

**PTEROMERIS JOZINAE VAN AARTSEN, 1985 (BIVALVIA, CARDITIDAE)  
FROM THE LOWER PLEISTOCENE OF SICILY**

RAFAEL LA PERNA

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Abstract: *Pteromeris jozinae* is presently known from the eastern and southern coasts of the Mediterranean Sea (Israel, Tripoli, Gabes Bay). It is also present in the Lower Pleistocene of SE and NW Sicily (Grammichele, Mineo, Palermo).

The presence of this species in the central Mediterranean during the Lower Pleistocene, suggests its withdrawal towards warmer areas, i.e. the Levantine Basin, caused by the Quaternary cooling. Other Mediterranean species show a similar trend, among which *Gibbula spratti* (Forbes) is a notable example.

Riassunto: *Pteromeris jozinae* è attualmente nota per le coste orientali e meridionali del Mediterraneo (Israele, Tripoli, Golfo di Gabes). Essa è presente anche nel Pleistocene inferiore della Sicilia sud-orientale (Grammichele, Mineo) e nord-occidentale (Palermo).

La presenza di questa specie nel Mediterraneo centrale durante il Pleistocene inferiore suggerisce un processo di regressione verso i settori più caldi del Mediterraneo, cioè verso il Bacino Levantino, determinata dal raffreddamento climatico quaternario. Qualche altra specie mediterranea mostra una tendenza simile, come per esempio *Gibbula spratti* (Forbes), anch'essa reperita nel Pleistocene della Sicilia (Grammichele).

RAFAEL LA PERNA, Istituto Policattedra di Oceanologia e Paleoecologia, Università di Catania, Corso Italia, 55 - I-95129 Catania (CT).

## Introduction

In 1985, VAN AARTSEN described *Pteromeris jozinae* on specimens from the *Shearwater* expedition (1871), along the coast of Tripoli (see WAREN, 1980 for further information about expedition and samples). JEFFREYS (1874) referred such specimens to the new species *Cardita incurva*, but this name remained a *nomen nudum* and is anyway preoccupied by *Cardita incurva* Buvignier, 1852. VAN AARTSEN (1985) examined the *Shearwater* lot (USNM), some specimens from Haifa Bay (Israel) and a valve from Djerba (Gabes Bay). VAN AARTSEN *et al.* (1989) again reported *Pteromeris jozinae* from Israel and the Sinai coasts.

Although under different names, *Pteromeris jozinae* has been reported three times from the Lower Pleistocene of Sicily.

The presence of this species in the Lower Pleistocene of Sicily deserves some comments about its changes in the geographic distribution within the Mediterranean Basin during the Quaternary.

## Lower Pleistocene records of *Pteromeris jozinae* from Sicily

*Cardita* sp. - Monterosato, 1872: 24.

*Cardita (Pteromeris) scalaris* - De Fiore, 1937: 12.

*Cardita (Cyclocardia) scalaris* - Malatesta, 1963: 338, text-fig. 20, pl. 15, fig. 3.

The oldest record of *Pteromeris jozinae* from the Sicily Pleistocene is that by MONTEROSATO (1872), who reported *Cardita* sp. from Monte Pellegrino (Palermo). Later, dealing with the living species *Cardita corbis* Philippi [= *Pteromeris minuta* (Scacchi)], MONTEROSATO (1874) stressed its close relation to *Cardita incurva* Jeffreys ms., which figure, dans mon Catalogue des fossiles du Monte Pellegrino et de Ficarazzi, sous la dénomination de «*Cardita* sp.»" (see also VAN AARTSEN, 1985). MONTEROSATO'S remarks about the fossil species, leave no doubt about its identity. MONTEROSATO (1875, 1878) again listed *Cardita incurva* among the Mediterranean molluscan fauna, merely on the grounds of the original report.

In 1937, DE FIORE reported "*Cardita (Pteromeris) scalaris* Sowerby" from "Pliocene" molluscan faunas from Mineo (SE Sicily), with no remark but a cross to indicate an extinct species. The sample labelled as "*Cardita (Pteromeris) scalaris* Sow." in DE FIORE collection (Paleontological Museum of Catania University), contains four valves. Three of them are perfectly referable to *Pteromeris jozinae* (Figs. 4, 5), whereas a fourth one belongs to *Ctena decussata* (O.G. Costa). In this regard, it is worth reporting what MONTEROSATO (1874) wrote about *Cardita incurva*: "... et rappelle plus encore les jeunes exemplaires du *Lucina reticulata*, Poli (= *Ctena decussata*), avec lesquels on peut facilement la confondre". The stratigraphic sequence of Mineo, and surely the beds from which the specimens in DE FIORE collection come, are Lower Pleistocene in age (AMORE *et al.*, 1985), as testified by the presence of *Arctica islandica* too, and not Upper Pliocene as DE FIORE thought.

