https://www.biodiversityjournal.com - Edizioni Danaus
Biodiversity Journal, 2024, 15 (3): 497–508 - **ARTICLE**
https://doi.org/10.31396/Biodiv.Jour.2024.15.3.497.508
https://www.zoobank.org/25793D10-4599-4114-B1F2-30F2E76C575F

Biodiversity Journal
ISSN 2039-0394 (Print Edition)
ISSN 2039-0408 (Online Edition)

A new species of *Pusia* Swainson,1840 from southern Turkey (Gastropoda Costellariidae)

Bruno Amati

Largo Giuseppe Veratti 37/D, 00146 Roma, Italy; e-mail: bruno_amati@yahoo.it; https://orcid.org/0000-0002-3515-9543

ABSTRACT *Pusia (Ebenomitra) angeloamatii*, a new species of the genus *Pusia* Swainson, 1840 (Gastropoda Costellariidae), is described based on empty shells from the coasts of southern Turkey (Eastern Mediterranean Sea). It is compared with other species of the genus. *Uromitra hypatiae* Pallary, 1912 (currently *Vexillum hypatiae*) is transferred to *Pusia* based on characters of shell morphology (*Pusia hypatiae* comb. nov.).

KEY WORDS Gastropoda; Costellariidae; Eastern Mediterranean; *Pusia*; new species; taxonomy.

Received 02.05.2024; accepted 18.06.2024; published online 24.07.2024

INTRODUCTION

The family Costellariidae MacDonald, 1860 (Gastropoda: Neogastropoda) comprises twenty-one genera, including *Pusia* Swainson, 1840 (MolluscaBase, 2024).

Giannuzzi-Savelli (1984) has revised the Mediterranean species of the Costellariidae along with those of the families Mitridae Swainson, 1831, and Volutomitridae Gray, 1854, at that time included in the superfamiy Mitroidea. Today, however, Volutomitridae Gray, 1854 and Costellariidae have been moved to the superfamily Turbinelloidea (Bouchet et al., 2017). The genus *Pusia* Swainson, 1840 is represented by 25 Recent species distributed in the eastern Atlantic, the Mediterranean and the Indo-Pacific, and by 21 fossil species from the Oligocene to the Pliocene (Europe: France, Italy, Romania; Asia: Turkey, Borneo, Indonesia, China, Japan). In the Mediterranean Sea 4 Recent species are known (MolluscaBase, 2024), some of which are also known as fossils (see 'material examined'). *Pusia* is currently separated from *Vexillum* Röding, 1798 based on molecular phylogenetics and radular anatomical features: the rachidian tooth in *Vexillum* has seven (or more) equally developed cusps, whereas it is tricuspidate in *Pusia* (Fedosov et al., 2017).

The genus *Pusia* has recently been divided (Fedosov et al., 2017: 563) into three subgenera: *Pusia*, ranging in the Indo-Pacific from Madagascar to French Polynesia, in shallow water; *Ebenomitra* Monterosato, 1917, from the Mediterranean at subtidal depths; and *Vexillena* Fedosov, Puillandre, Herrmann, Dgebuadze et Bouchet, 2017, in the West Pacific, from Japan and the Philippines to New Caledonia and the Coral Sea, at depths greater than 200 m. The species of *Pusia* (*Ebenomitra*) are characterized by a paucispiral protoconch, indicative of non-planktotrophic larval development, as a character unique among species of *Pusia*. *Ebenomitra* was recently elevated to full genus for some species from the Miocene of the Vienna Basin (Biskupič, 2023). However, I do not believe there are the conditions for a change of supraspecific taxon based only on the different larval developmental strategy: planktotrophic *vs* non-planktotrophic.

The species currently accepted in the Mediterranean are: *Pusia* (*Ebenomitra*) *ebenus* (Lamarck, 1811) (Fig. 12), *Pusia* (*Ebenomitra*) *granum* (Forbes, 1844) (Fig. 13), *Pusia* (*Ebenomitra*) *savignyi* (Payraudeau, 1826) (Fig. 10), *Pusia* (*Ebenomitra*) *tricolor* (Gmelin, 1791) (Fig. 9). Based on shell features (polished teleoconch without spiral sculpture, with axial sculpture, when present, only on the first whorls, paucispiral protoconch), *Uromitra hypatiae* Pallary, 1912 (currently *Vexillum hypatiae*) is considered as belonging to this same lineage, and thus transferred to this genus as *Pusia* (*Ebenomitra*) *hypatiae* (Pallary, 1912) (Fig. 14) (new combination). Therefore, *Pusia* (*Ebenomitra*) species are the only costellariids recorded in the Mediterranean, and the ranges of the three subgenera do not overlap. Giannuzzi-Savelli (1984: 96) described, among other things, the diameters of the protoconch of four of the five species of *Pusia. P. ebenus*: nucleus diameter (0.425 mm), first half whorl diameter (0.570 mm). *P. tricolor*: nucleus diameter (0.290 mm), first half whorl diameter (0.480 mm). *P. savignyi*: nucleus diameter (0.430 mm), first half whorl diameter (0.605 mm). *P. granum* (as *P. littoralis*): nucleus diameter (0.225 mm), first half whorl diameter (0.425 mm). The fifth species *P. hypatiae*: nucleus diameter (0.206 mm), first half whorl diameter (0.410 mm) (See Table 2, for new measurements). A further undescribed species has been found in a bioclastic sand sample from Kaş (Turkey), and it is described here.

MATERIAL AND METHODS

The material of the new species studied here, consists of four empty shells (intact and broken) that were extracted from bioclastic sand samples collected off Kaş (southern Turkey), at 50 m depth (Fig. 1). All specimens (two adults with predation hole and two subadults) were measured (see Table 1) under a Kyowa stereomicroscope, with a micrometric eyepiece (with magnification x90, ± 10% deviation), using the method of Verduin (1982). Photographs were taken with a Sony Cyber-Shot digital camera mounted on the stereomicroscope and digitally edited with Combine-Z (Hadley 2006). All the specimens here studied are stored in public and private collections, as detailed under each species (see abbreviations). Specimen data are listed using the standardised format suggested by Chester et al. (2019).

ABBREVIATIONS AND ACRONYMS. MCZR: Museo Civico di Zoologia di Roma, Rome (Italy); MNHN: Muséum national d'Histoire naturelle, Paris (France); CBA: private collection of Bruno Amati (Rome, Italy); CCO: private collection of Cesare Bogi (Livorno, Italy); CIN: private collection of Italo Nofroni (Rome, Italy); CMO: private collection of Marco Oliverio (Rome, Italy); dd: empty shell(s); lv: live collected specimen(s); *vs: versus.*

