

Two new species of the genus *Clathromangelia* Monterosato, 1884 (Gastropoda Raphitomidae) from the Mediterranean Sea, with lectotype designation of *C. granum* (R.A. Philippi, 1844)

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ABSTRACT Notwithstanding few more or less recent contributions, taxonomy of the raphitomid extant species of the genus *Clathromangelia* Monterosato, 1884 (Gastropoda Caenogastropoda) remains almost controversial. Fossil materials revealed a wide diversity from Miocene to Pleistocene. Representatives in this genus seem to be almost exclusively Mediterranean, with only few doubtful taxa described for extra-Mediterranean localities. Species in the *C. granum* (R.A. Philippi, 1844) complex are here revised starting from the type material, among which the lectotype here designed. Two species are here described as new: *C. fatamorganae* n. sp. and *C. martinastellae* n. sp.

KEY WORDS Taxonomy; *Clathromangelia*, Raphitomidae, Mediterranean, new species.

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INTRODUCTION

Once upon a time the family Turridae has been comprised of numerous species, often almost different between themselves. Currently they are included in 13 distinct families of the superfamily Conoidea and a high diversification emerges on account of molecular data (Bouchet et al, 2011), while the genus *Clathromangelia* Monterosato, 1884 appears included in Clathurellidae. Høisæter (2016), giving recognition to Bouchet et al. (2011) for having promoted taxonomical stability to the entire group of Turridae s.l., concerning this latter inclusion stated: "... the assignment of a genus to this family is anything but straightforward, [...] However, as suggested by several authors (e.g., Powell 1966, Oliverio 1995, Kilburn 2009) *the diagonally cancellated multispiral ('raphitomine')* protoconch is (almost) diagnostic for the family". He recognized a critical defect in their approach: the use of almost exclusively Indo-Pacific species for groups whose typetaxon are by contrast European.

In recent times, several revisions have been carried out and numerous new living and fossil species have been described mainly, but not exclusively, with a morphological approach, particularly for the highly diverse families Mangeliidae and Raphitomidae (Pusateri & Giannuzzi-Savelli, 2008; Pusateri et al., 2012, 2013, 2016, 2017a,b, 2018; Giannuzzi-Savelli et al., 2017, 2018a,b, 2019, 2020; Manousis et al., 2018; Landau

et al., 2022, 2023; Kontadakis et al., 2019; Prkić et al., 2020; Kontadakis & Manousis, 2022; Mbazios et al., 2023; Spada et al., 2023).

On account of anatomical studies, the radulaless species of *Clathromangelia* are included by Oliverio (1995) in Daphnellinae (currently accepted as Raphitomidae Bellardi, 1875). Recently the inclusion of *Clathromangelia* in Raphitomidae has been confirmed by Fassio et al. (2019) on the basis of molecular data from Mediterranean materials. Oliverio (1995) also added that this is an exclusively Mediterranean genus, as the attribution of few other extra-Mediterranean (Atlantic and Pacific) species to it is incorrect. Moreover, he stated that the three extant Mediterranean species, C. granum (Philippi, 1844), C. loiselieri Oberling, 1970 and C. strigilata Pallary, 1904 (MolluscaBase eds., 2024), are all almost geographically localized except the former, typetaxon of *Clathromangelia* sub Pleurotoma rude Philippi, 1836, which has a wider distribution still in the Mediterranean Sea. This latter species is considered identical with C. quadrillum Dujardin, 1837 by van Aartsen and Zenetos (1987), who separated it from P. clathrata M. de Serres, 1829, considered instead a valid fossil species. However, Oliverio again (1995) amended this last synonymy, considering C. quadrillum and three other similar congeners as valid fossil (Miocene to Lower Pliocene) species, different from C. granum on the basis of the teleoconch and protoconch morphology. Among taxa referable to C. granum van Aartsen and Zenetos (1987) considered Pleurotoma cancellata Calcara, 1839 an unavailable name, junior synonym of C. granum (sub C. quadrillum) fide Monterosato (1874, 1875, 1878), pre-occupied by two other identical names, one of Eichwald 1830 and the other of Deshayes 1834.

Considering extant and fossil species too, the genus *Clathromangelia* includes 25 species, from Miocene to recent: *C. acuticostata* Landau, Harzhauser et Giannuzzi-Savelli, 2022; *C. coffea* Kuroda et Oyama, 1971; *C. daisyae* Landau, Van Dingenen et Ceulemans, 2020, *C. densecostata* Landau, Van Dingenen et Ceulemans, 2020, *C. elvirae* Oliverio, 1995, *C. fenestrata* (Millet, 1865), *C. fuscoligata* (Dall, 1871), *C. granum* (R.A. Philippi, 1844), *C. hakkennesi* Landau, Van Dingenen & Ceulemans, 2020, *C. helwerdae* Landau, Van Dingenen et Ceulemans, 2020, *C. helwerdae* Landau,

karinneae Landau, Van Dingenen et Ceulemans, 2020, C. loiselieri Oberling, 1970, C. marinae Oliverio, 1995, C. mulderi Landau, Harzhauser et Giannuzzi-Savelli, 2022, C. oliverioi Landau, Harzhauser et Giannuzzi-Savelli, 2022, C. pereirae Landau, Van Dingenen et Ceulemans, 2020, C. quadrillum (Dujardin, 1837), C. rhyssa (Dall, 1919), C. strigilata (Pallary, 1904), C. tavianii Oliverio, 1995, C. terpsichore Chirli et Linse, 2011, C. vandervoorti (Landau, Harzhauser, İslamoğlu et C.M. Silva, 2013), C. vanieulandei Landau, Van Dingenen et Ceulemans, 2020, C. variegata (P.P. Carpenter, 1864), C. wopkeae Landau, Van Dingenen et Ceulemans, 2020).

