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ON THE PRESENCE OF THE INDO-PACIFIC BIVALVE *CHAMA PACIFICA* IN THE EASTERN MEDITERRANEAN (Mollusca, Bivalvia, Chamidae)

by

H.K. MIENIS ⁽¹⁾, E. GALILI ⁽²⁾ & J. RAPOPORT ⁽³⁾

ABSTRACT

The recent discovery of at least three thriving populations of *Chama pacifica* Broderip, 1834 in the Eastern Mediterranean off Israel, means a confirmation of the presence of this Lessepsian migrant in the Mediterranean Sea some 88 years after its first recording from off Alexandria, Egypt. Mediterranean specimens, the biotope, and the epibionts and predators are described or enumerated.

Key-words: Bivalvia, *Chama pacifica*, Lessepsian migration, colonization, epibionts, predators.

SAMENVATTING

De recente ontdekking van ten minste drie bloeiende populaties van *Chama pacifica* Broderip, 1834 in het oostelijk deel van de Middellandse Zee ter hoogte van Israël, betekent een bevestiging van het voorkomen van deze soort uit de Rode Zee in de Middellandse Zee (=Lessepsian migrant) zo'n 88 jaar na de eerste vondst van deze soort ter hoogte van Alexandrië, Egypte. Exemplaren vanuit dit nieuwe verspreidingsgebied worden beschreven. Ook wordt aandacht geschonken aan het milieu, de floristische en faunistische begroeiing en de natuurlijke vijanden.

INTRODUCTION

Since the opening of the Suez Canal in 1869 a man-made link exists between two different malacological faunas: those of the Red Sea and the Mediterranean Sea. The former is of Indo-Pacific, the latter of Atlantic origin. This connection has resulted so far in the reporting of some 120 mollusc species of Indo-Pacific origin from the Mediterranean basin (Mienis, in prep.).

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Some of these so-called Lessepsian migrants are now firmly established throughout the major part of the Mediterranean Sea eg *Cerithium scabridum* Philippi, 1848, *Bursatella leachi savigniana* Audouin, 1826, *Brachidontes variabilis* (Krauss, 1848) and *Pinctada radiata* (Leach, 1814). Others are still confined to the Eastern Mediterranean eg *Diodora ruppellii* (Sowerby, 1834), *Trochus erithreus* Brocchi, 1823, *Minolia nedyma* Melvill, 1897, *Rissoiana bertholleti* (Issel, 1869), *Strombus decorus persicus* Swainson, 1821, *Cypraea gracilis* Gaskoin, 1849, *Murex forskoehtii* Röding, 1798, *Thais lacera* Born, 1778, *Zafra troglodytes* (Souverbie, 1866), *Malvifundus regula* (Forsskål, 1775) and *Macra olorina* Philippi, 1846, or occur even more locally elsewhere like *Umbonium vestiarium* (Linnaeus, 1758) off Lybia. All these species, about 50% of the recorded migrants among the molluscs, may now be considered permanent inhabitants of the Mediterranean basin.

All the other records of Indo-Pacific molluscs from the Mediterranean are mainly based on finds of single shells like *Nerita sanguinolenta* Menke, 1829 at Karpathos Island, Greece, *Lophiotoma indica* (Röding, 1798) or *Lophiotoma acuta* (Perry, 1811) off Alexandrina, Egypt and *Conus arenatus* Hwass, 1792 at Atlit, Israel, or on occasional massive intrusions which failed to result in the establishment of viable populations eg *Angiola punctostriatus* (Smith, 1872). Some records are even based on purely accidental finds of so-called souvenir shells on the beach like *Cypraea tigris* Linnaeus, 1758 in Venica, Italy or *Hippopus hippopus* (Linnaeus, 1758) at Tel Aviv, Israel.

Chama pacifica Broderip, 1834 belonged until recently to the group of Lessepsian migrants of which the presence in the Mediterranean had never been confirmed. Tillier & Bavay (1905: 177) and Pallary (1912: 166) recorded it off Alexandria at the beginning of the 20th Century, now, at the end that century we are finely able to confirm the existence of viable populations of *Chama pacifica* along the Mediterranean coast of Israel.

