

## Rapid Communication

## First record of *Gari pallida* (Deshayes, 1855) (Mollusca: Bivalvia: Psammobiidae) in the Mediterranean Sea

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Received: 9 July 2018 / Accepted: 19 September 2018 / Published online: 19 October 2018

Handling editor: Fred Wells

### Abstract

A live specimen of *Gari pallida* was collected in June 2017 off Palmahim, on the Mediterranean coast of Israel. This is the first record of the species, previously known from the tropical western Pacific to the Indian Ocean and the Red Sea, in the Mediterranean Sea, and the second Erythraean alien psammobiid bivalve. It is differentiated from congeners recorded from the eastern Mediterranean.

**Key words:** bioinvasion, Erythraean alien, Suez Canal, Levantine Basin

### Introduction

The Suez Canal is the main pathway of introduction of marine organisms from the Red Sea into the Mediterranean Sea. The recent enlargement of the Suez Canal raised concern over increasing propagule pressure likely to raise the number of Erythraean introductions (Galil et al. 2016, 2017). Of the 144 non-indigenous molluscs recorded off the Israeli coastline, all but eight are considered to have been introduced through the Suez Canal (B.G., unpublished material).

A single Erythraean alien psammobiid bivalve, *Hiatula rosea* (Gmelin, 1791), was reported in the Mediterranean Sea. It was first reported from Port Said, Egypt, as *Psammobia ruppelliana* (Reeve, 1857) (Tillier and Bavay 1905). In 1968, a pair of valves was collected in Bardawil lagoon, on the Mediterranean coast of the Sinai Peninsula, and identified as *Soletellina ruppelliana* (Reeve, 1857) (Mienis 1980). Barash and Danin (1982: 123, 1992: 294) listed these same specimens as *Soletellina rubra* (Schröter, 1788) and Zenetos et al. (2003) as *Hiatula ruppelliana*

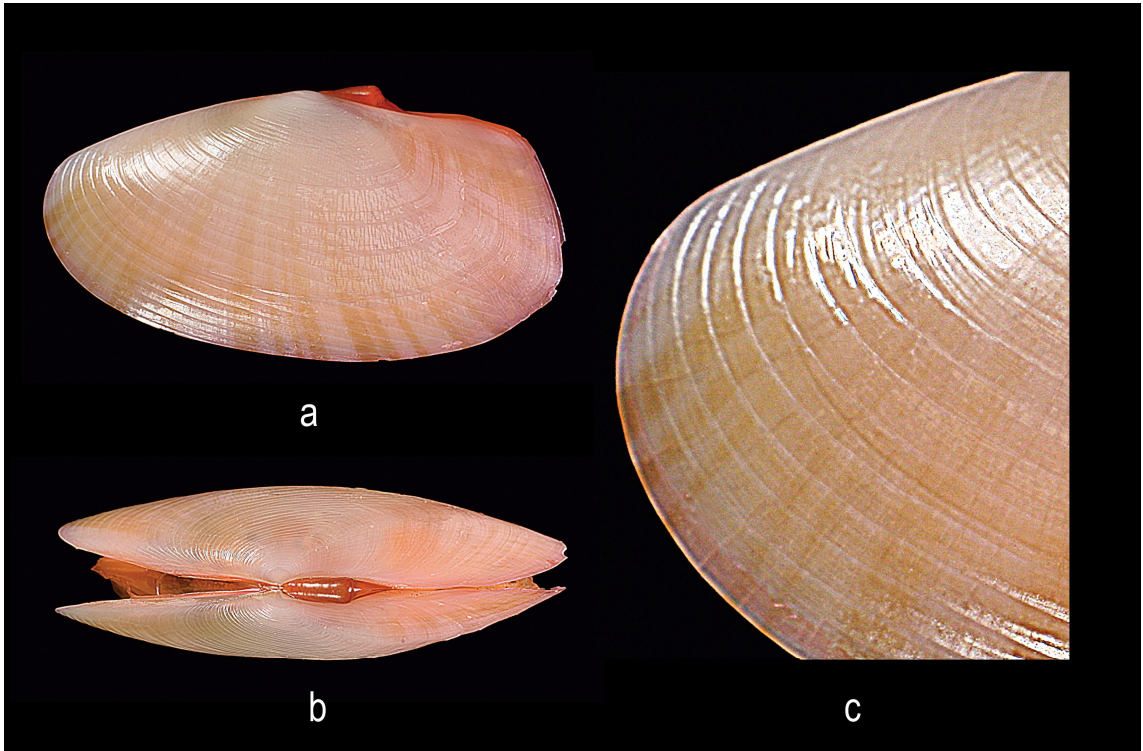
(Reeve, 1857). It is now recognized as a junior synonym of *Hiatula rosea* (Gmelin, 1791).

