

**Notes on the systematics, morphology and biostratigraphy of fossil holoplanktonic Mollusca, 15<sup>1</sup>. Description of *Edithinella doliarius* spec. nov. (Gastropoda, Euthecosomata), from the Miocene (Langhian) of the Maltese archipelago.**

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The macrofossils of the Maltese archipelago received little attention over the years, in particular the holoplanktonic molluscs. A new species, *Edithinella doliarius* spec. nov. is described from the Upper Globigerina Limestone Formation (Miocene, Langhian) in Mgarr and other localities (Malta).

Key words: Gastropoda, Euthecosomata, systematics, *Edithinella*, new species, Malta.

### INTRODUCTION

Over the years, the geology and palaeontology of the Maltese archipelago have been studied by numerous, predominantly foreign, geologists. The existing literature has recently been summarised and the geology beautifully illustrated by Pedley et al. (2002), who have also provided an extensive list of references. As far as the fossil record is concerned, mainly planktonic foraminifera (e.g., Felix, 1973; Giannelli & Salvatorini, 1972a-b) and calcareous nannoplankton (Hojjat-zadeh, 1978; Kienel et al., 1995) have been studied to date.

Among macrofossils only few groups have received attention, as most of the originally aragonitic species are decalcified and occur in the form of internal moulds. This also explains why echinoderms (and sea urchins in particular), as well as sharks' teeth and, among the molluscs, (calcitic) Pectinidae are relatively well known and popular collectors' items.

Benthic molluscs remain largely unstudied and generally indeterminate in view of the fact that they are preserved as phosphatic or limonitic internal moulds. A number of such gastropods and bivalves, originating from several levels within the Lower Globigerina Limestone Formation (Miocene, Early Aquitanian) has recently been illustrated by Janssen (2004). Identification of this material proved possible to family or genus level, at best.

Maltese holoplanktonic molluscs, i.e. heteropods and pteropods, internal moulds of which can be identified because of the extremely thin shell wall, have so far received scant attention in the literature. A single species, *Cavolinia cookei* Simonelli, was described in detail back in 1895. Much later, Janssen (in Rehfeld & Janssen, 1995) and Janssen (2004) described five additional pteropod species. The total number of holoplanktonic molluscs from the various Miocene assemblages is now estimated to be over 60; most of these taxa are known from other parts of the Mediterranean, while some are undescribed. In the present note, one of these is formally named.

Abbreviations: RGM, Nationaal Natuurhistorisch Museum Naturalis, Palaeontology Department, Leiden (The Netherlands), formerly Rijksmuseum van Geologie en Mineralogie; MNHM, National Museum of Natural History, Mdina, Malta.

### STRATIGRAPHY

Cainozoic deposits in the Maltese archipelago range in age between Late Oligocene

1) For number 14 in this series see: Basteria 69: 73-80 (2005).

(Chattian) and Late Miocene (Messinian). An overview of the various formations and their estimated ages is as follows:

Lithology		Age	
Upper Coralline Limestone Formation		Miocene	Messinian
Green Sand Formation			(Tortonian)
hiatus			Serravallian
Blue Clay Formation			Langhian
Globigerina Limestone Formation	Upper		Burdigalian
	Middle		Aquitanian
	Lower		
Lower Coralline Limestone Formation		Oligocene	Chattian

In this table boundaries of formations are seen to coincide with those of stage boundaries, which is highly unlikely. Most probably, the hiatuses between the various units are of a higher magnitude than assumed to date. On the other hand, the lower boundaries of the Burdigalian, Langhian and Serravallian have yet to be defined internationally.

The local presence and/or absence, as well as the thicknesses of all these units, varies considerably, which is explained by synsedimentary winnowing and tectonics, as well as subsequent erosion.

Quite recently Sprovieri et al. (2002), Foresi et al. (2002) and Bonaduce & Barra (2002) studied astronomical calibration, calcareous plankton (Foraminifera and nannofossils) and ostracods, respectively, of the Maltese Late Langhian-Early Serravallian interval. The investigated sequence of the Blue Clay Formation at Ras il-Pellegrin (Malta) is a candidate section for the designation of a GSSP (Global Stratotype Section and Point) for the lower boundary of the Serravallian.

Holoplanktonic molluscs are known now from all units except Lower and Upper Coralline Limestone, which are shallow-water deposits and have not yielded any heteropods or pteropods to date. The new species described here originates from the basal part of the Upper Globigerina Limestone Formation (inclusive of its lowermost portion, a phosphorite bed accompanying a hardground, referred to as Main Phosphorite Layer C 2).

Further study (in progress) will result in more detailed knowledge of Maltese Miocene holoplanktonic molluscan assemblages and of biozones based on these fossils, applicable to the entire Mediterranean.

## SYSTEMATIC PART

### *Edithinella doliarius* spec. nov. (fig. 1 a-e)

**Holotype.**— RGM 286.603, Fig. 1; shell height 5.3 mm, width 2.1 mm, dorso-ventral diameter at aperture 1.1 mm.

**Locus typicus.**— Mgarr (Malta), Gnejna Bay, coastal cliff outcrop at UTM 40.644/3975.488.

**Stratum typicum.**— Upper Globigerina Limestone Formation, bed with scattered phosphorite concretions c. 2 m above Main Phosphorite Layer C 2; Miocene, Langhian.

