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TERMINOLOGY OF OSTRACOD CARAPACES

BY

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CONTENTS

INTRODUCTION

LITERATURE on ostracods contains so many synonyms, as well as some homonyms, to describe features of the carapace that precise interpretation of descriptions is often very difficult for most paleontologists. These synonyms and homonyms occur in publications for several reasons, all related to the great number of ostracod species described during the last fifty years.

First, the number of terms necessary for a complete description has increased because some of the new species possess features which had not been previously described; and certain morphological structures which are now considered to be of a taxonomic value were formerly undifferentiated by authors or not mentioned at all.

Second, translation often results in inconsistent terminology and

occasionally in homonyms. Terms have been introduced from descriptions of new species in various languages, the most important of which are English, German, French, Swedish, Hungarian, Italian, and Spanish. Translation requires selection of an equivalent word or phrase not only consistent with the original author's meaning, but also fitting into the established terminology.

Third, a difference as to the orientation of Paleozoic species causes particular confusion in the use of the terms "anterior" and "posterior." Certain ostracods are oriented in one direction by one group of authors, but in the completely opposite direction by another. Several articles have been written for the express purpose of championing one orientation as against the other and to set forth the logic and reasons for the particular choice.

This paper aims to present a consistent set of terms which can be used to describe the morphological structures commonly present in ostracods, and to give most of the equivalents which have been used by other students of the group. Composite drawings (Figs. 1–7) labeled with selected terms are included as text figures, because illustrations of this type are often more effective than words in portraying the nature of a structure. Drawings of many species are included as plates and are referred to for illustration of specific terms.

The writer wishes to thank Dr. George M. Ehlers, Dr. Lewis B. Kellum, and Dr. C. A. Arnold, of the Museum of Paleontology, University of Michigan, for their constructive criticism of this paper; also Mrs. Betty Kellett Nadeau, of the Geology Department, Washington University, for her helpful comments and opinions; Mrs. Irene Weiss, for her assistance in translating Hungarian; and Dr. Harold W. Scott, of the Department of Geology, University of Illinois, for his encouragement in working out this problem.

ORIENTATION

Because many terms used to describe ostracods refer to the location of morphological features, a discussion of terminology should begin with ORIENTATION.

The determination of orientation is not as difficult in the case

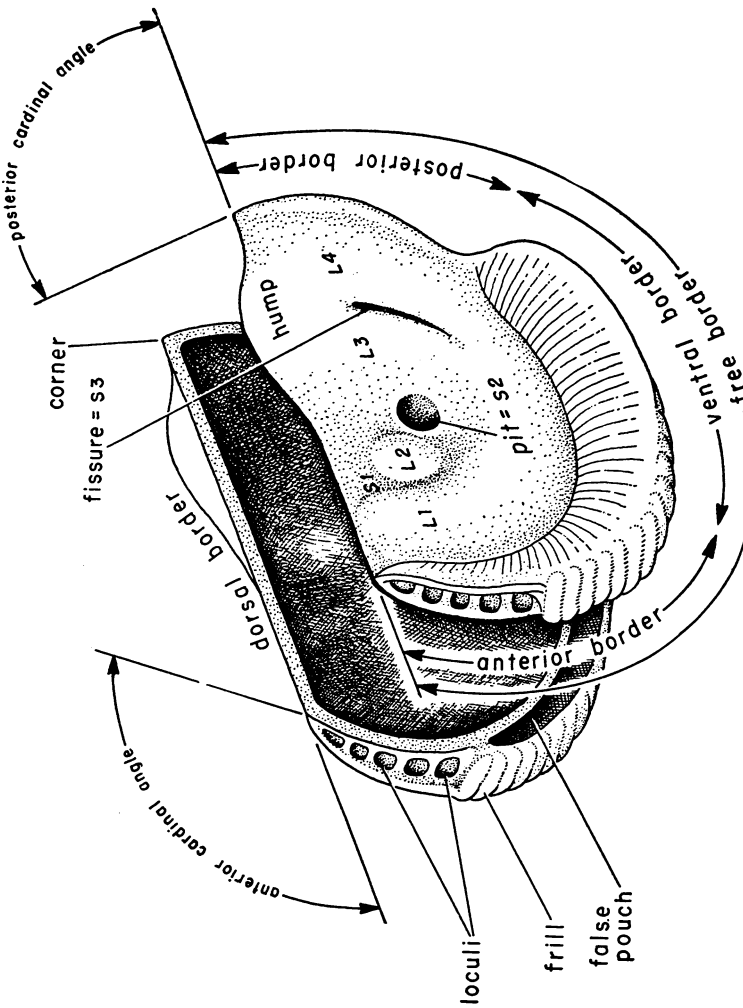

FIG. 1. Composite drawing of two opposite valves of an ostracod with certain surface features labeled.

of ostracods which have living representatives as it is for those which are extinct. The superfamily Cypridacea extends from the Paleozoic to the present and has fossil species with close relationships to their living descendants. Ostracods of the family Cypridae, in particular, have changed very little since the Paleozoic; in fact, H. W. Scott (1944) classified some fresh-water forms from the Pennsylvanian under the genus *Cypridopsis,* which has several living species that are abundantly represented throughout the world. There is apparently complete agreement among paleontologists on the orientation of the Cypridacea.

The determination of orientation of ostracods belonging to the superfamilies Beyrichiacea and Leperditiacea, on the other hand, is difficult. These superfamilies became extinct by the end of the Paleozoic and do not have any near relatives living. The oldest species of these groups which have been found are distinctly different from the species of the Cypridacea. Moreover, only the carapaces are preserved in most Paleozoic forms. (Note: There is one exception from France.) The orientation of ostracods of the Beyrichiacea and Leperditiacea has to depend, therefore, on the comparison of certain morphological features of the carapaces with those of the living ostracods of another superfamily, the Cypridacea.

Living ostracods can be oriented with certainty by noting the relative positions of the various appendages and soft parts. ANTERIOR refers to the end of the ostracod in which the antennules, antennae, forehead, and upper lip are located; POSTERIOR to the opposite end of the animal, in which are the genital organs, furcae, and anus. DORSAL signifies the upper part of the animal when in its normal position, the region in which are located the hinge, ligament, excretory and secreting glands in the epidermis, antennules, eye, and stomach; VENTRAL to the lower part of the animal when in its normal position, the region in which are the mouth, hypostome, maxillae, and thoracic legs. Certain other organs have a consistent relation to this orientation and to one another. For example, adult females have the ovaries in the posterior part of the epidermis or hypodermis, which secretes the hard parts. The two livers, which are also in the epidermis, extend anteriorly before they empty into the stomach.

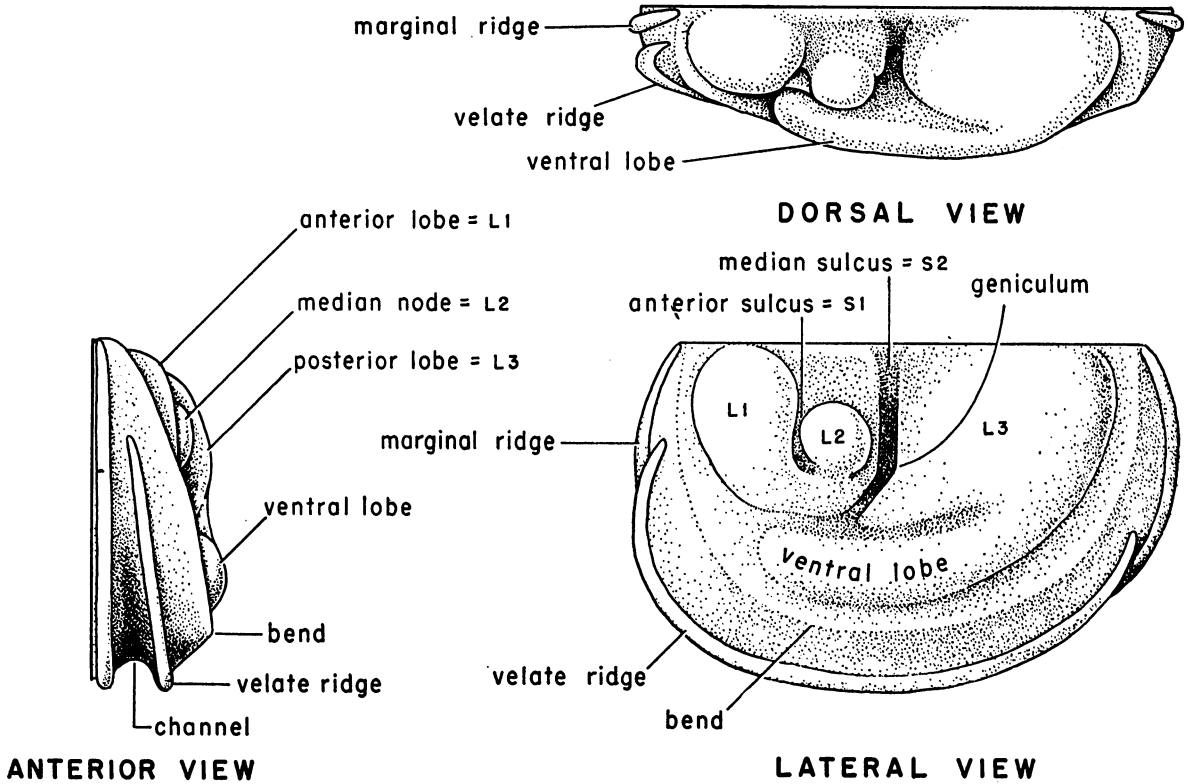

FIG. 2. Composite drawing of the dorsal, lateral, and anterior views of a left valve with certain surface features and lobation labeled.

The cerebrum is in the forehead, near the front end of the body. The chain of ganglia bearing the sensory and motor nerves for the appendages is posterior to the cerebrum and ventral to the stomach and rear gut. If an eye is present, it is dorsal to the cerebrum, to which it is connected by three vertical optic nerves. The esophagus is behind the cerebrum and below the stomach. The chitinous endoskeleton is posterior to the esophagus and ventral to the stomach. The salivary glands are anterior to the atrium of the mouth. The masticating teeth are at the ventral ends of the mandibles. Many other organs and appendages could be mentioned, each of which has a definite relation to the arrangement of the other parts of the ostracod. Consequently, it is possible to orient a living animal from the identification of only a few parts of its anatomy.

Usually, however, the only fossil remains of Paleozoic and Mesozoic ostracods available are either the valves, internal or external molds of the valves, or casts of the valves or of a complete carapace. Specimens of *Paleocypris edwardsi* Brogniart from the Carboniferous have been collected in which additional structures were preserved; these, described and illustrated by Brogniart (1876, pp. 49–56, Pl.7), have silicified remains of the eye, antennules, antennae, mandibles, thoracic legs, and genital organs. Unfortunately, this is the only species of the Paleozoic and Mesozoic with such remarkable preservation, and all others must be classified on the form of the valves alone. The assumption must be made, therefore, as a basis for comparison and for the application of terms of orientation, that all fossil ostracods had approximately the same relations of soft parts to the form of the valves as those which exist in living species. Otherwise, such terms as anterior and posterior are wholly arbitrary and artificial when applied to fossil ostracods.

Structures of the carapace which give evidence for orientation may be divided into three categories: (1) muscle scars, the areas where the muscles closing the valves and the muscles assisting in the operation of the appendages were attached to the valves; (2) the proportions of the carapace, particularly the positions of greatest width and greatest height, which bear a definite relationship to the soft parts in living ostracods; and (3) certain structural features

of the carapace, which are consistently associated with either muscle scars or with certain proportions of the carapace.

With rare exceptions all muscle scars of present ostracods are situated in the anterior half of the carapace. There are scars for the adductor muscles and for muscles which operated the mandibular supports, antennules, antennae, and furcae, as well as for small muscles which supported the endoskeleton. The adductor muscles are the largest and are attached in a small area near the center of each valve. (It is the adductor muscle scars which are most often preserved in Paleozoic ostracods.) The triangular support of each mandible is attached by two muscles which join the adjacent valve immediately anterior to the adductor muscles. Accessory muscles of each antennule and antenna are attached to the anterodorsal part of the valve. All other muscles are attached in the central dorsal parts of the valves. With no definitive evidence to the contrary, it may be assumed that the muscle scars in Paleozoic ostracods are also anterior.

In living ostracods the greatest width of the carapace is posterior, in the region of the genital organs. This location is consistent in living forms and when the muscle scars are lacking or indistinct in Paleozoic ostracods the greatest width may also be presumed to be posterior. The greatest height of the carapace is usually anterior in living ostracods, in the region of the antennules and antennae. This is particularly true for species with relatively straight dorsal borders. When Paleozoic ostracods of the Beyrichiacea are oriented on the basis of their muscle scars, their greatest height is anterior; but when ostracods of the Leperditiacea are likewise oriented by muscle scars, their greatest height is found to be posterior.

Sulcate species of the Beyrichiacea have their major sulcus in the same location as the adductor muscle scar, which indicates that this sulcus is also anterior. If the major sulcus of each valve is curved, the curvature is downward and forward. Any nodelike lobate structure next to the major sulcus is anterior. Certain other features are oriented with reference to the muscle scars and the associated major sulcus: the greatest development of a frill is anterior, the most inflated and largest lobe of trilobate valves is posterior, major spines

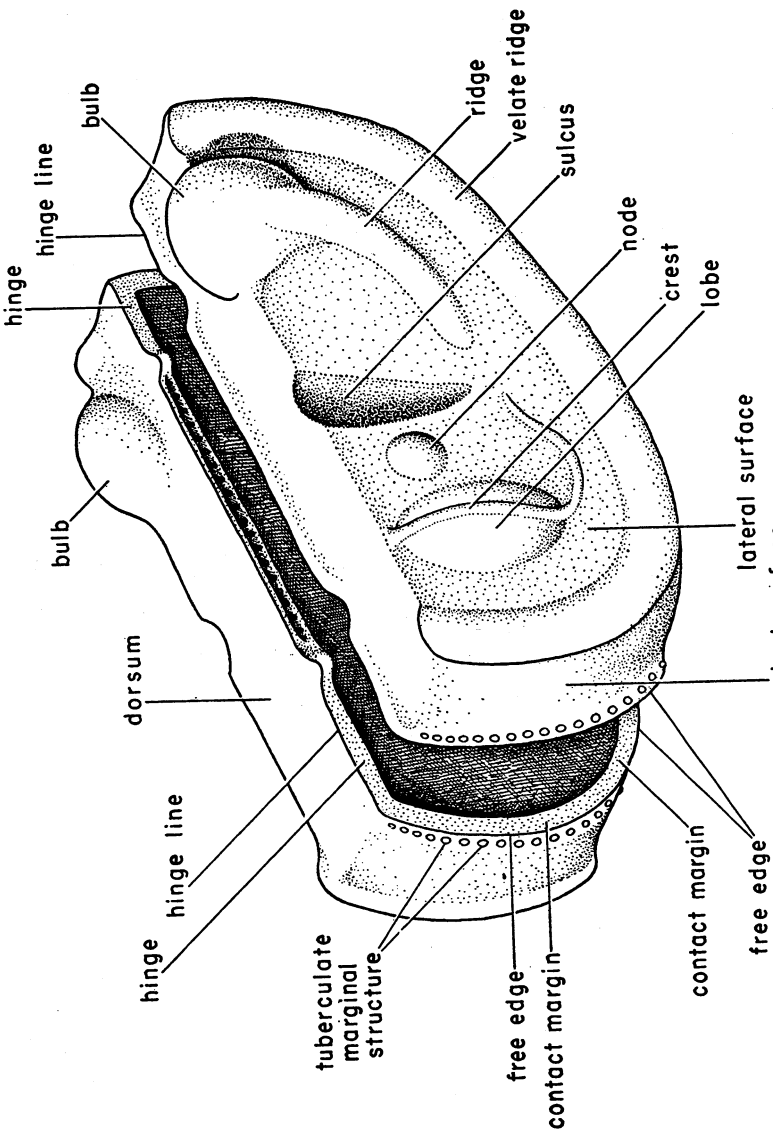

FIG. 3. Composite drawing of two opposite valves of an ostracod with certain surface features labeled

and the tips of alate extensions point toward the posterior end, and the largest cardinal angle is anterior. Some important articles dealing with orientation of the Beyrichiacea and Cypridacea are summarized in Chart 1.

Most authors who discuss the orientation problem have defended their own choice on the basis of certain morphological features. The importance of muscle scars was stressed by Bonnema (1913*a* and *b*, 1932), Triebel (1941), Swartz (1945), Hessland (1949), and Levinson (1950). Muscle scars have been discussed in detail for ostracods of all three superfamilies in the Paleozoic: Scott (1944) for certain Cypridacea; Hessland (1949) for certain Beyrichiacea; and Swartz (1949) for some Leperditiacea. All three authors agree that muscle scars are anterior.

The one structure which has caused most confusion in the orientation problem is the dimorphic pouch in the so-called female valves of the family Beyrichiidae. This pouch is in the same half of the valve as the muscle scar of the adductor muscle and, therefore, may be regarded as anterior. This orientation has been clearly set forth by Kiesow (1888), Moberg and Grönwall (1909), Bonnema (1932), Swartz (1936), and Hessland (1949). Another group of authors, however, has argued that the possible use of such pouches as brood chambers is a factor favoring a posterior position. This group includes Reuter (1885), Ulrich and Bassler (1908, 1923), Matern (1929), Kummerow (1931), Warthin (1933), Bassler and Kellett (1934), and Wright (1948). Brood care is known to occur in certain living species, but in all such cases the brood chamber is posterodorsal and is not accompanied by any external lobation. It is hardly plausible that dimorphic structures of unknown use should be considered as brood chambers and used as criteria for orientation.

The posterior position of the widest part of the carapace has been set forth as a rule of orientation by Bonnema (1930), Geis (1932), Swartz (1933, 1936), and Bold (1946). These writers oriented ostracods so that the muscle scars, the major sulcus, and the greatest height are anterior. On the other hand, Reuter (1885) and Wright (1948) advocated the posterior position of the widest part, although they oriented their specimens with the major sulci in the

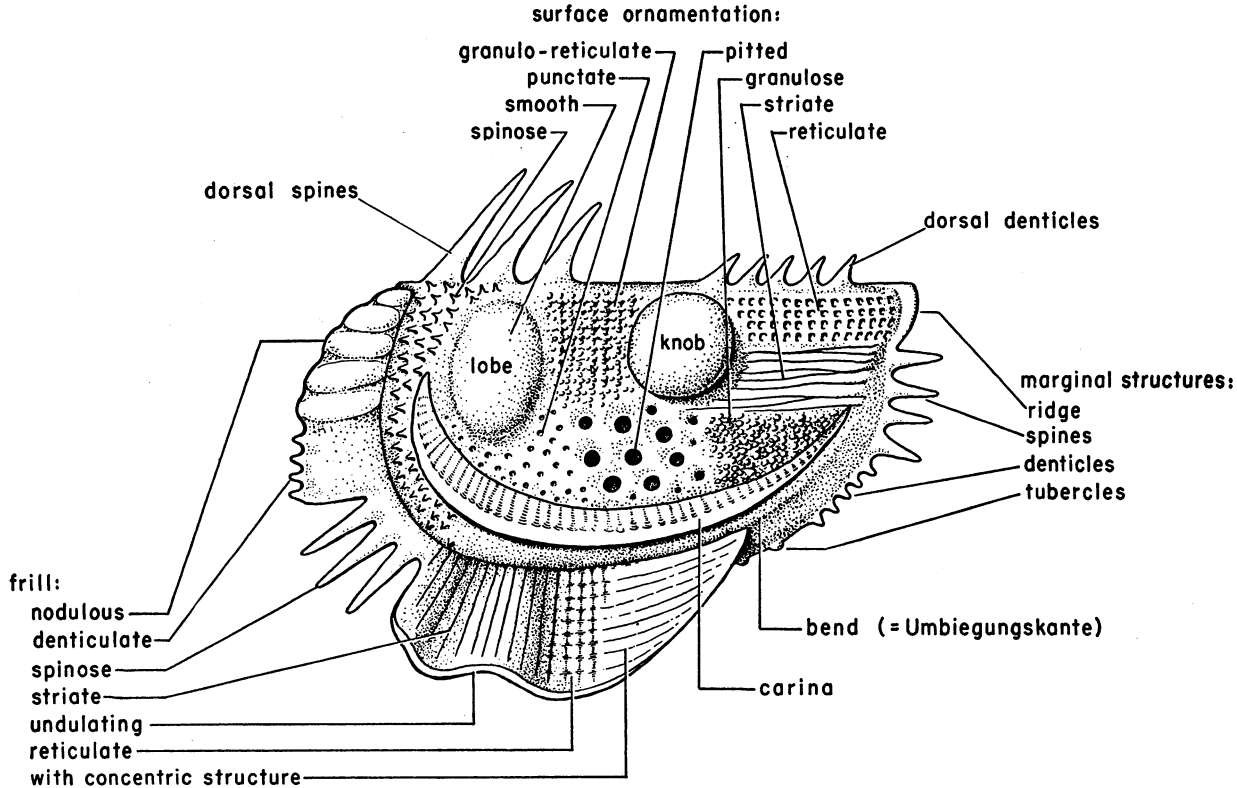

FIG. 4. Composite drawing of a lateral view of a left valve of an ostracod with certain surface features and ornamentation labeled.

posterior half of the valves and a critical inspection of their illustrations and descriptions reveals a marked discrepancy between their stated rule and its application. A part of this discrepancy can be explained by the unusually large dimorphic pouches of some beyrichiid females, which are wider than any other part of the carapace. Pouches are not present in the so-called male form, and if pouches are omitted from consideration, then the widest parts of both female and male carapaces are posterior. Warthin (1933) is the only author who has selected the widest part as an anterior characteristic.

The greatest height of the valves has been called anterior by Bonnema (1930) and Bold (1946), posterior by Ulrich and Bassler (1908, 1923), Warthin (1933), and Bassler and Kellett (1934). The anterior position of the eye tubercles of the Leperditiacea has been advocated by Bonnema (1930), Solle (1935), Swartz (1945, 1949), and Wright (1948).

S2 (the median sulcus, which is more important than S1) is slightly anterior according to Bonnema (1913*a* and *b*, 1930, 1932), Triebel (1941), and Hessland (1949); slightly posterior according to Ulrich and Bassler (1908, 1923), Knight (1928), Roth (1928), Kummerow (1931), and Bassler and Kellett (1934). Its intimate association with the adductor muscle scar indicates that it should be regarded as anterior.

S1 (the anterior sulcus) is anterior in the orientation used by Swartz (1936), Triebel (1941), Hessland (1949), and Levinson (1950); posterior in that used by Ulrich and Bassler (1923), Knight (1928), and Bassler and Kellett (1934).

L2 (the median node or median lobe) is anterior with reference to S2 (the median sulcus) and muscle scars, and Hessland (1949) has discovered that the shell material is thinner in this area of the valves than at any other place. He suggested that this node may mark the position of the eyes. The anterior position of L2 is specifically mentioned by Moberg and Grönwall (1909), Bonnema (1913*a* and *b*, 1930), and Swartz (1936). It was considered to be posterior by Ulrich and Bassler (1923), Knight (1928), Kummerow (1931), and Bassler and Kellet (1934).

The more obtuse cardinal angle was said to be anterior by Geis

(1932) and Swartz (1936); posterior by Roth (1929*c*). The more completely developed frill, which is in the same half of the valve as S2, was regarded by Kay (1940) and Wright (1948) as a posterior feature.

In addition to the means of orientation listed in Chart 1, Geis (1932) gave the following criteria, which agree with the orientation used in this paper: the end of *Primitiopsis* exhibiting dimorphism is posterior; the obtuse cardinal angle in forms having only one angle is anterior; the blunt end as seen in dorsal view is posterior; and a deep furrow paralleling the border of the widest end (as in *Healdia*) is posterior.

DIMORPHISM

Little is actually known about the sex or the method of reproduction in Paleozoic ostracods. For the present micropaleontologists can only hope for discovery of fossilized soft parts, so that observation may replace or confirm much of the speculation. Meantime, the carapaces of Paleozoic ostracods must be compared with those of living species in any attempt to determine the taxonomic assignment.

Living ostracods, all of which are limited to the superfamily Cypridacea, have two types of reproduction: (1) syngamic, resulting from the copulation of females and males, and (2) parthenogenetic, in which the females produce fertile eggs giving rise to a generation of females only. The syngamic species have varying degrees of dimorphism; some have females with carapaces larger than those of the males, others have no perceptible differences in the carapaces of the two sexes, and still others have males with carapaces larger than those of the females.