Monterosato (1872) initially identified *C. granum* with *Pleurotoma clathrata* de Serres, 1829, but this latter is a Miocenic different species figured by Oliverio (1995). However, Monterosato (1872, 1874, 1875, 1878, 1884, 1891, 1917a, 1917b), as well as numerous Authors in the XIX century, considered *C. granum* an almost morphologically variable species. More recently, Oliverio (1995) regarded it as a variable species for shell dimensions and colour, but considered the possibility that morphs of *C. granum* could be different species.

It is noteworthy that all the past as well as the recent authors who have treated *C. granum* in their papers declared that they have not been able to study the type material of Philippi.

As a consequence, the current idea of *C. granum* diffused among the Mediterranean malacologists is that which can be inferred by ancient descriptions and the original drawing of Philippi (1836: plate XI, n. 16): a turreted small species, entirely dark brown in colour, with tubercles at the intersection of a cancellated sculpture.

In Landau et al. (2020, 2022) numerous fossil European species are treated and a wider morphology range in this group could be appreciated, both for protoconch and teleoconch. As a consequence, being treated a total of 16 species, taxonomical characters utilized are better fitting the morphological intrageneric variability, particularly for the protoconch. In the same paper, in particular, *C. granum* is reported among the fossil species for the Pliocene of Estepona, not on the basis of their own materials, but instead on the report of Vera Pelàez (2002) as *C. quadrillum*. In fact, pictures of this species, though not very clear, depict a paucispiral type of protoconch, what convinced Landau et al. (2022) to name this species *C. granum*. We agree to these latter in considering the specimen figured by Vera Pelàez (2002) not as *C. quadrillum*, but really the delicate sculpture of the protoconch, with numerous thin axial riblets seem different from that of *C. granum*, thus leaving open the question on presence of this species for the Pliocene of Estapona (Spain).

Among Raphitomidae, species of the Indo-Pacific genus *Kermia* show evident morphological analogies to those of *Clathromangelia*, though both are almost variable in morphology. The teleoconch shares with this latter the cancellate sculpture, which in many species appears evidently separated by an almost wide space between fasciolae and primary cords. Though almost variable among the numerous species, protoconchs in *Kermia* appear to be halfway between that of *Clathromangelia* and that of *Raphitoma*. It is characterized by a reticulated microsculpture of axial riblets and prosocline to opisthocline spiral threads, in some species interrupted on the last whorl at absutural zone and forming minute, somewhat cruciform structures. No spiral keels are reported on the last portion. Probably to this latter genus should be associated the extra-Mediterranean species of *Clathromangelia*.

In recent times, among materials of the Philippi collection, Coan & Kabat (2017) located syntypes of *Pleurotoma granum* Philippi, 1836. The study of the documentation of these syntypes allowed us to unequivocally interpret this species, to ascertain significant differences among some populations from the Central-Southern Mediterranean and to produce the present work.

MATERIAL AND METHODS

Dry specimens have been found among shell grit from different Mediterranean localities, then housed in our own and other private collections. Only two living specimens were collected to obtain informations on external soft parts chromatism. To collect this latter living materials, samples were conducted along the Eastern Ionian coasts of Sicily



Figure 1. Map of the sampling Mediterranean localities. Green circles: *Clathromangelia granum*; pink circles = *C. martinastellae*; yellow circles = *C. fatamorganae*. Records which need confirmation are marked with "?".

(Fig. 1) and were collected by scuba with a handtowed net, with a 0.5 mm mesh size, to gather the biological material obtained by brushing on shaphilic hard substrata, from 6 to 35 m depth. Materials fallen into the net were immediately stored in marine water, then sorted under stereomicroscope after few minutes. Specimens were photographed and filmed to obtain pictures (.jpg files) and small video clips (.avi files) and suddenly drawn with grey and coloured pencils. All the specimens were observed under a stereoscope for shell comparisons and measurements and photographed uncoated under a Thermo Scientific[™] Phenom[™] XL G2 Desktop SEM in Low Vacuum modality to obtain details of their micromorphology. Shell measurements were utilized for morphometric studies: in particular al/h ratio, b/h ratio, lw/h ratio (see abbreviations under Fig. 2 explanation) allowed shell outline comparisons between different species.

All specimens were then stored in 90° ethanol. The following extra-Mediterranean species of genus *Kermia* are also studied for comparisons: *K. cavernosa* (Reeve, 1845) from Maldives Republic, Ari Atoll, Kuda Rah island, beached shell grit; *K. edychroa* (Hervier, 1897) from Maldives Republic, Ari Atoll, Ranveli island, beached shell grit.

ABBREVIATIONS AND ACRONYMS. H = height; lw = last teleoconch whorl; SEM = scanning electron microscope; sh./s = shell/s without soft parts inside; sp./s = living collected specimen/s. AR = Agatino Reitano collection (Catania, Italy); AV= Alberto Villari collection (Messina, Italy); DS= Danilo Scuderi collection (Catania, Italy); MNB = Museum für Naturkunde, Berlin, Germany; MNHN = Muséum national d'Histoire naturelle, Paris, France; MSNC = Museo di Storia Naturale di Comiso, Italy; MSNM = Museo Civico di Storia Naturale di Milano, Italy; PM = Pasquale Micali collection (Fano, Italy). See also Fig. 2.