MATERIAL EXAMINED FOR COMPARISON. *Pusia ebenus*. ITALY, Sicily • 6 dd; Lampedusa Is. (AG); 30 m depth; 30 Apr.1991; CBA • 7 dd; Salina Is. (ME); 18 m depth; 2002; Grotta dei Gamberetti; CBA • 1 dd; Marettimo Is. (TP); 25–45 m depth; 4–20 Jun. 1998; CBA • 1 dd; Marettimo Is. (TP); Cammello; 37°58'59,9"N, 12°03'54,3"E; 30 m depth; semi dark Tunnel; CBA • 2 dd; Merettimo Is. (TP); 37°58'03,1"N, 12°04'40,6"E; 27–32 m depth; Orlata San Simone; in cave; CBA • 2 dd; Marettimo Is. (TP); 28 m depth; Cattedrale Cave; CBA • 1 dd; Linosa Is. (AG); 60 m depth; 16 Sep. 2017; CBA • 5 dd; Capo Asparano (SR); Sep. 1985; beached bioclastic sand; CBA • 6 dd; Pantelleria Is. (TP); 15–20 m depth; 2 Jul. 2006; Scauri loc.; CBA • 10 dd; Trapani and Ognina (SR); MCZR.17286, Monterosato coll. • 3 dd; Palermo; (Palazzo Braschi exhibition); MCZR.0678, Monterosato coll. • 2 dd; Trapani, (sub nomine *Uromitra cordieri* Maravigna; MCZR.17273, Monterosato coll. • 1 dd; Levanzo Is. (TP); 31 m depth; 3 May 1991; P.ta Alterella; CBA. Sardinia • 8 dd; between Olbia and the Golfo degli Aranci; 1982; beached bioclastic sand; CBA • 2 dd; Maddalena Is.; Punta Marginetto; 1977; beached bioclastic sand; CBA • 1 lv.; Dorgali (NU), Cala Gonone; 40°16'58"N, 9°38'13"E; 1 m depth; Aug. 2010; under rock on sand; CBA • 8 dd; off the Budelli Is. (SS); 14. Jul. 1993; on sand and coral enclaves; CBA. ITALY • 2 dd; S. Marinella (RM); 1978; CBA • 2 dd; Montaldo di Castro (VT); 2 m depth; CMO • 3 dd; Ventotene Is. (LT); 33 m depth; 20 Jun. 1987; CMO • 18 dd; S. Agostino (RM); 29 Jun. 1977; beached bioclastic sand; CBA • 7 dd; S. Marinella (RM); beached bioclastic sand; CBA • 35 dd; Torre Astura (RM); 1978; beached bioclastic sand; CBA • 1 dd; Santa Caterina (LE), Porto Selvaggio; 40°08'43,4"N, 17°58'23,1"E; 15–22 m depth; CBA• 5 dd; Santa Caterina (LE), Porto Sel-

vaggio; 40°08'43,4"N, 17°58'23,1"E; 15–22 m depth; CBA • 3 dd; Bari, beached bioclastic sand; CBA • 1 dd; unknown data; CMO. SPAIN • 2 dd; Alboran Is. "Mediterraneao–92" Stn ALB A; 35°56"94'N, 003°00"90'E; 31.9 m depth; bioclastic sand; CMO. TUNISIA • 8 dd; Kerkennah Is. Jul. 2015; CBA • 19 dd; Sfax; sub nomine *lanceolata* = *plicatiformis* Locard; MCZR.17242, Monterosato coll. ex Pallary coll. • 20 dd; Tunisi; MCZR.17242; Monterosato coll. ex Pallary coll. • 8 dd; Sfax; sub nomine *M. lanceolata* + 1 dd; typical form; MCZR.17242, Monterosato coll. ex Pallary coll. • 5 dd; Sfax; MCZR.17242; Monterosato coll. ex Pallary coll. • ? dd; Sfax; sponges; sub nomine *ebenus* var. *stenostoma* Monterosato; MCZR.17268, Monterosato coll. • 4 dd; Gabes; sponges; sub nomine *M. ebenus* var. *coccinea* MCZR.17239, Monterosato coll. • 3 dd; Sfax; sub nomine *M. distinta* Monterosato MCZR.17277, Monterosato coll. • 1 dd; Sfax; MCZR, sine numera, Monterosato coll.

Pusia granum. ITALY, Sardinia • 1 dd; bioclastic sand; CAB. Sicily • 2 dd; Salina Is. (ME), 35 m depth; Jul. 2002; Grotta dei Gamberetti; CMO. ITALY • 3 dd; Torre Astura (RM); bioclastic sand; CBA • 30 dd; Porto Cesareo (LE); Aug. 1976; intertidal in sandy pockets; CIN • 3 dd; Bari, bioclastic sand; CBA. CROATIA • 15 dd; Umag; 1980; beached bioclastic sand; CBA • Novigrad; 2 dd; 3–4 m depth; Aug. 1983; bioclastic sand; CIN • 4 dd; Zara; sub nomine *Mitra columbellaria*; MCZR, Settepassi coll. • 4 dd; Umag; 1978; beached bioclastic sand; CBA. GREECE • 2 dd; Lagonisi; Jun. 1982; CMO • 1 dd; Kefalonia Is., loc. Agia Efimia; 7–8 m depth; Aug. 1990; CBA • 11 dd; Ormos, Panagias-Sithonia; 1–2 m depth; Aug. 1982; on algae; CIN • 11 dd; Lagonissi; 1 m depth; Jun. 1982; bioclastic sand; CIN • 2 dd; Milos Is.; Aug. 1981; bioclastic sand; CIN • 3 dd; Chios Isl.; Aug. 1982; beached bioclastic sand; CIN • 4 dd; Capo Sounion; 5 m depth; Aug. 1978; bioclastic sand; CIN. Crete • 9 dd; Aghia Pelaghia; 2 m depth; Jun. 1982; bioclastic sand; CIN. TURKEY • 1 dd; Datça; 10–15 m depth; 22 Nov. 1983; CMO • 5 dd; Yumurtalik, Adana; 1990; sand bottom; CBO • 2 dd; Aydincik; AKDENIZ–92 Stn AKD/92–18; 10–21 m depth; bioclastic sand; CMO. ISRAEL • 1 dd; Shigmona beach; Aug. 1987; CCB.

Pusia hypatiae. GREECE • 2 dd; Karpathos Is.; 70 m depth; CCB. TURKEY • 5 dd; Yumurtalik, Adana; 1990; from sand botton; CCB • 2 dd; Aydincik; AKDENIZ–92 Stn AKD/92–18; 10–21 m

Figure 1. Type locality (red dot) of *Pusia angeloamatii* n. sp.: Turkey, Kaş (map modified from Google Earth).

depth; bioclastic sand; CMO. ISRAELE • 2 dd; Palmahin; 18 m; CCB • 10 dd; Shigmona; Aug. 1987; beach; CCB • 27 dd; Rosh Hanikra; CCB. EGYPT • 1 dd; Alexandria, topotype; MCZR.17235, coll. Monterosato ex Caziot.

