

On the systematic position of “*Cima*” *melitensis* Mifsud, 1998, with erection of the new genus *Mifsudia* (Heterobranchia Cimidae)

Paolo Mietto¹, Italo Nofroni^{2*} & Ermanno Quaggiotto³

¹Università degli studi di Padova, Dipartimento di Geoscienze, via Gradenigo 6, 35131 Padova, Italy; e-mail: paolo.mietto@unipd.it

²Via B. Croce 97, 00152 Roma, Italy; e-mail: italo.nofroni@uniroma1.it

³Via Secula 13, 36023 Longare, Vicenza, Italy; e-mail: ermanno@quaggiotto.net

*Corresponding author

ABSTRACT

Based on teleoconch and, especially, protoconch features, the new genus *Mifsudia* is erected for *Cima melitensis* Mifsud, 1998 and placed in the family Cimidae. The protoconch is hyperstrophic, as in the other cimids. At least, two European fossil species (*Cima gantensis* Bandel, 2005, from the Middle Eocene of Hungary and *Murchisonella* cf. *obtusata* Gougerot & Le Renard, 1978 from Early Oligocene of France) are also included in the new genus. *Mifsudia melitensis* (Mifsud, 1998) comb. nov., originally described from Malta, is here recorded for the first time from Lampedusa Island, Alboran Sea and the coasts of Mauritania (West Africa).

KEY WORDS

Gastropoda; *Cima*; *Murchisonella*; *Mifsudia*; Mediterranean Sea; Western Africa.

Received 28.01.2014; accepted 21.03.2014; printed 30.06.2014

Proceedings of the Seventh Malacological Pontine Meeting, September 9th-10th, 2013 - San Felice Circeo, Italy

INTRODUCTION

During the in progress revision of the genus *Cima* Chaster, 1896 (Heterobranchia Cimidae) in the Mediterranean Sea, we examined several specimens of Mediterranean and Atlantic “*Cima*” and recorded notable differences on the protoconchs. This drove us to investigate in depth this complex group of Heterostropha and allowed recognizing two different typologies of protoconchs: the first one is globular, typical of *Cima* sensu strictu (e.g. *Cima minima* Jeffreys, 1858, Fig. 5), the second one is clearly hyperstrophic (e.g. *Cima melitensis* Mifsud, 1998, Figs. 1–4). This latter type, resembles the protoconch of some *Murchisonella* Mørk, 1875 (Warén, 2013) but is clearly distinguishable. This

double typology of protoconch can be recognized in the fossil species referred to “*Cima*” (Warén, 2013).

The known species attributable to the genus *Cima*, for the Mediterranean and European sea waters (*C. minima*; *C. cylindrica* Jeffreys, 1856; *C. cuticulata* Warén, 1993; *C. inconspicua* Warén, 1993; *C. apicisbelli* Rolan, 2003) consist of a morphologically homogeneous group. One exception is “*Cima*” *melitensis*, described by Mifsud (1998) from a limited number of specimens coming from 80–100 m deep Malta’s waters, and lacking of soft tissue. This species is characterized by a pyramidelliform teloconch, surmounted by a protoconch that seems truncated; at a first sight the shell resembles closely *Odostomia* Fleming, 1813 or *Liostomia* G.O. Sars, 1878.

The analysis at SEM of some shells highlighted a very peculiar protoconch, certainly different from Pyramidellidae: after an extremely small nucleus (about 27 μm), the protoconch unwinds on an horizontal axis for half a rotation; then it raises, creating a small prominence easy visible in lateral view (Fig. 4); then it goes down and continues with a normal dextrorse envelopment. This kind of protoconch is called hyperstrophic and is typical of some families of Heterobranchia (Heterostropha) such as Architectonicidae, Murchisonellidae, etc. Basing on these morphological features we believe that the collocation of this species into the genus *Cima* is incorrect.

Chaster (1896) instituted the subgenus *Cima* (ex Monterosato) without any description, just declaring that "... which Jeffreys described as *Odostomia minima*, for which species and the closely allied but quite distinct *Jeffreysia cylindrica* Jeffr., *Monterosato* proposes the sub-genus *Cima*, a separation with which I entirely concur."

One first problem is to determine which is the type species of *Cima*. Following Warén (1993) this is *Odostomia minima* Jeffreys, 1858, while Bandel (2005) indicates as type species *Jeffreysia cylindrica* Jeffreys, 1856. The work of Warén (1993) is earlier and then the correct type species for *Cima* is *Odostomia minima*.

