

***Melanella cyclopia* n. sp. (Gastropoda Eulimidae) from Eastern Sicily**

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ABSTRACT

Melanella cyclopia n. sp. (Gastropoda Eulimidae) is described based on tens of shells found in shell grit taken in various localities located in a short length of Northern coast of Catania (Eastern Sicily, Ionian Sea), between 20 and 45 m depth. Findings include a live taken specimen, whose soft parts have been observed and drawn. The new species is characterized by a well-rounded, swollen, solid shell similar to some Mediterranean congeners, but peculiar on account of some protoconch and shell details and a different external morphology of the soft parts. Differences from similar species from Eastern Atlantic, Red Sea, as well as Indo-Pacific are hereafter discussed.

KEY WORDS

Melanella cyclopia; Eastern Sicily; new species; Eulimidae; Mediterranean Sea.

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INTRODUCTION

Twenty species of the genus *Melanella* Bowdich, 1822 (Gastropoda Eulimidae) are currently listed for the Mediterranean Sea (S.I.M. Sistematica Mediterranea, 2022), showing a wide variety of forms: some of them need further taxonomical investigations as concern their taxonomic validity and their correct placing under this genus. The Eulimids have been dealt with by Warén (1984), while the Mediterranean species have been discussed and/or illustrated by Giannuzzi Savelli et al. (1999), Cossignani & Ardovini (2011), Gofas (2011). Fretter & Graham (1982) well illustrated and discussed the species from Britain and Denmark, most of which are also present in the Mediterranean Sea. Species from Gabès Gulf have been dealt with by Cecalupo et al. (2008).

Scuderi et al. (2006) reported and figured as *Me-*

lanella sp. one specimen found along the Eastern coast of Sicily. Subsequently, this specimen was treated by Scuderi & Criscione (2011), who gave a short description and discussed the possibility that it was a morphological variation of *Melanella petiti-tiana* (Brusina, 1869). The finding of further specimens allowed us to better study this species and compare it to biological materials and literature data of Mediterranean Sea, Eastern Atlantic and Indo-Pacific species, thus convincing us to describe it as new species.

MATERIAL AND METHODS

This species has been found in various localities located in a short length of coast (about 10 km) of the Northern side of Catania (Eastern Sicily, Ionian Sea) between “Armisi” (37°30’18”N, 15°06’04”

E), an ancient toponym which designates the first rocky place of the city northern to the harbor, and Capomulini (37°34'30"N, 15°10'33"E), at depths between 20 and 50 m (Fig. 1). Sediments containing materials utilized in the present study were collected from sandy gravel, detritic, pre-coralligenous bottoms, rich in mud, in different circumstances: a part was taken manually during SCUBA divers with ARA, using a hand-towed net of 1 mm mesh size and another part was sampled on soft substrates by a 15 litres Van Veen grab and sieved on a 1 mm mesh sieve to remove the finest substrate fraction. Only one not fully grown living specimen was kept after brushing on volcanic rocky surfaces with crevices containing muddy detritic gravel at 42 m depth, maintained alive in sea-water and drawn with gray and colored pencils and then saved in 90° ethanol. The remaining material was dried and sorted under a stereomicroscope, separated and identified at species level.

Similar congeners were observed too with the aim to better understand all the possible morphological characters of the shell which characterize this group of Eulimidae.

ABBREVIATIONS AND ACRONYMS. SEM = scanning electron microscope; W: maximum width (in mm); H = maximum height (in mm); h = height of last whorl; coll. = collection; sh. = shell/s without soft parts inside; sp. = living collected specimen/s; DS = Danilo Scuderi collection (Catania, Italy); FA = Franco Agamenone collection (Pescara, Italy); MT = Morena

Tisselli collection (Ravenna, Italy); PM = Pasquale Micali collection (Fano, Italy); MZB = Museo Zoologico dell'Università di Bologna, Bologna, Italy.

