S. Brullo, G. Giusso del Galdo & E. Lanfranco

A new species of *Zannichellia* L. (*Zannichelliaceae*) from Malta

Abstract

Brullo S., Giusso del Galdo G. & Lanfranco E.: A new species of *Zannichellia* L. (*Zannichelliaceae*) from Malta. — Fl. Medit. 11: 379-384. 2001. — ISSN 1120-4052.

Zannichellia melitensis, a new species from the Maltese Archipelago is described and illustrated. It occurs in the small pools of the calcareous plateaux, where it grows together with other hydrophytes. Its relationships with the other known species of the genus *Zannichellia* are also examined.

Introduction

According to Talavera & al. (1986), *Zannichellia* L. is a widely distributed genus centred in the Northern Hemisphere with the highest concentration of species in the Mediterranean basin. On the basis of morphological features, regarding the habit, stamens, stigmas and fruitlets, several species were previously described within this genus (Desfontaines 1798, Willdenow 1805, Reichenbach 1830, Wallmann 1840, Reuter 1854, Clavaud 1888, etc.). On the contrary, other authors regard that many of the described taxa have to be referred to a single variable species (see Dandy 1980). More recently, Talavera & al. (1986), in their revision of the genus *Zannichellia,* recognize six species, well differentiated from the morphological, caryological and anatomical point of view; they are *Z. obtusifolia* Talavera, Garcia Murillo & Smit, *Z. palustris* L., *Z. pedunculata* Reichenb., *Z. contorta* (Desf.) Chamisso & Schlech., *Z. peltata* Bertol. and *Z. major* Boenn. ex Reichenb.During field work connected with the Maltese flora, a distinct *Zannichellia* was found, frequently occurring in small pools on the calcareous plateaux of the islands of this archipelago. Previously, Sommier & Caruana Gatto (1915), Borg (1927) and Haslam & al. (1977) referred these populations to *Z. palustris* or *Z. pedunculata* (as "*Z. palustris* var. *pedicellata* Fries"); but morphological and anatomical surveys have shown that these populations are well differentiated from the other known species of the genus *Zannichellia.* Therefore, they are treated as a new species.

Zannichellia melitensis Brullo, Giusso & Lanfranco **sp. nova** (Fig.1)

Typus: Malta, Ghallis, 28.02.1999, Bartolo, Brullo, Lanfranco & Stevens (holotype CAT)