Van Aartsen (1981) validates the separation between *Cima* and *Pherusina* Norman, 1888 (= *Aclis* Lovén, 1846), proposed by Monterosato, but, basing on morphological features such as the shape of peristome, the embrional whorls, the clear flexuous growth lines, he considers valid the position of the genus in Aclididae. The same opinion is shared by Fretter & Graham (1982), that nevertheless do not exclude to put this genus in a new, to be created, family Cimidae. Afterwards Graham (1988) preserves the collocation of *Cima* in Aclididae.

Warén (1993), mainly on anatomical base, puts *Cima* in the new monogeneric family Cimidae, into the subclass Heterobranchia.

Bouchet & Rocroi (2005) maintain *Cima* in the Cimidae family, into the Heterobranchia, but without further collocation. Bandel (2005) discusses the collocation of many genera, now included in Heterostropha, such as *Aclis* Lovén, 1846, *Hemiaclis* G.O. Sars, 1878, *Graphis* Jeffreys, 1867, *Cima*, *Murchisonella* Mörch, 1875, and *Ebala* Gray, 1847. The result, based on anatomy, shell morphol-

ogy and evolutionary trend, is that all these genera have to be included in different families. In particular, *Cima* is re-positioned in Streptacididae, a family that includes other fossil genera from the Paleozoic. *Murchisonella* is included in the Donadnidae family, including fossil genera from Carboniferous. The Ebalidae (= Anisocyclidae) is considered separated family.

Recently, Peñas & Rolán (2013) reviewed the genus *Murchisonella* and proposed using the genus *Pseudoaclisina* Yoo, 1994 for the species with rounded coils; in the same year Warén (2013) published a study about Murchisonellidae, where he analyzed this family and other similar ones, basing on genetic, anatomical and palaeontological features, providing guidelines on these small Heterobranchia for future studies.

The morphological differences that all the Authors recognize between *Cima* and *Murchisonella* regard the shape of the protoconch and the presence of growth lines: *Cima* does not have the deep sinus close to the suture that characterizes *Murchisonella*. Moreover, *Murchisonella* has a scalariform profile, while in *Cima* it is rounded.

Considering the *Cima* species, both the type species *Odostomia minima* Jeffreys, 1858 and then *Jeffreysia cylindrica* Jeffreys, 1856 present a globular and slightly inclined protoconch (Figs. 5, 7, 8), completely different from those of *melitensis*.

The features of the protoconch of *C. melitensis* bring the species close to the genus *Murchisonella*, whose type species *Murchisonia* (*Murchisonella*) *spectrum* Mørk, 1875 (Fig. 9), comes from the Caribbean area (Redfern, 2001). This genus is characterized by an acclidiform shell, densely striated in the middle and inferior part of the whorls, with a sinus in the upper part of the external peristome edge, and hyperstrophic protoconch.

The only species attributed to this genus, reported in the Mediterranean, is *Murchisonella mediterranea* Peñas & Rolán, 2013 (= *Murchisonella columna* Auctores not Hadely, 1807).

With both these species *C. melitensis* shares only the protoconch and not the growth style or the shape of the whorls that are in common with *Cima*. Thus, we think that *C. melitensis* has to be attributed to a distinct genus, but none of the known ones, both from fossil and living records, seems suitable. So we believe it is necessary to institute a new genus.