Pusia savignyi. ITALY, Sardinia • 2 dd; Sant'Antioco (CA), Cala de Saboni loc.; 5 m depth; Aug. 1983; bioclastic sand; CIN. Sicily • 2 dd; Pantelleria Is., Cala Tramontana/Arco dell'Elefante; 1–10 m depth; Jul. 2006; CMO • 20 dd; Levanzo Is. (TP); 31 m depth; 3 May 1990; CMO • 1 dd; Lipari Is. (ME), Punta Castagna; 3–18 m depth; Jul. 2002; pumice; CMO • 1 dd; Ustica Is. (PA)-Linosa Is. (AG); CMO • 44 dd; Salina Is. (ME), 18 m depth; 2002; Grotta dei Gamberetti; CBA • 4 dd; Cannizzaro (CT); 30–40 m depth; CBA • 2 dd; Linosa Is. (AG); 60 m depth; 16 Sep. 2017; CBA • 13 dd; Marettimo Is. (TP); 25–45 m depth; 4–20 Jun. 1998; CBA • 19 dd; Marettimo Is. (TP); Cammello; 37°58'59,9"N, 12°03'54,3"E; 30 m depth; semi dark tunnel; CBA • 17 dd; Marettimo Is. (TP), Orlata San Simone; 37°58'03,1"N, 12°04'40,6"E; 27–32 m depth; in cave; CBA • 3 dd; Marettimo Is. (TP), Cattedrale Cave; 28 m depth; CBA • 14 dd; Merettimo Is. (TP), Orlata San Simone; 37°58'03,1"N, 12°04'40,6"E; 27–32 m depth; in cave CBA • 1 dd; Portopalo di Capo Passero (TP); 21 m depth; Jul. 1988; bioclastic sand; CIN • 5 dd; Portopalo di Capo Passero (TP), Secca dei Catanesi loc.; 18 m depth; Sep. 1987; bioclastic sand; CIN • 11 dd; Portopalo di Capo Passero (TP), Cala S, Antonio loc.; 35 m depth; Jul. 1986; bioclastic sand; CIN • 5 dd; Pachino (SR), Isola delle Correnti; 12 m depth; Jul. 1986; bioclastic sand; CIN • 8 dd; Lampedusa Is. (AG), Cala Calandra loc.; 30 m depth; Apr. 1991; bioclastic sand; CIN • 1 dd; Favignana (TP), Levanzo Is., loc. Punta Altarella; 31 m depth; May 1991; bioclastic sand; CIN • 32 dd; Pantelleria Is. (TP), Gadir Bay loc.; 10–24 m depth; Jul. 1983; bioclastic sand; CIN • 7 dd; Capo Asparano (SR); Sep. 1985; bioclastic sand; CBA • 6 dd; Pantelleria Is. (TP), Scauri loc.; 15–20 m depth; 2 Jul. 2006; CBA • 68 dd; Capri (NA); MCZR, Settepassi coll. • 1 dd; Palermo; MCZR.17286, Monterosato coll. • 4 dd; Palermo, Palazzo Braschi exhibition; MCZR.0675, Monterosato coll. • 1 dd; Palermo; MCZR.17288, Monterosato coll. • 7 dd; Agosta (RM); subfossil; MCZR.17121, Monterosato coll. • 1 dd; Monte Pellegrino (PA); MCZR.17121, Monterosato coll. ITALY • 1 dd; Montecristo Is. (LI); 20 m depth; Apr. 1980; bioclastic sand; CIN • 6 dd; Santa Caterina (LE), Porto Selvaggio; 40°08'43,4"N, 17°58'23,1"E; 15–22 m depth; CBA • 17 dd; Ventotene Is.; 33 m depth; 20 Jun. 1987; CMO • 1 dd; Montaldo di Castro (VT); 2 m depth; CMO • 5 dd; Giannutri Is. (GR); 18 m depth; Jul. 1983; bioclastic sand; CIN • 1 dd; Giannutri Is. (GR); 47 m depth; Jun. 1982; bioclastic sand; CIN • 1 dd; Civitavecchia (RM), S. Agostino loc.; 25 m depth; Mar. 1979; bioclastic sand; CIN • 4 dd; Santa Marinella (RM); 25 m depth; Aug. 1983; bioclastic sand; CIN • 2 dd; Secche di Tor Paterno (RM); 30 m depth; 24 May 1986; bioclastic sand; CIN • 2 dd; Secche di Tor Paterno (RM); 22 m depth; bioclastic sand; CIN • 3 dd; Zannone Is. (LT); 35 m depth; Oct. 1978; bioclastic sand; CIN • 2 dd; Terracina (LT); 30 m depth; Jul. 1981; CIN • 2 dd; Procida Is. (NA), Punta Pioppeto loc.; 2–5 m depth; Jul. 1981; bioclastic sand; CIN • 4 dd; unknown data; CMO • 2 dd; illegible data; 13 m depth; 1985; CMO • 2 dd; IDC 18; CMO • 31 dd; G. 47; CMO. GREECE • 1 dd; Chios Is.; Aug. 1982; beached bioclastic sand; CIN. TUNISIA • 1 dd; Sfax; MCZR, sine numera, Monterosato coll.

Pusia tricolor ITALY, Sardinia • 3 dd; Alghero (SS), Ennio Falco Cave, Porto Conte; 5–15 m depth; Aug. 2003; CMO • 17 dd; Alghero (SS), Golfo Porto Conte; 1956; MCZR, Settepassi coll. • 1 dd; Alghero (SS), Ennio Falco Cave, Capo Caccia; 9 m depth; 2003; CBA • 3 dd; off Budelli Is. (SS); 14 Jul. 1993; on sand and coral enclaves; CBA • 5 dd; Golfo Aranci (SS); Jul. 1977; beached bioclastic sand; CIN • 10 dd; Dorgali (NU), Cala Gonone; 2–4 m depth; Aug. 2010; CBA • 1 lv; Dorgali (NU), Cala Gonone; 1 m depth; Aug. 2010; algae washing; CBA • 4 dd; Capo Comino, (NU); MCZR, Settepassi coll. • 20 dd; Sant'Antioco (CA), Cala de Saboni loc.; 14 m depth; Aug. 1983; bioclastic sand; CIN • 1 dd; San Pietro Is. (CA); MCZR.17286, Monterosato coll. • 1 dd; Piana Is. (CA); Jul. 1983; beached bioclastic sand; CIN • 2 dd; San Pietro Is. (CA), Spalmatore; 3 m depth; Aug. 1986; bioclastic sand; CIN • 2 dd; Porto Scusu (CA); Feb.1982; CMO. Sicily • 1 dd; Pantelleria Is. (TP), Cala Tramontana/Arco dell'Elefante; 1–10 m depth; Jul. 2006; CMO • 10 dd; Pantelleria Is. (TP), Scauri loc.; 15–20 m depth; 2 Jul. 2006; CBA • 1 dd; Pantelleria Is. (TP), Gadir Bay loc.; 10–24 m depth; Jul. 1983; bioclastic sand; CIN • 2 dd; Lipari Is. (ME), Punta Castagna; 3–18 m depth; Jul. 2002; on pumice;