Some fossil specimens so closely resemble other specimens in general lobation, dimensions, and surface ornamentation that there is little doubt that they are dimorphic forms of the same species. Such a species evidently was syngamic in its reproduction. Other species apparently occur in only one form and, in such instances, it is impossible to determine whether the species were syngamic, with

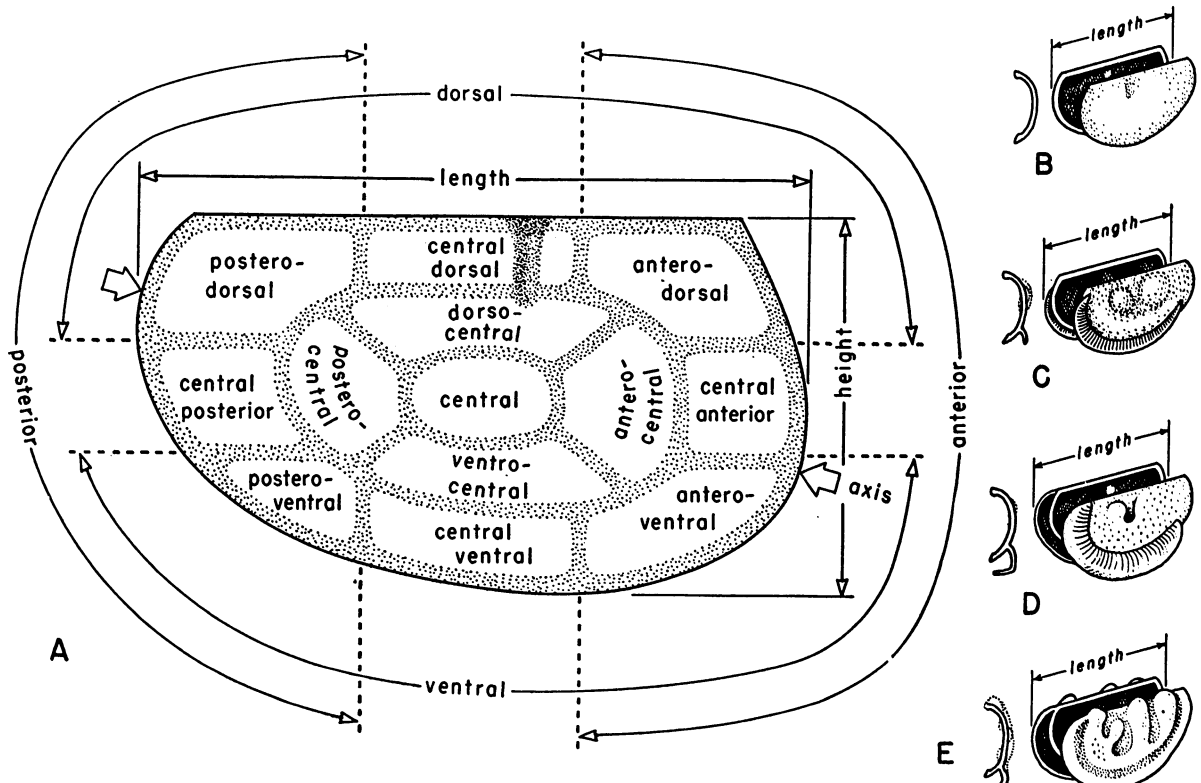

FIG. 5. Composite drawings of ostracod valves with certain dimensions and areas labeled. A. Lateral view of a right valve. B. Two valves and a transverse section of *Primitia*. C. Two valves and a transverse section of *Hollinella*. D. Two valves and a transverse section of *Piretella*. E. Two valves and a transverse section of *Tallinella*.

the carapaces of both sexes alike, or whether they were parthenogenetic, with only females.

The dimorphic species exhibit different degrees of dimorphism. Fossil ostracods of the Cypridacea, like their living relatives of the same superfamily, show only slight variations between male and female carapaces. Most of these cases of dimorphism involve differences in the posterodorsal part of the carapace.

Species of the Beyrichiacea, particularly those of Upper Paleozoic time, have greater dimorphic differences than those of the Cypridacea. It is possible that the marked degree of dimorphism contributed to their extinction. Some of the complex dimorphic structures not only do not appear to have given the animal any functional advantage, but may seriously have hindered locomotion and copulation.

The dimorphism of the family Beyrichiidae has already been mentioned under Orientation. One sex has an internal anteroventral pouch, frequently called the "brood pouch," in each valve (Pl. IX, Figs. 2-3, 5, 7; Pl. X, Figs. 2, 4, 6, 8; Pl. XI, Figs. 1, 3-4, 7, 9, 11). This sex most writers tentatively agree, assuming that the pouch is used for brood care, is the female; Hessland (1949, p. 125) reported discovery of two larval carapaces inside an adult female *Beyrichia kloedeni* McCoy. Triebel (1941, p. 365), however, suggested that the pouches were male structures for the storage of sperm, which are known to be very long in some living species, often longer than the carapace. The dimorphism in some Beyrichiidae extends to some additional structures. In *Treposella lyoni* (Ulrich) (Pl. XI, Figs. 4-5) the male has a pointed L3 extending above the hinge line, although the female has a rounded L3. In *Beyrichia kirki* Ulrich and Bassler (Pl. XI, Figs. 2-3) the male has a large L2 tapering to a dorsal point, and the female has a small rounded L2. Other species show similar small secondary dimorphic differences in addition to the pouch of the female.

Species of the family Hollinidae have dimorphism primarily in the form of the frill. *Hollinella* (Pl. XIII, Figs. 5-6; Pl. XIV, Figs. 1-2, 4-5), *Piretella* (Pl. VIII, Figs. 3-6), and *Öpikium* (Pl. VIII, Figs. 1-2) have females with frills incurved to form false pouches and males with frills parallel to the sagittal plane or flared outward. Hessland (1949, p. 128) suggested that the frills may have prevented the animals from sinking into the mud on which they crawled

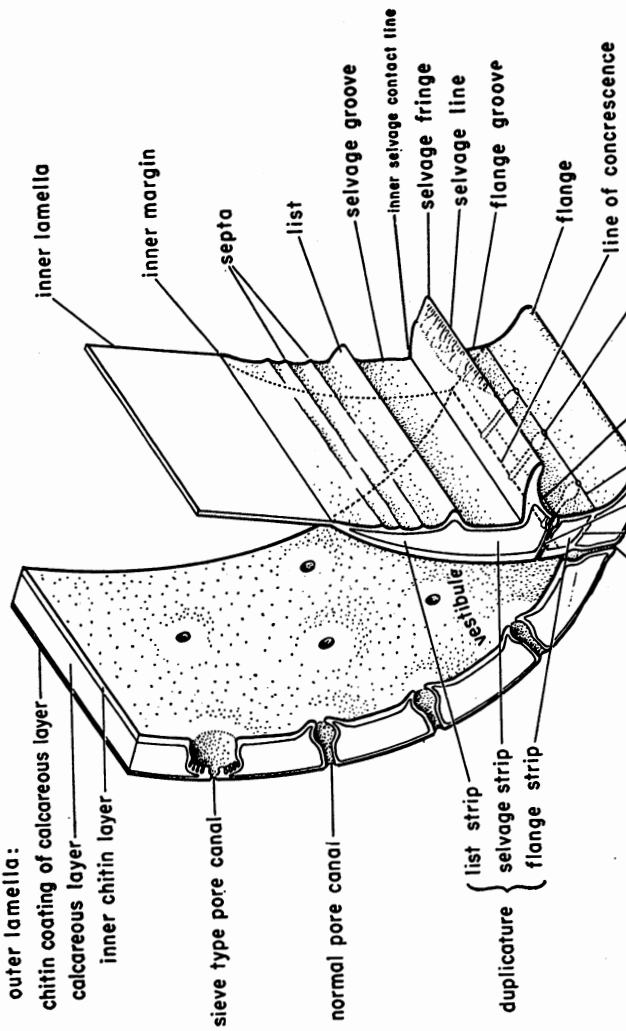

FIG. 6. Composite drawing of a section of an ostracod valve with details of shell structure labeled.

and served as sled runners for the carapace, and he further offered the opinion that the sexual dimorphism may have been an arrangement to facilitate copulation. In the genus *Tallinnella* (Pl. XII, Figs. 1-2) the frills of both sexes are curved inward, but the false pouch of the female is much larger than that of the male. *Tetrasacculus* (Pl. XII, Figs. 3-4) has greater dimorphic differences; the male has no frill, but the female has a frill with loculi. In *Ctenoloculina* (Pl. XIII, Figs. 1-2) the female also has a frill with loculi, but the male has spurs as extensions of L1, L2, and L3. The author found three incomplete specimens with the frill and loculi of the female form and the spurs of the male form; these may have been hermaphroditic, or they may belong to another species of hollinid ostracod (Pl. XIII, Fig. 3). *Falsipollex* (Pl. XIII, Figs. 7-8) also shows marked dimorphism, the females having broad incurved frills and the males having spurs.

Ceratopsis (Pl. VI, Figs. 1-8), whose taxonomic position is uncertain, has some dimorphic species. It has been assigned to the Tetradellidae, but that family might well be reserved for the non-dimorphic quadrilobate species of the Beyrichiacea. The dimorphism present is not primarily a feature of the velate structure, so that *Ceratopsis* does not fit into the family Hollinidae either. In *Ceratopsis platyceras* Öpik, the female has a velate lobe extending over the free edge and a pointed posterior end and the male has a less-developed velate structure and a rounded posterior end. In *Ceratopsis obliquejugata* (Schmidt), the male has a linguiform L1 extending above the hinge line and the female has a claviform L1 at the end of a ridgelike stem.

Ostracods of the family Kloedenellidae, such as *Jonesina* (Pl. XVIII, Figs. 2-3), have dimorphism in the width of the posterior part of the carapace. The females are very inflated in the posterior part, and the males are only slightly wider in the posterior part than the anterior. Two genera of the family Primitiopsidae, *Primitiopsis* and *Sulcicuneus*, have posterior dimorphism. The females have a false pouch formed by posterior frills, but the males have no frills. Additional investigations of fossil faunas may reveal further types of dimorphism in the Beyrichiacea.

GENERAL TERMS OF CARAPACE

	Ulrich 1894	Ulrich and Bassler 1908	Ulrich and Bassler 1923	Zalányi 1929a, 1929b	Solle 1935	Bouček 1936	Swartz 1936, 1945a, b	Öpik 1937	Anderson 1939	Bradley 1941	Triebel 1941	Schmidt 1941	Rome 1947	Hessland 1949
carapace	shell = carapace	carapace	carapace	Schale = einerdoppelten Hülle			carapace	carapace	carapace	carapace	Gehäuse	Gehäuse	une coquille bivalve	carapace
valves	valves	valves	valves			Klappen	valves	valves	valves	valves	Klappen	Klappen	valves	valves
length				Länge		Länge			length	length			longeur	length
height				Höhe	Höhe	Höhe			depth	height			hauteur	height
width	thickness		thickness						width	width			largeur	thickness
axis					Achse = Länge						Längsachse			
outline: dorsal border	dorsal margin = hinge = cardinal line			dorsaler Bogen = Dorsalrand	Schlossrand = Dorsalrand	Schloss- = Dorsalrand	back (as in "straight-backed")	= hingeline	dorsum	dorsal margin	Schlossrand = Dorsalrand	Dorsalrand	le bord dorsal	dorsal margin
outline: anterior border	free margin: anterior margin	outline: anterior border		vorderer Bogen des Seitenumrisses	Vorderbogen	Vorderrand	free edges = free margins: anterior		anterior	anterior margin	Vorderrand	freier Rand: Vorder-Rand	le bord antérieur	anterior margin
outline: posterior border	free margin: posterior margin	outline: posterior border		hinterer Bogen des Seitenumrisses	Hinterbogen	Hinterrand	free edges = free margins: posterior		posterior	posterior margin	Hinterrand	freier Rand: Hinter-Rand	le bord postérieur	posterior margin
outline: ventral border	free margin: ventral margin	outline: ventral border		ventraler Bogen des Seitenumrisses	Ventralbogen	Ventralrand	free edges = free margins: ventral		venter	ventral margin	Ventralrand	freier Rand: Ventral-Rand	le bord ventral	ventral margin
hinge line			hinge line	Berührungslinie	(= Schlossrand)		hinge	hingeline	hinge					
free edge: anterior	actual margin		free edges	Aussenrand = külső peremvonal	Vorderrand			true margin = true valval margin				Klappenrand		free margin
free edge: ventral					Ventralrand									
free edge: posterior					Hinterrand									
hinge				Schlossrand = zárosperemen						hinge margin			une charnière dorsale	
contact margin: anterior				freie Randzone = peremövön: vorderen						contact margin				
contact margin: ventral				freie Randzone = peremövön: ventralen										
contact margin: posterior				freie Randzone = peremövön: hinteren										
lateral view		lateral view = side view		seitlicher (Profil-) Ansicht		Aufsicht					Seitenansicht			
ventral view		ventral view		Vorder (Ventral-) Ansicht		Ventralansicht			ventral aspect		Ventralansicht			
dorsal view		dorsal view		Rücken (Dorsal-) Ansicht		Dorsalansicht			dorsal aspect		Rückenansicht			
posterior view		posterior view				Hinteransicht								
anterior view		anterior view				Vorderansicht								
sagittal section												Sagittalschnitt = vertikale Längsschnitt	coupes sagittales	
frontal section						Längsschnitt						Frontalschnitt = horizontale Längsschnitt	coupes frontales	
transverse section						Querschnitt						Transversalschnitt = vertikale Querschnitt	coupes transversales	
corners: anterior	extremities				vordere Dorsalecke	Vorderecke	corners = cardinal extremities					vordere Dorsalecke		
corners: posterior					hintere Dorsalecke	Hinterecke						hintere Dorsalecke		
cardinal angles: anterior	dorsal angles			vorderer Dorsalwinkel	vorderer Dorsalwinkel		cardinal angles: anterior	anterior dorsal angle				vorderer Dorsal-Winkel		anterodorsal angle
cardinal angles: posterior				hinterer Dorsalwinkel	hinterer Dorsalwinkel		cardinal angles: posterior	posterior dorsal angle				hinterer Dorsal-Winkel		posterodorsal angle
corner surfaces												Eckfläche		
areas of valve seen in lateral view: anterior dorsal: anterodorsal			antero-dorsal area											dorsal area
areas of valve seen in lateral view: anterior dorsal: central dorsal			dorsal region											
areas of valve seen in lateral view: anterior dorsal: posterodorsal			postero-dorsal area											
areas of valve seen in lateral view: posterior dorsal: central poster.														posterior area
areas of valve seen in lateral view: posterior ventral: posteroventral			postero-ventral area											ventral area
areas of valve seen in lateral view: posterior ventral: central ventral			ventral region											
areas of valve seen in lateral view: anterior ventral: anteroventral			antero-ventral area											anterior area
areas of valve seen in lateral view: anterior ventral: central anterior														
areas of valve seen in lateral view: total central: anterodorsal														dorsocentral area
areas of valve seen in lateral view: total central: dorsocentral														
areas of valve seen in lateral view: total central: posterocentral														centroventral area
areas of valve seen in lateral view: total central: ventrocentral			subcentral portion											
areas of valve seen in lateral view: total central: anterocentral														central area
areas of valve seen in lateral view: total central: central						Mitte					Zentrum			
free marginal area	marginal area							ventral margin						free marginal zone
lateral surface											Lateralfläche	Seitenfläche		
marginal surface											Ventralfläche	Randfläche		
dorsum	dorsum											dorsale Randfläche		
swing		backward swing = retral swing					swing				"Vorwartsschwung"			
plenate end							plenate end							
adplenate							adplenate							
antiplenate							antiplenate							
overlap	overlap	overlap	overlap				overlap		overlap				debordant	
transverse rounding					Querwölbung									
frontal rounding				linker u. rechter Bogen der Kantenlinie	Längswölbung									
anterior frontal point				vordere Spitze der Kantenlinie										
posterior frontal point				hintere Spitze der Kantenlinie										

SOME ADDITIONAL SYNONYMS OF GENERAL TERMS OF CARAPACE AND LOBATION

	Linnarsson 1869 Namais 1900	Linnarsson 1869	Reuter 1885 for genus *Beyrichia*	Milne-Edwards 1840 Leriche 1912	Kiesow 1892	Canavari 1890 Namais 1900	Lienenklaus 1894 Steusloff 1894	Moberg and Grönwall 1909	Spizharsky 1939 Tshernychev 1939, et.al.	Bonnema 1913
	LATIN	SWEDISH	GERMAN	FRENCH	GERMAN	ITALIAN	GERMAN	SWEDISH	RUSSIAN	DUTCH
carapace	testa		Schale	une carapace conchiforme = le test bivalve	Schale	conchiglia	Schale = Gehäuse	Skalen	раковина	tweekleppige schaal
left valve	valva sinistra	valvlerna	Klappen	valve gauche	linke Schale	valva sinistra		vensterskalet	левой створки	linker klep
right valve	valva dextra			valve droite	rechte Schale	valva destra		högerskalet	правая створки	rechter klep
length	longitudo	längd	Lange	longeur	Länge = Schalenlänge	lunghezza	Länge	längd	длина	
height	latitudo	bredd	Breite		grösste Höhe	larghezza	Höhe = Schalenhohe = Breite = Schalenbreite (St.)	höjd	высота	
width					Dicke	spessore	Breite (Lk.)	tjocklek	ширина	
hinge				l'articulation du test		cardine	Schloss	lås	замок	
outline		konturen	Umriss		Umrisse	contorno	Umrissform = Profillinie = Profil	skalkonturen	очертание	
dorsal view	de supra visa					lato dorsale			вид со спинной стороны	
ventral view			Ventralansicht			lato ventrale	Bauchansicht	sedt från ventralytan	вид со нижний стороны	
anterior view			Caudalansicht			vista di fronte		sedt framifrån	вид со передний стороны	van voren gezien
posterior view			Cephalansicht				Rückenansicht	sedt från bakre ändan	вид со задний стороны	
orientation			Stellung der Schale		Stellung			ställning		de stand der schalen
overlap						abbraccia		öferskjutande ventralrand	охватывает	
surface		valvlernas yta	Schalenoberfläche	la surface	Schalenoberfläche-Umschlag	la superficie	Oberfläche = Schalenoberfläche	skalyta	поверхность	
hinge line					Schlossrand	margine cardinale	Schlossrand	låsrand	замочным край	slotrand
lateral view	a latere visa		Lateralansicht					sedt från sidan	вид сверху	van ter zijde gezien
muscle scar					Schliessmuskelfleck	impressione dei muscoli adduttori = impronta muscolare	Schliessmuskelhöcker = Narbenfeld Schliessmuskelnarbe Narbe	stöd åt en slutmuskel	мускульны	spierindruksel
ornamentation				l'ornementation		ornamenti = la scultura	Ornamentik = Skulptur	skulptur	скульптурои = украшение	
dorsal border	margo dorsalis	öfre konturen = dorsalrand	Dorsalrand	le bord supérieur = le bord dorsale	Dorsalrand	contorno superiore = c.dorsale linea dorsale = margine dorsale	Längsränder: Oberrand = Rückenrand = Dorsalrand	dorsalrand	спинной край	dorsaalrand
ventral border	margo ventralis	undre konturen	Ventralrand	le bord inférieur	Bauchrand = Ventralrand	margine ventrale	Längsränder: Unterrand = Bauchrand = Ventralrand	ventralrand	брюшной край = нижний край	ventraalrand
anterior border	antice	främre konturen	Caudalrand		Vorderrand	estremità: contorno cefalico = margine anteriore	Vorderrand	främre rand	передний край	voorrand
posterior border	postice	bakre konturen	Cephalrand		Hinterrand	estremità: contorno caudale = margine posteriore	Hinterrand	bakre rand	задний край	achterrand
pouch			Ventralhöcker		Ventralhöcker			äggformig (päronf.) ventrallob		broedruimte
eye tubercle	tuberculum oculare	ögontuberkeln			Augentuberkel = Augenhöcker	tubercolo oculare = rilievo oculare		ögontuberkeln		oogtuberkel
lobe	inflatum		Wulst	lobe	Wulst	lobo	Wulst = Lappen	lob	бугорками	verhevenheid
node	tuberculum rotundatum	knöl	Buckel		Knötchen = Buckel	gonfio	Höcker	Knöl		knobbel
inflation		upphöjning			Schalenwölbung	gibbosità = ingrandimento	Anschwellung	upphöjning	возвышения	
tubercle			Knötchen	peu gibbeuse = tubercule	Knötchen	tubercolo	Warz = Tuberkel		бугорок-бугорочка	
ridge	carena					carene	Längswulst = Leiste		вытянутыми возвышениями	
crest		smala och skarpa lister				cresta	Leistchen = Fäden			
L1			Caudalwulst / Dorsalhöcker Ventralhöcker	lobe postérieur	vordere Wulst			främre lob		
L2			Centralwulst	lobe médian	Centralwulst	lobo centrale	Centralhöcker	midtlob = mellersta lob		
L3			Cephalwulst: Procephal-Wulst + Dorsalfurche + Meso-Wulst + Ventralfurche + Metacephal-Wulst	lobe antérieur	hintere Wulst			bakre lob		
sulcus	impressio	fåra = insänkning	Furche	sillon	Furche	solco	Furche	fåra	бороздка	groeve
furrow							Längsrunzel	grunda fåra		dwarsgroeve
depression						escavazioni = infossature	Depression			
S2			Praecentralfurche + Centrocephalfurche			solco mediano	Medianfurche	bakre fåran		mediane groeve
S1			Postcentralfurche					främre fåran		
bend			Umbiegungskante				Aussenkant = Grenze d. Bauchseite	nedre horn = ventralkant		
papillae		punktformiga upphöjningar	Granulation			granulazione = papille arrotond.	Körnelung			
frill			Kantensaum				Randsaum	plattadt bräm		
velate ridge		nedtryckt kant	Kantenleiste		Randsaum		Kiel	limb		
lateral surface			Lateralfläche	faces laterales		margini laterali	Seitenfläche	lateralyta	стороны	de zijvlakte
alate extension	alatus					processo aliforme	Flügel = flügelartig Erweiterung		крыловидное расширение	
pit					Grube		Grube		ямками = отпечаток	
smooth		glatt		lisse	glatt	levigata	glatt	glatt	гладкая	
reticulation						gratticciato	Netzwerk = Gitterwerks = Gitternetz = Masch = Maschennetz = Adernetz			
punctations punctate						punteggiature = piccole depressione = puntata	Grübchen = Pünchen = Punktierung grob punktirt	instuckna punkter	точками	
anterior corner		dorsalrandens främre ändpkt.					Vorderende des Rückenrand		— угол	
posterior corner		dorsalrandens bakre ändpunkt					Hinterende des Rückenrand			
anterior cardinal angle		dorsalrandes förenar (vinkel) med den främre				l'angolo di riunione del contorno dorsale con quello anteriore	vordere Winkel			
male							Männchen	hanexemplar	мужского	
female							Weibchen	honexemplar	женского	vrouwelijke individuen

CHART 3

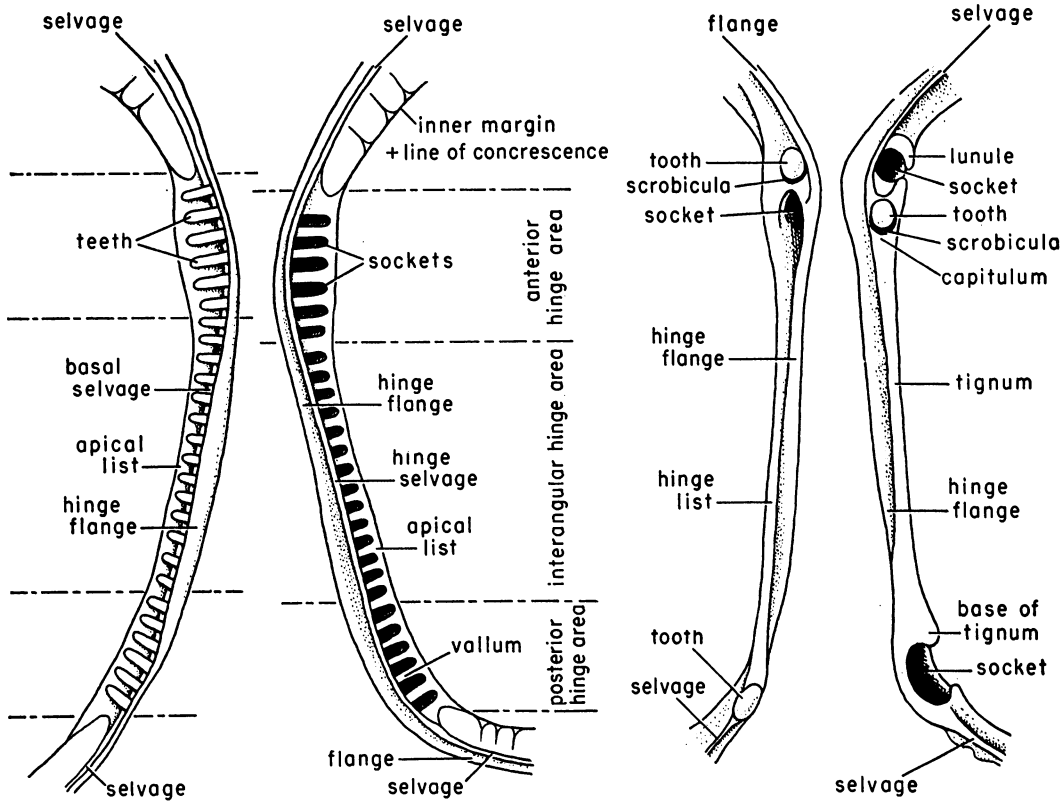

FIG. 7. Hinge elements of *Cytheridea hungarica* Zalányi (left) and *Cythereis dentata* G. W. Müller (right), with the various structures labeled. After Zalányi (1929*a*, Figs. 8–9).