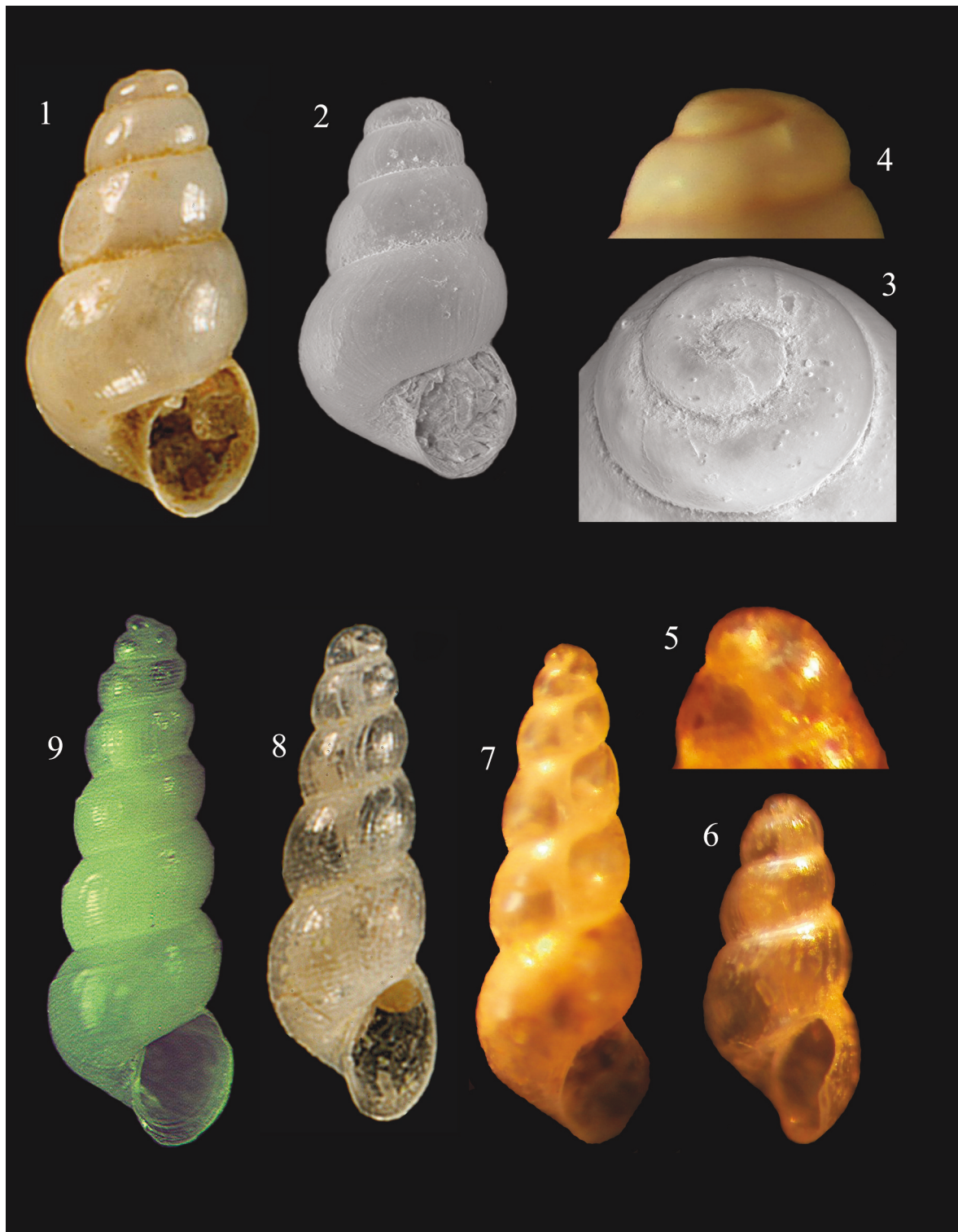


Figure 1. *Mifsudia melitensis*, Mauritania, -80/100 m (1.1 mm). Figure 2. *Mifsudia melitensis*, Mauritania, -80/100 m (0.98 mm). Figure 3. *Mifsudia melitensis*, Mauritania, -80/100 m, protoconch of shell in Fig 2. Figure 4. *Mifsudia melitensis*, protoconch, lateral view, Mauritania, -80/100 m. Figure 5. *Cima minima*, protoconch, Giannutri Island, Grosseto, Italy, -18 m. Figure 6. *Cima* sp., Getares, Algeciras, Spain, beach (0.86 mm). Figure 7. *Cima* cf. *cylindrica*, Sorrento, Naples, Italy, -50/60 m (1.48 mm). Figure 8. *Cima cylindrica*, Levanzo Island, Trapani, Italy, -31 m (1.45 mm). Figure 9. *Murchisonella spectrum*, Varadero, Bahía de Cochinos (Cuba), -10 m (1.4 mm).

ACRONYMS. Franco Gubbioli collection, Marbella, Málaga, Spain = FG. Paolo Mietto collection, Vicenza, Italy = PM. Italo Nofroni collection, Rome, Italy = IN. Ermanno Quaggiotto collection, Longare, Vicenza, Italy = EQ.

RESULTS

SYSTEMATIC

Class GASTROPODA Cuvier, 1797

Subclass HETEROBRANCHIA Gray, 1840 (unsigned)

Infraclass HETEROBRANCHIA Gray, 1840

Family CIMIDAE Warén, 1993

Genus *Mifsudia* n. gen.

