

**European marine Mollusca: notes on less well-known species. XV.¹
Notes on Lusitanian species of *Parvicardium* Monterosato, 1884, and
Afrocardium richardi (Audouin, 1826) (Bivalvia, Heterodonta,
Cardiidae)**

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The Lusitanian small cardiid species classified in *Parvicardium* are discussed, with notes on the nomenclature, diagnoses and an identification key. The Indo-Pacific *Afrocardium richardi*, recently reported from the eastern Mediterranean, is also shortly dealt with.

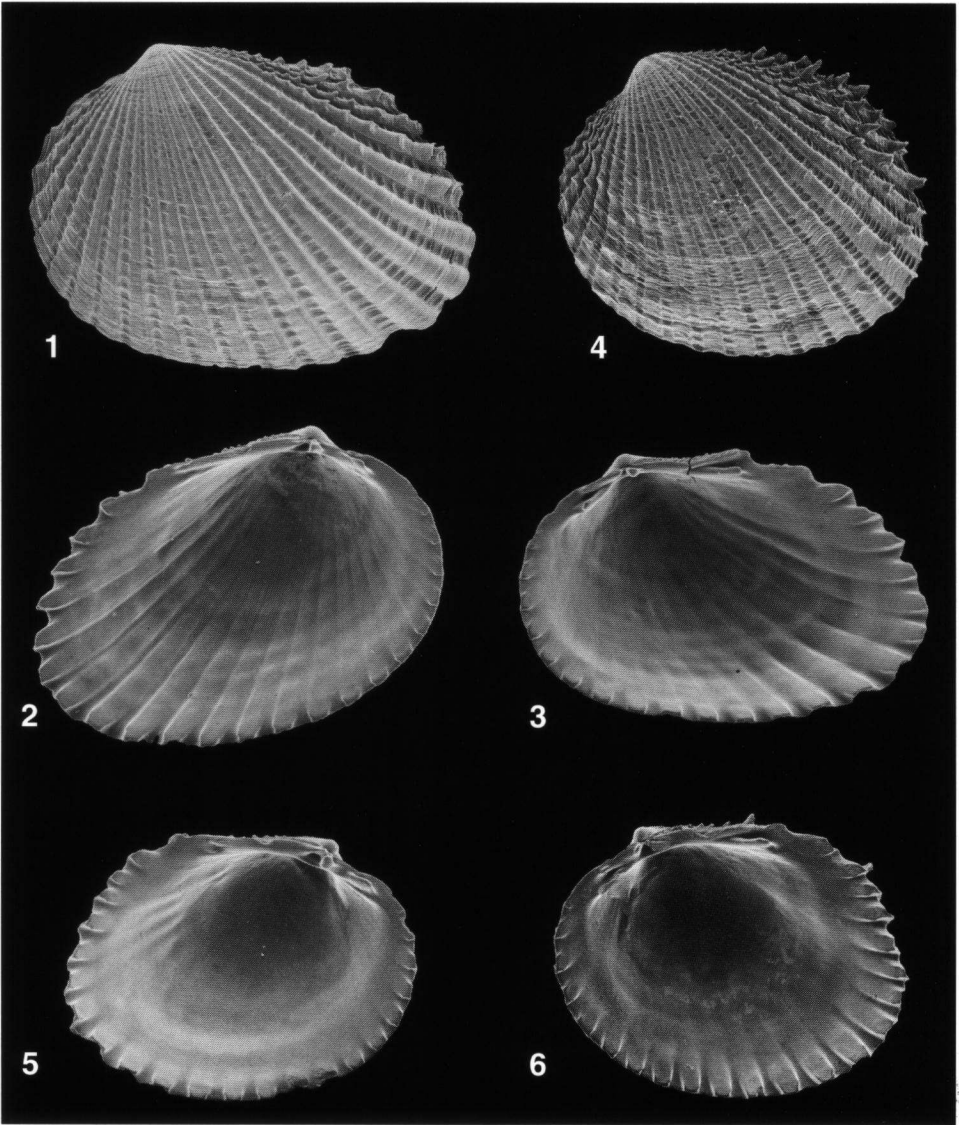
Key words: Bivalvia, Cardiidae, *Parvicardium*, Lusitanian, taxonomy, nomenclature.

INTRODUCTION

The genus *Parvicardium* was erected by Monterosato (1884: 19) with the following diagnosis: "Piccole specie oblique, papillose, che formano un gruppo distinto". Two species were originally included: "*P.[arvicardium] parvum* Ph. (*Cardium*) - II, p. 39, t. 14, f. 17" and "*P.[arvicardium] transversale*, Desh. (*Cardium*) ex typo in Brit. Mus. - Proc. Zool. Soc. 1854, p. 333". *Parvicardium parvum* (Philippi, 1844) was selected as the type species by Crosse (1885: 140). There has been some discussion about the identity of this nominal taxon, which is either identical with *Cardium exiguum* Gmelin, 1791, or belongs to a species which is quite closely related. On this basis, small species of the genus *Cardium* L., 1758 (sensu lato) are classified in *Parvicardium*. We follow current opinions and also place many of the small European Cardiidae in *Parvicardium*. In the following notes several of these species are dealt with in order to elucidate their status. For all of them the original description is cited and important synonyms are indicated. Only some selected literature references are given.

The arctic *Goethemia elegantulum* (Möller, 1842) is not considered here although that species was placed in *Parvicardium* by CLEMAM (2000). Schneider (1998: 346) classified *Parvicardium* in the Fraginae and considers *Goethemia* a valid genus, not even belonging to the same subfamily. The Baltic *Cardium hauniense* Høpner Petersen & Russell, 1971, is considered to belong to a different genus too, viz. *Ceratobyssum* Høpner Petersen & Russell, 1973 (= *Balticardium* Lambiotte, 1979). Schneider (1998: 355) considered *Ceratobyssum* a subgenus of *Parvicardium*.

¹For no. XIV in this series see La Conchiglia 30 (289): 56-58, 1998.



