REVISTA ESPAÑOLA DE MICROPALEONTOLOGÍA
Vol. XXIX, núm. 3, 1997, pp. 71-106

DIANA BARRA

Dipartimento di Paleontologia, Università "Federico II" di Napoli,
Largo S. Marcellino, 10, Napoli, Italia

THE SHALLOW-WATER MARINE OSTRACODS OF TRIPOLI (LYBIA) AND THEIR GEOGRAPHICAL DISTRIBUTION IN THE MEDITERRANEAN

RESUMEN

De acuerdo con las sistemáticas más modernas y detalladas ha sido reexaminada una abundante y bien diversificada asociación de ostrácodos contenida en una muestra de arena de Trípoli (Libia), ya estudiada por Bonaduce y Pugliese (1975). En esta revisión se han identificado 68 especies, entre ellas *Aurila meridionalis* n. sp., indicada como *nomen nudum*, y *Cytherelloidea ruggierii* y *Xestoleberis phaselus* propuestas y descritas como nuevas.

De los datos de la literatura resulta que la mayoría de las especies encontradas en Trípoli, está presente en todo el Mediterráneo, mientras algunas de ellas tienen una distribución restringida a su parte meridional. Se considera por consiguiente, que estas especies son buenas indicadoras de aguas templadas-cálidas.

Palabras clave: Ostrácodos, Taxonomía, Reciente, Trípoli, Libia, Climatología, Mediterráneo.

ABSTRACT

The abundant and well diversified ostracode assemblage of a beach sand sample from Tripoli (Lybia), previously studied by Bonaduce & Pugliese (1975), has been reexamined following the more modern and detailed systematics. A total of 68 species have been identified between which *Aurila meridionalis* n. sp. reported as *nomen nudum*, and *Cytherelloidea ruggierii* and *Xestoleberis phaselus* proposed and described as new.

The literature's data show that most of the species are widely distributed all around the Mediterranean, while some of them (*Cytherelloidea beckmanni, Callistocythere folliculosa, Falsocythere terryi, Cistacythereis (C.) carthaginiensis, Cistacythereis (H.) rubra, Aurila glyptica, A. prasina, Semicytherura kaloderma, Macrocypris succinea*) seem to be ristrected to its southern part. These species are consequently hypothesized indicators of warm-temperate waters.

Key words: Ostracoda, Taxonomy, Recent, Tripoli (Lybia), Climatology, Mediterranean.

INTRODUCTION

Bonaduce & Pugliese (1975) studied the ostracod fauna of a beach sample from Tripoli (Lybia). The assemblage is characterized by shallow marine species except for the presence of *Cyprideis torosa*, well known brackish species, considered contaminant.

The present paper deals with the revision of the abundant and well diversified assemblage of the same sample, on the base of the modern literature and systematics.

I identified 68 species which are reported in alphabetical order in Table 1 with the corresponding list given by Bonaduce & Pugliese (op. cit.) and their abundance in the assemblage. Of the species found, 51 are known in the literature, 8 doubtfully identified, 6 in open nomenclature, 1 indicated as *nomem nudum* and 2 proposed as new that are *Cytherelloidea ruggierii* and *Xestoleberis phaselus.* For all the species known, maps of distribution (Figs. 2-10) in the Mediterranean Sea have been prepared, utilizing the rich literature which covers almost completely the basin with the purpose to define their geographical, and consequently, climatic distribution. The areas object of the present study are shown in Fig. 1 and the related literature utilized is reported in Table 2.

The paper is completed by a detailed iconography (SEM micrographs and transparency drawings). All the specimens figured are stored in the collection of the Department of Paleontology of the University of Naples (Bonaduce Ostracod Collection: B.O.C.).

SYSTEMATICS

All the species, listed in systematic order following Hartmann & Puri (1974), are reported with the fundamental synonimy together, when considered necessary, with taxonomic comments.

Cytherella sp.

1975 *Cytherella* aff. *C. vulgata* Ruggieri. Bonaduce & Pugliese, p. 130.

Present Paper	Bonaduce & Pugliese, 1975	Frequency
Aurila arborescens	*A. woodwardi*	frequent
Aurila convexa	*A. convexa*	dominant
Aurila aff. *A. convexa*		very rare
Aurila fallax		rare
Aurila glyptica	*A. glyptica*	frequent
Aurila meridionalis nomen nudum		common
Aurila prasina	*A. prasina*	frequent
Bairdia corpulenta	*B. corpulenta*	rare
Bairdia ? corpulenta		very rare
Bairdia aff. *B. longevaginata*	*B. longevaginata*	rare
Bairdia mediterranea	*B. mediterranea*	rare
Bairdia minor	*B. minor*	very rare
Basslerites berchoni	*B. berchoni*	very rare
Callistocythere folliculosa	*C. folliculosa*	rare
Callistocythere levis	*L. levis*	rare
Callistocythere littoralis	*C. littoralis*	very rare
Callistocythere protracta	*C. flavidofusca*	rare
Carinocythereis whitei	*C. antiquata*	common
Caudites calceolatus	*C. calceolatus*	frequent
Cistacythereis (C.) chartaginiensis	*C. caelatura*	frequent
Cistacythereis (C.) hannibalis	*C. caelatura*	frequent
Cistacythereis (H.) rubra		rare
Cistacythereis (H.) sp. 1	*Hiltermann.* sp.	common
Costa batei	*C. batei*	rare
Cyprideis torosa	*C. torosa*	common
Cytherella sp.	*C.* aff. *C. vulgata*	very rare
Cytherelloidea beckmanni	*C. beckmanni*	rare
Cytherelloidea aff. *C. cincta*		rare
Cytherelloidea ruggierii n. sp.	*C. sordida*	rare
Cytheretta adriatica	*C. adriatica*	common
Cytheretta subradiosa	*C. subradiosa*	common
Cytheridea neapolitana		very rare
Falsocythere terryi	*F. maccagnoi*	rare
Heterocythereis voraginosa	*H. albomaculata*	abundant
Loculicytheretta pavonia	*L. pavonia*	frequent
Loxoconcha affinis	*L. rhomboidea*	common
Loxoconcha ovulata	*L. tumida*	common
Loxoconcha pontica	*Loxoconcha* n. sp. A	very rare
Loxoconcha rubritincta	*L. rubritincta*	abundant
Loxoconcha stellifera	*L. stellifera*	abundant
Macrocypris succinea	*M. succinea*	rare
Microcytherura fulva	*M. fulva*	rare
Paracytheridea ? hexalpha	*Paracytheridea* spp.	very rare
Paracytheridea sp. 1	*Paracytheridea* spp.	very rare
Pontocythere turbida	*P. elongata*	abundant
Procytherideis complicata	*N. complicata*	frequent
Procytherideis retifera	*Neocytherideis* sp.1	rare
Procytherideis subspiralis	*N. subspiralis*	frequent
Sagmatocythere napoliana	*L. napoliana*	rare
Semicytherura alifera	*S. alifera*	very rare
Semicytherura incongruens	*S. incongruens*	very rare
Semicytherura aff. *S. inversa*	*S. inversa*	rare
Semicytherura kaloderma	*S. kaloderma*	frequent
Semicytherura sulcata	*S. sulcata*	rare
Tenedocythere prava	*T. prava*	common
Triebelina raripila	*T. raripila*	rare
Urocythereis sp. 1	*U.* aff. *U. favosa*	common
Urocythereis sp. 2	*U.* aff. *U. favosa*	common
Urocythereis sp. 3	*U.* aff. *U. favosa*	common
Xestoleberis communis	*X. communis*	common
Xestoleberis cypria		frequent
Xestoleberis decipiens	*X. decipiens*	frequent
Xestoleberis dispar	*X. dispar*	frequent
Xestoleberis fuscomaculata		rare
Xestoleberis phasalus n. sp.		very rare
Xestoleberis aff. *X. plana*		rare
Xestoleberis rara	*X. rara*	rare
Xestoleberis aff. *X. sexmaculata*		rare

Table 1- List of the species found in alphabetical order, their correlation with the determinations of Bonaduce & Pugliese (1975), and frequency in the sample.

	SECTOR	AREA	AUTHORS
1	North Western Mediterranean	Northern Tyrrhenian Bay of Banyuls Southern Rhone Delta Gulf of Marseille Monaco Alicante (Spain) Gulf of Calvi (Corsica)	Bonaduce *et al.*, 1977 Hartmann, 1953a, b, c Peypouquet & Nachite, 1984 Reys, 1961; 1964; 1965 Rome, 1964 van Morkhoven, 1963 Wouters, 1972
2	Central Tyrrhenian	Gulf of Policastro Gulf of Pozzuoli Gulf of Naples Gulf of Naples Gulf of Naples	Bonaduce & Gervasio, 1966 Bonaduce *et al.*, 1984 G. W. Müller, 1894; 1912 Pugliese *et al.*, 1977 Puri *et al.*, 1964
3	Southern Tyrrhenian	Mondello (Palermo) Sicily Egadi Islands Palermo (Sicily)	Bonaduce, 1984 Brady, 1868b Melis & Pugliese, 1985 Ruggieri, 1973b
4	Malta	Malta Isle	Bonaduce & Masoli, 1970
5	North African Coast	Tunisian Shelf Tunisian Shelf Tunisian Shelf Tunisian Shelf Bay of Bou Ismail (Algeria)	Athersuch & Bonaduce, 1976 Bonaduce & Masoli, 1968 Bonaduce *et al.*, 1979 Bonaduce *et al.*, 1988 Yassini, 1979
6	Ionian	Tor Vendicari (Siracusa) Tor Vendicari (Siracusa) Noto Marina (Siracusa) Gulf of Taranto Crotone Crotone	Barra & Bonaduce, 1996 Bonaduce *et al.*, 1984 Bonaduce *et al.*, 1984 Bonaduce *et al.*, 1980-81 Bonaduce *et al.*, 1984 Ruggieri, 1972
7	Southern Adriatic	Apulia Apulia	Bonaduce *et al.*, 1976 Breman, 1975
8	Northern Adriatic	Marano and Grado Lagoons Northern Adriatic Northern Adriatic Coast of Dalmatia Coast from Venice to Trieste Coast from Venice to Fano Coast of Montenegro Limsky Canal	Bonaduce *et al.*, 1973-74 Bonaduce *et al.*, 1976 Breman, 1975 Klie, 1942 Masoli, 1968; 1969 Ruggieri, 1952b Sokác, 1977 Uffenorde, 1972
9	Aegean	Bozcaada (Tenedos) Naxos Piraeus Turkey	Athersuch & Whittaker, 1980 Barbeito-González, 1971 Brady, 1869 Brady, 1869
10	Eastern Mediterranean	Cyprus Cyprus Saint George Bay (Lebanon) Levant	Athersuch, 1978; 1979b; 1980b Athersuch & Bonaduce, 1976 Bonaduce *et al.*, 1970 Brady, 1866

Table 2- Sectors of the Mediterranean Sea, with related areas and literature taken into consideration.

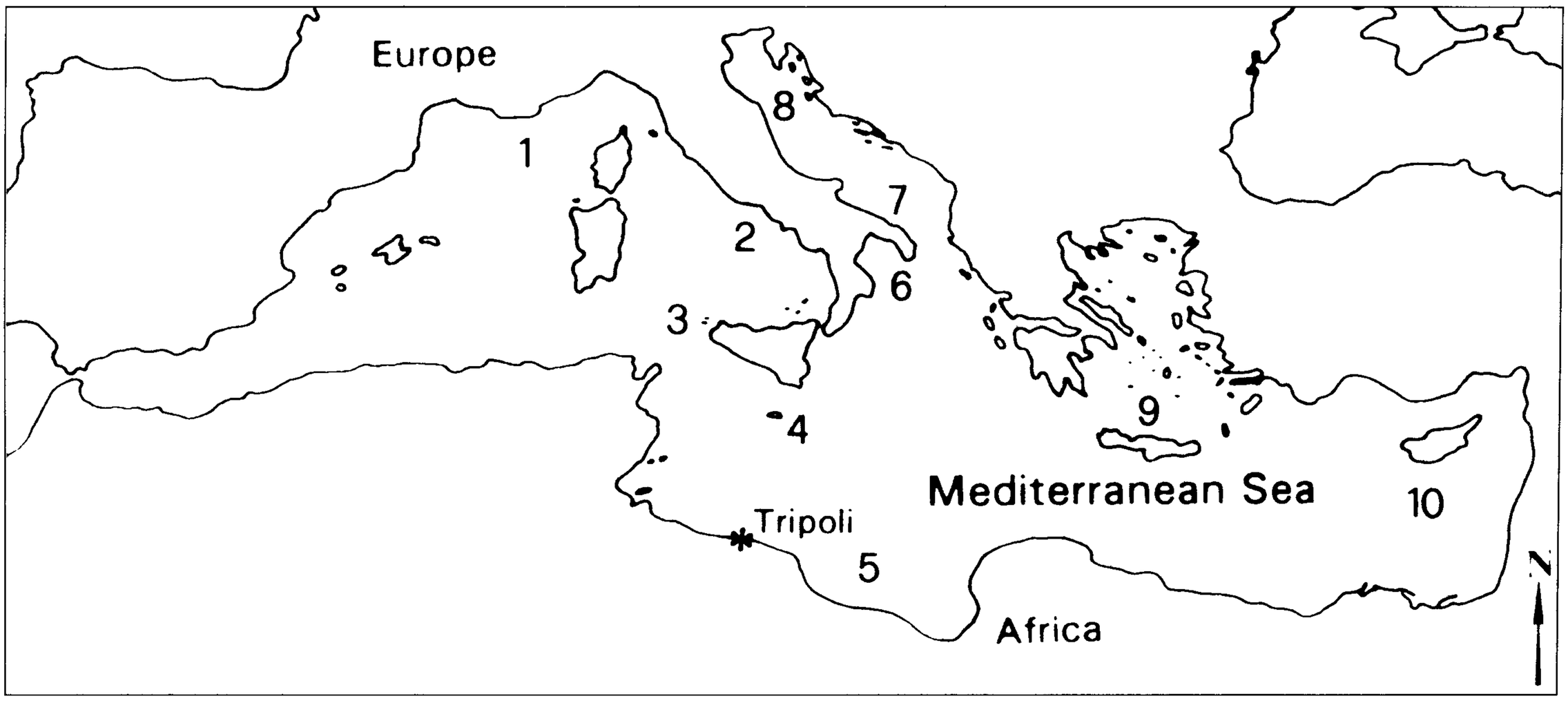

Figure 1- Sectors in which the Mediterranean Sea has been subdivided, as shown in tab. 2.

The only specimen found, attributed to *Cytherella* aff. *C. vulgata* Ruggieri, 1962 by Bonaduce & Pugliese (1975) is so badly preserved that a more precise identification was impossible.

Cytherelloidea beckmanni Barbeito-González, 1971
(Plate 1 Fig. 1)

1971 *Cytherelloidea beckmanni* Barbeito-González, p. 262, pl. 2, figs. 1c-3c; pl. 45, figs. 14,15.

1975 *Cytherelloidea beckmanni* Barbeito-González. Bonaduce & Pugliese, p. 130, pl. 1, fig. 7.

Cytherelloidea aff. *C. cincta* (Malz & Jellineck, 1989)
(Plate 1 Fig. 2)

Cytherella cincta Malz & Jellineck, 1989, which is here considered to pertain to *Cytherelloidea* Alexander, 1929 is very similar to the present species due to the large foveolae occurring at the periphery of the valves and to the presence of striae parallel to the anterior margin. It differs in the presence of foveolae along the dorsal magin and in the posterior extremity delicately ornamented. The rarity of the species does not allow the study of its variability nor the eventual description of a new species.

Cytherelloidea ruggierii n. sp.
(Plate 1 Figs. 4, 5)

1993 *Cytherelloidea* sp. ind. Ruggieri & D'Arpa, p. 200, pl. 1, figs. 2a, b.

?1971 *Cytherelloidea sordida* G. W. Müller. Barbeito-González, p. 262, pl. 45, figs. 12, 13.

1975 *Cytherelloidea sordida* G. W. Müller. Bonaduce & Pugliese, p. 130.

Etymology: In honour of Prof. Giuliano Ruggieri, the outstanding italian ostracodologist, University of Palermo, Italy.

Holotype: 1 RV (Pl. 1, fig. 4). B.O.C. 2272.

Paratype: 1 RV (Pl. 1, fig. 5). B.O.C. 2273.

Description: This species well agrees with *Cytherelloidea* sp. ind. Ruggieri & D'Arpa, 1993 from the Late Pliocene of Altavilla (Palermo, Sicily). The

cited AA., even suggesting that the species should be considered new, do not institute it because represented only by young instars. The specimens of Tripoli are certainly adult and agree perfectly with the description and illustration given by Ruggieri & D'Arpa (1993) for the juveniles, fact which supports the stability of the characters and the validity of the species. For the description of the proposed new species I refer to that given by Ruggieri & D'Arpa (1993).

Size (in mm): RV L = 0.74 mm; H = 0.40 (Pl. 1, fig. 4).

Affinities: Very close to *C. sordida* G. W. Müller, 1894, as illustrated by Barbeito-González (1971) from the Recent of Aegean Sea in both general shape and type of ornamentation. The only difference observed is the smaller size of the foveole. The two forms are considered doubtfully conspecific and in the range of the ecophenotipic variability. The species is anyway not comparable with *C. sordida* G. W. Müller.

Distribution: Few specimens found in the sample and previously doubtfully cited only from very shallow environment of the Recent of the Aegean Sea. Even if its occurrence is very limited the species, because of its geographical distribution, can be hypothesized to pertain to warm temperate environment.

Bairdia corpulenta G. W. Müller, 1894
(Plate 1 Fig. 7)

1894 *Bairdia corpulenta* G. W. Müller, p. 272, pl. 13, figs. 39, 40; pl. 14, figs. 8, 9, 11, 24; pl. 25, fig. 25.

Bairdia? corpulenta G. W. Müller, 1894
(Plate 1 Fig. 3)

The left valve well corresponds to the Müller's species in the outline in both lateral and dorsal view. The single valve at disposal, badly preserved, shows the anterior and posterior areas finely pitted while the central part appears smooth. *B. corpulenta* as described by Müller, figured by Bonaduce *et al.*, (1976) and in the present paper (Pl. 1, fig. 7) is completely pitted; because of the cited difference this form is doubtfully identified.

Bairdia aff. *B. longevaginata* G. W. Müller, 1894
(Plate 1 Fig. 9)

1975 *Bairdia longevaginata* G. W. Müller. Bonaduce & Pugliese, p. 130.

The figured specimen differs from the Müller's species especially due to the reduced and not upturned caudal process. Few valves occur in the sample examined and they have been attributed to *B. longevaginata* by Bonaduce & Pugliese (1975).

Bairdia mediterranea G. W. Müller, 1894

1894 *Bairdia mediterranea* G. W. Müller, p. 270, pl. 13, fig. 27; pl. 14, figs. 1, 2, 26.

The few valves found were broken and consequently the species has not been figured.

Bairdia minor G. W. Müller, 1894

1894 *Bairdia minor* G. W. Müller, p. 271, pl. 14, fig. 3.

Few specimens badly preserved and consequently not figured.

Triebelina raripila (G. W. Müller, 1894)
(Plate 1 Fig. 6)

1894 *Bairdia raripila* G. W. Müller, p. 272, pl. 13, fig. 27; pl. 15, figs. 5-7, 28.