MATERIAL AND METHODS

The presence of a small population of a *Chama* species in the Mediterranean Sea off Haifa Bay was first noted in 1988 by Adam Kotzer, a local fisherman. Additional populations were discovered in the following years during professional diving activities (EG).

Representative samples were taken (AK and EG) and the collected specimens were cleared off their encrusting epibiontic flora and fauna and prepared for storage in collections (JR).

The material was studied and identified to specific level (HKM) and several voucher specimens were deposited for permanent documentation in the National Mollusc Collection, Zoological Museum, Hebrew University of Jerusalem (HUI).

RESULTS

Chama pacifica Broderip, 1834 — Fig. 1

Chama broderipi: Tillier & Bavay, 1905. Bull. Soc. Zool. France, 30: 177.

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Chama pacifica: Delsaerd, 1986. Gloria Maris, 25 (3): 102, plt. 1, figs. 4-5, plt. 4, figs. 1, 3, 5-6, plt. 5, fig. 11, plt. 6, figs. 2, 5-6, plt. 7, figs. 1-7.

Chama reflexa: Oliver, 1992. Bivalved seashells of the Red Sea: 106, plt. 25, figs. 8a-8b.

Taxonomical and nomenclatural notes. — Tillier & Bavay (1905) and Pallary (1912) reported an Indo-Pacific *Chama* species as *Chama broderipi* Reeve, 1846 from off Alexandria, Egypt. Although Delsaerd (1986: 78) uttered some doubts concerning the proper identification of Tillier & Bavay's material, the figure in Pallary (1912: plt. 17, fig. 8) shows that at least his specimen is indeed referable to that taxon.

In his revision of the Erythraean Chamidae, Delsaerd (1986: plt. 8, fig. 5) figured the holotype of *Chama broderipi* and selected a lectotype of *Chama pacifica* Broderip, 1834 (Delsaerd, 1986: plt. 7, fig. 1). Both were described from material collected at Lord Hood's Island and present in the Cuming collection. Delsaerd reached the conclusion that *C. broderipi* has to be considered as a junior synonym of *C. pacifica*.

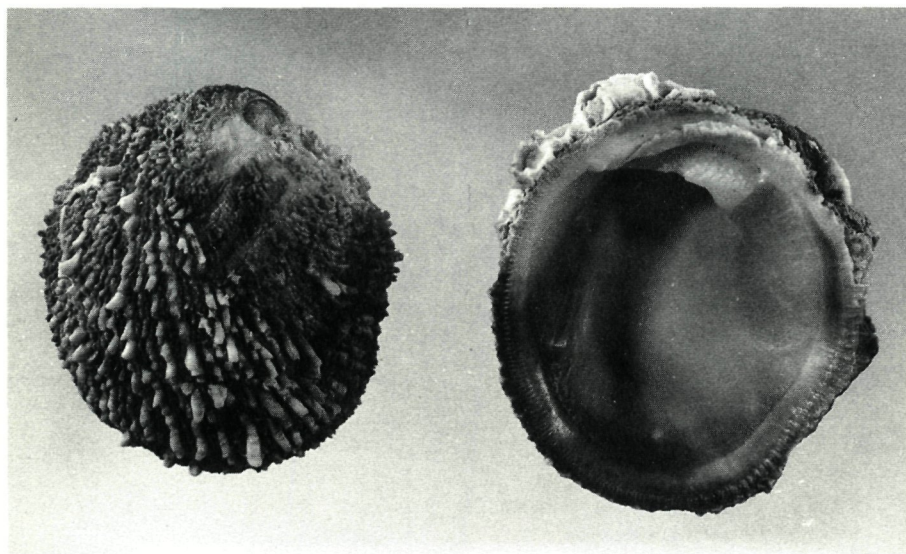


Fig. 1. *Chama pacifica* Broderip, 1834 off Carmel coast (HUI 2547). Left: upper valve (max. diam. 61 mm); Right: lower valve (max. diam. 68.4 mm).

Oliver (1992: 106, plt. 25, figs. 8a-8b) mentioned the same species as *Chama reflexa* Reeve, 1846 but added: «*Chama pacifica* has been recorded from the Red Sea but the specimens are attributable to *C. reflexa* and it is quite probable that the two are synonymous». As a matter of fact Delsaerd (1986) had proven already the synonymy of these taxa. We accept therefore the latter's opinion and follow Sharabati (1984) and Delsaerd (1986) in using the oldest available name: *Chama pacifica* Broderip, 1834.