In the course of recent studies of the benthic biota off the Mediterranean coast of Israel, a subadult specimen of a psammobiid was collected and identified as *Gari pallida* (Deshayes, 1855), a species widely spread from the Red Sea to the tropical western Pacific Ocean (Willan, 1993).

### Material and methods

A survey of the shallow soft bottoms along the central Mediterranean coast of Israel was made aboard the Research Vessel “MED EXPLORER” in June 2017. Surface sediments were collected by means of a Van Veen grab (KahlSico, WA265/SS214, 32 × 35 cm, volume 20 L). Samples were preserved in 99% ethanol upon collection, and within days were sieved on a 250 µm mesh. The retained molluscan material was preserved in 70% alcohol and tinted with eosin dye.

A single subadult specimen of *Gari pallida* (shell height 23.0 mm, width 11.8 mm), complete with its animal, was collected on 5 June 2017, off Palmahim



**Figure 1.** *Gari pallida* (Deshayes, 1855), (a–c) Israel, Palmahim, specimen length 23 mm, width 11.8 mm; (a) frontal view; (b) dorsal view; (c) detail of shell sculpture. The specimen is stained with eosin dye. Photographs by S. Bartolini.

(31.9385°N; 34.6811°E) at a depth of 24.3 m, on a sandy bottom with small silt-clay component. The specimen is deposited in the Steinhardt Museum of Natural History, Tel Aviv University, Israel (SMNH-MO 82596). Synonymy is limited to material collected in the Red Sea.

## Results

### SYSTEMATICS

#### PSAMMOBIIDAE Fleming, 1828

##### *Gari* Schumacher, 1817

##### *Gari pallida* (Deshayes, 1855)

(Figure 1A–C)

Unnamed figure Savigny 1817, pl. 8, figs 1, 1–3.

*Psammobia maculosa*. – Audouin 1828: 195 (misidentification; not *Psammobia maculosa* Lamarck, 1818).

*Psammobia pallida* Deshayes 1855: 323; Cooke 1886: 104; Shopland 1902: 177.

*Psammobia rosea*. – Vaillant 1865: 120; Issel 1869: 56.