RESULTS

Systematics

Classis GASTROPODA Cuvier, 1795 Subclassis CAENOGASTROPODA Cox, 1960 Ordo NEOGASTROPODA Wenz, 1938

Superfamilia CONOIDEA J. Fleming, 1822 Familia RAPHITOMIDAE Bellardi, 1875

Genus Clathromangelia Monterosato, 1884

TYPE-SPECIES. *Pleurotoma granum* R. A. Philippi, 1844 accepted as *Clathromangelia granum* (R.A. Philippi, 1844)

DESCRIPTION. Shell (Fig. 2) of small dimensions (5-8 mm), fusiform, turriculate, almost solid. Teleoconch composed by three to five rounded whorls, with incised suture and moderately to wide subsutural ramp. Sculpture reticulated constituted by almost robust axial ribs and more or less equal spiral cords, which give rise to siphonal fasciole on the siphonal canal. At the intersection of axials and spirals more or less pronounced tubercles or spines could be present while more or less deep pits are visible in interspaces. A more or less wide space divides spirals and fasciole and is visible on the back side as a constricted basal zone. On the shell surface of many species dense microgranules are present. Aperture ovate, almost wide, with pronounced but usually not long siphonal canal and not deep to almost vanishing anal sinus. Outer lip often thickened, with denticles or lirae on the inner side. Columella slightly curved, "S" shaped, with narrow and smooth callus.

Protoconch multi or paucispiral, usually conic, more or less pointed, with cancellate sculpture of axial riblets and spiral threads, on the last whorl often interrupted and forming scales. On the last portion, before the protoconch-teleoconch boundary, one or two absutural protoconch carinae are present. Some species show no sculpture.

External soft parts with large foot, anteriorly almost incised, and short cephalic tentacles and siphon, white or whitish in colour. Operculum not present.

Clathromangelia granum (Philippi, 1836)

Clathromangelia delosensis (Reeve, 1846) Pleurotoma cancellata Calcara, 1839 † (not P. cancellata H.C. Lea, 1841 †) Pleurotoma delosensis Reeve, 1846 Pleurotoma granum R.A. Philippi, 1844 Pleurotoma rude R.A. Philippi, 1836

ORIGINAL DESCRIPTION. Philippi, 1836: "Pl. testa

minuta oblonga; costellis longitudinalibus circa 9, lineisque elevatis transversis (3 in anfr. superioribus) grosse clathrata; apertura oblonga, spiram aequante; labro incrassato, intus crenato. Rarum. Specimina quatuor in secundo itinere inveni. Anfractus sex; plicae labri internae 3. – Male cl. Kiener p. 70 dubitavit hanc speciem esse statum juvenilem Pl. Reticulati Ren. – Nonne Pl. quadrillum Dujardin? Mem. Soc. geol. de France II. 2. p. 291. nr. 10. t. XX. f. 23. In textu anfractus 3 ½ indicantur, in figura 6-7 et labrum perfectum conspiciuntur!! Quid de tali negligentia dicendum?".



Figure 2. Schematic drawing of the shell (left) with detail of the protoconch (right) of a generic *Clathromangelia*. Nomenclature: al: aperture length; b: total breadth of the shell; EL: external lip; ID: internal denticles; h: total height of the shell; IS: spirals between interspaces; LC: lower teleoconch spiral cord; N: nucleus of protoconch; NP: nuclear papillae; P: protoconch; PAR: protoconch axial ribs; PC: primary teleoconch cords; PC I: adsutural primary teleoconch cord; PK I: adsutural protoconch keel; PSS: space between primary cords and siphonal fasciole; PTT: protoconch-teleoconch transition; RP: rows of micro-papillae; SF: siphonal fasciole; UC: upper teleoconch spiral cord.



Figures 3–5. Sketches of the protoconch of the lectotype of *Clathromangelia granum* (Fig. 3), of *C. granum* (Fig. 4) and of *C. martinastellae* n. sp. (Fig. 5). Absutural carina is coloured in blue, adsutural in green; the first two teleoconch spirals are in blue. The lacking upper portion in the lectotype is sketched in red, while the azure zone indicates an eroded area.

TYPE LOCALITY. "*Catania and Palermo*" (from the original description. Only "*Sicilien*" is reported on labels in Fig. 10).

TYPE MATERIAL. Three syntypes; MNB; ZMB.Mol13779 • 1 sh; "Sicilien"; syntype n. 1; height 4.7 mm, width 2.47 mm (Fig. 6); • 1 sh; "Sicilien"; syntype n. 2; height 6.0 mm, width 2.93 mm (Fig. 5); • 1 sh; "Sicilien"; syntype n. 3, here selected as lectotype; height 5.8 mm, width 2.70 mm (Figs. 8, 9).

