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Instituto de Geociências, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil

CENOZOIC OSTRACODES OF THE UPPER AMAZON BASIN, BRAZIL

Ivone Purper *

SINOPSE

O presente trabalho compreende o estudo dos ostracodes cenozoicos da Bacia do Alto Amazonas, proveniente de três perfurações e de um afloramento. Abrange a descrição de seis gêneros novos e nove espécies novas, assim como seu significado para a paleoecologia e estratigrafia.

A fáunula é considerada endêmica, pois a maioria dos ostracodes revelou-se nova para a ciência, o que já havia sido constatado pelo estudo dos moluscos. Foi verificada, ainda a presença de tanatocenose e de retrabalhamento pela associação de ostracodes tipicamente mixohalinos, de água doce, e de formas antigas associadas a mais recentes. Neste caso, foi constatada a presença de ostracodes de idade jurássica superior-cretáceo inferior, representados pelos gêneros *Bisulcocypris* e *Cypridea* associados a ostracodes cenozóicos, sendo alguns, provavelmente do Plioceno.

Conclui-se pela validade da denominação Formação Pebas e não de Solimões, também para as camadas correspondentes em território brasileiro.

ABSTRACT

The present work consists of a study on the Cenozoic Ostracodes of the Upper Amazon Basin based on three wells and one outcrop.

Six new genera and nine new species are described and their significance to paleoecology and stratigraphy are discussed. Nearly all the ostracodes studied were new forms thus confirming previous studies based on molluscs suggesting the fauna to be endemic. Thanatocoenosis has taken place as shown by the presence of reworked material consisting of typically brackishwater ostracodes associated with freshwater forms as well as by the associated presence of Mesozoic and Cenozoic forms. The latter are represented by genera such as *Bisulcocypris* and *Cypridea*, Upper Jurassic to Lower Cretaceous forms together with Cenozoic ostracodes, among which there are some forms probably belonging to an age as late as Pliocene.

The name Pebas Formation is maintained instead of Solimões even for those beds in the Brazilian side.

INTRODUCTION

The beds of the Upper Amazon Basin have been studied since the end of the last century with views to their genesis, stratigraphy and paleoecology. Up to now almost all paleontological studies have been dealing with gastropods and bivalves which have been considered to be fresh, brackish or even marine forms. Besides these, there are other genera which do not inform anything related to environment, since they are endemic forms. Therefore, the study of the present ostracodes contributes with some data to the stratigraphy and paleoecology of those beds.

1. Origin and material repository

The material under study was found in samples collected by Prof. Dr. Eurico Romulo Machado from Instituto de Geociências – UFRGS – who researched the economic use of the lignite from

*Professora do Departamento de Paleontologia e Estratigrafia do Instituto de Geociências da UFRGS
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that area. The material proceeds from three wells — CPCAN-I-Tamanduá, CPCAN-II-Poreré and CPCAN-III-São Paulo de Olivença with a depth range from 19,50m to 215m and from one outcrop (Benjamin Constant).

The material has been deposited in the Museu de Paleontologia from Universidade Federal do Rio Grande do Sul, Micropaleontology, Ostracodes, under number MP-UFRGS, MP-0-501 to 518; 520; 565 to 593.

2. Geographical position of the drillings and outcrop (map. 1)

CPCAN-I is located by the Jutai River, near Tamanduá village. CPCAN-II is located in the same river, near Poreré village and CPCAN-III near São Paulo de Olivença. The outcrop is located in Atalaia do Norte, near Benjamin Costant.

3. Geological descriptions of the wells

The descriptions of the wells were based on data provided by Prof. Eurico Romulo Machado who made geological studies in that region

Well CPCAN-I-Tamanduá — Quota 68,50m

- 0-131,19 — Soft and plastic gray-greenish clay, sometimes bluish, interchanging many fine sand-argillaceous beds and three lignite horizons scattered in the interval.
- 131,19-135,27 — Soft and plastic gray-greenish clay, somewhat carbonaceous on the top; with fossils (sample M6635).
- 135,27-211,86 — Soft and plastic gray-greenish clay, interchanging many fine sand-argillaceous levels and four horizons of lignite scattered in the interval.
- 211,86-214,96 — Soft and plastic dark gray clay changing inferiorly to gray-greenish clay, rich in fossils. (sample M6636).
- 214,96-320,00 — Soft and plastic gray-greenish clay, interchanging many fine sand-argillaceous levels and one horizon of lignite between 280,50 and 280,60m and hard light gray siltstone in the following intervals: 258,95-259,55; 260,38-260,75; 260,91-261,27; 265,85-266,07; 266,32-266,49; 281,00-281,65; 286,46-286,81; 290,00-293,00.

Well CPCAN-II-Porere — Quota 58m

- 0-154,05 — Soft and plastic gray-greenish clay, sometimes bluish, interchanging many soft fine sand and ten lignite horizons scattered in the interval.
Between 150,88 and 151,05 a very hard greenish siltstone.
- 154,05-156,36 — Dark gray clay interchanging greenish gray clay (sample M6637).
- 156,36-262,00 — Soft and plastic gray greenish clay interchanging fine sand-argillaceous levels.