Figs 1-6. *Parvicardium* spec. Figs 1-3. *P. vroomi*, Algeciras, Spain. 1, outside of left valve, length 3.5 mm; 2, inside of left valve, length 3.4 mm; 3, inside of right valve, length 3.4 mm. Figs 4-6. *P. scriptum*, Viransehir, Mersin Turkey. 4, outside of left valve, length 3.0 mm; 5, inside of left valve, length 2.8 mm; 6, inside of right valve length 2.5 mm.

KEY TO THE LUSITANIAN *PARVICARDIUM* SPECIES

- 1a. Shells more or less equilateral, top not far from the midline 2
 1b. Shells clearly inequilateral, top at the anterior side 5
 2a. Interstices between the ribs rather broad, clearly marked with narrow slits or punctures; ribs with series of tubercles *papillosum*
 2b. Interstices between the ribs narrow, especially in the middle and ventrally, barely marked with small punctures 3
 3a. Ribs in the middle smooth, but with oblique transverse blunt plates on the anterior side; hinge weakly developed *pinnulatum*
 3b. Ribs largely covered either with small tubercles, with oval or arched plates, or with cusp-like spines 4
 4a. Shells fragile, rather circular in outline, white; ribs with cusp-like spines in one or sometimes two rows *minimum*
 4b. Shells solid, broadly oval in outline; ribs usually largely covered with oval or arched plates, sometimes with many small tubercles; hinge strong *scabrum*
 5a. Shells with a more or less prominent angle or ridge bordering the posterior side; with 20-22 (24) ribs *exiguum*
 5b. Shells without any trace of a ridge from the top to the posterior side 6
 6a. Shells with the ventral edge straight for an appreciable distance; small, up to 3 mm *trapezium*
 6b. Shells rather lengthened: about 1.4 times broader than high; up to 6 mm *vroomi*
 6c. Shells about 1.25 times broader than high; up to 12 mm *scriptum*

SYSTEMATIC PART

The diagnoses presented here are brief, other publications such as those by Lambiotte (1979) and Voskuil & Onverwagt (1989) should be consulted for more detailed information.

Parvicardium vroomi van Aartsen, Menkhorst & Gittenberger, 1984
 (figs 1-3, 10, 11, 16, 19)

Cardium transversale Deshayes, 1855: 333; Smith, 1885: 162; Watson, 1897: 278; Nobre, 1937: 81; Parenzan, 1974: 214. Not F. Römer, 1849.

Papyridea transversale Deshayes, 1854; Nordsieck, 1969: 103.

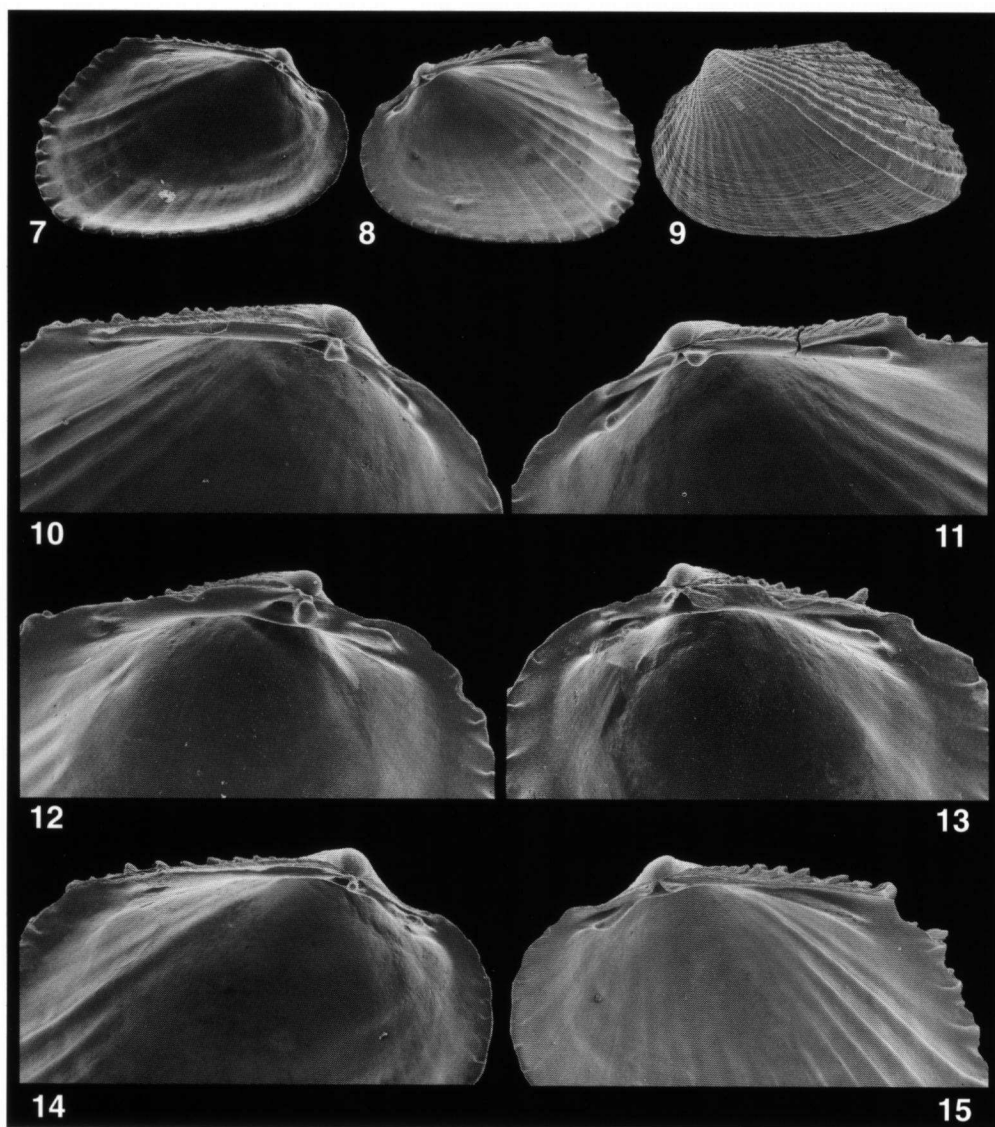
Cardium exiguum; Fischer-Piette, 1977: 86. Not Gmelin, 1791.

