BULLETIN OF THE NATIONAL MUSEUM OF NATURAL HISTORY, MALTA

VOLUME 1 • ISSUE 1

JUNE 2024

BULLETIN OF THE NATIONAL MUSEUM OF NATURAL HISTORY, MALTA

The peer-reviewed and biannual Bulletin of the National Museum of Natural History, Malta is a periodical dedicated to the publication and dissemination of work on aspects of the natural history of the Maltese archipelago and its wider Mediterranean context, including floristics, faunistics, palaeontology, ecology, and conservation science. These are presented together with perspectives on museology, reviews of historic collections, and historical and biographical insights.

Published by the:

National Museum of Natural History
Vilhena Palace, St. Publius Square
Mdina, MDN 1011
Malta

and

Heritage Malta
Head Office
Dawret Fra Giovanni Bichi
Kalkara, KKR 1280
Malta

June 2024

Cover image: Holotype of *Echinolampas tagliaferroi* Cottreau, 1913 (M/E293, National Museum of Natural History, Mdina, Malta).

ON WENTLETRAPS (GASTROPODA: EPITONIIDAE) FROM THE UPPER GLOBIGERINA LIMESTONE FORMATION (MIOCENE: LANGHIAN) OF MALTA

David P. CILIA [1]

ABSTRACT

In this study, a collection of fossil wentletraps (Gastropoda: Epitoniidae) representing five nominal taxa, all from the Upper Globigerina Limestone Formation of the Maltese Miocene (Langhian) and deposited in the National Museum of Natural History, Mdina (Malta), is reviewed. The replacement name *Sthenorytis garigor* **nom. nov.** is proposed for *Scalaria melitensis* Cowper Reed *in* Baldacchino, 1939, primary homonym of *Scalaria melitensis* Fuchs, 1876. Lectotypes for *S. garigor* **nom. nov.**, *Scalaria crassicostata* var. *inequalis* Cowper Reed *in* Baldacchino, 1939 and *Scalaria crassicostata* var. *obliquata* Cowper Reed *in* Baldacchino, 1939 are selected from the type series for nomenclatural stability. The varieties *S. crassicostata* var. *inequalis, S. crassicostata* var. *obliquata*, and *S. crassicostata* var. *taurina* Sacco, 1891 fall within the spectrum of intraspecific diversity expressed by *Cirsotrema crassicostatum* (Deshayes, 1850) and are synonymized with this species. Updated chresonymies and synonymies are given for *C. crassicostatum*, *Cirsotrema duciei* (Wright, 1855), and *S. garigor* **nom. nov.**

Keywords: Mollusca, *Scalaria*, *Cirsotrema*, *Sthenorytis*, fossil species, Maltese archipelago

SINTEŻI

[Dwar garigori (Gastropoda: Epitoniidae) mill-Formazzjoni tal-Franka ta' Fuq (Mijoċenu: Langjan) ta' Malta.] F'dan l-istudju qiegħda tiġi ppreżentata reviżjoni ta' kollezzjoni ta' garigori fossili (Gastropoda: Epitoniidae) minn ħames tassoni nominali, kollha mill-Franka ta' Fuq mill-Mioċenu Malti (Langjan), u miżmumin fil-Mużew Nazzjonali tal-Istorja Naturali, Mdina (Malta). L-isem ta' sostituzzjoni *Sthenorytis garigor* **nom. nov.** huwa propost għal *Scalaria melitensis* Cowper Reed *in* Baldacchino, 1939, omonimu primarju ta' *Scalaria melitensis* Fuchs, 1876. Lektotipi għal *S. garigor* **nom. nov.**, *Scalaria crassicostata* var. *inequalis* Cowper Reed *in* Baldacchino, 1939 u *Scalaria crassicostata* var. *obliquata* Cowper Reed *in* Baldacchino, 1939 qegħdin jiġu magħżulin mis-serje tat-tip għall-istabilità tan-nomenklatura. Il-varjetajiet *S. crassicostata* var. *inequalis, S. crassicostata* var. *obliquata* u *S. crassicostata* var. *taurina* Sacco, 1891 jaqgħu fl-ispektrum tad-diversità intraspeċifika espressa minn *Cirsotrema crassicostata* (Deshayes, 1850) u qegħdin jiġu sinonimizzati ma' din l-ispeċi. Il-kresonimiji u s-sinonimiji ta' *C. crassicostatum*, *Cirsotrema duciei* (Wright, 1855), u *S. garigor* **nom. nov.** qegħdin jiġu aġġornati.

Kliem muftieħ: Mollusca, *Scalaria*, *Cirsotrema*, *Sthenorytis*, speċi fossili, l-arċipelagu Malti

INTRODUCTION

Not later than 1939, the curator of the Maltese natural history collections presented an assortment of fossil wentletraps (Gastropoda: Epitoniidae) from the Upper Globigerina Limestone Member (*Franka ta' Fuq*) of the Maltese Miocene to English geologist Frederick Richard COWPER REED.

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Submitted **24 Nov. 2023**; accepted **02 Apr. 2024**.
urn:lsid:zoobank.org:pub:D8A5EC4B-90AC-4CA7-9772-9FF256DE8BBD

This curator, Joseph George BALDACCHINO (1894–1973), probably asked COWPER REED to provide a species determination of these fossils. (For biographical data on COWPER REED (1869–1946), reference is made to WOODS (1946) and CLEEVELY et al. (1989); see **Pl. 1 Fig. A**).

Specific documents attesting to correspondence between BALDACCHINO and COWPER REED could not be located within the NMNH, NMA or NHMUK archives, however, BALDACCHINO's (politically motivated) willingness to supply material and collaborate with British academics, especially archaeologists and natural historians, is well-documented (e.g. in BATE, 1935; TRECHMANN, 1938, and the description of *Helix baldacchini* within; BALDACCHINO & DUNBABIN, 1953; BALDACCHINO & EVANS, 1954; BUGEJA, 2006; ROSSI, 2017; etc.; see **Pl. 1 Fig. E**). COWPER REED's analysis of the fossils was reproduced *verbatim* in an article by BALDACCHINO, himself a medical doctor by profession and an amateur archaeologist, in the Maltese Government's *Museum Annual Report* (MAR) of that year (BALDACCHINO, 1939).

The report commissioned by BALDACCHINO resulted in the treatment of five nominal taxa of epitoniids of specific or infraspecific rank, three of which were newly described as species or as new varieties of known species (one and two taxa, respectively), namely (as written in the original document): *Scalaria* (*Stenorhytis*) *melitensis* (a new species), *Scalaria* (*Cirsotrema*) *Duciei* Wright, *Scalaria* (*Cirsotrema*) *crassicostata* Brocchi var. *taurina* Sacco, *Scalaria* (*Cirsotrema*) *crassicostata* Brocchi var. *obliquata* (a new variety), and *Scalaria* (*Cirsotrema*) *crassicostata* Brocchi var. *inequalis* (a new variety). *Scalaria* Lamarck, 1801 is a junior subjective synonym of *Epitonium* Röding, 1798, but the discussed entities are nowadays placed in the genera *Cirsotrema* Mörch, 1852 and *Sthenorytis* Conrad, 1863. Some of them were represented in the palaeontological display of the NMNH, inaugurated in 1973 (**Pl. 1 Fig. I**) (see ZAMMIT-MAEMPEL, 1977).

The new names published in BALDACCHINO (1939) satisfy the criteria established in ICZN Art. 10 and are therefore deemed available. The detailed descriptions, however, are not accompanied by the illustrations of any of the specimens. Neither did COWPER REED explicitly designate types for any of the new taxa, although specific quantities of specimens are always cited in his treatments.

The collection, subsequently deposited at the NMNH by BALDACCHINO, could be re-examined by the present author. The objectives of this study are to (1) evaluate the current status of the nominal taxa treated by COWPER REED, (2) provide an updated chresonymy and synonymy for the resultant (valid and available) entities, and (3) for the first time illustrate all the specimens he examined, as two-thirds of them qualify as syntypes according to ICZN Art. 72.1.1. Furthermore, (4) onomatophores (lectotypes) are selected from among the syntypes in accordance with ICZN Art. 72.2, for the stability of their nomenclature.

Analyses of planktonic chronostratigraphic markers by GIANNELLI & SALVATORINI (1972), JACOBS et al. (1996), and JANSSEN (2012a) situate the entirety of the Globigerina Limestone Formation within a late Oligocene (mid-Chattian) to a mid-Miocene (Langhian) timeframe. Deposition of its Upper Member occurred throughout the Langhian, likely up until the threshold with the Serravallian (ROSE et al., 1992; JANSSEN, 2012a). Translation of the lithostratigraphic data presented in PEDLEY (1976) and GATT (2006) to chronostratigraphy (see 'Materials and Methods') reveals that the taxa discussed in this paper are restricted to mid- to late Miocene deposits (Langhian to Tortonian), although the specimens studied by COWPER REED are from the Upper Globigerina, therefore, of an exclusively Langhian age.

Other wentletraps confirmed as occurring in the Maltese Miocene include, among others, *Cirsotrema melitensis* (Fuchs, 1876 in *Scalaria*) and *Cirsotrema taurovaricosum* Sacco, 1891 (Gatt, 2006), but these taxa are not systematically treated in this work, with the exception of the former's status as senior homonym of one of the taxa described by COWPER REED *in* BALDACCHINO (1939).

Pl. 1 Figs. A–I: Museum and archival material related to the authors mentioned in this paper**. A**: Portrait of Frederick Richard COWPER REED from the Library and Archives of the NHMUK. **B**: COWPER REED's handwritten label reading '*t. Scalaria crassicostata var. nov. inequalis*' for the specimen selected as lectotype in this paper (NMNH/M211). **C**.

COWPER REED's handwritten label reading '*l. Scalaria crassicostata var. obliquata*' for the specimen selected as lectotype in this paper (NMNH/M211). **D**: COWPER REED's handwritten label reading '*b. Scalaria melitensis*' for the specimen selected as lectotype in this paper (NMNH/M200). **E**: A photograph taken on the 5th of April of 1934 at the National Museum (Valletta, Malta) showing Maltese archaeologist Themistocles ZAMMIT (1864–1935) on the left, British palaeontologist Dorothea BATE (1878–1951) at the centre, and Curator of Natural History with the Museums Department, Joseph G. BALDACCHINO, on the right (from the archives of Heritage Malta, reproduced with permission). **F**, **G**: BALDACCHINO's typewritten labels for specimens in the geological collection of the NMNH, dating from between 1933 and 1947. **H**: BALDACCHINO's typewritten label for a specimen selected as lectotype in this paper (NMNH/M200). **I**: Specimens of the three varieties of *Cirsotrema crassicostatum* (Deshayes, 1850) discussed in this paper are exhibited in the George Zammit-Maempel Halls of Geology and Palaeontology at the National Museum of Natural History, Mdina, Malta. These specimens do not form part of the material studied for this paper. The museum display was planned and organized by Assistant Curator of Geology and Palaeontology, George ZAMMIT-MAEMPEL (1925–) and inaugurated by the Minister of Education, Culture, and Tourism, Agatha BARBARA (1923–2002), in 1973.

MATERIALS AND METHODS

Chresonyms and synonyms for the present taxa taken from other works were verified and integrated into an updated listing for each species. For *C. crassicostatum*, only the bibliographic references that describe Maltese occurrences, or that delimit the international stratigraphic range, are listed; the otherwise extensive corpus of literature referring to this species may be consulted in the exhaustive chresonymy by VAN DER VOORT (in press). The lists for the other species (hitherto only known from Maltese strata) are more complete. Notes in square brackets are additions of the present author.

Labels and correspondence were scanned and cropped with their borders retained within the image, then saved in *.jpeg* format. Measurements of specimens do not include the fossiliferous matrix. They were obtained using digital callipers and are reported in millimetres (mm). Photography of specimens was executed by means of Nikon D90 and Sony Alpha 7 II cameras. The resulting images were processed and collated into plates using Adobe Photoshop 2024®.

The translation from lithostratigraphy to chronostratigraphy follows the interpretations of LIRER & IACCARINO (2011) and JANSSEN (2012a: 208 fig. 3).

Symbols and abbreviations:
?: uncertain taxonomic allocation
ICZN: International Commission for Zoological Nomenclature
NHMUK: Natural History Museum, London, England
NMA: National Museum of Archaeology, Valletta, Malta
NMNH: National Museum of Natural History, Mdina, Malta
sh.: fossil shell
[***sic***]: intentionally so written
unn.: unnumbered

RESULTS

With each of the specimens he studied, COWPER REED included a handwritten note including the species (or varietal) name and a unique alphabetical identifier (**Pl. 1 Figs. B–D**). Additional samples of COWPER REED's calligraphy were not present within the NMNH collection, but confirmation that his hand was involved was achieved by comparison with correspondence traced within the Library and Archives of the NHMUK (letters addressed to British palaeontologist Francis Arthur BATHER (1863–1934), file DF PAL/100/182/12; unfortunately, none of the seen correspondence was addressed to BALDACCHINO).

The only specimens without COWPER REED's label consist of one *C. duciei* (of which he mentions three specimens, although four are actually present – the fourth (NMNH/M220, **Pl. 3 Fig. M**) may have been added by BALDACCHINO later) and two *C. crassicostata* var. *inequalis* (NMNH/M214–15, **Pl. 2 Figs. L, I**). The label for the single specimen of *C. crassicostata* var. *taurina* (NMNH/M216, **Pl. 2 Fig. N**) is the only to omit the varietal name, as well as the unique

alphabetical identifier. COWPER REED's label information is synthesized with the data generated at present in **Table 1**.

Also associated with each specimen is a second label attached to the glass lids of the containment boxes. Although there are no personal names on these labels, one can safely assume that they are BALDACCHINO's additions, as several other labels elsewhere in the geological collection that do bear his name are set in the same style and format, are dated from the period of his tenure (1933–1947) and were typewritten using the same machine (**Pl. 1 Figs. F–H**). These second labels include the species name, authority, variety (where applicable), and the provenance of the specimens: '*Globigerina Limestone, Malta*', a phrase often abbreviated simply as '*Glob.L.*'. The only specimens lacking BALDACCHINO's labels are the two *C. crassicostata* var. *inequalis* mentioned in the previous paragraph, and the singular *C. crassicostata* var. *taurina* specimen.

Table 1: Original label and updated data for each specimen in the COWPER REED & BALDACCHINO collection of Maltese fossil wentletraps. **L**: lectotype; **P**: paralectotype; **Reg.**: registration number; NA: not applicable; **St.**: status.

Original label (pre-1940)		**NMNH Collection** (2024)			**Fig.** (in this paper)
Determination	**Letter**	**Accepted name**	**Reg.**	**St.**	
Scalaria melitensis	b	*S. garigor* nom. nov.	**M200**	**L**	**Pl. 3 Figs. A–C**
Scalaria melitensis	c	*S. garigor* nom. nov.	M201	P.I	**Pl. 3 Figs. D–F**
Scalaria melitensis	a	*S. garigor* nom. nov.	M202	P.II	**Pl. 3 Figs. G–I**
Scalaria crassicostata var. *obliquata*	l	*C. crassicostatum*	**M203**	**L**	**Pl. 2 Fig. D**
Scalaria crassicostata var. *obliquata*	m	*C. crassicostatum*	M204	P.II	**Pl. 2 Fig. B**
Scalaria crassicostata var. *obliquata*	o	*C. crassicostatum*	M205	P.I	**Pl. 2 Fig. A**
Scalaria crassicostata var. *obliquata*	i	*C. crassicostatum*	M206	P.III	**Pl. 2 Fig. C**
Scalaria crassicostata var. *obliquata*	d	*C. crassicostatum*	M207	P.IV	**Pl. 2 Fig. E**
Scalaria crassicostata var. *obliquata*	q	*C. crassicostatum*	M208	P.V	**Pl. 2 Fig. G**
Scalaria crassicostata var. *obliquata*	p	*C. crassicostatum*	M209	P.VI	**Pl. 2 Fig. J**
Scalaria crassicostata var. *obliquata*	v	*C. crassicostatum*	M210	P.VII	**Pl. 2 Fig. M**
Scalaria crassicostata var. *inequalis*	t	*C. crassicostatum*	**M211**	**L**	**Pl. 2 Fig. F**
Scalaria crassicostata var. *inequalis*	r	*C. crassicostatum*	M212	P.I	**Pl. 2 Fig. H**
Scalaria crassicostata var. *inequalis*	j	*C. crassicostatum*	M213	P.II	**Pl. 2 Fig. K**
NA	NA	*C. crassicostatum*	M214	NA	**Pl. 2 Fig. L**
NA	NA	*C. crassicostatum*	M215	NA	**Pl. 2 Fig. I**
Scalaria crassicostata [var. *taurina*]	NA	*C. crassicostatum*	M216	NA	**Pl. 2 Fig. N**
Scalaria Duciei	g	*C. duciei*	M217	NA	**Pl. 3 Fig. J**
Scalaria Duciei	k	*C. duciei*	M218	NA	**Pl. 3 Fig. K**
Scalaria Duciei	f	*C. duciei*	M219	NA	**Pl. 3 Fig. L**
NA	NA	*C. duciei*	M220	NA	**Pl. 3 Fig. M**

SYSTEMATICS

Gastropoda Cuvier, 1795
Caenogastropoda Cox, 1960
incerti ordinis
Epitonioidea Berry, 1910 (1812)
Epitoniidae Berry, 1910 (1812)
Cirsotrema Mörch, 1852
(type species by monotypy: *Scalaria varicosa* Lamarck, 1822)

Cirsotrema crassicostatum (Deshayes, 1850) (**Pl. 2 Figs. A–N**)

Scalaria crassicostata DESHAYES, 1850: 42, pl. 70 figs 1–3.
Cirsotrema crassicostatum (Desh.) – SACCO, 1891: 45.
Cirsotrema crassicostatum var. *taurina* SACCO, 1891: 45, pl. 2 fig. 12.
Cirsotrema crassicostatum Deshayes – COOKE, 1896: 510.
Cirsotrema crassicostatum Deshayes var. – COOKE, 1896: 510.
Scalaria (*Cirsotrema*) *crassicostata* [*sic*] Brocchi var. *taurina* Sacco – COWPER REED *in* BALDACCHINO, 1939: 171.
Scalaria (*Cirsotrema*) *crassicostata* [*sic*] Brocchi var. *obliquata* COWPER REED *in* BALDACCHINO, 1939: 171.

Scalaria (*Cirsotrema*) *crassicostata* [*sic*] Brocchi var. *inequalis* COWPER REED *in* BALDACCHINO, 1939: 171.
Scala (*Cirsotrema*) *crassicostata* [*sic*] Deshayes, 1839 – GLIBERT, 1952: 40–42, pl. 3 fig. 8a–d.
Cirsotrema (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – ANDERSON, 1964: 217, pl. 16 fig. 137.
Cirsotrema (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – JANSSEN, 1967: 141.
Cirsotrema (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – JANSSEN, 1972: 9.
Scalaria [sp.] – ZAMMIT-MAEMPEL, 1977: 25.
Cirsotrema (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – JANSSEN, 1984: 166, pl. 50 fig. 15.
Cirsotrema crassicostatum (Deshayes, 1853) – LOZOUET et al., 2001: 51, pl. 19 fig. 6.*Cirsotrema* (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – WIENRICH, 2001: 450, pl. 73 figs. 1–3, pl. 91 fig. 7.
Cirsotrema crassicostata [*sic*] Deshayes var. *taurina* Sacco, 1891 – GATT, 2006: 177–178, 177 fig. [unn.].
Cirsotrema crassicostata [*sic*] Deshayes var. *obliquata* Reed, 1939 – GATT, 2006: 178, 178 fig. [unn.].
Cirsotrema crassicostata [*sic*] Deshayes var. *inequalis* Reed, 1939 – GATT, 2006: 178, 178 fig. [unn.].
Cirsotrema crassicostata [*sic*] (Deshayes, 1839) – CARONE & ARDOVINI, 2008: 609–620, 611 fig. 1 [map], 612 fig. 2 [diagram], 613 fig. 3, 616 fig. 4, 616 tab. 1, 614 pl. 1, 615 pl. 2.
Cirsotrema crassicostatum (Deshayes, 1839) – JANSSEN, 2012a: 218, 224, 226, 234.
Cirsotrema crassicostata [*sic*] (Deshayes, 1839) – JANSSEN, 2012a: 514.
Cirsotrema crassicostatum (Deshayes, 1850) – VAN DER VOORT, in press.

Type material studied:
MALTA • **lectotype** of '*Scalaria* (*Cirsotrema*) *crassicostata* Brocchi var. *obliquata* Cowper Reed *in* Baldacchino, 1939' (**established herein**); '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939 or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/M203; NMNH • **7 paralectotypes** of '*S.* (*C.*) *crassicostata* var. *obliquata*'; data as previous; NMNH/M204–210; NMNH • **lectotype** of '*Scalaria* (*Cirsotrema*) *crassicostata* Brocchi var. *inequalis* Cowper Reed *in* Baldacchino, 1939' (**established herein**); '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939 or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/M211; NMNH • **2 paralectotypes** of '*S.* (*C.*) *crassicostata* var. *inequalis*'; data as previous; NMNH212–13; NMNH.

Other material studied:
GERMANY • 1 sh.; Twistringen, Niedersachsen; Twistringer Schichten (Upper Mica Clay); Miocene (Langhian to Early Serravallian) (Reinbekian); J. VAN DER VOORT leg.; coll. J. VAN DER VOORT.
MALTA • 2 sh. of '*S.* (*C.*) *crassicostata* var. *inequalis*'; '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939 or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/214–15; NMNH • 1 sh. of '*Cirsotrema crassicostata* Deshayes var. *taurina* Sacco, 1891'; '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939 or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/M216; NMNH • 1 sh.; Gozo, San Lawrenz outcrop 1 km south of San Dimitri Point; Upper Globigerina Limestone Formation; Miocene (Langhian); 25 May 1993; A.W. JANSSEN leg.; 5-8m above main phosphorite level C2; NMNH • 2 sh.; Xwejni Bay, Marsalforn, Għawdex; Upper Globigerina Limestone Formation; Miocene (Langhian); S. ATTARD leg.; coll. S. CARDONA • 1 sh.; Fomm ir-Riħ, Mġarr; Upper Globigerina Limestone Formation; Miocene (Langhian); 15 Apr. 2015; S. CARDONA leg.; coll. S. CARDONA • 1 sh.; Blata Step, Baħrija, Rabat; Upper Globigerina Limestone Formation; Miocene (Langhian); 20 Jan. 2016; S. CARDONA leg.; coll. S. CARDONA • 1 sh.; Rdum il-Ħmar, Mellieħa; Blue Clay Formation; Miocene (Serravallian to Tortonian); 1995; S. CARDONA leg.; uppermost densely glauconitic sediments; coll. S. CARDONA • 3 sh.; Qammieħ, Mellieħa; Upper Globigerina Limestone Formation; Miocene (Langhian); 08 Mar. 2011; S. CARDONA leg.; coll. S. CARDONA • 2 sh.; Selmun, San Pawl il-Baħar; Upper Globigerina Limestone Formation; Miocene (Langhian); 19 Oct. 2014; S. CARDONA leg.; coll. S. CARDONA • 1 sh.; Xatt l-Aħmar towards Mġarr ix-Xini, Għawdex; Upper Globigerina Limestone Formation; Miocene (Langhian); 08 Apr. 2015; S. CARDONA leg.; coll. S. CARDONA • 1 sh.; Qammieħ, Mellieħa; Upper

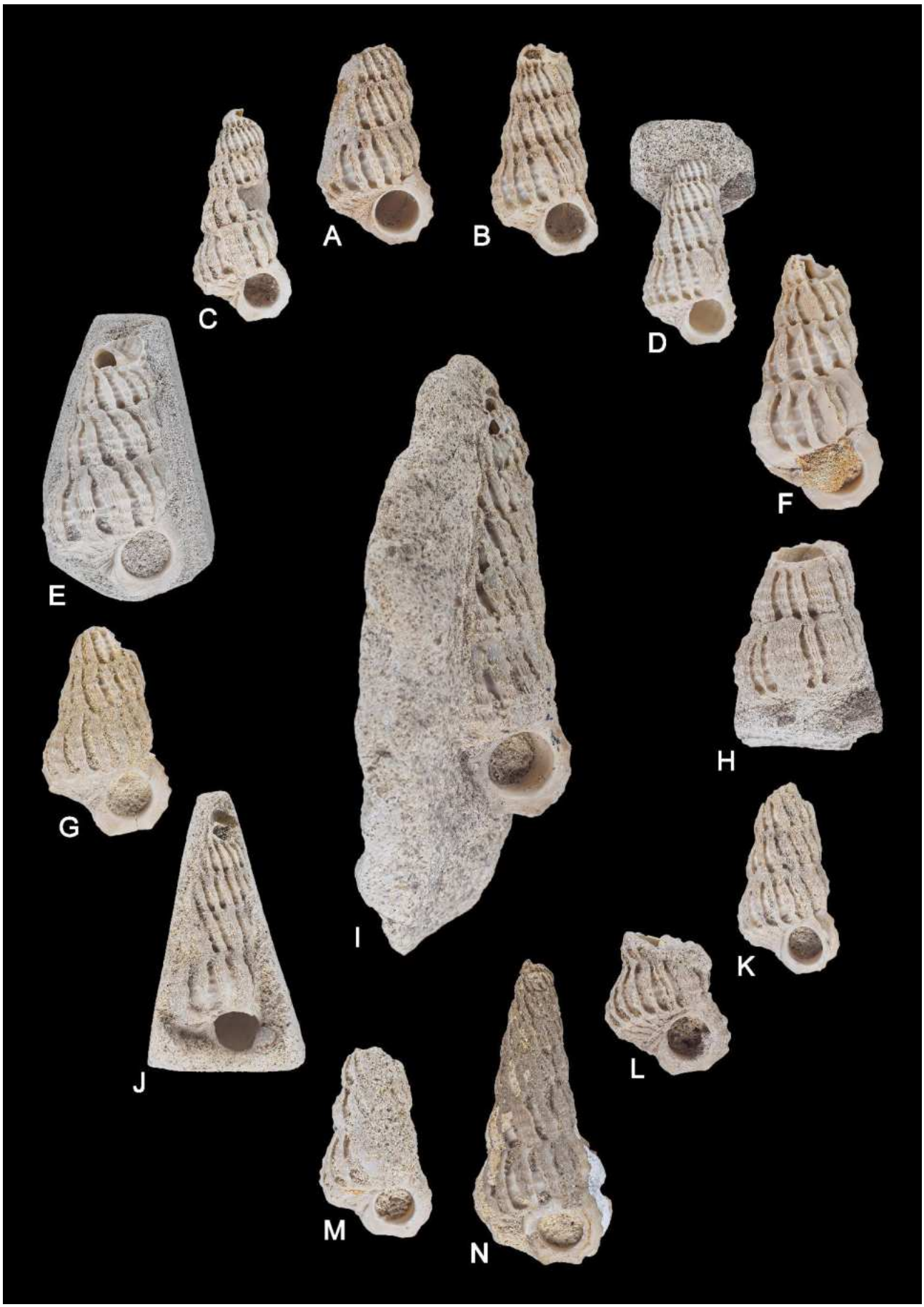
Globigerina Limestone Formation; Miocene (Langhian); 13 Feb. 2011; S. CARDONA leg.; coll. S. CARDONA.
THE NETHERLANDS • 1 sh.; Winterswijk-Miste bed, Gelderland; Breda Formation; Miocene (Late Burdigalian to Early Langhian) (Hemmoorian); J. VAN DER VOORT leg.; coll. J. VAN DER VOORT.

Stratigraphic range: Miocene: Langhian (from data collected by GATT (2006: 177–178) and from material deposited by Arie W. JANSSEN (1937–2021) in the NMNH) to the upper Serravallian (unpublished, ex coll. S. CARDONA). Non-locally, the chronologically and geographically wide-ranging species has been reported from all other chronostratigraphic units within the Miocene, namely: the Aquitanian of France; the late Burdigalian to the late Langhian of Belgium, the Netherlands, and Germany; and the Tortonian of southern Italy (GLIBERT, 1952; ANDERSON, 1964; JANSSEN, 1967, 1972, 1984; LOZOUET et al., 2001; WIENRICH, 2001; CARONE & ARDOVINI, 2008).

Remarks: The grammatical gender of *Cirsotrema* is neuter; consequently, the species name must be cited as *Cirsotrema crassicostatum*, and not *Cirsotrema crassicostata*. Citations as the latter in this paper are due to the author/s cited being quoted *verbatim*. The year of description for the species is often cited as 1939, although this is incorrect, for reasons elaborated upon by VAN DER VOORT (in press).
COWPER REED mentions one specimen of *C. crassicostata* var. *taurina* (NMNH/M216) and eight specimens of *C. crassicostata* var. *obliquata* (NMNH/M203–10); the specimens of both varieties are found in the collection in those exact numbers. The handwritten label of the specimen of *C. c.* var. *taurina* just reads '*Scalaria crassicostata* Desh.', without the varietal name (although interestingly, COWPER REED in BALDACCHINO (1939) erroneously attributes the species to BROCCHI, and not to DESHAYES). As for *C. crassicostata* var. *inequalis*, COWPER REED states that he examined '*four examples and a doubtful fifth*', agreeing with the number of specimens currently in the collection (NMNH/M211–15), although only three of these specimens bear his label (NMNH/M211–13). For this reason, and also due to the perceived doubtful nature of the fifth fossil, only the labelled three specimens are being regarded as syntypes, and the lectotype (NMNH/M211) has been selected from among them.
All three varieties fit within the intraspecific diversity expressed by the highly polymorphic *C. crassicostatum*, and therefore they may all be relegated to the voluminous synonymy of DESHAYES' species.

Cirsotrema duciei (Wright, 1855) (**Pl. 3 Figs. J–M**)

Scalaria Duciei WRIGHT, 1855: 274–275, pl. 7 figs. 3a, 3b.
Scalaria duciei – CARUANA *ex* MAMO, 1867: 41.
Scalaria ducei [*sic*] – ADAMS, 1870: 266.
Scalaria swanni ADAMS, 1870: 266, 271, pl. 10 fig. 9.
Scalaria Duciei Wright – FUCHS, 1876: 69.
Scalaria Duciei Wright – DE BOURY, 1891: 188.
Scalaria Duciei Wrigt. – DE GREGORIO, 1895: 8 [figs. incorrect].
Scalaria Ducei [*sic*] Wright – COOKE, 1896: 505, 510.
Cirsotrema Ducei [*sic*] – COOKE, 1896: 506.
Cirsotrema Swanni Adams – COOKE, 1896: 510.
Scalaria (*Cirsotrema*) *Duciei* Wright – COWPER REED *in* BALDACCHINO, 1939: 170.
Epitonium duciei – PEDLEY, 1976: 231 fig. 9.
Scalaria duciei – ZAMMIT-MAEMPEL, 1989: 195.
Scalaria swanni Adams – ZAMMIT-MAEMPEL, 1989: 195.
Cirsotrema ducei [*sic*] (Wright, 1855) – GATT, 2006: 176–177, 177 fig. [unn.].



Pl. 2 Figs. A–N: *Cirsotrema crassicostatum* (Deshayes, 1850) from the Langhian Upper Globigerina Limestone Formation of Malta. The measurements indicate the height. **A**: Paralectotype I of *Scalaria crassicostata* var. *obliquata* Cowper Reed *in* Baldacchino, 1939, NMNH/M205, 24.1 mm. **B**: Paralectotype II of *S. c.* var. *obliquata,*

NMNH/M204, 27.6 mm. **C**: Paralectotype III of *S. c.* var. *obliquata*, NMNH/M206, 26.1 mm. **D**: Presently designated lectotype of *S. c.* var. *obliquata*, NMNH/M203, 27.8 mm. **E**: Paralectotype IV of *S. c.* var. *obliquata*, NMNH/M207, 33.8 mm. **F**: Presently designated lectotype of *Scalaria crassicostata* var. *inequalis* Cowper Reed *in* Baldacchino, 1939, NMNH/M211, 27.5 mm. **G**: Paralectotype V of *S. c.* var. *obliquata*, NMNH/M208, 31.8 mm. **H**: Paralectotype I of *S. c.* var. *inequalis*, NMNH/M212, 25.8 mm. **I**: NMNH/M215, 33.5 mm. **J**: Paralectotype VI of *S. c.* var. *obliquata*, NMNH/M209, 23 mm. **K**: Paralectotype II of *S. c.* var. *inequalis,* NMNH/M213, 25.2 mm. **L**: NMNH/M214, 20.6 mm. **M**: Paralectotype VII of *S. c.* var. *obliquata*, NMNH/M210, 46 mm. **N**: NMNH/M216, 39.7 mm.

Material studied:
MALTA • 4 sh.*;* '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939 or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/217–20; NMNH • 1 sh.; Kalanka, Delimara; Upper Globigerina Limestone Formation; Miocene (Langhian); 26 Feb. 2014; S. CARDONA leg.; coll. S. CARDONA • 1 sh.; Qala, Għawdex; 36°01'37"N 14°18'19"E; Upper Globigerina Limestone Formation; c. 1 m above phosphorite hardground; Miocene (Langhian); 22 Feb. 2024; A. BOCHA leg.; NMNH.

Stratigraphic range: Miocene: Langhian to lower Tortonian (from data collected by PEDLEY (1976: 231 fig. 9) and GATT (2006: 176)). Finds of this species seem to be restricted to the Maltese archipelago. The material studied at present is exclusively Langhian.

Remarks: COWPER REED states that he examined three specimens, although four are present in the collection. As stated in the introduction, it is safe to assume that the single specimen out of these without COWPER REED's handwritten label (**Pl. 3 Fig. M**) is the one excluded from the series he examined. Furthermore, this fourth specimen was set into a customized cottonwool support, an artifact not met with anywhere else within the collection.
WRIGHT named this species after Henry John REYNOLDS-MORETON, third EARL OF DUCIE (1827–1921) and cartographer of Malta (DUCIE, 1854); therefore, the spelling '*ducei*' is incorrect.
ADAMS' illustration of *Scalaria swanni* (1870) seems to be the same as fig. 3b in WRIGHT's description of *Scalaria Duciei*, except for the superfluous addition of a protoconch, likely for aesthetic reasons (FUCHS, 1876). There is no description of *S. swanni*, nor any designation of types associated with it. In any case, this taxon must be regarded as a junior subjective synonym of *C. duciei*. The taxon *Cirsotrema duciei* var. *crassicostanomala* Sacco, 1891, described from the Italian mid-Miocene, is a separate and unrelated species (HARZHAUSER et al., 2014). In DOLLFUS et al. (1904), *C. duciei* is listed as a synonym of *C. crassicostatum* (p. 11 sub *Scalaria crassicostata* Deshayes), although the present author disagrees with that assessment on the basis of adequately divergent morphologies (compare **Pl. 2 Figs. A–N** to **Pl. 3 Figs. J–M**).

Sthenorytis Conrad, 1863
(type species by subsequent designation: *Scalaria expansa* Conrad, 1862)

Sthenorytis garigor nom. nov. pro ***Scalaria melitensis*** Cowper Reed *in* Baldacchino, 1939 *non* Fuchs, 1876 (**Pl. 3 Figs. A–I**)
urn:lsid:zoobank.org:act:61A49F42-3F93-4275-A701-08E3A644FCD3

? *Scalaria retusa* Brocchi – FORBES *in* SPRATT, 1843: 230, 231.
? *Scalaria retusa* Brocchi – CARUANA *ex* MAMO, 1867: 41.
? *Scalaria retusa* – ADAMS, 1870: 266.
Scalaria retusa Brocc. – DE GREGORIO, 1895: 8, pl. 2 figs. 9a–c. [non *retusus* Brocchi, 1814]
? *Scalaria retusa* – COOKE, 1896: 505.
? *Cirsotrema retusa* – COOKE, 1896: 506, 510.
Scalaria (*Stenorhytis*) [*sic*] *melitensis* COWPER REED *in* BALDACCHINO, 1939: 169–170. [*non melitensis* Fuchs, 1876]
Sthenorytis melitensis Reed, 1939 – GATT, 2006: 180–181, 180 fig. [unn.].

Type material studied:
MALTA • **lectotype** of '*Scalaria* (*Stenorhytis*) *melitensis* Cowper Reed *in* BALDACCHINO, 1939' (**established herein**); '*Globigerina Limestone*' [Upper Globigerina Limestone Formation]; 1939

or before; Miocene (Langhian); ex coll. J.G. BALDACCHINO; NMNH/M200; NMNH • **2 paralectotypes** of '*S.* (*S.*) *melitensis*'; data as previous; NMNH/M201–02; NMNH.

Stratigraphic range: Miocene: Langhian to Tortonian (from data collected by GATT (2006: 180); FORBES *in* SPRATT (1843: 230), who mentions specimens (as *Scalaria retusa*) from '*Bed B*', corresponding to the Greensands Formation [*Rina*], a deposit of lower Tortonian age; and DE GREGORIO (1895: 8), who mentions specimens (as *Scalaria retusa*) from a '*calcaire jaunâtre friable et léger*', corresponding to the Globigerina Limestone Formation, and from '*une espèce de grès rougeâtr*', corresponding to the Greensands Formation). Finds of this species seem to be restricted to the Maltese archipelago. The material studied at present is exclusively Langhian.