RESULTS

Systematics

Classis GASTROPODA Cuvier, 1795

Subclassis CAENOGASTROPODA Cox, 1960

Superfamilia VANIKOROIDEA J.E. Gray, 1840

Familia EULIMIDAE Philippi, 1853

Genus *Melanella* Bodwich, 1822

Type-species: *Melanella dufresnei* Bodwich, 1822

Melanella cyclopia n. sp. (Figs. 4-14)

<https://zoobank.org/act:63B3B41F-391A-414C-984B-9F4C4A7380E1>

TYPE MATERIAL. Holotype MZUB 60416, H = 4.0 mm, W = 1.67 mm, Italy: Cannizzaro (Catania), shell grit collected with ARA by diver, 45 m depth, pre-coralligenous bottom, VI/2007 (Figs. 4, 5, 8, 9, 10); paratype 1 (Figs. 6, 7, 11), H = 3.8 mm, W = 1.7 mm, Aci Castello (Catania), 30 m depth in SGCF/DC biocoenosis (DS); paratypes 3-9, same data of holotype: paratype 2: H = 3.1 mm, W = 1.35 mm (MT); paratype 3: H = 3.5 mm, W = 1.45 mm (MT); paratype 4: H = 3.85 mm, W = 1.55 mm (MT); paratype 5: H = 3.75 mm, W = 1.75 mm (MT); paratype 6: H = 4.75 mm, W = 1.9 mm (MT); paratype 7: H = 4.55 mm, W = 1.85 mm (MT); paratype 8, H = 3.95 mm, W = 1.65 mm (PM); paratype 9: H = 5.85, W = 2.35 (MT); paratype 10 (Figs. 13, 14), H = 2.1 mm, W = 1.0 mm, Italy: Cannizzaro (Catania), shell grit collected with ARA at 42 m depth, 1 sp. (DS).

OTHER EXAMINED MATERIAL. The following specimens of *M. cyclopia* were also examined: Italy: Cannizzaro (Catania), shell grit collected with ARA at 42 m depth, 9 sh. (DS); Acitrezza (Catania), 50 m depth, fishing nets residuals, 2 sh. (DS); Capomulini (Catania), shell grit collected with ARA at 25 m depth, 7 sh. (DS); Capomulini (Catania), shell grit collected with ARA at 26 m depth, 4 sh. (DS); Catania "Armisi", shell grit collected with ARA at 20 m depth, 2 sh. (DS). Skerke Bank, "Secca del Kait", 60 miles SE of Marettimo Island

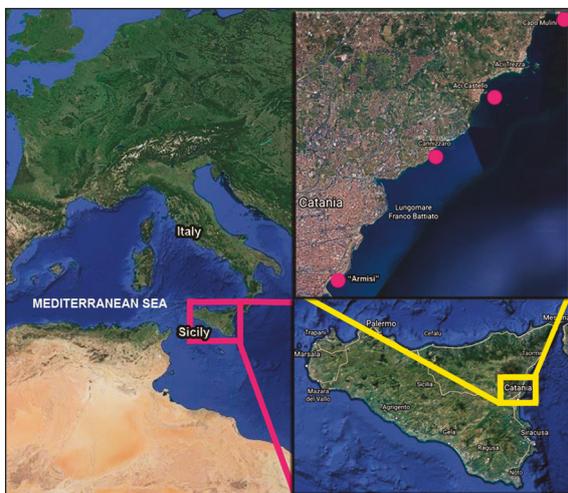


Fig. 1. Geographic map of the records.

(Trapani), July 1997, in shell-grit, 37 m (Giovanni Pesaresi legit), 2 sh. (FA) (Fig. 12).

Melanella alba (da Costa, 1778). Italy: Aci Castello (Catania), 4 specimens and 75 shells, 80 m depth, DC biocoenosis (DS).

