

MIDDLE MIOCENE OSTRACODS FROM THE SALENTINE PENINSULA

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Riassunto. Vengono presentati i risultati dello studio sistematico e biostratigrafico delle ostracofaune delle sezioni di S. Caterina e S. Maria al Bagno (Penisola Salentina, Puglia). Le sezioni interessano i livelli inferiori e medi della formazione della Pietra Leccese e si estendono complessivamente dal Burdigaliano superiore o Langhiano inferiore al Serravalliano medio. L'ostracofauna rinvenuta è costituita da quarantuno specie appartenenti a ventisette generi. Di queste, diciannove specie note dalla letteratura sono illustrate e discusse, sei (*Carinocythereis messapica* n. sp., *Celtia multicostata* n. sp., *Cytherella obesa* n. sp., *Cytherella polygonalis* n. sp., *Cytherella salentinensis* n. sp., *Cytherelloidea ? rectangularis* n. sp.) vengono descritte come nuove e due sono lasciate a nomenclatura aperta. Per ciascuna specie sono fornite le segnalazioni precedenti e la distribuzione bio-cronostratigrafica nell'ambito delle sezioni esaminate. Per un considerevole numero di specie di piattaforma note in letteratura a partire dal Miocene Superiore è stato possibile documentare che l'effettiva distribuzione risulta estendersi anche a parte del Miocene Medio.

Abstract. The ostracod faunas of the S. Caterina and S. Maria al Bagno sections (Salentine Peninsula, Apulia) were studied. These sections comprise the lower and middle levels of the Pietra Leccese formation and range collectively from the uppermost Burdigalian or the lower Langhian to the middle Serravallian. Forty-one species, belonging to twenty-seven genera were identified. Nineteen species known previously are illustrated and discussed, six (*Carinocythereis messapica* n. sp., *Celtia multicostata* n. sp., *Cytherella obesa* n. sp., *Cytherella polygonalis* n. sp., *Cytherella salentinensis* n. sp. and *Cytherelloidea ? rectangularis* n. sp.) are described as new, and two are left in open nomenclature. It is shown that the stratigraphic distribution of a remarkable number of shelf ostracod species, known previously from the Upper Miocene upwards, includes also part of the Middle Miocene.

Introduction

The systematics and stratigraphy of Middle Miocene ostracods from the S. Caterina and S. Maria al Bagno sections (Salentine Peninsula, Apulia) presented here comprise a portion of a more extensive research project on Italian Miocene ostracods (Dall'Antonia 2000, 2001; Dall'Antonia, in review; Dall'Antonia & Bossio 2001; Dall'Antonia et al., in press). The S. Cate-

rina and S. Maria al Bagno sections were sampled originally by Bossio et al. (1992) in the sole subaerial exposure of the Pietra Leccese formation along the Ionic coast of Apulia. This informal unit (Largaiolli et al. 1969; Rossi 1969; Martinis 1970; Bossio et al. 1989a, 1989c, 1991, 1992) crops out extensively in the Salentine Peninsula, especially in the eastern sector, and ranges from the upper Burdigalian/lower Langhian to the lower Messinian (Bossio et al., 1991). Apart from the work of Bossio et al. (1989a), which provides a list of ostracods from the Poggiardo Well (drilled about 9 km southwest of Otranto), no detailed systematic study has been carried out on the faunas of the Pietra Leccese formation.

The depositional environment of this succession is referable mainly to shelf marine conditions (Bossio et al. 1992; Bossio et al., in progress). Both ostracods and benthic foraminifers indicate that the Langhian is dominated by a rapidly deepening trend from the inner shelf to the upper part of the epibathyal zone. Quantitative changes in the ostracod assemblages suggest the beginning of a slow regressive tendency within the Serravallian. Although the quality of preservation is not optimal, the faunas recovered are quite interesting, since the Lower and Middle Miocene shallow ostracods of the Mediterranean have been scantily studied to date (Carbonnel 1966; Coutelle & Yassini 1973; Gökçen 1985). Previous works on this time interval address mainly deep, mostly bathyal faunas (Ruggieri 1960; Oertli 1961; Russo 1966; Russo & Bossio 1976; Ciampo 1981; Bonaduce & Russo 1985). Shelf marine ostracods are well documented only in the Upper Miocene (Ruggieri 1962, 1963, 1967, 1976b; Dieci & Russo 1965; Aruta 1966, 1983; Ascoli 1968; Russo 1969; Sissingh 1972; Russo & Bossio 1976; Ciampo 1980, 1984, 1986; Bonaduce et al. 1992; Miculan 1992; Dall'Antonia & Bossio, 2001, *cum bibl.*). The new taxa described and the presence in the Middle Miocene succession of several

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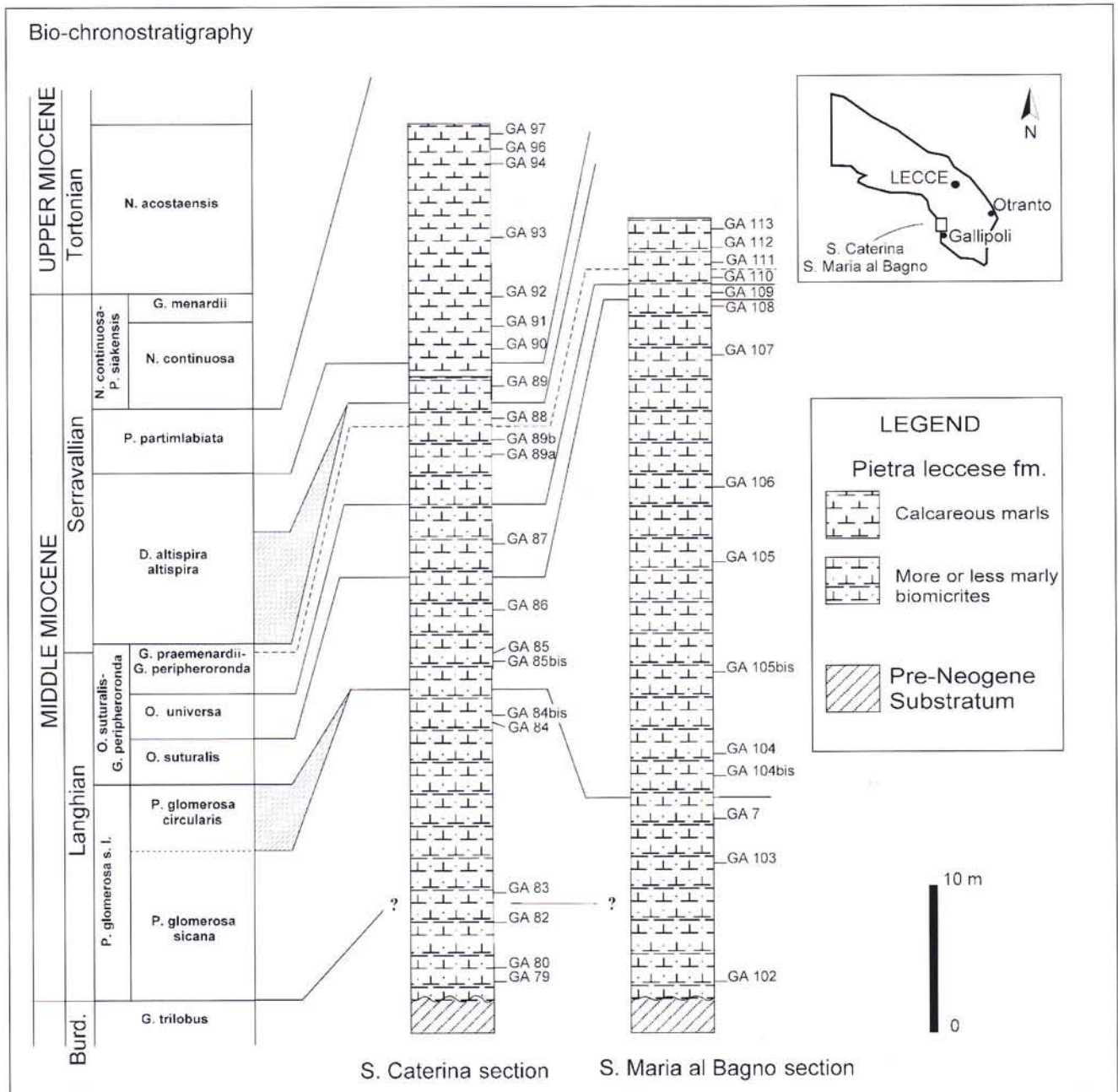


Fig. 1 - S. Caterina and S. Maria al Bagno sections (Salentine Peninsula): lithology and bio-chronostratigraphy based on the foraminiferal zonal scheme of Iaccarino & Salvatorini (1982) and Iaccarino (1985); the LO of *Sphenolithus heteromorphus* (broken line) is also reported (modified after Bossio et al. 1992).

species, previously thought to appear in the Upper Miocene, show that our knowledge of shelf Miocene assemblages of the Mediterranean is at best incomplete.

Materials and Methods

The S. Caterina and S. Maria al Bagno sections are located about 2 km from the village of Nardò (Lecce). They comprise the lower and middle levels of the Pietra Leccese formation and are 60 and 50 m thick, respectively. The lower 10 m consist of compact/, scarcely stratified, yellowish biomicrites with abundant benthic

foraminifers and frequent bioturbated horizons. Upwards, the biomicrites become progressively more marly and strongly enriched in planktonic foraminifers. In the uppermost levels (upper part of the S. Caterina section) the biomicrites rapidly change to whitish calcareous marls.

According to Bossio et al. (1992), who provide a detailed bio-chronostratigraphy based on the foraminiferal zonal scheme of Iaccarino & Salvatorini (1982) and Iaccarino (1985), the base of the two sections can be referred to the uppermost Burdigalian or lower Langhian (*G. trilobus* Zone or *P. glomerata sicana* Subzone), while the top falls within the Serravallian.

S. Maria al Bagno section samples GA	? Burd.			Langhian								Serravallian						
	? G. tril.	P. glomerosa s. l.		Orbulina suturalis-G. peripheroronda														
		P. g. sicana	P. g. circ.	Orbulina suturalis								O. u.		G. praem- G. peripher.				
				104bis	104	105bis	105	106	107	108	109	110	111	112	113			
Taxa	102	103	7															
<i>Carinocythereis messapica</i> n. sp.		13/2i	6/1j															
<i>Carinivalva rotundata</i>		12	5															
<i>Cytherella obesa</i> n. sp.		94	44															
<i>Cytherella polygonalis</i> n. sp.		50/4j	18/3j															
<i>Cytherella vandenboldi</i>		16/4j																
<i>Cytheretta</i> cf. <i>C. semipunctata</i>		23																
<i>Cytheretta rhenana rhenana</i>		2																
<i>Phlyctenophora arcuata</i>		2																
<i>Buntonia dertonensis</i>			2															
<i>Henryhowella asperrima</i>			2															
<i>Paracytheridea triquetra</i>			1															
<i>Celtia cephalonica</i>																		
<i>Puricytheretta melitensis</i>																		
<i>Celtia multicosata</i> n. sp.																		
<i>Cytherella postdentuculata</i>																		
<i>Argilloecia acuminata</i>																		
<i>Costa punctatissima</i>																		
<i>Paracypris</i> sp. A																		
<i>Retithythere</i> (B.) <i>vandenboldi</i>																		
<i>Xestoleberis prognata</i>																		
<i>Carinocythereis galilea</i>																		
<i>Cytherella scutulum</i>																		
<i>Trachyleberidea lanceolata</i>																		
<i>Bairdia conformis</i>																		
<i>Cytherella salentinensis</i> n. sp.																		
<i>Cytherelloidea</i> ? <i>circuminflata</i>																		
<i>Carinivalva aquila</i>																		
<i>Ruggieria michelmiana</i>																		
<i>Australoecia posterocurva</i>																		
<i>Cytherella inaequalis</i>																		
<i>Eucythere curta</i>																		
<i>Pseudopsammocythere kollmanni</i>																		
<i>Ruggieria tetraptera</i>																		
<i>Sagmatocythere tenuis</i>																		
<i>Xestoleberis geometra</i>																		
Sample weights (g)	250	600	400		250	400	250	400	400	400	400	400	400	400	400	400	400	400

Fig. 2 - Numerical distribution of the ostracod species identified in the S. Maria al Bagno section (Key: simple numbers refer to adult specimens; numbers followed by the symbol j refer to juveniles specimens).

Specifically, the S. Caterina section extends to the middle Serravallian (*P. partimlabiata* Zone) and the S. Maria al Bagno section to the lowermost Serravallian (upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). Two hiatuses were detected in the succession, the first involving at least the *P. glomerosa circularis* Subzone in both sections and the second spanning at least the lower part of the *D. altispira altispira* Zone in the S. Caterina section. The two sections, their lithology and their bio-chronostratigraphy based on planktonic foraminifers (Bossio et al., 1992) are shown in Fig. 1. The LO of *Sphenolithus heteromorphus* as defined by Bossio et al. (1992) is also indicated, since this bioevent is regarded currently as the best criterion for defining the base of the Serravallian (Fornaciari et al., 1997a; 1997b; Rio et al., 1997).

The samples from which the ostracod fauna was obtained are those utilized by Bossio et al. (1992). Some other samples, however, were added to the original sampling (samples GA 84bis, GA 85bis, GA 89a, GA 89b for the S. Caterina section and samples GA 104bis, GA 105bis for the S. Maria al Bagno section). Approximately 250 g or 400 g of each sample were used for the

extraction of ostracods (sample weights are shown in Figs. 2 and 3), except for sample GA 103 which was about 600 g. All specimens present in the washed residues (size grain larger than 125 μ m) were picked.

Only the basal sample of the S. Maria al Bagno section is barren of fossils, whereas the lowermost sample of the S. Caterina section yielded a freshwater fauna (*Metacypris* sp., freshwater gastropods and fragments of *Characeae*) reworked from the underlying Oligocene Galatone Formation (Bossio et al., 1999). The diversity and abundance of ostracods is low in the lower levels of both sections. Throughout the succession both values are characterized by large short-term fluctuations, nevertheless they tend to increase progressively upwards. Collectively, the fauna is moderately well preserved. Disregarding the genus *Parakrithe* van den Bold, which could not be identified at the species level due to poor preservation, a total of 41 species belonging to 27 genera were recognized. A list of these taxa is shown in the Appendix. Additional material of the Pietra Leccese formation from the S. Oronzo Well (the core is deposited in the Dipartimento di Geofisica e Geologia, Università di Bari) drilled in the city of Lecce (Margiotta, 1995) was

S. Caterina section samples GA	? Burdigalian										Langhian										Serravallian									
	? G. trilobus					P. glomerosa s. l.					O. suturalis					O. suturalis-G. peripheroronda					D. altispira					P. partimlabiata				
	79	80	82	83	84	84bis	84	84	84bis	P.g.cir.	85bis	85	86	87	88a	89a	89b	88	89	90	91	92	93	94	96	97				
<i>Carnocythereis messapica</i> n. sp.																														
<i>Carnovalva rotundata</i>	2	2	1	3																										
<i>Cytherella obesa</i> n. sp.	12	13	31	15	11																									
<i>Cytherella</i> cf. <i>C. semipunctata</i>	2	6	3																											
<i>Buontonia dertonensis</i>			5																											
<i>Cytherella polygonalis</i> n. sp.			16	20/2	16/1																									
<i>Cytherella vandenboldi</i>			36/8																											
<i>Cytherella rhenana rhenana</i>			6																											
<i>Henryhowella asperima</i>			5	5																										
<i>Phlyctenophora arcuata</i>			3	1																										
<i>Ruggieria tetraptera</i>			2																											
<i>Bairdia coniformis</i>				4																										
<i>Carnovalva aquila</i>				1																										
<i>Celtia multicosata</i> n. sp.				6	4																									
<i>Costa punctatissima</i>				8																										
<i>Cytherella salentinensis</i> n. sp.				24/8	22/4																									
<i>Cytherelloidea ? rectangularis</i> n. sp.				1	4																									
<i>Occidocythereis bituberculata</i>				7	10																									
<i>Paracypris</i> sp. A				1																										
<i>Paracytheria melitensis</i>				3	1																									
<i>Retibythere (B.) vandenboldi</i>				1	1																									
<i>Xestoleberis prognata</i>					1																									
<i>Celtia cephalonica</i>																														
<i>Cytherelloidea ? circumflata</i>																														
<i>Grinioneis pirata</i>																														
<i>Ruggieria micheliniana</i>																														
<i>Sagmatocythere tenuis</i>																														
<i>Trachyleberidea lanceolata</i>																														
<i>Cytherella postidenticalata</i>																														
<i>Cytherella scutulium</i>																														
<i>Carnocythereis galilea</i>																														
<i>Eucythere curta</i>																														
<i>Olimfatunia plicatula</i>																														
<i>Pseudosammocythere kollmanni</i>																														
<i>Xestoleberis geometra</i>																														
<i>Australoecia posteroconvexa</i>																														
<i>Argilloecia robusta</i>																														
<i>Pajenhorchella tocosa</i>																														
<i>Metaeypris</i> sp. (reworked)	8																													
Sample weights (g)	250	250	400	400	400	250	400	400	400	250	250	400	400	400	250	250	250	250	400	400	400	400	400	400	250	250				

Fig. 3 - Numerical distribution of the ostracod species identified in the S. Caterina section (Key as for Fig. 2).