1974 *Triebelina raripila* (G. W. Müller). Doruk, pp. 65-68.

Microcytherura fulva (Brady & Robertson, 1874)
(Plate 1 Fig. 8)

1874 *Cytherura fulva* Brady & Robertson, p. 116, pl. 4, figs. 1-5.

1952a *Microcytherura fulva* (Brady & Robertson). Ruggieri, p. 88, pl. 5, fig. 12.

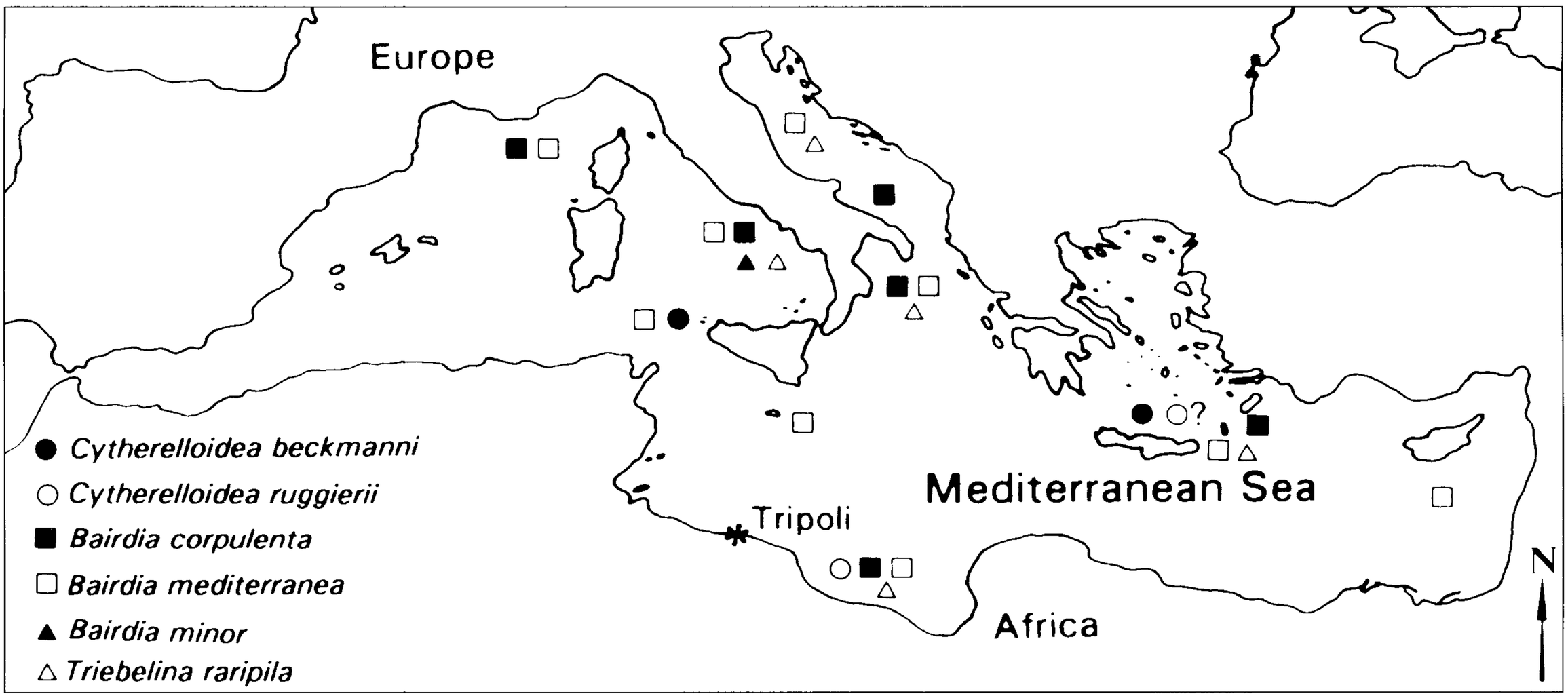

Figure 2- Geographical distribution map of the indicated species.

Callistocythere folliculosa Bonaduce Ciampo & Masoli, 1976
(Plate 1 Fig. 11)

1975 *Callistocythere folliculosa nomen nudum* Bonaduce & Pugliese, p. 130.

1976 *Callistocythere folliculosa* Bonaduce, Ciampo & Masoli, pp. 36-38, pl. 13, figs. 8-14; text-fig. 20.

Callistocythere levis (G. W. Müller, 1894)
(Plate 2 Fig. 2; Plate 8 Fig. 6)

1894 *Cythere levis* G. W. Müller, p. 357, pl. 27, fig. 31; pl. 28, figs. 11, 12.

1950 *Leptocythere macallana levis* (G. W. Müller). Ruggieri, p. 44, pl. 1, figs. 13, 33.

1975 *Leptocythere levis* (G. W. Müller). Bonaduce & Pugliese, p. 130.

This species represented by very few specimens, has to be attributed to the genus *Callistocythere* Ruggieri, 1953b because of the peculiar characters of the inner lamella and pore - canals and related vestibule, as also figured by Müller (Pl. 28, fig. 12), even if the ornamentation is not typical of the genus.

Generally in the literature this species is attributed to the genus *Leptocythere* Sars, 1925.

Callistocythere littoralis (G. W. Müller, 1894)

1894 *Cythere littoralis* G. W. Müller, p. 353, pl. 28, fig. 18.

1980 *Callistocythere littoralis* (G. W. Müller). Athersuch & Whittaker, pp. 61-66.

Callistocythere protracta Ruggieri & D'Arpa, 1993
(Plate 1 Fig. 10)

1975 *Callistocythere flavidofusca* (Ruggieri). Bonaduce & Pugliese, p. 130.

1976 *Callistocythere flavidofusca* (Ruggieri). Bonaduce, Ciampo & Masoli, p. 36, pl. 12, figs. 6, 7, 8, 10 (*nec* Ruggieri, 1950).

1993 *Callistocythere protracta* Ruggieri & D'Arpa, pp. 209, 210.

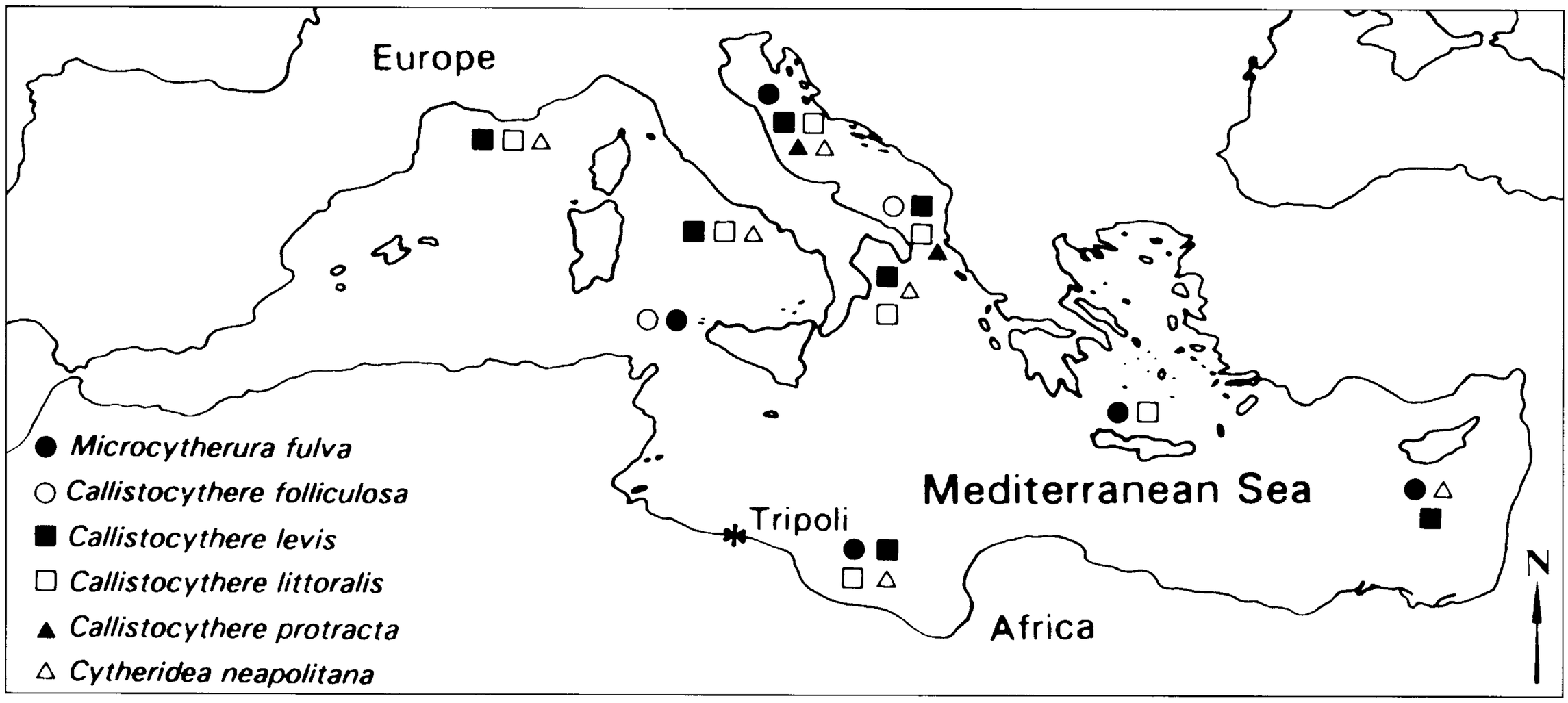

Figure 3- Geographical distribution map of the indicated species.

This species has been erected by Ruggieri & D'Arpa (1993) on specimens figured by Bonaduce *et al.*, (1976) from the Recent of the Adriatic.

Cyprideis torosa (Jones, 1850)
(Plate 2 Fig. 1)

1850 *Candona torosa* Jones, p. 27, pl. 3, figs. 8, 9.

1857 *Cyprideis torosa* Jones. Jones, 21, pl. 2, figs. 1 a-i, fig. 2.

This brackish species, even if common, is considered contaminant of the marine assemblage.

Cytheridea neapolitana Kolmann, 1960

1960 *Cytheridea neapolitana* Kolmann, p. 152, pl. 7, figs. 7-10, text-figs. 3a-b, d.

Only one badly preserved valve. The species has not been cited by Bonaduce & Pugliese (1975).

Pontocythere turbida (G. W. Müller, 1894)
(Plate 2 Fig. 6)

1894 *Cytheridea turbida* G. W. Müller, p. 361, pl. 30, figs. 28, 31.

1963 *Pontocythere turbida* (G. W. Müller). Van Morkhoven, p. 330.

1975 *Pontocythere elongata* (Brady). Bonaduce & Pugliese, p. 131.

The speciemens of Tripoli, on the base of the shape in dorsal view and the carapace's size, have to be attributed to *P. turbida* (G. W. Müller), in agreement also with Wouters (1973) and Ruggieri (1978) instead than to *P. elongata* (Brady) as reported by Bonaduce & Pugliese (1975). The species has also been compared with recent specimens from North-Western Spain.

Procytherideis complicata (Ruggieri, 1953)
(Plate 2 Fig. 5)

1953b *Cytherideis complicata* Ruggieri, p. 109, pl. 4, figs. 34, 35.

1975 *Neocytherideis complicata* (Ruggieri). Bonaduce & Pugliese, p. 130.

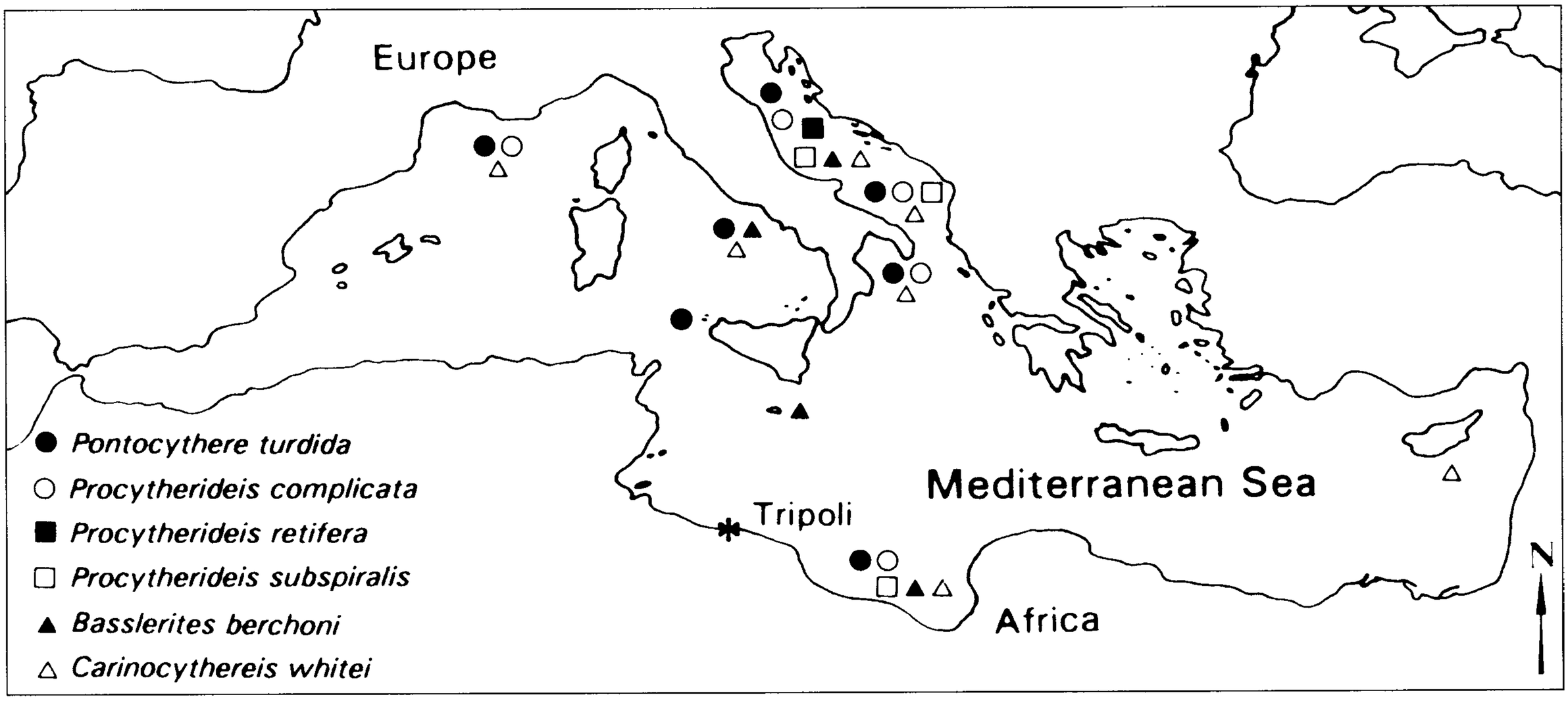

Figure 4- Geographical distribution map of the indicated species.

1978 *Procytherideis complicata* (Ruggieri). Ruggieri, p. 10, fig. 4.

Procytherideis retifera Ruggieri, 1978
(Plate 2 Fig. 3)

1975 *Neocytherideis* sp. 1 Bonaduce & Pugliese, p. 131.

1976 *Neocytherideis* sp. 1 Bonaduce, Ciampo & Masoli, p. 62, pl. 36, figs. 5-11.

1978 *Procytherideis retifera* Ruggieri, p. 10.

This species has been erected by Ruggieri (1978) on a specimen figured by Bonaduce *et al.*, 1976 (holotype, Pl. 36, fig. 7) from the Recent of the Adriatic.

Procytherideis subspiralis (Brady, Crosskey & Robertson, 1874)
(Plate 2 Figs. 7, 14)

1874 *Cytherideis subspiralis* Brady, Crosskey & Robertson, p. 211, pl. 10, figs. 16, 17.

1975 *Neocytherideis subspiralis* (Brady, Crosskey & Robertson). Bonaduce & Pugliese, p. 131.

1978 *Procytherideis subspiralis* (Brady, Crosskey & Robertson). Ruggieri, p. 10.

Basslerites berchoni (Brady, 1870)

1870 *Cythere berchoni* Brady p. 117, pl. 14, figs. 3, 4.

1953a *Basslerites berchoni* (Brady). Ruggieri, p. 42, text-fig. 26.

Carinocythereis whitei (Baird, 1850)
(Plate 2 Fig. 9)

1850b *Cythereis whitei* Baird, p. 175, pl. 20, figs. 3, 3a.

1975 *Carinocythereis antiquata* (Baird). Bonaduce & Pugliese, p. 130.

1985 *Carinocythereis whitei* (Baird). Athersuch, Horne & Whittaker, p. 158, pl. 1, figs. 12-19; pl. 2, figs. 7-8.

This species is generally cited in the literature as *C. antiquata* (Baird) or *C. bairdii* Uliczny, 1969; for a more complete synonimy see Athersuch *et al.*, 1989.

Costa batei (Brady, 1866)
(Plate 2 Fig. 8)

1866 *Cythereis batei* Brady, p. 384, pl. 40, fig. 8.

1959 *Costa batei* (Brady). Ruggieri, p. 67, 140, pl. 1, figs. 4, 4a.

Falsocythere terryi (Holden, 1967)
(Plate 2 Fig. 10)

1967 *Neocaudites Terryi* Holden, p. 43, figs. 33 a-d.

1972 *? Occultocythereis maccagnoi* Ciampo, p. 27, pl. 2, figs. 7-9; pl. 3, fig. 1; pl. 7, fig. 1.

1972 *Falsocythere maccagnoi* (Ciampo). Ruggieri, p. 91.

1975 *Falsocythere maccagnoi* (Ciampo). Bonaduce & Pugliese, p. 130.

1993 *Falsocythere terryi* (Holden). Witte, pp. 47-49, pl. 6, figs. 22-26.

For more complete references see Witte (1993) who, comparing specimens from West Pacific, West Africa and Mediterranean, demonstrated that *F. maccagnoi* is junior synonym of *F. terryi.*

Cistacythereis (Cistacythereis) carthaginiensis
Barra & Bonaduce, 1996
(Plate 3 Fig. 1)

1969 *Cistacythereis pokornyi hellenica* Uliczny, pl. 16, fig. 10; *nec* pl. 7, figs. 1, 2.

1975 *Cystacythereis caleautura* Uliczny. Bonaduce & Pugliese, p. 130, pl. 2, fig. 1.

1996 *Cistacythereis (Cistacythereis) carthaginiensis* Barra & Bonaduce, pp. 277-280, pl. 1, figs. 1-7, 12, 17.

Bonaduce & Pugliese (1975) attribute two specimens (a female, Pl. 2, fig. 1 and a male Pl. 2, fig. 2) to *C. caelatura* Uliczny, 1969. In a recent paper (Barra & Bonaduce, 1996) they are considered to pertain to two different species described as new.

Cistacythereis (Cistacythereis) hannibalis Barra & Bonaduce, 1996
(Plate 3 Fig. 2)

1975 *Cystacythereis caelatura* Uliczny. Bonaduce & Pugliese, p. 130, pl. 2, fig. 2.

1996 *Cistacythereis (Cistacythereis) hannibalis* Barra & Bonaduce, pp. 280-281, pl. 1, figs. 8-11, 13-16.