Well CPCAN-III-São Paulo de Olivença — Quota 53m

- 0-19,50m — Soft and plastic greenish-grayed clay interchanging eventual levels of fine sand-argillaceous beds.
- 19,50-20,78 — Gray-greenish clay, with layers of fine mica and fragments of dark vegetable matter (sample M6632).
- 20,78-31,52 — Greenish clay with some levels somewhat carbonaceous presenting on the top of the interval fine layer of lignite.
- 31,52-32,62 — Soft and plastic olive-gray clay rich in fossils (sample M6633).
- 32,62-34,45 — Soft and plastic gray-olive green clay with carbonaceous horizons.
- 34,45-36,65 — Soft and plastic greenish clay.
- 36,65-239,05 — Gray-greenish clay with many layers of fine sand-argillaceous levels and three scattered levels of fine lignite.

The profiles of the five wells (Fig. 1) were based on the lithologic description presented in Gold (1967) but they are different from the profiles presented in this work. For example, the discontinuous line marks the limit to what Gold named "Serie A" and "Serie B" represented in his graphic and the continuous line represents the same limit based on the description of the same work.

4. History

Many studies have been done about the fossils of the Upper Amazon Basin, mainly on the Peru side, having in mind paleontologic and geocronologic results. Most of those studies is about Molluscs as those of Gabb (1868), Conrad (1871), Woodward (1871), Dall (1872), Conrad (1874a, 1874b), Boettger (1878), Etheridge (1879), Roxo (1924, 1935, 1937), Marshall (1928), Marshall & Bowles (1932), Maury (1924, 1937), Greeve (1938), Santos & Castro (1967). These previous studies resulted in various different ideas concerning the systematic, paleoecology and geocronology of that region. Purper (1977b) made a bibliographic revision about all the previous work to reach a general view of what was already done there and to facilitate future researches.

It was maintained the nomenclature used by each original author as revision of the molluscs taxonomy was not the purpose of this paper.

5. Acknowledgments

Posthumous acknowledgements are due to Prof. Eurico Romulo Machado who collected and gently supplied the fossil material under study. Gratitude is also expressed to Professors Josué Camargo Mendes, Setembrino Petri, Paulo Miranda de Figueiredo Filho, Clovis Carlos Carraro, Renato Rodolfo Andreis, Lilia Pinto de Ornellas and Norma Luiza Würdig for many valious suggestions.

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PALEOECOLOGY

Up to now the Pebas Formation paleoecology has been based mostly on the molluscs and, as practically all the fauna is represented by new genera and species, some of them with no recent representation, it has been difficult to make a comparison with material from other places. Nevertheless the previous authors have tried to determine the environment reaching different ideas (Purper, 1977a, Table 2). The different opinions could be due to the molluscs systematic inaccuracy or to the fact that the study area could have different facies in the same horizon carrying different material.

In order to achieve a better understanding of the paleoecology problem of that region an analysis has been made based on the following aspects:

1. data from previous studies
2. data based on the study of the ostracodes.

1. Data from previous studies

Observations leading to some important conclusions about paleoecology have been pointed out here. For instance, Orton (1870) thought of a marine environment when he found tertiary shells lying close to the mouth of Ambiyacu River, near Pebas. Nevertheless Gabb (1868) who studied the material collected by Orton had not presented a definite conclusion about environment as he said it was "a marine or perhaps rather a brackish water fauna". It is not clear in which material Orton based his studies so as to call it a marine environment but that discovery enabled him to refute Agassiz's theory that the Amazonian beds were entirely composed of glacial drift. Moreover, Orton addressed a letter to the Geological Magazine (in Woodward, 1871) in which he suggests the fauna as being a "quiet lake or estuary". On the other hand, Santos & Castro (1967) figured out a freshwater environ-

ment to those sediments but the material studied came from different places, some of them not considered as Pebas Formation, such as those from the Acre State.

The other authors agree on the predominance of brackishwater species related to freshwater species and affirm that the genera which should indicate the typical marine character were presented without a systematic support.

In this way Marshall (1928) describing the new genera *Prodiplodon*, *Eodiplodon*, *Anodontites*? of freshwater environment, pointed that they were associated to the brackishwater forms *Anisothyris*, *Isaea* and *Neritina*. He concluded for a mixed assemblage, that is, a thanatocoenoses.

As there is a great similarity between the genus *Anisothyris* from Pebas and the estuarine form *Azara labiata* d'Orbigny from La Plata, many authors as Woodward (1871), Conrad (1874a), Boettger (1878), Etheridge (1879), Maury (1924), Gardner (1927) supposed that region could be an old estuary. Boettger (op. cit.) amplifies this idea when he says that the most frequent species are the Corbulidae genus – *Anisothyris*, the sub-genus *Isaea* (genus *Hydrobia*) and the genera *Dreissena* and *Neritina* that indicate the presence of an estuary and the close relationship between the sea and the river. He also says that the marine forms are missing and that the freshwater genera such as *Hemisinus*, *Anodonta* and *Unio* are so rare that they probably have not lived in the place where they were found. Conrad (op. cit.) also mentioned the possibility of an estuary by the abundance of *Dreissena scripta*.