Description of Mediterranean material.—Shell up to 65 mm. Upper (right) valve almost circular in outline, margin irregularly sinuous. Both outline and form of margin heavily dependant on shape of lower valve. Sculpture consisting of distinct radical rows of broad spines. Radial sculpture rather conspicuous due to contrast between the white scaly spines and the dark rust to orange red ground colour. In some specimens the radial sculpture consists of alternating rows of white and coloured spines. Internal margin finely crenulated, of a red purple colour; hinge and anterior adductor area white. Lower valve with attachment area occupying $\pm 20\%$ of entire surface; sculpture and colour pattern as in upper valve but less pronounced.

Distribution in the Mediterranean Sea (Fig. 2).—EGYPT, off Alexandria (Tillier & Bavay, 1905 : 177); off Alexandria, on valve of *Flexopecten glaber* (Linnaeus, 1758) (Pallary, 1912 : 166). ISRAEL, off Carmel coast, depth 15-18 m, summer 1992 (HUI 2547), off Haifa Bay, depth 15-20 m, autumn 1992 (HUI 2548), off Acco-Naharia, depth 15-20 m, autumn-winter 1992 (HUI 2549). Numerous specimens from the three populations off the coast of Israel are present in the Rapoport collection.

Habitat in the Mediterranean.—The habitat of *Chama pacifica* off the coast of Israel consists of bare, rocky outcrops of kurkar, a submerged aeolic sandstone, at depths of 12-25 m. Most specimens were encountered between 15-18 m, where they may occur in densities of up to 30 specimens per square meter. They share the habitat with an other Indo-Pacific migrant. *Spondylus spinosus* Schreibers, 1793 (Mienis, Galili & Rapoport, subm.). Juvenile specimens of *C. pacifica* are often found as epibionts in the upper valves of the *Spondylus* species.

Epibiontic flora and fauna.—The shells of *Chama pacifica* are usually heavily encrusted with epibiontic flora and fauna elements. Sofar we could identify the following epibionts:

Red algae: *Hildenbrandtia rosea*

Serpulid worms: *Serpula tetraceros* (Schmarda, 1861)

Hydroides elegans (Haswells, 1883)

Hydroides minax (Grube, 1878)

Barnacles: *Balanus perforatus* Bruguière, 1789

Bivalves: *Lithophaga lithophaga* (Linnaeus, 1758)

Malvifundus regula (Forsskål, 1775)

Spondylus spinosus Schreibers, 1793

Chama pacifica Broderip, 1834

None of these epibionts seems to have any detrimental effect on the growth and reproduction of *Chama pacifica*.

Natural enemies.—The populations of *Chama pacifica* off the Mediterranean coast of Israel are exploited as a foodsource by a number of malacophagous predators. Sofar we could register successful cases of predation on *Chama* by the Slipper lobster *Scyllarides latus* (Latreille, 1803), the Banded dye rock shell *Hexaplex trunculus* (Linnaeus, 1758), an unidentified species of *Octopus* and the Grey Trigger fish *Balistes carolinensis* Gmelin, 1789.

DISCUSSION

The rediscovery of *Chama pacifica* in the Mediterranean Sea after more than 80 years comes as a real surprise. The three thriving populations present off the