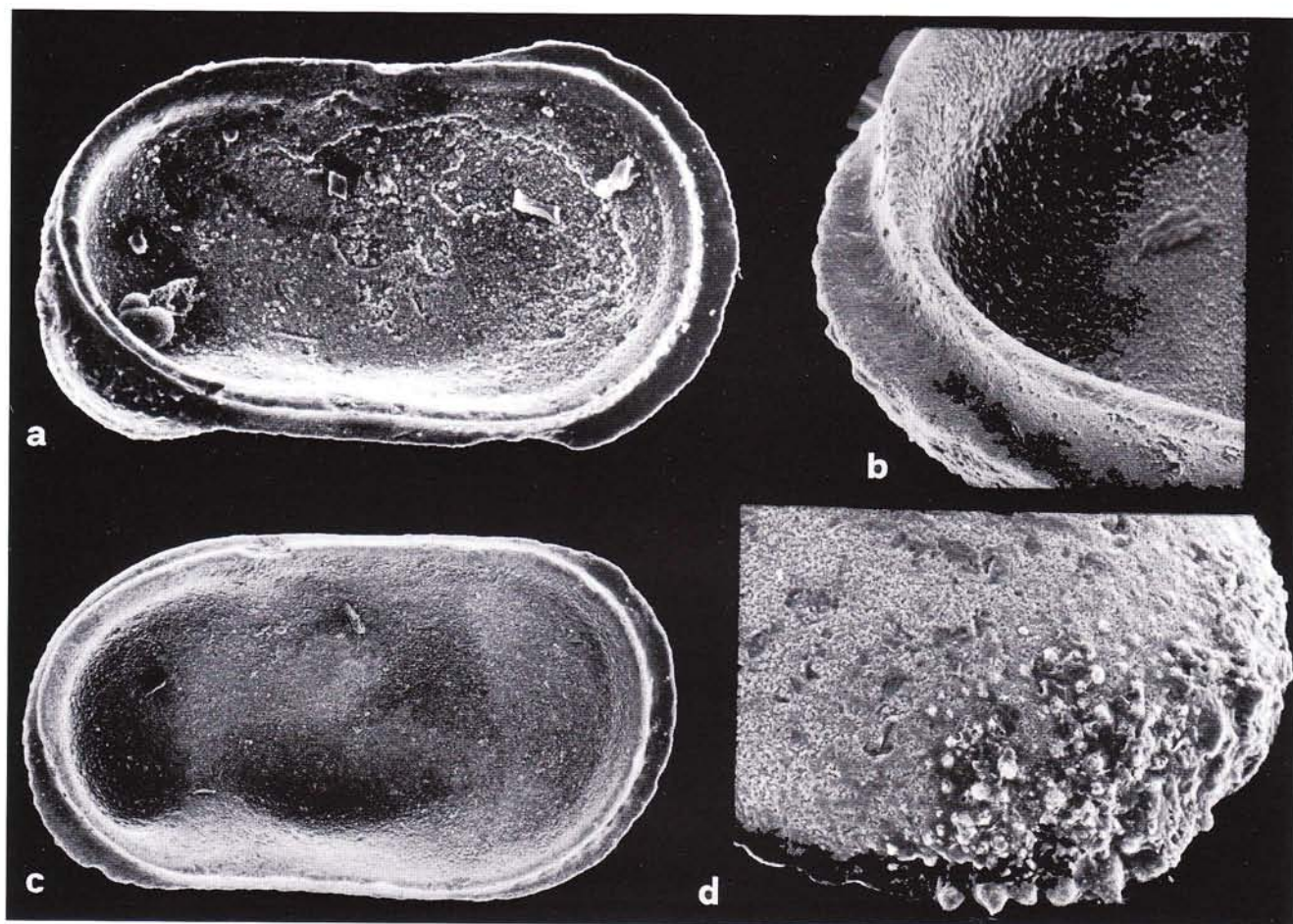


Fig. 4 - *Cytherella postdenticulata* Oertli, 1961. a) Female LV (with crescentic, smooth postero-ventral expansion) internal view, C.O.B. 163, Tremiti Islands sample TD 181 (upper Serravallian, *G. menardii* Subzone), x 130. b, c) Female LV (with narrow, denticulate postero-ventral expansion), C.O.B. 164, Tremiti Islands sample TD 115 (middle Serravallian, *P. partimlabiata* Zone): b, detail of the postero-ventral expansion, oblique internal view, x 280; c, internal view, x 115. d) Male LV (with narrow, denticulate postero-ventral expansion) detail of the postero-ventral expansion, external view, C.O.B. 108, Langhian stratotype sample 6 (*P. glomerosa* s.l. Zone), x 280.

used for the description of *Carinocythereis messapica* n. sp. Finally, additional unpublished material from the Langhian stratotype (samples from Fornaciari et al. 1997a), the Tortonian stratotype (samples from Mazzei 1977) and the Miocene succession of the Tremiti Islands (samples from Iaccarino et al., in press) was used to provide a more comprehensive systematic discussion of some of the other species involved.

Biostratigraphic remarks

Although moderately well-preserved, but not highly diverse, the faunas recovered in the S. Caterina and S. Maria al Bagno sections provided new data on the Miocene stratigraphy of Mediterranean ostracods. The numerical distribution of the species identified is given in Fig. 2 and Fig. 3 for the S. Maria al Bagno and S. Caterina sections, respectively. A considerable number of species, i.e. *Carinocythereis galilea* Ruggieri, *Celtia cephalonica* (Uliczny), *Costa punctatissima* Ruggieri, *Cytherella scutulum* Ruggieri, *Cytherelloidea ? circumin-*

flata Dieci & Russo and *Sagmatocythere tenuis* (Ciampo), which were reported previously from the Upper Miocene upwards, are now known to occur in the Middle Miocene of the Salentine Peninsula.

Systematics

Twenty-seven species are illustrated and discussed; the remainder are listed. Six species (*Carinocythereis messapica* n. sp., *Celtia multicostata* n. sp., *Cytherella obesa* n. sp., *Cytherella polygonalis* n. sp., *Cytherella salentinensis* n. sp., *Cytherelloidea ? rectangularis* n. sp.) are described as new, one is left in open nomenclature and another is tentatively referred to a taxon described previously. The occurrence of the species in the Miocene succession of the Tremiti Islands (Dall'Antonia, 2001) is given to provide a more complete account of their stratigraphic range. All the specimens illustrated are deposited in the Ostracoda Collection of Prof. A. Bossio (C.O.B. 73-164), Dipartimento di Scienze della Terra, Università di Pisa, Italy.

Class **Ostracoda** Latreille, 1806
 Order **Podocopida** Müller, 1894
 Suborder **Platycopa** Sars, 1866
 Family **Cytherellidae** Sars, 1866
 Genus *Cytherella* Jones, 1849

Type species *Cytherina ovata* Roemer, 1840

Cytherella obesa n. sp.

(Pl. 1, fig. 9, 11-15)

Material. Approximately 200 valves and 40 carapaces.

Etymology. Referring to the very swollen valves.

Holotype. A female left valve (C.O.B. 96) illustrated in Pl. 1, fig. 9.

Type-level. upper Langhian (*O. suturalis* Subzone) of the Pietra Leccese formation.

Type-locality. Area between S. Caterina and S. Maria al Bagno (Lecce, Salentine Peninsula); S. Maria al Bagno section (sample GA 108).

Paratypes. A female left valve (C.O.B. 97), a female right valve (C.O.B. 98), a male left valve (C.O.B. 99), a female carapace (C.O.B. 100) and a male carapace (C.O.B. 101).

Diagnosis. A large, thick-shelled, subrectangular species of the *Cytherella postdenticulata* Oertli group, as shown by the presence of a postero-ventral crescentic expansion of the margin in the left valve. Carapace squat, inflated, with greatest height and width behind mid-length; anterior flange very reduced.

Description. Female valves thick-shelled with subrectangular lateral outline. Maximum height behind mid-length. Dorsal margin slightly concave, ventral margin nearly straight. Anterior end broadly rounded with a narrow, laminar flange, which extends also along the ventral margin. Posterior margin rounded, bearing a crescentic, internally concave postero-ventral expansion. Ornament consisting of small, scattered, circular puncta on the central lateral surface; /frequent tubercles occur at the posterior end. Right valve higher, with dorsal and ventral margins converging slightly towards the anterior extremity. The right valve overlaps the left along the ventral and dorsal margins, less so along the anterior and postero-dorsal margins, where the valves are juxtaposed. In the postero-ventral area the crescentic expansion of the left valve creates a reverse overlap. Carapaces in dorsal view squat, swollen, and wedge-shaped; both ends rounded. Maximum width behind mid-length. Males proportionally more elongate than females; in dorsal view carapace nearly subrectangular with weakly sinuous flanks.

Dimensions (mm).

Holotype Female LV (C.O.B. 96) L = 0.73, H = 0.40

Paratype Female LV (C.O.B. 97) L = 0.71, H = 0.39

Paratype Female RV (C.O.B. 98) L = 0.72, H = 0.45

Paratype Male LV (C.O.B. 99) L = 0.70, H = 0.34

Paratype Female C (C.O.B. 100) L = 0.71, W/2 = 0.16

Paratype Male C (C.O.B. 101) L = 0.71, W/2 = 0.14

Remarks. Most similar to *Cytherella postdenticulata* Oertli (see Remarks for that species, below), but

more swollen, with different lateral and dorsal outlines. Furthermore, *C. obesa* is more markedly punctate. Unlike *C. postdenticulata* the postero-ventral expansion does not seem to display significant modifications.

Distribution. S. Caterina section: ? upper Burdigalian /lower Langhian-upper Langhian (? *G. trilobus* Zone/*P. glomerosa sicana* Subzone-*O. suturalis* Subzone); S. Maria al Bagno section: lower Langhian-upper Langhian (*P. glomerosa sicana* Subzone-top of the *O. suturalis* Subzone).

Cytherella polygonalis n. sp.

(Pl. 2, fig. 8-9, 12-14)

Material. Approximately 70 valves (10 juveniles) and 30 carapaces.

Etymology. Referring to the polygonal reticulum which characterizes the mid-lateral surface of the valves.

Holotype. A female left valve (C.O.B. 102) illustrated in Pl. 2, fig. 13-14.

Type-level. lower Langhian (*P. glomerosa sicana* Subzone) of the Pietra Leccese formation.

Type-locality. Area between S. Caterina and S. Maria al Bagno (Lecce, Salentine Peninsula); S. Caterina section (sample GA 84bis).

Paratypes. A female right valve (C.O.B. 103), a female carapace (C.O.B. 104) and a male carapace (C.O.B. 105).

Diagnosis. Medium-sized species with subovate, rather inflated carapaces. Ornament restricted to the mid-lateral surface, consisting of chains of small, circular puncta which form a polygonal reticulum.

Description. Female valves subovate and elongate. Dorsal and ventral margins convex and slightly converging anteriorly; posterior and anterior margins regularly rounded. Greatest height in the posterior half of the carapace. Valves rather inflated, especially at the posterior end. Mid-lateral surface characterized by a polygonal, mainly pentagonal reticulum, in which the muri are delicate linked chains of puncta; periphery smooth. Carapaces in dorsal view squat, with slightly convex flanks; anterior end broadly rounded, posterior bluntly rounded. Neither end laterally compressed. The more rounded right valve completely overlaps the left. Sexual dimorphism pronounced, males being smaller and more compressed than females and showing an oblique postero-dorsal margin and a narrowly rounded posterior extremity. Two shallow depressions near the anterior and posterior margins give the males a sinuous dorsal outline.

Dimensions (mm).

Holotype Female LV (C.O.B. 102) L = 0.72, H = 0.42

Paratype Female RV (C.O.B. 103) L = 0.78, H = 0.49

Paratype Female C (C.O.B. 104) L = 0.69, W/2 = 0.17

Paratype Male C (C.O.B. 105) L = 0.72, W/2 = 0.14

Remarks. The peculiar reticulate ornament, in which the muri are linked chains of puncta, makes this species readily identifiable.

Distribution. S. Caterina section: lower Langhian-upper Langhian (*P. glomerosa sicana* Subzone-*O. suturalis* Subzone); S. Maria al Bagno section: lower Langhi-

an-upper Langhian (*P. glomerosa sicana* Subzone-*O. suturalis* Subzone). The species was recovered also as displaced material in a single sample in the upper Langhian (top of the *O. suturalis* Subzone) of the Tremiti Islands (Dall'Antonia, 2001).

Cytherella postdenticulata Oertli, 1961

(Fig. 4a-d; Pl. 1, fig. 1-8, 10)

- 1961 *Cytherella postdenticulata* Oertli, pp. 19-20, pl. 1, fig. 1-11
 1962 *Cytherella postdenticulata* - Ruggieri, pp. 8-9, text-fig. 3, 3a
 1965 *Cytherella postdenticulata* - Dieci & Russo, pp. 52-53, pl. 9, fig. 2
 1966 *Cytherella postdenticulata* - Russo, pp. 232-233, pl. 40, fig. 2a, b
 ? 1966 *Cytherella postdenticulata* - Van den Bold, p. 159, pl. 2, fig. 8a-b
 1972 *Cytherella (Cytherella) postdenticulata* - Sissingh, pp. 68-69, pl. 2, fig. 1
 1974 *Cytherella postdenticulata* - Doruk, pp. 53-56, pl. 2/54, fig. 1-3; pl. 2/56, fig. 1-3
 1985 *Cytherella postdenticulata* - Bonaduce & Russo, p. 428, pl. 2, fig. 1
 1996 *Cytherella cercinata* Aiello, Barra, Bonaduce & Russo, pp. 176, 178, pl. 3, fig. 1, 3, 6-9, 12
 1998 *Cytherella cercinata* - Babinot & Boukli-Hacene, pl. 1, fig. 3

Material. Approximately 190 valves (19 juveniles) and 10 carapaces.

Remarks. *Cytherella postdenticulata* Oertli was described from the Bricco della Croce section (Langhian stratotype, Piedmont). Oertli (1961) noted that the postero-ventral expansion of the left valve displayed some degree of variability, especially in the development of marginal tubercles or spines. According to Oertli (1961) the presence of a denticulate expansion is related to ontogenetic development, since it develops usually in the juveniles. However, direct examination of *Cytherella* specimens from the Langhian stratotype and from other Miocene Italian successions indicate that adults with denticulate postero-ventral expansion are quite well represented. Furthermore, specimens ranging in characters from left valves bearing an evident, crescentic, smooth or poorly ornamented postero-ventral expansion, which is internally concave (Fig. 4a; Pl. 1, fig. 1-2, 5-8, 10), to left valves displaying a narrow, internally flattened, postero-ventral expansion, which has short, but marked marginal spines (Fig. 4b-d; Pl. 1, fig. 3-4) have been found. Moreover, the anterior marginal flange is always evident, but quite variable in size, and the peripheral anterior ornament varies from well marked to almost completely absent. It is noteworthy that some adults of *C. postdenticulata* recovered in the Langhian stratotype (Pl. 1, fig. 1) show anteriorly a wide marginal flange and a well-developed peripheral ornament which coincide perfectly with the features of *Cytherella cercinata* Aiello, Barra & Bonaduce, 1996. Consequently, we regard *C. cercinata* as a junior synonym of *C. postdenticulata*. Based on these observations, *C. postdenticulata* seems to be a rather variable species, whose distinctive features are the subrectangular lateral outline, with maximum height at the anterior end, the presence of a changeable,

but distinct postero-ventral expansion and anterior marginal flange in the left valve, and finally, the strong overlap of the right valve on the left along the dorsal and ventral margins.