See the comments on *Cistacythereis (C.) carthaginiensis.*

Cistacythereis (Hiltermannicythere) rubra (G. W. Müller, 1894)

1894 *Cythereis rubra* G. W. Müller, p. 372, pl. 28, figs. 21, 26; pl. 31, figs. 2, 3.

1975 *Hiltermannicythere rubra* (G. W. Müller). Bonaduce & Pugliese, p. 130.

1976 *Hiltermannicythere rubra* (G. W. Müller). Bonaduce, Ciampo & Masoli, p. 49.

nec 1985 *Hiltermannicythere rubra* (G. W. Müller). Athersuch & Horne, pp. 45-48.

In a recent paper (Barra & Bonaduce, 1996) the systematic position of *Hiltermannicythere* Bassiouni, 1970 has been revised and the genus proposed as subgenus of *Cistacythereis* Uliczny, 1969.

The specimens found have been compared with topotypic material from the Gulf of Naples.

Cistacythereis (Hiltermannicythere) sp.1
(Plate 2 Figs. 4, 12, 13)

1975 *Hiltermannicythere* sp. Bonaduce & Pugliese, p. 130, pl. 2, fig. 3.

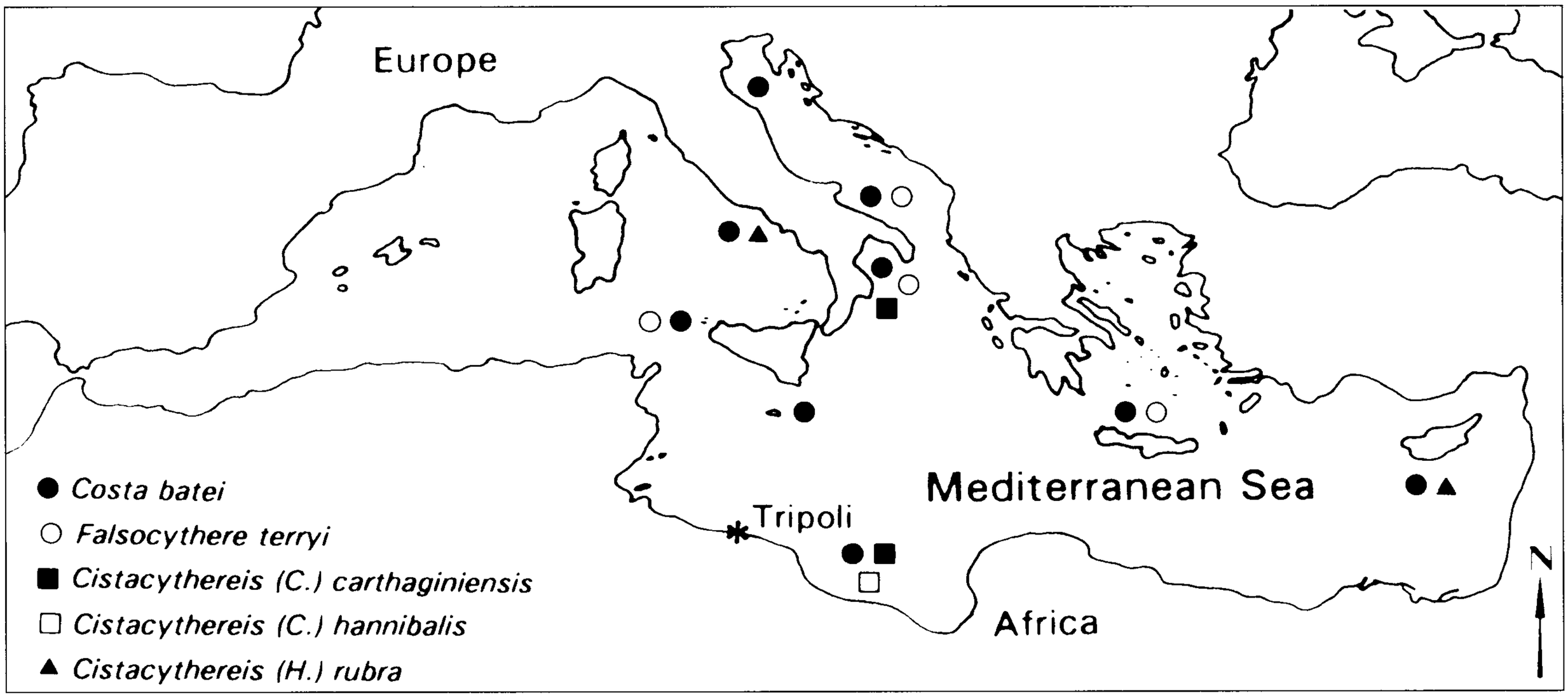

Figure 5- Geographical distribution map of the indicated species.

1985 *Hiltermannicythere rubra* (G. W. Müller). Athersuch & Horne, pp. 45-48.

The figured specimens are very similar to *Cistacythereis (Hiltermannicythere) turbida* (G. W. Müller, 1894) from which they differ due to the posterior extremity more truncated, the less protruding longitudinal ridges and the different type of ornamentation in the dorsal area. Moreover the anterior margin appears more obtusely rounded and the ornamentation, just after the anterior marginal ridge, is constituted by more rare foveolae.

It is also similar to *Cistacythereis (H.) rubra* (G. W. Müller, 1894) from which it differs chiefly due to the less truncated posterior extremity and the smaller and rare foveolae especially below the median ridge.

It corresponds perfectly with *Hiltermannicythere rubra* as illustrated by Athersuch & Horne (1985).

This species, even if common in the examined assemblage, is left in open nomenclature and will be object of a future study.

Aurila arborescens (Brady, 1865)
(Plate 3 Fig. 7)

1865 *Cythere arborescens* Brady, p. 190, pl. 9, figs. 5-8.

1868b *Cythere woodwardi* Brady, p. 93, pl. 10, figs. 19-21.

1964 *Aurila woodwardi* (Brady). McKenzie, p. 8, pl. 1, figs. 1-3.

1975 *Aurila woodwardi* (Brady). Bonaduce & Pugliese, p. 130.

1980a *Aurila woodwardi* (Brady). Athersuch, pp. 45-52.

1985 *Aurila arborescens* (Brady). Athersuch, Horne & Whittaker, p. 156, pl. 1, figs. 5-8; pl. 2, figs. 1-4.

The opinion of Athersuch *et al.*, (1985) who consider *A. woodwardi* (Brady, 1865) a junior synonym of *A. arborescens* described by Brady himself only three years later is accepted in the present paper.

In a large part of the literature also in recent papers the species is reported as *Aurila woodwardi.*

Aurila convexa (Baird, 1850)
(Plate 3 Fig. 3)

1850b *Cythere convexa* Baird, p. 174, pl. 21, fig. 5.

1894 *Cythereis convexa* (Baird). G. W. Müller, p. 366, pl. 28, figs. 14, 19; pl. 30, figs. 49-50; pl. 35, figs. 6, 13, 19-21.

1955 *Aurila convexa* (Baird). Pokorny, p. 19, text-fig. 8-11.

Aurila aff. *A. convexa* (Baird, 1850)
(Plate 3 Fig. 4)

The specimen figured is similar to *A. convexa* (Baird, 1850b) in the general scheme of the ornamentation; it differs due to the uniformly small foveolae in the central part of the valve while *A. convexa* shows more rare and larger foveolae in this area and of decreasing size toward the periphery.

Aurila fallax Ruggieri, 1983
(Plate 3 Figs. 8, 10; Plate 5 Fig. 6)

1894 *Aurla speyeri* (Brady). G. W. Müller, p. 367, pl. 32, figs. 24, 25, 28.

1973 *Mutilus speyeri* (Brady). Doruk, pp. 137-140.

1983 *Aurila fallax* Ruggieri, p. 283.

The specimens of Tripoli correspond perfectly to *A. speyeri* (Brady, 1868a) in Müller (1894) also in size and distribution of the foveolae which are of bigger size in the central and antero-ventral areas where frequently they are arranged in groups of 2 or 3, while in the dorso marginal area they become extremely small and very frequent.

The specimens of Tripoli have been compared with topotypic material from the Gulf of Naples collected at St. 3 (Gaiola locality), 30 m depth.

Ruggieri (1983) designated as holotype of *A. fallax,* the LV female (Pl. 138, figs. 2a, 2b) illustrated by Doruk (1973) and collected in the Pleistocene of Southern Turkey; this form corresponds perfectly with both the specimens of Tripoli and of the Gulf of Naples.

As pointed out by Ruggieri (1983), the species is commonly identified in the literature as *A. speyeri.*

Aurila glyptica Barbeito-González, 1971
(Plate 3 Figs. 5, 6)

1971 *Aurila glyptica* Barbeito-González, p. 277, pl. 12, figs. 1b, 2b, 3b; pl. 46, figs. 13-18.

1975 *Aurila glyptica* Barbeito-González. Bonaduce & Pugliese, p. 130, pl. 1, fig. 5.

Aurila meridionalis n. sp. *nomen nudum*
(Plate 4 Figs. 1, 2, 4, 5, 10)

A species of *Aurila* Pokorny, 1955 characterized by a carapace peculiarly strongly inflated with females very high and short and ornamentation constituted by concentric alignements of deep foveolae which appear elongated near the margins and roughly rounded in the central area. Even if I have at disposal abundant material, this new species is not erected in the present paper because of the needed comparison with similar species.

Aurila prasina Barbeito-González, 1971
(Plate 3 Fig. 9)

1971 *Aurila prasina* Barbeito-González, p. 277, pl. 12, figs. 1a, 2a, 3a; pl. 46, figs. 11, 12.

Caudites calceolatus (O. G. Costa, 1853)
(Plate 2 Fig. 11)

1853 *Cytherina calceolata* O. G. Costa, p. 185, pl. 16, fig. 14.

1959 *Caudites calceolatus* (O. G. Costa). Ruggieri, p. 188.

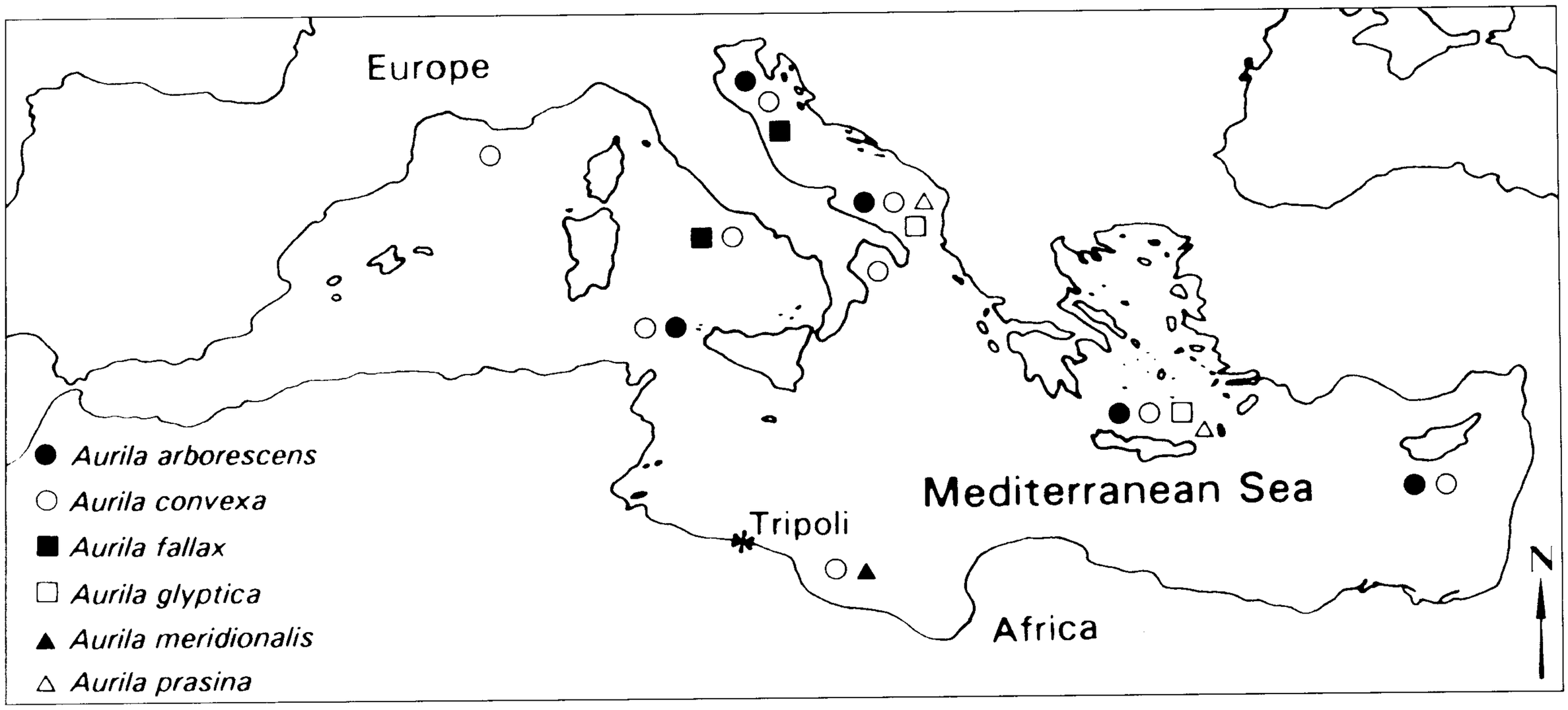

Figure 6- Geographical distribution map of the indicated species.

Heterocythereis voraginosa Athersuch, 1979
(Plate 4 Fig. 7)

1975 *Heterocythereis albomaculata* (Baird). Bonaduce & Pugliese, p. 130.

1976 *Heterocythereis albomaculata* (Baird). Bonaduce, Ciampo & Masoli, p. 46, pl. 21, figs. 8-11. (*nec Cythere albomaculata* Baird, 1838).

1979 *Heterocythereis voraginosa* Athersuch, pp. 125-132.

Tenedocythere prava (Baird, 1850)
(Plate 4 Fig. 3)

1850a *Cythereis prava* Baird, p. 256, pl. 18, figs. 13-15.

1974 *Tenedocythere prava* (Baird). Ruggieri, p. 168.

1984 *Tenedocythere prava* (Baird). Bonaduce, Ruggieri & Russo, pp. 522, 524, pl. 1, figs. 4, 7; pl. 2, fig. 7; pl. 3, figs. 1-9; pl. 9, fig. 6; pl. 10, fig. 7.

Genus *Urocythereis* Ruggieri, 1950

Urocythereis is the commonest genus in the assemblage and it is represented by 3 species previously ilustrated but not identified or described by Athersuch (1977).

Due to the difficulty of the systematics of this genus, due to the large variability of the ornamentation which cannot be controlled in one single sample, the following 3 species, even if rather well differentiated, are left in open nomenclature.

Urocythereis sp. 1
(Plate 4 Fig. 6)

1975 *Urocythereis* aff. *U. favosa* (Roemer). Bonaduce & Pugliese, p. 130.

1977 *Urocythereis* sp. Athersuch, pl. 17, fig. 2.

This species is probably new.

Urocythereis sp. 2
(Plate 4 Fig. 8)

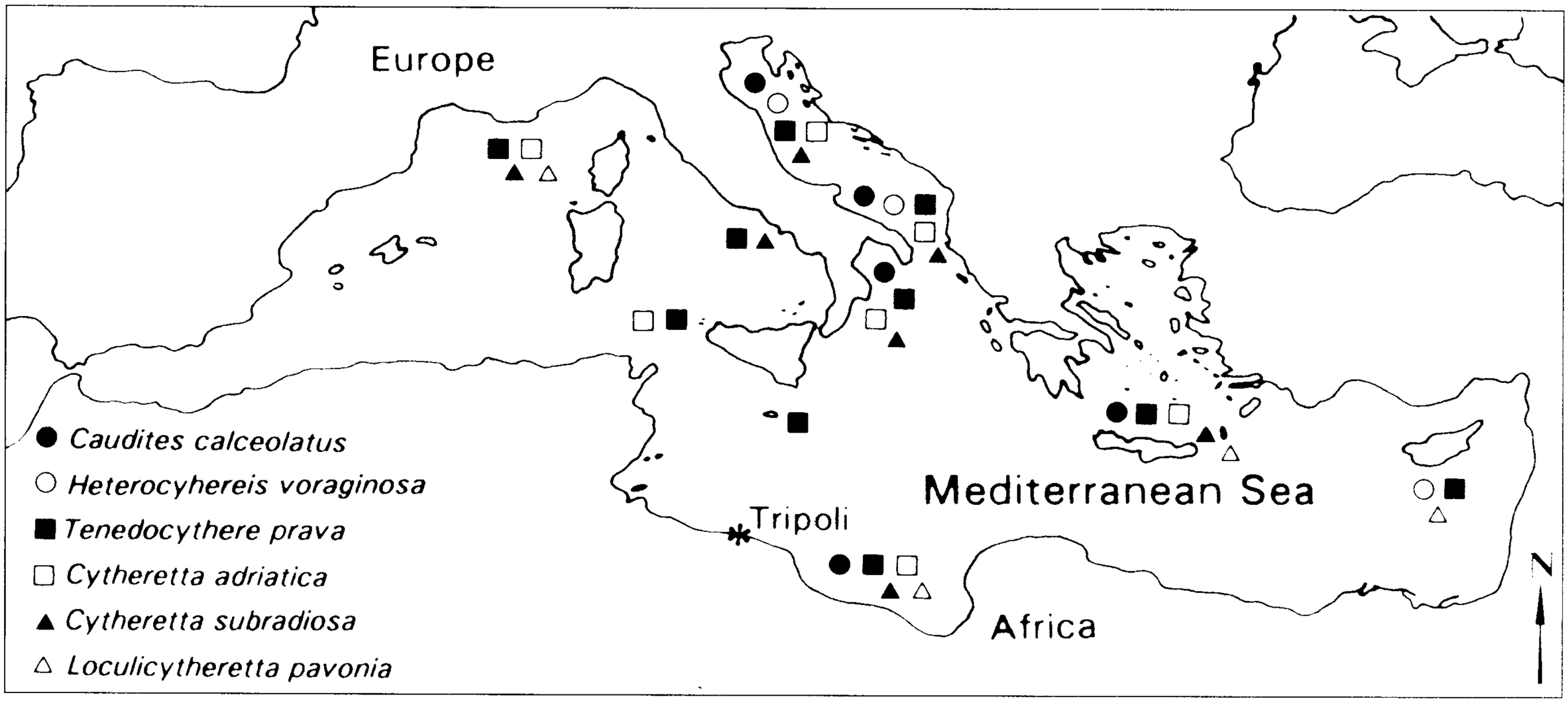

Figure 7- Geographical distribution map of the indicated species.

1975 *Urocythereis* aff. *U. favosa* (Roemer). Bonaduce & Pugliese, p. 130.

1977 *Urocythereis* sp. Athersuch, pl. 17, fig. 4.

Athersuch (1977) hypotesizes that the specimen of his fig. 4 is a morphotype of his fig. 2. The abundance of specimens at disposal allowed to observe a relative constancy of the ornamentation which is constituted by large and deep foveolae defined by high and marked muri in *Urocythereis* sp. 1, while in *Urocythereis* sp. 2 the foveolae are much smaller and frequently semifused two by two. In my opinion we are dealing with two different species, none of which previously described.