OTHER EXAMINED MATERIAL. • ITALY • 1 sps; Catania, San Giovanni Li Cuti; 38 m depth; brushing on algae covering hard substrata, Fig. 42; DS • 41 shs; Catania, San Giovanni Li Cuti; 8–38 m depth; shell grit collected with scuba; AR and DS • 2 shs; Catania, Playa; 10–15 m depth; dredged; DS • 24 shs; Catania, Cannizzaro; 35–42 m depth; shell grit collected with scuba; AR and DS • 6 shs; Catania, Cajto; 20 m depth; shell grit collected with scuba; DS • 15 shs; Catania, Tavernetta; 56 m depth; shell grit collected with scuba; AR • 7 shs; Catania, Pozzillo; 20 m depth; shell grit collected with scuba; A. and S. Palazzi legit; DS • 1 sh; Messina, Taormina, Isola Bella; 18-25 m; shell grit collected inside a cave with scuba; AV • 4 sh; Messina, Capo Milazzo; Late Pleistocene; AR • 25 shs; Siracusa, Vendicari; beached bioclastic coarse sediment; DS • 3 shs; Siracusa, Magnisi; beached bioclastic coarse sediment; DS • 6 shs; Siracusa, Portopalo di Capo Passero; beached bioclastic coarse sediment; DS • 1 sh; Siracusa, Augusta, Capo S.ta Croce; 30 m depth; van veen grab; DS • 13 shs; Siracusa, Francofonte, Oxena river; Early Pleistocene; DS • 15 shs; Siracusa, Francofonte, Oxena river; Early Pleistocene; AR • 27 shs; Agrigento, Lampedusa Island; 8 m depth; shell grit collected with scuba; DS • 3 shs; Ragusa, Donnalucata; 4–8 m; shell grit collected with scuba; DS • 2 shs; Caserta, Mondragone; 10-20 m depth; shell grit collected with scuba; DS • 4 shs; Salerno, Punta degli Infreschi; 15-30 m depth; shell grit collected with scuba; DS.

DESCRIPTION. Shell small (5.8 mm), fusiform, with turriculate profile and elongate and scaled spire, solid, with reticulated sculpture, reddishbrown to yellowish, slightly darker on the siphonal canal and first whorls (Figs. 6–14, 23–27). At high magnification the shell surface is covered by dense microgranules (Fig. 27). Teleoconch constituted by

4.5 slightly rounded whorls, with angular shoulder and deep undulated suture; b/h ratio: 0.44. Last whorl moderately inflated forming more than half of the shell: lw/h ratio: 0.67. Aperture narrowly oval, with thickened outer lip, shouldered at the top, with al/h ratio: 0.49. Inner lip with 4 evident denticles. Columella evenly curved lower, "S" shaped, with columellar callus not well developed. Parietal callus weak, simply connected with the narrow and curved anal sinus. Siphonal canal not long, thick, rounded, with sinus short and twisted, but well opened. Siphonal fasciole thick, except for the last, 5 in number, with robust rounded tubercles on the top. PSS wide, well delimited. Spiral ridges narrower than axial ribs and intervals, forming on the last whorl 3 primary cords (2 on the first whorl, 3 on the others) plus further two spirals on the last whorl, with PC I adherent to suture, closer to the following and slightly less pointed than the others. This latter starts on the first tele-whorl as a not marked, evenly rounded undulation near the suture. Axial sculpture constituted by 11 strong orthocline straight ribs on the last whorl, almost as wide as interspaces. Spirals and axials form a reticulate sculpture, with prominent but rounded tubercles at the intersection and squared pits in interspaces.

Protoconch. Paucispiral, h: 531 μ m, w: 422 μ m, diameter 405 μ m, conical, brownish, constituted by 1.8 rounded whorls shouldered by a thin keel slightly over half of the first whorl, which gives rise to a strong upper (adsutural) carina on the last quarter. A second lower (absutural) carina appears late on the very last portion. These two carinae give rises to the two spirals of the first teleoconch whorl. Nucleus large with small aligned papillae forming numerous, thin spiral threads on the first post-nuclear whorl. They are intersected by 28–30 opisthocline keeled axial riblets. They become more numerous and disaggregated in scales between and over the carinae in the last portion, just before the sharp and sinuous protoconch-teleoconch boundary.

External soft parts (Fig. 44) with large foot, anteriorly almost incised, short cephalic tentacles and siphon, uniformly grey-brownish in colour with sparse minute white dots. Operculum not present.

DISTRIBUTION AND BIOLOGY. This species is present (Fig. 1) in shallow rocky sciaphilous biocoenosis, usually 10/50 m depth, in central Mediterranean (Oliverio, 1995), Greece (Manousis 2012; Manousis, 2021), Turkey (Öztürk et al.,



Figures 6–14. Shells of *Clathromangelia*. Figs. 6-9: syntypes of *C. granum* MNB (ZMB.Mol 13779). Fig. 6: syntype n. 1, H = 4.7 mm. Fig. 7: syntype n. 2, H = 6 mm. Figs. 8, 9: lectotype and detail of the protoconch residuals, H = 5.8 mm. Fig. 10: labels of the type material lot. Figs. 11–14: intraspecific variability in *C. granum*. Figs. 11–13: Catania Italy, H = 5.5, 5.8, and 5.0 mm respectively. Fig. 14: darker specimen from Portopalo di Capo Passero (Italy), H = 6.0 mm.

2014); Pantelleria and Lampedusa (Italy) and Malta (Cossignani & Ardovini, 2011); Calabria, Italy (Giacobbe & Renda, 2018). However, it was never reported for the Western basin and the Atlantic ocean (Oliverio, 1995).