CMO • 1 dd; Ustica Is. (PA), Scoglio del Medico; 2–25 m depth; 22–30 Jul. 2000; CMO • 4 dd; Salina Is. (ME), Grotta dei Gamberetti; 35 m depth; Jul. 2002; CMO • 66 dd; Salina Is. (ME), Grotta dei Gamberetti; 18 m depth; 2002; CAB • 14 dd; Levanzo Is. (TP); 31 m depth; 3 May 1990; CMO • 14 dd; Levanzo Is. (TP); 31 m depth; 3 May 1990; CMO • 6 dd; Ustica Is. (PA)-Linosa Is. (AG); only fragments; CMO • 4 dd; Lampedusa Is. (AG); 30 m depth; 30. Apr. 1991; CBA • 1 dd; Cannizzaro (CT); 30–40 m depth; CBA • 9 dd; Marettimo Is. (TP), Cammello; 37°58'59,9"N, 12°03'54,3"E; 30 m depth; semi dark Tunnel; CBA • 6 dd; Merettimo Is. (TP), Orlata San Simone; 37°58'03,1"N, 12°04'40,6"E; 27–32 m; in cave; CBA • 2 dd; Marettimo Is. (TP), Cattedrale Cave; 28 m depth; CBA • 3 dd; Marettimo Island. (TP), Orlata San Simone; 27–32 m depth; 37°58'03,1"N, 12°04'40,6"E; in cave; CBA • 9 dd; Trapani, S. Giuliano loc.; Apr.1983; beached bioclastic sand; CIN • 2 dd; Vendicari (SR); 29 m depth; Jul. 1985; bioclastic sand; CIN • 32 dd; Portopalo di Capo Passero (SR), Cala S, Antonio loc.; 35 m depth; Jul. 1986; bioclastic sand; CIN • 4 dd; Portopalo di Capo Passero (SR), Secca dei Catanesi loc.; 18 m depth; Sep. 1987; bioclastic sand; CIN • 4 dd; Marzamemi (SR), Porto Industriale; 1 m depth; Aug. 1978; on algae; CIN • 9 dd; Siracusa; Apr. 1982; beached bioclastic sand; CIN • 4 dd; Levanzo Is. (TP), Favignana, Punta Altarella loc.; 31 m depth; May. 1991; bioclastic sand; CIN • 3 dd; Capo Asparano (SR); Sep.1985; beached bioclastic sand; CBA • 9 dd; Levanzo Is. (TP), P.ta Alterella; 31 m depth; 3 May 1991; CBA • 2 dd; Trabia (PA); MCZR, Settepassi coll. • 2 dd; Siracusa; MCZR.17286, Monterosato coll. • 2 dd; Palermo; MCZR17286, Monterosato coll. • 1 dd; Palermo; MCZR.17288, Monterosato coll. • 9 dd; Trapani; MCZR.17286, Monterosato coll. • 1 dd; Messina (Quaternary); MCZR.17286, Monterosato coll. • 33 dd; Messina, Basin; MCZR. 17121, Monterosato coll. • 3 dd; Altavilla (PA); MCZR.17121, Monterosato coll. • 2 dd; Ficarazzi (PA); MCZR.17121, Monterosato coll. ex Libassi coll. • 5 dd; Trapani; MCZR sine numera, Monterosato coll. • 1 dd; Messina; MCZR sine numera, Monterosato coll. • 4 dd; MCZR sine numera, Monterosato coll. • 4 dd; Trapani; MCZR sine numera, Monterosato coll. • 6 dd; Palermo; Palazzo Braschi exhibition; MCZR.0674, Monterosato coll. ITALY • 4 dd; Sanremo (IM); 20 m depth; Mar. 1978; bioclastic sand; CIN • 1 dd; Montecristo Is. (LI); 20 m depth; Apr. 1980; bioclastic sand; CIN • 3 dd; Giannutri Isl. (GR); 18 m depth; Jun. 1983; bioclastic sand; CIN • 2 dd; Giannutri Is. (GR); 47 m depth; Jun. 1982; bioclastic sand; CIN • 2 dd; Castiglione (LI); MCZR.17286, Monterosato coll. • 2 dd [*P. tricolor* cfr] (glued to paper), (illegible location, Toscana)?; fossil; MCZR.17127, Monterosato coll. • 1 dd; Civitavecchia (RM), S. Agostino loc.; 25 m depth; Mar. 1979; bioclastic sand; CIN • 3 dd; Santa Marinella (RM); 30 m depth; Aug. 1982; bioclastic sand; CIN • 1 dd; Santa Marinella (RM); 28 m depth; Aug. 1981; bioclastic sand; CIN • 1 dd; Santa Marinella (RM); 25 m depth; Aug. 1983; bioclastic sand; CIN • 14 dd; Secche di Tor Paterno (RM); 22–30 m depth; 14 May. 1986; bioclastic sand; CIN • 1 dd; Secche di Tor Paterno (RM); 50 m depth; 17 Apr. 1983; CMO • 6 dd; Secche di Tor Paterno (RM); 35 m depth; 24 Sep. 1983; CMO • 1 dd; Terracina (LT); 30 m depth; Jul. 1981; CIN • 7 dd; Ventotene Is. (LT); 20 Jun. 1987; CMO • 6 dd; Montaldo di Castro (VT); 2 m depth; CMO • 2 dd; IDC 18; CMO • 7 dd; Zannone Is. (LT); 5–20 m depth; 13 Jul. 2009; CMO • 10 dd; G. 47; CMO • 3 dd: S. Marinella (RM); 1980; beached bioclastic sand; CBA • 2 lv; S. Agostino (RM); 1 m depth; 1980; on *Posidonia*; CBA • 19 lv. S. Agostino (RM); on *Posidonia*; 1 m depth; 28 Jul. 1977; CBA • 4 dd; Agosta (RM); MCZR.17121, Monterosato coll. • 1 dd; Capri (NA); MCZR, Settepassi coll. • 17 dd; Santa Caterina (LE), Porto Selvaggio; 40°08'43,4"N, 17°58'23,1"E; 15–22 m depth; CBA • 22 dd; Porto Cesareo (LE); Aug. 1976; debris in tide pools; CIN • 5 dd; Bari, beached bioclastic sand CBA • 2 dd; unknown data; sub nomine *turricula*, *lanceolata* = *plicatuliformis*; MCZR, sine numera, Monterosato coll. ex Pallary coll. • 8 dd; CMO. FRANCE, Corsica • 1 dd; Verghia; 5 m depth; Aug. 1988; bioclastic sand; CIN • 1 dd; in the Corallina; MCZR drawer M36 sine numera, Monterosato coll. ex Caziot coll. SPAIN • 5 dd; Alboran Is.; MEDITERRANEAO–92 Stn ALB C; 35°56'10"N, 003°01'48"E; 17 m depth; bioclastic sand; CMO • 3 dd; Marbella (Malaga); 4 m depth; May 1985; bioclastic sand; CIN • 1 dd; Minorca (Baleari Is.); MCZR drawer M36 sine numera, Monterosato coll. • 6 dd; Algecisas (Cadiz), Getares loc.; 1 m depth; May 1985; bioclastic sand; CIN. CROATIA • 80 dd; Umag; 1980; beached bioclastic sand; CBA • 2 dd; Novigrad; 3–4 m depth; Aug. 1983; bioclastic

sand; CIN • 4 dd; Novi Vinodolski; 4 m depth; Aug. 1983; bioclastic sand; CIN • 8 dd; Umag; 1978; beached bioclastic sand; CBA. GREECE • 1 dd; Milos Is.; Aug. 1981; beached bioclastic sand; CIN. Crete • 1 dd; MCZR drawer M36 sine numera, Monterosato coll. ex Maltazan coll. 1883. TUNISIA • 13 dd; N Zarzis; 2–7 m depth; Jun. 2007; beached bioclastic sand *Posidonia*; CMO • 7 dd; Kerkennah Is., Gharbi Is., Sidi Youssef loc.; beached bioclastic sand; CBA • 2 dd; Sfax; sub nomine *turricula* (*Pusiola*); MCZR.17121, Monterosato coll. ex Pallary coll. • 3 dd; Sfax; sub nomine var. *pallida* Issel and *proxima* Monts.; MCZR sine numera, coll. Monterosato • 84 dd; Gabes Gulf; sub nomine var. *gracilis* Sfax and var. *pallida* Issel MCZR, sine numera, Monterosato coll. • 16 dd; Sfax; MCZR drawer M36 sine numera, Monterosato coll. ex Pallary coll. • 8 dd: Ancienne Lagune Tunis; MCZR, drawer M36, sine numera, Monterosato coll.