Melanella boscii (Payraudeau, 1826). Italy: S. Giovanni Li Cuti (Catania), 5 sp. and 6 sh., 7/8 m depth, hand-collected by SCUBA diving, in AP biocoenosis (DS); Cannizzaro (Catania), shell grit collected with ARA by diver, 45 m depth, pre-coralligenous bottom, VI 2007, 10 sh. (MT).

Melanella lubrica (Monterosato, 1890). Italy: Aci Castello (Catania), 42 specimens, 80 m depth, DC biocoenosis (DS); Cannizzaro (Catania), shell grit collected with ARA by diver, 45 m depth, pre-coralligenous bottom, from 2006 to 2011, 44 sh. (MT). Chioggia (Venezia) sediment dredged XII.1990, 1 sp., 4 sh. (MT); Rimini, sediment 50 m depth, XI.1987, 1 sp. (MT).

Melanella petitiana (Brusina, 1869). Italy: Capraia Island (Livorno), 180 m depth, 2 sh. (PM); Pozzillo (Catania), 24 m depth, 6 sh. (PM); Scilla (Reggio Calabria), 30/41 m depth, 2 sh. (PM); Isola Bella (Taormina), 30 m depth, 6 sh. (PM); San Giuliano (Trapani), beach, 2 sh. (PM); S. Giovanni Li Cuti (Catania), 4 sp. and 12 sh., 7/10 m depth, sciaphilous side of rocks (DS). Cannizzaro (Catania), shell grit collected with ARA by diver, 45 m depth, pre-coralligenous bottom, VIII.2006, 150 sh. (MT).

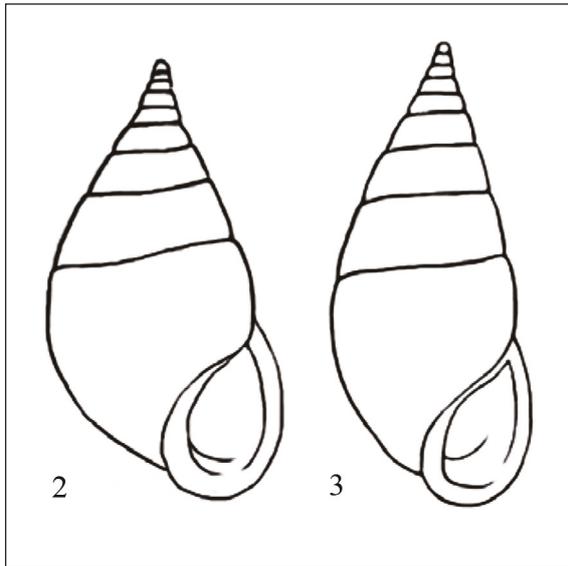
Melanella polita (Linnaeus, 1758). Italy: Catania, Playa, 12 shells beached on the sandy littoral (DS); S. Giovanni Li Cuti (Catania), 2 sp., 2/4 m depth, hand-collected on volcanic sand between rocks (DS); "Armsi" (Catania), 1 sp., 20 m depth, on volcanic sand between rocks (DS). Cannizzaro (Catania), shell grit collected with ARA by diver, 45 m depth, pre-coralligenous bottom, VI.2007, 10 sh. (MT).

DESCRIPTION. Shell pupoid (Figs. 4, 5, 11, 12), very thick, glossy white, constituted by about 6 very slightly convex, smooth, teleoconch whorls marked by incremental labial scars during the growth. The whorl width increases quickly in the initial teleoconch whorls, more slowly on the following ones. Under stereomicroscope, in fresh specimens, with transverse reflection light, the surface of the teleoconch whorls appears rutted by very faint dense spirals and less dense growth lines, which cross themselves and form a net-like reticulum (Fig. 10), while SEM photograph (Fig. 9) shows a completely