Stratigraphic distribution. Previous citations of *C. granum* indicate the presence of the species in the Upper Pliocene (Landau et al., 2022), Lower and Middle Pleistocene of central and Eastern Mediterranean (Oliverio, 1995). As previously debated, all these citations are to be verified: the only certain fossil specimens are those reported in the present paper, attributable to the Early Pleistocene.

REMARKS. The study of the original description and figure did not allow us to characterize the species with absolute certainty. In particular, the description does not mention any information on the sculpture of the protoconch and the original picture (Philippi, 1836: Pl. XI, Fig. 16) does not correctly represent the species as concerns the teleoconch sculpture, which shows a more delicate specimen, with pointed tubercles at intersection, with equally spaced spiral cords in all the entire shell, and a subsutural ramp too wide to represent any extant Mediterranean species. Useful morphological characters, instead, are dimensions (height of almost 6 mm), a more solid shell structure and, in the refreshed diagnosis (1844), the presence of six whorls (protoconch included) and three labial teeth. The dark colour of the most part of specimens is appreciable from the drawings, thought syntypes are paler and uniformly white specimens are not uncommon.

The study of the three syntypes in MNB (Figs. 6-10) revealed the worn general conditions and the loss of the protoconch whorls. However, at a more detailed observation syntype n. 3 (Fig. 8), here selected as lectotype, revealed the presence of a residual protoconch sculpture. Further detailed photographs (Figs. 3, 9) allowed to ascertain the presence of one lower protoconch carina, being entirely abraded the upper portion (azure colour in the sketch of Fig. 3), where the upper protoconch carina is not appreciable. This species differs from congeners C. loiselieri and C. strigilata for: the higher, more solid and less slender usually darker shell, the presence of a lower number of axials and spirals in the teleoconch, a different protoconch (see Oliverio, 1995 for the protoconch illustration of the other species).

For differences from *C. fatamorganae* n. sp. and *C. martinastellae* n. sp. see under these species.

Clathromangelia fatamorganae n. sp.

https://www.zoobank.org/6B01AC47-B26A-401B-B84B-A73C23AB1BF3

TYPE LOCALITY. Italy, Messina, Pace village; 38°15'11"N, 15°36'01"E.

TYPE MATERIAL. Holotype. ITALY • 1 sh; Messina, Pace village; shell grit collected with scuba from intermattes of *Posidonia* beds, A. Villari legit, height 5.0 mm, width 2.1 mm, Figs. 15, 28, 31, 32; MNHN-IM-2000-39860.

Paratypes. ITALY • 1 sh; same data as for holotype; A. Villari legit, height 4.5 mm, width 2.0 mm, Figs. 17, 34; paratype 1, MNHN-IM-2000-39861 • 1 sh; same data as for holotype; A. Villari legit, height 6.0 mm, width 2.5 mm, Figs. 16, 33; paratype 2, AV • 1 sh; same data as for holotype; A. Villari legit, height 4.2 mm, width 2.0 mm; Figs. 29, 30; paratype 3, AV • 1 sh; same data as for holotype; A. Villari legit, height 5.1 mm, width 2.2 mm; paratype 4, MSNC 5026 • 1 sh; same data as for holotype; A. Villari legit, height 5.2 mm, width 2.1 mm; paratype 5, AR • 1 sh; same data as for holotype; A. Villari legit, height 3.7 mm, width 1.9 mm; paratype 6, DS • 1 sh; Catania, S. Giovanni Li Cuti; 35 m depth; shell grit collected with scuba; D. Scuderi legit, height 5.3 mm, width 2 mm; Figs. 18, 35, 36; paratype 7, DS.

OTHER EXAMINED MATERIAL. The following materials constitute further unnumbered paratypes in the private collections of the Authors. ITALY • 2 shs; Messina, Taormina, Isola Bella; 18-25 m depth; shell grit collected inside a cave with scuba; AV • 11 sh; Messina, Capo Milazzo; Late Pleistocene; AR • 12 shs; Catania, S. Giovanni Li Cuti; 35 m depth; shell grit collected with scuba; DS-AR • 2 shs; Catania, Cannizzaro; 40 m depth; shell grit collected with scuba; PM • 1 sh; Siracusa, Vendicari; beached bioclastic coarse sediment; DS • 1 sh; Siracusa, Maddalena peninsula, Minareto lighthouse, beached bioclastic coarse sediment; DS • 4 shs; Agrigento, Lampedusa Island, Capo Grecale; 50 m depth; shell grit collected with scuba; AR • 11 sh; Reggio Calabria, Case Alte, Early Pleistocene; AR.

Clathromangelia cfr. *fatamorganae* n. sp. ITALY • 14 shs; Catania, S.ta Tecla; 70 m depth; shell grit; AR • 26 shs; Reggio Calabria, Scilla; 52–56 m depth; shell grit collected with scuba; DS and AR • MALTA • 4 shs; Bahar ic Caghaq; beached bioclastic coarse sediment; DS.