RESULTS

Systematics

Classis GASTROPODA Cuvier, 1795
Subclassis CAENOGASTROPODA Cox, 1960
Ordo NEOGASTROPODA Wenz, 1938
Superfamilia TURBINELLOIDEA Swainson, 1835
Familia COSTELLARIIDAE MacDonald, 1860
Genus *Pusia* Swainson, 1840: 320
Subgenus *Ebenomitra* Monterosato, 1917: 26
type species *Mitra ebenus* Lamarck, 1811 (= *Pusiolina* Cossmann, 1921).

TYPE SPECIES. *Mitra microzonias* Lamarck, 1811 accepted as *Pusia microzonias* (Lamarck, 1811) (type by monotypy)

Pusia* (*Ebenomitra*) *angeloamatii n. sp. (Figs. 1–8, 11; Table 1)
https://www.zoobank.org/1ADC7878-D59E-4201-8AA7-EBE7E67A0955

TYPE MATERIAL. Holotype. Turkey • dd; Kaş; 36.150000°, 29.617833°; 50 m depth; in bioclastic sand; height 6.9 mm, width 3 mm, Figs. 2–4, 7, 8, 11, Oliverio legit (Rome); MNHN-IM-2000-34891. Paratypes • 1 dd; (type locality); CBA; • 2 dd; (type locality); CMO.

TYPE LOCALITY. Kaş, Turkey, 36.150000°, 29.617833°, 50 m depth (Fig. 1).

DIAGNOSIS. *Pusia* of medium size for the genus (height c. 7 mm), biconical, robust, shiny and brilliant. Protoconch paucispiral. Teleoconch with convex whorls, sculpted on the last whorl by 16 axial ribs and on the siphonal canal by 4 spiral oblique cords. Background colour light brown-orange, ribs white and white lines on the base alternating with thinner brown-orange ones.

DESCRIPTION OF HOLOTYPE. Shell (Figs. 2–4, 11) of medium size for the genus, height 6.9 mm, width 3 mm, height/width ratio 2.30, biconical, turriform-fusiform, robust, shiny and brilliant. Protoconch (Figs. 7, 8) paucispiral, bulbous, rapidly developing, of 1.2 barely convex and glossy whorls, apparently (x90) devoid of sculpture, height 0.617 mm, nucleus diameter 0.233 mm, fist half whorl diameter 0.400 mm, maximum diameter 0.567 mm. Protoconch-teleoconch boundary scarcely marked, slightly prosocline.

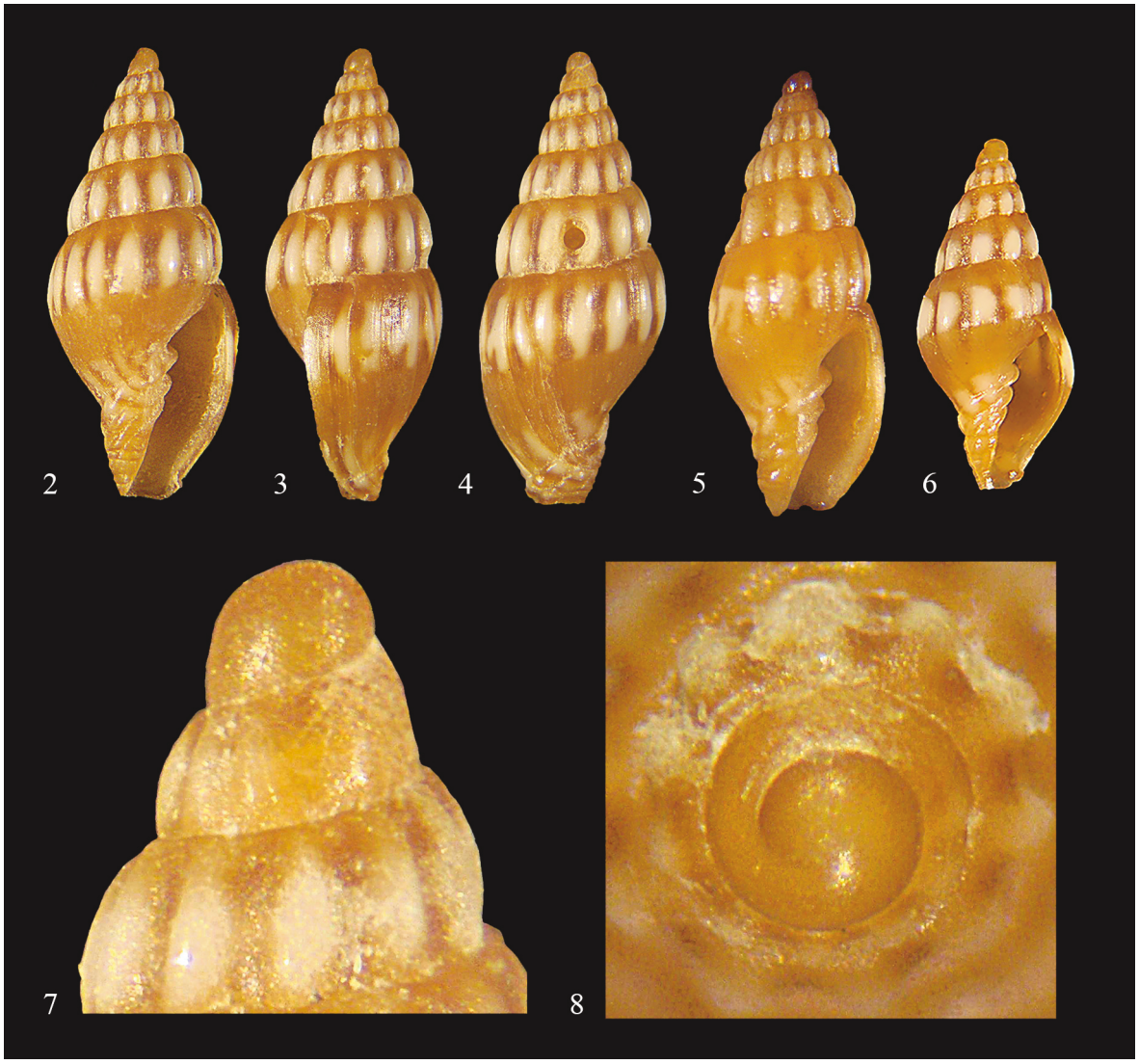
Teleoconch of 5.2 convex whorls, sutures impressed, last whorl slightly swollen with narrow base. Axial sculpture of 16 low, orthocline and rounded ribs, slightly broader than interspaces, vanishing toward the base; spiral sculpture absent. Umbilical fissure absent. Siphonal canal moderately long, sculptured with 4 strong oblique cords. Aperture elongate, height 3.3 mm, height/aperture height ratio 2.09; outer lip internally weakly lyrate. Columella with three strong oblique folds, the most adapical strongest. Colour: background light brown-orange, axial ribs white (except a short subsutural band of the background colour), interspaces slightly darker than background; white lines on the base alternating with thinner brown-orange ones.