smooth surface. Suture shallow but well distinct, of slightly variable depth. False suture (grayish sub-sutural area) occupying about 33% of the whorl height. Last whorl regularly rounded at the periphery. The aperture is small compared to the whole shell, pyriform, not protruding outside the profile of penultimate whorl, adapically acute, abapically expanded and regularly convex. Base outline well rounded. Columella straight, slightly opisthocline, gently angled in the middle. Columellar lip expanded. Parietal callus thick, extended up to connection with the external lip. Outer lip very thick, gently sinuous in lateral view (Fig. 6 in paratype 1), starting slightly opisthocline and projecting in the central part. Last whorl occupies about 54.6% of total height, aperture about 37.2% of total height. The protoconch consists of about 3 whorls (Figs. 7, 8), 410 μm high. The initial 1.7 protoconch whorls are slowly increasing in diameter, subcylindrical, rapidly enlarging just before and conforming to the teleoconch profile. The transition protoconch-teleoconch (Fig. 7, purple arrows) is considered to be the first incremental scar. The nucleus is 46.7 μm high and 116.7 μm wide.

The living mollusc (Fig. 14 based on specimen of Fig. 13) is whitish as background colour and bears characteristic yellow lines: one is visible through the shell just under the false suture of the body whorl; two are parallel from just below the eyes to almost the tip of the cephalic tentacles, which remain white, other two run parallel from the tail to the middle of the foot, where they form a sinus upward and from which they continue to the anterior part of the foot. A stain of the same colour is visible under the operculum in transparency and a couple of orange stains are present in the head: one between the eye and the tip of the right cephalic tentacle and the second at the base of the left one. The colour of the rest of visceral mass in the other whorls is whitish. Operculum thin, paucispiral, with an eccentric nucleus.

Two main morphs could be distinguished among shells of the new species. Some shells (Fig. 2) are smaller, stouter, thicker, apparently more globose than others, due to the lower teleoconch whorls (e.g. paratype 1, Fig. 11), with a h/H ratio around 0.57. Others (Fig. 3) are bigger, slender and with a tapered spire and a h/H ratio around 0.49 (e.g. holotype and sp. in Fig. 12). Both the morphs have a h/H ratio less than the most similar congeners. These



Figures 2, 3. Sketches of shell outline of paratype 1 (Fig. 2: probably male, 3.8 mm) and of sp. in Fig. 12 from Skerke Bank (Fig. 3: probably female, 5.85 mm).

specimens are here interpreted as sexual dimorphism, as ascertained for other species of *Melanella* (Warén, 1984): since we could not verify this with an anatomical dissection, we can only suppose that, similarly to other species, the stouter are male, while the more conical are female specimens.

The last note on variability concerns the soft body chromatism, which is based on observation of only one living specimen. While the disposition of the simply chromatic accessories of the colour pattern of the species is evidently different from those of the more similar species, the asymmetric disposition of the orange stains in the cephalic region could be anomalous, maybe due to the young age of the specimen or to other contingent events. The observations of further specimens could confirm or deny this affirmation.