MALATESTA (1960-63) extensively studied the Lower Pleistocene molluscan fauna from the Catallarga hill (near Grammichele, not far from Mineo). The rich fossiliferous deposit of Catallarga has been known since the last century (TRAVAGLIA, 1880). From this deposit, MALATESTA (1963) reported "*Cardita (Cyclocardia) scalaris* (Leathes ms.) Sowerby", on the grounds of a badly preserved valve, whose pictures clearly shows that it belongs to *Pteromeris jozinae*. In referring this specimen to Sowerby's species, MALATESTA was obviously influenced by DE FIORE'S report from the close locality. He stressed, however, how doubtful such attributions were.

Several valves (6 right and 5 left) (Figs. 1-3) of *Pteromeris jozinae* have been lately detected among a mollusc collection from Catallarga. They show the typical look of the greatest part of fossils from this deposit, i.e. sometimes encrusted by calcitic cement and more or less worn.

No other record, throughout the literature about the Plio-Pleistocene molluscs of Sicily (see GRECO, 1986), is referable to *Pteromeris jozinae*, although misidentifications (e.g. with young specimens of *Ctena decussata*) seem likely.

### Morphologic remarks

All the examined valves agree very well with the holotype of *Pteromeris jozinae*, illustrated by VAN AARTSEN (1985). Their size, expressed as antero-posterior length, ranges from 2.0 to 4.4 mm, with a length to height ratio very close to 1.0 (the holotype is 3.5 x 3.5 mm large).

As stressed by Van Aartsen (1985), sculptural features allow an easy distinction of *Pteromeris jozinae* from *Pteromeris minuta*. In the former, sculpture consists of flat radial ribs (about 15), marked out by well-incised grooves. The ribs show crowded (10-15 per millimetre) lamellar "scales". A similar sculptural pattern is actually present in *Pteromeris minuta* as well, but the radial grooves are ill-defined and a true concentric sculpture develops. Other differences

regard the hinge (see Van Aartsen, 1985: figs. 2-3), as well as the valve outline. The inner ventral margin shows a rough crenulation (Fig. 1b), whilst it is finely crenulated in *Pteromeris minuta*. Both species show a roundish prodissoconch, whose size is about 210 mm in *jozinae* and about 280 mm in *minuta*.

SOWERBY'S *Cardita scalaris*, as illustrated by WOOD (1853), SACCO (1899) and GLIBERT (1945) from the European Miocene and Pliocene, is quite distinct from *Pteromeris jozinae*. It is larger and almost equilateral; its sculpture is coarser and somewhat granulose. Apart from *Pteromeris minuta*, some Mio-Pliocene species, close to *Pteromeris jozinae*, are known from the Mediterranean area, such as "*Cardita*" *orbicularis* Sowerby and "*Cardita*" *chamaeformis* Sowerby.

## Ecology

The recent records of *Pteromeris jozinae* give neither information about substrate characteristics, nor detailed bathymetric data (40-120 fms. in the original report and 9-75 m in Haifa Bay).

MONTEROSATO'S report (1872) is from the Lower Pleistocene biocalcarenic beds ("*tufo calcareo*") which outcrop extensively near Palermo.

The specimens from Mineo come from alternating biogenic sandy and clay beds, as reported by DE FIORE. It is worth noting that valves are filled with a coarse biogenic sand. A similar alternance was described in detail along the stratigraphic sequence of Mineo by AMORE *et al.* (1985). Sandy levels are referred to current-swept circalittoral bottoms.

Paleoecological research on the macrofaunal assemblages from Catallarga (DI GERONIMO, 1984; ROSSO, 1987, DI GERONIMO & SANFILIPPO, 1992) allow us to refer the depositional environment to a shallow-water (about 30 m) biotope, swept by bottom currents. This biotope is comparable with that in which the present SGCF Biocoenosis (PERES & PICARD, 1964) lives.

At Catallarga, sediment is mainly represented by biogenic coarse sand and fine gravel. Molluscan assemblage is rich in rheophile species, such as *Astarte fusca* (Poli), *Digitaria digitaria* (L.), *Gonilia calliglypta* (Dall), *Goodallia triangularis* (Montagu) and again *Pteromeris minuta*. All these species are non-siphonate filter-feeders, needing coarse and porous sediments (see STANLEY, 1968; 1970). *Pteromeris jozinae* should be therefore regarded as a rheophile species, linked to coarse grained bottoms.

## Discussion

According to the fossil records, the Lower Pleistocene geographic distribution of *Pteromeris jozinae* included the central Mediterranean area, reaching at least as far as the Sicilian coasts. In contrast, its present distribution is limited to the eastern and southern Mediterranean areas. This species should be presently regarded as a Levantine endemism, with a somewhat westward distribution.

Another eastern species occurs among the molluscan fauna from Catallarga, i.e. *Gibbula spratti* (Forbes) (LA PERNA, unpublished). At present, it is an eastern Mediterranean endemism and it is probably present in the Gabes Bay too (GHISOTTI & MELONE, 1972; ZENETOS & VAN AARTSEN, 1995).