Woodward (1871) considered the presence of an estuary by studying *Anisothyris tenuis*. He studied two varieties: var. α *distorta* and var. β *crassa*. In variety α he placed a large series of highly distorted specimens which may own their singular form by having suffered periodic changes from freshwater to extremely salty water, due to their estuarine habitat. In variety β the forms of very thick carapaces dissimilar to the normal type were included. No reference has been made to this latter form concerning environment.

Roxo (1935) studied the dwarfish character of the forms, typical of brackishwater environment revealing a morphological adaptation of the species to an adverse environment.

Another aspect considered by some authors concerned biocoenosis and thanatocoenoses. Conrad (1871) found in vast abundance entire bivalves and univalves mingled together to a multitude of fragments. This fact made him think that the material was not drifted from a long distance but lived and died in the vicinity of the spot in which they were found. The same fact was considered by Boettger (1878) when he found *Neritina ortonii* still having the opercula in the carapaces and by Conrad (1874b) who mentioned the good preservation of *Hemisinus*. Gardner (1927) and Greve (1938) also refer to the presence of *Anisothyris* with the valves united and closed suggesting a quiet water environment with no strong currents. Gardner (op. cit.) completes her ideas saying that "in some of the deposits there was not only no rapid movement but not even sufficient circulation to carry off the decaying animal matter, and the shale and its contained fauna present the characteristic features of the "black shale" . . . She continues saying that "such deposits are particularly characteristic of the mouths of rivers, where precipitation of suspended matter is suddenly accelerated not only by the loss of current velocity but also by the additional deposition induced by the salt water, particularly the flocculation of the organic matter".

On the other hand, ecologic conclusions lacking the necessary basis have been drawn. For example, Conrad (1871) referring to *Ebora*, a new genus of gastropod said: "I presume this to be a freshwater genus but have no means of proving it". About this species, Woodward (1871) criticised the work of Conrad (1871) because Conrad shows *Ebora crassilabra* as having a hole made by another gastropod from the Buccinidae Family or *Natica* exclusively of marine water, excluding this way the fresh water aspect proposed by Conrad. Woodward also mentions an intimate resemblance between this species and *Lacuna*, a North-American genus from mixohaline water. His remark, however is refuted by Dall (1872) (foot-note, p.92) who says: "Mr. Woodward is in error in stating that *Ebora* "closely resembles *Lacuna*", which is not a "North American genus" exclusively, nor does it "inhabit brackish water", but is found in the littoral and laminarian zones in salt water".

The inaccuracy of some classifications has led to a few inexact conclusions such as the case of *Neritina pupa* Linné, a recent species of the Caribbean fauna studied by Gabb (1868). This species was put as *N. ortonii* Conrad in subsequent works having no recent representation in the Caribbean fauna.

It is believed that a secure interpretation having in mind the Molluscs could only be achieved through a systematic review, an accurate register of the collecting localities and a review of the stratigraphical position of the beds where the fossils are found.

2. Data on the study of the ostracodes fauna

The fauna of ostracodes is formed by 18 ostracode genera including 27 species, 6 new genera, 16 new species and 3 species not determined yet.

Five out of the six beds studied have shown the predominance of *Cytheridea* and *Cyprideis*, eurihaline genera, suggesting a mixohaline environment. Even in the level where the new *Amazonacytheridea* genus prevails the two genera mentioned above were also found.

Although the new genus does not permit any interpretation based on previous studies, its morphological characteristics can also be found among mixohaline species such as the smooth surface and the typical merodont hinge.

An analysis has been done concerning the two most representative genera (*Cytheridea* and *Cyprideis*) although all the species found are represented by new species. So, *Cyprideis* is considered a genus predominantly mixohaline inhabiting meso-polyhaline environments (Morkhoven, 1963). Although it is not possible to draw a definite conclusion based on the generic level, because each species presents particular ecological characteristics, a research was made on the ecological environment of all the species registered to the Americas.

According to Sandberg (1964b) the fauna reported by Stephenson (1935) from the *Potamides matsoni* zone (Miocene) in Louisiana included *Cyprideis locketti* and species of *Perissocytheridea*, *Paracytheroma*, *Elphidium*, *Eponidella* and *Ammonia*. This fauna is generically similar to that one found in the brackishwater lagoon environment in Laguna de Tamiahua, Mexico, where the genera *Cytherura* and *Cytheromorpha* may also be found. According to Mincher (1941) these two genera associated to *Cyprideis pascagoulensis* Mincher and *C. americana* (Sharpe) were related to the Pascagoula Formation (Miocene from Mississippi). This Formation partly represents a brackishwater facies of the Arca Zone of the Choctawatchee from middle Miocene.

Hartmann (1955) describes *Cyprideis multidentata* found in the swamps in Itanhaen and Porto Novo, Brazil, as an eurihaline species. Concerning this species Pinto & Ornellas (1965) have mentioned a salinity variation from 6.10 to 29.11‰ in Tramandai beach, State of Rio Grande do Sul.