TERMS USED IN GENERAL DESCRIPTION OF CARAPACE

The synonyms used by several authors for the terms included in this group are listed on Charts 2 and 3.

CARAPACE—The hard protective covering which encloses and shields the soft parts and appendages during life. It is composed of two valves. "Carapace" refers to the form of this bivalved armor, "SHELL" to the materials of which it is made.

VALVE—One of the two parts of the carapace, oriented left and right (hence called LEFT VALVE and RIGHT VALVE) and hinged at their dorsal margins.

LENGTH—The greatest possible dimension of the valve taken parallel to the hinge line (Fig. 5). When the hinge line is curved, the greatest measurement obtainable is called the length, and in such cases the length and axis coincide. Some species have frills which extend beyond the anterior free edge; the length, by definition, includes such structures which project beyond the free edge. By the same reasoning spines should also be included in the length. In highly decorated forms, therefore, it is desirable to record that part of the length which is intercepted by the anterior and posterior free edges.

HEIGHT—The greatest dimension of the valve taken between the dorsal and ventral borders and perpendicular to the direction of the length (Fig. 5).

WIDTH—The greatest dimension of the valve perpendicular to the directions of length and height. Width can be measured on a valve seen in dorsal, anterior, ventral, or posterior views. The width of a single valve is usually equal to approximately half the width of the complete carapace.

THICKNESS—The extent of actual shell material. It is always much less than the width.

AXIS—The greatest measurement of the valve in a sagittal plane, the valve seen in lateral view (Fig. 5). The axis will always be equal to or greater than the length.

OUTLINE—The boundary of the valve as seen in lateral view. The outline extends around all projecting features such as humps, spines, and bulbs. It is subdivided into the DORSAL, ANTERIOR, VENTRAL, and POSTERIOR BORDERS (Fig. 1). The anterior, ventral, and posterior borders form the FREE BORDER. (Fig. 1).

HINGE LINE—The line along which the two valves are articulated, seen when the carapace is complete (Fig. 3). The hinge line may coincide with the dorsal border, or it may be depressed below it (Fig. 1). Anderson (1939) referred to a depressed hinge line as an "infold." This term is not used here as it is misleading.

FREE EDGE—The line, exclusive of the hinge line, formed where the two valves come together when they are tightly closed (Fig. 3). The free edge is the distal limit of the contact margin. It bears the same relation to the anterior, ventral, and posterior borders that the hinge line bears to the dorsal border.

HINGE—The area of a valve which is articulated to the opposite valve during the life of the ostracod (Fig. 3). It includes all the special interlocking structures which strengthened the hingement.

CONTACT MARGIN—The area of a valve, exclusive of the hinge, which is in contact with the opposite valve when the two are closed (Fig. 3). The distal limit of the contact margin is the free edge.

LATERAL VIEW—The appearance of the valve as seen from the side (Fig. 2).The line of sight is at right angles to the median sagittal plane of the complete carapace. Each carapace has two lateral views, one of the right valve and one of the left valve.

DORSAL VIEW—The appearance of the valve as seen from above (Fig. 2). The line of sight is in the median sagittal plane of the complete carapace and at right angles to the hinge line.

ANTERIOR VIEW—The appearance of the valve as seen from the front (Fig. 2). The line of sight is in the median sagittal plane of the complete carapace and parallel to the hinge line, or along the direction of the length.

VENTRAL VIEW—The appearance of the valve as seen from below (Pl. II, Fig. 8*c*; Pl. III, Fig. 8*b*). The line of sight is in the median sagittal plane of the complete carapace and at right angles to the hinge line, or along the direction of the height.

POSTERIOR VIEW—The appearance of the valve as seen from behind. The line of sight is the same as that for the anterior view, but in the opposite direction.

SAGITTAL SECTION—Any section through the valve made at right angles to the direction of the width. It is a vertical section taken from anterior to posterior.

FRONTAL SECTION—Any horizontal section through the valve. It is made perpendicular to the direction of height.

TRANSVERSE SECTION—Any section through the valve made perpendicular to the direction of length (Fig. 5*d*; Pl. VII, Fig. 1*c*). It is a vertical section taken from side to side.

CORNER—The junction of the dorsal border with the anterior or posterior border.

ANTERIOR CORNER—The junction of the dorsal and anterior borders.

POSTERIOR CORNER—The junction of the dorsal and posterior borders (Fig. 1).

CORNER SURFACE—The area of the valve adjacent to the corner.

CARDINAL ANGLE—The angle formed between the hinge line and either the anterior or the posterior free edge.

ANTERIOR CARDINAL ANGLE—The angle formed between the hinge line and the anterior free edge. In most specimens this will also be the angle between the dorsal border and the anterior border; but if there is a dorsal spine at the anterior corner or a frill extends anterior to the free edge, the edge of the spine or frill may form a continuation of the line of the anterior edge and no angle is then formed. It is, therefore, the angle between the hinge line and anterior free edge which is commonly referred to as the anterior cardinal angle. It can be determined from a photograph by measuring its opposite angle, formed by extensions of the lines of the hinge line and of the anterior free edge (Fig. 1).

POSTERIOR CARDINAL ANGLE—The angle formed between the hinge line and the posterior free edge. It can be determined from a photograph by measuring its opposite angle, formed by extensions of the lines of the hinge line and of the posterior free edge (Fig. 1).

TRANSVERSE ROUNDING—The rounding of the valve in a transverse section. Some species have a boxlike shape, with flattened sides, and this term is not applicable in such cases.

FRONTAL ROUNDING—The lateral rounding of the valve in a frontal (horizontal) section.

ANTERIOR FRONTAL POINT—The anterior point in a frontal section where the two valves come together.

POSTERIOR FRONTAL POINT—The posterior point in a frontal section where the two valves come together.

LATERAL SURFACE—A flattened side, especially applicable to ostracods with a boxlike shape (Fig. 3).

MARGINAL SURFACE—A flattened area adjacent to the free edge and set off from the lateral surface (Fig. 3).

DORSUM—A flattened area adjacent to the hinge line and set off from the lateral surface (Fig. 3).

AREA—A region of the surface of a valve as seen in lateral view. In descriptions of valves, it is often desirable to locate a feature as being in a certain part of the valve. The shape of any particular area designated will be affected by the outline of the valve. The following terms for areas of a valve are descriptive and do not require explanation (Fig. 5):

ANTERIOR	ANTEROVENTRAL	ANTEROCENTRAL
POSTERIOR	CENTRAL VENTRAL	VENTROCENTRAL
DORSAL	POSTEROVENTRAL	POSTEROCENTRAL
VENTRAL	CENTRAL POSTERIOR	DORSOCENTRAL
ANTERODORSAL	POSTERODORSAL	CENTRAL
CENTRAL ANTERIOR	CENTRAL DORSAL	

OVERLAP—A closure of two valves in such a manner that the contact margin of one valve extends around the edge of that of the

other. Overlap may be described by abbreviations for the valves; for example, L/R signifies that the left valve overlaps the right.

SWING—A sloping, nearly straight posteroventral border, so-called because it can be developed only when the ventral half of the valve is displaced or "swung" somewhat forward in relation to the dorsal half of the valve. A swing gives the posterior half of a valve a tapered appearance.

PLENATE END—The end of the valve opposite to that having a swing, so-called because it tends to be plenate or full and has a greater area than the end with the swing. The terms anterior and posterior signify a definite orientation; plenate, adplenate, and antiplenate describe a valve only by its physical appearance, and an author using these terms does not commit himself as to the actual orientation of the ostracod.

LEFT PLENATE—A valve with the plenate end on the left side when seen in lateral view.

RIGHT PLENATE—A valve with the plenate end on the right side when seen in lateral view.

ADPLENATE—Of features located in the half of the valve with the plenate end.

ANTIPLENATE—Of features located in the half of the valve opposite the plenate end.

TERMS USED IN DESCRIPTION OF LOBATION, SULCATION, AND SURFACE ORNAMENTATION

The synonyms used by several authors for the terms included in this group are listed on Chart 4.

LOBATION—The arrangement and number of lobes or elevated areas of the valves. A valve may be described according to the number of lobes present as:

UNILOBATE, with the surface elevated evenly, no sulci present (Pl. X, Figs. 7–8).

BILOBATE, having two lobes and one sulcus (Pl. I, Figs. 1, 3; Pl. III, Figs. 3, 6; Pl. XII, Fig. 3).

TERMS USED IN DESCRIPTION OF LOBATION, SULCATION, AND SURFACE ORNAMENTATION

		Ulrich 1894	Ulrich and Bassler 1908	Ulrich and Bassler 1923	Zalányi 1929a	Bouček 1936.	Swartz 1936, 1945a,b	Öpik 1937	Anderson 1939	Triebel 1941	Schmidt 1941	Hessland 1949
lobation			lobation	lobation				lobation				
papillae		papillae					papillae					
tubercle		tubercle						tubercle	tubercle	Knötchen		
pustule		? pustule										
node		node (= tubercle in part)	node	node			node	node	? boss	Knoten	Knoten	node
knob							knob					
bulb		bulb	bulb									
lobe		lobe	lobe	lobe	Höcker	Lappen	lobe			Wulst = Höcker	Wulst	lobe
hump							hump					
inflation		elevation					undefined swelling	swelling				
crest			ribs = crests	crest-like ribs			crest	crest			Leiste and Kiel	
ridge			ridge	ridge			ridge	ridge		Rippe	Rippe	
eye tubercle		"eye tubercle" = tubercles = "eye spot"	eye tubercle							Augenknoten		
punctae							punctae					
pit		pit	pit	pit			pit	pit		Grube (Schliessmuskeln)	Delle	
fissure							cleft					fissure
furrow		furrow						furrow				furrow
sulcus		sulcus	furrow = sulcus	furrow = sulcus		Furche	sulcus	sulcus		Furche	Furche	sulcus
depression		depression		depression				depression				sulcate depressions
lobe locations	anterior = L1		posterior lobe	p-posterior lobe		Hinterlappen		posterior lobe			vordere Wulst = 1. Rippe = a (anterior)	L1
	median = L2	middle lobe	median node = median lobe = post-median node	m-median lobe		Mittellappen	median lobe	median lobe		Medianhöcker	Medianhöcker = 2. Rippe = m (medius)	L2
	posterior = L3		anterior lobe	a	anterior lobe	hinteren Vorderlappen					hintere Wulst = 3. Rippe = p (posterior)	L3
	postreme = L4			aa		vorderen Vorderlappen					hinterste Wulst = 4. Rippe = pp (postremus)	L4
	ventral							ventral				
sulcus locations	anterior = S1					Hinterfurche					vordere Furche	S1
	median = S2	mesial sulcus	median furrow	median sulcus; mesial depression		Mittelfurche				Mittelfurche	Mittelfurche	S2
	posterior = S3	anterior sulcus				Vorderfurche					hintere Furche	S3
sickle-shaped ridge		sickle-shaped ridge	sickle-shaped ridge									
horseshoe-shaped ridge		horseshoe ridge = loop = U-shaped ridge	horse-shoe ridge = loop = curved ridge = isthmus	horseshoe-shaped ridge			U-shaped ridge = yoke *(Bollia only)*	horse-shoe shaped ridge				
carina				double border				carina (in part)				carina
velate structure	frill	frill-like false border = "frill" = border	flange = flange-like border = false border = overhanging b.	frill = false border			marginal frill	frill = false border = carina (in part)				velate structure: velum
	velate ridge	marginal rim = border	marginal ridge	submarginal ridge = rim-like ridge			rim = false border = marginal ridge	marginal ridge				velate structure: velate ridge
descriptive frill adjectives	denticulate	fringe		marginal fringe		Randkamm		denticulate				
	spinose						marginal spines					
	striate						radially striate	striate				
	nodulous							nodulous				
	with concentric structure							concentric structure				
	reticulate											
	undulating						undulating					
	scalloped											
marginal structures	denticles				die äussere Zone des Schalenrandes: kammartige Vorsprünge			true border: denticulate				
	tubercles											
	ridge											
	spines				zahnartige Vorsprünge = Randzähne							
channel		channel or groove		canaliculate = channeled				canaliculate				
pouch		swelling	ventral pouch = ovarian inflation	brood pouch			pouch = female pouch			"Brutkammern" = "Brutraum" = Bruttasche = Bruthöcker		brood pouch
false pouch								brood-pouch				
domicilium												
loculi				loculi				loculi		halbkugeligen Vertiefungen der Ventralfläche		
spine		spine		horn-like process = spine		Horn = Stachel	spine	horn = spine		Dorn = Stachel = Ecksporn	Stachel = Dorn	
dorsal denticles										Kamme = einer Stachelreihe am Dorsalrande		
dorsal spines												
spur												
geniculum												geniculum
knurling									knurling			
flexure									flexure			
bend												flexure
beak									beak			
notch									notch			
alate extension							flange *(Acronotella)*					
muscle scars	chevron						chevron scars					
	adductor	muscle-spot = muscle spot		muscular imprint	Schliessmuskeleindrücke		adductor scars	muscle spot		Muskelansatz = Muskelnarben		
	mandibular											
blood canals										Blutkanäle = "Gefässe" of F. Schmidt 1873		
surface		surface		surface	Oberfläche	Schalenoberfläche		surface		Schalenoberfläche		surface
surface ornamentation	smooth	smooth	smooth	smooth and glossy		Skulptur:		smooth		Oberflächenskulptur:		ornamentation: smooth
	pitted	pitted		pitted		Grübchen				Grübchen		pitted
	punctate	punctate	punctate					punctate	punctate			punctate
	reticulate	reticulate	reticulate	reticulose		netzartig		reticulate	reticulate			reticulate
	striate			striate		Rippchen				Rippchen		striote
	granulose	granulose	granulose	granulose				granulated				granulate
	spinose											
	granulo-reticulate		granulo-reticulate									
	tuberculate											

CHART 4

TRILOBATE, having three lobes and two sulci (Pl. VIII, Figs. 1-2; Pl. IX, Figs. 1–4; Pl. XI, Figs. 10–11).

QUADRILOBATE, having four lobes and three sulci (Pl. I, Figs. 2, 6; Pl. VI, Figs. 1–8; Pl. VII, Figs. 6–7; Pl. XII, Figs. 1–2); Pl. XIII, Figs. 1–2).

SULCATION—The arrangement and number of sulci or depressed areas on the valves. Both the lobes and the sulci make up the form of the valve, and the number of lobes is directly related to the number of sulci. A valve may be described either according to the number of lobes present (as above) or according to the number of sulci present as:

NONSULCATE, no sulci present, with the surface elevated evenly, unilobate.

UNISULCATE, having one sulcus and two lobes, bilobate.

BISULCATE, having two sulci and three lobes, trilobate.

TRISULCATE, having three sulci and four lobes, quadrilobate.

PAPILLA—One of many small discrete protuberances of the surface, each with steep sides, smaller than tubercles (Pl. I, Figs. 7–8).

TUBERCLE—A small, more or less hemispherical protuberance. Tubercles are larger than papillae and smaller than nodes (Pl. IX, Figs. 5–6; Pl. XIV, Figs. 3–5).

PUSTULE—A protuberance with a pore in the middle. It has the form of a volcano with a crater, or of a rodent's burrow with a surrounding ridge of earth. A pustule is about the size of a tubercle.

NODE—A protuberance smaller than a lobe or knob but larger than a tubercle (Fig. 3; Pl. I, Fig. 5; Pl. II, Figs. 1–2, 5; Pl. III, Figs. 2, 4; Pl. IV, Figs. 3–4; Pl. V, Figs. 2–3, 7; et al.).

KNOB—A high rounded major protuberance with the sides joining the rest of the valve at a distinct line and at a steep angle (Fig. 4).

BULB—A protuberance resembling a knob, but with a greater relative area exposed (Fig. 3). Usually a knob has the form of half a sphere, whereas a bulb has that of three-quarters of a

sphere. A bulb is found frequently as the L3 in ostracods of the family Hollinidae, extending above the hinge line (Pl. XIII, Figs. 7–8).

LOBE—A low rounded major protuberance with the sides gently sloping (Fig. 4).

HUMP—A large low dorsal inflation projecting above the hinge line (Fig. 1).

INFLATION—A large gently domed part of the valve, without distinct borders.

CREST—A small ridge (Fig. 3; Pl. VIII, Figs. 5–7).

RIDGE—An elongate major protuberance (Fig. 3; Pl. VII, Fig. 5). It is sometimes necessary to draw an arbitrary distinction between short ridges and elongate lobes.

EYE TUBERCLE—A prominent tubercle in the Leperditiidae, which may or may not be related to the eye of the original animal.

PUNCTAE—Small pitlike depressions (Fig. 4; Pl. VII, Fig. 1; Pl. XI, Fig. 1; Pl. XII, Figs. 3–4).

PORE—The outside opening of a pore canal.

PIT—A large, more or less circular, deep hollow (Fig. 4; Pl. II, Figs. 4–5; Pl. III, Fig. 4; Pl. IV, Figs. 4, 6–7; Pl. V, Figs. 2, 4; Pl. IX, Figs. 7–8).

FISSURE—A steep-sided groove (Fig. 1; Pl. VII, Figs. 2–3).

FURROW—A shallow groove.

SULCUS—A large groove or trench (Fig. 3).

DEPRESSION—A large gentle concavity without distinct borders.

L1—The anterior lobe or other elevated structure nearest the anterior end (Figs. 1–2). Usually, L1 is not as highly developed as L3, but in some genera, such as *Ceratopsis,* it is very ornate and highly developed (Pl. VI, Figs. 1–6). L1 may be prolonged as a spine, as in *Rakverella* (Pl. I, Figs. 7–8) and *Dicranella* (Pl. II, Figs. 2, 4).

L2—The median lobe or other elevated structure immediately posterior to L1 and anterior to S2 (Figs. 1–2). This structure is

only a node in many ostracods (Pl. I, Fig. 2), or it may be absent completely. It is never the most prominent lobe of the valve.

L3—All of the valve posterior to S2 in trilobate ostracods (Fig. 2); in quadrilobate ostracods, the lobe immediately posterior to S2 (Fig. 1).

L4—The extreme posterior lobe, only in quadrilobate ostracods (Fig. 1).

S1—The anterior sulcus or anterior sulcate structure, in trilobate and quadrilobate ostracods (Figs. 1–2).

S2—The median sulcus or the major sulcate structure. It is the only sulcus in unisulcate ostracods (Pl. I, Figs. 1, 3; Pl. II, Figs. 3, 8; Pl. III, Fig. 3). In trilobate and quadrilobate ostracods, S2 separates L2 and L3 (Pl. I, Fig. 2; Pl. VII, Figs. 2, 5–7; Pl. X, Figs. 3–6; Pl. XII, Figs. 1–2).

S3—The posterior sulcus or posterior sulcate structure, only in quadrilobate ostracods (Fig. 1) and in many of them only weakly developed (Pl. VI, Fig. 3; Pl. VII, Fig. 2).

VENTRAL LOBE—A lobe in the ventral part of the valve, in many ostracods situated parallel to the ventral border (Fig. 2; Pl. XIII, Figs. 4–6).

VENTRAL RIDGE—A ridge in the ventral part of the valve, in many ostracods situated parallel to the ventral border (Pl. I, Fig. 2; Pl. VII, Figs. 2, 5–6; Pl. XII, Figs. 1–2).

SICKLE-SHAPED RIDGE—A ridge made of a continuous composite of a curved anterior lobe and a ventral ridge. This type of ridge is typical of the genus *Drepanella*.

HORSESHOE-SHAPED RIDGE—A ridge bordering the anterior, ventral, and posterior borders of S2. In most occurrences such a ridge is horseshoe-shaped (Pl. IV, Fig. 8; Pl. XI, Figs. 6, 8–9), but it may be U-shaped (Pl. I, Fig. 6) or even V-shaped (Pl. II, Figs. 2, 4). This type of ridge may be formed in ostracods with a small L2 by a ventral junction of L1 and L3 (Pl. I, Fig. 6; Pl. II, Figs. 2, 4; Pl. IV, Fig. 8), or in other ostracods by a ventral junction of L2 and L3 (Pl. XI, Figs. 6, 8–9).

CARINA—A frill-like or ridgelike structure dorsal and parallel to the velate structure. A frill or velate ridge must be also present to have a structure designated as a carina (Fig. 4; Pl. IV, Figs. 2, 4, 6).

VELATE STRUCTURE—Any elongate elevated structure parallel to the free edge of the valve; if a carina is present, the velate structure lies ventral to it.

FRILL—A wide velate structure, often extending beyond the free edge of the valve (Figs. 1, 4; Pl. I, Figs. 1–2, 5; Pl. II, Figs. 1–8; Pl. III, Figs. 2, 4, 7, 9; Pl. IV, Fig. 4; Pl. VII, Fig. 1; Pl. VIII, Figs. 1–7; Pl. IX, Figs. 1–2, 7–8; XIII, Figs. 5–6, 8; Pl. XIV, Figs. 2, 4–5). A frill may be described as:

NODULOUS, composed of fused nodular structures (Fig. 4; Pl. VIII, Figs. 3, 5).

DENTICULATE, with denticles on the distal edge (Fig. 4; Pl. I, Fig. 8).

SPINOSE, composed of numerous spines with their bases fused (Fig. 4; Pl. I, Fig. 6; Pl. II, Fig. 6 in part; Pl. VIII, Figs. 4, 6 in part).

STRIATE, with striae perpendicular to the edge of the frill (Fig. 4; Pl. I, Figs. 2, 5; Pl. II, Figs. 3, 6; Pl. VIII, Figs. 1–2; Pl. IX, Figs. 1–4, 7–8; Pl. X, Figs. 7–8).

UNDULATING, with the surface waved or warped (Fig. 4; Pl. II, Fig. 5; Pl. III, Fig. 4).

SCALLOPED, with a series of convex warps (Pl. I, Fig. 1; Pl. III, Fig. 2; Pl. XIII, Fig. 1).

(with) CONCENTRIC STRUCTURE, having small grooves parallel to the edges (Fig. 4; Pl. II, Fig. 5).

RETICULATE, having both striae and concentric structure (Fig. 4; Pl. VIII, Figs. 1–2).

VELATE RIDGE—A low, usually rounded ridge in the position of a velate structure (Fig. 2; Pl. III, Figs. 6, 8; Pl. IV, Figs. 6, 8–9; Pl. VII, Figs. 6–7).

MARGINAL STRUCTURE—A structure adjacent to and parallel to the free edge of the contact margin, but discrete from the free

edge. Marginal structures may be developed as a MARGINAL RIDGE (Fig. 3; Pl. II, Fig. 8; Pl. IV, Fig. 6), MARGINAL TUBERCLES (Fig. 3; Pl. III, Fig. 8), MARGINAL DENTICLES (Fig. 3; Pl. VIII, Figs. 1–2, 5–6), or MARGINAL SPINES (Fig. 3; Pl. I, Fig. 4; Pl. III, Fig. 7).

CHANNEL—A groove between marginal structures and velate structures (Fig. 2; Pl. II, Fig. 8; Pl. III, Fig. 8; Pl. IV, Figs. 8–9; Pl. VI, Fig. 8; Pl. VII, Fig. 7).

POUCH—A female lobate structure of the valve in dimorphic species (Pl. IX, Figs. 2, 3, 5, 7; Pl. X, Figs. 2, 4, 6, 8; Pl. XI, Figs. 1, 3, 4, 7, 9, 11).

FALSE POUCH—A chamber formed by the frills of opposite valves being so incurved as to meet at their distal edges (Fig. 1; Pl. VIII, Figs. 3, 5, 7; Pl. XII, Figs. 1–2).

DOMICILIUM—In ostracods with a false pouch, that part of the carapace exclusive of the frills (Pl. XII, Figs. 1–2).

LOCULI—Deep pitlike depressions in the ventral surface of a valve formed by transverse processes joining a marginal ridge to a frill (Fig. 1; Pl. III, Fig. 6; Pl. VII, Fig. 5; Pl. XII, Fig. 4; Pl. XIII, Fig. 1) or joining velate structures to carinae (Pl. I, Figs. 3, 4). Insofar as is known, all loculi occur as female dimorphic structures.

SPINE—A conical extension of the carapace, either hollow or solid (Pl. I, Fig. 8; Pl. II, Figs. 2, 4; Pl. III, Figs. 3, 7; Pl. VI, Figs. 7–8).

DENTICLE—A small, delicate, spinelike projection of solid shell material. Denticles are usually attached to the dorsal part of the valve (dorsal denticles), adjacent to the free edge of the contact margin (marginal denticles, see Marginal Structure, above), or on the edge of a frill (in which case the frill is said to be "denticulate").

DORSAL DENTICLE—A denticle attached to the dorsal part of the valve (Fig. 4).

DORSAL SPINE—A spine attached to the dorsal part of the valve (Fig. 4; Pl. I, Figs. 7–8; Pl. III, Fig. 9).

SPUR—A flattened spinelike projection found as a modification of the velate structure in the males of certain dimorphic ostracods of the family Hollinidae (Pl. XIII, Figs. 2, 7), or as a terminal thickening of a frill (Pl. XIII, Fig. 6; Pl. XIV, Figs. 4–5).

