

# First record of *Rugulina fragilis* (Sars G.O., 1878) from the Mediterranean Sea (Mollusca Gastropoda Pendromidae)

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**ABSTRACT** Several shells of *Rugulina fragilis* (Sars G.O., 1878) (Mollusca Gastropoda Pendromidae) are reported from the Tuscan Archipelago. This is the first record of the species from the Mediterranean Sea.

**KEY WORDS** Mediterranean Sea; new records; Pendromidae; *Rugulina fragilis*; Tuscan Archipelago.

Received 02.02.2015; accepted 05.03.2015; printed 30.03.2015

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## INTRODUCTION

Pendromidae Warén, 1991 is a small family of vetigastropods whose systematic position is not yet well understood (Bouchet P. & Rocroi J.P., 2005). It includes two genera, *Pendroma* Dall, 1927 and *Rugulina* Palazzi, 1988. The latter comprises few species (Gofas, 2014), only two of them belong to the European fauna: *Rugulina fragilis* (Sars G.O., 1878) and *R. monterosatoi* (van Aartsen & Bogi, 1987). Their troubled nomenclatural and taxonomic histories are well documented by Warén (1991). Only *R. monterosatoi* has previously been found in the Mediterranean Sea.

## MATERIAL AND METHODS

All material was picked up from bottom samples trawled by local fishermen. Shells were studied with a stereomicroscope. Photos were taken with a digital photocopier. The protoconch whorls are counted according to the method of Verduin (1977).

**ABBREVIATIONS AND ACRONYMS.** Dp: total diameter of the protoconch (in  $\mu\text{m}$ ); H: maximum height (in mm); Nwp: number of whorls of the protoconch; Nwt: number of whorls of the teleoconch; W: maximum width (in mm); APC: Attilio Pagli collection (Lari, Italy); CBC: Cesare Bogi collection (Leghorn, Italy); CSC: Carlo Sbrana collection (Leghorn, Italy); FCC: Francesco Chiriaco collection (Leghorn, Italy); FGC: Francesco Giusti collection (Leghorn, Italy); RRC: Romualdo Rocchini collection (Pistoia, Italy).

## RESULTS AND DISCUSSION

### *Taxonomy*

Class Gastropoda Cuvier, 1795  
Subclass Vetigastropoda Salvini-Plawen, 1980  
Family Pendromidae Warén, 1991  
Genus *Rugulina* Palazzi, 1988

***Rugulina fragilis*** (Sars G.O., 1878) (Figs. 1–3, 5)

*Adeorbis fragilis* G.O. Sars, 1878: 213, tab. 22, figs. 19a–c (Fig. 4)

*Rugulina fragilis*: Warén, 1991: 71–73, figs 11A–E, 13A, B

*Rugulina fragilis*: Beck et al., 2006: 47

*Rugulina fragilis*: Hoffman et al., 2010: 49, figs. 1–3

ORIGINAL DESCRIPTION. "*Testa tenuis et fragilis, albida, leviter rufescens, exacte trochiformis, spira elevata, anfractibus 4 convexis, ultimo permagno et amplo basi leviter applanata, sutura profunda, apertura patula, oblique expansa, forma ovato-elliptica, labro externo tenuissimo, obliquo, columella aequaliter incurvata, umbilico magno et profundo crista nulla a basi difinito. Superficies vix nitida, lineis spiralibus, elevatis, regularibus obducta. Diam. basis 2,0 mm; altit. 1,7 mm.*"

[The shell is thin and fragile, whitish, slightly reddish, perfectly trochiform, with elevated spire, 4 convex whorls, the last is large and wide with the base slightly flattened, suture deep, aperture wide, obliquely expanded, ovate-elliptic, the external lip is very thin, oblique, the columella is regularly curved, the umbilicus is large and deep, there is no keel on the base. Surface barely shining, regularly covered with raised spiral lines. Diameter at the base 2.0 mm; height 1.7 mm.]

