



Additional taxonomic data on late Messinian ostracods from Eastern Tunisia

Francesco Sciuto^a, Rim Temani^{b,*}, Hayet Khayati Ammar^b

^a University of Catania, Department of Biological, Geological and Environmental Science, Corso Italia 55, 95129 Catania, Italy

^b Office National des Mines, 24, Rue de l'Energie, 2035 La Charguia, Tunis Tunisia

ARTICLE INFO

Keywords:

Ostracoda
New species
Systematic
Late Messinian
Tunisia
Mots clés
Ostracodes
Nouvelles espèces
Systématique
Messinien supérieur
Tunisie

ABSTRACT

The ostracod fauna of two late Messinian stratigraphic sections in eastern Tunisia have been analysed. The first section (Salakta-SAL section), is located south of Cape Bon, the second (Wadi el Kebir-OK section) in the Sahel region. In both sections the shallow marine ostracod fauna is dominant but have also been found taxa referable to the Lago Mare facies. From the shallow water marine levels, several ostracods taxa were recognized; some of which, due to their morphological particularities, have been described as new species. In a first contribution (Sciuto *et al.*, 2021) have been described twenty-four taxa. Now, a second series of sixty shallow water marine ostracod taxa coming from the sedimentary levels of the Oued El Bir Formation, considered unknown or little known until now are systematically listed below, described and illustrated. They belong to the genera *Cytherella*, *Bairdia*, *Cushmanidea*, *Cytheridea*, *Cyamocytheridea*, *Miocyprideis*, *Aurila*, *Cimbourila*, *Peteraurila*, *Urocythere*, *Callistocythere*, *Leptocythere*, *Mediocytherideis*, *Loxococoncha*, *Loxococonchissa*, *Sagmatocythere*, *Neomonocerotina*, *Carinocythereis*, *Chrysocythere*, *Cistocythereis*, *Keijella*, *Mutilus*, *Neocytheretta*, *Okadaleberis*, *Verrucocythereis*, *Cytheretta*, *Xestoleberis*.

Contents

1. Introduction	1
2. Material, methods and depository	2
3. Systematic paleontology	3
4. Conclusion	15
Résumé	15
Declaration of Competing Interest	15
Acknowledgement	15
References	15
Further readings	16

1. Introduction

The late Messinian deposits in Tunisia and its microfauna are little known. The only detailed studies are those of Bonaduce *et al.*, 1992, which illustrates and describes the Upper Messinian ostracods recovered from the well Ashtart 1 in the Gulf of Gabes, of Temani *et al.*, (2018, 2020) which illustrates the ostracods referable to the Lago-Mare phase of the late Messinian and of Sciuto *et al.*, 2021 in which the marine ostracod assemblages, showing characteristics referable to shallow marine environments, are analyzed.

After this last paper, this is the second contribution on the late Messinian ostracod fauna coming from shelf environments sedimentary levels of the Oued El Bir Formation. These levels outcrop in two stratigraphic sections in eastern Tunisia (Fig. 1): Salakta- SAL section, south of Cape Bon (35°24'18"N 11°00'12" E) and Wadi el Kebir – OK section in the Sahel region (36°30'07" N 10°44'46"E) (Fig. 2) (Temani *et al.*, 2020; Sciuto *et al.*, 2021) and are correlated with the late Messinian sediments of the Oued bel Khedim Fm. studied in the Ashtart 1 well by Bonaduce *et al.* (1992). The two sections investigated show substantial differences, despite the fact that they belong to the same Oued El Bir For-

* Corresponding author.

E-mail addresses: fsciuto@unict.it (F. Sciuto), rim.temani@yahoo.fr (R. Temani).

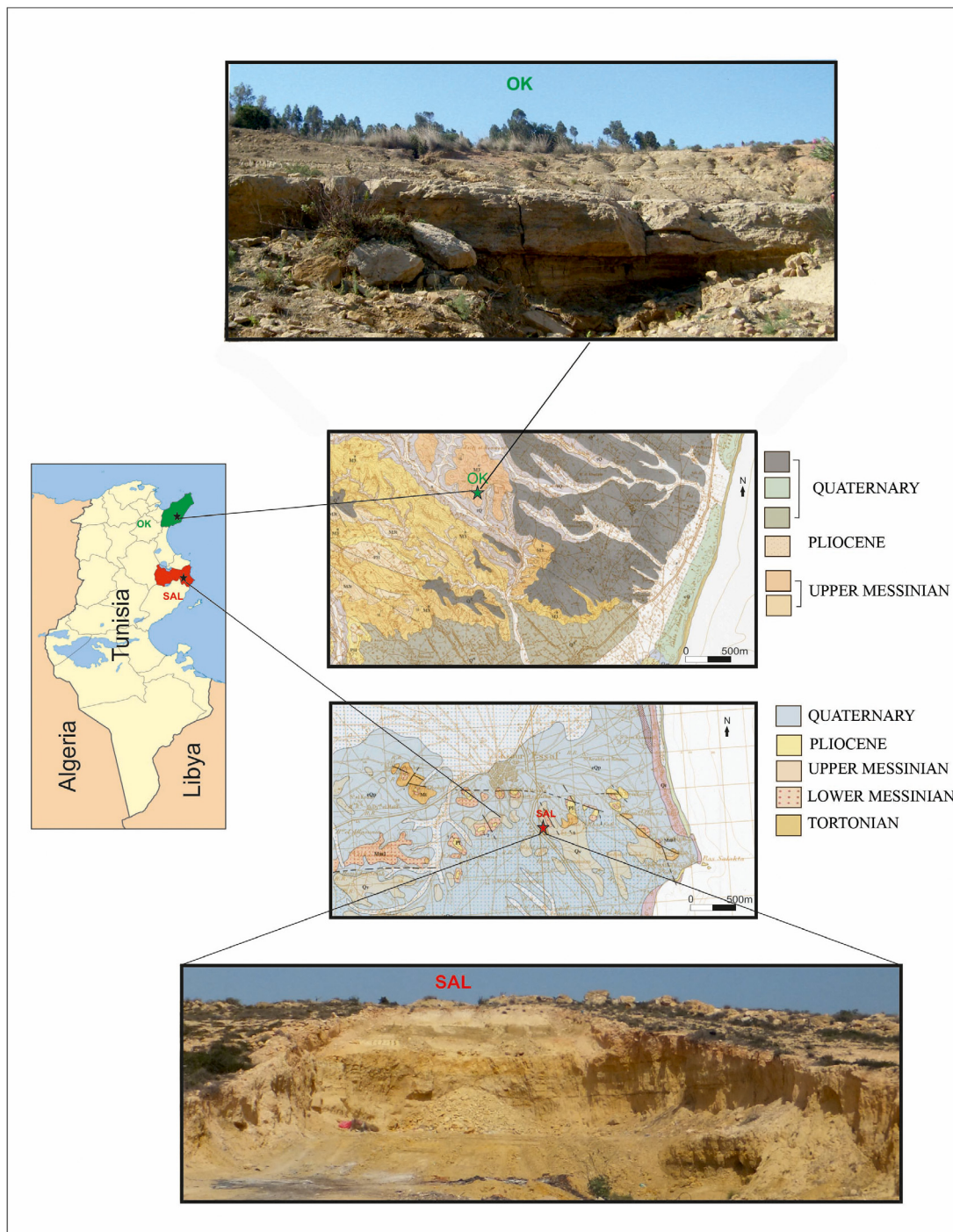


Fig. 1. The Salkta Section (SAL) and the Wadi el Kebir Section (OK): geographical location and geological context.

mation, referred to the late Messinian (Burolet, 1951; Colleuil, 1976; Ben Salem, 1998; Frigui et al., 2016). In both sections we find shelf-environment ostracod fauna and subordinately fauna referable to Lago-Mare facies; Nevertheless, while in the OK section the Lago-Mare faunas is dispersed along the entire thickness of the sedimentary succession, in the SAL section the same fauna is concentrated in a central stratigraphic interval of the section (Fig. 2). This paper, like the previous one, is dedicated solely to marine ostracod fauna.

The acquisition of all the new data will allow us to improve and increase the knowledge of the late Messinian continental shelf ostracod fauna in this area of Tunisia.

2. Material, methods and depository

As already specified in Sciuto et al. (2021), thirty-one samples were recovered from the SAL section and fifty-one samples from the OK section. From each sample, 250 g of sediment were washed using diluted hydrogen peroxide for disaggregation. The residues were sieved through standard sieves (63/125/250/500 μm). All ostracods, in the $>250 \mu\text{m}$ fraction of each sample, were picked and subjected to careful taxonomic examination. Specimens were examined and measured under the LMU Tescan Vega II Scanning Electron Microscope (SEM) at the Electron Microscopy Laboratory of the Department of Biological, Geological and En-

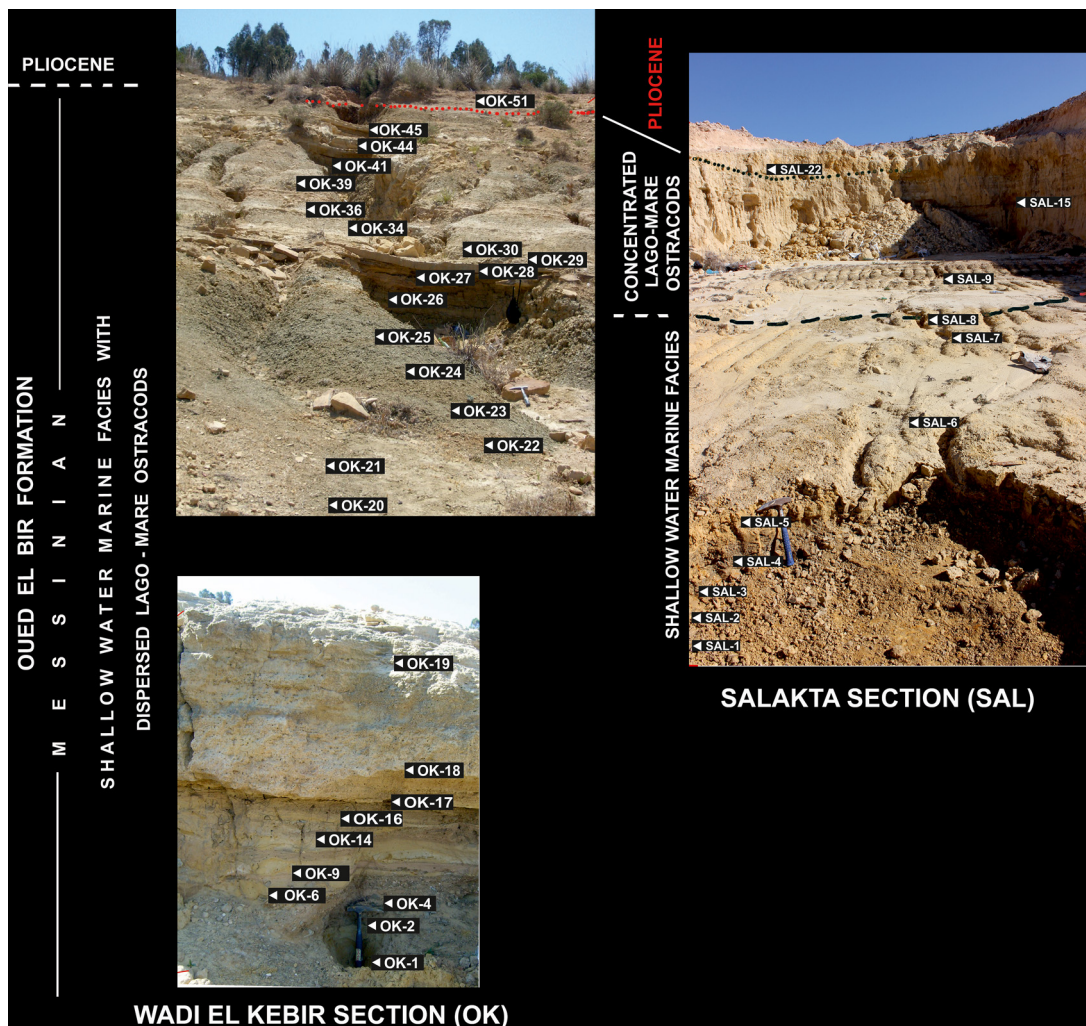


Fig. 2. Field views of the OK Section and SAL Section (see also Sciuto et al., 2021 for the details of the stratigraphic logs).

environmental Science of the Catania University. Systematics of Ostracoda was based on Horne et al. (2001), Martin and Davis (2001) and the website WoRMS Editorial Board. (2021). To identify the taxa we consulted some of the key papers on the Recent to Tertiary Mediterranean area ostracods, among which Müller (1894); Puri et al. (1969), Bonaduce et al. (1988), Bonaduce et al. (1992) and Ruggieri (1950; 1953; 1962; *inter alia*); Wood (2005), Papadopoulou et al. (2020). The specimens are deposited in the Paleontological and Sedimentological Laboratory of the Geological Survey of the Office National des Mines de Tunisie 24, Rue de l’Energie, 2035 La Charguia, Tunis (Tunisia).