Parvicardium vroomi van Aartsen, Menkhorst & Gittenberger, 1984: 67 (replacement name for *Cardium transversale* Deshayes, 1855); Voskuil & Onverwagt, 1989: 75; Poppe & Goto, 1993: 98; Salas, 1996: 63.

Parvicardium ovale; Spada & Della Bella, 1990: 395; Avila et al., 1998: 51. Not G.B. Sowerby II, 1840.

Diagnosis. — Shell inequilateral, elliptical. Ribs and interstices about equally broad, shining through at the inside. Hinge-plate regularly curved.

Notes. — *Cardium transversale* was described by Deshayes (1855: 333) from the Mediterranean island Alboran. Later on the same species was reported from the Azores (Fayal) and the Canary Islands by Smith (1885: 162) and from Madeira by Watson (1897: 278), who added "Everywhere; extremely abundant". Nobre (1937: 81) in his



Figs 7-15. *Parvicardium* spec. Figs 7-9, 14-15. *P. trapezium*. 7-8, 14-15, Prassonissi, Rhodos, Greece; inside of left valve (7), length 2.5 mm, with detail of the hinge (14, 25x); inside of right valve (8), length 2.4 mm, with detail of the hinge (15, 25x); 9, Kizkalesi, Mersin, Turkey, outside of left valve, length 2.5 mm. Figs 10-11. *P. vroomi*, hinges of left and right valves of shells illustrated in figs 2 and 3 (25x). Figs 12-13. *P. scriptum*, hinges of left and right valves of shells illustrated in figs 5 and 6 (25x).

report on the Mollusca from Madeira, cited Watson (1897) but did not add any observation of his own.

After a long time the species was mentioned again by Nordsieck (1969: 103). Parenzan (1974: 214) mentioned it too, following Nordsieck, both citing it from Algeria. Fischer-Piette (1977: 86), in his revision of the Cardiidae, considered the species a form of what he called "Complexe du *Cardium exiguum* Gmelin". This author included in this 'complex' *Parvicardium ovale* (Sowerby, 1840) and *P. scriptum* (Bucquoy, Dautzenberg & Dollfus, 1892), which we consider separate species. Fischer-Piette (1977: 155) also mentioned that *C. transversale* Deshayes, 1855, is preoccupied by *C. transversale* F. Römer, 1849, but did not introduce a replacement name because "cette espèce [*C. transversale* Deshayes] est mise par nous en synonymie de *C. exiguum* Gmel...". Van Aartsen et al. (1984: 67) considered this a separate species and introduced the replacement name *Parvicardium vroomi* for *C. transversale* Deshayes, 1855, not Römer, 1849. These authors reported *P. vroomi* from Algeciras (Southern Spain). We found it also nearby near Tarifa. Voskuil & Onverwagt (1989: 75) pointed to a possible confusion of this species with *P. scriptum*, the most generally distributed *Parvicardium* species of the Mediterranean. However, van Aartsen et al. (1984: 68) already discussed the differences between *P. vroomi* and *P. scriptum*.

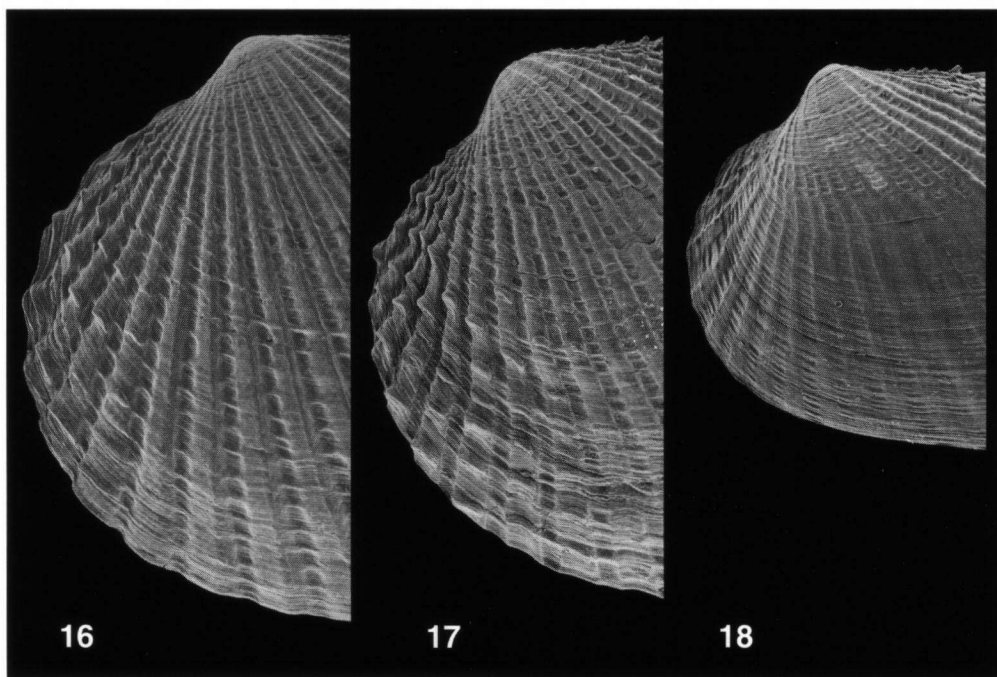
In recent years much confusion has arisen from a paper by Spada & Della Bella (1990), who synonymized *Parvicardium vroomi* with *P. ovale* (= *P. pinnulatum*) a species which does not occur with certainty in the Mediterranean. From the figures given by Spada & Della Bella (1990: pl. 3 figs a-d, pl. 4 figs a, b) it is quite clear that these authors did not know *P. pinnulatum*: their figured shells most probably belong to *P. scriptum* and certainly not to *P. pinnulatum*. Cecalupo & Quadri (1996: 102) also pointed out that *P. ovale* sensu Spada & Della Bella, 1990, is not the real *P. ovale* (G.B. Sowerby II, 1840). Good figures of the true *P. pinnulatum* are given by Ziegelmeier (1957: pl. 7 fig. 5 "*C. fasciatum* Montagu, 1808") and Tebble (1966: 102, fig. 52 "*C. ovale*").