Original description: '*Shell trochiform, of few whorls, apical angle about 60°. Whorls tubular, rather loosely coiled, increasing slowly in size, cylindrical in cross section, bearing equidistant transverse lamellae corresponding but not in direct line on successive whorls; sutures rather deeply sunken; sutural angle about 75°. Lamellar costae crossing whorls at regularly decreasing intervals from mouth to apex, strong, prominent, sharp, plate-like, concavo-convex with the convexity on oral side, composed of several thin shelly layers; free edge of lamellae irregularly and weakly crenulated, with one deeper broader marginal crenulation near the upper (sutural) end forming a blunt spine; particularly developed on that lamella which forms the outer lip of the mouth; upper ends of successive lamellae bent back along the suture and fused with base of corresponding lamellae on next upper whorl; interspaces between lamellae flattened or slightly concave, curving up into aboral face of the lamellae and crossed by transverse equidistant lines, usually alternately strong and weak passing up with diminished strength on to the concave face of the lamellae. Mouth projecting laterally, circular, with broad thickened inner lip reflexed on basal whorl and thick outer lip formed chiefly by first transverse lamella; 8-10 lamellae present on basal whorl, 10-12 on next whorl, successively more closely placed, and corresponding with those on basal whorl but curved forward at base and overlapping them.*' (BALDACCHINO, 1939: 169).

Remarks: *Stenorhytis* Cossmann, 1912 is an unjustified emendation of *Sthenorytis* Conrad, 1863. The large number of nominal taxa assigned to genus *Sthenorytis* may be a consequence of high intraspecific variability misinterpreted as speciation (SACCO, 1891: 34), although rapid speciation accelerated by the animals' strict niche requirements and host-specific interactions is also plausible (LANDAU et al., 2006; SCHNEIDER et al., 2009). The latter view is adopted in the present research, thoroughly supported by the ample morphological and stratigraphic data discussed further below. The validity of this taxon is thus confirmed.

Unfortunately, however, *Scalaria melitensis* Cowper Reed *in* Baldacchino, 1939 is primarily homonymous with *Scalaria melitensis* Fuchs, 1876 (68, pl. 1 fig. 4), a Serravallian '*minute form*' (COOKE, 1896: 503) found in the Blue Clay Formation [*Tafal*] and at present assigned to *Cirsotrema* Mörch, 1852 (see GATT, 2006). COWPER REED assigned his species to the subgenus *Scalaria* (*Stenorhytis*) [*sic*], but original subgeneric placement is irrelevant according to ICZN Art. 57.4. Together with the absence of junior synonyms for the 1939 taxon, this necessitates the proposal of a replacement name: *Sthenorytis garigor* nom. nov. Requirements for reversal of precedence according to ICZN Art. 23.9 are not met.

As noted in the original description, all three specimens of *S. garigor* are imperfect, lacking the upper whorls to varying degrees. The specimen selected as lectotype of *S. garigor* (NMNH/M200) is the most complete. This integrity of this specimen is also noted in the paper by BALDACCHINO (1939).

DE GREGORIO (1895) seems to have been the first to illustrate *S. garigor* (1895: 8, pl. 2 figs. 9a–c), although it is therein classified as *Scalaria retusa* Brocchi (currently *Sthenorytis retusus* Brocchi, 1814). His illustration of a Maltese specimen is not of optimal quality, although it does show the more numerous costae (and therefore the shorter intercostal spaces) that differentiate *S. garigor* from *S. retusus*, on which the costae are situated further apart. Any type specimens corresponding to BROCCHI's (1814) original description of *S. retusus* are lost (MANGANELLI et al., 2011), but a

Pl. 3 Figs. A–M: Epitoniidae from the Langhian Upper Globigerina Limestone Formation of Malta: *Sthenorytis garigor* nom. nov. and *Cirsotrema duciei* (Wright, 1855). **A–C**: Presently designated lectotype of *Scalaria* (*Stenorhytis*) *melitensis* Cowper Reed *in* Baldacchino, 1939 (NMNH/M200); apertural, lateral, and ventral views;

diameter 24 mm. **D**–**F**: Paralectotype I of *Scalaria* (*Stenorhytis*) *melitensis* Cowper Reed *in* Baldacchino, 1939, NMNH/M201; apertural, lateral, and ventral views; diameter 25.9 mm. **G**–**I**: Paralectotype II of *Scalaria* (*Stenorhytis*) *melitensis* Cowper Reed *in* Baldacchino, 1939, NMNH/M202; apertural, lateral, and ventral views; diameter 27.5 mm. **J**–**M**: *Cirsotrema duciei* (Wright, 1855). The measurements indicate the height. **J**: NMNH/M217, 30.3 mm. **K**: NMNH/M218, 26.1 mm. **L**: NMNH/M219, 32.6 mm. **M**: NMNH/M220, 36 mm.

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topotype is illustrated by DE BOURY (1890: pl. 4, fig. 15), while photographs of a typical specimen may be found in STRAUSZ (1966: pl. 13, fig. 16). DE BOURY (1891) remarked that *S. retusus* is reminiscent of an octahedron, on account of the eight regular costae on the body whorl; whereas all type specimens of *S. garigor* possess nine ('*eight to ten*' according to the original description). In addition, DE BOURY (1891) noticed a maximum basal diameter of 20 mm for *S. retusus*, and an unusual absence of transverse striae on the interspaces between its costae, although this is contradicted by STRAUSZ (1966), who also sets a diameter of between 22 to 26 mm. The type specimens of *S. garigor* measure between ~24 to ~28 mm in diameter, and consistently feature numerous, fine, but clearly defined transverse striae on each intercostal surface, many of which extend onto the concave side of the corresponding costa. Costae in *S. retusus* are flatter and less elevated. Whorls of *S. garigor* are rounder in cross section, spiral less tightly, and widen more slowly, also resulting in deeper sutures. The aperture is oriented more obliquely in *S. garigor*.

Morphological characteristics aside, DE BOURY (1912) attributes an Aquitanian age to *S. retusus*, while SACCO (1890) a 'Helvetian' one. The latter is an obsolete term usually indicating a period roughly contemporary to the Serravallian (see LIRER & IACCARINO, 2011), although HARZHAUSER et al. (2003) demonstrate that SACCO (1890) was actually misinterpreting a stratum of late Burdigalian deposition. This indicates that *S. retusus* is of slightly older age than, and conceivably ancestral to, *S. garigor*. No verified specimens from Malta of *S. retusus* could be traced during the studies leading to the present paper. It is highly likely that all bibliographic citations of *S. retusus* from Malta are actually referable to *S. garigor*, as in the case of DE GREGORIO (1895).

By far, the species of *Sthenorytis* morphologically closest to *S. garigor* is a Pliocene entity: *Sthenorytis trochiformis* (Brocchi, 1814), the neotype of which is similar to *S. garigor* by way of size, profile, number of costae, and distinct transversal sculpture (see CHIRLI, 2009; MANGANELLI et al., 2011). It differs by way of its thicker, more elevated, and more concavo-convex costae, which together attain a higher degree of fusion as they approach the umbilical region, almost fully concealing the intercostal spaces, whereas clear grooves between the costae are discernible in *S. garigor*. Another Pliocene species, *Sthenorytis globosa* De Boury, 1891, is smaller, with lower, thinner and more numerous costae. In any case, no post-Messinian marine deposits are to be found in Malta, with the exception of a small outlier from the mid-Pleistocene (PEDLEY, 2011).

The original description of *S. garigor* also includes comparisons with *Sthenorytis retuspina* De Gregorio, 1889. This is a Tortonian species with a body whorl that is broader than that of *S. garigor*. Its whorls increase rapidly towards the peristome, which is less rounded, with a columellar edge that rests on a basal callus separating it from the external surface of the body whorl (SACCO, 1891). Finally, the upper Burdigalian *Sthenorytis proglobosa* Sacco, 1890 is more elongated, and also has finer costae in a greater quantity (up to 15) on the body whorl (SCHNEIDER et al., 2009).

So far, it seems that *S. garigor* is endemic to the Maltese Langhian, a distinction shared with other deep-sea taxa, such as the gastropods *Carinaria maempeli* Janssen, 2012 and *Clio tripartita* Janssen, 2012 (JANSSEN, 2012a; 2012b) and the cirripedes *Trilasmis melitense* Withers, 1953 and *Scalpellum lovisatoi* de Alessandri, 1895 (GATT, 2006).

Etymology: The Maltese word *garigor* indicates a spiral stone staircase, essentially a transliteration of the German *Wendeltreppe* or the Greek derivation *Gyroscala* de Boury, 1887. It was applied by MIFSUD (in SULTANA & FALZON [eds.], 1995: 174) as the vernacular Maltese name of *Gyroscala lamellosa* (Lamarck, 1822).

ACKNOWLEDGEMENTS

The author is greatly indebted to Andrea NAPPO (Ħamrun, Malta), who kindly photographed the specimens, prepared plates 2 and 3, and critically read an earlier version of the manuscript. John J. BORG (NMNH) and Sharon SULTANA (NMA) facilitated access to Heritage Malta archival material for bibliographic research, and Charlotte BIRKETT and Kathryn ROOKE (Library and Archives of the Natural History Museum, London, England) made available biographical data on F.R. COWPER REED, together with samples of his handwriting. Luigi ROMANI (Muséum national d'Histoire naturelle, Paris, France) and Jaap VAN DER VOORT (Ostercappeln, Germany) critically read an earlier version of the manuscript and suggested improvements, and the latter permitted comparison with specimens from his collection. Stephen CARDONA (Mqabba, Malta) loaned material for examination and comparison. Antoni BOCHA (Pietà, Malta) donated a specimen of *C. duciei* to the NMNH. Philippe BOUCHET (Muséum national d'Histoire naturelle, Paris, France) advised on nomenclature, and James LICARI (Heritage Malta) advised on calligraphy.

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UPDATES TO THE MARINE MALACOFAUNA (MOLLUSCA: GASTROPODA) OF MALTA

Charles CACHIA [2]

ABSTRACT

Seven species of marine gastropods, namely *Melanella praecurta* (Pallary, 1904), *Entoconcha mirabilis* Müller, 1852, *Alvania asperula* (Brugnone, 1880), *Alvania peloritana* (Aradas & Benoit, 1874), *Trophonopsis sparacioi* Smriglio, Mariottini & Di Giulio, 2015, *Conus vayssierei* Pallary, 1906, and *Raphitoma mirabilis* (Pallary, 1904), are newly recorded for Maltese waters, while *Alvania subareolata* (Monterosato, 1869) and *Trophonopsis barvicensis* (Johnson, 1825) are excluded from the local fauna. In addition, a review of recent publications (i.e. after 2019) that include new records and / or references to marine molluscs of Malta is compiled.

Keywords: new records, Maltese archipelago

SINTEŻI

[Aġġornamenti għall-malakofawna tal-baħar (Mollusca: Gastropoda) ta' Malta.] Seba' speċi ta' gastropodi tal-baħar, iġifieri *Melanella praecurta* (Pallary, 1904), *Entoconcha mirabilis* Müller, 1852, *Alvania asperula* (Brugnone, 1880), *Alvania peloritana* (Aradas & Benoit, 1874), *Trophonopsis sparacioi* Smriglio, Mariottini & Di Giulio, 2015, *Conus vayssierei* Pallary, 1906, u *Raphitoma mirabilis* (Pallary, 1904), qegħdin jiġu rreġistrati minn ibħra Maltin għall-ewwel darba, filwaqt li *Alvania subareolata* (Monterosato, 1869) u *Trophonopsis barvicensis* (Johnson, 1825) huma esklużi mill-fawna lokali. Barra minn hekk, qiegħda tingħata reviżjoni ta' pubblikazzjonijiet reċenti (i.e. wara l-2019) li jinkludu reġistrazzjonijiet ġodda u / jew referenzi għall-molluski tal-baħar ta' Malta.

Kliem muftieħ: reġistrazzjonijiet ġodda, l-arċipelagu Malti

INTRODUCTION

Checklists of the marine mollusc species inhabiting Maltese waters have been long been presented by malacologists, starting with Giuseppe MAMO (1793-1865) (see CARUANA, 1867). Especially in earlier works (e.g. CARUANA, 1867; CARUANA-GATTO & DESPOTT, 1919a; 1919b; DESPOTT, 1919), the emphasis was on the littoral inhabitants, but, more recently, deeper water species have been sampled and brought to light (CACHIA et al., 1991; 1996; 2001; 2004). Periodic updates to these lists are necessary, so that a more complete picture of the local species may emerge. The most recent comprehensive work that gives a complete record of all species hitherto recorded from Maltese waters is that given by CACHIA et al. (2019). The present paper provides new records of gastropods recently encountered by the author, as well an overview of species newly recorded and / or discussed in publications issued after CACHIA et al. (2019) (i.e. SCAPEROTTA et al., 2022; CACHIA, 2023; GIANNUZZI-SAVELLI et al., 2023; MIFSUD, 2023; TISSELLI & MICALI, 2023; CILIA et al., 2024; and NAPPO et al., 2024). Most of the discussed species were taken in single specimens, owing to their rarity (due to various reasons) in Maltese waters.

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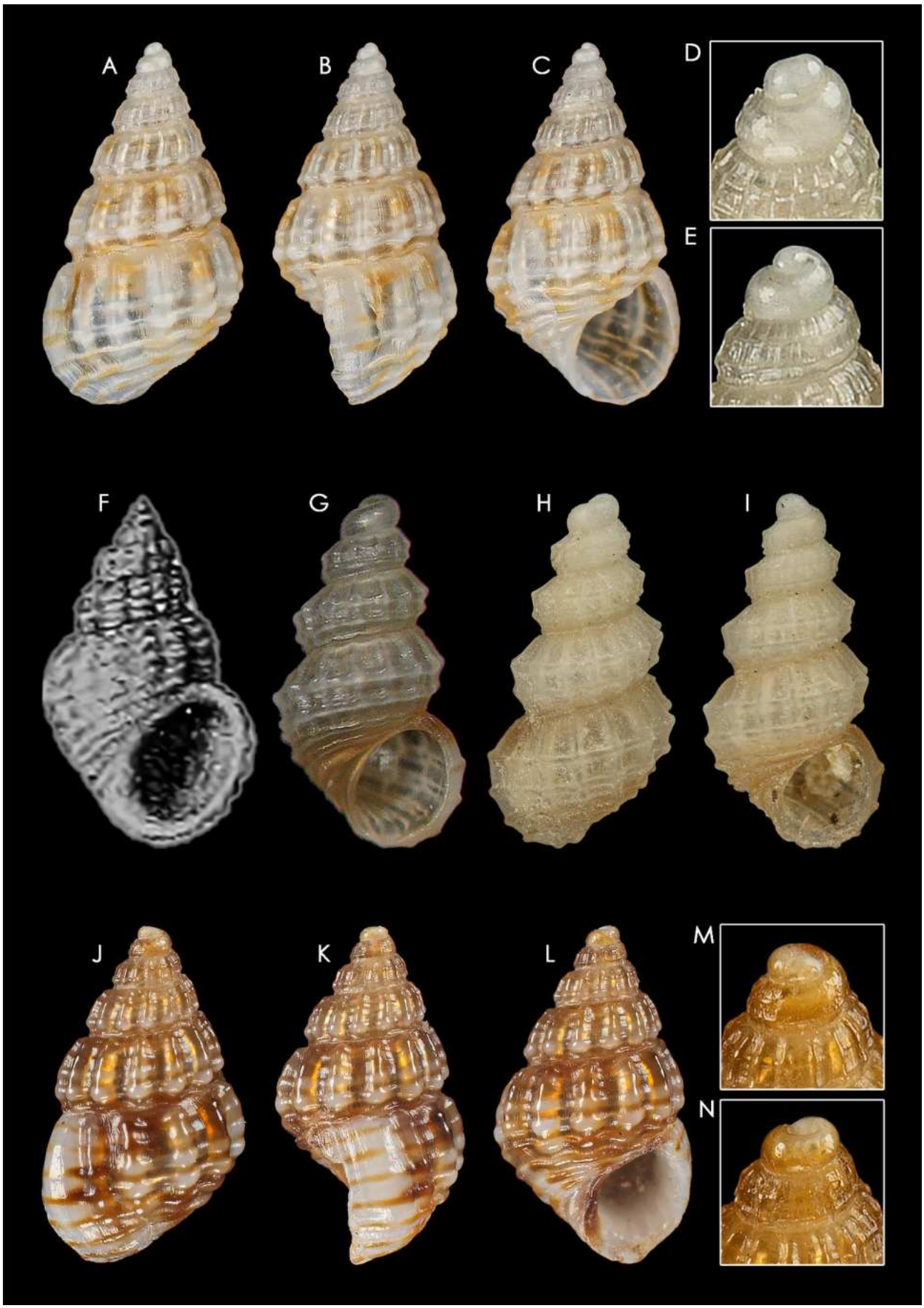
Submitted **08 Feb. 2024**; accepted **08 Apr. 2024**.



Pl. 1 Figs. A–N: Some of the marine gastropods discussed in the present work. **A–E**: *Alvania asperula* (Brugnone, 1880); Birżebbuġa, at sea level; height of 3.16 mm. **F**: *Alvania asperula* (Brugnone, 1880). Original drawing of *Rissoa* (*Alvania*) *asperula* by BRUGNONE (1880: pl. 1 fig. 17). **G**: *Alvania skylla* Tisselli & Micali, 2023. Holotype in Muséum

national d'Histoire naturelle, Paris, France. **H–I**: *Alvania skylla* Tisselli & Micali, 2023; Ras ir-Reqqa, at 45 m depth; height of 2.06 mm. **J–N**: *Alvania peloritana* (Aradas & Benoit, 1874); Birżebbuġa, at sea level; height of 3.11 mm.

MATERIALS AND METHODS

All material inspected for this paper originated from detritus, whether collected by hand from shallower waters or dredged from deeper locations as specified in the 'materials studied' sections. Larger species were handpicked from detritus. The rest was washed, filtered, and examined for smaller species. Shell measurements were taken using digital Vernier callipers. The species lists in the discussion section below are arranged systematically and not by order of pagination in the original publications.

Abbreviations:
CCC: collection of Charles CACHIA (Qormi, Malta)

SYSTEMATICS

Class Gastropoda Cuvier, 1795

Order Littorinimorpha Golikov & Starobogatov, 1975
Family Eulimidae Philippi, 1853
Melanella Bowdich, 1822

Melanella praecurta (Pallary, 1904) (**Pl. 2 Figs. D–G**)

Material studied:
MALTA • 13 shells; St. Paul's Bay, Salina; 2 to 4 m depth; Aug. 1985; C. CACHIA leg.; CCC, • 4 shells; Comino (Kemmuna); 45 m depth; Nov. 1996; C. CACHIA leg.; no. 431, CCC.

Remarks: New record for the Maltese archipelago.

Entoconcha Müller, 1852

Entoconcha mirabilis Müller, 1852 (**Pl. 2 Figs. A–C**)

Material studied:
MALTA • 2 shells; Mġarr, off Ġnejna Bay; 100 m depth; C. MIFSUD leg.; no. 1444, CCC.

Remarks: New record for the Maltese archipelago of this holothuroidean parasite (MÜLLER, 1852).

Family Rissoidae Gray, 1847
Alvania Risso, 1826

Alvania asperula (Brugnone, 1880) (**Pl. 1 Figs. A–F**)

Alvania discors (Allan, 1818) – CACHIA et al., 2019: 58 (and references therein). [*partim*]

Material studied:
MALTA • >30 shells; Birżebbuġa; at sea level (beached); Feb. 2022; C. CACHIA leg.; CCC • 4 shells; St. Paul's Bay, Salina; 2 to 4 m depth; Aug. 1993; C. CACHIA leg.; no. 1535, CCC.

Remarks: New record for the Maltese archipelago. At the time of writing, this taxon is listed as a junior synonym of *Alvania discors* (Allan, 1818) on MolluscaBase (https://www.molluscabase.org/; last accessed on 15 Feb. 2024), but in the author's opinion, *A. asperula* merits a full specific status, on account of its consistent pale yellow colour and two

protoconch whorls, as opposed to the two and a half protoconch whorls of *A. discors*, as well as a different height-to-diameter ratio, more convex whorls, and more numerous and thinner ribs.

Alvania peloritana (Aradas & Benoit, 1874) (**Pl. 1 Figs. J–N**)

> *Alvania discors* (Allan, 1818) – CACHIA et al., 2019: 58 (and references therein). [*partim*]

Material studied:
MALTA • several shells; Birżebbuġa; at sea level (beached); Feb. 2022; C. CACHIA leg.; no. 1536, CCC.

Remarks: As with with the preceding species, *A. peloritana* is similar to *A. discors*. However, the protoconch of *A. discors* is smooth, among other consistent morphological characteristics (VILLARI & SCUDERI, 2017). In the author's opinion, this species also merits full specific status. This taxon is accepted as valid by MolluscaBase as of the time of writing.

Order Neogastropoda Wenz, 1938
Family Muricidae Rafinesque,1815
Trophonopsis Bucquoy & Dautzenberg, 1882

Trophonopsis sparacioi Smriglio, Mariottini & Di Giulio, 2015 (**Pl. 2 Figs. O–S**)

> *Trophonopsis barvicensis* (Johnston, 1825) – CACHIA et al., 2019: 90 (and references therein). [non *barvicensis* Johnston]

Material studied:
MALTA • 11 shells; Mġarr, off Ġnejna Bay; 200 m depth; C. MIFSUD leg.; no. 460, CCC.

Remarks: This is the true identity of the *Trophonopsis barvicensis* (Johnson, 1825) and most records of *Trophonopsis muricatus* (Montagu, 1803) (except for FARRUGIA RANDON, 2011) recorded by earlier authors on Maltese malacofauna (see CACHIA et al., 1993; 2019 for a full list of references). This also means that *T. barvicensis* should be excluded from the Maltese malacofauna.

Family Conidae Fleming, 1822
Conus Linné, 1758

Conus vayssierei Pallary,1906 (**Pl. 2 Figs. H–J**)

Material studied:
MALTA • few shells; St. Paul's Bay, Salina; 2 to 4 m depth; Feb. 2022; C. CACHIA leg.; no. 1494, CCC • few shells; Birżebbuġa; at sea level (beached); Feb. 2022; C. CACHIA leg.; CCC.

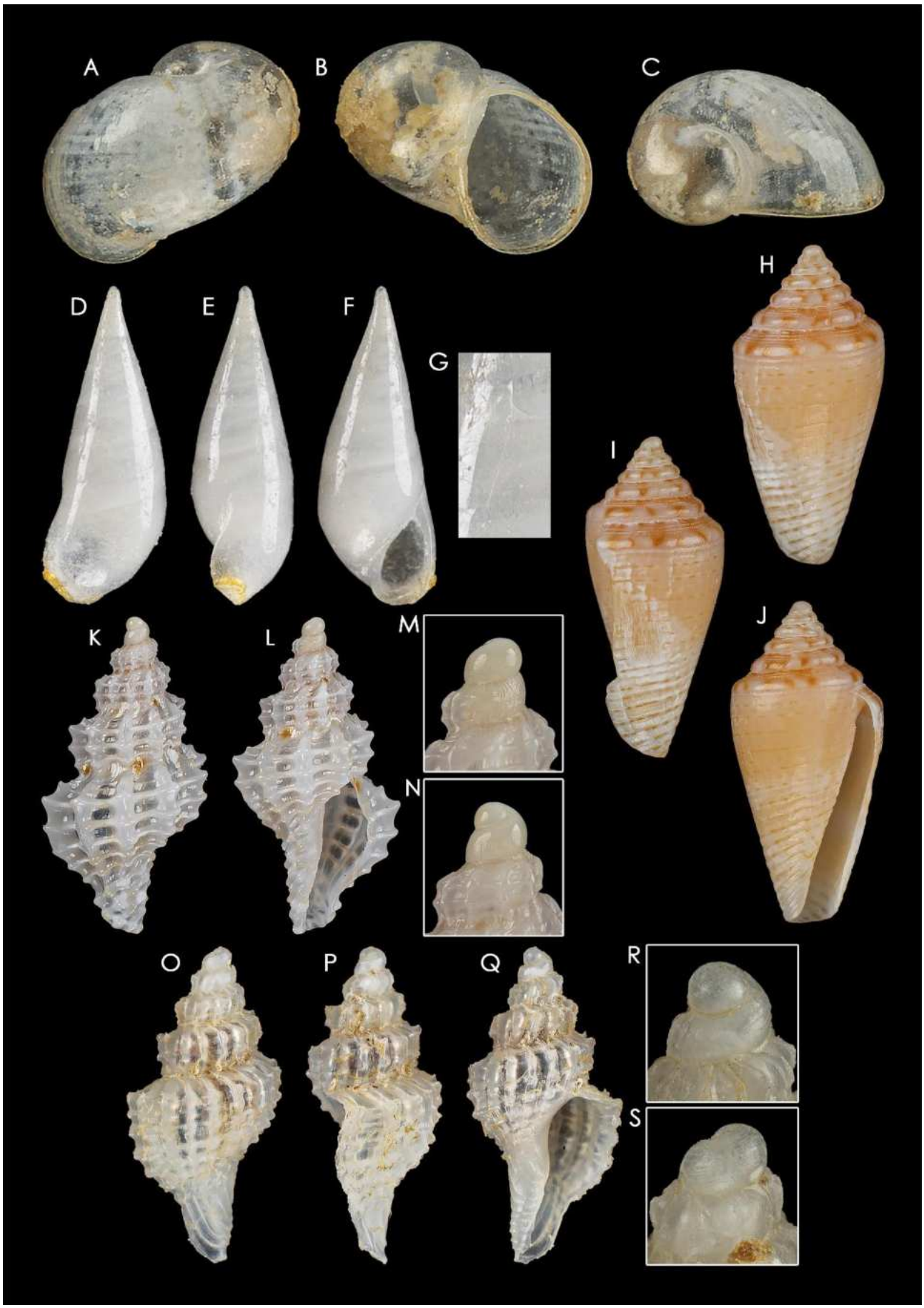
Remarks: New record for the Maltese archipelago. The taxon is considered valid following SCAPEROTTA et al. (2022).

Family Raphitomidae Bellardi, 1875
Raphitoma Bellardi, 1847

Raphitoma mirabilis (Pallary, 1904) (**Pl. 2 Figs. K–N**)

Material studied:
MALTA • 3 shells; St. Paul's Bay, Salina; 2 to 4 m depth; Aug. 1996; C. CACHIA leg.; no. 1362, CCC.

Remarks: New record for the Maltese archipelago.



Pl. 2 Figs. A–S: Some of the marine gastropods discussed in the present work. **A–C**: *Entoconcha mirabilis* Müller, 1852; Mġarr, off Ġnejna Bay; 100 m depth; diameter of 1.17 mm. **D–G**: *Melanella praecurta* (Pallary, 1904); Salina, at 2 to 4 m depth; height of 3.68 mm. **H–J**: *Conus vayssierei* Pallary, 1906; Salina, at 2 to 4 m depth; height of 9.1

mm. **K–N**: *Raphitoma mirabilis* (Pallary, 1904); Salina, at 2 to 4 m depth; height of 4.88 mm. **O–S**: *Trophonopsis sparacioi* Smriglio, Mariottini & Di Giulio, 2015; off Ġnejna Bay at 200 m depth; height of 4.78 mm.

DISCUSSION

Since CACHIA et al. (2019), other publications discussing elements of the Maltese malacofauna appeared. These include SCAPEROTTA et al. (2022), CACHIA (2023), GIANNUZZI-SAVELLI et al. (2023), MIFSUD (2023), TISSELLI & MICALI (2023), CILIA et al. (2024), NAPPO et al. (2024), and CILIA et al. (2024, in press).

In SCAPEROTTA et al. (2022: 128), one species is discussed for Malta, namely *Ondina michaelae* Cachia & Mifsud, 2015.

In CACHIA (2023), the species newly recorded for Malta include *Anatoma tenuisculpta* (Seguenza, 1880) (p. 15), *Tricolia punctura* (Gofas, 1993) (p. 15), *Tricolia tingitana* (Gofas, 1982) (p. 15), *Cerithium repandum* Monterosato, 1878 (p. 15), *Amaea retifera* (Dall, 1889) (p. 15), *Alvania rominae* Amati, Trono & Oliverio, 2020 (p. 14), *Peringiella eburnea* (Nordsieck, 1968) (p. 14), *Rissoa splendida* Eichwald, 1830 (p. 14), *Rissoa* cf. *gemmula* P.Fischer, 1869 (p. 14), *Pseudosimnia angusta* Celzard, 2017 (p. 15), *Tectonatica prietoi* (Hidalgo, 1873) (as *Natica prietoi* Hidalgo, 1873) (p. 14), *Gibberula oryza* (Lamarck,1822) (p. 14), *Fusiturris undatiruga* (Bivona & Bernardi, 1838) (p. 15), *Mangelia pontica* Milaschewitch, 1908 (as *Mangelia* cf. *brusinae* van Aartsen & Fehr-de Wal, 1978) (p. 15), *Mangelia secreta* (van Aartsen & Fehr-de Wal, 1978) (p. 15), *Raphitoma brunneofasciata* Pusateri, Giannuzzi-Savelli & Oliverio, 2013 (p. 15), *Turbonilla rosewateri* Corgan & van Aartsen, 1993 (p. 14), *Tomura rubiorolanorum* Romani & Sbrana, 2016 (p. 15), *Ondina crystallina* Locard, 1891 (p. 15), *Pyrgulina nana* Hornung & Mermod, 1924 (p. 15), and *Tellimya tenella* (Lovén, 1846) (p. 14).

In GIANNUZZI-SAVELLI et al. (2023), Maltese specimens of the following species, all previously recorded, are discussed: *Raphitoma alternans* (Monterosato, 1884) (p. 94), *Raphitoma pseudohystrix* (Sykes, 1906) (p. 132), *Leufroyia villaria* (Pusateri & Giannuzzi-Savelli, 2008) (p. 180), *Pleurotomella gibbera* Bouchet & Warén, 1980 (p. 188), *Mangelia striolata* Risso, 1826 (p. 208), *Mangelia unifasciata* (Deshayes, 1835) (p. 212), *Mangelia jerbaensis* Scarponi & Della Bella, 2010 (p. 236) (authorship as amended by NAPPO et al., 2024), *Pseudomangelia sicula* (Reeve, 1846) (p. 248), and *Mitromorpha olivoidea* (Cantraine, 1835) (p. 310).

MIFSUD (2023) describes a new species, namely *Alvania sabiha* Mifsud, 2023, based on three specimens from off Aħrax Point, from a depth of 60 to 70 m.

In TISSELLI & MICALI (2023), the new species *Alvania skylla* Tisselli & Micali, 2023 is described using specimens from various localities, including five shells from Malta. Until 2023, this new species had been recorded for Maltese waters as *Alvania subareolata* (Monterosato, 1869) (see CACHIA et al., 2019: 61 for a full list of references). The latter taxon, however, has to be excluded from the Maltese malacofauna, at least until typical specimens are found. Many specimens of *A. skylla* have been taken from off St. Paul's Bay, from off Ras ir-Reqqa at a depth of 45 m, and from stations off western Malta (**Pl. 1 Figs. G–I** in this paper).

In CILIA et al. (2024), one species is newly recorded for Malta, namely *Conomurex persicus* (Swainson, 1821).

In NAPPO et al. (2024), *Anatoma aspera* (Philippi, 1844) is excluded from the Maltese malacofauna, while the following species are newly recorded: *Sinezona semicostata* Burnay & Rolán, 1990 (p. 47), *Sinezona* sp. (p. 49), *Anatoma tenuisculpta* (Seguenza, 1880) (p. 51), *Opalia fusticulus* Gaglini, 1992 (p. 52), *Alvania aeoliae* Palazzi, 1988 (p. 55), *Alvania aliceae* Amati, 2014 (p. 55), *Alvania clathrella* Seguenza, 1903 (p. 55), *Alvania datchaensis* Amati & Oliverio, 1987 (p. 58), *Alvania hallgassi* Amati & Oliverio, 1985 (p. 58), *Pseudopusula problematica* (Schilder, 1931) (p. 60), *Trivia virginea* Fehse & Grego, 2021 (p. 62), *Chauvetia giunchiorum* Micali, 1999 (p. 62),

Pseudochileutomia carinata (de Folin, 1870) (p. 65), *Ebala gradata* (Monterosato, 1878) (p. 67), *Bacteridium macilentum* (Monterosato, 1878) (p. 67), *Cornirostra* sp. (p. 73), and *Isognomon bicolor* (Adams, 1845) (p. 75). The record of *Ebala pointeli* (de Folin, 1868) (p. 67) is preceded by others in the literature from CACHIA et al. (1993) onwards (see synonymy in CACHIA et al., 2019: 135). In addition, NAPPO et al. (2024) discuss the following: *Anatoma micalii* Geiger, 2012 (p. 49), *Epitonium striatissimum* (Monterosato, 1878) (p. 51), *Crisilla gaglinae* (Amati, 1985) (p. 58), *Megalomphalus petitianus* (Tiberi, 1868) (p. 60), *Tectonatica prietoi* (Hidalgo, 1873) (p. 62), *Mangelia jerbaensis* Scarponi & Della Bella, 2010 (p. 65), *Ondina crystallina* Locard, 1891 (p. 70), *Ondina michaelae* Cachia & Mifsud, 2015 (p. 71), *Pyrgulina nana* Hornung & Mermod, 1924 (p. 73), *Pyrgulina maiae* Hornung & Mermod, 1924 (p. 73), and *Tomura rubiorolanorum* Romani & Sbrana, 2016 (p. 75). By way of information, a second record of *Alvania hallgassi* Amati & Oliverio, 1985, based on a single fresh specimen from Birżebbuġa beach, is being documented in the present paper.

In this issue of the *Bulletin of the National Museum of Natural History, Malta*, CILIA et al. (in press) are presenting the first record of *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003.

CONCLUSION

The present update does not represent the last word regarding the complete picture of Maltese marine malacofauna. It is without doubt that future research will bring to light other new records.

ACKNOWLEDGEMENTS

Constantine MIFSUD (Rabat, Malta) donated specimens and data which was instrumental in the composition of the present paper. Photographs and plates were prepared by Andrea NAPPO (Ħamrun, Malta). David P. CILIA (National Museum of Natural History, Mdina, Malta) critically read and commented on an earlier version of the manuscript.

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A FIND OF *CORALLIOPHILA GUANCHA* SMRIGLIO, MARIOTTINI & ENGL, 2003 (GASTROPODA: MURICIDAE) IN MALTESE WATERS

David P. CILIA [3*], Andrea NAPPO [4], Stephen CARDONA [5]

ABSTRACT

The marine gastropod species *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003 is newly recorded for Maltese waters.

Keywords: Coralliophilinae, Maltese archipelago

SINTEŻI

[Sejba ta' *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003 f'ibħra Maltin.] L-ispeċi ta' gastropodu tal-baħar *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003 hija rreġistrata minn ibħra Maltin għall-ewwel darba.

Kliem muftieħ: Coralliophilinae, l-arċipelagu Malti

INTRODUCTION

The muricid neogastropod subfamily Coralliophilinae is represented in Maltese waters by ten species in four genera: *Babelomurex benoiti* (Tiberi, 1855), *B. cariniferus* (Sowerby I, 1834), *B. sentix* (Bayer, 1971), *B. tectumsinense* (Deshayes, 1856), *Coralliophila brevis* (Blainville, 1832), *C. meyendorffii* (Calcara, 1845), *C. panormitana* (Monterosato, 1869), *Emozamia richardi* (Fischer, 1882), and *Hirtomurex squamosus* (Bivona e Bernardi, 1838) (CACHIA et al., 2001, 2019; TAVIANI et al., 2009; classification following RUSSINI et al., 2023). The present report adds another species to this list, namely *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003, which was described from the Canary Islands (SMRIGLIO et al., 2003) and subsequently recorded from other Atlantic islands, as well as localities from the Strait of Gibraltar to the central Mediterranean (CROCETTA & SPANU, 2008; COSSIGNANI, 2009; VAZZANA, 2015; SMRIGLIO et al., 2023).

MATERIALS AND METHODS

One specimen of *C. guancha* was extracted from sediment retrieved from a depth of 44 m. This was obtained using a simple metal dredge attached to a sailboat and deployed off northwestern Malta. It was compared to other individuals of the same species from Sardinia (Italy) and a (Moroccan) topotype of *Coralliophila ahuiri* Cossignani, 2009, junior synonym of the present entity as suggested by CROCETTA *in* MONTESANTO et al. (2022) and confirmed by SMRIGLIO et al. (2023), as well as images in the literature, cited below in the chresonymy and synonymy. Photography was executed by means of Nikon D90 and Sony Alpha 7 II cameras with mounted macro lenses. The resulting images were processed and collated into a plate using Adobe Photoshop 2024®.