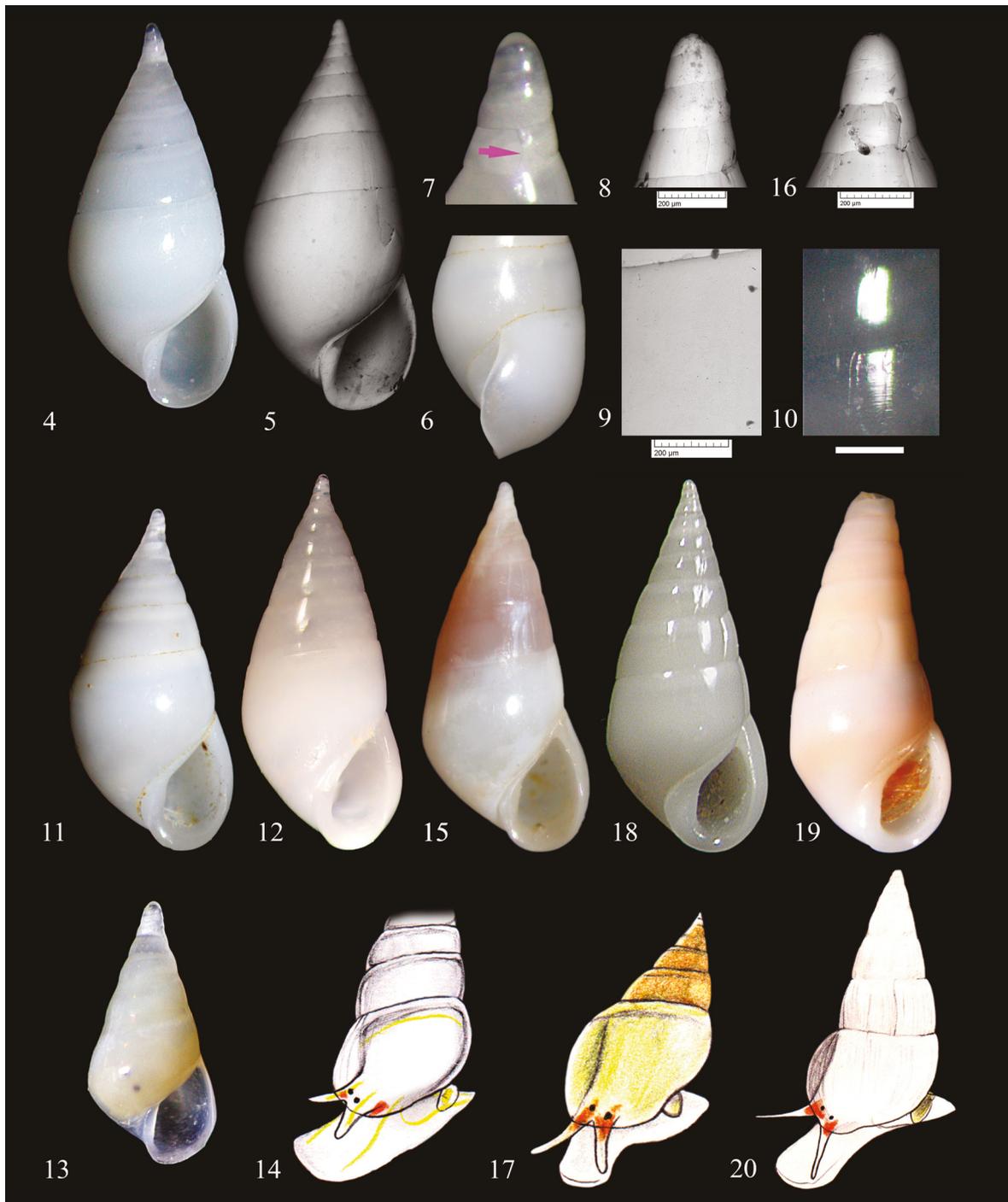
DISTRIBUTION AND BIOLOGY. The new species has been found in various localities of a short length of coast (about 10 km) between the harbour of Catania and the village of Capomulini, located North of Catania (Eastern Sicily, Ionian Sea), at depth between 20 and 45 m. But the only one live taken specimen from Cannizzaro has been caught crawling free, so no evidence of the possible host of this species could be furnished here. In all these localities the new species was sympatric with the abundant congener *M. petitiana*, but seems to prefer deeper

bottoms. Species of *Melanella* are known to be parasites of holothurians (Warén, 1984), and in the above described detritic bottoms, where the new species was found, they were abundant (personal observations of the first Author).

ETYMOLOGY. The name of the species originates from the ancient Greek adjective “κυκλώπειος” and the related Latin “Cyclōpius, -a, -um” which meant “concerning the Cyclops”, with reference to the geographical area where specimens has been found, recounted in the “Odyssey” by Homer.