Sabelli et al. (1990: 310), copied by CLEMAM (2000), followed Spada & Della Bella in synonymizing *P. vroomi* with *P. ovale* (= *P. pinnulatum*). This has the additional unfortunate result that the arctic, boreal *P. pinnulatum* is reported from the Mediterranean.

Poppe & Goto (1993: 98) indicated about *P. vroomi* that "This may be a young form of another species". Salas (1996: 63) found the species off the Southern Iberian Peninsula and Alboran. Although she studied the type specimens of *C. transversale* Deshayes, 1855, in the British Museum and cited the species correctly under *P. vroomi* she added that "There are some doubts about its validity and some authors consider it as a synonym of *Parvicardium ovale* (G.B. Sowerby, 1840)". Cecalupo & Quadri (1996: 102) considered *P. vroomi* a separate species and compared it with *P. scriptum* and *P. trapezium* Cecalupo & Quadri, 1996.

In their checklist of the marine Mollusca of the Azores, Avila et al. (1998: 511) listed *P. vroomi* as a synonym of *P. ovale* (= *P. pinnulatum*). However, Avila (in litt.) now agrees that two species are involved and that the one known from the Azores is not *P. pinnulatum*.

In order to put an end to all uncertainty, *Parvicardium vroomi* should once more be compared with *P. scriptum* and, therefore, SEM-figures of both species are given. Half-grown specimens were selected, because without already being eroded or deformed they represent best the characteristic features. The main difference between *P. vroomi* and *P. scriptum* is found in the hinge. In *P. vroomi* the hinge is weak and the angle between the dorsal side and the anterior lateral(s) is about 140°. In *P. scriptum* the hinge is stronger



Figs 16-18. *Parvicardium* spec. 16, *P. vroomi*, detail of fig. 1, 30x; 17, *P. scriptum*, detail of fig. 4, 30x; 18, *P. trapezium*, detail of fig. 9, 30x.

and the angle between the dorsal side and the anterior lateral(s) is larger, viz. 160° . As a consequence, the hinge of *P. vroomi* looks more curved compared to that of *P. scriptum* (figs 10-11, 12-13). There are additional differences in the cardinal teeth of both species, but these cannot be seen easily under the optical microscope. The shell form of both species is different too. In *P. vroomi* the shells are elongated elliptical, about 1.4 times as broad as high, whereas in *P. scriptum* they are more oval and not more than 1.25 times as broad as high on the average (figs 1-3, 4-6). The intercostal sculpture of both species (figs 16-17) and their prodissoconchs (figs 19-20) are not clearly different.

Parvicardium scriptum (Bucquoy, Dautzenberg & Dollfus, 1892) (figs 4-6, 12-13, 17, 20)

Cardium exiguum var. *scripta* Bucquoy, Dautzenberg & Dollfus, 1892: 283, pl. 45 figs 13-18.

Parvicardium nodosum (Turton); Tenekidis, 1989: 61 B26.6, fig. 8. Not Turton, 1822.

Diagnosis. — Shell inequilateral, broadly oval; with a dark posterior half. Ribs and interstices of about the same width; sometimes shining through at the inside. Hinge-plate only slightly curved.

Notes. — This species was dealt with by van Aartsen et al. (1984: 67). It is one of the most common *Parvicardium* species, occurring throughout the Mediterranean.

Differences with *P. vroomi* are mentioned under that species.

Parvicardium trapezium Cecalupo & Quadri, 1996 (figs 7-9, 14, 15, 18, 21)*Parvicardium trapezium* Cecalupo & Quadri, 1996: 101, pl. 3 fig. 5, pl. 4 figs 1a, 2a.

Diagnosis. — Shell inequilateral, strongly truncated posteriorly. Ventral side nearly straight over its whole length. Ribs and interstices about equally broad; shining through at the inside. Hinge-plate regularly curved.

Notes. — Compared with both *Parvicardium vroomi* and *P. scriptum*, the hinge of *P. trapezium* looks much more like that of *P. vroomi*, being regularly curved and relatively weak. The shells are much more truncated posteriorly, however (figs 7-9). The intercostal sculpture, formed by thickened growthlines, is clearly more dense than in the other two species (figs 16-18).

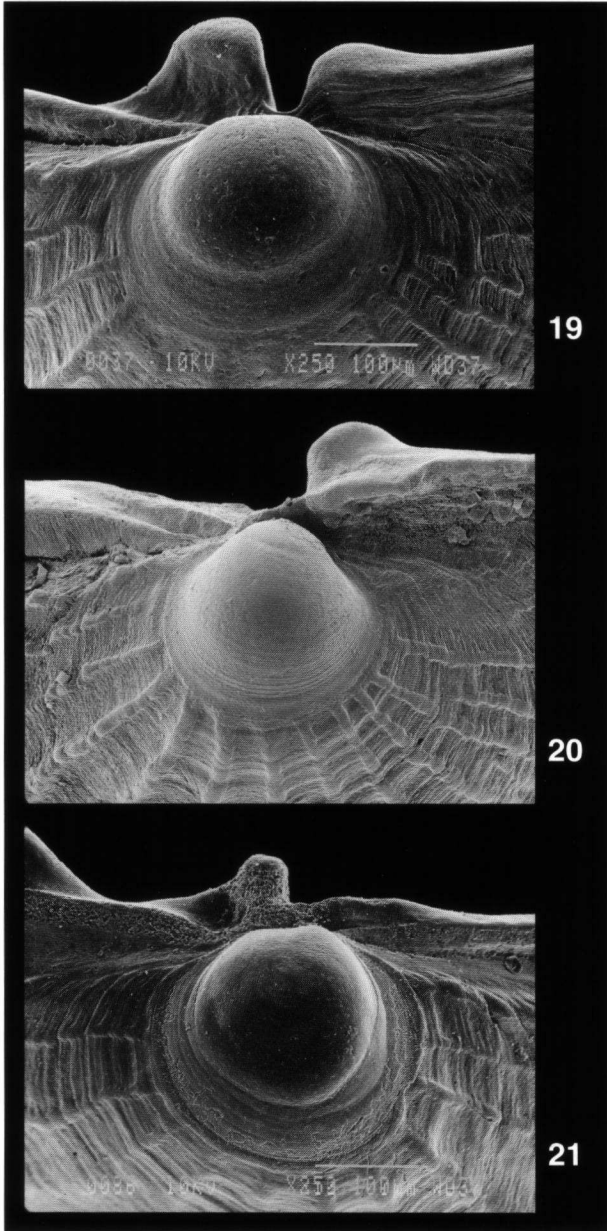
This species was described recently from the Eastern Mediterranean (Cyprus and Fetye, Turkey). We can add two localities at the SE. Mediterranean coast of Turkey, viz. Kizkalesi and Viransehir, as well as the Greek island of Rhodos (Colln. van Aartsen).