Cytherella postdenticulata Oertli was reported and illustrated from the Lower Miocene of Gabon by Van den Bold (1966). However, in our opinion the illustrations given by the author lack the distinctive features of *C. postdenticulata*. This latter genus differs from *Cytherella obesa* n. sp. mainly in general shape (see Remarks for *C. obesa* n.sp.). For relationships with *Cytherella pestiensis* (Mehes, 1941) Brestenská (1975), *Cytherella pestiensis postdenticulata* Brestenská & Jiríček (1978) and *Cytherella postdenticulata* Jiríček & Riha (1991) see Aiello et al. (1996).

Dimensions (mm).

- Female LV (C.O.B. 106) L = 0.73, H = 0.44
 Juvenile LV (C.O.B. 107) L = 0.65, H = 0.39
 Male LV (C.O.B. 108) L = 0.81, H = 0.48
 Juvenile LV (C.O.B. 109) L = 0.67, H = 0.43
 Female LV (C.O.B. 110) L = 0.75, H = 0.42
 Female C (C.O.B. 111) L = 0.72, H = 0.45
 Female C (C.O.B. 112) L = 0.69, H = 0.44
 Female C (C.O.B. 113) L = 0.68, W/2 = 0.15
 Male C (C.O.B. 114) L = 0.67, W/2 = 0.12
 Female LV (C.O.B. 163) L = 0.72, H = 0.42
 Female LV (C.O.B. 164) L = 0.76, H = 0.39

Previous records. Aquitanian-Burdigalian (NN1 Zone-NN4 Zone sensu Martini, 1971) of Sardinia (Bonaduce & Russo 1985). ? Lower Miocene of Gabon (Van den Bold 1966). Langhian stratotype (Oertli 1961). Langhian of Pescale, Northern Apennines (Russo 1966). Tortonian of Italy (Dieci & Russo 1965; Ruggieri 1962; Ciampo 1980 not illustrated, 1986 not illustrated; Aiello et al. 1996) and Upper Miocene of the South Aegean Islands Arc (Sissingh, 1972; Aiello et al. 1996). Messinian of Algeria (Babinot & Boukli-Hacene 1998). Pliocene of Crete (Doruk 1974).

Distribution. S. Caterina section: upper Langhian-middle Serravallian (top of the *O. suturalis* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lower Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is common in the lower Langhian-lower Messinian (*P. glomerosa sicana* Subzone-*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia 2001).

Cytherella salentinensis n. sp.

(Pl. 2, fig. 3-6, 10-11)

Material. 80 valves (20 juveniles) and 12 carapaces.

Etymology. Referring to the presence of this species in the Langhian of the Salentine Peninsula.

Holotype. A female right valve (C.O.B. 115) illustrated in Pl. 2, fig. 5.

Type-level. upper Langhian (*O. suturalis* Subzone) of the Pietra Leccese formation.

Type-locality. Area between S. Caterina and S. Maria al Bagno (Lecce, Salentine Peninsula); S. Maria al Bagno section (sample GA 106).

Paratypes. A female carapace (C.O.B. 118), a male right valve (C.O.B. 117), a male left valve (C.O.B. 116) and a male carapace (C.O.B. 119).

Diagnosis. A medium-sized species, subovate, elongate in lateral view. Mid-lateral surface covered by small puncta; two deep, rounded depressions occur near the posterior and anterior margins.

Description. Female valves elongate, subovate in lateral view. Dorsal and ventral margins nearly straight and parallel; both ends rounded. Maximum height at the posterior end. Small puncta cover the mid-lateral surface; in a few specimens they extend to the periphery. Two deep, rounded, micropunctate depressions occur at mid-height on the lateral surface near the anterior and posterior margins (the latter being generally less evident). Right valve higher, completely overlapping the left. Carapaces in dorsal view rather inflated with sinuous flanks, which slightly converge towards the anterior; both ends swollen and truncate. Maximum width behind mid-length. Males generally smaller and proportionally more elongate than females. Dorsal outline similar to that of females, but with sinuous subparallel flanks; both the two perimarginal depressions are well developed.

Dimensions (mm).

Holotype Female RV (C.O.B. 115) L = 0.75, H = 0.45

Paratype Male LV (C.O.B. 116) L = 0.71, H = 0.35

Paratype Male RV (C.O.B. 117) L = 0.71, H = 0.39

Paratype Female C (C.O.B. 118) L = 0.70, W/2 = 0.15

Paratype Male C (C.O.B. 119) L = 0.69, W/2 = 0.12

Remarks. The species is similar in lateral outline and ornament to *Cytherella vandenboldi* Sissingh, 1972, but is easily distinguished from the latter by the presence of its two deep, perimarginal depressions.

Distribution. S. Caterina section: lower Langhian-upper Langhian (*P. glomerosa sicana* Subzone-O. *suturalis* Subzone); S. Maria al Bagno section upper Langhian (*O. suturalis* Subzone).

Cytherella scutulium Ruggieri, 1976a

(Pl. 2, fig. 15-17)

- ? 1965 *Cytherella abyssorum* Sars - Dieci & Russo, pp. 51-52, pl. 9, fig. 1
 1968 *Cytherella* aff. *C. pulchella* Ruggieri - Ascoli, pl. 1, fig. 7-9
 ? 1969 *Cytherella* aff. *pulchella* Ruggieri - Russo, p. 47
 1976a *Cytherella scutulium* Ruggieri, pp. 95-96, text-fig. 6
 ? 1992 *Cytherella* cf. *vandenboldi* Sissingh - Miculan, p. 114
 1996 *Cytherella scutulium* - Aiello, Barra, Bonaduce & Russo, pp. 185-186, pl. 5, fig. 6, 9, 11, 12 (*cum syn.*)

Material. 29 valves.

Remarks. The species was illustrated and discussed recently by Aiello et al. (1996), to which the reader is referred for a more complete synonymy. Direct examination of *Cytherella* specimens from the Tortonian stratotype (Pl. 2, fig. 17) leaves no doubt that *Cytherella* aff. *C. pulchella* Ruggieri, illustrated from the same section by Ascoli (1968), is conspecific with *C. scutulium*. On this account, also *Cytherella abyssorum* Sars of Dieci & Russo (1965), *Cytherella* aff. *pulchella* Ruggieri of Russo (1969) and *Cytherella* cf. *vandenboldi* Sissingh of Miculan (1992) should be assigned probably to *C. scutulium*.

The Miocene specimens recovered in the Salentine Peninsula, in the Tortonian stratotype and in the Tremiti Islands (collectively about 1500 valves) appear somewhat more rectangular than those from the Pliocene and Pleistocene. They show almost perfectly parallel ventral and dorsal margins and a large degree of variability in the extension of the puncta. Unlike the Pliocene material kindly donated by Prof. G. Bonaduce (Bonaduce Ostracoda Collection, Dipartimento di Paleontologia, Università di Napoli), in all the Miocene left valves we examined, the "selvage" extends some distance from the outer margin in the postero-ventral area. In the abundant Miocene material we observed that a similar thickening of the postero-ventral outer margin seems to occur commonly in *Cytherella vulgata* Ruggieri, 1962 and occasionally in *Cytherella russoi* Sissingh, 1972. In

PLATE 1

Fig. 1-8, 10 - *Cytherella postdenticulata* Oertli, 1961. (x 90)

- 1) Female LV (with crescentic, smooth postero-ventral expansion) external view, C.O.B. 106, Langhian stratotype sample 55 (*O. suturalis* Subzone). 2) Juvenile LV (with crescentic, smooth postero-ventral expansion) external view, C.O.B. 107, Tremiti Islands sample TD 116 (middle Serravallian, *P. partimlabiata* Zone). 3) Male LV (with narrow, denticulate postero-ventral expansion) external view, C.O.B. 108, Langhian stratotype sample 6 (*P. glomerosa* s.l. Zone). 4) Juvenile LV (with narrow, denticulate postero-ventral expansion) external view, C.O.B. 109, Tremiti Islands sample TD 176 (upper Serravallian, *N. continuosa* Subzone). 5) Female C (with crescentic, smooth postero-ventral expansion) dorsal view, C.O.B. 113, S. Caterina section sample GA 94. 6) Female LV (with crescentic, smooth postero-ventral expansion) external view, C.O.B. 110, S. Maria section sample GA 110. 7) Female C (with crescentic, smooth postero-ventral expansion) left view, C.O.B. 111, S. Maria section sample GA 105. 8) Male C (with crescentic, smooth postero-ventral expansion) dorsal view, C.O.B. 114, S. Maria section sample GA 105. 10) Female C (with crescentic, smooth postero-ventral expansion) right view, C.O.B. 112, S. Maria section sample GA 105.

Fig. 9, 11-15 - *Cytherella obesa* n. sp. (x 90)

- 9) Holotype, female LV external view, C.O.B. 96, S. Maria section sample GA 108. 11) Paratype, female LV internal view, C.O.B. 97, S. Caterina section sample GA 84bis. 12) Paratype, male C dorsal view, C.O.B. 101, S. Maria section sample GA 108. 13) Paratype, male LV external view, C.O.B. 99, S. Caterina section GA 85. 14) Paratype, female C dorsal view, C.O.B. 100, S. Maria section sample GA 7. 15) Paratype, female RV external view, C.O.B. 98, S. Maria section GA 108.



our opinion, such modifications cannot be regarded as distinctive at specific or subspecific rank, but are most likely to be related to phenotypic variations.

Dimensions (mm).

Male LV (C.O.B.119 bis) L = 0.68, H = 0.34

Female LV (C.O.B.120) L = 0.69, H = 0.39

Female LV (C.O.B.121) L = 0.70, H = 0.37

Previous records. Tortonian stratotype (Ascoli 1968). ? Tortonian of the Rio-Mazzapiedi-Castellania section (Dieci & Russo 1965). ? Tortonian of Montebaranzone, Northern Apennines (Russo 1969 not illustrated). "Sahelian" of Bonfornello, Sicily (Aruta 1983). ? lower Messinian of Vigoleno, Piacenza Subapennines (Miculan 1992 not illustrated). Upper Pliocene of Greece (Mostafawi, 1981). Pleistocene of Cinisi, Sicily (Ruggieri 1976a). Subrecent of the Gulf of Gabès (Lachenal 1989). Recent of the Adriatic sea (Bonaduce et al. 1976; Aiello et al. 1996) and the Gulf of Taranto (Aiello et al. 1996).

Distribution. S. Caterina section: upper Langhian-middle Serravallian (*O. universa* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species was recovered also in the lower Langhian-lower Messinian (*P. glomerosa sicana* Subzone-*G. conomiozea* Zone) of the Tremiti Islands and in the Tortonian stratotype, from the lower part of the *N. acostaensis* Zone to the *G. extremus*/*G. bulloideus* Subzone (Dall'Antonia 2001).

***Cytherella vandenboldi* Sissingh, 1972**

(Pl. 2, fig. 1-2, 7)

1972 *Cytherella* (*Cytherella*) *vandenboldi* Sissingh, pp. 71-72, pl. 2, fig. 4-5

non 1976 *Cytherella vandenboldi* - Bonaduce, Ciampo & Masoli, p. 21, pl. 4, fig. 13-14 (= *Cytherella thrakiensis* Stambolidis, 1980, cf. Aiello et al., 1996)

1978 *Cytherella vandenboldi* - Brestenská & Jiríček, pl. 1, fig. 9

1985 *Cytherella vandenboldi* - Gökçen, p. 44, pl. 1, fig. 2-3

non 2001 *Cytherella ? vandenboldi* - Barra & Bonaduce, p. 58, pl. 1, fig. 9-10; pl. 2, fig. 7

Material. Approximately 400 valves (150 juveniles) and 40 carapaces.

Remarks. The size of the puncta is somewhat variable, the ornament is less well developed all around the periphery. *C. vandenboldi* is close to *Cytherella salentina* n. sp.; their relationships are discussed under the latter species. *C. ? vandenboldi* illustrated by Barra & Bonaduce (2001) differs from our material in disposition and size of the puncta on the lateral surface and is therefore regarded as a different species.

Dimensions (mm).

Female RV (C.O.B. 122) L = 0.81, H = 0.48

Female C (C.O.B. 123) L = 0.71, W/2 = 0.15

Male C (C.O.B. 124) L = 0.74, W/2 = 0.15

Previous records. Burdigalian of Turkey (Gökçen, 1985). Badenian of the Central Paratethys (Brestenská & Jiríček, 1978). Upper Miocene of the South Aegean Islands Arc (Sissingh, 1972). upper Tortonian of the Maltese Archipelago (Russo & Bossio, 1976 not illustrated).

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerosa sicana* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: lower Langhian-lowermost Serravallian (*P. glomerosa sicana* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is present as displaced material in a single sample in the upper Langhian (top of the *O. suturalis* Subzone) of the Tremiti Islands, while is common in the upper Tortonian (*G. extremus*/*G. bulloideus* Subzone) and in the lower Messinian (*G. conomiozea* Zone) of the same area (Dall'Antonia 2001).

Genus *Cytherelloidea* Alexander, 1929

Type species *Cythere* (*Cytherella*) *williansioniana* Jones, 1849

PLATE 2

Fig. 1-2, 7 - *Cytherella vandenboldi* Sissingh, 1972. (x 85)

1) Female RV external view, C.O.B. 122, S. Caterina section sample GA 94. 2) Female C dorsal view, C.O.B. 123, S. Maria section sample GA 113. 7) Male C dorsal view, C.O.B. 124, S. Caterina section sample GA 91.

Fig. 3-6, 10-11 - *Cytherella salentinensis* n. sp. (x 85)

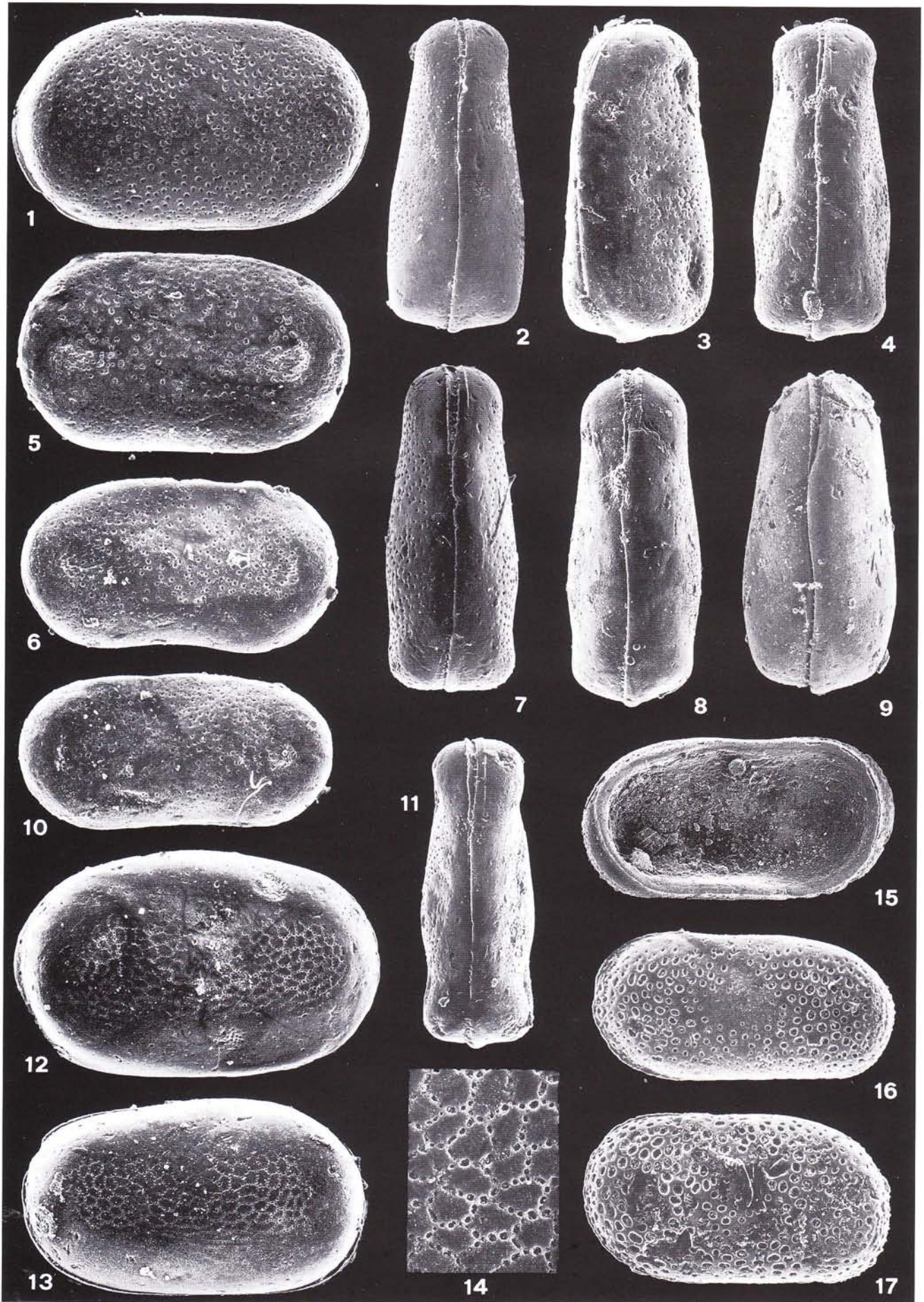
3, 4) Paratype, Female C, C.O.B. 118, S. Caterina section sample GA 85: 3, oblique dorsal view; 4, dorsal view. 5) Holotype, Female RV external view, C.O.B. 115, S. Maria section sample GA 106. 6) Paratype, Male RV external view, C.O.B. 117, S. Caterina section sample GA 85. 10) Paratype, Male LV external view, C.O.B. 116, S. Caterina section sample GA 85. 11) Paratype, Male C dorsal view, C.O.B. 119, S. Caterina section sample GA 85.