GENICULUM—A sharp lateral bend in the course of a sulcus (Fig. 2; Pl. I, Figs. 3–4).

KNURLING—A pointed projection of the hinge line of one valve into that of the opposite valve as seen in dorsal view.

FLEXURE—A lateral offset of the hinge line as seen in dorsal view.

BEND—A rather sharp angulation of the valve in the ventral part, usually parallel to the free edge of the valve (Fig. 2; Pl. III, Fig. 5).

BEAK—An anteroventral projection in ostracods of the subfamily Rostrocyprinae, dorsally confluent with the rest of the anterior border (Pl. XVIII, Fig. 1).

NOTCH—An anterodorsally-directed sharp indentation immediately posterior to a beak.

MUSCLE SCAR—An area marking the former position of a muscle. These areas may be distinguished from the rest of the interior face of a valve by their elevation, depression, surrounding groove, or different texture. Muscle scars are classified as:

ADDUCTOR, a muscle scar formed by the previous attachment of the adductor or closing muscle, located slightly anterior to the middle of the valve.

CHEVRON, a peculiar chevron-shaped scar found in ostracods of of the family Leperditidae.

MANDIBULAR, a muscle scar, other than the adductor or chevron, which marks the attachment of small muscles formerly leading to the appendages.

ALATE EXTENSION—Any outward lateral extension in the ventral half of the valve, usually increasing in width posteriorly and terminating abruptly, with a generally triangular shape. Alate extensions occur rarely in the Beyrichiacea (Pl. III, Fig. 8), more commonly in the Cypridacea (Pl. V, Figs. 5–6; Pl. XVI, Figs. 2–3).

BLOOD CANALS—Certain branched grooves on the interior of valves, which are assumed to mark the positions of former blood vessels.

SURFACE—The outer area of the valve.

SURFACE ORNAMENTATION—Small structures modifying or "decorating" the surface. Surface ornamentation may be described as:

GRANULO-RETICULATE, with granules arranged in intersecting rows (Fig. 4).

GRANULOSE, with a surface like that of sandpaper; with the surface covered by very small protuberances, usually partially fused and lacking the steep sides and discrete borders of papillae (Fig. 4; Pl. I, Fig. 1; Pl. III, Figs. 3, 8).

PAPILLOSE, covered with papillae (Pl. I, Figs. 7–8).

PITTED, with rather large pitlike depressions (Fig. 4; Pl. IV, Fig. 7; Pl. V, Fig. 2).

PUNCTATE, with relatively small depressions (Fig. 4; Pl. IV, Figs. 2, 4–6; Pl. VI, Fig. 1; Pl. VII, Fig. 1; Pl. VIII, Figs. 3–6; Pl. X, Figs. 1–2; Pl. XI, Fig. 1; Pl. XII, Figs. 3–4).

RETICULATE, with a netlike pattern of small intersecting crests (Pl. IV, Fig. 1; Pl. V, Figs. 4–5), small intersecting grooves, small angular pits or punctate located at the intersections of two sets of imaginary straight or curved lines (Fig. 4; Pl. II, Fig. 3; Pl. IV, Figs. 2–4, 5–6; Pl. VII, Fig. 3; Pl. X, Figs. 1–2; Pl. XI, Figs. 4–5), or angular tubercles located similarly at the intersections of imaginary lines.

SMOOTH, lacking small elevated or depressed areas, even (Fig. 4; Pl. I, Fig. 3; Pl. III, Figs. 1–2, 6; Pl. IV, Fig. 9; Pl. VI, Figs. 2–3, 5–6; et al.).

SPINOSE, covered with small spines (Fig. 4; Pl. II, Fig. 7; Pl. III, Fig. 7.).

STRIATE, with a number of very small grooves, parallel or nearly parallel (Fig. 4).

TUBERCULATE, covered with tubercles (Pl. IX, Figs. 5–6).

INNER SURFACE—The proximal area of a valve. The hypodermis was originally attached to this surface.

TERMS USED IN THE DESCRIPTION OF SHELL STRUCTURE AND HINGEMENT

The synonyms used by several authors for terms included in this group are listed on Chart 5.

OUTER LAMELLA—The hard shell material which, in the living animal, covers the outside of the epidermis that secreted it (Fig. 6). The outer lamella of the two valves is all that can be seen when the carapace is closed. It is composed of a thick layer of calcite enclosed between two layers of chitin.

CHITIN COATING OF CALCAREOUS LAYER—A thin waxy chitin layer coating the layer of calcite (Fig. 6). After the ostracod molts, this is the first layer of the new valve that is secreted by the epidermis.

CALCAREOUS LAYER—A thick layer of calcite secreted by the epidermis immediately after the chitin coating (Fig. 6). This layer is often the only part of the carapace preserved as a fossil.

CHITIN COATING OF EPIDERMIS (or HYPODERMIS) or INNER CHITIN LAYER—A thin transparent layer of chitin secreted by the epidermis immediately after the calcareous layer, and lying next to the epidermis in the completely formed valve of the living ostracod (Fig. 6).

INNER LAMELLA or CHITIN LINING OF THE EPIDERMIS—A thin layer of chitin which, together with the duplicature, forms a proximal covering of the epidermis in the anterior, ventral, and posterior parts (Fig. 6); the dorsal part of the epidermis is confluent with the main portion of the soft parts of the ostracod. At its inner limit, the inner lamella is folded back on itself to form the body wall of the pouch-shaped body of the animal, without any apparent change in composition or texture.

TERMS USED IN DESCRIPTION OF SHELL STRUCTURE AND HINGEMENT

	Claus 1893, 1895	Zalányi 1929a	Zalányi 1929b	Bradley 1941	Hoff 1942	Rome 1947	Levinson 1950
outer lamella	äussere Schalendecke	äussere Schalenlamelle	*külső teknőlamella*	outer lamella	outer plate	la lamelle externe = la cuticle	
inner lamella = chitin lining of the epidermis	innere Schalenblatt = innere Schalenlamelle	innere Schalenlamelle	*belső teknőlamella*	inner lamella	inner plate	la lamelle interne	
layers of outer lamella: chitin coating of the calcareous layer		äussere Chitinschicht		integument		couche de chitin	
layers of outer lamella: calcareous layer		mittlere Kalkschicht				une lame calcaire	
layers of outer lamella: chitin coating of the epidermis = inner chitin layer		innere Chitinschicht				couche de chitin	
duplicature	Schalenduplikatur = Duplikatur	innere Randlamelle		duplicature	calcified area of the inner plate	bord interne	
chitin adhesive strip		"Zwischenmembran"					
proximal zone of duplicature	innere Lippe (approximately)	proximales Randfeld	*proximáles mező*				
distal zone of duplicature	äussere Lippe (approximately)	distales Randfeld	*distális mező*				
line of concrescence		Verwachsungslinie	*benövési vonal*	line of concrescence	submarginal line	ligne de suture	
distal line of adhesive strip	distale Schalenlinie ?						
vestibule				vestibule			
hingement: simple							
hingement: ridge and groove							groove and ridge
hingement: teeth and sockets							tooth and socket
inner margin	proximale Schalenlinie	Innenrand	*belső peremvonal*	inner margin			
septa		Septum	*szeptum v. borda*	septa			
list strip				list strip			
selvage strip				selvage strip			
flange strip				flange strip			
list	Chitinleiste	Innenleiste		list			
selvage groove				selvage groove			
inner selvage contact line		innere Saumlinie	*belső ajakvonal*				
selvage	Randborde der inneren Lippe + Cuticularsaum	Saum	*peremajak*	selvage	hyaline border = lip		
selvage line		Saumkante = Kantenlinie für die Kante des Saumes	*ajakél*				
outer selvage contact line		äussere Saumlinie	*külső ajakvonal*				
flange groove				flange groove			
flange	Chitinleiste	Aussenleiste		flange			
selvage fringe				selvage fringe			
pore canals: normal	Porenkanal = Porencanäle	Porenkanal: flächenständiger	csatorna: valódi peremlikacs =	pore canals: normal			
pore canals: radial		Porenkanal: randständiger	csatorna: járulékos likacs =	pore canals: radial			
pore canals: adventive		Porenkanal: adventiver	csatorna:	pore canals:			
pore canals: false radial		Porenkanal: falscher	csatorna: öl peremlikacs =	pore canals:			
pore canals: sieve type			csatorna:	pore canals: sieve type			
ampoules						petites ampoules	
hairs	Borste	Borste		hair	setae		
hinge area: anterior		Schlossrand: vorderer					anterior hinge component
hinge area: interangular		Schlossrand: interangularer					
hinge area: posterior		Schlossrand: hinterer					posterior hinge component
hinge flange		äussere Schlossleiste	*külső zárólléc*	flange (in part)			
hinge selvage		Saum (in part)	*peremajek* (in part)	selvage (in part)			
hinge list		innere Schlossleiste	*belső zárólléc*	list (in part)			
hinge flange groove				flange groove (in part)			
hinge selvage groove				selvage groove (in part)			
tooth		Schlosszahn	*zárfog*	tooth			tooth
toothlet							toothlet
socket		Zahngrube	*fogmeder*	socket			socket
basal selvage		Basalleiste	*bazális léc*				
vallum		Vallum	*vallum*				
apical list		Apikalleiste	*apikális léc*				
scrobicula		Scrobicula					
lunule		Lunula	*lunula*				
capitulum		Capitulum (der Schlossäule)	*kapitulum = a zároszlop feje*				
tignum		Tignum = Schlossäule	*zároszlop*				
base of tignum		Basis (der Schlossäule)	*a zároszlop bázisa*				
crenulations							crenulations

CHART 5

DUPLICATURE—A relatively narrow band of shell material around the outer edge of the proximal face of the epidermis, composed of the same three layers as the outer lamella (Fig. 6). It is the only calcified layer of the proximal covering, or lining, of the epidermis. It may be divided into:

LIST STRIP, that part of the duplicature from the inner margin to and including the list (Fig. 6).

SELVAGE STRIP, that part of the duplicature which forms the selvage groove and the selvage (Fig. 6).

FLANGE STRIP, that part of the duplicature which forms the flange groove and, in some cases, the flange (Fig. 6).

ADHESIVE STRIP—A thin layer of chitin between the duplicature and the outer lamella (Fig. 6)

LINE OF CONCRESCENCE—The proximal line of junction of the duplicature and the outer lamella. It is the inner border of the chitin adhesive strip (Fig. 6).

DISTAL LINE OF ADHESIVE STRIP—The distal line of junction of the duplicature and the outer lamella (Fig. 6).

PROXIMAL ZONE OF DUPLICATURE—That part of the duplicature from the inner margin to the line of concrescence.

DISTAL ZONE OF DUPLICATURE—That part of the duplicature from the line of concrescence to the distal line of the adhesive strip.

VESTIBULE—The space between the outer lamella and the duplicature. In the living animal it is filled with a part of the epidermis (Fig. 6).

INNER MARGIN—The proximal limit of the duplicature (Fig. 6).

SEPTUM—A small ridge on the list-strip part of the duplicature (Fig. 6).

LIST—A proximal ridge on the contact margin, absent in some ostracods (Fig. 6).

SELVAGE—The middle and principal ridge of the contact margin (Fig. 6).

SELVAGE LINE—The line formed by the tapering edge of the selvage (Fig. 6).

INNER SELVAGE CONTACT LINE—The proximal line between the selvage and the rest of the duplicature (Fig. 6).

OUTER SELVAGE CONTACT LINE—The distal line between the selvage and the rest of the duplicature (Fig. 6).

SELVAGE FRINGE—A very thin part of the selvage, structurally reinforced by thin ridges normal to the selvage line (Fig. 6).

FLANGE—A distal ridge of the contact margin, absent in some ostracods (Fig. 6). In many ostracods the flange is a part of the outer lamella.

SELVAGE GROOVE—The part of the surface of the duplicature between the list and the selvage (Fig. 6).

FLANGE GROOVE—The part of the surface of the duplicature between the selvage and the flange (Fig. 6).

PORE CANAL—A passage through the entire valve, originally connecting sensory hairs to the nerves of the hypodermis.

NORMAL PORE CANAL—A passage through the outer lamella with small distal and proximal openings. It is lined with chitin. The proximal part is often expanded like a bulb (Fig. 6).

SIEVE-TYPE PORE CANAL—A passage through the outer lamella with a small distal and a large proximal opening. The proximal part is wide and deep and has small discrete protuberances at its base which suggested its name (Fig. 6). It is not strictly a sieve structure, for it has only one distal opening.

RADIAL PORE CANAL—A passage through the adhesive strip (Fig. 6).

FALSE RADIAL PORE CANAL—A passage through the shell material with its proximal opening along the line of concrescence but not passing through the rest of the chitin adhesive strip (Fig. 6).

ADVENTIVE PORE CANAL—A passage through the duplicature (Fig. 6).

HAIRS—Very small hollow hairlike structures with expanded bulblike bases set into the pore canals. They mechanically transmit physical stimuli to scolopoïdes connected to the nerve network. The hairs serve to warn the animal of objects near to the outer lamella.

HINGEMENT—The group of structures comprising the hinge. Although the hingement is usually complex and involves more than one type of structure, it may be divided into the following elements:

SIMPLE, the edge of one valve fitting against or under the edge of the opposite valve.

RIDGE AND GROOVE, a ridge in one valve fitting into a corresponding groove in the opposite valve.

TOOTH AND SOCKET, a toothlike projection of one valve fitting into a corresponding socketlike depression in the opposite valve.

HINGE AREA—The surface involved in hingement. Usually the hingement is differentiated, with the more complex elements at the ends, so that the hinge area can be readily divided (Fig. 7) into the ANTERIOR, INTERANGULAR, and POSTERIOR HINGE AREAS.

HINGE FLANGE—A hinge structure corresponding to the flange of the contact margin, and continuous with it in many species (Fig. 7).

HINGE-FLANGE GROOVE—A hinge feature corresponding to the flange groove of the contact margin and continuous with it in some species. Bradley (1948, p. 793) has proposed the term "accommodation groove" for a well-developed hinge flange groove in the left valve of some Cytheracea, because the groove serves to accommodate the dorsal margin (hinge flange) of the right valve when the carapace is open.

HINGE LIST—A hinge structure corresponding to the list of the contact margin (Fig. 7).

HINGE SELVAGE—A hinge structure corresponding to the selvage of the contact margin and continuous with it in some species (Fig. 7).

HINGE-SELVAGE GROOVE—A hinge feature corresponding to the selvage groove of the contact margin.

TOOTH—A projection of one valve forming part of the hinge and fitting into a socket of the opposite valve (Fig. 7).

TOOTHLET—One of the small projections forming a single unit and fitting into a common socket.

SOCKET—A depression in one valve forming a part of the hinge and fitting around a tooth of the opposite valve (Fig. 7).

COMPOUND SOCKET—A socket formed as a combination of small sockets and fitting around toothlets in the opposite valve (Pl. XV,(Figs. 1, 3; Pl. XVI, Fig. 4; Pl. XVIII, Figs. 1, 3).

APICAL LIST—Either the part of the hinge forming the proximal side of the teeth in one valve, or the part forming the proximal side of the sockets in the opposite valve, occurring only in ostracods having many teeth arranged in a taxodont pattern (Fig. 7).

VALLUM—The part of the hinge between two sockets, occurring only in ostracods having many taxodont teeth in one valve and corresponding sockets in the opposite valve (Fig. 7).

BASAL SELVAGE—A ridge between the distal ends of two teeth, occurring in ostracods with many taxodont teeth in one valve (Fig. 7).

TIGNUM—A wide bar between the sockets, or between the socket and the tooth, corresponding to a hinge selvage. It occurs only in a hinge with sockets at the ends or with a socket at one end and a socket and a tooth at the other (Fig. 7).

BASE OF TIGNUM—A wide part of the tignum anterior to the posterior socket (Fig. 7).

CAPITULUM—A wide prominence at the anterior end of the tignum (Fig. 7).

SCROBICULA—A small groove at the base of a tooth (Fig. 7).

LUNULE—A convex or concave crescentic area at the edge of a socket (Fig. 7).

LIST OF SYNONYMS WITH THEIR EQUIVALENTS[1]

D.=Dutch G.=German L.=Latin
F.=French H.=Hungarian S.=Swedish
It.=Italian

—A—

a = L1, L3*
aa = L4*
abbraccia (It.)=overlap
accessory furrow = S1
accessory lobe = L2
Achse (G.) = axis
achterrand (D.) = posterior border
actual margin = free edge
adventiver Porenkanal (G.) = adventive pore canal
äggformig ventrallob (S.) = pouch
ajakél (H.) = selvage line
alatus (L.) = with alate extension
ál peremlikacs-csatorna (H.) = false radial pore canal
(l') angolo di riunione del contorno dorsale con quello anteriore (It.) = anterior cardinal angle
Anschwellung (G.) = inflation
anterior angle = anterior cardinal angle
anterior dorsal angle = anterior cardinal angle
anterior lobe = L1; L3 and L4*
anterior margin = free edge; posterior border*
anterior sulcus = S1
anterodorsal angle = anterior cardinal angle
antice (L.) = anterior border
apikális léc (H.) = apical list
Apikalleiste (G.) = apical list
area libera marginale (It.) = anterodorsal, central anterior, antero-

[1] The equivalents given in the list include a few general and other terms which it has not been thought necessary to define in the preceding section.

* Orientation the reverse of that accepted in this paper.

ventral, central ventral, posteroventral, central posterior, and posterodorsal areas.

(en) arrière (F.) = posterior
(l') articulation du test (F.) = hinge
Aufsicht (G.) = lateral view
Augenhöcker (G.) = eye tubercle
Augenknoten (G.) = eye tubercle
Aussenkant (G.) = bend
Aussenleiste (G.) = flange
Aussenrand (G.) = free edge
äussere Chitinschicht (G.) = chitin coating of calcareous layer
äussere Lippe (G.) = distal zone of duplicature
äussere Saumlinie (G.) = outer selvage contact line
äussere Schalendecke (G.) = outer lamella
äussere Schlossleiste (G.) = hinge flange
äussere Zone des Schalenrandes (G.) = marginal structure
(en) avant (F.) = anterior

— B —

back = dorsal border
backward swing = swing
bakre fåran (S.) = S2
bakre konturen (S.) = posterior border
bakre lob (S.) = L3 and L4
bakre rand (S.) = posterior border
Basalleiste (G.) = basal selvage
Basis der Schlossäule (G.) = base of tignum
Bauchansicht (G.) = ventral view
Bauchfläche (G.) = marginal surface
Bauchrand (G.) = ventral border
bazális léc (H.) = basal selvage
belső ajakvonal (H.) = inner selvage contact line
belső peremvonal (H.) = inner margin
belső teknőlamella (H.) = inner lamella
belső záróléc (H.) = hinge list
benövési vonal (H.) = line of concrescence

Berührungslinie (G.) = free edge and hinge line
Blutkanäle (G.) = blood canals
Bogen der Kantenlinie (G.) = frontal rounding
(le) bord dorsal (F.) = dorsal border
(le) bord inférieur (F.) = ventral border
(le) bord supérieur (F.) = dorsal border
(le) bord ventral (F.) = ventral border
border with raised rim = velate ridge
Borste (G.) = hairs
boss = node
bredd (S.) = height
Breite (S.) = height; width
broedruimte (D.) = pouch
brood pouch = pouch
Bruthöcker (G.) = pouch
Brutkammern (G.) = pouch
Brutraum (G.) = pouch
Bruttasche (G.) = pouch
Buckel (G.) = node

— C —

calcified area of inner plate = duplicature
canaliculate = having a channel
Capitulum der Schlossäule (G.) = capitulum
(une) carapace conchiforme (F.) = carapace
cardinal edge = corner
cardinal extremity = corner
cardinal line = dorsal border
cardine (It.) = hinge
carena (It.) = ridge
Caudal ansicht (G.) = anterior view*
Caudalrand (G.) = anterior border*
Caudalwulst (G.) = L1*
Centralwulst (G.) = L2

* Orientation the reverse of that accepted in this paper.

Centrocephalfurche (G.) = S2* (ventral part)
Cephalansicht (G.) = posterior view*
Cephalrand (G.) = posterior border*
Cephalwulst (G.) = L3*
chagrinerad (S.) = having a tuberculate surface ornamentation
Chitinleiste (G.) = list or flange
conchiglia (It.) = carapace
contorno caudale (It.) = posterior border
contorno cefalico (It.) = anterior border
contorno dorsale (It.) = dorsal border
contorno superiore (It.) = dorsal border
coquille (F.) = carapace
costicine longitudinali (It.) = striate surface ornamentation
cresta (It.) = crest
crest-like rib = crest
csatorna (H.) = pore canal

— D —

Delle (G.) = pit
dentelature (It.) = teeth or toothlets (see tooth and toothlet)
denti (It.) = teeth (see tooth)
denticolazioni (It.) = teeth or toothlets (see tooth and toothlet)
denticulatus (L.) = having denticles
dernier bord (F.) = anterior border*
(en) dessous (F.) = ventral
diametro longitudinale (It.) = length
Dicke (G.) = width
distale Schalenlinie (G.) = distal line of adhesive strip
distales Randfeld (G.) = distal zone of duplicature
diztális mező (H.) = distal zone of duplicature
Dorn (G.) = spine
dorsaalrand (D.) = dorsal border
dorsal angle = cardinal angle
Dorsalansicht (G.) = dorsal view

* Orientation the reverse of that accepted in this paper.

dorsal aspect = dorsal view
Dorsalecke (G.) = corners (see corner)
dorsale Randfläche (G.) = dorsum
dorsaler Bogen (G.) = dorsal border
Dorsalhöcker (G.) = L1*
dorsal margin = dorsal border
Dorsalrand (G.) = dorsal border
dorsalrand (S.) = dorsal border
dorsalrandes förenar (vinkel) med den bakre (S.) = posterior cardinal angle
dorsalrandens främre ändpunkt (S.) = anterior corner
dorsal region = dorsal area
Dorsalwinkel (G.) = cardinal angle
double border = carina
Duplikatur (G.) = duplicature
Durchschnitt (G.) = transverse section; frontal section; sagittal section
dwarse doorsnede (D.) = transverse section
dwarsgroeven (D.) = furrows (see furrow)

— E —

échelle (F.) = carapace
echter Porenkanal (G.) = radial pore canal
Ecke (G.) = corner
Eckfläche (G.) = corner surfaces (see corner surface)
Ecksporn (G.) = spine
einerdoppelten Hülle (G.) = carapace
elevation = inflation
escavazioni (It.) = pit
estremità cefalica (It.) = anterior area
extremities = corners (see corner)
eye spot = eye tubercle

— F —

faces latérales (F.) = lateral surface

* Orientation the reverse of that accepted in this paper.

