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CYTHERACEA (OSTRACODA) FROM THE UPPERMOST CRETACEOUS AND LOWERMOST TERTIARY OF POLAND

Abstract. — Ostracods of the superfamily Cytheracea from the Uppermost Cretaceous and Lowermost Tertiary of central and north Poland are studied. Of the 63 species and subspecies described, 23 species and 2 subspecies are new. One new genus, *Pulaviella*, is erected. The variability, ontogenetic development and sexual dimorphism of the described species are analysed. The geographical and stratigraphical distribution of studied Ostracoda and their comparison with those of Foraminifera are discussed.

INTRODUCTION

The Uppermost Cretaceous, Danian and Paleocene ostracods from Poland have not been investigated so far. The studies on the ostracods of this age were started by the present author in 1961. The first results of these studies, dealing only with one genus, i. e. *Monoceratina* Roth, represented by 17 species, were published in 1964 (Szczechura, 1964). The present elaboration takes in 29 genera (of this number, 1 new), 61 species (of this number, 23 new) and 2 new subspecies, belonging to the superfamily Cytheracea. The remaining superfamilies, well represented in the material collected, will be elaborated in future.

A detailed analysis of the species morphology is the main aim of the present paper. It is especially important since, although it concerns many well-known species, it is more than once that this study allows one to complete the lacking data on their morphology, particularly on the internal morphology which make up a basis for considerations of their taxonomic position. A chronological and regional distributions, in Poland and abroad, are given. The author compares the results obtained with the results of investigations on the chronological and regional distribution of foraminifers, most of them coming from the same samples. A discussion

of the importance of some morphological characters of the carapace to the taxonomy of ostracods is also included in the general part of the present paper. The descriptions of some species include data on their ontogeny, variation and presumable affinity to other species.

The samples investigated come from the borings at Pamiętowo near Chojnice, Pomerania (Maastrichtian, Dano-Paleocene and Eocene), at Sochaczew near Warsaw (Maastrichtian, Dano-Paleocene) and Lucimia, Chotcza and Kazimierz (Maastrichtian).

The samples from Pamiętowo and Sochaczew, which constitute the property of the Geological Institute, have been obtained by the present author by courtesy of Professor W. Pożaryski. The samples from the vicinities of Puławy and Mielnik come from the collections of Professor K. Pożaryska and Professor W. Pożaryski.

Professor K. Pożaryska and Professor W. Pożaryski have also been so kind as to make available to the author many comparative samples they personally collected in Poland and abroad, such as those from the Maastrichtian of Germany (Rügen Island), from the Maastrichtian and Danian of Holland, from the Maastrichtian, Danian and Paleocene of Belgium, from the Danian and Paleocene of Denmark and Sweden, from the Danian of the Crimea, from the Danian and Paleocene of Georgia, as well as from the Upper Cretaceous and Paleocene of North America. The samples from the Campanian of Miały near Grodno (Belorussian S. S. R.) constitute Docent J. Małecki's contribution.

The present elaboration has been prepared at the Palaeozoological Institute of the Polish Academy of Sciences, under the guidance of Professor K. Pożaryska.

To all these persons and to the management of the Geological Institute who contributed to this work, the present author wishes to express her gratitude and thanks. Many thanks are also due to Professor R. Kozłowski for his valuable critical remarks, to Dr. J. Neale, University of Hull, and to Dr. P. Kaye, University of Reading, England, for remarks and comparative materials, to Dr. H. V. Howe, University of Louisiana, U.S.A., to Professor R. Marlière, Faculté Polytechnique de Mons, Belgium, to Mr. B. C. King, University College, London, and to Dr. F. Brotzen, Geological Survey of Stockholm, for comparative materials, to Dr. A. J. Keij, B.S.P. Co., Borneo, and to Dr. G. Deroo, Institut Français du Pétrole, Rueil-Malmaison, France, for their opinions on assigning the species. The author expresses also her thanks to Miss L. Łuszczewska for taking photographs, and to Mrs. E. Gadomska for inking drawings of seven plates on the basis of the author's pencil sketches and for preparing two tables.

The material described is housed at the Palaeozoological Institute of the Polish Academy of Sciences where it is given the catalogue numbers of O. II/212 to 520.

GENERAL PART

MATERIAL AND CHARACTERISTIC OF BORINGS AND OUTCROPS

The facial development of the Uppermost Cretaceous and the Lowermost Tertiary is different in various regions of the Central and North Poland.

List of samples and their age

Borings and outcrops	Number of samples	A g e
Borings:		
1) Pamiętowo	20	Lower Maastrichtian-Danian-Paleocene (+ Lower Eocene)
2) Sochaczew	17	Upper Maastrichtian-Danian-Paleocene
Outcrops:		
3) Mielnik	4	Upper Campanian-Lower Maastrichtian
4) Lucimia	1	Upper Maastrichtian
5) Bochotnica	16	Upper Maastrichtian-Danian-Paleocene
6) Nasiłów	11	Upper Maastrichtian-Paleocene

1) *Boring at Pamiętowo near Chojnice, Pomerania*

The foraminifers from this boring have been described by Brotzen and Pożaryska (1961) and by Pożaryska (1965). It has been stated by these authors that this boring contains the Maastrichtian beds, developed in the form of limestones, as well as Danian and Paleocene, represented by sandy limestones, passing into detritic limestones of the "Tuffeau" type with cherts. The overlaying Lower Eocene sediments are developed in the form of sandy marls with limestone intercalations.

2) *Boring at Sochaczew near Warsaw*

The stratigraphy of this boring has been elaborated by Pożaryska (1964, 1965). Among other deposits, this boring comprises the Upper Maastrichtian, developed as calcareous-siliceous beds which pass upwards into sandy sediments, underlying the Danian and Paleocene argillaceous marls.

3) *Outcrop at Mielnik on the Bug River*

The stratigraphy of this section, outcropped in a quarry, situated near Góra Zamkowa, was, on the basis of the foraminifers, described by Bieda (1958) and, on the basis of macrofauna, by Pożaryski (1960). The Upper Campanian and Lower Maastrichtian which occur in this quarry are developed in the chalk facies.

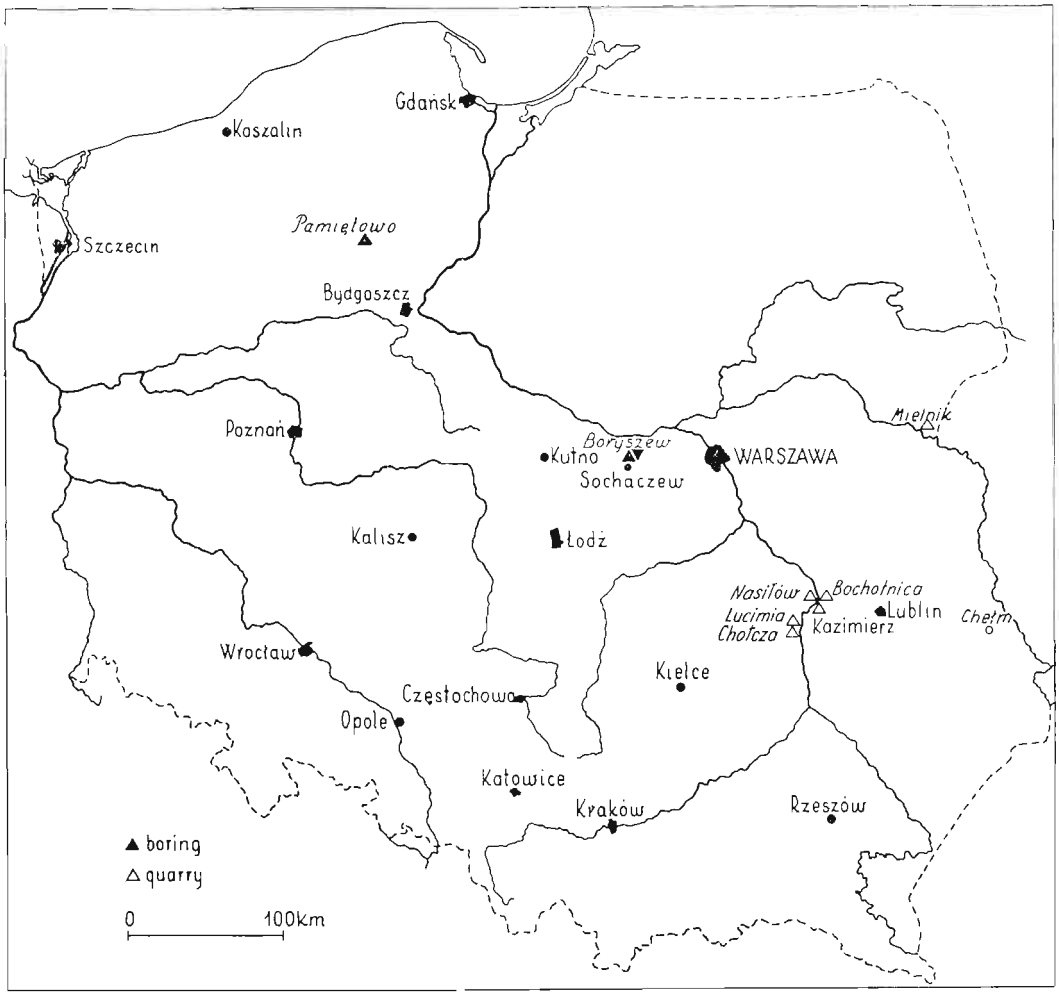

Fig. 1. — Distribution of borings and quarries.

4—6) *Outcrops at Lucimia, Bochotnica and Nasiłów on the Vistula River*

The stratigraphy and lithology of the region in which the outcrops, mentioned above, are situated in the Vistula river valley, were elaborated by Pożaryski (1938) on the basis of the macrofauna and Pożaryska (1954, 1957, 1965) on the basis of the foraminifers. At Bochotnica, the Upper Maastrichtian outcrops in the form of a calcareous "opoka" with marly intercalations and above a layer of the limestone. On this layer, strongly reduced, sandy-glauconite Danian sediments rest, as well as the Paleocene "gaize" bed, containing calcareous intercalations and forming the so-called "siwak" series. At Nasiłów, there is no Danian. The Upper Maastrichtian at Lucimia is developed in chalk facies.

From about 70 samples, coming from the borings and outcrops, mentioned above, over 6,000 single valves or complete carapaces, belonging to the superfamily Cytheracea, have been selected. In addition, there are in the studied collection the representatives of the superfamilies Bairdiacea and Cypridacea, as well as the representatives of the family Cytherellidae, which have not been taken into account in the present paper.

OSTRACODA (CYTHERACEA) IN THE UPPERMOST CRETACEOUS AND THE LOWERMOST TERTIARY OF POLAND

The occurrence of the species, described in the present paper, is shown on the Tables 1 and 2. The distribution of particular species in samples from the borings and outcrops under study is shown on the Table 1. The final stratigraphic results, concerning the Uppermost Cretaceous and the Lowermost Tertiary of North and Central Poland, obtained on the basis of ostracods, are presented on the Table 2.

The analysis of the spacial distribution of the Cytheracea species which occur in the sections, discussed above, confirms the stratigraphic boundary, determined on the basis of foraminifers, between the Uppermost Cretaceous and the Lowermost Tertiary which coincides with the boundary between the Maastrichtian and the Danian. However, it does not allow one to separate the Danian from the Paleocene which could have been done on the basis of foraminifers (Pożaryska, 1965). For this reason, the present author uses the term, the Dano-Paleocene, as one of the stratigraphic units of the Lowermost Tertiary. Maybe, future elaborations of the remaining groups of Ostracoda will allow one to divide the Dano-Paleocene into two separate stratigraphic units. The concept of the Dano-Paleocene has been used until recently in Polish geological literature (K. & W. Pożaryski, 1959, 1960; Gawor-Biedowa & Witwicka, 1960) in reference to the oldest Tertiary sediments.

In the author's opinion, the Danian together with the Paleocene belong to the Tertiary since almost all species of the Ostracoda, occurring in the Paleocene, may already be found in the Danian, similarly as most Paleocene foraminifers (Pożaryska, 1965).

UPPERMOST CRETACEOUS

The following ostracod fauna have been distinguished in the investigated Cretaceous beds (Upper Campanian and Lower and Upper Maastrichtian:

Table 1

DISTRIBUTION OF OSTRACODA IN SAMPLES FROM THE UPPERMOST CRETACEOUS AND LOWERMOST TERTIARY OF POLAND

Species

Metres

Pamiętowo

L. Maastrichtian: 300,2 | 294 | 286,5 | 283,4 | 278,8 | 276,2 | 275

Dano - Paleocene: D. | Paleocene: 274,5 | 273,4 | 263,8 | 257 | 250,5 | 243 | 241 | 231 | 228 | 223

L. Eocene: 215 | 210,7 | 208

Sochaczew

U. Maastrichtian: 278,8 | 272 | 271 | 267

Dano - Paleocene: D. | Paleocene: 265,2 | 263,8 | 261 | 258 | 256,8 | 254,5 | 249 | 233,9 | 224,9-227,3 | 215 - 216 | 208 - 210,6 | 202,9 | 194

Bochotnica

U. Maastrichtian: -7,5 | -6 | -4,5 | -3 | -1,5 | hard ground

Dano - Paleocene: D. | Paleocene: 0,0-0,5 | 1 | 1,5 | 2,8 | 3,8 | 4,9 | 5,7 | 6,6 | 8,5 | 10,7

Nasiłów

U. Ma: -2

Dano - Paleocene: Paleocene: 2 | 3 | 4 | 7 | 9 | 11 | 13 | 15 | 19 | 21

Mielnik

U. Cm.: -27 | hard ground

L. Ma.: 1,5 | 1,1

Lu

U. Ma

Species	Pamiętowo	Sochaczew	Bochotnica	Nasiłów	Mielnik	Lu
Brachycythere pustulosa marlieri n.subs.						
Pterygocythereis tuberculata (Veen)						
P. phylloptera (Bosquet)						
P. serrulata (Bosquet)						
P. pamientoviensis n.sp.						
Kingmaina opima n.sp						
Kikliocythere? nitida n.sp						
Paracytheretta reticosa Triebel						
Protocytheretta interrupta (Bosquet)						
P. canaliculata (Apostolescu)						
Aulocytheridea gracilis n.sp						
Cytheridea bosqueti (Veen)						
Cuneocythere (Monsmirabilia) porifera n.sp.						
Clithrocytheridea preciosa (Veen)						
C. arcuata n.sp.						
Schuleridea maculata (Apostolescu)						
Cytheropteron v-scriptum Veen						
Eucytherura tumida Bonnema						
E. squamifera Veen						
E. dorsotuberculata Veen						
E. bicornis Veen						
E. derupta n.sp.						
Paracytheridea cf. bosqueti Veen						
Hemicytherura unisulcata Veen						
Triginglymus? cribratus Apostolescu						
T? callosus n.sp						
Xestoleberis pergensi Veen						
Uroleberis? mazoviensis n.sp.						
Cythereis (Trachyleberis) aculeata (Bosquet)						
C. (Trachyleberis) horridula (Bosquet)						
C. bispinifera (Veen)						
C. lonsdaleiana Jones						
C. (Mauritsina) hieroglyphica (Bosquet)						
C. cf. nodulosa (Bosquet)						
C. ornata (Bosquet)						
C. parva Bonnema						
C. quadridentata (Bosquet)						
C. semiplicata (Reuss)						
C. spinosa n.sp						
C. compressa n.sp.						
C. latebrosa latebrosa n.sp						
C. latebrosa confinis n.sp n.subsp.						
C. (Trachyleberis) incerta n.sp						
C. multifora n.sp.						
C. iucunda n.sp						
C. formosa n.sp						
C. infragilis n.sp						
C. morata n.sp						
C. agatae n.sp						
Trachyleberidea semiplana n.sp						
T. acutiloba (Marsson)						
Echinocythereis aff. aragonensis Oertli						
Phacorhabdotus? texanus Howe & Laurencich						
Veenia pergensi (Veen)						
Schizocythere solida n.sp.						
Amphicytherura chelodon (Marsson)						
A. limburgensis Howe & Laurencich						
A. aculeata (Bonnema)						
Neocythere (Physocythere) virginea (Jones)						
N. (Physocythere) minuticosta n.sp.						
Pseudobytnocythere sigillata n.sp						
Saida elliptica (Bonnema)						
Pulaviella ovata (Bonnema)						

Cm - Campanian, Ma - Maastrichtian, D - Danian; L - Lower, U - Upper, Lu - Lucimia.

Numbers of samples refer to the depth (in m.) which they come from.

Table 2

Stratigraphy of the Uppermost Cretaceous and Lowermost Tertiary in Poland determined on the basis of Ostracoda

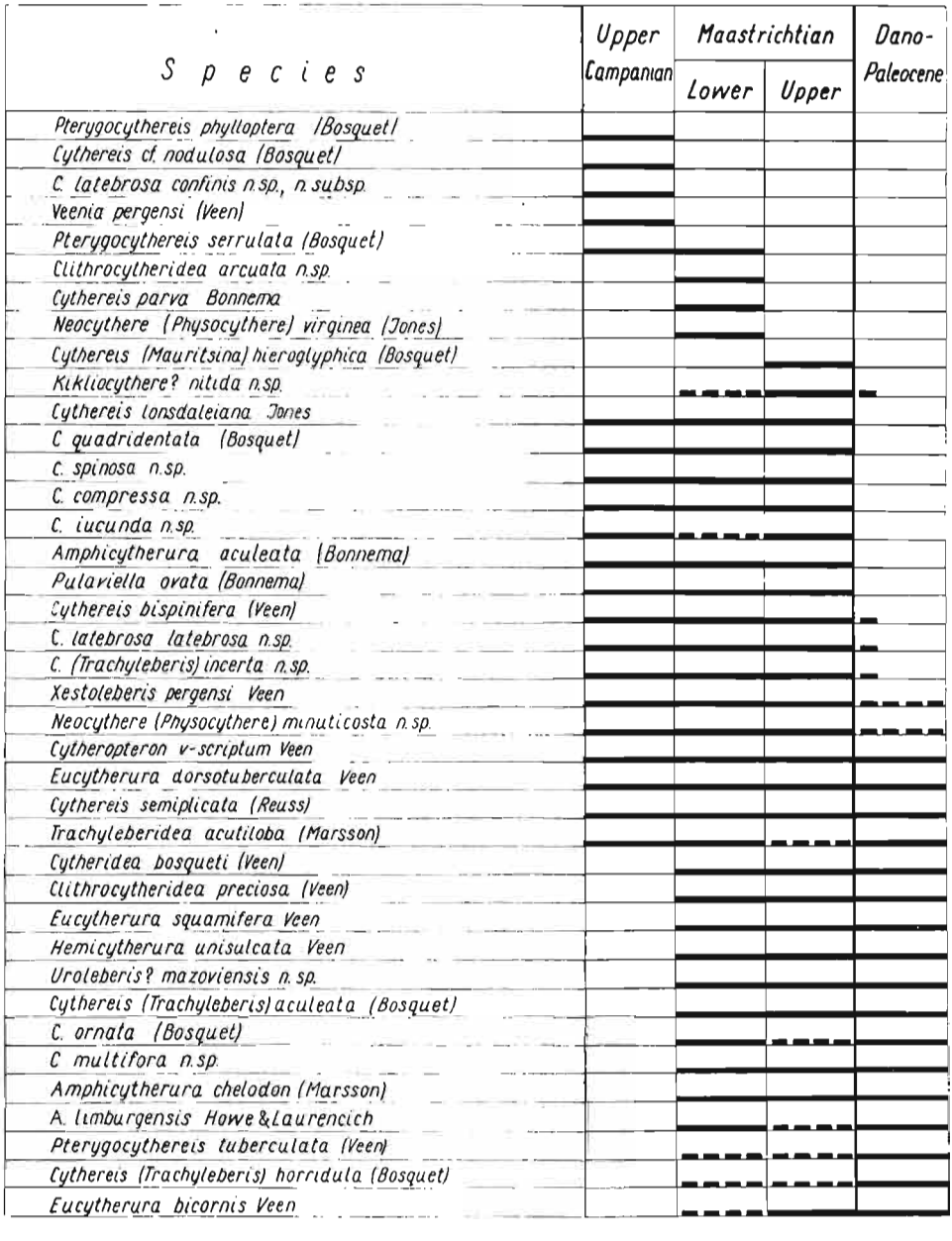

Table 2

(*continued*)

Species	Upper Campanian	Maastrichtian		Dano-Paleocene
		Lower	Upper	
Brachycythere pustulosa marlieri n.subsp.				
Pterygocythereis pamientoviensis n.sp.				
Kingmaina opima n.sp.				
Paracytheretta reticosa Triebel				
Protocytheretta interrupta (Bosquet)				
P. canaliculata (Apostolescu)				
Aulocytheridea gracilis n.sp.				
Cuneocythere (Monsmirabilia) porifera n.sp.				
Schuleridea maculata (Apostolescu)				
Eucytherura tumida Bonnema				
E. derupta n.sp.				
Paracytheridea cf. bosqueti Veen				
Triginglymus? cribratus Apostolescu				
T.? callosus n.sp.				
Cythereis formosa n.sp.				
C. infragilis n.sp.				
C. morata n.sp.				
C. agatae n.sp.				
Trachyleberidea semiplana n.sp.				
Echinocythereis aff. aragonensis Oertli				
Phacorhabdotus? texanus Howe&Laurencich				
Schizocythere solida n.sp.				
Pseudobythocythere sigillata n.sp.				
Saida elliptica (Bonnema)				

The boundary between the Danian—Paleocene and Paleocene—Eocene is based on Foraminifera.

Upper Campanian

Veenia pergensi (Veen), *Cythereis* cf. *nodulosa* (Bosquet), *C. latebrosa confinis* n.sp. n. subsp. and *Pterygocythereis phylloptera* (Bosquet). No representatives of these species have been found in younger layers. The valves of *Pterygocythereis serrulata* (Bosquet), a species also occurring in the Lower Maastrichtian, have been found in the Upper Campanian as well as *Cythereis quadridentata* (Bosquet), *C. lonsdaleiana* Jones, *C. compressa* n.sp., *C. iucunda* n.sp., *C. spinosa* n.sp., *Amphicytherura aculeata* (Bonnema) and *Pulaviella ovata* (Bonnema) which occur in the Lower and Upper Maastrichtian and which have not been found in the Tertiary sediments. *Cythereis bispinifera* (Veen), *C. latebrosa latebrosa* n.sp. and *C. (Trachyleberis) incerta* n.sp., found in the Upper Campanian, slightly exceed the boundary between the Cretaceous and the Tertiary, while *Xestoleberis pergensi* Veen and *Neocythere (Physocythere) minu-*

ticosta n.sp. occur, as single individuals, in the upper part of Dano-Paleocene. *Cythereis semiplicata* (Reuss), *Trachyleberidea acutiloba* (Marsson), *Cytheropteron v-scriptum* Veen and *Eucytherura dorsotuberculata* Veen, frequently found in both the Upper Campanian and the Dano-Paleocene, seem to be less important.

Lower Maastrichtian

In addition to the species which pass here from the Upper Campanian, *Cythereis parva* Bonnema, *Neocythere (Physocythere) virginea* (Jones), *Clithrocytheridea arcuata* n.sp., which have not been recorded in younger sediments, appear in the Lower Maastrichtian along with the following species, passing to the Upper Maastrichtian and the Dano-Paleocene: *Cythereis (Trachyleberis) aculeata* (Bosquet), *C. ornata* (Bosquet), *C. (Trachyleberis) horridula* (Bosquet), *C. multifora* n.sp., *Eucytherura squamifera* Veen, *E. bicornis* Veen, *Amphicytherura chelodon* (Marsson). *A. limburgensis* Howe & Laurencich, *Pterygocythereis tuberculata* (Veen), *Cytheridea bosqueti* (Veen), *Clithrocytheridea preciosa* (Veen), *Hemicytherura unisulcata* Veen, *Uroleberis? mazoviensis* n.sp. and *Kikliocythere? nitida* n.sp. The latter species only slightly exceeds the boundary of the Cretaceous and the Tertiary.

Upper Maastrichtian

Cythereis (Mauritsina) hieroglyphica (Bosquet) is the only species found which is limited exclusively to the Upper Maastrichtian.

DANO-PALEOCENE

A dozen or so of all species, occurring in the Dano-Paleocene, appear already in the Upper Cretaceous. However, there are many species which have been found only in the Dano-Paleocene and their ranges are either limited to this layer only, or they pass higher. i. e. to the Eocene (cf. Table 1). The following forms belong to those, appearing as late as in the Dano-Paleocene: *Cythereis morata* n.sp., *C. infragilis* n.sp., *C. formosa* n.sp., *C. agatae* n.sp., *Trachyleberidea semiplana* n.sp., *Triginglymus? cribratus* Apostolescu, *T.? callosus* n.sp., *Protocytheretta interrupta* (Bosquet), *P. canaliculata* (Apostolescu), *Paracytheretta reticosa* Triebel, *Eucytherura tumida* Bonnema, *E. derupta* n.sp., *Brachycythere pustulosa marlierei* n.subsp., *Pterygocythereis pamientoviensis* n.sp., *Paracytheridea* cf. *bosqueti* Veen, *Echinocythereis* aff. *aragonensis* Oertli, *Schizocythere solida* n.sp., *Schuleridea maculata* (Apostolescu), *Aulocytheridea gracilis* n.sp., *Cuneocythere (Monsmirabilia) porifera* n.sp., *Saida elliptica* (Bonnema), *Phacorhabdotus? texanus* Howe & Laurencich and *Pseudobythocythere sigillata* n.sp.

Of the Dano-Paleocene species, mentioned above, which occur in Poland, *Brachycythere pustulosa marlierei* n.subsp., *Pseudobythocythere*

sigillata n.sp., *Pterygocythereis pamientoviensis* n.sp., *Schizocythere solida* n.sp., *Echinocythereis* aff. *aragonensis* Oertli and *Paracytheretta reticosa* Triebel are limited exclusively to the Paleocene, although the first two forms have also been recorded in the Danian sediments outside Poland. The remaining four species, which, in Poland, were found only in the Paleocene of Pamiętowo, probably make up an assemblage of endemic forms or, maybe, they are characteristic of a horizon, not recorded by the present writer in other sections investigated. *Echinocythereis* aff. *aragonensis* Oertli and *Paracytheretta reticosa* Triebel are, outside Poland, also known from the Selandian of Denmark.

The above determined stratigraphic positions of the Ostracoda species, described in the present paper, have been confirmed by the analysis of comparative samples, taken from other parts of Poland, i. e. from the Upper Maastrichtian of Kazimierz and Chotcza on the Vistula and from the Paleocene of Boryszew near Sochaczew, as well as from foreign countries.

OSTRACODA (CYTHERACEA) IN THE UPPERMOST CRETACEOUS AND LOWERMOST TERTIARY OF EUROPE (OUTSIDE THE GEOSYNCLINAL BELTS)

Many comparative samples from the Uppermost Cretaceous and the Lowermost Tertiary, made use of by the present writer, have to a considerable extent been used and described by Pożaryska (1965). In this work a detailed localization of the sections which the samples, mentioned above, come from, is given. Pożaryska describes the foraminifers, found in them and, in addition, on their basis, she correlates corresponding geological horizons of Poland and Europe. The present chapter will, therefore, make up only a complement of the investigations, presented in Pożaryska's paper, the more so as the ostracods, found in comparative material, do not contradict the palaeogeographic and stratigraphic conclusions, drawn by that author on the basis of foraminifers. It should only be mentioned that, on the basis of the ostracods from both Poland and foreign countries, the present author did not succeed in separating the Danian from the Paleocene.

GERMANY (RÜGEN ISLAND)

The ostracods of the Uppermost Cretaceous of the Rügen Island have been described by Marsson (1880) and Herrig (1963). A few species, belonging to the genus *Monoceratina,* are cited in Szczechura's work (1964). The comparative samples from Rügen Island represent the Lower Maastrichtian, developed in the chalk facies and contain the following assemblage of ostracods of the group Cytheracea: *Cythereis parva* Bon-

nema, *C. lonsdaleiana* Jones, *C. latebrosa latebrosa* n.sp., *Pterygocythereis phylloptera* (Bosquet), *Clithrocytheridea arcuata* n.sp., *Neocythere saccata* (Marsson), as well as a few species of the genus *Monoceratina*. Some species, described by Marsson, have been not found by the present writer. Except for *Neocythere saccata* (Marsson), all species, mentioned above, occur in the Maastrichtian of Poland.

U. S. S. R.

The following assemblage of Cytheracea have been found by the present author in the Campanian samples from Miały near Grodno (Belorussian S.S.R.), developed in the chalk facies: *Cythereis lonsdaleiana* Jones, *C.* cf. *nodulosa* (Bosquet), *C. iucunda* n.sp., *Trachyleberidea acutiloba* (Marsson), *Veenia pergensi* (Veen), *Xestoleberis pergensi* Veen, *Pterygocythereis serrulata* (Bosquet), *Amphicytherura aculeata* (Bonnema) and *Neocythere (Physocythere) minuticosta* n.sp. All the species, occurring in that locality, are also characteristic of the Campanian of Poland. No ostracods have been found by the present writer in the samples from the village Mikhailovka, Georgia, Caucasus, in the Danian, developed in the form of limestones with marls and in the Paleocene clayish marly sediments. Very few ostracods were recorded in the samples, coming from the village Skalistoye, in the vicinity of Bakhchisaray near Simferopol, Crimea. The Danian is there developed as detritic limestones. *Cythereis (Trachyleberis) aculeata* (Bosquet), *Pterygocythereis tuberculata* (Veen) and *Cythereis agatae* n.sp., found there, also occur in the Dano-Paleocene of Poland.

DENMARK AND SWEDEN

The ostracods of the Lowermost Tertiary of Denmark have been elaborated by Franke (1927) and Triebel (1941). The ostracods of the Uppermost Cretaceous from that country have not been yet described.

The comparative samples from Denmark come from the Upper Danian, developed as coccolith limestones, and from the Paleocene, in Denmark and Sweden — of the so-called Selandian — developed in the form of glauconitic marly sands. The following species of Cytheracea occur in the Paleocene samples from Lellinge, Zealand: *Trachyleberidea acutiloba* (Marsson), *Cythereis semiplicata* (Reuss), *C. morata* n.sp., *Paracytheretta reticosa* Triebel, *Pterygocythereis* cf. *tuberculata* (Veen) and *Echinocythereis* aff. *aragonensis* Oertli. In the samples, coming from the Paleocene from Hvallöse, Jutland, the author recorded: *Cythereis (Trachyleberis) aculeata* (Bosquet), *Trachyleberidea acutiloba* (Marsson), *Cythereis semiplicata* (Reuss), *C. (Trachyleberis) horridula* (Bosquet) and *Paracytheretta reticosa* Triebel. Of these forms *Trachyleberidea acutiloba* (Marsson), *C. semiplicata* (Reuss), *C. (Trachyleberis) aculeata* (Bosquet),

Phacorhabdotus? texanus Howe & Laurencich, as well as *Cythereis multifora* n.sp., have also been found by the author in the samples from the coccolith limestones of the Upper Danian from the same locality. Specimens, resembling *Phacorhabdotus? texanus* Howe & Laurencich, a species which also occurs in Poland, but of somewhat different shape and structure of the hinge margin, have been found by the author in samples, coming from both these localities. All the species, mentioned above, also occur in the Dano-Paleocene of Poland.

Unfortunately, despite the presence of many, though dwarfed foraminifers, the present writer has not succeeded in finding ostracods either in samples from the sandy-glauconitic sediments of the Selandian (Paleocene) from Klagshamn, Scania, kindly sent in by Dr. F. Brotzen, or in samples from the bryozoan limestones of the Danian from Limhamn, Scania.

BELGIUM

The elaborations, concerning ostracods of the Uppermost Cretaceous and the Lowermost Tertiary of Belgium are rather few. The works by Bosquet (1850) and Marlière (1958) who deal with the Lowermost Tertiary, and by Deroo (1958) who focuses his attention mostly on the Uppermost Cretaceous, seem to be the most important.

The comparative samples of Belgium come from the Mons Basin (from the boring at the Polytechnical College in Mons, kindly sent in by Professor R. Marlière, and from the Ciply quarry), as well as from the area of Southern Limburg (outcroppings at Vroenhoven in the Albert Canal gate), collected by Professor K. Pożaryska and Professor W. Pożaryski. The present author has investigated a few samples from the boring at Mons which, at the depths between 66.5 m. and 155.5 m., contained both the Danian sediments, developed in detritic limestone facies, called Tuffeau de Ciply and the Lower Paleocene, called Montian, developed in the form of limestones, called Calcaire de Mons. *Cytheretta nerva montensis* Marlière, *Triginglymus? cribratus* Apostolescu, *Cythereis* cf. *ornata* (Bosquet) and *C. agatae* n.sp. were found in the material, sampled at a depth of 86.5—87.0 m. *T.? cribratus* have also been found in the sample, taken at depths of 94.5—95.0 m. and 107.0—107.5 m., along with *Cytheretta nerva* Apostolescu. The species, mentioned above, are accompanied by few others, previously elaborated by Marlière (1958) which are absent from the Dano-Paleocene of Poland. No ostracods were found by the present writer in the material sampled at a depth of 141.0—141.5 m. and below.

Three samples from the quarry at Ciply were available to the author: 1) from the hard ground, 2) from the lowermost layers of Tuffeau de Ciply and 3) from the true Tuffeau de Ciply; the latter were taken 16 m. above

its base. In sample 1, *Triginglymus? cribratus* Apostolescu has been recognized, found also in samples 2 and 3. In sample 2, *Cythereis (Trachyleberis) horridula* (Bosquet) and *Pterygocythereis tuberculata* (Veen) occur as well. *Cythereis* cf. *ornata* (Bosquet), *C. (Trachyleberis) horridula* (Bosquet), *C. formosa* n.sp. and *Trachyleberidea semiplana* n.sp. are represented by few specimens each in sample 3. All these species have also been found in the Dano-Paleocene of Poland.

Four samples were obtained by the author from the outcrops at Vroenhoven (on Albert Canal). Two of them come from the Uppermost Maastrichtian and two others — from the layers which are younger than the Maastrichtian and assigned by Meijer (1959) to the Danian. With regard to the lithology, all these samples are typical of "tuffeau". *Cythereis (Mauritsina) hieroglyphica* (Bosquet), *Veenia pergensi* (Veen), *Amphicytherura chelodon* (Marsson) and other species, described by Veen (1936—1938) and Bonnema (1940—1941) from the Maastrichtian of Holland and absent from the Uppermost Cretaceous of Poland, have been recognized by the author in the samples, coming from the Uppermost Maastrichtian. The following species have been discovered in the samples from the deposits overlying the Maastrichtian: *Cythereis (Trachyleberis) horridula* (Bosquet), *C. (Trachyleberis) aculeata* (Bosquet), *C. ornata* (Bosquet), *Trachyleberidea semiplana* n.sp., *Pterygocythereis* cf. *tuberculata* (Veen), *Uroleberis? mazoviensis* n.sp., *Triginglymus? cribratus* Apostolescu and *Pseudobythocythere sigillata* n.sp. This assemblage of species is characteristic of the Dano-Paleocene of Poland.

HOLLAND

We owe the elaboration of the Uppermost Cretaceous ostracods of Holland primarily to Bosquet (1847—1854), Veen (1928—1938) and Bonnema (1936, 1941). The Lowermost Tertiary ostracods of Holland have not so far been elaborated.

The comparative samples, obtained from the Uppermost Cretaceous and Lowermost Tertiary of Holland, come from the outcrop at Geulhem (the quarry at Curfs) where outcrop in the Uppermost Maastrichtian and somewhat younger sediments, developed in the form of "tuffeau" and assigned by Meijer (1959) to the Danian. The samples from the Maastrichtian contain the ostracod assemblage, mentioned in the description of the Vroenhoven samples of the same age and enriched with such Cretaceous species as *Cythereis quadridentata* (Bosquet), *C. bispinifera* (Veen), *C. multifora* n.sp., *Xestoleberis pergensi* Veen and others. In overlaying layers, beginning with a depth of 1—2 m. over the hard ground, the species appear which are also present in the Dano-Paleocene of Poland, i.e. *Pterygocythereis tuberculata* (Veen), *Cythereis (Trachyleberis) horridula* (Bosquet) and *Cuneocythere (Monsmirabilia) porifera*

n.sp. In addition, *Brachycythere pustulosa marlierei* n.subsp., *Triginglymus? cribratus* Apostolescu, *Cythereis morata* n.sp. and *Trachyleberidea semiplana* n.sp. occur at 6 and 8 m. above the hard ground. A sample, much richer in ostracods, comes from the hard ground layer in which there are canals, filled up with a sediment, younger than the hard ground and containing typical Upper Cretaceous and Dano-Paleocene species, mixed with each other. *Cythereis (Mauritsina) hieroglyphica* (Bosquet) and *Neocythere (Physocythere) virginea* (Jones) have, among other species, been recognized by the author. In Poland, these species are limited only to the Uppermost Cretaceous. In addition, there were such typical Dano-Paleocene forms as *Cythereis morata* n.sp., *Trachyleberidea semiplana* n.sp., *Triginglymus? cribratus* Apostolescu, *Aulocytheridea gracilis* n.sp., *Cuneocythere (Monsmirabilia) porifera* n.sp., *Eucytherura derupta* n.sp., *Pseudobythocythere sigillata* n.sp. and others.

GREAT BRITAIN

The Ostracoda from the Uppermost Cretaceous of England were studied by Williamson (1848, 1872), Jones (1849, 1870), Jones & Hinde (1890) and Kaye (1964).

Comparative material from England and Ireland, which has been supplied to the present writer by Mr. C. B. King, University College, London, comes from the Upper Campanian and Lower Maastrichtian. The following species, occurring also in the Uppermost Cretaceous of Poland, have been identified by the present author in the samples from Beeston Chalk (Upper Campanian), Whitlingham, England: *Cythereis lonsdaleiana* Jones, *C. quadridentata* (Bosquet), *C. parva* Bonnema, *C. bispinifera* (Veen), *C. semiplicata* (Reuss), *C. compressa* n.sp., *Trachyleberidea acutiloba* (Marsson), *Neocythere (Physocythere) virginea* (Jones), *Eucytherura dorsotuberculata* Veen, *Amphicytherura chelodon* (Marsson), *A. aculeata* Bonnema, *Xestoleberis pergensi* Veen, *Cytheropteron v-scriptum* Veen, *Pulaviella ovata* (Bonnema).

The samples from Upper White Limestone (Lower Maastrichtian), from a hollow flint nodule, Ballycastle, Antrim, Northern Ireland, consist of selected valves, belonging to several species of *Monoceratina* and, similarly, to the sample from Upper Campanian of England, contain species also present in the Upper Cretaceous of Poland (cf. Szczechura, 1964).

*

On the basis of the works by Bosquet (1852), Apostolescu (1954), Oertli (1960, 1963), and Deroo (1962), the conclusion may be drawn that some species, occurring in the Uppermost Cretaceous and Lowermost

Tertiary of Poland, are also present in the Upper Cretaceous and Eocene of France. These species and their localization are discussed in the systematic part of the present paper.

REMARKS ON THE STRATIGRAPHY, REGIONAL DISTRIBUTION AND ECOLOGY OF OSTRACODS AND FORAMINIFERS

Great differences in vertical ranges of particular species are revealed by the comparison of ostracods, occurring in the Uppermost Cretaceous and the Dano-Paleocene of Poland (cf. Table 2).

Of all species, mentioned in the present paper, 27 per cent are limited to the Cretaceous, 38 per cent occur exclusively in the Dano-Paleocene, while the remaining 35 per cent make up the forms which are met with in both the Cretaceous and the Lowermost Tertiary. Moreover, no Dano-Paleocene species is limited exclusively to the Danian and four species, occurring only in the Paleocene, have only been found at Pamiętowo. In view of these facts, the author does not ascribe these species the importance of the index forms of the Paleocene of Poland. Many Dano-Paleocene species of ostracods pass to the Lower Eocene (at Pamiętowo), while the Lower Eocene assemblage of foraminifers distinctly changes as compared with the foraminiferal assemblage, characteristic of the Paleocene (Brotzen & Pożaryska, 1961). Few species of ostracods, occurring in the Dano-Paleocene of Poland, may also be recorded in the Oligocene (cf. Keij, 1957). Recapitulating our considerations, we may say that the ostracod species seem to live longer than the foraminiferal species and, consequently, to be less sensitive stratigraphic indexes than the foraminifers. Ostracods are, however, unquestionably useful in the case of a local stratigraphy.

On the basis of the regional distribution of the ostracods, described in the present paper, the conclusion may be drawn that both the Upper Cretaceous and Dano-Paleocene forms limit their regional ranges to Europe only[1]. Many North and South American species, most of them Upper Cretaceous, considered to be identical with European species (Alexander, 1929, 1934, 1936, and van den Bold, 1946), are in fact quite different. In contradistinction to the ostracods many species of foraminifers, occurring in Poland, such as, for instance, those belonging to the genera *Bolivinoides* and *Globotruncana*, i. e. index species of the Upper Cretaceous, are recorded in the Upper Cretaceous of both America (Cushman, 1946; Bolli, 1951) and Asia (Israel) (Reiss, 1952). This fact testifies to a wider distribution of foraminifers than ostracods. This is

[1] *Phacorhabdotus? texanus* Howe & Laurencich is an exception in this respect (cf. p. 542).

also confirmed by Reyment (1960) who ascribes this phenomenon to a different mode of life of these animals. In the present author's opinion, the more limited regional distribution of ostracods as compared to the regional distribution of foraminifers should also be explained by the fact that ostracods are more closely than foraminifers related with the conditions of the environment. The analysis of the distribution of the Upper Cretaceous and Dano-Paleocene species of ostracods in particular borings and outcrops (Tables 1 and 2) over the territory of Poland, does not, for the time being, allow the author to grasp some closer correlations between the facies and an assemblage of ostracods, occurring in it. In the present paper, the representatives of the superfamilies, Cypridacea and Bairdiacea, and family Cytherellidae have been omitted. In the table of the distribution of particular species in different samples, the discussion of both the number of individuals, representing a given species, and detailed data on the lithology of a sample, has been given up. All the same, it is easy to notice that certain species occur in different facies, while others are related only with a definite environment, for instance, with chalk, sandy limestones, etc. (cf. Szczechura, 1964). In this respect, the author did not observe a similar behaviour of foraminifers; the index foraminifers of the Upper Cretaceous or of Dano-Paleocene are found in different samples of the same age regardless of the facies. This indicates that ostracods depend to a greater extent than foraminifers on definite ecological conditions.

In conclusion, it is worth mentioning that, although Ostracoda, as compared with typically marine Foraminifera, have larger possibilities of adaptation to different environments, i. e. they live in fresh and brackish waters, only very few ostracods have been found by the present writer in distinctly sandy sediments where, on the other hand, foraminifers occurred more or less frequently.

The majority of the described species are the inhabitants of the open sea, the remaining ones being epineritic.

REMARKS ON THE DEVELOPMENT OF SOME MORPHOLOGICAL CHARACTERS OF THE OSTRACOD VALVES AND THEIR TAXONOMIC IMPORTANCE

There are many publications on the morphology of the ostracod carapaces and on its importance to the taxonomy. The most important among them are those by: Triebel (1941), Grekoff [*in* Piveteau (1953)] (1961), Pokorný (1954, 1958), Howe & Laurencich (1958), Moore (1961), and Morkhoven (1962). It is not always that the authors of these works agree in their evaluation of particular elements of the morphology of the carapace, concerning the taxonomy, and also it is not always that

they accept the same hierarchy of the characters in its taxonomy, the more so as some of them support the taxonomy and its principles, introduced by zoologists, some others accept the taxonomy, applied by palaeontologists. The adjustment of their opinions in estimating the value of the morphological characters of the ostracod carapace to their taxonomy will probably be possible only when the ostracods, both fossil and Recent, are better-known and, particularly, when the correlation is better-known between their soft and skeletal parts.

A great variety and number of the ostracod forms which occur in the Uppermost Cretaceous and in the Lowermost Tertiary of Poland, as well as their satisfactory state of preservation, allowed the present writer to make certain observations, concerning the morphological characters of their carapaces.

The size and thickness of the valve depend primarily on the development stage of a given valve; the younger the valve, the smaller are its dimensions and the thinner are its walls. The size of the valve may, however, differ even within the range of the same development stage in different individuals of the same species. Moreover, in different individuals of same species, it may differ, depending on varying ecological conditions, as well as on different generations. Both the size and the thickness of the valve are not of any decisive importance to the taxonomy, although they may make up an auxiliary specific character.