Soft parts unknown.

VARIABILITY. Only four specimens examined, not particularly fresh, two adults with predation hole and two subadults: no significant variation detected. The adult paratype 'A' (Fig. 5) is 6.6 mm high and 2.75 mm wide, the 17 ribs on the last whorl are very flattened, evanescent towards the aperture. It has a high protoconch 0.633 mm, nucleus diameter 0.217 mm, fist half whorl diameter 0.433 mm, maximum diameter 0.533 mm. Teleoconch aperture high 3.1 mm, height/aperture height ratio 2.13 (See Table 1).

Protoconch	Holotype	Paratype A	Paratype B	Paratype C	Min.-max	Mean
Height	0.617	0.633	0.567	0.567	0.567-0.633	0.596
Diameter of nucleus	0.233	0.217	0.183	0.217	0.183-0.233	0.212
Diameter of first half whorl	0.400	0.433	0.383	0.400	0.383-0.433	0.404
Maximum diameter	0.567	0.533	0.517	0.533	0.517-0.567	0.537
No. of whorls	1.2	1.25	1.25	1.2	1.2-1.25	1.225

Table 1. Measurements of protoconch of *Pusia angeloamatii* n. sp. in mm with range and main values.



Figures 2–4, 7, 8. *Pusia angeloamatii* n. sp.: (2-4), holotype, Kaş, Turkey, height 6.9 mm (7, 8), holotype, detail of the protoconch (MNHN-2000-34981). Figure 5. paratype A, same locality data as holotype, height 6.6 mm (CMO). Figure 6. paratype B, same locality data as holotype, height 4.9 mm (CBA).

ETYMOLOGY. The species is named in memory of Angelo Amati, father of the author, on the centenary of his birth (1924) and for the example given in respecting nature, in particular molluscs.

REMARKS. The genus *Pusia* is absent in the Red Sea (Dekker & Orlin, 2000; Blatterer & Blatterer, 2019), and therefore, the new species cannot be a Lessepsian migrant. The genus *Pusia* is instead well represented in the Mediterranean, with some species occurring in sympatry (see below). Five species have recently been reported for the waters of Turkey (Sea of Marmara, Aegean Sea and Levantine Sea: Öztürk et al., 2014).

Pusia ebenus (Lamarck, 1811) (Fig. 12) (Lamarck, 1811; Scaperrotta et al., 2010, 5 unnumbered figs; Fedosov et al., 2017), is a very variable species, distributed throughout the Mediterranean. It differs from *P. angeloamatii* n. sp. in its larger and more robust shell (up to 39 mm in height for a specimen from Palermo, Sicily, in the Monterosato collection, MCZR.0678); a different colour pattern, generally monochrome with a narrow median whitish spiral line *vs* light brown-orange background, with white axial ribs and white lines on the base alternating with thinner brown-orange ones. A specimen from Apulia, particularly colourful with wide bands (Trono et al., 2023: 96, fig. 3I).

Pusia granum (Forbes, 1844) (Fig. 13) (Forbes, 1844; Scaperrotta et al., 2018), lives in the central and eastern Mediterranean (Giannuzzi-Savelli, 1984; Renda et al., 2022). It has recently been reported from Kuşadası Bay (Turkey) in the southern part of the Aegean Sea (Bitlis et al., 2017). It differs from *P. angeloamatii* n. sp. in its flat whorls with a slight adapical indentation at two-thirds of the whorl *vs* convex whorls without indentation; and the flatter and/or absent axial ribs on the last whorls. Protoconch very similar in shape and size (see Table 1). More or less dark greenish brown colour, with a wide whitish central band, crossed by thin wavy lines of hazelnut colour; on the base wavy vertical bands of the same colour as the background, alternating with white ones *vs* white ribs with dark interspaces and on the base white lines alternating with thinner dark ones like the background.

Pusia hypatiae (Pallary, 1912) new combination (Fig. 14) (Pallary, 1912; Scaperrotta et al., 2019) is restricted to the eastern Mediterranean. It differs from *P. angeloamatii* n. sp. in having axial ribs, when present, only on the first whorls, *vs* 16–17 low ribs on all whorls; less convex whorls with slightly stepped profile; more or less dark monochrome brown colour *vs* light brown-orange background, with white axial ribs and white lines on the base alternating with thinner brown-orange ones. Bouchet et al. (2001) reported for this species the date of 1913, which is probably right.

Pusia tricolor (Gmelin, 1791) (Fig. 9) (Gmelin, 1791; Giannuzzi-Savelli, 1981; Scaperrotta et al., 2009) lives in the western and central Mediterranean (Giannuzzi-Savelli, 1984; Renda et al., 2022), but rare records from Greece and Crete (see Material examined') and others reported for Turkey (Öztürk et al., 2014) confirm the extension of its range to the eastern basin. It differs from *P. angeloamatii* n. sp. in having slightly convex, almost flat whorls with a slightly incised suture *vs* more convex whorls with a deep suture; the last whorl more swollen and the base narrower; the background light greenish-hazelnut, with a thin suprasutural white line on the whorls delimited by pairs of hazelnut-coloured spots in correspondence with the interspaces *vs* white ribs with dark interspaces and white lines on the base alternating with thinner but darker ones. The protoconch is very similar in shape and size but the nucleus is slightly more protruded (Table 1).

Pusia savignyi (Payraudeau, 1826) (Fig. 10) (Payraudeau, 1826; Giannuzzi-Savelli, 1981; Scaperrotta et al., 2009; Fedosov et al., 2017), is distributed in the central-eastern Mediterranean (Giannuzzi-Savelli, 1984, Renda et al., 2022). It differs from *P. angeloamatii* n. sp. in its more convex whorls; a suprasutural white band slightly detached from the suture, less evident in the interspaces. The protoconch is less slender (height 0.633–0.733 mm *vs* 0.567–0.633 mm) and larger (maximum diameter 0.617–0.700 mm *vs* 0.517–0.567 mm) (see Table 2). The colour pattern is similar but devoid of white lines on the base.

The presence of the exotic (Indian/Red Sea) *Vexillum depexum* (Deshayes in Laborde, 1834) in the eastern Mediterranean, limited to the waters of Israel, needs to be confirmed by reproductive populations (e.g. Mienis, 1985; 2004; Bouchet et al., 2001; Streftaris et al., 2005; Zenetos et al., 2010; http://www.femorale.com/shellphotos/detail.asp?species=Vexillum+depexum+%28Deshayes%2C+1