EXAMINED MATERIAL. *Rugulina fragilis*: off Capo Corso (Corsica, France) 600 m, 2 shells in CSC, 6 shells in FGC, 1 shell in APC. *Rugulina cf. fragilis*: off Capo Corso (Corsica, France) 600 m, 1 shell in CSC. *Rugulina monterosatoi*: off Gorgona Island (Leghorn, Italy) 400 m, 4 shells in RRC, 1 shell in CSC, 1 shell in FCC; 3 shells off Gorgona Island (Leghorn, Italy) 300 m, in APC; 13 shells, Alboran Sea (Spain) 160 m, in CBC; 4 shells off Giglio Island (Grosseto, Italy) 400 m, in CBC; 4 shells off Capraia Island (Leghorn, Italy) 500 m, in FGC.

DESCRIPTION OF THE EXAMINED SHELLS. Small, thin and fragile, broadly conical (height: 1.00–1.65 mm; width: 1.15–2.05 mm), whitish and semitransparent. Protoconch (0.5–0.6 whorls; diameter about 185  $\mu\text{m}$ ) protruding, paucispiral, smooth, tilted, border with the teleoconch clear. Teleoconch whorls (2.2–2.6) convex, fairly expanding, suture deep. Aperture broad, ovate, prosocline (seen laterally).

Outer lip sharp. Columella curved, simple. Base quite flattened. Umbilicus wide. Sculpture of subtle spiral threads (9–14 on the last whorl), more close-set in the periumbilical zone. Shell surface further ornamented with a somewhat net-shaped microsculpture of irregular discontinuous lines.

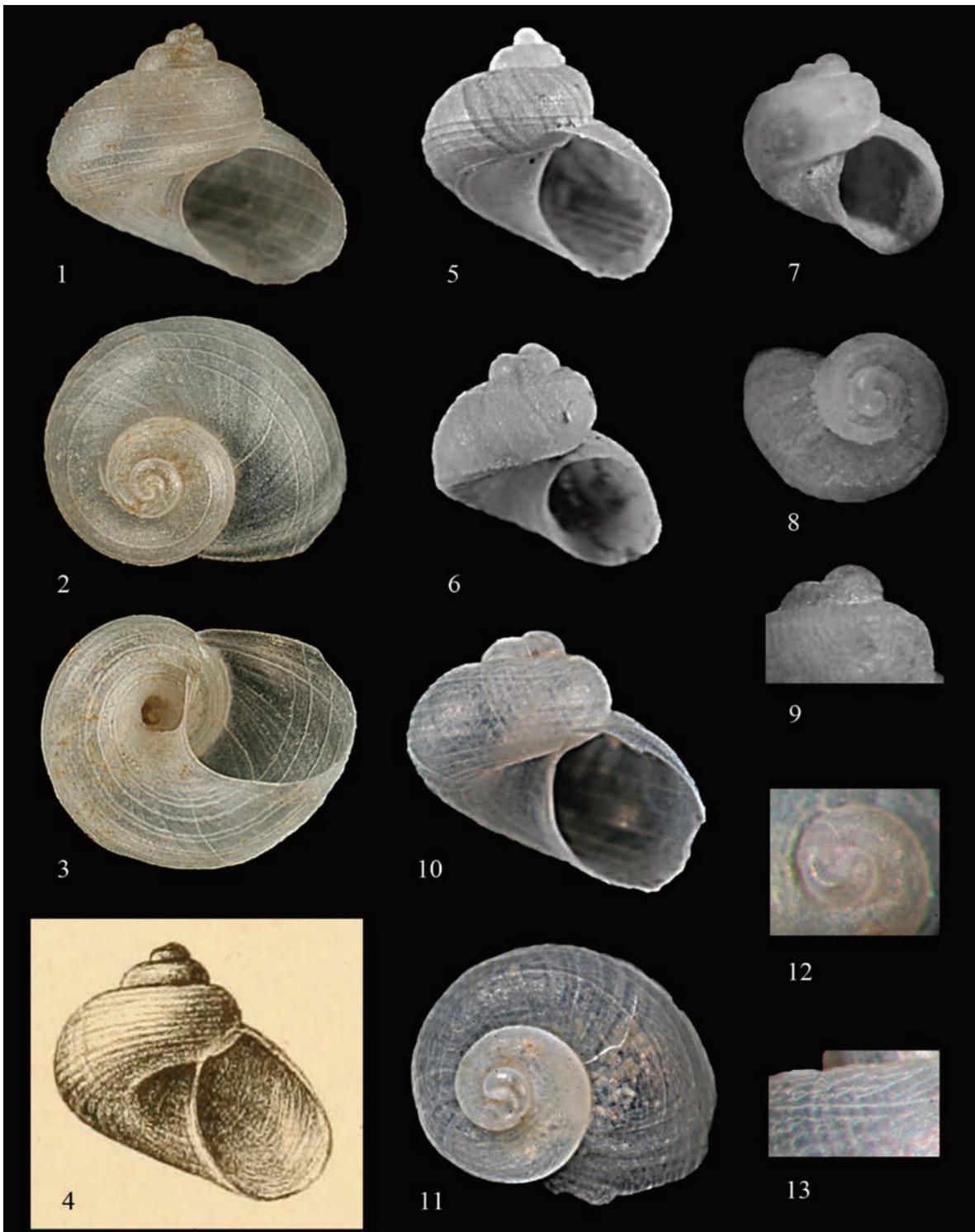
REMARKS. The mediterranean shells match *R. fragilis* in all respects. The only similar species is the cogeneric *R. monterosatoi*, which is constantly smaller (maximum W: 0.85 mm; maximum H: 0.80 mm). Its spiral sculpture has only 2 strong periumbilical cords forming a sort of keel and 1 adapical thread. The protoconch are comparable in size (Dp: about 185  $\mu\text{m}$ ) (Aartsen van & Bogi, 1987; Warén, 1991; pers. obs.) (Figs. 7–9). Comparing similar-sized shells of *R. fragilis* and *R. monterosatoi*, the latter has a more globular outline, a more depressed spire, less expanded whorls, the outline of the last whorl appears more squarish due to the spiral sculpture, the umbilicus is smaller, and the protoconch less tilted (Figs. 5–6). Note that the shell in fig. 6 is gerontic, being larger for the species and having the last whorl slightly loose. It is nevertheless clearly different from *R. fragilis*.