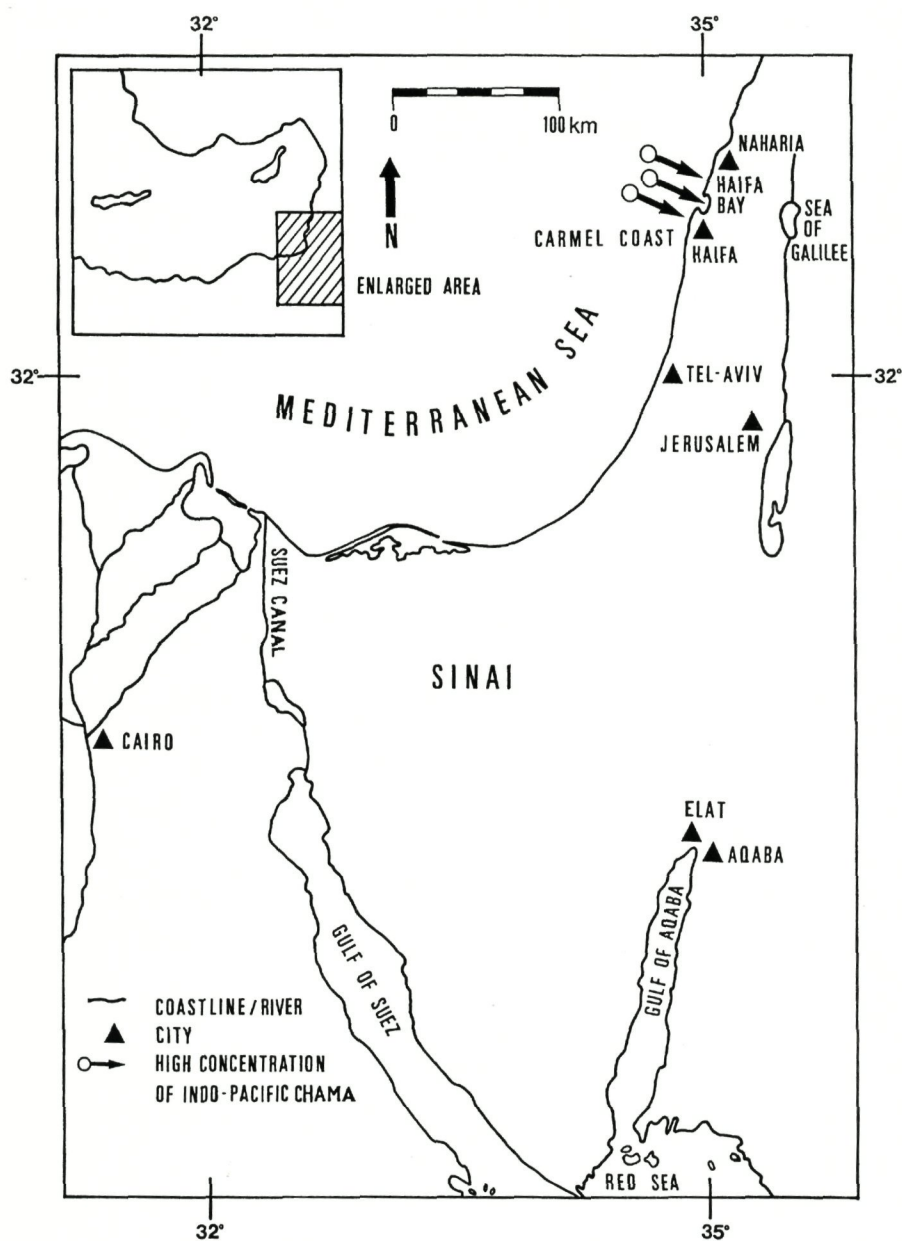


Fig. 2.

Distribution of *Chama pacifica* Broderip, 1834 in the Eastern Mediterranean.

coast of Israel consist of numerous specimens ranging in size from just settled metamorphosed larvae to fully grown adult specimens.

It is rather doubtful whether small colonies of this *Chama* have existed in the Mediterranean since the first records from off Alexandria at the beginning of the 20th Century. In the middle of the forties extensive dredgings have been carried out all along the Mediterranean coast of Israel at depths ranging between 0 to over 200 m. This failed to reveal even a single trace of *Chama pacifica* although the material contained a wealth of molluscs often not recorded before from the Eastern Mediterranean.

Moreover, Barash & Danin (1973, 1977, 1986 & 1992) have dealt intensively with the presence of Lessepsian migrants in the Mediterranean Sea. They were also unable to add any new information.

The mechanism allowing Indo-Pacific mollusca to settle in the Mediterranean is still unclear. Often several migrants are discovered almost simultaneously, hinting in a direction that the penetration of the Mediterranean Sea by Indo-Pacific species occurs rather in waves than in a continuous trickle.

Whatever the case may be, we can place *Chama pacifica* now on the list of firmly established Lessepsian migrants in the Mediterranean Sea.

ACKNOWLEDGEMENTS

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