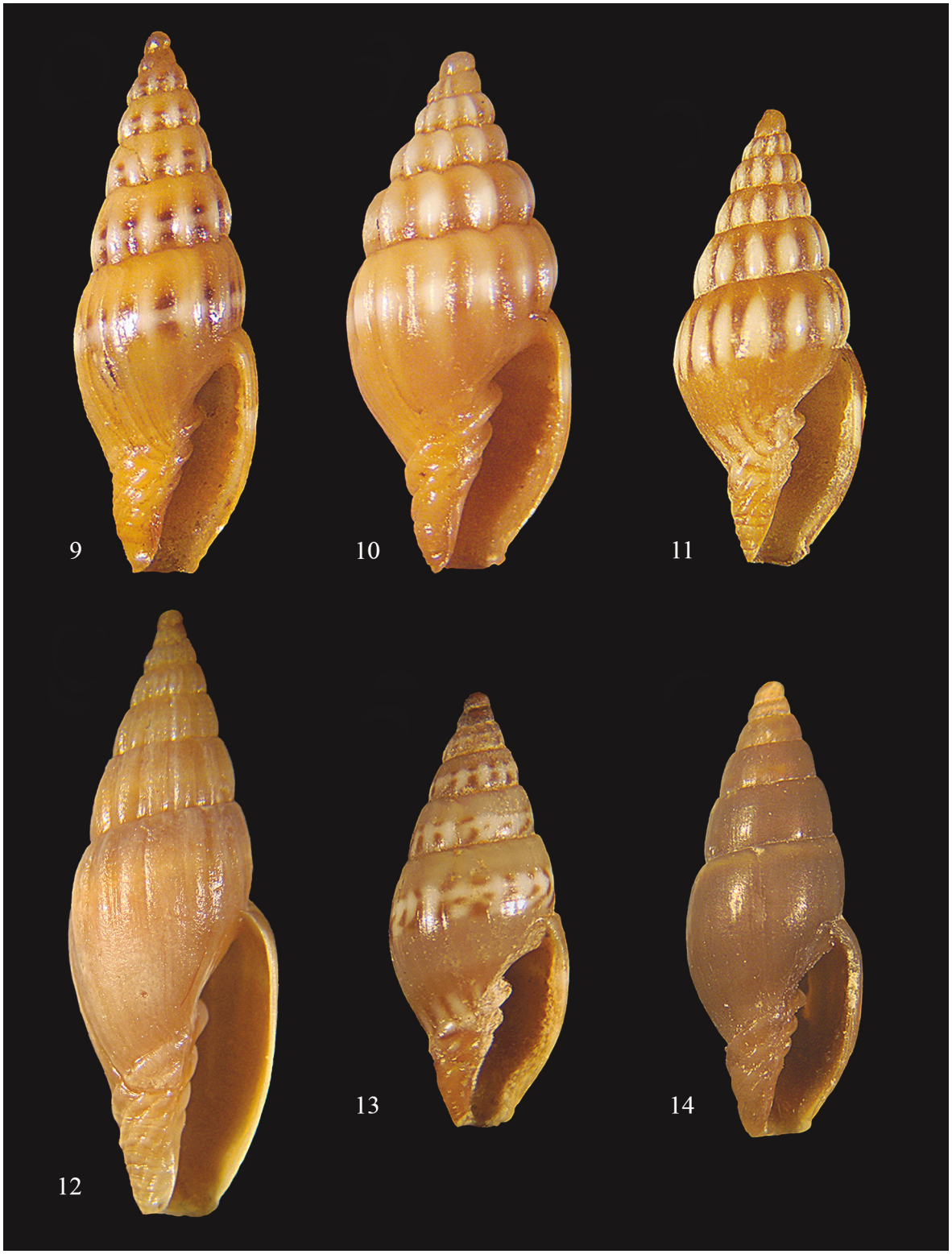


Figure 9. *Pusia tricolor*, Salina Island, Sicily, "Gamberetti" cave, 35 m, height 8.2 mm (CBA). Figure 10. *Pusia savignyi*, Salina Island, Sicily, "Gamberetti" cave, 35 m, height 7.9 mm (CBA). Figure 11. *Pusia angeloamatii* n. sp., Kaş (Turkey), holotype, height 6.9 mm (MNHN-2000-34891). Figure 12. *Pusia ebenus*, Kerkennah Island (Tunisia), height 11 mm (CBA). Figure 13. *Pusia granum*, Umag (Croatia), height 6.6 mm (CBA). Figure 14. *Pusia hypatiae*, Palmahin (Israele) 18 m, height 6.3 mm (CCB).

Protoconch	*P. angeloamatii* n. sp.	*P. ebenus*	*P. granum*	*P. hypatiae*	*P. savignyi*	*P. tricolor*
Height	0.567–0.633	0.625–0.650	0.567–0.600	0.488–0.588	0.633–0.733	0.533–0.600
Diameter of nucleus	0.183–0.233	0.250–0.275	0.233–0.250	0.200–0.225	0.283–0.350	0.233–0.283
Diameter of first half whorl	0.383–0.433	0.475–0.600	0.433–0.533	0.380–0.450	0.583–0.600	0.417–0.466
Maximum diameter	0.517–0.567	0.600–0.700	0.533–0.633	0.500	0.617–0.700	0.500–0.550
No. of whorls	1.2–1.25	1.2–1.35	1.25	1.1–1.2	1.1–1.2	1.2–1.25

Table 2. Range morphometric characters of the protoconch in Mediterranean species of the genus *Pusia*. Measurements in mm.

834%29&url=%2Fshellphotos%2Fthumbpage%2Easp%3Ffamily%3Dcostellariidae%26cod%3D1104%26nav%3D2%26prov%3D). The species is however different from *P. angeloamatii* n. sp. in its narrow and dense axial ribs throughout the shell; spiral cords on the base; four columellar folds; multispiral protoconch; chromatic pattern with a more or less dark brown background, with large irregular white subsutural blotches, and a series of white spots on the thin and granular basal cords, etc.

Vexillum leucaspis Herrmann & Stossier, 2011 (Herrmann & Stossier, 2011), from Senegal, Dakar, Atlantic Ocean, is quite reminiscent of *P. angeloamatii* n. sp. in its chromatic pattern. It differs in its less convex whorls, fewer axial ribs (12 *vs* 16–17); shorter base and aperture; narrower apex; absence of white lines on the base.

ACKNOWLEDGEMENTS

The author wishes to thank Massimo Appolloni (MCZR, Roma, Italy) for assistance with the Monterosato and Settepassi malacological collections; Cesare Bogi (Livorno, Italy), Italo Nofroni (Roma, Italy) and Marco Oliverio (Department of Biology & Biotecnologies 'Charles Darwin', Sapienza University of Rome, Italy) for the specimens made available for study. I thank also Marco Oliverio for his very helpful comments.

REFERENCES

Bitlis B., Bilal Öztürk B. & Doğan A., 2017. Contribution to the knowledge of the molluscan fauna of Kuşadası Bay (Aegean Sea). Turkish Journal of Zoology, 41: 980–990. https://doi.org/10.3906/zoo-1602-35.

Biskupič R., 2023. New records and paleoecology of the Middle Miocene (Badenian) Costellariidae MacDonald, 1860 (Gastropoda Neogastropoda) from Devínska Nová Ves (Vienna Basin, Slovakia) Biodiversity Journal, 14: 749–764. https://doi.org/10.31396/Biodiv.Jour.2023.14.4.749.764

Blatterer H. & Blatterer J., 2019. *Mollusca of the Dahab region.* Land Oberösterreich, Oberösterreichisches Landesmuseum, Biologiezentrum, 480 pp.

Bouchet P., Le Renard J. & Gofas S., 2001. The Mollusca part of ERMS is based on CLEMAM (Checklist of European Marine Molluscs), a database at the website. http://www.mnhn.frlbase/ malaco.html

Bouchet P., Rocroi J.P., Hausdorf B., Kaim A., Kano Y., Nützel A., Parkhaev P., Schrödl M. & Strong E.E., 2017. Revised classification, nomenclator and typification of gastropod and monoplacophoran families. Malacologia, 61: 1–526.