Fig. 8-9, 12-14 - *Cytherella polygonalis* n. sp. (x 90, unless otherwise stated)

8) Paratype, Male C dorsal view, C.O.B. 105, S. Caterina section sample GA 84bis. 9) Paratype, Female C dorsal view, C.O.B. 104, S. Caterina section sample GA 84bis. 12) Paratype, Female RV external view, C.O.B. 103, S. Caterina section sample GA 84. 13, 14) Holotype, Female LV, C.O.B. 102, S. Caterina section sample GA 84bis: 13, external view; 14, detail of the surface ornament, x 150.

Fig. 15-17 - *Cytherella scutulium* Ruggieri, 1976a. (x 85)

15) Female LV internal view, C.O.B. 121, Tremiti Islands sample TD 161 (upper Tortonian, *G. suteriae* Subzone). 16) Male LV external view, C.O.B. 119 bis, S. Maria section sample GA 110. 17) Female LV external view, C.O.B. 120, Tortonian stratotype sample 3605 (*G. extremus*/*G. bulloideus* Subzone).



Cytherelloidea ? circuminflata Dieci & Russo, 1965

(Pl. 3, fig. 10, 13, 14-15)

1965 *Cytherelloidea circuminflata* Dieci & Russo, pp. 53-54, pl. 9, fig. 4a-b; pl. 16, fig. 1a-b**Material.** 5 valves and 3 carapaces.

Remarks. Some of the specimens recovered in the Pietra Leccese formation (Pl. 3, fig. 10, 15) correspond exactly to the holotype of *Cytherelloidea circuminflata* Dieci & Russo, kindly put at our disposal by Prof. A. Russo. In contrast with the original diagnosis, the marginal rim does not appear well developed around the entire periphery, being absent mid-dorsally and mid-ventrally. Other specimens, which often co-occur with the previous ones, are squatter, more rectangular in lateral view, more swollen posteriorly and have a less pronounced marginal rib (Pl. 3, fig. 13-14). In our opinion, these two types are merely the manifestation of a strongly pronounced sexual dimorphism, the former being the male dimorph and the latter the female. Dieci & Russo (1965) assigned the present species to the genus *Cytherelloidea* Alexander, which differs from the related genus *Cytherella* Jones in having marked longitudinal and marginal ribs and two posterior internal brood cavities in the female valves, while each female valve of *Cytherella* contains only one such cavity. Since both dimorphs described above possess only one posterior internal cavity, the assignment to *Cytherelloidea* is regarded as doubtful.

The present species closely resembles *Cytherelloidea ? creutzburgi* Sissingh (1972, pp. 73-74, pl. 2, fig. 6a-b) in overall lateral outline, ornament, and presence of one posterior internal cavity. However, the two

species differ in the development of the marginal rim. *C. creutzburgi* possesses an uninterrupted rim which extends along the anterior, ventral and posterior margins, whereas in *C. circuminflata*, the marginal rim is developed only at the extremities. Furthermore, Sissingh's species is generally larger than *C. circuminflata*. Two specimens of *C. creutzburgi* from the Upper Miocene of the Tremiti Islands (Dall'Antonia, 2001) are illustrated in Pl. 3, fig. 11-12 for comparison.

Dimensions (mm).

Male C (C.O.B. 125) L = 0.59, H = 0.33

Male C (C.O.B. 126) L = 0.59, W/2 = 0.10

Female RV (C.O.B. 127) L = 0.62, H = 0.36

Female C (C.O.B. 128) L = 0.59, W/2 = 0.13

Previous records. Tortonian of the Rio Mazzapiedi-Castellania section, Northern Apennines (Dieci & Russo, 1965). Tortonian stratotype (Ascoli, 1968 not illustrated).

Distribution. S. Caterina section: upper Langhian (*O. suturalis* Subzone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone).

Cytherelloidea ? rectangularis n. sp.

(Pl. 3, fig. 16-18)

Material. 2 valves and 2 carapaces.**Etymology.** Referring to the rectangular outline in lateral view. **Holotype.** A left valve (C.O.B. 131) illustrated in Pl. 3, fig. 16.

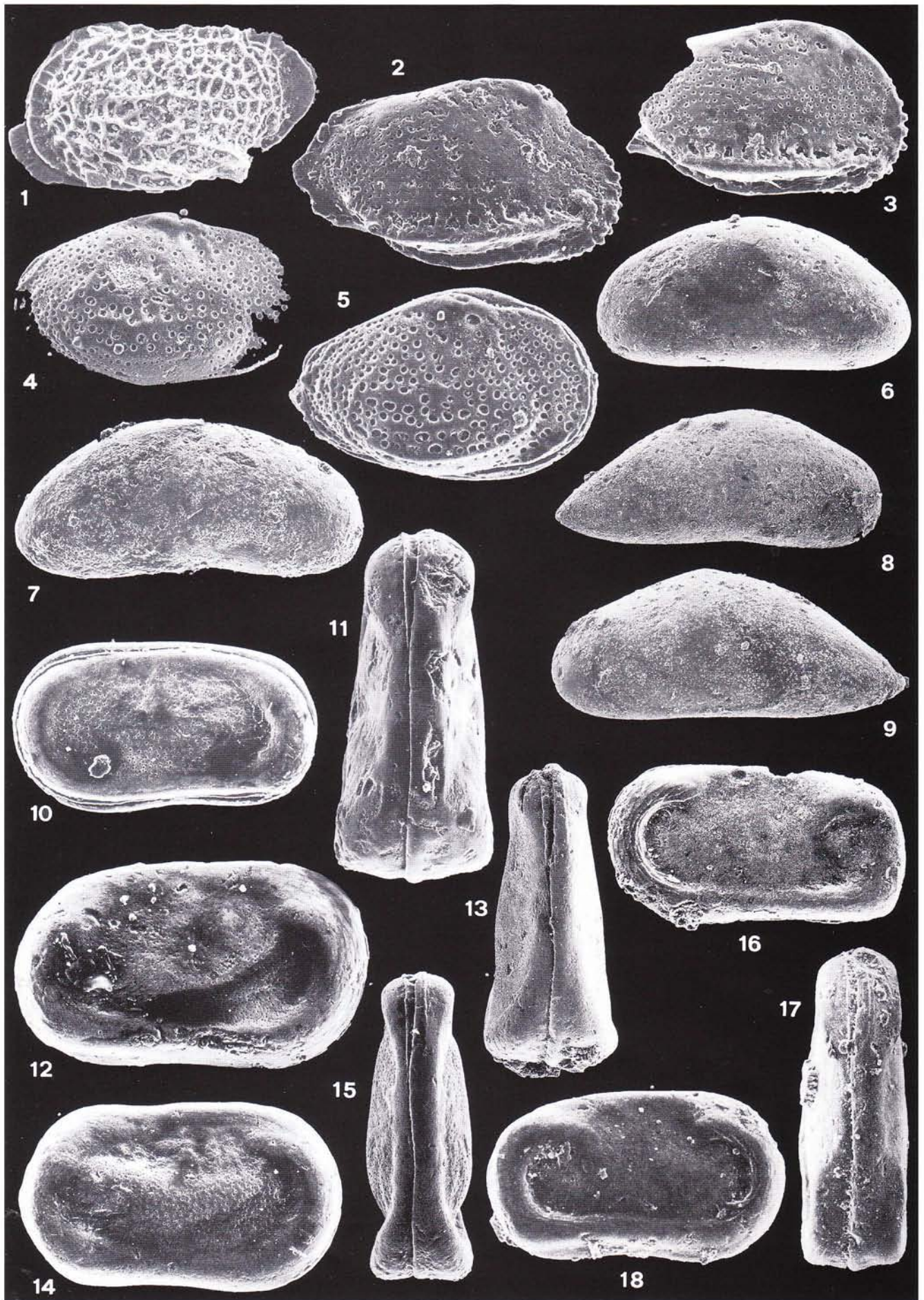
Type-level. upper Langhian (*O. suturalis* Subzone) of the Pietra Leccese formation.

Type-locality. Area between S. Caterina and S. Maria al Bagno (Lecce, Salentine Peninsula); S. Maria al Bagno section (sample GA 85).

Paratypes. 2 carapaces (C.O.B. 132-133).

PLATE 3

- Fig. 1 - *Sigmatocythere tenuis* (Ciampo, 1980). (x 145). LV external view, C.O.B. 158, S. Caterina section sample GA 91.
 Fig. 2-3 - *Ruggieria micheliniana* (Bosquet, 1852). (x 70)
 2) RV external view, C.O.B. 153, S. Maria section sample GA 109. 3) Incomplete RV external view, C.O.B. 154, S. Caterina section sample GA 85.
 Fig. 4-5 - *Buntonia dertonensis* Ruggieri, 1954. (x 120)
 4) RV external view, C.O.B. 74, S. Maria section sample GA 110. 5) C right view, C.O.B. 73, S. Maria section sample GA 111.
 Fig. 6-7 - *Phlyctenophora arcuata* (Von Münster, 1830). (x 55)
 6) LV external view, C.O.B. 151, S. Maria section sample GA 107. 7) RV external view, C.O.B. 152, S. Caterina section sample GA 83.
 Fig. 8-9 - *Paracypris* sp. A. (x 50)
 8) RV external view, C.O.B. 150, S. Caterina section sample GA 94. 9) LV external view, C.O.B. 149, S. Maria section sample GA 106.
 Fig. 10, 13, 14-15 - *Cytherelloidea ? circuminflata* Dieci & Russo, 1965. (x 100)
 10) Male C left view, C.O.B. 125, S. Caterina section sample GA 85. 13) Female C dorsal view, C.O.B. 128, S. Maria section sample GA 106. 14) Female RV external view, C.O.B. 127, S. Maria section sample GA 110. 15) Male C dorsal view, C.O.B. 126, S. Maria section sample GA 111.
 Fig. 11-12 - *Cytherelloidea ? creutzburgi* Sissingh, 1972. (x 100)
 11) C dorsal view, C.O.B. 130, Tremiti Islands sample TD 147 (lower Messinian, *G. conomiozea* Zone). 12) RV external view, C.O.B. 129, Tremiti Islands sample TD 198 (lower Tortonian, *N. acostaensis* Zone).
 Fig. 16-18 - *Cytherelloidea ? rectangularis* n. sp. (x 100).
 16) Holotype, LV external view, C.O.B. 131, S. Caterina section sample GA 85. 17) Paratype, C dorsal view, C.O.B. 133, S. Caterina section sample GA 84bis. 18) Paratype, C right view, C.O.B. 132, S. Caterina section sample 84bis.



Diagnosis. A medium-sized species, subrectangular in lateral view, with subquadrate posterior end. Ventral margin and extremities strongly rimmed; antero-dorsal extremity of the marginal rim hook-shaped. Mid-lateral surface flat and completely smooth.

Description. Left valve subrectangular in lateral view. Dorsal and ventral margins nearly straight and parallel. Anterior end broadly rounded with apex above mid-height; posterior end subquadrate. Right valve relatively more rounded with slightly concave ventral margin and completely overlapping the left. The entire periphery of the three margins is strongly rimmed; the antero-dorsal extremity of the marginal rim is hook-shaped. A few thin riblets are developed concentrically on the marginal rim, especially at the anterior end. The lateral surface is low, flat and completely smooth. Carapace with nearly parallel flanks in dorsal view; anterior extremity rounded, posterior blunt. The greatest width is located behind mid-length. No distinct sexual dimorphism could be detected; as for *Cytherelloidea* ? *circum-inflata* the valves recovered show only one posterior chamber.

Dimensions (mm).

Holotype LV (C.O.B. 131) L = 0.58, H = 0.30

Paratype C (C.O.B. 132) L = 0.57, H = 0.33

Paratype C (C.O.B. 133) L = 0.62, W/2 = 0.10

Remarks. The strongly pronounced annular rim, which abruptly disappears along the dorsal margin, and the completely smooth lateral surface distinguish this species from the other members of the genus. A somewhat similar species was described by Gökçen (1985, p. 45, pl. 1, fig. 8-10) from the Burdigalian of Turkey as *Cytherelloidea* sp. However, the latter species, has a more rounded lateral outline, with convex dorsal margin, and a more slender dorsal profile, with rounded posterior extremity than *C. rectangularis*.

Distribution. S. Caterina section: lower Langhian-upper Langhian (*P. glomerosa sicana* Subzone-*O. suturalis* Subzone).

Suborder **Podocopa** Sars, 1866
Superfamily Cypridacea Baird, 1845
Family Paracyprididae Sars, 1923
Genus *Paracypris* Sars, 1866

Type species *Paracypris polita* Sars, 1866

Paracypris sp. A

(Pl. 3, fig. 8-9)

Material. 8 valves and 11 carapaces.

Description. Subtriangular, particularly in left view. Anterior margin narrowly rounded with apex below mid-height. Posterior margin with acute, subventral apex. Dorsal margin umbonate in left valve and tapering anteriorly and posteriorly from apex just in front of mid-length; less umbonate in right valve. Ventral margin almost straight in left valve; with shallow median concavity in right valve. Internal characters as for the genus.

Dimensions (mm).

LV (C.O.B. 149) L = 1.36, H = 0.58

RV (C.O.B. 150) L = 1.26, H = 0.50

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerosa sicana* Subzone-*P. parimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone).