The Eastern Mediterranean shows some peculiar faunistic characteristics (PERES & PICARD, 1964; FREDJ, 1974), which are referable to its climatic features. The eastern areas show the highest values in water temperature and salinity within the Mediterranean. The Levantine Basin

has a principal role in originating the warm and salt "Intermediate Levantine Waters", which spread at intermediate depths throughout the Mediterranean (LACOMBE & TCHERNIA, 1972).

Differences in the Pleistocene and Recent distribution of *Pteromeris jozinae* are well explained by the Plio-Quaternary climatic changes and related modifications in shallow-water benthic assemblages. The Plio-Quaternary cooling caused a progressive extinction of littoral taxa with tropical affinity in the Mediterranean (MARASTI & RAFFI, 1980; RAFFI *et al.*, 1985, 1989). Both extinctions and a drastic decrease in taxonomic diversity, which involved several taxa (such as Terebridae, Conidae, Cancellariidae, Mitridae, etc.) should be referred to this phenomenon. Even *Pteromeris*, and Carditidae in general, were involved in a marked drop in diversity, as many Miocene and Pliocene carditid species are known from the Mediterranean and North Atlantic areas. It is worth stressing that during the Mio-Pliocene, *Pteromeris minuta* had a markedly higher northward distribution (up to the Netherlands and British Isles) than the present one, whose limit falls at about 44° N (MARASTI, 1990).

As stressed by Raffi (1986), the Earlier Pleistocene climatic conditions allowed some subtropical taxa to survive in the Mediterranean, such as terebrids (two species occur at Catallarga). Some Mediterranean "warm" species, now confined in the south-eastern sectors, could therefore tolerate even better these conditions. The increasing climatic deterioration during the Middle-Late Quaternary (SHACKLETON & OPDYKE, 1976; THUNELL & WILLIAMS, 1983), caused a "definitive" segregation of these species in the warmest areas. New expansions during favourable interglacial phases should be however expected, as shown by the "southern" scleractinian *Astroides calycularis* (ZIBROWIUS, 1995).

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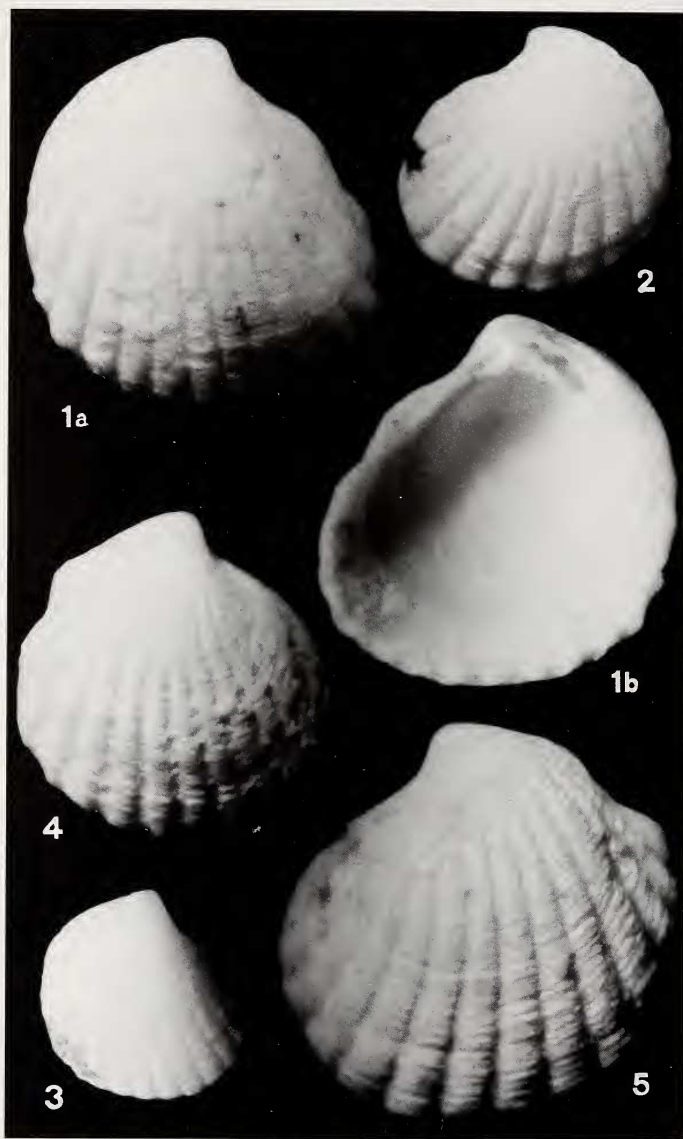


Plate I. *Pteromeris jozinae* Van Aartsen, 1985. 1a,b, 2, 3 - specimens from Catallarga (Grammichele, SE Sicily), Lower Pleistocene. 4, 5 - specimens from Mineo (SE Sicily), Lower Pleistocene (De Fiore coll., Paleontological Museum of Catania University). Valve in Fig. 5 shows a slight deformation along the posterior margin. Sizes (as antero-posterior length) are: 1) 3.5 mm, 2) 2.6 mm, 3) 2.0 mm, 4) 3.1 mm, 5) 3.9 mm.