TYPE SPECIES. *Cima melitensis* Mifsud, 1998: Figs. 4, 5.

EXAMINED MATERIAL. “*Cima*” *melitensis*. Lampedusa Island, Cala Calandra, -30 m, legit M. Oliverio, 1 shell (IN). Between Estepona (Malaga, Spain) e Tetuan (Morocco), -25/35 m, 1 shell (IN). Mauritania (West Africa, Atlantic Ocean), - 80/100 m, more than 40 shells, legit F. Gubbioli, (FG, PM, IN, EQ). All inedited reports. Malta, Golden Bay, -100/120 m, legit F. Carmona, 1 shell (EQ). *Cima minima*: more than 60 shells from all the Mediterranean Sea, from 0 to 180 m of depth (PM, IN, EQ).

Cima cylindrica. More than 60 shells from all the Mediterranean Sea, from 0 to 100 m of depth (PM, IN, EQ).

Cima sp. 2 shells from Getares (Algeciras. Spain), beach, inedited report (IN).

Murchisonella spectrum. Varadero (Cuba, Caraib Sea), beach, legit C. Petrella, 1 shell (EQ). Bahía de Cochinos (Cuba, Carribean), debris -10 m, legit M. Chiodi, 7 shells (IN).

Murchisonella mediterranea. Aydıncık (Turkey), -27 m, , legit M. Oliverio, 1 shell (IN).

Murchisonella sp. Watamu (Kenia, Indian Ocean), -32 m, legit L. Contessini, 1 shell (IN). Shaiab

Rumi (Sudan, Red Sea), - 60 m, legit M. Oliverio, 1 shell (IN).

DESCRIPTION. Small shell, white, bright, lacking in the spiral sculpture, widely umbilicate, with the shape similar to *Odostomia*; rounded whorl with growth lines flexuous but lacking in the subsutural sinus. External peristome edge thin and sharp, lacking in sinus. Hyperstrophic protoconch with probable planctotrophic development.

ETIMOLOGY. The name has been coined in honor of Constantine Mifsud, the well known Maltese malacologist, discoverer of *C. melitensis*.

REMARKS. Composition of the genus:
Mifsudia melitensis Mifsud, 1998 - living, Mediterranean Sea and Atlantic Ocean
Mifsudia gantensis Bandel, 2005 - fossil, Middle Eocene, Hungary (= *Cima gantensis*)
Mifsudia sp. (= *Murchisonella* n. sp.? pro *Murchisonella* cf. *obtusa* Gougerot & Le Renard, 1978) fossil, Early Oligocene, France, see below.

DISCUSSION

As previously discussed, the new genus *Mifsudia* n. gen. differs from *Cima* for the shape of the protoconch, hyperstrophic and not globular; the shape of the growth lines, sinuous (sigmoids) but always lacking in the subsutural sinus. The rounded shape of the whorls is similar in both genera.

Mifsudia n. gen. and *Murchisonella* share the same typology of hyperstrophic protoconch but not the shape of the whorls, that in the latter is clearly angular, nor the shape of the growing lines that in *Murchisonella* is sigmoid and characterized by a deep sinus in the subsutural area.

These differences occur also in the fossil forms, at least from Lutetian (Middle Eocene).

Thus, to be included in *Mifsudia* there are:

- 1) *Cima gantensis* Bandel, 2005 from the Middle Eocene of Hungary.
- 2) *Murchisonella* n. sp.? pro *Murchisonella* cf. *obtusa* (in Gougerot & Le Renard, <http://www.somali.asso.fr/fossils/biotaxis.php>, fiche batch LR-71951) from the Early Oligocene (Stampiano Auct.) of France.

According to Le Renard (<http://www.somali.asso.fr/fossils/biotaxis.php>), Janssen A.W. (1984), because of

the features of the protoconch and of the growth lines, have to be referred to *Cima* the fossil species *Cima gougeroti* Le Renard, in schedis, from the Lutetian of the Paris Basin (<http://www.somali.asso.fr/fossils/biotaxis.php>, batch 60859 and 61595), *Cima microscopica* Le Renard, in schedis, from the Lutetian and “Biarritzian” of the Paris Basin (<http://www.somali.asso.fr/fossils/biotaxis.php>, batch 73241), *Aclis (Stilbe) proneglecta* R. Janssen, 1978 from the Upper Oligocene of Glimmerode (Germany), *Aclis (Stilbe) neglecta* A.W. Janssen, 1969 from the Miocene of Dingden (Germany).