3. Systematic paleontology

Class OSTRACODA Latreille, 1806
 Subclass PODOCOPA Sars, 1866
 Order PLATYCOPIIDA Sars, 1866
 Superfamily CYTHERELLOIDEA Sars, 1866
 Family CYTHERELLIDAE Sars, 1866
 Genus *Cytherella* Jones, 1849
 Type species: *Cythere ovata* (Roemer, 1841)
Cytherella sp. 1
 (Fig. 3.1)

Material: Three complete carapaces and several valves
 Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24’18”N 11°00’12” E), Tunisia.
 Type horizon: late Messinian.

Remarks: the species is similar to *C. harrymutvei* Stambolidis, 1980, but it is distinguishable from it by the posterior area less ornamented and for the greater symmetry between the right and left valves.

Cytherella sp. 2
 (Fig. 3. 2)

Material: two complete carapaces.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24’18”N 11°00’12” E), Tunisia.

Type horizon: late Messinian.

Remarks: very similar to *Cytherella* sp.1 ex gr. *vulgata* Ruggieri, 1962, figured in Bonaduce et al., 1992.

Order PODOCOPIDA Sars, 1866
 Superfamily BAIRDIOIDEA Sars, 1865
 Family BAIRDIIDAE Sars, 1865
 Genus *Bairdia* M’Coy, 1844
 Type species: *Bairdia curta* M’Coy, 1844
Bairdia sp.
 (Fig. 3. 3)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24’18”N 11°00’12” E), Tunisia.

Type horizon: late Messinian.

Remarks: the specimen here figured can be assimilated to *Bairdia* sp. 1 figured by Bonaduce et al., 1992. The lack of specimens prevents a correct taxonomic evaluation.

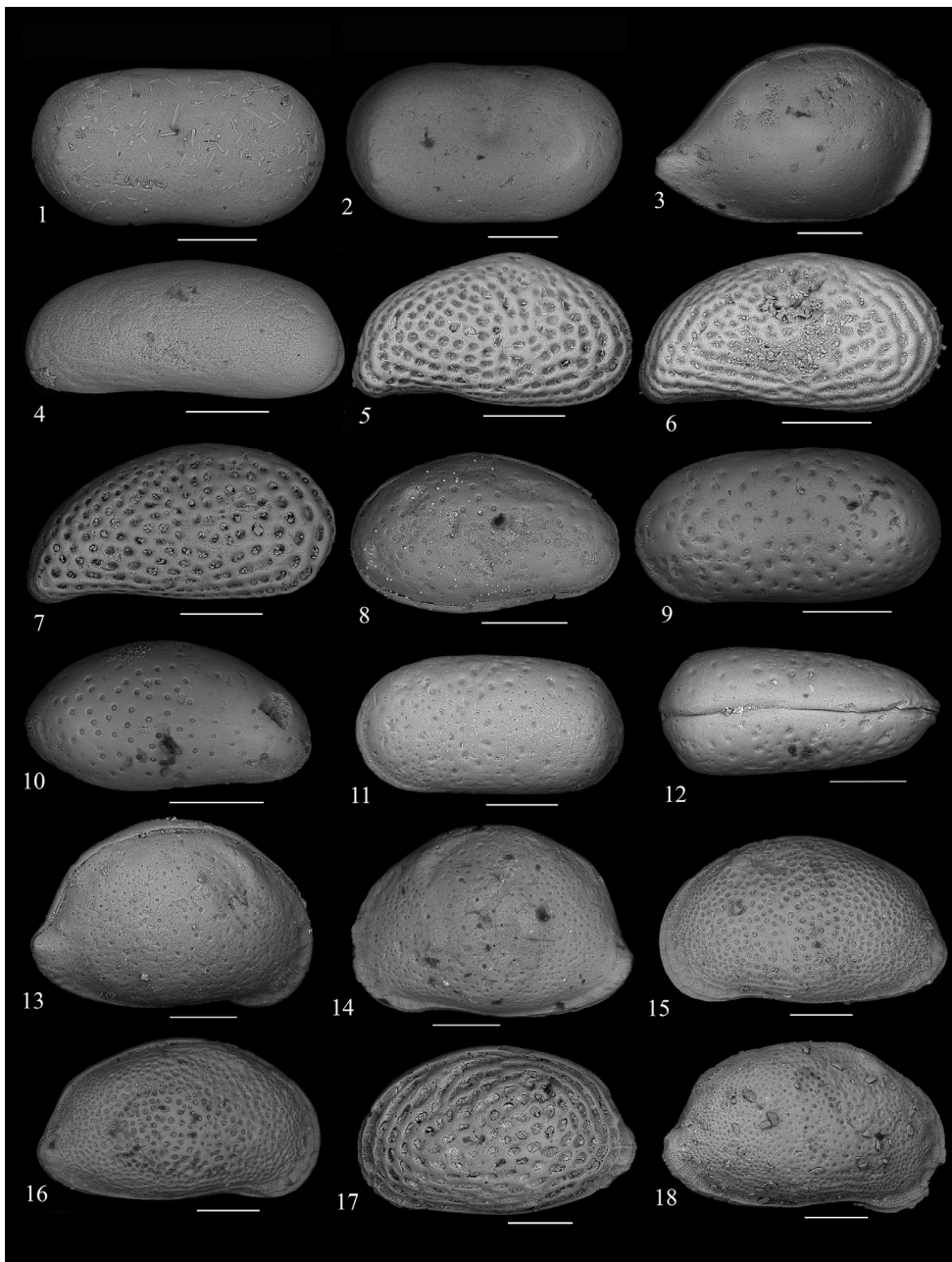


Fig. 3. Late Messinian ostracods from eastern Tunisia (Scale bar 200µm).

- 1 *Cytherella* sp. 1. Right valve in lateral view.
- 2 *Cytherella* sp. 2. Right valve in lateral view.
- 3 *Bairdia* sp. Entire carapace in lateral view.
- 4 *Cushmanidea* sp. Left valve in lateral view.
- 5 *Cytheridea jonesi* n. sp. Holotype, right valve in lateral view.
- 6 *Cytheridea münsteri* n. sp. Holotype, right valve in lateral view.
- 7 *Cytheridea* aff. *C. paracuminata verrucosa* Kollmann 1960. Right valve in lateral view.
- 8 *Cyamocytheridea dertonensis* Ruggieri, 1958. Right valve in lateral view.
- 9 *Cyamocytheridea phaseolus* Bonaduce et al., 1992. Left valve in lateral view.
- 10 *Cyamocytheridea* sp. Right valve in lateral view.
- 11 *Miocyprideis* sp. Left valve in lateral view.
- 12 *Miocyprideis* sp. dorsal view.
- 13 *Aurila agathae* n. sp. Holotype. Entire carapace in right lateral view.
- 14 *Aurila agathae* n. sp. Left valve in lateral view.
- 15 *Aurila burolleti* n. sp. Holotype. Left valve in lateral view.
- 16 *Aurila burolleti* n. sp. Entire carapace in right lateral view.
- 17 *Aurila castanyi* n. sp. Holotype. Left valve in lateral view.
- 18 *Aurila cicatricosa* (Reuss, 1850). Right valve in lateral view.

Family CUSHMANIDEIDAE Puri, 1974 in Hartmann and Puri, 1974
Genus *Cushmanidea* Blake, 1933

Type species *Cushmanidea seminuda* (Cushman, 1906) Blake, 1933
Cushmanidea sp.

(Fig. 3.4)

Material: one complete carapace.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: the figured specimen shows strong resemblance to *C. turbida* (Müller, 1894), and differs from it by the more rounded anterior margin and by the scarcely visible normal pores canal. The lack of specimens prevents a correct taxonomic evaluation.

Superfamily CYTHEROIDEA Baird, 1850

Family: CYTHERIDEIDAE Sars, 1925

Genus *Cytheridea* Bosquet, 1852 type genus *Cythere mullerii* Münster 1830

Cytheridea jonesi n. sp.
(Fig. 3.5)

Etymology: The species is dedicated to Thomas Rymer Jones, (1810–1880) Naturalist.

Material: four carapaces.

Holotype: one carapace PMC O 69 H 03/12/2019 ($L = 700 \mu\text{m}$, $H = 380 \mu\text{m}$).

Paratypes: two carapaces PMC O 148-149 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Cytheridea* Bosquet, 1852 characterized by a dorsal margin bent at a marked obtuse angle.

olae which totally cover the valves. In the central area of the carapace the foveolae are widely spaced between them; vice versa around this area, they are very close together, until they create a grid towards the outer margin. Sieve type normal pore canals are located within some foveolae. The anteromarginal area and the caudal process are pitted and show thin marginal ridges, some orthogonal to the outer margin and one parallel. Other characters are typical of the genus.

Remarks: the species shows some similarities with *A. hesperia* Ruggieri, 1975 = *A. cicatricosa arborescens* (Reuss, 1850) (figured in Ruggieri, 1950) and *Aurila* aff. *cicatricosa* (Reuss, 1850) figured in Ruggieri, 1975, but it is possible to distinguish it due to the different dimension and distribution of the foveolae and the wider marginal area.

Aurila castanyi n. sp.

(Fig. 3.17)

Etymology: The species is dedicated to Gilbert Castany †, géologist (Geological Survey of Tunisia).

Material: five valves.

Holotype: one left valve PMC O 56 H 03/12/2019 (L = 862 μm , H = 540 μm).

Paratypes: two valves PMC O 126-127 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Aurila* Pokorny, 1955 with ornamentation characterized by circular large foveolae in the central area and elongated outside of this area.

Description: large carapace with typical shape of the genus with left valve overlapping the right. Ornamentation constituted by large foveolae rounded in the central area of the carapace, elongated and arranged concentrically, outside of this area. The elongated foveolae, with their concentric arrangement, which give rise a thick and marked reticulum that affects the outermost areas of the carapace. Few normal pore canals. The internal features of the carapace are like of those of the genus.

Remarks: the new species is similar to *Aurila abscisa* Terquem 1878 but it can be distinguished thanks to a different distribution of the foveolae and a greater number of concentric ribs.