Urocythereis sp. 3
(Plate 4 Fig. 11)

1975 *Urocythereis* aff. *U. favosa* (Roemer). Bonaduce & Pugliese, p. 130.

1977 *Urocythereis* sp. Athersuch, pl. 17, fig. 5.

The specimen figured is characterized in lateral view by a shape subrectangular and elongated with the posterior extremity of the LV obtusely rounded. The ornamentation is constituted by few isolated foveolae almost equally spaced each other.

Cytheretta adriatica Ruggieri, 1952
(Plate 5 Fig. 4)

1952a *Cytheretta adriatica* Ruggieri, p. 94, pl. 1, fig. 11.

Cytheretta subradiosa (Roemer, 1838)
(Plate 8 Fig. 5)

1838 *Cytherina subradiosa* Roemer, p. 517, pl. 6, fig. 20.

1950 *Cytheretta subradiosa* (Roemer). Ruggieri, p. 9.

Loculicytheretta pavonia (Brady, 1866)

1866 *Cythere pavonia* Brady, p. 378, pl. 61, figs. 2 a-d.

1954 *Loculicytheretta pavonia* (Brady). Ruggieri, p. 571, figs. 40 a, b, 41, 41 a.

1975 *Loculicytheretta pavonia* (Brady). Bonaduce & Pugliese, p. 130, pl. 2, fig. 4.

1976 *Loculicytheretta pavonia* (Brady). Athersuch & Bonaduce, pp. 349-364, pl. 1, figs. 1-4; pl. 2, figs. 1-10.

Loxoconcha affinis (Brady, 1866)
(Plate 5 Fig. 2)

1866 *Normania affinis* Brady, p. 382, pl. 61, figs. 12 a-d.

1868a *Loxoconcha affinis* (Brady). Brady, p. 220.

1894 *Loxoconcha impressa* (Baird). G. W. Müller, p. 342, pl. 27, figs. 16, 17, 20; pl. 28, figs. 1, 6.

1912 *Loxoconcha bairdi* G. W. Müller (*nec Cythere impressa* M'Coy, 1844), p. 306, fig. 85.

1975 *Loxoconcha rhomboidea* (Fischer). Bonaduce & Pugliese, p. 131.

Following Athersuch (1976a), G. W. Müller (1912) suggests for *L. impressa* (Baird, 1850b) preoccupied by *Cythere impressa* M'Coy, 1844, the new name *L. bairdi* but that his illustration and redescription certainly correspond to *L. affinis* (Brady, 1866).

Bonaduce & Pugliese (1975) quote *L. rhomboidea* (Fischer, 1855) which very probably corresponds to *L. affinis*.

This species is generally recorded under different names, as *L. adriatica* Klie, 1942, *L. impressa*, *L. bairdi* and *L. rhomboidea*.

Loxoconcha ovulata (O. G. Costa, 1853)
(Plate 5 Fig. 1)

1853 *Cytherina ovulata* O. G. Costa, p. 181, pl. 16, fig. 7.

1869 *Loxoconcha tumida* Brady, p. 48, pl. 8, figs. 11, 12.

1965 *Loxoconcha ovulata* (O. G. Costa). Ascoli, p. 99, pl. 1, fig. 8; pl. 2, fig. 12, pl. 3, fig. 1.

1975 *Loxoconcha tumida* Brady. Bonaduce & Pugliese, p. 131.

1979a *Loxoconcha ovulata* (O. G. Costa). Athersuch, pp. 141-150.

Ahtersuch (1979a) accepts the opinion of Ascoli (1955) who reexhumes *Loxoconcha ovulata* (Costa), original name *Cytherina ovulata*, and considers it conspecific with *Loxoconcha tumida* Brady, 1869, even if *L. ovulata* should be considered *nomen oblitum.*

It has to be stressed that most of the citations of *L. tumida* have to be attributed to *L. ovulata*.

Loxoconcha pontica Klie, 1937
(Plate 5 Fig. 3; Plate 8 Figs. 7, 8)

1937 *Loxoconcha pontica* Klie, p. 13, figs. 24-30.

1971 *Loxoconcha micra* Barbeito-González, p. 307, pl. 32, figs. 1a, 2a, 3a, 4a.

1975 *Loxoconcha* n. sp. A Bonaduce & Pugliese, p. 131, pl. 1, fig. 8.

1980b *Loxoconcha pontica* Klie. Athersuch, pp. 53-60.

The only female carapace corresponds to the lectotype of *L. pontica* Klie, 1937 designated by Athersuch (1980b). The specimen of Tripoli is relatively smaller (L = 0.433 mm) than that figured by Athersuch (L = 0.476 mm).

Loxoconcha rubritincta Ruggieri, 1964
(Plate 4 Fig. 9; Plate 5 Fig. 5)

1964 *Loxoconcha rubritincta* Ruggieri, p. 521, figs. 8-10.

1976b *Loxoconcha rubritincta* Ruggieri. Athersuch, pp. 107-116.

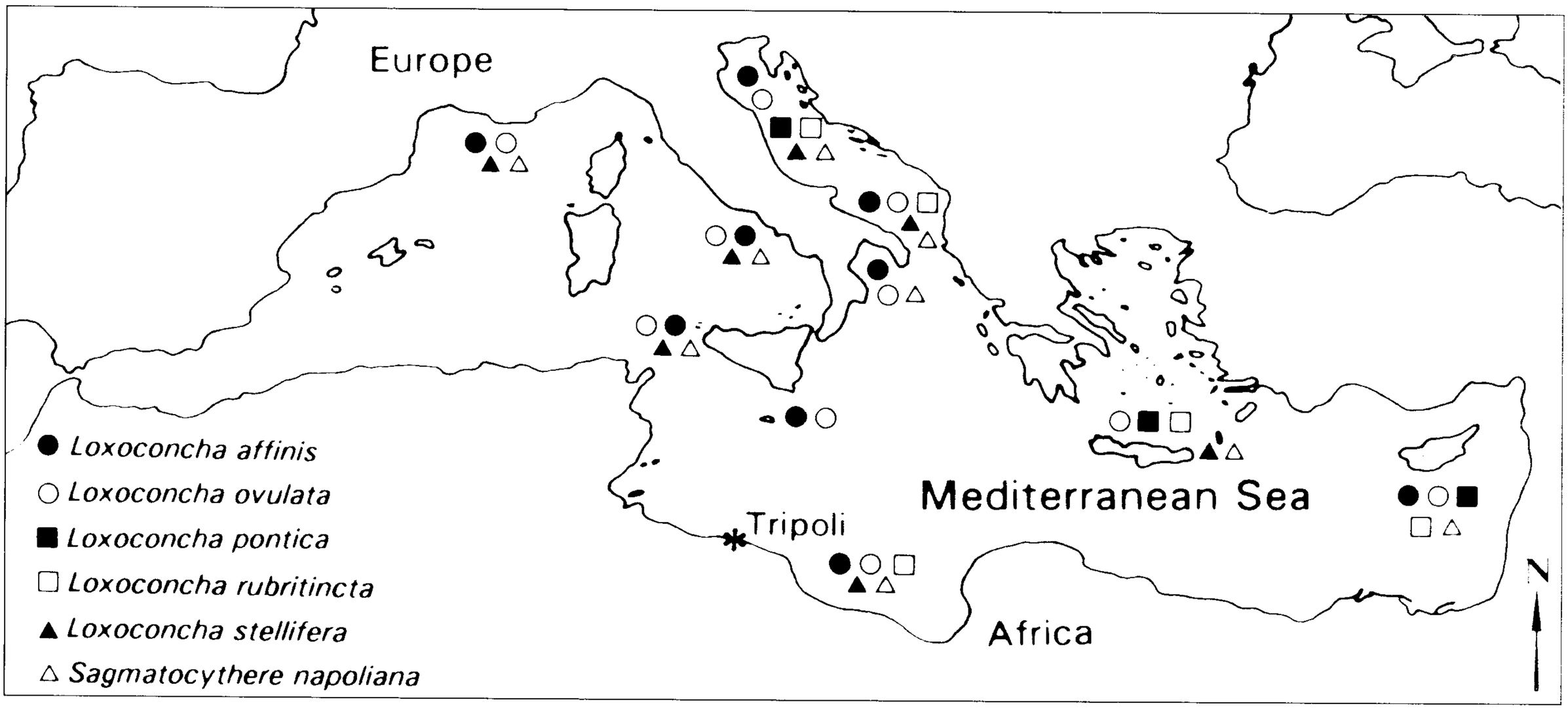

Figure 8- Geographical distribution map of the indicated species.

1976 *Loxoconcha geometrica* Bonaduce, Ciampo & Masoli, p. 107, pl. 63, figs. 6-13.

For a more complete synonymy see Athersuch (1976b). This A. with the study of the soft parts demonstrate that *L. geometrica* Bonaduce, Ciampo & Masoli, 1976 is conspecific with *L. rubritincta*.

Loxoconcha stellifera G. W. Müller, 1894
(Plate 8 Fig. 2)

1894 *Loxoconcha stellifera* G. W. Müller, p. 343, pl. 27, figs. 15, 18; pl. 28, figs. 2, 7.

Sagmatocythere napoliana (Puri, 1963)
(Plate 4 Fig. 12)

1894 *Loxoconcha mediterranea* G. W. Müller, p. 347, pl. 26, figs. 33-42.

1963 *Loxoconcha napoliana* Puri, p. 5.

1971 *Loxoconcha mediterranea* G. W. Müller. Barbeito-González, p. 309, pl. 34, figs. 1 a-c, 2 a-c.

1975 *Loxoconcha napoliana* Puri. Bonaduce & Pugliese, p. 131.

1976c *Sagmatocythere napoliana* (Puri). Athersuch, p. 117-124.

Paracytheridea ? hexalpha Doruk, 1980
(Plate 5 Fig. 8)

The single RV found is doubitatively attribute to the species due to the shorter and stocky caudal process and to the secondary ornamentation constituted by subrounded foveolae instead than mostly subrectangular meshes.

Paracytheridea sp. 1
(Plate 5 Fig. 7)

The single LV found is similar to *P. hexalpha* Doruk, 1980 from which it differs due to the oblique median ridge less developed near the dorsal margin and bifurcating at about mid heigth in a short subhorizontal arm which almost reaching the posterior extremity of the ventral ridge. In *P. hexalpha* it is interrupted before the mid-length from where it is substituted by subrectangular foveolae.

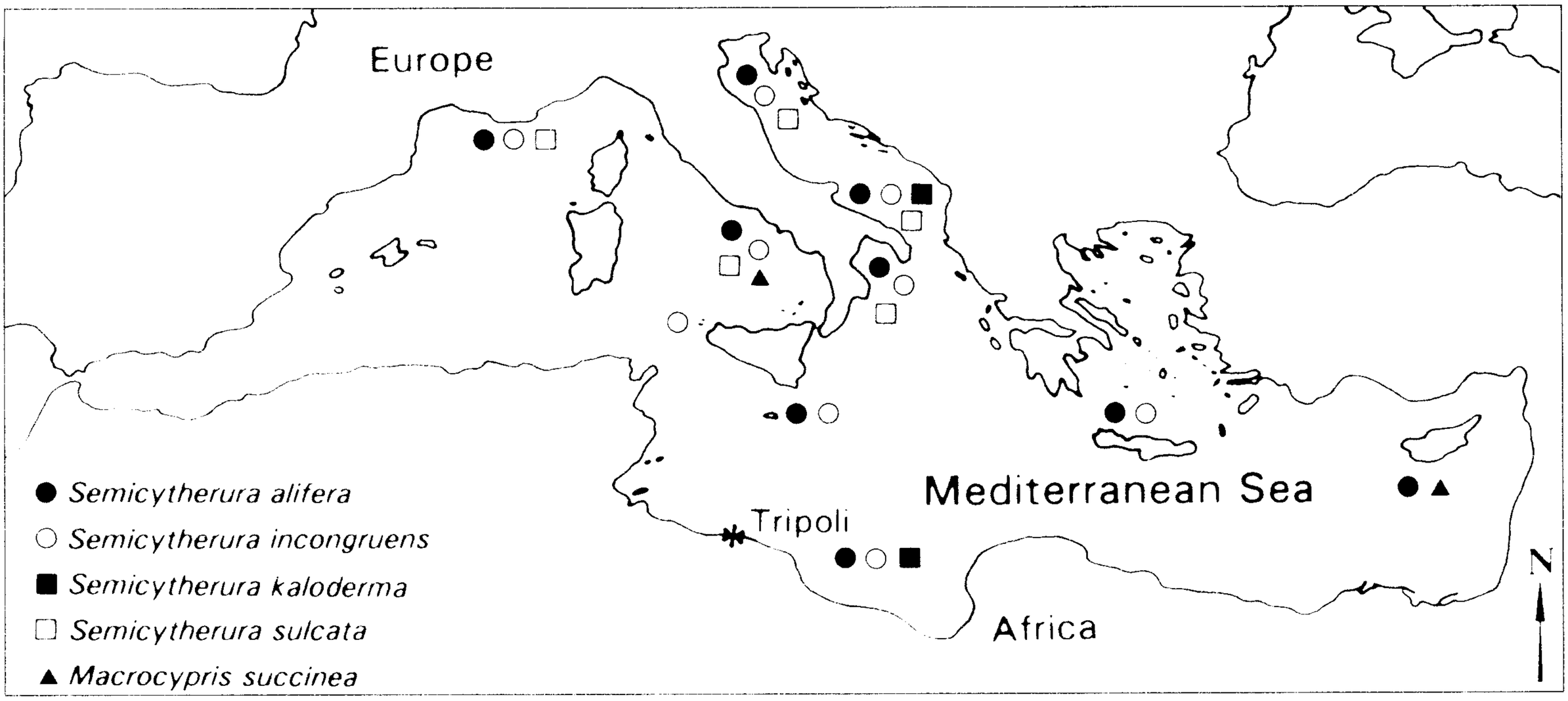

Figure 9- Geographical distribution map of the indicated species.

Semicytherura alifera Ruggieri, 1959

1894 *Cytherura alata* G. W. Müller, p. 288, pl. 18, figs. 1, 7. 8; pl. 19, fig. 9 (*nec C. alata* Lienenklaus, 1894).

1959 *Semicytherura alifera* Ruggieri, p. 204.

This species is represented by badly preserved specimens and consequently is not figured.

Semicytherura incongruens (G. W. Müller, 1894)

1894 *Cytherura incongruens* G. W. Müller, p. 296, pl. 17, figs. 2, 7, 8; pl. 19, fig. 7.

1959 *Semicytherura incongruens* (G. W. Müller). Ruggieri, p. 204.

Few badly preserved specimens but certainly attributable to the species of Müller.

Semicytherura aff. *S. inversa* (Seguenza, 1880) (Plate 5, Figs. 9-11; Plate, 8 Figs. 3, 4)

1975 *Semicytherura inversa* (Seguenza). Bonaduce & Pugliese, p. 131.

Semicytherura aff. *S. inversa* is very similar to *S. cribriformis* G. W. Müller, 1894 as figured by Bonaduce *et al.*, (1976); it differs due to the smaller size (*S. cribriformis* L = 0.61 mm; H = 0.34 mm), to the lack of the protrusion at mid-lenght of the anterior area which in dorsal view gives a more acuminate appearance to the carapace instead than truncated. Moreover in the specimens of Tripoli the reticulation occurs up to the dorsal margin while in the form figured by Bonaduce *et al.*, (1976) it is ristrected to the lower half of the valve and substituted in the upper part by pits.

Semicytherura aff. *S. inversa* is much more similar to *S. inversa* (Seguenza, 1880) *fide* Ruggieri (1991) who regards *S. cribriformis* as junior synonym of *S. inversa*; it differs due to the absence of the anterior protrusion and to the outline regularly arched till the posterior extremity which in the form figured by Ruggieri is abruptly interrupted posteriorly at about 2/3 of the length.

Size (in mm): LV L = 0.42; H = 0.24 (Pl. 5, fig. 9); RV L = 0.42; H = 0.25 (Pl. 5, fig. 11).

Semicytherura kaloderma Bonaduce & Pugliese, 1975

1975 *Semicytherura kaloderma* Bonaduce & Plugliese, pp. 129, 132, 133, pl. 1, figs. 1-3.

This species has been erected by Bonaduce & Pugliese (1975) on specimens from the same sample object of the present study.

Semicytherura sulcata (G. W. Müller, 1894)

1894 *Cytherura sulcata* G. W. Müller, p. 297, pl. 17, figs. 4, 10; pl. 19, fig. 19.

1959 *Semicytherura sulcata* (G. W. Müller). Ruggieri, p. 204.

Few and badly preserved specimens, consequently not figured.
The genus *Xestoleberis* Sars, 1866 is represented by numerous species. Some of them, well represented, are well known in the literature while others are very rare and a specific attribution has not been possible because of the few specimens at disposal. One of them, even if represented by a single carapace, is described as new, because of its peculiar and distinctive characters.

Xestoleberis communis G. W. Müller, 1894
(Plate 6 Fig. 1)

1894 *Xestoleberis communis* G. W. Müller, p. 338, pl. 25, figs. 32, 33, 39; pl. 26, figs. 1, 6.

Xestoleberis cypria Athersuch, 1978
(Plate 6 Figs. 5, 6)

1978 *Xestoleberis cypria* Athersuch, p. 291, pl. 1, figs. 1-4; pl. 2, figs. 1-6; pl. 3, fig. 1; pl. 17, fig. 7; text-figs. 1, 3 a-g, 6a, 9a.

This species has been described from the Recent of Cyprus, where it seems to occur rather frequently (Athersuch, 1978; 1979b). This is the second occurrence datum of the species outside the type-area. It has not been listed in Bonaduce & Pugliese (1975) probably because included in *X. decipiens.* The RV, not illustred by Athersuch (1978), is given by a transparency drawing (Pl. 6, fig. 6).

Xestoleberis decipiens G. W. Müller, 1894
(Plate 6 Figs. 7, 8)

1894 *Xestoleberis decipiens* G. W. Müller, p. 337, pl. 25, fig. 10; pl. 26, figs. 4, 8.

The common occurrence of this species (57 specimens) reported by Bonaduce & Pugliese (1975) probably corresponds to the sum of the present species and *X. cypria* Athersuch, 1978, species not yet described at the time and very similar in shape and development of the posteroventral inner lamella. *X. cypria* differs from *X. decipiens* chiefly due to the cove - shaped anterior marginal pore - canals. The sexual dimorphism is evident with ratio L/H female = 1.49 e L/H male = 1.63. A LV male is also illustrated (Pl. 6, fig. 8).

Xestoleberis dispar G. W. Müller, 1894
(Plate 7 Figs. 7, 8)

1894 *Xestoleberis dispar* G. W. Müller, p. 334, pl. 25, figs. 2, 35, 36.

The left valve of the carapace figured (Pl. 7, fig. 7) well corresponds in the general outline, shape of the anterior and posterior vestibules and type and position of the marginal pore-canals to the original drawing of Müller (Pl. 25, fig. 3) which (following Müller) corresponds to a male.

The RV figured by Müller (Pl. 25, fig. 2) as a female does not correspond to the RV figured here (Pl. 7, fig. 8) in the different running of the more acuminate posterior margin, which, certainly pertain to a male, because I am dealing with drawings of the 2 valves of the same carapace.

