and one doubtful record. An update on the moss flora (Mifsud 2012) added ten species and one variety, but rejected five previous records and considered six previous records questionable. Among the 206 collections done by the authors in January 2018, six species of bryophytes (two liverworts and four mosses) represent new records for the Maltese Islands: *Riccia ciliata*, *Targionia lorbeeriana*, *Amblystegium serpens*, *Cheilothela chloropus*, *Ephemerum recurvifolium*, and *Tortula cuneifolia*. *Cephaloziella baumgartneri*, *Astomum crispum* and *Tortula vahliana* have recently been reported as new to Malta (Frahm & Lüth 2008; Mifsud 2012) and its occurrence could be confirmed. *Riccia ciliifera* has been refound for the first time since its description as *Riccia melitensis* more than 120 years ago, *Riccia crozalsii* was reported only by Sommier & Caruana Gatto (1915), and *Acaulon muticum* was so far known only from a Sickenberger collection made in 1876 (Baur 1891).

The occurrence of *Brachythecium rutabulum* should be confirmed, and that of *Entosthodon muhlenbergii* seems to be at least doubtful.

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