Aurila cicatricosa (Reuss, 1850)

(Fig. 3.8)

Material: two valves.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: the figured specimen is very similar to that coming from the lower Messinian of Lampedusa, figured by Dall'Antonia and Bossio, 2001 and indicated as *Aurila* cf. *A. cicatricosa*. The species is also reported by Faranda et al., 2008 (Plate 2, Fig. 4) in the Late Miocene of central Crete, in the Lower Badenian of Mühlbach (Zorn, 2003) and, generally, it is known from Miocene to Recent (Guernet, 2005).

Aurila doruki n. sp.

(Fig. 4.1)

Etymology: The species is dedicated to Neriman Doruk (1945 - 2008), ostracodologist.

Material: four complete carapaces.

Holotype: one carapace PMC O 54 H 03/12/2019 (L= 940 μm , H= 560 μm).

Paratypes: two carapaces PMC O 123-124 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Aurila* Pokorny, 1955 with carapace entirely covered with large, weakly engraved foveolae.

Description: Large carapace with the typical shape of the genus *Aurila* with left valve higher and overlapping the right valve. Ornamentation consisting of large, weakly engraved foveolae, regularly distributed and spaced on the carapace. Some foveolae are circular shaped, others, mainly present in postero-ventral area, elongated. In the anterior part of the carapace, the foveolae are coupled in groups of two. Fестоons are present along the anteroventral margin and marginal ridge along the antero-dorsal margin. Three ridges follow the anterior margin. Simple normal pore canals are regularly distributed on the carapace. Internal characters are typical of those of the genus.

Remarks: the species shows some features that make it look like *A. (A.) anguisfoveata* Uliczny, 1969 (Taf. 1, Fig. 1) and it is distinguished from it because the foveolae are less densely distributed on the valve, they are wider in the posterior part of the carapace, while along the anterior margin they form groups of two, three elements.

Aurila aff. *A. speyeri* (Brady, 1868)

(Fig. 4.2)

Material: one right valve.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Aurila zargounii n. sp.

(Figs. 4.3, 4)

Etymology: The species is dedicated to Foued Zargouni, geologist (Geological Survey of Tunisia)

Material: one complete carapace and many valves.

Holotype: one complete carapace PMC O 57 H 03/12/2019 (L = 715 μm , H = 490 μm)

Paratype: one left valve PMC O 128-129 P 03/12/2019

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species Genus *Aurila* Pokorny, 1955 characterized by weakly engraved foveolae and ribs sometimes intertwined.

Description: carapace shape like that of the type species, left valve bigger than the right, strong overlapping in postero- dorsal, dorsal, antero- dorsal and anterior margin, collar narrow. Ornamentation consisting of simple foveolae well engraved and weakly engraved and intertwined ribs. In the central part of the carapace there are only large and roundish foveolae; outside this area, the foveolae are smaller and closer together, elongated ventrally, even more externally. The foveolae are arranged along lines parallel to the external margin separated by thin and long ribs, intertwined, sometimes, in the posterior area. Marginal anterior and posterior areas flat and narrow with marginal ribs. Eye spot marked and elongated, caudal process obtuse with spines.

Remarks: the carapace shape of this species is similar to that of *A. impressa* Ruggieri, 1976 but it is distinguishable for the different ornamentation.

Subgenus *Aurila* (*Trigonoaurila*) Ruggieri, 1975.

Aurila (*Trigonoaurila*) sp. 1

(Fig. 4.5)

Material: one entire carapace.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: carapace entirely covered with foveolae with the exception of the anterior margin and the caudal process. The species resemble *Aurila* (*Trigonoaurila*) *doliaris* Bonaduce et al., 1992 but differs from that for wider and more spaced foveolae.

Aurila (*Trigonoaurila*) sp. 2

(Fig. 4.6)

Material: one left valve

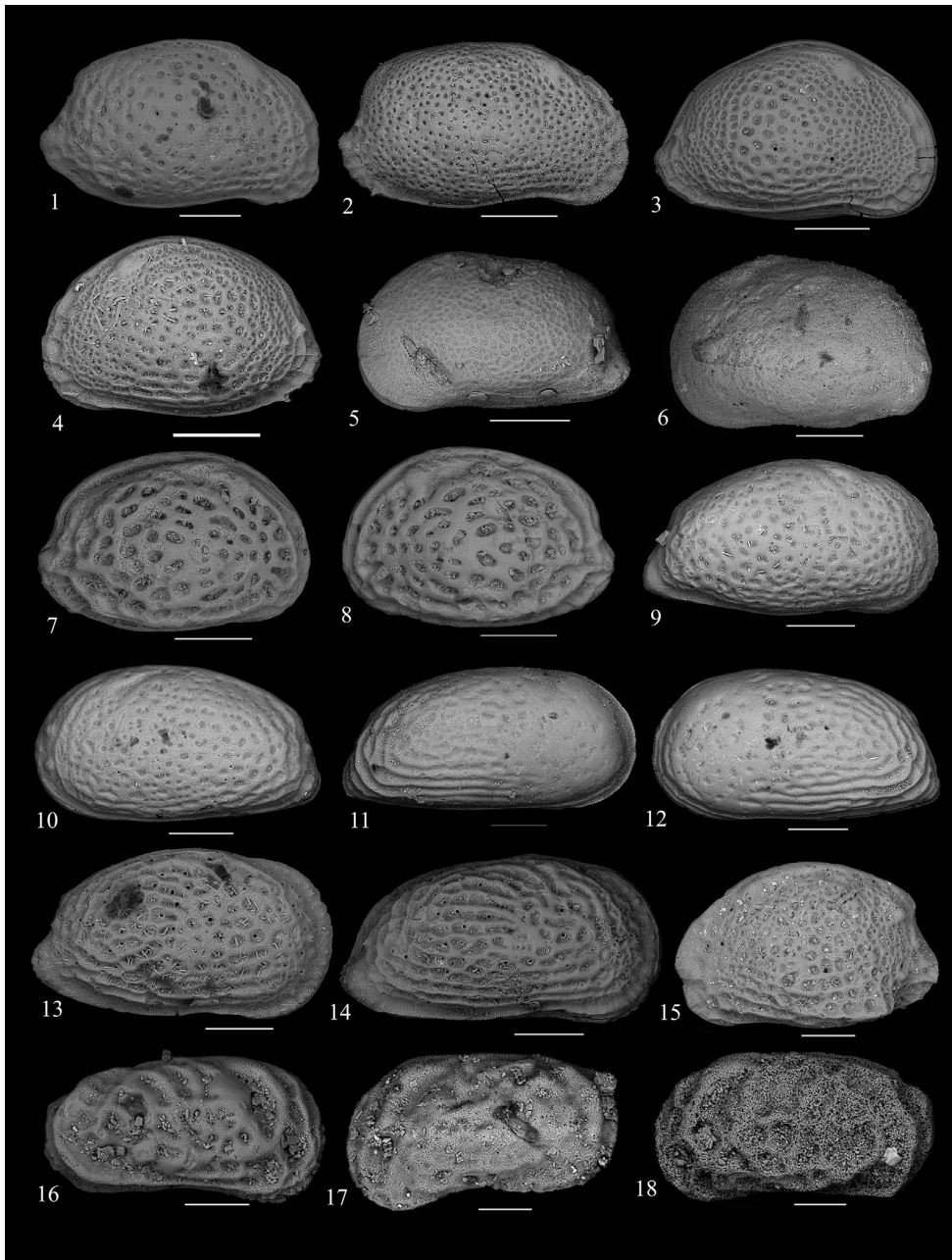


Fig. 4. Late Messinian ostracods from eastern Tunisia (Scale bar 200µm).

- 1 *Aurila doruki* n. sp. Holotype. Right valve in lateral view.
- 2 *Aurila* aff. *A. speyeri* (Brady, 1868). Right valve in lateral view.
- 3 *Aurila zargounii* n. sp. Holotype. Right valve in lateral view.
- 4 *Aurila zargounii* n. sp. Left valve in lateral view.
- 5 *Aurila (trigonoaurila)* sp.1. Entire carapace in left lateral view.
- 6 *Aurila (trigonoaurila)* sp. 2. Left valve in lateral view.
- 7 *Cimbourila mariellae* n. sp. Holotype. Entire carapace in right lateral view.
- 8 *Cimbourila mariellae* n. sp. Left valve in lateral view.
- 9 *Peteraurila carbonneli* n. sp. Holotype, right valve in lateral view.
- 10 *Peteraurila moissettei* n. sp. Holotype. Left valve in lateral view.
- 11 *Peteraurila nachitei* n. sp. Holotype. Right valve in lateral view.
- 12 *Peteraurila nachitei* n. sp. Left valve in lateral view.
- 13 *Peteraurila ulicznyi* n. sp. Holotype. Right valve in lateral view (female).
- 14 *Peteraurila ulicznyi* n. sp. Right valve in lateral view (male).
- 15 *Urocythere (Pokornyella) bremani* n. sp. Holotype. Left valve in lateral view.
- 16 *Callistocythere sissinghi* n. sp. (Scale bar 100µm). Holotype. Entire carapace.
- 17 *Callistocythere* sp. (Scale bar 100µm). Left valve in lateral view.
- 18 *Callistocythere* aff. *alfuraihi* Bonaduce et al., 1992 (Scale bar 100µm). Left valve in lateral view.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: the conservation conditions of the carapace prevent a good specific definition but in our opinion this specimen is very similar to that figured in Bonaduce et al., 1992 (Plate 10, Figs 11, 12) and indicated as *Syratica (?) ponderosa* Bonaduce et al., 1992.

Genus *Cimbourila* Ruggieri, 1975

Type genus *Cimbourila cimbaeformis* (Seguenza, 1883)

Cimbourila mariellae n. sp.

(Figs. 4.7, 8)

Etymology: The species is dedicated to Mariella in token of friendship and affection.

Material: eight complete carapaces.

Holotype PMC O 58 H 03/12/2019 ($L = 705 \mu m$, $H = 482 \mu m$).

Paratypes PMC O 130-131 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species with typical features of the genus. Very large rounded or trapezoidal foveolae.

Description: subtrapezoidal strong carapace with left valve bigger than the right. Collar well marched. Anterior margin arched with the curve culmination slightly sloping downwards. Arched dorsal margin in left valve, straighter in the other; posterior margin with small obtuse caudal process; ventral margin slightly curved. Solea and sledge well defined. Carapace ornamentation consists of a long thin but raised ridge that follows the external margin of the carapace. Within this ridge the carapace is characterized by big foveolae well marched and engraved rounded or elongated and concentrically distributed. Five sub trape-



Fig. 5. Late Messinian ostracods from eastern Tunisia (Scale bar 200µm).