Chester C., Agosti D., Sautter G., Catapano T., Martens K., Gérard I. & Bénichou L., 2019. EJT editorial standard for the semantic enhancement of specimen data in taxonomy literature. European Journal of Taxonomy 586: 1–22. https://doi.org/10.5852/ejt.2019.586

Dekker H. & Orlin Z., 2000. Check list of Red Sea Mollusca. Spirula, 47 (supplement), 1–46.

Fedosov A.E., Puillandre N., Herrmann M., Dgebuadze P. & Bouchet P., 2017. Phylogeny, systematics, and evolution of the family Costellariidae (Gastropoda: Neogastropoda). Zoological Journal of the Linnean Society, 179: 541–626. https://doi.org/10.1111/zoj.12431

Forbes E., 1844. Report on the Mollusca and Radiata of the Aegean Sea, and on their distribution, considered

as bearing on geology. Reports of the British Association for the Advancement of Science for 1843: 130–193.

Giannuzzi Savelli R., 1984. La Superfamiglia Mitroidea nel Mediterraneo. Lavori SIM, Atti del Simposio 1982, 21: 67–116.

Giannuzzi Savelli R., 1981. Osservazioni su *Vexillum* (*Pusia*) *tricolor* e *Vexillum* (*Pusia*) *savignyi.* Bollettino Malacologico, 16: 407–410.

Gmelin J.F., 1791. Vermes. In: Gmelin J.F. (Ed.) Caroli a Linnaei Systema Naturae per Regna Tria Naturae, Ed. 13. Tome 1(6). G.E. Beer, Lipsiae [Leipzig]. pp. 3021–3910. Systema Naturae. Linneaeus (ed.).

Hadley A., 2006. Combine ZP public domain image processing software. Available from https://web.archive.org/web/20160221032141/http://www.hadleyweb.pwp.blueyonder.co.uk/

Herrmann M. & Stossier G., 2011. Four new species of *Vexillum* (*Pusia*) (Gastropoda: Costellariidae) from the Central Indo-Pacific and West Africa. Conchylia, 41: 33–46.

Lamarck J.B.M. [de], 1811. Suite de la détermination des espèces de Mollusques testacés. Mitre (Mitra.). Annales du Muséum National d'Histoire Naturelle, 17: 195–222.

Mienis H.K., 1985. First record of the Erythrean species *Vexillum depexum* from the Mediterranean coast of Israel. Levantina, no. 58: 640.

Mienis H.K., 2004. New data concerning the presence of lessepsian and other Indo-Pacific migrants among the molluscs in the Mediterranean Sea with emphasize on the situation in Israel. 1. Ulusal Malakoloji Kongresi 1–3 Eylül 2004 İzmir – Türkiye Bilal Öztürk & Alp Salman, Eds). Türk Sucul Yaşam Dergisi, 2: 117–131.

MolluscaBase eds, 2021. MolluscaBase. *Pusia* Swainson, 1840. Accessed at: https://www.molluscabase.org/aphia.php?p=taxdetails&id=206261 on 2024-04-28

MolluscaBase eds, 2024. MolluscaBase. *Vexillum hypatiae* (Pallary, 1912). Accessed at: https://www.molluscabase.org/aphia.php?p=taxdetails&id=139418 on 2024-04-29

Monterosato T.A., 1917. Molluschi viventi e quaternari raccolti lungo le coste della Tripolitania dall'ing. Camillo Crema. Bollettino della Società Zoologica Italiana, 3rd Series 4 [= 24]: 1–28; pl. I and some additional photos to pl. I.

Öztürk B., Doğan A., Bitlis-Bakir B. & Salman A., 2014. Marine molluscs of the Turkish coasts: an updated checklist. Turkish Journal of Zoology, 38: 1-48. https://doi.org/10.3906/zoo-1405-78

Pallary P., 1912. Catalogue des mollusques du littoral méditerranéen de l'Egypte. Mémoires de l'Institut d'Egypte, 7: 69–207, pls 15–18.

Pallary P., 1913. Catalogue de la faune malacologique de l'Égypte. Mémoires présentés a l'Institut Égyptien, 6: 1–182, 5 plates. Le Caire.

Payraudeau B.C., 1826. Catalogue descriptif et méthodique des annelides et des mollusques de l'Ile de Corse; avec huit planches représentant quatre-vingt-huit espèces, dont soixante-huit nouvelles. Imprimerie de J. Tastu, Paris, vii + 218 pp., pls. 1–8.

Renda W., Amati B., Bogi C., Bonomolo G., Capua D., Dell'angelo B., Furfaro G., Giannuzzi-Savelli R., La Perna R., Nofroni I., Pusateri F., Romani L., Russo P., Smriglio C., Tringali L. P. & Oliverio M., 2022. Marine Mollusca. In: Bologna M.A., Zapparoli M., Oliverio M., Minelli A., Bonato L., Cianferoni F. & Stoch F. (Eds), Checklist of the Italian fauna. Version 1.0. Last update: 2021-05-31. https://doi.org/10.21426/B637156028

Scaperrotta M., Bartolini S. & Bogi C., 2009. Accrescimenti. Studi di accrescimento dei molluschi marini del Mediterraneo. L'Informatore Piceno 1, 167 pp.

Scaperrotta M., Bartolini S. & Bogi C., 2010. Accrescimenti. Studi di accrescimento dei molluschi marini del Mediterraneo. L'Informatore Piceno 2, 176 pp.

Scaperrotta M., Bartolini S. & Bogi C., 2018. Accrescimenti. Studi di accrescimento dei molluschi marini del Mediterraneo. L'Informatore Piceno 9, 192 pp.

Scaperrotta M., Bartolini S. & Bogi C., 2019. Accrescimenti. Studi di accrescimento dei molluschi marini del Mediterraneo. L'Informatore Piceno 10, 212 pp.

Streftaris N., Zenetos A. & Papathanassiou E., 2005. Globalisation in marine ecosystems: the story of non-indigenous marine species across european seas. Oceanography and Marine Biology: An Annual Review, 43: 419–453.

Swainson W., 1840. A treatise on malacology; or the natural classification of shells and shell-fish. Longman, London, viii + 419 pp.

Trono D., Macrì G. & Renda W., 2023. The latest but not the last: Checklist of the Molluscan fauna of the Salento coast (Apulia, Italy). Bollettino Malacologico, 59: 59–105. https://doi.org/10.53559/BollMalacol.2022.19

Verduin A., 1982. How complete are diagnoses of coiled shells of regular build? A mathematical approach. Basteria, 45: 127–142. https://natuurtijdschriften.nl/pub/596748

Zenetos A., Gofas S., Verlaque M., Cinar M., Garcia Raso J., Bianchi C., Morri C., Azzurro E., Bilecenoglu M., Froglia C., Siokou I., Violanti D., Sfriso A., San Martin G., Giangrande A., Katagan T.,

Ballesteros E., Ramos-Espla A., Mastrototaro F., Ocana O., Zingone A., Gambi M. & Streftaris N., 2010. Alien species in the Mediterranean Sea. A contribution to the application of European Union's Marine Strategy Framework Directive (Msfd). Part I. Spatial distribution. Mediterranean Marine Science, 11, 381–493.
https://doi.org/10.12681/Mms.87