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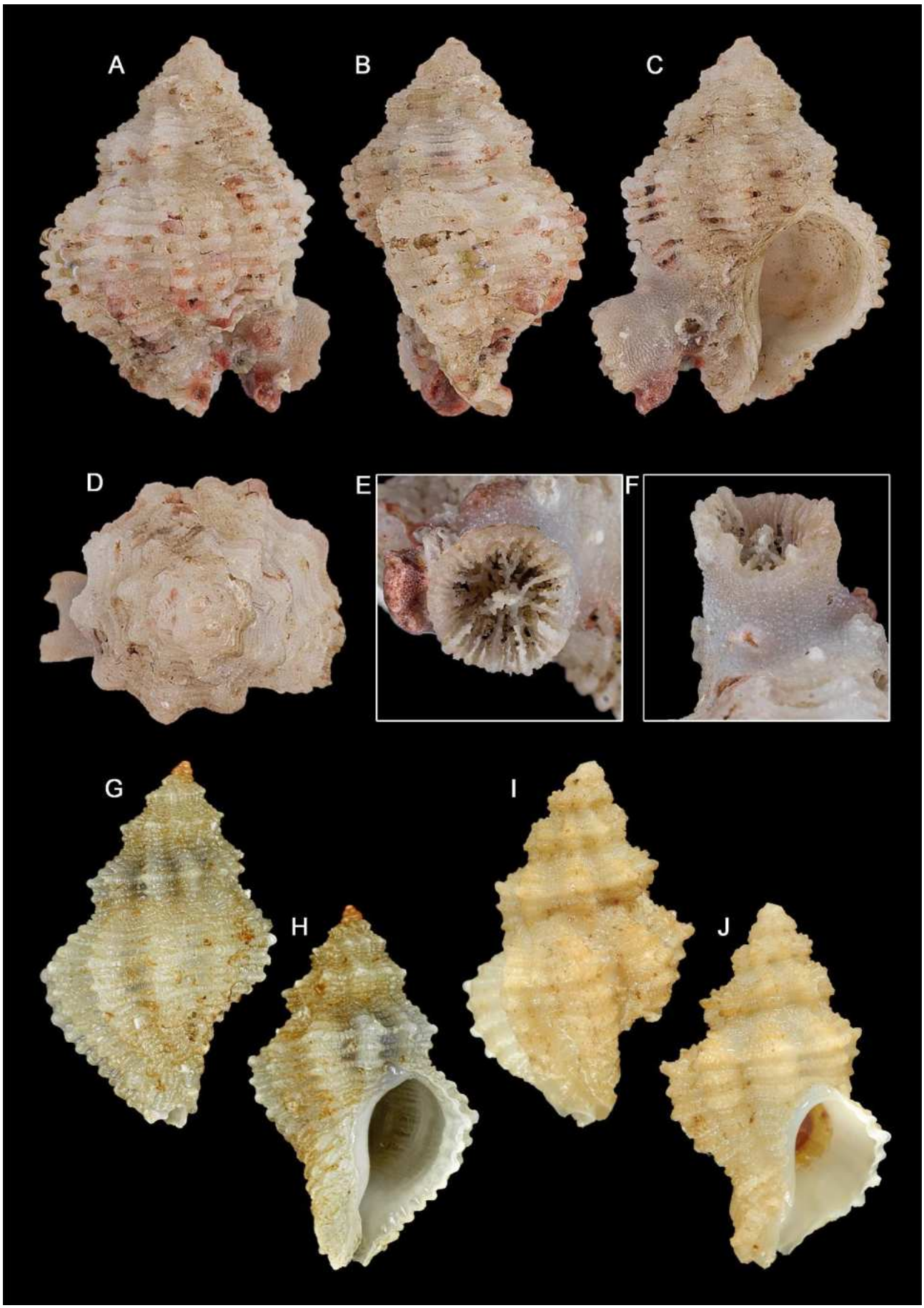
Submitted **01 Feb. 2024**; accepted **26 Mar. 2024**.



Pl. 1 Figs. A–J. *Coralliophila guancha* Smriglio, Mariottini & Engl, 2003 from Mediterranean locations. **A–D**: *C. guancha* from off Baħar iċ-Ċagħaq, Malta, 24 Jul. 2023; 14.2 mm. **E**, **F**: Caryophiliid coral attached to the Maltese

specimen of *C. guancha*. **G**, **H**: *C. guancha* from Strait of Gibraltar, Morocco; 12 mm. **I**, **J**: *C. guancha* from Fertilia, Italy; 20.8 mm.

SYSTEMATICS

Gastropoda Cuvier, 1795
Neogastropoda Wenz, 1938
Muricidae Rafinesque, 1815
Coralliophilinae Chenu, 1859
Coralliophila Adams & Adams, 1853
(type species by subsequent designation: *Murex neritoideus* Gmelin, 1791)

Coralliophila guancha Smriglio, Mariottini & Engl, 2003 (**Pl. 1 Figs. A–J**)

Coralliophila guancha SMRIGLIO et al., 2003: 39-42.
Coralliophila squamosa (Bivona Ant. in Bivona And., 1838) – CROCETTA & SPANU, 2008: 66 tab. 1, 71-72, figs. 2H, I. [non *squamosus* Bivona e Bernardi, 1838]
Coralliophila ahuiri COSSIGNANI, 2009: 14-15.
Coralliophila ahuiri Cossignani, 2009 – VAZZANA, 2015: 10, 11 figs. 3A-I.
Coralliophila ahuiri T. Cossignani, 2009 – CROCETTA *in* MONTESANTO et al., 2022: 974, 975 fig. 5.
Coralliophila guancha Smriglio, Mariottini et Engl, 2003 – SMRIGLIO et al., 2023: 707-711.

Material studied:
ITALY • 1 specimen; Sardegna, Alghero, Fertilia; 90 to 120 m depth, on *Corallium rubrum* (Linné, 1758); collection of A. NAPPO.
MALTA • 1 specimen; Naxxar, off Baħar iċ-Ċagħaq; 44 m depth; 24 Jul. 2023; A. NAPPO & L. CHIANESE leg.; collection of A. NAPPO.
MOROCCO • 1 specimen; Strait of Gibraltar (between Cape Malabata and Targa); 80 m depth; on *Corallium rubrum* (Linné, 1758); collection of A. NAPPO.

Remarks: The studied individual of *C. guancha*, representing the first record of the species in Maltese waters, measures 14.2 mm. It originates from a maerl bed with rhodoliths of *Lithothamnion corallioides* (P.L.Crouan & H.M.Crouan) P.L.Crouan & H.M.Crouan and *Phymatolithon calcareum* (Pallas) W.H.Adey & D.L.McKibbin. Other molluscs recovered from the same locality include gastropods, such as *Epitonium striatissimum* (Monterosato, 1878), *Philinissima denticulata* (J. Adams, 1800), and *Turbonilla grossa* (J. T. Marshall, 1894), and bivalves, such as *Flexopecten hyalinus* (Poli, 1795) and *Similipecten similis* (Laskey, 1811). An epibiotic caryophilliid coral individual and colonial encrusting bryozoans were observed (**Pl. 1 Figs. E, F**).

DISCUSSION

The depths at which this species is found seem to be rather variable, and several findings indicate symbiosis with coral, as in fact indicated by the generic epithet. CROCETTA & SPANU (2008) recovered this species from a biocoenosis associated with *Corallium rubrum* (Linné, 1758) at depths between 100 and 120 m, while SMRIGLIO et al. (2023) note an association with '*caryophyllid scleractinians*' at depths between 10 to 15 m. The present finding is from a depth similar to that reported in the type locality for the species (45 m), and an association with a caryophilliid as an epizoon, likely indicating a commensal or mutualistic relationship, was discerned.

The current find of *C. guancha* brings up the total number of coralliophilin species recorded from Maltese waters up to nine, and represents an addition to the totality of locally known (marine) molluscs listed by CACHIA et al. (1991; 1996; 2001; 2004; 2019), MIFSUD & CACHIA (2011), CACHIA (2023; in press), NAPPO et al. (2024), and CILIA et al. (2024).

ACKNOWLEDGEMENTS

Ludovico CHIANESE (Sliema, Malta) allowed use of his dredge and boat and assisted in sampling and Charles C. CACHIA (Qormi, Malta) commented on an earlier version of the manuscript.

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NOTE ON THE CORRECT YEAR OF PUBLICATION OF DESHAYES' *SCALARIA CRASSICOSTATA* (*CIRSOTREMA CRASSICOSTATUM*) (GASTROPODA: EPITONIIDAE), AND ITS PRECISE BIBLIOGRAPHIC REFERENCE

Jaap VAN DER VOORT [6]

ABSTRACT

The year of publication and bibliographic reference of *Scalaria crassicostata* has often been quoted incorrectly. It is herein concluded that the name was published in DESHAYES' *Traité élémentaire de conchyliologie avec les applications de cette science à la Géologie*, and that the correct year is 1850. It is also noted that assumed dates of publication of other species described by DESHAYES in the *Traité élémentaire* should be checked against the publication dates given by COX (1942).

Keywords: chresonymy, authorship, Miocene

SINTEŻI

[Nota dwar is-sena korretta tal-pubblikazzjoni minn Deshayes ta' *Scalaria crassicostata* (*Cirsotrema crassicostatum*) (Gastropoda: Epitoniidae), bir-referenza biblijografika preċiża.] Is-sena ta' pubblikazzjoni u r-referenza biblijografika ta' *Scalaria crassicostata* kemm-il darba ġew ikkwotati ħażin. Hawnhekk tintlaħaq il-konklużjoni li l-isem ġie ippublikat fit-*Traité élémentaire de conchyliologie avec les applications de cette science à la Géologie* ta' DESHAYES, u li s-sena korretta hija 1850. Is-snin preżunti ta' speċi oħrajn li ddeskriva DESHAYES fit- *Traité élémentaire* għandhom jiġu mqabblin mad-dati mogħtija minn COX (1942).

Kliem muftieħ: krożonimija, awtorità, Mijoċenu

INTRODUCTION

The epitoniid species *Cirsotrema crassicostatum* was originally described by Gérard Paul DESHAYES (**Pl. 1 Fig. G**) under the name *Scalaria crassicostata*. There is no doubt whatsoever about this fact, but there is a great degree of confusion about the exact year of publication (cited by various authors anywhere between 1839 and 1858), and about the exact publication in which the new species was validly described.

MATERIALS AND METHODS

The compilation of a chresonymy for *Scalaria crassicostata* from 1839 onwards (reproduced in this paper) resulted in an array of dates and references, only one of which can be correct. In this chresonymy, the quoted date of publication is given first, followed by the species name and quoted author, and (if applicable) a further reference to the record.

Symbols and abbreviations:
°: references only mentioned somewhere in a text or in a table;
*: references found only in synonym or chresonym lists;
ICZN: International Commission for Zoological Nomenclature.

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RESULTS

So far, the following references referring to *crassicostatum/crassicostata* were found, irrespective of having been attributed generically to *Cirsotrema* Mörch, 1852, *Scalaria* Lamarck, 1801, or *Scala* Mörch, 1852. This overview encompasses publications in which the taxon was either described systematically or publications which, at least, contain a mention in a text, a table, or a plate explanation.

The presence in the list below does not mean that the reference as such is correct, nor that these authors also included these publications in their literature reference lists, if such a bibliography was provided at all.

Finally, this reference list does not include possible synonyms under different species names as listed by various authors.

All references to synonym lists are represented *verbatim* as published by the author.

*1839 *Scalaria crassicostata* – Deshayes, Bull. Soc. Geol. France, 11: 76.
Reference in synonym list in ANDERSON (1964) with an asterisk indicating: '*die für den Namen er Art maßgebende Originalveröffentlichung*' [*the original publication relevant for the name of the taxon*].

*1839 *Scalaria crassicostata* Desh. *B.S.G.F.* t. XI, p.76.
Reference in synonym list COSSMANN & PEYROT (1922).

*1839 *Scalaria crassicostata* – Deshayes *in* de Verneuil, Bull. Soc. Géol. de France, XI, p. 76, Note Pliocène algérien.
Reference in synonym list DOLLFUS et al. (1904).

*1839 *Scalaria crassicostata* – Deshayes, Traité élément. Conchyl. Atlas, pl. 70, fig. 1–3 (*bene*).
Reference in synonym list DOLLFUS et al. (1904).

°1839 *Scalaria crassicostata* – Deshayes, Traité élém. Conch. Tome 2, p. 41.
Text section in CARONE & ARDOVINI (2008: 617) with wrong p. 41 instead of p. 42.

*1839 *Scalaria crassicostata* Deshayes in Verneuil : 76 (nom. nudum).
Reference in synonym list LOZOUET et al. (2001).

*1840 *Scalaria crassicostata* – Deshayes, Traité élém. Conch. pl. LXX, fig. 1–2.
Reference in synonym list COSSMANN & PEYROT (1922) and copied by ANDERSON (1964) in his synonym list. However, no part of the *Traité* was published in 1840. (Possibly *lapsus calami* in COSSMANN & PEYROT (1922) for the correct year 1850?).

*1840 *Scalaria crassicosta* [*sic*] Desh. 1839, Bull. Soc. Geol. France Tome XI, p. 76 et Atlas du Traité élém. Conch. pl. 70, fig. 1,2,3.
Reference in synonym list BENOIST (1873).

°1844 *Scalaria crassicosta* [*sic*] DESH. – DE VERNEUIL *in* LEONHARD & BRONN (p. 218).

°1850 *Cirsotrema crassicostatum* (Deshayes, 1850). Text reference and fig. in DUERR (2004).

°1852 *Scalaria crassicostata* Desh. – D'ORBIGNY (p. 30, reference nr. 396 in species list).

*1853 *Scalaria crassicostata* Deshayes - Deshayes : pl. 70, figs 1-3.
Reference in synonym list LOZOUET et al. (2001).

°1873 *Scalaria crassicosta* [*sic*] Desh. 1839 – BENOIST (p. 283).

*1874 *Scalaria crassicostata* Desh. Benoist, Cat. Syn. Test. fossiles, p. 99.
Reference in synonym list DOLLFUS [PEREIRA DA COSTA] with incorrect year 1874 instead of 1873.

1891 *Cirsotrema crassicostatum* (Desh.) – SACCO (p. 45).

1895 *Scalaria* (*Cirsotrema*) Cf. *crassicostata* Deshayes – DEGRANGE-TOUZIN (p. 315).

°1896 *Cirsotrema crassicostatum* Deshayes – COOKE (p. 510).

°1896 *Cirsotrema crassicostatum* Deshayes var. – COOKE (p. 510).

1904 *Scalaria crassicostata* Deshayes – DOLLFUS [PEREIRA DA COSTA] (p. 11, pl. XXXIII figs. 16a, 16b).

°1912 *Sc. crassicostata* Desh. – COSSMANN (p. 52, pl. III figs. 1–3).

°1912 *Cirsotrema crassicostatum* Desh. – COSSMANN (p. 179, pl. III figs 1–3).

1922 *Cirsotrema crassicostatum* Desh. – COSSMANN & PEYROT (pp. 151–153, pl. 4 figs 79, 80, 85, 97, 98).
1925 *Cirsotrema crassicostatum* Desm. [sic] – KAUTSKY (p. 80, pl. 7 fig. 1).
1952 *Scala* (*Cirsotrema*) *crassicostata* Deshayes, sp. 1839 – GLIBERT (pp. 40–42, pl. 3 figs. 8a–d).
1964 *Cirsotrema* (*Cirsotrema*) *crassicostatum* (Deshayes 1839) – ANDERSON (p. 217, pl. 16 fig. 137.
1967 *Cirsotrema* (*Cirsotrema*) *crassicostatum* – JANSSEN (p. 141).
°1972 *Cirsotrema* (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – JANSSEN (p. 9).
1984 *Cirsotrema* (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – JANSSEN (p. 166, pl. 50 fig. 15).
2001 *Cirsotrema* (*Cirsotrema*) *crassicostatum* (Deshayes, 1839) – WIENRICH (p. 450, pl. 73 figs 1-3, pl. 91 fig. 7).
2001 *Cirsotrema crassicostatum* (Deshayes, 1853) – LOZOUET et al. (p. 51, pl. 19 fig. 6).
2002 *Cirsotrema* aff. *crassicostatum* (Deshayes,1839) – HARZHAUSER (pp. 65, 93, pl.12 fig. 6).
2004 *Cirsotrema crassicostatum* (Deshayes, 1850) – DUERR (pp. 152, 155, fig. 10).
2008 *Cirsotrema crassicostata* (Deshayes, 1839) – CARONE & ARDOVINI (pp. 609–620, 611 fig. 1 [map], 612 fig. 2 [diagram], 613 fig. 3, 616 fig. 4, 616 tab. 1, 614 pl. 1, 615 pl. 2).
°2012 *Cirsotrema crassicostatum* (Deshayes, 1839) – JANSSEN (pp. 218, 224, 226, 234).
°2012 *Cirsotrema crassicostata* (Deshayes, 1839) – JANSSEN (p. 514).
°2014 *Cirsotrema crassicostatum* (Deshayes, 1853) – HARZHAUSER et al. (p. 93).

DISCUSSION & CONCLUSIONS

A closer look at the above overview reveals some surprising facts. GLIBERT (1952), ANDERSON (1964), JANSSEN (1976, 1984), WIENRICH (2001), HARZHAUSER (2002) and CARONE & ARDOVINI (2008) were the only ones who cited in their captions DESHAYES' authorship of the taxon with the year of publication as 1839. Nearly all others referred to DESHAYES without mentioning any publication year, except in their list of synonyms, if such a list was published.

One author (KAUTSKY, 1925) mentioned an incorrect author *Desm.*, which, however, may have been a *lapsus calami* for *Desh.*

The only two authors who referred to DESHAYES with a year other than 1839 were DUERR (2004), who gave 1850 as the date, and LOZOUET et al. (2001), who gave it as 1853.

Also surprising is the fact that, of all the above-mentioned authors, only ANDERSON (1964), CARONE & ARDOVINI (2008), and LOZOUET et al. (2001) included the relevant DESHAYES publication (with the years 1839–1858, 1839–1853, and 1857 respectively) in their literature reference list. All other authors who in some way or other described or mentioned *crassicostatum* refrained from including DESHAYES in their reference lists, which casts some doubt as to whether they had actually studied DESHAYES' papers, or just copied their references from previous authors.

The main two questions that need to be answered are:
1: in which publication did DESHAYES validly describe his new species *Scalaria crassicostata* (= *Cirsotrema crassicostatum*)?
2: in what year was this published?

In the references and synonym lists the earliest mention of *Scalaria crassicostata* is page 76 in Volume XI of the *Bulletin de la Société Géologique de France* (abbreviated as '*Bull. Soc. Geol. France*' or '*B.S.G.F.*'), with the year 1839.

ANDERSON (1964: 123) explicitly states, by adding an asterisk to the citation in his synonym list, that this is the '*für den Namen der Art maßgebende Originalveröffentlichung*' [*the original publication relevant for the name of the taxon*]. However, this *Tôme onzième* [*Volume eleven*] was, according to its title page, the volume for the years '*1839 à 1840*' and the title page is consequently dated 1840, and not 1839.

Volume XI of the *Bulletin* begins with reports on the sessions of the *Société Géologique de France* on 4 November, 18 November, and 2 December of the year 1839. On page 69 the report on the meeting of 16 December 1839, under the presidency of Constant PREVOST, is found. After some preliminaries, pages 74 to 82 contain a report written and read by DE VERNEUIL. The *Bulletin* text reads: '*M. de Verneuil présente quelques fossiles tertiaires, recueillis par lui en Algérie, et lit à cette occasion la note suivante. Note sur les environs d'Alger.*' [*Mr. de Verneuil presents some tertiary fossils, found by himself in Algeria, and on this occasion reads the following report, Notice about the surroundings of Algiers*].

Édouard DE VERNEUIL (1805–1873) gives a detailed account of the geology of this part of Algeria and describes where and how he collected fossil molluscs in the hills around the city of Algiers. On pages 75–76, he publishes a list of the fossil shells, and states that DESHAYES assisted him with their determination: '*Voici la liste des espèces que j'ai trouvées tant dans cette localité que dans les calcaires des collines qui avoisinent la ville d'Alger, et que M. Deshayes a bien voulu m'aider à déterminer.*' DESHAYES' help is not surprising, as in 1839, the French government sent him to Algeria, where he spent three years involved in geological explorations.

On top of the left column of this list, on page 76 of this *Bulletin* of 1840, one finds the name *Scalaria crassicostata* (Deshayes). This is the page reference given by authors from COSSMANN & PEYROT (1922) onwards, and assumed by many to be the first valid reference. However, only the name is given here – a brief mention with neither a description nor any figure, nor any further reference whatsoever. Therefore, DE VERNEUIL's report and fossil list, even if presented in 1839, does not constitute a valid description, and DESHAYES was not even author of the meeting report – as first (and so far, only) noted by LOZOUET et al. (2001: 51), this is a *nomen nudum* (ICZN Article 9, 9.10).

The second reference, cited by many authors, is the *Traité élémentaire de Conchyliologie avec les applications de cette science a la Géologie*, by DESHAYES (**Pl. 1 Fig. H**). Both text and plates were published in instalments between 1839 and 1857. In these references, text page 42 of the '*Explication des Planches*' and Plate 70 figs. 1–3 of the '*Atlas*' are unanimously cited.

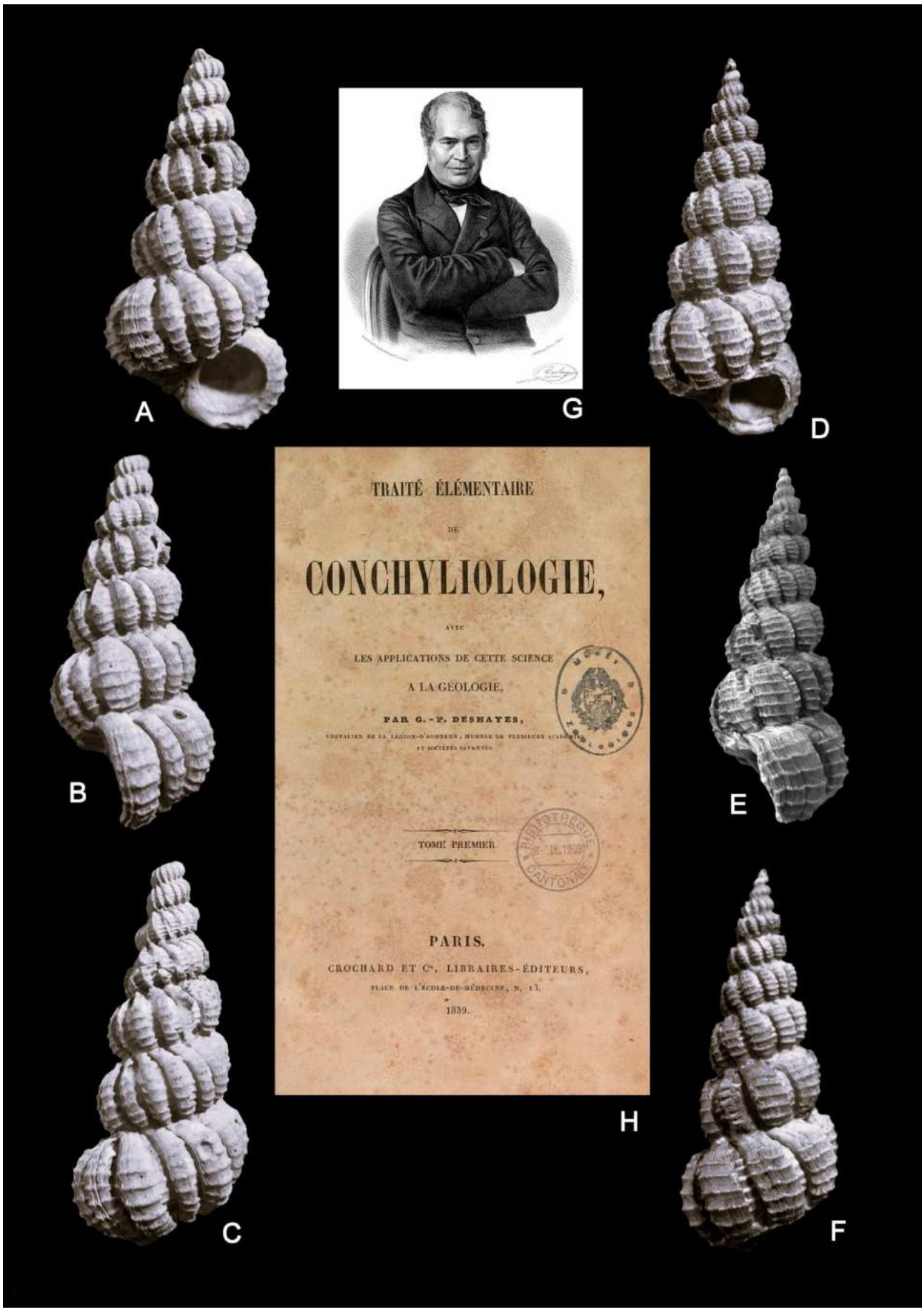
In Article 12.1, the ICZN states: '*To be available, every new name published before 1931 must satisfy the provisions of Article 11 and must be accompanied by a description or a definition of the taxon that it denotes, or by an indication*'. The '*indication'* is defined in Article 12.2 as '*the proposal of a new genus-group name or of a new species-group name in association with an illustration of the taxon being named*'.

The publication of three unmistakable figures in the '*Atlas*', combined with a description - however short - on page 42 of the '*Explication des Planches*', as '*Scalaire à côtes épaisses*' [*Scalaria with thick ribs*] satisfies the ICZN rules to validate the new species name: *Scalaria crassicostata*.

Here, COX's publication of 1942 is of great importance, as it clearly defines that Plate 70 was published in 1850, as was page 42 of the '*Explication des Planches*' (pages 1–24 in 1839, pages 25–48 in 1850, and pages 49–80 in 1853). This publication can also be accessed online as a schematic overview in *2,400 Years of Malacology* by COAN & KABAT (2024), on pages 34–35 of the '*Annex 1: Collations of Books of Malacological Significance*' (latest version of 2 February 2024).

It is quite surprising that till today, only one author, Richard DUERR, in his paper of 2004, mentioned and figured the species with the correct year of 1850, although he did not include DESHAYES in his literature reference list. In LOZOUET et al. (2001), a paper apparently overlooked by most later authors, the authors confirmed the *nomen nudum* status of 1839, but related page 42 of the *'Explication des Planches'* to the year 1853, instead of the correct publication year 1850.

No doubt the correct publication dates in COX (1942) may also have an impact on the hitherto assumed publication dates of other new species described by DESHAYES in the *Traité élémentaire*. This, however, is beyond the scope of this note on *Cirsotrema crassicostatum* (Deshayes, 1850) (**Pl. 1 Figs. A–C, D–F**).



Pl. 1 Figs. A–H: Gérard Paul DESHAYES (1795–1875), the frontispiece of his publication *Traité élémentaire de conchyliologie avec les applications de cette science à la Géologie*, and *Cirsotrema crassicostatum* (Deshayes, 1850), described therein as *Scalaria crassicostata*. **A–C**: Apertural, lateral, and dorsal views of *Cirsotrema crassicostatum*

(Deshayes, 1850) from Winterswijk-Miste bed, Gelderland, The Netherlands; Breda Formation; Miocene (Late Burdigalian to Early Langhian) (Hemmoorian); J. VAN DER VOORT leg.; coll. J. VAN DER VOORT; height 55.8 mm. **D–F**: Apertural, lateral, and dorsal views of *Cirsotrema crassicostatum* (Deshayes, 1850) from Twistringen, Niedersachsen, Germany; Twistringer Schichten (Upper Mica Clay); Miocene (Langhian to Early Serravallian) (Reinbekian); J. VAN DER VOORT leg.; coll. J. VAN DER VOORT; height 63 mm. **G**: Bust of Gérard Paul DESHAYES (1795-1875) from MERLE (ed.) (2008), courtesy of D. MERLE (Muséum national d'Histoire naturelle, Paris, France). **H**: Frontispiece of DESHAYES' publication *Traité élémentaire de conchyliologie avec les applications de cette science à la Géologie*.

ACKNOWLEDGEMENTS

The author is greatly indebted to Han STOUTJESDIJK (Numansdorp, The Netherlands) for comments and for his invaluable assistance in providing access to some hard-to-find literature and to Didier MERLE (Muséum national d'Histoire naturelle, Paris, France) who gave permission to use a picture from the publication *Stratotype Lutétien* (MERLE (ed.), 2008). Special thanks go to Bernard M. LANDAU (Naturalis Biodiversity Center, Leiden, The Netherlands/ Instituto Dom Luiz da Universidade de Lisboa, Campo Grande, Lisboa, Portugal/ International Health Centres, Albufeira, Portugal) who carefully reviewed the original manuscript and provided useful suggestions to improve the text considerably.

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AN OVERVIEW OF THE MEDITERRANEAN 'ALLIED COWRIES' (GASTROPODA: OVULIDAE), WITH THE DESCRIPTION OF *XANDAROVULA AETHERIA* N. SP.

Andrea NAPPO [7]

ABSTRACT

The family Ovulidae Fleming, 1822, collectively known as the 'allied cowries', is represented by nine species across four genera in the Mediterranean Sea. The taxonomy of these species has undergone multiple revisions in recent years by various authors. Unfortunately, these changes were frequently published in less accessible journals or self-published books, making them challenging to locate. Consequently, this has led to a lack of updates in prominent online registers such as WoRMS and MolluscaBase. This paper aims to shed light on this group by elucidating the chronology of the taxonomic changes and evaluating their outcomes.
Mioseguenzia cimbrica recens Nordsieck, 1973 and *Mioseguenzia conica* Nordsieck, 1973 are herein removed from the synonymy of *Pedicularia sicula* Swainson, 1840 and considered *nomina dubia*. Their genus, *Mioseguenzia* Nordsieck, 1973, is also considered a *nomen dubium*. The Eastern Atlantic and Mediterranean systematics for the genera *Neosimnia* Fischer, 1884, *Simnia* Risso, 1826, and *Xandarovula* Cate, 1973, and the species included in them, is here reverted to the one proposed by DOLIN & LEDON (2002): *Simnia nicaeensis* Risso, 1826 is a junior synonym of *Simnia spelta* (Linnaeus, 1758); *Neosimnia* Fischer, 1884 is a junior synonym of *Simnia* Risso, 1826; and *Xandarovula* Cate, 1973 is reinstated to include *Xandarovula aetheria* **n. sp.**, *Ovulum apertum* Sowerby II, 1849, *Simnia hiscocki* Lorenz & Melaun, 2011, *Simnia hyalina* Lorenz & Fehse, 2009, *Simnia jacintoi* Fehse & Trigo, 2015, and *Bulla patula* Pennant, 1777. *Neosimnia illyrica* Schilder, 1927 is considered a junior synonym of *Simnia spelta* (Linnaeus, 1758), and *Pseudosimnia angusta* Celzard, 2017 is considered a junior synonym of *Pseudosimnia carnea* (Poiret, 1789). *Ovula capellinii* De Stefani, 1889 and *Ovula passerinalis* Lamarck, 1810 are moved from the genus *Pseudosimnia* F. A. Schilder, 1927 to *Simnia* Risso, 1826.

*Keywords***:** Mollusca, Gastropoda, Cypraeoidea, *Ovulidae*, Mediterranean Sea

SINTEŻI

[Ħarsa ġenerali lejn l-ovulidi tal-Mediterran (Gastropoda: Ovulidae), bid-deskrizzjoni ta' *Xandarovula aetheria* n. sp.] Il-familja Ovulidae Fleming, 1822 hi rrappreżentata fil-Mediterran minn disat ispeċi maqsumin f'erba' ġeneri. It-tassonomija ta' dawn l-ispeċi għaddiet minn bosta tibdiliet minn awturi varji f'dawn l-aħħar snin. Sfortunatament, ħafna minn dan it-tibdil deher f'ġurnali mhux aċċessibli faċilment, jew inkella f'kotba awto-ppubblikati li diffiċli jinstabu. Bħala konsegwenza, dan wassal għal nuqqas ta' aġġornamenti f'reġistri prominenti online bħall-WoRMS u MolluscaBase. F'dan ix-xogħol, il-kronoloġija ta' dan it-tibdil tassonomiku qiegħda tiġi iċċarata, u r-riżultati tat-tali tibdil qiegħdin jiġu evalwati.
Mioseguenzia cimbrica recens Nordsieck, 1973 u *Mioseguenzia conica* Nordsieck, 1973 qegħdin jiġu mneħħijin mis-sinonimija ta' *Pedicularia sicula* Swainson, 1840, u kkunsidrati bħala *nomina dubia*. Il-ġeneru tagħhom, *Mioseguenzia* Nordsieck, 1973, huwa wkoll ikkunsidrat bħala *nomen dubium*. Is-sistematika tal-ġeneri *Neosimnia* Fischer, 1884, *Simnia* Risso, 1826 u *Xandarovula* Cate, 1973 tal-Atlantiku tal-Lvant u tal-Mediterran, u tal-ispeċi inklużi fihom, issegwi l-proposta ta' DOLIN & LEDON (2002): *Simnia nicaeensis* Risso, 1826 huwa sinonimu iżgħar ta' *Simnia spelta* (Linnaeus, 1758); *Neosimnia* Fischer, 1884 huwa sinonimu iżgħar ta' *Simnia* Risso, 1826; u

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Submitted **29 Feb. 2024**; accepted **10 Apr. 2024**.
urn:lsid:zoobank.org:pub:F949293F-D23D-4CB6-959C-067107BBD609

Xandarovula Cate, 1973 qiegħed jerġa' jiġi integrat biex jinkludi lil *Xandarovula aetheria* **n. sp.**, *Ovulum apertum* Sowerby II, 1849, *Simnia hiscocki* Lorenz & Melaun, 2011, *Simnia hyalina* Lorenz & Fehse, 2009, *Simnia jacintoi* Fehse & Trigo, 2015, u *Bulla patula* Pennant, 1777. *Neosimnia illyrica* Schilder, 1927 huwa kkunsidrat sinonimu iżgħar ta' *Simnia spelta* (Linnaeus, 1758), u *Pseudosimnia angusta* Celzard, 2017 huwa kkunsidrat sinonimu iżgħar ta' *Pseudosimnia carnea* (Poiret, 1789). *Ovula capellinii* De Stefani, 1889 u *Ovula passerinalis* Lamarck, 1810 jiġu trasferiti mill-ġeneru *Pseudosimnia* F. A. Schilder, 1927 għal *Simnia* Risso, 1826.

Kliem muftieħ: Mollusca, Gastropoda, Cypraeoidea, *Ovulidae*, il-Baħar Mediterran

INTRODUCTION

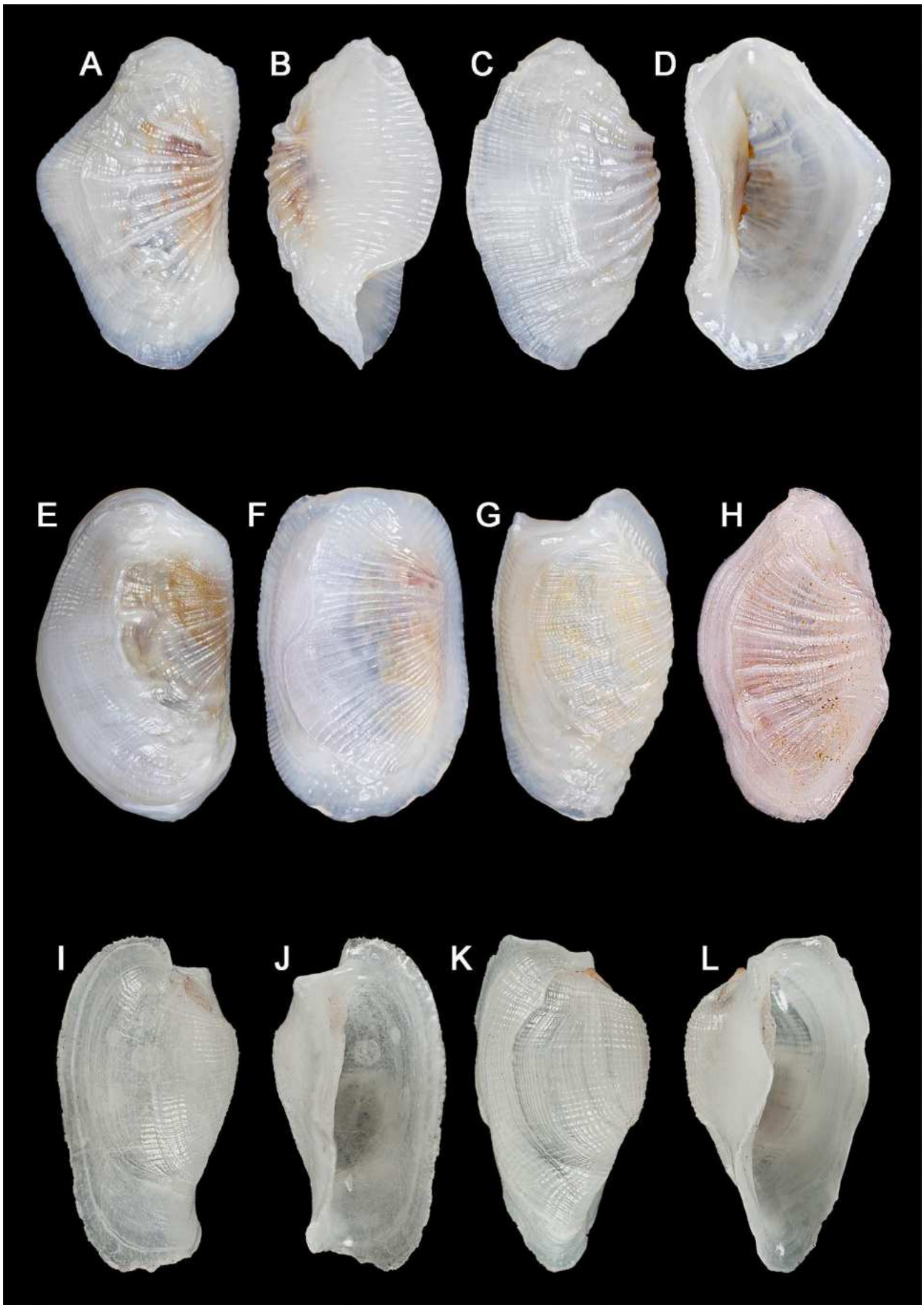
According to Molluscabase (https://www.molluscabase.org/; last accessed 29 Feb. 2024) the family *Ovulidae* Fleming, 1822 contains around 365 recent and fossil species, grouped in 57 genera. They are distributed in tropical and temperate seas, from the intertidal to the bathyal zone (LORENZ & FEHSE, 2009). The majority of ovulids function as ectoparasites on sessile colonial coelenterates, particularly soft corals, leather corals, and black corals, feeding on their polyps and secretions. The animals of these gastropods often mimic the colors and patterns of the host, making them very hard to notice.