The shape of the valve changes more or less during its ontogenetic development and, in addition, usually, it differs in adult forms which are sexually differentiated. The valves of young individuals which, as a rule, do not display a distinct sexual dimorphism, show, however, like adult forms, an ontogenetic variation which, among other characters consists in the variation of the valve shape (Szczechura, 1964, p. 392). In the present author's opinion, the shape of the valve is an important character of generic rank.

The ornamentation of the valve changes with the development process of the valve, varying in the individuals of the same species which belong to different sexes and also it varies, to a different degree, in different individuals of the same sex and of the same species. The ornamentation of the valves of different individuals, belonging to the same species, may vary, depending on the environment, as well as it may change with geological time. Moreover, right and left valves of the same specimen may differ in the ornamentation. During the evolution of a species, the ornamentation may either develop, or disappear. The ornamentation of the valve is a character of a specific and, in some cases, of a generic rank.

The muscle scars are not always identically distinct and this is, maybe, the reason why carapaces with different muscle scars are ascribed to the same species (or, only genus). It seems, however, that the number

and arrangement of muscle scars are, in a general outline, characteristic of the genus (sometimes, of many genera). A variation, observed by the present author, even between the individuals of the same species, consists in the fact that some frontal scars [as, for instance, in *Cythereis ornata* (Bosquet)] or some adductor scars [for instance, in *Cythereis quadridentata* (Bosquet)] may be separated or joined.

The hinge and the duplicature. In the author's opinion, the development of the hinge and of the duplicature are mutually closely correlated which may be perhaps explained by their common origin (Morkhoven, 1962, pp. 59—62). A general type of the hinge is undoubtedly a generic feature (of one or even several genera) and, in the details of its structure, the hinge may be, of course, characteristic of a species. However, it is even within the range of the same species that, in different individuals, both the elements of the hinge and the duplicature may, in a fossil state, be fairly differently preserved. In the case of the hinge, this concerns mostly the terminal elements, more or less smooth or denticulate and, in the case of the duplicature, this concerns primarily the valves which have a vestibule, where the inner lamella, not coalescent with the outer lamella, is subject to crushing. Both the hinge and the width of the duplicature also vary during the ontogeny. Among adult forms of many species, here described, a phenomenon may be observed which has been given by the author the name of an incomplete development of the carapace. As far as the best visible characters are concerned, it consists in an incomplete development of the hinge and in a poor development of the duplicature (cf. Pl. XI, Figs. 1 and 2) as compared to the development of these elements in fully developed carapaces. This phenomenon which will be more extensively described and better documented in the next paper, the author explains by a sudden death of an animal before its skeletal part, i.e. the carapace could be fully developed.

The ontogeny and dimorphism. Particular ontogenetic stages, established in the present paper for some species, were separated by the author on the basis of the coefficient 1.26 in which the lengths of the successives instars differ. This coefficient was settled by Przibram's and Brooke's law (Kesling, 1953). The correctness of this law was not discussed by the author. It is very difficult to determine the actual development stage of a carapace and, in particular, the succession of ontogenetic stages, investigated on the basis of the dimensions of the carapace. Carapaces of different stages, of young, i. e. thin, with a lophodont hinge and adult, thick, with an amphidont hinge as for instance in *Triginglymus? cribratus* Apostolescu, may be identical in size. The dimensions cannot, therefore be decisive of the succession of instars in the case of young individuals. In the ontogeny of the ostracod carapace, only the young and adult forms may be recognized to the greatest degree of certainty. But this may be done on the basis of the shape, thickness and ornamen-

tation of the valves, as well as on the basis of the structure of the hinge margin and the free margin. In the forms which, in adult stages, have an amphidont hinge and a well-developed duplicature, the young individuals, in the Cytheracea, described here, always have a lophodont hinge and a narrow duplicature.

As an explanation, it should be mentioned that ordinal numbers, given with the description of particular stages of the ontogenetic development of the species, indicates an order in which particular young forms should supposedly be examined.

TERMINOLOGY

The terminology, concerning morphological elements of the ostracod carapace, used in the present paper, has been taken by the writer after Kesling (1951), Sylvester-Bradley (1956), Howe & Laurencich (1958), Morkhoven (1962) and other authors.

Using a concept, "the main group of muscle scars", the author means the scars left by the adductor, mandibular and antennal muscles. The definition, "a muscle field", designates the place on the valve where muscles were attached.

The following division of carapaces, depending on their size, has been adopted by the author: 1) small, lesser than 0.4 mm., 2) medium, between 0.4 and 0.7 mm., 3) large, larger than 0.7 mm.

SYSTEMATIC PART

Subclass **Ostracoda** Latreille, 1806
Order **Podocopina** G. W. Müller, 1894
Suborder **Cytheracea** G. O. Sars, 1888
Superfamily **Cytheracea** Baird, 1850
Family **Brachycytheridae** Puri, 1954
Genus *Brachycythere* Alexander, 1933
Brachycythere pustulosa marlierei n. subsp.
(Pl. II, Figs. 5, 6; Pl. XI, Figs. 5—8)

Holotypus: Pl. XI, Fig. 8 (O.II/217).
Stratum typicum: Paleocene.
Locus typicus: Boryszew, Poland.
Derivatio nominis: marlierei — named in honour of the French geologist Prof. Dr. R. Marlière.

Diagnosis. — Carapace strongly swollen, laterally covered with regular tubercles. Ventral side with a few almost parallel ribs. Anterior

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SYSTEMATIC PART

should be:

Subclass **Ostracoda** Latreille, 1806
Order **Podocopida** G. W. Müller, 1894
Suborder **Podocopina** G. O. Sars, 1886
Superfamily **Cytheracea** Baird, 1850
Family **Brachycytheridae** Puri, 1954

margin denticulated, posterior margin terminating distally in 3—5 short spines.

Material. — Seven complete carapaces, 32 right and 22 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, male	O.II/215	1.12	0 62
Left valve, male	O.II/216	1.12	0.65
Left valve, female	O.II/217	1.17	0.69

Description. — Carapace large, very solid, elongated, subovate in lateral outline. Both valves similar in shape and ornamentation; left valve larger, in anterodorsal part more truncated. Dorsal margin somewhat rounded, almost parallel to ventral which is concave half-way its length. Anterior end abruptly rounded, posterior end slightly elongated, rounded. The entire carapace, except for the most distal, peripheral, anterior and posterior part, strongly swollen. Ventral side compressed. Lateroventral ridge thickened and sometimes keel-like in shape, extending from the anterior to the posterior margin, posteriorly sharply terminating. Eye tubercle prominent, glassy. Valve margins rimmed. The anterior margin denticulate, especially so in its lower part, posterior margin having a few short and strong spines. Lateral surface covered with numerous, regular tubercles which in some specimens disappear near the anterior margin. Almost parallel ribs are visible on the ventral side.

Muscle scars consist of four scars arranged transversally, two others, above the latter, arranged vertically, and a heart-shaped scar situated in front of them. Radial pore canals straight, short, numerous. Duplicature not very wide, line of concrescence coincides with the line of inner margin and parallel to outer margin. Hinge amphidont, with distinct accommodation groove in the left valve; terminal elements of the right valve denticulate.

Variation, found in the size, shape and ornamentation of valve, is probably the result of sexual dimorphism. The female valves are higher, more inflated, with a well developed lateroventral ridge. This species is represented in the writer's collection by adult specimens, but some of them are yet incompletely developed.

Remarks. — *Brachycythere pustulosa marlierei* is similar to *B. pustulosa* (recte *B. pustulosa pustulosa*), described by Marlière (1958, p. 21, Pl. 3, Figs. 3, 3 a-b) from Montian of Belgium, differing from it in more numerous, more regular and finer tubercles which cover the surface of the valve.

Occurrence. — In Poland: Paleocene of Boryszew, Sochaczew, Pamiętowo and Bochotnica. Abroad: Danian of Holland.

Genus *Pterygocythereis* Blake, 1933

Pterygocythereis tuberculata (Veen, 1936), emend.

(Pl. IV, Figs. 1, 2; Pl. X, Figs. 10, 11)

1936. *Cythereis (Pterygocythereis) serrulata* Bosquet var. *tuberculata* n. var. Veen; J. E. van Veen, Die Cytheridae..., p. 162, Pl. 8, Fig. 15.

1958. *Alatacythere serrulata tuberculata* (Veen); H. V. Howe & L. Laurencich, Introduction..., p. 44.

Material. — Seven complete carapaces, 46 right and 51 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/218	1.06	0.50
Left valve	O.II/219	1.03	0.50

Description. — Carapace large, very solid, subovate in lateral outline. Valves are somewhat different in shape and ornamentation, the left being less truncated in anterodorsal and posterodorsal part, having a short spine in the middle of its dorsal margin and another in the anterodorsal angle. Dorsal margin almost straight, subparallel to the ventral margin, somewhat concave in the middle. Anterior end broadly rounded, posterior end slightly elongated, obliquely truncated, rounded. Valve inflated, especially near venter where it forms an alar inflation. In the most peripheral distal anterior and posterior part, as well as on the ventral side the valve is compressed. A sharp, distinct lateroventral ridge, bordering the alar inflation, situated above it, passes frontally into a thickened admarginal rim, running along the anterior margin and posteriorly terminating in a long, sharp spine. Numerous rather short, solid spiny denticles occur along the anterior margin. Sometimes, fine processes also cover the lateroventral ridge and the dorsal margin. On the thickened rim of the posterior end the spines are, in general, less numerous but longer. Distinct tubercles or short spines, frequently crowded, occur below the dorsal margin, along the midline and behind the muscle field. Eye tubercle distinct, glassy.

Muscle scars of the main group consist of three elongated scars, transversally arranged, two other ones situated above the latter and arranged somewhat obliquely and a heart-like scar in front of them. Marginal pore canals fairly numerous, rather short, straight. Duplicature not very wide, the line of concrescence coincides with that of inner margin. Hinge amphidont; terminal elements of the right valve smooth.

Variation concerns mainly the ornamentation. Shape and number of spines, sometimes, markedly differ.

Remarks. — Subspecies *Cythereis (Pterygocythereis) serrulata tuberculata* was erected by Veen (1936) on the basis of a single specimen from the Maastrichtian of Holland. Specimens, included in *Pte-*

rygocythereis tuberculata from Upper Cretaceous and Dano-Paleocene of Poland do not differ from Veen's specimen, but they seem to differ from *Cypridina serrulata* (recte *Pterygocythereis serrulata*) Bosquet, 1854, to such an extent as to be included in a separate species.

Occurrence. — In Poland: Lower Maastrichtian, Danian, Paleocene and Eocene of Pamiętowo, Danian and Paleocene of Sochaczew, Paleocene of Boryszew, Bochotnica and Nasiłów. Abroad: Maastrichtian and Danian of Holland, Danian of Belgium and of the Crimea.

Pterygocythereis phylloptera (Bosquet, 1854)
(Pl. IV, Fig. 3; Pl. XI, Figs. 3, 4)

1854. *Cythere phylloptera* Bosquet; J. Bosquet, Monographie..., p. 116, Pl. 7, Figs. 10 a-d.
1940. *Cythereis (Pterygocythereis) phylloptera* Bosquet; J. H. Bonnema, Ostracoden..., p. 132, Pl. 4, Figs. 37—41.
1958. *Pterygocythereis? phylloptera* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 486.
1964. *Alatacythere? phylloptera* (Bosquet); P. Kaye, Revision..., p. 51, Pl. 2, Figs. 17, 19.

Material. — One complete carapace, 4 right and 6 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat No.	Length	Height
Right valve	O.II/223	0.69	0.34
Left valve	O.II/224	0.69	0.37

Description. — Carapace medium-sized, solid, subovate in lateral outline. Both valves differ in outline, left being more angulate with horn-like backwards bent marginal spine in the anterodorsal part. Dorsal margin straight, somewhat converging with almost straight ventral margin. Anterior end broadly rounded, posterior end elongated, obliquely truncated, slightly rounded. Valve moderately inflated, particularly so in the ventral part. In the most peripheral posterior part and on the ventral side, it is compressed. Along the ventral margin, there is an alar inflation, bordered with a sharp, lateroventral ridge which frontally passes into an admarginal rim, running along the anterior margin, and is sharply terminating posteriorly. Lateroventral ridge and anterior margin covered with a rather long, more or less numerous, spines. Spines, occurring on the thickened posterior margin are less numerous, longer, more massive and bent downwards. A large, solid tubercle is situated near the middle of the dorsal margin and somewhat below it. Valve surface smooth. Eye tubercle distinct, glassy.

Muscle scars and marginal pore canals invisible. Duplicature narrow. The line of concrescence coincides with the line of inner margin.

Hinge amphidont; terminal elements of the right valve indistinctly crenulated.

Variation is observed in the ornamentation of the valve. Number and form of marginal spines varies more or less in different specimens.

Remarks. — Specimens included in *Pterygocythereis phylloptera* from Upper Cretaceous of Poland are very similar to the specimens of *Cythere phylloptera* (recte *Pterygocythereis phylloptera*), described by Bosquet (1854) from Senonian of Holland and Belgium. They also do not differ from specimens assigned to this species by Bonnema (1941) from Upper Cretaceous of Holland and by Kaye (1964) from Upper Cretaceous of England. Not excluding the probability that it may represent the genus *Alatacythere,* Howe & Laurencich (1958) tentatively placed that species into genus *Pterygocythereis.* In the present author's opinion the genus *Alatacythere* Murray & Hussey, 1942, is a synonym of the genus *Pterygocythereis* Blake, 1933, erected earlier.

Occurrence. — In Poland: Upper Campanian of Mielnik. Abroad: Lower Maastrichtian of Rügen Island, Upper Cretaceous (Maastrichtian?) of Belgium, Holland and England.

Pterygocythereis serrulata (Bosquet, 1847)
(Pl. IV, Fig. 6; Pl. XVIII, Figs. 16, 17)

1847. *Cypridina serrulata* Bosquet; J. Bosquet, Description des Entomostracés..., p. 20, Pl. 4, Figs. 2 a-c.
1854. *Cythere serrulata* Bosquet; J. Bosquet, Monographie..., p. 114, Pl. 9, Figs. 9 a-d.
1936. *Cythereis serrulata* Bosquet; J. E. van Veen, Die Cytheridae..., p. 166, Pl. 8, Figs. 8—14.
1958. *Alatacythere serrulata* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 44.

Material. — One complete carapace, 8 right and 5 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/226	0.72	0.34
Left valve	O.II/227	0.75	0.37

Description. — Carapace rather large, subrectangular in lateral outline. Both valves differ conspicuously, the left being larger, more angulate in lateral view and with a posterodorsal tubercle on the margin. Dorsal margin straight, parallel to the ventral margin. Anterior end broadly rounded, posterior end elongated, obliquely truncated, somewhat rounded. The valve inflated, especially ventrally, forming there an alar swelling. The most distal, peripheral anterior and posterior part of the valve, and the ventral side are compressed. Lateroventral ridge markedly thickened, anteriorly passing into a thickened marginal rim,

posteriorly terminating in a long, sharp spine turned backwards; behind that spine, there are some few, small spines. The anterior margin is covered with strong, fairly prominent spines which are shorter in the lower part. A few longer spines are situated on the thickened posterior margin. Valve surface smooth. Eye tubercle poorly developed.

Muscle scars and marginal pore canals invisible. Duplicature not very wide. The line of concrescence, parallel to the line of outer margin, coincides with the inner margin. Hinge amphidont; terminal elements of the right valve indistinctly crenulated.

Variation mainly observed in the valve ornamentation, is probably related with the state of preservation.

Remarks. — Specimens assigned to *Pterygocythereis serrulata* from Upper Cretaceous of Poland somewhat differ from specimens of *Cypridina serrulata* (recte *Pterygocythereis serrulata*) described by Bosquet (1847) from Upper Cretaceous of Holland. Specimens from Holland, described by Bosquet, seem to be denticulated along the lateroventral ridge, while Polish and Dutch ones described by Veen (1936) are smooth.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian of Pamiętowo. Abroad: Maastrichtian of Holland and Belgium, Campanian of Miały (B. S. S. R.).

Pterygocythereis pamientoviensis n. sp.
(Pl. IV, Fig. 7; Pl. X, Figs. 12 a-c)

Holotypus: Pl. X, Fig. 12 a-c (O.II/228).
Stratum typicum: Paleocene.
Locus typicus; Pamiętowo, Poland.
Derivatio nominis: *pamientoviensis* — named after the locality Pamiętowo.

Diagnosis. — Margin of the carapace strongly rimmed, intensively frilled, especially along lateroventral ridge. Along the dorsal margin, in the posterior half, there are comb-like ribs joined posteriorly with another oblique rib which touches the posterior spiny end of lateroventral ridge. A prominent rib occurs between a distinct eye tubercle and muscle node, above which, in the left valve, there is a horn-like spine.

Material. — Five complete carapaces, 4 right and 2 left valves, only adult, mostly poorly-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/228	1.12	0.62
Left valve	O.II/228	1.19	0.66

Description. — Carapace of large size, very massive, subovate in lateral outline. Both valves differ somewhat in shape and size, left being higher, less truncated along anteroventral margin, with a horn-like spine

above eye tubercle and a spiny knob in posterodorsal angle. Anterior margin broadly rounded, posterior end elongated, more acutely rounded. Dorsal margin straight, slightly coinciding with an almost straight ventral margin. Carapace considerably inflated, particularly so at ventral margin and forming there an alar inflation. The most posterior part. and ventral side compressed. Margin of valve and lateroventral ridge strongly rimmed, frilled. Rims of posterior and anterior end covered with flattened spines. At the dorsal margin, there occur comb-like ribs posteriorly passing into an oblique rib which is connected with a spiny end of lateroventral ridge. Another rib connects a prominent eye tubercle with the muscle node. Surface of the valve irregularly covered with scarce spiny tubercles.

Muscle scars and marginal pore canals indistinct. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements in the right valve rather smooth.

Variation is mainly found the degree of development of ornamentation, especially along the anterior and posterior end.

Remarks. — Specimens from Dano-Paleocene of Poland included into *Pterygocythereis pamientoviensis*, seem to be the most similar to the specimens of *Cythereis (Pterygocythereis) miquelli*, described by Veen (1936, p. 162, Pl. 8, Figs. 22—26) from which differ mainly in admarginal, ornamental elements along the dorsal margin and in an oblique rib in the posterior part of valve, absent from specimens of *Cythereis (Pterygocythereis) miquelli.*

Occurrence. — In Poland: Paleocene of Pamiętowo.

Genus *Kingmaina* Keij, 1957

Kingmaina opima n. sp.

(Pl. II, Figs. 10, 11; Pl. XVI, Figs. 8, 9)

Holotypus: Pl. XVI, Fig. 8 (O.II/231).

Stratum typicum: Paleocene.

Locus typicus: Pamiętowo, Poland.

Derivatio nominis: *opima* — Lat. *opima* = fat, thick, heavy, being a general character of the valve.

Diagnosis. — Carapace intensively swollen. Lateral surface of the valve irregularly reticulate. Fairly large, regular, pits occur near the margin of the anterior end and along the margin of the alar swelling.

Material. — Thirteen right and 12 left valves, representing only adult individuals, a few of them damaged.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/231	0.65	0.37
Left valve	O.II/232	0.65	0.40

Description. — Carapace middle-sized, thick, solid, subtrapezoidal in lateral outline. Both valves of the carapace only slightly differ from each other in size and shape. Right valve smaller, with its antero- and posterodorsal margin somewhat more truncated. Dorsal margin straight, almost parallel to a slightly concave, almost straight ventral margin. Anterior end obtusely rounded posterior end slightly elongated, in lower part distinctly acuminate. The valve strongly swollen, especially above the ventral margin, while on the ventral side and in the posterior distal part it is compressed. The most swollen part of the valve, overhanging outside the ventral margin and covering it almost over its entire length, is rimmed underneath with a sharp, thickened lateroventral ridge. The eye tubercle poorly developed, the muscle field indistinctly outlined. The valve surface irregularly, coarsely reticulate; at the lateroventral ridge and along the anterior margin, the reticulation mesh considerably increases. On the ventral and lateral side, a few (6—7) distinct, round pits occur near the lateroventral margin. The posterior margin is provided, in its lower part, with 1—3 short, solid prickles.

Muscle scars of the main group consist of four elongated scars, arranged transversely in a subvertical row, and of a heart-shaped scar at the top and in front of them. Marginal pore canals invisible. Duplicature wide, particularly in the anterior part of the valve; the line of concrescence coincides with the line of the inner margin. Hinge amphidont.

Variation. — A small variation concerns the size of valves within the range of the same adult stage.

Remarks. — The valves assigned to *Kingmaina opima* n. sp. from the Dano-Paleocene of Poland are somewhat similar to those of *Cythere hagenowi* (recte *Kingmaina hagenowi*) Bosquet, 1854, which were described and illustrated in Veen's work (1936, p. 157, Pl. 7, Figs. 35—42), from the Maastrichtian of Holland. As compared with the species from the Cretaceous of Holland, the individuals, found in the Dano-Paleocene of Poland, are considerably larger, more solid, with stronger reticulation and differently developed posterior end of the valve.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo.

Genus *Kikliocythere* Howe & Laurencich, 1958

Kikliocythere? nitida n. sp.

(Pl. V, Fig. 2; Pl. IX, Figs. 11—13)

Holotypus: Pl. IX, Fig. 12 (O.II/235).

Stratum typicum: Upper Maastrichtian.

Locus typicus: Nasiłów, Poland.

Derivatio nominis: *nitida* — Lat. *nitida* = lustrous, smooth; a characteristic feature of the valve.

Diagnosis. — Carapace subovate, strongly swollen. In the posterior part of the valve, near the dorsal margin, and in the posteroventral part, long but not very distinct ribs occur.

Material. — Two complete carapaces, 23 right and 18 left valves. All specimens only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/235	0.75	0.44
Left valve	O.II/236	0.81	0.50

Description. — Valve large, thick, solid, subovate. Carapace valves distinctly differ in outline; the right one is smaller and has truncated antero- and posterodorsal margins. Dorsal margin straight or very slightly concave, parallel to the ventral margin which is somewhat concave half-way its length. Anterior margin broadly rounded, posterior margin slightly elongated and slightly rounded. Almost entire valve, except for the distal, posterior part, is strongly swollen and, on the ventral side, somewhat compressed. The place of muscle attachment is distinctly marked, slightly swollen. Eye tubercle poorly developed but, usually, distinct. In the posterior part of the dorsal margin, close to the margin of the valve, a short, fairly solid rib occurs. Another, shorter rib is situated lateroventrally at the base of the biggest swelling of the valve in its posterior part. It is better developed on the right valve. A short, not very distinct rib is also developed on the posteroventral side close to the ventral margin of the valve. The surface of the valve is smooth. The margins of the valve are thickened; sometimes a fragile, narrow, frill, mostly vestigial in character, occurs along the anterior margin.

Muscle scars are obscured. Marginal pore canals numerous, straight and rather short. Duplicature not very wide, the line of concrescence coincides with the line of inner margin and is almost parallel to the valve margin. Hinge amphidont; terminal elements of the right valve, in particular, the anterior one, are distinctly denticulate.

Variation. — A small variation concerns the size of valves within the same adult stage. Valves from Pamiętowo are larger than those from Bochotnica and Nasiłów.

Remarks. — Specimens, assigned to *Kikliocythere? opima* n. sp. from the Polish Cretaceous do not resemble those of any other, so far described, species. This species has been attributed to the genus *Kikliocythere* with a reservation since its valves have clearly visible ribs in the lateroventral parts which, according to Howe & Laurencich (1958) who erected it, do not occur in the representatives of this genus. However, other characters of this species resemble, to the greatest extent, the generic characters of *Kikliocythere*.

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo, Upper Maastrichtian of Nasiłów and Bochotnica, Paleocene (?) of Pamiętowo.

Family **Bythocytheridae** G. O. Sars, 1926
Genus *Pseudobythocythere* Mertens, 1956
Pseudobythocythere sigillata n. sp.
(Pl. I, Figs. 13, 14; Pl. XIX, Figs. 26—31)

Holotypus: Pl. XIX, Fig. 28 (O.II/506).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *sigillata* — Lat. *sigillatus* = ornamented by bas-relief; named after the type of the valve ornamentation.

Diagnosis. — Valve flatly swollen, ridged along ventral and posterior part of dorsal margin. Surface of valve irregularly, coarsely reticulated, especially posteriorly and rather pitted frontally where there are two almost horizontal ribs.

Material. — Three complete carapaces, 24 right and 27 left valves both young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, female	O.II/506	0.40	0.25
Left valve, female	O.II/504	0.41	0.24
Left valve, male	O.II/505	0.44	0.25

Description. — Carapace rather medium in size, ovate in lateral outline, massive. Both valves differ somewhat in size and shape, left being longer, with a less arched dorsal margin and a more rounded anterior end. Ventral margin slightly sigmoid, posteriorly truncated. Anterior and posterior end rounded, posterior end more acute. Valve flatly swollen, in the most peripheral, distal posterior end and on ventral side, compressed. Along posterior part of dorsal margin and along ventral margin, there are prominent ribs posteriorly indistinctly joined. On the ventral side, below the adventral rib, there are 2—3 distinct ribs, adhering to and covering the ventral margin. Surface of valve posteriorly ornamented by coarse, irregularly arranged ribs, frontally having two horizontal ribs and pits. Margin of valve slightly thickened. Eye tubercle small, distinct.

Muscle scars of a main group consist of four elongated scars arranged in a subvertical row and two round scars in front. Marginal pore canals invisible. Duplicature narrow the line of concrescence coincides with the line of inner margin. Hinge of left valve consists of a serrate bar terminating in elongated, serrate sockets.

Variation is mainly observed in the size and shape of valve, resulting from the valve differentiation during the ontogenetic development and sexual dimorphism within adult forms. Male specimens are longer than female.

Ontogeny. — Three instars, probably last ones may be recognized within left valves.

Instar 1 — Dimensions (in mm.): length 0.25, height 0.17.

Valve similar to that in adult instar but thinner, with a less developed hinge.

Instar 2 — Dimensions (in mm.): length 0.32, height 0.19. In comparison with the adult form the valve of that instar differs rather only in size.

Instar 3 (adult) — Dimensions (in mm.): length 0.41, height 0.24. Cf. description.

Remarks. — Specimens included into *Pseudobythocythere sigillata,* from Dano-Paleocene and Eocene of Poland, seem to differ conspicuously, especially in valve relief, from other specimens of so far described species belonging to *Pseudobythocythere.*

Occurrence. — In Poland: Paleocene of Sochaczew, Paleocene and Eocene of Pamiętowo. Abroad: in Holland — the layer containing both Cretaceous and Tertiary species, in Belgium — Danian.

Family **Cytherettidae** Triebel, 1952
Genus *Paracytheretta* Triebel, 1941
Paracytheretta reticosa Triebel, 1941
(Pl. II, Figs. 8, 9; Pl. XII, Figs. 4, 5, 6?)

1941. *Paracytheretta reticosa* Triebel; E. Triebel, Zur Morphologie..., p. 389, Pl. 15, Figs. 165—168.

Material. — Eighteen complete carapaces, 4 right and 3 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/239	0 90	0.47
Left valve	O.II/240	0.88	0.53

Description. — Carapace large, thick, solid, subovate. Valves differ from each other in their size and shape. Right, smaller valve, in its antero- and posteroventral part, has a considerably more truncated margin. Dorsal margin almost straight and nearly parallel to the ventral, slightly concave half-way its length. Anterior margin broadly rounded, posterior end slightly elongated, bluntly pointed and somewhat inflected

upwards. Valve fairly swollen, in the anterior and posterior distal part and on the ventral side, compressed. A sharp, slightly arched rib, anteriorly wedge-like below the anterodorsal margin and posteriorly disappearing at the margin of the valve near the end of the dorsal margin, occurs near the dorsal margin. The middle, bifurcated rib extends along the entire inflated middle part of the valve and posteriorly joins a downwards arching lower rib which is almost parallel to the ventral margin. The muscle field is very poorly outlined, the eye tubercle lacking. The valve surface — intensively reticulate, the mesh being usually distinctly elongated in conformity with the longer axis of the valve. Two sharp, solid ribs and more abundant, weak, barely visible ribs, occur on the ventral side parallel to the ventral margin. The margin of the anterior end is sometimes provided with very fine, short denticles.

Muscle scars (visible in specimens from the Lower Paleocene of Hvallöse, Denmark) consist of 4 ovate scars, arranged in a slightly slanting row, as well as a round scar in the anterior part of the main group. Duplicature wide; the line of concrescence coincides with the line of inner margin but is not parallel to the valve margin. Hinge amphidont.

Variation. — A distinct variation concerns mostly the valve ornamentation. Ribs on the valve surface are either sharp and high, or low with mildly rounded edges; in addition, some valves are completely reticulate, some others only in their middle part. Unfortunately, a small number of the individuals found, assigned to this species, does not allow one to state if the existing variation is a character of one only species or, if it results from other, similar species or, at least, subspecies being present in the collection examined.

Remarks. — Valves with maximum development of the ornamentation from the Dano-Paleocene of Poland, do not differ from figured valves of *Paracytheretta reticosa* from the Lower Paleocene of Denmark described by Triebel (1941).

Occurrence. — In Poland: Paleocene and Eocene of Pamiętowo. Abroad: Paleocene of Denmark.

Genus *Protocytheretta* Puri, 1958

Protocytheretta interrupta (Bosquet, 1847)

(Pl. I, Fig. 9; Pl. XII, Figs. 9, 10)

1847. *Cypridina interrupta* Bosquet; J. Bosquet, Description des Entomostracés..., p. 362, Pl. 2, Figs. 1 a-d.

1936. *Cythereis interrupta* Bosquet; J. E. van Veen, Die Cytheridae..., p. 140, Pl. 3, Figs. 29—33, non 23—28.

1958. *Cythereis? interrupta* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 206.

Material. — Three complete carapaces, 12 right and 12 left valves, representing adult, fairly well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/242	0.94	0.53
Left valve	O.II/243	0.97	0.56

Description. — Carapace large, thick, solid, subovate. Both valves of the carapace slightly differ from each other in size and shape; in its antero- and posterodorsal part, the right, smaller valve has a more truncated margin. Dorsal margin almost straight and almost parallel to the ventral one which is slightly concave about half-way its length. Anterior margin obliquely rounded, posterior end somewhat elongated and bluntly terminating. Almost entire valve, except for its terminal, posterior part, is strongly and uniformly inflated and, on the ventral side, flattened. In the middle part of the valve, a poorly developed, oblique hump occurs which is better developed in the anterior part of the valve where it is connected with a small muscle swelling. Another hump is situated above and parallel to the ventral margin; it is better developed and fairly acuminate in the posterior part of the valve. The entire surface of the valve is regularly, strongly reticulate. Along the margin of the anterior end and along the ventral margin, the main ornamentation elements are disposed parallel to the valve margin, while in the middle part, they are parallel to the longer axis of the valve. The margins of the valve are slightly thickened. Many, fine, prickly denticles are observed along the margin of the anterior end, while not so many (4—5) but more solid and longer spines occur on the margin of the posterior end. Eye tubercle small, glassy.

Muscle scars and marginal pore canals invisible. Duplicature fairly wide, the line of concrescence coincides with the line of inner margin and is almost parallel to the valve margin. Hinge amphidont; the anterior terminal element in the right valve is slightly denticulate.

Variation. — A small variation concerns the size and shape of valves, as well as their ornamentation. In addition to elongated and relatively low valves, probably representing male individuals, there are also somewhat higher and shorter valves, presumably belonging to female individuals. The variation in ornamentation consists mostly in different sizes of the reticulation mesh, visible on the valve surface.

Remarks. — The valves attributed to *Protocytheretta interrupta* from the Dano-Paleocene of Poland do not differ in their aspect from valves of *Cypridina interrupta* (recte *Protocytheretta interrupta*), described by Bosquet (1847) from the Maastrichtian of Holland. They are also similar to a part of the figured and described valves, assigned to *Cythereis inter-*

rupta in Veen's work (1936) also based on a material from the Maastrichtian of Holland. It seems, however, that the valves shown in Pl. 3, Figs. 23—28 have a completely different shape and ornamentation as compared with the valves of *P. interrupta*. Perhaps, they belong to another species and even to another genus. According to Howe and Laurencich (1958), this species resembles the genus *Cytheretta* to a greater extent than the genus *Cythereis* and, therefore, it was only with a reservation that it was assigned by these authors to the genus *Cythereis*. The species under study has been assigned by the present author to the genus *Protocytheretta* mostly on the basis of its shape, ornamentation and structure of the hinge margin of the valve.

Occurrence. — In Poland: Dano-Paleocene and Eocene of Pamiętowo, Paleocene of Boryszew. Abroad: Maastrichtian of Holland.

Protocytheretta canaliculata (Apostolescu, 1956)
(Pl. III, Figs. 2, 2a; Pl. XII, Figs. 7, 8)

1956. *Puriana canaliculata* Apostolescu; V. Apostolescu, Contribution..., p. 1341, Pl. 3, Figs. 43, 44.
1958. *Puriana canaliculata* Apostolescu; R. Marlière, Ostracodes..., p. 29, Pl. 6, Figs. 1, 1a.

Material. — Three complete carapaces, 10 right and 6 left valves, representing only the adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/246	0.88	0.47
Left valve	O.II/247	0.88	0.50

Description. — Carapace large, thick, solid. Both valves are similar in size, shape and ornamentation; the left valve, a little higher, has, in its antero- and posterodorsal part, a less truncated margin. Dorsal margin straight, subparallel to the ventral margin which is slightly concave half-way its length. Anterior end broadly rounded, posterior end slightly elongated and bluntly terminating. The valve is moderately and rather uniformly swollen, especially in the posteroventral part, while in the terminal, posterior part and on the ventral side it is compressed. The muscle swelling distinct, the eye tubercle glassy, small. A distinct, slightly arched rib, posteriorly inflected downwards and anteriorly disappearing below the eye tubercle, is visible near the dorsal margin. This rib is posteriorly connected with a long median rib, forking in the region of the muscle swelling. Above the ventral margin, there is a slightly visible ridge, anteriorly passing into an admarginal rib of the anterior end, posteriorly sharply pointed. Another, short and rather small rib, posteriorly distinctly pointed and parallel to the ventral

margin, is situated below the posterior part of the lateroventral ridge on the ventral side. The margin of the anterior end is usually rimmed with very fine, short, dentate processes, while in the lower part of the margin of the posterior end, few but fairly long, solid spines are visible. The valve surface is rather regularly, coarsely reticulate. Along the margin of the anterior end and on the ventral side, the main elements of ornamentation are parallel to the valve margin.

Muscle scars of the main group consist of 3 longitudinal and, above them, 2 round scars, arranged in a subvertical row, as well as of an irregular scar, situated at the top in the frontal part of them. Marginal pore canals invisible. Duplicature rather wide, line of concrescence, subparallel to the valve margin, coincides with the line of inner margin. Hinge amphidont; posterior terminal element in the right valve distinctly denticulate.

Variation. — A distinct variation concerns mostly the size and shape of the valve and may probably be explained by the sexual dimorphism. The valves of female individuals are shorter and a little more inflated as compared with those of male individuals.

Remarks. — The valves, assigned to *Protocytheretta canaliculata* from Dano-Paleocene of Poland do not differ much from the figured individuals of this species, described by Apostolescu (1956), from Tanetian of France. They also resemble the rather indistinctly figured valves, assigned, in Marlière's work (1958) from the Montian of Belgium, to *Puriana canaliculata*. Both Apostolescu and Marlière attributed their species to the genus *Puriana*. In the present author's opinion, however, the shape, ornamentation, as well as the development of the hinge margin allow one to attribute this species to the genus *Protocytheretta*.

Occurrence. — In Poland: Danian and Paleocene of Pamiętowo, Paleocene of Sochaczew and Boryszew. Abroad: Montian of Belgium and Tanetian of France.

Family **Cytherideidae** G. O. Sars, 1925

Genus *Aulocytheridea* Howe, 1951

Aulocytheridea gracilis n.sp.

(Pl. III, Figs. 8, 9; Pl. VIII, Figs. 1—4)

Holotypus: Pl. VIII, Fig. 1 (O.II/250).

Stratum typicum: Paleocene.

Locus typicus: Pamiętowo, Poland.

Derivatio nominis: *gracilis* — Lat. *gracilis* = slender, slim; a general character of the valve.

Diagnosis. — Valve considerably, almost evenly swollen. The valve surface smooth, finely pitted. Close to the margin of the anterior end,

especially in the right valve, few poorly developed ribs are visible parallel to the valve margin. This species is markedly dimorphic.

Material. — Ten complete carapaces, 42 right and 18 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve female	O.II/250	0.53	0.31
Left valve female	O.II/251	0.54	0.31

Description. — Carapace middle-sized, thick, solid, subovate in lateral outline. Carapace valves differ from each other to an insignificant degree in the outline and size; the left valve, partially overlapping the right, has a less truncated margin in its postero- and anterodorsal parts and, consequently, seems to be somewhat more square as compared to a more triangular right valve. Dorsal margin slightly arched, somewhat convergent with the ventral margin which is straight and slightly concave half-way its length. Anterior and posterior ends rounded, anterior more acutely. The carapace strongly swollen, on the ventral side slightly compressed. The valve surface is usually smooth but, in some specimens, slight, barely visible, concentric ribs, parallel to the valve margin, occur close to the margin of the anterior end. The middle part of the valve surface is usually slightly pitted.

Muscle scars, very indistinct, consist of four almost round scars, arranged in a vertical row; other scars invisible. Marginal pore canals short, straight and numerous. Duplicature not very wide, a narrow vestibule occurring sometimes posteriorly. The line of concrescence parallel to the valve margin. Hinge of the left valve consists of a distinctly serrate bar posteriorly gradually disappearing and anteriorly passing into a longitudinal dentate terminal socket; a small accommodation groove occurs above.

Variation. — A distinct variation, found in the size and shape of valves, is probably related with the sexual dimorphism. Female, as compared with male valves, are somewhat higher and more swollen in their central parts.

Remarks. — The valves of this species resemble the figured male valves of *Cytheridea falcoburgensis*, described by Veen (1936, p. 173, Pl. 9, Figs. 47—51) from the Maastrichtian of Holland. Since no detailed description of the latter, particularly of its hinge structure, has not been given by Veen and, moreover, since the sexual dimorphism presented, characteristic of *C. falcoburgensis* does not coincide with the sexual dimorphism which marks the species from Dano-Paleocene of Poland, this species is attributed by the present author to a new one.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo, Danian of Sochaczew and Paleocene of Boryszew. In Holland: the layer which contains both the Cretaceous and the Lowermost Tertiary elements.

Genus *Cytheridea* Bosquet, 1852
Cytheridea bosqueti (Veen, 1936)
(Pl. III, Figs. 6, 7; Pl. VIII, Figs. 5, 6)

1936. *Cytherideis bosqueti* Veen; J. E. van Veen, Die Cytheridae..., p. 167, Pl. 9, Figs. 10—15.
1958. *Cushmanidea bosqueti* (Veen); H. V. Howe & L. Laurencich, Introduction..., p. 114.

Material. — Four complete carapaces, 22 right and 12 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/254	0.53	0.28
Left valve	O.II/255	0.56	0.31

Description. — Carapace middle-sized, solid, subovate in lateral outline. Valves slightly differ from each other in outline and size; the left, larger one, is antero- and posterodorsally less truncated. The dorsal margin arched and posteriorly convergent with an almost straight ventral margin. The anterior margin is obliquely rounded, the posterior — especially in the right valve — is also rounded but more acutely. The valve is strongly swollen, on the ventral side slightly compressed. Few, very short, denticle-like processes occur along the margin of the anterior and posterior end. Carapace surface smooth, finely pitted.

Muscle scars of the main group consist of four ovate scars, arranged transversely in a vertical row, two round scars at the top and one round scar at the bottom, in front of them. Marginal pore canals straight, short, numerous. Duplicature rather wide with a small vestibule in the anterior part of the valve. Hinge of the left valve consists of a bar, terminating at both ends with terminal sockets, the anterior one being much better developed; a small accommodation groove occurs above. Terminal elements of the hinge margin of the right valve are distinctly denticulate.

Variation. — A considerable variation is found in the size of valves within the adult stage and in the ornamentation, particularly in the admarginal ornamentation elements which are differently developed. Dano-Paleocene valves are larger than Cretaceous ones.

Remarks. — The specimens, assigned to *Cytheridea bosqueti* from Upper Cretaceous and Dano-Paleocene of Poland, do not differ from

the figured specimens of *Cytherideis bosqueti* (recte *Cytheridea bosqueti*), described by Veen (1936) from the Maastrichtian of Holland. Perhaps, it was mostly on the basis of the valve shape that this species was assigned by Howe and Laurencich (1958) to the genus *Cushmanidea*, since they had only a closed valve, representing this species (from the Cretaceous of Holland) and the description of the hinge margin, given by the author of the species, is very vague and inaccurate. On the basis of both the valve shape and the structure of the hinge margin, the present writer believes that the species erected by Veen represents the genus *Cytheridea*.

Occurrence. — In Poland: Lower Maastrichtian, Paleocene and Eocene of Pamiętowo, Upper Maastrichtian and Paleocene of Sochaczew. Abroad: Maastrichtian of Holland.

Genus *Cuneocythere* Lienenklaus, 1894

Cuneocythere (Monsmirabilia) porifera n.sp.

(Pl. II, Fig. 4; Pl. VIII, Figs. 28—30)

Holotypus: Pl. VIII, Fig. 28 (O.II/259).

Stratum typicum: Paleocene.

Locus typicus: Pamiętowo, Poland.

Derivatio nominis: *porifera* — Gk. poros = a pore, Lat. *ferre* = to carry; porous. a character of the valve.

Diagnosis. — Carapace moderately swollen. Anteriorly and posteriorly laterally compressed. Along the anterior and posteroventral margin of the right valve there is an admarginal rim. Surface smooth, finely pitted.

Material. — Fifteen complete carapaces, 5 right and 4 left valves, representing only adult, well-preserved specimens.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/259	0.53	0.31
Left valve	O.II/260	0.56	0.40

Description. — Carapace middle-sized, fairly solid, ovate. Carapace valves slightly differ from each other in size and shape; the left, higher and, particularly along the dorsal margin, distinctly overlapping the right one, has more rounded dorsal and ventral margins in contrast with straighter dorsal and ventral margins of the right valve. The anterior margin acutely rounded, the posterior end slightly elongated, angulately rounded. Carapace more swollen in the central part. In the terminal, anterior and posterior parts, it is compressed. The margin of the anterior end thickened. Eye tubercle lacking. Valve surface smooth, the central, swollen part, usually, distinctly although very finely pitted.

Muscle scars poorly visible; within the main group, there are four subround scars, arranged in a vertical row. Marginal pore canals numerous, almost straight, rather long and fanwise disposed. Duplicature wide; concrescence line coincides with the inner margin line. Hinge of the left valve consists of a furrow slightly deepened in the anterior part above which an accommodation groove is distinctly visible.

Variation. — A small degree of variation is found in the valve size but it seems to take place only within the same, adult stage.

Remarks. — The valves of *Cuneocythere (Monsmirabilia) porifera* n.sp. from the Dano-Paleocene of Poland are somewhat similar to the figured valves of *C. (Monsmirabilia) triebeli*, described by Keij (1957, p. 79, Pl. 9, Figs. 1—4) from the Eocene of Belgium but are less elongated and devoid of admarginal rim along the anterior and posteroventral margin of the right valve.

Occurrence. — In Poland: Paleocene and Eocene of Pamiętowo, Danian and Paleocene of Sochaczew, Paleocene of Boryszew and Nasiłów. In Holland: the layer, containing both the Cretaceous and Tertiary elements, and in Danian.

Genus *Clithrocytheridea* Stephenson, 1936

Clithrocytheridea preciosa (Veen, 1936)

(Pl. I, Figs. 15, 16; Pl. VIII, Figs. 16—19)

1963. *Cytherura(?) preciosa* Veen; J. E. van Veen, Die Cytheridae..., p. 100, Pl. 4, Figs. 77—85.

1958. *Clithrocytheridea preciosa* (Veen); H. V. Howe & Laurencich, Introduction..., p. 113.