Parvicardium pinnulatum (Conrad, 1831) (figs 22-24, 28)*Cardium pinnulatum* Conrad, 1831: 260, pl. 11 fig. 4. **Lectotype** (design. nov.), from Massachusetts: ANSP 62763.*Cardium ovale* G.B. Sowerby II, 1840: 2.*Cardium elongatum* Montagu, 1803: 82. Not Bruguière, 1789.*Cardium fasciatum* Montagu, 1808: 30. Not Gmelin, 1791.*Cardium (Parvicardium) ovale* G.B. Sowerby II, 1840; Winckworth, 1932: 243; Bowden & Heppell, 1968: 250; Turk, 1973: 48; Høisaeter, 1986: 122.*Parvicardium ovale* (G.B. Sowerby II, 1841); Nordsieck, 1969: 99; Piani, 1980, Corr. 1: 11; Bruschi et al., 1985: 56; Spada & Della Bella, 1990: 395.*Cardium ovale* Sowerby, 1841; Fischer-Piette, 1977: 88; Voskuil & Onverwagt, 1989: 72; Poppe & Goto, 1993: 98.*Parvicardium ovale* (G.B. Sowerby II, 1840); Lambiotte, 1979: 46; Smith & Heppell, 1991: 67; Sabelli et al., 1990: 310; Cecalupo & Quadri, 1996: 102; CLEMAM, 2000.*Parvicardium (Parvicardium) ovale* (Sowerby, 1840); Voskuil, 1989: 260.*Parvicardium (Parvicardium) pinnulatum* (Conrad, 1831); Voskuil & Onverwagt, 1989: 72.

Diagnosis. — Shell roundish, somewhat inequilateral and slightly truncated posteriorly. Ribs low and broad, interstices very narrow. Fragile; ribs shining through over the entire height of the inside. Hinge rather weak.

Notes. — Voskuil & Onverwagt (1989: 72-73) were the first to identify the East Atlantic species known as *Cardium fasciatum* Montagu, 1808, with the West Atlantic species *C. pinnulatum* Conrad, 1831. Their opinion is followed here. We have studied Conrad's syntypes, three valves and a complete specimen (Academy of Natural Sciences, Philadelphia, no. 62763), from Massachusetts, and selected the complete specimen as lectotype. We consider *Cardium ovale* G.B. Sowerby II, 1840, a synonym. Note that the name *C. ovale* (a new name for *C. fasciatum* Montagu, 1808, not Gmelin, 1791) was printed in a separate "catalogue", which most probably dates from 1840 (Shaw, 1909; Reynell, 1910). These catalogues were reprinted in the last part (no. 200) of Sowerby's Conchological Illustrations, issued in 1841. Descriptions of many *Cardium* species were given by G.B. Sowerby II (1841: 105-111) in the same year. This may explain the confusion in the year of formal publication of the name *C. ovale*.

Shells of *Parvicardium pinnulatum* can be recognized by the ribs which are narrowly



Figs 19-21. *Parvicardium* spec., prodissoconchs, 135x. 19, *P. vroomi*, Algeciras, Spain; 20, *P. scriptum*, Viransehir, Mersin, Turkey; 21, *P. trapezium*, Prassonissi, Rhodos, Greece.

spaced so that the interstices are very small grooves. The shell is thin, so that the ribs can be seen from the inside over nearly the entire height of the valve. The hinge is very weakly developed (figs 22-23); it differentiates *P. pinnulatum* from *P. scabrum* (Philippi, 1844), with which it is often confused. The latter species has a much more prominent hinge (figs 25-26).

Good figures of *Parvicardium pinnulatum* were published by Ziegelmeier (1957: pl. 7 fig. 5 "*C. fasciatum*") and Tebble (1966: 102, fig. 52 "*C. ovale*").

Parvicardium scabrum (Philippi, 1844) (figs 25-27, 29)

Cardium scabrum Philippi, 1844: 38, pl. 14 fig. 16.

?*Cardium roseum* Lamarck, 1819; Jeffreys, 1864: 284. Not Gmelin, 1791.

Cardium nodosum Montagu, 1803; Turton, 1822: 186, pl. 13 fig. 8; Fischer-Piette, 1977: 93. Not Montagu, 1803.

Parvicardium ovale (G.B. Sowerby); Parenzan, 1974: 273, fig. 224; Tenekidis, 1989: B26.7 fig. 9. Not G.B. Sowerby II, 1840.

Diagnosis. — Shell roundish, nearly equilateral, truncated posteriorly. Ribs much broader than the interstices, not shining through at the inside. Hinge rather strong.