Species of the ovulid subfamily *Pediculariinae* Gray, 1853 live in association with corals of the family *Stylasteridae* Gray, 1847. Members of the subfamily *Pediculariinae* are protandric, which means that they are born male, but undergo a sex change at a certain point in their life to become female. This shift in biological sex is reflected in a sudden alteration in the shape and sculpture of their shells. In fact, male (younger) shells are more cylindrical and lack an expanded lip, making them better suited for movement. On the other hand, female (older) shells exhibit a distorted shape with an expanded lip, usually mirroring the conformation of the coral host where they reside, indicating a lack of movement during this phase. This observation suggests an active role for the male in fertilizing the female (LORENZ & FEHSE, 2009).

MATERIALS AND METHODS

Material was obtained by dredging, fishing and scuba diving. Standard photographs were obtained with Nikon D80 and Sony Alpha 7 II cameras and processed with Adobe Photoshop 2024® (by way of brightness, contrast, sharpness and colour balance adjustments exclusively, applied to the entirety of the image). Sizes are given in millimetres (mm) and listed as [shell height × shell width].

Symbols and abbreviations:
*: original description
coll.: collection of
pp.: pages
s.l.: *sensu lato*
spm./spms.: specimen/s
ANC: Andrea NAPPO collection (Il-Ħamrun, Malta)
ATPC: Attilio PAGLI collection (Empoli, Italy)
ALPC: Alen PETANI collection (Zadar, Croatia)
DPC: Daniel PELLEGRINI collection (Valmontone, Italy)
CCC: Charles CACHIA collection (Qormi, Malta)
FSC: Frank SWINNEN collection (Lommel, Belgium)
IMMC: Ivan MULERO MENDEZ collection (Murcia, Spain)
PUC: Pero UGARKOVIĆ collection (Split, Croatia)
MNHN: Muséum national d'Histoire naturelle, Paris, France
MSF: The Mollusca Science Foundation, Inc. (Baltimore, Maryland, U.S.A.)
NHMUK: Natural History Museum (London, England)
SBC: Stellario BERTOLINO (Trapani, Italy)



Pl. 1 Figs. A–L: *Pedicularia sicula* Swainson, 1840. **A–H**: Specimens of *P. sicula* from Italy. **A–D**: Messina Strait, 140 m depth, Jul. 1990, 7.5 mm (ANC). **E**: Messina Strait, 140 m depth, Jul. 1990, 7.9 mm (ANC). **F**: Messina Strait, 140 m depth, Jul. 1990, 5.5 mm (ANC). **G**: Messina Strait, 140 m depth, Jul. 1990, 7.5 mm (ANC). **H**: Messina Strait,

140 m depth, Jul. 1990, 6 mm (ANC). **I–L**: Specimens of *P. sicula* from Portugal. **I–J**: Selvagens Islands, 30.1060° N, 15.9163° E, 669 m depth, 4.2 mm (FSC). **K–L**: Selvagens Islands, 30.1060° N, 15.9163° E, 669 m depth, 4 mm (FSC).

SYSTEMATICS

Class Gastropoda Cuvier, 1795
Subclass Caenogastropoda Cox, 1960
Order Littorinimorpha Golikov & Starobogatov, 1975
Superfamily Cypraeoidea Rafinesque, 1815
Family Ovulidae J. Fleming, 1822
Subfamily Pediculariinae Gray, 1853
Genus *Pedicularia* Swainson, 1840
(type species by monotypy: *Pedicularia sicula* Swainson, 1840)

Remarks: Following NOCELLA et al. (2024), pediculariids are here placed as a subfamily within the family *Ovulidae* J. Fleming, 1822, while as of the time of writing, online registers as WoRMS (https://www.marinespecies.org/; last accessed 29 Feb. 2024) and MolluscaBase place them in their own family, namely *Pediculariidae* Gray, 1853.

Pedicularia sicula Swainson, 1840 (**Pl. 1 Figs. A–L, Pl. 2 Figs. A–C, F**)

* *Pedicularia Sicula* SWAINSON, 1840: 357, fig. 44.
Calyptraea polymorpha CALCARA, 1842: 17.
Thyreus paradoxus PHILIPPI, 1844: 92, pl. 18 fig. 1.
Pedicularia sicula var. sublevigata LOCARD, 1897: 99.

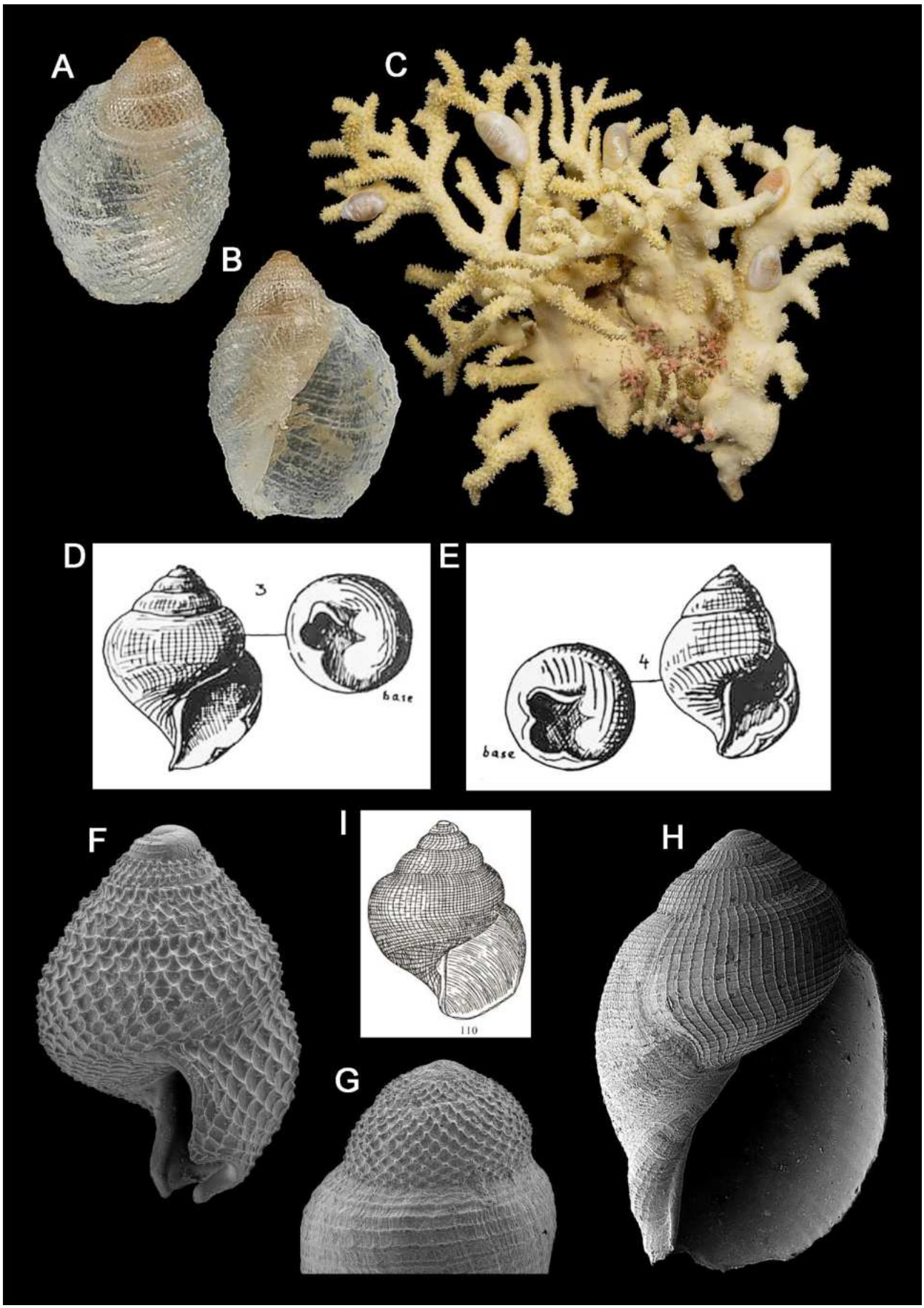
Type locality: coasts of Sicily, Italy.

Type material: Lost (see BOUCHET & WARÉN, 1993; MCGHIE, 2008).

Original description: 'Shell irregular, sub-patelliform; a thick, large, obsolete apex on one of the longest sides, and an internal callous rim within, on one side only; circumference undulated, irregular' (SWAINSON, 1840: 357).

Material studied:
ITALY • 16 spms.; Messina Strait; 140 m depth; Jul. 1990; ANC.
PORTUGAL • 5 spms.; Selvagens Islands; 30.1060° N, 15.9163° E; 669 m depth; FSC.

Remarks: *Pedicularia sicula* Swainson, 1840 is an extremely variable species in shape. This occurs because the animal adjusts the shape of the shell to the host branch during the female phase. Species of this genus are born male, and in this phase, the shells are cylindrical, often with dentition on the outer lip. During this stage, the male is mobile and sexually active. The sex change from male to female is reflected in the shell through a sudden change in sculpture. While in the male phase, the shell exhibits a strong spiral sculpture, whereas in the female phase, the shell has a smooth surface, with sparse spiral sculpture.
In the Mediterranean, this species' distribution is scattered, occurring specifically in Sicily, Alboran Sea, and possibly Malta, at depths ranging from 70 to 140 metres. In the Atlantic, the species is found from the northern part of the Bay of Biscay to the Azores and the Canary Islands, at depths from 110 to 1125 meters. *P. sicula* in the Mediterranean lives exclusively on *Errina aspera* (Linnaeus, 1767), while in the Atlantic it was recorded also on *Errina dabneyi* (Pourtalès, 1871) and *Stylaster ibericus* (Zibrowius & Cairns, 1992) (BRAGA-HENRIQUES et al., 2010).
The databases at MolluscaBase and WoRMS list two taxa - *Mioseguenzia cimbrica recens* Nordsieck, 1973 (NORDSIECK, 1973: 6, fig. 3) (**Pl. 2 Fig. D** in this paper) and *Mioseguenzia conica* Nordsieck, 1973 (NORDSIECK, 1973: 6, fig. 4) (**Pl. 2 Fig. E** in this paper) - as synonyms of *P. sicula*.



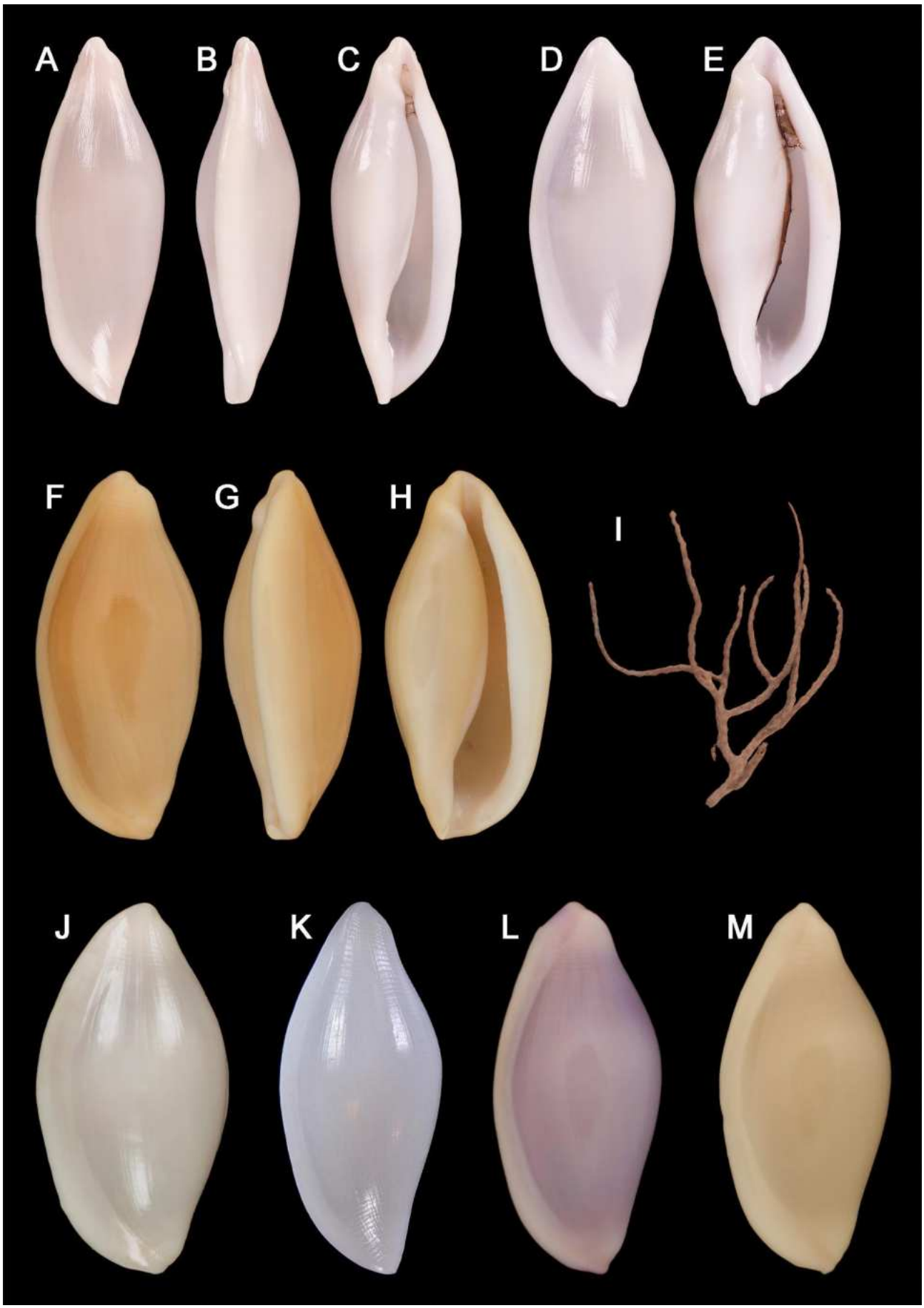
Pl. 2 Figs. A–H: *Pedicularia sicula* Swainson, 1840, its host, and comparative gastropod material. **A–C**: Specimens of *P. sicula* from Italy. **A–B**: Messina Strait, 140 m depth, Jul. 1990, 1.5 mm (ANC). **C**: *Errina aspera* (Linnaeus, 1767) with *P. sicula*, Messina Strait, 140 m depth, Jul. 1990 (ANC). **F**: Specimen of *P. sicula* from Portugal, Selvagens

Islands, 30.1060° N, 15.9163° E, 669 m of depth, 4.2 mm (FSC). **G**: Specimen of Ovulidae s.l. J. Fleming, 1822 from Ascension Island, Georgetown, 130 m depth, 7°53.505'S 14°25.990'W, 1.5mm (FSC). **H**: Specimen of Cypraeidae Rafinesque, 1815 from Italy, Sicily, Catania, Cannizzaro, 45 m depth, 2.3 mm (ANC). **D–E, I**: Drawings from reference works used for comparative purposes. **D**: *Mioseguenzia cimbrica recens* Nordsieck, 1973: 6, fig. 3. **E**: *Mioseguenzia conica* Nordsieck, 1973: 6, fig. 4. **I**: *Janthina cimbrica* Sorgenfrei, 1958: 176, pl. 32 fig. 110.

Although the source of this synonymization could not be traced, NORDSIECK's (1973) original illustrations unequivocally indicate the familial assignment of these two taxa. The drawings clearly depict protoconchs of Cypraeoidea Rafinesque, 1815, most likely representing two different species or even genera, based on their overall shape and spire height. Both illustrations, however, exhibit a distinct sculpture composed of intersecting horizontal spiral ridges and vertical axial ridges, typical of the protoconchs of Cypraeidae Rafinesque, 1815 (**Pl. 2 Fig. H**). In contrast, members of the Pediculariinae (**Pl. 2 Fig. F**) and Ovulidae s.l. (**Pl. 2 Fig. G**) possess protoconchs with sculptures consisting of oblique ridges. Consequently, these two taxa are excluded from the synonymy of *P. sicula* and designated as *nomina dubia*. Assigning a generic and specific name is unlikely, given the lack of characteristics for a confident identification. The two taxa were described in the genus *Mioseguenzia* Nordsieck, 1973, of which *Janthina cimbrica* Sorgenfrei, 1958, a Miocene fossil from Denmark, was designed as type species. QUINN (1983) removed this genus from 'Seguenziacea' (Seguenziidae Verrill, 1884) because the original illustration of *J. cimbrica* depicted a larva of 'Cypraeacea' (Cypraeidae). Similarly to the preceding taxa, the excellent illustration of *J. cimbrica* (SORGENFREI, 1958: 176, pl. 32 fig. 110) (**Pl. 2 Fig. I** in this paper) indeed displays a larva of a cypraeid. Consequently, the synonymy of *Mioseguenzia* with *Pedicularia* is not justified. However, the genus is herein also designated as *nomen dubium*, as it is not possible to trace it back to a specific genus or species.

Subfamily Simniinae Schilder, 1927
Genus *Simnia* Risso, 1826
(type species by subsequent designation: *Simnia nicaeensis* Risso, 1826, accepted as *Simnia spelta* (Linnaeus, 1758))

Remarks: Recently, the validity of this genus was discussed by several authors (DOLIN & LEDON, 2002; FEHSE, 2018). This confused situation is caused by the interpretation these authors gave to the type species of the genus: *Simnia nicaeensis* Risso, 1826. This species was described from a single specimen only, and the original drawing by RISSO (1826: fig. 150) shows an elongate, thin shell, with extremely developed siphonal canals (**Pl. 7 Fig. A** in this paper). The subsequent drawing of the same specimen made by SCHILDER (1932) shows a damaged shell, which is less elongate than the original drawing and more pyriform in shape (**Pl. 7 Fig. B** in this paper). Today, the lectotype of *Simnia nicaeensis* Risso, 1826 housed in the MNHN (MNHN-IM-2000-3644) is a broken shell of 13.7 mm, pinkish in color and with huge parts missing (**Pl. 7 Fig. C**). Even if very damaged, the type specimen itself and the two drawings show a very elongate form which is identical to juvenile specimens of *Simnia spelta* (Linnaeus, 1758) (**Pl. 7 Fig. D**) and clearly different from the shells usually identified in literature as *S. nicaeensis* (in this paper *Xandarovula aetheria* n. sp.) (**Pl. 7 Figs. E–H, Pl. 8 Figs. A–H**) which possess a more cylindrical shell, with an aperture that is wider anteriorly. The length and shape of the siphonal canals match the ones of juvenile *S. spelta* and are very different from the short and wide canals of *Xandarovula aetheria* n. sp., which is also bigger in size (*X. aetheria* n. sp.: ~25 mm; *S. spelta*: ~20 mm) and white in colour.
Following DOLIN & LEDON (2002), *Simnia nicaeensis* Risso, 1826 is regarded a synonym of *Bulla spelta* Linnaeus, 1758. *Neosimnia* P. Fischer, 1884, of which *B. spelta* is the type species, becomes a synonym of *Simnia* Risso, 1826.
All the species possessing thin lips (namely *Ovulum apertum* Sowerby II, 1849; *Simnia hiscocki* Lorenz & Melaun, 2011; *Simnia hyalina* Lorenz & Fehse, 2009; *Simnia jacintoi* Fehse & Trigo, 2015; and *Bulla patula* Pennant, 1777) are moved to *Xandarovula* Cate, 1973, of which *Bulla patula* Pennant, 1777 is the type species (**Pl. 9 Figs. A–C**). Additionally, this genus also includes the *Xandarovula* in open nomenclature of the present paper, namely, *X.* sp. 1 and *X.* sp. 2, and *Xandarovula aetheria* n. sp.



Pl. 3 Figs. A–M: *Simnia spelta* (Linnaeus, 1758) and its host. **A–E**: Specimens of *S. spelta* from Croatia, Brač Island, 25 m depth on *Eunicella singularis* (Esper, 1791). **A–C**: 20 mm (ANC). **D–E**: 17.6 mm (ANC). **F–I**: Specimen of *S. spelta* from Spain, and its host. **F–H**: Granada, 20 m depth on *Leptogorgia sarmentosa* (Esper, 1791), 2020, B.

CUNNINGHAM APARICIO leg., 11.4 mm (ANC). **I**: *Leptogorgia sarmentosa* (Esper, 1791), 20 m depth, 2020, B. CUNNINGHAM APARICIO leg. (ANC). **J–M**: Specimens of *S. spelta* from Italy. **J**: Latium, Civitavecchia, 50–80 m of depth, A. GAGLINI leg., 10.3 mm (ANC). **K**: Calabria, Scilla, 50 m of depth, A. VAZZANA leg.,14.4 mm (ATPC). **L**: Sardinia, Cagliari Gulf, Poetto, 50–80 m depth; A. NAPPO leg., 10.3 mm (ANC). **M**: Sardinia, Cagliari Gulf, Poetto, 50–80 m depth, A. NAPPO leg., 10.8 mm (ANC).

Ovula capellinii De Stefani, 1889, from the Italian Pliocene, and *Ovula passerinalis* Lamarck, 1810, from the Italian and Spanish Pliocene, are usually placed by several authors (CHIRLI, 1997; BRUNETTI & VECCHI, 2015; PACAUD, 2021) in the genus *Pseudosimnia* F. A. Schilder, 1927, due to their bulbous shape. However, the lack of dentition on both the columellar and the labral sides, the presence of a strong funiculum on the columellar side in the posterior terminal, and the aperture widening anteriorly suggest that *Simnia* is a better fit for these two species, even if the bulbous shape of the shell is unusual for this genus.

Simnia spelta (Linnaeus, 1758) (**Pl. 3 Figs. A–H**, **J–M**, **Pl. 4 Figs. A–H**, **Pl. 5 Figs. A–I**)

* *Bulla spelta* LINNAEUS, 1758: 726.
Ovula triticea Lamarck, 1810 sensu PAYRAUDEAU, 1826: 169.
Ovulum obtusum SOWERBY I, 1828: 156.
Ovulum secale SOWERBY I, 1828: 157.
Simnia nicaeensis RISSO, 1826: 235, fig. 150.
Ovula spelta var. roseocarnea BUCQUOY, DAUTZENBERG & DOLLFUS, 1883: 135.
Ovula acicularis Lamarck, 1810, sensu TRYON, 1885: 251.
Ovula intermedia G. B. Sowerby I, 1828 sensu TRYON, 1885: 251.
Ovula sowerbyana Weinkauff, 1881 sensu TRYON, 1885: 253.
Ovula leathesi J. de C. Sowerby, 1824 sensu TRYON, 1885: 254.
Ovula obsoleta LOCARD, 1891: 36, pl. 8, fig. 12.
Ovula spelta var. lutea PALLARY, 1900: 301.
Ovula spelta var. rosea PALLARY, 1900: 301.
Simnia spelta var. brevis COEN, 1949: 18.

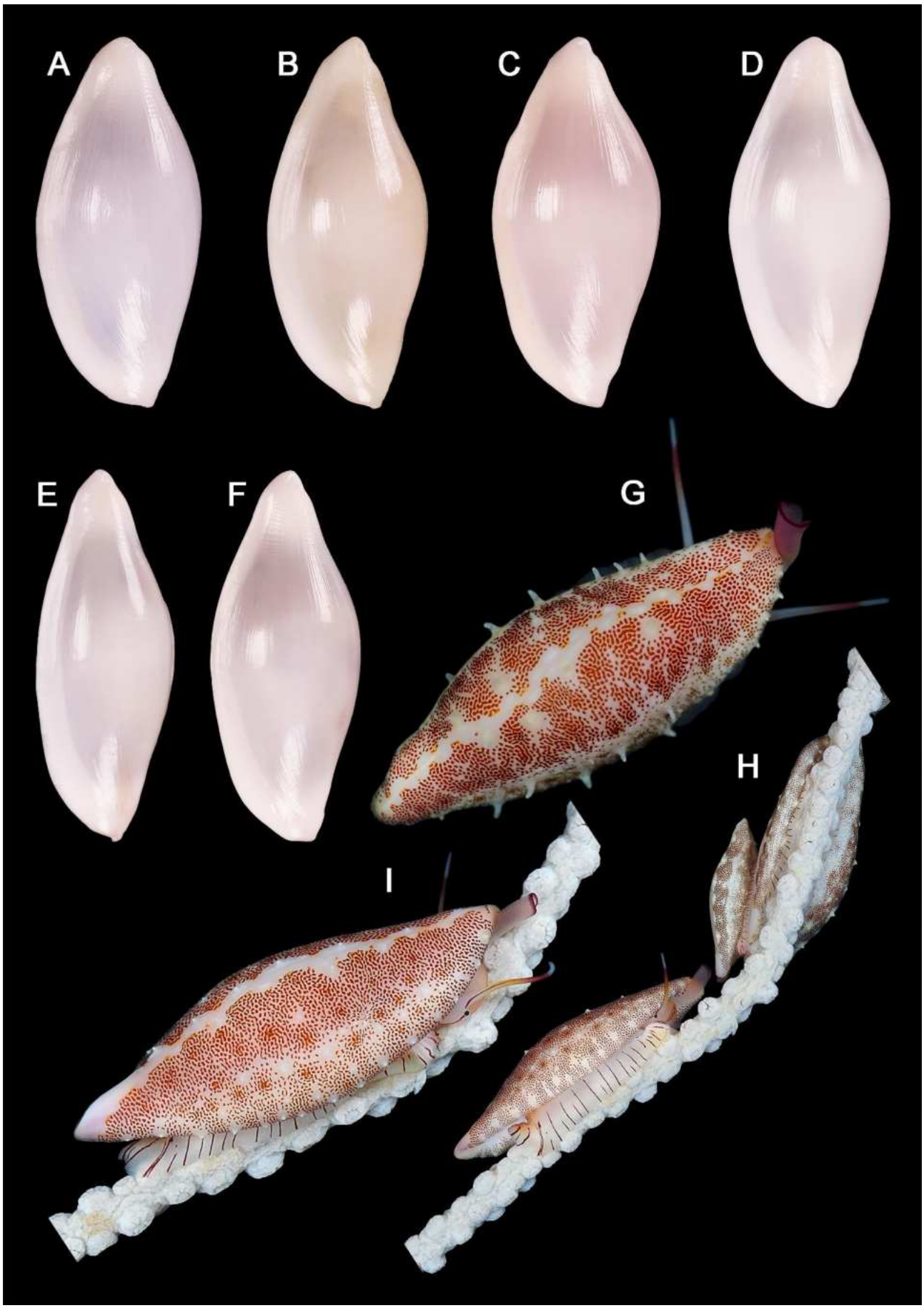
Type locality: Mediterranean Sea (LINNAEUS, 1758).

Type material: Syntypes in Linnean Society of London (N. P-Z 0010772).

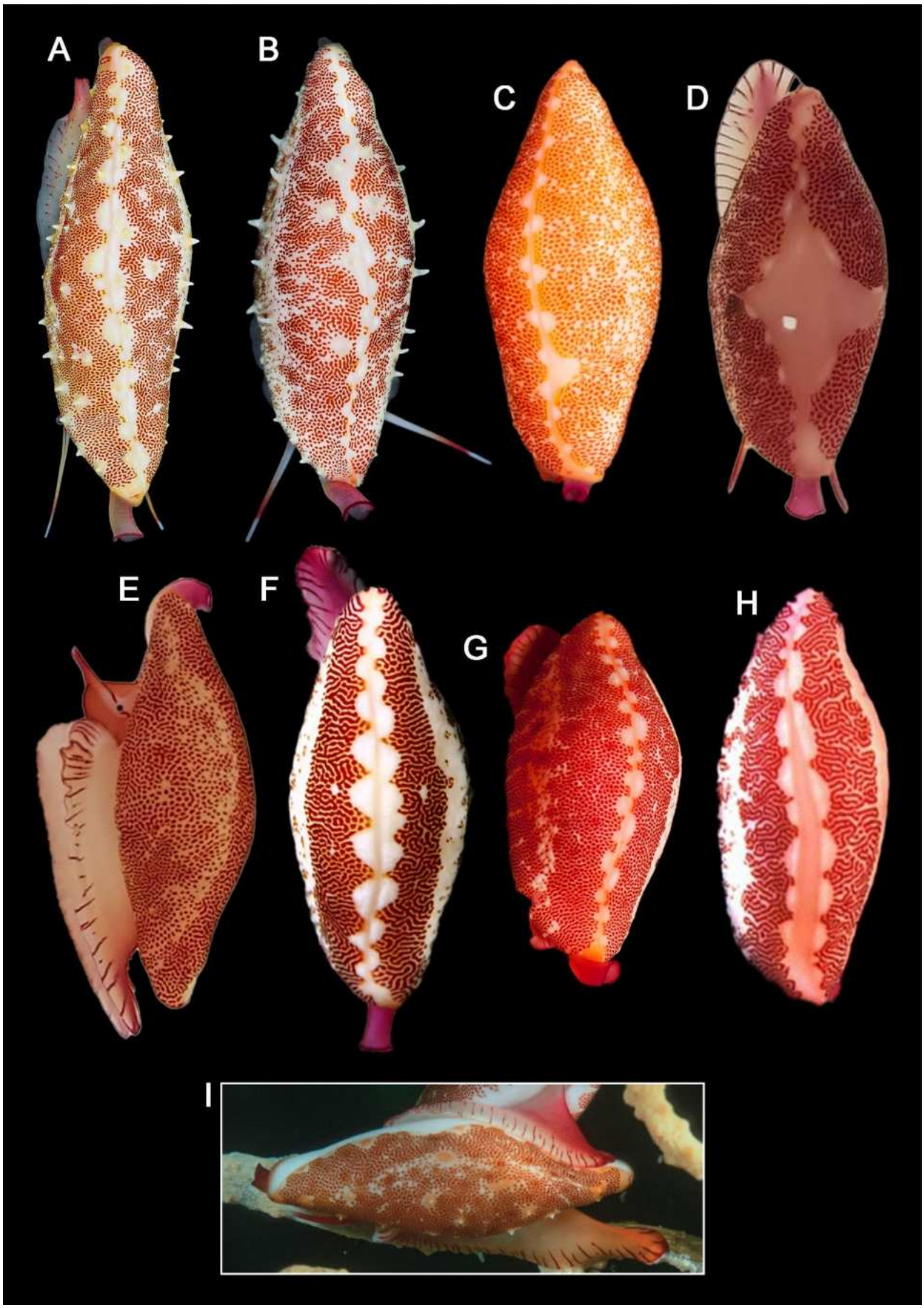
Original description: 'Testa alba, lavis, semine Tritici duplo major, vix birostris, sed magis patula. Apertura longitudinalis, lunata cum denticulo obsoleto ad apicem columelle. Spira externa omnino nulla' [Shell white, smooth, twice as large as wheat seed, barely bi-rostrated, but quite open. Longitudinal opening, crescent-shaped with a nearly obsolete denticle at the tip of the columella. Sculpture entirely absent] (LINNAEUS, 1758: 726).

Material studied:
ITALY • 1 spm.; Latium, Civitavecchia; 50–80 m depth; A. GAGLINI leg.; ANC • 2 spms.; Sardinia, Cagliari Gulf, Poetto; 50–80 m depth; A. NAPPO A. Leg.; ANC • 1 spm.; Calabria, Scilla; 50 m depth; A. VAZZANA leg.; ATPC.
CROATIA • 9 spms.; Brač Island; 25 m depth on *Eunicella singularis* (Esper, 1791); 2021; R. STANIĆ leg.; ANC.
SPAIN • 1 spm.; Granada; 20 m depth on *Leptogorgia sarmentosa* (Esper, 1791); 2021; B. CUNNINGHAM APARICIO leg.; ANC.

Remarks: *Simnia spelta* (Linnaeus, 1758) is an extremely variable species in size, shape, and colours of the shell and animal. Adult specimens can vary in size from 10 to 20 mm. It lives in *Eunicella cavolini* (Koch, 1887), *Eunicella singularis* (Esper, 1791), *Leptogorgia ruberrima* (Koch, 1886), *Leptogorgia sarmentosa* (Esper, 1791) (**Pl. 3 Fig. I**) and *Leptogorgia viminalis* (Pallas, 1766) (SCHIAPARELLI et al., 2005).



Pl. 4 Figs. A–I: *Simnia spelta* (Linnaeus, 1758). Specimens from Croatia, Brač Island, on *Eunicella singularis* (Esper, 1791). **A**: 25 m depth, 10.6 mm (ANC). **B**: 25 m depth, 12.2 mm (ANC). **C**: 25 m depth, 12.9 mm (ANC).



D: 25 m depth, 14.3 mm (ANC). **E**: 25 m depth, 15.6 mm (ANC). **F**: 25 m depth, 17.4 mm (ANC). **G–I**: 27 m depth (photo credit: R. STANIĆ). **Pl. 5 Figs. A–I**: *Simnia spelta* (Linnaeus, 1758). **A–B**: Specimens of *S. spelta* from Croatia, Brač Island, 25 m depth on *Eunicella singularis* (Esper, 1791) (photo credit: R. STANIĆ). **C**: Specimen of *S. spelta* from

Spain, St. Feliu de Guixols (photo credit: J. VILANOVA, user JOSEPVILANOVA on iNaturalist). **D–E**: Specimen of *S. spelta* from Spain, Granada, 20 m depth on *Leptogorgia sarmentosa* (Esper, 1791) (photo credit: B. CUNNINGHAM APARICIO). **F**: Specimen of *S. spelta* from Spain, Tarifa Island (photo credit: user WHODDEN on iNaturalist); **G**: Specimen of *S. spelta* from Spain, Almuñecar (photo credit: L. SÁNCHEZ TOCINO). **H**: Specimen of *S. spelta* from Spain, Ria de Muros, 17 m depth (photo credit: J. SANTIAGO). **I**: Specimen of *S. spelta* from Italy, Alghero, Capo Caccia, 20 m depth (photo credit: Bruno MANUNZA).

Neosimnia illyrica F. A. Schilder, 1927 was published from the Adriatic Sea as "=*spelta* var. Kob.". This probably means that SCHILDER (1927) wanted to give a name to the Adriatic form of *spelta* described by KOBELT (1908), which, translated from the German, is defined as '*a strikingly slender, pure white variety, which is characterized by a pronounced dorsal edge and, when viewed at a*
slightly oblique angle, also shows a clear calloused ridge on the mouth wall, which [is not found] *in specimens from the* [Western] *Mediterranean*[, its] *dimensions are:* [height of] *17.5* [mm], [maximum diameter of] *7 mm*.' (KOBELT, 1908: 39).

SCHIAPARELLI et al. (2005) highlighted a little genetic divergence between two morphs, which were named morphs '*A*' and '*B*'. The authors assign as '*morph A*' the specimens found on *E. singularis* and *E. cavolini*, characterized by a mantle with small, sparse and distinct orange-red spots. '*Morph B*' lives on *L. sarmentosa* [as *Lophogorgia ceratophyta* (Linnaeus, 1758)] and is characterized by having a mantle striped with different colours, and a large median red stripe.

LORENZ & FEHSE, 2009 assign the name *N. illyrica* to the morph with the striped mantle ('*morph B*' *sensu* SCHIAPARELLI et al., 2005) and *Neosimnia spelta* (Linnaeus, 1758) to the morph with sparse and distinct orange-red spot ('*morph A*' *sensu* SCHIAPARELLI et al., 2005).