**Paratypes.**— from the type locality, 1 specimen, RGM 285.866. Ghajn il-Kbira (Malta), road cutting, UTM 468683; Upper Globigerina Limestone Formation, phosphorite concentration 0.75-0.95 m above Main Phosphorite Layer C 2; 2 specimens, RGM 285.137. Mtahleb (Malta), coastal cliff exposure, UTM



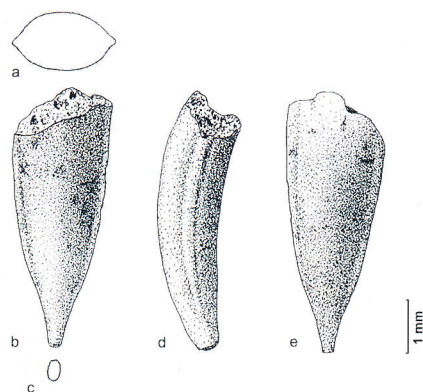


Fig. 1 *Edithinella doliarius* spec. nov., holotype, RGM 286.603; a: transverse section at aperture, b: ventral view, c: transverse section at apical side, d: right lateral view, e: dorsal view.

<sup>40.959/39.375</sup>, Upper Globigerina Limestone Formation, phosphorite-bearing level c. 1.5 m above Main Phosphorite Layer C 2; Miocene, Langhian; 3 specimens, RGM 285.997. Mtahleb (Malta), coastal cliff exposure, UTM <sup>40.966/39.370</sup>; Upper Globigerina Limestone Formation, c. 2-5 m above Main Phosphorite Layer C 2; Miocene, Langhian; 3 specimens, RGM 286.294, 1 specimen donated to MNHM. Rdum il-Qammieh (Malta), southern slope of Marfa Ridge, coastal cliff outcrop, UTM <sup>40.142/39.090</sup>; Upper Globigerina Limestone Formation, Main Phosphorite Layer C 2; Miocene, Langhian; 3 specimens, RGM 286.373. Marsalforn (Gozo, Malta), temporary outcrop in building pit, UTM 336922; Upper Globigerina Limestone Formation, Main Phosphorite Layer C 2; 3 specimens, RGM 285.714; 1 specimen donated to MNHM. San Lawrenz (Gozo, Malta), outcrop 1 km S of San Dimitri Point, UTM 268918; Upper Globigerina Limestone Formation, 5-8 m above Main Phosphorite Layer C 2; Miocene, Langhian; 3 specimens, RGM 429.364. Xewkija (Gozo, Malta), temporary building pit along road Mgarr-Victoria, UTM 336883; greyish upper 0.2 m of exposed double phosphorite bed, local base of Upper Globigerina Limestone Formation; Miocene, Langhian; 3 specimens, RGM 285.624.

Note.— Six-figure UTM co-ordinates were taken from the topographical map of Malta; the more detailed co-ordinates were obtained by means of a Magellan 310 GPS device.

Derivatio nominis.— From *L. doliarius* (noun) = cooper ('vatenmaker' or 'kuiper' in Dutch). The species is named in honour of malacologist and Sphaeriidae specialist, Dr J.G.J. (Hans) Kuiper, of Vaucresson, France, on the occasion of his 90th birthday.

Diagnosis.— Species of *Edithinella* with strong dorso-ventral curvature and marked lateral carinae, visible in both dorsal and ventral view.

Description.— Shell vaginelliform. The holotype is 2.5 times taller than wide, dorso-ventrally curved, the dorsal (convex) surface slightly more strongly than the ventral one. Apical shell portion and protoconch missing. At a diameter of c. 0.75 mm (ventral view) the shell is rather suddenly widened. A well-developed, rounded lateral carina is present on both sides, and is visible in ventral and dorsal view. Initially, the dorso-ventral diameter equals almost twice the shell width but soon the shell becomes flattened, near the aperture the shell is c. 1.7 times wider than thick. Ventral and dorsal shell portions are about equally convex.

Discussion.— The new species resembles species of the genus *Vaginella*, but the strong curvature, and the well-developed carinae preclude assignment to that genus. Species of *Edithinella*, such as the type species, *E. undulata* (Gabb, 1873), or *E. varanica* (Sirna, 1968), usually have a lateral furrow visible from the ventral (concave) side only. In others, e.g. *E. caribbeana* (Collins, 1934) or *E. curva* Janssen, 1998 the lateral furrows are less well developed. The latter demonstrates a curvature similar to *E. doliarius*, all other species are less strongly curved.

*Edithinella doliarius* co-occurs with several other pteropod species, the most important

of which are *Cuvierina* (C.) *paronai* Checchia-Rispoli, 1921, *Clio* (s. lat.) *bellardii* Audenino, 1897, *Cavolinia cookei* Simonelli, 1895, *Cavolinia zamboninii* Checchia-Rispoli, 1921, *Diacrolinia aurita* (Bellardi, 1873), *Vaginella acutissima* Audenino, 1897 and *V. austriaca* Kittl, 1886. The new species seems to be restricted to the lower portion of the Upper Globigerina Limestone Formation. In the upper part, *Edithinella varanica* is found, and this ranges up into the overlying Blue Clay Formation of Serravallian age.

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