DESCRIPTION OF HOLOTYPE. Shell small (5.0 mm), fusiform; profile elongated and turriculate with slightly scaled spire, solid, with reticulated sculpture, uniformly red-brownish, slightly darker on the siphonal canal. At high magnification the shell surface is covered by dense microgranules (Fig. 32). Teleoconch constituted by 4.5 slightly rounded whorls, with angular shoulder, without subsutural ramp, and deep undulated suture; b/h ratio: 0.41. Last whorl moderately elongated forming more than half of the shell: lw/h ratio: 0.63. Aperture narrowly oval, with sloping outer lip, not shouldered at the top, with al/h ratio: 0.45. Inner lip with 4 denticles. Columella nearly straight, very evenly curved lower, with columellar callus almost faint. Parietal callus weak, simply connected with the narrow and curved anal sinus. Siphonal canal not long, slender, straight, with sinus short and twisted, but well opened. Siphonal fasciole thin, 4 in number, with pointed small tubercles on the top, all of the same dimensions, except the last more delicate. PSS wide, well delimited.

Spiral ridges narrower than axial ribs and intervals, forming 3 primary cords (2 only on the first

whorl) plus further two spirals on the last whorl, with PCI adherent to suture, closer to the following and more rounded than the others. It starts on the first telewhorl as only a slight undulation near the suture. Axial sculpture constituted by 12 strong orthocline straight ribs on the last whorl, slightly less wide than interspaces. Spirals and axials form a reticulate sculpture, with rounded, not very prominent tubercles at the intersection and squared pits in interspaces.

Protoconch. Paucispiral, h: 606 µm, w: 420 µm, diameter 510 µm, cylindrical, with nucleus lighter, constituted by 2.2 rounded whorls shouldered by a thin keel slightly over half of the first whorl, which gives rise to a strong upper (adsutural) carina on the last quarter. A second lower (absutural) carina appears late on the very last portion. These two carinae give rises to the first two spirals of the first teleoconch whorl. Nucleus large with coalescent papillae forming not marked spiral treads on the first post-nuclear whorl. These treads appear very subtle, faint, tending to disappear on the last whorl. They are intersected by 28-30 opisthocline keeled axial riblets, which are something disaggregated in scales between and over the carinae just before the middle of the whorls, while very small, punctiform papillae, aligned to form 4-6 spiral lines, are present at the base of the whorl. Protoconch-teleoconch boundary sharp and sinuous.

External soft parts unknown.



Figures 15–18. *Clathromangelia fatamorganae* n. sp. Fig. 15: holotype, MNHN-IM-2000-39860, Villaggio Pace, Messina (Italy), apertural and dorsal views, H = 5 mm. Fig. 16: paratype 2, same data of the holotype, H = 5.9 mm. Fig. 17: paratype 1, MNHN-IM-2000-39861, same data of the holotype, MNHN, H = 4.5 mm. Fig. 18: paratype 7 from S. Giovanni Li Cuti, Catania, H = 5.3 mm.

VARIABILITY. Differences between paratypes and the holotype are not marked and concern mainly the colour, which could range from deep to bright brown, with darker cancellate sculpture, and less significantly dimensions, which ranges from 5 to almost 6 mm in height.

DISTRIBUTION AND BIOLOGY. Only known after the type material. No living specimens were collected.

Stratigraphic distribution. The only certain fossil specimens are those reported in the present paper, attributable to the Late Pleistocene.

ETYMOLOGY. The specific name refers to the particular mythical reflaction phenomenon, "Fata Morgana", typical of the Strait of Messina (Italy), a true mirage known since the ancient times of the town, derived from the Breton tradition and handed down here by Normans, according which vessels or even the same houses of Messina (the phenomenon is better visible from Calabria), under peculiar meteo-marine conditions can be seen floating in the air, over the horizon (Ammendolia et al., 2018).

REMARKS. This species differs from congeners *C. loiselieri* and *C. strigilata* for almost the same characters expressed for *C. granum*. This latter is the most similar, but *C. fatamorganae* n. sp. differs for: a slender profile of the shell, usually darker in colour, less marked anal sinus and not very pronounced round tubercles on the ribs. The protoconch is peculiar, has a cylindrical instead of a conical shape and bears a different sculpture, in which spirals are feeble and axial ribs are usually broken down since just the first post-nuclear whorl, where a crown of delicate spirals of punctiform papillae stands out. For differences from *C. martinastellae* n. sp. see under this species.

Clathromangelia martinastellae n. sp.

https://www.zoobank.org/E0EE6DF1-8487-4BE9-A8FF-C0080C36CB0A

Clathromangelia granum sensu Oliverio, 1995

TYPE LOCALITY. S. Giovanni Li Cuti, Catania, Sicily, Italy, 37°31'10"N, 15°06'37"E.

TYPE MATERIAL. Holotype. ITALY • 1 sh; Catania, S. Giovanni Li Cuti; 35 m depth; shell grit collected with scuba; D. Scuderi and A. Reitano legit, height 2.9 mm, width 1.5 mm, Figs. 19, 37, 41; MNHN-IM-2000-39862.

Paratypes. ITALY • 1 sh; same data as for holotype; D. Scuderi and A. Reitano legit, height 3.0 mm, width 1.6 mm, Figs. 20, 38, 39, 41; paratype 1; MSNC 5025 • 1 sh; same data as for holotype; D. Scuderi and A. Reitano legit, height 4.1 mm, width 2.0 mm, Fig. 21; paratype 2, DS • 1 sh; same data as for holotype; D. Scuderi and A. Reitano legit, height 3.1 mm, width 1.7 mm, Fig. 40; paratype 3, AV • 1 sh; same data as for holotype; D. Scuderi and A. Reitano legit, height 4.2 mm, width 2.0 mm; Fig. 22; paratype 4, AR • 1 sh; same data as for holotype; D. Scuderi and A. Reitano legit, height 4.1 mm, width 2.0 mm; paratype 5, DS.