Genus *Phlyctenophora* Brady, 1880

Type species *Phlyctenophora zealandica* Brady, 1880

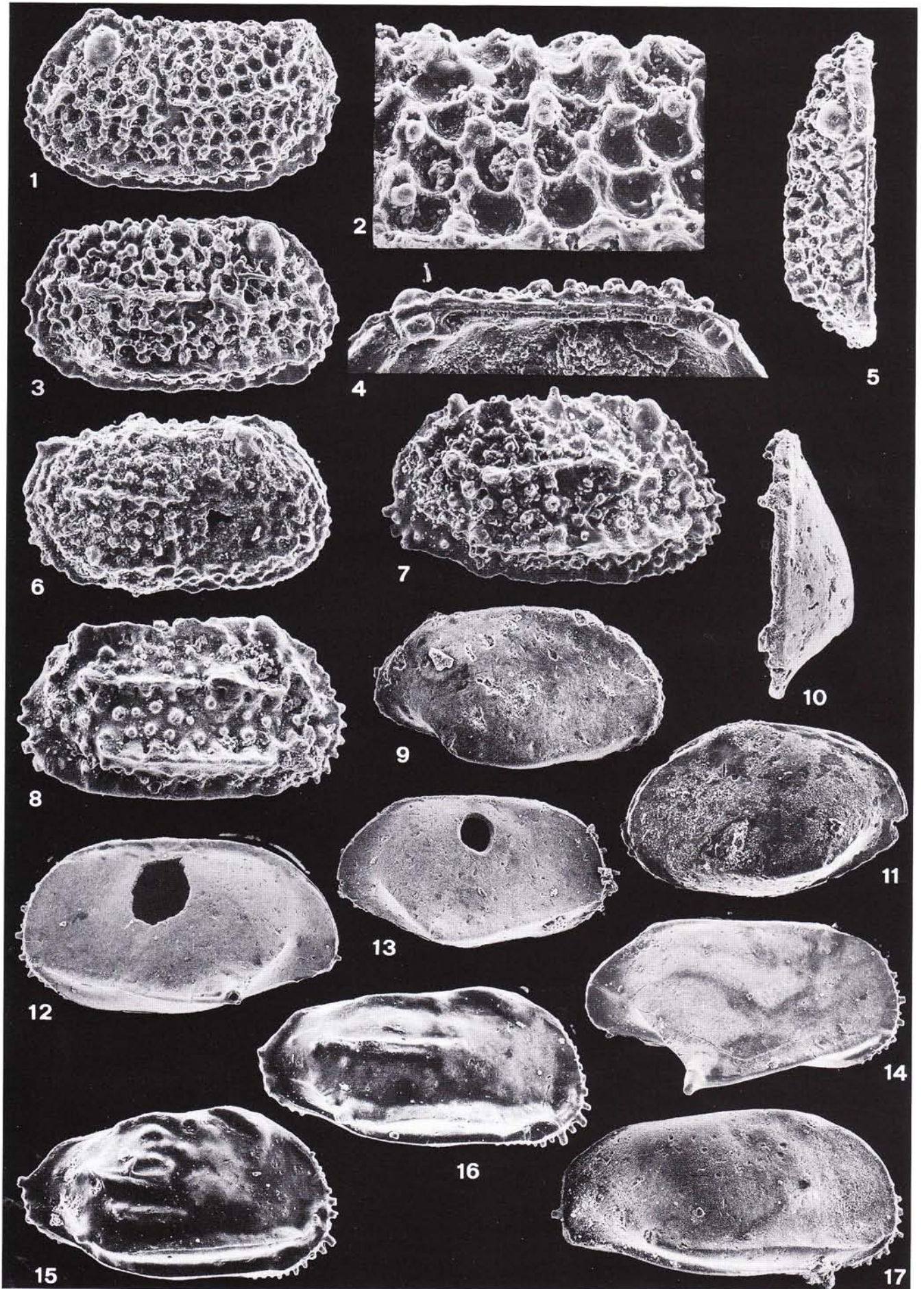
Phlyctenophora arcuata (Von Münster, 1830)

(Pl. 3, fig. 6-7)

1830 *Cythere arcuata* Von Münster, p. 63

PLATE 4

- Fig. 1-6 - *Carinocythereis messapica* n. sp. (x 85, unless otherwise stated)
1, 2, 5) Holotype, LV, C.O.B. 77, S. Oronzo well sample 24, Burdigalian: 1, external view; 2, detail of the surface ornament, x 280; 5, dorsal view. 3, 4) Paratype, RV, C.O.B. 78, S. Oronzo well sample 24, Burdigalian: 3, external view; 4, detail of the hinge, x 130.
6) Paratype, C right view, C.O.B. 79, S. Maria section sample GA 103.
- Fig. 7-8 - *Carinocythereis galilea* Ruggieri, 1972. (x 85)
7) Female RV external view, C.O.B. 76, S. Caterina section sample GA 97. 8) Female RV external view, C.O.B. 75, S. Caterina section sample GA 88.
- Fig. 9-11 - *Carinovalva rotundata* (Ruggieri, 1962). (x 75)
9) Male RV, external view, C.O.B. 83, sample GA 83 S. Caterina section. 10) Female RV, dorsal view, C.O.B. 85, S. Maria section sample GA 103. 11) Female LV, external view, C.O.B. 84, S. Caterina section sample GA 83.
- Fig. 12-14 - *Carinovalva aquila* (Ruggieri, 1972). (x 60)
12) ? Female LV external view, C.O.B. 82, Tremiti Islands sample TD 179 (uppermost Serravallian, *G. menardii* Subzone). 13) ? Female RV external view, C.O.B. 80, S. Caterina section sample GA 94. 14) ? Male RV external view, C.O.B. 81, Tremiti Islands sample TD 124 (uppermost Serravallian, *G. menardii* Subzone).
- Fig. 15-17 - *Ruggieria tetraptera* (Seguenza, 1880). (x 70)
15) Female RV external view, C.O.B. 157, Tremiti Islands sample TD 84 (upper Serravallian, *N. continuosa* Subzone). 16) Male RV external view, C.O.B. 156, Tremiti Islands sample TD 161 (upper Tortonian, *G. suterae* Subzone). 17) Male RV external view, C.O.B. 155, S. Maria section sample GA 112.



- 1838 *Cytherina arcuata* - Roemer, p. 517, pl. 6, fig. 17
 1969 *Pblyctenophora arcuata* - Russo, pp. 16-17, text-fig. 2-4 (*cum syn.*)
 1979 *Bythocypris arcuata* - Yassini, p. 96, pl. 10, fig. 15, 18-19
 1981 *Bythocypris arcuata* - Uffenorde, pp. 132-133, pl. 4, fig. 8, 10
 1988 *Bythocypris arcuata* - Nascimento, pp. 67-68, pl. 2, fig. 10

Material. 5 valves and 1 carapace.

Remarks. The best-preserved specimen, a left valve, shows large, similar, anterior and posterior vestibula (the former being only slightly wider). The marginal pore-canals are numerous and conspicuously branching at the anterior end; elsewhere they are generally simple and straight and few in number. Muscle scars not visible.

Dimensions (mm).

LV (C.O.B. 151) L = 1.11, H = 0.53

RV (C.O.B. 152) L = 1.21, H = 0.53

Previous records. Eocene-Miocene of Aquitaine (Moyes 1965; McKenzie et al. 1979 not illustrated). Oligocene-Miocene of Central and Western Europe (Von Münster 1830; Roemer 1838; Bosquet 1852; Keij 1957; Lienenklaus 1900; Uffenorde 1981; Nascimento, 1988). Pliocene of Algeria (Yassini 1979). Tortonian-Quaternary of Italy (Russo 1969).

Distribution. S. Caterina section: lower Langhian (*P. glomerata sicana* Subzone); S. Maria al Bagno section: lower Langhian-upper Langhian (*P. glomerata sicana* Subzone-*O. suturalis* Subzone). The species was recovered also as displaced material in a single sample in the upper Langhian (top of the *O. suturalis* Subzone) of the Tremiti Islands; it is rare in the Messinian (top of the *G. conomiozea* Zone-Non distinctive Zone) of the same area (Dall'Antonia 2001).

Superfamily Cytheracea Baird, 1850

Family Loxoconchidae Sars, 1925

Genus *Sagmatocythere* Athersuch, 1976

Type species *Loxoconcha napoletana* Puri, 1963

Sagmatocythere tenuis (Ciampo, 1980)

(Pl. 3, fig. 1)

- 1980 *Loxoconcha moncharmonti tenuis* Ciampo, p. 19, pl. 3, fig. 1
 1983 *Loxoconcha moncharmonti tenuis* - Aruta, p. 117, pl. 4, fig. 8
 1990 *Sagmatocythere tenuis* - Mostafawi, pl. 3, fig. 41

Material. 13 valves and 2 carapaces.

Remarks. There is some variability in the shape of the reticulate ornament. The reticulum may be more or less regularly polygonal in pattern and some of the muri may be locally emphasized, as are the horizontal components in the specimen illustrated here.

Dimensions (mm).

LV (C.O.B. 158) L = 0.41, H = 0.22

Previous records. Tortonian-lower Messinian, *G. obliquus extremus* Subzone-*G. multiloba* Subzone *sensu* D'Onofrio et al., 1975, of various Italian localities (Ciampo, 1980, 1986 not illustrated). upper Tortonian of Greece (Mostafawi, 1990). "Sahelian" of Sicily (Aruta, 1983). lower Messinian of Vigoleno, Piacenza Subapennines (Miculan, 1992 not illustrated).

Distribution. S. Caterina section: upper Langhian-middle Serravallian (*O. universa* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: uppermost Langhian-lowermost Serravallian (*G. praemenardii*-*G. peripheroronda* Subzone). The species is present, also, in the upper Serravallian-lower Messinian (*G. menardii* Subzone-*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia, 2001).

Family Trachyleberididae Sylvester-Bradley, 1948

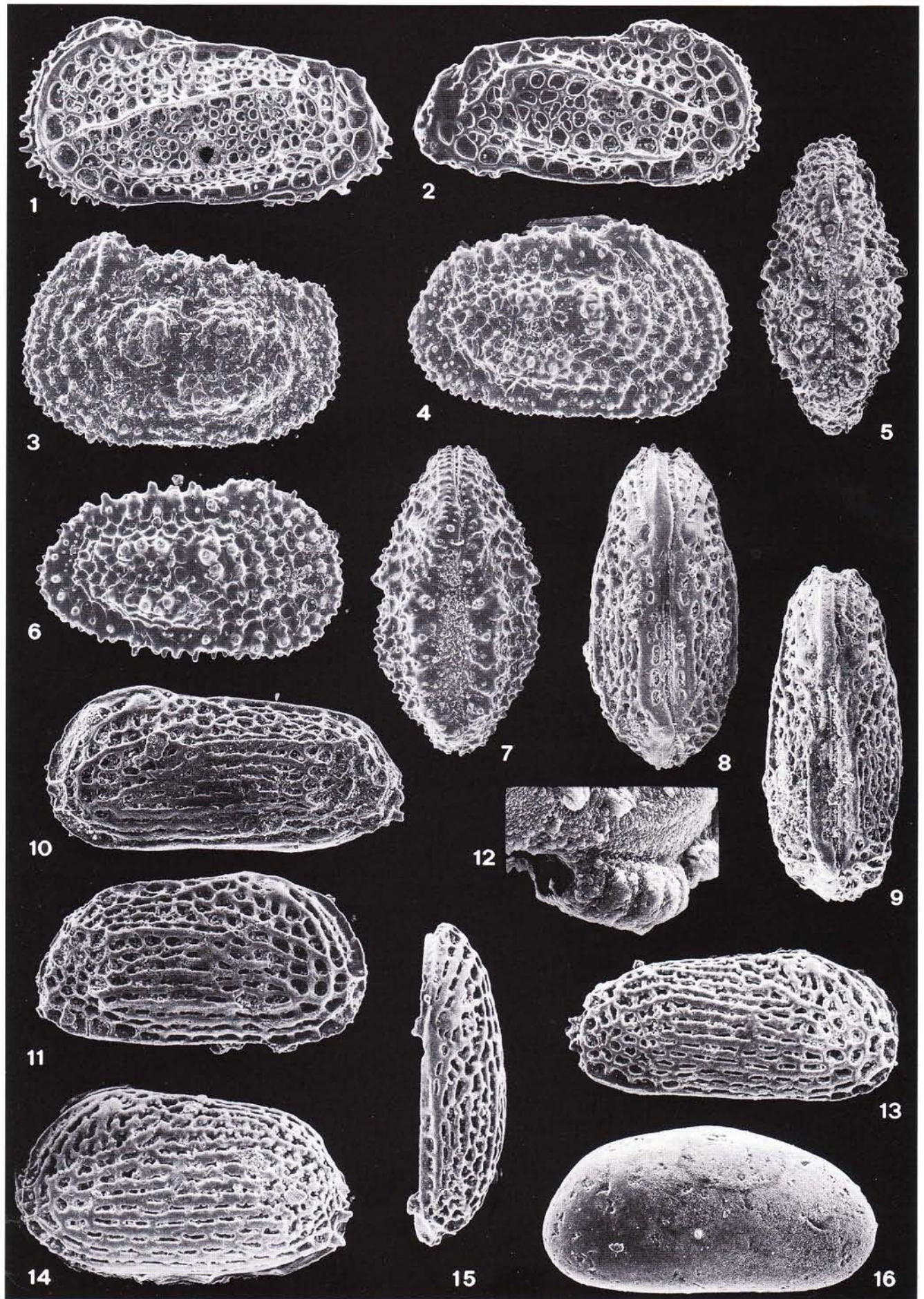
Subfamily Buntoninae Apostolescu, 1961

Genus *Buntonia* Howe, 1935

Type species *Buntonia shubutaensis* Howe, 1935

PLATE 5

- Fig. 1-2 - *Costa punctatissima* Ruggieri, 1961. (x 80)
 1) LV external view, C.O.B. 94, S. Caterina section sample GA 94. 2) RV external view, C.O.B. 95, S. Caterina section sample GA 84.
 Fig. 3-7 - *Henryhowella asperrima* (Reuss, 1850). (x 80)
 3) Female LV external view, C.O.B. 139, Langhian Stratotype sample 17 (*P. glomerata* s.l. Zone). 4) Female RV external view, C.O.B. 140, Tremiti Islands sample TD 110 (middle Serravallian, *P. partimlabiata* Zone). 5) Female C dorsal view, C.O.B. 143, S. Maria section GA 110. 6) Female RV external view, C.O.B. 142, S. Maria section GA 110. 7) Female C dorsal view, C.O.B. 141, Tremiti Islands sample TD 110 (middle Serravallian, *P. partimlabiata* Zone).
 Fig. 8-12 - *Celtia multicostata* n. sp. (x 90, unless otherwise stated)
 8) Paratype, Female C dorsal view, C.O.B. 91, S. Maria section sample GA 105bis. 9) Paratype, Male C dorsal view, C.O.B. 92, S. Maria section sample GA 107. 10) Paratype, Male LV external view, C.O.B. 90, S. Maria section sample GA 105bis. 11) Holotype, Female RV external view, C.O.B. 89, S. Maria section sample GA 105. 12) Paratype, Male RV detail of the posterior tooth, C.O.B. 93, S. Maria section sample GA 105bis, x 600.
 Fig. 13-15 - *Celtia cephalonica* (Uliczny, 1969). (x 90)
 13) Male RV external view, C.O.B. 87, S. Caterina section sample GA 94. 14) Female LV external view, C.O.B. 86, S. Caterina section sample GA 94. 15) Female RV dorsal view, C.O.B. 88, S. Caterina section sample GA 91.
 Fig. 16 - *Australoecia posterocurva* Barra & Bonaduce, 2001. (x 110).
 RV external view, S. Caterina section sample GA 93.



Buntonia dertonensis Ruggieri, 1954

(Pl. 3, fig. 4-5)

- 1954 *Buntonia sublatissima dertonensis* Ruggieri, pp. 565, 568, text-fig. 25-25a, 26, 32-33
- 1965 *Buntonia sublatissima dertonensis* - Dieci & Russo, p. 75, pl. 12, fig. 12
- non 1971a *Buntonia dertonensis* - Ciampo, p. 29, pl. 3, fig. 2-5; pl. 7, fig. 3-4 (= *Buntonia textilis* Bonaduce, Ciampo & Masoli, 1976, cf. Bonaduce et al., 1976)
- 1972 *Buntonia (Buntonia) sublatissima dertonensis* - Sissingh, p. 95, pl. 6, fig. 6
- 1978 *Buntonia (Buntonia) sublatissima dertonensis* - Brestenská & Jiríček, pl. 1, fig. 12
- 1980 *Buntonia dertonensis* - Ciampo, p. 10, pl. 1, fig. 5-6
- 1981 *Buntonia (Buntonia) sublatissima dertonensis* - Uffenorde, p. 149, pl. 10, fig. 12
- 1985 *Buntonia* aff. *B. dertonensis* - Bonaduce & Sprovieri, pl. 2, fig. 3
- 1985 *Buntonia (Buntonia) sublatissima dertonensis* - Gökçen, p. 47, pl. 3, fig. 7-10
- 2000 *Buntonia dertonensis* - Aiello, Barra & Bonaduce, p. 98, pl. 4, fig. 1-3, 5
- 2001 *Buntonia dertonensis* - Barra & Bonaduce, p. 62, pl. 2, fig. 9-10

Material. 19 valves and 9 carapaces.

Remarks. In his original description of *Buntonia dertonensis* Ruggieri defined it as being characterized by the almost complete obliteration of the longitudinal ribs in the ventro-lateral area (Ruggieri, 1954, p. 565). Nevertheless, based on the wide iconography available in the literature, the species seems to display a considerable degree of variation in the development of the ventro-lateral ribs, which vary from thin and subdued (cf. Ciampo, 1980, pl. 1, fig. 5-6) to strongly pronounced (cf. Aiello et al., 2000, pl. 4, fig. 1-3, 5). In our opinion, such morphological variability makes it difficult to distinguish *B. dertonensis* from *Buntonia ruggierii* Ciampo (1981, p. 68, pl. 4, fig. 1-2) and it seems possible that transitional steps between the two species exist.

Dimensions (mm).

C (C.O.B. 73) L = 0.48, H = 0.31

LV (C.O.B. 74) L = 0.45, H = 0.27

Previous records. Burdigalian of Turkey (Gökçen, 1985), lower Badenian of the Central Paratethys (Brestenská & Jiríček, 1978). Langhian (*P. glomerosa sicana* Subzone-lower part of the *O. suturalis* Subzone) of the Hyblean Plateau (Dall'Antonia et al., in press), late Langhian-early Serravallian (*O. universa* Subzone-*D. altispira altispira* Zone) of Malta Isle (Barra & Bonaduce 2001). Upper Miocene of various Italian localities (Ruggieri 1954; Dieci & Russo 1965; Ciampo 1980, 1986 not illustrated), of the South Aegean Island Arch (Sissingh 1972) and NW Germany (Uffenorde 1981). Pliocene (MPI 2 Zone-MPI 4 Zone *sensu* Cita 1975) of Calabria (Ciampo 1992 not illustrated). Pliocene (MPI 2 Zone-MPI 4 Zone *sensu* Cita 1975) of Sicily (Bonaduce & Sprovieri 1985; Aiello et al., 2000; Aiello & Barra 2001). Quaternary of Italy (Ruggieri 1954), reworked (*vide* Ruggieri, 1962 p. 51).