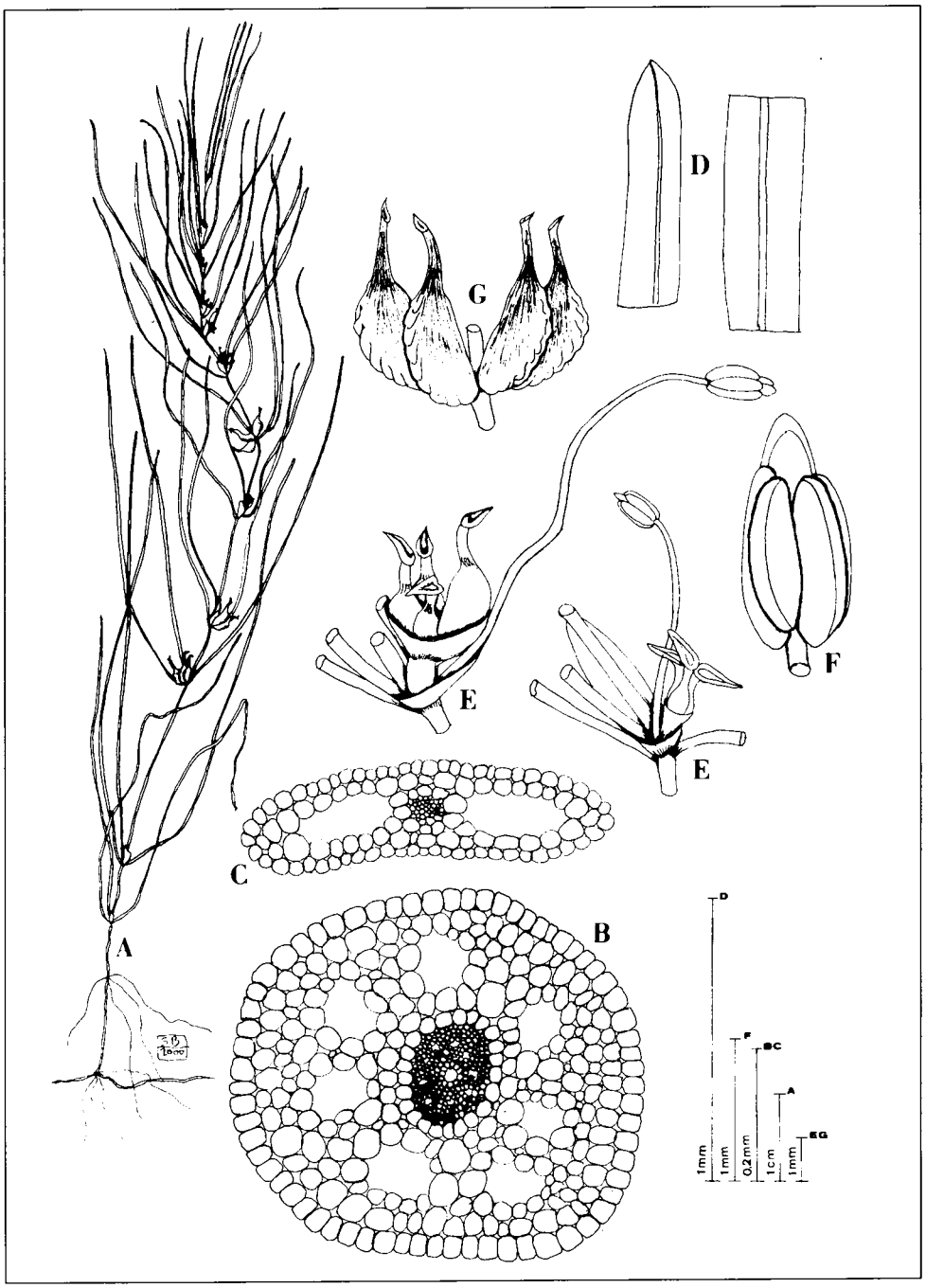

Fig.1. *Zannichellia melitensis* Brullo, Giusso & Lanfranco. **A,** habit; **B,** cross section of the stem; **C,** cross section of the leaf; **D,** apex and middle part of the leaf; **E,** nodes with immature and mature flowers; **F,** anther; **G,** fruitlets.

Herba aquatica, annua, internodiis usque ad 2 mm longis, 7-8 aeriphoris canalibus in cortice, foliis 1.5-5 cm longis, 0.3-0.6 mm latis, obtusiusculis, 2 aeriphoris canalibus in mesophyllo. Flores masculini et feminei in eodem nodo, filamento staminali 5-10 mm longo, anthera tetraloculari, 1.3-1.4 mm longa, flore femineo, 3-4 carpellato, stigmate linguiformi, lanceolato, superficie alveolata, achenio sessili vel subsessili, corpore 3-3.2 mm longo, plicato in margine convexo, rostro 1.2-1.5 mm longo.

Hydrophyte submerged, annual, monoecious, stoloniferous. Stem elongated, slender, 6-15 cm long. Internodes up to 2 cm long, with 7-8 aeriferous canals in the cortex. Leaves linear, flat, 1.5-5 cm long, 0.3-0.6 mm wide, somewhat obtusely at apex, with 2 aeriferous canals in the mesophyll. Female and male flowers inserted at the same node. Stamen filament 5-10 mm long, and anther 4-locular, 1.3-1.4 mm long. Female flower shortly pedicelled, with membranous perianth, provided with 3-4 (5) free carpels. Stigma linguiform, lanceolate, entire at the margin, with alveolate surface. Fruitlets sessile or subsessile, with corpus 3-3.2 mm long, laterally compressed, plicate at the convex margin, and beak 1.2-1.5 mm long.

Specimina visa. – Malta, in inundatis Wied S. Julian, 10.03.1874, Duthie (FI); ibid., secus diam a Notabile (Rabat) ad Imtahleb ducentim in rivo, 06.05.1907, Sommier (FI); ibid., inter Birchircara et S. Paulo a mare in rivo ad viam, 03.05.1907, Sommier (FI); ibid., in inundatis Wied at Zasel, 16.03.1874, Duthie (FI); ibid., 27.03.1967, Wied il-Ghasel, Lanfranco (L); ibid., 26.10.1969, Ta' Zuta, in a rock pool, Lanfranco (L); ibid., Wied Harq Hamiem, 25.10.1970, Lanfranco (L); ibid., 10.02.1972, Verdala, Lanfranco (L); ibid., Wied il-Ghasel, 01.02.1978, Lanfranco (L); ibid., 04.03.1979, Wied Babu, specimen with galls, Lanfranco (L);ibid., Dingli, 27.02.1999, Bartolo, Brullo, Lanfranco & Stevens (CAT); ibid., Ras il Bajjada, 27.02.1999, Bartolo, Brullo, Lanfranco & Stevens (CAT); ibid., Fiddien near Rabat, 16.04.1987, Brullo, Pavone (CAT); ibid., Tal-Blata, 09.04.1984, Brullo, Pavone (CAT); Gozo, Cala Dueira, in una pozzanghera laghetto, 17.04.1906, Sommier (FI); ibid., in una pozzanghera, 17.04.1907, Sommier (FI); ibid., Cala Dweira, 13.04.1987, Brullo, Pavone (CAT); ibid., Xlendi Valley, 13.04.1987, Brullo, Pavone (CAT); ibid., Wied il Mielah, 13.04.1987, Brullo, Pavone (CAT); Comino, 07.05.1907, Sommier (FI); ibid., pozzanghera, 07.05.1907, Sommier (FI).