OTHER EXAMINED MATERIAL. The following materials constitutes further paratypes in the private collections of the Authors. ITALY • 1 sh; Messina, Ganzirri; beached bioclastic coarse sediment; DS • 2 sh; Messina, Capo Milazzo; Late Pleistocene; AR • 198 shs; Catania, S. Giovanni Li Cuti; 35 m depth; shell grit collected with scuba; DS-AR • 2 shs; Catania, Playa, 10–15 m depth; dredged; DS • 25 shs; Catania, Cannizzaro; 40 m depth; shell grit collected with scuba; DS and AR • 185 shs; Catania, S. Giovanni Li Cuti; 35 m depth; shell grit collected with scuba; DS-AR • 4 shs; Catania, Pozzillo; 20 m depth; shell grit collected with scuba, A. and S. Palazzi legit; DS • 38 shs ; Catania, Santa Tecla; 8-70 m depth; shell grit; DS and AR • 1 sp.; Catania, Santa Tecla; 8 m depth; brushing on algae covering hard substrata, Figs. 40, 41; DS •1 sh; Catania, Acitrezza; 10 m depth; shell grit collected with scuba; DS • 2 shs; Catania, Cajto; 20 m depth; shell grit collected with scuba; DS • 13 shs; Catania, Tavernetta; 56 m depth; shell grit collected with scuba; AR • 1 sh; Palermo, Ustica Island; shell grit collected with scuba; AV • 19 shs; Agrigento, Lampedusa Island, Capo Grecale/Cala Croce; 8-50 m depth; shell grit collected with scuba; DS and AR • 15 shs; Agrigento, Linosa Island, lighthouse; 35-100 m depth; shell grit collected with scuba and residuals of bycatch nets; DS • 1 sh; Siracusa, Portopalo di Capo Passero; beached bioclastic coarse sediment; DS • 2 shs; Siracusa, Marzamemi, 4–6 m depth; shell grit collected with scuba; DS • 1 sh; Siracusa, Francofonte, Oxena river; Early Pleistocene; DS • 8 shs; Reggio Calabria, Scilla; 56 m depth; shell grit collected with scuba; DS and AR • 13 shs; Brindisi, from Cerano to Punta Torre Cavallo; 1–3 m depth; from hard substrata collected with scuba; DS.

DESCRIPTION OF HOLOTYPE. Shell very small (2.9 mm), fusiform; profile turriculate but stouter, with scaled spire, not very solid, with reticulated sculpture, uniformly red chestnut to dark brown, darker on the siphon. At high magnification the shell surface is covered by dense microgranules (Fig. 41). Teleoconch constituted by 3.8 slightly rounded whorls, with angular shoulder, without subsutural ramp, and deep undulated suture; b/h ratio: 0.47. Last whorl moderately elongated forming more than half of the shell: lw/h ratio: 0.67. Aperture narrowly oval, wider in the upper part, with thickened outer lip, shouldered at the top, with al/h ratio: 0.45. Columella nearly straight, only very evenly curved lower, with columellar callus almost faint. Parietal callus sloping, directly connected with the opened but not well marked anal sinus. Outer lip thickened, inner lip with 4 not marked denticles. Siphonal canal not long, thick, stout, rounded, with sinus short and twisted, but well opened. Siphonal fasciole moderately thick, 4 in number, with rounded tubercles on the top, the first of which smaller than the following two. PSS not wide. Spiral ridges narrower than axial ribs and intervals, forming on the 3 primary cords (2 on the first whorl) plus further two spirals on the last whorl, with PC I adherent to suture, projected upward, closer to the following, smaller and more rounded than the others. This latter starts on the first tele-whorl as only a slight undulation near the suture. Axial sculpture constituted by 12 strong orthocline straight ribs on the last whorl, slightly less wide than interspaces. Spirals and axials form a reticulate sculpture, darker in colour, with pointed and lighter tubercles at the intersection and squared pits in interspaces.

Protoconch. Paucispiral, h: 558 μ m, w: 414 μ m, diameter 360 μ m, conical, lighter than teleoconch whorls, constituted by 2.0 rounded whorls shouldered by a thin keel slightly over half of the first whorl, which gives rise to a strong upper (adsutural) carina on the last quarter. This latter carina give rises to the first (upper) spiral of the first teleoconch whorl. Nucleus large with rounded papillae forming subsequently not marked treads. On the first post-nuclear whorl these treads appear very subtle, faint, tending to disappear on the last whorl. They are intersected by 28–30 opisthocline keeled axial riblets, which are something disaggregated in scales just before the middle whorl. Protoconch-teleoconch boundary sharp and sinuous.

External soft parts (Figs. 42, 43) has been described by Scuderi (2023) under the erroneous



Figures 19–22. *Clathromangelia martinastellae* n. sp. Fig. 19: holotype, MNHN-IM-2000-39862, S. Giovanni Li Cuti, Catania (Italy), apertural and dorsal views, H = 2.9 mm. Fig. 20: paratype 1, MSNC 5025, same data of the holotype, H = 3 mm. Fig. 21: paratype 2, same data of the holotype, H = 4.1 mm. Fig. 22: paratype 4, same data of the holotype, H = 4.2 mm.

name *C. quadrillum* on a specimen not of the typical series. Large foot, anteriorly almost incised, and short cephalic tentacles and siphon, uniformly whitish in colour with sparse, minute and lighter white dots. Operculum not present.