- 1 *Leptocythere* sp. 1 (Scale bar 100µm). Left valve in lateral view.
- 2 *Leptocythere* (?) sp. 2. Right valve in lateral view.
- 3 *Mediocytherideis hornei* n. sp. (Scale bar 100µm). Holotype. Left valve in lateral view.
- 4 *Loxoconcha perspicua* Bonaduce et al., 1992. Entire carapace (male) in left lateral view.
- 5 *Loxoconcha* sp.1. Left valve in lateral view (male).
- 6 *Loxoconcha* sp. 2. Left valve in lateral view (female).
- 7 *Loxoconcha* aff. *rhomboidea* (Fischer, 1855). Left valve in lateral view (female).
- 8 *Loxoconchissa* sp. Left valve in lateral view.
- 9 *Sagmatocythere* sp. Right valve in lateral view.
- 10 *Neomonoceratina lajmii* n. sp. Holotype. Left valve in lateral view (male).
- 11 *Neomonoceratina lajmii* n. sp. Dorsal view
- 12 *Neomonoceratina morkhoweni* n. sp. (Scale bar 100µm). Holotype. Entire carapace (male) in right lateral view.
- 13 *Neomonoceratina mostafawii* n. sp. (Scale bar 100µm). Holotype. Entire carapace (male) in right lateral view.
- 14 *Neomonoceratina mostafawii* n. sp. Dorsal view.
- 15 *Neomonoceratina reussi* n. sp. (Scale bar 100µm). Holotype. Entire carapace (female) in right lateral view.
- 16 *Neomonoceratina reussi* n. sp. Entire carapace in right lateral view (male).
- 17 *Neomonoceratina reussi* n. sp. Dorsal view.
- 18 *Neomonoceratina* aff. *N. interiecta* Bonaduce et al., 1992 (Scale bar 100µm). Entire carapace (female) in right lateral view.

zoidal foveolae are present along the anterior margin separated from this by a thin but raised ridge. Fostoon poorly visible in the postero-ventral margin. Antero-ventral margin with marginal ridge. Very few normal pore canals. Internal features like those of the genus.

Remarks: the new species has some morphological characteristics common to the congeners (strong carapace, large foveolae, robust crest running along the external profile, sole, sledge) but it is distinguishable from them due to the arrangement, shape and dimension of foveolae. Compared to *A. cimbaeformis* (Seguenza, 1884), the new species shows larger foveolae distributed mostly concentrically on the carapace; it does not have the spur in postero-ventral position and the tubercle in postero-dorsal position. Vice versa in *A. cimbaeformis*, the foveolae are smaller and oriented according to oblique and parallel lines clearly visible in the posterior region.

Subfamily AURILINAE Puri, 1953

Genus *Peteraurila* Aruta and Ruggieri, 1980

Type species: *Peteraurila musculus* Aruta and Ruggieri, 1980

Peteraurila carbonneli n. sp.

(Fig. 4.9)

Etymology: The species is dedicated to Gilles Carbonnel, ostracodologist (Université Claude Bernard-Lyon).

Material: several valves.

Holotype: one right valve PMC O 59 H 03/12/2019 (L=880 µm , H=460 µm).

Paratypes: two valves PMC O 131-132 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Peteraurila* Aruta and Ruggieri, 1980 characterized by large foveolae slightly engraved and ribs.

Description: the species shows the external outline as that of the type species. The surface of the carapace is characterized by large foveolae slightly engraved concentrically distributed in the central area of the carapace. The foveolae are mostly rounded in the central part of the

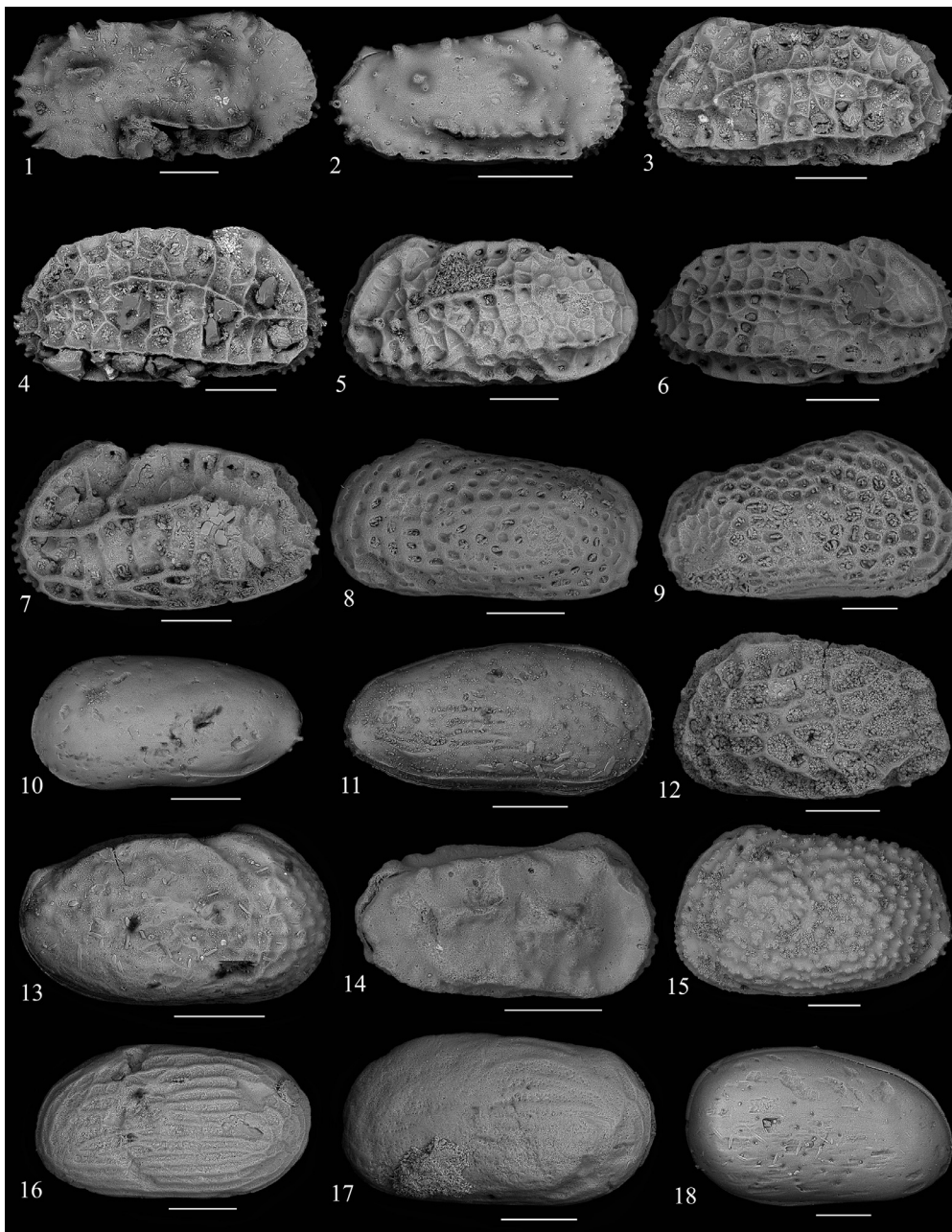


Fig. 6. Late Messinian ostracods from eastern Tunisia (Scale bar 200µm).

- 1 *Carinocythereis carboneli* n. sp. Holotype. Right valve in lateral view.
- 2 *Carinocythereis cultrata* (Ruggieri & Russo, 1980). Entire carapace in right lateral view.
- 3 *Chrysoythere nevanii* n. sp. Holotype. Left valve in lateral view (male).
- 4 *Chrysoythere nevanii* n. sp. Right valve in lateral view (female).
- 5 *Chrysoythere* sp. Left valve in lateral view (female).
- 6 *Chrysoythere* aff. *C. cataphracta* Ruggieri, 1962. Right valve in lateral view (male).
- 7 *Chrysoythere* aff. *C. lignea* Bonaduce et al., 1992. Left valve in lateral view (female).
- 8 *Cistacythereis merzeraudi* n. sp. Holotype. Left valve in lateral view.
- 9 *Cistacythereis purii* n. sp. Holotype. Right valve in lateral view.
- 10 *Keijella lucida* Aruta, 1982. Left valve in lateral view (female).
- 11 *Keijella* aff. *K. loricata* Bonaduce et al., 1992. Entire carapace (male) in right lateral view.
- 12 *Mutilus* sp. Left valve in lateral view.
- 13 *Neocytheretta* sp. Entire carapace in right lateral view.
- 14 *Okadaleberis azouzi* n. sp. Holotype. Entire carapace in right lateral view.
- 15 *Verrucocythereis* aff. *V. bulbospinata* (Uliczny, 1969). Left valve in lateral view.
- 16 *Cytheretta ciampoi* Bonaduce et al., 1992. Left valve in lateral view.
- 17 *Cytheretta* aff. *C. ishizakii* Bonaduce et al. 1992. Left valve in lateral view.
- 18 *Xestoleberis* aff. *X. retropunctata* Aruta 1983 (Scale bar 100 µm). Right valve in lateral view.

carapace, elongated ventrally. Anteriorly, the foveolae have a lower density, they are smaller and distributed, in groups of two or three. Ribs are present along the anterior, ventral and posterior margin. Well-marked triangular smooth, subacute caudal process; slightly raised eyespot. Other characters are typical of the genus.

Remarks: the new species is very similar to the type species but it is distinguished from it by the presence of the ribs.

Peteraurila moisettei n. sp.

(Fig. 4.10)

Etymology: The species is dedicated to Pierre Moissette, geologist (Laboratoire de Géologie de Lyon, retired).

Material: two complete carapaces and many valves.

Holotype: one carapace PMC O 60 H 03/12/2019 (L=942 µm , H=520 µm).

Paratypes: one carapace PMC O 133 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of Genus *Peteraurila* Aruta and Ruggieri, 1980 with ribs along anterior, ventral and posterior margin, foveolae in the central part of the carapace.

Description: large sized ovoid carapace, rounded margins except the posterior margin which is straight. Obtuse caudal process in the postero-ventral angle. Ornamentation consists of circular or ovoid foveolae little engraved. Ribs, that delimit alignments of elongated foveolae, follow the anterior, posterior and ventral margins of the carapace. Slightly raised tubercles, with a normal pore canal at the top, are present along the anterior and posterior margin. Ocular sulcus marked, curved and elongated.

Remarks: the species show features rather similar to the previous one, but it is distinguished for the more pronounced ribs especially along the anterior margin, for the different distribution and size of the foveolae and for the presence of tubercles.

Peteraurila nachitei n. sp.

(Figs. 4.11, 12)

Etiology: The species is dedicated to Driss Nachite, Ostracodologist (University of Tétouan).

Material: five valves.

Holotype: one left valve PMC O 61 H 03/12/2019 (L=980 µm , H=510 µm).

Paratypes: one right valve PMC O 134 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the Genus *Peteraurila Aruta and Ruggieri, 1980* characterized by foveolae in the anterior third and foveolae and ribs in the posterior two thirds of the carapace.

Description: Subtrapezoidal carapace with well arched anterior margin, slightly convex dorsal margin which proceeds seamlessly towards the posterior margin, without caudal process, which continues in the ventral margin through a slightly acute angle; ventral margin just wavy. The external surface of the carapace is almost smooth in the anterior third with a few barely visible foveolae; the central part of the carapace is characterized by large rounded foveolae weakly engraved while the posterior, postero-dorsal and postero-ventral part are affected by prominent ribs, straight in the postero-central part, intertwined posteriorly and gradually fading towards the dorsal area. Barely visible scar eye. Internal feature like those of the genus.

Remarks: the new species differs from the type species because of the ornamentation and the profile of the postero-dorsal margin is continuous, while in the type species it is characterized by an obtuse angle; from the other species because of the more complex ornamentation.

Peteraurila ulicznyi n. sp.

(Figs. 4.13, 14)

Etiology: the species is dedicated to Frank Uliczny, micropaleontologist.

Material: three valves.

Holotype: one right valve PMC O 62 H 03/12/2019 (L = 870 µm , H = 480 µm).

Paratypes: two right valves PMC O 135-136 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Peteraurila Aruta and Ruggieri, 1980* characterized by ribs and foveolae arranged to form the figure of an octopus.