Fäden (G.) = striate surface ornamentation
falscher Porenkanal (G.) = false radial pore canal
false border = frill
fåra (S.) = sulcus
fåran mellan främre loben och midtloben (S.) = S1
female pouch = pouch
fimbriated = reticulate (of frill)
first sulcus = S3*
flächenständiger Porenkanal (G.) = radial pore canal
flange (in part) = frill; alate extension
flange-like border = frill
flexure (in part) = bend
Flügel (G.) = alate extension
flügelartig Erweiterung (G.) = alate extension
fogmeder (H.) = socket
fossette (It.) = (small) pit
främre änd (S.) = anterior area
främre fåran (S.) = S1
främre konturen (S.) = anterior border
främre lob (S.) = L1
främre rand (S.) = anterior border
free-edge (in part) = outline
free margin = outline
freie Randzone (G.) = contact margin
freier Rand (G.) = free border
frill-like false border = frill
fringe = denticulate frill
Furche (G.) = sulcus
furrow (in part) = sulcus

— G —

Gefässe (G.) = blood canals
Gehäuse (G.) = carapace
gekornelt (G.) = having a papillose surface ornamentation

* Orientation the reverse of that accepted in this paper.

gestrichelt (G.) = having a striate surface ornamentation
gibbosità (It.) = inflation
Gitternetz (G.) = reticulate surface ornamentation
Gitterwerks (G.) = reticulate surface ornamentation
glatt (S.) = having a smooth surface ornamentation
globoso-inflatum (L.) = node
gonfio (It.) = inflation
granulated = having a granulose surface ornamentation
granulazione (It.) = granulose surface ornamentation
granulerad (S.) = having a granulose surface ornamentation
graticciato (It.) = reticulate surface ornamentation
grob punktirt (G.) = having a punctate surface ornamentation
groeve (D.) = sulcus
Grenze der Bauchseite (G.) = bend
Grube (G.) = pit
Grübchen (G.) = punctate surface ornamentation
grunda fåror (S.) = furrow

— H —

halbkugeligen Vertiefungen der Ventralflache (G.) = loculi
hanexemplar (S.) = male
hinge (in part) = dorsal border
hinge line (in part) = dorsal border
Hinteransicht (G.) = posterior view
Hinterbogen (G.) = posterior border
Hinterecke (G.) = posterior corner
hintere Dorsalecke (G.) = posterior corner
hintere Furche (G.) = S3
Hinterende des Rückenrand (G.) = posterior corner
hinteren Vorderlappen (G.) = L3
hinterer Bogen des Seitenumrisses (G.) = posterior border
hinterer Dorsalwinkel (G.) = posterior cardinal angle
hinterer Schlossrand (G.) = posterior hinge area
hintere Spitze der Kantenlinie (G.) = posterior frontal point
hintere Wulst (G.) = L3

Hinterfurche (G.) = S1*
Hinterlappen (G.) = L1*
Hinterrand (G.) = posterior border
Hinter-Rand (G.) = posterior border
hinterste Wulst (G.) = L4
Höcker (G.) = lobe
högerskalet (S.) = right valve
Höhe (G.) = height
höjd (S.) = height
honexemplar (S.) = female
Horn (G.) = spine
horn = spine
horn-like process = spine
horse shoe ridge = horseshoe-shaped ridge
hyaline border = selvage

— I —

impressio (L.) = sulcus
inferior (L.) = ventral
infossature (It.) = socket; depression
Innenfläche (G.) = inner surface
Innenleiste (G.) = list
Innenrand (G.) = inner margin
innere Chitinschicht (G.) = chitin coating of epidermis
innere Lippe (G.) = proximal zone of duplicature
innere Randlamelle (G.) = duplicature
innere Saumlinie (G.) = inner selvage contact line
innere Schalenblatt (G.) = inner lamella
innere Schalenlamelle (G.) = inner lamella
innere Schlossleiste (G.) = hinge list
inner plate = inner lamella
instuckna punkter (S.) = punctae
integument = chitin coating of calcareous layer
interangularer Schlossrand (G.) = interangular hinge area

* Orientation the reverse of that accepted in this paper.

isthmus = horseshoe-shaped ridge

— J —

járulékos likacs-csatorna (H.) = adventive pore canal

— K —

kammartige Vorsprünge (G.) = marginal denticle
Kamme (G.) = dorsal denticle
Kantenlinie für die Kante des Saumes (G.) = selvage line
Kantensaum (G.) = velate ridge
kapitulum (H.) = capitulum
Kerbe (G.) = socket
Kiel (G.) = crest; ridge; velate ridge
Klappen (G.) = valves (see valve)
Klappenrand (G.) = free edge
knob (in part) = node
knobbel (D.) = node
knöl (S.) = node
Knotchen (G.) = tubercle; node
Knoten (G.) = node
konturen (S.) = outline
Körnelung (G.) = papillae (see papilla)
külső ajakvonal (H.) = outer selvage contact line
külső peremvonal (H.) = free edge
külső teknőlamella (H.) = outer lamella
külső záróléc (H.) = hinge flange

— L —

längd (S.) = length
Länge (G.) = length; axis
Längsachse (G.) = axis
Längsränder (G.) = dorsal border or ventral border
Längsschnitt (G.) = frontal section
Längswölbung (G.) = frontal rounding
Lappen (G.) = lobe
larghezza (It.) = height
lås (S.) = hinge

låsrand (S.) = hinge line
Lateralfläche (G.) = lateral surface
lateralyta (S.) = lateral surface
latitudo (L.) = height
lato dorsale (It.) = dorsal view
lato ventrale (It.) = ventral view
Leistchen (G) = crest
Leiste (G.) = crest
levigata (It.) = having a smooth surface ornamentation
limb (S.) = velate structure
linea dorsale (It.) = dorsal border
linker klep (D.) = left valve
linke Schale (F.) = left valve
lip = selvage
lisse (F.) = having a smooth surface ornamentation
lobe antérieur (F.) = L3*
lobe médian (F.) = L2
lobe postérieur (F.) = L1*
lobo (It.) = lobe
lobo centrale (It.) = L2
longeur (F.) = length
longitudo (L.) = length
loop = horseshoe-shaped ridge
lunghezza (It.) = length
Lunula (G., H.) = lunule

— M —

m = L2
margin = outline
marginal frill = frill
marginal furrow = channel
marginal ridge (in part) = velate ridge
marginal rim = velate ridge
margine anteriore (It.) = anterior border
margine cardinale (It.) = dorsal border
margine dorsale (It.) = dorsal border

* Orientation the reverse of that accepted in this paper.

margine interno (It.) = duplicature
margine laterale (It.) = lateral surface
margine posteriore (It.) = posterior border
margine transparente (It.) = duplicature
margine ventrale (It.) = ventral border
Maschennetz (G.) = reticulate surface ornamentation
mediane groeve (D.) = S2
median furrow = S2
Medianhöcker (G.) = L2
median lobe = L2
median node = L2
median sulcus = S2
mellersta lob (S.) = L2
mesial depression = S2
mesial sulcus = S2
middle lobe = L2
midtlob (S.) = L2
Mitte (G.) = central area
Mittelfurche (G.) = S2
Mittellapen (G.) = L2
mittlere Kalkschicht (G.) = calcareous layer
muscular imprint = muscle scar
muscle-spot = muscle scar
Muskelansatz (G.) = muscle scar
Muskelnarben (G.) = muscle scar

— N —

Narbe (G.) = muscle scar
Narbenfeld (G.) = muscle scar
nedre hörn (S.) = bend
nedtryckt kant (S.) = velate ridge
netzartig Skulptur (G.) = reticulate surface ornamentation
Netzwerk (G.) = reticulate surface ornamentation

— O —

Oberfläche (G.) = surface

Oberflächenskulptur (G.) = surface ornamentation
Oberrand (G.) = dorsal border
öfre konturen (S.) = dorsal border
öfverskjutande ventralrand (S.) = overlap
ögontuberkeln (S.) = eye tubercles (see eye tubercle)
oogtuberkel (D.) = eye tubercle
orlo marginale (It.) = outline
ornamenti (It.) = surface ornamentation
Ornamentik (G.) = surface ornamentation
outer plate = outer lamella
ovarian inflation = pouch
overhanging border = frill

— P —

p = L1*; L3
päronformig ventrallob (S.) = pouch
pelo (It.) = hair (see hairs)
peremajak (H.) = selvage
peremövön (H.) = contact margin
peu gibbeuses (F.) = tubercles (see tubercle)
piccole depressioni (It.) = punctae
plattadt bräm (S.) = frill
poils (F.) = hairs
Porencanäle (G.) = pore canal
Porenkanal (G.) = pore canal
Postcentralfurche (G.) = S1*
posterior free margin = posterior border
posterior lobe = L1*; L3; L4
posterior margin = posterior border
posterior sulcus = S3
posterodorsal angle = posterior cardinal angle
post-median node = L2*
postremus = L4
pp = L4

* Orientation the reverse of that accepted in this paper.

Praecentralfurche (G.) = S2* (dorsal part)
Procephal-Wulst (G.) = L3* (dorsal part)
processo aliforme (It.) = alate extension
Profilansicht (G.) = lateral view
Profillinie (G.) = outline
proximáles mező (H.) = proximal zone of duplicature
proximales Randfeld (G.) = proximal zone of duplicature
proximale Schalenlinie (G.) = inner margin
punktformiga upphöjningar (S.) = papillae (see papilla)
Punktierung (G.) = punctae
Püntchen (G.) = punctae
punteggiature (It.) = punctae
pustolette (It.) = pustule

— Q —

Querschnitt (G.) = transverse section
Querwölbung (G.) = transverse rounding

— R —

radial grooves = striate frill
radially striate frill = striate frill
radialt streckad (S.) = striate (of frill)
Randborde der inneren Lippe (G.) = selvage
Randfläche (G.) = marginal surface
Randkamn (G.) = denticulate frill
Randsaum (G.) = marginal ridge; velate ridge
randständiger Porenkanal (G.) = radial pore canal
Randverdickung (G.) = duplicature
Randzähne (G.) = marginal spines
rechter klep (D.) = right valve
regione ventrale anteriore (It.) = anteroventral area
reticolata (It.) = having a reticulate surface ornamentation
retral swing = swing*
rib = crest
rilievo oculare (It.) = eye tubercle

* Orientation the reverse of that accepted in this paper.

rim = velate ridge
Rinne (G.) = furrow; channel
Rippe (G.) = ridge
Rippchen (G.) = striate surface ornamentation
rostro (It.) = beak
Rückenansicht (G.) = dorsal view
Rücken Ansicht (G.) = dorsal view
Rückenrand (G.) = dorsal border
Runzel (G.) = furrow

— S —

Sagittalschnitt (G.) = sagittal section
Saum (G.) = selvage
Saumkante (G.) = selvage line
scar = muscle scar
Schale (G.) = carapace
Schalenduplikatur (G.) = duplicature
Schalenoberfläche (G.) = surface
scherpe randen (D.) = selvage
Schliessmuskeleindrücke (G.) = muscle scar
Schliessmuskelfleck (G.) = muscle scar
Schlossäule (G.) = tignum
Schlossleiste (G.) = hinge selvage
Schlossrand (G.) = hinge; hinge area; hinge line
Schlosszahn (G.) = tooth
scultura (It.) = surface ornamentation
second sulcus = S2
sedt framifrån (S.) = anterior view
sedt från bakre ändan (S.) = posterior view
sedt från sidan (S.) = lateral view
sedt från ventralytan (S.) = ventral view
Seitenansicht (G.) = lateral view
Seitenfläche (G.) = lateral surface
Seitenumriss (G.) = outline
seitlicher Ansicht (G.) = lateral view
serie transversale (It.) = transverse section

setae = hairs
setole (It.) = hair (see hairs)
shell (in part) = carapace
sillon (F.) = sulcus
skalen (S.) = valves (see valve)
skalkonturen (S.) = outline
skalyta (S.) = surface
skulptur (S., G.) = surface ornamentation
slutmuskel (S.) = adductor muscle
smala och skarpa lister (S.) = crests (see crest)
solco (It.) = sulcus
solco mediano (It.) = S2
spessore (It.) = width
spierindruksel (D.) = muscle scar
spinescente (It.) = having a spinose surface ornamentation
Spitz (G.) = spines (see spine)
Stachel (G.) = spine
Stachelreihe am Dorsalrande (G.) = dorsal denticles
ställning (S.) = orientation
stand der schalen (D.) = orientation
Stellung der Schalen (G.) = orientation
sterke bocht (D.) = swing
stöd åt en slutmuskel (S.) = muscle scar
subcentral portion = ventrocentral area
submarginal line = line of concrescence
submarginal ridge = velate ridge
sulcate depression = depression
superficie (It.) = surface
superior = dorsal
swelling = pouch
szeptum (H.) = septum

— T —

taggar (S.) = spines (see spine)
testa (L.) = carapace
test bivalve (F.) = carapace

thickness (in part) = width
tjocklek (S.) = width
Transversalschnitt (G.) = transverse section
true border = marginal structure
true margin = free edge
true valval margin = free edge
tubercle (in part) = eye tubercle
tubercule (F.) = tubercle
tuberculo oculare (It.) = eye tubercle
tuberculum oculare (L.) = eye tubercle
tuberculum rotundatum (L.) = node
Tuberkeln (G.) = tubercles (see tubercle)
tweekleppige schaal (D.) = carapace

— U —

Umbiegungskante (G.) = bend
Umbiegungs-Kante (G.) = bend
Umriss (G.) = outline
Umschlag (G.) = surface
undefined swelling = inflation
undre konturen (S.) = ventral border
Unterrand (G.) = ventral border
upphöjning (S.) = inflation
U-shaped ridge = horseshoe-shaped ridge

— V —

valódi peremlikacs-csatorna (H.) = radial pore canal
valva destra (It.) = right valve
valva sinistra (It.) = left valve
valve droite (F.) = right valve
valve gauche (F.) = left valve
valvlerna (S.) = valves (see valve)
valvlernas yta (S.) = surface
van ter zijde gezien (D.) = lateral view
van voren gezien (D.) = posterior view
velum = frill

vensterskalet (S.) = left valve
ventraalrand (D.) = ventral border
Ventralansicht (G.) = ventral view
ventral aspect = ventral view
Ventralbogen (G.) = ventral border
ventral edge = ventral border
Ventralfläche (G.) = marginal surface
Ventralhöcker (G.) = pouch
ventral margin = ventral border
ventral pouch = pouch
Ventralrand (G.) = ventral part of free edge; ventral border
ventral region = ventral area
verhevenheid (D.) = lobe
Verwachsungslinie (G.) = line of concrescence
vista di fronte (It.) = anterior view
vóór (D.) = anterior
voorand (D.) = anterior border
Vorder Ansicht (G.) = ventral view
Vorderansicht (G.) = ventral view
Vorderbogen (G.) = anterior border
Vorderecke (G.) = anterior corner
vordere Dorsalecke (G.) = anterior corner
vordere Furche (G.) = S1
Vorderende des Rückenrand (G.) = anterior corner
vorderen Vorderlappen (G.) = L4*
vorderer Bogen des Seitenumrisses (G.) = anterior border
vorderer Dorsalwinkel (G.) = anterior cardinal angle
vorderer Schlossrand (G.) = anterior hinge area
vordere Spitze der Kantenlinie (G.) = anterior frontal point
vordere Wulst (G.) = L1
Vorderfurche (G.) = S3*
Vorderrand (G.) = anterior part of free edge; anterior border
"Vorwärtsschwung" (G.) = swing
vrijerand (D.) = contact margin
vrouwelijke individuen (D.) = females

* Orientation the reverse of that accepted in this paper.

— W —

Warz (G.) = tubercle
Wärzchen (G.) = papilla
Winkel (G.) = cardinal angle
Wulst (G.) = lobe

— Y —

yoke = horseshoe-shaped ridge

— Z —

Zahn (G.) = tooth
zahnartige Vorsprünge (G.) = marginal spines
Zahnchen (G.) = toothlets
Zahngrube (G.) = socket
Zahnhöcker (G.) = tooth
Zahnhöckerchen (G.) = toothlets
Zahnlücke (G.) = socket
zárfog (H.) = tooth
zárosperemen (H.) = hinge
zároszlop (H.) = tignum
(a) zároszlop bázisa (H.) = base of tignum
zároszlop feje (H.) = capitulum
Zentrum (G.) = central area
(de) zijvlakte (D.) = lateral surface
"Zwischenmembran" (G.) = adhesive strip

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PLATES

Arrows point toward anterior end in each drawing.

EXPLANATION OF PLATE I

Parabolbina granosa (Ulrich)

FIG. 1. Lateral view of right valve, showing scalloped frill and granulose surface. After Swartz (1936, Pl. 80, Fig. 2).

Tetradella marchica (Krause)

FIG. 2. Lateral view of left valve, showing striate frill and quadrilobate lobation. After Swartz (1936, Pl. 81, Fig. 2*h*).

Ctenentoma polytropis (Öpik)

FIG. 3. Lateral view of female right valve, showing deep sulcus with geniculum, carinae, velate ridge, and loculi. After Öpik (1937, Fig. 4 and Pl. VIII, Fig. 7).

Ctenentoma ctenolopha (Öpik)

FIG. 4. Lateral view of left valve, showing marginal spines, carinae, velate ridge, and loculi. After Öpik (1937, Pl. X, Fig. 17).

Kiesowia radians (Krause)

FIG. 5. Lateral view of right valve showing wide striate frill and scattered nodes. After Ulrich and Bassler (1908, Pl. XXXIX, Fig. 12).

Tetradella perornata Öpik

FIG. 6. Lateral view of left valve, showing spinose frill, unusual lateral denticles on L1, L3, and L4, and connection of L1 and L3 to form a horseshoe-shaped ridge. After Öpik (1937, Fig. 3 and Pl. II, Figs. 8–9).

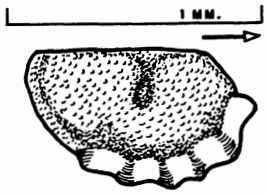
Rakverella bonnemai Öpik

FIG. 7. Lateral view of right valve, showing dorsal spine, denticulate frill, and unusual prolongation of L1. After Öpik (1937, Pl. XV, Figs. 10–11).

Rakverella spinosa Öpik

FIG. 8. Lateral view of left valve, showing dorsal spines, denticulate frill, prolongation of L1 and L3 as spines, and the ventral connections of L1, L2, and L3. After Öpik (1937, Fig. 6 and Pl. IX, Fig. 6).

PLATE I



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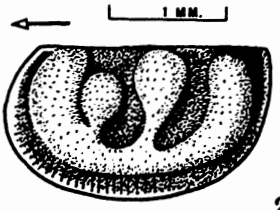
Parabolbina granosa (ULRICH)



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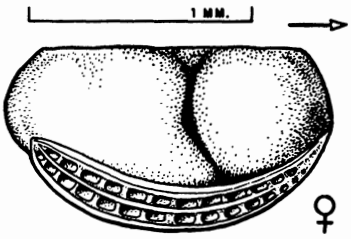
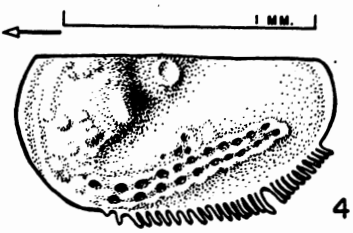
Tetradella marchica (KRAUSE)



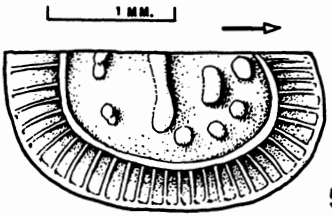
3 ♀

Ctenentoma polytropis (ÖPIK)



4

Ctenentoma ctenolopha (ÖPIK)



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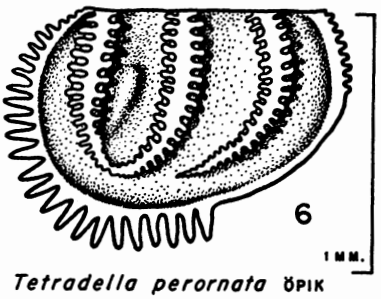
Kiesowia radians (KRAUSE)



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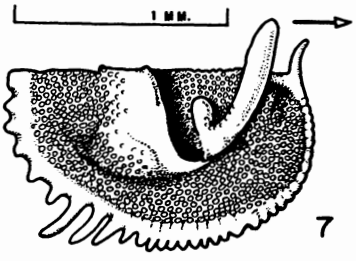
Tetradella perornata ÖPIK



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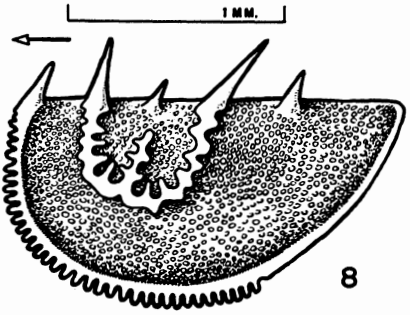
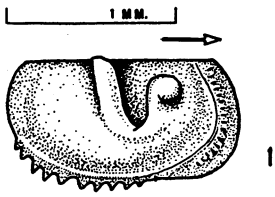
Rakverella bonnemai ÖPIK



8

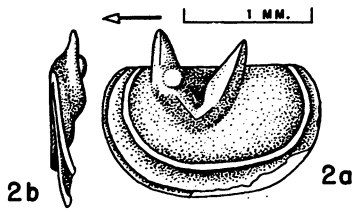
Rakverella spinosa ÖPIK

PLATE II

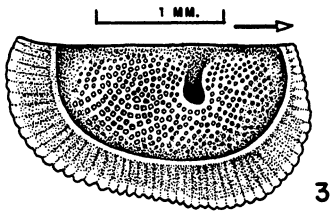


1

Dicranella spinosa ULRICH

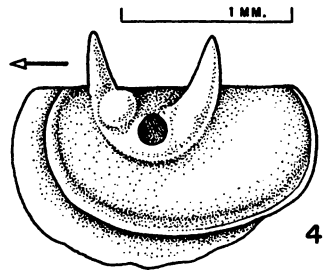


Dicranella bicornis ULRICH



3

Eurychilina reticulata ULRICH



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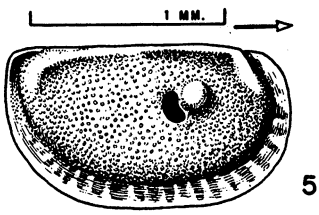
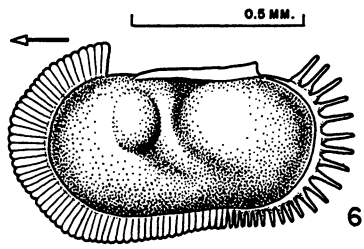
Dicranella bicornis ULRICH



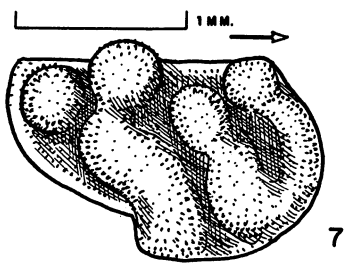
5

Laccochilina dorsiplicata HESSLAND



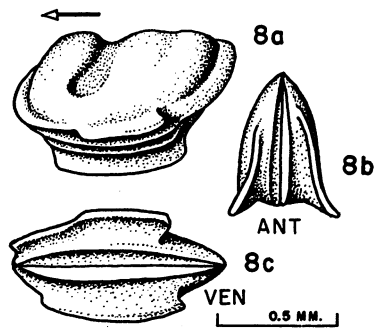
6

Beyrichiopsis fimbriata JONES & KIRKBY



7

Hollina insolens (ULRICH)



Ctenobolbina auricularis (JONES)

EXPLANATION OF PLATE II

Dicranella spinosa Ulrich

FIG. 1. Lateral view of right valve, showing frill and nodelike L2. After Swartz (1936, Pl. 78, Fig. 11*b*).

Dicranella bicornis Ulrich

FIG. 2. Lateral view (*a*) and anterior view (*b*) of left valve, showing frill, node for L2, prolongation of L1 and L3 as spines, and junction of L1 and L3. After Ulrich (1894, Pl. 46, Figs. 39–40).

Eurychilina reticulata Ulrich

FIG. 3. Lateral view of right valve, showing striate frill and reticulate surface ornamentation. After Swartz (1936, Pl. 78, Fig. 3*a*).

Dicranella bicornis Ulrich

FIG. 4. Lateral view of left valve, showing development of a pit immediately dorsal to junction of L1 and L3. After Swartz (1936, Pl. 78, Fig. 11*a*).

Laccochilina dorsiplicata Hessland

FIG. 5. Lateral view of right valve, showing slightly undulating frill with concentric structure, node for L2, and pit for S2. After Hessland (1949, Pl. VI, Fig. 6).

Beyrichiopsis fimbriata Jones and Kirkby

FIG. 6. Lateral view of left valve, showing the striate and spinose frill. After Ulrich and Bassler (1908, Pl. XXXVIII, Figs. 22–23).

Hollina insolens (Ulrich)

FIG. 7. Lateral view of right valve, showing spinose surface, bulb for L3, and knobby and irregular lobation. After Ulrich and Bassler (1908, Pl. XLII, Fig. 8).

Ctenobolbina auricularis (Jones)

FIG. 8. Left ventrolateral view (*a*), anterior view (*b*), and ventral view (*c*) of complete carapace, showing marginal ridges, channels, and alate extensions. The alate extensions of Cypridacea later originated independently, but have the same form (see Pl. XV, Fig. 4). After Ulrich and Bassler (1908, Pl. XL, Figs. 25–27).

EXPLANATION OF PLATE III

Ctenobolbina? octispina Öpik

FIG. 1. Lateral view of right valve, showing lobate development of velate structures. After Öpik (1937, Pl. XI, Fig. 16).

Ctenentoma loculata (Ulrich)

FIG. 2. Lateral view (*a*) and interior view (*b*) of left valve, showing scalloped frill, node for L2, and long slanting S2. After Ulrich and Bassler (1908, Pl. XL, Figs. 30–31).

Ctenentoma bispinosa (Ulrich)

FIG. 3. Lateral view of left valve, showing curved sulcus and unusual spines. After Ulrich and Bassler (1908, Pl. XL, Fig. 9).

Laccochilina estonula (Öpik)

FIG. 4. Lateral view of right valve, showing node for L2, pit for S2, and slight undulations of the frill. After Öpik (1935, Pl. 1, Fig. 6).

Hollina cavimarginata (Ulrich)

FIG. 5. Lateral view (*a*), interior view (*b*), and anterior view (*c*) of right valve, showing irregular lobation, and loculi in the frill. After Ulrich and Bassler (1908, Pl. XLII, Figs. 10–12).

Dilobella fulcrata (Ulrich)

FIG. 6. Lateral view (*a*) and anterior view (*b*) of right valve, showing loculi. After Ulrich and Bassler (1908, Pl. XL, Figs. 13–14).

Hollina spiculosa (Ulrich)

FIG. 7. Lateral view of left valve, showing spinose surface and frill. After Ulrich and Bassler (1908, Pl. XLII, Fig. 13).

Ctenobolbina alata Ulrich

FIG. 8. Right lateral view (*a*), ventral view (*b*), and dorsal view (*c*) of complete carapace, showing marginal tubercles, channels, and unusual alate extensions. After Ulrich (1890, Pl. VII, Figs. 4*a-c*).

Ctenonotella elongata Öpik

FIG. 9. Lateral view of left valve, showing frill, elongate lobes, and dorsal spines. After Öpik (1937, Pl. VIII, Fig. 2).