Ecology and distribution. – *Zannichellia melitensis* is linked to the small deep pools, temporary filled with rainwater, which are quite frequent on the calcareous plateaux of the Archipelago Maltese islands. In particular it grows in the islands of Malta, Gozo and Comino, where it can be seen from December to April.

In these wet habitats, *Z. melitensis* is associated with other submerged hydrophytes, such as *Damasonium bourgaei* Cosson, *Callitriche truncatula* Guss., *Elatine gussonei* (Sommier) Brullo & al., *Chara vulgaris* L., *Ranunculus peltatus* Schrank subsp. *fucoides* (Freyn) Muñoz, etc. From the phytosociological point of view, this community can be assigned to the *Callitricho-Batrachion,* alliance of the *Potametea* class.

Taxonomic relationships. – According to Talavera & al. (1986), within the genus *Zannichellia* L. two sections can be recognized: sect. *Zannichellia* and sect. *Monopus* Graebner. The first one is morphologically characterized by male and female flowers borne

Table 1. Differential characters of the species belonging to the genus Zannichellia L

Characters	*Z. obtusifolia*	*Z. contorta*	*Z. peltata*	*Z. palustris*	*Z. major*	*Z. pedunculata*	*Z. melitensis*
LIFE FORM	annual	perennial	annual	annual	perennial	annual	annual
INTERNODE SIZE	long	short	long	long	long	long	long
NO. AERIFEROUS CANALS IN THE CORTEX	9-11	0	0	0	several	0	7-8
LEAF WIDTH (MM)	1,5	0.7	0.5	1	2	0.8	0.3-0.6
LEAF APEX	obtuse	acute	acute	acute	acute	acute	obtuse
NO. AERIFEROUS CANALS IN THE LEAF	0	2	2	2	2	2	2
LENGTH OF STAMEN FILAMENT (MM)	12-33(60)	9-42	10-30	0.7-10	2-10	1.5-4 (7)	5-10
ANTHER LENGTH (MM)	1,7-2,5	1-1.5	1.2-1.8	0.3-1.7	1.2-1.8	0.3-0.8	1.3-1.4
NO. LOCULI OF THE ANTHER	4	4	4	2-3-4	2	2	4
FLOWER SEXUALITY IN THE NODES	dioecious	dioecious	dioecious	monoecious	monoecious	monoecious	monoecious
NO. CARPELS OF FEMALE FLOWER	2 (3-5)	4 (7)	2 (3-5)	(2) 4 (8)	(2) 3-5	2-4 (6)	3-4 (5)
STIGMA SHAPE	infundibular, ovate	discoid, rounded	infundibular, rounded	infundibular, lanceolate	linguiform, lanceolate	linguiform, lanceolate	linguiform, lanceolate
STIGMA SURFACE	alveolate	crested	alveolate	alveolate	alveolate	alveolate	alveolate
STIGMA MARGIN	entire or slightly dentate	irregular	irregularly dentate	irregularly dentate	entire	entire	entire
FRUITLET PODOCARP (MM)	0,6-1,5	0.3-0.7	0.2-0.5	0.2-0.9	unknown	0.8-2	0-0.2
FRUITLET CORPUS (MM)	1,7-2,2 (2,5)	2.2-2.3	2.5-3	1.6-2.8	3.2-4.5	1.8-2.7	3-3.2
FRUITLET BEAK (MM)	1-1,5	0.5-1	0.9-2	0.1-1.4	1.5-1.7	1.3-2	1.2-1.5
ECOLOGY	temporary lagoons with fresh waters	brooks and streams of calcareous mountains with fresh and oxygenated waters	lagoons with slow moving waters (fresh or brackish)	lakes or streams with fresh or brackish waters	salt-marshes with sandy soils	lakes or streams with fresh or brackish waters	temporary small pools on calcareous rocks with fresh waters

on the same node, stamen filament 0.7-10 mm long, and anthers generally 2-locular (rr. 3-4-locular); while the second one is differentiated by male and female flowers borne by different nodes, stamen filament 9-60 mm long, and anthers 4-locular. Due to the monoecious nodes and short stamen filaments, *Z. melitensis* belongs clearly to sect. *Zannichellia;* however, because of the constant occurrence of 4-locular anthers, it must be referred to the sect. *Monopus.* Therefore, it is possible to assert that the number of the anther loculi is not a good diagnostic character to differentiate the sections, since *Z. palustris,* which is the type species of the sect. *Zannichellia,* shows anthers with 2-4 loculi.