Description: species characterized by a subrectangular carapace with anterior margin well rounded, dorsal margin sinuous anteriorly, slightly curved back, which continues with an obtuse angle to the straight posterior margin. Caudal process broad, ventral margin sinuous. Oral convexity marked. Ornamentation consists of elongated crests and foveolae mostly rectangular, few are rounded concentrated in the central anterior part of the carapace. The central area is characterized by ribs and foveolae arranged according to the length of the carapace as to form the figure of an octopus. Four ribs follow the ventral margin and rise, intertwining, along the posterior and dorsal margin. At the height of the eye spot they descend, always intertwined, parallel to the anterior margin. Flat anterior and ventral marginal areas, decorated along the edge by large tubercles anteriorly, smaller posteriorly. Normal pore canals very evident and regularly distributed on the carapace.

Remarks: this new species, like the previous two, shows features that can lead both to the genus *Aurila* and to the genus *Peteraurila* as already written by *Aruta and Ruggieri, 1980*. The differences, not always observable, can be identified only from the details of the hinge. Indeed, some specimens of the Ashtart 1 well, very similar to ours, have doubtfully been attributed to the genus *Aurila* by *Bonaduce et al., 1992*; but, according to *Aruta and Ruggieri, 1980*, the bearing or the general appearance of our specimens and the ratio between height and length that is much closer to that of the specimens of the genus *Peteraurila* than to that of the genus *Aurila*, allow to refer our specimens to the first genus.

Genus *Urocythere (Pokornyella) Oertli, 1956*

Type species: *Urocythere (Pokornyella) limbata (Bosquet, 1852)*

Urocythere (Pokornyella) bremani n. sp.

(Fig. 4.15)

Etiology: The species is dedicated to Ewert Breman ostracodologist.

Material: several valves.

Holotype: one left valve PMC O 63 H 03/12/2019 (L = 968 µm , H = 622 µm).

Paratypes: two valves PMC O 137-138 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Urocythere (Pokornyella) Oertli, 1956* with inflated alar process in centroventral area.

Description: strong carapace medium sized with anterior margin rounded slightly downward sloping which extends, without interruption, into the convex dorsal margin. Caudal process that is grafted to the dorsal margin with a marked flexion while passing continuously to the ventral margin. Sinuous ventral margin. Flat anterior and posterior marginal areas, while the rest of the carapace appears inflated because of a marked alar process facing backwards in the centro-ventral position. Ornamentation consisting in large and rounded foveolae in central dorsal position, while they are aligned according to the shape of the ala, separated by thick ribs. A rib marks the ala profile; in the posterior area the foveolae are arranged in a grid. A large tubercle is present near the dorso-caudal flexion. Eye spot well marked, normal pore canals distributed on the carapace surface. Internal structures are like those of the genus.

Remarks: the swollen alar process makes this species easily distinguishable from its congeners.

Family LEPTOCYOTHERIDAE *Hanai, 1957*

Genus *Callistocythere Ruggieri, 1953*

Type species: *Sagmatocythere littoralis (Müller, 1894)*

Callistocythere sissinghi n. sp.

(Fig 4.16)

Etiology: The species is dedicated to W. Sissingh, ostracodologist

Material: three complete carapaces.

Holotype: one complete carapace, collection number PMC O 51 H 03/12/2019 (L = 450 µm , H = 244 µm)

Paratypes: two carapaces PMC O 117-118 P 03/12/2019

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of Genus *Callistocythere Ruggieri, 1953* characterized by strong curved ridges separated by large and elongated fossae.

Description: species with the typical bean-shaped carapace of the genus; the ornamentation consists of a complicated intertwining of two series of ridges: the main one consists of seven very easily detected, thick and sturdy ridges separated by elongated fossae and distributed, mostly in the central part of the carapace, with curvilinear course. Six of these ridges have the convexity facing forward and one, in the posterior area, backward. The first of the six ridges, defines an almond-shaped perimeter, starts from the antero-dorsal area and with a curvilinear course first descends downwards and then rises abruptly towards the postero-dorsal angle. The ridges from the second to the fifth, start from the dorsal area and curve downwards. The secondary series consists of thinner ridges present in the anterior part of the carapace; one of the latter, very prominent, follows the external profile of the carapace from the anterodorsal angle to the posterodorsal area. A large smooth and circular area like a big tubercle, is present in the medio-antero-dorsal area.

Remarks: the species is rather similar to *C. callosa Bonaduce et al., 1992* but it is distinguished from it because the thin ridge continuously follows the external profile of the carapace.

Callistocythere sp.

(Fig. 4.17)

Material: one complete carapace.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E).

Type horizon: late Messinian.

Remarks: the lack of specimens and the preservation conditions of the carapace do not permit to define with certainty a precise specific identification.

Callistocythere aff. *alfuraihi* Bonaduce et al., 1992

(Fig. 4.18)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Remarks: the not perfect conditions of conservation of the carapace do not allow a precise identification. In general, the features of the figured specimen are very similar to *C. alfuraihi* Bonaduce et al., 1992.

Genus *Leptocythere* Sars, 1925

Type species: *Leptocythere pellucida* (Baird, 1850) Sars, 1925

Leptocythere sp. 1

(Fig. 5.1)

Material: one left valve

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: it is certainly a species not yet described but the conservation conditions of the carapace prevent a good specific definition.

Leptocythere (?) sp. 2

(Fig. 5.2)

Material: one left valve

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: it is not possible to observe the internal structures; therefore, the specimen is doubtfully attributed to the genus *Leptocythere* only on the basis of the shape of the carapace.

Subfamily MEDIOCYTHERIDEISINAE Mandelstam, 1960

Genus *Mediocytherideis* (Mandelstam, 1956) 6

Type species *Cytherideis apatoica* Schweyer, 1949

Mediocytherideis hornei n. sp.

(Fig. 5.3)

Etymology: The species is dedicated to David Horne, ostracodologist (Queen Mary University of London)

Material: four valves

Holotype: one left valve, PMC O 52 H 03/12/2019 ($L = 515 \mu\text{m}$, $H = 254 \mu\text{m}$)

Paratypes: two valves PMC O 119-120 P 03/12/2019

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Mediocytherideis* (Mandelstam, 1956) characterized by ridges and little foveolae, a smooth area is present in the postero-ventral area of the carapace.

Description: swollen carapace medium sized with shape typical of the congeners: anterior margin rounded and slightly folded down, dorsal margin convex, posterior margin rounded with a small caudal process obtuse and slightly facing up, the posterior margin connects to the ventral without discontinuity, ventral margin convex. Anterior and posterior marginal areas narrow and flat, rest of the carapace swollen. The ornamentation consists of some ribs, particularly evident in the anterior half of the carapace, where they are parallel to the anterior margin; the innermost ribs extend posteriorly along the entire external margin of

the carapace. Other less prominent ribs are heavy in the posterior and central part. Medium sized foveolae affect the anterior two thirds of the carapace. Postero-ventral area smooth. Internal structures are like those of the genus.

Remarks: the new species here described shows some resemblance with *Mediocytherideis* (*Sylvestra*) *sulcata* Ligios, Bossio and Gliozzi, 2008 from the Messinian of Velona Basin (Tuscan) but it is possible to distinguish it for the more numerous and marked ribs in anterior area.

Family LOXOCONCHIDAE Sars, 1925

Genus *Loxoconcha* Sars, 1866

Type taxon *Cythere rhomboidea* Fischer, 1855

Loxoconcha persipua Bonaduce et al., 1992

(Fig. 5.4)

Material: one complete carapace and many valves of male and female specimens.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Loxoconcha sp.1

(Fig. 5.5)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Remarks: Due to the scarcity, the specimen is not taxonomically placed at a specific level, however we give a brief description of the figured specimen: ovoid carapace little sized. Ornamentation constituted by fossae rounded and well engraved in the central part of the carapace, which become wider and elongated towards the anterior and ventral areas, while in the posterior and dorsal area are small and thickened. Five ridges arcuate and well-marked in central-ventral area. Anterior and posterior marginal area with marginal ridges. Eye spot marked.

Loxoconcha sp. 2

(Fig. 5.6)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Remarks: the lack of specimens and the condition of the carapace do not allow an exact specific attribution.

Loxoconcha aff. *rhomboidea* (Fischer, 1855)

(Fig. 5.7)

Material: one complete carapace

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Genus *Loxoconchissa* Triebel and Malz, 1969

Type species *Loxoconchissa foveolata* Triebel and Malz, 1969

Loxoconchissa sp.

(Fig. 5.8)

Material: one valve.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Remarks: Due to the scarcity, the specimen is not taxonomically placed at a specific level, however we give a brief description: small size rounded carapace with the narrowest rear end of the front, entirely covered with a quadrangular mesh reticulum. The meshes are arranged according to curved lines with the concavity on the right in the anterior half and with the concavity on the left in the posterior half of the carapace. These intertwining lines originate the reticulum. Eye spot not observable.

Genus *Sagmatocythere* Athersuch, 1976

Type taxon *Sagmatocythere napoliana* (Puri, 1963)

Sagmatocythere sp.

(Fig. 5.9)

Material: one valve.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: carapace ornamented by ribs that intersect forming a very large mesh grid. The state of conservation of the carapace prevents a correct specific definition.

Subfamily SCHIZOCYETHERINAE (Mandelstam, 1959, In: Hanai, 1970)

Genus *Neomonoceratina* Kingma, 1948Types species *Neomonoceratina columbiformis* Kingma, 1948*Neomonoceratina lajmii* n. sp.

(Figs. 5.10, 11)

Etymology: The species is dedicated to Tijani Lajmi, géologist (Geological Survey of Tunisia)

Material: four valves

Holotype: one left valve PMC O 73 H 03/12/2019 (L=598 µm , H=285 µm).

Paratypes: two valves PMC O 154-155 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the Genus *Neomonoceratina* Kingma, 1948 characterized by elongate, pointed carapace.

Description: carapace elongated wedge-shaped with anterior margin curved slightly asymmetric, separated from the dorsal margin by a protruding ocular tubercle; dorsal margin slightly convex, separated from the posterior margin by a big tubercle. Posterior margin straight which forms a right angle with the ventral margin. Anterior, posterior and postero-ventral marginal areas flat, the rest of the carapace protrudes strongly from these flat areas. The carapace is characterized by a groove, typical of the genus, strongly engraved in the upper part of the carapace, less so in the lower one. The groove from the antero-dorsal margin descends vertically towards the antero-central area of the carapace. Here it is intersected by a thin crest which obliquely cuts the anterior part of the carapace from the middle of the anterior margin to the central anterior area. Below the crest, the groove continues less markedly, thus separating the ornamentation of the carapace into two parts consisting of a simple grid with large, mostly quadrangular meshes. Eye spot marked, normal pore canals numerous and present throughout the carapace.

Remarks: the species is similar to some congeneric as *N. acupicta* Bonaduce et al., 1992 and *N. interiecta* Bonaduce et al., 1992 but it is distinguishable for the different ribs arrangement.

Neomonoceratina morkhoweni n. sp.

(Fig. 5.12)

Etymology: The species is dedicated to Franciscus P. C. M. van Morkhowen (1922-1993), Ostracodologist.

Material: two complete carapaces.

Holotype: one complete carapace. PMC O 71 H 03/12/2019 (L=580 µm , H=300 µm).

Paratypes: one complete carapace. PMC O 152 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Neomonoceratina* Kingma, 1948 with three longitudinal ridges and one transversal anterior ridge.