PLATE III

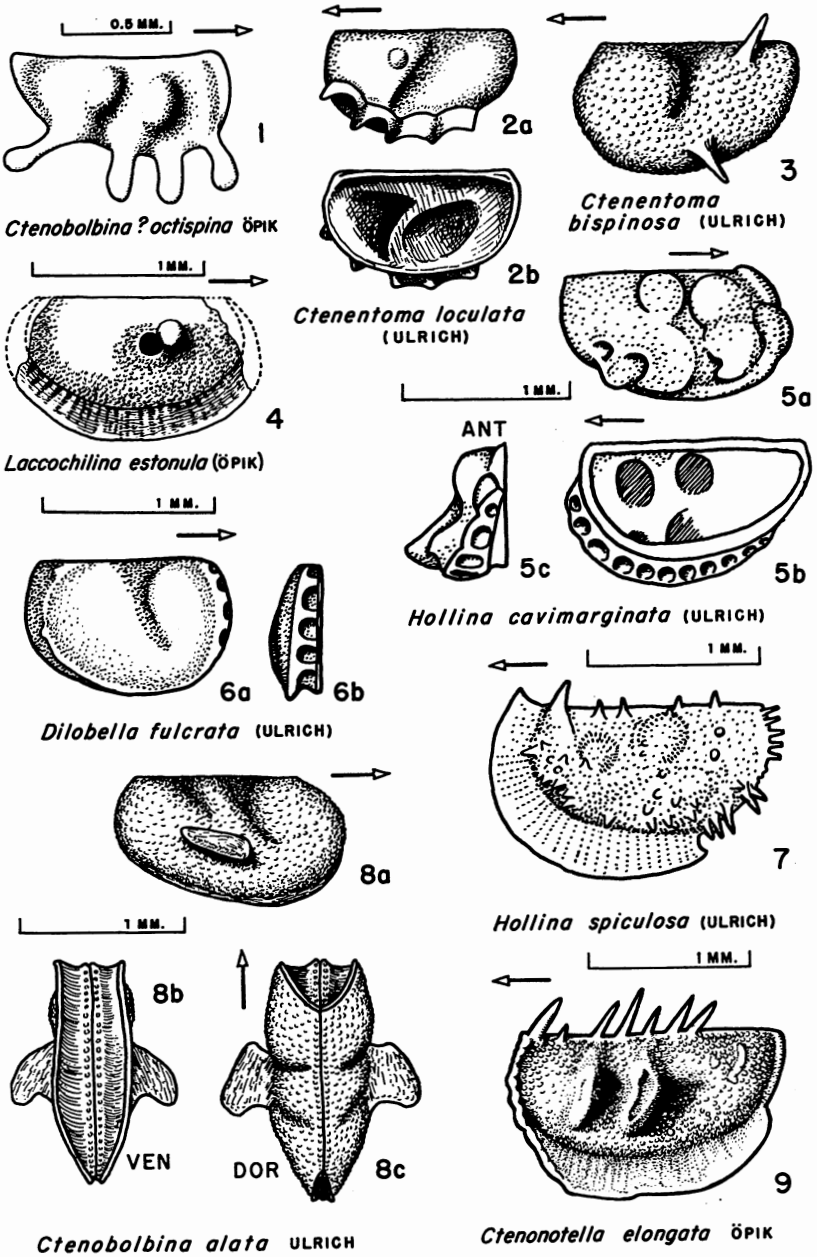
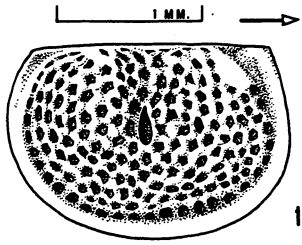
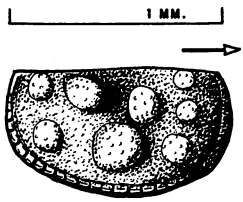

0.5 MM.
1
Ctenobolbina ? octispina ÖPIK
0.5 MM.
2a
2b
Ctenentoma loculata (ULRICH)
1 MM.
3
Ctenentoma bispinosa (ULRICH)
1 MM.
4
Laccochilina estonula (ÖPIK)
1 MM.
5a
ANT
5c
5b
Hollina cavimarginata (ULRICH)
1 MM.
6a
6b
Dilobella fulcrata (ULRICH)
1 MM.
7
Hollina spiculosa (ULRICH)
8a
1 MM.
8b
VEN
DOR
8c
Ctenobolbina alata ULRICH
1 MM.
9
Ctenonotella elongata ÖPIK

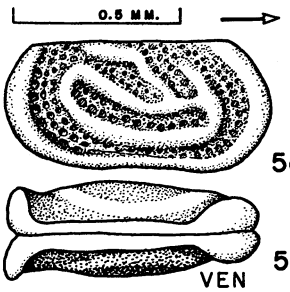
PLATE IV



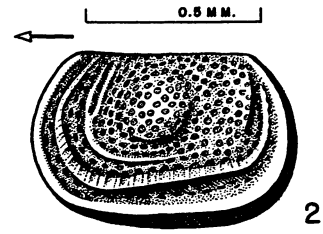
Amphissites lacrimosus SWARTZ and ORIEL



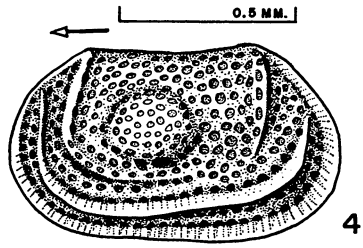
Kiesowia mamillosa (KRAUSE)



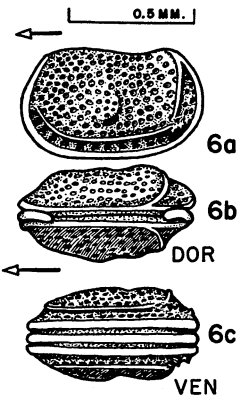
Moorites minutus (WARTHIN)

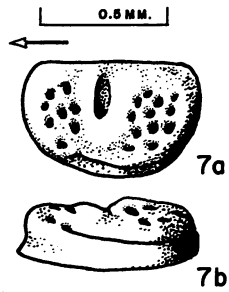


Amphissites rugosus GIRTY



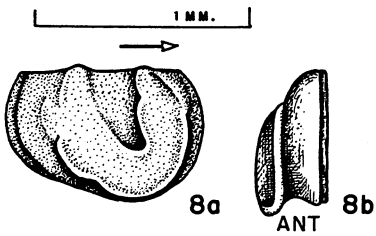
Amphissites margniferus ROTH



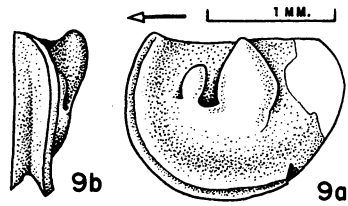


Pyxiprimitia ventriclefta SWARTZ

Amphissites dattonensis HARLTON



Dilobella crassa (ULRICH)



Dicranella marginata ULRICH

EXPLANATION OF PLATE IV

Amphissites lacrimosus Swartz and Oriel

FIG. 1. Lateral view of right valve, showing reticulation. This species closely resembles *Halliella retifera* Ulrich as illustrated by Ulrich (1890, Pl. XV, Fig. 5). After Swartz and Oriel (1948, Pl. 79, Fig. 15).

Amphissites rugosus Girty

FIG. 2. Lateral view of left valve, showing frill and carinae. After Bradfield (1935, Pl. 3, Fig. 12).

Kiesowia mamillosa (Krause)

FIG. 3. Lateral view of right valve, showing scattered nodes representing the lobation. After Ulrich and Bassler (1908, Pl. XXXIX, Fig. 11).

Amphissites marginiferus Roth

FIG. 4. Lateral view of left valve, showing frill, carinae, nodelike L2, and "Kirkbyian" pit below the L2. After Bradfield (1935, Pl. 3, Fig. 14).

Moorites minutus (Warthin)

FIG. 5. Right lateral view (*a*) and ventral view (*b*) of complete carapace, showing combination of ridges and reticulation on the surface. After Bradfield (1935, Pl. 5, Fig. 1).

Amphissites dattonensis Harlton

FIG. 6. Left lateral view (*a*), dorsal view (*b*), and ventral view (*c*) of complete carapace, showing velate ridges, carinae, surface reticulation, and pit. After Bradfield (1935, Pl. 4, Figs. 9*a–c*).

Pyxiprimitia ventriclefta Swartz

FIG. 7. Lateral view (*a*) and ventral view (*b*) of left valve, showing pitted surface. After Swartz (1936, Pl. 87, Figs. 2*a–b*).

Dilobella crassa (Ulrich)

FIG. 8. Lateral view (*a*) and anterior view (*b*) of right valve, showing velate ridge and wide channel. After Ulrich and Bassler (1908, Pl. XL, Figs. 15–16).

Dicranella marginata Ulrich

FIG. 9. Lateral view (*a*) and anterior view (*b*) of left valve, showing wide velate ridge and deep channel. After Ulrich (1894, Pl. XLIV, Figs. 27–28).

EXPLANATION OF PLATE V

Euglyphella numismoides Swartz and Oriel

FIG. 1. Lateral view of right valve, showing surface ridges. After Swartz and Oriel (1948, Pl. 81, Fig. 5).

Ulrichia affinis Swartz

FIG. 2. Lateral view (*a*) and dorsal view (*b*) of left valve, showing nodes and pitted surface. After Swartz (1936, Pl. 87, Figs. 6*c–d*).

Kiesowia dissecta (Krause)

FIG. 3. Lateral view of right valve, showing nodes comprising the lobation. After Ulrich and Bassler (1908, Pl. XXXIX, Fig. 10).

Roundyella bellatula Bradfield

FIG. 4. Lateral view of left valve, showing pit and surface reticulation. After Bradfield (1935, Pl. IV, Fig. 11).

Hemicythere jollaensis LeRoy

FIG. 5. Right lateral view (*a*), dorsal view (*b*), and ventral view (*c*) of complete carapace, showing a pattern of reticulation and L/R overlap. After LeRoy (1943, Pl. 59, Figs. 28–29, 31).

Cythereis pennata LeRoy

FIG. 6. Left lateral view (*a*) and ventral view (*b*) of complete carapace, showing alate extensions and marginal tubercles and denticles. After LeRoy (1943, Pl. 59, Figs. 36–37).

Scaberina nodomarginata Bradfield

FIG. 7. Lateral view (*a*) and interior view (*b*) of left valve, showing nodular character of the surface. The dorsal margin and the free border clearly extend beyond the hinge line and the free edge of the contact margin. After Bradfield (1935, Pl. IV, Figs. 12*a–b*).

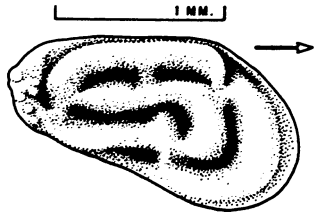
Cytheruro? saratogana Israelsky

FIG. 8. Lateral view of right valve, showing surface ornamentation of interrupted crests. After Israelsky (1929, Pl. IV, Fig. 8).

Cythereis hazardi Israelsky

FIG. 9. Lateral view of left valve, showing surface ornamentation of crests and small nodes. After Israelsky (1929, Pl. IV, Fig. 9).

PLATE V



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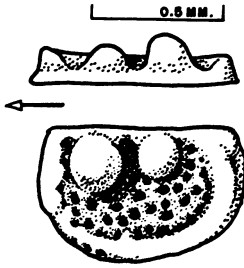
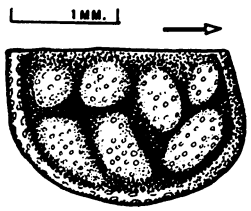
Euglyphella numismoides SWARTZ and ORIEL



2b

2a

Ulrichia affinis SWARTZ



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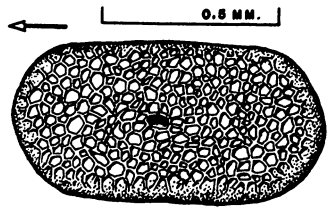
Kiesowia dissecta (KRAUSE)



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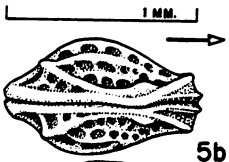
Roundyella bellatula BRADFIELD

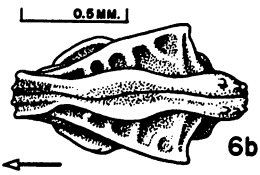


5b

5a

5c

Hemicythere jollaensis LE ROY



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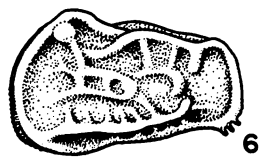
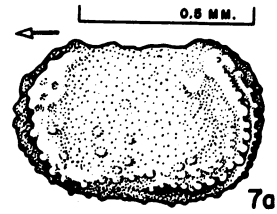


6a

Cythereis pennata LE ROY



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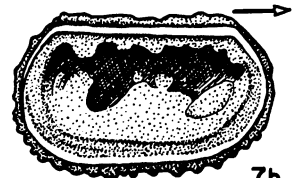
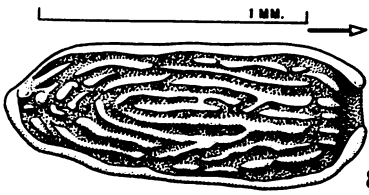


7b

Scaberina nodomarginata BRADFIELD



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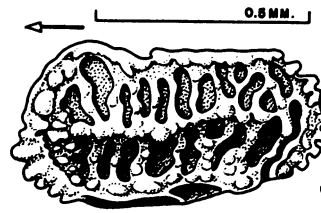
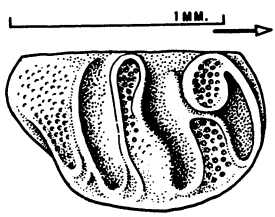
Cytherura? saratogana ISRAELSKY



9

Cythereis hazardi ISRAELSKY

PLATE VI



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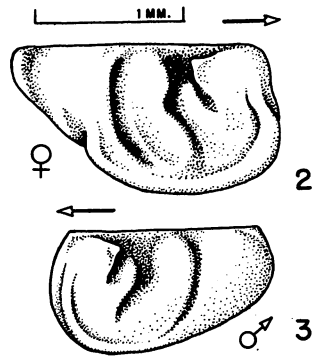
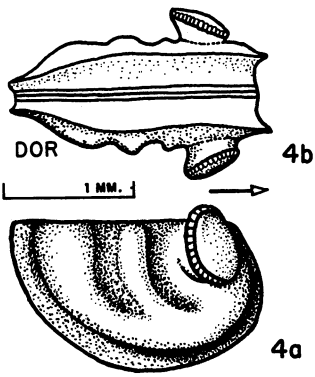
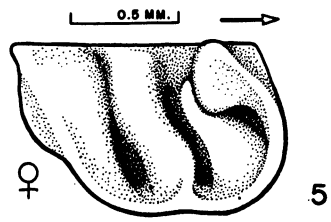
Ceratopsis perpunctata ÖPIK

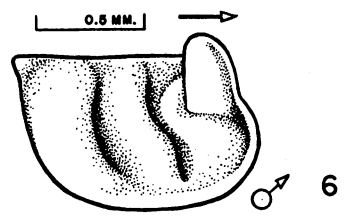


Ceratopsis platyceras ÖPIK

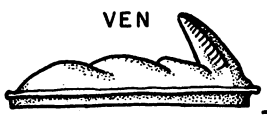


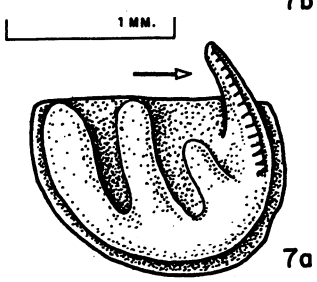
Ceratopsis oculifera (HALL)



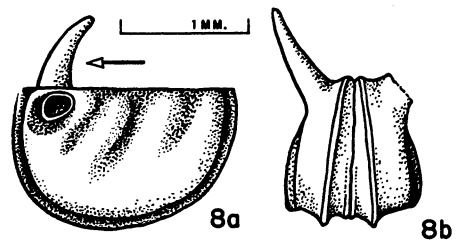


Ceratopsis obliquejugata (SCHMIDT)





Ceratopsis chambersi (MILLER)



Ceratopsis chambersi robusta ULRICH

EXPLANATION OF PLATE VI

Ceratopsis perpuncta Öpik

FIG. 1. Lateral view of right valve, showing punctate lobes and unusual development of L1. After Öpik (1937, Pl. X, Fig. 3).

Ceratopsis platyceras Öpik

FIG. 2. Lateral view of female right valve, showing ventral dimorphism in the velate ridge. After Öpik (1937, Pl. II, Fig. 6).

FIG. 3. Lateral view of male left valve, showing dimorphism in the weak velate ridge. After Öpik (1937, Pl. II, Fig. 7).

Ceratopsis oculifera (Hall)

FIG. 4. Right lateral view (*a*) and dorsal view (*b*) of complete carapace, showing unusual development of L1. After Ulrich and Bassler (1908, Pl. XXXIX, Figs. 19–20).

Ceratopsis obliquejugata (Schmidt)

FIG. 5. Lateral view of female right valve, showing dimorphism of L1. After Öpik (1937, Pl. II, Fig. 4).

FIG. 6. Lateral view of male right valve, showing dimorphism of L1. After Öpik (1937, Pl. II, Fig. 3).

Ceratopsis chambersi (Miller)

FIG. 7. Lateral view (*a*) and ventral view (*b*) of right valve, showing prolongation of L1 as an ornate spine and a velate ridge. After Ulrich and Bassler (1908, Pl. XXXIX, Figs. 13–14).

Ceratopsis chambersi robusta Ulrich

FIG. 8. Left lateral view (*a*) and anterior view (*b*) of carapace with left spine broken, showing prolongation of L1 as a large curved spine. After Ulrich and Bassler (1908, Pl. XXXIX, Figs. 17–18).

EXPLANATION OF PLATE VII

Eurychilina subradiata Ulrich

FIG. 1. Lateral view (*a*), interior view (*b*), and transverse section (*c*) of right valve, showing punctate surface and broad incurved frill. After Ulrich (1894, Pl. XLIV, Figs. 3, 4, 4*a*).

Glossopsis lingua Hessland

FIG. 2. Lateral view (*a*) and dorsal view (*b*) of left valve, showing fissure for S3, long narrow L2, and projection of ventral border below free edge. After Hessland (1949, Pl. VIII, Figs. 7*a–b*).

Glossopsis alata Hessland

FIG. 3. Lateral view of right valve, showing fissure-like S3, quadrilobate lobation, and punctate surface. After Hessland (1949, Pl. VII, Fig. 26).

Aulacopsis bifissurata Hessland

FIG. 4. Lateral view of right valve, showing long sulcus (S2) and distinct fissures on each side of the ventral end of S2. After Hessland (1949, Pl. VII, Fig. 13).

Tetradella quadrilirata (Hall and Whitfield)

FIG. 5. Lateral view (*a*), dorsal view (*b*), and anterior view (*c*) of left valve, showing quadrilobate lobation, ridges for L1, L2, L3, and L4, and slight development of loculi. After Ulrich (1894, Pl. XLVI, Figs. 1–3).

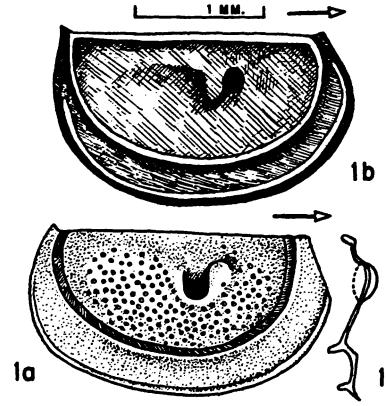
Tetradella lunatifera (Ulrich)

FIG. 6. Lateral view (*a*), ventral view (*b*), and anterior view (*c*) of right valve, showing quadrilobate lobation and unusual bifurcation of L1 and L3. After Ulrich (1894, Pl. XLVI, Figs. 12–14).

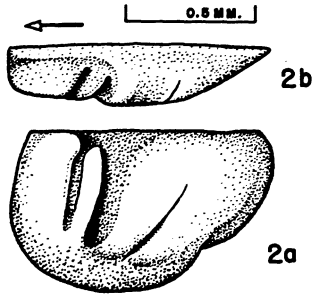
Ogmoopsis nodulifera Hessland

FIG. 7. Lateral view (*a*), ventral view (*b*), and anterior view (*c*) of left valve, showing quadrilobate lobation, velate ridge, and carina. After Hessland (1949, Pl VIII, Figs. 20*a–c*).

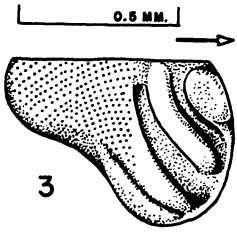
PLATE VII



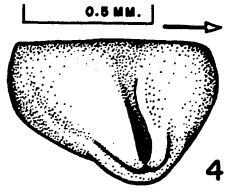
Eurychilina subradiata ULRICH



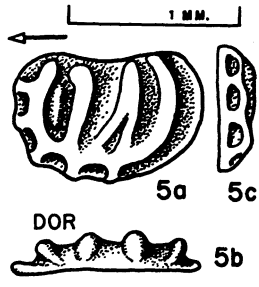
Glossopsis lingua HESSLAND



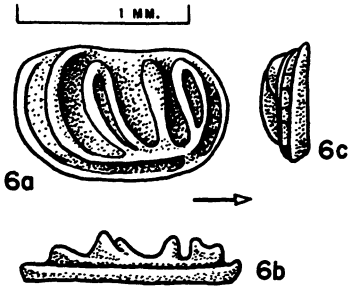
Glossopsis alata HESSLAND



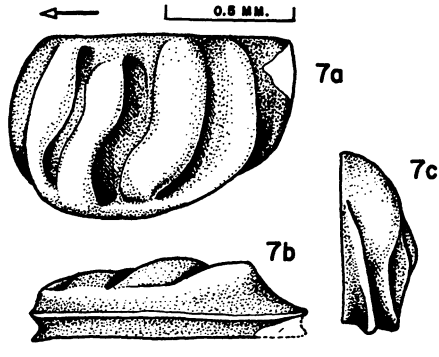
Aulacopsis bifissurata HESSLAND



Tetradella quadrilirata (HALL & WHITFIELD)

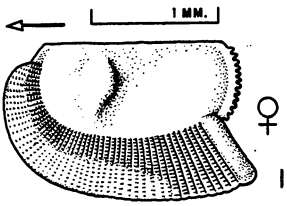


Tetradella lunatifera (ULRICH)

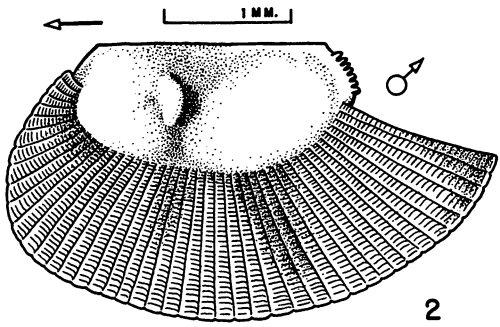


Ogmoopsis nodulifera HESSLAND

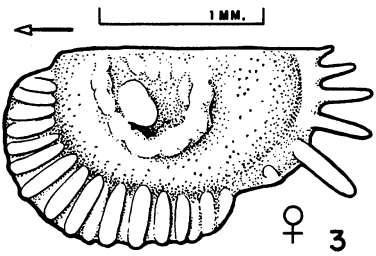
PLATE VIII



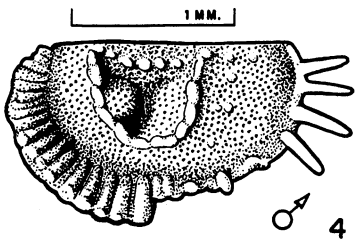
Öpikium tenerum (ÖPIK)



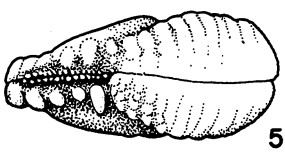
Öpikium tenerum (ÖPIK)

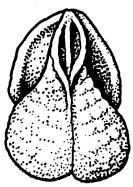


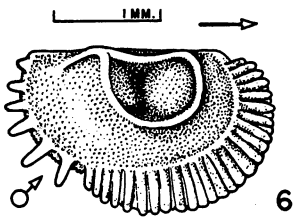
Piretella margaritata ÖPIK



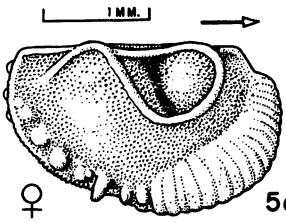
Piretella margaritata ÖPIK

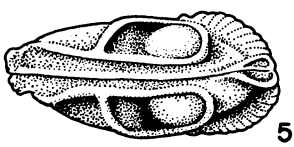




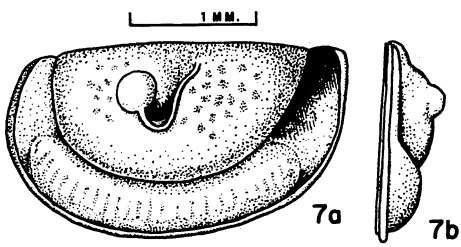


Piretella acmaea ÖPIK





Piretella acmaea ÖPIK



Eurychilina ventrosa ULRICH

EXPLANATION OF PLATE VIII

Öpikium tenerum (Öpik)

FIG. 1. Lateral view of female left valve, showing marginal denticles and terminal thickening of the dimorphic frill. After Öpik (1937, Pl. V, Figs. 3–4).