Material. — Thirty nine right and 44 left valves, both young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat No.	Length	Height
Right valve female	O.II/263	0.56	0.28
Left valve female	O.II/265	0.56	0.31
Right valve male	O.II/264	0.59	0.25

Description. — Carapace of medium size, solid, subtrapezoidal in lateral outline. Both valves differ in size and shape. Right valve smaller, having a less rotund dorsal margin, anterior end more truncated, posterior end more acute. Dorsal margin rounded, especially in the left valve, ventral margin straight, somewhat concave in the middle. Anterior end slightly rounded, posterior end elongated, acute. Valve almost uniformly inflated, on the ventral side compressed. The most inflated part of the valve is bordered by a thickened lateroventral ridge which passes frontally into a faint rib, somewhat oblique to the latero-

ventral ridge. In the posterior part of the valve, below the dorsal margin, there is another oblique rib, bent downwards posteriorly and connected with the lateroventral ridge. Lateral surface of of the valve weakly, irregularly ornamented and distinctly pitted. Ventral side covered by fine ribs parallel to ventral margin.

Muscle scars of the main group consist of four elongated scars, transversally arranged in a vertical row with two subovate scars above and slightly to the front. Marginal pore canals indistinct. Duplicature not wide, sometimes anteriorly and posteriorly forming a small vestibule. Hinge merodont, in the left valve, with elongated, crenulate sockets at both ends, separated by a projecting, finely crenulate bar. In the left valve, there is a distinct accommodation groove.

Variation is observed in size and shape of valve as a result of sexual dimorphism and differentiation of valve during ontogeny. Female specimens in comparison with male ones are higher, shorter and with a more rounded dorsal margin.

Ontogeny. — The last two instars may be recognized among right valves assigned to *Clithrocytheridea preciosa.*

Instar 1 — Dimensions (in mm.): length 0.47, height 0.25. Valve very similar to the valve of next instar, but thinner, more delicate.

Instar 2 (adult) — Dimensions (in mm.): length 0.56, height 0.28. Cf. description.

Remarks. — Specimens assigned *to C. preciosa* from Upper Cretaceous and Dano-Paleocene of Poland do not differ from figured specimens of *Cytherura? preciosa* (recte *Clithrocytheridea preciosa*) described by Veen (1936), from Maastrichtian of Holland.

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo, Upper Maastrichtian and Paleocene of Sochaczew, Paleocene of Bochotnica. In Holland: Maastrichtian.

Clithrocytheridea arcuata n.sp.

(Pl. II, Figs. 13, 14; Pl. VIII, Figs. 20—24)

Holotypus: Pl. VIII, Fig. 23 (O.II/271).

Stratum typicum: Lower Maastrichtian.

Locus typicus: Pamiętowo, Poland.

Derivatio nominis: *arcuata* — Lat. *arcuatus* = arched; after the arched dorsal margin, typical of that species.

Diagnosis. — Carapace semiovate in side view, laterally considerably and almost uniformly inflated, ventrally compressed. Lateral surface faintly pitted, with a subtransversal rib in the middle. Ventral side with parallel ribs.

Material. — Seventeen right and 30 left valves, both young and adult, in most cases well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve female	O.II/271	0.53	0.31
Left valve female	O.II/272	0.50	0.28
Right valve male	O.II/270	0.56	0.23

Description. — Carapace of medium size, massive, semiovate in lateral outline. Both valves differ a little in shape and size, left being higher, more rounded dorsally and less truncated in anterodorsal part. Dorsal margin strongly rounded, ventral margin straight, slightly concave in the middle. Anterior and posterior margin somewhat rounded, forming an acute angle with ventral margin. The valve considerably, almost uniformly inflated, on ventral side compressed. The most peripheral, posterior part of the valve is also compressed. Lateroventral ridge thickened. Along the middle of lateral side od the valve, there is a subtransversal rib. More numerous, parallel ribs occur on ventral side. Surface of carapace pitted.

Muscle scars consist of four elongated scars, arranged in a vertical row and one subovate scar above and in front. Marginal pore canals indistinct. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge merodont, like in *C. preciosa* Veen (cf. p. 487).

Variation is found in the shape and size of valves and results from the sexual dimorphism. It changes during the ontogenetic development. Female specimens are higher, somewhat shorter and dorsally more arched.

Ontogeny. — The last three instars can be recognized among the right valves, assigned to *Clithrocytheridea arcuata.*

Instar 1 — Dimensions (in mm.): length 0.34, height 0.22. Valve less elongated than in the next instars, more delicate. Internal morphological elements weakly developed but similar to those of adult forms.

Instar 2 — Dimensions (in mm.): length 0.40, height 0.22. Valve less elongated and thinner than in adult form. Internal morphological characters well-developed.

Instar 3 (adult) — Dimensions (in mm.): length 0.50, height 0.28. Cf. description.

Remarks. — Left valve of *Clithrocytheridea arcuata* from Upper Cretaceous of Poland is somewhat similar to the left valve of figured specimen of *Cythere? krausei,* described by Veen (1936, p. 174, Pl. 9, Figs. 44, 45) on the basis of a single valve from Maastrichtian of Holland. In comparison with indistinct figure of *Cythere? krausei,* the Polish specimens are more strongly rounded dorsally.

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo. Lower Maastrichtian of Rügen Island.

Genus *Schuleridea* Swartz & Swain, 1946
Schuleridea maculata (Apostolescu, 1956)
(Pl. I, Figs. 1, 2; Pl. IX, Figs. 1—4)

1956. *?Aequacytheridea maculata* Apostolescu; V. Apostolescu, Contribution..., p. 1335, Pl. 2, Figs. 23, 24.

Material. — Thirty five complete carapaces, 34 right and 20 left valves, only adult, in most cases well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat No.	Length	Height
Right valve, female	O.II/275	0.78	0.47
Left valve, female	O.II/276	0.84	0.56
Right valve, male	O.II/277	0.88	0.47

Description. — Carapace large in size, massive, ovate in lateral outline. Both valves differ somewhat in size and shape; right, smaller, with a less rounded dorsal and ventral margin in contrast to the left one which is larger, with more round dorsal and ventral margin. Anterior and posterior end rounded, posterior end slightly elongated. Valves equally inflated, at both ends laterally compressed. Small eye tubercle not always distinct. Surface of carapace conspicuously pitted.

Muscle scars consist of four elongated scars arranged in a nearly vertical row, with three ovate scars joined to form the letter V in front. Marginal pore canals numerous, straigth. Duplicature rather wide, the line of concrescence coincides with the line of inner margin. Hinge merodont; terminal elements in the right valve are distinctly crenulated. Above the median element in the right valve, there is an accommodation groove.

Variation is mainly observed in the shape and size of valves caused by the distinct sexual dimorphism. Female specimens are shorter, higher and more inflated than male. Moreover, specimens from Boryszew and Sochaczew are larger that those from Pamiętowo.

Remarks. — Specimens assigned to *Schuleridea maculata* from Dano-Paleocene of Poland do not differ from figured specimens of *?Aequacytheridea maculata,* described by Apostolescu (1956) from Eocene of France. The present author has changed the generic assignment of that species considering *Aequacytheridea* Mandelstam (1947) congeneric with the earlier described *Schuleridea* Swartz & Swain (1946).

Occurrence. — In Poland: Paleocene and Eocene of Pamiętowo, Danian and Paleocene of Sochaczew, Paleocene of Boryszew. Abroad: Eocene (Thanetian) of France.

Family **Cytheruridae** G. W. Müller, 1894
Genus *Cytheropteron* Sars, 1866
Cytheropteron v-scriptum Veen, 1936
(Pl. II, Fig. 12; Pl. XIX, Figs. 9—13)

1936. *Cytheropteron v-scriptum* Veen; J. E. van Veen, Die Cytheridae..., p. 70, Pl. 3, Figs. 51—54.
1941. *Cytheropteron v-scriptum* Veen; J. H. Bonnema, Ostracoden..., p. 26, Pl. 6 Figs. 12—17.
1958. *Cytheropteron v-scriptum* Veen; H. V. Howe & L. Laurencich, Introduction... p. 307.

Material. — Two complete carapaces, 48 right and 57 left valves, both young and adult, in most cases well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/284	0 39	0.23
Left valve	O.II/283	0.36	0.28

Description. — Carapace of rather small size, thick, massive, subovate in lateral outline. Both valves differ markedly in shape and size, left being higher and having a more rounded dorsal margin; dorsal margin of right valve almost straight. Ventral margin nearly straight, somewhat concave in the middle. Anterior end rounded, posterior end elongated, more acutely rounded. Valve flatly inflated, forming an alar inflation at the venter, overhanging ventral margin. Valve compressed at both ends and on ventral side. Lateroventral ridge, bordering alar inflation, thickened. Lateral surface of valve pitted, with two small grooves, joining each other to form the letter V in the middle, near the venter. On the ventral side, there are parallel ribs. Margin of valve slightly rimmed.

Muscle scars and marginal pore canals invisible. Duplicature rather wide, the line of concrescence coincides with the line of inner margin. Hinge of left valve consists of a bar, terminating at both ends in sockets; above the median element, there is a large accommodation groove. In the right valve, terminal elements are crenulated.

Variation is mainly found in size of valve, a result of differentiation during the ontogenetic development. Within the adult forms, the alar inflation varies, being sometimes more and less developed, with the end sometimes acute and sometimes blunt.

Ontogeny. — Three instars, probably the last ones may be recognized among the left valves.

Instar 1 — Dimensions (in mm.): length 0.28, height 0.19. The valve very thin, delicate, with V-like groove absent from the central part of the lateral side of valve. Internal morphological features indistinct.

Instar 2 — Dimensions (in mm.): length 0.31, height 0.23. The valve more similar to those of the adult forms, but thinner. Hinge margin like in adult specimens, less developed.

Instar 3 (adult) — Dimensions (in mm.): length 0.36, height 0.23. Cf. description.

Remarks. — Specimens assigned to *Cytheropteron v-scriptum* from Upper Cretaceous and Dano-Paleocene of Poland do not differ from figured specimens, described by Veen (1936) from Maastrichtian of Holland. They are also very similar to the specimens, included in *C. v-scriptum*, described by Bonnema (1941) from Upper Cretaceous of Holland.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian of Pamiętowo, Upper Maastrichtian, Danian and Paleocene of Sochaczew, Upper Maastrichtian and Paleocene of Bochotnica. Abroad: Upper Cretaceous of Holland.

Genus *Eucytherura* G. W. Müller, 1894
Eucytherura tumida Bonnema, 1941
(Pl. VII, Figs. 5, 5a; Pl. XIX, Figs. 32—33)

1941. *Eucytherura tumida* Bonnema; J. H. Bonnema, Ostracoden..., p. 23, Pl. 5, Figs. 69—77.

1958. *Eucytherura tumida* Bonnema; H. V. Howe & L. Laurencich, Introduction..., p. 341.

Material. — Seven complete carapaces, 118 right and 77 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/286	0.31	0.19
Left valve	O.II/287	0.31	0.19

Description. — Carapace of small size, subrectangular in lateral view. Both valves similar in size, shape and ornamentation, although the right one is more truncated in anterodorsal part and posteriorly more pointed. Dorsal margin straight, almost parallel to ventral margin which is slightly concave in the middle and somewhat curved posteriorly. Anterior end broadly rounded, posterior end in the right valve pointed in the left one obtusely truncated. The valve inflated, in the most distal, peripheral posterior part and on ventral side compressed. Eye tubercle distinct. At the end of dorsal margin and in posteroventral part of valve, there are tubercles. The arched lateroventral ridge is sharp. Anterior margin serrate. Surface of carapace regularly, finely, reticulated.

Muscle scars consist of four elongated scars, arranged in a vertical row with a subovate scars in front. Duplicature rather narrow, sometimes forming a small vestibule in the frontal part. Marginal pore canals

invisible. Hinge lophodont; terminal elements in left valve form distinct hinge ears.

Variation is mainly found in valve ornamentation, especially in the degree of development of admarginal tubercles.

Remarks. — Specimens, assigned to *Eucytherura tumida* from Upper Cretaceous and Dano-Paleocene of Poland seem to be similar to figured specimens of *Eucytherura tumida,* described by Bonnema (1941) from Upper Cretaceous of Holland. However, Bonnema's figures are indistinct. In the opinion of Howe and Laurencich (1958), the Dutch specimens of that species have a smooth surface.

Occurrence. — In Poland: Upper Maastrichtian, Danian and Paleocene of Sochaczew, Danian and Paleocene of Bochotnica, Paleocene of Nasiłów, Paleocene and Eocene of Pamiętowo. Abroad: Upper Cretaceous of Holland.

Eucytherura squamifera Veen, 1936
(Pl. VII, Fig. 2; Pl. XIX, Figs. 39, 40)

1936. *No. 3.* Veen; J. E. van Veen, Die Cytheridae..., p. 178, Pl. 10, Figs. 37—41.
1938. *Eucytherura squamifera* Veen; J. E. van Veen, Die Ostracoden..., p. 16.
1958. *Eucytherura squamifera* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 340.

Material. — Three complete carapaces, 22 right and 28 left valves only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal Cat.No	Length	Height
Right valve	O.II/289	0.33	0.19
Left valve	O.II/290	0.31	0.19

Description. — Carapace of small size, subrectangular in lateral view. Both valves are similar in size, shape and ornamentation, but anterodorsal part of the right valve is more truncated. Dorsal margin straight, subparallel to ventral margin, which is somewhat concave in the middle and posteriorly slightly truncated. Anterior end broadly rounded, posterior end slightly elongated, obtusely truncated in the left or pointed in the right valve. The valve flatly inflated, at the most peripheral posterior part and on the ventral side, compressed. Eye tubercle distinct, glassy. Along the dorsal margin, above the lateroventral ridge and along the middle of valve, there are irregular, sharp processes. Lateroventral ridge posteriorly terminates in a prominent, tubercular spine. Margins of valve not thickened, anterior margin finely serrate. Surface of the valve reticulated.

Muscle scars and marginal pore canals indistinct. Duplicature not

very wide, the line of concrescence coincides with the line of inner margin. Hinge lophodont with distinct hinge ears in the left valve.

Variation is primarily observed in the degree of the development and pattern of valve ornamentation. It is possible that the specimens assigned by the present author to *Eucytherura squamifera* represent more than one species.

Remarks. — Specimens included into *Eucytherura squamifera* from Upper Cretaceous and Dano-Paleocene of Poland are similar to the figured specimens, described by Veen (1936/1938) as *Eucytherura squamifera* from Maastrichtian of Holland.

Occurrence. — In Poland: Upper Maastrichtian of Sochaczew, Lower Maastrichtian, Paleocene and Eocene of Pamiętowo, Danian and Paleocene of Sochaczew, Upper Maastrichtian and Paleocene of Bochotnica. Abroad: Maastrichtian of Holland.

Eucytherura dorsotuberculata Veen, 1936
(Pl. V, Figs. 6, 6a; Pl. XIX, Figs. 34, 35)

1936. *No. 8.* Veen; J. E. van Veen, Die Cytheridae..., p. 179, Pl. 10, Figs. 55—57.
1938. *Eucytherura dorsotuberculata* Veen; J. E. van Veen, Die Ostracoden..., p. 17.
1941. *Eucytherura dorsotuberculata* Veen; J. H. Bonnema, Ostracoden..., p. 21, Pl. 5, Figs. 45—46.
?1949. *Eucytherura ansata* Weingeist; L. Weingeist, The Ostracode..., p. 370, Pl. 73, Figs. 1, 2, 4—7.
1958. *Eucytherura dorsotuberculata* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 335.
1964. *Eucytherura ansata* Weingeist; P. Kaye, Ostracoda..., p. 97, Pl. 4, Figs. 1—4.

Material. — Two complete carapaces, 27 right and 26 left valves only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/292	0.30	0.18
Left valve	O.II/293	0.30	0.17

Description. — Carapace of small size, subovate in lateral view. Both valves are very similar in size, shape and ornamentation. Dorsal margin straight, ventral margin mildly concave, posteriorly somewhat truncated. Anterior end rounded, posterior end elongated, more acutely rounded. The carapace, laterally and on the ventral side, compressed, in frontal part slightly swollen. Along the anterior margin and lateroventral ridge there is a prominent rim; along the anterior margin it is weakly serrate and ventrally terminating in a bifurcate tubercle. At the dorsal margin, there are three evenly spaced tubercles and a prominent eye

tubercle in front. In the most distal, posterior part of valve there is a short, oblique rib. Surface of valve rather smooth.

Muscle scars of the main group consist of four elongated scars, arranged in a nearly vertical row with a horseshoe-like scar in front. Duplicature rather wide, especially anteriorly and posteriorly where it forms a vestibule. The line of concrescence almost parallel to the line of outer margin. Marginal pore canals invisible. Hinge merodont, with distinct hinge ears in the left valve; terminal elements in right valve weakly serrate.

Variation is mainly found in the ornamentation. In contrast to the typical specimens there are some valves with disappearing dorsal tubercles.

Remarks. — Specimens, assigned to *Eucytherura dorsotuberculata* from Upper Cretaceous and Dano-Paleocene of Poland are similar to those of *Eucytherura dorsotuberculata*, described by Veen (1936) and later by Bonnema (1941) from Maastrichtian of Holland. They are also similar to figured specimens of *E. ansata* Weingeist, 1949, described by Kaye (1946) from Albian of England. To *E. dorsotuberculata* synonymy the present author tentatively included *E. ansata* from Albian of Texas, USA, not accepting the features attributed by Weingeist to *E. dorsotuberculata*. In Weingeist's opinion, in *E. dorsotuberculata,* in contrast to those of *E. ansata,* the dorsal tubercles are unequally distributed.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Lucimia, Upper Mastrichtian and Paleocene of Bochotnica, Paleocene of Sochaczew and Nasiłów, Eocene of Pamiętowo. Abroad: Upper Cretaceous of England.

Eucytherura bicornis Veen, 1936
(Pl. VI, Fig. 9; Pl. XIX, Figs. 16—21)

1936. *No.* 2. Veen; J. E. van Veen, Die Cytheridae..., p. 178, Pl. 10, Figs. 34—36.

1938. *Eucytherura bicornis* Veen; J. E. van Veen, Die Ostracoden..., p. 16.

1941. *Eucytherura chelodon* Marsson; J. H. Bonnema, Ostracoden..., p. 21, Pl. 5, Figs. 58, 59.

1958. *Eucytherura bicornis* Veen: H. V. Howe & L. Laurencich, Introduction..., p. 334.

Material. — Ninety three right and 112 left valves, young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/300	0.36	0.19
Left valve	O.II/299	0.37	0.22

Description. — Carapace of small size, ovate-rectangular in lateral view, delicate. Both valves nearly identical in shape and ornamentation, left being somewhat larger. Dorsal margin straight or a little concave in the middle, subparallel to a slightly arched ventral margin. Anterior end broadly rounded, posterior end elongated, pointed. The valve inflated, in the most distal, posterior part and on ventral side, compressed. Lateroventral ridge sharp, posteriorly pointed, frontally passing into a somewhat upturned rib which joins the median rib. Median rib extends in front of the muscle swelling to the anterior margin which is indistinctly serrate. Behind the muscle swelling and, sometimes, at the end of dorsal margin, there are small tubercles. Margins of valve slightly thickened. Surface of the valve almost smooth. Eye tubercle prominent.

Muscle scars of the main group consist of four scars, arranged in a subvertical row with one scar in front. Duplicature narrow, the line of concrescence coincides with the line of inner margin. Hinge merodont; terminal elements in the right valve crenulated. Marginal pore canals indistinct.

Variation is mainly observed in the size and degree of development of valve ornamentation, resulting from the valve differentiation during the ontogeny.

Ontogeny. — Four instars can be recognized among the left valves of *E. bicornis.*

Instar 1 — Dimensions (in mm.): length 0.19, height 0.12. Valve very delicate, with very weakly differentiated external and internal morphological features, rather triangular in lateral outline.

Instar 2 — Dimensions (in mm.): length 0.23, height 0.12. Valve similar to that of the next instar, but thinner, with less developed ornamentation. Hinge margin weakly differentiated.

Instar 3 — Dimensions (in mm.): length 0.28, height 0.15. Valve very similar to those of the adult instar. Hinge lophodont.

Instar 4 (adult) — Dimensions (in mm.): length 0.36, height 0.19. Cf. description.

Remarks. — Specimens assigned to *Eucyterura bicornis* from Upper Cretaceous and Dano-Paleocene of Poland not differ from specimens of *Eucytherura bicornis,* described by Veen (1936, 1938) from Maastrichtian of Holland. In the present author's opinion, specimens figured by Bonnema (1941) from Upper Cretaceous of Holland, and assigned by him to *E. chelodon,* should be referred to *E. bicornis.*

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo, Danian and Paleocene of Sochaczew, Upper Maastrichtian, Danian and Paleocene of Bochotnica, Upper Maastrichtian and Paleocene of Nasiłów, Upper Maastrichtian of Kazimierz. Abroad: Maastrichtian of Holland.

Eucytherura derupta n. sp.

(Pl. I, Fig. 12; Pl. XIX, Figs. 22—25)

Holotypus: Pl. XIX, Fig. 24 (O.II/303).

Stratum typicum: Paleocene.

Locus typicus: Bochotnica, Poland.

Derivatio nominis: *derupta* — Lat. *deruptus* = steep; named after the steep lateral side of valve.

Diagnosis. — Valve subrectangular in lateral view, pointed posteriorly. Lateral side steep, bearing an indistinct median rib behind the muscle swelling. Ventral side compressed. Surface irregularly pitted.

Material. — Fifty one right and 39 left valves, young and adult, well-preserved.

Dimensions (in mm.):

	Z Pal.Cat.No.	Length	Height
Right valve	O.II/303	0.44	0.22
Left valve	O.II/304	0.44	0.23

Description. — Carapace of medium size, subrectangular in lateral outline, solid. Both valves are similar in size and shape, left being more truncated in the anterodorsal part. Dorsal margin straight, parallel to the ventral margin. Anterior end abruptly rounded, posterior end elongated, pointed. The valve laterally steep, in the most peripheral posterior part and on ventral side compressed. Lateroventral ridge frontally passes into a somewhat oblique rib, attached to the anterior margin, posteriorly rather sharply ended. Eye tubercle distinct, glassy. Anterior margin somewhat thickened, in the lower part serrate. Surface of the valve irregularly, finely pitted and bearing an indistinct rib along the middle, behind the muscle swelling.

Muscle scars and marginal pore canals invisible. Duplicature rather narrow the line of concrescence coincides with the line of inner margin. Hinge merodont; terminal elements in the right valve crenulated.

Variation is mainly found in the size and degree of development of the ornamental features of valve, which result from the differentiation of the valve during the ontogeny.

Ontogeny. — The last three instars can be recognized among the right valves, assigned to *E. derupta*.

Instar 1 — Dimensions (in mm.): length 0.28, height 0.15. Shape of valve similar to that of next instar, the ornamentation weakly developed. Hinge margin indistinctly differentiated.

Instar 2 — Dimensions (in mm.): length 0.34, height 0.19. Valve very similar to that of adult but more fragile, thinner. Hinge lophodont.

Instar 3 (adult) — Dimensions (in mm.): length 0.44, height 0.22. Cf. description.

Remarks. — Specimens included into *Eucytherura derupta* from Dano-Paleocene of Poland seem to be somewhat similar to specimens of *E. simplex,* described by Veen (1936, p. 17, Pl. 5, Fig. 13) from Maastrichtian of Holland. In contrast to specimens of *E. simplex,* specimens of *E. derupta* are not compressed laterally, and are devoid of such a thickened margin. Moreover, they are distinctly pitted.

Occurrence. — In Poland: Danian and Paleocene of Bochotnica, Paleocene of Nasiłów, Sochaczew and Pamiętowo, Eocene of Pamiętowo. In Holland: the layer, containing both Upper Cretaceous and Lowermost Tertiary forms.

Genus *Paracytheridea* G. W. Müller, 1894
Paracytheridea cf. *bosqueti* Veen, 1936
(Pl. VI, Fig. 6; Pl. XIX, Figs. 5—8)

1936. *Paracytheridea bosqueti* Veen; J. E. van Veen, Die Cytheridae..., p. 64, Pl. 3, Figs. 7—11.
1958. *Paracytheridea bosqueti* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 453.

Material. — Sixteen right and 11 left valves, both young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat No.	Length	Height
Right valve	O.II/310	0.46	0.22
Left valve	O.II/309	0.46	0.22

Description. — Carapace of medium size, delicate. Both valves are of the same size and similar in shape, left being anterodorsally less truncated. Dorsal margin straight, convergent to the ventral margin. Anterior end rounded, posterior end elongated, pointed. The carapace alarly inflated, in the most distal part of the posterior end, compressed. Alar inflation, bordered in a lower part by a sharp lateroventral ridge, parallel to the dorsal margin and pointed posteriorly, overhangs the ventral margin. Between posterior end and a spiny end of lateroventral ridge, there is a prominent, downturned process. Eye tubercle indistinct, muscle swelling well developed. Surface of carapace covered with an irregular, weak reticulation and irregular tubercles behind muscle swelling.

Muscle scars and marginal pore canals invisible. Duplicature narrow, coinciding with the line of inner margin. Hinge amphidont; terminal elements in right valve serrate.

Variation concerns the size and degree of development of internal and external morphological features of the valve in different instars.

Ontogeny. — Three last instars can be recognized among the left valves of *P.* cf. *bosqueti.*

Instar 1 — Dimensions (in mm.): length 0.32, height 0.17. Valve very thin, delicate, of similar shape as adult form, but less ornamented. Hinge margin indistinctly differentiated.

Instar 2 — Dimensions (in mm.): length 0.39, height 0.19. Valve similar to that of preceding instar. Hinge lophodont, duplicature very narrow.

Instar 3 (adult) — Dimensions (in mm.): length 0.46, height 0.22. Cf. description.

Remarks. — The shape of the valves, assigned to *P.* cf. *bosqueti* from Dano-Paleocene of Poland, is very similar to that of specimens, figured by Veen (1936) from Maastrichtian of Holland and described as *Paracytheridea bosqueti.* Unfortunately, the ornamentation of Veen's specimens is not clear and insufficiently described and, therefore, the present author has only tentatively assigned the Polish specimens to *P. bosqueti.*

Occurrence. — In Poland: Danian and Paleocene of Bochotnica and Sochaczew, Paleocene of Nasiłów, Paleocene and Eocene of Pamiętowo. In Holland: Maastrichtian and the layer containing both Cretaceous and Lowermost Tertiary forms and in Danian.

Genus *Hemicytherura* Elofson, 1941

Hemicytherura unisulcata (Veen, 1936)

(Pl. IV, Figs. 11, 12; Pl. XIX, Figs. 14, 15)

1936. *Cytherura unisulcata* Veen; J. E. van Veen, Die Cytheridae..., p. 84, Pl. 4, Figs. 7—11.
1941. *Cytherura unisulcata* Veen; J. H. Bonnema, Ostracoden..., p. 10, Pl. 5, Fig. 23.
1958. *Hemicytherura unisulcata* (Veen); H. V. Howe & L. Laurencich, Introduction..., p. 360.

Material. — Nine complete carapaces, 11 right and 6 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat No.	Length	Height
Right valve	O.II/313	0.34	0.22
Left valve	O.II/314	0.36	0.20

Description. — Carapace of small size, solid, almost semiovate in lateral view. Both valves differ in shape and size, right being higher, dorsally more arched. Ventral margin slightly sigmoidal, anteriorly somewhat truncated. Anterior end narrowly rounded, posterior end elongated, caudate. The valve flatly inflated, on ventral side and in the most distal, posterior part compressed. Lateroventral ridge merges frontally with the admarginal rim of the anterior end and of the dorsal margin. In the posterior part of valve, there is a prominent, slightly arched rib, extending from dorsal margin to the venter where it forms a blunt process. Surface of carapace covered with rather irregular, subvertical and subhorizontal

crossing ribs, more developed posteriorly. Frontally, there are indistinct pits. Margin of anterior end finely denticulate. Eye tubercle indistinct.

Muscle scars consist of four elongated scars, arranged in a subvertical row with a heart- shaped scar in front. Marginal pore canals invisible. Duplicature rather wide, the line of concrescence coincides with the line of inner margin. Hinge of left valve consists of a median rib, terminally weakly serrate and of terminal sockets; above the median element, there is an accommodation groove.

Variation is mainly observed in the degree of development of ornamental features.

Remarks. — Specimens assigned to *Hemicytherura unisulcata,* from Upper Cretaceous and Dano-Paleocene of Poland seem not to differ from figured specimens of *Cytherura unisulcata* (recte *Hemicytherura unisulcata*), described by Veen (1936), from Maastrichtian of Holland, also found there later by Bonnema (1941).

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo, Upper Maastrichtian of Kazimierz, Upper Maastrichtian, Danian and Paleocene of Sochaczew, Upper Maastrichtian and Paleocene of Bochotnica, Paleocene of Nasiłów. In Holland: Maastrichtian.

Family **Leguminocythereididae** Howe, 1961

Genus *Triginglymus* Blake, 1950

Triginglymus? cribratus Apostolescu, 1956

(Pl. III, Figs. 13, 13 a; Pl. XVIII, Figs. 9—15)

1956. *Triginglymus cribratus* Apostolescu; V. Apostolescu, Contribution..., p. 1343, Pl. 3, Figs. 47, 48.

?1958. *Triginglymus? tricostatus* Marlière; R. Marlière; Ostracodes du Montien..., p. 35, Pl. 5, Figs. 3, 3 a.

Material. — Over 150 complete carapaces, 200 right and 200 left valves, young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, female	O.II/319	0.73	0.44
Left valve, female	O.II/321	0.78	0.46
Right valve, male	O.II/320	0.83	0.44

Description. — Carapace of large size, massive, subovate in lateral view. Both valves differ a little in size and shape, left being larger and somewhat more angulated in lateral outline. Dorsal margin almost straight, subparallel to the ventral margin slightly concave in the middle. Anterior end broadly rounded, posterior end elongated, acutely rounded. The valve conspicuously inflated, in the most distal anterior and posterior part and on ventral side, compressed. Muscle swelling well developed,

eye tubercle distinct. At the dorsal margin there occurs a prominent ridge, frontally disappearing below the eye tubercle, sharply ended and posteriorly curving downwards. Distinct, thickened lateroventral ridge borders the inflated part of valve. Thickened anterior margin bears numerous, fine spines. Along the posterior margin, there are less numerous but generally longer denticles. Surface of valve strongly reticulated; around the muscle swelling reticulation arranged concentrically.

Muscle scars consist of four elongated scars, arranged in a subvertical row with two scars in front. Marginal pore canals numerous, short and straight. Duplicature not wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont with smooth terminal elements.

Variation is found in the size and shape of valves of different instars and in the sexual differentiation. The valves of males are longer than those of females. Among adult specimens of this species there occur forms with dimensions of young individuals and young specimens with dimensions of adult individuals. This species includes not fully developed specimens.

Ontogeny. — The last four instars may be recognized among the right valves of *Triginglymus? cribratus.*

Instar 1 — Dimensions (in mm.): length 0.46, height 0.26. Valve thin, delicate, in lateral outline more angulated than those of next instars, having weakly developed ornamentation. Internal morphological features indistinct.

Instar 2 — Dimensions (in mm.): length 0.56, height 0.34. Valve similar to those of next instars but thinner. Duplicature narrow, hinge margin weakly differentiated, lophodont; posterior terminal hinge element better-developed.

Instar 3 — Dimensions (in mm.): length 0.64, height 0.36. Valve like in the next, adult instar, but with a narrower duplicature and lophodont hinge.

Instar 4 (adult) — Dimensions (in mm.): length 0.73, height 0.44.

Remarks. — Specimens assigned to *Triginglymus? cribratus* from Dano-Paleocene of Poland seem not to differ from figured specimens of *T. cribratus,* described by Apostolescu (1956) from Lutetian of France. Specimens of this species are also in general appearance, similar to illustrated forms of *T.? tricostatus,* described by Marlière (1958) from Montian of Belgium. However, Marlière's specimens are rather schematically figured and, therefore, in this paper they are only tentatively included in the synonymy of *T.? cribratus.* The present author has only tentatively referred the species described above to the genus *Triginglymus*; in contrast to *Triginglymus,* it is distinctly ridged along the ventral and dorsal margin and does not possess "a triangular "anti-slip" tooth

behind the anterior cardinal angle and just anterior to and below the middle of the dorsal margin" (see Blake, 1950, p. 181).

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo, Paleocene of Sochaczew, Nasiłów, Boryszew and Bochotnica. In Belgium: Danian and Montian, in Holland: the layer containing both Upper Cretaceous and Lowermost Tertiary forms in Lutetian.

Triginglymus? callosus n.sp.
(Pl. III, Figs. 1, 1 a; Pl. XVI, Figs. 10, 11)

Holotypus: Pl. XVI, Fig. 10 (O.II/324).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *callosus* — Lat. *callosus* = swollen; named after the inflated shape of the carapace.

Diagnosis. — The carapace strongly inflated. Surface of valve meanderingly, closely reticulated. Along the rimmed anterior margin, there is a distinct groove. Posterior end bears some spines, the lower ones gradually increasing in length.

Material. — Ten right and 13 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No	Length	Height
Right valve	O.II/324	0.81	0.50
Left valve	O.II/325	0.79	0.50

Description. — Carapace of large size, very solid, subovate in lateral outline. Both valves differ a little, especially in shape, the left being more angulated in lateral view. Dorsal margin straight, parallel to the ventral margin, concave in middle. Anterior end broadly rounded, posterior end slightly elongated, angulately rounded. The valve strongly inflated, on ventral side and in the peripheral part of anterior and posterior end, compressed. Distinct lateroventral ridge borders the inflated central part of the valve. Muscle swelling distinctly marked, eye tubercle glassy, rather small. Margins of valve thickened. Along the rimmed, denticulated anterior margin, there is a distinct groove. Posterior margin bears some spines, the lower ones gradually increasing in length. Surface of valve meanderingly, closely reticulated.

Muscle scars of the main group consist of four elongated scars arranged in a subvertical row, with two scars in front. Marginal pore canals invisible. Duplicature not wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of right valve almost smooth.

Variation is mainly observed in the degree of development of the ornamentation and, to a lesser extent, in its pattern.

Remarks. — Specimens assigned to *Triginglymus? callosus* from Dano-Paleocene of Poland seem to be quite different from those of species so far described. They are only tentatively referred to genus *Triginglymus* as they possess a lateroventral ridge absent from *Triginglymus* and have a somewhat different hinge margin (cf. remarks at *T.? cribratus* Apostolescu, p. 500—501).

Occurrence. — In Poland: Danian and Paleocene of Pamiętowo.

Family **Xestoleberididae** G. O. Sars, 1928
Genus *Xestoleberis* G. O. Sars, 1866
Xestoleberis pergensi Veen, 1936
(Pl. IV, Figs. 4, 5; Pl. VIII, Figs. 11—15)

1936. *Xestoleberis pergensi* Veen; J. E. van Veen, Die Cytheridae..., p. 69, Pl. 3, Figs. 12—29.

1958. *Xestoleberis pergensi* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 517.

Material. — Forty two right and 28 left valves, young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No	Length	Height
Right valve	O.II/332	0.47	0.33
Left valve	O.II/331	0.54	0.34

Description. — Carapace of medium size, subovate in lateral outline, solid. Both valves similar in size and shape, although left, being somewhat larger, is more acutely rounded dorsally. Dorsal margin strongly arched, ventral margin almost straight, concave in the middle. Anterior end abruptly rounded, slightly elongated, posterior end more broadly rounded. The valve evenly and strongly inflated, particularly so in posteroventral part where it slightly overhangs the ventral margin. Ventral side compressed. Surface of the valve smooth. Eye spot indistinct.

Muscle scars consist of four elongated scars arranged in a vertical row and of subovate scar in front. Duplicature rather narrow but in the frontal part, there is, in general, a small vestibule. Marginal pore canals straight, not numerous, short. Hinge of left valve consists of terminal, elongated sockets and a median bar; in the right valve terminal elements are distinctly serrate.

Variation is mainly found in the size and shape of valves, belonging to different instars.

Ontogeny. — Four instars may be recognized among the left valves of *Xestoleberis pergensi* from Lucimia.

Instar 1 — Dimensions (in mm.): length 0.23, height 0.17. Valve not so rounded in lateral outline, less elongated and less inflated than in the next instar. Internal morphology indistinct.

Instar 2 — Dimensions (in mm.): length 0.33, height 0.22. Valve more similar to those of next instars but less inflated in posteroventral part. Hinge margin weakly differentiated and of the same type as in adult forms.

Instar 3 — Dimensions (in mm.): length 0.40, height 0.28. Shape of the valve like in preceding instar. Hinge margin well-developed, duplicature narrow.

Instar 4 (adult) — Dimensions (in mm.): length 0.54, height 0.34. Cf. description.

Remarks. — Specimens, assigned to *Xestoleberis pergensi* from Upper Cretaceous of Poland seem not to differ from specimens described by Veen (1936) as *Xestoleberis pergensi,* from Maastrichtian of Holland.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Bochotnica, Lucimia, Chotcza, Nasiłów and Kazimierz, and Paleocene of Pamiętowo (1 specimen). Abroad: Campanian of Miały (B.S.S.R.), Maastrichtian of Holland and Belgium.

Genus *Uroleberis* Triebel, 1958

Uroleberis? mazoviensis n.sp.

(Pl. I, Figs. 3, 4; Pl. VIII, Figs. 7—10)

Holotypus: Pl. VIII, Fig. 8 (O.II/337).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *mazoviensis* — after Mazowsze, a region in Central Poland.

Diagnosis. — The valve evenly, considerably swollen, compressed on ventral side where it is ribbed. Lateroventral ridge sharp, especially posteriorly. Lateral surface smooth, finely pitted.

Material. — Fourteeen complete carapaces, 51 right and 37 left valves, only adult, well- preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, male	O.II/336	0.40	0.25
Left valve, male	O.II/337	0.44	0.26

Description. — Carapace of rather medium size, semiovate in lateral outline, solid. Both valves similar in shape and size. Dorsal margin strongly arched, ventral margin straight. Anterior end somewhat elongated, acutely rounded, posterior end more broadly rounded. The valve evenly and considerably inflated, on ventral side, compressed. Lateroventral ridge sharp, especially posteriorly. Surface of carapace smooth,

finely pitted. Parallel ribs occur on ventral side. Eye spot, in general, indistinct.

Muscle scars of the main group consist of four elongated scars, arranged in a vertical row and one scar in front. Marginal pore canals invisible. Duplicature rather wide, sometimes forming anteriorly a small vestibule. Hinge of left valve consists of a serrate groove, terminally enlarged, with the bar and accommodation groove above.

Variation is mainly found in the shape and size of valve and results from the sexual dimorphism. Male specimens are lower, longer and, in contrast to female ones, less inflated, especially posteriorly.

Remarks. — Specimens assigned to *Uroleberis? mazoviensis* resemble figured specimens of *Xestoleberis supplanta,* described by Veen (1936, p. 69, Pl. 3, Figs. 30—43) from Maastrichtian of Holland, but specimens of *U.? mazoviensis* are lower, slimmer and with a sharper lateroventral ridge. The species *Uroleberis? mazoviensis* has been tentatively referred to the genus *Uroleberis*; unlike the type species of *Uroleberis,* in *Uroleberis? mazoviensis* the caudal process is lacking.

Occurrence. — In Poland: Lower Maastrichtian, Danian, Paleocene and Eocene of Pamiętowo, Upper Maastrichtian, Danian and Paleocene of Sochaczew. Abroad: in Holland — the layer containing both Upper Cretaceous and Lowermost Tertiary elements, in Danian of Belgium.

Family **Trachyleberididae** Sylvester-Bradley, 1948

Genus *Cythereis* Jones, 1849

Cythereis (Trachyleberis) aculeata (Bosquet, 1852)

(Pl. VI, Figs. 7, 8; Pl. XV, Figs. 1—8, 11—13)

1852. *Cythere aculeata* Bosquet; J. Bosquet, Description des Entomostracés..., p. 107, Pl. 5, Figs. 10a-d.

?1936. *Cytheridella darvini* Veen; J. E. van Veen, Die Cytheridae..., p. 164, Pl. 8, Figs. 51, 52.

?1936. *Cythereis horridulior* Veen; J. E. van Veen, *Ibid.*, p. 145, Pl. 4, Figs. 44—50.

non 1955. *Trachyleberis aculeata* (Bosquet); V. Apostolescu, Description..., p. 271, Pl. 8, Figs. 123, 124.

1957. *Trachyleberis (Trachyleberis) aculeata* (Bosquet); A. J. Keij, Eocene and Oligocene Ostracoda..., p. 90, Pl. 13, Figs. 16, 17; Pl. 16, Figs. 14, 15.

?1958. *Trachyleberis aculeata* Bosquet; R. Marlière, Ostracodes..., p. 42, Pl. 6 Figs. 5, 5a.

?1958. *Cythereis horridulior* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 203.

Material. — Two hundred and twenty nine right and 236 left valves, as well as 22 complete carapaces, representing both the young and adult specimens, mostly well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/352	1.08	0.59
Left valve	O.II/349	1.05	0.55

Description. — Carapace large, solid, subovate in lateral outline. Both valves of the carapace are similar in size, shape and ornamentation, although the right one has — in its antero- and posterodorsal parts — a more truncated margin. Dorsal margin straight or slightly convergent with the ventral margin which is slightly concave half-way its length. The anterior end acutely rounded, the posterior one elongated, somewhat pointed. Valve strongly swollen, in the distal posterior part and on the ventral side, compressed. Muscle swelling fairly extensive. Eye tubercle glassy, well-developed. Fairly long, solid spines, with their dimensions increasing posteriorly, arranged in an irregular row, occur close to the dorsal margin. The spine, situated more or less half-way the length of the hinge margin, as well as that, usually bifurcated, in the posterodorsal angle, seem to be the most characteristic. Short spines occur behind the muscle field and along the lateroventral ridge of the valve. At the posterior end of the lateroventral ridge they are longer and, usually, occur in crowded groups. Valve margins thickened. Abundant and rather long spines cover the margin of the anterior and posterior end. The entire lateral and ventral side of the valve are intensively reticulated. On the ventral side, spines are arranged in rows, parallel to the valve margin.

Muscle scars of the main group consist of four oblong scars, arranged in a subdiagonal row, and a heart-shaped scar, situated in front. Marginal pore canals almost straight, rather long and numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Variation. — A great degree of variation is found in size and ornamentation of valves and is a result of the presence of valves, representing different stages of ontogenetic development and of the changes related to stratigraphic position. Changes in ornamentation and size of valves, occurring in this species, are shown in Pl. XV, Figs. 10—13, the valves, coming from different levels of Upper Cretaceous of Mielnik and Bochotnica being used as an example. The increase is visible in the size of valves and in the development of ornamentation which took place during the period from Upper Campanian to Upper Maastrichtian.

Ontogeny. — The following six last stages of the ontogenetic development have been identified among left valves of *C. (Trachyleberis) aculeata* from Lower Maastrichtian of Mielnik:

Instar 1 — Dimensions (in mm.): length 0.32, height 0.20. Valve very

thin, fragile, ovate, outer relief slightly marked. Surface covered with fine, short, scarcely visible processes. No elements of the internal morphology visible.

Instar 2 — Dimensions (in mm.): length 0.44, height 0.29. Valve similar to that of the previous instar but slightly thicker. Duplicature very narrow, hinge indistinct.

Instar 3 — Dimensions (in mm.): length 0.56, height 0.34. Valve somewhat more solid and, as compared with those of previous instars, it has a more differentiated external morphology. Ornamental spines poorly developed. Duplicature narrow, hinge lophodont. The posterior, terminal hinge element better developed than the anterior.

Instar 4 — Dimensions (in mm.): length 0.68, height 0.39. Valve resembling those of previous instars, especially so with regard to the ornamentation. Margins slightly thickened. Hinge lophodont.

Instar 5 — Dimensions (in mm.): length 0.88, height 0.54. Valve shaped as in an adult stage but much more finely ornamented and thinner; margins slightly thickened. Valves of the same instar from Dano- Paleocene of Bochotnica are slightly reticulated, while those from Lower Maastrichtian of Mielnik are devoid of reticulation. Hinge lophodont, duplicature narrow.

Instar 6 (adult) — Dimensions (in mm.): length 1.05, height 0.56. Cf. — description.

Remarks. — The valves of *C. (Trachyleberis) aculeata* from Cretaceous and Dano-Paleocene of Poland have been identified mostly on the basis of Keij's (1957) revised description of this species from Lower Tertiary of Belgium and France. On the basis of an illustration of *Trachyleberis aculeata* from Eocene of Belgium, figured by Keij, it is only with a certain reservation that a specimen from the Montian of Belgium, assigned by Marlière (1958) to *Trachyleberis aculeata,* may be considered conspecific with it. The illustrations, given by Marlière, are schematic and vague and they seem to show *C. (Trachyleberis) horridula* (Bosquet) whose representatives have been found by the present writer in samples from Montian of Belgium. Likewise, the figured valves from Lutetian of France, attributed by Apostolescu (1955) to *Trachyleberis aculeata* (Bosquet) should, in the present write's opinion, be included in *Cythereis (Trachyleberis) horridula* (Bosquet). *Cytheridella darwini,* described by Veen (1936) from Maastrichtian of Holland is undoubtedly a young stage of *Cythereis horridulior,* a species, described by Veen (1936) also from Maastrichtian of Holland. They make up a species with an external morphology very similar to that of *C. aculeata* which was much earlier described by Bosquet. Unfortunately, both the illegibility of illustrations and insufficient description of *Cytheridella darwini* (recte *Cythereis horridulior*) and *Cythereis horridulior* do not allow one to state unequi-

vocally if these forms represent *C. (Trachyleberis) aculeata* or some other species.