Description: medium size acute carapace. Anterior margin little arcuate, ventral margin arcuate, caudal process very prominent, truncated and acute, dorsal margin jagged with a marked obtuse angle in postero-dorsal area. Marginal posterior and anterior areas flat and lower than the

central part of the carapace. Ornamentation consisting of a first wavy and sharp ridge along the ventral margin, a second antero-posterior-dorsal wavy ridge that continues backwards with some tubercles, a third short ridge also wavy in antero-dorsal position that continues backwards in an aligned series of tubercles and, finally, a fourth crest following the anterior margin. Eye spot weakly marked.

Remarks: the presence of the four sharp ridges makes this species easily distinguishable from other congeners.

Neomonoceratina mostafawii n. sp.

(Figs. 5.13, 14)

Etymology: The species is dedicated to Nasser Mostafawi, ostracodologist.

Material: two complete carapaces.

Holotype: one complete carapace PMC O 72 H 03/12/2019 (L= 522 µm , H= 280 µm).

Paratypes: one complete carapace PMC O 153 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Neomonoceratina* Kingma, 1948 with two large and deep grooves in central dorsal and central ventral position.

Description: pointed carapace medium sized with anterior margin regularly arcuate which continues without interruption in the ventral arched margin; truncated and acute caudal process, jagged dorsal margin with an obtuse and well-marked angle in postero-dorsal area. Central part of the carapace raised than the lowered and flat posterior and anterior marginal areas. Ornamentation constituted by two large and deep funnel-shaped grooves, joined by the beaks, which separates the carapace, in dorso-ventral direction, into two areas: antero-central and postero-central. Both areas are decorated with an irregular polygonal grid. Anterior marginal area with tubercles and transversal ribs. Ocular tubercles prominent.

Remarks: the species is similar to *N. laskarevi* (Krstić and Pietrzniuk, 1972)) from which it is distinguished by the absence of tubercles on the carapace.

Neomonoceratina reussi n. sp.

(Figs. 5.15, 16, 17)

Etymology: The species is dedicated to August Emanuel Rudolph von Reuss (1811 – 1873), Geologist and paleontologist.

Material: two complete carapaces.

Holotype: one complete carapace PMC O 74 H 03/12/2019 (L=550 µm , H=335 µm).

Paratype: one complete carapace PMC O 156 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Neomonoceratina* Kingma, 1948 characterized by a wide ridge arranged in a fan shape.

Description: medium sized arrowhead shaped carapace with anterior margin well rounded which continues, without interruption, in the ventral margin which is also arched; caudal process prominent and acute which continues through an obtuse angle with the dorsal margin straight. Anterior and posterior marginal areas flat. Central part of the carapace raised than the marginal areas. Ornamentation consisting of a wide reticulated ridge, arranged subhorizontally, limited by two vertical ridges in central ventral and central dorsal position. Another short ridge in antero dorsal position. Little tubercles are present along the anterior margin, other, with normal pore canals on the top, are distributed on the carapace. Eye spot just marked.

Neomonoceratina aff. *N. interiecta* Bonaduce et al., 1992

(Fig. 5.18)

Material: one entire carapace and two valves.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region

south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: compared to *N. interiecta* Bonaduce et al., 1992, our figured specimen (female) shows an acute caudal process, a groove in the antero central dorsal area much less pronounced and decidedly more open outwards, a thin crest runs along the anterior margin, an another oblique crest present in the postero-dorsal.

Family TRACHYLEBERIDIDAE Sylvester-Bradley, 1948

Carinocythereis Ruggieri, 1956

Type species: *Cytherina carinata* Roemer, 1838

Carinocythereis carboneli n. sp.

(Fig. 6.1)

Etymology: The species is dedicated to Pierre Carbonel, ostracodologist (French National Centre for Scientific Research, retired).

Material: four valves.

Holotype: one right valve PMC O 65 H 03/12/2019 (L=1050 µm, H=530 µm).

Paratypes: two valves PMC O 140-141 P 03/12/2019.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: elongate carapace with a sharp crest in central ventral area and spines in posterior and anterior margin.

Description: features typical of the genus, carapace elongated and subrectangular, anterior margin rounded and symmetric, dorsal margin straight, posterior margin arcuate and with long and thick tubercles like thick thorn, ventral margin straight. Anterior and postero-ventral marginal areas flat and wide with marginal ridges. Ornamentation constituted by a slightly concave sharp crest in central ventral area; two separate short sharp crest are present in central dorsal area and finally, a jagged curved crest with long and thick tubercles is present along the central dorsal margin. Ocular tubercle clear but not prominent. Normal pore canals at the top of little tubercles scattered on the carapace.

Remarks: the species shows some similarity with the congeners illustrated in Bonaduce et al., 1992 and Ruggieri and Russo, 1980 but it is distinguishable by the particular features of its ornamentation.

Carinocythereis cultrata (Ruggieri and Russo, 1980)

(Fig. 6.2)

1980 - *Oclusocythereis cultrata* Ruggieri and Russo, 1980

1992 - *Oclusocythereis cultrata* Ruggieri and Russo, 1980; Bonaduce et al., 1992.

Material: two complete carapaces.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Remarks: According to Wood, 2005 the differences in ornamentation which had allowed to separate the genus *Oclusocythereis* Ruggieri & Russo, 1980 from the genus *Carinocythereis* Ruggieri, 1956 are not important enough to justify the institution of the first genus; in this paper the two genera are considered synonymous and, therefore, we use the name that has the priority.

Genus *Chrysocythere* Ruggieri, 1962

Type species: *Chrysocythere cataphracta* Ruggieri, 1962

Chrysocythere neviranii n. sp.

(Figs. 6.3, 4)

Etymology: The species is dedicated to Antonio Neviani (1857-1946) geologist and paleontologist.

Material: two complete carapaces.

Holotype: one complete carapace PMC O 64 H 03/12/2019 (L=900 µm, H=438 µm)

Paratypes: one complete carapace PMC O 139 P 03/12/2019

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Chrysocythere* Ruggieri, 1962

Description: strong, large size, subtrapezoidal carapace. Typical appearance of congener species with four longitudinal ribs and numerous other transverse ribs. Ventral rib parallel to the ventral margin, lateroventral rib straight and inclined forward; median rib first straight near the anterior margin, then curved and parallel to the dorsal margin almost to the posterior margin; dorsal rib begins above the eye tubercle, then curves parallel to the postero-dorsal margin. Numerous secondary transverse ribs; the main one is located along the anterior margin and follows it parallel, down it engages with the ventral and lateroventral ribs. When the longitudinal and transverse ribs intersect, they create a grid with large polygonal meshes. Anterior and posterior margin denticulate, eye spot spherical and prominent. Interl features typical of the genus.

Remarks: the species shows some affinities with *C. cataphracta* Ruggieri, 1962, as, above all, the "median longitudinal rib" that seems to have the same trend in both species, but it is distinguishable for the different distribution of polygonal meshes.

Chrysocythere sp.

(Fig. 6.5)

Material: one left valve.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: Due to the scarcity the specimen is not taxonomically placed at a specific level, however we give a brief description: species of the genus *Chrysocythere* Ruggieri, 1962 characterized, as like their congeners, by four longitudinal subparallel strong ridges. The two medians are joined in the anterior area of the carapace by a transverse ridge. The rest of the ornamentation is constituted by a grid with large polygonal and irregular meshes that affect the whole carapace except the anterior marginal area.

Chrysocythere aff. *C. cataphracta* Ruggieri, 1962

(Fig. 6.6)

Material: one right valve.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: the specimen is very similar to *C. cataphracta* Ruggieri, 1962; it is distinguishable by the different position of the ventral and lateroventral ribs that in our specimen are convergent.

Chrysocythere aff. *C. lignea* Bonaduce et al., 1992

(Fig. 6.7)

Material: one left valve.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Cistacythereis Uliczny, 1969

Types species: *Cistacythereis cebrenidos* Uliczny, 1969

Cistacythereis merzeraudi n. sp.

(Fig. 6.8)

Etymology: The species is dedicated to Gilles Merzeraud, sedimentologist (University of Montpellier).

Material: several valves

Holotype: one left valve PMC O 68 H 03/12/2019 (L=790 µm, H=400 µm).

Paratypes: two valves PMC O 146-147 P 03/12/2019

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Cistacythereis* with large ovate foveole well engraved on the carapace.

Description: subrectangular heavy carapace with anterior margin curve and symmetric, ventral and dorsal margin straight, posterior margin obtuse with some denticulation in the lower part. Ornamentation consist of large, spaced, ovate foveolae well engraved on the carapace and arranged concentrically. Eye spot small and little marked. Internal features are like those of the genus.

Remarks: the new species here proposed, shows some similarity in the carapace shape to that which [Bonaduce et al., 1992](#) call dubiously *Olimphalunia (?) olive*, however the first differs from the second because the foveole have a lower density and are not tegminate.

Cistacythereis purii n. sp.

(Fig. 6.9)

Etymology: The species is dedicated to Harbans Singh Puri, Geologist and Ostracodologist.

Material: several valves.

Holotype: one right valve PMC O 67 H 03/12/2019 (L=540 µm, H=300 µm).

Paratypes: two valve PMC O 144-145 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Cistacythereis* with large polygonal foveolae.

Description: species with carapace subtrapezoidal. Anterior margin curved and asymmetric with denticulation in the left valve, ventral margin sinuous, posterior margin obtuse with some denticulation in the lower part in the right valve, dorsal margin with a slight concavity in the middle. The ornamentation consists of a grid of polygonal large foveolae mostly arranged according to parallel line which begin, inclined, from the dorsal margin and then become concordant with the anterior, ventral and posterior margin.

Remarks: the species here described shows all the characters of the genus *Cistacythereis*. It is distinguishable from the congeners described by [Bonaduce et al., 1992](#) for the ornamentation.

Genus *Keijella* [Ruggieri, 1967](#)

Type species: *Keijella hodgii* ([Brady, 1866](#)) [Doruk, 1973](#)

Keijella lucida [Aruta, 1982](#)

(Fig. 6.10)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12"E), Tunisia.

Type horizon: late Messinian.

Keijella aff. *K. loricata* [Bonaduce et al., 1992](#)

(Fig. 6.11)

Material: two complete carapaces.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12"E), Tunisia.

Type horizon: late Messinian.

Genus *Mutilus* [Neviani, 1928](#)

Type species: *Mutilus (Obtusomutilus) retiformis* ([Terquem, 1878](#)) [Malz & Jellinek, 1984](#)

Mutilus sp.

(Fig. 6.12)

Material: one left valve

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Remarks: the species shows some similarities with *Mutilus (Obtusomutilus) rubicornius* [Ruggieri, 1980](#).

Genus *Neocytheretta* [Morkhoven, 1963](#)

Type species *Neocytheretta snellii* ([Kingma, 1948](#))

Neocytheretta sp.

(Fig. 6.13)

Material: one carapace

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12"E), Tunisia.

Type horizon: late Messinian.

Remarks: Due to the scarcity, the specimen is not taxonomically placed at a specific level, however we give a brief description: strong carapace ovoid medium sized with anterior margin well rounded in continuity with the ventral margin also arched, dorsal margin arched with two large tubercles in the posterior and anterior end of the LV. Ornamentation consisting of a sturdy arched rib in postero-dorsal position which at two thirds of the dorsal margin downwards curve becoming thinner. Five alignments of tubercles propagate from the elongated ocular tubercle and follow the curved course of the anterior margin. Numerous normal pore canals distributed on the carapace.

Genus *Okadaleberis* [Bonaduce, Ruggieri, Russo and Bismuth, 1992](#)

Type species *Okadaleberis aspera* [Bonaduce, Ruggieri, Russo and Bismuth, 1992](#)

Okadaleberis azouzi n. sp.