Distribution. S. Caterina section: lower Langhian-lower Serravallian (*P. glomerosa sicana* Subzone-*D. altispira altispira* Zone); S. Maria al Bagno section: lower Langhian-lowermost Serravallian (*P. glomerosa sicana* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species was recovered also in the lower Langhian-lower Messinian (*P. glomerosa sicana* Subzone-lower part of the *G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia 2001).

Subfamily Campylocytherinae Puri, 1960

Genus *Carinivalva* Sissingh, 1973

Type species *Lixouria aquila* Ruggieri, 1972

Carinivalva aquila (Ruggieri, 1972)

(Pl. 4, fig. 12-14)

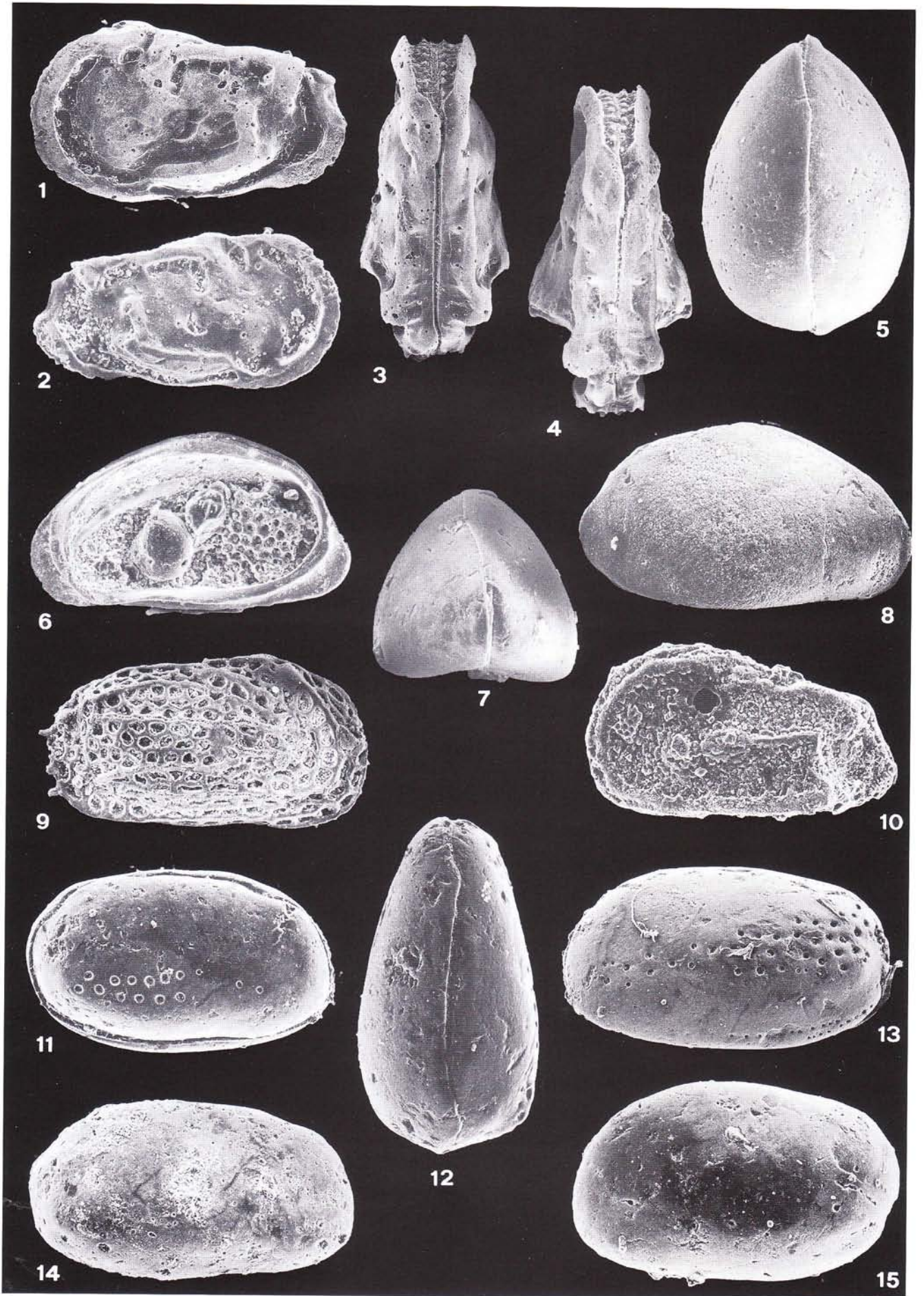
? 1960 *Pterygocythere* (?) *iblea* Ruggieri, p. 5, pl. 2, fig. 2a-c

1972 *Lixouria aquila* Ruggieri, pp. 102, 104-106, text-fig. 3, 4, 6, 7

1972 *Inconguellina (Lixouria) keiji* Sissingh, p. 109, pl. 5, fig. 14a-b

PLATE 6

- Fig. 1-4 - *Occultocythereis bituberculata* (Reuss, 1850). (x 120)
1) Female LV external view, C.O.B. 146, Tremiti Islands sample TD 162, (upper Tortonian, *G. suterae* Subzone). 2) Female RV external view, C.O.B. 144, S. Caterina section sample GA 85. 3) Female C dorsal view, C.O.B. 147, Tremiti Islands sample TD 142 (upper Tortonian, *G. extremus*/*G. bulloideus* Subzone). 4) Female C dorsal view, C.O.B. 145, S. Caterina section sample GA 84bis.
- Fig. 5-8 - *Xestoleberis geometra* Ruggieri, 1962. (x 140)
5) C dorsal view, C.O.B. 161, S. Caterina section sample GA 94. 6) RV internal view, C.O.B. 160, S. Maria section sample GA 112. 7) C anterior view, C.O.B. 162, S. Maria section sample GA 111. 8) RV external view, C.O.B. 159, S. Caterina section sample GA 94.
- Fig. 9 - *Olimfalunia plicatula* (Reuss, 1850). (x 80)
RV external view, C.O.B. 148, S. Caterina section sample GA 94.
- Fig. 10 - *Trachyleberidea lanceolata* Barra & Bonaduce, 2001. (x 90)
LV external view, S. Caterina section sample GA 85.
- Fig. 11-13 - *Cytheretta* sp. cf. *C. semipunctata* (Bornemann, 1855). (x 80)
11) Female C right view, C.O.B. 136, S. Maria section sample GA 103. 12) Female C dorsal view, C.O.B. 138, S. Maria section sample GA 103. 13) Male C left view, C.O.B. 137, S. Caterina section GA 82.
- Fig. 14-15 - *Cytheretta rhenana rhenana* Triebel, 1952. (x 80)
14) RV external view, C.O.B. 134, S. Caterina section sample GA 83. 15) LV external view, C.O.B. 135, S. Caterina section sample GA 83.



- 1973 *Carinivalva keiji* - Sissingh, pp. 145-146, text-fig. 1
 1978 *Incongruella keiji* - Brestenská & Jiríček, pl. 4, fig. 10
 1979 *Incongruella keiji* - Yassini, p. 104, pl. 7, fig. 1-2
 1980 *Carinivalva aquila* - Ruggieri, p. 129
 1984 *Carinivalva keiji* - Malz & Jellinek, p. 130, pl. 2, fig. 7
 1989b *Carinivalva aquila* - Bossio, Guelfi, Mazzei, Monteforti, Salvatoreini & Varola, pl. 1, fig. 7
 ? 1992 *Pterygocythere iblea* - Ruggieri, p. 185
 1993 *Carinivalva aquila* - Ruggieri & D'Arpa, pp. 221-222

Material. 16 valves and 6 carapaces.

Remarks. This species is relatively well represented in the Salentine sections and occurs also in the Middle and Upper Miocene of the Tremiti Islands. Although the Salentine material is rather uniform morphologically, the specimens from the Tremiti Islands (approximately 70 valves) display a considerable degree of variability in the nature and development of the alar prolongation, which varies from being moderately developed and only slightly ventrally inclined (Pl. 4, fig. 12-13), as in the specimens illustrated by Ruggieri (1972) and Sissingh (1972), to being strongly expanded and markedly bent on the ventral margin (Pl. 4, fig. 14). In the latter case, the valves are proportionally more elongate (they could be regarded tentatively as male dimorphs) and closely resemble *Pterygocythere* (?) *iblea* Ruggieri, 1960. This species, described from the Middle Miocene of Sicily, was assigned only tentatively by Ruggieri to *Pterygocythere* Hill, since he was unable to observe the hinge characters (Ruggieri 1960, p. 5). *Pterygocythere* (?) *iblea* was recorded by Ciampo (1980) in the Tortonian-lower Messinian of Sicily, but, unfortunately, no further material of this species, apart from that of the type series, has been described to date or illustrated in the literature. From examination of the present Miocene material, we believe that *C. aquila* is highly variable with respect to its lateral outline and the nature of its alar prolongation. We regard *Pterygocythere* (?) *iblea* as a probable synonym of *C. aquila*.

Dimensions (mm).

? Female RV (C.O.B. 80) L = 0.87, H = 0.50

? Male RV (C.O.B. 81) L = 1.02, H = 0.56

? Female LV (C.O.B. 82) L = 1.02, H = 0.57

Previous records. lower Badenian of the Central Paratethys (Brestenská & Jiríček, 1978). Upper Miocene-Pliocene of the South Aegean Islands Arc (Sissingh, 1972, 1973). Pliocene-Lower Pleistocene of various Mediterranean localities (Ruggieri, 1972, 1980 not illustrated; Malz & Jellinek, 1984; Yassini, 1979; Bossio et al., 1989b; Mostafawi, 1989 not illustrated; Ruggieri & D'Arpa, 1993 not illustrated).

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerosa sicana* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. universa* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is present also in the lower Langhian-lower Messinian (*P. glomerosa circularis* Sub-

zone-*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia 2001).

Carinivalva rotundata (Ruggieri, 1962)

(Pl. 4, fig. 9-11)

- 1962 *Ruggieria rotundata* Ruggieri, pp. 46-47, pl. 4, fig. 14-15
 1966 *Ruggieria rotundata* - Van den Bold, p. 166, pl. 1, fig. 2; pl. 6, fig. 2
 1973 *Incongruella rotundata* - Coutelle & Yassini, p. 92, pl. 1, fig. 7
 1985 *Incongruella rotundata* - Gökçen, p. 47, pl. 3, fig. 1-6
 1992 *Ruggieria* (?) *rotundata* - Ruggieri, p. 186

Material. 22 valves and 9 carapaces.

Remarks. The species, attributed originally to the genus *Ruggieria*, was assigned subsequently to *Incongruella*. In our opinion, the general shape, the absence of a distinct carapace asymmetry, and the avestibulate inner lamella suggest placing it in the genus *Carinivalva* Sissingh, 1973. Sexual dimorphism is fairly distinct.

Dimensions (mm).

Male RV (C.O.B. 83) L = 0.75, H = 0.41

Female LV (C.O.B. 84) L = 0.73, H = 0.45

Female RV (C.O.B. 85) L = 0.69, W/2 = 0.21

Previous records. Burdigalian of Algeria (Coutelle & Yassini, 1973) and Turkey (Gökçen, 1985). Tortonian of Enna, Sicily (Ruggieri, 1962). Miocene of Gabon (Van den Bold, 1966).

Distribution. S. Caterina section: ? upper Burdigalian /lower Langhian (? *G. trilobus* Zone/*P. glomerosa sicana* Subzone); S. Maria al Bagno section: lower Langhian (*P. glomerosa sicana* Subzone).

Genus *Ruggieria* Keij, 1957

Type species *Cythere micheliniana* Bosquet, 1852

Ruggieria micheliniana (Bosquet, 1852)

(Pl. 3, fig. 2-3)

- 1852 *Cythere micheliniana* Bosquet, p. 111, pl. 5, fig. 13a-d
 1957 *Ruggieria micheliniana* - Keij, pp. 112-113, pl. 15, fig. 5-6; pl. 20, fig. 1-3
 1965 *Ruggieria micheliniana* - Moyes, p. 93, pl. 10, fig. 13
 1988 *Ruggieria* (*Ruggieria*) *micheliniana* - Nascimento, pp. 120-121, pl. 6, fig. 7-11

Material. 3 adult valves and 1 juvenile.

Remarks. The adult specimens recovered possess a moderately developed ornament. A broad, rounded rib extends along the edge of the alae. Above this rib and along the ventral margin there is a single row of deep, irregularly shaped puncta. Small pits of variable size may entirely or locally cover the remainder of the valve. *R. micheliniana* has been reported from the Tertiary of Atlantic Europe and this is probably the first record of the species in the Mediterranean area *sensu stricto*.

Dimensions (mm).

RV (C.O.B. 153) L = 0.90, H = 0.51

RV (C.O.B. 154) H = 0.48

Previous records. Oligocene-Miocene of Aquitaine

(Bosquet, 1852; Keij, 1957; Moyes, 1965; McKenzie et al., 1979 not illustrated). Aquitanian-Burdigalian of Portugal (Nascimento, 1988).

Distribution. S. Caterina section: upper Langhian (*O. suturalis* Subzone); S. Maria al Bagno section: upper Langhian (*O. univversa* Subzone).

Ruggieria tetraptera (Seguenza, 1880)

(Pl. 4, fig. 15-17)

- 1880 *Cythere tetraptera* Seguenza, p. 125, pl. 12, fig. 9-9a
 1880 *Cythere tetraptera* var. *angustata* Seguenza, p. 193
 1880 *Cythere tetraptera* var. *dentata* Seguenza, p. 193
 1957 *Ruggieria* sp. Keij, p. 113, pl. 14, fig. 10; pl. 15, fig. 7
 1960 *Ruggieria palpebralis* Ruggieri, pp. 4-5, pl. 1, fig. 3-5; pl. 2, fig. 13
 1962 *Ruggieria tetraptera angustata* - Ruggieri, pp. 47-48, pl. 5, fig. 10
 1962 *Ruggieria tetraptera tetraptera* - Ruggieri, p. 47, pl. 5, fig. 11-13 (*cum syn.*)
 1963 *Ruggieria tetraptera tetraptera* - Ruggieri, pp. 11-13, text-fig. 7-9, pl. 1, fig. 1-1a
 1965 *Ruggieria tetraptera angustata* - Dieci & Russo, p. 68, pl. 11, fig. 5
 1965 *Ruggieria tetraptera tetraptera* - Dieci & Russo, p. 68-69, pl. 11, fig. 6
 1965 *Ruggieria tetraptera tetraptera* - Moyes, p. 95-96, pl. 10, fig. 14
 1965 *Ruggieria tetraptera* (Seguenza) *bicostata* Moyes, p. 96-97, pl. 11, fig. 3-4
 1966 *Ruggieria tetraptera tetraptera* - Van den Bold, p. 166, pl. 1, fig. 1a-d; pl. 6, fig. 1
 1966 *Ruggieria tetraptera* (Seguenza) *subinermis* Aruta, p. 7, text-fig. 1a-c, 2
 1967 *Ruggieria tetraptera tetraptera* - Ruggieri, p. 361, text-fig. 17-20 (*cum syn.*)
 1971b *Ruggieria tetraptera tetraptera* - Ciampo, pl. 4, fig. 1-4
 1983 *Ruggieria tetraptera subinermis* - Aruta, p. 119, pl. 5, fig. 7
 1985 *Ruggieria tetraptera tetraptera* - Carbonel, pl. 95, fig. 4-5
 1988 *Ruggieria tetraptera angustata* - Ciampo, pl. 4, fig. 10
 1992 *Ruggieria tetraptera tetraptera* - Bonaduce, Ruggieri, Russo & Bismuth, p. 66, pl. 19, fig. 9-10
 1991 *Ruggieria tetraptera* - Ruggieri, p. 70
 1992 *Ruggieria* sp. cf. *angustata* Ruggieri, p. 186
 1992 *Ruggieria tetraptera* subsp. ind. Ruggieri, p. 186
 2000 *Ruggieria tetraptera palpebralis* - Aiello, Barra & Bonaduce, p. 101, pl. 3, fig. 1-2
 2001 *Ruggieria tetraptera* - Barra & Bonaduce, pp. 63-64, pl. 3, fig. 3-4

Material. 57 valves (33 juveniles) and 2 carapaces.