Aside from the little genetic divergence highlighted by SCHIAPARELLI et al. (2005), differences in shell shape and size, the colour of the mantle, and the host preference don't seem to be stable.

The shell shape is extremely variable within the same population on the same host. In fact, **Pl. 3 Figs. A–E** show two specimens morphologically identifiable as *N. illyrica*, but collected in Croatia feeding on *E. singularis*, the purported host of *Simnia spelta* (Linnaeus, 1758). **Pl. 4 Figs. A–F** show six specimens from the same colony, but with a shell that is intermediate between typical *S. spelta* (**Pl. 4 Figs. A–D**) and the more elongate *S. illyrica*. **Pl. 3 Figs. F–H** show a specimen collected in Spain feeding on *L. sarmentosa* (**Pl. 3 Fig. I**), the purported host of *S. illyrica*, morphologically identifiable as *S. spelta*.

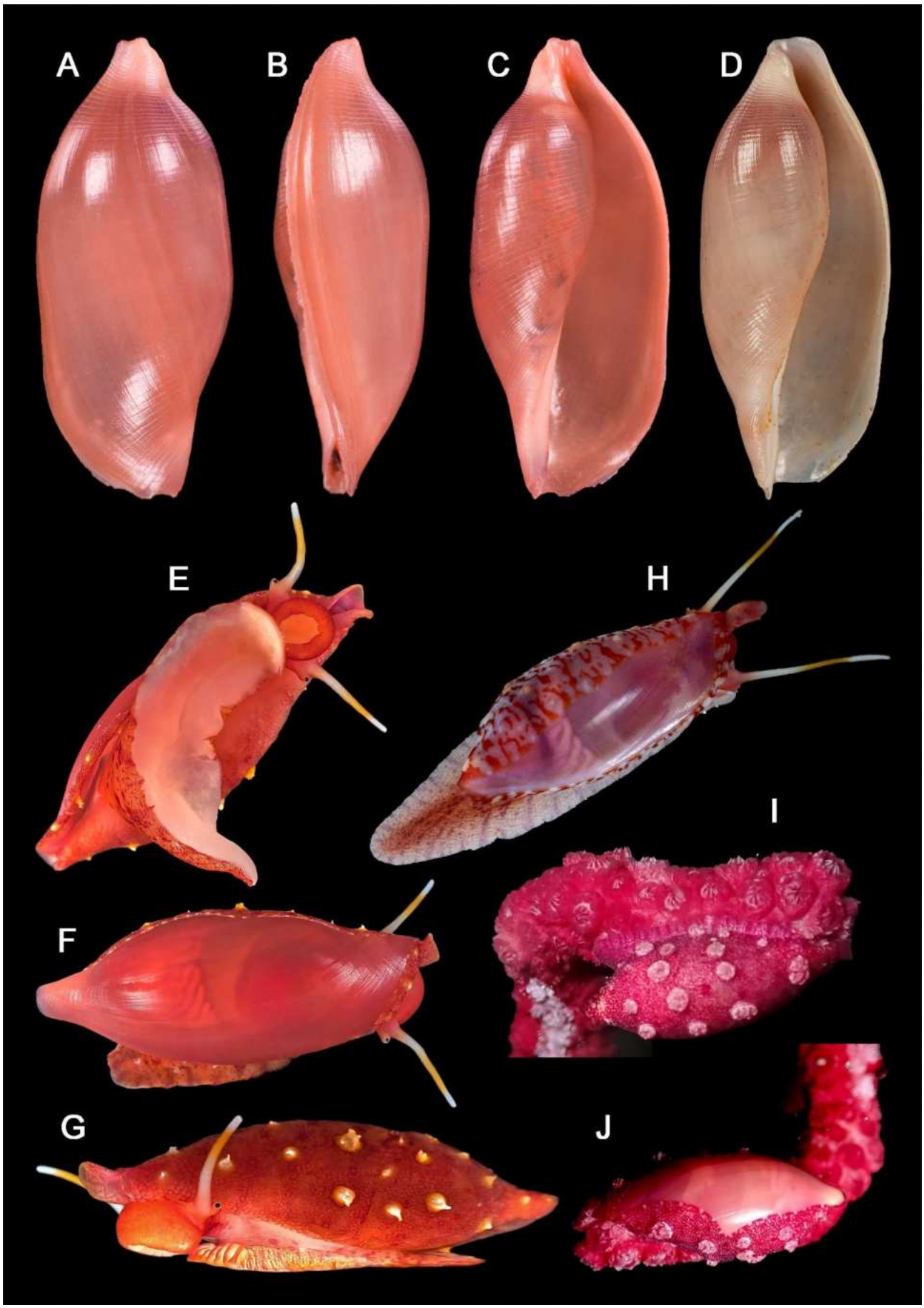
Aquarium observation of living specimens from Croatia proved that the two morphs both feed on polyps of *Eunicella* spp. As well as *Leptogorgia* spp. (J. PRKIC, unpublished).

The mantle pattern and colour seem highly variable too, and intermediate specimens between the two morphs exist, as shown in **Pl. 4 Figs. G–I** and **Pl. 5 Figs. A–I**.

Considering the extreme variability of all these features, *N. illyrica* is herein considered a synonym of *S. spelta*.

Amphiperas (Neosimnia) spelta var. pliomajor Sacco, 1894 is a Pliocenic species distributed in Italy, Spain and Portugal. It is morphologically identical to *S. spelta*, but it reaches larger sizes and, overall, its appearance resembles the one of *S. illyrica*. The two taxa are here considered separate due to the temporal distance between the fossil entity and the living one. This taxon is usually placed in the genus *Neosimnia* P. Fischer, 1884 (FEHSE, 2001, LANDAU & FEHSE, 2004, BRUNETTI & VECCHI, 2015) but is herein considered to belong in *Simnia*. CHIRLI (1997) reports *S. spelta* from the Italian Pliocene; this record was subsequently attributed to *S. pliomajor* (Sacco, 1894) by PACAUD (2021).

Cyphoma bovetensis SEGUENZA, 1880 is placed in the synonymy of *S. spelta* by Molluscabase, but LANDAU & FEHSE (2004) placed this Pliocenic taxon in the synonymy of *Neosimnia pliomajor*.



Pl. 6 Figs. A–J: *Xandarovula aperta* (Sowerby II, 1849). **A–G**: Specimens of *X. aperta* from Croatia. **A–C**: Lastovo Island, 80 m depth on *Corallium rubrum* (Linnaeus, 1758), 2014, R. STANIĆ leg. 2014, 12.8 mm (ANC). **E–G**: Svetac Island, 80 m depth on *Corallium rubrum* (Linnaeus, 1758), 16.1 mm (photo credits: P. UGARKOVIĆ & R.

STANIĆ). **D**, **H**: Specimens of *X. aperta* from Italy. **D**: Specimens of *X. aperta* from off Alghero, Sardinia, 120 m of depth on *Corallium rubrum* (Linnaeus, 1758); 1988; 15.4 mm (ANC). **H**: Specimen of *X. aperta* from Italy, Lecce, Gallipoli, 50 m depth on *Corallium rubrum* (Linnaeus, 1758) (photo credit: F. VITALE). **I–J**: Specimen of *X. aperta* from France, Marseille (photo credit: SLEBRIS on iNaturalist).

Genus *Xandarovula* Cate, 1973
(type species by original designation: *Bulla patula* Pennant, 1777)

Remarks: FEHSE (2018) considers *Xandarovula* Cate, 1973 a synonym of *Simnia*, and the latter as the proper generic placement for the thin-shelled species. The type species of *Simnia*, however, possesses a thick shell with a well-developed callous external lip, a feature absent in the type species of *Xandarovula*, which is *Xandarovula patula* (Pennant, 1777). This species always possesses a thin external lip (**Pl. 8 Figs. A–C**). Five species distributed in the Atlantic and the Mediterranean, plus two undescribed species and one herein described species from Mediterranean, are included in this genus, and all of them share shell features in common.

Xandarovula aperta (Sowerby II, 1849) (**Pl. 6 Figs. A–J**)

* *Ovulum apertum* SOWERBY II, 1849: 478, pl. ci. F. 106, 107.
Ovula birostris (Linnaeus, 1767) sensu TRYON, 1885: 253.
Primovula rhodia SCHILDER, 1932: 52.

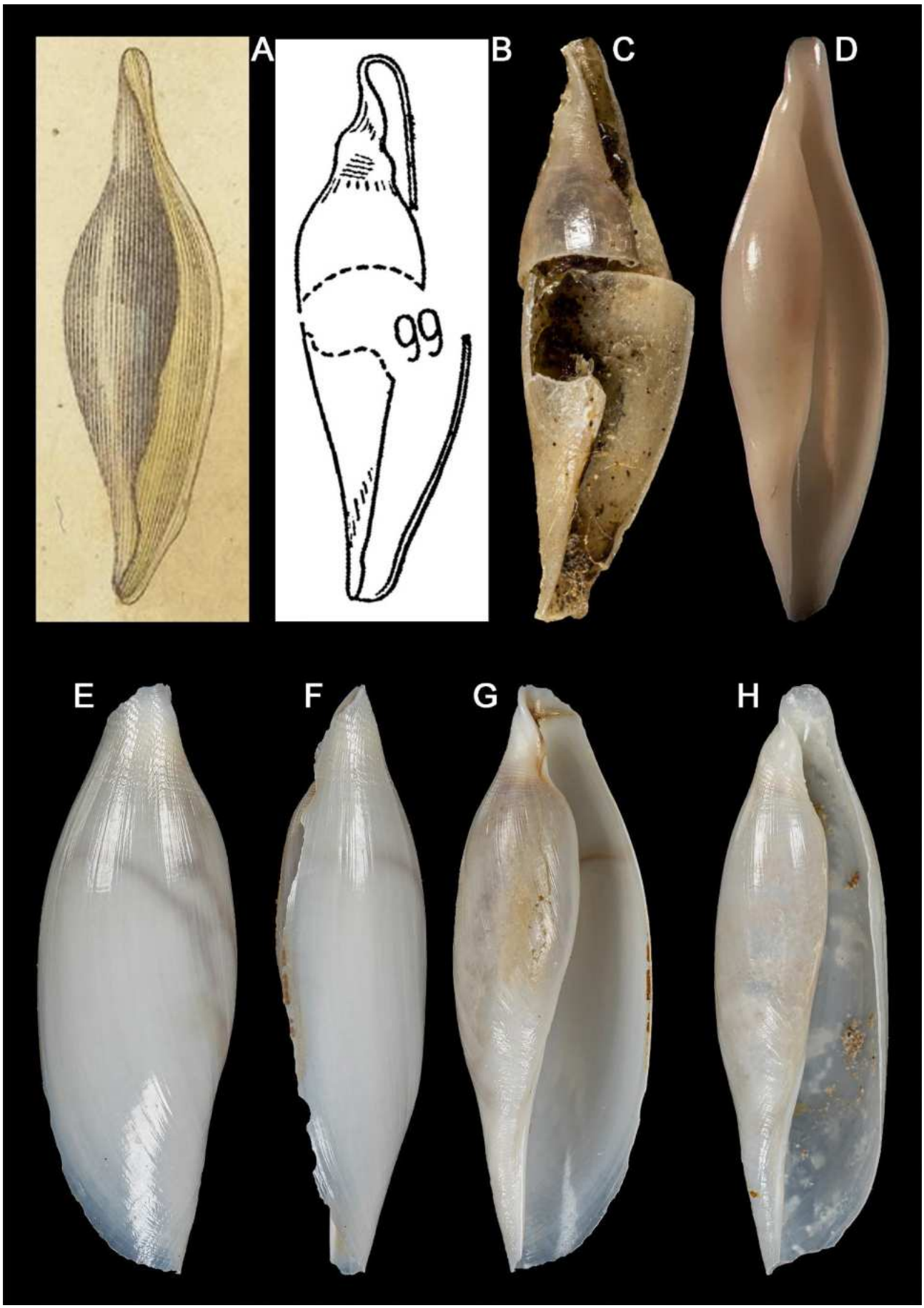
Type locality: Off Alghero, Sardinia, Italy (designated by FEHSE, 2006).

Type material: Syntype at NHMUK (1907.12.30.246).

Original description: 'O. testâ lævigatâ elongato-ovali, fulvâ-rufescente; canalibus breviusculis; aperturâ apertâ, labio externo tenui, anticè sub- emarginatâ; labio interno posticè ad canalem sub-reflexo, anticè sub-tortuoso tenui; intùs sub-depresso' [*Shell smooth, elongated-oval, fulvous-reddish; canals somewhat short; aperture wide, outer lip thin, aperture slightly emarginate anteriorly; inner lip slightly reflected posteriorly towards the canal, thin and slightly sub-tortous anteriorly; interior somewhat depressed*] (SOWERBY II, 1849: 478).

Material studied:
ITALY • 1 spm.; off Sardinia, Alghero; 120 m depth on *Corallium rubrum* (Linnaeus, 1758); 1988; ANC.
CROATIA • 2 spms.; Lastovo Island; 80 m depth on *Corallium rubrum* (Linnaeus, 1758); R. STANIĆ leg.; 2014; ANC.

Remarks: *Xandarovula aperta* (Sowerby II, 1849) was formerly known as *Simnia purpurea* Risso, 1826, but this taxon is a *nomen dubium* since it was published without a drawing, and the type specimen is lost. The short description by RISSO (1826) isn't precise enough to arrive to a proper identification. The main characteristic of this species is the bright reddish colour of the shell, which is purple in fresh collected specimens. The shell is cylindrical, with short and wide siphonal canals. The spiral sculpture is quite variable, with specimens almost fully covered by spiral cords in the ventral side (**Pl. 6 Figs. A–C**) to specimens with spiral sculpture only in the base and close to the siphonal canals (**Pl. 6 Fig. D**). The mantle is red, with whitish papillae. It lives in depths from 20 m (FEHSE et al., 2010) to 92 m (present paper) feeding on *Corallium rubrum* (Linnaeus, 1758) and *Alcyonium glomeratum* (Hassall, 1843) (LORENZ & FEHSE, 2009; FEHSE et al., 2010).
There is the possibility that multiple species with identical or almost identical shells are referred to by this name, since living specimens shown in the present paper from Croatia (**Pl. 6 Figs. E–G**), from Galicia, Spain (FEHSE et al., 2010) and from Salento, Puglia, Italy (**Pl. 6 Fig. H**) show identical shells, but extremely different animal features such as papillae, pattern and colour. Recently, this theory got confirmed by the description of *Simnia jacintoi* Fehse & Trigo, 2015, here placed in the genus *Xandarovula*, which possesses a shell almost or fully identical to the one of *Xandarovula aperta* (Sowerby II, 1849) except for minor differences, but with a totally different mantle.



Pl. 7 Figs. A–H: *Simnia spelta* (Linnaeus, 1758) and *Xandarovula aetheria* n.sp. **A**: Original drawing of *Simnia nicaeensis* by RISSO (1826). **B**: Drawing by SCHILDER (1932) of RISSO's specimen. **C**: Lectotype of *Simnia nicaeensis* Risso, 1826 (MNHN-IM-2000-3644) (photo credit: M. CABALLER). **D**: Specimen of *S. spelta* from Croatia, Brač Island,

60–80 m depth, 13.4 mm (photo credit: N. LETE). **E–H**: Specimens of *X. aetheria* n. sp. from Italy, Sardinia, Bosa Marina, 120 m depth on *Callogorgia verticillata* (Pallas, 1766). **E–G**: holotype of *X. aetheria*, 11.7 × 4 mm (MSF-ov3061). **H**: paratype 1 of *X. aetheria*, 14.9 × 4.4 mm (MSF).

Xandarovula aetheria n. sp. (**Pl. 7 Figs. E–H, Pl. 8 Figs. A–H**)
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Type material (*material studied*):
ITALY • **holotype**; 1 spm.; Sardinia, Bosa Marina; 120 m depth on *Callogorgia verticillata* (Pallas, 1766); MSF-ov3061 (dimensions: 10.2 × 2.9 mm) • **paratype I**; 1 spm.; same data as holotype; ANC (dimensions: 12.5 × 4.1 mm) • **paratype II**; 1 spm.; same data as holotype; ANC (dimensions: 11.4 × 4.2 mm) • **paratype III**; 1 spm.; same data as holotype; ANC (dimensions: 9.9 × 3 mm) • **paratype IV**; 1 spm.; same data as holotype; ANC (dimensions; 9 × 3.1 mm) • **paratype V**; 1 spm.; DPC (dimensions: 13.2 × 4.5 mm) • **paratype VI**; 1 spm.; DPC (dimensions: 12.7 × 4.5 mm) • **paratype VII**; same data as holotype; IMMC (dimensions: 22 × 6.5 mm).

Type locality: Italy, Sardinia, Bosa Marina; 120 m depth.

Etymology: The new species takes its name from the *Aether* mod, a videogame set in a world of islands suspended in the sky. This videogame, along with the individuals within its development team, hold significant sentimental value for the author.

Distribution: Distributed in the whole Mediterranean and Atlantic (FEHSE et al., 2010 as *Simnia nicaeensis*) in depths from 30 m (FEHSE et al., 2010) to 220 m (present paper), feeding on *Callogorgia* spp., *Eunicella verrucosa* (Pallas, 1766) and *Paramuricea* spp. (LORENZ & FEHSE, 2009).

Description: (Data of the holotype (**Pl. 7 Figs. E–G**) in brackets.) Shell fragile, semitransparent, cylindrical, slightly variable in shape, medium-sized for the genus, of a height of ~9–22 mm (10.2 mm) and a width of ~1.9–6.5 mm (2.9 mm). Glossy and rounded whorls, smooth, with faint spiral lirae near the siphonal canals; aperture elongate, anteriorly widened; siphonal canals short and wide. Colour white. Columella straight. Aperture is smooth in the interior. Animal whitish; white mantle with orange dots, with many, fairly large, wart-like papillae. Tentacles white with orange tip.

Remarks: Formely known as *Simnia nicaeensis* Risso, 1826 (see above), this species was undescribed until now.

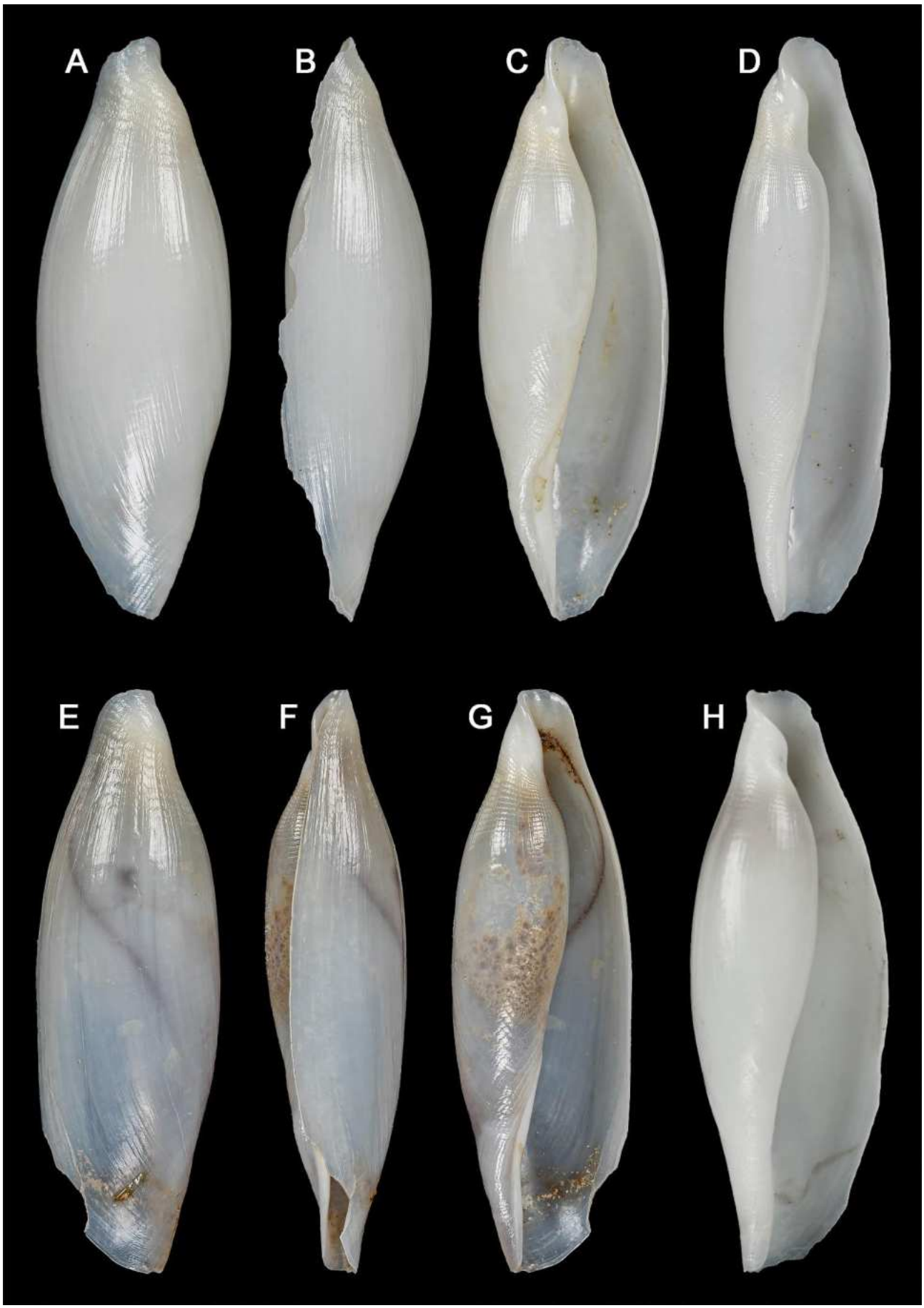
Xandarovula sp. 1 (**Pl. 10 Figs. A–G**)

Material studied:
CROATIA • 2 spms.; Pag Island; 50 m on *Eunicella verrucosa* (Pallas, 1766); 2014; A. PETANI & Đ. IGLIĆ leg.; ALPC.

Remarks: This peculiar new species is known from only two specimens. The shell is elongate, with a developed shoulder and with long siphonal canal that widens at the extremities. The shell lengths of the two specimens are 13.6 and 16.4 mm. The shell colour is orange when fresh, becoming yellowish after some time. The animal is bright orange, with the mantle covered by branched papillae.

Xandarovula sp. 2 (**Pl. 9 Figs. D–F**)

Material studied:
ITALY • 1 spm.; Sardinia, Asinara Island, Pedra Bianca; 15 m depth on *Eunicella singularis* (Esper, 1791); 2015.
FRANCE • 1 spm.; Marseille, Sausset-Les-Pins; 8 m depth on *Eunicella singularis* (Esper, 1791); 2012.



Pl. 8 Figs. A–H: *Xandarovula aetheria* n. sp., specimens from Italy, Sardinia, Bosa Marina, 120 m depth on *Callogorgia verticillata* (Pallas, 1766). **A–C**: paratype 2 of *X. aetheria*, 13.6 × 4.4 mm (MSF). **D**: paratype 3 of of *X.*

aetheria, 12.1 × 3.5 mm (MSF). **E–G**: paratype 4 of *X. aetheria*, 10.8 × 3.4 mm (MSF). **H**: paratype 4 of *X. aetheria*, 13.2 × 4.5 mm (DPC).

Remarks: This new species was recently reported from northern Sardinia under the name of *X. patula* (PIREDDA et al., 2016) (**Pl. 9 Fig. D** in this paper). Another similar specimen was photographed in the south of France and misidentified as *X. aperta* (Sabine BOULAD, **Pl. 9 Figs. E, F**). Both the specimens were left alive in the wild. They were observed in relative shallow water (8–15 m), a very unusual depth for *Xandarovula*. Even if similar to *X. patula* (**Pl. 9 Figs. A–C**), both the visible shell and the mantle differ considerably. The general shape of the shell appears elongate, in contrast to the globose shell of *X. patula*; the siphonal canals are short and wide, in contrast to the very rostrate siphonal canals of *X. patula*, and the patterns of the mantle, with the relative papillae, are quite different, with the new species displaying large, branched papillae, in a higher number than the ones of *X. patula*.
It is very unlikely that a typical eastern Atlantic species is found in a single location in northern Sardinia and southern France, but it is reasonable to assume that this is an undescribed species, endemic to the northern Mediterranean.

Subfamily Prionovolvinae Fehse, 2007
Genus *Pseudosimnia* F. A. Schilder, 1927
(type species by original designation: *Bulla carnea* Poiret, 1789)

Pseudosimnia adriatica (Sowerby I, 1828) (**Pl. 11 Figs. A–K**)

Ovula haliotidea BLAINVILLE *in* DEFRANCE, 1825: 131.
* *Ovulum adriaticum* SOWERBY I, 1828: 150.
Ovula virginea CANTRAINE, 1835: 391.
Aperiovula adriatica iberia CATE, 1973: 37, fig. 72.
Aperiovula emersoni CATE, 1973: 39, fig. 79.

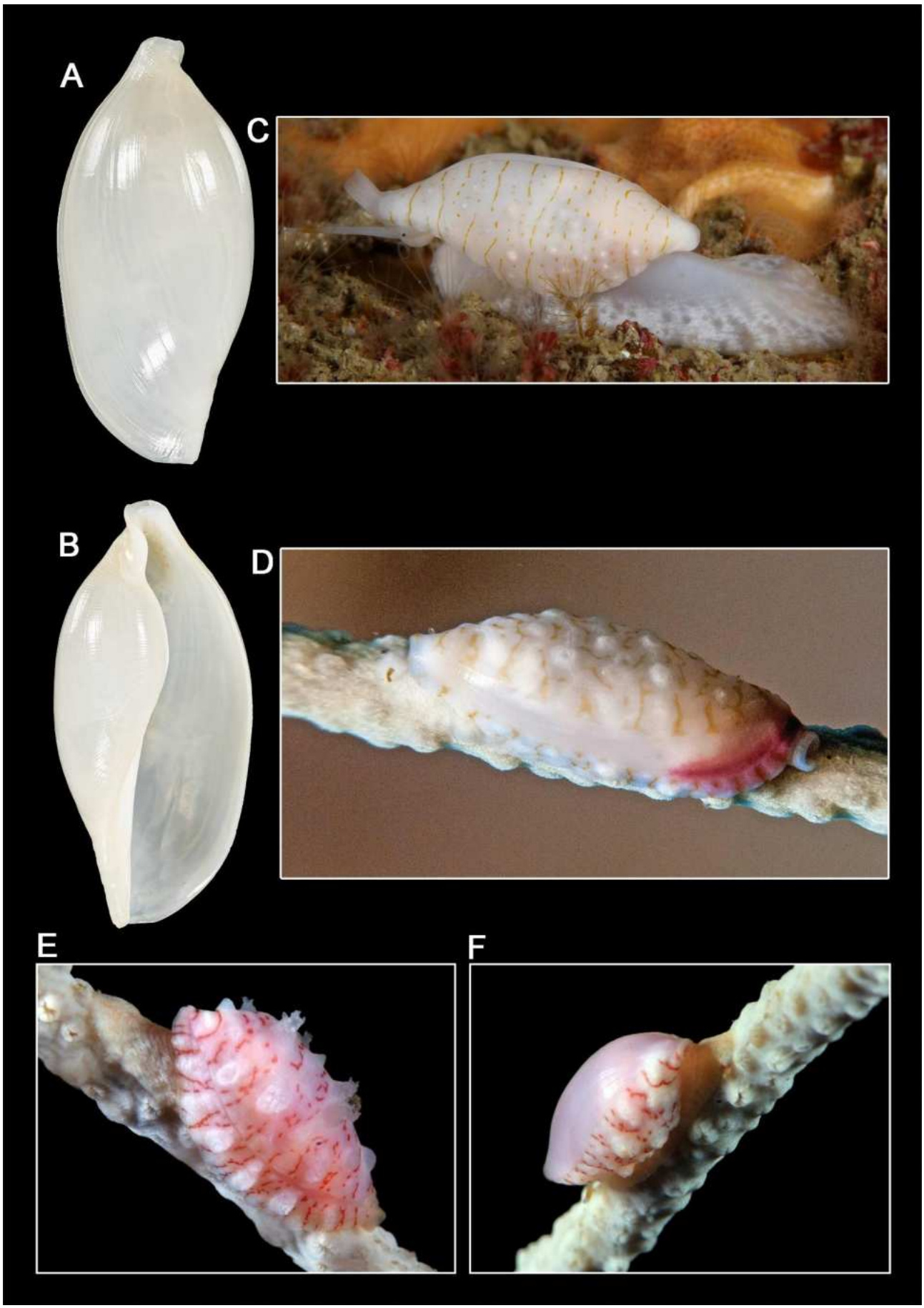
Type locality: Adriatic Sea.

Type material: Not located.

Original description: 'Testá oblongo-ovali, subventricosd, utrinque subacuminata, pallidè carned, hyalind; labii externi margine angusto, intùs denticulato; columella supernè uniplicatâ, infrà subdepressa, intùs marginata' [Shell oblong-oval, sub-ventricose; somewhat acuminated at both extremities, pale flesh colour, hyaline; margin of the outer lip narrow, denticulated on the inside: upper end of the columella with one oblique small swelling; lower end somewhat flattened, with a thickened internal margin] (SOWERBY I, 1828: 150).

Material studied:
CROATIA • 2 spms.; Jabuka Island; 160 m on *Funiculina quadrangularis* (Pallas, 1766); R. STANIĆ leg.; ANC • 2 spms.; Jabuka Island; 180–220 m on *Funiculina quadrangularis* (Pallas, 1766); P. UGARKOVIĆ leg.; PUC.
ITALY • 2 spms.; Capraia, Tuscan Archipelago; 180 m depth; A. GAGLINI leg.; ANC.
MALTA • 2 spms.; off N. Għawdex [Gozo]; 400 m; Jun. 2006; R. STANIĆ leg.; ANC.

Remarks: Very similar to *Pseudosimnia carnea* (Poiret, 1789), but it differs from it by a larger size (~28 mm vs ~19 mm maximum length), a more elongate form, a thin and light shell, and by having a less developed labrum with less pronounced teeth. The animal is white-bluish with black dots around the feet, with a mantle with black fine dots with very short white papillae.
It is a rather uncommon species, which lives in depths that range from 80 m (LORENZ & FEHSE, 2009) to 400 m (present paper), feeding on *Funiculina quadrangularis* (Pallas, 1766).
NOCELLA et al. (2024) recently highlighted that *P. adriatica* and *P. carnea* represent a single lineage based on molecular data. This suggests that a more integrative approach combining habitat preference, host, shell morphology, and anatomy is needed to better understand this very complex family.



Pl. 9 Figs. A–F: *Xandarovula patula* (Pennant, 1777) and *Xandarovula* sp. 2. **A–B**: Specimen of *X. patula* from West England, Bristol Channel, depth of 70 m on *Nemertesia* spp.; 21.6 mm (CAN). **C**: Specimen of *X. patula* from the United Kingdom, Falmouth area, 20–25 m depth on *Alcyonium digitatum* Linnaeus, 1758 (photo credit: D. KIPLING).

D: Specimen of *Xandarovula* sp. 2 from Italy, Sardinia, Asinara Island, Pedra Bianca, 15 m on *Eunicella singularis* (Esper, 1791), 2015 (photo credit: R. PIREDDA). **E–F**: Specimen of *Xandarovula* sp. 2 from France, Marseille, Sausset-Les-Pins, 8 m depth on *Eunicella singularis* (Esper, 1791), 2012 (photo credit: S. BOULAD). **Pl. 10 Figs. A–G**:

Xandarovula sp. 1. Specimens from Croatia, Pag Island, 50 m depth on *Eunicella verrucosa* (Pallas, 1766), 2014, A. PETANI A. & Đ. IGLIĆ leg. (ALPC). **A–B, E**: 16.4 mm. **C–D, F–G**: 13.6 mm.

Pseudosimnia carnea (Poiret, 1789) (**Pl. 12 Figs. A–M**, **Pl. 13 Figs. A–L**)

* *Bulla carnea* POIRET, 1789: 21–22.
Ovula dentata FISCHER VON WALDHEIM, 1807: 157–158.
Bulla lepida DILLWYN, 1817: 474.
Bulla nucleus DILLWYN, 1817: 474.
Ovula cepula SCHUMACHER, 1817: 259.
Bulla nucleus MAWE, 1823: 100.
Bulla triticea (Lamarck, 1810) sensu COSTA, 1830: LXXV, LXXVII.
Ovula adriatica var. elongata REQUIEN, 1848: 84.
Ovula adriatica var. oblonga REQUIEN, 1848: 84.
Ovula carnea var. rosea REQUIEN, 1848: 85.
Ovula carnea var. albida MONTEROSATO, 1875: 45.
Ovula carnea var. alba BUCQUOY, DAUTZENBERG & DOLLFUS, 1883: 134.
Ovula carnea var. pallida BUCQUOY, DAUTZENBERG & DOLLFUS, 1883: 134.
Ovula carnea var. rubra BUCQUOY, DAUTZENBERG & DOLLFUS, 1883: 134.
Ovula carnea var. rufula MOLLERAT, 1890: 105.
Ovula rufula MOLLERAT, 1890: 105.
Ovula carnea var. elongata PALLARY, 1900: 300, pl. 8 fig. 17.
Ovula carnea var. globosa PALLARY, 1900: 300, pl. 8 fig. 15.
Ovula carnea var. major PALLARY, 1900: 300, pl. 8 fig. 18.
Ovula carnea var. minor PALLARY, 1900: 300, pl. 8 fig. 13.
Ovula carnea var. obtusula PALLARY, 1900: 300, pl. 8 fig. 16.
Ovula carnea var. violacea PALLARY, 1900: 300.
Ovula carnea var. gibbosa COEN, 1933: 46.
Primovula carnea var. dorsolirata COEN, 1949: 18.
Primovula carnea var. major COEN, 1949: 18.
Pseudosimnia carnea expallescens SCHILDER, 1967: 197–198, fig. 2.
Pseudosimnia angusta CELZARD, 2017: 29–33.

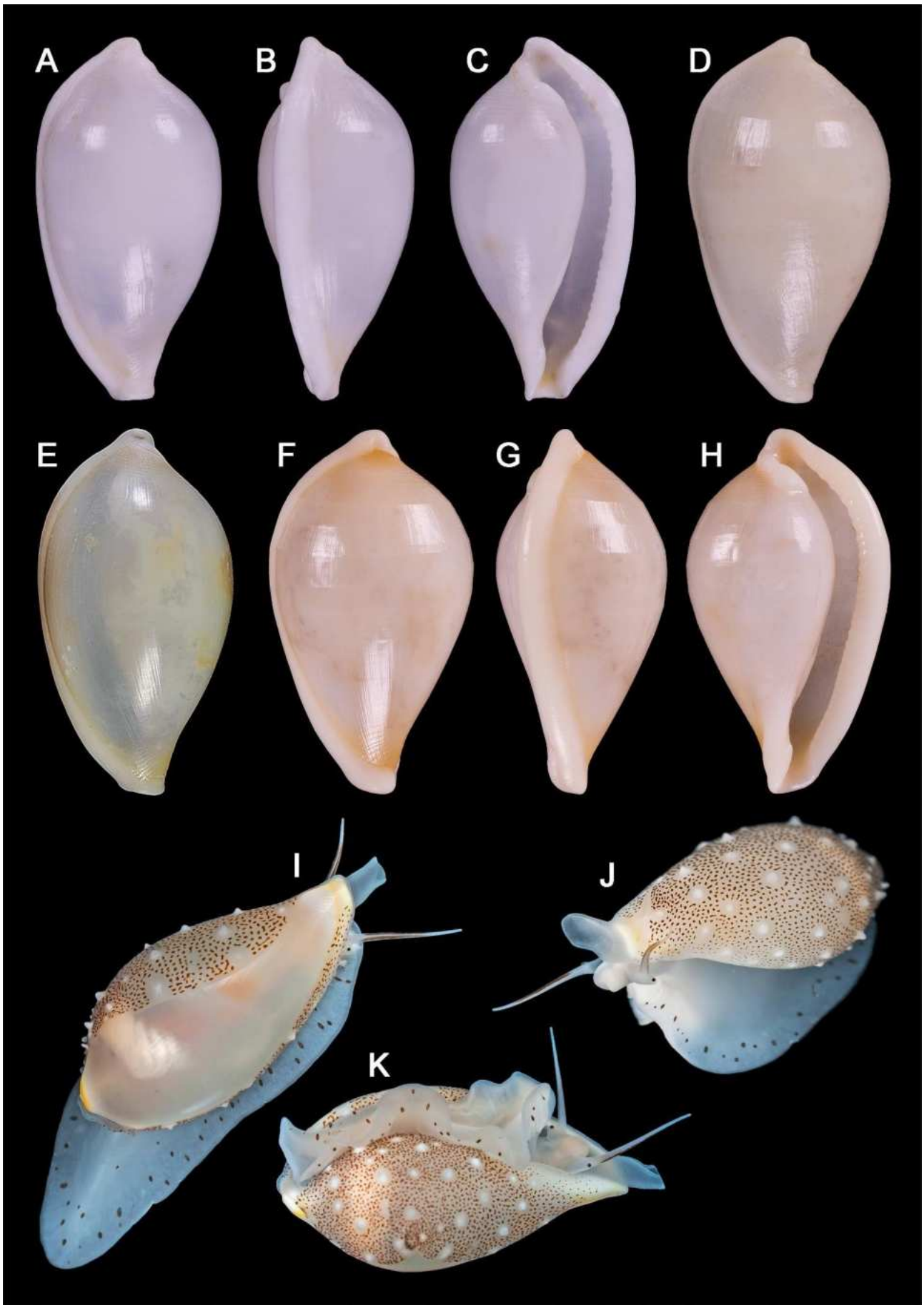
Type locality: Algeria (Numidia).