The illustrated specimen is of bigger size than that of Müller (L male of Müller's specimens = 0.48-0.58 mm).

Size (in mm): LV L = 0.65; H = 0.32 (Pl. 7, fig. 7). RV L = 0.63; H = 0.31 (Pl. 7, fig. 8).

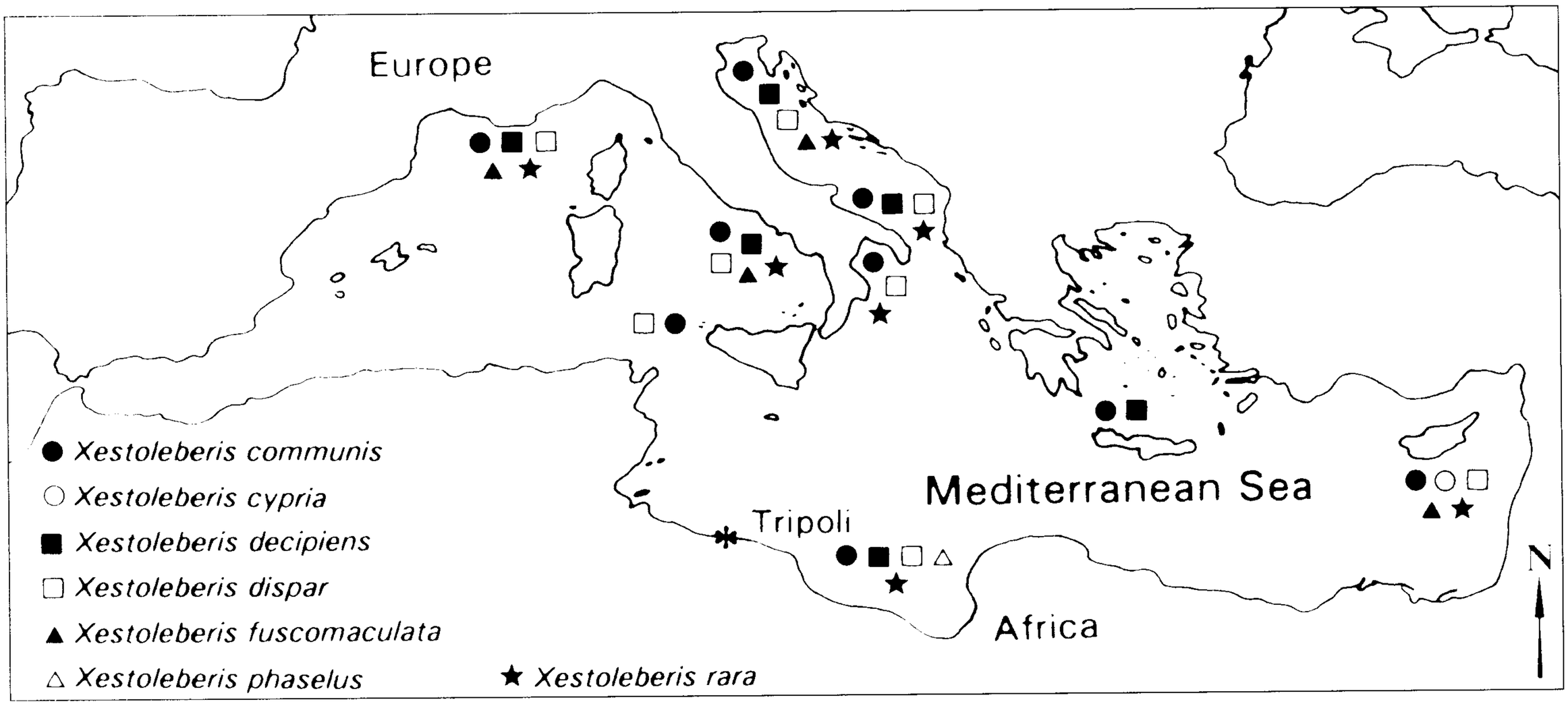

Figure 10- Geographical distribution map of the indicated species.

Xestoleberis fuscomaculata G. W. Müller, 1894
(Plate 7 Figs. 1, 2)

1894 *Xestoleberis fuscomaculata* G. W. Müller, p. 337, pl. 25, figs. 41, 42; pl. 26, fig. 3.

The specimens of Tripoli well correspond to the Müller's drawings except in the bigger size (L male of Müller's specimens = 0.55-0.60 mm).

Size (in mm): LV L = 0.67; H = 0.35 (Pl. 7, fig. 1). RV L = 0.65; H = 0.34 (Pl. 7, fig. 2).

Xestoleberis phaselus n. sp.
(Plate 6 Figs. 3, 4)

Etymology: From latin *phaselus* = bean.

Holotype: 1 CC (Pl. 6, figs. 3, 4). B.O.C. 2320.

Description: A very rare species of *Xestoleberis* of small size characterized in lateral view by the anterior margin obtusely rounded, ventral concave before the mid-length, posterior acutely rounded with postero-ventral forming a clear angle with the ventral. In dorsal view carapace particularly inflated with maximum width at mid-length. Inner lamella moderately wide, anteriorly and posteriorly, reduced ventrally. Marginal pore-canals numerous (in number of about 40 anteriorly) simple, short, straight and regularly spaced. Anterior vestibule rather wide and semilunar in shape.

Size (in mm): LV L = 0.51; H = 0.32; L/H = 1.56 (Pl. 6, fig. 3). RV L = 0.49; H = 0.30; L/H = 1.63 (Pl. 6, fig. 4).

Affinities: The proposed new species can be compared with *X. communis* and *X. rara* from both of which it differs in lateral view especially due to the more obtusely rounded anterior margin, to the accentuated ventral concavity and more angulate running of the posterior margin.

Xestoleberis aff. *X. plana* G. W. Müller, 1894
(Plate 7 Figs. 3, 4)

Very similar in outline and in the flattened ventral margin to *X. plana* G. W. Müller, 1894; it differs due to the less acuminate anterior margin in the RV and to the smaller size (*X. plana* = 0.59-0.63 mm).

Size (in mm): LV L = 0.54; H = 0.27 (Pl. 7, fig. 3). RV L = 0.52; H = 0.26 (Pl. 7, fig. 4).

Xestoleberis rara G. W. Müller, 1894
(Plate 6 Fig. 2)

1894 *Xestoleberis rara* G. W. Müller, p. 338, pl. 39, figs. 5, 23, 36-38.

Xestoleberis aff. *X. sexmaculata* Athersuch, 1978
(Plate 7 Figs. 5, 6)

The figured carapace is similar in outline and shape of the vestibule to *X. sexmaculata* Athersuch, 1978; it differs due to the more obtusely rounded posterior margin and the smaller size (*X. fuscomaculata* L = 0.54 mm).

Size (in mm): LV L = 0.48; H = 0.26 (Pl. 7, fig. 5). RV L = 0.47; H = 0.25 (Pl. 7, fig. 6).

Macrocypris succinea G. W. Müller, 1894
(Plate 8 Fig. 1)

1894 *Macrocypris succinea* G. W. Müller, p. 242, pl. 13, figs. 25-28.

CLIMATOLOGICAL REMARKS

The geographical distribution in the present Mediterranean Basin of the species identified in the sample of Tripoli, obtained from the literature and reported in Table 2 and Figs. 2-10, allows some climatological considerations.

The use of ostracods as climatic markers has been previously pointed out by Ruggieri (1973a) for some species of the Mediterranean Pleistocene. The present study of the recent ostracods distribution can fournish a more objective interpretation of their climatic significance in the fossil record, particularly in the warm-temperate Quaternary.

A large group of species occurs all around the Mediterranean and, at the present state of art, does not seem to have a clear climatological significance.

The following species show a distribution ristrected to the Southern part of the basin, that is:

Cytherelloidea beckmanni: Naxos (Barbeito-González, 1971); Egadi Islands (Melis & Pugliese, 1985).

Callistocythere folliculosa: Egadi Islands (Melis & Pugliese, 1985); Apulia (Bonaduce *et al.*, 1976).

Falsocythere terryi: Egadi Islands (Melis & Pugliese, 1985); Palermo (Ruggieri, 1973b); Crotone (Ruggieri, 1972); Apulia (Bonaduce *et al.*, 1976); Naxos (Barbeito-González, 1971).

Cistacythereis (Cistacythereis) carthaginiensis: Tunisian Shelf (Bonaduce *et al.*, 1979); Tor Vendicari (Barra & Bonaduce, 1996).

Cistacythereis (Hiltermannicythere) rubra: Gulf of Naples (G. W. Müller, 1894); Cyprus (Athersuch, 1979b).

Aurila glyptica: Apulia (Bonaduce *et al.*, 1976); Naxos (Barbeito-González, 1971).

Aurila prasina: Apulia (Bonaduce *et al.*, 1976); Naxos (Barbeito-González, 1971).

Semicytherura kaloderma: Tunisian Shelf (Bonaduce *et al.*, 1988); Apulia (Bonaduce *et al.*, 1976).

Xestoleberis cypria: Cyprus (Athersuch, 1978; 1979b).

Macrocypris succinea: Gulf of Naples (G. W. Müller, 1894); Saint George Bay (Bonaduce *et al.*, 1970).

These species appear to be indicators of warm-temperate water and should be considered good markers in shallow water environment.

A reduced number of species show a more common frequence in the Southern Mediterranean, even if scatteredly cited in its northern part, that is:

Triebelina raripila: In southern part of Mediterranean that is Gulf of Naples (G. W. Müller, 1894); Tunisian Shelf (Bonaduce & Masoli, 1968; Bonaduce *et al.*, 1979; Bonaduce *et al.*, 1988); Naxos (Barbeito-González, 1971); Apulia (Bo-

naduce *et al.*, 1976) and in its northern part that is Limsky Canal (Uffenorde, 1972).

Microcytherura fulva: Egadi Islands (Melis & Pugliese, 1985); Bay of Bou Ismail (Yassini, 1979); Tunisian Shelf (Bonaduce *et al.*, 1979); Naxos (Barbeito-González,1971); Saint George Bay (Bonaduce *et al.*, 1970) and few specimens in the Marano and Grado Lagoons (Bonaduce *et al.*, 1973-74) and very rare in only two stations in Northern Adriatic (Bonaduce *et al.*, 1976).

Heterocythereis voraginosa: Cyprus (Athersuch, 1979b); many specimens along the southern coast of Apulia and only once in the northernmost Adriatic Sea (Bonaduce *et al.*, 1976).

Tenedocythere prava: This species is abundant and widely distributed in the Southern Mediterranean: Gulf of Naples (G. W. Müller, 1894); Egadi Islands (Melis & Pugliese, 1985); Mondello, Noto Marina, Crotone, Tor Vendicari (Bonaduce *et al.*, 1984); Malta (Bonaduce & Masoli, 1970); Tunisian Shelf (Bonaduce *et al.*, 1988); Gulf of Taranto (Bonaduce *et al.*, 1980-81); Apulia (Bonaduce *et al.*, 1976); Naxos (Barbeito-González, 1971); Cyprus (Athersuch, 1979b); Saint George Bay (Bonaduce *et al.*, 1970). It is cited, very rare, in its northern part at Monaco (Rome, 1964), in the Northern Tyrrhenian (Bonaduce *et al.*, 1977) and in the Northern Adriatic (Masoli, 1968).

Loculicytheretta pavonia: Cited as common in the southern part of the basin that is Bay of Bou Ismail (Yassini, 1979); Tunisian Shelf (Athersuch & Bonaduce, 1976; Bonaduce *et al.*, 1988); Naxos (Barbeito-González, 1971); Cyprus (Athersuch & Bonaduce, 1976); Levant (Brady, 1866). This species occurs rarely in its northern part, that is Alicante (van Morkhoven, 1963) and Gulf of Genova (pers. comm. of N. Pugliese to G. Bonaduce, 1995).

Loxoconcha pontica: Naxos (Barbeito-González, 1971); Cyprus (Athersuch, 1980); cited in the northern Dalmatian coast (Klie, 1942).

PLATE I

Fig. 1. *Cytherelloidea beckmanni* Barbeito-González, 1971. LV, B.O.C. 2269 (x 90).

Fig. 2. *Cytherelloidea* aff. *C. cincta* (Malz & Jellineck, 1989). RV, B.O.C. 2270 (x 90).

Fig. 3. *Bairdia ? corpulenta* G. W. Müller, 1894. LV, B.O.C. 2271 (x 95).

Figs. 4, 5. *Cytherelloidea ruggierii* n. sp.
4. Holotype. RV, B.O.C. 2272 (x 100).
5. Paratype. RV in dorsal view, B.O.C. 2273 (x 87).

Fig. 6. *Triebelina raripila* (G. W. Müller, 1894). LV, B.O.C. 2274 (x 115).

Fig. 7. *Bairdia corpulenta* G. W. Müller, 1894. RV, B.O.C. 2275 (x 94).

Fig. 8. *Microcytherura fulva* (Brady & Robertson, 1874). LV, B.O.C. 2276 (x 157).

Fig. 9. *Bairdia* aff. *B. longevaginata* G. W. Müller, 1894. RV, B.O.C. 2277 (x 77).

Fig. 10. *Callistocythere protracta* Ruggieri & D'Arpa, 1993. LV, B.O.C. 2278 (x 133).

Fig. 11. *Callistocythere folliculosa* Bonaduce, Ciampo & Masoli, 1976. RV, B.O.C. 2279, (x 147).

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These species seem to show a tendency to warm-temperate environment, more tolerant of temperature variations with latitude; consequently they occur also in the northern part of the Basin even if in reduced number of specimens.

Some species, considered new or not yet officially described (*Cytherelloidea ruggierii, Cistacythereis [Cistacythereis] hannibalis, Aurila meridionalis, Xestoleberis phaselus*) have been found exclusively in the sample examined. They could in future studies be confirmed as warm-temperate indicators.

ACKNOWLEDGEMENTS

I am very grateful to Prof. Gioacchino Bonaduce, my generous teacher, for the permission to use the original material and for the criticism and the helpful discussions; I thank also Mr. Canzanella, responsible of the Electron Microscopy of the University of Naples for the micrographs.

The present research is been supported by MPI 60% (resp. Dr. D. Barra).

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PLATE II

Fig. 1. *Cyprideis torosa* (Jones, 1850). LV, B.O.C. 2280 (x 153).

Fig. 2. *Callistocythere levis* (G. W. Müller, 1894). B.O.C. 2281 (x 160).

Fig. 3. *Procytherideis retifera* Ruggieri, 1978, LV, B.O.C. 2282 (x 117).

Figs. 4, 12, 13. *Cistacythereis (Hiltermannicythere)* sp. 1.
4. CC in dorsal view, B.O.C. 2283 (x 87).
12. LV, B.O.C. 2291 (x 87).
13. RV, B.O.C. 2292 (x 87).

Fig. 5. *Procytherideis complicata* (Ruggieri, 1953). RV, B.O.C. 2284 (x 100).

Fig. 6. *Pontocythere turbida* (G. W. Müller, 1894). LV, B.O.C. 2285 (x 80).

Figs. 7, 14. *Procytherideis subspiralis* (Brady, Crosskey & Robertson, 1874).
7. RV, B.O.C. 2286 (x 109).
14. CC in dorsal view. B.O.C. 2286 (x 109).

Fig. 8. *Costa batei* (Brady, 1866). LV, B.O.C. 2287 (x 100).

Fig. 9. *Carinocythereis whitei* (Baird, 1850). LV, B.O.C. 2288 (x 90).

Fig. 10. *Falsocythere terryi* (Holden, 1967). LV, B.O.C. 2289 (x 133).

Fig. 11. *Caudites calceolatus* (O. G. Costa, 1853). LV, B.O.C. 2290 (x 113).

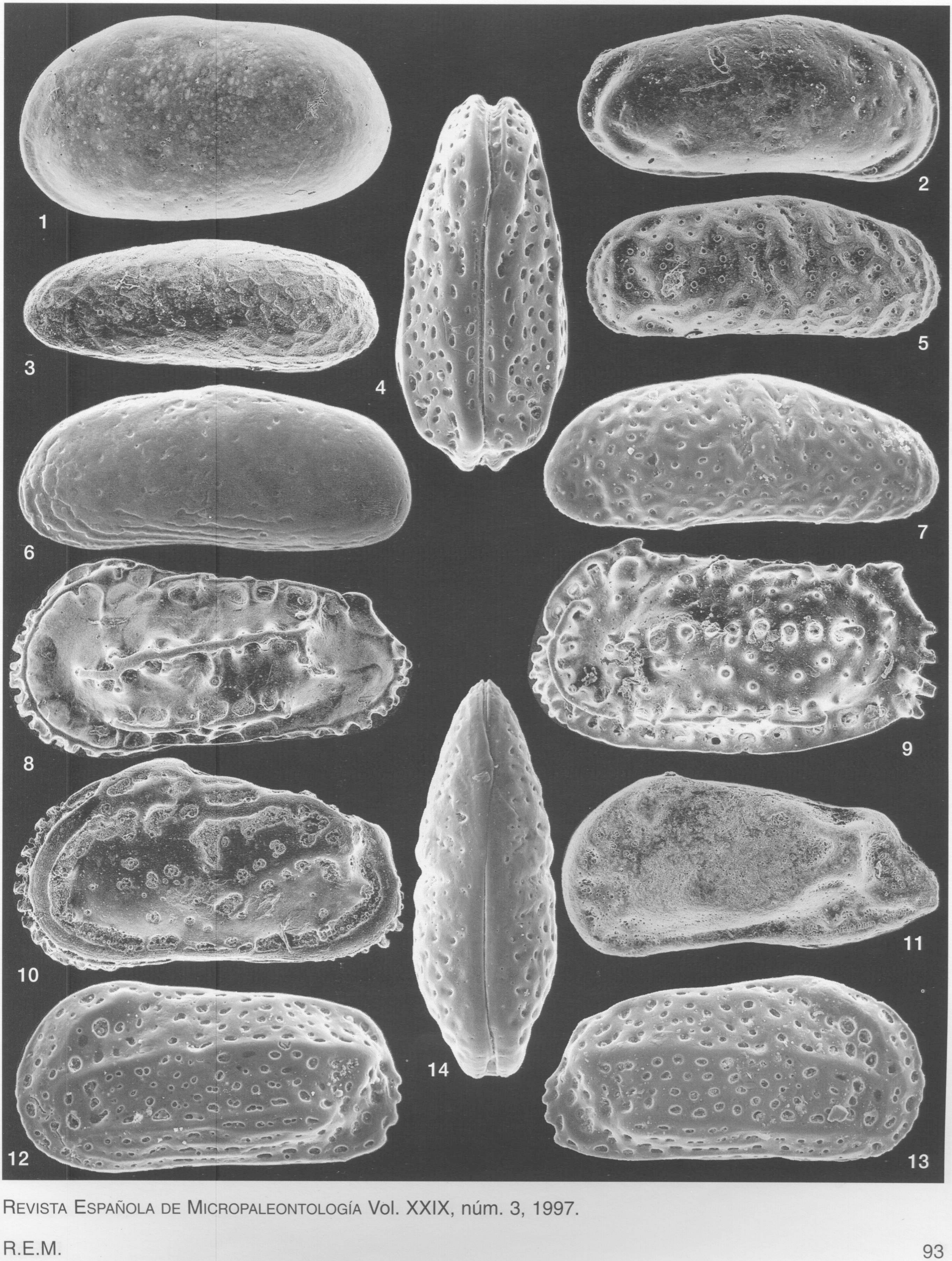
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PLATE III

Fig. 1. *Cistacythereis (Cistacythereis) carthaginiensis* Barra & Bonaduce. LV of complete carapace, B.O.C. 2249 (x 106).