FIG. 2. Lateral view of male left valve, showing reticulate frill (with both striae and concentric structure). After Öpik (1937, Pl. V, Figs. 1–2).

Piretella margaritata Öpik

FIG. 3. Lateral view of female left valve, showing development of a false pouch by the incurved nodulous frill. The posterior part of the velate structure developed as widely spaced long spines. After Öpik (1937, Pl. XIV, Fig. 11).

FIG. 4. Lateral view of male left valve, showing frill formed by fused spines and discrete spines in posteroventral area of valve. After Öpik (1937, Pl. XIV, Fig. 10).

Piretella acmaea Öpik

FIG. 5. Right lateral view (*a*), dorsal view (*b*), ventral view (*c*), and anterior view (*d*) of complete female carapace, showing development of a false pouch by incurving of nodulous frill. A crest surrounds S2, and the free edge has marginal denticles. After Öpik (1937, Pl. VII, Figs. 6–9).

FIG. 6. Lateral view of male right valve, showing frill formed of fused spines in its anterior and ventral parts and discrete spines in its posterior part. A crest surrounds S2. After Öpik (1937, Pl. IV, Fig. 7).

Eurychilina ventrosa Ulrich

FIG. 7. Lateral view (*a*) and anterior view (*b*) of left valve, showing false pouch formed by an incurved frill, nodelike L2, and small crest extending from L2 around ventral end of S2. After Ulrich (1894, Pl. XLV, Figs. 2–3).

EXPLANATION OF PLATE IX

Dibolbina cristata Ulrich and Bassler

FIG. 1. Lateral view of male left valve, showing crest and striate frill. After Ulrich and Bassler (1923, Fig. 20, No. 7).

FIG. 2. Lateral view of female left valve, showing crest, striate frill, and circular pouch. After Ulrich and Bassler (1923, Fig. 20, No. 8).

Beyrichia moodeyi Ulrich and Bassler

FIG. 3. Lateral view (*a*) and ventral view (*b*) of female right valve, showing striate frill and ovate pouch. After Swartz (1936, Pl. 78, Figs. 8*k–l*).

FIG. 4. Lateral view (*a*) and ventral view (*b*) of male left valve, showing dimorphism and striate frill. After Swartz (1936, Pl. 78, Figs. 8*i–j*).

Beyrichia tuberculata (Klöden)

FIG. 5. Lateral view (*a*), ventral view (*b*), and posterior view (*c*) of female left valve, showing ovate pouch, tripartite L3, and tuberculate surface. After Ulrich and Bassler (1908, Pl. XXXVII, Fig. 2).

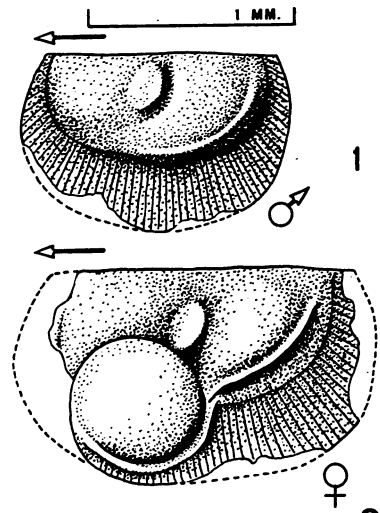
FIG. 6. Lateral view (*a*), ventral view (*b*), posterior view (*c*), and anterior view (*d*) of male right valve, showing character of dimorphic lobation and tuberculate surface. After Ulrich and Bassler (1908, Pl. XXXVII, Fig. 1).

Chilobolbina dentifera (Bonnema)

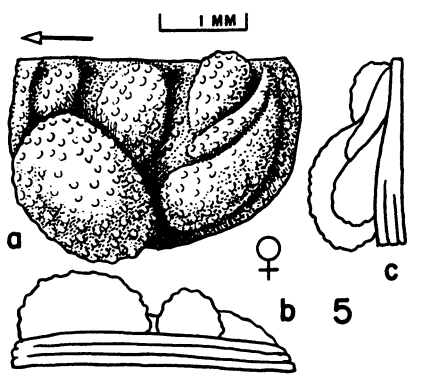
FIG. 7. Lateral view of female right valve, showing striate frill, pouch, and unusual pit for S2. After Ulrich and Bassler (1923, Fig. 16, No. 2).

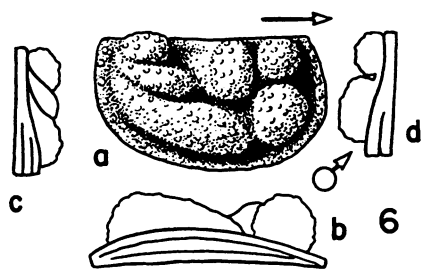
FIG. 8. Lateral view of male right valve, showing striate frill and unusual pit. After Ulrich and Bassler (1923, Fig. 16, No. 1).

PLATE IX

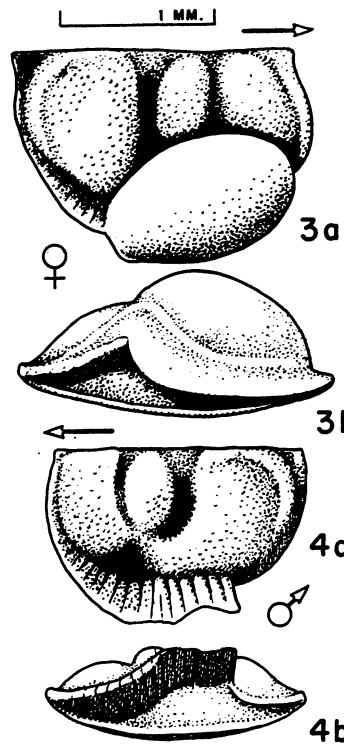


Dibolbina cristata
ULRICH and BASSLER

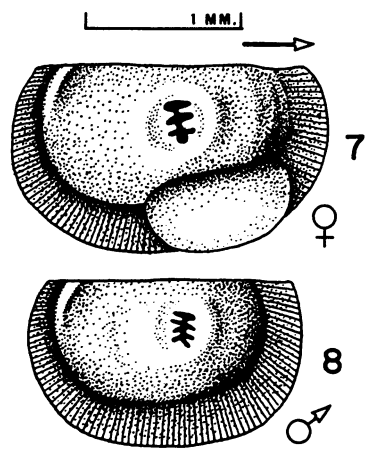




Beyrichia tuberculata (KLÖDEN)

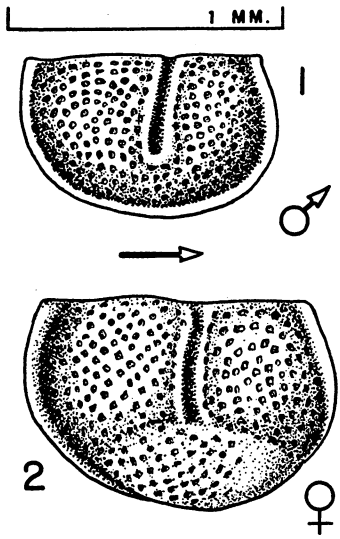


Beyrichia moodeyi
ULRICH and BASSLER

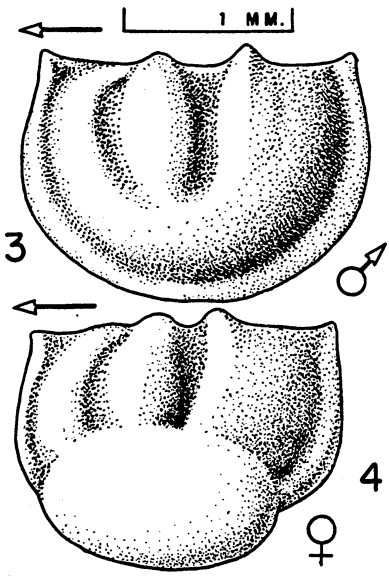


Chilobolbina dentifera
(BONNEMA)

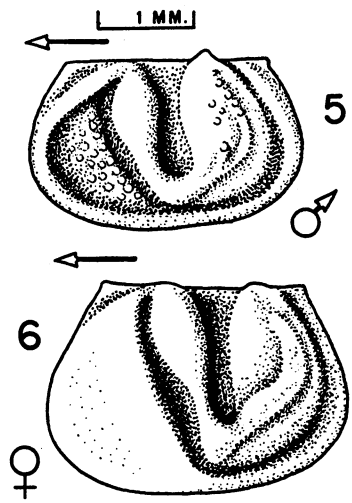
PLATE X



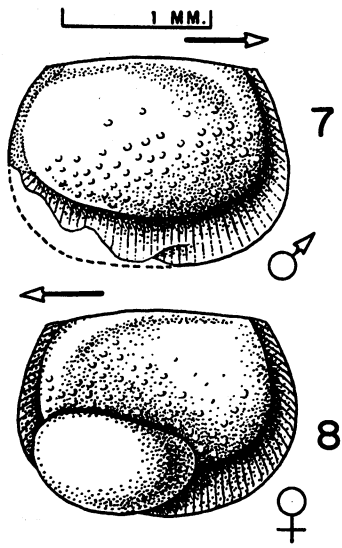
Halliella fissurella
ULRICH and BASSLER



Kyamodes tricornia
ULRICH and BASSLER



Mastigobolbina triplicata
(FOERSTE)



Apatobolbina granifera
ULRICH and BASSLER

EXPLANATION OF PLATE X

Halliella fissurella Ulrich and Bassler

FIG. 1. Lateral view of male right valve, showing punctate surface and long S2. After Ulrich and Bassler (1923, Pl. XXXVII, Fig. 22).

FIG. 2. Lateral view of female right valve, showing dimorphic pouch. After Ulrich and Bassler (1923, Pl. XXXVII, Fig. 23).

Kyamodes tricornia Ulrich and Bassler

FIG. 3. Lateral view of male left valve, showing dimorphism and trilobate lobation. After Ulrich and Bassler (1923, Pl. LV, Fig. 1).

FIG. 4. Lateral view of female left valve, showing dimorphic pouch. After Ulrich and Bassler (1923, Pl. LV, Fig. 2).

Mastigobolbina triplicata (Foerste)

FIG. 5. Lateral view of male left valve, showing dimorphism and crest on L3. After Ulrich and Bassler (1923, Pl. L, Fig. 1).

FIG. 6. Lateral view of female left valve, showing anteroventral pouch and ventral connection of L2 and L3. After Ulrich and Bassler (1923, Pl. 1, Fig. 4).

Apatobolbina granifera Ulrich and Bassler

FIG. 7. Lateral view of male right valve, showing dimorphism and striate frill. After Ulrich and Bassler (1923, Fig. 16, No. 3).

FIG. 8. Lateral view of female left valve, showing striate frill, pouch, and scattered tubercles on the surface. After Ulrich and Bassler, (1923, Fig. 16, No. 4).

EXPLANATION OF PLATE XI

Kloedenia centricornis Ulrich and Bassler

FIG. 1. Lateral view of female right valve, showing punctate surface, pouch, and unusual L2. After Ulrich and Bassler (1908, Pl. XXXV, Fig. 23).

Beyrichia kirki Ulrich and Bassler

FIG. 2. Lateral view of male left valve, showing dimorphic development of L2 and L3. After Ulrich and Bassler (1923, Pl. LXIII, Fig. 29).

FIG. 3. Lateral view of female left valve, showing the pouch and dimorphic character of L2 and L3. After Ulrich and Bassler (1923, Pl. LXIII, Fig. 30).

Treposella lyoni (Ulrich)

FIG. 4. Lateral view of female right valve, showing dimorphic character of L3 and pouch. After Ulrich and Bassler (1908, Pl. XLII, Fig. 4).

FIG. 5. Lateral view of male left valve, showing dimorphic character of L3 and coarse reticulation of the surface. After Ulrich and Bassler (1908, Pl. XLII, Fig. 1).

Zygobolbina conradi Ulrich and Bassler

FIG. 6. Lateral view of male right valve, showing horseshoe-shaped ridge formed by L2 and L3. After Ulrich and Bassler (1923, Pl. XLIII, Fig. 1).

FIG. 7. Lateral view of female left valve, showing pouch and dimorphic character of L2 and L3. After Ulrich and Bassler (1923, Pl. XLIII, Fig. 5).

Bolbibollia labrosa Ulrich and Bassler

FIG. 8. Left lateral view of male carapace, showing slightly rounded dorsal border, and horseshoe-shaped ridge formed by L2 and L3. After Ulrich and Bassler (1923, Fig. 15, No. 17).

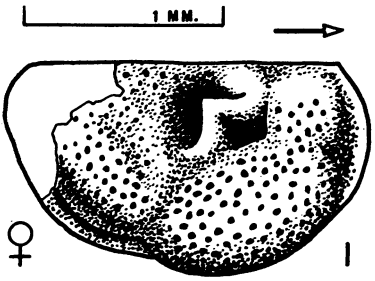
FIG. 9. Right lateral view of female carapace, showing pouch. After Ulrich and Bassler (1923, Fig. 15, No. 16).

Kloedenia normalis Ulrich and Bassler

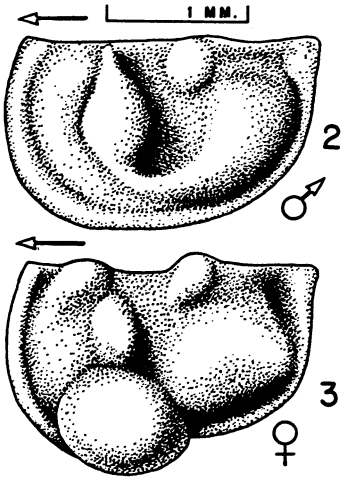
FIG. 10. Lateral view of male left valve, showing trilobate lobation. After Swartz (1936, Pl. 84, Fig. 5*c*).

FIG. 11. Lateral view of female left valve, showing pouch. After Swartz (1936, Pl. 84, Fig. 5*d*).

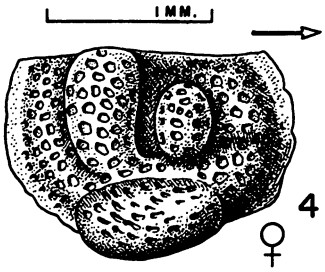
PLATE XI



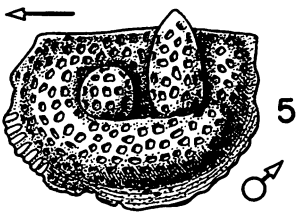
Kloedenia centricornis U.& B.

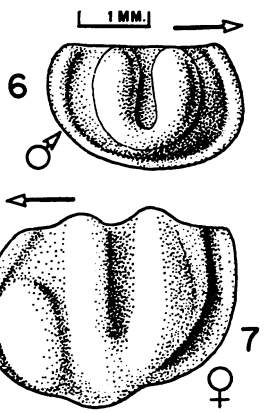


Beyrichia kirki ULRICH and BASSLER

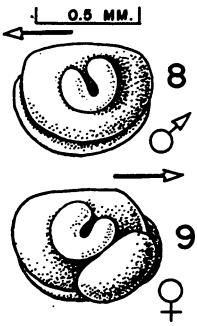


Treposella lyoni (ULRICH)

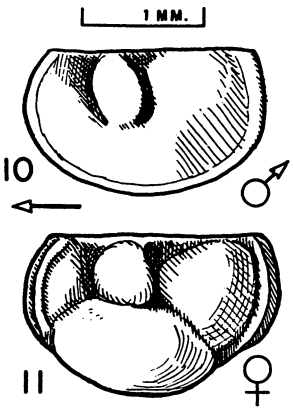




Zygobolbina conradi
ULRICH and BASSLER

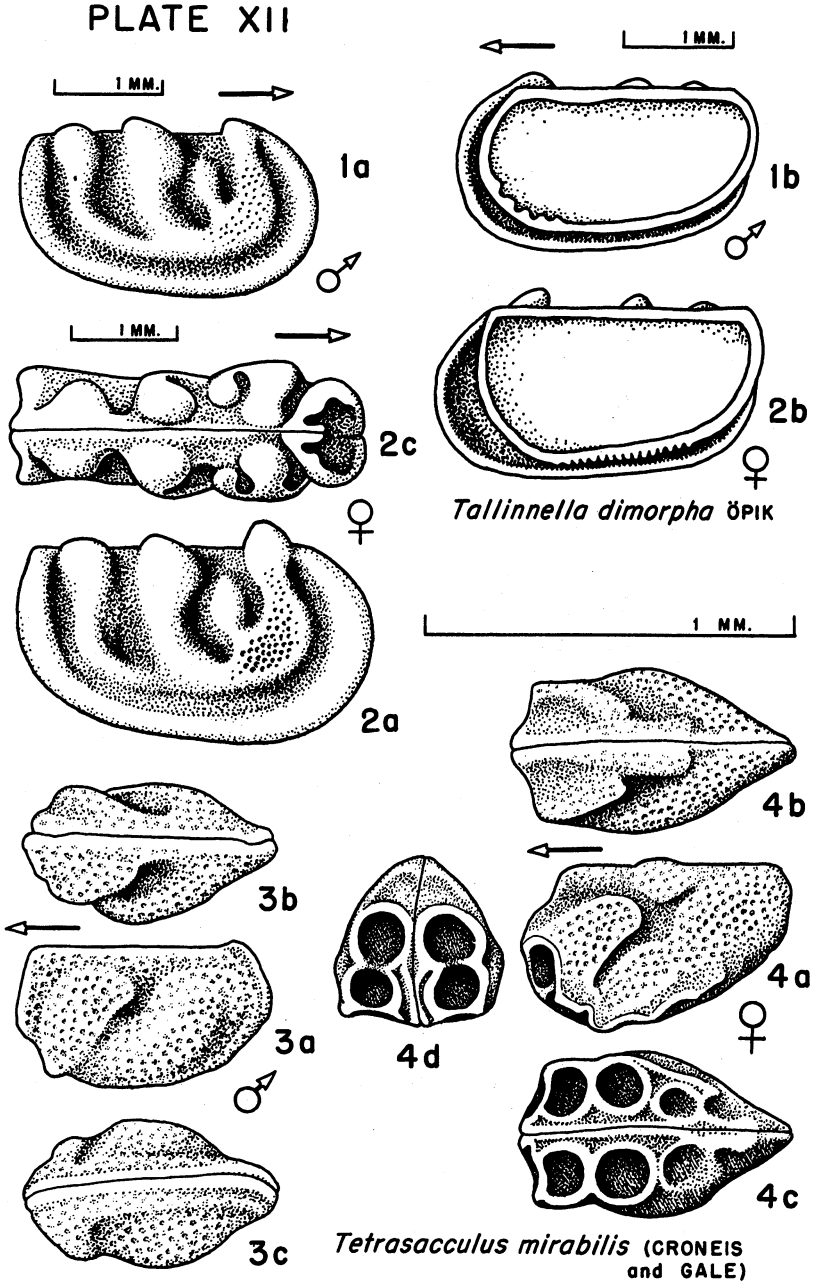


Bolbibollia labrosa
ULRICH and BASSLER



Kloedenia normalis
ULRICH & BASSLER

PLATE XII


1 MM.
1a
1 MM.
1b
♂
1 MM.
2c
♀
2b
♀
Tallinnella dimorpha ÖPIK
2a
1 MM.
4b
3b
4a
♀
4d
3a
♂
4c
3c
Tetrasacculus mirabilis (CRONEIS and GALE)

EXPLANATION OF PLATE XII

Tallinella dimorpha Öpik

FIG. 1. Lateral view (*a*) and interior view (*b*) of male right valve, showing dimorphic development of the incurved frill and L1. After Öpik (1937, Pl. II, Figs. 1*a–b*, 2*a*).

FIG. 2. Right lateral view (*a*) and dorsal view (*c*) of complete female carapace and interior view of female right valve (*b*), showing dimorphic development of the frill and L1. After Öpik (1937, Pl. X, Figs. 1–2; Pl. II, Fig. 2*b*).

Tetrasacculus mirabilis (Croneis and Gale)

FIG. 3. Left lateral view (*a*), dorsal view (*b*), and ventral view (*c*) of male carapace, showing dimorphic character of S2. After Cooper (1941, Pl. 14, Figs. 45–47).

FIG. 4. Left lateral view (*a*), dorsal view (*b*), ventral view (*c*), and anterior view (*d*) of female carapace, showing dimorphic character of S2, frill, and loculi. After Cooper (1941, Pl. 14, Figs. 50–53).

EXPLANATION OF PLATE XIII

Ctenoloculina cicatricosa (Warthin)

FIG. 1. Left lateral view (*a*) and ventral view (*b*) of female carapace, showing quadrilobate lobation, scalloped frill, and loculi. Specimen from the Norway Point formation of the Middle Devonian Traverse group of Michigan.

FIG. 2. Lateral view of male left valve, showing quadrilobate lobation and spurs at the ventral ends of L1, L2, and L3. Specimen from the Norway Point formation of the Middle Devonian Traverse group of Michigan.

FIG. 3. Lateral view of incomplete hermaphrodite (?) left valve, showing the spurs typical of the male and the scalloped frill (loculi not visible) typical of the female. Specimen from the Norway Point formation of the Middle Devonian Traverse group of Michigan.

Hollinella dentata Coryell

FIG. 4. Lateral view of immature left valve, showing fused tubercles forming the velate structure. After Cooper (1946, Pl. 13, Fig. 32).

FIG. 5. Lateral view of male right valve, showing the frill flared outward. After Cooper (1946, Pl. 13, Fig. 34).

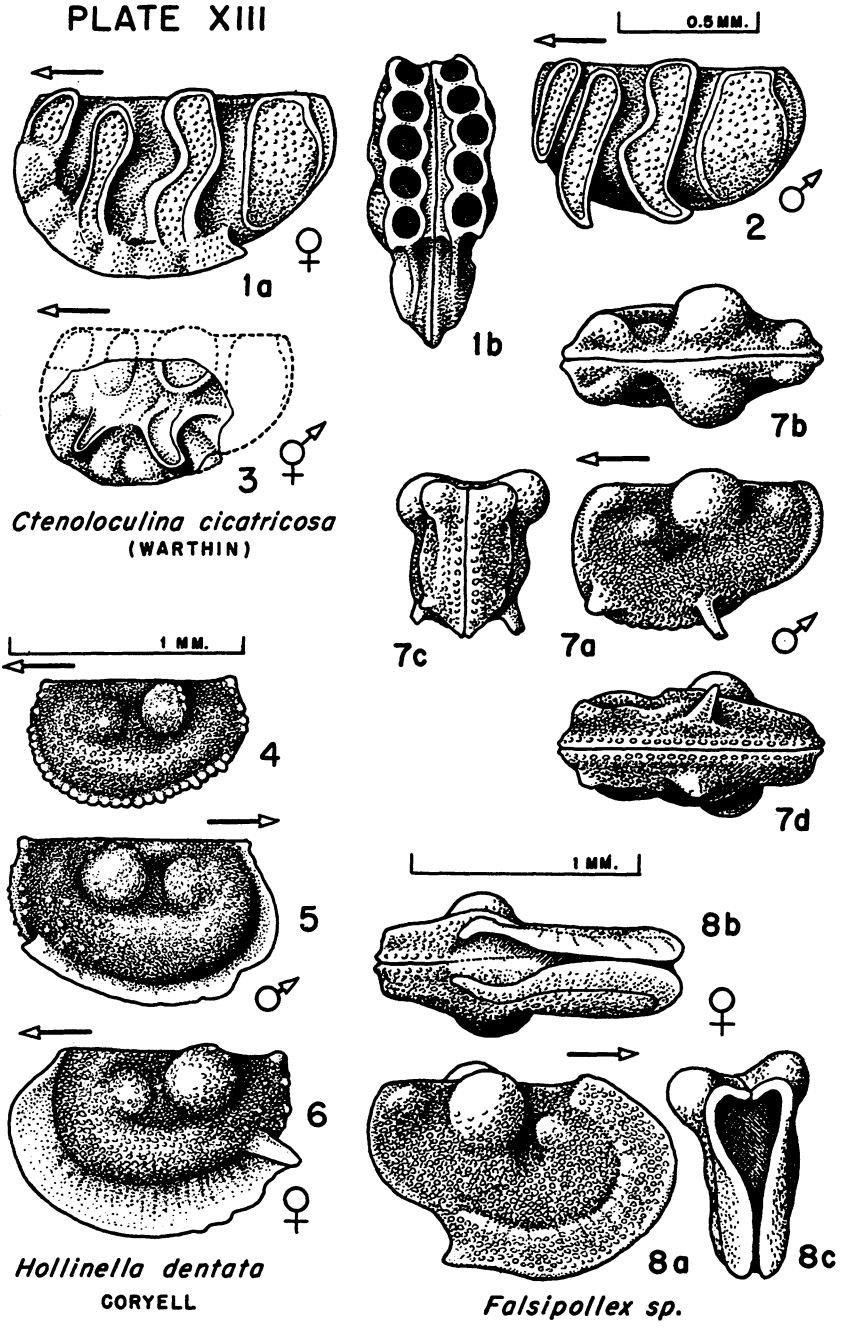
FIG. 6. Lateral view of female left valve, showing the broad incurved frill. After Cooper (1946, Pl. 13, Fig. 38).

Falsipollex sp.