Type material: Probably lost.

Original description: 'Testa ovata incarnata gibba, labro arcuato incrassato, intus dentato' [Shell ovate, flesh-colored, gibbous, with a thickened, arched lip, internally toothed] (POIRET, 1789: 21–22).

Material studied:
CROATIA • 8 spms.; Lastovo Island; 80 m depth on *Corallium rubrum* (Linnaeus, 1758); 2014; R. STANIĆ leg.; ANC.
MOROCCO • 45 spms.; between Cap Malabata and Targa; 80 m depth on *Corallium rubrum* (Linnaeus, 1758); ANC.
ITALY • ~400 spms.; Sardinia, Alghero; 90–100 m depth on *Corallium rubrum* (Linnaeus, 1758); ANC • 2 spms.; Sardinia, Cagliari Gulf, Capo Teulada; 140 m; ANC.
SPAIN • 2 spms.; Malaga; 80 m depth.

Remarks: The most common Mediterranean species, found by the thousands by coral fishermen in North Sardinia (pers. obs.). It is distributed throughout the whole of the Mediterranean and lives on *Corallium rubrum* (Linnaeus, 1758) and *Lophogorgia* spp. (LORENZ & FEHSE, 2009). It is an extremely variable species as regards size, sculpture, shape, and colour. Its size can range from 8 to



Pl. 11 Figs. A–K: *Pseudosimnia adriatica* (G. B. Sowerby I, 1828). **A–D, I–K**: Specimens of *P. adriatica* from Croatia, Jabuka Island, on *Funiculina quadrangularis* (Pallas, 1766), R. Stanić leg. (ANC). **A–C**: 160 m depth, 18.7 mm. **D**: 160 m depth, 21.5 mm. **I–K**: 180–220 m depth, 21 mm (photo credit: P. Ugarković). **E**: Specimen of *P.*

adriatica from Tuscan Archipelago, Capraia, 180 m depth, A. GAGLINI leg., 19.2 mm (ANC). **F–H**: Specimen of *P. adriatica* from Malta, off northern Għawdex [Gozo], 400 m depth, Jun. 2003, 20 mm (ANC).

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19 mm, and the shape can vary from bulbous to very elongate with rostrate terminals (corresponding to *Pseudosimnia angusta* Celzard, 2017). The surface can be fully (or almost fully) smooth, or fully sculpted by thin spiral cords. The colour ranges from the classic red, to purple, orange, yellow, and pure white. The animal is whitish in color, with black dots on the foot. The mantle is transparent and finely dotted with whitish irregular short papillae.
Throughout the centuries, this extreme variability led to the creation of many specific and varietal names, nowadays all synonyms of the species. The most recent is *P. angusta* (**Pl. 13 Figs. I–K**) from Atlantic and Mediterranean Morocco. It lives on *C. rubrum* together with typical specimens of *P. carnea* and it is characterized by its slender, rostrate, less bulbous and lighter shell, all features that can be found in other Mediterranean populations of *P. carnea* (**Pl. 13 Figs. A, D, E, F–H, L**).
Among the synonyms of *P. carnea*, the original drawing of *Ovula carnea var. elongata* Pallary, 1900 (PALLARY, 1900: pl. 8 fig. 17) shows a specimen possessing all the features of *P. angusta*, suggesting that this particularly elongate form was already described by previous authors.

Pseudosimnia juanjosensii (Pérez & Gómez, 1987) (**Pl. 14 Figs. A–L**)

> **Aperiovula juanjosensii* PÉREZ & GÓMEZ, 1987: 1–2.
> *Primovula (Adamantia) bellocqae* CARDIN, 1997: 24–25.

Type locality: Spain, Canary Island, Tenerife and La Palma Islands, at a depth ranging from 100 to 250 m.

Type material: Holotype deposited in AMI (International Malacological Society).

Original description: '*The shell is pyriform in shape, not very solid, with extremely small apertures, slightly translucent, and small in size. The base is convex. The aperture is rather narrow with the columella and the lip being practically parallel. The latter has hardly accentuated denticles in the internal border, which terminate toward the anterior extremity. The funiculus is well marked. The posterior extremity is enlarged and pointed, with the sinus open and slightly curved toward the dorsal part. The lip border is clearly marked. The columella is curved with an evident small depression and dimple. The syphon canal terminates obliquely (the external lip is shorter than the internal one).The external surface - it is sculptured by transversal striae localized at both extremities, particularly on the posterior where they are more numerous and dense. The globular area of the final whorl has no spiral sculpture, except for some so fine that they are visible only upon microscopic examination. Colouring - the colouring is bright white, almost translucent. On the lip borders and the extremities it takes on an opaque ivory shade. An exact description of the mollusc itself is not yet possible, but local fishermen have referred that it has a reddish tint*' (PÉREZ & GÓMEZ, 1987: 1–2).

Material studied:
ITALY • 2 spms.; Sicily, Messina, Punta Faro; 90 m; ATPC • 7 spms.; Sicily, Egadi Islands; 90–120 m depth; Aug. 2022; ANC.
MALTA • 1 spm.; Marsaxlokk Bay; 80 m; CCC.

Remarks: Very peculiar species, characterized by its small size (7–9 mm), the very rostrate extremities, and the very weak, almost absent, teeth in the labrum. Distributed in the central-western Mediterranean Sea and Atlantic Ocean, from 50 m (CARDIN, 1997) to 300 m (BOUCHET & WARÉN, 1993) feeding on *Villogorgia bebrycoides* (von Koch, 1887) and most probably also on *Eunicella* spp. and *Paramuricea* spp.
This species was recently reported from Malta (CACHIA, 2023) misidentified as *Pseudosimnia angusta* Celzard, 2017.

Pl. 12 Figs. A–N: *Pseudosimnia carnea* (Poiret, 1789). **A–G, M**: Specimens of *P. carnea* from Croatia. **A–G**: Lastovo Island, 80 m depth on *Corallium rubrum* (Linnaeus, 1758). **A–C**: 17.8 mm (ANC). **D**: 14.5 mm (ANC). **E–F**: 13.8 mm (ANC). **G**: 13.5 mm (ANC). **M**: Svetac Island, 80 m depth on *Corallium rubrum* (Linnaeus, 1758) (photo

credit: P. UGARKOVIĆ). **H**: Specimen of *P. carnea* from Spain, Malaga, 80 m depth, 12.6 mm (ANC). **I–L**: Specimens of *P. carnea* from Italy, Sardinia, Alghero, 90–100 m depth on *Corallium rubrum* (Linnaeus, 1758) (ANC). **I–J**: 10.7 mm. **K–L**: 10.1 mm (ANC). **N:** Italy, Sardinia, Alghero, 120 m depth on *Corallium rubrum* (Linnaeus, 1758) (photo credit: B. MANUNZA).

Spiculata bijuri Cate, 1976 (now *Simnia bijuri* (Cate, 1976)) from the Western Atlantic was considered a senior synonym of *Primovula (Adamantia) bellocqae* Cardin, 1997 (now synonym of *Pseudosimnia juanjosensii* (Pérez & Gómez, 1987)) by SIMONE (2007), but the holotype differs considerably from the typical *P. juanjosensii* by its bigger size (14.5 mm), a very elongate profile, and a lack of labral teeth. SIMONE (2007) shows other specimens under this name, but they differ considerably from the holotype of *S. bijuri*, being more similar to the typical *P. juanjosensii*. These specimens from Westen Atlantic probably belong to a similar, as yet undescribed, species.

ACKNOWLEDGEMENTS

The author expresses his gratitude to David P. CILIA (Mużew Nazzjonali tal-Istorja Naturali / National Museum of Natural History, Mdina, Malta), Riccardo GIANNUZZI-SAVELLI (Palermo, Italy), Felix LORENZ (Buseck, Germany), and Michael MONT (Owings Mills, United States), who contributed with critical revisions of the manuscript and precious advice leading to its improvement. Manuel CABALLER (MNHN, Paris, France), Brian CUNNINGHAM APARICIO (Puerto de Mazarrón, Spain), Sabine BOULARD (Martigues, France), Laetitia DESPOTIN (Royal Belgian Institute of Natural Sciences, Brussels, Belgium), Mauro DONEDDU (Tempio Pausania, Italy), Đani IGLIĆ (Zara, Croatia), Neven LETE (Split, Croatia), David KIPLING (Glasgow, Scotland), Bruno MANUNZA (Sassari, Italy), Italo NOFRONI (Rome, Italy), Alen PETANI (Zadar, Croatia), Stefano PETRANGELI (Rome, Italy), Roberto PIREDDA (Stintino, Italy), Luis SÁNCHEZ TOCINO (Almuñecar, Spain), Javier SANTIAGO (https://www.european-marine-life.org/), Dario Marcello SOLDAN (Milano, Italy), Rino STANIĆ (Split, Croatia), Egidio TRAINITO (Loiri Porto San Paolo, Italy), Pero UGARKOVIĆ (Split, Croatia), Fabio VITALE (Lecce, Italy), and users JOSEPVILANOVA, SLEBRIS, and WHODDEN (iNaturalist; https://www.inaturalist.org/) are gratefully acknowledged for providing photographs and SEM scans.

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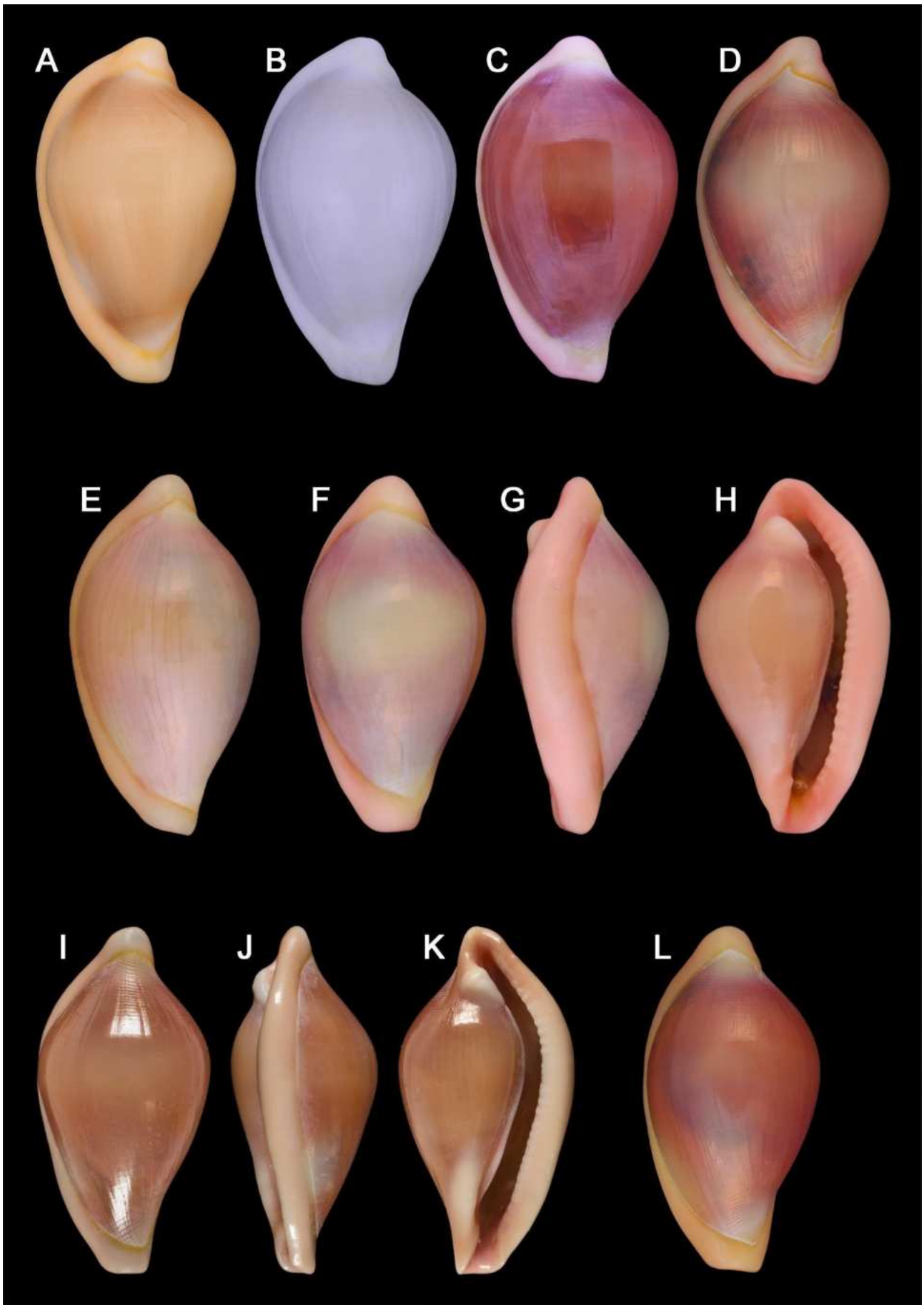

Pl. 13 Figs. A–L: *Pseudosimnia carnea* (Poiret, 1789). **A, C**: Specimens of *P. carnea* from Spain, Malaga, 80 m depth (ANC). **A**: 12.5 mm. **C**: 13.1 mm. **B, D–H, L**: Specimens of *P. carnea* from Italy, Sardinia. **B**: Cagliari Gulf, Capo Teulada, 140 m depth, 11.3 mm (ANC). **D–L**: Sardinia, Alghero, 90–100 m depth on *Corallium rubrum*

(Linnaeus, 1758) (ANC). **D**: 11.4 mm. **E**: 12.2 mm. **F–H**: 14.7 mm. **L**: 13.4 mm. **I–K**: Holotype of *Pseudosimnia angusta* Celzard, 2017 (MNHN-IM-2000-33175), Morocco, waters close to the Gibraltar Strait, 80 m depth, 13.5 mm.

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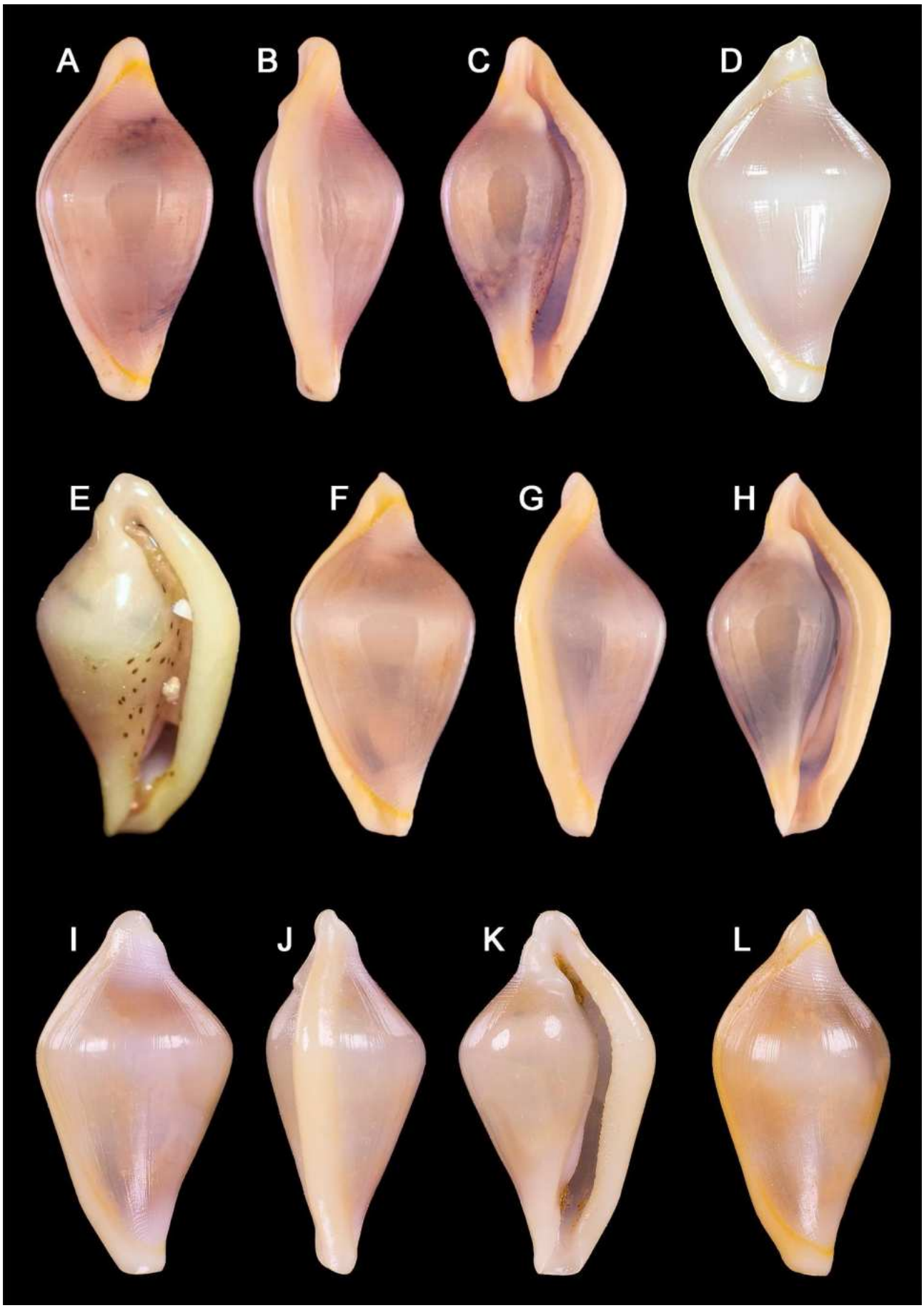

Pl. 14 Figs. A–L: *Pseudosimnia juanjosensii* (Pérez & Gómez, 1987). Specimens from Italy, Sicily. **A–C**: Egadi Islands, 90–120 m depth, Aug. 2022, 7.5 mm (ANC). **D**: Messina, Punta Faro, 90 m depth, 8.3 mm (ATPC). **E**: Egadi Islands, 90–120 m depth, Aug. 2022, 9 mm (SBC). **F–H**: Egadi Islands, 90–120 m depth, Aug. 2022, 7.6 mm (ANC).

I–K: Egadi Islands, 90–120 m depth, Aug. 2022, 8.3 mm (ANC). **L**: Egadi Islands, 90–120 m depth, Aug. 2022, 8.7 mm (ANC).

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CONTRIBUTIONS TO THE MALACOLOGY OF MALTA, VI: ERRONEOUS RECORDS OF TERRESTRIAL GASTROPODS (HELICIDAE, PUNCTIDAE, AND VALLONIIDAE)

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ABSTRACT

Some publications from the last decade mention the presence in Malta of three terrestrial snail species, namely *Helix melanostoma* Draparnaud, 1801, *Paralaoma servilis* (Shuttleworth, 1852), and *Vallonia costata* (Müller, 1774). However, no supporting evidence for any of these records exists, and therefore they must be excluded from the list of Maltese terrestrial malacofauna.

Keywords: Mollusca, *Helix melanostoma*, *Paralaoma servilis*, *Vallonia costata*, terrestrial snails, checklist

SINTEŻI

[Kontribuzzjonijiet għall-malakoloġija ta' Malta, VI: reġistrazzjonijiet żbaljati ta' gastropodi tal-art (Helicidae, Punctidae, u Valloniidae).] Matul l-aħħar għaxar snin, xi pubblikazzjonijiet semmew li tlett speċi ta' bebbux tal-art, jiġifieri *Helix melanostoma* Draparnaud, 1801, *Paralaoma servilis* (Shuttleworth, 1852), u *Vallonia costata* (Müller, 1774), huma preżenti ġewwa Malta. Madankollu, ma hemm l-ebda xhieda għal dawn ir-reġistrazzjonijiet, u allura għandhom jiġu mneħħijin mill-lista tal-malakofawna tal-art ta' Malta.

Kliem muftieħ: Mollusca, *Helix melanostoma*, *Paralaoma servilis*, *Vallonia costata*, bebbux tal-art, lista ta' kontroll

INTRODUCTION

Non-marine snails in the Maltese islands, native or otherwise, have been the subject of considerable attention over the past century, generating several rich datasets (e.g. SOÓS, 1933; BECKMANN, 1987; MANDAHL-BARTH, 1988; BECKMANN, 1992; GIUSTI et al., 1995; MIFSUD et al., 2003, 2007; CILIA et al., 2012, 2022) on which further research in faunistics, biogeography, and ecology have been based (e.g. THAKE, 1985; HOLYOAK, 1986; SCHEMBRI, 1992; PFENNINGER et al., 2010; SHERPA et al., 2018; MILLER et al., 2022). They also enable the assessments of conservation status and inform the planning of conservation strategies (e.g. THAKE & SCHEMBRI, 1989), and facilitate the monitoring of invasive species (e.g. SCHEMBRI & LANFRANCO, 1996; CAMILLERI et al., 2021; CILIA et al., 2022). For these reasons, oversights or erroneous records making their way into baseline studies should be resolved upon detection. In this paper, three species of terrestrial snails are excluded from the list of terrestrial malacofauna of the Maltese archipelago, despite being recorded as present on the islands in a number of recent publications (WELTER-SCHULTES, 2012; NEUBERT, 2014; DE MATTIA, 2017; SPARACIO et al., 2019; FELLNER, 2020; SPARACIO, 2020; HAUSDORF, 2023; and CILIA et al., 2022).

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Submitted **17 Feb. 2023**; accepted **02 Apr. 2023**.

MATERIALS AND METHODS

Surveys of malacological literature for original data on the allochthonous species compiled by CILIA et al. (2022) revealed a small number of taxa mentioned in isolation. Such records were traced to their primary sources, either in other publications or as metadata of museum specimens. The taxa discussed in this paper are not supported by evidence that would confirm their presence in Malta. Chresonymies are hereby limited to references relevant to the Maltese records.

SYSTEMATICS

Mollusca Linné, 1758
Gastropoda Cuvier, 1795
Stylommatophora Schmidt, 1855
Helicidae Rafinesque, 1815
Helicinae Rafinesque, 1815
Helicini Rafinesque, 1815
Helix Linné, 1758

Helix melanostoma Draparnaud, 1801 (**Pl. 1 Figs. A–D**)

> *Helix* (*Pomatia*) *Melanostoma* Drop. [*sic*] – COUTURIER, 1903: 30.
> *Helix* (*Helicogena*) *melanostoma* Draparnaud – KOBELT, 1903: 122.
> *Helix melanostoma* (Draparnaud, 1801) – MANDAHL-BARTH, 1988: 59, 59 unn. fig. [non *melanostoma* Draparnaud]
> *Helix melanostoma* Draparnaud, 1801 – BOUCHET, 1990: 261.
> *Helix melanostoma* Draparnaud, 1801 – BECKMANN, 1992: 21. [non *melanostoma* Draparnaud]
> *Helix* (*Helix*) *melanostoma* Draparnaud, 1801 – NEUBERT, 2014: 117, 118 figs. 181–189, 119 fig. 188, 121 fig. 189 [map].
> *Helix* (*Helix*) *melanostoma* Draparnaud, 1801 – SPARACIO, LIBERTO & CROVATO, 2019: 104, 105 figs. 1a, b, 106 figs. 2a–f.
> *Helix melanostoma* Draparnaud, 1801 – SPARACIO, 2020: 131.

Material studied:
MALTA • No material purportedly originating from Malta could be traced.
FRANCE • 1 **syntype** of *Helix* (*Helix*) *melanostoma* Draparnaud, 1801; '*France, Marseille*'; ex coll. J.P.R. DRAPARNAUD, NHMW-MO-14812, Naturhistorisches Museum Wien, Austria. Diameter 28.9 mm.

Remarks: One of the 29 *Helix* spp. treated in NEUBERT's (2014) monograph on the eastern European to northern African members of the genus is *Helix melanostoma* Draparnaud, 1801, a predominantly Maghrebi taxon, but also known from France, and as an introduced species in eastern Spain and Italy (NEUBERT, 2014; MARTÍNEZ-ORTÍ & ROBLES, 2003; WELTER-SCHULTES, 2012; CIANFANELLI & BODON, 2014; HILL et al., 2017; SPARACIO, 2020). Following a list of material studied from Algeria and Tunisia, the distribution of *H. melanostoma* is stated by NEUBERT (2014: 121) to include '*the complete Mediterranean coast of France, Malta, and from Tunisia to Oran in Algeria, at the border to Morocco*', perhaps following KOBELT (1903: 124) who commented that the species might have been introduced into Malta and the Balearic islands, although '*eingeborenen Forscher stellen diese beiden Fundorte in Abrede*' [*the native researchers deny these two occurrences*]. (The '*native researcher*' in question must be Alfredo CARUANA-GATTO (1868–1926), who is quoted elsewhere within KOBELT's treatise.)
Citing KOBELT (1903), BOUCHET (1990) includes Malta within the range of *H. melanostoma*, while citing NEUBERT (2014), SPARACIO et al. (2019) and SPARACIO (2020) also include Malta within the range of *H. melanostoma*.
A rather more detailed account of *H. melanostoma* in Malta appears in MANDAHL-BARTH (1988), who assumed it to be the likeliest valid identity of *Helix giuliae* Bourguignat, 1876, which was

described on allegedly Maltese specimens collected by Aristide LETOURNEUX (1820–1890) (BOURGUIGNAT, 1876). LETOURNEUX is also mentioned as the source of *H. melanostoma* specimens in the collection of Paul HAGENMÜLLER (1852–1900) at the Museum d'Histoire Naturelle de Marseille (France), which is stated by the latter's cataloguer, COUTURIER (1903), to inhabit Provence [France], Sfax [Tunisia], La Calle [El Kala, Algeria] and Malta. An exhaustive inventory of the malacological collection of this museum, however, is still forthcoming; any specimens of *H. melanostoma* in the current database are of local (French) origin (curatorial team of Marseille museum, pers. comm. 2024).
BECKMANN (1992) followed MANDAHL-BARTH's (1988) opinion even though KOBELT (1903: 103, 119) had already considered *H. giuliae* to be a form of either *Helix cincta* Müller, 1774 or *Helix nucula* Mousson, 1854, with the confirmation as *H. cincta* appearing in ZILCH (1952). This assessment was definitively confirmed by GIUSTI et al. (1995) following a study of BOURGUIGNAT's (1876) syntypes, which were illustrated by NEUBERT (2014: 85 fig. 141) and CILIA et al. (2022: 136 figs. 3A-F).
No lots in museum collections nor entries in other recent faunistic syntheses (e.g. GIUSTI et al., 1995) could provide any evidence that *H. melanostoma* is known from Malta, and it is hereby excluded from the local fauna.

Punctoidea Morse, 1864
Punctidae Morse, 1864
Laominae Suter, 1913
Paralaoma Iredale, 1913

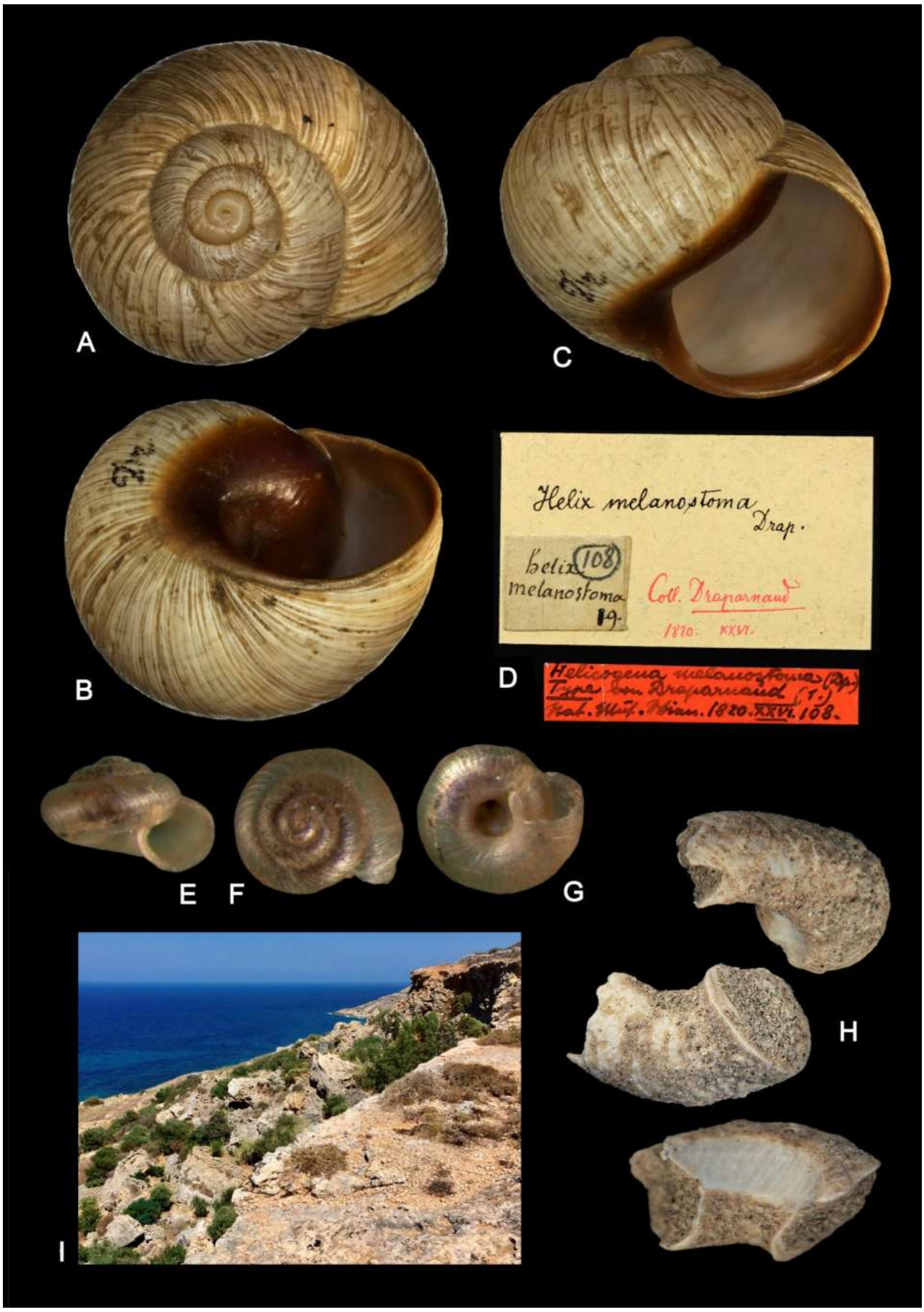
Paralaoma servilis (Shuttleworth, 1852) (**Pl. 1 Figs. E–G**)

> *Paralaoma servilis* (Shuttleworth, 1852) – WELTER-SCHULTES, 2012: 203, 203 unn. figs. (1 map).
> *Paralaoma servilis* (Shuttleworth, 1852) – DE MATTIA, 2017: webpage.
> *Paralaoma servilis* (Shuttleworth, 1852) – HAUSDORF, 2023: fig. 2, supplementary material 1.

Material studied:
MALTA • No material purportedly originating from Malta could be traced.
SPAIN • 1 **syntype** of *Helix servilis* Shuttleworth, 1852; '*Canary Islands, Teneriffa, ad saxa prope Garachico*'; ex coll. R.J. SHUTTLEWORTH, ZMZ 503343, Zoologisches Museum der Universität Zürich, Switzerland.

Remarks: The valuable work on European non-marine molluscs by WELTER-SCHULTES (2012) features a map of Europe highlighting the distribution of *Paralaoma servilis* (Shuttleworth, 1852), which incorrectly includes the Maltese islands (p. 203). Also, within the same species' European range, WELTER-SCHULTES (2012) includes Belgium, although the first record of *P. servilis* for that country does not appear until three years later in VAN DEN NEUCKER & RONSMANS (2015), as well as parts of Bulgaria, although the first record of *P. servilis* in that country is given by GEORGIEV & DEDOV (2022).
Other more recent publications outlining the species' range exclude Malta categorically (e.g. GITTENBERGER at al., 2020), although in the IUCN Red List assessment for the species, DE MATTIA (2017) classifies *P. servilis* as '*Extant & Origin Uncertain*' for Malta, citing WELTER-SCHULTES (2012). In turn, DE MATTIA (2017) is cited by HAUSDORF (2023: fig. 2, supplementary material 1), who also includes Malta in a distribution map for *P. servilis*.
Despite the species having been introduced throughout most of the Palaearctic (WELTER-SCHULTES, 2012; HAUSDORF, 2023), no lots in museum collections nor other entries in recent faunistic syntheses (e.g. MANDAHL-BARTH, 1988; BECKMANN, 1992; GIUSTI et al., 1995) provide any evidence that *P. servilis* is known from Malta. It is hereby excluded from the local fauna.

Pupilloidea Turton, 1831
Valloniidae Morse, 1864
Vallonia Risso, 1826



Pl. 1 Figs. A–I: Terrestrial gastropods erroneously recorded for Malta and related materials. **A–C**: Syntype of *Helix* (*Helix*) *melanostoma* Draparnaud, 1801, NHMW-MO-14812; apical, ventral, and apertural views; diameter: 28.9 mm. Photographs by A. ESCHNER. **D**: Labels accompanying the syntype of *Helix* (*Helix*) *melanostoma* Draparnaud, 1801,

NHMW-MO-14812. Smallest label with writing '108' was the original one in the collection of J.P.R. DRAPARNAUD (A. ESCHNER, pers. comm, 2024). Photograph by A. ESCHNER. **E–G**: Syntype of *Helix servilis* Shuttleworth, 1852, ZMZ 503343; apertural, apical and ventral views; diameter 1.8 mm. Photographs by E. NEUBERT. **H**: Three different views of the same fossil fragment of Serpulidae indet. sp., C. FELLNER leg. (sub *Vallonia costata*); no. 102130238; c. 1.5mm. Photographs by M. CHRISTODOULOU. **I**: Upper Coralline Limestone karst in the immediate vicinity of Calypso Cave [L-Għar ta' Kalipso], Xagħra, Gozo [Għawdex], Malta. Photo taken by the author in Jul. 2017.

Vallonia costata (Müller, 1774) (**Pl. 1 Fig. H**)

Vallonia costata (Müller, 1774) – FELLNER, 2020: 164, 167.
Vallonia costata (Müller, 1774) – CILIA, NAPPO & CARDONA, 2022: 137.

Material studied:
MALTA • No material purportedly originating from Malta could be traced.

Additional material studied:
MALTA • Serpulidae indet. sp.: 1 fragment; '*Gozo: Calypso-Höhle, Eingangsbereich*' (Gozo [Għawdex]: Calypso Cave [L-Għar ta' Kalipso], Xagħra); Feb. 2002; C. FELLNER leg.; ex coll. C. FELLNER, no. 102130238, Oberösterreichisches Landesmuseum, Linz, Austria. (Miocene: late Tortonian to early Messinian.)

Remarks: The checklist by FELLNER (2020) treats about 30 terrestrial species collected from Malta and Gozo by the author, amongst which there is the purported first Maltese record of *Vallonia costata* from a cave in Gozo. Citing FELLNER (2020), CILIA et al. (2022) include *V. costata* in their checklist of allochthonous species.
Since no illustrations to support this observation were provided by FELLNER (2020), examination of the original material was deemed necessary. The lot forming the basis of the record could be located within FELLNER's collection in the Oberösterreichisches Landesmuseum in Austria. It consists of one specimen and is a section of a calcified and highly weathered tube of around 1.5 mm, which is however not a whorl fragment of *V. costata*, nor does it belong to any gastropod.
The tube was constructed by an indeterminate species of Serpulidae Rafinesque, 1815 (Annelida: Polychaeta) typical of fossil reef biocenoses of the late Miocene in the Upper Coralline Limestone Formation (PEDLEY, 1976, 1979; BOSENCE, 1983; GATT, 2006; GATT & DE ANGELI, 2010), a raised marine sedimentary deposit in which the cave cited by FELLNER (2020) is located ((**Pl. 1 Fig. I**). Serpulid tubes, especially those of *Rotularia* sp. and *Serpula* sp., fossilize exceptionally well due to their calcitic construction, and such fossils from Malta *in situ* that are very similar to FELLNER's specimen are illustrated by BIALIK et al. (2021: 260 fig. 4b). Sessile gastropods of the family Vermetidae Rafinesque, 1815 also construct tubes analogous to those of serpulids. However, these shells are composed of aragonite, and would have dissolved quickly in a submerged environment such as that prevailing in Malta during the Messinian (see BIALIK et al., 2021). This explains the virtual absence of Maltese vermetid fossils, with the possible exception of *Vermetus melitensis* (Gmelin, 1791), a *species inquirenda*, but originally also interpreted as a serpulid (GMELIN, 1791: 3746; BIELER & PETIT, 2011; see also SCILLA, 1670: pl. 12 fig. 2).
As no other lots in museum collections nor entries in recent faunistic syntheses (e.g. MANDAHL-BARTH, 1988; BECKMANN, 1992; GIUSTI et al., 1995; GERBER, 1996) could provide any evidence that *V. costata* is known from Malta, it is hereby excluded from the local fauna.