Benson (1959) describes *C. castus*, a recent species from Todos Santos Bay (Mexico), as an endemic form to the salt-water-lagoon biofacies of the Estero de Punta Banda. He has also recorded the occurrence of *C. beaconnensis* (Le Roy) in chlorinity above .9‰ and the absence in chlorinity below .6‰; it has not been found in marine environment.

Bold (1963) describes *C. salebrosa*, a pliocene species from Talparo Formation (Trinidad). He mentions that "lagoon to brackish conditions are indicated in the Talparo Formation by the presence of *Cyprideis* and *Perissocytheridea*."

According to Sandberg (1964b), *Cyprideis mexicana*, a recent species from the east coast of Mexico, achieves fully development in lower salinity brackish-water environments. To *C. bensoni* from Laguna de Tamiahua (Mexico) the species occurred in various salinity rates: in an area in the northern end of the lagoon at a salinity rate of 14.5‰ and in two areas near the southern end at salinities rates of 28.2‰ and 35.4‰ respectively; in the more central part of the lagoon the salinity rates varied between 15.6 and 23.0‰.

Rossi de Garcia (1966b) has made a paleogeographical interpretation about Entre Rios Formation (Miocene of Argentina) concluding for a coastal zone to these sediments. Rossi de Garcia based his studies on the presence of *Cyprideis* which occurs in areas with large amount of fresh water also typical of marine regression environments.

Bold (1971b) describes *C. portusprospectuensis* to Harbour View beds (Jamaica) (Pliocene). These beds are considered partially mixohaline by the presence of a brackish-water fauna with species of *Cyprideis*, *Perissocytheridea* and *Loxoconcha*.

Bold (1972a) described *C. panamensis* from La Boca Formation (Miocene of Panama) occurring at the lower part of the Formation (Zone III) in which predominate the brackish-water species of *Cyprideis*, *Cytheridea*, *Perissocytheridea* and *Paracytheroma*.

The presence of *Cyprideis* in marine environment is not common except in places of mixohaline influence where it occurs associated to marine shallow species (Ornellas, personal communication). *C. floridana* Howe & Hough from Miocene of Arca Zone (Howe, 1935) was found associated to marine genera as *Cythereis*, *Basslerella*, *Cytheretta*, *Paracytheridea*. Sandberg (1964b) says that although the great majority of recent *Cyprideis* could tolerate marine or even hypersaline environments their development is fully achieved within mixohaline environment. *C. floridana* was also registered by Darby (1965) in a complex estuarine-lagoonal environment of Sapelo Island, Georgia, in brackish water of salinity rating from 13 to 28‰.

Significant information about ecological association involving the genus *Cyprideis* is provided by Ornellas (1974, p.493) who says that the relationship between *Cyprideis*, *Perissocytheridea*, *Cytherura* and the new genus *Minicythere* is an excellent indicator of meso-polyhaline environments. The salinity rate measured in various occasions was between 6.1‰ to 28.47‰. The same association was found not only in the channel that links Tramandai to the sea but also in places of similar ecological conditions as Patos Lagoon, Mirim Lagoon and in Laguna, Santa Catarina State (Ornellas, op. cit.).

Cytheridea is a brackish to marine (epi-neritic) genus (Sohn, 1951; Morkhoven, 1963). The ecological data are scarce and even the taxonomy is complex. It would be necessary to make a review so as to come to a better classification of the genus or subgenera, as it has been the case of subgenera *Haplocytheridea* and *Clithrocytheridea* (Stephenson, 1936) which have been classified as genera (Stephenson, 1946). After this late classification a great number of species have been included in the synonymy of these new genera. Nevertheless the problems of taxonomy will not modify the context of the present paper for all those new genera have an habitat similar to that of *Cytheridea*.

The most important papers in the study of those genera to the Americas are those of Stephenson (1936, 1937, 1938a, 1938b, 1944, 1944a, 1944b, 1946) who researched the Tertiary deposits. Nevertheless stratigraphy has been more emphasized than the paleoecology in all these works. On the other hand the material described from Jackson (Eocene), Red Bluff (Oligocene), lower and upper Chickasawhay members of the Catahoula (Miocene) of the Gulf Coast (Stephenson, 1937); from Miocene and Pliocene of Florida (Stephenson, 1938a); from Lower Eocene of Alabama (Sabine and Midway Groups) (Stephenson, 1938b), present a fauna restricted to genera *Cytheridea* (*Haplocytheridea*); *Cytheridea* (*Clithrocytheridea*) and *Perissocytheridea*, suggesting a mixohaline environment. Greater salinity rate has been detected (Stephenson, 1944a) when *Haplocytheridea* was found, associated to *Bairdia*, *Cythereis*, *Alatocythere*, *Hemicythere*, *Cytherideis* and *Cytheretta*, typical of marine environment. The same may be noted in the Reklaw Eocene Claiborne group of Texas where *Cythereis* with *Haplocytheridea* have been found.