Notes. — Some authors, e.g. Fischer-Piette (1977: 93), suggested that this is *Cardium nodosum* Montagu, 1803. We follow the majority of the authors in considering the species described by Turton (1822: 186, pl. 13 fig. 8) different from the one introduced as *C. nodosum* by Montagu. Forbes & Hanley (1849: 23) already suggested that Montagu described young specimens of *C. tuberculatum* (L., 1758) as *C. nodosum*. These authors incorrectly used the name *Cardium nodosum* Turton, 1822, for this species.

Later on Jeffreys (1864: 284) suggested that *Cardium roseum* Lamarck, 1819 should be considered a variety of *C. nodosum* Turton, 1822 [sic!]. The same suggestion was made by Bucquoy, Dautzenberg & Dollfus (1898: 803). Here we follow the opinion of Fischer-Piette (1977: 94), based on E. Römer (1869), Dautzenberg (1887) and Lamy (1942). Type specimens clarifying this case could not be found. Besides, *C. roseum* Lamarck, 1819, is a junior homonym of *C. roseum* Gmelin, 1791, and cannot be used therefore.

Parvicardium scabrum can be differentiated from *P. pinnulatum* by its much more solid hinge (figs 22-23, 25-26), its thicker shell, and the much more clearly decorated ribs (fig. 29), which are "most crowdedly set with squamular tubercules" (Forbes & Hanley, 1849: 22). In *P. pinnulatum* (fig. 28) "the central ribs (except in the fry) are smooth and unarmed" (Forbes & Hanley, 1849: 26). Usually the shell of *P. scabrum* is more equilateral, with the top in the middle.

Parvicardium exiguum (Gmelin, 1791)

Cardium exiguum Gmelin, 1791: 3255.

Cardium pygmaeum Donovan, 1800: pl. 32 fig. 3.

Cardium subangulatum Scacchi, 1833: 16.

Cardium parassitum O.G. Costa, 1839: 26, pl. 3 fig. 1a-d.

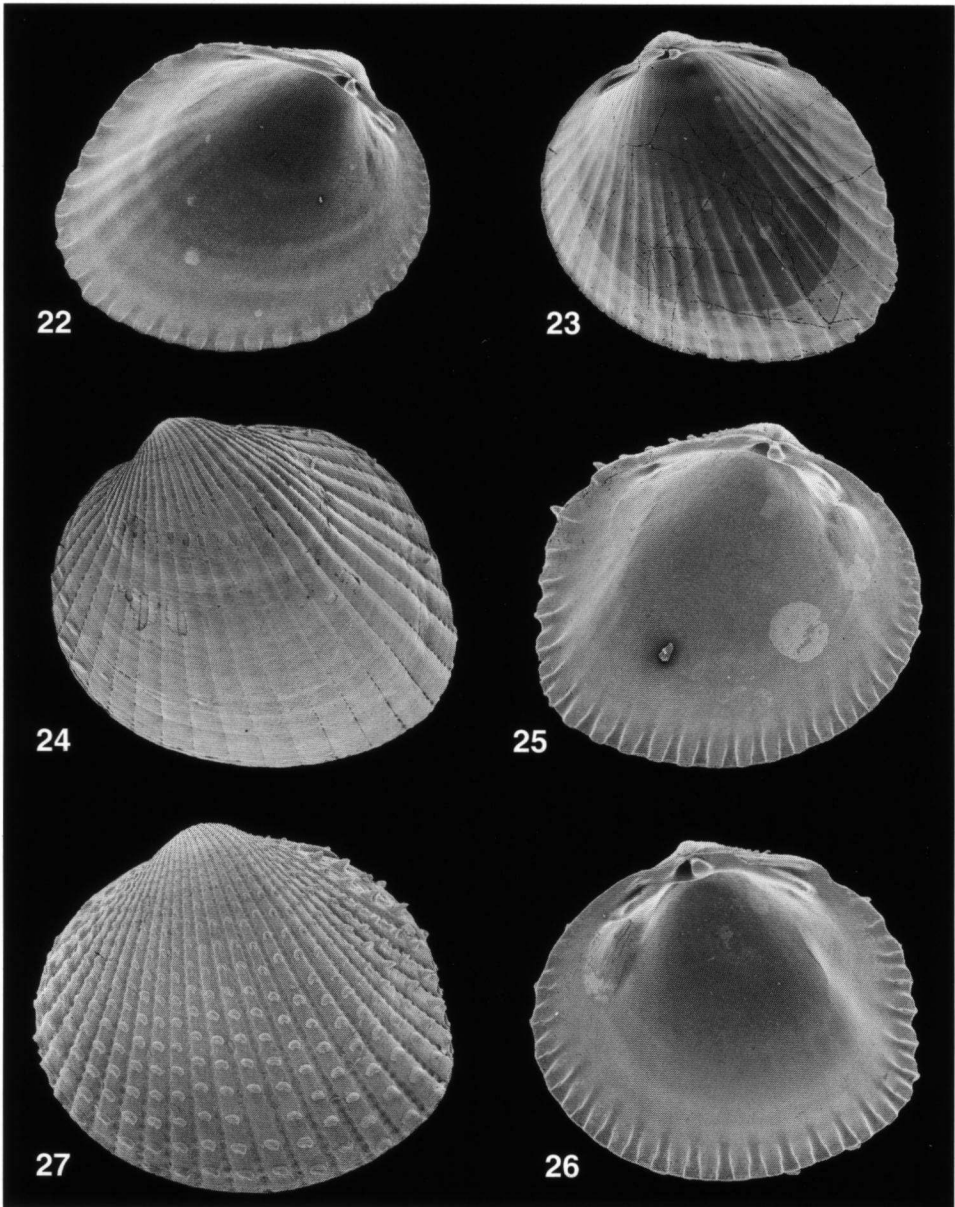
Cardium siculum G.B. Sowerby II, 1834: fig. 31 [without legends]; 1840: 2 [name with reference to fig. 31]; 1841: 106 [description].

Cardium aquilinum Mitre, 1842: 191.

Cardium parvum Philippi, 1844: 9, pl. 14 fig. 17. Not Da Costa, 1778; not Mawe, 1823; not G.B. Sowerby II, 1840.