DISCUSSION

The discussed species' presence in Malta is not proven. Information to the contrary originated through oversight or misidentification in primary sources, which were sometimes cited in secondary sources. Ideally, checklists should combine critical evaluation of bibliographic references with metadata of positively identified specimens, either *in situ* or in museum collections. The important role of museums to properly source, maintain, and make their repositories accessible to researchers, perhaps even remotely, is here highlighted.

ACKNOWLEDGEMENTS

The author is indebted to Magdalini CHRISTODOULOU (Oberösterreichisches Landesmuseum, Linz, Austria), who provided the photos of the specimen from FELLNER's collection, to Anita ESCHNER (Naturhistorisches Museum Wien, Austria), who provided the photos of the *Helix* syntype, to Eike NEUBERT (Naturhistorisches Museum Bern, Switzerland), who provided the photos of the *Paralaoma* syntype, and to Patrick J. SCHEMBRI (University of Malta), who commented critically on an earlier version of the manuscript.

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A REVIEW OF THE DISTRIBUTION OF *OTALA PUNCTATA* (O.F. MÜLLER, 1774) (GASTROPODA: STYLOMMATOPHORA: HELICIDAE) OUTSIDE OF ITS NATIVE RANGE

Mauro GRANO [9]

ABSTRACT

The aim of this contribution is to analyze the diffusion of the terrestrial mollusc *Otala punctata* (O.F. Müller, 1774) outside of its native range. Through this analysis, the importance of historical malacological collections present in natural history museums around the world is highlighted.

Keywords: Malta, Italy, non-indigenous species, Mollusca, museum collection

SINTEŻI

[Id-distribuzzjoni ta' *Otala punctata* (O.F. Müller, 1774) (Gastropoda: Stylommatophora: Helicidae) barra mill-firxa indiġena tagħha.] L-għan ta' din il-kontribuzzjoni hija l-analiżi tat-tixrid tal-mollusk tal-art *Otala punctata* (O.F. Müller, 1774) barra mill-firxa indiġena. Permezz ta' din l-analiżi tingħata xhieda l-importanza tal-kollezzjonijiet malakoloġiċi storiċi f'mużewijiet tal-istorja naturali madwar id-dinja.

Kliem muftieħ: Malta, Italja, speċi mhux indiġena, Mollusca, kollezzjoni tal-mużew

INTRODUCTION

The accidental and deliberate introduction of non-native species is a notable worldwide phenomenon, which has been identified as one of the leading causes of global biodiversity decline (MCKINNEY & LOCKWOOD, 1999; CLAVERO & GARCIA-BERTHOU, 2005; BUTCHART et al., 2010). Moreover, many introduced non-native species are harmful to local and regional economic activities, as well as to human welfare (PIMENTEL et al., 2005; HULME, 2014). The helicid *Otala punctata* (O.F. Müller, 1774) is a western Mediterranean thermophilic species, with a range extending from the north-western tip of Algeria to France (FALKNER, 1990; CLANZIG & BERTRAND, 2001; FALKNER et al., 2002; MAUREL, 2006; HERBERT, 2010; WELTER-SCHULTES, 2012; HOLYOAK & HOLYOAK, 2017). SACCHI (1965) suggests a Ibero-Maghrebian origin for the species, while MARTÍNEZ-ORTÍ & ROBLES (2001) consider the species native to the Iberian Peninsula. Its introduction in non-native environments has the potential to alter local ecosystems (POINTIER & AUGUSTIN, 1999). Owing to its ready establishment in various temperate habitats, *O. punctata* has gained popularity as a delicacy in some countries, for example in France, where it is protected (BARBARA & SCHEMBRI, 2008). In some cases, *O. punctata* has become invasive, and has proliferated to the point of becoming a horticultural and agricultural pest (BORAY & MUNRO, 1998; MIENIS, 1999a) that can be challenging to eradicate (MACDONALD et al., 2003; FRANK, 2010). Although there is no precise documentation of the monetary losses suffered by the agricultural sector due to *O. punctata*, this sector is known to experience high financial losses with respect to the management of invasive species in general (PAINI et al., 2016).

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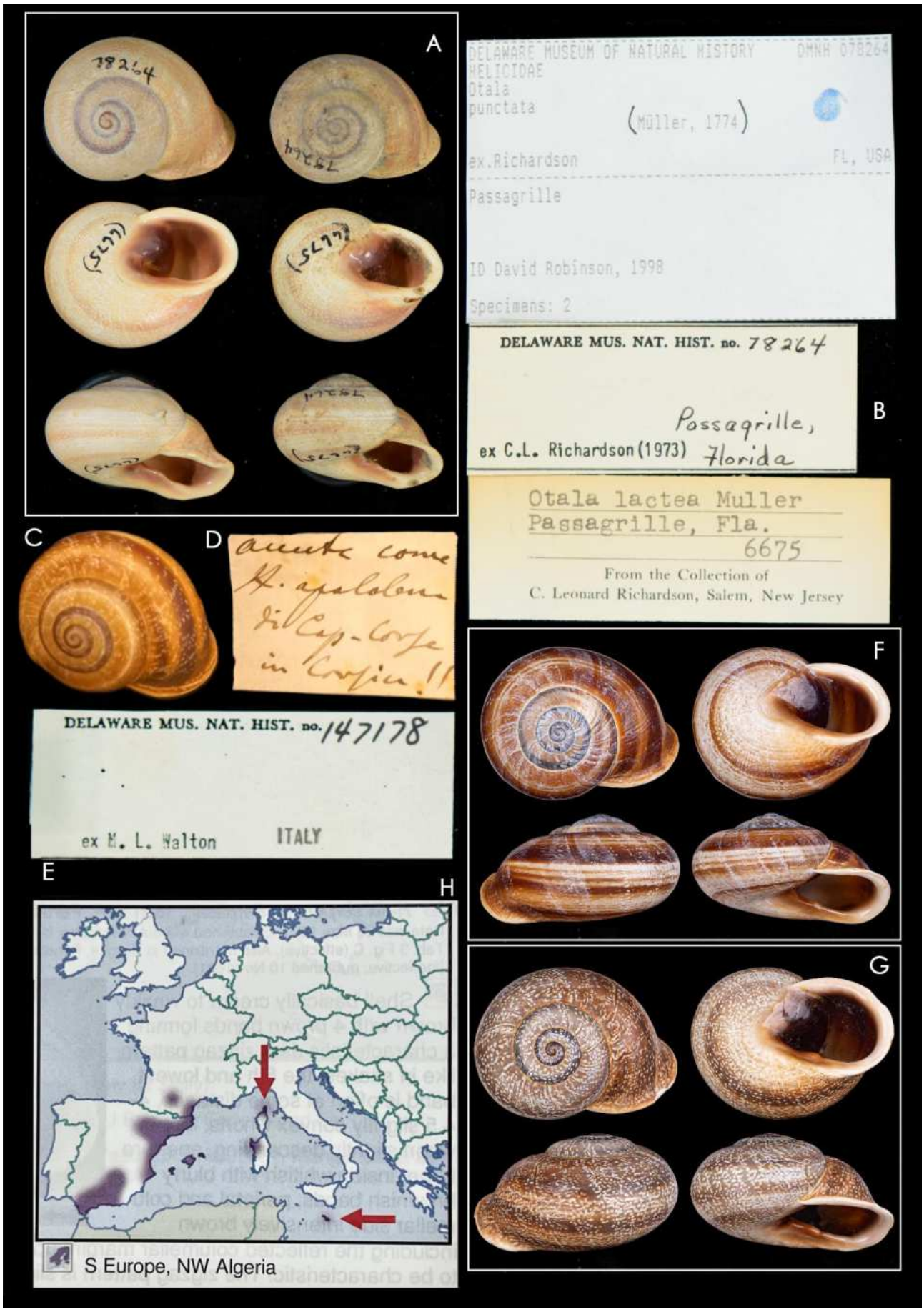
Submitted **01 Mar. 2024**; accepted **12 Apr. 2024**.



Pl. 1 Figs. A–H: Museum specimens of *Otala punctata* (O. F. Müller, 1774) from outside its native range and related textual information. **A**: Different views of two specimens of *Otala punctata* (O. F. Müller, 1774) from Passagrille, Pinellas County, Florida, U.S.A., lot registered as DMNH 78264. **B**: Three museum labels of lot DMNH 78264. **C**: A

specimen of *Otala punctata* (O. F. Müller, 1774) from Cap Corse, Corsica, France, lot from the collection of Tommaso di Maria ALLERY, marquis of MONTEROSATO (1841–1927) in the Museo Civico di Zoologia, Rome, Italy. **D**: Label with MONTEROSATO's handwriting for the specimen in the preceding figure. *Helix apalolena* Bourguignat, 1867 is a synonym of *Otala punctata* (O. F. Müller, 1774) (photos C & D courtesy of M. APPOLLONI, Museo Civico di Zoologia, Rome, Italy). **E**: Museum label of two specimens of *Otala punctata* (O. F. Müller, 1774) from Italy (no detailed location data), lot registered as DMNH 147178 (photos A, B & E courtesy of Liz SHEA, DMNH). **F**: Different views of a specimen of *Otala punctata* (O. F. Müller, 1774) from Mosta, Malta, from lot registered as NMNH 80-003. **G**: Different views of a specimen of *Otala punctata* (O. F. Müller, 1774) from Baħrija, Rabat, Malta, from lot registered as NMNH 80-004 (figures F & G courtesy of A. NAPPO, Hamrun, Malta). **H**: Range in Europe of *Otala punctata* (O. F. Müller, 1774) according to WELTER-SCHULTES (2012: 624).

MATERIALS AND METHODS

The research on museum collections was carried out by consulting catalogues available online. In some cases, curators of the collections were contacted directly.

Abbreviations:
ANSP: Academy of Natural Sciences of Drexel University, Philadelphia, Pennsylvania, U.S.A.
CAS: California Academy of Sciences, San Francisco, California, U.S.A.
CM: Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, U.S.A.
DMNH: Delaware Museum of Nature & Science, Wilmington, Delaware, U.S.A.
DMNS: Denver Museum of Nature and Science, Denver, Colorado, U.S.A.
FML: Fundación Miguel Lillo, Tucumán, Argentina
FMNH: Field Museum, Chicago, Illinois, U.S.A.
HNS: Haus der Natur, Salzburg, Austria
INHS: Illinois Natural History Survey, Champaign, Illinois, U.S.A.
LACM: Natural History Museum of Los Angeles, Los Angeles, California, U.S.A.
MACN: Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina
MMK: Malacological Museum Malakos, Città di Castello, Perugia, Italy
MNCB: Museu de Ciències Naturals de Barcelona, Barcelona, Spain
MNRJ: Museu Nacional, Rio de Janeiro, Brazil
MZUC: Museo de Zoología de la Universidad de Concepción, Biobío, Chile
MZUF: Museo Zoologico 'La Specola', Firenze, Italy
NHMA: Naturhistorisk Museum Aarhus, Aarhus, Denmark
NMNH: National Museum of Natural History, Mdina, Malta
RBINS: Royal Belgian Institute of Natural Sciences, Brussels, Belgium
RMNH: Naturalis Biodiversity Center, Leiden, The Netherlands
SNSD: Senckenberg Naturmuseum Frankfurt, Frankfurt am Main, Germany
UF: Florida Museum of Natural History, Gainesville, Florida, U.S.A.
UMMZ: Museum of Zoology, University of Michigan, Michigan, U.S.A.

SYSTEMATICS

Stylommatophora Schmidt, 1855
Helicoidea Rafinesque, 1815
Helicidae Rafinesque, 1815
Helicinae Rafinesque, 1815
Thebini Wenz, 1923
Otala Schumacher, 1817

> (*Helix*) *Otala* SCHUMACHER, 1817: 58, 191. [type species *Helix lactea* O.F. Müller, 1774, by subsequent designation in PILSBRY, 1895: 323]

Otala punctata (O. F. Müller, 1774) (**Pl. 1 Figs. A–G**)

> *Helix punctata* O. F. MÜLLER, 1774: 21. [*locus typicus* given as '*Italy*', but probably from North Africa (see PALLARY, 1914)].

Remarks: The general appearance of the shell alternates dark and light brownish spiral bands, covered with numerous tiny white spots, rather similar to snowflakes. Whorls feature a dark grey-brown band above the suture. Interior of aperture covered with a dark brown to almost black enamel, which obscures the underlying color pattern. Flared edge of the outer lip is pale. Diameter may be up to 40 mm (HERBERT, 2010).
In parts of the Iberian peninsula to where it is indigenous, *O. punctata* is often sympatric with *Otala lactea* (O.F. Müller, 1774), and both species show similar life cycle patterns (ROBINSON et al., 1998). However, *O. lactea* is distinguished from *O. punctata* by the colour of the peristome, which is very dark brown to black in the former, but light brown to whitish in the latter (SEBBAN et al., 2022).
The habitat of *O. punctata* is highly variable. It is known to thrive on rocky slopes (KERNEY et al., 1983), coastal zones (FRANK, 2010), gardens (MIENIS, 1999a; GRANO & SPARACIO, 2023), wasteland, industrial land, disturbed land, docks (HERBERT & SIRGEL, 2001), rural environments (DE MATTIA & MASCIA, 2011), vineyards, and walls (HERBERT, 2010; CILIA, 2012). The species is mostly nocturnally active (BARBARA & SCHEMBRI, 2008), particularly with dewfall, which facilitates mobility. In aestivation, *O. punctata* seals its aperture with an epiphragm (BARBARA & SCHEMBRI, 2008). During its active season, the snail feeds on foliage, favouring dense ruderal vegetation for grazing.
Despite the literature cited above, the biology of *O. punctata* is not well documented; much more has been published on the similar helicids *O. lactea* and *Eobania vermiculata* (O. F. Müller, 1774) (BOUAZIZ-YAHIATENE et al., 2017; HOLYOAK & HOLYOAK, 2017; EKIN, 2023), both thermophilic Mediterranean species sharing similar morphologies, ecology, and life cycles (BARBARA & SCHEMBRI, 2008).

RESULTS

Through synanthropic dispersal, this species is known to have spread to other areas within the Mediterranean, such as Italy (DE MATTIA & MASCIA, 2011; GRANO & SPARACIO, 2023) and Malta (MIFSUD et al., 2003 sub *Otala lactea*; BARBARA & SCHEMBRI, 2008; CILIA, 2012; CAMILLERI et al., 2021), but also to more distant locations such as South Africa (HERBERT & SIRGEL, 2001), Argentina, Brazil, Chile, Uruguay (MIENIS, 1999a; ARAYA, 2015), and the U.S.A. (MIENIS, 1999b, 2001; ALBRECHT, 2001; COWIE et al., 2009).

Italy: In Italy, *O. punctata* was recorded for the first time by MALATESTA & SETTEPASSI (1954 sub *Archelix apalolena* (Bourguignat, 1867)) from Alghero in Sardinia. Its presence in the same area was confirmed CARRADA et al. (1967). Significantly, both papers reported finding badly preserved shells only, with no living specimens found. More recently, the presence in Sardinia was confirmed by DE MATTIA & MASCIA (2011). The species is present exclusively in the southern surroundings of the city of Alghero (Sassari), along the southern rocky coastal area of the city, from sea level to 40 m altitude. Populations cover an area of approximately 0.4 km^2. CARRADA et al. (1967) stressed the presence of fossil shells of *O. punctata* in travertines from Alghero, but this has not been confirmed. Preliminary field research revealed that, in the surroundings of Alghero, Quaternary deposits do not show a presence of *O. punctata* (DE MATTIA & MASCIA, 2011). BALDINO et al. (2008) and WILKENS (2004) did not cite the species from the archaeological sites of Northwestern Sardinia. In addition, PAULUCCI (1882) did not cite *O. punctata* for Sardinia. The introduction in Sardinia of *O. punctata* may be referred to the Aragonese occupation during the 14th century C.E. The traditional local denomination of this species, '*caragol español*' [*Spanish snail*], could support this hypothesis (DE MATTIA & MASCIA, 2011). The second (and most recently documented) population is that in the city of Rome (GRANO & SPARACIO, 2023). Here, the population is present in a very narrow area of one of the city's historic parks, Villa Torlonia, which has a total area of 0.132 km^2. The presence of *O. punctata* in Rome is almost certainly attributable to anthropochory, with two leading hypotheses. The first is related to trade in molluscs for food purposes, practiced

by man since ancient times with the dispersal of living populations from one region to another. In Rome, consumption of terrestrial molluscs is widespread and a part of traditions consolidated since historical times (GRANO, 2021). Introduction of *O. punctata* linked to human consumption has already been documented, for example, in France (CLANZIG & BERTRAND, 2001). DE MATTIA & MASCIA (2011) state that *O. lactea* and *O. punctata* were commonly farmed in heliciculture plants in Sardinia. SPARACIO (2020) reports the presence, in 2015 and 2018, of *Otala* sp., in bags containing *Theba pisana* (O.F. Müller, 1774) for sale in the markets of Palermo. A report of *O. lactea* in Tuscany refers to specimens escaped from a heliciculture plant in Campagnatico, in the province of Grosseto (BODON et al., 2021).
The second hypothesis to take into consideration could be that of passive transport with 15 palm trees planted in Villa Torlonia in May 2022. These palm trees were planted to replace, albeit partially, 29 specimens of *Phoenix canariensis* H.Wildpret, removed due to infestation with *Rhynchophorus ferrugineus* (Olivier, 1790).
Museum specimens of *O. punctata* from Italy recovered during the present research are listed in **Table 1.**

Malta: There are no native species of *Otala* on the Maltese Islands (GIUSTI et al., 1995). Reports of the similar *O. lactea* exist: FEILDEN (1879) collected a number of beached specimens, presumably transported by the sea, while MACHIN (1972) claimed to have obtained a culture of *O. lactea* from Malta, although it is more likely that these were the common *E. vermiculata*, which superficially resembles *O. lactea*. After, MIFSUD et al. (2003) claimed to have recorded *O. lactea* within a plant nursery in central Malta. However, it is highly likely that the records by FEILDEN (1879) and MIFSUD et al. (2003) are misidentifications of *O. punctata*. In fact, BARBARA & SCHEMBRI (2008), visiting the surrounding areas of the same nursery, found a substantial population of *O. punctata*. BARBARA & SCHEMBRI (2008) state that this species has established itself in an estimated area of 50,000 m² in the immediate vicinity of the Mosta nursery, occupying various sites and habitats around the nursery. The snails did not have particular substratum preferences and individuals were found on dry-stone walls, under stones, and on a variety of ubiquitous flora, including wild carrot *Daucus carota* L., *Diplotaxis tenuifolia* (L.) DC., *Ferula melitensis* Brullo, C. Brullo, Cambria, Giusso, Salmeri & Bacch., *Foeniculum vulgare* Mill., *Lavatera arborea* L., *Galactites tomentosus* Moench, and *Glebionis coronaria* (L.) Cass. ex Spach.
Museum specimens of *O. punctata* from Malta recovered during the present research are listed in **Table 1.**

South Africa: The first population of *O. punctata* in South Africa was found at Tygerberg Hospital, near Cape Town, in December 1986, and the second population at the Cape Town docks, in January 1987 (HERBERT & SIRGEL, 2001; DAVIES ET AL., 2020; JANION-SCHEEPERS & GRIFFITHS, 2020). An eradication programme was started promptly, and the two populations were targeted from 1987 to 1989 and monitored through to Aug. 1990, with no further presence of the species detected thereafter (HERBERT & SIRGEL, 2001). Control techniques included manual collection of snails and baiting with molluscicide. Dense vegetation such as patches of grass were removed using herbicide and flame throwers, so that snails could be detected more easily.
HERBERT & SIRGEL (2001) estimated that the Tygerberg colony initially covered about 40,000 m², and that over 22,000 snails were removed from the area. The eradication project was justified because no species of *Otala* had ever been reliably recorded in South Africa prior to 1986, and they were known to be invasive elsewhere. Since this is a relatively large polyphagous herbivore, there is a possibility it could be reintroduced in future, either for cultivation or by accident (DAVIES et al., 2020).

South America: In Chile, the first record of *O. punctata* is from Buin, Santiago (33°43’59” S; 70°45’00″ W) and refers to two specimens collected attached to fence-posts in a vineyard (ARAYA, 2015).
Museum specimens of *O. punctata* from South America recovered during the present research are listed in **Table 1.**

U.S.A.: MIENIS (1999b) reports that Harry G. LEE (1940–2024) sent him a specimen of *O. punctata* that he collected at Fernandina Beach, Nassau County, Florida. Currently, this species is found in the same locality, although it shows no sign of expanding its range. In this location it feeds on some

ornamental plants, but does not constitute a serious problem (CAPINERA & WHITE, 2011). In research through museum collections, numerous specimens of *O. punctata* were found, collected in Georgia (FELIX et al., 2018).
Museum specimens of *O. punctata* from the U.S.A. recovered during the present research are listed in **Table 1.**

Table 1: Museum specimens of *Otala punctata* (O.F. Müller, 1774) from outside of its native range traced for the present paper, sorted alphabetically by country and location. Unknown years of collection are intentionally left blank.

Country	Location	Year	Registration
Argentina	Buenos Aires		MCNB 78-0231
Argentina	Buenos Aires		MCNB 79-4221
Argentina	Buenos Aires		CAS 41613
Argentina	Buenos Aires		FMNH 37340
Argentina	Buenos Aires		FMNH 54757
Argentina	Buenos Aires		FMNH 57457
Argentina	Buenos Aires		FMNH 65236
Argentina	Buenos Aires		FMNH 69210
Argentina	Buenos Aires		FMNH 94484
Argentina	Buenos Aires		FMNH 147368
Argentina	Buenos Aires		ANSP1462
Argentina	Buenos Aires		ANSP 5785
Argentina	Buenos Aires		ANSP 32738
Argentina	Buenos Aires		MMK 17183
Argentina	Buenos Aires		UF 97647
Argentina	Buenos Aires	1938	FMNH 125480
Argentina	Buenos Aires	1939	FMNH 191980
Argentina	Buenos Aires, Bahia Blanca		FML 15424
Argentina	Buenos Aires, Mar del Plata		FML 681
Argentina	Buenos Aires, Mar del Plata		FML 10306
Argentina	Buenos Aires, Mar del Plata		FML 15421
Argentina	Buenos Aires, Miramar		MACN 35640
Argentina	Buenos Aires, Monte Hermoso	1982	RMNH 55632
Argentina	Buenos Aires, Necochea		FML 12780
Argentina	Buenos Aires, Port of Lading	1997	UF 528499
Argentina	Buenos Aires, San Pedro		UF 222553
Argentina	Buenos Aires, Sierra de Los Padres		FML 15427
Argentina	Buenos Aires, Tres Arroyos		DMNH 137735
Argentina	Buenos Aires, Villa Gesell	1980	MMK 39200
Argentina	Cordoba, Rio Quarto		UMMZ 153575
Argentina	La Pampa	2009	UF 519406
Argentina	Mar del Plata	1963	FMNH 217354
Argentina	Mendoza, La Consulta		MMK 39366
Argentina	Mendoza, Parque Gral San Martin		FML 15958
Argentina	Sa. De Cordoba, Rio Primero		RMNH 65840
Argentina	Tierra del Fuego		SNSD 46837
Brazil	Brazil		NHMA 29956
Brazil	Rio Grande do Sul		MNRJ 53879
Chile	Buin, Santiago		MZUC 39632
Cuba	not specified		MCNB 79-4258
Italy	not specified		CM 62.30325
Italy	not specified		DMNH 147178
Italy	not specified		INHS 94102
Italy	not specified		LACM 103017
Italy	Isolotto Argentarola, Grosseto	1885	MZUF 2764
Italy	Potenza		CM 144814
Italy	Sardinia		DMNH 146640
Italy	Siracusa, Vendicari	2002	CM66224
Malta	Baħrija, Rabat	2008	NMNH 80-004
Malta	Mosta	2005	NMNH 80-003
Malta	Ta' Qali, Attard/ Mosta	2003	NMNH 80-005
Malta	Ta' Qali, Attard/ Mosta	2003	NMNH 80-001
Malta	Ta' Qali, Attard/ Mosta	2003	NMNH 80-002
U.S.A.	California, San Diego, Miramar		CM 154275
U.S.A.	Florida, Nassau County, Fernandina Beach	1993	UF 208929
U.S.A.	Florida, Nassau County, Fernandina Beach	1993	UF 529835
U.S.A.	Florida, Nassau County, Fernandina Beach	2002	UF 528458
U.S.A.	Florida, Pinellas County, Passagrille		DMNH 78264

U.S.A.	Georgia, Chatham County		UF 223235
U.S.A.	Georgia, Chatham, 15 miles below Savannah	1930	FMNH 364261
U.S.A.	Georgia, Chatham, 2 miles west of Savannah	1959	FMNH 267831
U.S.A.	Georgia, Chatham, 2 miles west of Savannah	1959	FMNH 267833
U.S.A.	Georgia, Chatham, Cockspur Island		FMNH 118694
U.S.A.	Georgia, Chatham, Cockspur Island		ANSP 170287
U.S.A.	Georgia, Chatham, Cockspur Island		UF 27678
U.S.A.	Georgia, Chatham, Cockspur Island		UF 97613
U.S.A.	Georgia, Chatham, Cockspur Island		UF 223236
U.S.A.	Georgia, Chatham, Cockspur Island	1937	FMNH 118413
U.S.A.	Georgia, Chatham, Cockspur Island	1954	FMNH 109754
U.S.A.	Georgia, Chatham, Cockspur Island	1959	FMNH 267832
U.S.A.	Georgia, Chatham, Savannah Beach	1959	FMNH 267830
U.S.A.	Georgia, Chatham, small island near mouth of Savannah River		UF 97619
U.S.A.	Georgia, Chatham, Tybee Island	2004	FMNH 307861
U.S.A.	Georgia, Glynn, St. Simon Island		FMNH 83170
U.S.A.	Texas, Waco		FMNH 168164
Uruguay	Cerro de Montevideo		FMNH 159426
Uruguay	Ciudad de Salto		DMNH 78268
Uruguay	Garriti Island, Maldonado Bay	1892	ANSP 118953
Uruguay	Ioma de Montevideo		MCNB 79-4274
Uruguay	Maldonado		DMNH 25948
Uruguay	Maldonado	1960	FMNH 159435
Uruguay	Maldonado, Punta del Este		DMNH 158344
Uruguay	Mar del Plata, Punta Mogotes	1990	ANSP 447732
Uruguay	Montevideo		RBINS 143162
Uruguay	Montevideo		MCNB 77-8303
Uruguay	Montevideo		MCNB 79-4277
Uruguay	Montevideo		DMNH 25950
Uruguay	Montevideo		DMNH 34585
Uruguay	Montevideo		ANSP 30493
Uruguay	Montevideo		ANSP 67401
Uruguay	Montevideo		UF 97606
Uruguay	Montevideo	1948	FMNH 93242
Uruguay	Montevideo	1948	FMNH 107589
Uruguay	Montevideo	1967	RMNH 65839
Uruguay	Montevideo	1997	CAS 112582
Uruguay	Montevideo	1997	CAS 229193
Uruguay	Montevideo, Punta Gorda	1969	UF 128907
Uruguay	not specified		SNSD 44705
Uruguay	Punta del Este	1950	ANSP 251824
Uruguay	Rocha	1996	UF 529150
Uruguay	Rocha	1996	UF 534055
Uruguay	Rocha, La Paloma	1998	DMNS 34006
Uruguay	not specified		HNS 1901790
Uruguay	not specified		HNS 1902052

CONCLUSION

Alien species, particularly those that become invasive, have enormous economic and environmental consequences. PIMENTEL et al. (2005) estimated that the annual economic costs resulting from invasive alien species in the U.S.A. alone are approximately $120 billion (around €110 billion as of the time of writing). Biodiversity-related costs can also be considerable, and introduced species are recognized as one of the most significant threats to terrestrial biota (CLOUT, 1995, 2002), resulting in the homogenization of once diverse faunas (MCKINNEY & LOCKWOOD, 1999; COWIE, 2004). In addition, the economic impact of many slug and land snail pests on the agricultural sector is well known (BARKER, 2002).

All members of the genus *Otala* are edible and have been exploited as a cheap food source since historical times. This also led to introduction of *Otala* to other areas (MIENIS, 1999b). Traditional harvesting of these terrestrial molluscs directly from the wild has declined in recent decades, and sales from farmed populations (even as imports) have increased, especially in North Africa (SPARACIO, 2020). Internationally, Morocco is the topmost exporter in the world of edible snails (15.7%), followed by Romania (7.42%), Turkey (5.94%), France (5.93%), and Indonesia (5.71%)

(SEBBAN et al., 2022). Therefore, it is absolutely possible that *O. punctata* could expand its distribution areas, even in a relatively short time.

ACKNOWLEDGEMENTS

The author would like to thank Massimo APPOLLONI (Museo Civico di Zoologia, Rome, Italy), Gianluigi BINI (MMK), Simone CIANFANELLI (University of Florence, Firenze, Italy), David P. CILIA (NMNH), Jessica GOODHEART (American Museum of Natural History, New York, U.S.A.), Fabio LIBERTO (Cefalù, Italy), Gary ROSENBERG (ANSP), Liz SHEA and Alex KITTLE (DMNH), and for critical advice and/ or the sharing of data from the collections under their care. Photographs of Maltese specimens were taken by Andrea NAPPO (Ħamrun, Malta).

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THE AVIFAUNA OF THE MALTESE QUATERNARY – A HISTORICAL OVERVIEW

John J. BORG [10]

ABSTRACT

The Maltese Quaternary is mostly renowned for its mammalian fauna. Since the early excavations in the late 1800s, avian remains were unearthed along with bones of pachyderms, deer, rodents, and others. The bone remains were normally sent to the British Museum (NH) in London for identification. W.K. PARKER and R. LYDEKKER were the first to work on these bones, followed by others, including scientists from Germany and Malta, who identified most of the remains, from which they also described several new species to science. These included extinct species, such as the Giant Swan *Cygnus falconeri*, Giant Crane *Grus melitensis*, a 'Maltese' Vulture *Gyps melitensi,s* and a 'Maltese' owl *Strix melitensis*. To date, a total of 49 species of birds have been identified. The main aim of this overview is to highlight the various contributions and authors who constructed our present knowledge on the Maltese Quaternary avifauna.

Keywords: Malta, Quaternary, bird bones, historical context

SINTEŻI

[L-avifawna tal-Kwaternarju Malti – ħarsa ġenerali storika.] Il-Kwaternarju ta' Malta huwa magħruf l-iktar għall-fawna tal-mammiferi. Sa mill-iskavi bikrija fl-aħħar tas-snin 1800, inkixfu fdalijiet ta' tjur flimkien ma għadam ta' pakidermi, ċriev, gerriema, u oħrajn. Il-fdalijiet ta' għadam normalment kienu jiġu mibgħuta l-British Museum (NH) f'Londra għall-identifikazzjoni. W.K. PARKER u R. LYDEKKER kienu l-ewwel li studjaw dan l-għadam, segwiti minn oħrajn, fosthom xjenzjati mill-Ġermanja u Malta, li identifikaw ħafna mill-fdalijiet u li minnhom iddeskrivew ukoll diversi speċi ġodda għax-xjenza. Dawn jinkludu speċi estinti, bħaċ-Ċinju Ġgant *Cygnus falconeri*, Grawwa Ġgant *Grus melitensis*, avultun 'Malti' *Gyps* melitensis, u kokka 'Maltija' *Strix melitensis*. Sal-lum, ġie identifikat total ta' 44 speċi ta' għasfur. L-għan ewlieni ta' din il-ħarsa ġenerali huwa li jiġu enfasizzati d-diversi kontribuzzjonijiet u awturi li bnew l-għarfien tagħna dwar l-avifauna tal-Kwaternarju Malti.

Kliem muftieħ: Malta, Kwaternarju, għadam tal-għasafar, kuntest storiku

INTRODUCTION

Pleistocene deposits in the Maltese Islands were mainly discovered inside caves, but several fissures and crevices also yielded very interesting finds. Avian remains were almost always present in these deposits, in variable amounts and a diversity of species. The Magħlaq Cave, close to the Mnajdra prehistoric complex, produced bird bones from its upper layers, alongside bones and teeth of the rodent *Myoxus melitensis* Adams, 1866 (ADAMS, 1866). Avian bones from the Żebbuġ Cave, belonging mainly to *Cygnus falconeri* Parker, 1865 and *Cygnus equitum* Bate, 1916, were found associated with those of at least two *Elephas* sp,, tortoise bones, and two *Myoxus* spp., including *M. melitensis* (SPRATT, 1867). DESPOTT discovered several bone-remains pertaining to eight different species of birds from the Tal-Ħerba Fissure in Mqabba. Undoubtedly, and nevertheless, since it is

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Submitted **31 Jan. 2024**; accepted **10 Apr. 2024**.

the most 'studied' site, the abundance of material unearthed and the diversity of species recorded, make Għar Dalam the richest and most important of Maltese Quaternary sites for fossil birds to date.

DISCUSSION

The late 19th Century.

The middle and upper Pleistocene fauna of the Maltese Islands received considerable attention, with focus on the pachyderms, ungulates, and rodents (e.g. ADAMS, 1866, 1867, 1870; SPRATT, 1867). It is also at this time that the first major works on Maltese fossil birds came to light. The avian remains from the SPRATT and ADAMS excavations were being studied in England. One must also note that all the Maltese material was not being identified locally, but instead was sent to be identified at various museums, notably the British Museum (Natural History) (London, England) (BORG, 1999; HUNT & SCHEMBRI, 1999; ZAMMIT-MAEMPEL, 1999; GATT, 2006b; SULTANA & BORG, 2015).

The first scientific palaeontological excavations in the Maltese Islands were carried out in 1859 (as testified by labels from the SPRATT collection at the Natural History Museum in London bearing this year) by Captain (later Admiral) Thomas Abel Brimage SPRATT R.N. (1811–1888) (ZAMMIT-MAEMPEL, 1999). SPRATT excavated inside caves at Mellieħa, Qrendi, and Żebbuġ, from where he unearthed numerous animal bones, including those of birds. These were later examined by William Kitchen PARKER (1823–1890, see **Appendix 1**) of the British Museum. PARKER reported on the bird bones excavated not only by SPRATT, but also those unearthed by ADAMS. At the British Museum (Natural History), PARKER came across a box containing avian remains collected by SPRATT from a cave in Żebbuġ, Malta. PARKER's first note, entitled '*Preliminary notes on some fossil birds from the Zebbug Cave, Malta*', was published in the *Proceedings of the Zoological Society, London* (PARKER, 1865). The remains of two swan species (*Cygnus* Garsault, 1764) and one duck or goose species (*Anas* Linnaeus, 1758 or *Anser* Brisson, 1760) were described. Four years later, PARKER published his second contribution entitled '*On some fossil birds from the Zebbug Cave, Malta*' in the *Transactions of the Zoological Society, London* (PARKER, 1869). Here, the author reexamined the bone material excavated from various caves by SPRATT, as well as those by ADAMS. The bulk of the material was composed of *Cygnus* bones, and about half of that amount contained *Cygnus* sp. bones that were significantly larger than those of a modern-day Mute Swan *Cygnus olor* (Gmelin, 1789). Many of the remaining bones were smaller in size to those of the Mute Swan, and about the same size as those of Bewick's Swan *Cygnus bewickii* Yarrell, 1830 or the Whooper Swan *Cygnus cygnus* (Linnaeus, 1758). There were also bones of even smaller dimensions, possibly pertaining to a large goose such as the Brent Goose *Branta bernicla* (Linnaeus, 1758). From the largest bones, PARKER described a new species of swan, which he named *Cygnus falconeri* (**Pl. 1 Figs. D–G**).

During his time in Malta, Army Surgeon Andrew Leith ADAMS (1827–1882) excavated a number of caves, but none so intensely as the Mnajdra Gap cave and others nearby (ZAMMIT-MAEMPEL, 1999). Apart from numerous mammals and batrachians, these caves also yielded many bird bones, including those of *C. falconeri*. ADAMS (1866) recounts that *'remains of birds were very common in nearly all localities and embraced various species. Raptors of large dimensions were represented by foot and wing bones in the Mnaidra Gap, where, likewise, as before stated, water birds, including gigantic Grallae and Anseriformes, were plentiful. In the Mnaidra Cave bird bones of large dimensions were found alongside many fragments and a few entire teeth and bones of* Myoxus melitensis'. Although ADAMS mentioned some avian finds in his papers and notes, the first descriptions of these bird bones were by George BUSK (1807–1886) in 1868 (see **Appendix 1**).