Concerning the Pebas material, all the species, even the scarce ones, have been analysed and it was found that almost all species present smooth surface or, at the utmost, they have punctate or pitted surface. The hinge of almost all material is typically antimerodont-entomodont which is a characteristic of the mixohaline environment species.

The scarce presence of *Darwinula*, *Cytheridella* and *Cypria*? on the upper portion of the Formation suggests the proximity to fresh water. These specimens may have been brought into brackish condition by occasional courses of fresh water or by rivers. The percentage is not representative as the greater rate does not reach 6% and the majority is below 2%. This part of the ostracode fauna represents an allochthonous condition which occurs nowadays to those genera within mixohaline environment.

To reinforce the presence of a mixohaline environment and not a marine one there is the total absence of organisms such as forams, brachiopods, echinoderms, bryozoans and marine ostracodes.

Finally the evidence of a mixohaline environment is confirmed by the presence of species and specimens of this environment, by the scarce number of species and specimens from fresh water and by the lack of marine organisms.

The presence of young instars, the occurrence of fragile very well preserved carapaces and also the occurrence of delicate fragments has led to the conclusions that there has been low energy rate conditions.

Although the study area is, at the present date, far (2.400km) from the Atlantic Ocean and presents a geographic barrier (the Andes) to the Pacific Ocean, the presence of a brackish water fauna leads to think of some sort of nearness to the sea.

Assumptions on the existence of a preterite sea which could explain the existence of such an environment have been raised but up to now none of them have proved to be definite.

Boettger (1878), for example, believed that those beds were Tertiary delta beds which had been displaced eastern to form presently the Amazon estuary. Brown (1879) had similar thought supposing that, at the time of their deposition, the physical features of the north-eastern portion of South America may have been vastly different from what they are at the present, having the sea reached far inland then, probably to 1500 miles from its present shore-line, spreading over an area which is now the Amazon Valley.

Gardner (1927) thought that though the greater number of the Pebas species suggest the proximity to salt water, it is not probable that Atlantic Ocean washed the foothills of the Andes so late as the Upper Pliocene. She believes that the Andean streams may have formed wide deltas, since the sediments are all fine. She adds that the rivers wandered across such flooded plains, leaving bayous and ox bows which perhaps became increasingly saline.

According to Katzer (1903) the brackish influence of these sediments might be associated with the Pacific Ocean before the Andean uplift. So, at the beginning of the Mesozoic time, with the connection of the Guianas lands to those of Brasil the Mediterranean Paleozoic Sea would be withdrawn to the western instead of to eastern side, draining into the Pacific Ocean at the Guayaquil Gulf. With the Andean uplift this situation began to reverse: at first the water bodies were prisoners in lakes on the edges of which clays and lignites with a fresh and brackish fauna were deposited. But with the continuation of the Andean uplift movements these lakes were all linked together forming a sea lake covering the entire depression. Only later this water was forced to the other side having the movement that is found today. This hypothesis has been very much discussed and is not accepted by many Brazilian geologists due to the lack of geological and paleontological studies in that part of Brazil.

Another hypothesis stresses the fact that it may have been a connection with the Caribbean Sea during the Tertiary. This assumption was not only accepted by some authors (Roxo, 1935; Maury, 1924) but was also spread in such a way that some came to believe that a sea arm had entered and crossed the whole continent. Ihering (1837, in Boltovskoy, 1958) was the first to propose the existence of such an arm of the Tethys. He based his conclusion on a comparison between the Patagonian fauna and flora and those of Australia and New Zealand, and between the Brazilian fauna and flora and those of Africa. Camp (1952) himself has reached a conclusion similar to Ihering's by dividing the South American continent into three parts, during the Tertiary, based on botanical and geological grounds. Later on, Szidat (1955, in Boltovskoy, 1958) while studying fish and their parasites drew the same conclusion concerning the existence of a Miocene sea separating Archiplata from Archibrazil. Boltovskoy (1958), studying foraminifera from Rio de La Plata, found benthonic antillean forms which, he supposed, had crossed the Tethys arm since these forms have not to been found in Brazilian waters yet. Closs (1963) comes across such problems again while studying the foraminifera and thecamoeba from Patos Lagoon.

As a matter of fact, a definite conclusion concerning the preterite presence of the sea requires not only a great amount of data but a lot of material from outcrop and drill to follow the past path of this sea that probably once existed.

There is a strong belief, achieved while studying the ostracodes, that the sea, in the Mesozoic and Cenozoic was probably located near the local where the material studied where found, for the typical mixohaline characteristics of this material. Due to the scarce material, however, it is impossible to determine whether the link was with the Caribbean sea, with the Pacific sea or with both. It is a question that still demands a definite answer.

AGE AND BIOSTRATIGRAPHICAL CORRELATION

Up to now the age of the sediments of the Pebas Formation has not been definitively established. Neither has it been possible to make correlation between the "stratum typicum" and other

layers attributed as equivalent to that formation although attempts have been made by several authors.

The great diversity of opinion concerning the age and biostratigraphical correlation is due to many reasons such as the divergence in the Molluscs systematics which has brought not only a biostratigraphical divergence but also an ecological discrepancy; inexactness about the collecting places and geographical position and lack of data about sedimentology.