The valve of *Cythereis horridulior* Veen, 1936, figured by Howe & Laurencich (1958) also resembles the valves of *Cythere aculeata* [recte *C. (Trachyleberis) aculeata* (Bosquet)], described previously. Its outline is, however, much too indistinct as to enable one to determine a mutual relationship of both these forms.

In contrast with the smooth terminal hinge elements of the valves from Eocene of Belgium, the terminal hinge elements of the valve of *Cythereis (Trachyleberis) aculeata* from Cretaceous and Dano-Paleocene of Poland are distinctly denticulate and, therefore, they have been assigned by the present writer to the genus *Cythereis*. On account of the valve ornamentation, typical rather of the genus *Trachyleberis*, she included this species in the subgenus *Trachyleberis*.

Valves, assigned to *Cythereis (Trachyleberis) aculeata* (Bosquet), particularly those from Lower Maastrichtian of Mielnik, are similar to the valves, included in *Cythereis* cf. *nodulosa* (Bosquet), occurring in Upper Campanian of Mielnik, and seem to be related with them (cf. p. 514). Valves of *C. (Trachyleberis) aculeata*, compared with those of *C.* cf. *nodulosa*, are somewhat larger and have longer, more differentiated spines, especially on their lateral surfaces. They are also similar to those of *C. (Trachyleberis) incerta* n.sp., occurring in Upper Cretaceous of Poland, differing from the latter in a more intensive spininess and reticulation, never observed on the valves of *C. (Trachyleberis) incerta* n.sp. *C. (Trachyleberis) incerta* also seems to be related with *C. (Trachyleberis) aculeata*. The valves of *C. (Trachyleberis) incerta* n.sp., found in Lower Maastrichtian of Mielnik, are difficult to differentiate from those of *C. (Trachyleberis) aculeata*.

Occurrence. — In Poland: Lower Maastrichtian of Mielnik and Pamiętowo, Upper Maastrichtian of Sochaczew, Bochotnica, Nasiłów, Kazimierz and Lucimia, Paleocene of Pamiętowo, Sochaczew, Nasiłów, Bochotnica and Boryszew, as well as Eocene of Pamiętowo. Abroad: In Holland the Maastrichtian (?), the layer, containing the elements of both the Cretaceous and Lowermost Tertiary, as well as Danian, Danian and Eocene of Belgium, Upper Danian and Paleocene of Denmark, Danian of the Crimea and Eocene of France.

Cythereis (Trachyleberis) horridula (Bosquet, 1854)

(Pl. V, Figs. 9, 10; Pl. XVI, Figs. 12—15)

1854. *Cythere horridula* Bosquet; J. Bosquet, Monographie..., p. 105, Pl. 7, Figs. 5 a-d.
1936. *Cythereis horridula* Bosquet; J. E. van Veen, Die Cytheridae..., p. 145, Pl. 4, Figs. 38—43.
1958. *Cythereis horridula* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 203.

Material. — Sixteen complete carapaces, 91 right and 86 left valves, representing only adult, well-preserved specimens.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/357	0.94	0.47
Left valve	O.II/358	0.90	0.50

Description. — Carapace large, fairly solid, subovate in lateral outline. Both valves are similar in shape, size and ornamentation. The right valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin straight, slightly convergent with ventral one which is somewhat concave half-way its length. Anterior end broadly rounded, posterior elongated, bluntly pointed. Almost entire valve, except for the distal posterior part, strongly swollen, compressed on the ventral side. Muscle swelling distinctly outlined. Eye tubercle glassy, well-developped. A few (3—4) spines, the last of them, posterior one, being usually the longest and bifurcated, occur close to the dorsal margin. At the base of the greatest swelling of the valve, a row of spines is disposed along the lateroventral margin, their sizes increasing posteriorly. The last of them, the longest, is usually bifurcated. Few shorter, irregular spines occur behind the muscle swelling and in the anterior part of the valve, as well as along the thickened margin of the anterior and posterior end. The margin of the anterior end is rimmed by many denticles. The entire valve surface, intensively reticulate, is covered with more or less abundant sharp processes.

Muscle scars of the main group consist of four oblong scars, arranged in a subvertical row, and a horseshoe-like scar in front of them. Marginal pore canals straight, rather short and numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont. Terminal elements of the right valve almost smooth.

Variation. — A considerable degree of variation is found in both the size of valves within the same adult stage and their ornamentation. The number of the ornamental spines, their length and shape differ to a considerable extent even among the individuals from the same sample (cf. Pl. XVI, Figs. 12—15). A phenomenon of the incomplete development of the valve occurs among the individuals of this species.

Remarks. — Specimens, assigned to *Cythereis (Trachyleberis) horridula* from the Upper Cretaceous and Dano-Paleocene of Poland are similar to the figured specimens of *Cythere horridula* (recte *Cythereis horridula),* described by Bosquet (1854) from the Upper Cretaceous of Holland, as well as to the valves, also found there and described by Veen (1936) as *Cythereis horridula.*

Occurrence. — In Poland: Lower Maastrichtian of Mielnik(?), Danian of Sochaczew, Paleocene of Bochotnica, Sochaczew, Nasiłów, Pamiętowo

and Boryszew and Eocene of Pamiętowo. Abroad: Holland, the Uppermost Maastrichtian, the layer containing both the Cretaceous and Lowermost Tertiary elements, as well as Danian; Belgium, Danian; Denmark, Paleocene.

Cythereis bispinifera (Veen, 1936)
(Pl. V, Fig. 7; Pl. XIV, Figs. 1—8)

1936. *Cythereis bispinifera* Veen; J. E. van Veen, Die Cytheridae..., p. 157, Pl. 7, Figs. 25—30.

1936. *Cythereis symmetrica* (Jones & Hinde) Veen; J. E. van Veen, *Ibid.*, p. 157, Pl. 7, Figs. 31—34.

1958. *Cythereis bispinifera* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 185.

Material. — Three complete carapaces, 37 right and 51 left valves, representing both the young and adult forms, mostly well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/371	0.73	0.39
Left valve	O.II/372	0.68	0.39

Description. — Carapace middle-sized, fairly solid, subrectangular in shape. Both valves are similar in size, shape and ornamentation. The right valve, somewhat longer than the left, has, in its anterodorsal part, a more truncated margin. Dorsal margin straight and parallel to an almost straight ventral margin. Anterior margin rounded, posterior strongly elongated, pointed. Valve flatly swollen, in the terminal posterior part and on the ventral side, compressed. Muscle swelling distinctly outlined; eye tubercle well-developed. Irregular tubercular spines, more abundant and longer in the posterior part of the valve, occur along the dorsal margin. A fairly sharp rib, also covered with short, tubercular spines which are longer and sharper at its posterior end, is situated close to the ventral margin. Margins of the valve are thickened, particularly along the anterior and posterior end. The margin of the anterior and posterior end is provided with many more or less regular spiny denticles; sometimes, in the lower part of the posterior end, 2—3 fairly long downward spiny processes occur. The entire valve surface is intensively and irregularly reticulate; now and again, fairly distinct, irregular, radial ribs, branching out from the eye tubercle occur in the anterior part.

Muscle scars invisible. Marginal pore canals straight, short, numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve smooth.

Variation. — A considerable degree of variation is found in both the size and ornamentation of the valves, resulting, among other factors, from the presence of valves, belonging to the adult, as well as to the young individuals. The variation in ornamentation consists in a different degree of its development, for instance, the valves from Mielnik have less-developed ornamentation than those from Pamiętowo or Bochotnica (cf. Pl. XVI, Figs. 5—8) (marginal elements of ornamentation on particular valves are preserved to a different degree). The valves from the Mielnik and Pamiętowo samples are, in general, larger than those from other samples.

Ontogeny. — Five last stages of the ontogenetic development have been recognized among right valves, found in Upper Campanian of Mielnik:

Instar 1 — Dimensions (in mm.): length 0.29, height 0.15. Valve similar in outline to that of a mature form but more elongated and considerably thinner. Valve margins are not thickened, ornamentation is slightly outlined. Internal morphological characters indistinct.

Instar 2 — Dimensions (in mm.): length 0.34, height 0.17. Valve very similar to that of the previous instar, except for the external, ornamental elements which are better-developed. Internal morphological characters indistinct.

Instar 3 — Dimensions (in mm.): length 0.39, height 0.19. Valve as that of the previous instar but somewhat more solid. Hinge lophodont, poorly developed; duplicature very narrow.

Instar 4 — Dimensions (in mm.): length 0.51, height 0.24. Valve more similar to that of the next, mature stage; margins slightly thickened, ornamentation fairly well-developed. Hinge lophodont, duplicature narrow.

Instar 5 (adult) — Dimensions (in mm.): length 0.59, height 0.34. Cf. description.

Remarks. — It was only with a certain reservation that the valves, assigned to *Cythereis symmetrica* (Jones & Hinde), a species, described by Veen (1936) from Maastrichtian of Holland, have been included by the present writer in the synonomy of *Cythereis bispinifera*, described by Veen (1936) also from Maastrichtian of Holland. In her opinion, they may represent different development stages of this same species. The descriptions of the external morphology of both these species, as well as their illustrations, display a considerable degree of similarity. However, no description of the hinge margin has been presented by the author of the species *C. symmetrica* which might provide a basis for the determination if it represents a mature or young stage. It results from the illustration in Veen's work that *C. symmetrica* has smaller valves than those of *C. bispinifera* and, consequently, *C. symmetrica* may represent the young stages of *C. bispinifera*. According to Howe

and Laurencich, *C. symmetrica* (Jones & Hinde) Veen, 1936, makes up a young stage of *?Cythereis tuberosa* Jones & Hinde. The valves, assigned to the species *C. bispinifera* from the Polish Cretaceous, do not differ from the figured valves of *C. bispinifera*, a species, described by Veen (1936).

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian of Pamiętowo, Upper Maastrichtian of Sochaczew, Nasiłów and Bochotnica. Abroad: Uppermost Maastrichtian of Holland and Upper Cretaceous of England (?).

Cythereis lonsdaleiana Jones, 1849
(Pl. VI, Figs. 11; Pl. XVII, Figs. 19, 20)

1849. *Cythere (Cythereis) lonsdaleiana* Jones; T. R. Jones, A monograph..., p. 20, Pl. 5, Figs. 12 a, b (non 12 c).
1880. *Cythere filicosta* Marsson; T. Marsson, Die Cirripedien..., p. 43, Pl. 3, Figs. 12 a, b.
1890. *Cythereis lonsdaleiana* Jones; T. R. Jones & G. J. Hinde, A supplementary monograph..., p. 27, Pl. 1, Figs. 64, 65.
1941. *Cythereis filicosta* Marsson; J. H. Bonnema, Ostracoden..., p. 132, Pl. 4, Figs. 48—53 (non Pl. 7, Figs. 55—58).
1958. *Cythereis filicosta* (Marsson); H. V. Howe & L. Laurencich, Introduction..., p. 198.
1964. *Cythereis lonsdaleiana* Jones; P. Kaye, Revision..., p. 63, Pl. 7, Figs. 7, 10.

Material. — Forty four right and 50 left valves of only adult, mostly well-preserved specimens.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/374	0.69	0.37
Left valve	O.II/375	0.69	0.43

Description. — Carapace middle-sized, fairly solid, subovate. Both valves are similar in size, shape and ornamentation. Dorsal margin straight, almost parallel to ventral. Anterior end broadly rounded, posterior slightly elongated, angulately rounded. Valve inflated, particularly in the central part; on the ventral side and in the terminal posterior part, compressed. Close to the dorsal margin there are 3 sharp, short ribs, oblique to each other, the last of them, posterior one, is pronouncedly pointed in its posterior end, while the first passes, in the region of an indistinct eye tubercle, into a frill-like admarginal rim of the anterior end. Muscle swelling well-developed, posteriorly passing into a narrow, sharp, median rib, terminating in irregular, short processes. A sharp, long, keel-like, lower rib and, below it, another, somewhat shorter rib, parallel to the former, occur on the ventral side along the ventral margin; both ribs are posteriorly sharply pointed. The

thickened margin of the posterior end is provided with more or less regular short spines or denticles. The valve surface is smooth, usually lustrous.

Muscle scars invisible. Marginal pore canals indistinct, almost straight, rather long and numerous. Duplicature fairly wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve slightly denticulate.

Variation. — An insignificant degree of variation is found in the valve size (within the same, adult stage), as well as in the degree of development of some external, morphological elements, especially the frill-like rim of the anterior end and ornamental spines on the margin of the posterior end.

Remarks. — The individuals, from Polish Cretaceous, assigned to *Cythereis lonsdaleiana* do not differ from the figured specimens of *Cythere (Cythereis) lonsdaleiana,* described by Jones (1849) from Cretaceous of England (cf. Kaye, 1964). They are also very similar to the figured specimens of *Cythere filicosta* (recte *Cythereis filicosta*), described by Marsson (1880) from Upper Cretaceous of the Rügen Island, as well as to the figured valves, attributed to *Cythereis filicosta,* described by Bonnema (1941) from Upper Cretaceous of Holland.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Lucimia and Chotcza. Abroad: Campanian of Miały (B. S. S. R.), Lower Maastrichtian of the Rügen Island, Maastrichtian of Holland and Upper Cretaceous of England.

Cythereis (Mauritsina) hieroglyphica (Bosquet, 1847)
(Pl. VI, Fig. 5; Pl. XI, Figs. 1, 2, 9—11)

1847. *Cypridina hieroglyphica* Bosquet; J. Bosquet, Description des Entomostracés..., p. 367, Pl. 3, Figs. 4 a-c.

1936. *Cythereis hieroglyphica* Bosquet; J. E. van Veen, Die Cytheridae..., p. 137, Pl. 2, Figs. 16—21.

1958. *Cythereis hieroglyphica* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 201.

1962. *Mauritsina hieroglyphica* (Bosquet); G. Deroo, Mauritsininae..., p. 204, Pl. 1, Figs. 1—7; Pl. 2, Figs. 20—23.

Material. — Eight complete carapaces, 8 right and 9 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, female	O.II/381	0.81	0.44
Left valve, female	O.II/380	0.81	0.44
Left valve, male	O.II/379	0.84	0.54

Description. — Carapace large, very solid, subrectangular. Both valves are similar in size, shape and ornamentation; the right one, in its antero- and posterodorsal parts, has a more truncated margin. Dorsal margin straight or, sometimes, slightly arched,. almost parallel to the ventral margin. Anterior margin subobliquely rounded, posterior and slightly elongated, angulately rounded. Valve strongly swollen, in the terminal posterior part and on the ventral side, compressed. Muscle swelling distinctly outlined, eye tubercle glassy, prominent. A thick, irregular rib, anteriorly disappearing in the region of the eye tubercle, posteriorly bluntly terminating and slightly inflected downwards, is situated close to the dorsal margin. An equally thick lower rib, posteriorly sharply pointed and anteriorly passing into a thickened margin of the anterior end, runs along the ventral margin. Posteriorly, behind the muscle swelling, there are 3 low nodes, not always equally distinct. The middle one, the longest, is usually connected with the posterior part of the dorsal rib. The margins of the valve are strongly thickened; many, very fine denticles occur along the margin of the anterior end, while the margin of the posterior end is mostly provided with short, spiny processes. The lateral and ventral surface of the valve are covered with an irregular, scarcely visible reticulation and fine pits.

Muscle scars invisible. Marginal pore canals not very distinct, short, straight and numerous. Duplicature rather narrow, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve finely denticulate.

Variation is mainly found in the valve shape; beside long, relatively not very swollen, valves which perhaps represent the male indiduals, there are also shorter, much more inflated ones, probably belonging to female individuals.

Remarks. — The specimens, assigned to *C. (Mauritsina) hieroglyphica* from Polish Cretaceous are similar to the figured specimens of *Cypridina hieroglyphica* (recte *Cythereis hieroglyphica*) described by Bosquet (1847) from Maastrichtian of Holland and also they do not differ from the specimens, attributed to this species and described by Veen (1936) from Maastrichtian of Holland. Likewise, they are similar to the remaining forms, assigned to *C. hieroglyphica* (or *Mauritsina hieroglyphica*), described from Upper Cretaceous of Belgium and France. On the basis of this species, a new genus, i. e. *Mauritsina* was erected by Deroo (1962) who probably based it on the muscle scars, characteristic of the valves of this species and, according to him, different from those in the remaining species of the genus *Cythereis*. The present writer could not observe muscle scars in specimens, found in Polish Cretaceous and, therefore, does not discuss the generic classification of this species. The name *Mauritsina* is treated in the present paper as a name of a subgenus in relation to the genus *Cythereis*.

Occurrence. — In Poland: Upper Maastrichtian of Sochaczew. Abroad: Uppermost Maastrichtian and the layer, containing the elements of both the Cretaceous and Lowermost Tertiary of Holland, Maastrichtian of Belgium and Santonian of France (Oertli, 1963).

Cythereis cf. *nodulosa* (Bosquet, 1854)
(Pl. XV, Fig. 9)

1854. *Cythere ornatissima* (Reuss) var. *nodulosa* Bosquet; J. Bosquet, Monographie..., p. 108, Pl. 7, Figs. 7 a-d.
1936. *Cythereis nodulosa* Bosquet; J. E. van Veen, Die Cytheridae..., p. 154, Pl. 6, Figs. 67—73.
1940. *Cythereis nodulosa* Bosquet; J. H. Bonnema, Ostracoden..., p. 130, Pl. 4, Figs. 26, 27.
1958. *Cythereis nodulosa* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 215.

Material. — Eleven right and 9 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/353	0.81	0.45
Left valve	O.II/382	0.81	0.50

Description. — Carapace large, solid, subrectangular. Both valves are similar in size, shape and ornamentation, the right one having a more truncated margin in the anterodorsal part. Dorsal margin straight, parallel to ventral. Anterior end broadly rounded, posterior — slightly elongated, bluntly pointed. Valve swollen, particularly so in the posteroventral part. The distal, posterior part and the ventral side are compressed. Eye tubercle glassy, large. Muscle attachment distinctly visible, covered with a few short spines. Spiny tubercles, arranged in a row, occur also behind the muscle attachment along the dorsal margin and close to the ventral margin where, at the bottom, they border the greatest swelling of the valve. Valve margins, particularly the margins of the anterior and posterior end, are strongly thickened and covered with rather short, more or less abundant, spines. Few, fine processes occur also on the lateral and ventral side of the valve.

Muscle scars and marginal pore canals invisible. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation. — A small degree of variation is found in the development of the external ornamental elements of the valve, as well as in the size of the valve within the range of the same, mature stage.

Remarks. — The valves, assigned to *Cythereis* cf. *nodulosa* from Polish Cretaceous, slightly differ from the figured valves of *Cythere orna-*

tissima var. *nodulosa* (recte *Cythereis nodulosa*), described by Bosquet (1854) from Upper Cretaceous of Holland. The valves, assigned to *C.* cf. *nodulosa* from Poland, as compared with the valves of *C. nodulosa* from Holland, have more differentiated, smaller and less abundant spiny processes, disposed along the dorsal margin and behind the muscle field and, moreover, all their remaining ornamental elements are less developed. *C.* cf. *nodulosa* seems to be an ancestral species of *Cythereis (Trachyleberis) aculeata* (Bosquet) and *C. (Trachyleberis) incerta* n. sp., both of them occurring in Poland. The differences between them are discussed on page 507.

Occurrence. — In Poland: Upper Campanian of Mielnik. Abroad: Campanian of Miały (B. S. S. R.) and Upper Cretaceous of Holland (?).

Cythereis ornata (Bosquet, 1847)
(Pl. VI, Figs. 2—4; Pl. XVIII, Figs. 18, 19)

1847. *Cypridina ornata* Bosquet; J. Bosquet, Description des Entomostracés..., p. 21, Pl. 4, Figs. 3 a-f.
1894. *Cythereis ornata* Müller; G. W. Müller, Fauna und flora..., p. 369, Pl. 29, Fig. 20; Pl. 31, Fig. 13; Pl. 36, Figs. 18.
1936. *Cythereis ornata* Bosquet; J. E. van Veen, Die Cytheridae..., p. 133, Pl. 1, Figs. 13—22.
1958. *Cythereis ornata* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 218.

Material. — Sixty two right and 48 left valves, representing only adult, well-preserved specimens.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/386	1.06	0.53
Left valve	O.II/387	0.94	0.50

Description. — Carapace large, ovately rectangular. Both valves are similar in size, shape and ornamentation. The right valve has, in its anterodorsal part, a slightly more truncated margin. Dorsal margin straight, parallel to ventral. Anterior margin broadly rounded, posterior end elongated, obliquely truncated, slightly turned downwards. Valve convex, in the posterior terminal part and on the ventral side compressed. Muscle swelling distinctly outlined. Eye tubercle rather large, glassy. A thick rib, anteriorly disappearing in the region of the eye tubercle, posteriorly pointed, inflected downwards and connected with an oblique, less developed median rib, is situated along the dorsal margin. The median rib is disposed posteriorly in the extension of the muscle swelling. The lower rib, occurring on the lateroventral margin of the valve, is strongly thickened, posteriorly more or less sharpened, anteriorly almost reaching a thickened margin of the anterior end. Valve margins strongly

thickened; short, irregular denticles occur along the margin of the anterior end and the lower part of the margin of the posterior end is rimmed by few spines. Valve surface intensively reticulate.

Muscle scars consist of 3 oblong scars and of 2 round scars, situated above the former, of a heart-shaped scar, sometimes divided in its lower part, and of a round scar in front of them. Marginal pore canal straight, rather short, numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve slightly denticulate or, sometimes, smooth.

Variation. — A considerable variation is found in the valve size and ornamentation and it seems to occur within the same, last stage of the ontogenetic development; the limits of variation will be settled for this species after future more accurate studies, based on a more extensive material.

Remarks. — The valves, assigned to *Cythereis ornata* from Upper Cretaceous and Dano-Paleocene of Poland do not depart from the figured valves of *Cypridina ornata* (recte *Cythereis ornata*), described by Bosquet (1847) from Upper Cretaceous of Holland. They are also similar to the figured valves, assigned to that species by Veen (1936) from Maastrichtian of Holland. It seems that this species is related with *Cythereis multifora* n. sp. which also occurs in Upper Cretaceous and Dano-Paleocene of Poland; the differences between these species are discussed on page 528.

Cythereis ornata, described by Müller (1894) from Bay of Naples, is a Recent species which neither in the shape, nor in the ornamentation of the valve is similar to *Cythereis ornata,* described by Bosquet (1847).

Occurrence. — In Poland: Lower Maastrichtian, Danian, Paleocene and Eocene of Pamiętowo, Paleocene of Bochotnica, Sochaczew and Boryszew. Abroad: Maastrichtian and Danian of Belgium, Maastrichtian, the layer, containing the elements of both the Cretaceous and Lowermost Tertiary and Danian of Holland.

Cythereis parva Bonnema, 1940
(Pl. V, Fig. 4; Pl. XVII, Figs. 10, 11)

1940. *Cythereis parva* Bonnema; J. H. Bonnema, Ostracoden..., p. 8, Pl. 4, Figs. 54—58.

1958. *Cythereis parva* Bonnema; H. V. Howe & L. Laurencich, Introduction..., p. 222.

Material. — Twelve complete carapaces, 10 right and 13 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/389	0.53	0.28
Left valve	O.II/390	0.50	0.25

Description. — Carapace middle-sized, fairly solid, subrectangular. Both valves are similar in size, shape and ornamentation. The right valve has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, slightly convergent with ventral margin which is somewhat concave. Anterior end rounded, posterior end elongated, angulately rounded. Carapace laterally compressed, slightly swollen, its posterior terminal part completely flat. The muscle swelling prominent. Eye tubercle small. Single ribs, almost parallel to the valve margin, posteriorly sharply terminating, occur along the dorsal margin and along the lateroventral ridge. An accessory rib, adjoining the ventral margin of the valve and passing into a marginal thickening of the anterior end, is situated below the lateroventral ridge. Small, low nodes occur posteriorly in the extension of the muscle swelling. Margin of the anterior end thickened, slightly turned outside and with a few denticles, situated in its lower part. Margin of the posterior end thickened, provided, in its lower part, with 3—4 spines. Valve surface finely reticulate, particularly so along the margin of anterior end.

Muscle scars invisible. Marginal pore canals indistinct. Duplicature narrow, vestibule lacking. Hinge amphidont, terminal elements of the right valve smooth or, sometimes, slightly denticulate.

Variation. — An insignificant degree of variation is recorded in the valve size; the individuals, found in Cretaceous of Pamiętowo are larger than those from Cretaceous of Mielnik.

Remarks. — The specimens, assigned to *Cythereis parva* from Polish Cretaceous are very similar in outline and valve relief to the figured valves of this species, described by Bonnema (1940) from Upper Cretaceous of Holland. In the figures, published by Bonnema, the valve ornamentation of this species is very indistinct but it seems to be similar to that in the individuals, found in Poland.

Occurrence. — In Poland: Lower Maastrichtian of Mielnik and Pamiętowo. Abroad: Lower Maastrichtian of Rügen Island and Uppermost Maastrichtian of Holland.

Cythereis quadridentata (Bosquet, 1854)

(Pl. VII, Figs. 6—8; Pl. XVII, Figs. 14, 15)

non 1850. *Cythere quadridentata* Baird; W. Baird, The natural history..., p. 173, Pl. 21, Fig. 2.

1854. *Cythere quadridentata* Bosquet; J. Bosquet, Monographie..., p. 100, Pl. 6, Figs. 12 a-d.

1936. *Cythereis quadridentata* Bosquet; J. E. van Veen, Die Cytheridae..., p. 152, Pl. 6, Figs. 26—32.

1958. *Cythereis quadridentata* (Bosquet); H. V. Howe & L. Laurencich, Introduction..., p. 227.

Material. — Seventeen complete carapaces, 46 right and 37 left valves; all of them well-preserved, adult.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/394	0.62	0.34
Left valve	O.II/395	0.65	0.34

Description. — Carapace middle-sized, solid, ovately rectangular. Both valves are similar in size, shape and ornamentation. The right valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin almost straight, slightly convergent with ventral margin which is somewhat concave in its middle. Anterior end rounded, posterior elongated, sharply angulate. Valve flatly swollen, on the ventral side and in the terminal, posterior part, compressed. Muscle attachment clearly outlined, convex. Eye tubercle glassy, small. A rather thick rib occurs along the dorsal margin. Posteriorly it is sharply terminating, anteriorly reaching as far as the eye tubercle. A similar rib is situated close to the ventral margin and anteriorly it passes into a thickened margin of the anterior end. A short, not very distinct and smooth rib is situated posteriorly, behind the muscle swelling. Below and above this rib, usually there are short, single nodes, sometimes, indistinct. The margin of the anterior end is provided below with regular, spiny denticles (to 7). Likewise, such denticles (3—5) occur on the thickened margin of the posterior end. The valve surface is either covered with distinct pits, or finely reticulate.

Muscle scars of the main group consist of 3 elongated and, above them, 2 round scars, sometimes merging, arranged in a subdiagonal row, as well as of a crescent-shaped scar, situated at the top and in front of them. Marginal pore canals fairly abundant, straight, short. Duplicature narrow, vestibule lacking. Hinge amphidont; terminal elements of the right valve slightly denticulate.

Variation. — An insignificant degree of variation is mainly found in the valve ornamentation which is not always equally distinct. In addition, the valves, found at Pamiętowo are larger than the valves of this species from other localities.

Remarks. — The valves, assigned to *Cythereis quadridentata* from Polish Cretaceous do not differ from those of *Cythere quadridentata* (recte *Cythereis quadridentata*), described by Bosquet (1854) and, subsequently found and figured by Veen (1936) from Maastrichtian of Holland. *Cythere*

quadridentata, described by Baird (1850), is a Recent species, quite dissimilar to the species, described afterwards by Bosquet.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian of Pamiętowo, Upper Maastrichtian of Sochaczew and Lucimia. Abroad: Maastrichtian of Holland and Belgium.

Cythereis semiplicata (Reuss, 1846)

(Pl. II, Figs. 2, 3; Pl. XVII, Figs. 12, 13)

1846. *Cytherina semiplicata* Reuss; A. E. Reuss, Die Versteinerungen..., p. 104, Pl. 24, Figs. 16 a, b.

1929. *Cythere semiplicata* Reuss; C. I. Alexander, Ostracoda..., p. 80, Pl. 6, Figs. 9, 15.

1940. *Cythereis semiplicata* Reuss; J. H. Bonnema, Ostracoden..., p. 132, Pl. 4, Figs. 42—47.

1946. *Cythereis semiplicata* (Reuss); W. A. van den Bold, Contribution..., p. 90, Pl. 10, Fig. 12.

1956. *Cythereis semiplicata* (Reuss); G. Deroo, Etudes critiques..., p. 1519, Pl. 4, Figs. 65—67.

1958. *Cythereis semiplicata* (Reuss); H. V. Howe & L. Laurencich, Introduction..., p. 233.

Material. — Thirty five complete carapaces, 70 right and 68 left valves; all of them mature, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/398	0.53	0.28
Left valve	O.II/399	0.53	0.31

Description. — Carapace middle-sized, fairly solid, ovate. Both valves are similar in size, shape and ornamentation. In its anterodorsal part, the right valve has a more truncated margin. Dorsal margin almost straight, subparallel to the ventral margin. Anterior end rounded, posterior — slightly elongated, angulately rounded. Valve moderately swollen, particularly so in the middle, while, in the posterior terminal part and on the ventral side, it is compressed. Muscle attachment distinctly outlined, convex, posteriorly passing into a sharp median rib which is slightly granulate in its posterior part. A sharp, straight, short rib, occurs close to the dorsal margin. It disappears anteriorly more or less half-way the length of the dorsal margin and is pointed posteriorly. A similar rib is situated close to the ventral margin. Valve margins rimmed; the marginal rim of the posterior end is provided with few, short, spiny processes. Eye tubercle glassy, distinct. Valve surface smooth, polished.

Muscle scars of the main group (visible on the valves, found in comparative materials from Paleocene of Denmark) consist of two elongated

scars, of two almost round, situated above the former, and of a hook-like one in front of them. Marginal pore canals numerous, straight and rather short. Duplicature not very wide, the line of concrescence coinciding with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation. — An insignificant degree of variation is mainly found in the valve size within the range of the same, mature stage, as well as in the degree of development of some external morphological elements.

Remarks. — The valves, assigned to *Cythereis semiplicata* from Upper Cretaceous and Dano-Paleocene of Poland seem not to differ from the figured valves of *Cytherina semiplicata* (recte *Cythereis semiplicata*), described by Reuss (1846) from Turonian of Czechoslovakia. They also do not differ from the valves, attributed to this species by Bonnema (1941) from Upper Cretaceous of Holland. The valves of ostracods ffom Upper Cretaceous of Texas, U. S. A., assigned by Alexander (1929) to *Cythere semiplicata* have — like valves from Cenomanian of France, included in this species by Deroo (1956) — different shape and different ornamentation and probably represent different species. On the basis of the drawing of a valve from Upper Cretaceous of Cuba, assigned by van den Bold (1946) to *Cythereis semiplicata*, it is difficult to determine if it actually represents this species because the illustrations are very schematic, vague and devoid of any description.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Danian and Paleocene of Bochotnica and Paleocene of Nasiłów. Abroad: Turonian of Czechoslovakia, Maastrichtian of Holland and Upper Danian and Paleocene of Denmark.

Cythereis spinosa n. sp.
(Pl. VII, Fig. 3; Pl. XVII, Figs. 16, 18)

Holotypus: Pl. XVII, Fig. 16 (O.II/401).
Stratum typicum: Upper Maastrichtian.
Locus typicus: Nasiłów, Poland.
Derivatio nominis: *spinosa* — Lat. *spinosus* = spiny.

Diagnosis. — Valve flatly swollen, provided with ribs, situated along the dorsal and ventral margins. Valve margins thickened. Many spines occur on the margin of the anterior end and fewer on the margin of the posterior end. Three to four long, spiny processes are disposed close to the dorsal margin. Lateral, finely pitted, surface covered with few fine nodes, irregularly scattered.

Material. — Two complete carapaces, 23 right and 25 left valves, all of them mature, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/401	0.68	0.34
Left valve	O.II/402	0.65	0.37

Description. — Carapace middle-sized, fairly solid, ovate to triangular. Both valves are similar in size, shape and ornamentation. The left valve has, in its anterodorsal part, a more angulate shape and, at the top of this part, is provided with a spur-like process. In contradistinction to the right valve, it also has a short spine, situated in the posterodorsal angle. Dorsal margin straight, slightly convergent with an almost straight ventral margin. Anterior margin rounded, posterior — elongated, pointed. Valve flatly convex, in the terminal posterior part compressed. Muscle attachment slightly outlined, eye tubercle small, glassy. Along the dorsal margin, there are a few (about 5) nodular spines, the last of them, situated more or less in the posterior end of the hinge margin, is best-developed. The median spine is also longer than the adjoining ones. A fairly irregular, short rib is situated close to the ventral margin. Posteriorly it is provided with a sharp spine and anteriorly passes into the admarginal thickening of the anterior end. A few short spines are disposed on this rib. Valve margins, particularly of the anterior and posterior end, thickened. Nodular spines and fine, not always visible, denticles occur along the anterior end margin which is slightly turned outside. Sometimes, few, small, spiny nodes are observed on the valve surface, particularly in the region of the muscle field.

Muscle scars indistinct. The scars of the main group seem to consist of 4 longitudinal muscle scars, arranged in a somewhat oblique row. Marginal pore canals straight, rather short, numerous, about 30 of them along the margin of the anterior and about 15 along the margin of the posterior end. Duplicature rather wide, the line of concrescence subparallel to the line of inner margin. No distinct vestibule visible. Hinge amphidont; terminal elements of the right valve crenulate.

Variation. — A considerable variation is found in the valve size of mature stages even within the same sample. The elements of the external morphology of the valve, that is the hinge and duplicature are subject to more extensive modifications. A phenomenon of the incomplete development of these elements occurs in this case.

Remarks. — The valves, assigned to *Cythereis spinosa* n. sp. from Upper Cretaceous of Poland are somewhat similar to the figured specimens of *Cythereis corrigenda*, a species described by Kaye (1964, p. 62, Pl. 7, Figs. 6—9) from Upper Cretaceous of England. However, compared with the latter, they have fewer and considerably shorter marginal spines, as well as a pronouncedly lower degree of ornamentation of the lateral surface of the valve.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik and Upper Maastrichtian of Bochotnica, Nasiłów, Sochaczew, Chotcza and Kazimierz.

Cythereis compressa n. sp.
(Pl. VI, Fig. 1; Pl. XVII, Figs. 7—9)

?1936. *Cythereis interruptoidea* Veen; J. E. van Veen, Die Cytheridae..., p. 140, Pl. 3, Figs. 37, 39—41, non 31—36, 38.

Holotypus: Pl. XVII, Fig. 7 (O.II/405).
Stratum typicum: Upper Maastrichtian.
Locus typicus: Nasiłów, Poland.
Derivatio nominis: *compressa* — Lat. *compressus* = compressed.

Diagnosis. — Carapace flatly swollen, having a distinct, long rib along the dorsal and ventral margin and, posteriorly, in the extension of the muscle node. Valve margins thickened; fairly short spines occur on the margin of the posterior end. Lateral surface covered with distinctly visible pits.

Material. — Twelve complete carapaces, 20 right and 18 left valves, representing only mature, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/405	0.59	0.31
Left valve	O.II/406	0.59	0.32

Description. — Carapace middle-sized, fairly solid, ovately rectangular. Both valves are similar to each other in size, shape and ornamentation. Dorsal margin almost straight, subparallel to the ventral margin. Anterior margin rounded, posterior — slightly elongated, angulate. Valve flatly swollen, in the posterior terminal part and on the ventral side — compressed. Muscle swelling distinct, posteriorly passing into a narrow, sharp median rib, thickening towards the posterior end. Near the dorsal margin, there is a distinct, sharp rib, anteriorly disappearing in the region of a usually distinct eye tubercle, posteriorly slightly inflected downwards. A similar but slightly longer rib is situated close to the ventral margin. Valve margins thickened. A thin, fragile rib runs along the margin of the anterior end. It passes below into the thickening of the ventral margin and, at the top, into the thickening of the dorsal margin. The margin of the posterior end is provided with a few (3—4) short, spiny processes. The entire surface of the valve is densely but rather irregularly pitted, the size of pits increasing close to the dorsal margin and in the posterior part of the valve.

Muscle scars invisible. Marginal pore canals not very distinct, straight, short occurring in a great number. Duplicature fairly wide, the line of

concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve indistinctly denticulate.

Variation. — A small degree of variation is mainly found in the various development of ornamental elements of the valve, as well as in the valve size within the range of the same, mature stage.

Remarks. — It seems that a part of valves, described by Veen (1936) as *Cythereis interruptoidea* from Maastrichtian of Holland, belongs in fact to a new species, described from Upper Cretaceous of Poland as *C. compressa* n. sp. The illustrations, presented by Veen are not sufficiently distinct and the descriptions not sufficiently detailed as to allow one to find an unequivocal relationship between the Dutch and Polish forms. However, they enable us to assume that Veen adopted too wide an extent of variation for the species *Cythereis interruptoidea* and, consequently, two different species were considered by him to be conspecific.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Sochaczew, Bochotnica and Nasiłów. Abroad: Maastrichtian of Holland (?).

Cythereis latebrosa latebrosa n. sp., n. subsp.
(Pl. III, Fig. 10; Pl. XIII, Figs. 1—5)

Holotypus: Pl. XIII, Fig. 3 (O.II/411).
Stratum typicum: Lower Maastrichtian.
Locus typicus: Mielnik, Poland.
Derivatio nominis: *latebrosa* — Lat. *latebrosus* = full of holes, porous.

Diagnosis. — Carapace strongly swollen, with spiny upper and lower ribs. Valve margins thickened, slightly denticulate. Valve surface densely pitted, in the middle part, slightly reticulate. Few, short processes may be observed between the reticulation meshes.

Material. — Three complete carapaces, 78 right and 51 left valves of both the mature and young individuals, almost all of them well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/411	0.87	0.47
Left valve	O.II/412	0.90	0.50

Description. — Carapace middle-sized, solid, subrectangular. Both valves are similar to each other in size, shape and ornamentation. The right, somewhat smaller, has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, parallel to the almost straight ventral margin. Anterior end rounded, posterior — slightly elongated, sharply

angulate. Carapace distinctly swollen, particularly posteriorly, but compressed in the posterior terminal part. Muscle node distinct, eye tubercle well-developed. A sharp rib occurs along the dorsal margin. It is provided with spiny processes the longest of which is situated more or less half-way the length of the dorsal margin. This rib anteriorly disappears near the eye tubercle and posteriorly passes into a narrow, slanting rib which, in the region of the muscle field, extends and bifurcates. A lower rib, denticulate and with a few short processes in its posterior part, is situated close to the ventral margin; anteriorly, it reaches the thickening of the margin of the anterior end. The thickened margin of the anterior end, covered with short, regular denticles, is rimmed by a clearly visible depression. The margin of the posterior end is also thickened and has short, spiny denticles, usually somewhat longer in the lower part. Ventral side of the valve compressed, covered with almost parallel ribs. The lateral surface of the valve has many, distinct, large pits which, in the posterior part pass into the reticulation. Short, fairly sharp processes may also occur in the posterior part.

Muscle scars invisible. Marginal pore canals short, straight and numerous. Duplicature not very wide, the line of concrescence parallel to the line of inner margin. Vestibule lacking. Hinge amphidont: terminal elements of the right valve slightly denticulate.

Variation is mainly found in the size and ornamentation of valves and results mostly from the presence of individuals, representing different stages of ontogenetic development. In addition, the mature valves, coming from the samples from Pamiętowo and Mielnik, are larger than those from Bochotnica and Nasiłów.

Ontogeny. — Three stages, most likely, the last ones, of the ontogenetic development have been recognized among the right valves.

Instar 1 — Dimensions (in mm.): length 0.47, height 0.28. Valve very similar in shape to that of the mature stage but all external morphological characters are considerably less marked. Margins are not thickened. Valve surface finely pitted. Internal morphological characters indistinct.

Instar 2 — Dimensions (in mm.): length 0.59, height 0.34. External morphological characters resemble the previous stage. Duplicature narrow, hinge lophodont, poorly developed.

Instar 3 (adult) — Dimensions (in mm.): length 0.87, height 0.47. Cf. description.

Remarks. — *C. latebrosa latebrosa* n. sp. from Polish Cretaceous seem to be most similar to *Cythereis bicornis,* described by Israelsky (1929, p. 19, Pl. 4A, Figs. 10 a-c) from Upper Cretaceous of Arkansas, U. S. A. The latter has, however, a different ornamentation. The valves of *C. latebrosa latebrosa* have denticulate admarginal ribs which are smooth

in the figured valve of *C. bicornis*. Moreover, in the valves of *C. latebrosa latebrosa* there is no distinct median rib, present in *C. bicornis*. As compared with *C. latebrosa confinis* n. subsp., *C. latebrosa latebrosa* has a considerably better-developed ornamentation of the lateral surface. It is only a very fine pitting that occurs in the *C. latebrosa confinis*, particularly in the anterior and the distal part of the valve. Moreover, the posterior end of the *C. latebrosa confinis* valve is more elongated than that in *C. latebrosa latebrosa*.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian and Danian of Pamiętowo, Upper Maastrichtian of Sochaczew, Bochotnica, Chotcza, Nasiłów, Kazimierz and Lucimia, as well as Danian and Paleocene of Bochotnica (single specimen). Abroad: Lower Maastrichtian of Rügen Island.

Cythereis latebrosa confinis n.sp., n.subsp.
(Pl. XIII, Figs. 6,7)

Holotypus: Pl. XIII, Fig. 6 (O.II/414).
Stratum typicum: Upper Campanian.
Locus typicus: Mielnik, Poland.
Derivatio nominis: *confinis* — Lat. *confinis* = near, related; it is related with *C. latebrosa latebrosa* n. sp.

Diagnosis. — Valve strongly swollen, provided with a lower and upper ornamented rib. Valve margins thickened, denticulate. Valve surface pitted, in distal anterior and posterior parts, the pits are very fine. Few fragile processes occur on the valve surface.

Material. — Six right and 9 left adult valves. All of them well preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/414	0.81	0.44
Left valve	O.II/415	0.81	0.47

Description. — Carapace middle-sized, solid, subrectangular. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, slightly convergent with the somewhat concave ventral margin. The anterior end rounded, posterior — elongated and sharply angulate. Valve distinctly swollen, particularly so in the posterior part the distal end of which is compressed. Muscle node distinct, eye tubercle glassy, well-developed. A fairly thick rib with spiny nodes occurs along the dorsal margin. Posteriorly it terminates sharply and anteriorly disappears in the region of the eye tubercle. In the posterior part, this rib passes into another, slanting rib which, just behind the muscle field,

divides into nodular processes. A lower rib, also denticulate, runs along the lower margin. It is pointed, anteriorly and disappears close to the admarginal thickening of the anterior end. The edges of the anterior and posterior end are rimmed by fine spiny denticles. Ventral side compressed, covered with many subparallel ribs. The lateral and ventral side of the valve are covered with many, regular, fine pits. On the ventral side and in the central part of the lateral side of the valve, the pits are much larger than the remaining ones and form there a more or less regular reticulation. Close to the margin of the anterior and posterior ends, the valve surface is very finely pitted.

Muscle scars invisible. Marginal pore canals indistinct. Duplicature not very wide, the line of concrescence being parallel to the line of inner margin. Vestibule lacking. Hinge amphidont; terminal elements of the right valve denticulate.

Remarks. — *C. latebrosa confinis* n.sp., n.subsp. differs from *C. latebrosa latebrosa* n.sp. mostly in the ornamentation. Differences are discussed on page 525.

Occurrence. — In Poland: Upper Campanian of Mielnik.