A shell similar to *R. fragilis* (Figs. 10–13) was found in the same bottom sample (H: 1.20 mm; W: 1.40 mm; Nwt: 1.7). It differs from the latter in having a less conical outline, a stronger microsculpture, a protoconch not tilted, larger in diameter (Nwp: 0.6; Dp: about 270  $\mu\text{m}$ ). Being an unique specimen, we prefer to leave its status open.

*Rugulina fragilis* is previously known from the Northern Atlantic Ocean, ranging from E Greenland to Norway (Warén, 1991; Hoffman et al., 2010), and the Seine seamount, off the morroccan coasts (Beck et al., 2006). This is the first record from the Mediterranean Sea. Although no living specimens were found, the shells are in good conditions. *Rugulina fragilis* should be added to the recent mediterranean malacofauna.

**ACKNOWLEDGMENTS**

The authors are grateful to Cesare Bogi (Leghorn, Italy), Romina Rocchini (Pistoia, Italy), Attilio Pagli (Lari, Italy), Alessandro Raveggi (Florence, Italy), Francesco Chiriaco (Leghorn, Italy), Stefano Bartolini (Florence, Italy) for the



Figures 1–3: *Rugulina fragilis*, off Capo Corso, 600 m, 1.90 mm x 1.50 mm; Fig. 1: frontal view; Fig. 2: apical view; Fig. 3: basal view. Fig. 4: *Aedeorbis fragilis* (from Sars, 1878, pl. 22, figs. 19a, modified). Fig. 5: *R. fragilis*, off Capo Corso, 600 m, 1.15 mm x 1.00 mm. Fig. 6: *R. monterosatoi*, off Giglio Island, 400 m, 1.00 mm x 1.00 mm. Figs. 7–9: *R. monterosatoi*, off Gorgona Island, 400 m, 0.77 mm x 0.77 mm; Fig. 7: frontal view; Fig. 8: apical view; Fig. 9: protoconch. Figs. 10–13: *R. cf. fragilis*, same locality as Figs. 1–3, 1.40 mm x 1.20 mm; Fig. 10: frontal view; Fig. 11: apical view; Fig. 12: protoconch; Fig. 13: details of the sculpture.

loan of material. Sincere thanks are due to Cesare Bogi for useful advices, to Stefano Bartolini for digital photographs and to Enzo Campani (Leghorn, Italy) for reading the manuscript. Thanks to Patrick LaFollette (Cathedral City, U.S.A.) for editing the English manuscript.

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