REMARKS. The generic placement of the new species in *Melanella* is based on morphological analogies with the congener *M. petitiana*, to which it is more similar. The fact that few similar species have been placed in genera *Mucronalia* A. Adams, 1860, *Hypermastus* Pilsbry, 1899 and *Echineulima* Lützen et Nielsen, 1975 suggested us to explore the possibility of a different generic placement of the new species. All these genera share the peculiar stylet-like top of the shell, which is anyway present in other genera, like *Pelseneeria* Koehler et Vaney, 1908 for example, with a completely different teleoconch shape, dimensions and consistence. But other characters are different and shared with *Melanella* representatives too. As a confirmation, Warén (1984), when discussing the genus *Mucronalia* stated that “this genus has been misused almost all the time since it was described” and “...from shell characteristics, I have not been able to refer any known species to *Mucronalia* without considerable hesitation”. The type species *M. bicincta* A. Adams, 1860 from Japan is well different indeed (Takano et al., 2019). Genus *Echineulima* is larger, stouter, with convex whorls and sinuous scars. The possible placements of the new species in these genera did not fully persuade us. These genera are poor of species and the type taxon is tropical. They were (see Warén, 1984 for instance) and still remain almost poorly known in terms of anatomy and host, but also in peculiar shell characters, resulting heterogeneous or still not well defined taxa. Moreover molecular data are missing. For these reasons we prefer to place the new species in the genus *Melanella*.

Anyway, after being compared with the most similar Mediterranean species, comparisons of the new species with extra-Mediterranean representatives of these genera were performed to exclude or, at least limit, a possible case of alien introduction.



Figures 4-14. *Melanella cyclopia* n. sp. Figs. 4, 5, 8-10: holotype, Cannizzaro, H: 4.0 mm (MZUB 60416). Figs. 6, 7, 11: paratype 1, Aci Castello, details of the lip and of the protoconch (the purple arrow indicates transition protoconch-teleoconch), H: 3.8 mm (DS); Fig. 8: SEM photograph of the protoconch of holotype. Fig. 9: SEM detail of the surface of the shell of the holotype. Fig. 10: the same at stereoscope (scale bar = 200 μ). Fig. 11: paratype 1, whole shell, Aci Castello, H: 3.8 mm (DS). Fig. 12: Skerke Bank, H: 4.98 mm (FA). Fig. 13: living specimen (paratype 10), H 2.1 mm (DS). Fig. 14: drawing of the external soft parts of the specimen in Fig. 13. Figures 15-17. *M. petitiana*. Fig. 15: live collected specimen, S. Giovanni Li Cuti, H: 4.1 mm (DS). Fig. 16: SEM photograph of the protoconch of the same specimen. Fig. 17: drawing of the external soft parts of the same specimen. Figures 18-20. *M. boscii*. Fig. 18: shell, Cannizzaro, H: 5.1 mm (MT); Fig. 19: living specimen, S. Giovanni Li Cuti, H: 4.8 mm (DS); Fig. 20. drawing of the external soft parts of the same specimen (DS).

The new species seem to a weak reticulate sculpture on the surface of the teleoconch whorls constituted by spiral and axial lines, but they are only apparent, being the microsculpture only an optical illusion due, like in other species of this family (Waren, 1984), to light reflections on aragonite components of the shell. *Melanella cyclopia* was first reported as *M. sp.* from the type area (Scuderi et al., 2006) on the basis of the finding of a single specimen (paratype 1, Fig. 11) found at Aci Castello, at a depth of 30 m which later was supposed to belong to a morphological variation of *M. petitiana* (Scuderi & Criscione, 2011), this latter being relatively common in the area. But *M. petitiana* is a well-known species, on which interpretation of all Authors concur. It is widely distributed from the Mediterranean to southern Britain (Fretter & Graham, 1982) and was figured by several Authors (Giannuzzi Savelli et al., 1999; Cecalupo et al., 2008; Cossignani & Ardovini, 2011; Gofas, 2011; Scaperrotta et al., 2014) therefore there is a clear indication of the specific variability. Considering the finding of a single specimen Scuderi et al. (2006) concluded that “*In order to assess whether these differences are enough to justify a new species description or simply are the evidence of the intraspecific variability of M. petitiana, more material and observations on the external soft body parts characters are required*”.