Cythereis (Trachyleberis) incerta n.sp.
(Pl. VII, Fig. 10; Pl. XIII, Figs. 10—12)

Holotypus: Pl. XIII, Fig. 10 (O.II/417).
Stratum typicum: Upper Maastrichtian.
Locus typicus: Bochotnica, Poland.
Derivatio nominis: *incerta* — Lat. *incertus* = uncertain.

Diagnosis. — Valve strongly swollen, covered with many spines, situated both on the thickened margins, particularly along the anterior and posterior end, and on the lateral surface.

Material. — Seven complete carapaces, 72 right and 69 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/417	0.87	0.53
Left valve	O.II/418	0.90	0.59

Description. — Carapace large, solid, triangularly ovate in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right, smaller valve has, in the anterodorsal part, a more truncated margin. Dorsal margin straight, slightly convergent with ventral one which is somewhat concave half-way its length. Anterior margin widely rounded, posterior end slightly elongated, bluntly terminating. Valve strongly swollen, in the posterior terminal

part and on the ventral side compressed. Eye tubercle glassy, large. Muscle node distinct, swollen, covered with a few short spines. A few (4—5) spiny nodes, arranged in a row, occur behind the muscle field. A few spines, their size increasing posteriorly, are situated near the dorsal margin; the most characteristic seem to be the spines, disposed between the antero- and posterodorsal angle. The last, longest of them all is usually bifurcated. Several spines occur along the lateroventral margin of the valve. Their size increases posteriorly and anteriorly they are connected with short spines, covering a thickened, turned outwards, marginal rim of the anterior end. The lateral and ventral side of the valve, as well as the thickened margin of the posterior end are covered with more or less numerous spines.

Muscle scars consist of four oblong scars, arranged somewhat obliquely and forming a vertical row, as well as of a heart-shaped scar in front of them. Marginal pore canals straight, not very long and numerous (about 30) along the anterior end. Duplicature rather wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Variation. — A considerable variation is found in the valve size within the range of the same, adult stage, as well as in the valve ornamentation. The length and number of ornamental spines differs sometimes. The specimens from Pamiętowo are considerably larger than those from the remaining localities.

Remarks. — In Upper Campanian of Poland, the valves of *Cythereis* (*Trachyleberis*) *incerta* are very similar to those of *C.* (*Trachyleberis*) *aculeata* (Bosquet), differing from them only in the number and size of ornamental spines, disposed on the valve surface, but in Upper Maastrichtian these differences are quite distinct (cf. page 507).

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Lower Maastrichtian of Pamiętowo, Upper Maastrichtian of Nasiłów, Bochotnica, Lucimia, Sochaczew, Kazimierz and Chotcza, as well as Danian of Bochotnica (a single specimen).

Cythereis multifora n.sp.

(Pl. III, Figs. 11, 12; Pl. XVIII, Figs. 1—7)

Holotypus: Pl. XVIII, Fig. 6 (O.II/426).
Stratum typicum: Paleocene.
Locus typicus: Bochotnica, Poland.
Derivatio nominis: *multifora* — Lat. *multiforus* = having many openings.

Diagnosis. — Valve swollen, provided with serrate upper, middle and lower ribs. Valve margins thickened; margin of the anterior end denticulate, margin of the posterior end rimmed with short spines. Valve surface reticulate.

Material. — One hundred and twenty complete carapaces, 331 right and 342 left valves, most of them well-preserved; young individuals few.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/426	0.76	0.42
Left valve	O.II/425	0.73	0.44

Description. — Carapace large, solid, ovately rectangular. Both valves are similar to each other in size and ornamentation, but somewhat different in outline. The right valve has, in its antero- and posterodorsal parts, a more truncated margin. Dorsal margin straight, subparallel to ventral which is slightly concave in its middle. Anterior end rounded, posterior — slightly elongated, round to angulate. Valve distinctly swollen, in the posterior terminal part, completely compressed. Muscle swelling distinct, eye tubercle glassy, fairly large. A sharp, denticulate rib, anteriorly disappearing near the eye tubercle and posteriorly pointed, occur along the dorsal margin. A lower rib runs along and in parallel of the ventral margin, at the base of the greatest swelling. It is sharp, denticulate and anteriorly almost reaches the margin of the anterior end. Few, fine nodes, sometimes, merging into a short rib, occur behind the muscle swelling. Margin of the anterior end strongly thickened, covered with many, sharp denticles. Margin of the posterior end also thickened and having more or less numerous, short spines. Ventral side of the valve compressed, covered with subparallel ribs. The entire valve surface is intensively and distinctly reticulate.

Muscle scars consist of four elongated scars, a little obliquely arranged in a vertical row, as well as of a heart-shaped scar at the top and an oblong scar at the bottom in front of them. Marginal pore canals fairly numerous, short, straight. Duplicature not very wide, vestibule lacking. Hinge amphidont; terminal elements of the right valve slightly denticulate.

Variation is found in size, shape and ornamentation of the valve and makes up a result of the presence of valves, representing different stages of ontogenetic development, as well as, probably, of a considerable infraspecific variation of this species. The variation in the ornamentation consists mostly in a different reticulation pattern and in a fact that the admarginal ribs are differently denticulate, sometimes being almost smooth, like in the valves, assigned to *Cythereis ornata* (Bosquet). Any detailed and precise determination of the range of variation of *C. multifora* n.sp. requires an additional, detailed analysis of this species.

Ontogeny. — Five ontogenetic stages, probably representing the last five stages of the ontogenetic development have been recognized within the range of left valves.

Instar 1 — Dimensions (in mm.): length 0.32, height 0.19. Valve subovate, thin, fragile. External morphological characters poorly developed. Valve margins not thickened, reticulation indistinct. Internal morphological characters invisible.

Instar 2 — Dimensions (in mm.): length 0.39, height 0.22. Valve thin, fragile, in its outline similar to those of older individuals. Ribs on the outer surface of the valve poorly developed, valve margins not thickened. Reticulation very fine. Internal morphological characters indistinct.

Instar 3 — Dimensions (in mm.): length 0.46, height 0.24. Valve similar to the adult form but considerably thinner; all ornamental elements poorly developed. Hinge margin slightly differentiated, duplicature very narrow.

Instar 4 — Dimensions (in mm.): length 0.61, height 0.34. Compared with the valves of the next instar, the valve is thinner, with finer ornamental elements and with a distinctly lophodont hinge. Posterior terminal element better-developed. Duplicature very narrow.

Instar 5 (adult). — Dimensions (in mm.): length 0.73, height 0.44. Cf. description.

Remarks. — The valves, assigned to *Cythereis multifora* n. sp. from Cretaceous and Dano-Paleocene of Poland are most similar to the valves of *Cypridina ornata* (recte *Cythereis ornata*), described by Bosquet (1847) and the figured valves of *Cythereis binkhorsti* Veen (1936, p. 193, Pl. 1, Figs. 23—28), both of them coming from Maastrichtian of Holland. Compared with the valves of the species, mentioned above, the valves of *Cythereis multifora* differ from them mostly in ornamental details; in the valves of *Cythereis multifora* n.sp. ribs are distinctly and regularly denticulate, while in both the valves of *C. ornata* and *C. binkhorsti* they are smooth.

Occurrence. — In Poland: Lower Maastrichtian, Danian and Paleocene of Pamiętowo, Upper Maastrichtian, Danian and Paleocene of Sochaczew, Upper Maastrichtian and Paleocene of Nasiłów, Upper Maastrichtian of Kazimierz, Paleocene of Boryszew and Bochotnica. Abroad: Upper Danian of Denmark.

Cythereis iucunda n.sp.

(Pl. VII, Fig. 4; Pl. XVII, Figs. 21—23)

Holotypus: Pl. XVII, Fig. 21 (O.II/430).
Stratum typicum: Upper Maastrichtian.
Locus typicus: Nasiłów, Poland.
Derivatio nominis: *iucunda* — Lat. *iucundus* = nice, attractive.

Diagnosis. — Flatly swollen valve, provided with admarginal, upper and lower ribs, as well as with a very short median rib, the upper rib being distinctly serrate. Valve margins thickened, very poorly ornamented.

Material. — Two complete carapaces, 23 right and 21 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/430	0.65	0.37
Left valve	O.II/431	0.69	0.40

Description. — Carapace solid, middle-sized, ovately triangular in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right, smaller one, has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, subparallel to ventral. Anterior end rounded, posterior — elongated, acuminate. Valve flatly swollen, gradually flattening towards the anterior and posterior ends, on the ventral side — compressed. Muscle node distinct and apparently extended anteriorly in the form of a poorly-developed, rather short rib. Eye tubercle glassy, well-developed. A sharp serrate rib, posteriorly pointed and anteriorly disappearing in the region of the eye tubercle, is situated close to the dorsal margin. Along the ventral margin there runs a lower rib which, also posteriorly, sharply terminates and anteriorly passes into a slight marginal thickening of the anterior end. A short, sharp, not always equally distinct process is situated below the posterior end of the lower rib on the ventral margin of the valve. A median, short rib, usually distinctly outlined, occurs behind the muscle node. The margins of the valve are slightly rimmed;. the margin of the anterior end is very finely, somewhat indistinctly, denticulate; the margin of the posterior end has usually few more distinct spiny processes. The valve surface slightly pitted.

Muscle scars not very distinct. The main group consists of 4 scars, arranged in a subvertical row. Marginal pore canals numerous, fairly long, fan-wise disposed. Duplicature wide, particularly in the anterior part. The line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation. — The dimensions of valves, within the range of the mature ontogenetic stage, as well as the external morphological elements, are subject to small variation. The ribs on the valve surface are differently developed and either sharp or blunt. The not fully developed valves also occur within this species.

Remarks. — The valves of *Cythereis iucunda* n.sp. from Upper Cretaceous of Poland resemble to the greatest extent the figured valves of *Cypridina macrophtalma* (recte *Cythereis macrophtalma*) Bosquet, 1847, described by Veen (1936, p. 138, Pl. 2, Figs. 43—48) from Upper Cretaceous of Holland, but they differ from the latter in considerably sharper margins, as well as in better and differently developed ribs. According

to a very schematic figure, presented in a work by Bosquet (1847) the left valve of *Cythereis macrophtalma* is much higher in its anterior than posterior part, while, in the left valve of *C. iucunda* n.sp., the heights of the anterior and posterior end are only slightly differentiated.

Occurrence. — In Poland: Upper Campanian of Mielnik and Upper Maastrichtian of Nasiłów and Sochaczew. Abroad: Campanian of Miały (B.S.S.R.).

Cythereis formosa n.sp.
(Pl. VI, Fig. 10; Pl. XIV, Figs. 9—12)

Holotypus: Pl. XIV, Fig. 10. (O.II/435).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *formosa* — Lat. *formosus* = shapely.

Diagnosis. — Valve subovate in lateral outline, laterally compressed, provided with admarginal ornamented upper and lower rib, anteriorly passing into a thickened margin of the anterior end. Many processes occur on the thickened margins of the anterior and posterior end; on the anterior margin they are distinctly hook-like inflected.

Material. — Forty complete carapaces, 14 right and 13 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/435	0.59	0.33
Left female valve	O.II/436	0.62	0.31
Right male valve	O.II/434	0.69	0.34

Description. — Carapace middle-sized, fairly solid, subovate in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its anteroventral part, a more truncated margin. Dorsal margin straight, slightly convergent to a somewhat arched ventral margin. Anterior margin broadly rounded, posterior — elongated and obliquely truncated. Valve flatly swollen, slightly compressed in the distal posterior part and on the ventral side. Muscle node poorly outlined, eye tubercle glassy, rather large. A few nodal, irregular protuberances, merging into an irregular rib, posteriorly limited by a spiny node, are visible along the dorsal margin. Close to the ventral margin, a fairly thick, straight rib is situated, anteriorly passing into a thickened margin of the anterior end, posteriorly acuminate and inflected downwards. The margin of the anterior end, fairly wide, usually irregularly thickened and overhanging outwards, is rimmed by a few (8—9) flat, hook-like denticles. The thickened margin of the posterior

end is, in its lower part, provided with 4—6 spiny processes different in size. Valve surface smooth, usually distinctly pitted.

Muscle scars invisible. Marginal pore canals very obscure. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation is mainly found in the shape of valves. Besides long and low valves, probably representing male individuals, there are also shorter and higher ones which probably belong to female individuals.

Remarks. — The valves, assigned to *Cythereis formosa* n.sp. from Dano-Paleocene of Poland resemble to the greatest extent the figured valves of *Cythere complanata* (recte *Cythereis complanata*), a species, described by Bosquet, 1854 (*fide* Veen, 1936, p. 152, Pl. 6, Figs. 13—18) from Maastrichtian of Holland. As compared with *C. complanata,* the valves, assigned to *C. formosa* n.sp. are more trapezoidal in outline and have differently developed admarginal ribs and ornamental elements, rimming the margins of the anterior and posterior end.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo. Abroad: Danian of Belgium.

Cythereis infragilis n.sp.
(Pl. II, Fig. 1; Pl. XIV, Figs. 13—16)

Holotypus: Pl. XIV, Fig. 13 (O.II/438).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *infragilis* — Lat. *infragilis* = unbreakable.

Diagnosis. — Valve swollen, provided with a smooth, admarginal, lower and upper rib, connected with a long median rib; the upper and lower ribs anteriorly pass into a thickened margin of the anterior end. Valve margins, especially that of the anterior end, slightly denticulate.

Material. — Ninety eight complete carapaces, 9 right and 9 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/438	0.65	0.34
Left female valve	O.II/439	0.65	0.34
Right male valve	O.II/440	0.75	0.34

Description. — Carapace rather large, very solid, subovate in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin straight, insignificantly convergent to an almost straight ventral margin. Anterior end somewhat

obliquely rounded, posterior — slightly acuminate, more acutely rounded. Valve moderately swollen but, in the distal, posterior part and on the ventral side, compressed. Muscle node fairly distinctly marked. Eye tubercle well-developed, glassy. Close to the dorsal margin there runs a sharp rib, slightly arched upwards, anteriorly reaching the eye tubercle, posteriorly tapering, inflected downwards and connected with the median rib. The median rib, rather long and narrow, is disposed posteriorly, in the extension of the muscle field. A straight, sharp rib occurs along the ventral margin; anteriorly it almost reaches the marginal rim of the anterior end, posteriorly is expanding and pointed. This rib, inflected downwards, is connected with the thickened ventral margin. The anterior end is rimmed by a fairly broad, irregular thickening and has very fine, short denticles. The thickened margin of the posterior end is, sometimes, provided below with a few short, spiny processes. Valve surface smooth; single, scarcely visible nodes occur now and again in its central part.

Muscle scars invisible. Marginal pore canals numerous but not very distinct, rather straight and long. Duplicature fairly wide. The line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation is mainly found in the shape of valves. The relatively long and less swollen valves probably belong to male individuals, while the shorter and more inflated ones probably represent female specimens.

Remarks. — The valves, assigned to *Cythereis infragilis* n.sp., resemble to the greatest degree the valves of *Cythereis morata* n.sp.; both are from Dano-Paleocene of Poland. The differences between them are mainly found in the fact that all external morphological elements of the valves, attributed to *C. infragilis* are more sharpened and, moreover, they have a distinct median rib which — in the valves of *C. morata* — is absent, or, sometimes, limited to a short process. The valves of *C. morata* are usually distinctly pitted and have short spines, disposed along the margin of the anterior and posterior end, while those of *C. infragilis* are smooth and frequently devoid of any ornamentation on their margins.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo.

Cythereis morata n.sp.

(Pl. VII, Fig. 9; Pl. XIV, Figs. 17—20)

Holotypus: Pl. XIV, Fig. 17. (O.II/443).
Stratum typicum: Paleocene.
Locus typicus: Bochotnica, Poland.
Derivatio nominis: *moratus* — Lat. *moratus* = characteristic, typical.

Diagnosis. — Valve inflated, provided with an upper, lower and, very short, indistinct, median rib; the upper and lower rib anteriorly pass

into a marginal thickening of the anterior end. Valve margins thickened, rimmed with denticles, especially so at the anterior and posterior end. Valve surface pitted.

Material. — One hundred and thirty three complete carapaces, 185 right and 180 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/443	0.75	0.37
Left female valve	O.II/445	0.78	0.40
Right male valve	O.II/444	0.84	0.37

Description. — Carapace large, solid, ovately rectangular. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, slightly convergent to an almost straight ventral margin which is somewhat concave half-way its length. The anterior end rounded, the posterior end slightly elongated and obliquely truncated. Valve moderately, uniformly inflated, in the distal posterior part and on the ventral side, compressed. Muscle node distinct; eye tubercle glassy, usually well-developed. A straight, thick rib is situated close to the dorsal margin. It disappears in the region of the eye tubercle, being posteriorly slightly pointed and, through a fine, oblique thickening, connected with the median rib. The short, nodular, median rib is disposed posteriorly in the extension of the muscle node. Near the ventral margin and slightly converging with it, there is a lower rib which anteriorly passes into the marginal rim of the anterior end, while posteriorly, it is acuminate, inflected downwards and connected with a thickened rim of the ventral margin. The margin of the anterior end is rimmed by a distinct, irregular thickening and 6—8 hook-like denticles. The margin of the posterior end is provided, at the bottom, with 4—6 solid, blunt spines. Valve surface is finely and usually distinctly pitted.

Muscle scars invisible. Marginal pore canals (about 40 of them in all, disposed along the margin of the anterior end) are almost straight and fairly long. Duplicature not very wide, the line of concrescence coinciding with the line of inner margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Variation is mainly found in the shape of valves. In addition to relatively long and low valves, probably representing male individuals, there are short and higher ones which perhaps belonged to females. Moreover, a variation of certain elements of the external morphology of the valve may be observed in samples, coming from Pamiętowo. Distinct and usually sharp admarginal ribs merge in these samples with the valve surface and are very poorly outlined.

Remarks. — The valves, assigned to *Cythereis morata* n.sp. from Dano-Paleocene of Poland are somewhat similar to *Cythereis faujasi,* described by Veen (1936, p. 153, Pl. 6, Figs. 58—63), from Maastrichtian of Holland but, compared to the latter, the valves from Poland have a short median rib, lacking in *C. faujasi* and, moreover, they are somewhat differently ornamented. The valves of *C. morata* also resemble those of the *C. infragilis* n.sp., described in the present paper. The differences are discussed on page 533.

Occurrence. — In Poland: Danian and Paleocene of Bochotnica and Sochaczew, Paleocene of Pamiętowo, Nasiłów and Boryszew. Abroad: the layers, containing both Cretaceous and Tertiary elements, as well as Danian of Holland and Paleocene of Denmark.

Cythereis agatae n.sp.
(Pl. VII, Fig. 1; Pl. XVI, Figs. 1—4)

Holotypus: Pl. XVI, Fig. 1. (O.II/448).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: *agatae* — after the name of the present writer's daughter.

Diagnosis. — Carapace uniformly inflated, provided with an upper, lower and, anteriorly bifurcated, median rib. The lower and upper ribs anteriorly pass into the admarginal rim of the anterior end. The thickened margins of the valve, especially of the anterior and posterior end, are rimmed with fine denticles. Valve surface is fairly abundantly covered with regular nodes.

Material. — Eighteen complete carapaces, 11 right and 13 left valves, representing only adult, mostly well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/448	0.81	0.44
Left female valve	O.II/450	0.84	0.50
Left male valve	O.II/449	0.90	0.47

Description. — Carapace large, very solid, subovate in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its anterodorsal part, a more truncated margin. Dorsal margin straight, subparallel to the ventral margin which is slightly concave half-way its length. The anterior end rounded, posterior — slightly elongated, somewhat angulate. Carapace swollen, on the ventral side and in the distal, posterior part, compressed. Muscle node distinct, eye tubercle glassy, large. A sharp-edged rib is situated close to the dorsal margin, bifurcated. Anteriorly it disappears in the region of the eye tubercle and posteriorly gradually tapers and inflects

downwards, being connected with an oblique, median rib. The well-developed median rib runs along the entire central part of the valve; in the vicinity of the muscle field it bifurcates into two smaller ribs which almost reach the margin of the anterior end. A lower rib runs along the ventral margin. It is sharp, posteriorly pointed, anteriorly passing into a sharp admarginal rim of the anterior end. Beneath the lower rib, there is a strongly thickened, sharp rib, disposed on the ventral side and connected, in the anteroventral part of the valve, with both the lower rib and admarginal rim of the anterior end. Valve margins thickened; the margin of the anterior end finely denticulate, the margin of the posterior end provided with many short, spiny processes. Valve surface covered with more or less numerous regular, fine nodes, mostly concentrated around the ribs in the central part of the valve.

Muscle scars and marginal pore canals invisible. Duplicature not very wide; the line of concrescence almost parallel to the line of inner margin; vestibule lacking. Hinge amphidont; terminal elements of the right valve denticulate.

Variation. — A considerable degree of variation, mainly in the shape of valves, consists in the presence of relatively long valves, probably representing the males and short ones — the females. Female valves are more inflated.

Remarks. — *Cythereis agatae* n.sp. does not resemble any other, so far described, species.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo and Paleocene of Boryszew. Abroad: Montian of Belgium and Danian of the Crimea.

Genus *Trachyleberidea* Bowen, 1953

Trachyleberidea acutiloba (Marsson, 1880)

(Pl. III, Figs. 4, 5; Pl. XVII, Figs. 1—3)

1880. *Cythere acutiloba* Marsson; T. Marsson, Die Cirripedien..., p. 42, Pl. 3, Fig. 11.
1940. *Cythereis acutiloba* Marsson; J. H. Bonnema, Ostracoden..., p. 132, Pl. 4, Figs. 59—66.
1958. *Cythereis acutiloba* (Marsson); H. V. Howe & L. Laurencich, Introduction..., p. 179.
1964. *Trachyleberidea acutiloba* (Marsson); P. Kaye, Revision..., p. 70, Pl. 8, Figs. 7, 8 a-b, 10.

Material. — Eleven complete carapaces, 21 right and 34 left valves of adult and young individuals; almost all of them are well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/364	0.66	0.34
Left valve	O.II/365	0.62	0.34

Description. — Carapace fairly solid, middle-sized, triangularly ovate in shape. Both valves of the carapace are similar in size, shape and ornamentation. Dorsal margin straight, somewhat convergent with an almost straight ventral margin. The margin of the anterior end rounded, the posterior end elongated, distinctly acuminate. Valve laterally compressed and, in the terminal posterior part, flat. Muscle swelling, very poorly outlined, eye tubercle glassy, small. A sharp rib, posteriorly pointed, slightly inflected downwards and anteriorly disappearing in the region of the eye tubercle, occurs along the dorsal margin. A lower rib, slightly inflected upwards, posteriorly pointed, anteriorly passing into an admarginal thickening of the anterior end, occurs along the ventral margin. A short, tubercular process, sometimes indistinct, is situated posteriorly, behind the muscle swelling. A keel-like or roll-like rib, rimmed with fine denticles, is developed close to the margin of the anterior end. The margin of the posterior end, also thickened, is provided at the bottom with short, more or less numerous, prickly processes. The lateral and ventral surface of the valve are intensively reticulate.

Muscle scars (in *C. acutiloba* from Paleocene of Denmark) consist of 4, more or less elongated scars and an almost round scar in front of them. Marginal pore canals invisible. Duplicature wide, particularly in the anterior and posterior parts of the valve; the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve slightly denticulate.

Variation. — Variation is found in the valve size (as a result of the presence of both the adult and young individuals) and ornamentation of the valve surface. In the chalk samples from Mielnik, the valves have a coarse meandering reticulation, while some others as, for instance, those from Pamiętowo, are covered with a fine ornamentation network. The individuals, assigned to *T. acutiloba* from Dano-Paleocene of Pamiętowo (like those from Paleocene of Denmark), as compared with Cretaceous forms, have no eye tubercle and, moreover, their ornamentation is better-developed. Maybe, they belong to another species. Some not fully developed valves have been found among the individuals belonging to this species.

Ontogeny. — Among the right valves from Mielnik, there were forms, representing the last two stages of the ontogenetic development.

Instar 1 — Dimensions (in mm.): length 0.56, height 0.28. External morphological characters of the valve are developed to a similar extent as those in a mature form. Carapace thin, fragile. Internal morphological characters poorly developed; hinge lophodont, duplicature narrow.

Instar 2 (adult) — Dimensions (in mm.): length 0.66, height 0.34. Cf description.

Remarks. — Specimens, assigned to *Trachyleberidea acutiloba* from Poland, particularly from Cretaceous, are very similar to the figured specimens of this species, described by Marsson (1880) from Cretaceous of Rügen Island, as *Cythere acutiloba.* In their shape and ornamentation, they do not deviate from forms, assigned to *Cythereis acutiloba,* described by Bonnema (1940) from Upper Cretaceous of Holland, as well as from *Trachyleberidea acutiloba,* described by Kaye (1964) from Cretaceous of England. In the latter author's opinion, *Trachyleberidea acutiloba* (Marsson, 1880) is a synonym of *Cythere geinitzi* (recte *Trachyleberidea geinitzi*) Reuss, 1874 (personal communication).

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Lucimia and Chotcza, Danian, Paleocene and Eocene of Pamiętowo. Abroad: Campanian of Miały (B. S. S. R.), Lower Maastrichtian of Rügen Island, Maastrichtian of Holland, Cretaceous of England, Upper Danian and Paleocene of Denmark.

Trachyleberidea semiplana n. sp.
(Pl. IV, Figs. 13, 14; Pl. XVI, Figs. 5—7)

Holotypus: Pl. XVI, Fig. 6 (O.II/455).
Stratum typicum: Paleocene.
Locus typicus: Boryszew, Poland.
Derivatio nominis: *semiplana* — Lat. *planus* = plane, flat, semi = half.

Diagnosis. — Carapace laterally compressed, provided with an upper, lower and, poorly developed, median rib. Valve surface reticulate.

Material. — Twenty five complete carapaces, 16 right and 18 left valves of adult individuals, almost all of them well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/455	0.75	0.34
Left valve	O.II/454	0.75	0.37

Description. — Carapace large, triangularly ovate, fairly solid. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its anterodorsal part, a more truncated margin. Dorsal margin straight and slightly convergent with a somewhat arched ventral margin. The margin of the anterior end is rounded, the posterior end slightly elongated and obliquely truncated. Carapace flatly swollen, on the ventral side and, in the terminal posterior part, compressed. Muscle node very poorly outlined, eye tubercle glassy, small. A straight, posteriorly pointed rib occurs along the dorsal margin; this rib is posteriorly inflected downwards and slightly connected with a scarcely visible median rib. A lower rib, posteriorly pointed and anteriorly passing into the admarginal rim of the anterior end, is situated close to the ventral mar-

gin. Valve margins rimmed; the margin of the anterior end is usually slightly denticulate, while the lower part of the margin of the posterior end is, now and again, provided with few, short spines. The lateral and ventral surfaces of the valve are covered with a fine, regular reticulation.

Muscle scars consist of 3 elongated scars and, above them, 2 almost round ones, arranged in a subvertical row, as well as of a horseshoe-shaped scar in front of them. Marginal pore canals invisible. Duplicature rather wide, the line of concrescence subparallel to the line of inner margin. Vestibule lacking. Hinge amphidont; terminal elements of the right valve denticulate.

Variation is mainly found in the degree of development of the external morphological elements, that is admarginal rims and ribs, as well as in the valve ornamentation. Sometimes, instead of a regular, fine ornamental network, a coarse, meandering, narrow-mesh reticulation occurs on the valve surface.

Remarks. — The valves, assigned to *Trachyleberidea semiplana* n. sp. from Dano-Paleocene of Poland are similar to *Caudites* aff. *orchidea* (Bosquet), described by Marlière (1958, p. 26, Pl. 4, Figs. 3—6) from Montian of Belgium. They differ from the latter mostly in the ornamentation, that is instead of pits, covering the valves of *Caudites* aff. *orchidea*, the surface of the valves of *T. semiplana*, is covered with a fine, regular network. The figured valves of *Cythere orchidea*, described by Bosquet (1854) from Maastrichtian of Holland, are completely devoid of ornamentation and, moreover, the relief of their surfaces, somewhat similar to that of the valves of *T. semiplana*, is considerably more sharply outlined.

Occurrence. — In Poland: Danian, Paleocene and Eocene of Pamiętowo and Paleocene of Boryszew. Abroad: the layer, containing both the Cretaceous and Tertiary elements, Danian of Holland and Danian of Belgium.

Genus *Echinocythereis* Puri, 1953
Echinocythereis aff. *aragonensis* Oertli, 1960
(Pl. V, Fig. 1; Pl. XII, Figs. 1—3)

1960. *Echinocythereis aragonensis* Oertli; H. J. Oertli, Evolution..., p. 157, Pl. 3, Figs. 7—13, 15—21.

Material. — Twenty six complete carapaces, 24 right and 14 left valves, representing adult, mostly well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/458	0.78	0.44
Left female valve	O.II/459	0.78	0.47
Right male valve	O.II/460	0.84	0.44

Description. — Carapace large, thick, solid, subovate in lateral outline. Both valves are similar to each other in size, shape and ornamentation. The right valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin almost straight, slightly convergent to the ventral margin which is almost straight, slightly concave half-way its length. Anterior margin somewhat obliquely rounded, posterior end elongated and also rounded but more acutely. The entire carapace except for the posterior terminal part, swollen, particularly so in the posteroventral part. Muscle node fairly distinctly marked; eye tubercle glassy, large. An almost entire surface of the valve, except for its extreme posterior part, is covered with fine, spiny processes which — along the margin of the anterior end and close to the ventral margin — are arranged concentrically. A small „concentration" of somewhat longer processes is observed in the posteroventral part of the valve. In addition, the valve surface is provided with regular pits and the processes, mentioned above, occur in places where the walls of these pits touch each other. Fine, short, denticulate processes rim a slightly thickened margin of the anterior and posterior end and are disposed along the dorsal margin.

Muscle scars are very indistinct and consist of 4 oblong scars, arranged transversely in a subvertical row. The remaining scars are invisible. Marginal pore canals numerous (about 30 of them disposed along the anterior margin), straight and rather short. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont.

Variation. — A distinct variation is observed almost exclusively in the shape and size of valves and is probably related with the sexual dimorphism. The valves of female individuals are shorter and more inflated than those of male individuals.

Remarks. — The valves of *Echinocythereis* aff. *aragonensis* from Paleocene of Poland are similar to *E. aragonensis,* especially *E. aragonensis posterior,* described by Oertli (1960) from Lutetian of Spain. Since, in contradistinction to the valves from Paleocene of Poland, the valves from Eocene of Spain seem to have no processes, differentiated in the posteroventral part, the individuals, found in Poland, have been treated by the present writer only as forms related to the Spanish ones.

Occurrence. — In Poland: Paleocene and Eocene of Pamiętowo. Abroad: Paleocene of Denmark and Lutetian of Spain (?).

Genus *Phacorhabdotus* Howe & Laurencich, 1958

Phacorhabdotus? texanus Howe & Laurencich, 1958

(Pl. III, Fig. 3; Pl. XVII, Figs. 4—6)

1958. *Phacorhabdotus texanus* Howe & Laurencich; H. V. Howe & L. Laurencich, Introduction..., p. 467.

Material. — Ten complete carapaces, 47 right and 40 left valves, representing only adult, well-preserved forms.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right female valve	O.II/462	0.59	0.31
Left female valve	O.II/463	0.59	0.34
Left male valve	O.II/464	0.61	0.31

Description. — Carapace middle-sized, thin but fairly solid, subovate in lateral outline. The valves are similar to each other in size, shape and ornamentation. The right valve has, in its posterodorsal part, a more truncated margin. Dorsal margin almost straight, slightly convergent to the ventral margin which is concave in the middle. Anterior margin rounded, posterior — slightly elongated, more acutely rounded. Carapace conspicuously and fairly uniformly inflated, in the terminal posterior and anterior part, compressed. Muscle node distinctly marked, posteriorly passing into a narrow, sharp rib. Above, close to the dorsal margin, a sharp, short, solid rib, posteriorly acuminate, is situated in the posterior part of the valve. A similar but longer rib occurs just above the ventral margin. A somewhat less distinct rib is developed in the posteroventral part of the valve just near the ventral margin, covering its posterior part; this rib is, anteriorly and posteriorly, connected with the admarginal rim of the valve. The valve rims are thickened; the margin of the anterior end is frilled by a brittle, thin lamella, the margin of the posterior end is, posteriorly, provided with faint processes. Valve surface smooth.

Muscle scars obscure. Within the range of the main group, only 3 oblong muscle scars are visible, transversely arranged in a vertical row; the remaining scars invisible. Marginal pore canals numerous, long, sometimes forked, fan-wise disposed. Duplicature wide, the line of concrescence coincides with the line of inner margin. Hinge lophodont.

Variation. — A distinct variation, observed in the shape and size of valves, results from the presence of more elongated, lower, male valves and shorter, relatively higher female valves.

Remarks. — *Phacorhabdotus? texanus* from Dano-Paleocene of Poland almost do not differ from the topotypes of this species, described by Howe and Laurencich (1958) from Upper Cretaceous (Campanian?) of Texas, U.S.A. In the present writer's opinion, both Polish and American specimens have a lophodont hinge, although an amphidont hinge is ascribed to the species *P. texanus* by its authors who emphasize, however, that the median hinge element is indistinctly differentiated. It is only with a certain reservation that the species under study has been attributed by the present writer to the genus *Phacorhabdotus*, erected by Howe and Laurencich (1958) on the basis of *P. texanus*. Defining this

genus, these authors stated that a holamphidont hinge is characteristic of it, while a lophodont hinge has been found by the author of the present paper among the valves, assigned to the genus *Phacorhabdotus*.

Occurrence. — In Poland: Danian and Paleocene of Bochotnica and Paleocene of Nasiłów. Abroad: Danian and Paleocene of Denmark (?) and Upper Cretaceous (Campanian?) of Texas, U.S.A.

Genus *Veenia* Butler & Jones, 1957

Veenia pergensi (Veen, 1936)

(Pl. V, Fig. 3; Pl. IX, Figs. 9—10)

1936. *Cythereis pergensi* Veen; J. E. van Veen, Die Cytheridae..., p. 140, Pl. 3, Figs. 16—22.

1941. *Cythereis pergensi* Veen; J. H. Bonnema, Ostracoden..., p. 9, Pl. 5, Figs. 20—22.

1958. *Phacorhabdotus? pergensi* (Veen); H. V. Howe & L. Laurencich, Introduction..., p. 456.

Material. — Four right and 6 left valves, representing only adult individuals, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/466	0.69	0.40
Left valve	O.II/467	0.72	0.50

Description. — Valve middle-sized, thick, solid, subovate in lateral outline. The valves of the carapace are distinctly different from each other in shape; the left valve is anteriorly considerably higher than the right one and is more angulate in outline as compared with an almost ovate outline of the right valve. Dorsal margin is straight or somewhat concave in the left valve and slightly arched in the right valve. Ventral margin almost straight. Anterior end rounded, posterior — slightly elongated, more acutely rounded. Valve fairly strongly inflated in the central part and compressed in the terminal posterior and anterior part, as well as on the ventral side. Muscle swelling posteriorly elongated in the form of a wide, short protuberance. Eye tubercle very poorly developed. Fairly wide, low protuberances, poorly marked on the valve surface, occur close to the dorsal and ventral margin. Near the dorsal margin, sometimes, there are a few (4—5) short, spiny nodes; smaller, shorter processes are usually disposed on the margin of the posterior end and, now and again, along the margin of the anterior end. Valve surface smooth.

Muscle scars invisible. Marginal pore canals scarcely visible, straight, rather short and numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Remarks. — The valves of *Veenia pergensi* from Polish Cretaceous are similar to *Cythereis pergensi*, described by Veen (1936) from Maastrichtian of Holland. The main difference between them consists in the fact that the valves from Polish Cretaceous, sometimes, have an ornamented dorsal margin, while figured individuals of this species from Cretaceous of Holland are smooth. *Cythereis pergensi* has been with a reservation assigned by Howe and Laurencich (1958) to the genus *Phacorhabdotus*. Since no description of the hinge margin in individuals of this species has been given by Veen, in doing so, they mostly based their views on the shape of valves of this species. In the present writer's opinion, both the shape of the valve and the structure of the hinge margin justify the assignment of this species to the genus *Veenia*.

Occurrence. — In Poland: Upper Campanian of Mielnik. Abroad: Campanian of Miały (B.S.S.R.) and Maastrichtian of Holland.

Family **Schizocytheridae** Howe, 1961
Genus *Schizocythere* Triebel, 1950
Schizocythere solida n. sp.
(Pl. I, Figs. 5, 6; Pl. XIII, Figs. 8, 9)

Holotypus: Pl. XIII, Fig. 8 (O.II/470).
Stratum typicum: Paleocene.
Locus typicus: Pamiętowo, Poland.
Derivatio nominis: solida — Lat. *solidus* = solid.

Diagnosis. — Valve subovate in lateral view, strongly and rather evenly swollen, admarginally covered with concentric ribs; in the central part, irregularly, coarsely reticulate.

Material. — Ten right and 8 left valves, representing probably only mature, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/470	0.72	0.40
Left valve	O.II/471	0.73	0.41

Description. — Valve large, thick, solid, subovate in lateral outline. The valves slightly differ in size. Dorsal margin straight, subparallel to the ventral one which is somewhat concave half-way its length. Anterior end obliquely rounded, posterior — slightly elongated, more acutely rounded. Valve conspicuously inflated, especially so in the postero-ventral part, while, in the posterior terminal part and on the ventral side, it is compressed. The admarginal part of the valve surface is covered with thick, concentric ribs, particularly well-developed in the anterior, posterior and ventral parts. The central part of the valve surface is intensively, irregularly reticulate.

Muscle scars obscure, however, 4 subround ones arranged in a vertical row may be observed. Marginal pore canals straight, short, numerous. Duplicature not very wide, the line of concrescence coincides with the line of inner margin. Hinge amphidont; terminal elements of the right valve denticulate.

Variation. — A small degree of variation is mainly observed in the shape of valves and it is probably caused by sexual dimorphism; male individuals are longer and lower as compared with females.

Remarks. — This species does not resemble any other, so far described, species.

Occurrence. — In Poland: Paleocene of Pamiętowo.

Genus Amphicytherura Butler & Jones, 1957
Amphicytherura chelodon (Marsson, 1880)
(Pl. V, Figs. 8, 8a; Pl. XIX, Figs. 36—38)

1880. *Cythere chelodon* Marsson; T. Marsson, Die Cirripedien..., p. 43, Pl. 3, Figs. 13 a-f.
1936. *Cythereis elegans* Bosquet; J. E. van Veen, Die Cytheridae..., p. 145, Pl. 5, Figs. 1, 2 (partim).
non 1936. *Eucytherura chelodon* (Marsson); C. I. Alexander, Ostracoda.., p. 629, Pl. 93, Figs. 6, 12.
non 1941. *Eucytherura chelodon* Marsson; J. H. Bonnema, Ostracoden..., p. 21, Pl. 5, Figs. 58, 59.
1958. *Amphicytherura chelodon* (Marsson); H. V. Howe & L. Laurencich, Introduction..., p. 46.
1964. *Amphicytherura chelodon* (Marsson); P. Kaye, Revision..., p. 49, Pl. 1, Figs. 6, 7.

Material. — Thirty nine complete carapaces, 102 right and 66 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Left valve	O.II/473	0.40	0.25
Right valve	O.II/474	0.40	0.28

Description. — Carapace rather small, thick, solid, subovate in lateral outline. The valves differ from each other in size and shape. The right, smaller valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin straight and parallel to ventral. Anterior margin obliquely rounded, posterior end slightly elongated, somewhat angulately rounded. Valve moderately inflated, in the posterior terminal part and on the ventral side, compressed. A thick, irregular rib, occurs close to the dorsal margin, anteriorly reaching a distinct eye tubercle and posteriorly gradually disappearing. A thick, more irregular rib runs along the entire central part of the valve. Anteriorly growing thinner and almost reaching the margin of the anterior end it bifurcates posteriorly into irregular

nodes, adjoining each other. A lateroventral, thick, arched ridge covers the posterior part of the lower outline of the valve, anteriorly reaching the terminal part of the median rib and posteriorly becoming distinctly acuminate. Irregular nodes, mostly concentrated around the median rib, usually occur on the surface of the valve. Valve margins thickened. Few, short, fine denticles occur along the margin of the anterior end, especially at the bottom. Few, poorly developed denticles are, sometimes, situated in the lower part, on the margin of the posterior end. Somewhat better developed spiny nodes are visible at the end of the lower rib. Faintly visible, straight ribs, parallel to the ventral margin, may, sometimes, be observed on the ventral side of the valve.

Muscle scars of the main group consist of 4 almost round scars, arranged in an arched row, and a round scar, situated in front of them. Marginal pore canals indistinct. Duplicature fairly narrow, the line of concrescence coincides with the line of inner margin and is almost parallel to the valve margin. Hinge amphidont; terminal hinge elements distinctly denticulate.

Variation. — A considerable variation is mainly observed in the valve ornamentation. The valves from Upper Cretaceous are less ornamented than those found in Dano-Paleocene.

Remarks. — *Amphicytherura chelodon* from Upper Cretaceous and Dano-Paleocene of Poland does not differ from *Cythere chelodon* (recte *Amphicytherura chelodon*), described by Marsson (1880) from Cretaceous of Rügen Island. It also does not differ from a part of valves, comming from Maastrichtian of Holland, attributed by Veen (1936) to *Cythereis elegans*. The valves of *A. chelodon* from Poland also do not depart, in their shape and ornamentation, from this species, described by Kaye from Upper Cretaceous of England. The specimens, assigned by Alexander (1929) to *Eucytherura chelodon* from Upper Cretaceous of Texas, U.S.A., deviate from European forms to such an extent that they certainly make up a different species. The valves, described by Bonnema (1941) from Upper Cretaceous of Holland and identified as *Eucytherura chelodon*, represent in fact *Eucytherura bicornis*, described by Veen (1936) from Maastrichtian of Holland.

Occurrence. — In Poland: Lower Maastrichtian, Danian, Paleocene and Eocene of Pamiętowo, Upper Maastrichtian, Danian and Paleocene of Bochotnica and Sochaczew, as well as Paleocene of Nasiłów. Abroad: Maastrichtian and Danian of Holland, Upper Cretaceous of England and Maastrichtian of Belgium.

Amphicytherura limburgensis Howe & Laurencich, 1958

(Pl. I, Fig. 10; Pl. XIX, Figs. 43, 44)

1936. *Cythereis elegans* Bosquet; J. E. van Veen, Die Cytheridae..., p. 145, Pl. 4, Fig. 61; Pl. 5, Figs. 1, 2 (partim).

1958. *Amphicytherura limburgensis* Howe & Laurencich; H. V. Howe & L. Laurencich, Introduction..., p. 48.

Material. — Six right and 11 left valves, representing only adult, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/476	0.50	0.30
Left valve	O.II/477	0.50	0.31

Description. — Valve middle-sized, thick, solid, ovate-rectangular. The valves are somewhat different in shape; the right, smaller valve has, in its antero- and posterodorsal part, a more truncated margin. Dorsal margin straight, almost parallel to ventral. Anterior margin obliquely rounded, especially in the right valve, posterior end slightly elongated, obliquely truncated in the left and acuminate in the right valve. Almost entire valve, except for the posterior terminal part, moderately inflated, on the ventral side — compressed. A sharp, long rib occurs close to the dorsal margin, covering the line of this margin; anteriorly it disappears in the region of a well-developed eye tubercle and posteriorly is pointed. The median, slightly slanting, rib takes in almost entire length of the valve, growing considerably thinner at the anterior and posterior end. A lateroventral, very solid and, posteriorly, sharply pointed ridge passes, anteriorly, into a rib, somewhat inflected upwards and reaching the anterior margin. The ventral margin is, to a considerable extent, covered by this lateroventral ridge. Muscle node poorly outlined. Valve surface intensively ornamented by short, rather irregular ribs which are, as a rule, perpendicular and adhering to the main ornamental elements of the valve. On the ventral side, there are solid, short ribs, parallel to the ventral margin. Valve margins thickened. The margin of the anterior end is usually denticulate below.

Muscle scars and marginal pore canals invisible. Duplicature fairly wide, particularly so in the anterior part of the valve; the line of concrescence coincides with the line of inner margin and is subparallel to the valve margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Variation. — A small degree of variation is mainly observed in the ornamentation and is a result of a different degree of its development.

Remarks. — The specimens of *Amphicytherura limburgensis* from Upper Cretaceous and Dano-Paleocene of Poland do not deviate from the specimens of *Amphicytherura limburgensis*, described by Howe & Laurencich (1958) from Maastrichtian of Holland. Since the valves of *A. limburgensis* are similar to those of *A. chelodon* (Marsson, 1880), these two species were regarded by Veen (1936) conspecific.