(Fig. 6.14)

Etymology: The species is dedicated to Ahmed Azouz, geologist (Geological Survey of Tunisia).

Material: Three entire carapaces.

Holotype: one carapace PMC O 66 H 03/12/2019 (L = 625 µm , H = 340 µm).

Paratypes: two carapaces PMC O 142-143 P 03/12/2019.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Diagnosis: species of the genus *Okadaleberis* [Bonaduce, Ruggieri, Russo and Bismuth, 1992](#) with carapace almost completely smooth with ventral and central crests not very prominent.

Description: sub rectangular strong carapace medium sized. Anterior margin rounded and notched, ventral margin slightly flexuous which, in the posterior border, rises rapidly towards the obtuse caudal process; dorsal border rather straight interrupted by a large tubercle posteriorly and by the ocular tubercle anteriorly. Carapace surface almost completely smooth and porcelain-like. There are some robust but not prominent ribs: a rib marks the anterior margin and continues along the ventral margin, two thirds of the ventral margin it rises upwards parallel to the postero-ventral margin, at the height of the caudal process it splits into two branches, one towards the posterior tubercle, the other, flexing to "S" towards the middle of the dorsal margin. The central anterior area shows "shadows" of ribs and tubercles.

Remarks: the species here described shows some affinity with the congeners from the Ashtart 1 well ([Bonaduce et al., 1992](#)) but it differs from these by the different distribution of the ribs on the carapace.

Genus *Verrucocythereis* [Ruggieri, 1962](#)

Type species: *Verrucocythereis verrucosa* ([Reuss, 1850](#)) [Ruggieri, 1962](#) *Verrucocythereis* aff. *V. bulbospinata* ([Uliczny, 1969](#)).

(Fig. 6.15)

Material: one left valve

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Superfamily CYTHEROIDEA [Baird, 1850](#)

Family CYTHERETTIDAE [Triebel, 1952](#)

Genus *Cytheretta* [Müller, 1894](#)

Type species *Cytheretta rubra* [Müller, 1894](#)

Cytheretta ciampoi Bonaduce et al., 1992

(Fig. 6.16)

Material: two valves.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Cytheretta aff. *C. ishizakii* Bonaduce et al. 1992

(Fig. 6.17)

Material: one left valve.

Type locality: The Wadi El Kebir (OK) sampling station outcrops in the eastern side of the Wadi El Kebir dam, in the Nabeul region south eastern part of the Cape Bon Peninsula (36°30'07" N 10°44'46"E), Tunisia.

Type horizon: late Messinian.

Family XESTOLEBERIDIDAE Sars, 1928

Genus *Xestoleberis* Sars, 1866

Type taxon *Xestoleberis aurantia* (Baird, 1838)

Xestoleberis aff. *X. retropunctata* (Aruta, 1982)

(Fig. 6.18)

Material: one complete carapace.

Type locality: The Salakta sampling station (SAL) located about 3 km northward Salakta village (35°24'18"N 11°00'12" E), Tunisia.

Type horizon: late Messinian.

4. Conclusion

This paper represents the conclusion of the systematic study of the marine ostracod fauna coming from the late Messinian sedimentary levels of the Oued El Bir Formation out crop in two stratigraphic sections in eastern Tunisia. It represents a further contribution to the knowledge of the little studied Messinian ostracod fauna in this Mediterranean region. Overall, among the dozens of species found, forty-eight of them have been considered as new, described and figured. All the marine taxa found are referable to environments certainly located between the lower Infralittoral and the upper Circalittoral zone of the Continental Shelf.

Further studies and species findings will contribute to increase the knowledge of the stratigraphic and geographical distribution of these new species.

Résumé

La faune d'ostracodes de deux coupes stratigraphiques du Messinien supérieur dans l'est de la Tunisie a été analysée; la première section (section Salakta-SAL), est située au sud du Cap Bon, la seconde (section Wadi el Kebir-OK) dans la région du Sahel. Dans les deux sections, la faune d'ostracodes marins peu profonds est dominante, mais on a également trouvé des taxons se rapportant au faciès bien défini de Lago Mare. Dans les niveaux marins d'eau peu profonde, plusieurs taxons d'ostracodes ont été reconnus; dont certains, en raison de leurs particularités morphologiques, ont été décrits comme de nouvelles espèces. Dans la première contribution sur les ostracodes du Messinien supérieur de la Tunisie orientale, ont été décrits vingt-quatre taxons. Désormais, une seconde série de soixante taxons d'ostracodes marins d'eau peu profonde, provenant des niveaux sédimentaires de la Formation de l'Oued El Bir, considérés comme inconnus ou peu connus jusqu'à présent, sont systématiquement répertoriés ci-dessous, décrits et illustrés. Ils appartiennent aux genres *Cytherella*, *Bairdia*, *Cushmanidea*, *Cytheridea*, *Cyamo-cytheridea*, *Miocyprideis*, *Aurila*, *Cimbourila*, *Peteraurila*, *Urocythere*, *Cal-listocythere*, *Leptocythere*, *Mediocytherideis*, *Loxoconcha*, *Loxoconchissa*, *Sagmatocythere*, *Neomonoceratina*, *Carinocythereis*, *Chrysocythere*, *Cistacythereis*, *Keijella*, *Mutilus*, *Neocytheretta*, *Okadaleberis*, *Verrucocythereis*, *Cytheretta*, *Xestoleberis*.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors are grateful to the Editors and to the Referees for the valuable suggestions and correction on the manuscript. Special thanks are due also to Mr. Alfio Viola (Electronic microscopy laboratory, Earth Science Section, Catania University) for SEM assistance. Palaeoecological Research Group contribution n. 476. This research was supported by the University of Catania, Progetto PiaCeRi "Biodiversità e paleo-biodiversità di invertebrati e macroalghe di ambienti marini" - Piano Incentivi per la Ricerca di Ateneo 2020-22 linea di intervento 2.

References

- Aruta, L., 1982. Gli ostracodi del Saheliano (Miocene medio-superiore) di C. Pestavecchia (Bonfornello, Palermo). *Bollettino della Società Paleontologica Italiana* 21 (1), 113–132.
- Aruta, L., Ruggieri, G., 1980. Nuovo ostracode marino del Saheliano dell'Italia meridionale. *Bollettino della Società Paleontologica Italiana* 19 (1), 21–24.
- Athersuch, J., 1976. On *Sagmatocythere napoliana* (Puri). *Stereo-Atlas of Ostracod Shells* 3, 117–124. available online at <http://www.biodiversitylibrary.org/bibliography/11769>.
- Baird, W., 1850. *The Natural History of the British Entomostraca*. Ray Society, London, pp. 138–182.
- Ben Salem, H., 1998. Les formations miocènes post-Saouaf des environs de Nabeul (Cap Bon) et leurs équivalents offshore et en Tunisie sud atlasique. *Notes du Service Géologique de Tunisie* 64, 123–128.
- Blake, C., 1933. Order Ostracoda. In: Proctor, W (Ed.), *Biological Survey of the Mount Desert Region*. Part V. Wistar Institute of Anatomy and Biology, Philadelphia, pp. 229–241 available online at.
- Bonaduce, G., Ruggieri, G., Russo, A., 1988. New ostracode genera of the Mediterranean Miocene. *Bollettino della Società Paleontologica Italiana* 27, 349–360.
- Bonaduce, G., Ruggieri, G., Russo, A., Bismuth, H., 1992. Late Miocene ostracods from the Ashtart 1 well (Gulf of Gabes, Tunisia). *Bollettino della Società Paleontologica Italiana* 31 (1), 3–93.
- Bosquet, J., 1852. Description des Entomostracés fossiles des Terrains Tertiaires de la France et de la Belgique. *Mémoires Couronnés et Mémoires des Savants Étrangers* 24, 1–142.
- Brady, G.S., 1866. On new or imperfectly known species of marine Ostracoda. *Transactions of the Zoological Society of London* 5, 359–393.
- Brady, G.S., 1868. Contributions to the study of the Entomostraca III. Marine Ostracoda from Tenedos. *The Annals and magazine of natural history; zoology, botany, and geology* 4 (2), 220–225.
- Burollet, P.F., 1951. Étude géologique des bassins Mio-Pliocènes du Nord-Est de la Tunisie: Région entre Mateur, Ferryville et Porto-Farina. *Annales des Mines et de la Géologie* 8, 1–94.
- Colleuil, B., 1976. Diplôme d'Études Supérieures de Sciences Géologiques. In: Étude stratigraphique et néotectonique des formations néogènes et quaternaires de la région de Nabeul-Hammamet. Cap-Bon, Tunisie). Université de Nice, pp. 1–86.
- Cushman, J.A., 1906. Marine Ostracoda of Vineyard Sound and adjacent waters. *Proceedings of the Boston Society of Natural History* 32 (10), 359–385.
- Dall'Antonia, B., Bossio, A., 2001. Ostracoda from the lower Messinian of Lampedusa Island: systematics and chronostratigraphical significance. *Bollettino della Società Paleontologica Italiana* 40 (1), 81–96.
- Doruk, N., 1973. On *Keijella hodgii* (Brady). *Stereo-Atlas of Ostracod Shells* 1, 53–56.
- Faranda, C., Cipollari, P., Cosentino, D., Gliozzi, E., Pipponzi, G., 2008. Late Miocene ostracod assemblages from eastern Mediterranean coral reef complexes (central Crete, Greece). *Revue de Micropaléontologie* 51, 287–308.
- Fischer, S., 1855. Beitrag zur Kenntnis der Ostracoden. *Abhandlungen der Mathematisch-Physikalischen Classe der koeniglich-Beyerischen Akademie der Wissenschaften* 7 (3), 635–666. available online at <https://www.biodiversitylibrary.org/page/11391803>.
- Frigui, M., Ben Youssef, M., Ouaja, M., 2016. Evidences of "Lago-Mare" episode around the Messinian-Pliocene boundary in eastern Tunisia (central Mediterranean). *Journal of African Earth Sciences* 123, 57–74.
- Gross, M., 2002. Middle Miocene ostracodes from the Vienna Basin (Badenian-Sarmatian, Austria). *Dissertation Institut für Geologie und Paläontologie Karl Franzens Universität Graz*. Verlag der Österreichischen Akademie der Wissenschaften, Wien, p. 224 pp.
- Guernet, G., 2005. Ostracodes et stratigraphie du Néogène et du Quaternaire méditerranéens. *Revue de Micropaléontologie* 48, 83–121.
- Hanai, T., 1957. Studies on the Ostracoda from Japan. I. Subfamily Leptocytherinae, new subfamily. *Journal of the Faculty of Science of the University of Tokyo* 10, 431–468.
- Hartmann, G., Puri, H.S., 1974. Summary of neontological and paleontological classification of Ostracoda. *Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut* 70, 7–73.