With its obtuse leaves, aeriferous canals in the cortex and 4-locular anthers, *Z. melitensis* would seem to be related to Z. obtusifolia, but they differ in many morphological characters. In particular, *Z. obtusifolia* has leaves 1.5 mm wide without aeriferous canals, stamen filament 12-60 mm long, anther 1.7-2.5 mm long, dioecious nodes, stigma infundibular, ovate, fruitlet corpus 1.7-2.5 mm long, dentate at the margin. Basing on the occurrence of aeriferous canals in the cortex, stamen filament up to 10 mm long, monoecious nodes, female flower with 3-5 carpels, stigma linguiform and lanceolate, *Z. melitensis* seems to be related to *Z. major* as well. However, the latter differs distinctly from *Z. melitensis* in having a more robust habit, leaves acute, up to 2 mm wide, fruitlet corpus 3.2-4.5 mm long, dentate at the margin.

Moreover, *Z. melitensis* differs from all the other known species, apart from the many morphological features, also in its ecological requirements. In fact, this species occurs exclusively in the small deep pools hollowed out in the calcareous rock, while all the others, according to Van Vierssen (1982) and Talavera & al. (1986), grow on the muddy bottom of rivers, streams, lagoons, ponds, marshes with stagnant or slow moving waters (fresh or brackish), only rarely in the pools.

On the whole, *Z. melitensis* can be considered a species taxonomically differentiated, geographically quite isolated and ecologically very specialized. Such as many other endemisms occurring in the Maltese Archipelago (see Brullo & Pavone 1987, 1988; Lanfranco 1989, 1995), *Z. melitensis is* a species with a remarkable phytogeographical significance.

References

Borg, J. 1927: Descriptive flora of the Maltese Islands including the ferns and flowering plants. — Malta.

Brullo, S. & Pavone, P. 1987: Cremnophyton lanfrancoi: a new genus and species of Chenopodiaceae from Malta. — Candollea **42**:621-625.

— & — 1988: Hyoseris frutescens, a new species from Gozo (Malta). — Candollea **43**:717-726.

Clavaud, C. 1888: Sur les Zannichellia du Département de la Gironde. — Acta Soc. Linn. Bordeaux **42**:67-68.

Dandy, J. E. 1980: *Zannichellia* L. Pp. 13 in: Tutin & al. (eds). Flora Europaea **5**. — Cambridge.

Desfontaines, R. L. 1798: Flora Atlantica, sive Historia Plantarum, quae in Atlante, Agro tunetano et algeriensi crescunt. — Parisiis.

Haslam, S. M., Sell, P. D. & Wolseley, P. A. 1977: A flora of the Maltese Islands. — Malta.

Lanfranco, E. 1989: The flora. in: Schembri P. J. & Sultana G. (eds) Red Data Book for the Maltese Islands. — Malta.

— 1995: The Maltese flora and conservation. — Ecol. Medit. **21**(1/2):165-168.

Reichenbach, H. G. L. 1830: Flora Germanica excursoria **1**. — Lipsiae.
Reuter, P. 1854: Catalogue des Graines recueillies en 1854 et offertes en échange par le Jardin Botanique de Genève. - Genève.
Sommier, S. & Caruana Gatto, A. 1915: Flora Melitensis Nova. — Firenze.
Talavera, S., García Murillo, P. & Smit, H. 1986: Sobre el genero Zannichellia L. (Zannichelliaceae). — Lagascalia **14**:241-271.
Van Vierssen, W. 1982: The ecology of communities dominated by Zannichellia taxa in Western Europe. I. Characterization and ecology of the Zannichellia taxa. — Aquatic Bot. **12**:103-155.
Wallmann, J. 1840: En ny Zannichellia. — Bot. Not. **1840**:42-46.
Willdenow, C. L. 1805: Species Plantarum **4**(1). — Berolini.

Adresses of the authors:
S. Brullo & G. Giusso del Galdo, Dipartimento di Botanica, via A. Longo, 19, I - 95125 Catania, Italy.
E. Lanfranco, Department of Biology, University of Malta, Msida MSD 06, Malta.