Occurrence. — In Poland: Lower Maastrichtian and Paleocene of Pamiętowo. Abroad: Maastrichtian and the layer, containing both the Cretaceous and Lowermost Tertiary elements of Holland.

Amphicytherura aculeata (Bonnema, 1941)

(Pl. V, Fig. 5; Pl. XIX, Figs. 1—4)

1941. *Eucytherura aculeata* Bonnema; J. H. Bonnema, Ostracoden..., p. 21, Pl. 5, Figs. 60—68.

1958. *Eucytherura aculeata* Bonnema; H. V. Howe & L. Laurencich, Introduction..., p. 333.

Material. — Thirty three right and 32 left valves, representing both adult and young, well-preserved individuals.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/482	0.44	0.25
Left valve	O.II/481	0.45	0.28

Description. — Valve middle-sized, fairly thick, rather brittle, subovate. The valves are somewhat different from each other in size and shape; the right, smaller valve has, in its anterodorsal part, a more truncated margin. Dorsal margin almost straight, parallel to ventral which is concave half-way its length. Anterior margin obliquely rounded, posterior end slightly elongated, more acutely rounded. Valve moderately inflated, in the terminal posterior part and on the ventral side — compressed. A sharp, keel-like rib, occurs close to the dorsal margin. Anteriorly it disappears above a distinct glassy eye tubercle and posteriorly terminates at the end of the hinge margin. The median rib, sharp and interrupted in a few places, takes in the entire central part of the valve. Posteriorly, it terminates in fairly long processes, anteriorly, it grows thinner and reaches the margin of the anterior end. The lateroventral ridge is frilled, ragged and, posteriorly, sharply pointed. Anteriorly, it extends to the anterior margin. A thin, fine rib also occurs, on the ventral side, parallel to the lateroventral ridge. Valve surface intensively reticulate, sometimes, covered with fine prickles. Valve margins slightly thickened. The margin of the anterior end finely denticulate, especially so at the bottom. Somewhat longer, equally few, spines occur on the margin of the posterior end.

Muscle scar and marginal pore canals obscure. Duplicature fairly wide, the line of concrescence coincides with the line of inner margin and is subparallel to the valve margin. Hinge amphidont; terminal elements of the right valve distinctly denticulate.

Variation is observed in the size of valves and in the degree of development of the elements of their internal and external morphology. It results primarily from the presence of valves, representing different stages of ontogenetic development. This species also displays a considerable individual variation with regard to the ornamentation of the valve. Some valves, particularly those from Mielnik are only distinctly spiny, while the valves from Bochotnica, Nasiłów and Lucimia are, in addition, intensively reticulate.

Ontogeny. — The last three ontogenetic stages have been recognized within the left valves from Mielnik.

Instar 1 — Dimensions (in mm.): length 0.28, height 0.17. Valve very fragile, longer than those of next stages; external and internal morphological elements are only very poorly developed.

Instar 2 — Dimensions (in mm.): length 0.36, height 0.20. Valve similar to those of the next, adult instar but thinner and with a weakly developed ornamentation. Hinge lophodont, duplicature very narrow.

Instar 3 (adult). — Dimensions (in mm.): length 0.45, height 0.28. Cf. description.

Remarks. — The valves of *Amphicytherura aculeata* from Upper Cretaceous of Poland do not differ from *Eucytherura aculeata* (recte *Amphicytherura aculeata*), described by Bonnema (1941) from Upper Cretaceous of Holland. The uncertain taxonomic position of this species was emphasized by Howe & Laurencich. The present writer assigned this species to the genus *Aphicytherura,* doing so on the basis of the amphidont hinge, developed by the valves, found in Poland and assigned to this species.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Bochotnica, Nasiłów, Sochaczew, Lucimia, Chotcza and Kazimierz. Abroad: Campanian of Miały (B.S.S.R.) and Upper Cretaceous (Maastrichtian?) of Holland.

Family **Progonocytheridae** Sylvester-Bradley, 1948
Genus *Neocythere* Mertens, 1956
Neocythere (Physocythere) virginea (Jones, 1849)

(Pl. IV, Figs. 8, 9; Pl. IX, Figs. 5—8)

1849. *Cythere punctatula* var. *virginea* Jones; T. R. Jones, A monograph..., p. 12, Pl. 1, Fig. 2.

1938. *Cythere slavantensis* Veen; J. E. van Veen, Die Ostracoden..., p. 11, Pl. 1, Figs. 9—15.

1940. *Cythere slavantensis* Veen; J. H. Bonnema, Ostracoden..., p. 129, Pl. 4, Figs. 1—4.

1958. *Cythere slavantensis* Veen; H. V. Howe & L. Laurencich, Introduction..., p. 173.
1964. *Neocythere (Physocythere) virginea* (Jones); P. Kaye, Revision..., p. 48, Pl. 1, Figs. 11, 14—17.

Material. — Thirty three right and 21 left valves, representing both the adult and young stages of the ontogenetic development, mostly well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/487	0.78	0.49
Left valve	O.II/488	0.79	0.50

Description. — Valve large, fairly solid, subovate in lateral view. The valves slightly differ from each other in size and shape; the left, larger valve has a more rounded dorsal margin as compared with an almost straight dorsal margin of the right valve. Likewise, in the antero-dorsal part, the margin of the left valve is less truncated than that of the right valve. Ventral margin almost straight and more or less half-way its length, slightly concave. Anterior margin obliquely rounded, posterior end somewhat elongated, slightly pointed. Almost entire valve, except for its terminal anterior and posterior parts, strongly inflated, particularly so in the central part close to the ventral margin. The most inflated part of the valve overhangs outwards of the ventral margin and covers it almost completely. Small concentric ribs, particularly well-developed on the ventral side and along the anterior margin but disappearing in the central part, occur on the valve surface.

Obscure muscle scars consist of 4 ovate scars, arranged obliquely in a subvertical row and one scar, situated in front of them. Marginal pore canals poorly visible, fairly short, numerous. Duplicature not very wide. A narrow vestibule occurs in the anterior part of the valve. The hinge of the left valve consists of a bar, terminating in serrate sockets. Above them, there is an accommodation groove. The terminal elements of the right valve are distinctly denticulate.

Variation. — A considerable variation is mainly observed in the size of valves and results from the presence of young and adult individuals.

Ontogeny. — The last three instars have been recognized among right valves from Lower Maastrichtian of Pamiętowo.

Instar 1 — Dimensions (in mm.): length 0.54, height 0.34. As compared with the adult instar, the valve is thinner, less elongated and less inflated. Ornamentation obscure. Hinge similar to that of the last instar and weakly developed.

Instar 2 — Dimensions (in mm.): length 0.68, height 0.44. Valve very similar to that of the adult instar except for its ornamentation which is poorly developed.

Instar 3 (adult). — Dimensions (in mm.): length 0.78, height 0.49. Cf. description.

Remarks. — The valves of *Neocythere (Physocythere) virginea* from Lower Maastrichtian of Poland do not differ from *Cythere punctatula* var. *virginea,* described by Jones (1849) from Upper Cretaceous of England (cf. Kaye, 1964) and also, they are similar to specimens of *Cythere slavantensis,* described by Veen (1936) and, afterwards, by Bonnema (1940) from Upper Cretaceous of Holland. In the opinion of the author of the present paper, as well as according to Kaye, both species, mentioned above, are conspecific.

Occurrence. — In Poland: Lower Maastrichtian of Pamiętowo. Abroad: Lower Maastrichtian of Rügen Island, Maastrichtian of Holland and Upper Cretaceous of England.

Neocythere (Physocythere) minuticosta n.sp.

(Pl. I, Fig. 11; Pl. II, Fig. 7; Pl. X, Figs. 1—9)

Holotypus: Pl. X, Fig. 7 (O.II/497).
Stratum typicum: Lower Maastrichtian.
Locus typicus: Mielnik, Poland.
Derivatio nominis: *minuticosta* — Lat. *costa* = rib, *minutus* = fine, finely ribbed; named after the ornamental feature of the valve.

Diagnosis. — Surface of carapace, except for the most central part, covered with fine, regular, concentric ribs.

Material. — Ninety right and 118 left valves, young and adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve, female	O.II/497	0.78	0.51
Left valve, female	O.II/499	0.74	0.54
Right valve, male	O.II/498	0.80	0.48

Description. — Carapace of large size, ovate in lateral outline, rather solid. Both valves differ in size and shape, the right, which is lower, has a more truncated dorsal and anterodorsal margin and a more pointed posterior end. Ventral margin somewhat sigmoidal. Both anterior and posterior ends rounded, the posterior one more acutely. The valve strongly, almost evenly inflated; the most inflated adventral part overhangs the ventral margin. Surface of the valve, except for the central part, covered with fine, concentric ribs, especially well-developed on the ventral side and at the anterior margin.

Muscle scars, obscure, consisting of four elongated scars, arranged in a subvertical row with one(?) scar in front. Marginal pore canals not

numerous, straight, rather short. Duplicature not wide, sometimes with a small vestibule in front. Hinge of left valve consists of a median bar terminating in distinctly crenulated, elongated teeth; above the median element there is a prominent accommodation groove.

Variation is primarily observed in the size and shape of valve, which changes during ontogenetic development and among the adult, sexually differentiated, forms. The valves of males are lower and longer than those of females.

Ontogeny. — Seven instars, probably the last ones, can be recogniżed among the right valves of *Neocythere (Physocythere) minuticosta.*

Instar 1 — Dimensions (in mm.): length 0.22, height 0.14. Valve very delicate, triangularly ovate in lateral outline, weakly inflated, unornamented. Internal morphological features indistinct.

Instar 2 — Dimensions (in mm.): length 0.27, height 0.19. Valve delicate, thin, similar to that of the preceding instar, less elongated than in next instars, smooth. Duplicature poorly developed, hinge lophodont (?).

Instar 3 — Dimensions (in mm.): length 0.34, height 0.24. Valve similar to that of preceding instar, more massive. Internal morphological elements are of the same type as in adult forms, but not so well developed.

Instar 4 — Dimensions (in mm.): length 0.41, height 0.27. Valve elongated, with a weak surface ornamentation, massive.

Instar 5 — Dimensions (in mm.): length 0.46, height 0.34.

Instar 6 — Dimensions (in mm.): length 0.64, height 0.44.

Instar 7 (adult) — Dimensions (in mm.): length 0.78, height 0.51. Cf. description. The last three instars differ mainly in size, having other features as in adult forms.

Remarks. — Specimens, assigned to *Neocythere (Physocythere) minuticosta* from Upper Cretaceous of Poland resemble those of *Cythere saccata* (recte *Neocythere saccata*), described by Marsson (1880, p. 39, Pl. 3, Figs. 10 a-f) from Maastrichtian of Rügen Island but, in contrast with them, Polish specimens are larger, less ornamented and with an undivided median hinge element which, in *Neocythere saccata,* is distinctly bipartite. In comparison with the specimens of *Neocythere (Physocythere) virginea* (Jones), also present in Upper Cretaceous of Poland, specimens of *N. (Physocythere) minuticosta* are less elongated and more swollen, especially near the venter.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Lucimia, Bochotnica, Nasiłów and Kazimierz, Lower Maastrichtian and Paleocene (?) (1 specimen) of Pamiętowo. Abroad: Upper Campanian of Miały (B.S.S.R).

Family uncertain
Genus *Saida* Hornibrook, 1952
Saida elliptica (Bonnema, 1941)
(Pl. IV, Fig. 10; Pl. XIX, Figs. 41, 42)

1941. *Loxoconcha elliptica* Bonnema; J. H. Bonnema, Ostracoden..., p. 26, Pl. 6, Figs. 6—11.

1958. *Loxoconcha elliptica* Bonnema: H. V. Howe & L. Laurencich, Introduction..., p. 384.

Material. — Seven right and 5 left valves, only adult, well-preserved. Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/508	0.40	0.25
Left valve	O.II/509	0.40	0.25

Description. — Carapace of rather medium size, ovate in lateral view, delicate. Both valves do not differ in size and shape. Dorsal margin rounded, almost parallel to ventral margin which is slightly concave in the middle. Anterior and posterior ends rounded, posterior one more broadly. The valve bears an alar inflation above the venter, which overhangs the ventral margin and which is sharply ended in its lower part. At both ends and along the dorsal margin, the valve is uniformly compressed. Margins of valve thickened, bordered by a very fine, not always distinct, serrate frill. Anterior and posterior ends weakly denticulate. Surface of the valve finely pitted.

Muscle scars and marginal pore canals invisible. Duplicature rather wide, coincides with the line of inner margin. Hinge of left valve consists of a bar, terminating, at both ends, in sockets; above the median element, there is an accommodation groove.

Variation is mainly observed in the degree of development of the admarginal ornamental elements.

Remarks. — Specimens, assigned to *Saida elliptica* from Dano-Paleocene of Poland, seem not to differ from the illustrated specimens of *Loxoconcha elliptica* (recte *Saida elliptica*), described by Bonnema (1941) from Upper Cretaceous of Holland. In the present author's opinion, the specimens of that species should be referred to *Saida,* the Recent genus, described by Hornibrook (1952) from New Zealand, because they have similar shape of valve and hinge margin which differ greatly from those of *Loxoconcha.* By opinion of Howe and Laurencich (1958) specimens described by Bonnema as *Loxoconcha elliptica* represent other genus, belonging rather to the family Bythocytheridae.

Occurrence. — In Poland: Danian and Paleocene of Bochotnica. In Holland: Upper Cretaceous.

Genus *Pulaviella* n. gen.

Type species: *Xestoleberis ovata* Bonnema, 1941.
Derivatio nominis: *Pulaviella* — after the name of the locality Puławy.

Diagnosis. — Carapace subovate in lateral outline and evenly, strongly inflated, somewhat compressed on ventral side. Surface smooth. Four elongated adductor scars arranged in a vertical row. Hinge of left valve consists of a serrate groove which terminally becomes deeper and fits into the crenulated bar of the right valve. The species: *Xestoleberis ovata* Bonnema, 1941, and *X. bidentata* Bonnema, 1941, both described from Upper Cretaceous of Holland have been assigned by the present author to this genus.

Remarks. — Genus *Pulaviella* seem to be related, to the greatest extent, to *Xestoleberis*. Specimens, belonging to the species of both genera, are similar in shape. The main difference is found in the hinge margin which, in *Xestoleberis,* is distinctly tripartite, whereas simple, only indistinctly differentiated terminally in *Pulaviella.*

Pulaviella ovata (Bonnema, 1941)
(Pl. I, Figs. 7, 8; Pl. VIII, Figs. 25—27)

1941. *Xestoleberis ovata* Bonnema; J. H. Bonnema, Ostracoden..., p. 43, Pl. 7, Figs. 39—42, non 43—45.

1958. *Xestoleberis ovata* Bonnema; H. V. Howe & L. Laurencich, Introduction..., p. 517.

Material. — There complete carapaces, 46 right and 48 left valves, only adult, well-preserved.

Dimensions (in mm.):

	Z.Pal.Cat.No.	Length	Height
Right valve	O.II/512	0.44	0.28
Left valve	O.II/513	0.47	0.31

Description. — Carapace of medium size, solid, subovate in lateral outline. Both valves are similar in shape, left being slightly larger. Dorsal margin rotund, somewhat angulated in the middle, ventral margin almost straight. Anterior end abruptly rounded, posterior end more broadly rounded. Valve greatly and evenly swollen, on ventral side compressed. Valve inflation somewhat overhangs the ventral margin. Surface of valve smooth. The only visible adductor scars consist of four elongated scars, arranged in a vertical row. Duplicature rather narrow, although a vestibule sometimes occurs in the frontal part. The line of concrescence is parallel to the outer margin. Marginal pore canals short, not numerous, straight. Hinge of left valve formed by a serrate groove deepening ter-

minally, especially so in the anterior end; the bar of the right valve terminally higher, slightly crenulated.

Variation is mainly found in the size of valves within the same adult instar.

Remarks. — Specimens assigned to *Pulaviella ovata* from Upper Cretaceous of Poland are very similar to some specimens of *Xestoleberis ovata* (recte *Pulaviella ovata*), described by Bonnema (1941) from Upper Cretaceous of Holland. It seems that Bonnema's specimens represent two species, varying in the outline of the posteroventral part of valve. Bonnema has not designated the holotype of *X. ovata* (recte *Pulaviella ovata*), so the present author, referring to that species, takes into consideration only the specimens numbered 39—42 and not 43—45. The hinge margin, characteristic of the specimens *P. ovata*, varies from that in *Xestoleberis* and seems to be unknown in other genera and therefore the present author has assigned it to a new genus.

Occurrence. — In Poland: Upper Campanian and Lower Maastrichtian of Mielnik, Upper Maastrichtian of Lucimia, Bochotnica, Nasiłów and Kazimierz. Abroad: Upper Cretaceous of Holland.

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JANINA SZCZECHURA

CYTHERACEA (OSTRACODA) Z NAJWYŻSZEJ KREDY I NAJNIŻSZEGO TRZECIORZĘDU POLSKI

Streszczenie

Praca niniejsza dotyczy ostrakodów (Cytheracea) z najwyższej kredy (górny kampan — górny mastrycht) i najniższego trzeciorzędu (dan — dolny paleocen) Polski północnej i środkowej, uwzględnione jednak zostały także próby z dolnego eocenu Pamiętowa.

Materiał pochodzi z 2 wierceń (Pamiętowo i Sochaczew), 4 odsłonięć (Bochotnica, Nasiłów, Mielnik, Lucimia) i z prób porównawczych zarówno z obszaru

Polski (por. Fig. 1), jak i z zagranicy (Anglia, Belgia, Dania, Holandia, Niemcy, ZSRR, USA). Charakterystyka stratygraficzno-litologiczna zbadanych prób podana jest w odpowiednich rozdziałach części ogólnej pracy.

Spośród wybranych około 6000 pojedynczych skorupek, bądź kompletnych pancerzy ostrakodów, opisano 61 gatunków należących do 29 rodzajów nadrodziny Cytheracea, w tym 1 nowy rodzaj, 23 nowe gatunki oraz 2 nowe podgatunki. Pozostałe grupy ostrakodów, występujące w zbadanych próbach, opracowane będą później.

Rozprzestrzenienie opisanych gatunków ostrakodów w najwyższej kredzie i najniższym trzeciorzędzie Polski uwidocznia Tabela 1, natomiast Tabela 2 zawiera ostateczne wnioski stratygraficzne. Analiza rozprzestrzenienia regionalnego i stratygraficznego ostrakodów, w porównaniu z rozprzestrzenieniem regionalnym i stratygraficznym otwornic wskazuje, że ostrakody mają bardziej zawężony zasięg regionalny i są mniej czułym wskaźnikiem stratygraficznym. Ze względu na brak form przewodnich, pozwalających oddzielić dan od paleocenu, autorka potraktowała obydwie jednostki stratygraficzne jako jeden wspólny poziom. Granica między kredą a trzeciorzędem — podobnie jak na podstawie otwornic — ustanowiona jest między mastrychtem i danem (dano-paleocenem).

W analizie gatunków autorka uwzględniła, w miarę możności, zmienność zewnętrznych i wewnętrznych cech morfologicznych skorupki, rozwój ontogenetyczny i dymorfizm płciowy. Podsumowanie obserwacji w tym zakresie znajduje się w oddzielnym rozdziale niniejszej pracy. Zjawisko niedorozwoju skorupki, wspomniane w opisie niektórych gatunków, polega na niekompletnym wykształceniu zewnętrznych i wewnętrznych elementów morfologicznych. Zdaniem autorki, jest ono wynikiem przedwczesnej śmierci osobnika „niedorozwiniętego", tj. mającego nie całkowicie zwapniałe skorupki. Z badań autorki nad rozwojem ontogenetycznym skorupki wynika, że wielkość skorupki nie może stanowić jedynego kryterium, decydującego o określaniu kolejności wylinek, gdyż wśród osobników o rozmiarach form dorosłych występują też osobniki młodociane, natomiast wśród osobników o rozmiarach form młodocianych występują również formy niewątpliwie w pełni dojrzałe.

Diagnozy nowoutworzonych gatunków, podgatunków i jednego rodzaju podajemy w takiej kolejności, w jakiej opisane one zostały w części systematycznej tej pracy.

Diagnozy

Brachycythere pustulosa marlierei n.subsp.
(Pl. II, fig. 5, 6; Pl. XI, fig. 5—8)

Pancerz silnie wydęty. Powierzchnia boczna pokryta drobnymi, regularnie ułożonymi guzkami. Wzdłuż krawędzi przedniego końca znajdują się liczne, drobne ząbki. W dolnej części krawędzi tylnego końca znajdują się 3—4 krótkie kolce.

Występowanie w Polsce: dan i paleocen.

Pterygocythereis pamientoviensis n.sp.
(Pl. IV, fig. 7; Pl. X, fig. 12 a-c)

Krawędzie pancerza zgrubiałe, obrzeżone kilowatą, falistą listewką, szczególnie dobrze rozwiniętą wzdłuż krawędzi latero-wentralnej. Poniżej tylnej części brzegu dorsalnego znajduje się grzebieniaste żeberko, w tyle łączące się z innym, ukośnym żeberkiem, w dole dochodzącym do ostrego zakończenia krawędzi latero-wentralnej. Wyraźne, krótkie żeberko łączy guzek oczny z guzem występującym w miejscu pola mięśniowego. Powyżej guzka ocznego, w lewej skorupce, znajduje się rogowaty wyrostek.

Występowanie w Polsce: paleocen.

Kingmaina opima n.sp.
(Pl. II, fig. 10, 11; Pl. XVI, fig. 8, 9)

Pancerz silnie wydęty. Powierzchnia boczna nieregularnie retikulowana. Przy krawędzi przedniego końca i wzdłuż dolnej krawędzi alarnego wydęcia występują wyraźne jamkowate zagłębienia.

Występowanie w Polsce: dan, paleocen i eocen.

Kikliocythere? nitida n.sp.
(Pl. V, fig. 2; Pl. IX, fig. 11—13)

Pancerz prawie owalny w zarysie bocznym, silnie wydęty. W tylnej części, przy brzegu dorsalnym i w części postero-wentralnej, powyżej brzegu wentralnego, znajduje się niezbyt wyraźny, podłużny garb.

Występowanie w Polsce: dolny i górny mastrycht, paleocen (?).

Pseudobythocythere sigillata n.sp.
(Pl. I, fig. 13, 14; Pl. XIX, fig. 26—31)

Pancerz płasko wypukły, z wyraźnym żeberkiem wzdłuż brzegu wentralnego i wzdłuż tylnej części brzegu dorsalnego. Powierzchnia boczna nieregularnie, grubo retikulowana, zwłaszcza w tylnej części, w przedzie nakłuta, z dwoma prawie horyzontalnie ułożonymi żeberkami.

Występowanie w Polsce: paleocen i eocen.

Aulocytheridea gracilis n.sp.
(Pl. III, fig. 8, 9; Pl. VIII, fig. 1—4)

Pancerz znacznie, prawie równomiernie wydęty. Powierzchnia gładka, drobno nakłuta. Przy brzegu przedniego końca, zwłaszcza w prawej skorupce, występuje kilka nikłych żeberek, równoległych do krawędzi pancerza. Gatunek ten jest wyraźnie dymorficzny.

Występowanie w Polsce: dan, paleocen i eocen.

Cuneocythere (Monsmirabilia) porifera n.sp.
(Pl. II, fig. 4; Pl. VIII, fig. 28—30)

Pancerze umiarkowanie wydęty, w przedniej i tylnej rzęści bocznie spłaszczony. Wzdłuż brzegu przedniego końca i wzdłuż krawędzi postero-wentralnej występuje wyraźne zgrubienie. Powierzchnia gładka, delikatnie nakłuta.

Występowanie w Polsce: dolny mastrycht.

Clithrocytheridea arcuata n.sp.
(Pl. II, fig. 13, 14; Pl. VIII, fig. 20—24)

Pancerz półowalny w zarysie bocznym, bocznie dość znacznie i prawie równomiernie wydęty, na stronie brzusznej spłaszczony. W centralnej części powierzchni bocznej występuje ukośne żeberko. Brzuszną powierzchnię pokrywają równoległe żeberka.

Występowanie w Polsce: dolny mastrycht.

Eucytherura derupta n.sp.
(Pl. I, fig. 12; Pl. XIX, fig. 22—25)

Pancerz prawie prostokątny w zarysie bocznym. Boczna powierzchnia stromo ścięta, nieregularnie nakłuta, z niezbyt wyraźnym żeberkiem w okolicy pola mięśniowego. Brzuszna strona żeberkowana.

Występowanie w Polsce: dan, paleocen i eocen.

Triginglymus? callosus n.sp.
(Pl. III, fig. 1, 1a; Pl. XVI, fig. 10, 11)

Pancerz silnie wydęty, gęsto meandrycznie retikulowany. Wzdłuż zgrubiałej krawędzi przedniego końca znajduje się wyraźna bruzda. Krawędź tylnego końca obrzeżona jest kilkoma kolcami, których długość wzrasta ku dołowi.

Występowanie w Polsce: dan i paleocen.

Uroleberis? mazoviensis n.sp.
(Pl. I, fig. 3, 4; Pl. VIII, fig. 7—10)

Pancerz dość znacznie, równomiernie wydęty, na stronie brzusznej spłaszczony, żeberkowany. Latero-wentralna krawędź ostra, szczególnie w tylnej części. Powierzchnia boczna gładka, lekko nakłuta.

Występowanie w Polsce: dolny i górny mastrycht, dan, paleocen i eocen.

Cythereis spinosa n.sp.
(Pl. VII, fig. 3; Pl. XVIII, fig. 16, 18)

Pancerz płasko wypukły, z żeberkiem przy brzegu dorsalnym i wentralnym. Krawędzie zgrubiałe. Wzdłuż brzegu przedniego i tylnego końca oraz na brzegu

dorsalnym występują liczne kolce. Boczna powierzchnia, delikatnie nakłuta, pokryta nieregularnie rozprzestrzenionymi guzkami.

Występowanie w Polsce: górny kampan, dolny i górny mastrycht.

Cythereis compressa n.sp.
(Pl. VI, fig. 1; Pl. XVIII, fig. 7—9)

Pancerz płasko wypukły z żeberkiem przy brzegu dorsalnym, wentralnym i w tyle, na przedłużeniu wydętego pola mięśniowego. Krawędzie zgrubiałe. Krótkie kolce znajdują się na krawędzi tylnego końca. Powierzchnia wyraźnie nakłuta.

Występowanie w Polsce: górny kampan, dolny i górny mastrycht.

Cythereis latebrosa latebrosa n.sp.
(Pl. III, fig. 10; Pl. XIII, fig. 1—5)

Pancerz silnie wydęty, z nieco kolczastym żeberkiem przy brzegu dorsalnym i wentralnym. Krawędzie lekko ząbkowane. Powierzchnia obficie nakłuta, w części centralnej retikulowana; między oczkami retikulacji znajdują się nieliczne wyrostki.

Występowanie w Polsce: górny kampan, dolny i górny mastrycht, dan, paleocen (?).

Cythereis latebrosa confinis n.sp., n.subsp.
(Pl. XIII, fig. 6, 7)

Pancerz wydęty, z ornamentowanym żeberkiem przy brzegu dorsalnym i wentralnym. Krawędzie zgrubiałe, ząbkowane. Powierzchnia obficie nakłuta, zwłaszcza w części centralnej, gdzie ponadto znajdują się nieliczne wyrostki.

Występowanie w Polsce: górny kampan.

Cythereis (Trachyleberis) incerta n.sp.
(Pl. VII, fig. 10; Pl. XIII, fig. 10—12)

Pancerz silnie wydęty, pokryty licznymi kolcami; występują one zarówno na zgrubiałych krawędziach, zwłaszcza wzdłuż przedniego i tylnego końca, jak i na bocznej powierzchni.

Występowanie w Polsce: górny kampan, dolny i górny mastrycht, dan (?).

Cythereis multifora n.sp.
(Pl. III, fig. 11, 12; Pl. XVIII, fig. 1—7)

Pancerz wypukły, z ornamentowanym żeberkiem przy brzegu dorsalnym, wentralnym i w tyle, na przedłużeniu pola mięśniowego. Krawędzie zgrubiałe. Wzdłuż brzegu przedniego końca znajdują się liczne ząbki, natomiast krótkie kolce obrzeżają krawędź tylnego końca. Powierzchnia boczna gęsto retikulowana.

Występowanie w Polsce: dolny i górny mastrycht, dan, paleocen.

Cythereis iucunda n.sp.
(Pl. VII, fig. 4; Pl. XVII, fig. 21—23)

Pancerz płasko wypukły, z długim żeberkiem przy brzegu dorsalnym i wentralnym, oraz krótkim żeberkiem w centralnej części; górne żeberko jest wyraźnie ornamentowane krótkimi wyrostkami. Krawędzie zgrubiałe.

Występowanie w Polsce: górny kampan i górny mastrycht.

Cythereis formosa n.sp.
(Pl. VI, fig. 10; Pl. XIV, fig. 9—12)

Pancerz bocznie spłaszczony, z ornamentowanym żeberkiem przy brzegu dorsalnym i wentralnym; w przedniej części pancerza żeberka te łączą się ze zgrubiałym brzegiem przedniego końca. Zgrubiałą krawędź przedniego końca obrzeżają hakowate wyrostki.

Występowanie w Polsce: dan, paleocen i eocen.

Cythereis infragilis n.sp.
(Pl. II, fig. 1; Pl. XIV, fig. 13—16)

Pancerz wypukły, z żeberkiem przy brzegu dorsalnym i wentralnym oraz w centralnej części powierzchni bocznej; górne żeberko łączy się w tyle z nieco ukośnie biegnącym żeberkiem środkowym. Obydwa przybrzeżne żeberka w przedzie przechodzą w zgrubiałą krawędź przedniego końca. Krawędzie, zwłaszcza krawędź przedniego końca, lekko ząbkowane.

Występowanie w Polsce: dan, paleocen i eocen.

Cythereis morata n.sp.
(Pl. VII, fig. 9; Pl. XIV, fig. 17—20)

Pancerz wydęty, z wyraźnym żeberkiem przy brzegu dorsalnym i wentralnym, oraz niezbyt wyraźnym krótkim żeberkiem w centralnej części powierzchni bocznej. Górne i dolne żeberko w przedzie przechodzą w zgrubienie krawędzi przedniego końca. Krawędź przedniego i tylnego końca ząbkowana. Powierzchnia lekko nakłuta.

Występowanie w Polsce: dan i paleocen.

Cythereis agatae n.sp.
(Pl. VII, fig. 1; Pl. XVI, fig. 1—4)

Pancerz dość równo wydęty, z żeberkiem przy brzegu dorsalnym i wentralnym, oraz rozdwajającym się w przedzie długim żeberkiem w centralnej części powierzchni bocznej. Żeberko górne i dolne w przedzie przechodzi w przybrzeżne żeberko występujące wzdłuż krawędzi przedniego końca. Powierzchnia pokryta nieregularnie rozmieszczonymi guzkami.

Występowanie w Polsce: dan, paleocen i eocen

Trachyleberidea semiplana n.sp.
(Pl. IV, fig. 13, 14; Pl. XVI, fig. 5—7)

Pancerz bocznie spłaszczony, z nikłym żeberkiem przy brzegu dorsalnym, wentralnym i wzdłuż centralnej części powierzchni bocznej. Powierzchnia delikatnie retikulowana.

Występowanie w Polsce: dan, paleocen i eocen.

Schizocythere solida n.sp.
(Pl. I, fig. 5, 6; Pl. XIII, fig. 8, 9)

Pancerz prawie owalny w zarysie bocznym, silnie i raczej równomiernie wydęty. Powierzchnia pokryta koncentrycznie ułożonymi żeberkami, szczególnie regularnie ułożonymi w częściach przybrzeżnych. Centralna część retikulowana.

Występowanie w Polsce: paleocen.

Neocythere (Physocythere) minuticosta n.sp.
(Pl. I, fig. 11; Pl. II, fig. 7; Pl. X, fig. 1—9)

Pancerz silnie wydęty, przybrzeżnie pokryty koncentrycznymi, delikatnymi żeberkami.

Występowanie w Polsce: górny kampan, dolny i górny mastrycht, paleocen (?).

Pulaviella n.gen.

Pancerz prawie owalny w zarysie bocznym, wydęty silnie i dość równomiernie, na stronie brzusznej lekko spłaszczony. Powierzchnia gładka. Podłużne odciski mięśni zwierających tworzą pionowy szereg. Zawias lewej skorupki składa się z ząbkowanej bruzdy, pogłębiającej się terminalnie i odpowiadającej ząbkowanej listewce zawiasowej w prawej skorupce.

Do rodzaju *Pulaviella* zaliczone zostały gatunki: *Xestoleberis ovata* i *X. bidentata*, obydwa opisane przez Bonnemę (1941) z górnej kredy Holandii.

ЯНИНА ЩЕХУРА

ВЕРХНЕМЕЛОВЫЕ И НИЖНЕТРЕТИЧНЫЕ CYTHERACEA (OSTRACODA) ПОЛЬШИ

Резюме

Настоящая работа посвящена верхнемеловым (верхний кампан — верхний маастрихт) и нижнетретичным (дат — нижний палеоцен) остракодам (Cytheracea) северной и центральной Польши. Кроме того учтено также образцы из нижнего

зоцена Паментова. Материал происходит из скважин (Паментово и Сохачев), четырех обнажений (Бохотница, Насилув, Мельник, Люцимя), а также из сравнительных образцов Польши (фиг. 1) и других стран (Англия, Бельгия, Дания, Голландия, Германия, СССР, США). Стратиграфическо-литологическая характеристика изученных образцов подана в относительных главах общей части работы.

Среди выбранных около 6000 единичных створок или же полных раковин остракод описано 61 видов, принадлежащих к 29 родам надсемейства Cytheracea, в этом 1 новый род, 23 новые вида и 2 новые подвида. Остальные группы остракод, выступающие в изученных образцах, будут описаны в дальнейшем.

Распространение описанных видов остракод в верхнемеловых и нижнетретичных отложениях Польши указано на Таб. 1, а Таб. 2 вмещает окончательные стратиграфические выводы. Анализ регионального и стратиграфического распространения остракод в сравнении с таким же распространением фораминифер указывает, что остракоды имеют более узкое региональное распространение и становят менее чуткий стратиграфический указатель. Учитывая отсутствие руководящих форм, на основании которых можна было бы отделить дат от палеоцена, автор рассматривает обе стратиграфические единицы как один совместный горизонт. Граница между меловыми и третичными отложениями, также как и на ссновании фораминифер, установлена между маастрихтом и датом (дато-палеоцен).

Посколько это было возможно, анализируя виды учтено изменчивость внутренних и наружных морфологических признаков раковины, онтогенетическое развитие и половой диморфизм. Итог этих наблюдений находится в отдельной главе этой работы.

Упомянутое при описании некоторых видов явление недоразвития раковины заключается в неполном развитии наружных и внутренних морфологических элементов. По мнению автора, это результат преждевременной смерти „недоразвитой" особи, т. е. имеющей еще не совсем обизвествленную раковину.

В результате исследований автора над онтогенетическим развитием раковины указано, что величина раковины не может быть единым фактором определяющим последовательность вылинки, так как среди форм имеющих размеры взрослых особей находятся особи юные, а среди форм о размерах юных особей выступают несомненно формы совершенно взрослые.

PLATES

Plates I-VII contain the figures of the *internal* valve view

Scales correspond to 0.1 mm.

Plates VIII—XIX contain the figures of the *external* valve view
(except Pl. XV, Figs 1, 2)

Magnifications of figures approx. × 90

Plate I

Schuleridea maculata (Apostolescu)

Fig. 1. Right valve (O.II/273).
Fig. 2. Muscle scars of left valve (O.II/274).

Uroleberis? mazoviensis n. sp.

Fig. 3. Left valve (O.II/334).
Fig. 4. Muscle scars of left valve (O.II/335).

Schizocythere solida n. sp.

Fig. 5. Right valve (O.II/468).
Fig. 6. Muscle scars of left valve (O.II/469).

Pulaviella ovata (Bonnema)

Fig. 7. Left valve (O.II/510).
Fig. 8. Muscle scars of left valve (O.II/511).

Protocytheretta interrupta (Bosquet)

Fig. 9. Right valve (O.II/244).

Amphicytherura limburgensis Howe & Laurencich

Fig. 10. Right valve (O.II/475).

Neocythere (Physocythere) minuticosta n. sp.

Fig. 11. Left valve (O.II/489).

Eucythere derupta n. sp.

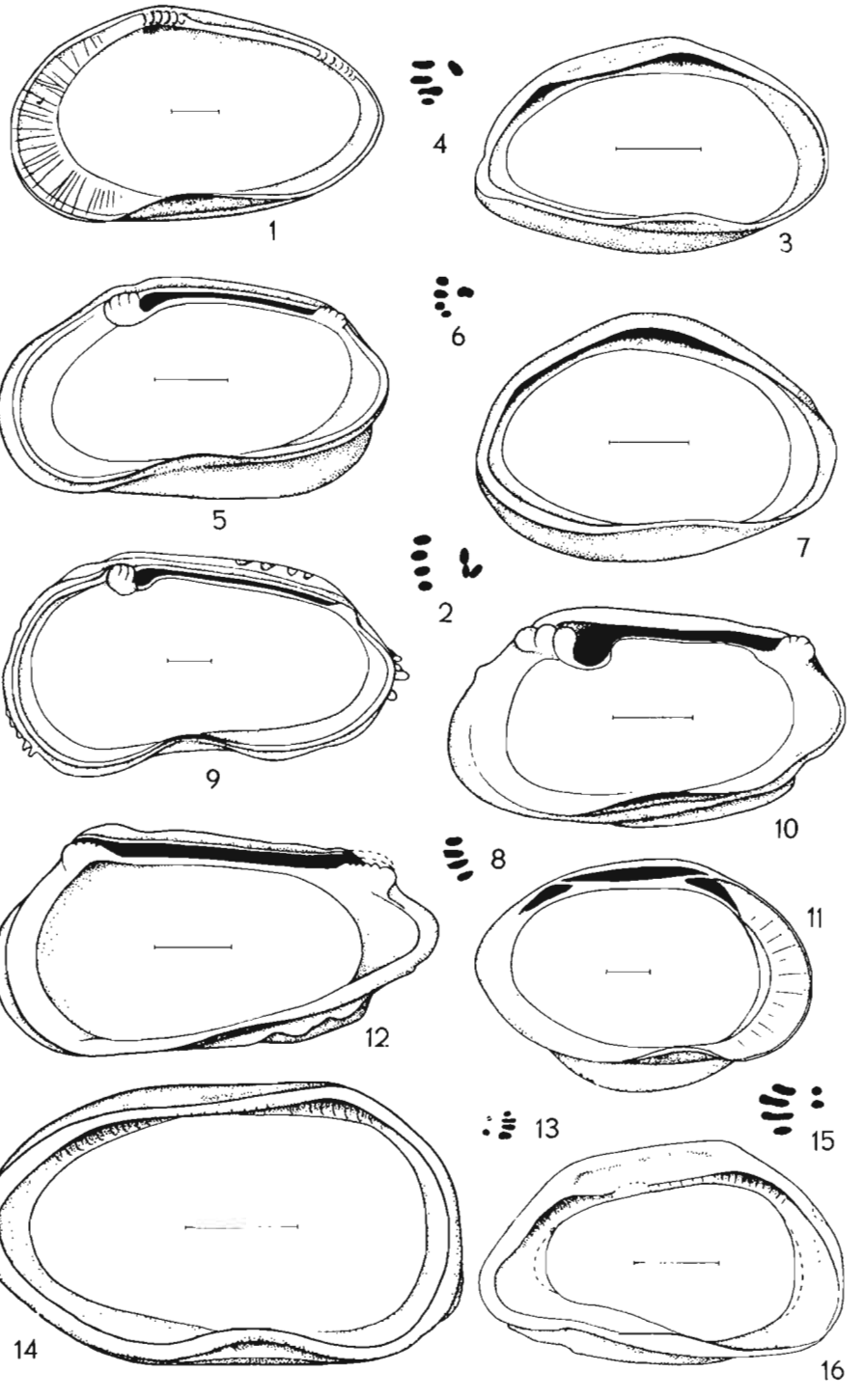
Fig. 12. Right valve (O.II/305).

Pseudocythocythere sigillata n. sp.

Fig. 13. Muscle scars of right valve (O.II/500).
Fig. 14. Left valve (O.II/501).

Clithrocytheridea preciosa (Veen)

Fig. 15. Muscle scars of left valve (O.II/266).
Fig. 16. Left valve (O.II/267).



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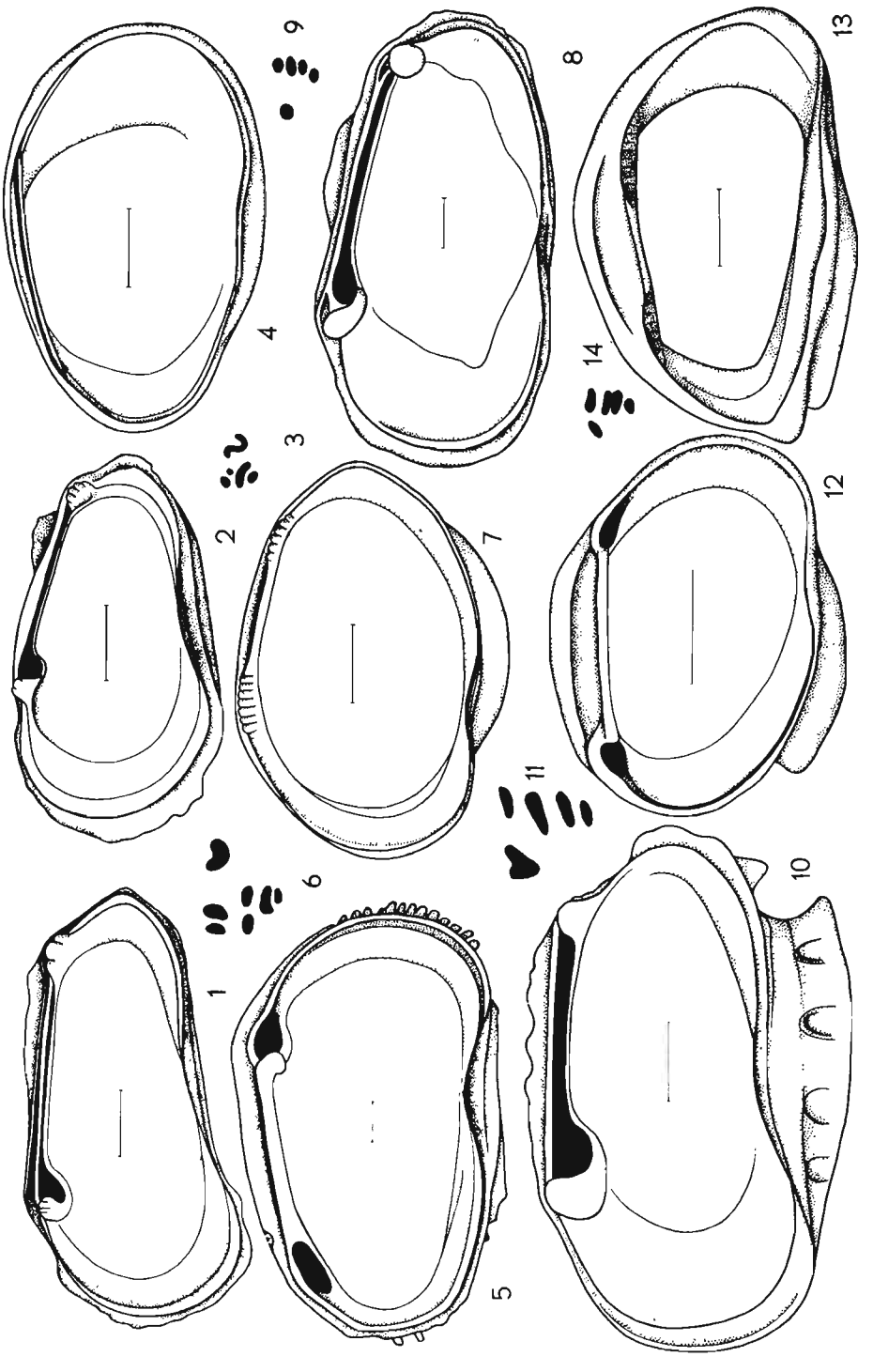

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Plate II

Cytherois infragilis n. sp.

Fig. 1. Right valve (O.II/333).

Cytherois semiplicata (Reuss)

Fig. 2. Right valve (O.II/396).

Fig. 3. Muscle scars seen outside the right valve (O.II/397).