Remarks. According to Nascimento (1988), Ruggieri (1991, 1992) and Barra & Bonaduce (2001) the species of the genus *Ruggieria* often exhibit a strong, sometimes gradual variability of their ornament. All the specimens recovered in the Salentine sections possess clearly rimmed ventro-lateral alae, and the remainder of the valve is completely smooth in both males and females (Pl. 4, fig. 17). The reduced surface ornament renders our material very similar to *R. tetraptera subinermis* Aruta, 1966, although no median longitudinal rib is developed on the male right valve as in Aruta's subspecies. During our study on the Miocene ostracods, we encountered similar specimens only in the lower Messinian of the Tremiti Islands. The Serravallian and Tortonian material of the same area is much more ornamented and could be assigned either to *R. tetraptera angustata* Seguenza *sensu* Ruggieri, 1962 (Pl. 4, fig. 15)

or to *R. tetraptera tetraptera* Seguenza *sensu* Ruggieri, 1962 (Pl. 4, fig. 16). Due to the difficulty in separating the several subspecies proposed in the literature, we prefer, for the time being, to group all our material in *Ruggieria tetraptera*.

Dimensions (mm).

Male RV (C.O.B. 155) L = 0.97, H = 0.47

Male RV (C.O.B. 156) L = 0.91, H = 0.44

Female RV (C.O.B. 157) L = 0.87, H = 0.48

Previous records. The synonymy of *R. tetraptera* interpreted in the wide sense discussed above is certainly more extensive than that reported herein. *R. tetraptera* is known from the Miocene to the Pliocene of the Mediterranean and Western Europe. It is also reported from the Miocene and Post-Miocene of Gabon (Van den Bold, 1966).

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerata sicana* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: uppermost Langhian-lowermost Serravallian (*G. praemenardii*-*G. peripheroronda* Subzone). The species is present also in the upper Serravallian-lower Messinian (*N. continuosa* Subzone-*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia, 2001).

Subfamily Trachyleberidinae Sylvester-Bradley, 1948

Genus *Carinocythereis* Ruggieri, 1956

Type species *Cytherina carinata* Roemer, 1838

Carinocythereis galilea Ruggieri, 1972

(Pl. 4, fig. 7-8)

- 1965 *Carinocythereis carinata* (Roemer) - Dieci & Russo, pp. 69-70, pl. 11, fig. 8
 1972 *Carinocythereis galilea* Ruggieri, pp. 108-110, text-fig. 8 (*cum syn.*)
 1992 *Carinocythereis galilea* - Miculan, pl. 3, fig. 8
 ? 2001 *Carinocythereis galilea* Ruggieri *jiriceki* Aiello & Szczechura, pp. 76, 77, pl. 1, fig. 1-11 (*cum syn.*)

Material. 38 valves (15 juveniles).

Remarks. The specimens recovered possess some of the main distinctive features of *C. galilea* as defined by Ruggieri (1972): the ventro-lateral rib extends anteriorly, but it is locally interrupted just below mid-height; the median rib turns upwards anteriorly and tends to join the hook-shaped uppermost part of the ventro-lateral rib (in our material this connection is usually not completely developed). However, unlike the type material of *C. galilea* Ruggieri the antero-ventral marginal rim may or may not be interrupted antero-ventrally and the longitudinal ribs are not ponticulate. This latter feature renders our specimens similar to the new subspecies *C. galilea jiriceki* Aiello & Szczechura (2001), which, according to the authors, differs from the nominative subspecies in having a continuous antero-ventral marginal rim and not ponticulate longitudinal ribs. Such a subspecific distinction seems to be hardly applicable to

our material, since not ponticulate ribs are sometimes associated with a discontinuous laminar rim. Thus, for the time being, we prefer to avoid any splitting.

Dimensions (mm).

Female RV (C.O.B. 75) L = 0.75, H = 0.41

Female RV (C.O.B. 76) L = 0.77, H = 0.43

Previous records. ? upper Badenian of the Central Paratethys (Aiello & Szczechura, 2001 *cum bibl.*). Tortonian of Montegibbio and the Rio Mazzapiedi Castellania section, Northern Apennines (Dieci & Russo, 1965). Tortonian and "Sahelian" of various Italian localities (Ruggieri, 1972). lower Messinian of Vigoleno, Piacenza Subapennines (Miculan, 1992).

Distribution. S. Caterina section: upper Langhian-middle Serravallian (*O. universa* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). Single specimens of the present species were recorded in the upper Langhian (top of the *O. suturalis* Subzone) and in the lower Tortonian (top of the *N. acostaensis* Zone) of the Tremiti Islands (Dall'Antonia, 2001).

Carinocythereis messapica n. sp.

(Pl. 4, fig. 1-6)

Material. 20 strongly abraded valves (3 juveniles) and 4 carapaces; two well-preserved specimens (1 left valve and 1 right valve) from sample 24 of the S. Oronzo Well (Pietra Leccese formation).

Etymology. From Messapi, the name of the ancient inhabitants of the Salentine Peninsula.

Holotype. A left valve (C.O.B. 77) illustrated in Pl. 4, fig. 1-2, 5.

Type-level. Burdigalian of the Pietra Leccese formation, estimated age based on planktonic foraminifers (Margiotta, 1995).

Type-locality. S. Oronzo Well (sample 24) drilled in Piazza S. Oronzo (city of Lecce, Salentine Peninsula), approx. lat. 40°21'08" N, long. 18°10'20" E.

Paratype. A right valve (C.O.B. 78) and a carapace (C.O.B. 79).

Diagnosis. A subrectangular species of *Carinocythereis* with not ponticulate longitudinal ribs. Vento-lateral rib extending around the anterior margin and interrupted anteriorly just below mid-height, median rib disconnected near the muscle scar area; these ribs tend to join anteriorly. Remainder of the carapace covered by a regularly reticulate ornament composed of a low, quadrangular network of muri and numerous mammillate conjunctive tubercles, which tend to be most strongly aligned longitudinally.

Description. Right valve subrectangular in lateral view, with nearly straight dorsal margin (slight concave in the left valve). Subrectilinear ventral margin (slightly concave in the left valve, with pronounced cardinal angles) and asymmetrically rounded anterior margin with apex below mid-height, both almost completely overhung by a wide laminar rim. Posterior end obliquely blunt with apex above mid-height furnished with a few, short denticles. Longitudinal ribs not ponticulate and weakly pronounced: the ventro-lateral rib extends around the anterior margin and is interrupted anteriorly just below mid-height; the median rib loses its identity near the muscle scar area. As in *C. galilea* (see above)

these ribs tend to join anteriorly. Remainder of the carapace covered by a regularly reticulate ornament composed of a low, quadrangular network of muri and numerous conjunctive mammillate tubercles. The tubercles tend to be aligned in longitudinal rows. Eye-tubercle large and prominent. Dorsal outline rather flattened centrally. Hinge heterodont: right valve with stepped anterior tooth, postjacent socket followed by dentate postero-medial groove and posterior tooth. No sexual dimorphism can be consistently recognized in our material.

Dimensions (mm).

Holotype LV (C.O.B. 77) L = 0.71, H = 0.41, W/2 = 0.20

Paratype RV (C.O.B. 78) L = 0.71, H = 0.40

Paratype C (C.O.B. 79) L = 0.69, H = 0.40

Remarks. The peculiar and strongly developed surface ornament makes this species readily identifiable.

Distribution. S. Oronzo Well: Burdigalian; S. Caterina section: ? upper Burdigalian / lower Langhian (? *G. trilobus* Zone/*P. glomerosa sicana* Subzone); S. Maria al Bagno section: lower Langhian (*P. glomerosa sicana* Subzone).

Genus *Celtia* Neale, 1973

Type species *Cythere quadridentata* Baird, 1850

Celtia cephalonica (Uliczny, 1969)

(Pl. 5, fig. 13-15)

1868 *Cythere quadridentata* Baird - Brady, p. 413, pl. 31, fig. 23-27 (non pl. 31, fig. 19-22)

1969 *Falunia cephalonica* Uliczny, pp. 93-95, pl. 8, fig. 2; pl. 17, fig. 4

1972 *Falunia (Hiltermannicythere) cephalonica* - Sissingh, p. 105, pl. 7, fig. 15

1989 *Celtia cephalonica* - Mostafawi, pl. 5, fig. 95

1990 *Celtia cephalonica* - Mostafawi, pl. 2, fig. 25

Material. Approximately 270 valves (27 juveniles) and 30 carapaces.

Remarks. The specimens recovered correspond well to *Celtia cephalonica* (Uliczny), except for the presence of tegminate reticulae. Although no *tegmen* seems to develop in the type material illustrated by Uliczny, it can be clearly detected in the specimens illustrated by Mostafawi (1989, 1990). In the present material, the extent of the *tegmen* is quite variable but is always better developed at the anterior and posterior ends and in the latero-dorsal area. The posterior element of the hinge is usually penta-lobate.

Dimensions (mm).

Female LV (C.O.B. 86) L = 0.71, H = 0.39

Male RV (C.O.B. 87) L = 0.71, H = 0.32

Female RV (C.O.B. 88) L = 0.69, W/2 = 0.19

Previous records. Upper Miocene-Pliocene of the Eastern Mediterranean (Uliczny, 1969; Sissingh, 1972; Mostafawi, 1989, 1990). Lower Pleistocene of Rhodes (Mostafawi, 1989). Recent of British seas (Brady, 1868).

Distribution. S. Caterina section: upper Langhian-

middle Serravallian (*O. suturalis* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is common in the upper Tortonian-Messinian (*G. extremus*/*G. bulloideus* Subzone-Non distinctive Zone) of the Tremiti Islands (Dall'Antonia, 2001).

***Celtia multicostata* n. sp.**

(Pl. 5, fig. 8-12)

Material. 31 valves and 7 carapaces.

Etymology. Referring to the presence of additional longitudinal ribs in the subcentral field.

Holotype. A female right valve (C.O.B. 89) illustrated in Pl. 5, fig. 11.

Type-level. upper Langhian (*O. suturalis* Subzone) of the Pietra Leccese formation.

Type-locality. Area between S. Caterina and S. Maria al Bagno (Lecce, Salentine Peninsula); S. Maria al Bagno section (sample GA 105).

Paratypes. A female carapace (C.O.B. 91), a male left valve (C.O.B. 90), a male right valve (C.O.B. 93), and a male carapace (C.O.B. 92).

Diagnosis. A species of *Celtia* with subrectangular lateral outline and prominent cardinal angles. Lateral surface costate/reticulate with dorsal, median and ventral longitudinal ribs moderately developed. Subcentral field characterized by four to five secondary longitudinal ribs; an antero-dorsal oblique rib extends from the inner anterior marginal rib to the region just above the muscle scar area.

Description. Female valves subrectangular with nearly parallel ventral and dorsal margins. Anterior margin broadly rounded with short marginal denticles; posterior end bluntly triangular bearing a few, robust postero-ventral spines. Lateral surface reticulate: reticulae of variable shape, cribose in the central area, polygonal elsewhere. Primary dorsal, median and ventral longitudinal ribs moderately developed. Four to five secondary horizontal ribs tend to emerge from the underlying mural network in the subcentral field. Anteriorly two perimarginal ribs link the eye-tubercle to the oral region. An antero-dorsal oblique rib extends from the inner anterior marginal rib to the region just above the muscle scar area. Carapace in dorsal view subovate, elongate and slightly irregular due to the presence of the longitudinal ribs; maximum width in the posterior half. Sexual dimorphism marked, with males more elongate and compressed than females. Internal features typical of the genus, except for the hinge, which is characterized by an elongate, gently penta-lobate posterior element.

Dimensions (mm).

Holotype Female RV (C.O.B. 89) L = 0.71, H = 0.37

Paratype Male LV (C.O.B. 90) L = 0.77, H = 0.35

Paratype Female C (C.O.B. 91) L = 0.69, W/2 = 0.16

Paratype Male C (C.O.B. 92) L = 0.71, W/2 = 0.14

Remarks. Most similar to *Celtia quadridentata* (*Cythere quadridentata* Baird, 1850, p. 173, pl. 21, fig. 2), but the present species has a more rectangular lateral outline and some additional longitudinal ribs, which give

it a more rugged appearance. The present species resembles also *Celtia biflexa* (*Cythere biflexa* Terquem, 1878, p. 112, pl. 13, fig. 6a-c), recently illustrated by Mostafawi (1989, p. 136, pl. 5, fig. 96-97), but the latter has a less regular lateral outline, with ventral and dorsal margins clearly converging toward the more acuminate posterior end. Furthermore *C. biflexa* has longer and stronger median and ventral ribs.

Distribution. S. Caterina section: lower Langhian (*P. glomerosa sicana* Subzone); S. Maria al Bagno section: upper Langhian (*O. suturalis* Subzone).

Genus *Costa* Neviani, 1928

Type species *Cytherina edwardsii* Roemer, 1838

***Costa punctatissima* Ruggieri, 1961**

(Pl. 5, fig. 1-2)

- 1961 *Costa punctatissima* Ruggieri, pp. 7-8, pl. 8, fig. 10-12 (*cum syn.*)
 1961 *Costa* n. sp. aff. *C. punctatissima* Ruggieri, p. 8, pl. 8, fig. 14
 1965 *Costa punctatissima* - Moyes, p. 81, pl. 9, fig. 13
 1969 *Costa punctatissima punctatissima* - Uliczny, pp. 88-89, pl. 7, fig. 3
 1969 *Costa punctatissima samiensis* Uliczny, pp. 89-91, pl. 7, fig. 4; pl. 17, fig. 1
 1972 *Costa punctatissima punctatissima* - Sissingh, p. 101, pl. 7, fig. 5
 1973 *Costa punctatissima* - Doruk, pp. 253-256, pl. 1/254, fig. 1-2, pl. 1/256, fig. 1-3
 1985 *Costa punctatissima* - Carbonel, pl. 97, fig. 10

Material. Approximately 120 valves (40 juveniles) and 16 carapaces.

Remarks. Our specimens display a fairly distinct sexual dimorphism and a considerable degree of variation in the nature of the reticulation. Specimens recovered in the lower levels of the Pietra Leccese formation (*P. glomerosa sicana* Subzone) are characterized by a coarse, simple reticular network and are very similar to *Costa* n. sp. aff. *C. punctatissima* described by Ruggieri (1961). Upwards, the abundant material recovered shows an increase with time in the complexity of the reticulation: the reticulae tend to subdivide irregularly into smaller, rounded fossae, only the peripheral areas remain characterized by almost entire reticulae. Such ornamented specimens correspond well to *Costa punctatissima*, as it was described and illustrated by Ruggieri (1961). The nature of the ornament varies so much and so gradually in our specimens that we were not able to separate it into different groups. Consequently, we prefer to regard both the coarsely reticulate forms and the more densely ornamented specimens as different variants of *C. punctatissima*, thus following the opinion of Doruk (1973), who includes in the synonymy of Ruggieri's species also *Costa* n. sp. aff. *C. punctatissima* of Ruggieri (1961) - mentioned above. The coarsely reticulate specimens are quite similar to *Costa ciampoi* (*Rectotrachyleberis ciampoi* Ruggieri, 1984, pp. 297-299), but differ from it in their less regular reticular network and more prominent longitudinal ribs, which clearly emerge from the remaining reticulate surface.

Dimensions (mm).

LV (C.O.B. 94) L = 0.90, H = 0.45

RV (C.O.B. 95) L = 0.84, H = 0.40

Previous records. Upper Miocene-Pliocene of Aquitaine (Moyes 1965; McKenzie et al. 1979 not illustrated). Pliocene of Italy (Ruggieri 1961). Pliocene of South-Western Spain (Ruiz & Gonzalez-Regalado, 1996 not illustrated) and Greece (Uliczny 1969). Pliocene-Pleistocene of Turkey (Doruk 1973) and the South Aegean Island Arch (Sissingh 1972).

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerosa sicana* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: upper Langhian-lowermost Serravallian (*O. suturalis* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is common in the lower Tortonian-lower Messinian (*N. acostaensis* Zone-*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia 2001).