According to Pachaud & Le Renard (1995) should be referred to *Murchisonella* the fossil species *Aciculina emarginata* Deshayes, 1861, *Murchisonella densesulcata* Gougerot, 1966 and *M. obtusa* Gougerot & Le Renard, 1978, all from the Lutetian of the Paris Basin.

The presence of clear distinctive characteristics among these three genera, highlighted since the Lutetian, supports the validity of the new genus *Mifsudia*.

About what concerns the systematic collocation of the new genus, we have to confess some embarrassment because the previous Authors used several and different criteria for the collocation of the genera at the family level. We think that what proposed by Bandel (2005) is not completely shareable because we separate *Mifsudia* from *Cima* due to the protoconch shape, without considering other anatomical characteristics.

Without starting a systematic discussion, it has to be considered that Bandel (2005) and Warén (2013) used as criterion the teloconch feature rather than the protoconch. Following this rule, the absence of the characteristic sinus in the growing lines, typical of *Murchisonella* and *Pseudoaclisina*, gives credit for the collocation of *Mifsudia* in Cimidae.

ACKNOWLEDGEMENTS

A special thanks to all the friends, particularly to Franco Gubbioli (Marbella, Málaga, Spain) that gave the malacological samples used in this study, to Matteo Belvedere (Padova, Italy) to Stefano Meggio (Vicenza, Italy) for english translation and

to Stefano Bartolini (Firenze, Italy) for providing us some colour photos (Fig. 1 and Fig. 8).

REFERENCES

- Aartsen J.J. van, 1981. European marine Mollusca: notes on less well-known species II. The genus *Cima* Chaster, 1896. *Basteria*, 45: 117–119.
- Bandel K., 2005. Living fossils among tiny Allogastropoda with high and slender shell from the reef environment of the Gulf of Aqaba with remarks on fossil and recent relatives. *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg*, 89: 1–24.
- Bouchet P. & Rocroi J.P., 2005. Classification and Nomenclator of Gastropod Families. *Malacologia*, 47: 1–397.
- Chaster G.W., 1896. Some new marine Mollusca from Tangier. *Journal of Malacology*, 5: 1–4.
- Fretter V. & Graham A., 1982. The Prosobranch Molluscs of Britain and Denmark. Part 7 - “Heterogastropoda” (Cerithiopsacea, Triforacea, Epitoniacea, Eulimacea). *Journal of Molluscan Studies*, 11 suppl.: 363–434.
- Graham A., 1988. Molluscs: Prosobranch and Pyramidellid Gastropods. The Linnean Society of London and the Estuarine and Brackish-Water Sciences Association. *Synopses of the British fauna (NS)*, 2: 1–662.
- Janssen A.W., 1984. Mollusken uit het mioceen van Winterswijk-Miste. Een inventarisatie, met Geshrijvingen en afbeeldingen van alle aangetroffen soorten. Koninklijke Nederlandse Natuurhistorische Vereniging, Amsterdam, 1: 451 + 82 platen.
- Le Renard P. <http://www.somali.asso.fr/fossils/biotaxis.php>
- Mifsud C., 1998. *Pseudographis cachiai* n. gen. e n. sp., e *Cima melitensis* n. sp.: due specie nuove di Heterostropha (Mollusca, Gastropoda) dell’arcipelago maltese. *La Conchiglia*, 286: 25–29.
- Pachaud J.M. & Le Renard P., 1995. Révision des mollusques paléogènes du Bassin de Paris. IV – Liste systématique actualisée. *Cossmanniana*, 3 : 151–187.
- Peñas A. & Rolán E., 2013. Revision of the genera *Murchisonella* and *Pseudoaclisina* (Gastropoda, Heterobranchia, Murchisonellidae). *Vita Malacologica*, 11: 15–64.
- Redfern C., 2001. Bahamian Seashells. A thousand species from Abaco, Bahamas. *Bahamianseashells.com*, Inc: Boca Raton, Florida. 280 pp., +124 pls.
- Warén A., 1993. New and little known Mollusca from Iceland and Scandinavia. Part 2. *Sarsia*, 78: 159–201, Bergen.

- Warén A., 2013. Murchisionellidae: who are they, where are they and what are they doing? (Gastropoda, lowermost Heterobranchia). *Vita Malacologica*, 11: 1–14.