- Horne, D.J., Bruce, A., Whittaker, J.E., 2001. Ostracoda. In: European Register of Marine Species. A check-list of the marine species in Europe and a bibliography of guides to their identification. In: Collection Patrimoines Naturels, 50. Muséum National d'Histoire Naturelle, Paris, pp. 244–251.
- Jones, T.R., 1849. A monograph of the entomostraca of the Cretaceous formation in England. Palaeontological Society, UK, p. 41 pp.
- Kingma, J.T., 1948. Contributions to the knowledge of the Young-Caenozoic Ostracoda from the Malayan region. University of Utrecht 1–118 pp., available online at <http://dspace.library.uu.nl/handle/1874/236218>.
- Kollmann, K., 1960. Cytherideinae und Schulerideinae n. subfam. (Ostracoda) aus dem Neogen des östlichen Österreich. Mitteilungen der Geologischen Gesellschaft in Wien 51 (4), 89–195.
- Krstić, N., Pietrzenuk, E., 1972. *Pajjenborchella (Eopajjenborchella) laskarevi*, eine Ostracodenart aus dem Oberen Torton des Pannonischen Beckens. Géologie 21, 100–109.
- Latreille, P.A., 1806. Genera crustaceorum et insectorum secundum ordinem naturalem in familias disposita, iconibus exemplisque plurimis explicata. A. Koenig. Parisiis et Argentorati 303 pp.
- Ligos, S., Bossio, A., Gliozzi, E., 2008. New species of *Mediocytherideis* (Ostracoda, Mediocytherideisinae) in the brackish Messinian of Italy. Bollettino della Società Paleontologica Italiana 47 (2), 147–167.
- M'Coy, F., 1844. A synopsis of the characters of the Carboniferous limestone fossils of Ireland Dublin University Press, Dublin.
- Malz, H., Jellinek, T., 1984. Marine Plio/Pleistozän-Ostracoden von SE-Lakonien (Peloponnes, Griechenland). Senckenbergiana Biologica 65 (1-2), 113–167.
- Mandelstam, M.I., 1956. Rod *Mediocytherideis* gen. nov. In: In: Mandelstam, M.I., Schneider, G.F., Zanina, I.E. (Eds.), Order Ostracoda. New families and genera of Invertebrates. In: Order Ostracoda. New families and genera of Invertebrates, 12. Vses. Nauchnoissled. Geol. Inst. Russian Geological Research Institute (VSEGEI), pp. 137–138 in Russian.
- Mandelstam, M.I., 1960. Subfamily Mediocytherideinae subfam. In: Trilobitomorpha and Crustacea. USSR, Osnovy Paleontologii, p. 127 edited by Yu. A. Orlov.
- Mandelstam, 1959, In: Hanai, T., 1970. Studies on the ostracod subfamily Schizocytherinae Mandelstam. Journal of Paleontology 44, 693–729.
- Martin, J.W., Davis, G.E., 2001. An Updated Classification of the Recent Crustacean. Natural History Museum of Los Angeles County, science series, Los Angeles.
- Morkhoven van, F.P.C.M., 1963. Post-paleozoic Ostracoda. Their Morphology. Taxonomy and Economic Use. Elsevier Publishing Company, Amsterdam, p. 204 pp.
- Müller, G.W., 1894. Die Ostracoden des Golfes von Neapel und der angrenzenden meeresabschnitte. Fauna und Flora des Golfes von Neapel 404 pp.
- Münster von, G., 1830. Ueber einige fossile Arten *Cypris* (Müller, Lamk.) und *Cythere* (Müller, Latreille, Desmarest). Jahrbuch für Mineralogie, Geognosie. Geologie und Petrefaktenkunde 1, 60–67.
- Neviani, A., 1928. Ostracodi fossili d'Italia I. Vallebiaja (Calabriano). Memorie della Pontificia Accademia delle Scienze. Nuovi Lincei 11, 1–120.
- Oertli, H.J., 1956. Ostrakoden aus der oligozänen und miozänen Molasse der Schweiz. Schweizerische Palaeontologische Abhandlungen 74, 1–119.
- Papadopoulou, P., Tsoni, M., Iliopoulos, G., 2020. Pleistocene ostracods from central and southern Greece: The marine and brackish record. Revue de Micropaléontologie 69, 100448 December 2020.
- Pokorny, V., 1955. Contribution to the Morphology and Taxonomy of the Subfamily Hemicytherinae Puri. Acta Universitatis Carolinae 2, 1–36.
- Puri, H.S., 1953. The ostracode genus *Hemicythere* and its allies. Journal of the Washington Academy of Sciences 43, 169–179.
- Puri, H.S., 1963. Preliminary notes on the Ostracoda of the Gulf of Naples. Experientia 19, 1–6.
- Puri, H.S., 1974. WoRMS Editorial Board., 2021. World Register of Marine Species Available on line at <https://www.marinespecies.org at VLIZ>. Accessed 2021-05-10. doi:10.14284/170.
- Puri, H.S., Bonaduce, G., Gervasio, A.M., 1969. Distribution of ostracod in the Mediterranean. The Taxonomy, Morphology and Ecology of Recent Ostracoda P. 356–411. Oliver & Boyd, Edinburgh Neale J. W. (Ed.).
- Reuss, A.E., 1850. Die fossilen Entomostraceen des oesterreichischen Tertiaerbeckens. Naturwissenschaftliche Abhandlungen 3, 41–92.
- Roemer, F.A., 1838. Die Cytherinen des Molasse-Gebirges. Neues Jahrbuch fuer Mineralogie. Geognosie, Geologie und Petrefaktenkunde 5, 514–519.
- Roemer, F.A., 1841. Die Versteinerungen des norddeutschen Kreidegebietes. Hannover, p. 145 pp.
- Ruggieri, G., 1950. Gli Ostracodi delle sabbie grigie quaternarie (Milazziano) di Imola (I). Giornale di Geologia ser 2 (21), 1–58.
- Ruggieri, G., 1953. Età e faune di un terrazzo marino sulla costa ionica della Calabria. Giornale di Geologia. ser 2a (23), 19–168.
- Ruggieri, G., 1956. La suddivisione degli ostracodi già compresi nel genere *Cythereis* proposta da Neviani nel 1928. Atti Società Italiana di Scienze Naturali 95 (2), 161–175.
- Ruggieri, G., 1958. Alcuni ostracodi del Neogene italiano. Atti Società Italiana di Scienze Naturali (Milano) 97 (2), 127–146.
- Ruggieri, G., 1962. Gli Ostracodi marini del Tortoniano (Miocene medio-superiore) di Enna, nella Sicilia centrale. Palaeontographia Italica 56 (2), 1–68.
- Ruggieri, G., 1967. Due Ostracofaune del Miocene Allectone della Val Marecchia (Appennino Settentrionale). Rivista Italiana di Paleontologia e Stratigrafia 73 (1), 351–384.
- Ruggieri, G., 1975. Contributo alla conoscenza del genere *Aurila* (Ostracoda, Podocopa) con particolare riguardo ai suoi rappresentanti nel Pleistocene italiano. Bollettino della Società Paleontologica Italiana 14, 27–46.
- Ruggieri, G., 1976. Ostracofauna tortoniana di Camporosso (Percicara, Apennino romagnolo). Bollettino della Società Paleontologica Italiana 15/2 175–18.
- Ruggieri, G., 1980. Sulla distribuzione stratigrafica di alcuni ostracodi nel Pleistocene italiano. Bollettino della Società Paleontologica Italiana 19 (1), 127–135.
- Ruggieri, G., Russo, A., 1980. Due nuovi generi di Ostracodi marini del Miocene superiore italiano. Bollettino della Società Paleontologica Italiana 19 (1), 25–35.
- Sars, G.O., 1922–1928. An account of the Crustacea of Norway. 9 Crustacea, Bergen Museum, pp. 1–277.
- Sars, G.O., 1865. WoRMS Editorial Board, 2021. World Register of Marine Species Available on line at <https://www.marinespecies.org at VLIZ>. Accessed 2021-05-10. doi:10.14284/170.
- Sars, G. O., 1866. Oversigtog Norges marine Ostracoder. Forhandlinger i videnskabs selskabet i Christiania: 130 p.
- Schweyer, A.V., 1949. On the Pliocene ostracoda of the northern Caucasus and lower Volga region with some new data on the systematics of fossil ostracods. Trudy V.N.I.G.R.I 30, 7–68 in Russian.
- Sciuto, F., Temani, R., Hayet Khayati, A., 2021. Late Messinian ostracods from Eastern Tunisia. Revue de Micropaléontologie 71 (2021), 100467.
- Seguenza, G., 1883. Il Quaternario di Rizzolo. Il Gli Ostracodi. Naturalista Siciliano anno III (1) 16–22.
- Sissingh, W., 1972. Late cenozoic ostracoda of the South Aegean Island Arc. Utrecht Micropaleontological Bulletin 6, 1–187.
- Stambolidis, E.A., 1980. Drei neue Cytherellidae aus der Nord-Ägäis (Crustacea: Ostracoda: Podocopida). Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut 77, 205–209.
- Sylvester-Bradley, P.C., 1948. The ostracode genus *Cythereis*. Journal of Paleontology 22 (6), 792–797.
- Temani, R., Hayet, K. H., Sciuto, F., 2018. New reports of Messinian Lago-Mare episodes from Tunisia: Ostracods and paleoenvironmental implications. In: Zhang, Z. et al. (Eds.), Patterns and mechanisms of climate, paleoclimate and paleoenvironmental changes from low-latitude regions.- Advances in Science, Technology & Innovation. Springer, pp. 69–71.
- Temani, R., Sciuto, F., Hayet Khayati, A., 2020. Messinian Lago-Mare ostracods from Tunisia. Carnets de Géologie 20 (17), 315–331.
- Terquem, O., 1878. Les foraminifères et les entomostracés ostracodes du Pliocène supérieur de l'île de Rhodes. Deuxième Section (ostracodes). Mémoires de la Société Géologique de France 3, 81–135.
- Triebel, E., 1952. Amendement à la subfamille Cytherettinae Triebel 1952 (Famille Cytherettidae (Triebel) Howe 1961). In: Proceedings 3rd African Micropaleont. Colloquium (NIDOC - Nat. Info Doc. Centre, Cairo), pp. 317–323.
- Triebel, E., Malz, H., 1969. Normale und inverse Gehäuse bei den Loxoconchinae (Ostracoda): *Loxoconchissa* n.g. Senckenbergiana Lethaea 50, 447–463.
- Uliczny, F., 1969. Hemicytheridae und Trachyleberididae (Ostracoda) aus dem Pliozän der Insel Kephallina (Westgriechland). Unpublished Dissertation Universität München, p. 152.
- Wood, A., 2005. Revision of the ostracod genus *Celtia* Neale, 1973 and other so-called 'tricostate' Trachyleberidinae from the Neogene to Recent of Europe. Bollettino della Società Paleontologica Italiana 44 (1), 55–80.
- WoRMS Editorial Board, 2021. World Register of Marine Species. Available on line at <https://www.marinespecies.org at VLIZ>. Accessed 2021-05-10. doi:10.14284/170
- Zorn, I., 2003. Ostracoda from the Gaidorf Formation (Middle Miocene, Lower Badenian) of Mühlbach (Molasse Basin, Lower Austria). Annalen des Naturhistorischen Museums in Wien, pp. 77–84 104 A.

Further readings

- Baird, W., 1838. The Natural History of the British Entomostraca. Magazine of Zoology and Botany 2, 132–144.
- Krstić, N., Pietrzenuk, E., 1972. *Pajjenborchella (Eopajjenborchella) laskarevi*, eine Ostracodenart aus dem Oberen Torton des Pannonischen Beckens. Géologie. Géologie 21, 100–109.
- Ruggieri, G., 1950. Gli Ostracodi delle sabbie grigie quaternarie (Milazziano) di Imola. Giornale di Geologia ser. 2, 21, 1–58.
- Ruggieri, G., 1958. Alcuni ostracodi del Neogene italiano. Atti Società Italiana di Scienze Naturali (Milano) 97 (2), 127–146.
- Ruggieri, G., 1975. Contributo alla conoscenza del genere *Aurila* (Ostracoda, Podocopa) con particolare riguardo ai suoi rappresentanti nel Pleistocene italiano. Bollettino della Società Paleontologica Italiana 14, 27–46.