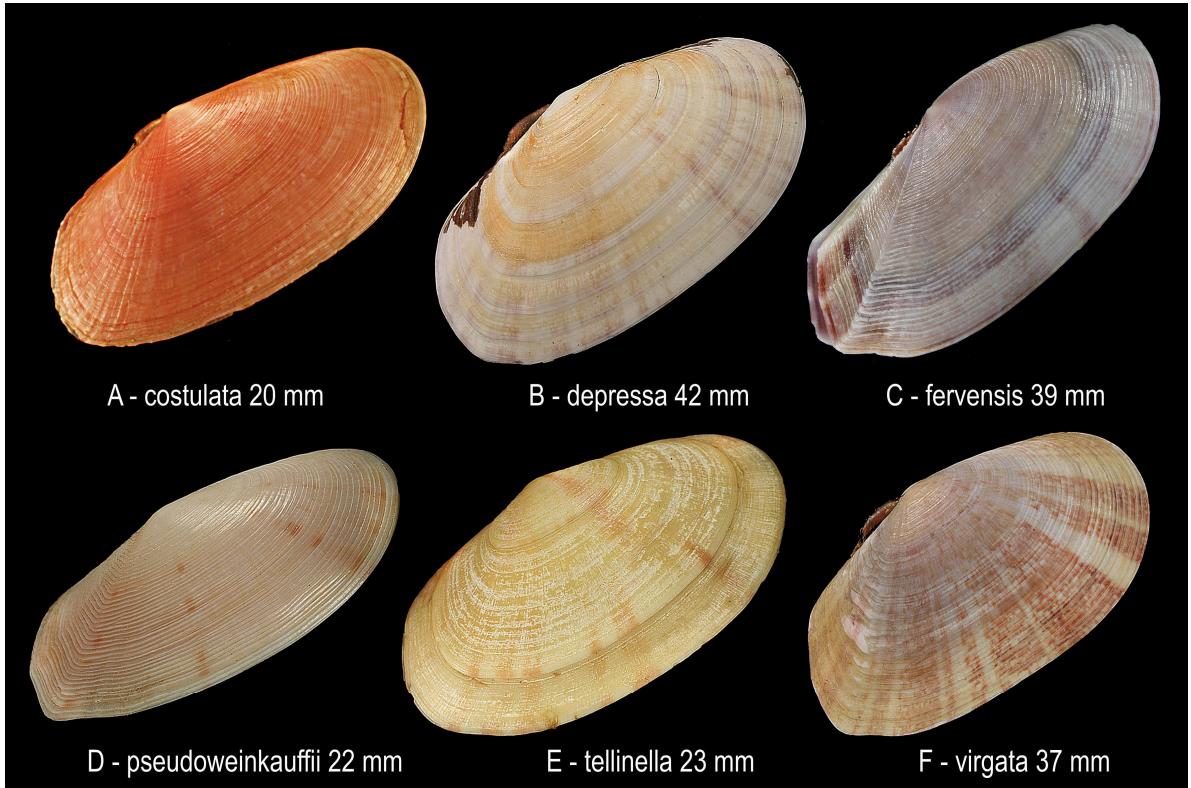
*Gari pallida*. – MacAndrew 1870: 446; Tomlin 1927: 307; Dekker and Orlin 2000: 14; Zuschin and Oliver 2003: 141, pl. 43.8.

*Psammobia weinkauffi*. – Shopland 1902: 177.

*Gari weinkauffi*. – Lamy 1918: 246; 1938: 36; Moazzo 1939: 95; Oliver 1992: 162, pl. 36, figs. 7a, b.

### Description

Shell with fragile and bilaterally compressed valves, outline elongate and ovate-subtrapezoidal, anterior end narrowly oval, posterior end moderately sharply truncate with weak angulation, rounded at intersections with dorsal and postero-ventral margins, beak white in color, small and almost central, regularly rounded ventral margin, slightly inclined antero-dorsal margin, no posterior flexure, small anterior and posterior gapes. Hinge poorly developed with two small cardinal teeth in each valve, the anterior one bifid, no lateral teeth. Outer surface glossy, crossed by oblique ridges (see Figure 1C) over the anterior three-quarters of the valves running from the antero-dorsal margin to the posterior-ventral margin which ends abruptly against a rounded, not well distinct radial ridge running from the beak to the posterior-ventral margin, rather than the weak secondary median ridge visible in adult specimens. Posterior area of both valves crossed only by very fine and indistinct commarginal growth lines. Inner margin smooth. External ligament on moderately long and narrow nymph. Pallial sinus deep, confluent, with rounded edge, just below the dorsal margin.



**Figure 2.** The six species of *Gari* Schumacher, 1817 recorded in the Mediterranean Sea, after Scaperrotta et al. 2018. Photographs by S. Bartolini.

Color: despite the eosin-stained shell, the pale brown radial rays from the umbo to the ventral margin are plainly visible (Figure 1A).