The previous authors who have made researches on this field based them on paleontological and stratigraphical evidences, biological aspects such as the preservation of the fossils, value of recent genera and value of genera exclusively extinct.

Purper (1977b) made a compile about the vast and controversial literature, showing the different opinions reached by those former authors about the age and correlations of the Pebas Formation.

The review of those previous studies has shown the following:

1. On age

Gabb (1868) studying the clay deposits of the Upper Amazon Basin has found a specimen of *Neritina* which had kept its original color. This fact made him think that the material dated from a very recent era. Dall (1872) reached the same conclusion by observing the features of the shells, their well preserved colors, the presence of epidermis and even remains of the cartilage. He had the opinion that they were not older than Pliocene, and could even be later.

However, these statements are not correct, as it has already been pointed out by Conrad (1874a) when he affirms that the look of freshness and the perfection of many specimens can not be used as method of comparative age as the clay in which they are imbedded is perfectly filled for their endless preservation. He also stated that clay is generally free from iron, and, thus, one strong source of injury disappears. On the other hand, he mentions the occurrence of *Neritina* of cretaceous age still presenting colored markings.

Conrad (op. cit.) tried to determine the age by comparing the close relation between *Anisorhynchus pyriformis* Meek from Eocene of Utah and *Pachydon (Anisorhynchus) cuneiformis* Conrad from Pebas. As the subgenus is unknown in later tertiary deposits he believes that the Pebas group is not of late tertiary origin. To emphasize his point of view he adds that a pliocene age is expected to present many recent species of the Lower Amazon and such shells are absent as well as the same species of recent characteristic South American rivers genera.

Similar opinion has been uttered by Orton (in Woodward, 1871) when he says that from the extermination of the genus *Anisothyrus* with all its representatives it is inferred that the formation cannot be late Tertiary, and may be Miocene. This opinion is corroborate by Conrad (1871) who concluded that if all the species are extinct the material studied cannot be later than the Tertiary.

Boettger (1878) supposed on Oligocene or Eocene age to those beds on the belief that they were Tertiary delta beds which were displaced eastward to form presently the Amazon estuary. It is dangerous to conclude so, as even now there are no proofs of the existence of such data in the intermediate path, as it has already been well mentioned by Katzer (1903).

Roxo (1924) concluded for a Pliocene age due to the presence of recent species as *Hyria corrugata* Lam. and *Castalia ambigua* Lam. with extinct forms.

Marshall & Bowles (1932) when studying mollusks from Ecuador compared them with those of Pebas and said, concerning age: "At present there are no reliable data to establish the age of the deposits, but as none of the species and none of the genera except *Pomacea* occur in the recent fauna, it is probable that the age can not be later than Pliocene and it may be earlier".

On the other hand the leaves material studied by Berry (1937) from Porto Peter was compared with those pliocene material from Bolivia, Peru and Ecuador and with the recent ones. Berry concluded, concerning age (p. 84) "...if they are as old as Pliocene, they should probably be regarded as late Pliocene in age".

Although Simpson (1961) attributes to Berry (op. cit.) and Maury (1937) the correlation of those beds with Pebas, Berry does not establish this correlation but only mentions (p. 81): "Associated poorly preserved molluscs, I am informed by Dr. Maury, indicate a correlation with the Pebas beds"...

Simpson (op. cit.) after having analysed the works of Maury and Berry, doubtly inquires about the pliocene age established and the correlation done. He found that nine out of the ten supposedly extinct species, have not been distinguished in any way from Recent species. Moreover, he disagreed with the classification of molluscs made by Maury. He interpreted those deposits of Jesumira and Porto Peter as fillings from a former oxbow lake, as it can be still observed at the present time. Each of these deposits would form a "stratigraphic unit" or diminutive "basin filling", without the dimensions of a Formation in the usual sense of the word as was evidently envisioned by Berry, Maury and others that followed their principles. Simpson also says: "Although the various oxbow fillings clearly are not precisely contemporaneous, none seen by us can be older than latest Pliocene and most, perhaps all in this area, are geologically Recent".

The great diversity of opinion presented by the mentioned authors seems to be due to the presence of a reworked fauna in this region as well as to the different ages of the fossils compared. Moreover, the correlation establish between materials from very distant areas lacking complete data may have also contributed to those different conclusions. Through the fossils studied in this paper it is supposed a Pliocene or more recent age for Pebas, having mesozoic (Jurassic-Cretaceous) reworked fossils mingled.

2. About biostratigraphical correlation

Brown (1879) analysed the sedimentological aspects of the Upper Amazon beds suggesting an enlargement of those beds to the Brazilian side. He made several sections in that region being the main those of São Paulo de Olivença and Canamã. He believed that there was a lithologic correspondence between these two places. He compared also the Canamã section with that of Pebas made by Steere (in Hartt, 1872) suggesting both could be on the same horizon by the remarkable similarity between the two, expanding therefore the extension of those beds.