Fig. 2. *Cistacythereis* (C.) hannibalis Barra & Bonaduce. LV, B.O.C. 2293 (x 91).

Fig. 3. *Aurila convexa* (Baird, 1850). LV, B.O.C. 2294 (x 100).

Fig. 4. *Aurila* aff. *A. convexa* (Baird, 1850). LV, B.O.C. 2295 (x 87).

Figs. 5, 6. *Aurila glyptica* Barbeito-González, 1971.
5. LV, B.O.C. 2296 (x 100).
6. RV, same specimen of fig. 5 (x 100).

Fig. 7. *Aurila arborescens* (Brady, 1865). LV, 2297 (x 107).

Figs. 8, 10. *Aurila fallax* Ruggieri, 1983.
8. RV female, B.O.C. 2298 (x 73).
10. RV male, B.O.C. 2298 (x 67).

Fig. 9. *Aurila prasina* Barbeito-González, 1971. LV, B.O.C. 2299 (x 106).

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PLATE IV

Figs. 1, 2, 4, 5, 10. *Aurila meridionalis nomen nudum.*
1. LV, B.O.C. 2300 (x 80).
2. RV female, B.O.C. 2301 (x 80).
4. RV female in dorsal view, B.O.C. 2304 (x 80).
5. RV male, B.O.C. 2303 (x 80).
10. RV male in dorsal view, same specimen of fig. 2 (x 80).

Fig. 3. *Tenedocythere prava* (Baird, 1850). LV, B.O.C. 2302 (x 80).

Fig. 6. *Urocythereis* sp. 1. LV female, B.O.C. 2305 (x 77).

Fig. 7. *Heterocythereis voraginosa* Athersuch, 1979. LV, B.O.C. 2306 (x 88).

Fig. 8. *Urocythereis* sp. 2. LV, B.O.C. 2307 (x 77).

Fig. 9. *Loxoconcha rubritincta* Ruggieri, 1964. RV female, B.O.C. 2308 (x 121).

Fig. 11. *Urocythereis* sp. 3. LV female, B.O.C. 2309 (x 83).

Fig. 12. *Sagmatocythere napoliana* (Puri, 1963). RV, B.O.C. 2310 (x 153).

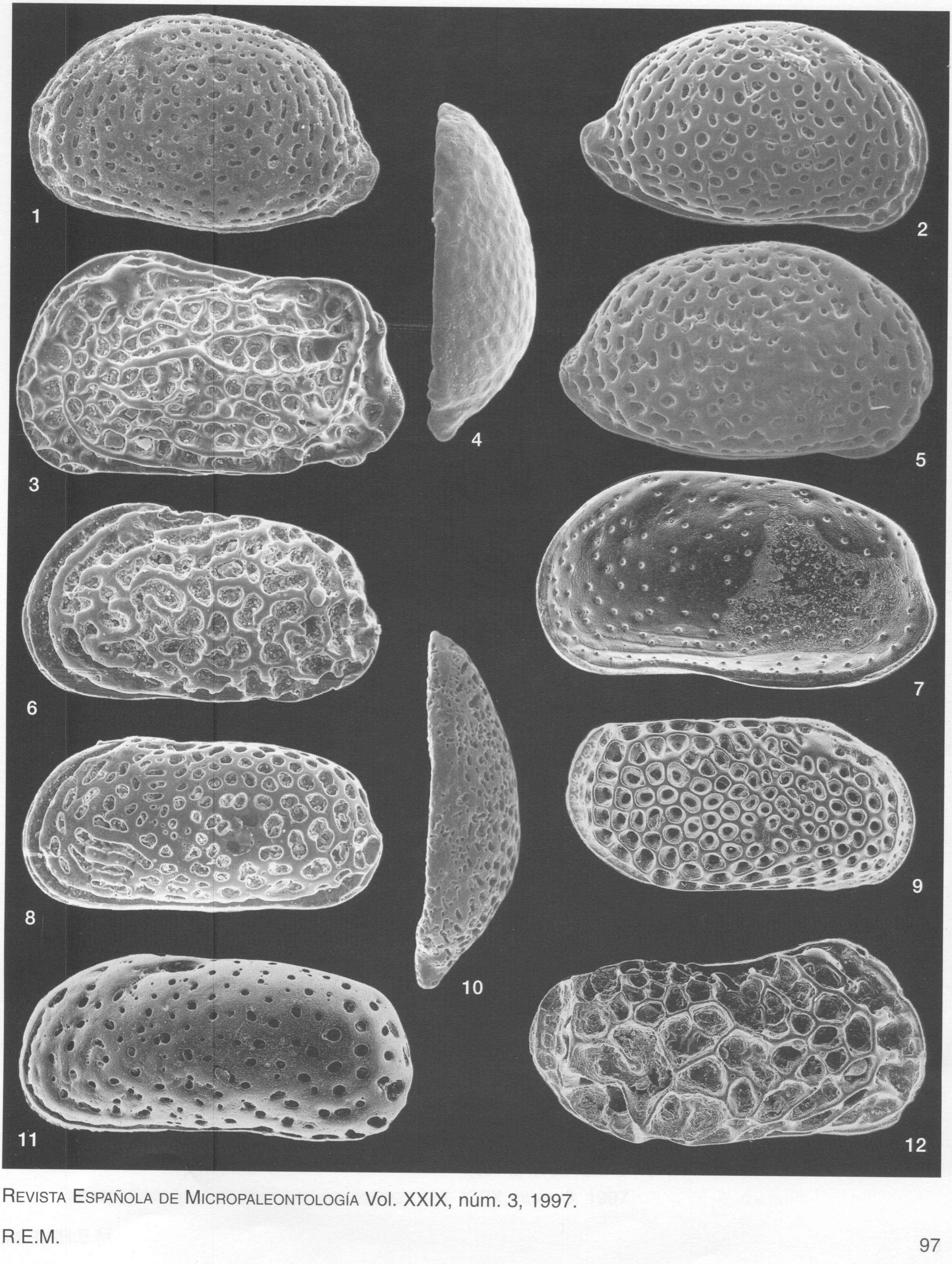
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PLATE V

Fig. 1. *Loxoconcha ovulata* (O. G. Costa, 1853). LV, B.O.C. 2311 (x 123).

Fig. 2. *Loxoconcha affinis* (Brady, 1866). LV female, B.O.C. 2312 (x 147).

Fig. 3. *Loxoconcha pontica* Klie, 1937. LV female, B.O.C. 2313 (x 160).

Fig. 4. *Cytheretta adriatica* Ruggieri, 1952. LV, B.O.C. 2314 (x 65).

Fig. 5. *Loxoconcha rubritincta* Ruggieri, 1964. CC in dorsal view, B.O.C. 2308 (x 123).

Fig. 6. *Aurila fallax* Ruggieri, 1983. CC in dorsal view, B.O.C. 2298 (x 67).

Fig. 7. *Paracytheridea* sp. 1. LV, B.O.C. 2315 (x 147).

Fig. 8. *Paracytheridea ? hexalpha* Doruk, 1980. RV, B.O.C. 2316 (x 110).

Figs. 9-11. *Semicytherura* aff. *S. inversa* (Seguenza, 1880).
9. LV, B.O.C. 2317 (x 160).
10. LV in dorsal view, B.O.C. 2317 (x 147).
11. RV, B.O.C. 2317 (x 160).

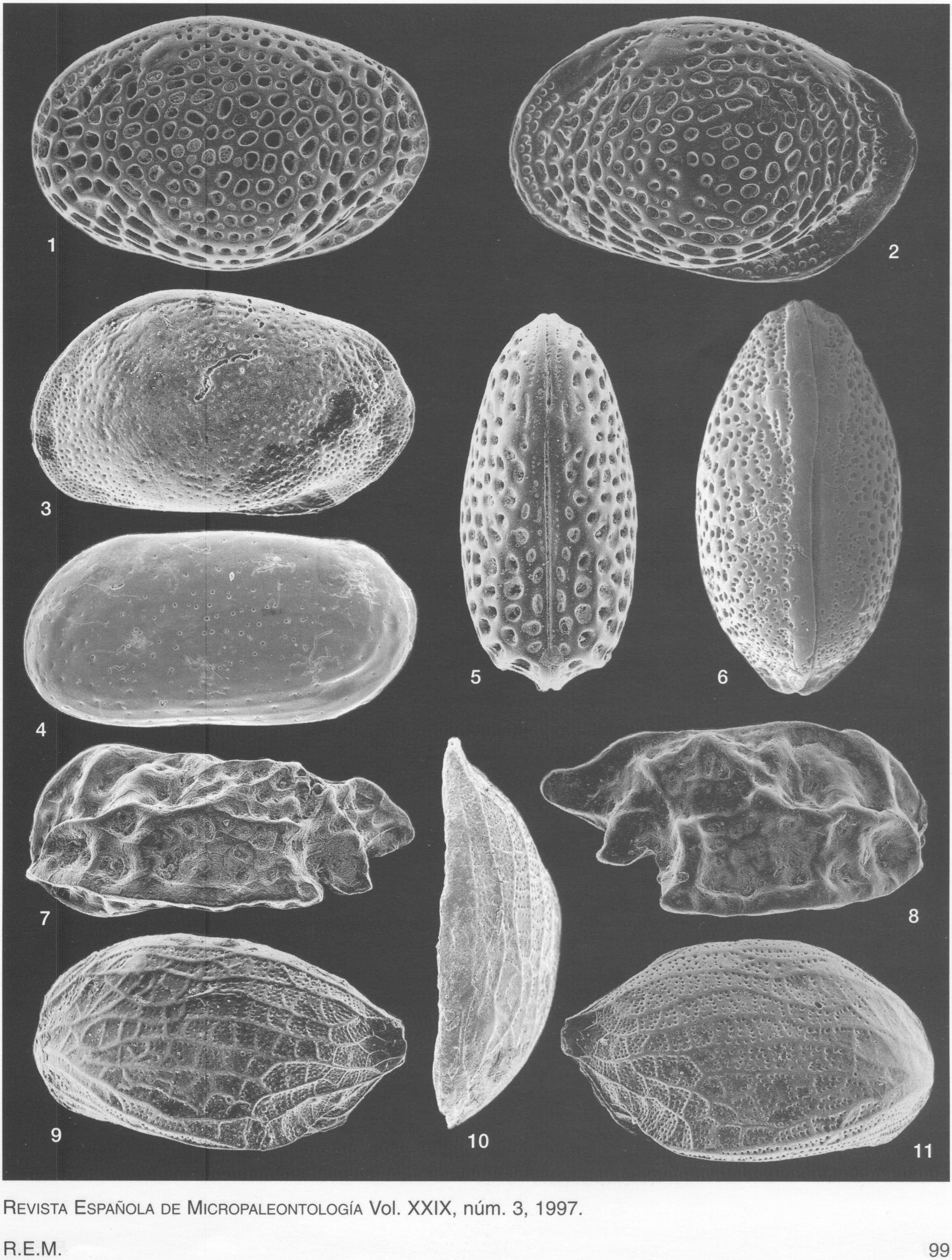
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PLATE VI

All magnification x 134

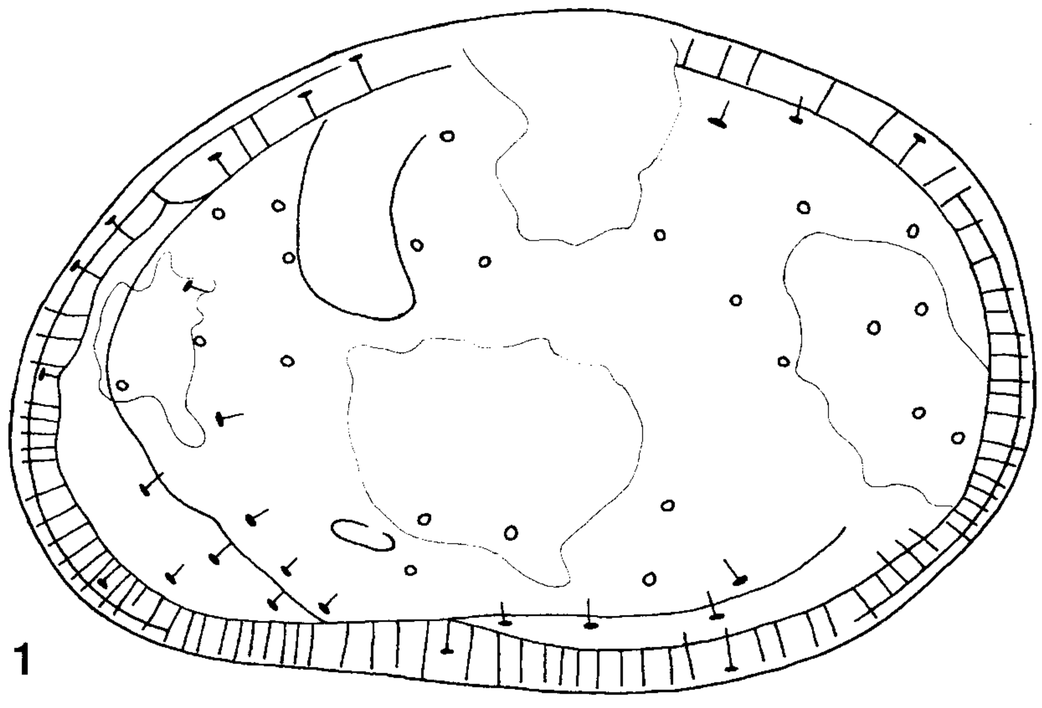
Fig. 1. *Xestoleberis communis* G. W. Müller, 1894. LV, B.O.C. 2318.

Fig. 2. *Xestoleberis rara* G. W. Müller, 1894. LV, B.O.C. 2319.

Figs. 3, 4. *Xestoleberis phaselus* n. sp.
3. Holotype, LV, B.O.C. 2320.
4. Holotype, RV, same specimen of fig. 3.

Figs. 5, 6. *Xestoleberis cypria* Athersuch, 1978.
5. LV, B.O.C. 2321.
6. RV, B.O.C. 2322.

Figs. 7, 8. *Xestoleberis decipiens* G. W. Müller, 1894.
7. LV female, B.O.C. 2323.
8. RV male, B.O.C. 2324.



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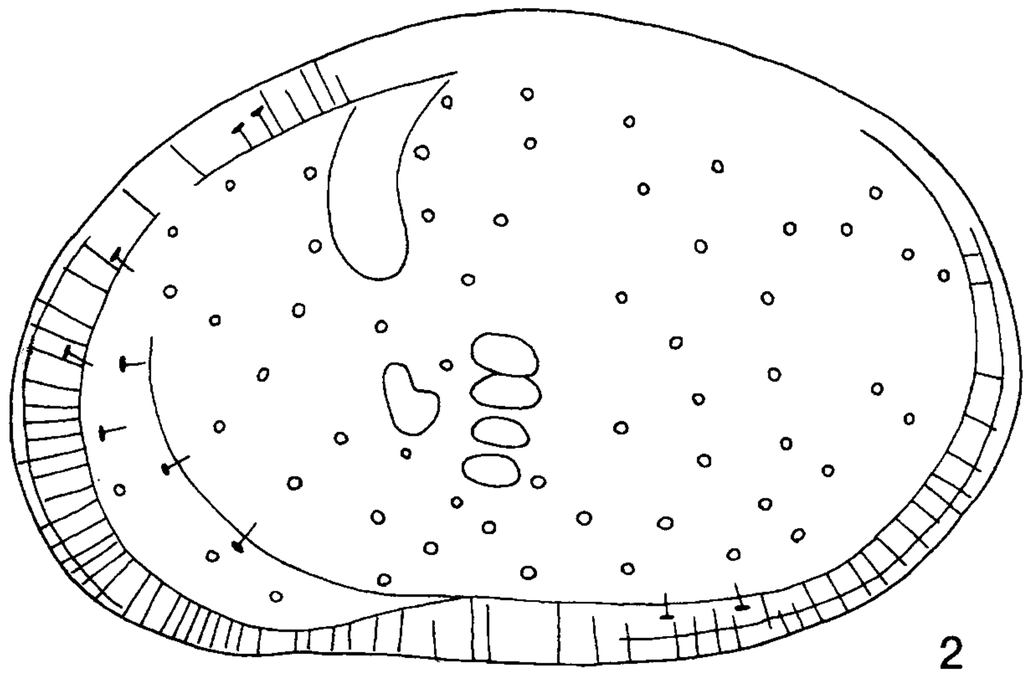

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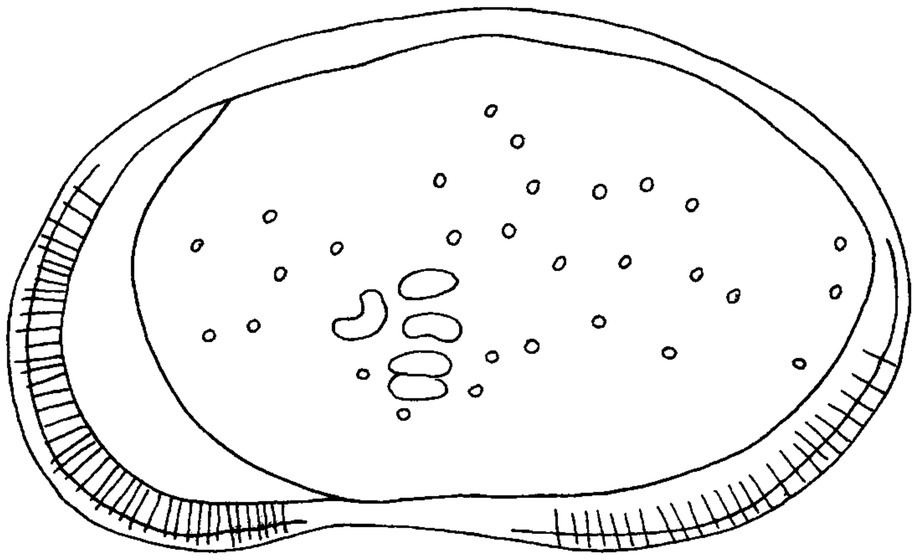

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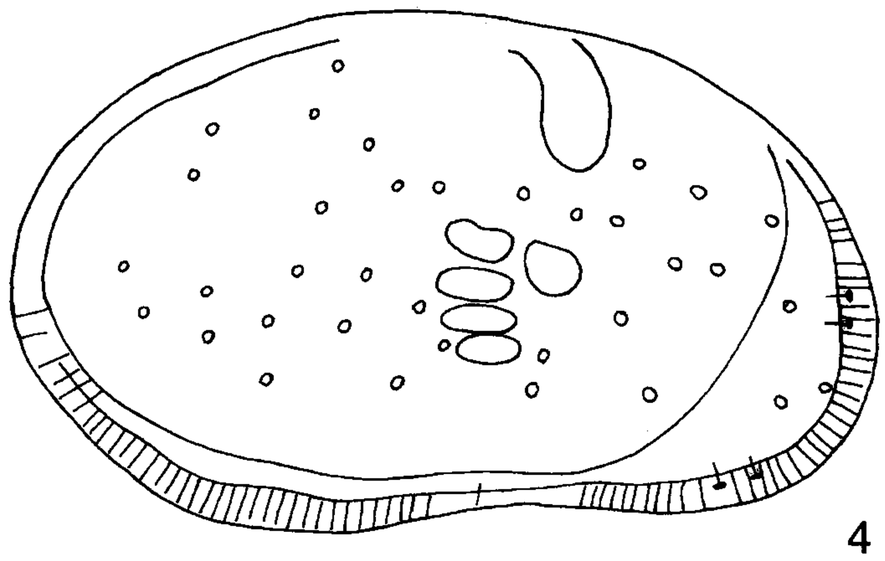