Cardium helleri Brusina, 1865: 36.

Cardium exiguum var. *commutatum* Bucquoy, Dautzenberg & Dollfus, 1892: 282, pl. 45 figs 9-12.



Figs 22-26. *Parvicardium* spec. Figs 22-24. *P. pinnulatum*, Sletvik, Trondhjemfjord, Norway. 22, inside of left valve, length 3.0 mm; 23, inside of right valve; length 4.0 mm; 24, outside of left valve, length 4.5 mm. Figs 25-27. *P. scabrum*, Ria de Arosa, Spain. 25, inside of left valve, length 3.1 mm; 26, inside of right valve, length 3.0 mm; 27, outside of left valve, length 4.3 mm.

Diagnosis. — Shell markedly truncated posteriorly, with a ridge from top to lower posterior margin. Ribs and interstices about equally broad. Depending on the habitat, thick or rather thin, fragile shells occur.

Notes. — This species was described by Gmelin (1791: 3255) as follows: “exiguum. 37. C. testa oblongiuscula inaequaliter costata subfusca. Lister. Conch. t. 317 f. 157. Habitat..... minutum, an distincta species?”. Lister figured an Atlantic specimen. Voskuil & Onverwagt (1989: 75) and earlier authors have suggested that another species, for which they suggest the name *P. siculum* (Sowerby), occurs in the Mediterranean. There are several other and earlier names to be considered however. As the sculpture is deemed diagnostic by these authors, the original descriptions are cited here with respect to these characters.

Cardium subangulatum Scacchi (1833: 16) is described as “...sulcis inter costas sub epiderme punctatis (Golfo di Napoli)”.

For *Cardium parassitum* O.G. Costa (1839: 26, pl. 3 fig. 1a-d) the sculpture is described as “Le prime sette costole sono appianate e finamente seghettate sul lato posteriore; le due medie che costituiscono la carena sono triangolari e lisce; le 9 che succedono sono depresse e leggermente addentellate negli interstisi; le 4 ultime posteriori sono ritondate e guernite da piccoli e rari tubercoli bianchi... (Golfo di Taranto)”. Note that the original name is spelled with double *s* although correct Latin would be *parasitum*; Sherborn (1929: 4757) cites it like that.

Cardium siculum Sowerby (1834: fig.31 [without legends]; 1840: 2 [name with reference]; 1841: 106) is fitted with “..costis numerosis, planulatis, 5 anticis crenulatis; interstitiis angustis (mare Siculum)”.

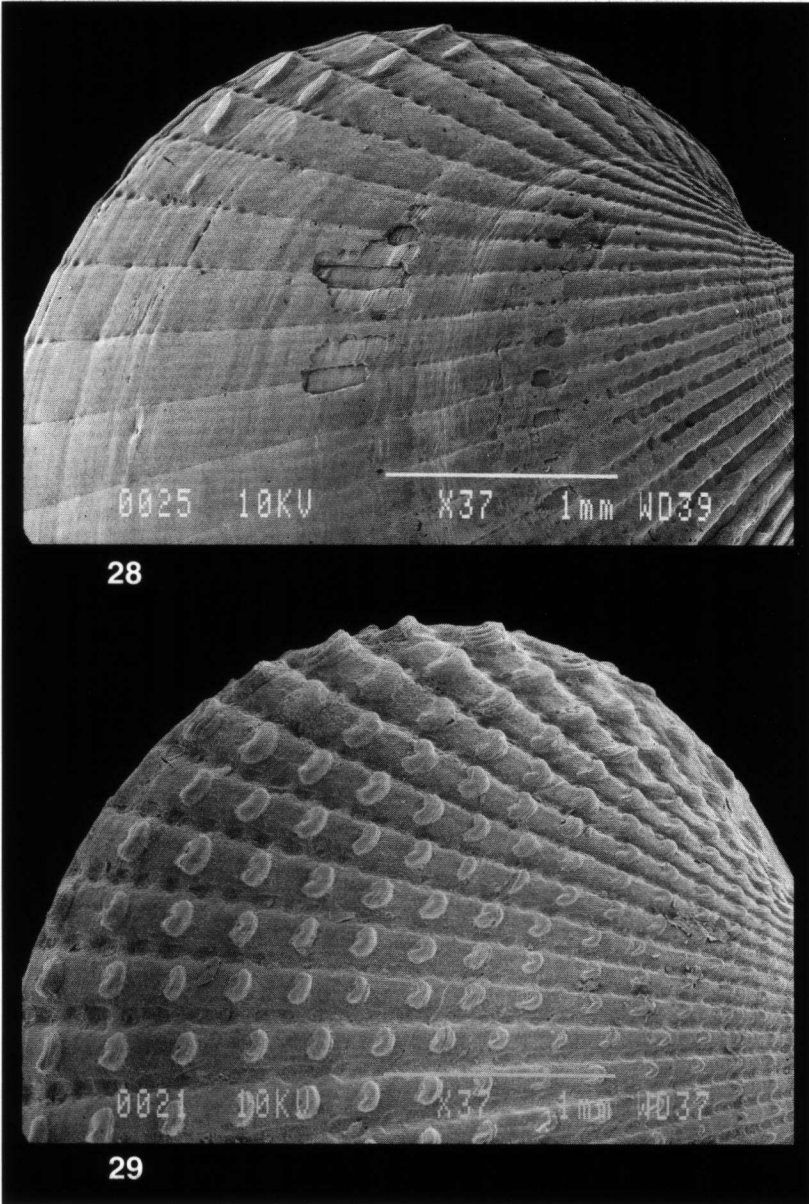
Cardium aquilinum Mitre (1842: 191) is described as “..les sillons qui les [=côtes] séparent sont en arrière, à peine marqués, indiqués seulement par un série de petits points fins et serrés; en avant ils sont larges, peu profonds, striés en travers...(rade de Toulon)”.