A correlation based on the fauna was tried to be established by several authors. Guppy (1908) (in Maury, 1924, 1937), for example, studied the fluvial or estuarine fauna of Comparo Road, in the central part of north Trinidad Island, West Indies. He believed that the Comparo Road fossils resembled the Amazonian fauna of Pebas and were from Pliocene age. Dr. Guppy identified four species, one as *Anodonta batesi* Woodward, which was originally described to the Pebas sediments. He found affinities between the other species and the living South and Central American river shells.

Marshall & Bowles (1932) studied the fauna of Biblian, Equador, suggesting it should have been an intimate geological relation between Biblian and Pebas. They say: "As the fossil fresh-water species found at Biblian and Pebas seem to be of the same geologic age and as the two localities lie on the same stream, it appears likely that there is an intimate geological relationship existing between the two places". At the same time they suggest that *Hemisinus tuberculiferus* Conrad from Pebas classified by them as *Sheppardiconcha*, could be related to *Sheppardiconcha bibliana* Marshall & Bowles from Biblian.

On the other hand, the study of fossil shells and leaves found in the Upper Rio Juruá valley was made by Maury (1937) and Berry (1937). Maury (op. cit.) when studying the molluscs from Jesumira and Porto Peter (valley of Rio Juruá, Acre) registers the occurrence of *Anisothyris*, a typical genus of Pebas beds. Based on this fact Maury comments about the horizon: "Those deposits are equivalent stratigraphically and faunally to the freshwater or brackish beds of the upper Amazonian valley, which are typical and were first described at Pebas, eastern Peru".

However, the classification of *Anisothyris acreana* Maury was based on not very well preserved material, as the own author says (p.6): "All the specimens are in the forms of molds and the hinge characters are not clearly enough shown for illustration . . ." On the other hand one generic characteristic of *Anisothyris* seems to be the inequality of the valves and although it has been mentioned (p.6) that the "inequality of the valves is only slight" (Maury, fig. 3) a perfect simetry of both may be perceived through the illustration. According to Dwigh E. Taylor (in Simpson, 1961) the species does not present the characteristics of *Anisothyris* but could belong to the genus *Polymesoda*.

Likewise it is not possible to take into consideration the classification of *Anisothyris* cf. *ovata* Conrad as it is a "fragmentary specimen" . . . "too incomplete for description" . . . (Maury, p. 8).

Based on what has been mentioned above, Maury's assumption concerning a possible paleontological correlation demands some sound basis.

Roxo (1937) when analysing the vertebrate and invertebrate fauna from Rio Juruá (Aquidabã) makes a remark that seems to be relevant. He says that the clay is sandy and different from the plastic clay in which the pliocene fossils of the Upper Amazon are found (Tres Unidos, Pebas, etc.) although it resembles somehow the clay found in Rio Quixito.

In this work Roxo (op. cit.) clearly states that the sediments of Aquidabã are different from those of Pebas and correlates the fossils to those of Magdalena Embayment, Colombia, by the presence of common genera such as *Castalia*, *Hyria* and *Hemisinus* and to the fossils of Biblian, Ecuador by the occurrence of *Ecuadorea* and *Sheppardiconcha*.

Oliveira & Carvalho (1924) while studying the prospection of lignite made many profiles along the boundaries of Brazil and Peru in the rivers Solimões, Javari, Curuçá, Quixito, Itecoai and Iça. By analysing the profiles they reached the conclusion that there are two very well defined formations: "the first one formed by variegated clay without fossils, presenting more or less quantity of sand, very similar in its lithology, color etc. to the variegated clay very common to the lower Amazon river. The second one, below the first, formed by gray-bluish clay, plastic, with many or few fossils. This last one is from Tertiary age, maybe Miocene; there is no proof concerning the age of the first formation and there is no information if it has or has not glacial origin; however, there is a probability that it has a very recent origin."

3. Data about the studies of the ostracodes

It has proved to be difficult to figure out the age and correlation of the Pebas beds having in mind the study of the ostracodes because the fauna is absolutely endemic and this seems to be the first work in such a vast region.

The material studied presents 27 species of 18 genera. Six of them are new genera.

The new genera do not permit any correlation and comparison with some other from other areas. In relation to the known genera, the great majority belongs to *Cytheridea* and *Cyprideis*. This latter one brings some enlightenment concerning age because in the Americas the oldest undoubted occurrence of *Cyprideis* is well up in the Miocene (Sandberg, 1964b). The distribution is Miocene-Recent and from the 28* known species, 12 (or 13) are found in the Miocene, being 4 (or 5) exclusive of this age; 6 are found in the Pliocene, being one exclusive of this age; 6 are found in the Pleistocene and 18 are recent forms, being 10 (or 11) exclusive of this age.

*This number is reduced because *C. stewarti* Benson, 1959, *C. miguelensis* Benson, 1959 and *C. sp.* Benson, 1959 are put as synonymous of *C. beaconensis* by Sandberg (1964b). *C. riograndensis* Pinto & Ornellas, 1965 was put as synonymous of *C. multidentata* Hartmann, 1955. *C. gigantea* Le Roy, 1964 and *C. hartmanni* Ramirez, 1967 were put as synonymous of *C. salebrosa* van den Bold, 1963 by Sandberg & Plusquellec (1974). *C. rohri* van den Bold, 1963 and *C. bronnimanni* van den Bold, 1958 belongs to *Cytheridea*.