Compared to the close similar and sympatric *M. petitiana* (Figs. 15, 16), the new species is more solid, with a pupoid (spire angle 45°) instead of almost cylindrical outline (spire angle 38°), the whorls are lower (H/W = 2.39 vs. 2.73 in *M. petitiana*, see Fig. 21), the outer lip only slightly protrudes from teleoconch profile, while in *M. petitiana* it well protrudes. The body-whorl (h) occupies a larger part of the total shell height (54.65% vs. 50.81% in *M. petitiana*, see Fig. 22), and the columella is more angulate in the middle. Moreover the protoconch of the new species has about 3 whorls and an height of about 410 µm, while in *M. petitiana* has about 2.2 whorls and is 375 µm high.

The new species differs from *M. boscii* (Payraudau, 1826) (Figs. 18, 19) for the smaller dimensions, the cylindrical instead of conical apex, the much slower growth in height and width (narrower spire angle) and the more convex whorls. Moreover the shell of *M. boscii* is heavier, the columella shows a more expanded parietal callus and a thicker external lip.

Comparing the external soft chromatic pattern, *M. boscii* and *M. petitiana* lack the characteristic yellow lines crossing the foot, the body-whorl and the cephalic tentacles (compare Figs. 14, 17 and 20).

All the other Mediterranean species are morphologically quite different in shell and soft parts and do not need to be compared.

The genus *Mucronalia* comprises three completely white species and two with coloured bands, the other species being considered not correctly placed in this genus (Takano et al., 2019). *Mucronalia oxytenes* Melvill, 1904 is figured in Melvill (1904, pl. X, fig. 10), from deep waters (285 m depth) from an area comprised between the Persian Gulf, the Gulf of Oman and the Arabian Sea (Melvill, 1904). The original drawing shows a little rotate shell, therefore the outline is difficult to compare, but it is a thin shell with not thickened external lip. *Mucronalia lepida* Melvill, 1906, figured in Melvill (1906, pl. VII, fig. 8), from deep waters of the area comprising Persian Gulf and Gulf of Oman (Melvill, 1906) differs for having a thin shell with a narrower outline (H/W = 3 from the description, but 2.4 judging from the drawing vs. 1.8-2.1 in *M. cyclopia*), oblique suture and higher aperture.

No other similar species have been found in Bosch et al. (1995), Hori & Matsuda (2000), Rumsore-Villaume (2008), Edelman-Furstenberg & Faershtein (2010), Blatterer (2019), and on works of James Cosmo Melvill on mollusca of Eastern Arabia and India.

Among the species living in Eastern Atlantic, only two have been found showing some similarity. *Echineulima leucophaes* (Tomlin & Shackelford, 1913) figured in Hernández et al. (2011, figs. 35 G-H), distributed in Eastern Atlantic at São Tomé, Gulf of Guinea and Canarias (Hernández et al., 2011), that is much larger (about 12 mm), much stouter, with rounded whorls, deeper suture, wider and squarish aperture. The Eastern Atlantic (Madeira and Canary Islands) *Echineulima mittrei* (Petit de la Saussaye, 1851) as figured in Segers et al. (2009, pl. 16, figs. 11, 11a), also distributed at São Tomé (Segers et al., 2009) is much larger (about 13 mm for the females), much stouter, with rounded whorls, deeper suture, wider and squarish aperture. But *E. mittrei* is really an Indo-pacific species and the record in Segers et al. (2009) could possibly be better referred to *E. leucophaes*.