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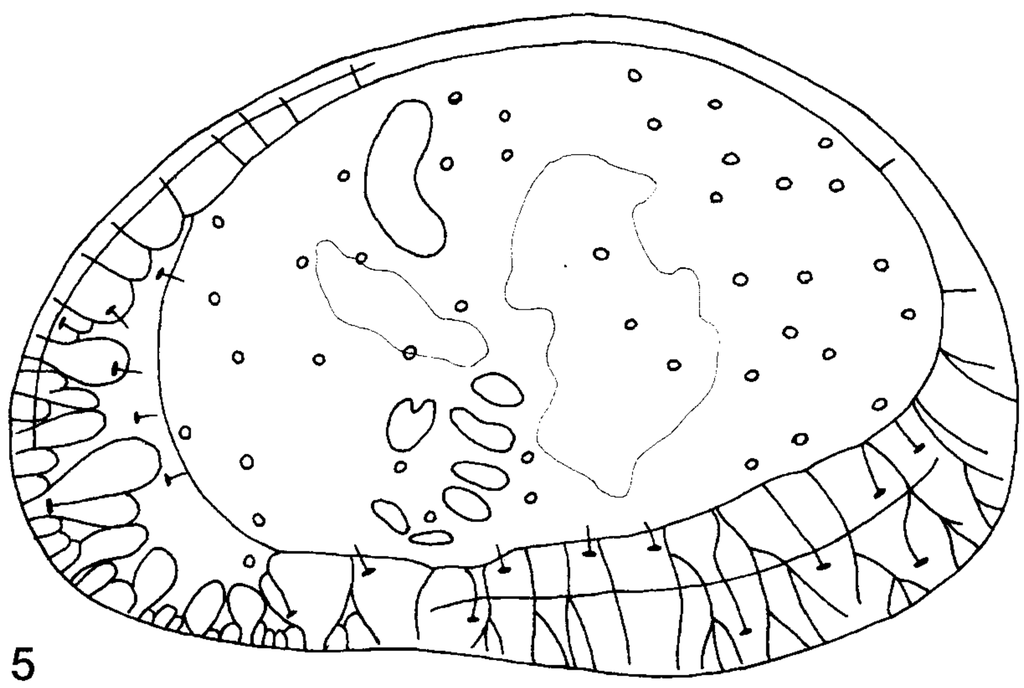

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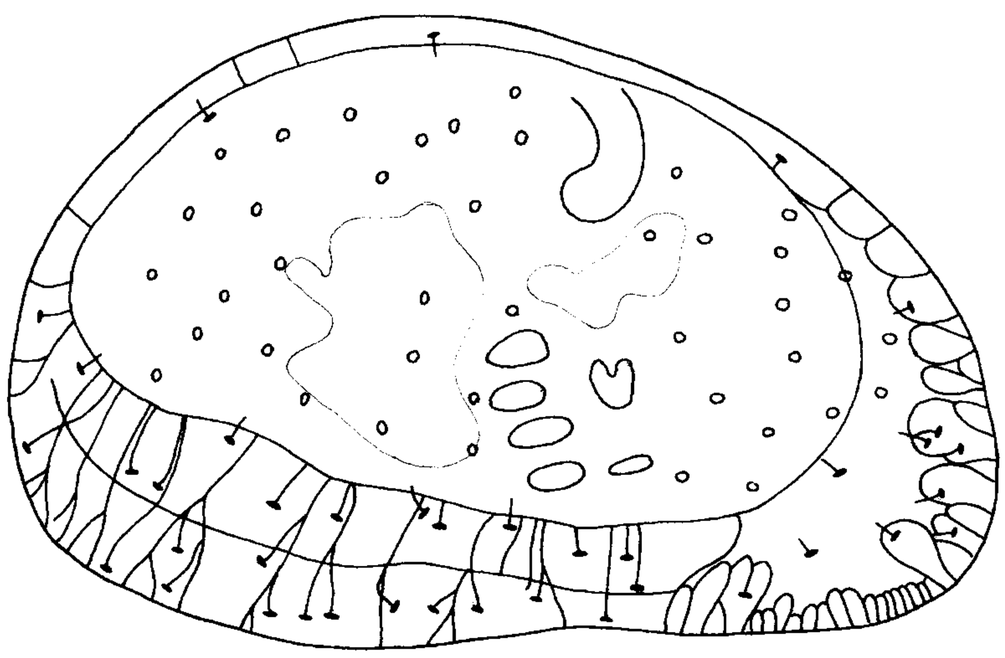

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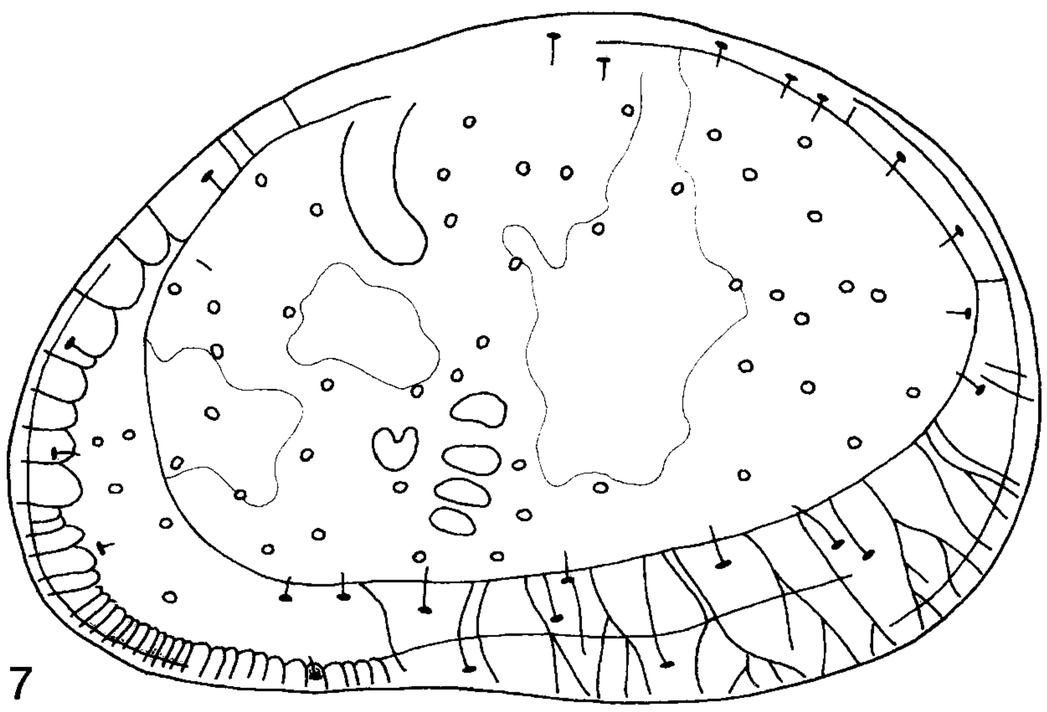

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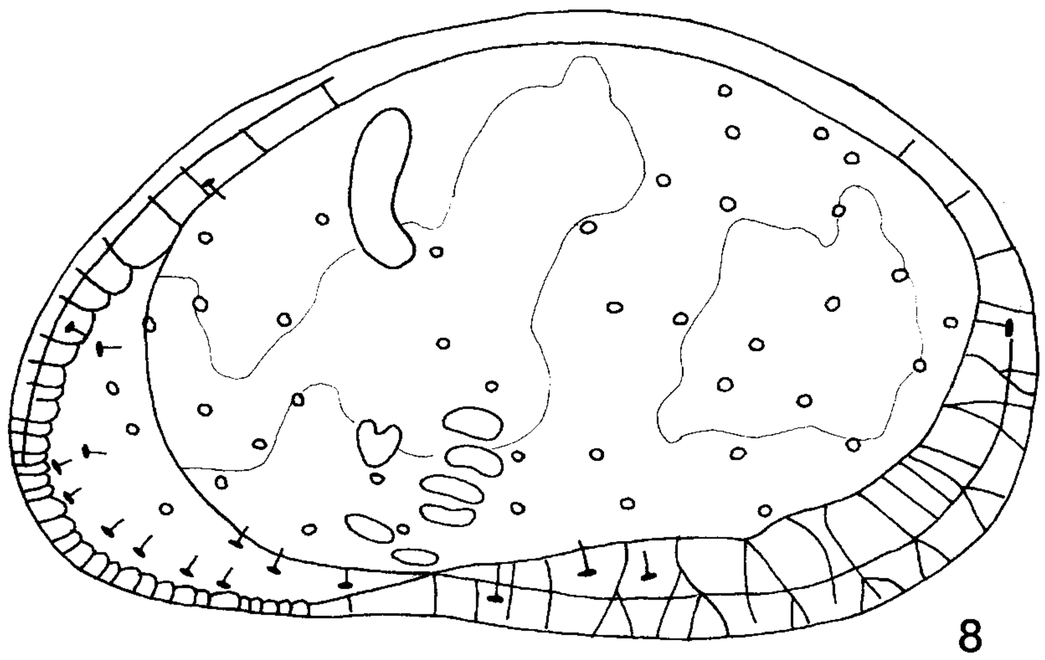

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PLATE VII

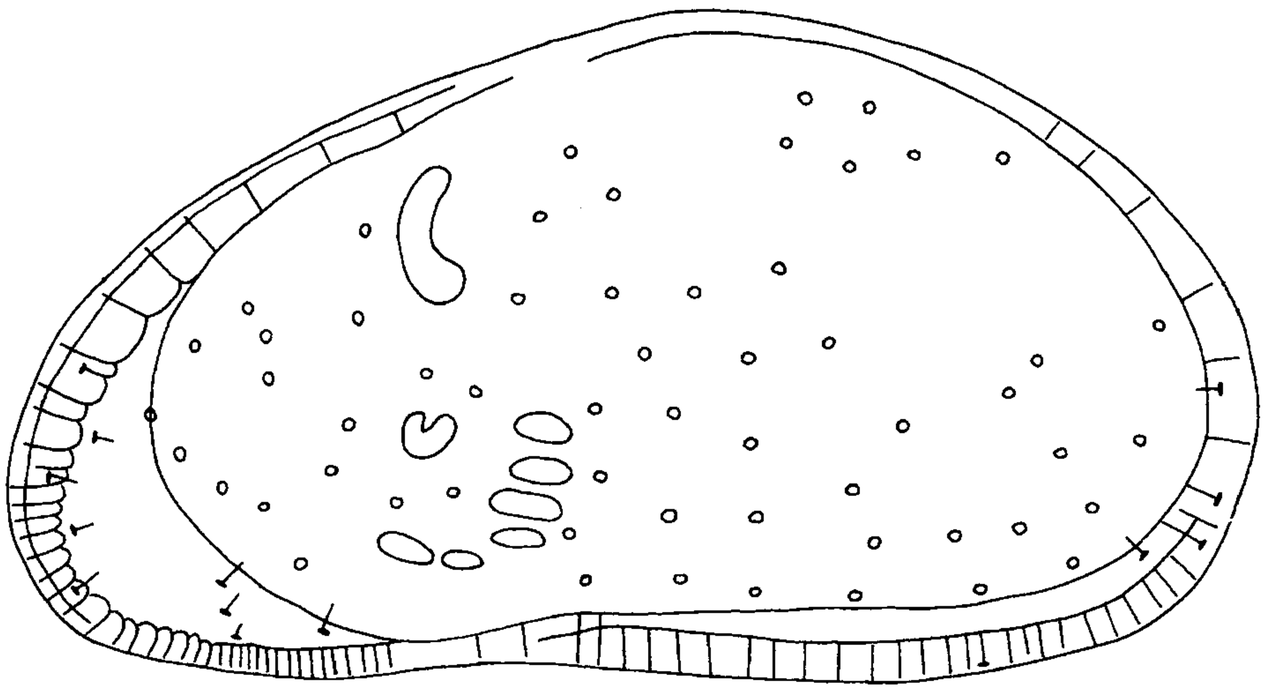
All magnification x 134

Figs. 1, 2. *Xestoleberis fuscomaculata* G. W. Müller, 1894.
1. LV, B.O.C. 2325.
2. RV, same specimen of fig. 1.

Figs. 3, 4. *Xestoleberis* aff. *X. plana* G. W. Müller, 1894.
3. LV, B.O.C. 2326.
4. RV, same specimen of fig. 3.

Figs. 5, 6. *Xestoleberis* aff. *X. sexmaculata* Athersuch, 1977.
5. LV, B.O.C. 2327.
6. RV, same specimen of fig. 5.

Figs. 7, 8. *Xestoleberis dispar* G. W. Müller, 1894.
7. LV male, B.O.C. 2328.
8. RV, same specimen of fig. 7.



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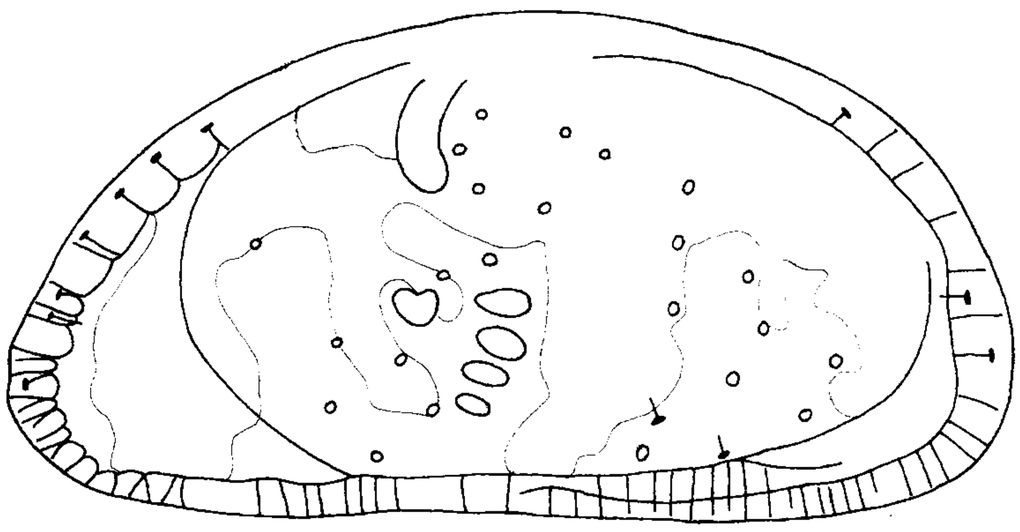

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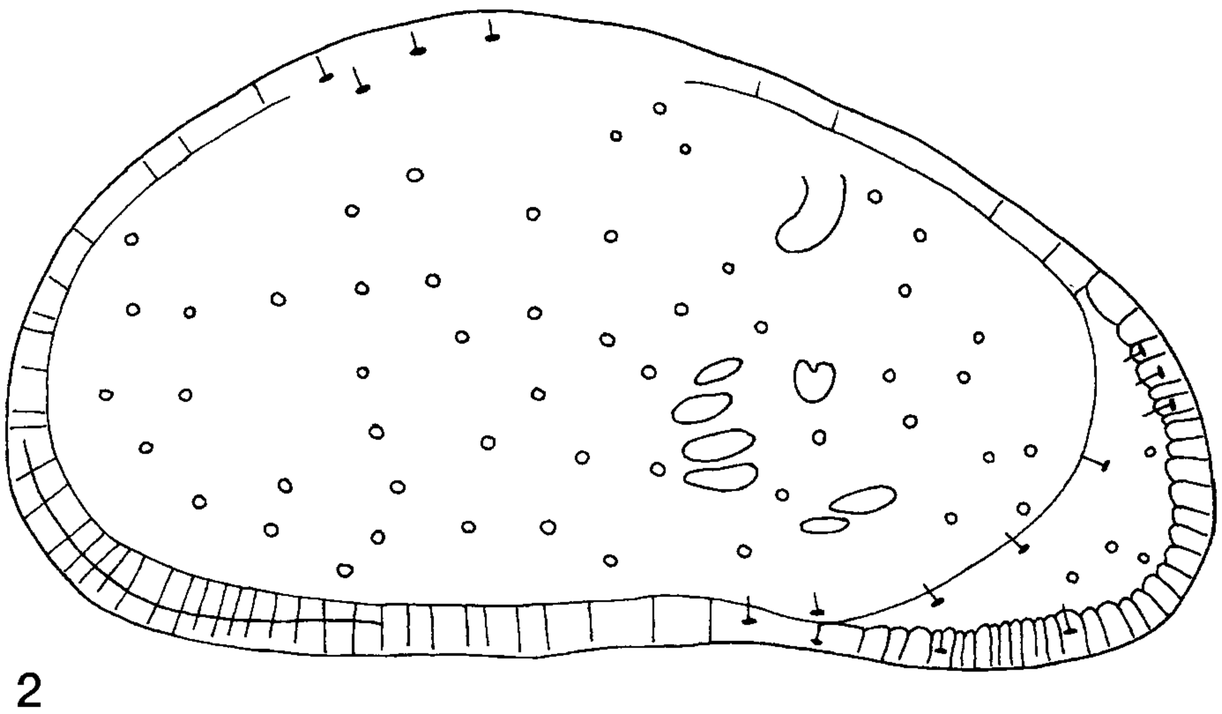

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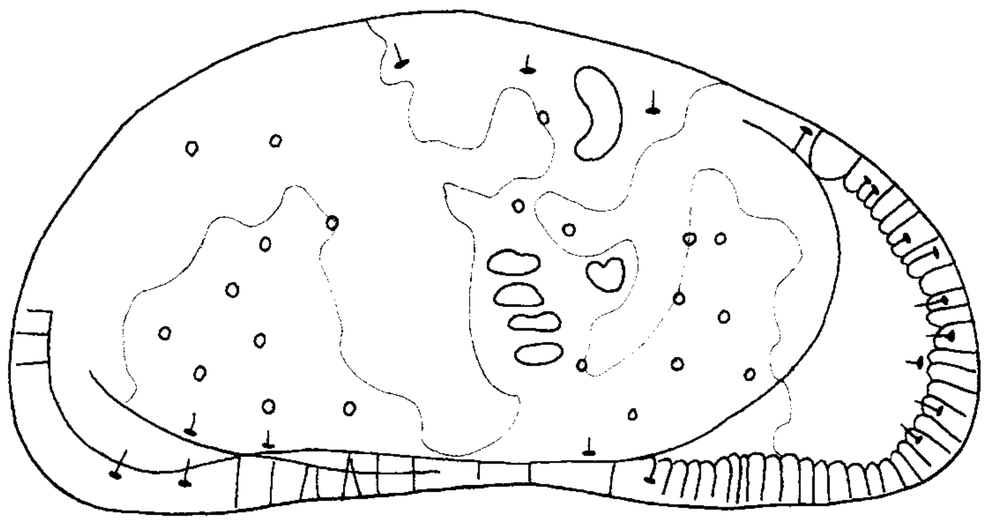