Philippi (1844: 9, pl. 14 fig. 17) apparently described the same species (at least in part) as *Cardium parvum* (not *C. parvum* da Costa, 1778; not Mawe, 1823; not G.B. Sowerby II, 1840) and writes “C. testa minuta, tenui, transversa, valde inequilatera, compressiuscula, costis 23, parum elevatis, interstitiis impunctatis (Lacu Fusaro et in Mari parvo Tarenti)”. Somewhat further on Philippi (1844: 39) writes “Costae plerumque laevissimae, interdum vero fere omnes tuberculis cylindricis asperae, saltem extimae. Inter costas laeves et asperas omnes transitus deprehendis”. Philippi (1844: 38) considers “*C. subangulatum* Sc.1833” and “*C. siculum* Sowerb.” to be synonyms of “*C. exiguum* Gm.”.

For *Cardium helleri* Brusina (1865: 36) the ribs and interstices are described as “21 di coste di rado 22, poco elevate, piane e lisce affatto, prive cioè di papille o bernoceoli, gli interstitii sono anche essi lisci (Porto di Zara)”.

Cardium exiguum var. *commutatum* Bucquoy, Dautzenberg & Dollfus (1892: 282, pl. 45 figs 9-12) is without doubt this species too. Its sculpture is described as follows “Les espaces intercostaux sont lisses partout ou bien présentent dans la région antérieure seule des ponctuations obsolètes (Étang de Berre)”. Note that Bucquoy, Dautzenberg & Dollfus (1892: 283) also (separately) mention “var. *subangulata* Scacchi = *sicula* Sowerby = *stellata* Reeve = *aquilina* Mitre”. These authors (1892: 282) state: “Ce type [= *C. exiguum* Gmelin, typique] vit aussi dans la Méditerranée”.

It is thus seen that in Mediterranean specimens the ribs are described as sculptured or smooth, with interstices that are either punctured, striated or also smooth. Evidently, these characters are rather variable which is exemplified by specimens from Lake Fusaro,



Figs 28-29. *Parvicardium* spec. 28, *P. pinnulatum*, detail of fig. 24, 30x; 29, *P. scabrum*, detail of fig. 27, 30x.

Étang de Berre and other localities. The only other allegedly differentiating character is a less pronounced posterior ridge in Mediterranean specimens, which we cannot confirm as being diagnostic indeed. Therefore, *Parvicardium exiguum* (Gmelin, 1791) is considered here a wide-spread species, occurring in both the Atlantic and the Mediterranean. Most Mediterranean specimens may belong to what has been called "*C. exiguum* (lagoon type)" by Høpner Petersen & Russell (1971b: pl. 2 fig. b). If these Mediterranean specimens should be considered a separate species, the oldest valid name is *C. subangulatum* Scacchi, 1833, which is not a nomen nudum as stated by Voskuil & Onverwagt (1989: 75)

Parvicardium minimum (Philippi, 1836)

Cardium minimum Philippi, 1836: 51; Philippi, 1844: 38, pl.14 fig. 18.

Parvicardium minimum; Tebble (1966: 21, 100, fig. 11a, b; Voskuil & Onverwagt, 1989: 72, fig. 5.4.02; Poppe & Goto, 1993: 97, pl. 16 fig. 9.

Diagnosis. — Shell nearly round, rather convex, thin and fragile; white. Ribs shining through at the inside. Intercostal spaces narrow, with fine but conspicuous lamellae.

Notes. — This is a well-known species from deeper water, occurring throughout Europe. The decoration of the ribs with sharply-angled V-shaped lamellae is characteristic.

Parvicardium papillosum (Poli, 1795)

Cardium papillosum Poli, 1795: 56, pl. 16 figs 2-4.

Cardium punctatum Brocchi, 1814: 666, pl. 16 fig. 11.

Parvicardium papillosum; Tebble, 1966: 101, figs 51a,b; Voskuil & Onverwagt, 1989: 76, fig. 5.4.11.

Plagiocardium papillosum; Poppe & Goto, 1993: 99, pl. 16 fig. 14.

Diagnosis. — Shell nearly round, rather convex, solid, with the ribs not shining through at the inside. Intercostal spaces wide, with coarse and conspicuous lamellae. Usually coloured with red-brown streaks or blotches.

Notes. — *Parvicardium papillosum* (Poli, 1795) which is placed in the genus *Parvicardium* following Tebble (1966: 101), Lambiotte (1979: 46) and Voskuil & Onverwagt (1989: 76), is a well-known species too and is not dealt with further.

Cardium punctatum Brocchi (1814: 666, pl. 16 fig. 11) was interpreted as a synonym of *P. papillosum* by Philippi (1836: 51). However, later on Philippi (1844:38) considered it to be different from *P. papillosum*. Jeffreys (1884: 33) after having studied the Brocchi-collection wrote "A single valve, and decorticated or deprived of the greater part of the outer layer. It appears to be *C. papillosum* Poli".

Afrocardium richardi (Audouin, 1826)

Afrocardium richardi; Bouchet & Danrigal, 1982: 14 fig.14; Oliver, 1992: 122, pl. 21 figs 8a,8b; Oliver in Dance (edit.), 1995: 244, fig. 1080.

Diagnosis. — Even juveniles of this species can be distinguished from all *Parvicardium* species treated above not only by a much greater number of ribs but also by alternating strong and weak ribs.

Notes. — Bogi & Galil (1999: 30, fig. 3, s.n. *Cardium richardi* Audouin, 1826) recently reported this Indo-Pacific species from the port of Haifa (Israel). We can confirm its presence along the Eastern Mediterranean coast of Turkey where we found one valve at Arzus (30 km south of Iskenderun), 11 loose valves and two specimens (all of them juvenile) at Karaagac (3 km south of Iskenderun), as well as two valves and one specimen (also juvenile) at Viransehir (near Mersin) (all in Colln van Aartsen). Although placed in *Parvicardium* by Moazzo (1939: 62), Pallary (1926: 110), Lamy (1927: 518) and Fischer-Piette (1977: 89) we follow recent literature and place this species in the genus *Afrocardium* Tomlin, 1931.

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