VARIABILITY. *Clathromangelia martinastellae* n. sp. appears to be very constant in shell as well as protoconch characters. Little differences between paratypes and the holotype concern mainly the colour, which could range from deep to reddishbrown, height (from 2.8 to 5 mm in full grown specimens) and the stouter or slender shape of some specimens.

DISTRIBUTION AND BIOLOGY. Only known after the studied material. Preceding citations of this species are to be verified. The species is present in shallow rocky sciaphilous biocoenosis, usually 10-50 m depth. It has been collected in South-Eastern part of the Mediterranean Sea, but records from the Western Mediterranean are lacking.

Stratigraphic distribution. Since it was confused with *C. granum* and also with *C. quadrillum*, all the preceding citations of this species are to be verified: the only certain fossil specimens are those reported in the present paper, attributable to the Early Pleistocene.

ETYMOLOGY. The species is dedicated to Martina Stella Scuderi, daughter of the first Author.

REMARKS. This species is what some Authors intended as *C. granum* (see for example Oliverio, 1995). It differs from congeners *C. loiselieri* and *C. strigilata* for almost the same characters expressed for *C. granum*. This latter is the most similar, but *C. martinastellae* n. sp. differs for: smaller dimensions, stouter profile with more delicate sculpture, pointed tubercles and uniform chestnut colour of the shell. The PSS is almost of the same width as interspaces and fasciolae are not so strong. Inner lip with less marked denticles. The conical protoconch has more robust and clearly prosocline axial ribs and bears one single (upper) carina just before the protoconchteleoconch boundary. The colour pattern of the external soft parts is uniformly white.

Compared to *C. fatamorganae* n. sp. it differs for: smaller dimensions, a stouter shell profile with deeper incised suture, wider aperture with more marked anal sinus and denticles on the inner lip; tubercles on the ribs are smaller and pointed, with PCI smaller than others and close to suture. The PSS is almost of the same width as interspaces and fasciolae are less strong. The protoconch is less slender, has a conical instead of a cylindrical shape and bears more robust and clearly prosocline axial ribs and one single (upper) carina just before the protoconch-teleoconch boundary, without the basal crown of delicate spirals of punctiform papillae.



Figures 23–27. *Clathromangelia granum*, SEM photographs. Fig. 23. Full specimen from S. Giovanni Li Cuti, Catania (Italy), H = 5.8 mm. Figs. 24–26: same specimen, details of the protoconch. Fig. 27: same specimen, detail of the shell surface.



Figures 28–36. *Clathromangelia fatamorganae* n. sp., SEM photographs. Figs. 28, 31. Holotype, full shell and detail of the protoconch. Figs. 29-30. Detail of the protoconch of the Paratype 1. Fig. 32. Detail of the shell surface. Figs. 33, 34, 35. Full specimen of paratype 2, paratype 1 and paratype 7, respectively. Fig. 36. Detail of the protoconch of paratype 7. Figs. 37–41. *Clathromangelia martinastellae* n. sp., SEM photographs. Fig. 37. Holotype, full shell. Fig. 38, 39. Details of the protoconch of paratype 1. Fig. 40. Detail of the protoconch of paratype 3. Fig. 41. Detail of the shell surface of paratype 1.



Figs. 42, 43. Digital photograph and drawing of the external soft parts of *C. martinastellae* n. sp. Fig. 44. Drawing of the external soft parts of *C. granum*.

DISCUSSION

Protoconch sculpture is a relevant useful item for identification of similar species of *Clathromangelia*, as demonstrated in other contributions (Oliverio, 1995; Landau et al., 2020; Landau et al., 2022) as well as in the present contribution. In particular, the presence and number of spiral cords on the last portion, just before the PTS, combined with the axial micro sculpture present on the nucleus and earlier whorls, is diagnostic and is a species-specific character.

The exam of the three syntypes of *P. granum* in the Philippi collection (MNB), though they are almost worn, allowed the correct definition of this species, on account of dimensions and robustness of the shell, teleoconch and protoconch characters. On the basis of these observations, integrated with the studied material, in particular, syntype n. 3, here selected as lectotype, bears the lower carina in the last portion (Fig. 3), which gives rise to the lower of the two spirals in the first teleoconch whorl. The upper whorl is eroded together with the upper portion of the protoconch (Fig. 3, azure portion). Protoconch of C. fatamorganae n. sp. has a similar disposition of the two protoconch carinae, but differs for relevant other shell characters and, in the type localities of C. granum, it is very rare (Catania) or seems absent (Palermo). On the contrary, C. martinastellae bears only one protoconch carina

(Fig. 5), but it is closer to the suture and gives rises to the upper of the two spirals in the first teleoconch whorl. Moreover, as concern the shell, all the three specimens of type material of C. granum are between 4.7 (the most eroded and one tele-whorl less) and 6.0 mm high, have a more turreted profile, higher dimensions and are solid, reddish, with strong denticles on the inner lip. Tubercles on the strong cancellate sculpture are rounded, not pointed, and space between primary cords and siphonal fasciole is wide. Putting together all these observations, the identity of C. granum is now well defined and nomenclatural stability is also supported by designation of the lectotype. Consequently, the two new species are well distinguishable on account of the characters above mentioned.

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