Cuneocythere (Monsmirabilia) porifera n. sp.

Fig. 4. Left valve (O.II/258).

Brachycythere pustulosa marlierei n.subsp.

Fig. 5. Left valve (O.II/212).

Fig. 6. Muscle scars seen outside the right valve (O.II/213).

Neocythere (Physocythere) minuticosta n. sp.

Fig. 7. Right valve (O.II/490).

Paracytheretta reticosa Triebel

Fig. 8. Right valve (O.II/239).

Fig. 9. Muscle scars of right valve (O.II/238).

Kingmaina opima n. sp.

Fig. 10. Right valve (O.II/230).

Fig. 11. Muscle scars of right valve (O.II/233).

Cytheropteron v-scriptum Veen

Fig. 12. Left valve (O.II/279).

Clithrocytheridea arcuata n. sp.

Fig. 13. Left valve (O.II/519).

Fig. 14. Muscle scars of right valve (O.II/520).

Plate III

Triginglymus? callosus n. sp.

Fig. 1. Right valve (O.II/323); *a* muscle scars.

Protocytheretta canaliculata (Apostolescu)

Fig. 2. Left valve (O.II/245); *a* muscle scars.

Phacorhabdotus? texanus Howe & Laurencich

Fig. 3. Left valve (O.II/461).

Trachyleberidea acutiloba (Marsson)

Fig. 4. Right valve (O.II/361).

Fig. 5. Muscle scars of right valve (O.II/362).

Cytheridea bosqueti (Veen)

Fig. 6. Left valve (O.II/256).

Fig. 7. Muscle scars of right valve (O.II/257).

Aulocytheridea gracilis n. sp.

Fig. 8. Left valve (O.II/248).

Fig. 9. Muscle scars of left valve (O.II/249).

Cythereis latebrosa latebrosa n. sp.

Fig. 10. Right valve (O.II/408).

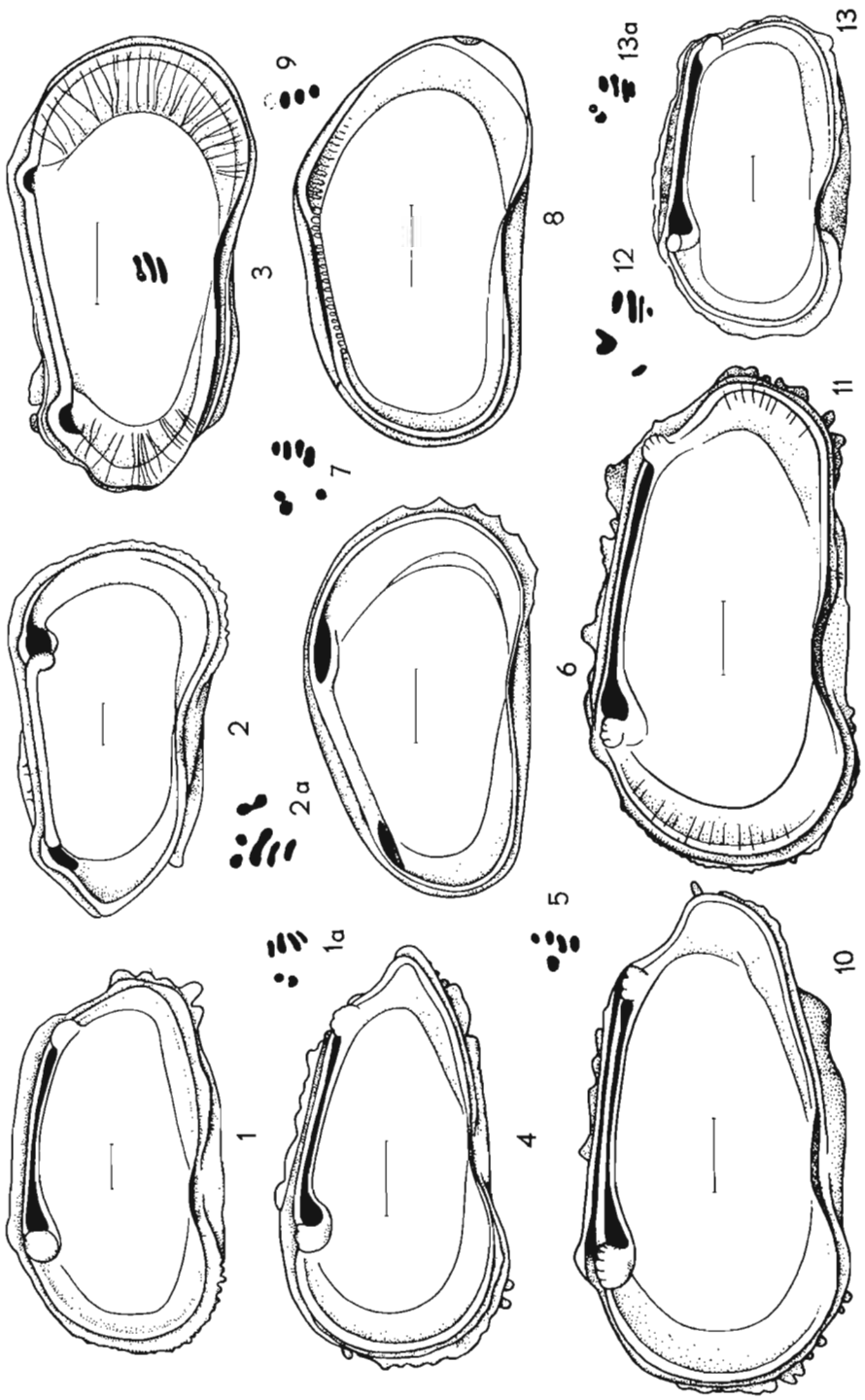
Cythereis multifora n. sp.

Fig. 11. Right valve (O.II/518).

Fig. 12. Muscle scars of right valve (O.II/420).

Triginglymus? cribratus Apostolescu

Fig. 13. Right valve (O.II/315); *a* muscle scars.



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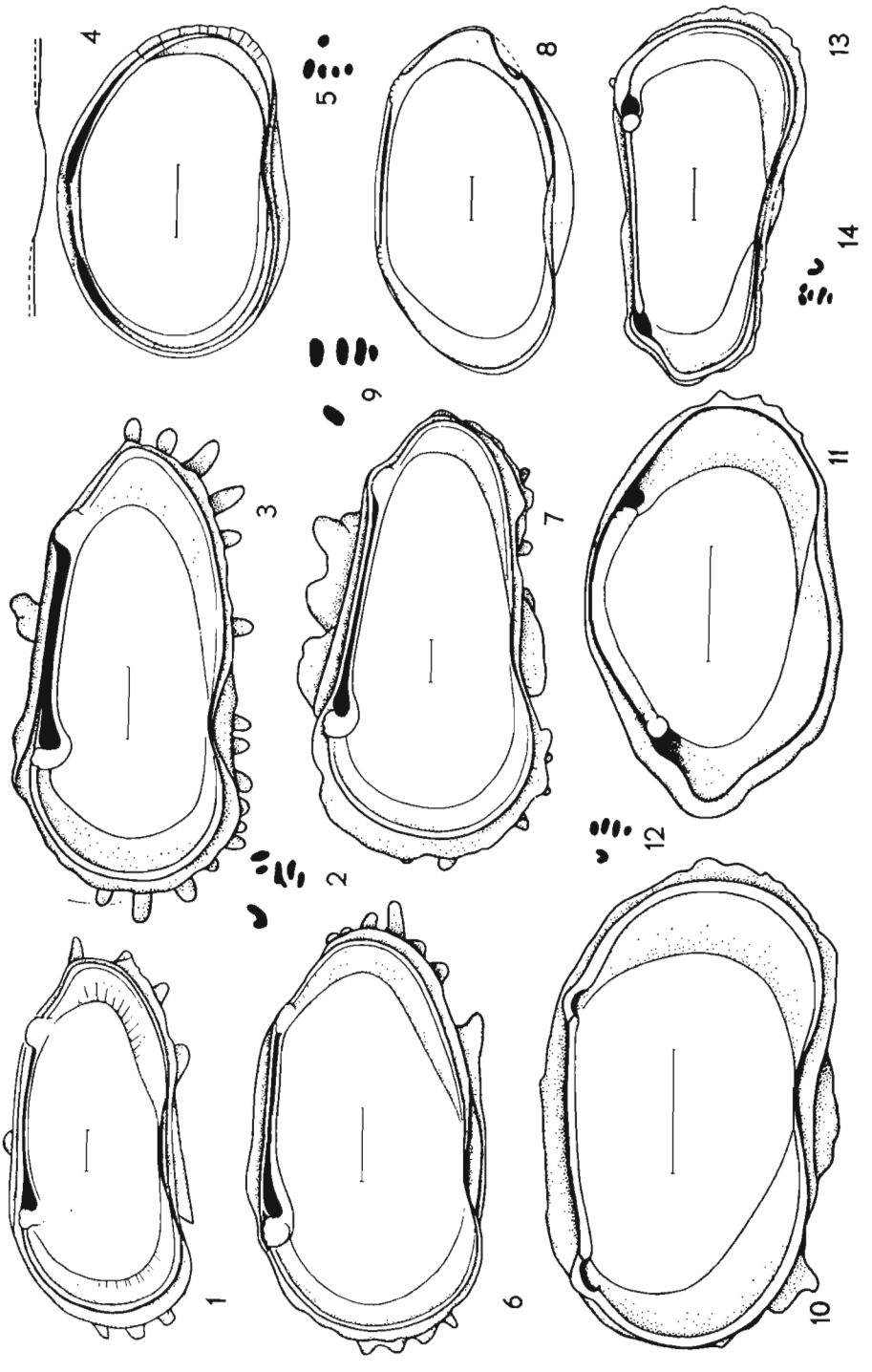

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Plate IV

Pterygocythereis tuberculata (Veen)

Fig. 1. Right valve (O.II/220).
Fig. 2. Muscle scars of right valve (O.II/221).

Pterygocythereis phylloptera (Bosquet)

Fig. 3. Right valve (O.II/222).

Xestoleberis pergensi Veen

Fig. 4. Left valve (O.II/326).
Fig. 5. Muscle scars of left valve (O.II/327).

Pterygocythereis serrulata (Bosquet)

Fig. 6. Right valve (O.II/225).

Pterygocythereis pamientoviensis n. sp.

Fig. 7. Right valve (O.II/229).

Neocythere (Physocythere) virginea (Jones)

Fig. 8. Right valve (O.II/483).
Fig. 9. Muscle scars of right valve (O.II/484).

Saida elliptica (Bonnema)

Fig. 10. Left valve (O.II/517).

Hemicytherura unisulcata Veen

Fig. 11. Left valve (O.II/311).
Fig. 12. Muscle scars of right valve (O.II/312).

Trachyleberidea semiplana n. sp.

Fig. 13. Left valve (O.II/452).
Fig. 14. Muscle scars of left valve (O.II/453).

Plate V

Echinocythereis aff. *aragonensis* Oertli

Fig. 1. Right valve (O.II/457).

Kikliocythere? nitida n. sp.

Fig. 2. Right valve (O.II/234).

Veenia pergensi (Veen)

Fig. 3. Right valve (O.II/465).

Cythereis parva Bonnema

Fig. 4. Right valve (O.II/388).

Amphicytherura aculeata (Bonnema)

Fig. 5. Right valve (O.II/478).

Eucytherura dorsotuberculata Veen

Fig. 6. Right valve (O.II/291); *a* muscle scars.

Cythereis bispinifera (Veen)

Fig. 7. Right valve (O.II/365).

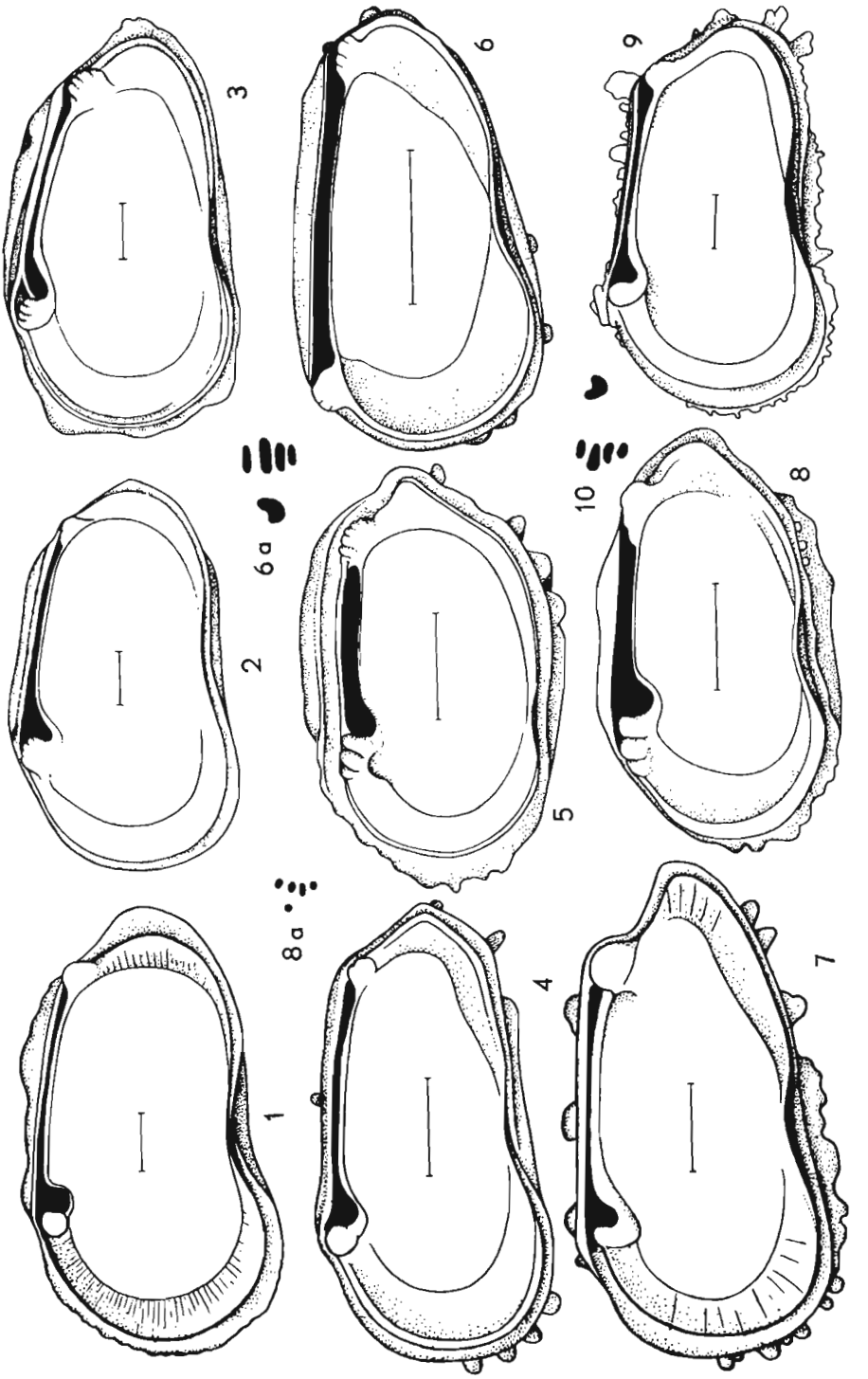
Amphicytherura chelodon (Marsson)

Fig. 8. Right valve (O.II/472); *a* muscle scars

Cythereis (Trachyleberis) horridula (Bosquet)

Fig. 9. Right valve (O.II/335).

Fig. 10. Muscle scars of left valve (O. II/356).



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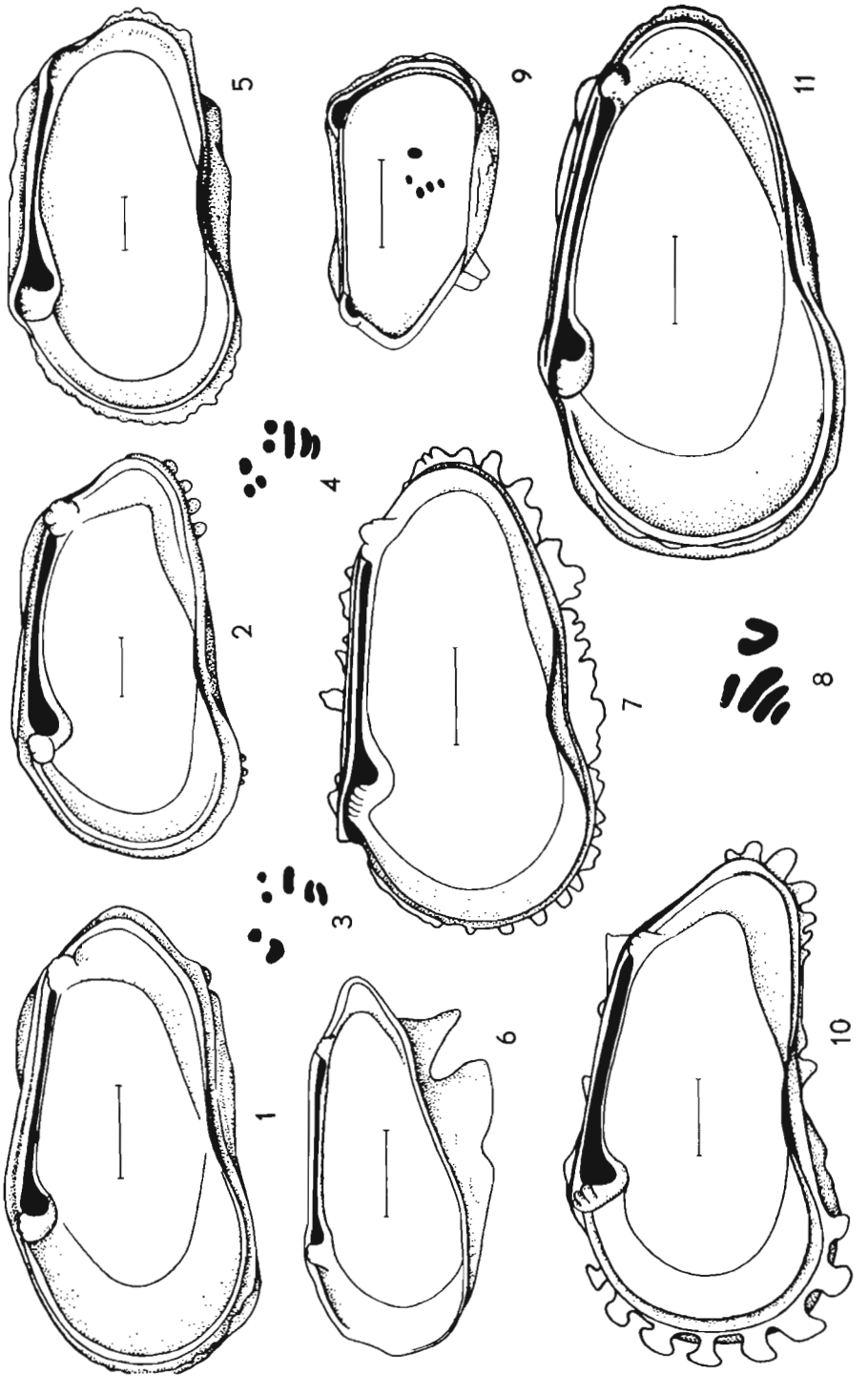

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Plate VI

Cythereis compressa n.sp.

Fig. 1. Right valve (O.II/404).

Cythereis ornata (Bosquet)

Fig. 2. Right valve (O.II/383).
Fig. 3. Muscle scars seen inside the right valve (O.II/384).
Fig. 4. Muscle scars seen outside the left valve (O.II/385).

Cythereis (Mauritsina) hieroglyphica (Bosquet)

Fig. 5. Right valve (O.II/376).

Paracytheridea cf. *bosqueti* Veen

Fig. 6. Right valve (O.II/306).

Cythereis (Trachyleberis) aculeata (Bosquet)

Fig. 7. Right valve (O.II/340).
Fig. 8. Muscle scars of left valve (O.II/341).

Eucytherura bicornis Veen

Fig 9. Left valve (O.II/294).

Cythereis formosa n.sp.

Fig. 10. Right valve (O.II/433).

Cythereis lonsdaleiana Jones

Fig. 11. Right valve (O.II/373).

Plate VII

Cythereis agatae n.sp.

Fig. 1. Right valve (O.II/447).

Eucytherura squamifera Veen

Fig. 2. Right valve (O.II/288).

Cythereis spinosa n. sp.

Fig. 3. Right valve (O.II/400).

Cythereis iucunda n.sp.

Fig. 4. Right valve (O.II/429).

Eucytherura tumida Bonnema

Fig. 5. Left valve (O.II/285); *a* muscle scars.

Cythereis quadridentata (Bosquet)

Fig. 6. Right valve (O.II/391).

Fig. 7. Muscle scars seen outside the right valve (O.II/392).

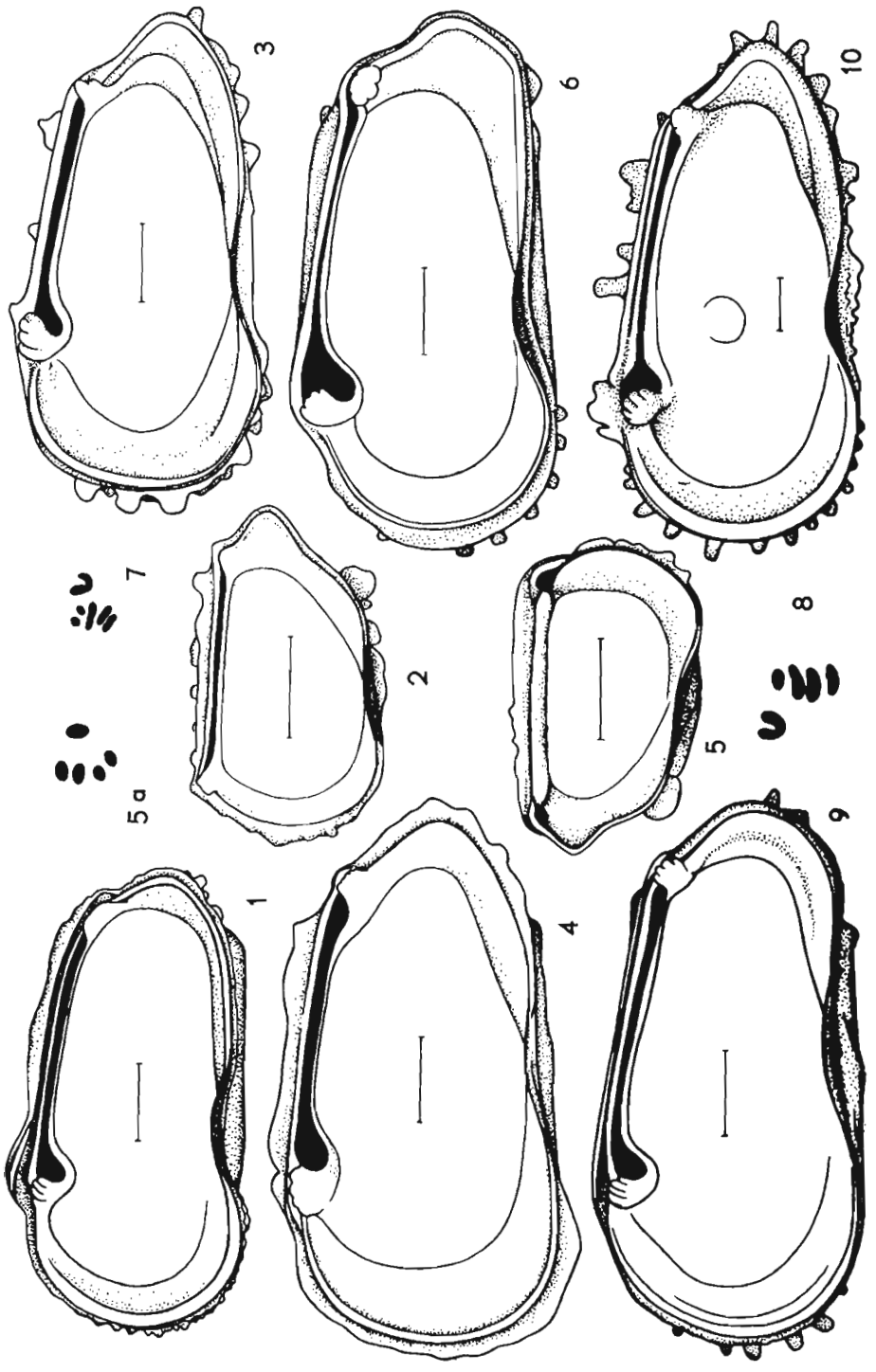
Fig. 8. Muscle scars seen outside the left valve (O.II/393).

Cythereis morata n.sp.

Fig. 9. Right valve (O.II/442).

Cythereis (Trachyleberis) incerta n.sp.

Fig. 10. Right valve (O.II/416).



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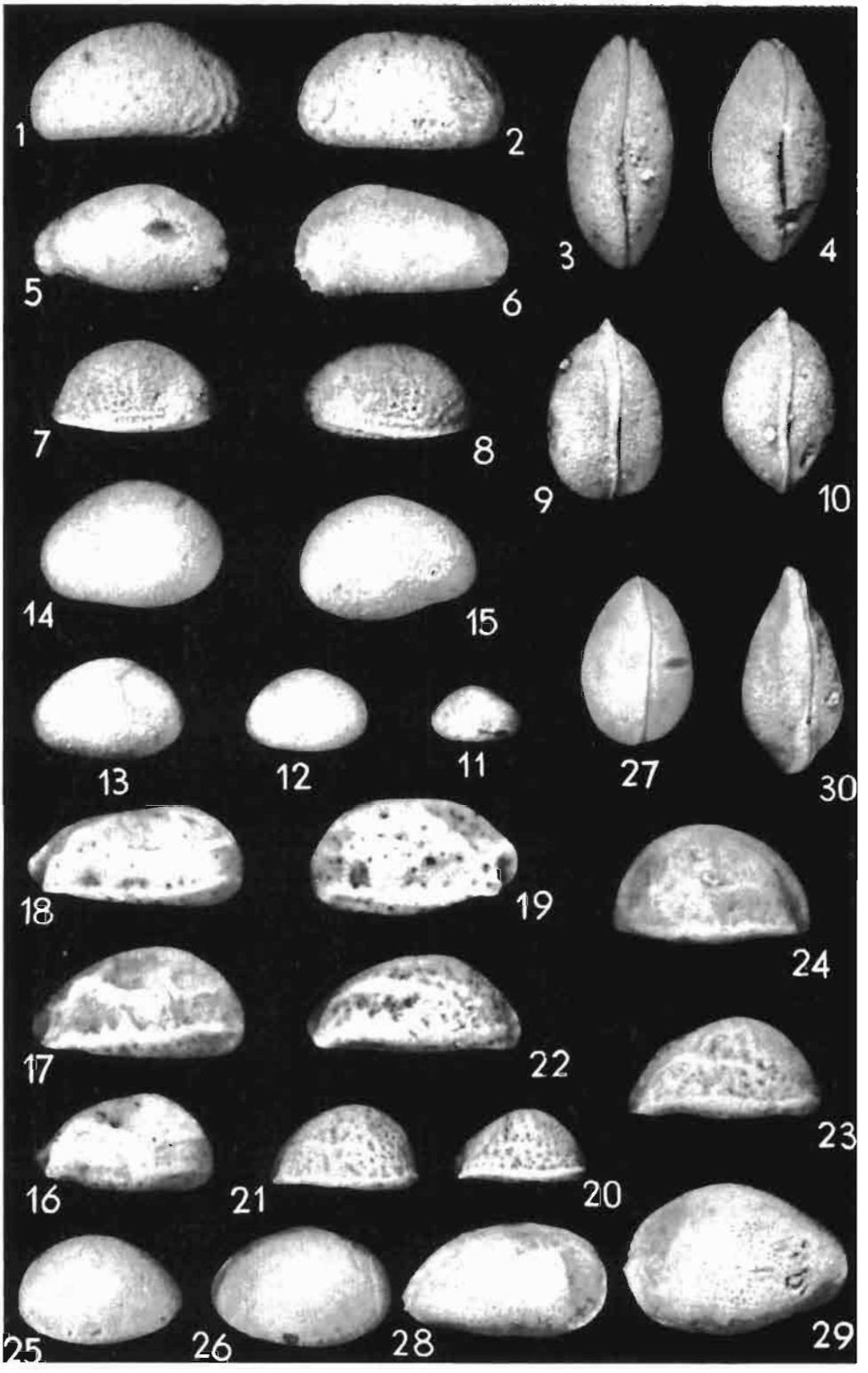

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Plate VIII

Aulocytheridea gracilis n.sp.
(Pamiętowo, 231 m., Paleocene)

Fig. 1. Holotype, female right valve (O.II/250).
Fig. 2. Female left valve (O.II/251).
Fig. 3. Dorsal view of male carapace (O.II/252).
Fig. 4. Dorsal view of female carapace (O.II/253).

Cytheridea bosqueti (Veen)
(Pamiętowo, 278 m., Lower Maastrichtian)

Fig. 5. Adult right valve (O.II/254).
Fig. 6. Adult left valve (O.II/255).

Uroleberis? mazoviensis n.sp.
(Pamiętowo, 243 m., Paleocene)

Fig. 7. Male right valve (O.II/336).
Fig. 8. Holotype, male left valve (O.II/337).
Fig. 9. Dorsal view of female carapace (O.II/338).
Fig. 10. Dorsal view of male carapace (O.II/339).

Xestoleberis pergensi Veen
(Lucimia, Upper Maastrichtian)

Fig. 11. Instar 1, left valve (O.II/328).
Fig. 12. Instar 2, left valve (O.II/329).
Fig. 13. Instar 3, left valve (O.II/330).
Fig. 14. Adult left valve (O.II/331).
Fig. 15. Adult right valve (O.II/332).

Clithrocytheridea preciosa (Veen)
(Pamiętowo, 276.2 m., Lower Maastrichtian)

Fig. 16. Instar 1, right valve (O.II/262).
Fig. 17. Female right valve (O.II/263).
Fig. 18. Male right valve (O.II/264).
Fig. 19. Female left valve (O.II/265).

Clithrocytheridea arcuata n.sp.
(Pamiętowo, 283,4 m., Lower Maastrichtian)

Fig. 20. Instar 1, right valve (O.II/268).
Fig. 21. Instar 2, right valve (O.II/269).
Fig. 22. Male right valve (O.II/270).
Fig. 23. Holotype, female right valve (O.II/271).
Fig. 24. Female left valve (O.II/272).

Pulaviella ovata (Bonnema)
(Nasiłów, 2 m. under hard ground, Upper Maastrichtian)

Fig. 25. Adult right valve (O.II/512).
Fig. 26. Adult left valve (O.II/513).
Fig. 27. Dorsal view of adult carapace (O.II/514).

Cuneocythere (Monsmirabilia) porifera n.sp.
(Pamiętowo, 257 m., Paleocene)

Fig. 28. Holotype, adult right valve (O.II/259).
Fig. 29. Adult left valve (O.II/260).
Fig. 30. Dorsal view of adult carapace (O.II/261).

Plate IX

Schuleridea maculata (Apostolescu)
(Boryszew, Paleocene)

Fig. 1. Female right valve (O.II/275).
Fig. 2. Female left valve (O.II/276).
Fig. 3. Male right valve (O.II/277).
Fig. 4. Dorsal view of female carapace (O.II/278).

Neocythere (Physocythere) virginea (Jones)
(Pamiętowo, 278.8 m., Lower Maastrichtian)

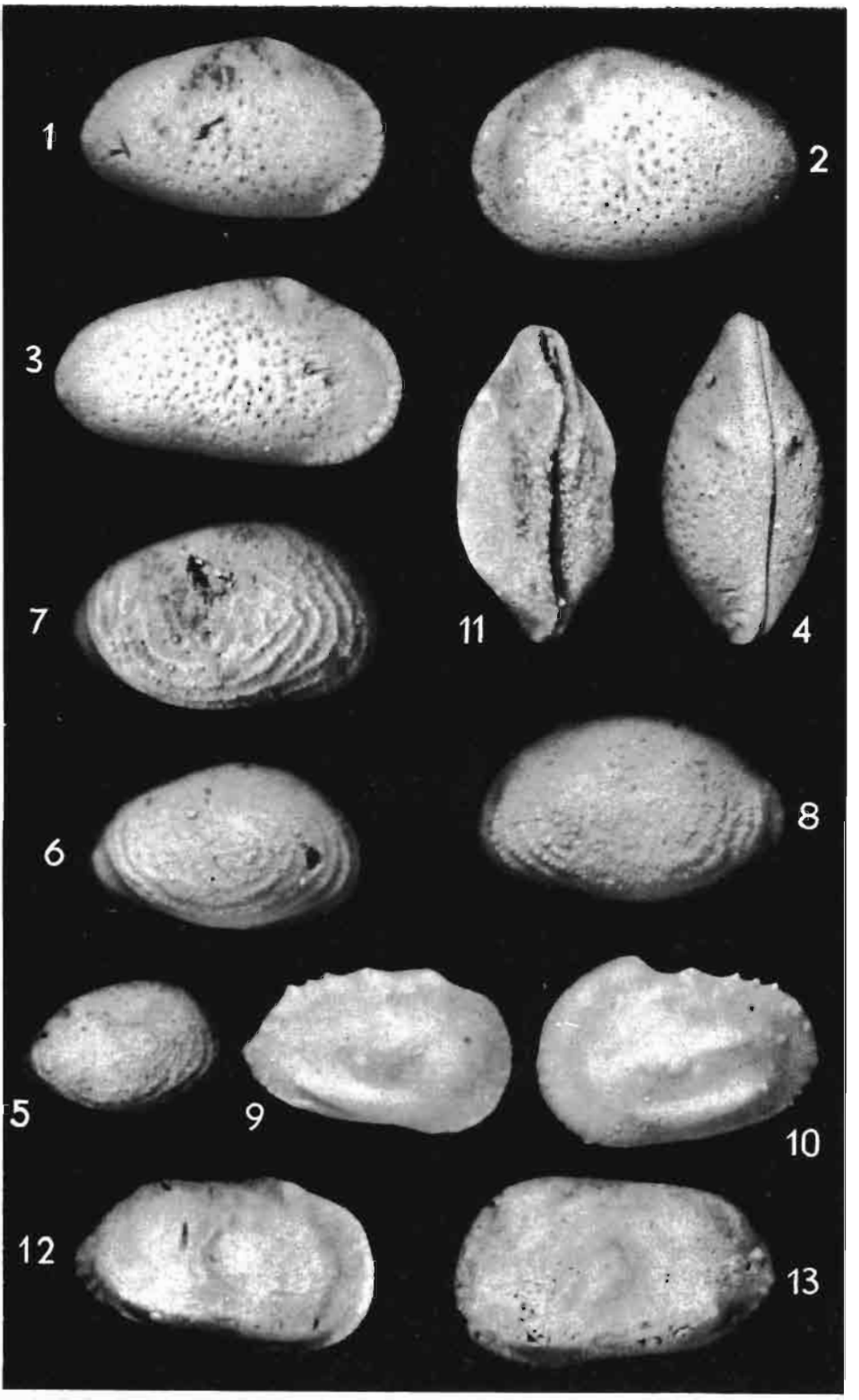
Fig. 5. Instar 1, right valve (O.II/485).
Fig. 6. Instar 2, right valve (O.II/486).
Fig. 7. Adult right valve (O.II/487).
Fig. 8. Adult left valve (O.II/488).

Veenia pergensi (Veen)
(Mielnik, 2.7 m. under hard ground, Upper Campanian)

Fig. 9. Adult right valve (O.II/466).
Fig. 10. Adult left valve (O.II/467).

Kikliocythere? nitida n.sp.
(Nasiłów, 2 m. under hard ground, Upper Maastrichtian)

Fig. 11. Dorsal view of adult carapace (O.II/237).
Fig. 12. Holotype, adult right valve (O.II/235).
Fig. 13. Adult left valve (O.II/236).



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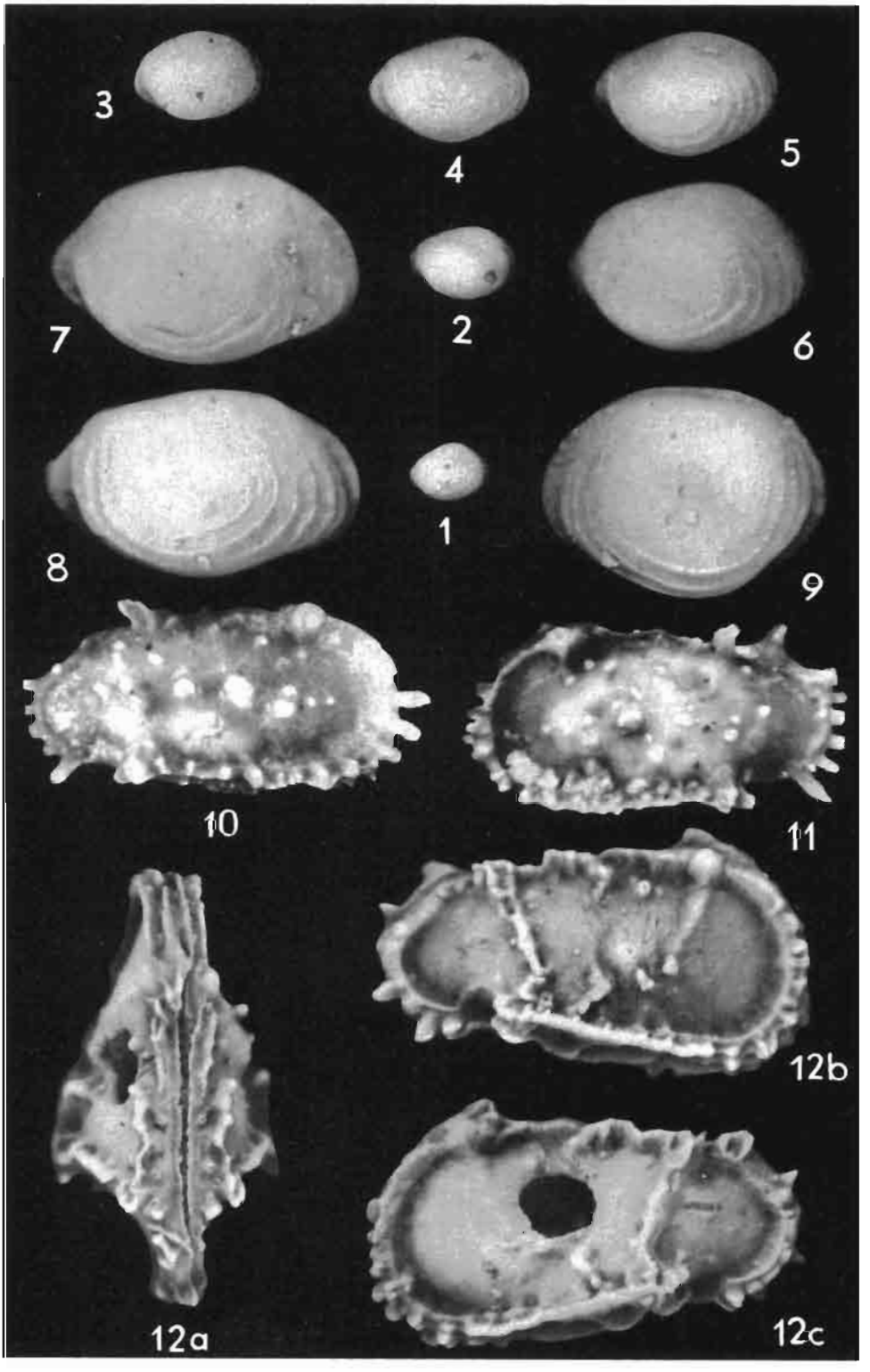

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Plate X

Neocythere (Physocythere) minuticosta n.sp.
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 1. Instar, 1, right valve (O.II/491).
Fig. 2. Instar 2, right valve (O.II/492).
Fig. 3. Instar 3, right valve (O.II/493).
Fig. 4. Instar 4, right valve (O.II/494).
Fig. 5. Instar 5, right valve (O.II/495).
Fig. 6. Instar 6, right valve (O.II/496).
Fig. 7. Holotype, female right valve (O.II/497).
Fig. 8. Male right valve (O.II/498).
Fig. 9. Female left valve (O.II/499).

Pterygocythereis tuberculata (Veen)
(Boryszew, Paleocene)

Fig. 10. Adult right valve (O.II/218).
Fig. 11. Adult left valve (O.II/219).

Pterygocythereis pamientoviensis n.sp.
(Pamiętowo, 241 m., Paleocene)

Fig. 12. Adult complete carapace (O.II/228); *a* dorsal view, *b* right valve, *c* left valve.

Plate XI

Cythereis (Mauritsina) hieroglyphica (Bosquet)
(Sochaczew, 272 m., Upper Maastrichtian)

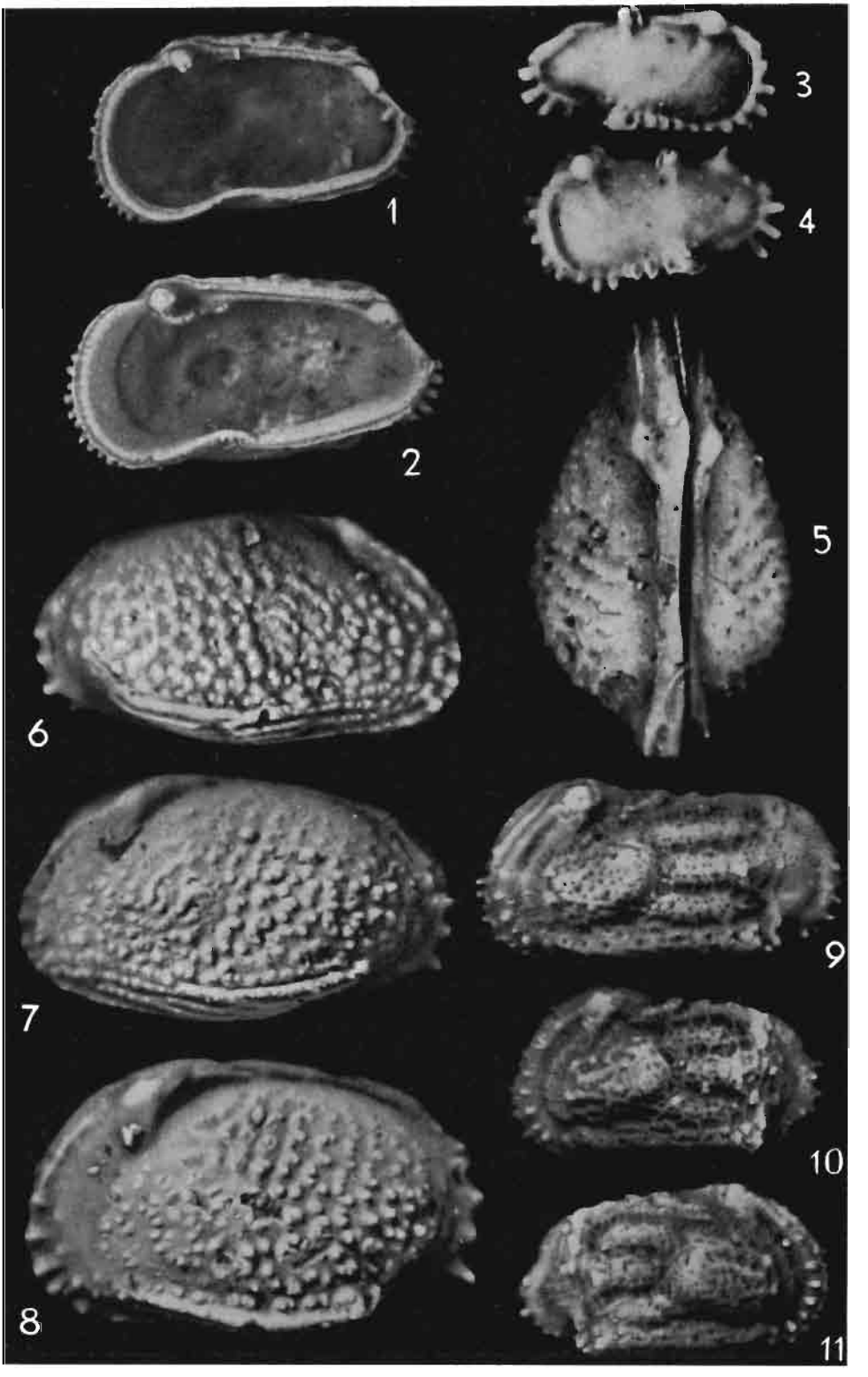
Fig. 1. Female right valve (O.II/377); inside view.
Fig. 2. Male right valve (O.II/378); inside view.
Fig. 9. Male left valve (O.II/379).
Fig. 10. Female left valve (O.II/380).
Fig. 11. Female right valve (O.II/381).