Genus *Henryhowella* Puri, 1957

Type species *Cythere evax* Ulrich & Bassler, 1904

***Henryhowella asperrima* (Reuss, 1850)**

(Pl. 5, fig. 3-7)

- 1850 *Cypridina asperrima* Reuss, p. 74, pl. 10, fig. 5a-b
 1961 *Henryhowella ruggierii* Oertli, pp. 28-30, pl. 4, fig. 39-45
 1993 *Henryhowella asperrima* - Kempf & Nink, pp. 95-114, text-fig. 1-30 (*cum syn.*)
 1999 *Henryhowella* ? *asperrima* - Bonaduce, Barra & Aiello, p. 61, pl. 1, fig. 3, 4
 1999 *Henryhowella sarsii* (G. W. Müller) *profunda* Bonaduce, Barra & Aiello, pp. 68, 70, pl. 1, fig. 5-12; pl. 4, fig. 1-8 (*cum syn.*)
 2001 *Henryhowella sarsii* (G. W. Müller) *profunda* - Barra & Bonaduce, p. 64, pl. 4, fig. 8

Material. 29 valves (10 juveniles) and 12 carapaces.

Remarks. Bonaduce et al. (1999) have undertaken recently a systematic revision of the genus *Henryhowella*, with which we are not in complete agreement. Specifically, we do not regard the differences between *H. asperrima* (Reuss) and *H. sarsii* (Müller) *profunda* Bonaduce, Barra & Aiello, 1999, which concern mainly the shape of the anterior margin, a sufficient criterion for species distinction. In our opinion, the topotypic material of *H. asperrima* illustrated by Kempf & Nink (1993) shows an anterior margin of quite variable shape (Kempf & Nink op. cit., fig. 1-2 and fig. 5-6) and, except for the presence of a more dense spinose ornament, is otherwise identical to the specimens of *H. sarsii* (Müller) *profunda* illustrated by Bonaduce et al. (1999). From the extensive iconography available in the literature, light to strong variations in the development of the spinose and tuberculate ornament seem to occur commonly in many *Henryhowella* species. As suggested by Bonaduce et al. (1999, p. 61) such variations might be due to ecological factors. On the basis of these previous considerations, we prefer to regard *H. sarsii profunda* as a variant of *H.*

asperrima.

Direct examination of *Henryhowella* specimens from the Langhian stratotype (Pl. 5, fig. 3), confirms the opinion of Colalongo (1966), Sissingh (1972) and Uffendorde (1981) that *Henryhowella ruggierii* Oertli, 1961 is a junior synonym of *H. asperrima* Reuss, as interpreted above.

Morphologically, the specimens of *Henryhowella* recovered in the Salentine sections are intermediate between *Henryhowella parthenopea* Bonaduce, Barra & Aiello (1999, pp. 61, 62, 64, pl. 3, fig. 1-11, 13-14; pl. 4, fig. 11-12; pl. 5, fig. 3-5, 9, 10, 12) and *H. asperrima*. They possess a flattened central part of the carapace, marked posterior plications and coarse spinose ornament, but do not show the antero-dorsal and postero-dorsal bouquets of tubercles typical of *H. parthenopea* (Pl. 5, fig. 5-6). In the very abundant material (some thousands of specimens) we have examined in the Miocene successions of the Tremiti Islands and the Hyblean Plateau, there are gradual, indistinct transitions from regularly inflated and densely spinose specimens, which correspond perfectly to *H. asperrima* (Pl. 5, fig. 4, 7), to those described above from the Salentine sections. As we were unable to subdivide our material into different groups, we prefer to include all the specimens in *H. asperrima*.

Dimensions (mm).

Female LV (C.O.B. 139) L = 0.76, H = 0.51

Female RV (C.O.B. 140) L = 0.77, H = 0.47

Female C (C.O.B. 141) L = 0.74, W/2 = 0.20

Female RV (C.O.B. 142) L = 0.74, H = 0.43

Female C (C.O.B. 143) L = 0.71, W/2 = 0.17

Previous records. The species, as discussed above, has a long stratigraphic range from Oligocene to Recent (cf. Bonaduce et al. 1999).

Distribution. S. Caterina section: lower Langhian-middle Serravallian (*P. glomerosa sicana* Subzone-*P. partimlabiata* Zone); S. Maria al Bagno section: lower Langhian-lowermost Serravallian (*P. glomerosa sicana* Subzone-upper part of the *G. praemenardii*-*G. peripheroronda* Subzone). The species is common in the lower Langhian-lower Messinian (*P. glomerosa sicana* Subzone-*G. conomiozea* Zone) of the Tremiti Islands and in the Langhian of the Hyblean Plateau (Dall'Antonia 2001).

Genus *Occultocythereis* Howe, 1951

Type species *Occultocythereis delumbata* Howe, 1951

***Occultocythereis bituberculata* (Reuss, 1850)**

(Pl. 6, fig. 1-4)

- 1850 *Cypridina bituberculata* Reuss, p. 71, pl. 10, fig. 11a, b
 1953 *Occultocythereis bituberculata* - Ruggieri, pp. 81-83, pl. 1, fig. 3
 1962 *Occultocythereis bituberculata* - Ruggieri, pp. 20, pl. 1, fig. 20
 1992 *Occultocythereis bituberculata* - Ruggieri, pp. 175-176

Material. 9 valves and 5 carapaces.

Remarks. As discussed previously by Ruggieri (1953) the systematics of the genus *Occultocythereis* is rather complex. In particular, there are debates concerning the distinction between *Occultocythereis bituberculata* (Reuss), erected from the Miocene of Vienna and *Cythereis lineata* Müller (1894, pp. 377-338, pl. 29, fig. 21, 26; pl. 31, fig. 25-30, 33), originally described from the Recent of the Gulf of Naples (later *Occultocythereis dohrni* Puri 1963). The main difficulty lies in the absence of recent illustrations of topotypic material of Reuss's species. The specimens recovered in the Salentine sections show a posteriorly upturned ventro-lateral projection and are very similar to *O. bituberculata* (Reuss) sensu Ruggieri 1953, 1962. In fact, in the present material, the wing-like postero-ventral expansion is unusually inflated and the vertical posterior rim extends further upwards than in Ruggieri's specimens. On the other hand, it should be noted that according to Triebel (1961) the presence of a vertical posterior rim extending from the ventro-lateral expansion is a typical feature of Muller's species, which serves to distinguish it from *O. bituberculata*. Muller's drawings show the occurrence of such a feature, but, unfortunately, his original description does not mention any relationship between his and Reuss's species. For the time being, we believe that the two species cannot be reliably distinguished and we prefer to assign our specimens to Reuss's species for priority reasons, thus following the opinion of Ruggieri (1992). The species was recovered also in the Miocene of the Tremiti Islands. Collectively our material (approximately 350 valves) shows a considerable degree of variation in shell thickness, strength of the ribs, and swelling of the ventro-lateral projection. Faint surface reticulation is present sometimes.

Dimensions (mm).

Female RV (C.O.B. 144) L = 0.49, H = 0.25

Female C (C.O.B. 145) L = 0.53, W/2 = 0.13

Female LV (C.O.B. 146) L = 0.51, H = 0.29

Female C (C.O.B. 147) L = 0.51, W/2 = 0.12

Previous records. The species, as discussed above, has a long stratigraphical range from Miocene to Recent (cf. Ruggieri, 1992).

Distribution. S. Caterina section: lower Langhian-upper Langhian (*P. glomerata sicana* Subzone-*O. suturalis* Subzone). The species is present randomly in the Langhian-Serravallian of the Tremiti Islands, whereas it is common in the Tortonian-lower Messinian interval (Dall'Antonia 2001).

Genus *Olimfalunia* Ruggieri, 1976b

Type species *Falunia stellata ornatissima* Ruggieri, 1967

***Olimfalunia plicatula* (Reuss, 1850)**

(Pl. 6, fig. 9)

1850 *Cypridina plicatula* Reuss, p. 84, pl. 10, fig. 23

- 1957 *Falunia plicatula* - Keij, p. 114, pl. 11, fig. 6; pl. 12, fig. 8
 1964 *Falunia plicatula* s. l. - Berger & Moyes, pp. 51-56, pls. 1-6
 1965 *Falunia plicatula* - Moyes, p. 65, pl. 7, fig. 16-20 (*cum syn.*)
 1965 *Falunia plicatula* - Dieci & Russo, p. 70, pl. 12, fig. 9a-b
 1972 *Falunia (Falunia) plicatula* - Sissingh, p. 104, pl. 7, fig. 12
 1973 *Falunia plicatula* (*sic*) - Coutelle & Yassini, p. 92, pl. 1, fig. 6; pl. 3, fig. 12-13
 1976b *Olimfalunia plicatula* - Ruggieri, p. 185
 1978 *Falunia* ex gr. *plicatula* (*sic*) - Brestenská & Jiríček, pl. 7, fig. 2-3
 1985 *Olimfalunia plicatula* - Carbonel, pl. 93, fig. 7-8; pl. 97, fig. 5
 1988 *Olimfalunia plicatula* - Nascimento, pp. 107-108, pl. 5, fig. 14-15
 1996 *Olimfalunia plicatula* - Ducasse & Cahuzac, pl. 2, fig. 12

Material. 38 valves (20 juveniles) and 1 carapace.

Remarks. All the adult valves recovered belong to female specimens. The reticulate surface ornament does not show significant variations.

Previous records. The species is widespread in the Oligocene-Pliocene of Europe and the Mediterranean Basin: Oligocene-Miocene of Central and Western Europe (Reuss 1850; Bosquet 1852; Egger 1858; Kuiper 1918; Keij 1957; Kollmann 1971); Oligocene-Pliocene of Aquitaine (Berger & Moyes 1964; Moyes 1965; Carbonel 1985; Ducasse & Cahuzac 1996); Tortonian of Northern Apennines, Italy (Dieci & Russo 1965); Upper Miocene of the South Aegean Island Arch (Sissingh 1972); Burdigalian of Algeria (Coutelle & Yassini 1973); Badenian of the Central Paratethys (Brestenská & Jiríček 1978); Aquitanian-Tortonian of Portugal (Nascimento 1988).

Dimensions (mm).

Female RV (C.O.B. 148) L = 0.76, H = 0.42

Distribution. S. Caterina section: middle Serravallian (*P. partimlabiata* Zone). The species was recovered as displaced material in a single sample in the upper Langhian (top of the *O. suturalis* Subzone) of the Tremiti Islands; it is rare in the Messinian (top of the *G. conomiozea* Zone-Non distinctive Zone) of the same area (Dall'Antonia 2001).

Subfamily Cytherettinae Triebel, 1952

Genus *Cytheretta* Müller, 1894

Type species *Cytheretta rubra* Müller, 1894

***Cytheretta rhenana rhenana* Triebel, 1952**

(Pl. 6, fig. 14-15)

- 1952 *Cytheretta rhenana rhenana* Triebel, p. 25, pl. 4, fig. 24-27
 1957 *Cytheretta rhenana rhenana* - Keij p. 138, pl. 10, fig. 17-18
 1965 *Cytheretta rhenana rhenana* - Moyes, p. 52, pl. 6, fig. 1
 1969 *Cytheretta rhenana rhenana* - Carbonnel, p. 109, pl. 8, fig. 7-8
 1985 *Cytheretta rhenana rhenana* - Carbonel, pl. 93, fig. 11-12

Material. 6 valves and 1 carapace.

Remarks. All the specimens recovered possess a completely smooth lateral surface. No distinct sexual dimorphism could be recognized in our material.

Dimensions (mm).

RV (C.O.B. 134) L = 0.79, H = 0.44

LV (C.O.B. 135) L = 0.79, H = 0.47

Previous records. Rupelian of Mayence Basin (Triebel 1952). Miocene of Aquitaine (Keij 1957; Moyes 1965; McKenzie et al. 1979 not illustrated; Carbonel 1985). Upper Miocene of the Rhône Basin (Carbonel 1969).

Distribution. S. Caterina section: lower Langhian (*P. glomerosa sicana* Subzone); S. Maria al Bagno section: lower Langhian (*P. glomerosa sicana* Subzone).

Cytheretta sp. cf. **C. semipunctata** (Bornemann, 1855)

(Pl. 6, fig. 11-13)

cf. 1855 *Bairdia semipunctata* Bornemann, p. 359, pl. 21, fig. 1

Material. 16 valves and 9 carapaces.

Remarks. Our specimens are very similar to some species of the *Cytheretta semipunctata* group described from the lowermost Miocene of the Mediterranean, e.g. *C. aff. semipunctata* (Bornemann) of Carbonel (1969, p. 110, pl. 8, fig. 12-13) from the Rhône Basin and *C. cf. semipunctata* (Bornemann) of Gammudi & Keen (1993, p. 128, pl. 1, fig. 16-17) from Libya. In our material there is a strong variation in the extent, number, and disposition of the pits. They may be reduced to a single short row in the postero-central area or they may form four to five parallel rows extending from the posterior margin to the anterior half of the valves. Sexual dimorphism distinct: males longer and more compressed than females.

Dimensions (mm).

Female C (C.O.B. 136) L = 0.75, H = 0.44

Male C (C.O.B. 137) L = 0.78, H = 0.44

Female C (C.O.B. 138) L = 0.81, W/2 = 0.22

Distribution. S. Caterina section: ? upper Burdigalian /lower Langhian (? *G. trilobus* Zone/*P. glomerosa sicana* Subzone); S. Maria al Bagno section: lower Langhian (*P. glomerosa sicana* Subzone).

Family Xestoleberididae Sars, 1866

Genus *Xestoleberis* Sars, 1866

Type species *Cythere aurantia* Baird, 1838

Xestoleberis geometra Ruggieri, 1962

(Pl. 6, fig. 5-8)

1962 *Xestoleberis geometra* Ruggieri, p. 62, pl. 7, fig. 19, 19a-b

Material. 21 valves and 3 carapaces.

Remarks. The specimens recovered correspond well in shape and size to the type material illustrated by Ruggieri, but show some degree of variability in the number and size of the puncta on the mid-lateral surface. In some specimens the puncta can be detected only by S.E.M. micrographs. Hinge typical of the genus with long, dentate terminal bars in the right valve, median

element apparently smooth.

Dimensions (mm).

RV (C.O.B. 159) L = 0.46, H = 0.26

RV (C.O.B. 160) L = 0.44, H = 0.25

C (C.O.B. 161) L = 0.41, W/2 = 0.14

C (C.O.B. 162) H = 0.25, W/2 = 0.14

Previous records. lower Badenian of the Central Paratethys (Brestenská & Jiríček 1978 not illustrated). Tortonian of Enna, Sicily (Ruggieri 1962). upper Tortonian-lower Messinian of the Maltese Archipelago (Russo & Bossio 1976, not illustrated).

Distribution. S. Caterina section: middle Serravallian (*P. partimlabiata* Zone); S. Maria al Bagno section: lowermost Serravallian (upper part of the *G. praemernardii*-*G. peripheroronda* Subzone). The species was recovered also in the lower Messinian (*G. conomiozea* Zone) of the Tremiti Islands (Dall'Antonia 2001).

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Appendix. Ostracod Faunal Reference List

- Argilloecia acuminata* Müller, 1894
Argilloecia robusta Bonaduce, Ciampo & Masoli, 1976
Australoecia posterocurva Barra & Bonaduce, 2001
Bairdia conformis Terquem, 1878
Buntonia dertonensis Ruggieri, 1954
Carinocythereis galilea Ruggieri, 1972
Carinocythereis messapica n. sp.
Carinovalva aquila (Ruggieri, 1972)
Carinovalva rotundata (Ruggieri, 1962)
Celtia cephalonica (Uliczny, 1969)
Celtia multicostrata n. sp.
Costa punctatissima Ruggieri, 1961
Cytherella inaequalis Moyes, 1965
Cytherella obesa n. sp.
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Cytherella salentinensis n. sp.
Cytherella scutulium Ruggieri, 1976a
Cytherella vandenboldi Sissingh, 1972
Cytherelloidea ? circuminflata Dieci & Russo, 1965
Cytherelloidea ? rectangularis n. sp.
Cytheretta rhenana rhenana Triebel, 1952
Cytheretta sp. cf. *C. semipunctata* (Bornemann, 1855)
Eucythere curta Ruggieri, 1975
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Henryhowella asperrima (Reuss, 1850)
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Olimfalunia plicatula (Reuss, 1850)
Paijenborchella iocosa Kingma, 1948
Paracypris sp. A
Paracytheridea triquetra (Reuss, 1850)
Phlyctenophora arcuata (Von Münster, 1830)
Pseudopsammocythere kollmanni Carbonel, 1966
Puricytheretta melitensis Russo & Bossio, 1975
Retibythere (Bathybythere) vandenboldi (Ruggieri, 1960)
Ruggieria micheliniana (Bosquet, 1852)
Ruggieria tetraptera (Seguenza, 1880)
Sagmatocythere tenuis (Ciampo, 1980)
Trachyleberidea lanceolata Barra & Bonaduce, 2001
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