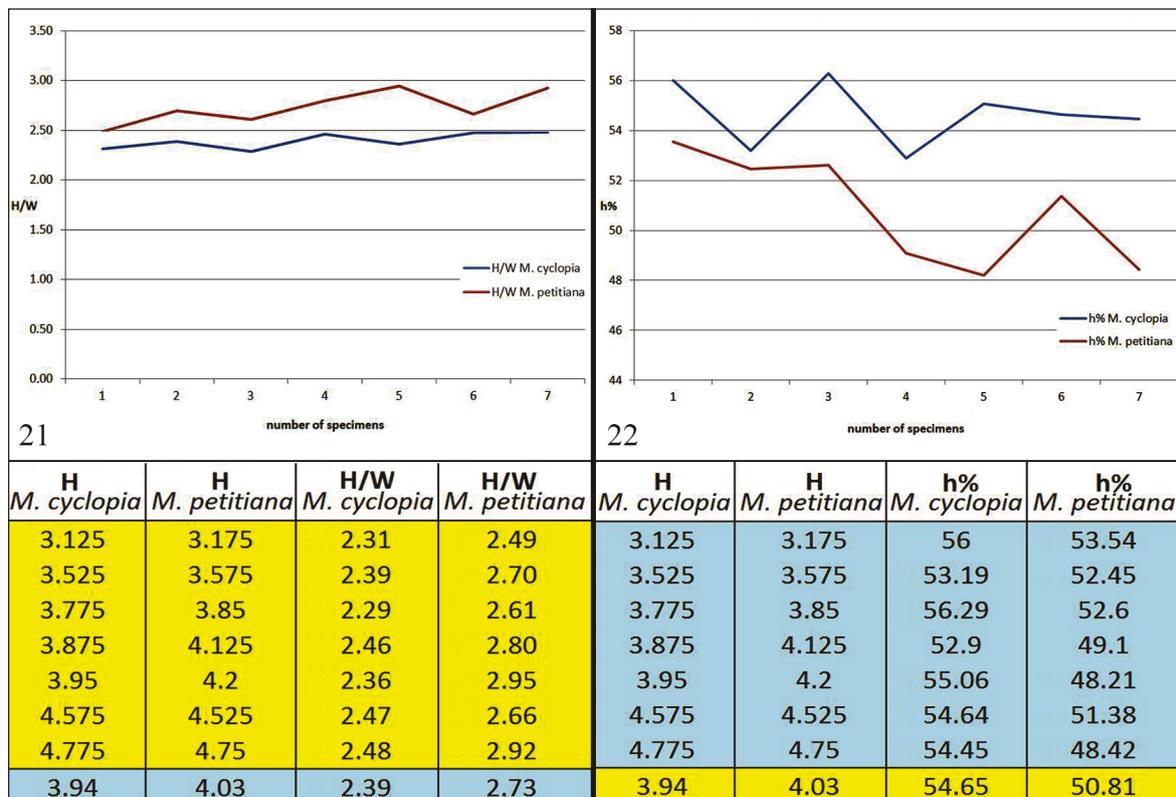


Figure 21. Data and diagram of the H/W ratio comparisons (in mm) between *M. cyclopia* and *M. pettitiana*. The first two columns refer to the total height of specimens of both the species considered (sizes are in millimetres); medium is in light blue color. Figure 22. Data and diagram of the h% comparisons (in mm) between *M. cyclopia* and *M. pettitiana*. The first two columns refer to the total height of specimens (H) of both the species considered (sizes are in millimetres); medium is in yellow color.

Among Western Atlantic species only *M. gibba* Abbott, 1974 morphologically resembles the new species, but it differs for the more conical shell outline, the less inflated and more angled base, in addition to an almost squared mouth, with a more inclined columella. Moreover the shell is almost yellowish in colour.

Other extra-Mediterranean species resemble *M. cyclopia* for the shell shape but they don't have the stylet-like apex, while others have a similar apex but a quite different shell outline. Finally, none of the Eulimidae listed and figured in Albano et al. (2021) as possible aliens recently entered in the Mediterranean morphologically match with *M. cyclopia*.

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