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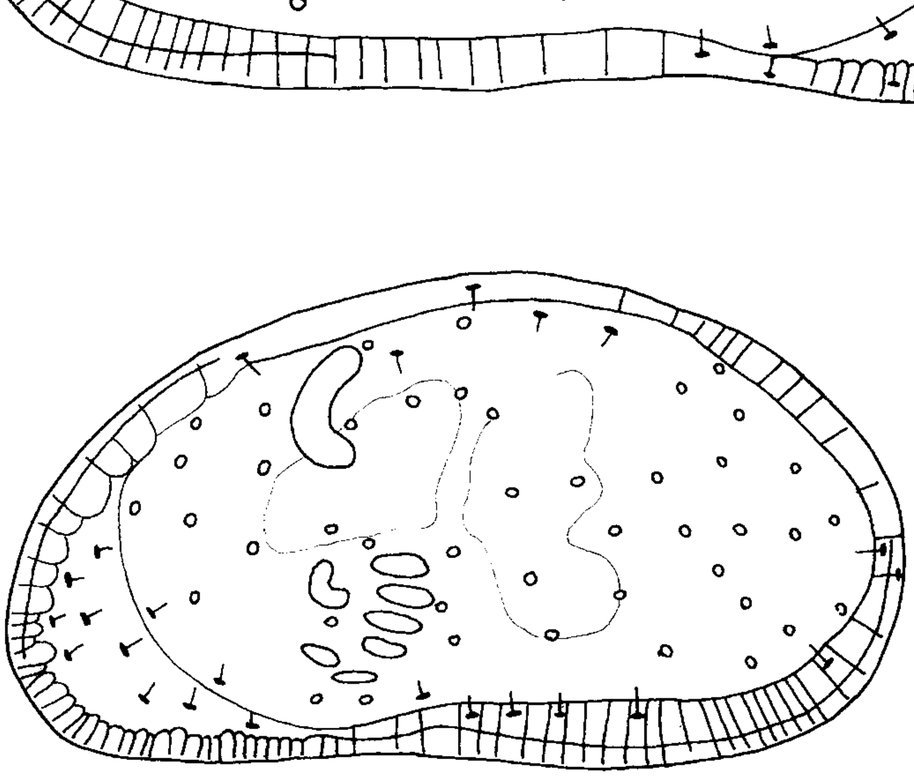

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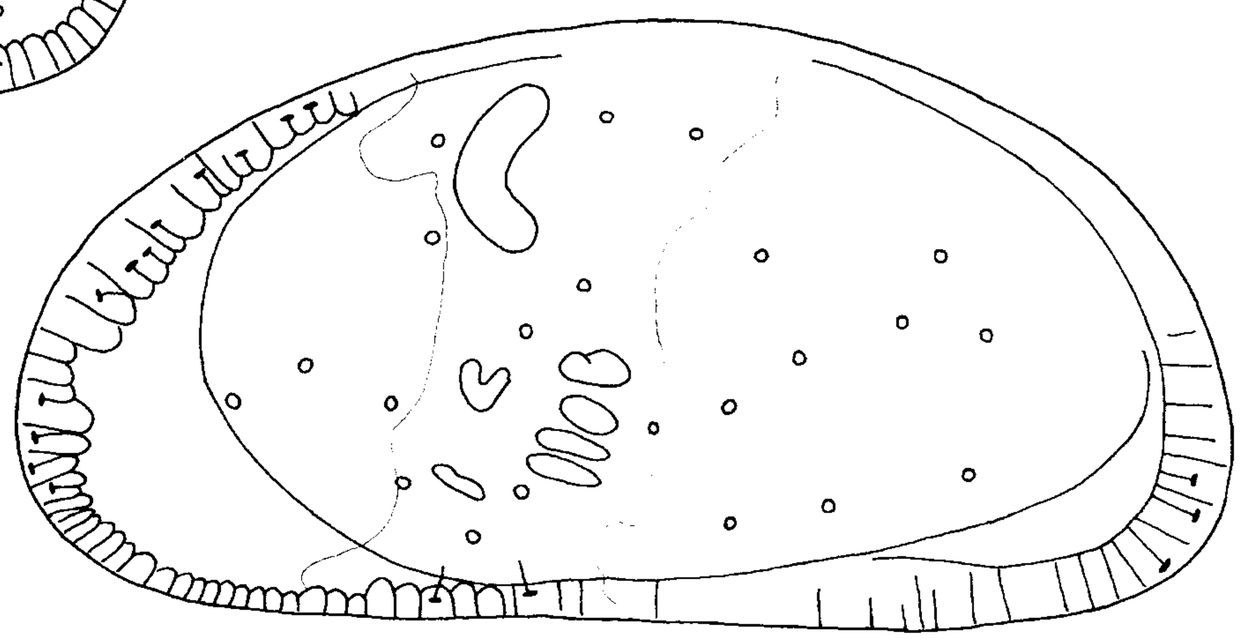

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PLATE VIII

Fig. 1. *Macrocypris succinea* G. W. Müller, 1894. LV, B.O.C. 2329 (x 114).

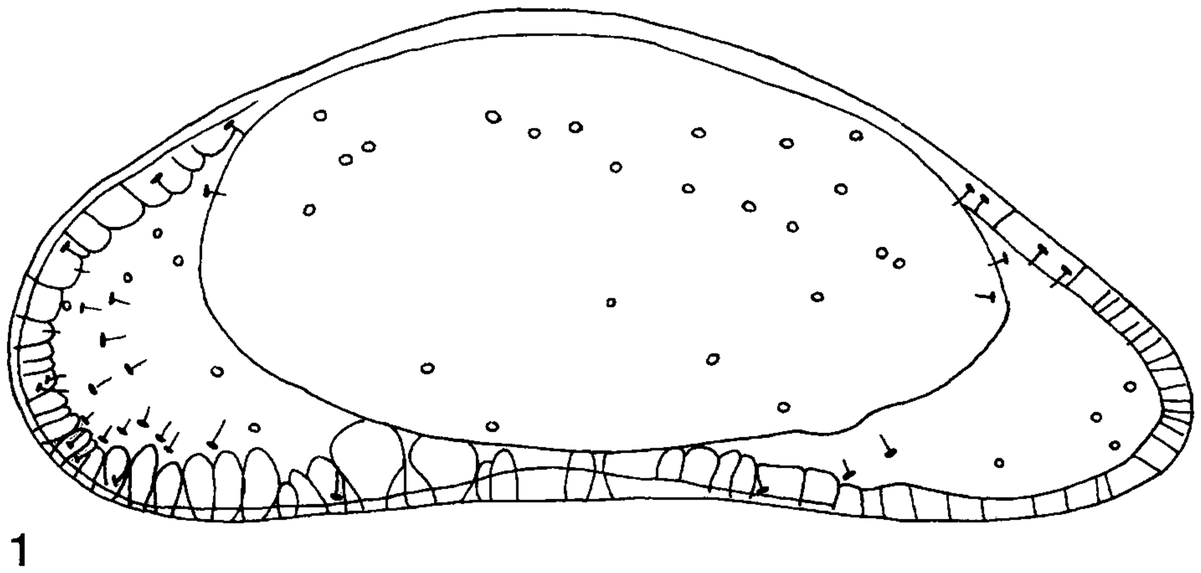
Fig. 2. *Loxoconcha stellifera* G. W. Müller, 1894. LV female, B.O.C. 2330 (x 100).

Figs. 3, 4. *Semicytherura* aff. *S. inversa* (Seguenza, 1880).
3. LV, same specimen of Pl. 5, fig. 9 (x 134).
4. RV, same specien of Pl. 5, fig. 11 (x 134).

Fig. 5. *Cytheretta subradiosa* (Roemer, 1838). LV female, B.O.C. 2331 (x 100).

Fig. 6. *Callistocythere levis* (G. W. Müller, 1894). RV, B.O.C. 2281 (x 134).

Figs. 7, 8. *Loxoconcha pontica* Klie, 1937.
7. LV female, same specimen of Pl. 5, fig. 3 (x 134).
8. RV, same specimen of fig. 7 (x 134).



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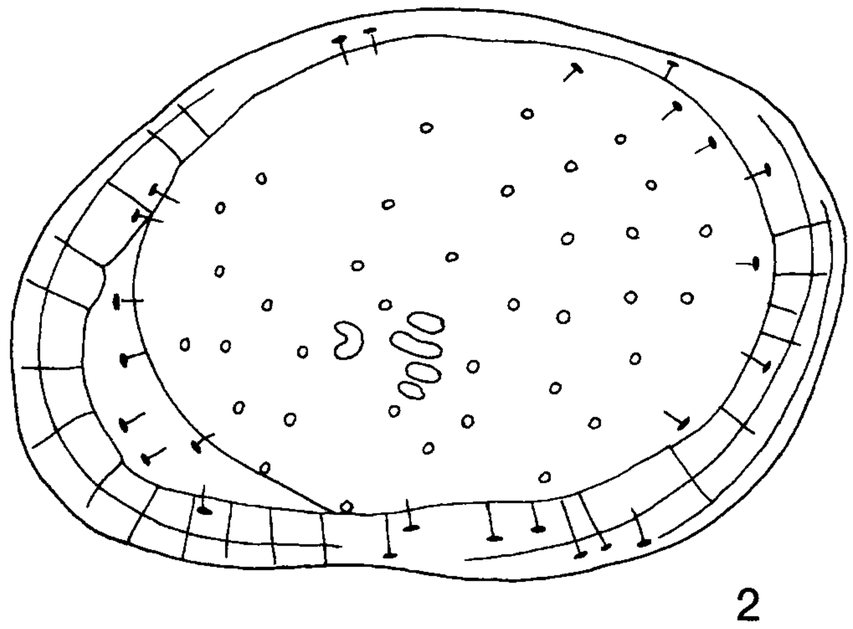

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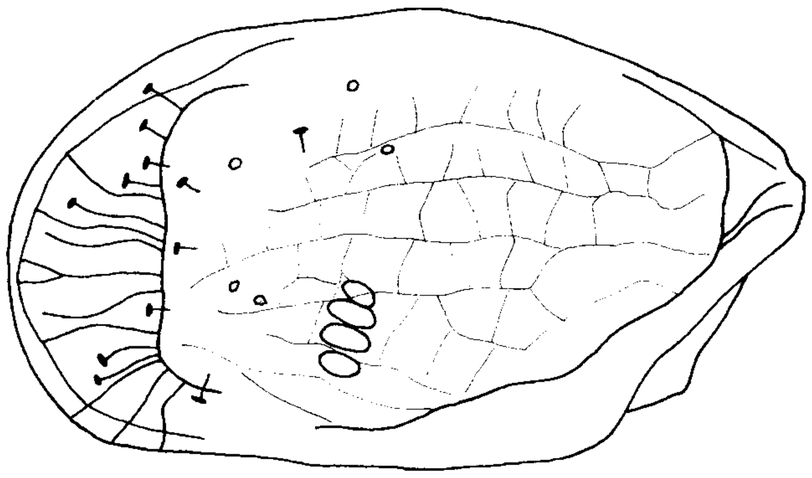

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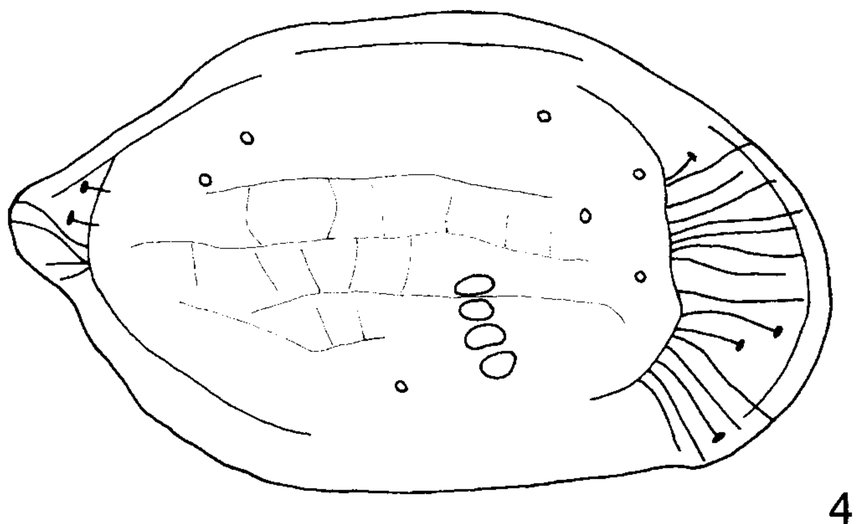

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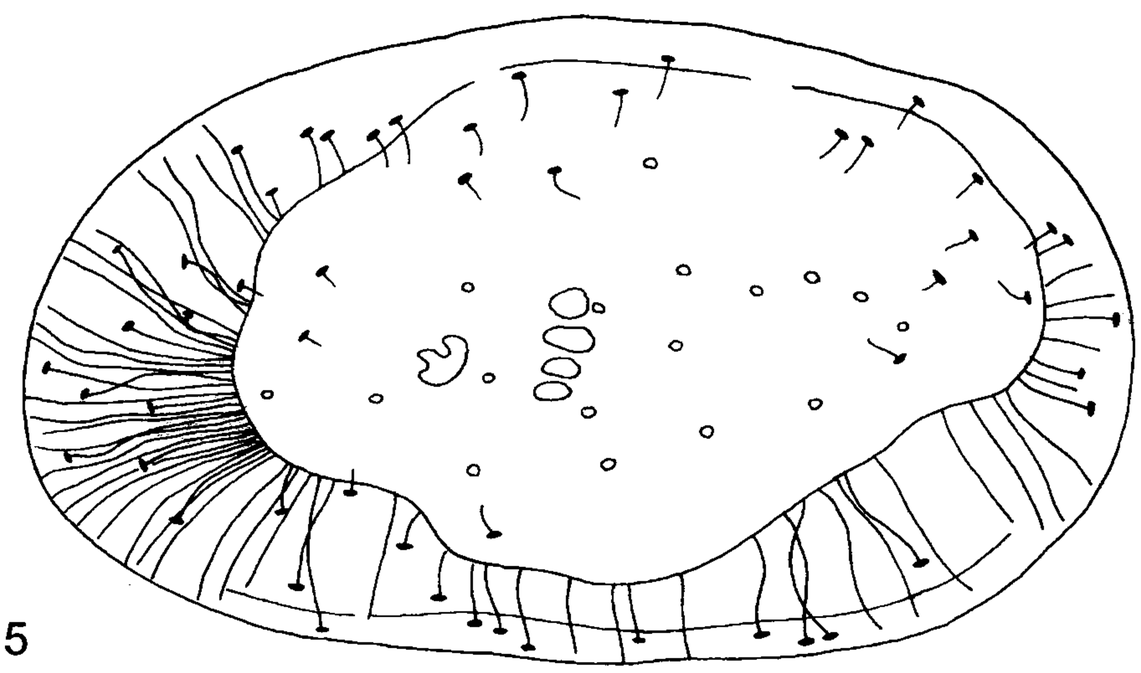

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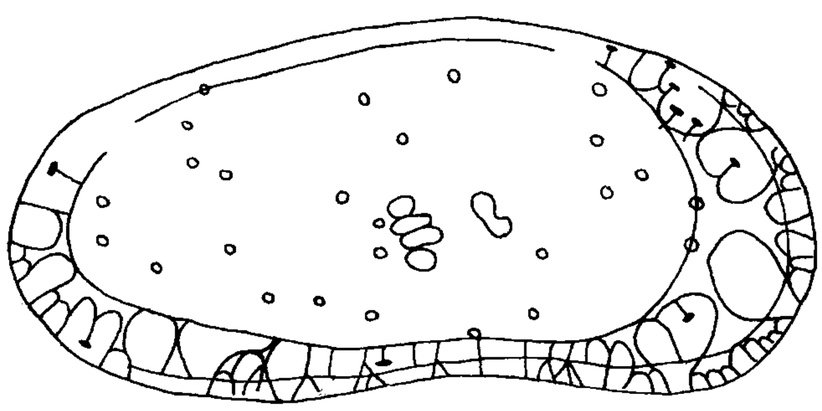

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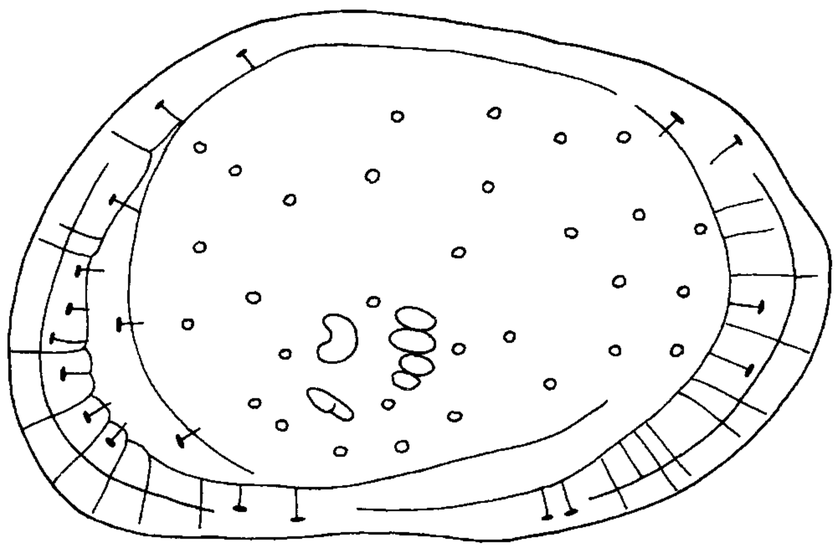

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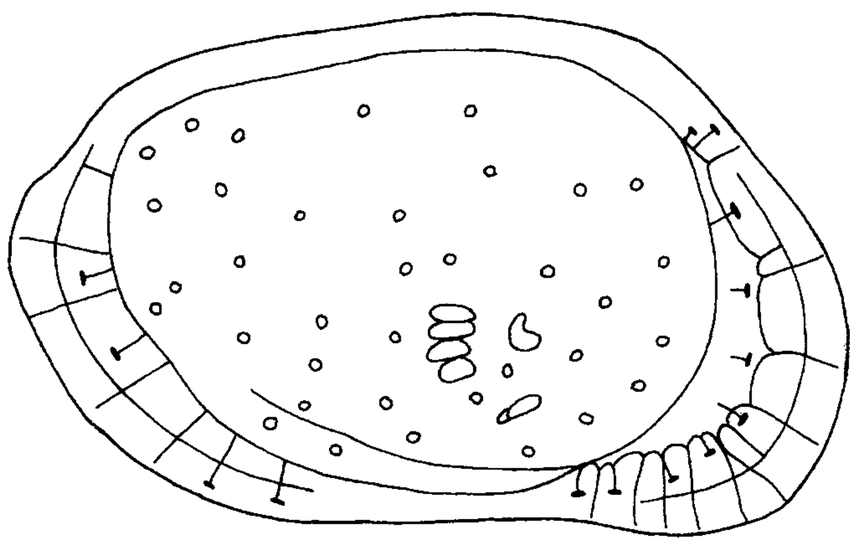

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Manuscrito recibido el 12-IV-1996
Manuscrito aceptado el 3-V-1996