FIG. 7. Left lateral view (*a*), dorsal view (*b*), anterior view (*c*), and ventral view (*d*) of male carapace, showing the anteroventral and posteroventral spurs. Specimen from the Ferron Point formation of the Middle Devonian Traverse group of Michigan.

FIG. 8. Right lateral view (*a*), ventral view (*b*), and anterior view (*c*) of female carapace, showing incurved frill. Specimen from the Ferron Point formation of the Middle Devonian Traverse group of Michigan.

PLATE XIII

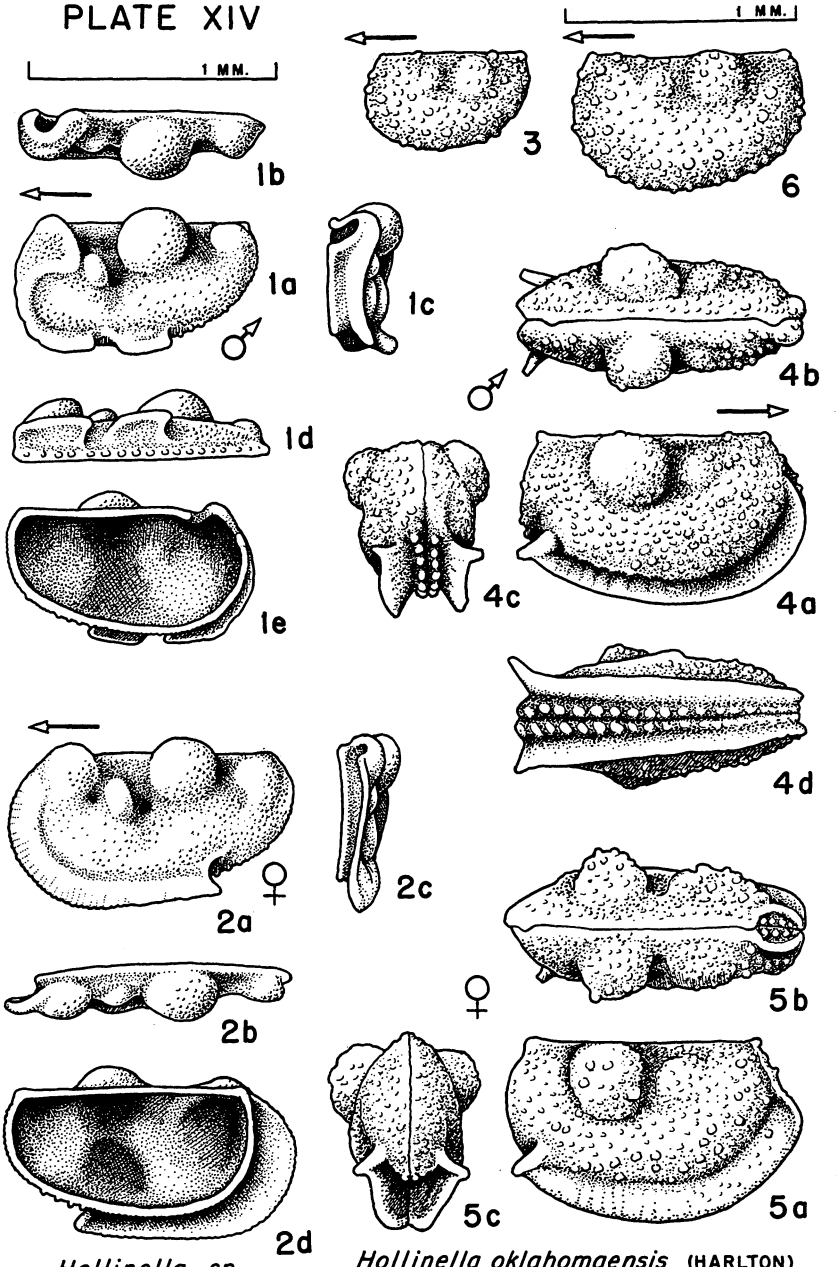


Ctenoloculina cicatricosa
(WARTHIN)

Hollinella dentata
CORYELL

Falsipollex sp.

PLATE XIV



Hollinella sp.

Hollinella oklahomaensis (HARLTON)

EXPLANATION OF PLATE XIV

Hollinella sp.

FIG. 1. Lateral view (*a*), dorsal view (*b*), anterior view (*c*), ventral view (*d*), and interior view (*e*) of male left valve, showing dimorphic interrupted frill. Specimen from the Norway Point formation of the Middle Devonian Traverse group of Michigan.

FIG. 2. Lateral view (*a*), dorsal view (*b*), anterior view (*c*), and interior view (*d*) of female left valve, showing the frill. Specimen from the Norway Point formation of the Middle Devonian Traverse group of Michigan.

Hollinella oklahomaensis (Harlton)

FIGS. 3, 6. Lateral views of two immature left valves, showing tuberculate surface. After Cooper (1946, Pl. 14, Figs. 40–41).

FIG. 4. Right lateral view (*a*), dorsal view (*b*), posterior view (*c*), and ventral view (*d*) of male carapace, showing marginal tubercles and the frill flared outward. After Cooper (1946, Pl. 14, Figs. 42–45).

FIG. 5. Right lateral view (*a*), dorsal view (*b*), and posterior view (*c*) of female carapace, showing incurved frill. After Cooper (1946, Pl. 14, Figs. 37–39).

EXPLANATION OF PLATE XV

Loxoconcha lenticulata LeRoy

FIG. 1. Right lateral view of complete carapace (*a*), interior view of right hinge (*b*), and interior view of left hinge and contact margin (*c*), showing L/R overlap; left-valve hinge elements consisting of (1) three anterior toothlets, (2) an interangular crenulate hinge selvage and hinge flange, and (3) a posterior compound socket; and right-valve hinge elements consisting of (1) anterior compound socket, (2) interangular crenulate hinge-flange groove and hinge flange, and (3) three posterior toothlets. After LeRoy (1943, Pl. 61, Fig. 34; Pl. 62, Figs. 13–14; Pl. 60, Figs. 19, 23).

Brachycythere plena Alexander

FIG. 2. Lateral view (*a*), dorsal view (*b*), and interior view of hinge (*c*) of right valve, showing alate extension and hinge elements consisting of (1) anterior socket and tooth, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior toothlets. After Murray and Hussey (1942, Fig. 2, Fig. 3; Pl. 27, Figs. 2, 6).

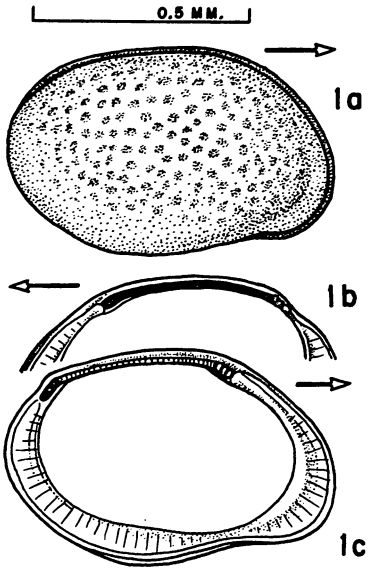
Paracytheridea granti LeRoy

FIG. 3. Lateral view of left valve (*a*), interior view of right hinge (*b*), and interior view of left valve (*c*), showing alate extension; left-valve hinge elements consisting of (1) anterior and interangular hinge selvage and (2) posterior compound socket; and right-valve hinge elements consisting of (1) anterior and interangular hinge selvage and (2) posterior toothlets. After LeRoy (1943, Pl. 61, Figs. 11, 13–14).

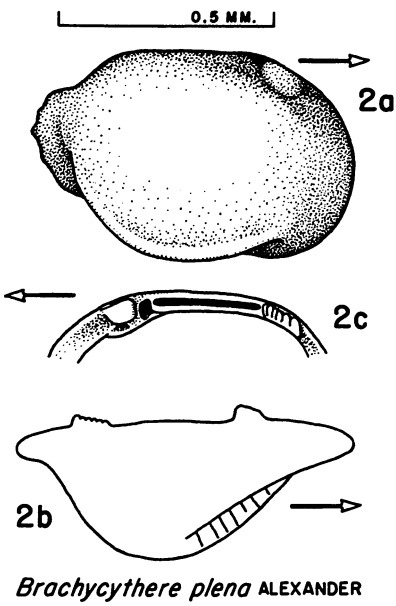
Alatacythere lemnicata (Alexander)

FIG. 4. Lateral view (*a*), dorsal view (*b*), and interior view of hinge (*c*) of right valve, showing large alate extension and hinge elements consisting of (1) anterior tooth and socket, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior crenulate tooth. After Murray and Hussey (1942, Fig. 1, Fig. 3; Pl. 27, Figs. 9, 12).

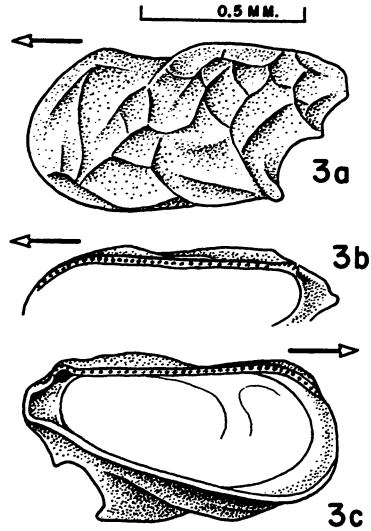
PLATE XV



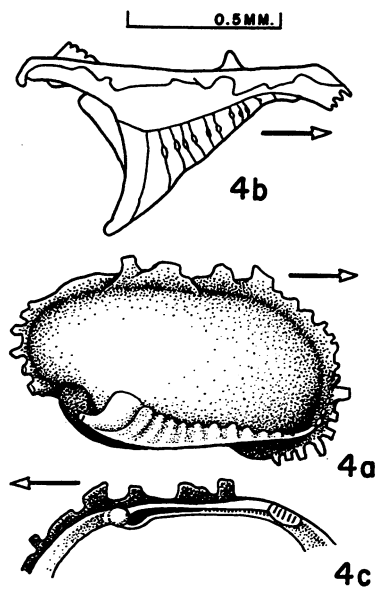
Loxoconcha lenticulata LE ROY



Brachycythere plena ALEXANDER

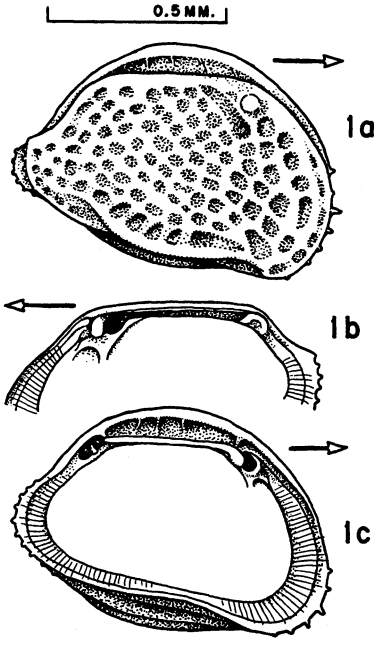


Paracytheridea granti LE ROY

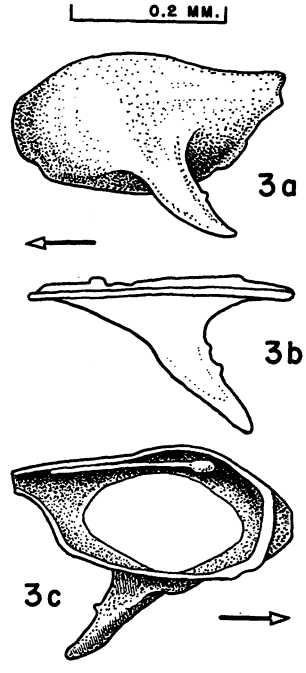


Alatacythere lemnicata
(ALEXANDER)

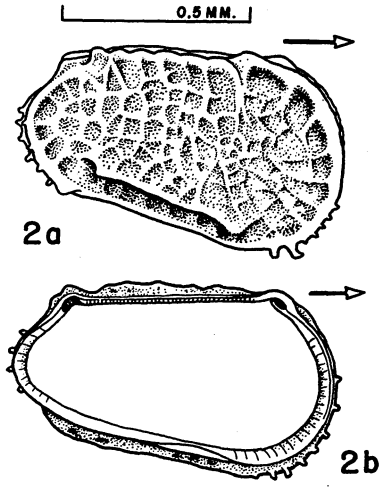
PLATE XVI



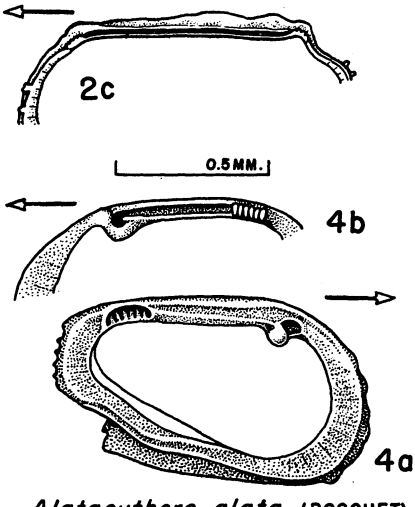
Brachycythere driveri LE ROY



Cytheropteron ? fragilissimum MARTIN



Archicythereis holmani LE ROY



Alatacythere alata (BOSQUET)

EXPLANATION OF PLATE XVI

Brachycythere driveri LeRoy

FIG. 1. Right lateral view of complete carapace (*a*), interior view of right hinge (*b*), and interior view of left valve (*c*), showing L/R overlap; left-valve hinge elements consisting of (1) anterior socket and tooth, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior socket; and right-valve hinge elements consisting of (1) anterior tooth and socket, (2) interangular hinge-flange groove and hinge flange, and (3) posterior tooth. After LeRoy (1943, Pl. 61, Fig. 6; Pl. 62, Figs. 17–18).

Archicythereis holmani LeRoy

FIG. 2. Right lateral view of complete carapace (*a*), interior view of left valve (*b*) and interior view of right hinge (*c*), showing small alate extension; left-valve hinge elements consisting of (1) anterior socket, (2) interangular crenulate hinge selvage, narrow hinge-flange groove, and hinge flange, and (3) posterior compound socket; and right-valve hinge elements consisting of (1) anterior toothlets, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior toothlets. After LeRoy (1943, Pl. 58, Fig. 1; Pl. 62, Figs. 22–23).

Cytheropteron? fragilissimum Martin

FIG. 3. Lateral view (*a*), dorsal view (*b*), and interior view (*c*) of left valve, showing very long alate extension, and hinge elements consisting of (1) anterior tooth and (2) interangular and posterior hinge selvage, hinge-flange groove, and hinge flange. After Martin (1939, Pl. 22, Figs. 16–18).

Alatacythere alata (Bosquet)

FIG. 4. Interior view of left valve (*a*) and interior view of right hinge (*b*), showing left-valve hinge elements consisting of (1) anterior socket and tooth, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior compound socket; and right-valve hinge elements consisting of (1) anterior tooth and socket, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior toothlets. After Stephenson (1946, Pl. 44, Figs. 12–13).

EXPLANATION OF PLATE XVII

Cythereis pennata LeRoy

FIG. 1. Right lateral view of complete carapace (*a*), interior view of left hinge (*b*), and interior view of right hinge (*c*), showing L/R overlap; left-valve hinge elements consisting of (1) anterior socket and tooth, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior compound socket; and right-valve hinge elements consisting of (1) anterior tooth and socket, (2) interangular hinge selvage, hinge-flange groove, and hinge flange, and (3) posterior toothlets. After LeRoy (1943, Pl. 59, Fig. 34; Pl. 62, Figs. 19–20).

Leguminocythereis corrugata LeRoy

FIG. 2. Right lateral view of complete carapace (*a*), interior view of right hinge (*b*), and interior view of left valve (*c*), showing L/R overlap; left-valve hinge elements consisting of (1) anterior socket and tooth, (2) interangular hinge selvage, and (3) posterior socket; and right-valve hinge elements consisting of (1) anterior tooth and socket, (2) interangular hinge-flange groove, and (3) posterior tooth. After LeRoy (1943, Pl. 59, Fig. 7; Pl. 62, Figs. 7–8).

Oligocythereis fullonica (Jones and Sherborn)

FIG. 3. Lateral view of right valve (*a*), dorsal views of left valve (*b*) and right valve (*c*), interior view of right valve (*d*), and interior view of left hinge (*e*), showing left-valve hinge elements consisting of (1) anterior compound socket, (2) interangular large hinge selvage, hinge-flange groove, and low hinge flange, and (3) posterior compound socket; and right-valve hinge elements consisting of (1) anterior toothlets, (2) interangular hinge selvage, deep hinge-flange groove, and low hinge flange, and (3) posterior toothlets. After Bradley (1948, Pl. 122, Figs. 1–2, 4–6).

Haplocytheridea stuckeyi Stephenson

FIG. 4. Interior view of left valve (*a*) and interior view of right hinge (*b*), showing left-valve hinge elements consisting of (1) small anterior sockets and (2) interangular and posterior apical list and very small sockets with valla; and right-valve hinge elements consisting of (1) small anterior teeth and (2) interangular and posterior very small teeth. After Stephenson (1946, Pl. 44, Figs. 7–8).

PLATE XVII

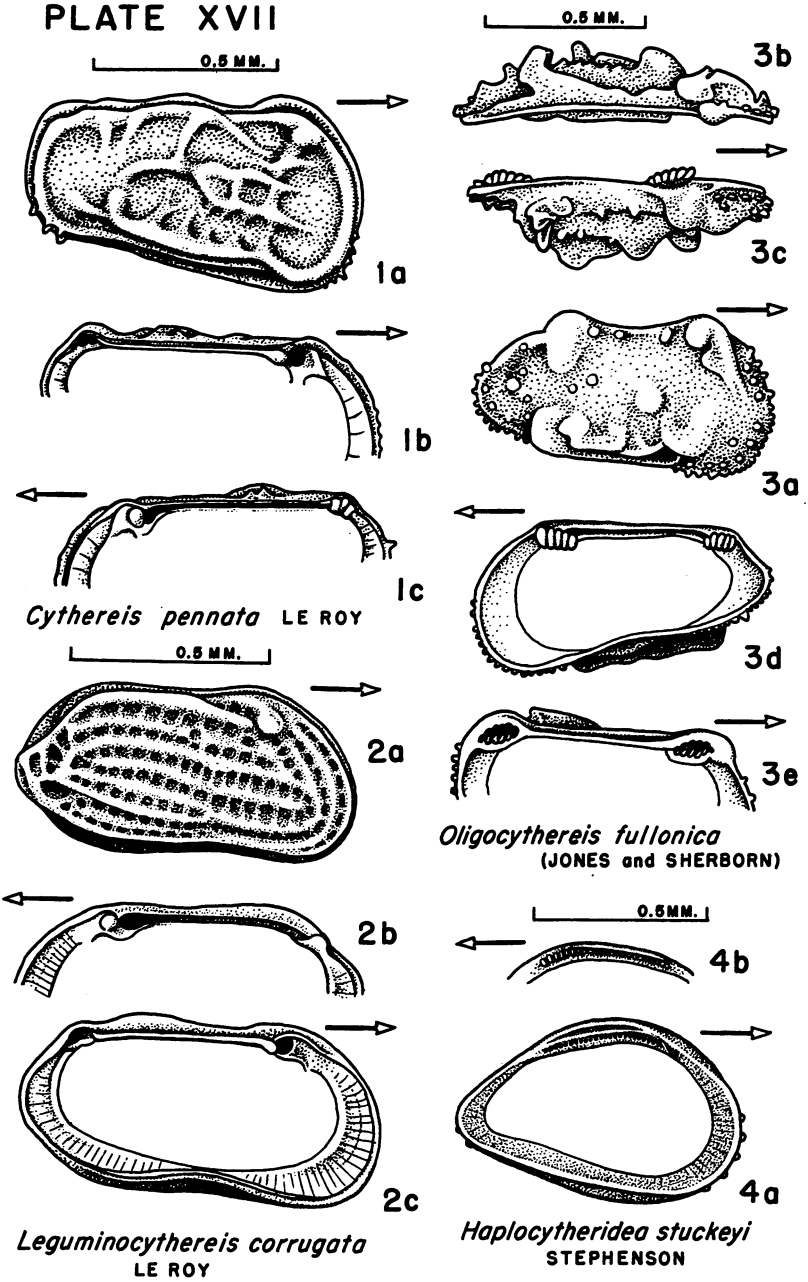
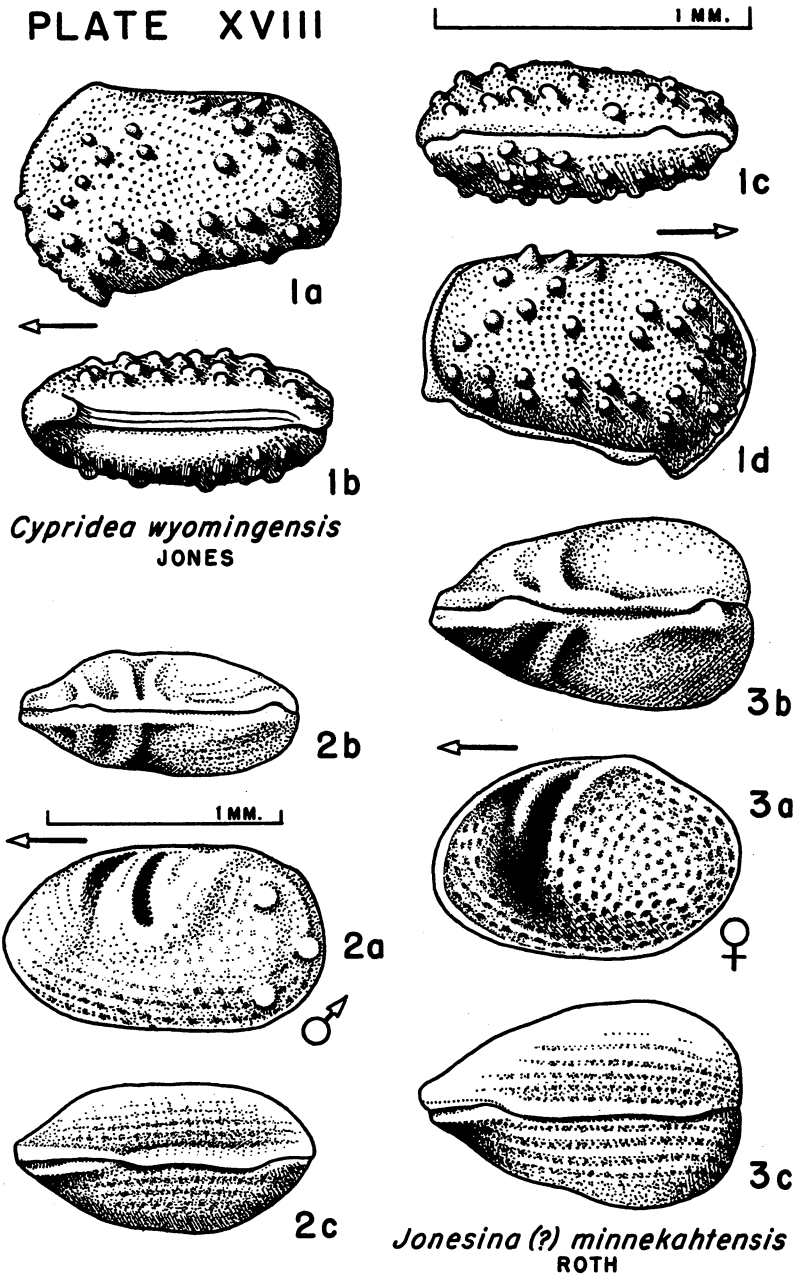

0.5 MM.
1a
1b
1c
Cythereis pennata LE ROY
0.5 MM.
2a
2b
2c
Leguminocythereis corrugata
LE ROY
0.5 MM.
3b
3c
3a
3d
3e
Oligocythereis fullonica
(JONES and SHERBORN)
0.5MM.
4b
4a
Haplocytheridea stuckeyi
STEPHENSON

PLATE XVIII


1 MM.
1a
1b
1c
1d
Cypridea wyomingensis
JONES
2b
1 MM.
2a
2c
3b
3a
3c
Jonesina (?) minnekahtensis
ROTH

EXPLANATION OF PLATE XVIII

Cypridea wyomingensis Jones

FIG. 1. Left lateral view (*a*), ventral view (*b*), dorsal view (*c*), and right lateral view (*d*) of complete carapace, showing beak, notch, L/R overlap, anterior knurling, and posterior flexure. After Peck (1941, Pl. 43, Figs. 10, 13, 16, 17).

Jonesina(?) minnekahtensis Roth

FIG. 2. Left lateral view (*a*), dorsal view (*b*), and ventral view (*c*) of complete carapace, showing posterior dimorphic lobation and ventral L/R overlap. After Harper and Sutton (1935, Pl. 76, Figs. 3–5).

FIG. 3. Left lateral view (*a*), dorsal view (*b*), and ventral view (*c*) of complete female carapace, showing posterior dimorphic inflation, ventral L/R overlap, knurling, and flexure. After Harper and Sutton (1935, Pl. 76, Figs. 6, 8–9).

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1. Check List of Fossil Invertebrates Described from the Middle Devonian Traverse Group of Michigan, by Erwin C. Stumm. Pages 1–44. Price $.75.

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