Pterygocythereis phylloptera (Bosquet)
(Mielnik, 2.7 m. under hard ground, Upper Campanian)

Fig. 3. Adult right valve (O.II/223).
Fig. 4. Adult left valve (O.II/224).

Brachycythere pustulosa marlierei n.subsp.
(Boryszew, Paleocene)

Fig. 5. Dorsal view of female carapace (O.II/214).
Fig. 6. Male right valve (O.II/215).
Fig. 7. Male left valve (O.II/216).
Fig. 8. Holotype, female left valve (O.II/217).



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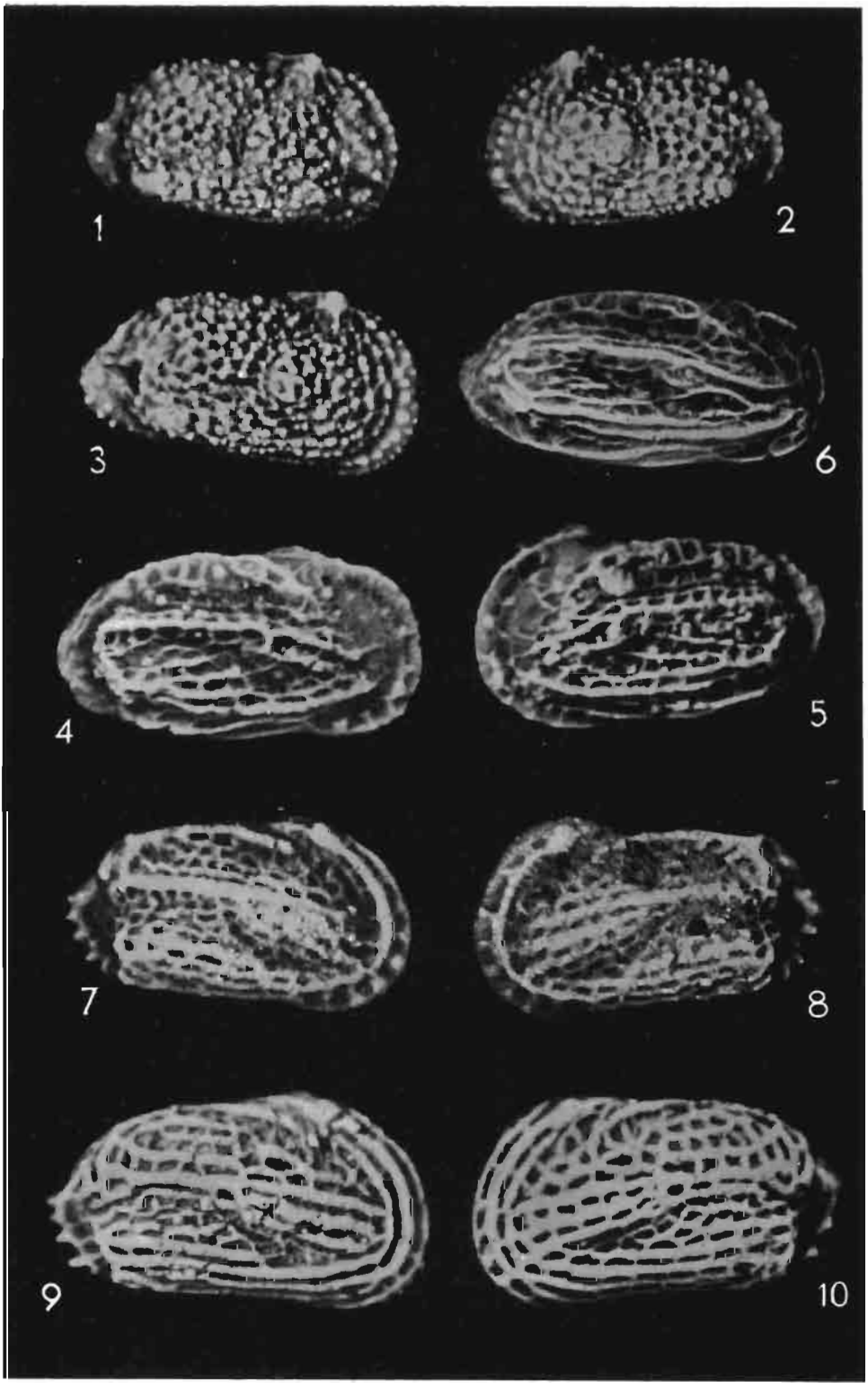

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Plate XII

Echinocythereis aff. *aragonensis* Oertli
(Pamiętowo, 257 m., Paleocene)

Fig. 1. Female right valve (O.II/458).
Fig. 2. Female left valve (O.II/459).
Fig. 3. Male right valve (O.II/460).

Paracytheretta reticosa Triebel
(Pamiętowo, 250.5 m., Paleocene)

Fig. 4. Adult right valve (O.II/239).
Fig. 5. Adult left valve (O.II/240).
Fig. 6. *P. reticosa?*, adult right valve (O.II/241).

Protocytheretta canaliculata (Apostolescu)
(Pamiętowo, 257 m., Paleocene)

Fig. 7. Adult right valve (O.II/246).
Fig. 8. Adult left valve (O.II/247).

Protocytheretta interrupta (Bosquet)
(Pamiętowo, 257 m., Paleocene)

Fig. 9. Adult right valve (O.II/242).
Fig. 10. Adult left valve (O.II/243).

Plate XIII

Cythereis latebrosa latebrosa n.sp.
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 1. Instar 1, right valve (O.II/409).
Fig. 2. Instar 2, right valve (O.II/410).
Fig. 3. Holotype, adult right valve (O.II/411).
Fig. 4. Adult left valve (O.II/412).
Fig. 5. Dorsal view of adult carapace (O.II/413).

Cythereis latebrosa confinis n.sp., n.subsp.
(Mielnik, 2.7 m. under hard ground, Upper Campanian)

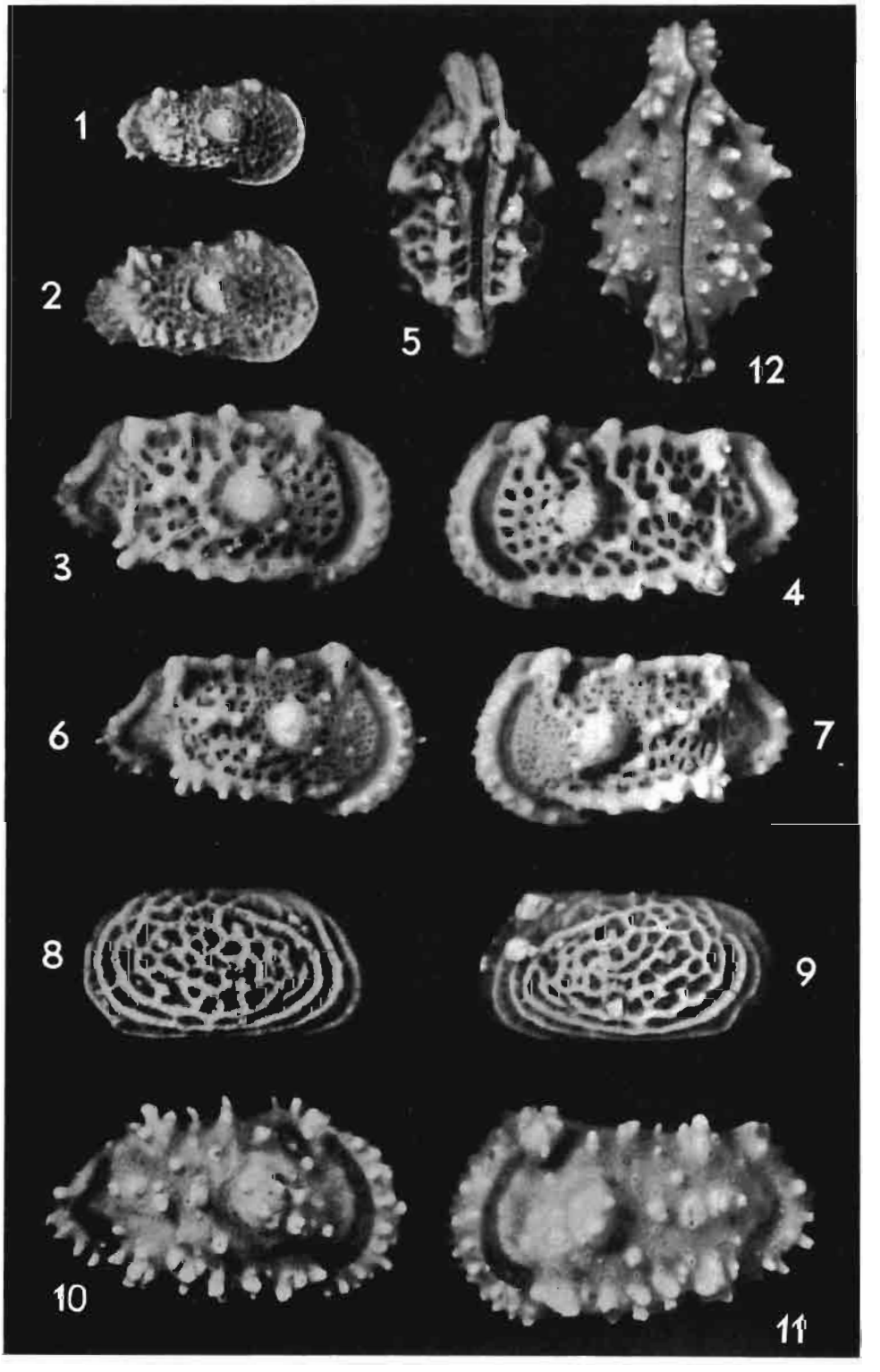
Fig. 6. Holotype, adult right valve (O.II/414).
Fig. 7. Adult left valve (O.II/415).

Schizocythere solida n.sp.
(Pamiętowo, 243 m., Paleocene)

Fig. 8. Holotype, adult right valve (O.II/470).
Fig. 9. Adult left valve (O.II/471).

Cythereis (Trachyleberis) incerta n.sp.
(Bochotnica, 6 m. under hard ground, Upper Maastrichtian)

Fig. 10. Holotype, adult right valve (O.II/417).
Fig. 11. Adult left valve (O.II/418).
Fig. 12. Dorsal view of adult carapace (O.II/419).



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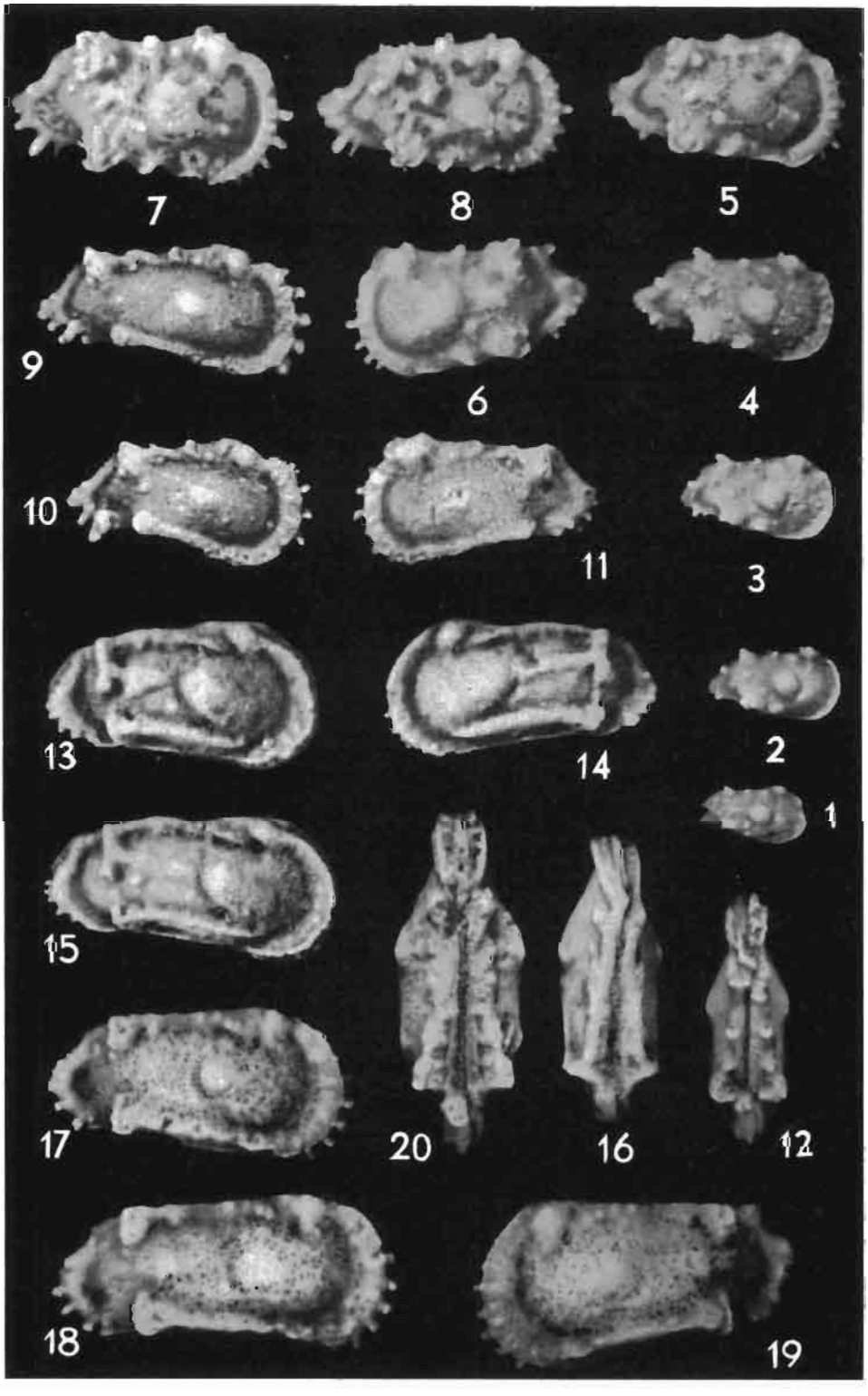


Phot. L. Łuszczewska

Plate XIV

Cythereis bispinifera (Veen)
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 1. Instar 1, right valve (O.II/367).
Fig. 2. Instar 2, right valve (O.II/368).
Fig. 3. Instar 3, right valve (O.II/369).
Fig. 4. Instar 4, right valve (O.II/370).
Fig. 5. Adult right valve (O.II/371).
Fig. 6. Adult left valve (O.II/372).
Fig. 7. Adult right valve (O.II/515); Pamiętowo, 286.5 m., Lower Maastrichtian.
Fig. 8. Adult right valve (O.II/516); Bochotnica, 6 m. under hard ground, Upper Maastrichtian.

Cythereis formosa n.sp.
(Pamiętowo, 231 m., Paleocene)

Fig. 9. Male right valve (O.II/434).
Fig. 10. Holotype, female right valve (O.II/435).
Fig. 11. Female left valve (O.II/436)
Fig. 12. Dorsal view of male carapace (O.II/437).

Cythereis infragilis n.sp.
(Pamiętowo, 257 m., Paleocene)

Fig. 13. Holotype, female right valve (O.II/438).
Fig. 14. Female left valve (O.II/439).
Fig. 15. Male right valve (O.II/440).
Fig. 16. Dorsal view of male carapace (O.II/441).

Cythereis morata n.sp.
(Bochotnica, 1.5 m. above hard ground, Paleocene)

Fig. 17. Holotype, female right valve (O.II/443).
Fig. 18. Male right valve (O.II/444).
Fig. 19. Female left valve (O.II/445).
Fig. 20. Dorsal view of male carapace (O.II/446).

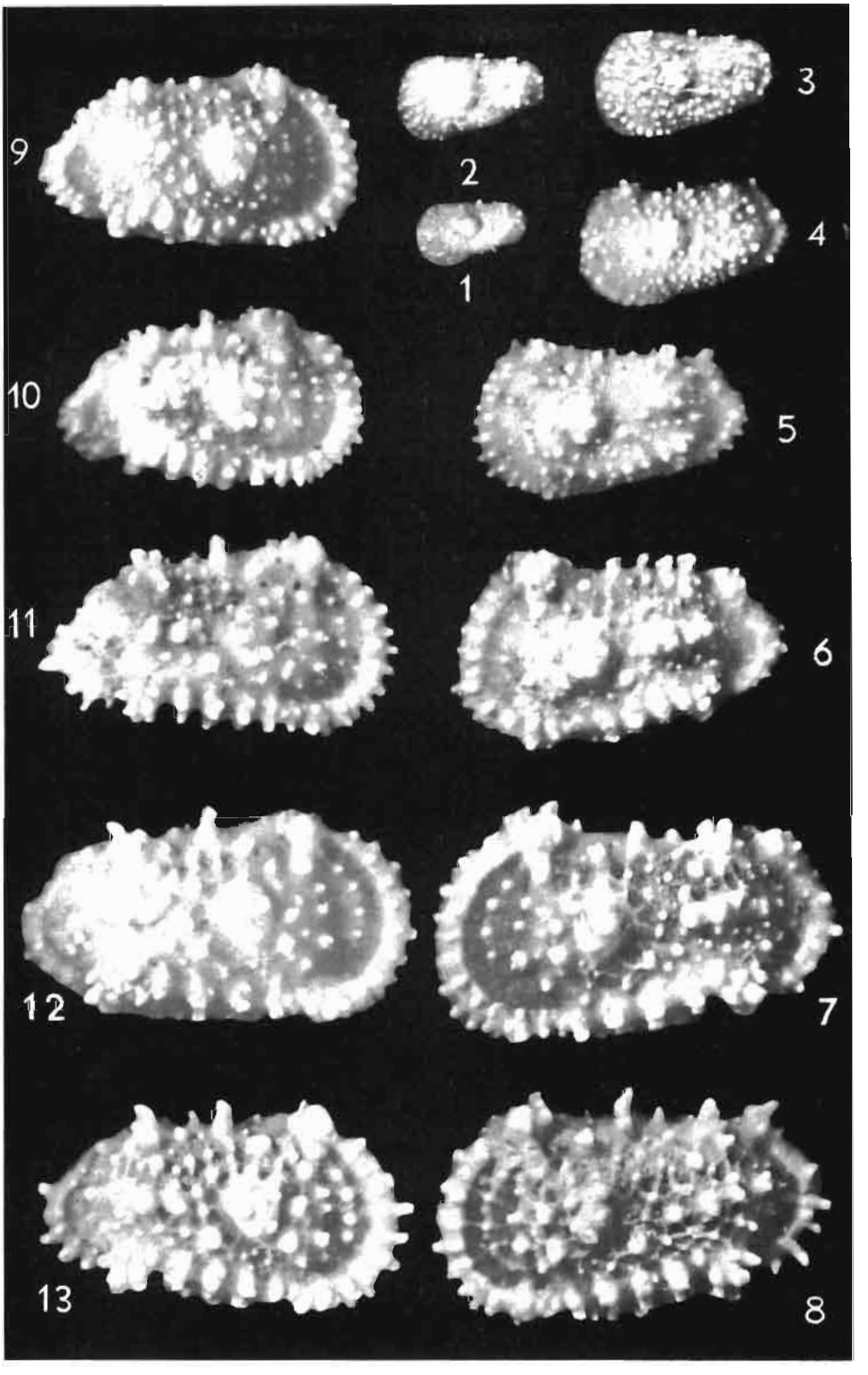
Plate XV

Cythereis (Trachyleberis) aculeata (Bosquet)
(Mielnik, 1.5 m. above hard ground, Lower Maastrichtian)

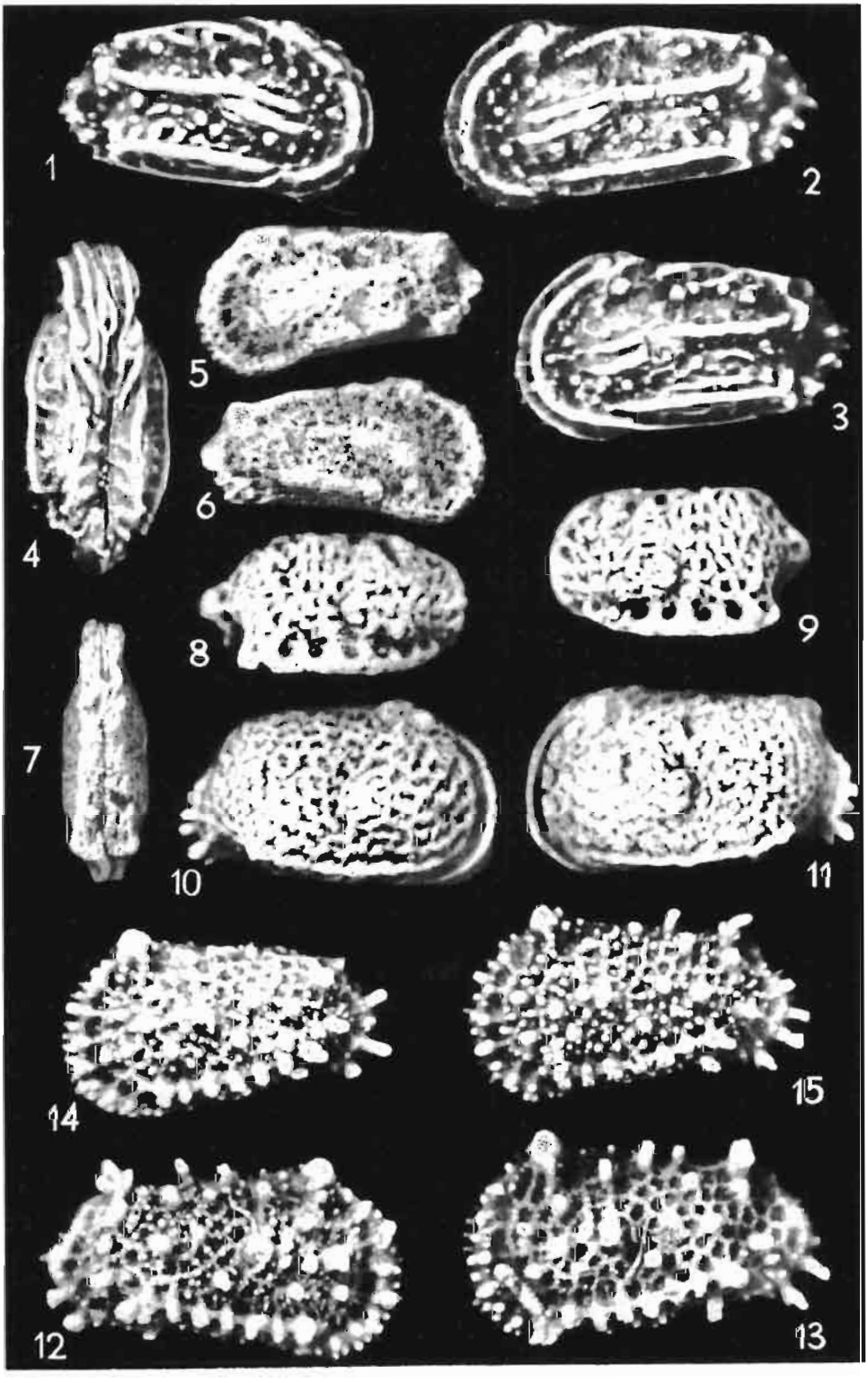
Fig. 1. Instar 1, left valve (O.II/342).
Fig. 2. Instar 2, left valve (O.II/343).
Fig. 3. Instar 3, left valve (O.II/344).
Fig. 4. Instar 4, left valve (O.II/345).
Fig. 5. Instar 5, left valve (O.II/346).
Fig. 6. Adult left valve (O.II/347).
Fig. 7. Adult left valve (O.II/348); Mielnik, 1.1 m. above hard ground, Lower Maastrichtian.
Fig. 8. Adult left valve (O.II/349); Bochotnica, 6 m. under hard ground, Upper Maastrichtian.
Fig. 11. Adult right valve (O.II/350); Mielnik, 1.5 m. above hard ground, Lower Maastrichtian.
Fig. 12. Adult right valve (O.II/351); Mielnik, 1.1 m. above hard ground, Lower Maastrichtian.
Fig. 13. Adult right valve (O.II/352); Bochotnica, 6 m. under hard ground, Upper Maastrichtian.

Cythereis cf. *nodulosa* (Bosquet)
(Mielnik, 2.7 m. under hard ground, Upper Campanian)

Fig. 9. Adult right valve (O.II/353).
Fig. 10. Adult right valve (O.II/354) intermediate between *C.* cf. *nodulosa* and *C. (Trachyleberis) aculeata*; Mielnik hard ground, Upper Campanian.



Phot. L. Łuszczewska



Phot. L. Łuszczewska

Plate XVI

Cythereis agatae n.sp.
(Pamiętowo, 257 m., Paleocene)

Fig. 1. Holotype, female right valve (O.II/448).
Fig. 2. Male left valve (O.II/449).
Fig. 3. Female left valve (O.II/450).
Fig. 4. Dorsal view of female carapace (O.II/451).

Trachyleberidea semiplana n.sp.
(Boryszew, Paleocene)

Fig. 5. Adult left valve (O.II/454).
Fig. 6. Holotype, adult right valve (O.II/455).
Fig. 7. Dorsal view of adult carapace (O.II/456).

Kingmaina opima n.sp.
(Pamiętowo, 257 m., Paleocene)

Fig. 8. Holotype, adult right valve (O.II/231).
Fig. 9. Adult left valve (O.II/232).

Triginglymus? callosus n.sp.
(Pamiętowo, 257 m., Paleocene)

Fig. 10. Holotype, adult right valve (O.II/324).
Fig. 11. Adult left valve (O.II/325).

Cythereis (Trachyleberis) horridula (Bosquet)
(Boryszew, Paleocene)

Fig. 12. Adult right valve (O.II/357).
Fig. 13. Adult left valve (O.II/358).
Fig. 14. Adult left valve (O.II/359).
Fig. 15. Adult left valve (O.II/360).

Plate XVII

Trachyleberidea acutiloba (Marsson)
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 1. Instar, 1, right valve (O.II/363).
Fig. 2. Adult right valve (O.II/364).
Fig. 3. Adult left valve (O.II/365).

Phacorhabdotus? texanus Howe & Laurencich
(Bochotnica, 1.5 m. above hard ground, Paleocene)

Fig. 4. Female right valve (O.II/462).
Fig. 5. Female left valve (O.II/463).
Fig. 6. Male left valve (O.II/464).

Cythereis compressa n.sp.
(Nasiłów, 2 m. under hard ground, Upper Maastrichtian)

Fig. 7. Holotype, adult right valve (O.II/405).
Fig. 8. Adult left valve (O.II/406).
Fig. 9. Dorsal view of adult carapace (O.II/407).

Cythereis parva Bonnema
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 10. Adult right valve (O.II/389).
Fig. 11. Adult left valve (O.II/390).

Cythereis semiplicata (Reuss)
(Bochotnica, 1.5 m. above hard ground, Paleocene)

Fig. 12. Adult left valve (O.II/399).
Fig. 13. Adult right valve (O.II/398).

Cythereis quadridentata (Bosquet)
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 14. Adult right valve (O.II/394).
Fig. 15. Adult left valve (O.II/395).

Cythereis spinosa n.sp.
(Nasiłów, 2 m. under hard ground, Upper Maastrichtian)

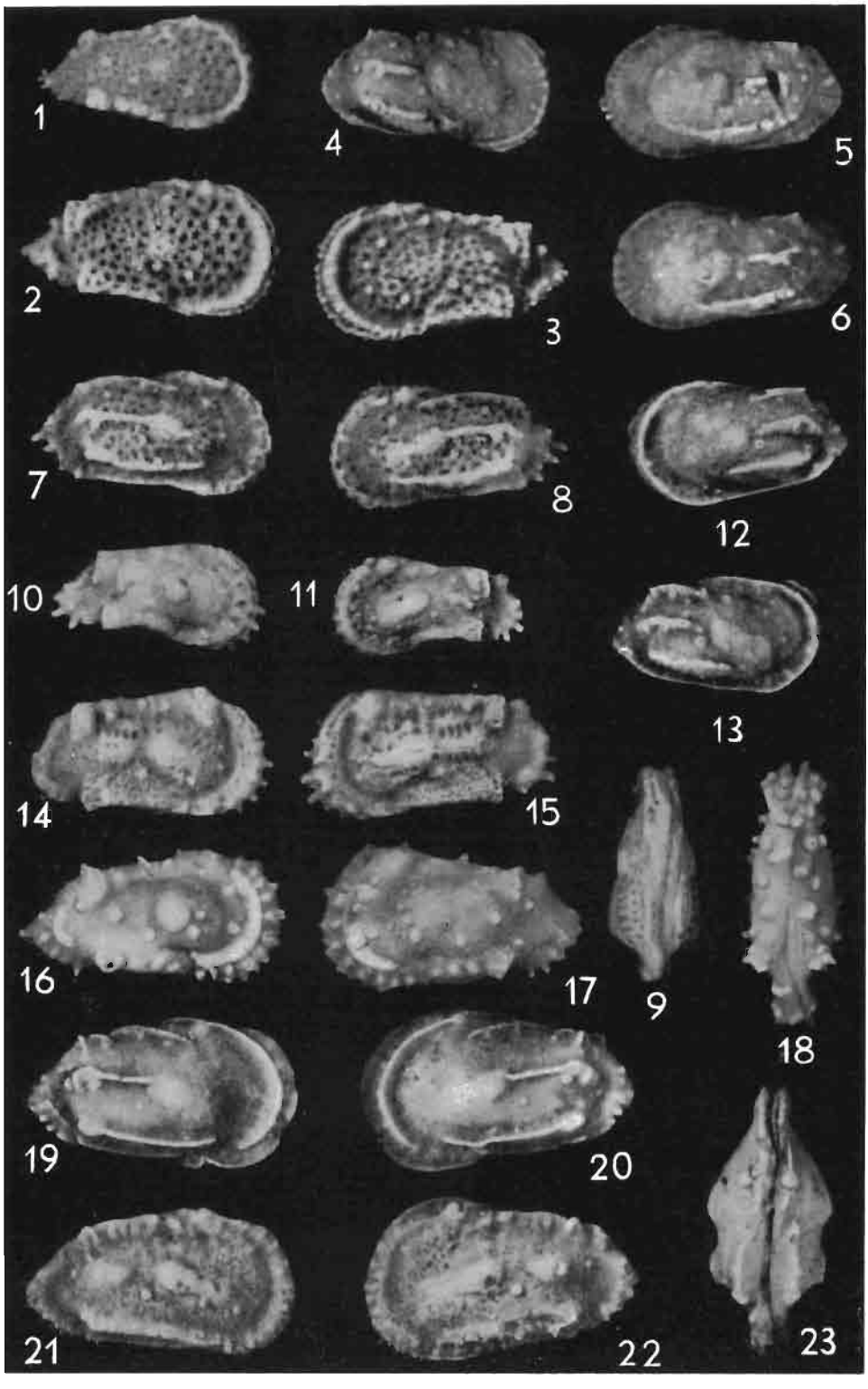
Fig. 16. Holotype, adult right valve (O.II/401).
Fig. 17. Adult left valve (O.II/402).
Fig. 18. Dorsal view of adult carapace (O.II/403).

Cythereis lonsdaleiana Jones
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 19. Adult right valve (O.II/374).
Fig. 20. Adult left valve (O.II/375).

Cythereis iucunda n.sp.
(Nasiłów, 2 m. under hard ground, Upper Maastrichtian)

Fig. 21. Holotype, adult right valve (O.II/430).
Fig. 22. Adult left valve (O.II/431).
Fig. 23. Dorsal view of adult carapace (O.II/432).



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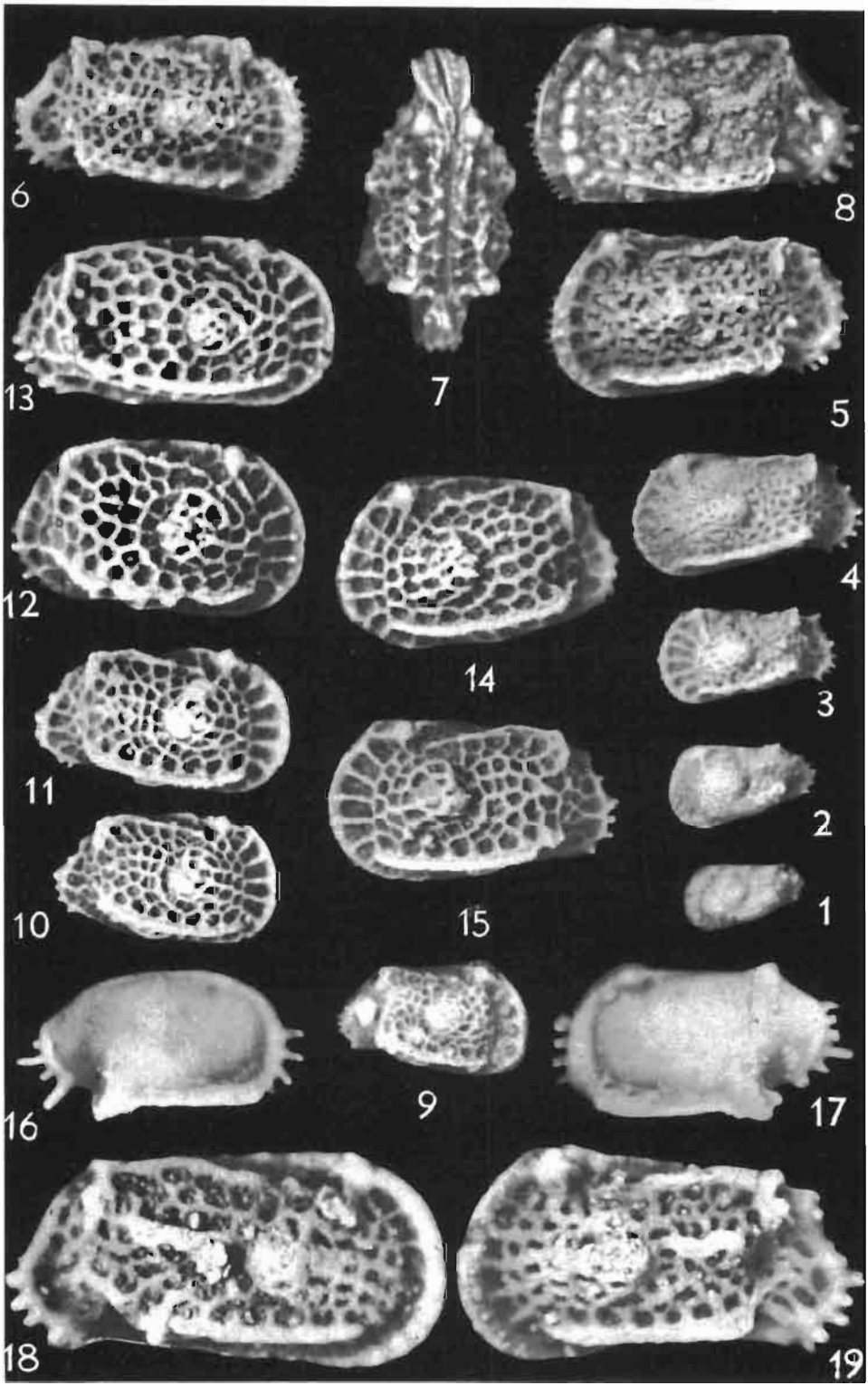

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Plate XVIII

Cythereis multifora n.sp.
(Bochotnica, 1.5 m. above hard ground, Paleocene)

Fig. 1. Instar 1, left valve (O.II/421).
Fig. 2. Instar 2, left valve (OO.II/422).
Fig. 3. Instar, 3, left valve (O.II/423).
Fig. 4. Instar, 4, left valve (O.II/424).
Fig. 5. Adult left valve (O.II/425).
Fig. 6. Holotype, adult right valve (O.II/426).
Fig. 7. Dorsal view of adult carapace (O.II/427).
Fig. 8. *C. multifora?*, adult left valve (O.II/428); Pamiętowo, 257 m., Paleocene).

Triginglymus? cribratus Apostolescu
(Pamiętowo, 231 m., Paleocene)

Fig. 9. Instar 1, right valve (O.II/316).
Fig. 10. Instar 2, right valve (O.II/317).
Fig. 11. Instar 3, right valve (O.II/318).
Fig. 12. Female right valve (O.II/319).
Fig. 13. Male right valve (O.II/320).
Fig. 14. Female left valve (O.II/321).
Fig. 15. Pre-adult left valve (O.II/322).

Pterygocythereis serrulata (Bosquet)
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 16. Adult right valve (O.II/226).
Fig. 17. Adult left valve (O.II/227).

Cythereis ornata (Bosquet)
(Pamiętowo, 283.4 m., Lower Maastrichtian)

Fig. 18. Adult right valve (O.II/386).
Fig. 19. Adult left valve (O.II/387).

Plate XIX

Amphicytherura aculeata (Bonnema)
(Lucimia, Upper Maastrichtian)

Fig. 1. Instar 1, left valve (O.II/479).
Fig. 2. Instar 2, left valve (O.II/480).
Fig. 3. Adult left valve (O.II/481).
Fig. 4. Adult right valve (O.II/482).

Paracytheridea cf. *bosqueti* Veen
(Bochotnica, 2.8 m. above hard ground, Paleocene)

Fig. 5. Instar 1, left valve (O.II/307).
Fig. 6. Instar 2, left valve (O.II/308).
Fig. 7. Adult left valve (O.II/309).
Fig. 8. Adult right valve (O.II/310).

Cytheropteron v-scriptum Veen
(Mielnik, 1.5 m. above hard ground, Lower Maastrichtian)

Fig. 9. Instar 1, left valve (O.II/280).
Fig. 10. Instar 2, left valve (O.II/281).
Fig. 11. Adult left valve (O.II/282).
Fig. 12. Adult left valve O.II/283).
Fig. 13. Adult right valve (O.II/284).

Hemicytherura unisulcata Veen
(Pamiętowo, 283.4 m., Lower Maastrichtian)

Fig. 14. Adult right valve (O.II/313).
Fig. 15. Adult left valve (O.II/314).

Eucytherura bicornis Veen
(Bochotnica, 2.8 m. above hard ground, Paleocene)

Fig. 16. Instar 1, left valve (O.II/295).
Fig. 17. Instar 2, left valve (O.II/296).
Fig. 18. Instar 3, left valve (O.II/297).
Fig. 19. Adult left valve (O.II/298).
Fig. 20. Adult left valve (O.II/299).
Fig. 21. Adult right valve (O.II/300).

Eucytherura derupta n.sp.
(Bochotnica, 2.8 m. above hard ground, Paleocene)

Fig. 22. Instar 1, right valve (O.II/301).
Fig. 23. Instar 2, right valve (O.II/302).
Fig. 24. Holotype, adult right valve (O.II/303).
Fig. 25. Adult left valve (O.II/304).

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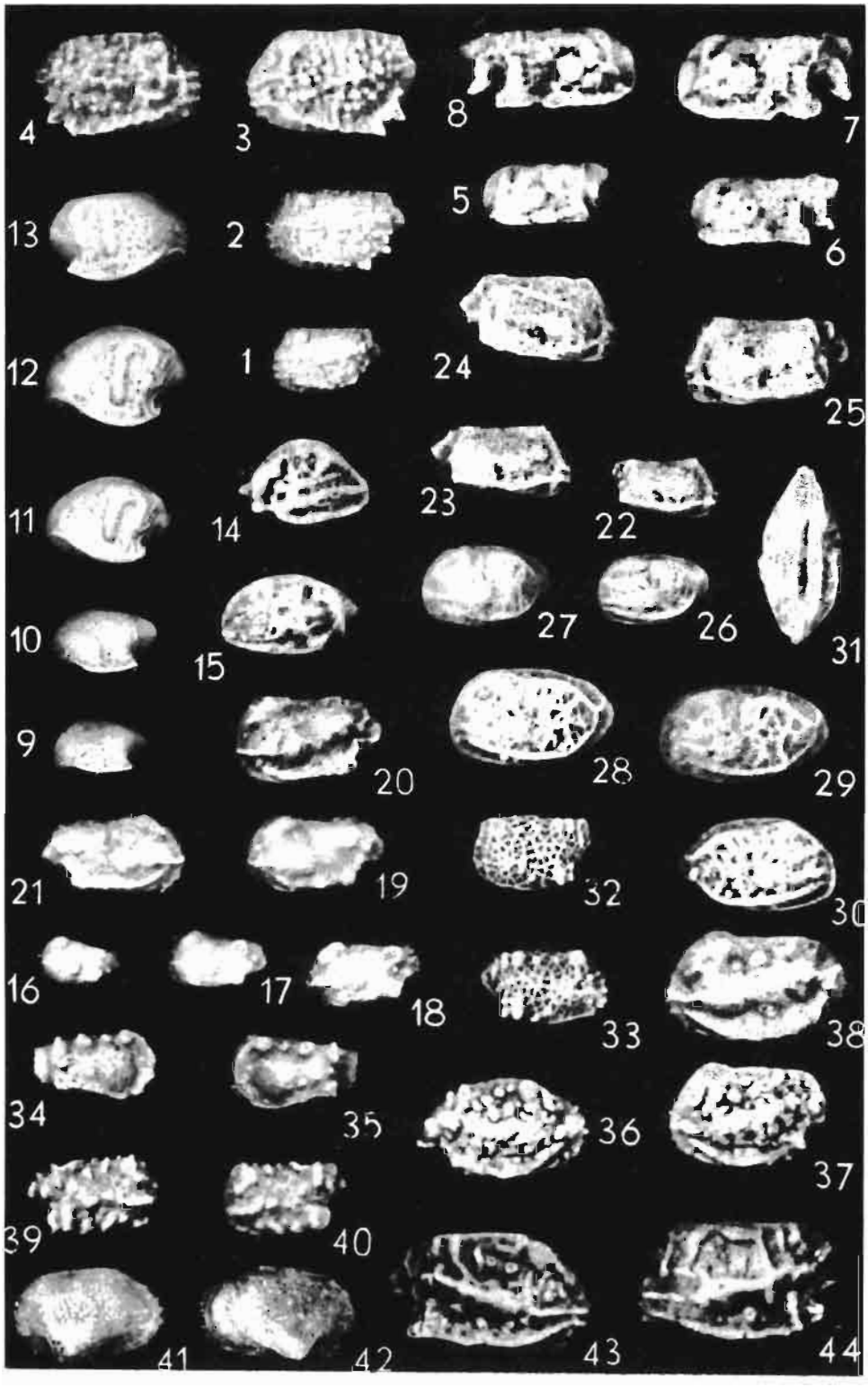

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Plate XIX

(*continued*)

Pseudobythocythere sigillata n.sp.
(Pamiętowo, 241 m., Paleocene)

Fig. 26. Instar 1, left valve (O.II/502).
Fig. 27. Instar 2, left valve (O.II/503).
Fig. 28. Female left valve (O.II/504).
Fig. 29. Male left valve (O.II/505).
Fig. 30. Holotype, female right valve (O.II/506).
Fig. 31. Dorsal view of male carapace (O.II/507).

Eucytherura tumida Bonnema
(Bochotnica, 3.8 m. above hard ground, Paleocene)

Fig. 32. Adult left valve (O.II/287).
Fig. 33. Adult right valve (O.II/286).

Eucytherura dorsotuberculata Veen
(Mielnik, 1.1 m. above hard ground, Lower Maastrichtian)

Fig. 34. Adult right valve (O.II/292).
Fig. 35. Adult left valve (O.II/293).

Amphicytherura chelodon (Marsson)

Fig. 36. Adult right valve (O.II/473), Pamiętowo, 231 m., Paleocene.
Fig. 37. Adult left valve (O.II/474), Pamiętowo, 231 m., Paleocene.
Fig. 38. Adult left valve (O.II/475), Pamiętowo, 275 m., Lower Maastrichtian.

Eucytherura squamifera Veen
(Bochotnica, 1.5 m. above hard ground, Paleocene)

Fig. 39. Adult right valve (O.II/289).
Fig. 40. Adult left valve (O.II/290).

Saida elliptica (Bonnema)
(Bochotnica, 6.6 m. above hard ground, Paleocene)

Fig. 41. Adult right valve (O.II/508).
Fig. 42. Adult left valve (O.II/509).

Amphicytherura limburgensis Howe & Laurencich
(Pamiętowo, 286.5 m., Lower Maastrichtian)

Fig. 43. Adult right valve (O.II/476).
Fig. 44. Adult left valve (O.II/477).