In ADAMS' report on Maltese caves (1865), he wrote that '*the avifauna of this cave embraced numerous remains of birds of various species, differing considerably in dimensions. Some of very large size were evidently water-birds. The collection I have forwarded for study*'. In a footnote, BUSK remarks that '*these bones have been subjected to the inspection of Mr. W.K. Parker, who has*

detected among them many remains of the Gigantic Swan, which he had already observed in the collection of Fossils from Zebbug brought by Captain Spratt'. Further analysis on these collections was taken up by Richard LYDEKKER (1849–1915, see **Appendix 1**) in 1890 and 1891.

In his first contribution entitled '*On the remains of some large extinct birds from the cavern deposits of Malta*' and published in the *Proceedings of the Zoological Society, London*, LYDEKKER described a new species of extinct vulture *Gyps* Savigny, 1809 and a crane *Grus* Brisson, 1760 hitherto unknown to science (LYDEKKER, 1890). LYDEKKER named these as *Gyps melitensis* Lydekker, 1890, and *Grus melitensis* Lydekker, 1890, respectively. The bone material of these two species, along with many others was previously identified as belonging to *C. falconeri* by PARKER.

A year later, in 1891, LYDEKKER published his *Catalogue of Fossil Birds in the British Museum (Natural History), London. British Museum (NH)*. This catalogue includes various type specimens unearthed from the Maltese Quaternary deposits which now form part of the British Museum (NH) collections. Such species listed in this work include: *Stryx melitensis* Lydekker, 1891, *Gyps melitensis*, *C. falconeri*, *Columba melitensis* Lydekker, 1891, *Grus melitensis*, and undetermined bones belonging to *Cygnus* sp. and *Anas* sp. Except for *C. falconeri*, all of these were described by LYDEKKER. This was the last contribution on Maltese fossil birds for the 19th Century.

The first half of the 20th Century.

Twenty-four years after LYDEKKER's catalogue, the first contribution by a Maltese naturalist appeared. In 1915, Giuseppe DESPOTT (1878–1936), the first curator of the national natural history collections, published a paper entitled '*On Archaeological Excavations in Malta: II Tal-Herba and Burmeghez Fissures*' in the *Annual Proceedings of the British Association, Section H. Manchester*. In this paper, DESPOTT reports on findings from two fissures in the south of Malta. Avian remains from the Tal-Ħerba Fissure I included numerous bones, which varied from the size of a pigeon to that of a common fowl. DESPOTT could not make heads or tails of these remains, so he sent them to Arthur SMITH WOODWARD (1864–1944) of the British Museum (Natural History) for identification. From a lower stratigraphic level, DESPOTT uncovered a right tibia belonging to *C. falconeri*. At the Tal-Ħerba Fissure II, bird bones were found that varied in size from that of a pigeon to a duck or a small goose, as well as smaller bones similar to those he had already sent to SMITH WOODWARD. Bird bones of small-sized species were also encountered at the Tal-Ħerba Fissure III, and these were also sent for identification to the South Kensington museum. No avian remains were reported from the Burmegħez Fissure.

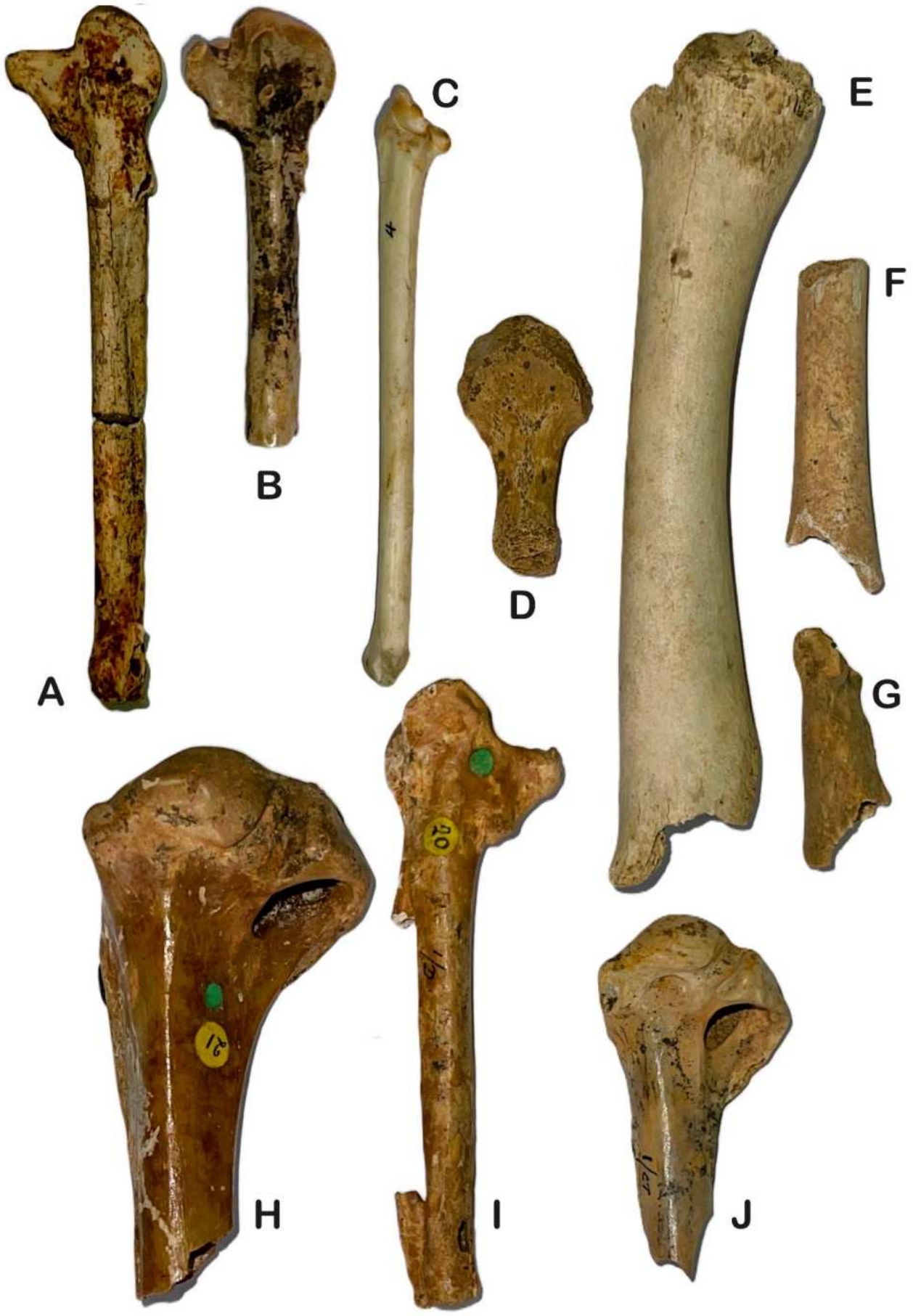
SMITH WOODWARD passed on all the Maltese material for examination to one of the foremost palaeontologists and ornithologists working at the Natural History Museum in London, Dorothea Minola BATE (1878–1951, see **Appendix 1**). BATE developed a strong affinity with Malta and the first two Curators of Natural History. She patiently examined the Pleistocene material excavated by DESPOTT and, later on, those sent by Joseph G. BALDACCHINO (1894–1974, see **Appendix 1**), as well as material excavated by Gertrude CATON-THOMPSON (1888–1985, see **Appendix 1**) from Għar Dalam. She visited Malta in 1934 on her way to Palestine, and during her short stay she excavated the Quaternary fissure at Tal-Ġnien. She discovered tiny shrews, a giant swan, a new species of vole, which she named *Pitymys melitensis* Bate, 1935, and an extinct giant dormouse *Leithia* Lydekker, 1896, the size of a squirrel.

In 1916, BATE published a note entitled '*On a small collection of Vertebrate remains from the Har Dalam Cavern, Malta, with notes on a new species of the genus* Cygnus' in the *Proceedings of the Zoological Society, London*. In this note, she described a new species of swan named *Cygnus equitum* (BATE, 1916) (**Pl. 1 Figs. H–I**). BATE published three more papers (BATE, 1920, 1923, 1925) in which Maltese Quaternary birds are mentioned. In her 1920 contribution '*Note on a new vole and other remains from the Ghar Dalam Cavern, Malta*', published in the *Geological Magazine*, she reports that '*bird remains were represented by only a few imperfect bones, some being those of passerines; one, the proximal portion of a right humerus of* Turdus? musicus (=T. philomelos)'. During her short stay in Malta, BATE also collected some interesting material from Tal-Ħerba fissure, which also contributed a good number of various species. The following contributions, published in 1923 and 1925, reported on some of the finds unearthed by CATON-

THOMPSON from Għar Dalam, where she excavated in the company of DESPOTT. In the first, entitled '*Notes on the Vertebrate Remains from the Ghar Dalam Cave, Malta*' and published in Margaret Alice MURRAY's (1863–1963) *Excavations in Malta,* BATE (1923) reports that '*the only avian remain discovered during the excavation of 1922 by Miss Gertrude Caton Thompson was a single bone belonging to a Brent Goose* Brenta bernicla'. In her second contribution, '*List of vertebrate remains from the Ghar Dalam Cave, Malta, found by Miss Caton Thompson*', published in the second report of MURRAY's *Excavations in Malta*, BATE (1925) presents a long list of vertebrate remains unearthed from Għar Dalam by CATON-THOMPSON in 1924, including a left femur of *Asio accipitrinus* (Pallas, 1771) (=*Asio flammeus* (Pontoppidan, 1763)), a proximal end of the left humerus from a *Tadorna cornuta* (Gmelin, 1774) (=*Tadorna tadorna* (Linnaeus, 1758)) (**Pl. 1 Fig. J**), a distal extremity of the right humerus of a *Corvus* cf. *corone* (Linnaeus, 1758) (**Pl. 1 Fig. B**), a left ulna of *C.* cf. *frugilegus* (Linnaeus, 1758) (**Pl. 1 Fig. C**), a left humerus of *Turdus* cf. *musicus* (Linnaeus, 1758) (=*Turdus philomelos* Brehm, 1831) and a tibia-tarsus belonging to a *T.* cf. *merula* (Linnaeus, 1758).

DESPOTT, followed later by BALDACCHINO, continued to excavate inside Għar Dalam, and in the period from 1915 up to the beginning of the Second World War published a string of papers and notes describing their respective finds. Birds feature in some of these, most notable being; '*Excavations at Ghar Dalam (Dalam Cave), Malta*', published in the *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, where DESPOTT (1923) covers a series of excavations carried out at Għar Dalam between the summers of 1918 and 1920. A description of the finds from each of the trenches is presented. From the first layer of the middle trench, '*a few bits of bird's bones at various depths, not yet identified*', were reported. The second layer was more productive and '*avian remains were met with at various depths; the greater part of these have not yet been identified, though some which were sent to the British Museum were declared by Miss Bate to belong to Passerine birds*'. No avian remains were encountered in the third and fourth layers. A few bits of bird bones (unidentified) were found in the first, third and fourth layers of the outer trench. No bird remains were reported as found in the inner trench.

In the *Museums Annual Report* of 1925, the Curator of Natural History (DESPOTT) reports on several avian remains, unearthed by CATON-THOMPSON from Għar Dalam in May 1924. The following species: *A. accipitrinus* (=*A. flammeus*), *T. cornuta* (*T. tadorna*), *C. corone*, *C. frugilegus*, *Turdus* sp. – possibly the Song Thrush *T. musicus* (= *T. philomelos*), *T. merula*, and the *C. equitum*, are listed. Further reports by DESPOTT are presented in the 1926–1927 *Museum Annual Reports*, where he reports that '*avian remains collected by the curator from various localities in Malta were sent to Ms. Bate for identification*' (DESPOTT, 1927). On their return to Malta, these were included within the national palaeontological collections. The following species, new to Malta's list of fossil birds, were identified: Raven *Corvus corax* Linnaeus, 1758, Golden Eagle *Aquila chrysaetos* Linnaeus, 1758, Bean Goose *Anser fabalis* (Latham, 1878), and Pochard *Fuligula ferina* Linnaeus, 1758 (=*Aythya ferina* Linnaeus, 1758). There were also remains of Ruddy Shelduck *Tadorna casarca* (Linnaeus, 1768) (=*T. ferruginea* (Pallas, 1764) (**Pl. 1 Fig. A**), *C.* cf. *corone*, *Gyps* sp., *C. falconeri*, *Cygnus musicus* Bechstein, 1809 (=*C. olor*), another *Cygnus* sp., and Great Bustard *Otis tarda* Linnaeus, 1758. In a following annual report, that of 1929, DESPOTT '*lists 61 avian bone remains belonging to eight species and two genera from eight Quaternary deposits in Malta*' (DESPOTT, 1929). The list of species includes Barnacle Goose *Branta leucopsis* (Bechstein, 1803), *C. equitum*, *C. falconeri*, Little Bustard *Otis tetrax* Linnaeus, 1758 (=*Tetrax tetrax* (Linnaeus, 1758), *O. tarda*, Wild Duck *Anas boschas* Linnaeus, 1758 (=*Anas platyrhynchos* Linnaeus, 1758), Willow Grouse *Lagopus albus* (Gmelin, 1789), a species of Marbled Duck (?) *Marmaronetta* Reichenbach, 1853, *Gyps* sp., and *Cygnus* sp. These remains were identified by Dr. Koloman LAMBRECHT (1889–1936, see **Appendix 1**), Reader at the Royal Hungarian Elisabeth University (Bratislava, Czechoslovakia). It is hardly surprising that these latter remains where not sent to BATE in London, following her harsh criticism of DESPOTT's way of handling and lack of reporting of his finds (see also SCHINDLER, 2005). Soon after DESPOTT's demise, excavations at Għar Dalam resumed, under the curatorship of BALDACCHINO. His meticulous work was immediately noted by BATE, who, upon visiting Għar Dalam, commented that '*the collecting has been carried out with such meticulous care that she hoped Baldacchino had at last brought modern methods to excavations on Malta*'. It is most unfortunate that BALDACCHINO



Pl. 1 Figs. A–J: Representative bones of avifauna of the Maltese Quaternary, forming part of the national collection at the National Museum of Natural History, Mdina, Malta. **A**: carpometacarpal of *Tadorna ferruginea* (Pallas, 1764),

70.6 mm . **B**: distal part of tibiotarsus of *Corvus* cf. *corone* (Linnaeus, 1758), 32.3 mm (NMNH-Q/32/D5). **C**: left ulna of *Corvus frugilegus* (Linnaeus, 1758), 81.5 mm. **D–G**: bone fragments of *Cygnus falconeri* Parker, 1865, 41 mm, 130.5 mm, 52 mm and 36.4 mm. **H–I**: Type specimens of *Cygnus equitum* Bate, 1916, 76.8 mm (NMNH-Q/1/MF/21) and 90.2 mm (NMNH-Q/1/MF/20). **J**: bone fragment of *Tadorna tadorna* (Linnaeus, 1758), 46 mm.

makes only one reference to bird bones in his reports (BALDACCHINO, 1934). This was published in the *Museums Annual Report* of 1933–1934. He reports on two Quaternary sites, namely Għar Dalam and the Tal-Ġnien Fissure. The avian remains, mentioned from the first locality according to the different layers from which they were found, include: *Turdus* sp. from the third layer ('Deer Layer'), and remains of a possible hawk (Accipitridae Vieillot, 1816) from the fifth layer (lower part of the 'Deer Layer'). The avian remains from the Tal-Ġnien Fissure include bones of *C. falconeri* and several species of smaller birds.

The post-war years.

In the years following the end of the Second World War, no official excavations are known to have been carried out. A request to excavate inside Għar Dalam was forwarded by Siegfried RIETSCHEL (1935–) on behalf of the Senckenberg Forschungsinstitut und Naturmuseum (Frankfurt, Germany), in a letter dated 6th September 1968 addressed to Charles George ZAMMIT (1911–2006), director of the Malta National Museum. RIETSCHEL enquired on the possibility of a mutual collaboration between the Museums Department and the Forschungsinstitut in excavating Quaternary sites in Malta, in particular Għar Dalam, in search of micro-mammals. Following an initial foray in 1968, a series of excavations were carried out inside Għar Dalam. Several interesting finds were discovered, among which was a considerable number of bird bones. The results of the avian finds were published in 1970 by BOESSNECK & KÜVER in *Senckenbergiana biologica*. The authors reported that 130 bird bones from the superficial layer ('Cultural Layer') were discovered in the excavations of 1969. Some of the species identified included chicks and adults of Rock Dove *Columba livia* Gmelin, 1789, Hawfinch *Coccothraustes coccothraustes* (Linnaeus, 1758), and Domestic Hen *Gallus gallus domesticus* (Linnaeus, 1758). The authors question whether the Rock Dove was wild form or feral. Four years later, a comprehensive list of bird remains from the Senckenberg excavations was presented by FISCHER & STEPHAN in the *Zeitschrift für Geologische Wissenschaften*. Here, the authors present a checklist of nine different species from the middle and upper Pleistocene of Għar Dalam. These included the Northern Pintail *Anas acuta* Linnaeus, 1758, Common Quail *Coturnix coturnix* (Linnaeus, 1758), Rock Partridge *Alectoris graeca* (Meisner, 1804), a new species of woodcock *Scolopax ghardalamensis* Fischer & Stephan, 1974, Barn Owl *Tyto alba* (Scopoli, 1769), Scops Owl *Otus scops* (Linnaeus, 1758), *C. coccothraustes*, and Starling *Sturnus vulgaris* Linnaeus, 1758. Bones of a species of swallow *Hirundo* Linnaeus, 1758, *Turdus* sp., and a species of finch *Carduelis* Brisson, 1760 were also identified. Two years later, in 1976, OLSON discredited the validity of *S. ghardalamensis* found in Għar Dalam on the basis of the original identification, that was based on a single tarso-metatarsus. When examined by OLSON, it was concluded that the identification was based on different characters belonging to *C. coturnix*. Therefore, *S. ghardalamensis* should be disregarded in any consideration of the evolution of woodcocks.

The giant birds of Malta.

In 1977, HARRISON & COWLES published an article in the *Journal of Archaeological Science* on '*the extinct large cranes of the North-West Palaearctic*'. The paper looks at, and compares, the Maltese Crane (*Grus melitensis*) with various other extinct, as well as extant, crane species. They remark that 'Grus melitensis *appears to have been a crane comparable in size with* G. antigone. *It differs in a trivial character of the width of the bridge over the tendinal canal of the distal end of the tibiotarsus, and (assuming the coracoid to be correctly referred to this species) in the more significant character of the small and slender structure of the latter. The coracoid size suggests that the species may have been an insular form with reduced powers of flight. One of the extinct swans from the Eemian deposits of Malta,* Cygnus equitum *Bate 1916, also had considerably reduced powers of flight. There is no link other than overall size between this crane and* G. primigenia. *The humeri referred to the latter do not suggest any reduction in wing size or flight*

power. Until further comparative material is available it is preferable to treat G. melitensis *as a Maltese isolate, although possibly derived from the same parental stock as* G. primigenia'.

An abridged version of this work entitled '*The Extinct Maltese Crane*' was published two years later in the BirdLife Malta scientific bulletin *Il-Merill*. This time, sole author Colin James Oliver HARRISON (1926–2003, see **Appendix 1**) reviewed the *Grus* bones excavated by SPRATT from Żebbuġ in 1878 and examined by LYDEKKER in 1890. The author hypothesized that a flightless species of crane may have inhabited Malta during the Pleistocene, and that it carried out a terrestrial existence. He concludes that before any more material is available, it is better to regard *Grus melitensis* as a separate, aberrant species.

The Pleistocene swans and cranes from the Maltese Islands have been the chief subjects of research of E. Marjorie NORTHCOTE. Throughout the 1980s, she published a string of papers dealing primarily with them, examining the material housed in the Natural History Museum (London, England) and continuing to build on the work of HARRISON & COWLES (NORTHCOTE, 1981–83, 1982a, 1982b, 1982c, 1984, 1984–85, 1988a, 1988b). Her work required a study of the two genera from other levels of deposits, as well as from the present.

NORTHCOTE elucidated the size, form, habit, and habitat of *C. falconeri* using data from studies on Neolithic-Bronze Age material, and recent *C. olor, C. cygnus C. bewickii*. She noted that *C. falconeri* lived on Malta alongside *C. cygnus* as well as an extinct 'swan-goose' (namely *C.* (*Anser*?) *equitum*). She has shown that, without doubt, *C. falconeri* was indeed a swan. The qualitative and quantitative studies on extinct *C. equitum* or *A. equitum* from the Ipswichian (Eemian) Interglacial of Malta (*c.* 125,000 B.P.) by NORTHCOTE have shown that it was a broad-bodied and dwarf swan, with some goose-like features. It was closer to *C. cygnus* and *C. bewickii* than to *C. olor*, although the relative shortness of the chief hand bones resembles that of the latter. Its feathered wingspan was *c.* 1.5 m. The wings were probably more 'elliptical' than in the other swans, the 'stouter' carpo-metacarpus and ulna (?) suggest higher camber, and the relatively shorter hand bones suggest a lower aspect ratio (length: width) than that of *C. cygnus*. There is no evidence to support assertions that it was flightless. The wings were fully feathered, it was light enough (*c.* 3.5–4.0kg) to fly, and the flight apparatus was not reduced. The femur was comparatively 'stout'. Abundant on the island, *C. equitum* may have swum on fresh and brackish water, walked well, and (unlike other swans) habitually taken off and alighted on land. It probably ate highly calorific plant food in enclosed and rather terrestrial habitats. Morphological differentiation facilitated coexistence with *C. cygnus* and the giant *C. falconeri*. The two extinct, more advanced swans probably arose from the same, fully flighted stock as *C. cygnus*.

NORTHCOTE also worked out the size, form, habit and habitat of *Grus melitensis* by comparing it with other cranes including the Common Crane *Grus grus* (Linnaeus, 1758), with which it was contemporaneous. The extinct crane *Grus primigenia* Milne-Edwards, 1869, that lived in Europe during the Pleistocene, was as large as, but different from, the Sarus Crane *Grus antigone* (Linnaeus, 1758), that was also present in the Mediterranean.

The end of the 20th Century, and the beginning of the 21st Century.

In the early 1990s, the present author began investigating the avian remains from the Maltese Quaternary deposits, mainly from the material present in the collections at the National Museum of Natural History (Mdina, Malta). Unfortunately, truly little of the examined material contained data labels. He was informed by the former curator of Għar Dalam, George ZAMMIT-MAEMPEL, that some boxes containing bird bones from Malta were housed at the Natural History Museum in South Kensington, London. A visit was planned and following a series of correspondence with the then curator of fossil birds, the late Cyril WALKER (1939–2009), a visit to examine this material was conducted in 1998. This material, originally collected by Bate, originated from Tal-Ġnien and Tal-Ħerba fissures when she visited the island in 1934. The boxes had remained sealed and locked up in the museum stores for over sixty years. Upon examination, the material revealed several interesting finds, including species which hitherto had not been recorded from the Maltese Pleistocene. The results were published in 1999 entitled '*A Checklist to the Quaternary Avifauna of the Maltese Islands, Preliminary Note*' published in the *Journal of the Prehistoric Society of*

Malta. All the bird species and genera recorded to date from Maltese Quaternary deposits (49 in all) are presented in **Table 1**.

The five new species of birds that had never recorded in the Maltese Quaternary previous to this note are Sparrowhawk *Accipiter nisus* (Linnaeus, 1758), Marsh Harrier *Circus aeruginosus* (Linnaeus, 1758), Wood Pigeon *Columba palumbus* Linnaeus, 1758, Tawny Owl *Strix aluco* Linnaeus, 1758, and Jackdaw *Corvus monedula* (Linnaeus, 1758). The list also included two procellariid species, namely, Scopoli`s Shearwater *Calonectris diomedea* (Scopoli, 1769) and Yelkouan Shearwater *Puffinus yelkouan* (Acerbi, 1827). The bone remains belonging to these last two species were collected from two caves overlooking the sea on the southern coast of Malta, in a soft clayey deposit. The associated fauna included a species of rat *Rattus* Fischer de Waldheim, 1803, *Crocidura esuae* Kotsakis 1984 and a species of horseshoe bat *Rhinolophus* Lacépède, 1799. In one of these caves, dried straw, formerly used as bedding for cattle, was also unearthed, along with the bird bones from the sub-surface layer. All of this indicated a Holocene deposit, probably a couple of hundred years old (BORG, 1999; GATT, 2006).

Table 1: Number of bird species discovered from the various Maltese Quaternary deposits (from BORG, 1999).

Locality	Number of bird species
Għar Dalam	31
Tal-Ħerba Fissure(s)	8
Żebbuġ Cave	6
Ta' Kandja Fissure	4
Benghisa Gap	4
Mosta Ravine	4
Mnajdra Cave	3
Kalafrana	3
Tal-Ġnien Fissure	3

Another paper on the Maltese Quaternary was published in *Facets of Maltese Prehistory*, co-authored by Christ HUNT of the School of Geography, Archaeology and Palaeoecology (GAP) at the Queen's University (Belfast, Northern Ireland) and Patrick J. SCHEMBRI of the Biology Department at the University of Malta, entitled '*Quaternary Environments and Biogeography of the Maltese Islands*'. The authors describe the environmental changes during the Quaternary period, and demonstrate how these affected the Maltese environment and the development of the Maltese fauna. The reassessment of early research on the local Quaternary, and particularly the renowned faunas, enabled the authors to examine the biogeographical processes and patterns, and to suggest directions for any future research. They present a list of vertebrate species identified from the Quaternary deposits at Għar Dalam and other Maltese sites, noting whether these named species occur also in Sicily. The list of birds is based mainly on the work of FISCHER & STEPHAN (1974) with 24 different species of birds, including the domestic chicken, domestic pigeon, and four other birds at genus level. The chicken and the pigeon were found in the Cultural (superficial) Layer of Għar Dalam, that is, alongside human artifacts. Their list also includes Bonelli's Eagle *Hieraeetus fasciatus* (=*Aquila fasciata* Vieillot, 1822), a species previously mentioned only by BATE, but never considered valid by others, as these bones require further studies.

In the late 1990s, two Maltese medical doctors with an interest in archaeology published two papers on the sediments and Pleistocene deposits of Għar Dalam entitled '*Għar Dalam Cave: a review of the sediments on the cave floor stratigraphy*' and the '*A review of the Pleistocene deposits in the south-western coast of Malta*'. In the first publication (SAVONA-VENTURA & MIFSUD, 1998), the authors reviewed the sediments of Għar Dalam, based on excavations carried out in the late 19th and early 20th centuries. The avian remains unearthed and identified by previous authors, especially those of FISCHER & STEPHAN (1974), are repeated here, including the presence of *Scolopax melitensis* already discredited by OLSON (1976). In their second contribution (SAVONA-VENTURA & MIFSUD, 1999), the authors look at the various publications dealing with the numerous cave-fissure and coastal deposits present along the south-western coast of Malta, and conclude that the fossil repertoire corresponds with the second faunal association described from Sicily, dated to circa 455 (+/-90) ka, and the third Sicilian faunal association, dated circa 200 (+/-40) ka. The

latter probably corresponds to the Gliridae/*Hippopotamus* Assemblage Biozone of Għar Dalam cave in Malta. From the published material, the authors list six species of bird, namely *C. equitum*, *C. falconeri*, *B. bernicla*, *Grus melitensis*, *G. grus* and *T. tetrax,* as well as *Anser* sp. and undetermined species as reported from the deposits of the Magħlaq and Mnajdra caves.

The present century.

The most recent major publication by a Maltese palaeontologist was published in two volumes as part of a Melitensia encyclopedia in 2006. Michael GATT (1965–), in his work, covers the major aspects of Maltese geology and palaeontology (GATT, 2006a, 2006b). In the section on fossil birds' section (2006b), the author reviewed and commented on Maltese Quaternary sites that produced avian remains, the persons who excavated them, and on the finds themselves.

Table 2: The avifauna of the Maltese Quaternary, and its temporal range. **M.**: Middle; **L.**: Late; **Pleist.**: Pleistocene; **E.**: Extinct.

Species	M. Pleist.	L. Pleist.	Holocene	E.
Cygnus equitum				
Cygnus falconeri				
Cygnus olor				
Cygnus cygnus				
Cygnus columbianus (?)				
Anser fabalis				
Branta bernicla				
Branta leucopsis				
Tadorna ferruginea				
Tadorna tadorna				
Anas acuta				
Anas platyrhnchos				
Aythua ferina				
Marmaronetta sp.				
Lagopus lagopus				
Coturnix coturnix				
Alectoris graeca				
Calonectris diomedea				
Puffinus yelkouan				
Gyps melitensis	?			
Aquila chrysaetos				
Aquila bonelli (?)				
Circus aeruginosus				
Accipiter nisus				
Grus melitensis				
Grus antigone				
Grus grus				
Otis tarda				
Otis tetrax				
Columba cf. *livia*				
Columba palumbus				
Columba cf. *melitensis*				
Tyto alba				
Asio (Strix) melitensis				
Asio flammeus				
Strix alucco		?		
Otus scops				
Hirundo sp.				
Turdus sp.				
Turdus cf. *merula / iliacus*				
Turdus philomelos				
Corvus monedula				
Corvus cf. *frugilegus*				
Corvus corone				
Corvus corax			?	
Sturnus vulgaris				
Carduelis chloris				
Coccothraustes coccothraustes				
Amandava amandava				

Material originating from other sites including Burmegħeż (Mqabba, Malta), excavated by BALDACCHINO came to light recently (2013) when a cleaning exercise of the National Museum of Natural History basement in Mdina revealed several carton boxes packed with Pleistocene bone material. The initial examination revealed bones pertaining to *Cygnus* and *Grus*, as well as some small-sized species that are yet to be determined. Excavations carried out at Pender Place in St. Julian's and at Għar Tuta in Mellieħa have also yielded numerous bird bones (E. SCERRI, pers. comm. 2023).

ACKNOWLEDGEMENTS

The author is always in debt to the late Cyril WALKER (Natural History Museum, London, England) in facilitating and providing access to the BATE collection, and to George ZAMMIT-MAEMPEL for his mentoring and inspiring company over an eight-year period as his assistant at Għar Dalam, who was also the first to introduce him to the Maltese Quaternary.

A synthesis of this paper was presented as an Annex in the tome by SULTANA & BORG*, '*History of Ornithology in Malta*' (2015).*

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Appendix 1: Biographical notes on personalities mentioned in the text.

Born in Siġġiewi (Malta), Joseph G. BALDACCHINO studied at the Royal University of Malta from where he graduated in pharmacology in 1915 and in medicine in 1919. For a period of 14 years, he practiced as a general practitioner when, in 1933, he was appointed as the new Curator of the Natural History section, a post he held until 1947, when he was

appointed Director of the Museums Department. He was interested in excavating parts of Għar Dalam. For a biography, see BUGEJA (2006).

Dorothea Minola Alice BATE was born in Carmarthen (Wales). At the age of 19, she visited the natural history museum in South Kensington and demanded a job in the bird room. She impressed the Curator of Birds, Richard BOWDLER SHARPE (1847-1909), so much with her skills, charm, and personality that she became the first woman to be employed as a scientist in the museum. It was in 1948 that Dorothea was appointed Officer in Charge of the Tring Museum. For the first time in her life, at nearly 70 and long after retirement age for most people, she was given official employment and managerial responsibility. Dorothea died from cancer in Westcliff-on-Sea, Essex. Correspondence between Bate, Despott, and Baldacchino is stored at the main library of the Natural History Museum, London and at the National Museum of Natural History, Mdina (Malta). See also SCHINDLER (2005).

George BUSK was born in St. Petersburg (Russia). He studied surgery in London, at both St. Thomas's and St. Bartholomew's hospitals, and was an excellent operator. He was appointed assistant-surgeon to the Greenwich Hospital in 1832, and served as naval surgeon first in the HMS *Grampus*, and afterwards for many years in the HMS *Dreadnought*. During this period, he made important observations on cholera and on scurvy. In 1855 he retired from service and settled in London, where he devoted himself to the study of zoology and palaeontology. Early in life he became the leading authority on bryozoans; later, the vertebrate remains from caverns and river deposits occupied his attention. He was a patient and cautious investigator, full of knowledge, and unaffectedly simple in character. He died in London.

Gertrude CATON-THOMPSON was born to William CATON-THOMPSON and Ethel PAGE in London (England). Gertrude came to Malta when she was still a student and formed part of an all-woman team of archaeologists led by Margaret MURRAY. She excavated parts of Għar Dalam with the intention of finding further evidence to the Magdalenian Culture, following DESPOTT's finds of the two taurodontic molars in 1917. She later worked as an archeologist at Abydos (Egypt) and Oxyrhynchus (Al-Bahnasa, Egypt). While she was studying at the British School of Archaeology in Egypt from 1924 to1926, with the help of Elinor Wight GARDNER, she began the first archaeological survey of the Northern Faiyum (Egypt). She continued working in Northern Faiyum for the next two years as a field director for the Royal Anthropological Institution. From 1928 to 1929, she excavated the famous ruins in Zimbabwe (Southern Rhodesia), directing stratigraphic studies of the architectural remains. She also worked in Kharga Oasis (Egypt), and Hadhramaut (Yemen). Her studies dismissed the popular thought of the ruins as being the remains of the biblical Ophir, of Phoenician origin. Her findings were reported in the book *The Zimbabwe Culture* (1931). CATON-THOMPSON died at the age of 97 in Worcestershire (England).

Colin James Oliver HARRISON spent most of his time reviewing British Pleistocene birds. Having published a summary paper on Pleistocene birds of south-eastern England (1979), he compiled another (1980) on Pleistocene and early Holocene bird remains from south-western Britain which were available for study (as some referred to in the literature had been destroyed during the war). He then worked on a similar survey of material from other English regions and North Wales (e.g., 1984). See also BOURNE (2004).

Kálmán (or Koloman) LAMBRECHT was a Hungarian palaeontologist born in Pancsova, Austria-Hungary. In 1909 he became a member of the Hungarian Ornithological Institute. In 1913 he received his doctorate in zoology, palaeontology, and chemistry, in 1917 he became member of the Imperial Geological Institute in Budapest (Hungary), and in 1926 librarian of the same institution. In 1934 he took over the same functions at the Hungarian National Museum in Budapest and received a professorship at the University of Pécs. He was encouraged to start research and specialize in the then neglected area of palaeornithology. Three years before his death, LAMBRECHT published a standard reference manual of palaeornithology (1933) in which he described not only fossil birds, but also abnormal subfossil skulls and bones of extant birds from various natural history museums in Europe. In this manual, he described numerous extinct genera, including *Miocorax* Lambrecht, 1933 for cormorants, *Miocorvus* Lambrecht, 1933 for corvids, and *Proardea* Lambrecht, 1933 for herons.

Richard LYDEKKER was born in London and was educated at Trinity College, Cambridge. In 1874 he joined the Geological Survey of India and made studies of the vertebrate palaeontology of northern India. He remained in this post until 1882. He was responsible for the cataloguing of the fossil mammals, reptiles, and birds in the Natural History Museum, London (e.g. see LYDEKKER, 1891). LYDEKKER was also influential in the science of biogeography. In 1895 he delineated the biogeographical boundary through Indonesia, known as Lydekker's Line, which separates Wallacea on the west from Australia and New Guinea on the east. He attracted amused public attention with a pair of letters to *The Times* in 1913, when he wrote on 6 February that he had heard a cuckoo, contrary to William YARRELL's 1843 tome, which doubted the bird arrived before April. Six days later on 12 February, LYDEKKER wrote again, confessing that '*the note was uttered by a bricklayer's labourer*'. Letters about the first cuckoo became a tradition in the British press.

William Kitchen PARKER was a British physician, zoologist, and comparative anatomist. He was elected Fellow of the Royal Society in 1865. PARKER was employed as a geologist by the British Museum (Natural History), during which time he examined the avian remains from Malta. He published his results in 1865 and 1869. His main source of material came from the remains excavated by Thomas Abel SPRATT and Andrew Leith ADAMS.

BULLETIN OF THE NATIONAL MUSEUM OF NATURAL HISTORY, MALTA

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  THAKE M.A., 1985. Land snails from the Mellieha Quaternary Deposit. *Potamon*, **2** (14): 93.
  Example of a book:
  WELTER-SCHULTES F.W., 2012. *European non-marine molluscs, a guide for species identification*. 679 + 78 pp.; Göttingen, Germany: Planet Poster Editions.
  Example of a chapter from a book:

HUNT C.O. & SCHEMBRI P.J., 1999. Quaternary environments and biogeography of the Maltese Islands. *In*: MIFSUD A. & SAVONA VENTURA C. (eds.). *Facets of Maltese prehistory*. Malta: The Prehistoric Society of Malta; pp. 41–75.

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BNMNHM Editorial Board
February 2024

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