#### *Habitat and distribution*

*Gari pallida* is a psammophile infaunal species, found on coarse sand, sand-shell-seagrass, and mudflats, at depths ranging from 10 to 150 m (Willan 1993).

The species was first collected in the Gulf of Suez by Savigny, a member of the “Commission des Sciences et des Arts” that accompanied Napoleon Bonaparte on his Egyptian campaign (Bouchet and Danrigal 1982). An un-named specimen was exquisitely drawn in 1817, as part of the atlas of the “Expedition d’Egypte” (Savigny 1817, pl. 8, figs. 1, 1–3). Failing eye-sight prevented Savigny from publishing his notes, and in the “Explication sommaire des planches” published a decade later, it was identified as *Psammobia maculosa* Lamarck, 1818 (Audouin 1826, 1828) – a different species widely distributed in the Indo-Pacific Ocean (Willan 1993). *Gari pallida* has been repeatedly collected in the Red Sea and adjacent waters: Vaillant 1865 (at Attaka, near the southern entry to the Suez Canal);

MacAndrew 1870; Cooke 1886; Lamy 1938 (in the Gulf of Suez); Shopland 1902 (in the Gulf of Aden); Lamy 1918 (at Suez, Djibouti, Aden); Tomlin 1927 (at Port Tawfiq, the southern entry to the Suez Canal); Moazzo 1939 (in the Suez Canal). Willan (1993: 22) concluded his summary of the distribution of *G. pallida* predicting the species “...could enter the eastern Mediterranean via the Suez canal in the future.” This note, documenting a live specimen of *G. pallida* in the Mediterranean Sea, proves him right.

Crosse (1864) reported *Psammobia weinkauffii*—a junior synonym of *G. pallida*—from the Mediterranean coast of Algeria. Already Bertin (1880) considered this record erroneous, though some authors (Nordsieck 1969; Parenzan 1976; Nicolay 1979) persisted in listing it in the Mediterranean malacofauna. Both von Cosel (1989) and Willan (1993: 22) “firmly reject” the Algerian locality and consider it “incorrect”.

#### **Remarks**

The genus *Gari* is represented in the Mediterranean Sea by six species: *G. costulata* (Turton, 1822), *G. depressa* (Pennant, 1777), *G. fervensis* (Gmelin,

1791), *G. pseudoweinkauffi* Cosel, 1989, *G. tellinella* Lamarck, 1818 and *G. virgata* (Lamarck, 1818) (Figure 2A–F). Three of these species – *G. virgata*, *G. pseudoweinkauffi* and *G. tellinella* – are widely distributed in the Atlantic Ocean and recorded, albeit rarely, in the western Mediterranean, though not from the eastern basin (von Cosel 1989; Huber 2010). *Gari costulata*, *G. fervensis* and *G. depressa* have been recorded in Turkey (Ostroumoff 1894; Sturany 1895; Demir 2003; Öztürk et al. 2014), but only the latter two species have been recorded in Israeli waters (Barash and Danin 1992). The reports of *G. tellinella* from Turkey (Buzurro and Greppi 1996) and Greece (Manousis 2012: 289) likely refer to juvenile specimens of *G. depressa*. *Gari fervensis* (Figure 2C) differs from *G. pallida* in having a prominent radial keel running from the beak to the posterior truncation, the surface of shell has well-defined concentric ridges crossed by about eight radiating ribs grouped posteriorly. *Gari depressa* (Figure 2B) reaches a larger size, with an ovate shell, almost central beaks, and sculpture of fine concentric and radiating lines. *Gari costulata* (Figure 2A) differs from *G. pallida* in its fine concentric ridges and up to 20 ribs radiating from the beaks to the posterior margin (Scaperrotta et al. 2018). All these six species lack the oblique ridges on the shell typical of *G. pallida* (Figure 1C), and differ in their color patterns (Figures 1A, 2A–C).

## Acknowledgements

The authors are deeply grateful to Stefano Bartolini (Florence, Italy) for the photographs. BSG additionally thanks the librarians of the American Museum of Natural History, New York.

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