	Mioc.	Plioc.	Pleist.	Rec.
<i>C.beaveni</i> Tressler & Smith, 1948				
<i>C.bensoni</i> Sandberg, 1966				
<i>C.castus</i> Benson, 1959				
<i>C.currayi</i> Swain, 1967				
<i>C.edentata</i> Klie, 1939				
<i>C.multidentata</i> Hartmann, 1955				
<i>C.pacifica</i> Hartmann, 1957				
<i>C.saetosa</i> Hartmann, 1955				
<i>C.stenopora</i> Triebel, 1956				
<i>C.swaini</i> Hall, 1965				
<i>C.gelica</i> Sandberg & Plusquellec, 1974			— ? — ? —	
<i>C.beaconensis</i> (Le Roy), 1943				
<i>C.similis</i> (Brady), 1869				
<i>C.salebrosa</i> Bold, 1963				
<i>C.mexicana</i> Sandberg, 1964				
<i>C.stephensoni</i> , Sandberg, 1964				
<i>C.americana</i> (Sharpe), 1908				
<i>C.floridana</i> (Howe & Hough), 1935				
<i>C.subquadraregulares</i> (brady), 1870				— ? —
<i>C.portusprospectuensis</i> Bold, 1971				
<i>C.nodosa</i> (Stephenson), 1938				
<i>C.curta</i> (Edwards), 1944				
<i>C.pascagoulensis</i> (Mincher), 1941				
<i>C.camachoi</i> Rossi de Garcia, 1966				
<i>C.locketti</i> (Stephenson), 1935				
<i>C.panamensis</i> Bold, 1972				
<i>C.aff.C.pascagoulensis</i> (Mincher), 1941				
<i>C.obscura</i> Butler, 1963	— ? — ?			

Cytheridea is registered from Eocene to Recent; *Cytheridella* from Oligocene to Recent; *Bisulcocypris* and *Cypridea* in Upper Jurassic-Lower Cretaceous.

Despite the fact that the material studied have been formed mostly by new species, some of them were compared with known species. So, *Cytheridea sulcosigmoidalis* sp.nov. was compared to *C.kollmanni* Bold from the Miocene; *C.reticulopunctata* sp.nov. to *C.pernota* Oertli & Keij from Oligocene-Miocene and to *C.intermedia* (Reuss) from Eocene; *C.pebasea* sp.nov. to *C.acuminata* Bosquet from Miocene and to *C.bensoni* Sandberg from Pliocene(?) (in Bold, 1975a); *Cyprideis amazonica* sp. nov. to *C.beaconensis* (Le Roy) from Pleistocene-Recent. *Cytheridella danielopoli* to *C.ritzkowskiana* Carbonnel & Ritzkowski from Oligocene.

Concerning *Darwinula*, it occurs from the Carboniferous to the Recent (Morkhoven, 1963) and, as the differences from one to other species are very sensitives, not only the specific determination is very difficult, but also the determination of age.

From the exposed results:

a) the hypothesis that *Cyprideis* would have amplified its stratigraphical range is remote and lack fundaments. Moreover, it would be contrary to the conclusion of those who have studied the molluscs stating Miocene or Pliocene age to those sediments. So, the sediments could not be older than Miocene by the presence of *Cyprideis*.

b) the *Cytheridea*, for its similarities with older forms (eocenics), could be older than the Miocene but in this case they would consist of reworked material.

On the whole, it is not possible to precise definitively the age through the present study on ostracodes. However it is possible to state that:

1. there were lower cretaceous-upper jurassic continental sediments evidenced by the presence of *Bisulcocypris* and *Cypridea* on the outcrop.

2. these forms are found associated to younger ones, probably from Miocene to Pliocene ages.

3. the age is probably pliocenic and the material was reworked mixing up mesozoic and lower tertiary forms with those of younger age.

PEBAS OR SOLIMÕES FORMATION?

It is necessary to justify the use of the name Pebas Formation instead of Solimões Formation. This last name was used by Moraes Rego (1930).

Caputo, Rodrigues & Vasconcelos (1972) say:

“In the Upper Amazon region there is a sequence of gray and red clays containing abundant vegetal and animal remains. This formation received many names in the Amazon as in the neighbor countries. Among those denominations there are: Pebas (Orton, 1876), Aquiri (Hartt, 1870), Red Beds (Singewald, 1927), Puca (Steinmann, 1929), Serie Solimões (Moraes Rego, 1930), Cruzeiro (Oppenheim, 1937), Baixada (Miranda, 1938), Quixito (Oliveira, 1940), Rio Acre (Oliveira, 1940), Rio Branco (Wanderley, after Oliveira, 1940), Grupo Contamana (Kümmel, 1946) and Purus (Cunha, 1963).

Caputo, Rodrigues & Vasconcellos (1971) verified that all those beds, by its lithologic characteristics, are regionally indifferenciabile forming only one lithostratigraphical unit. They called it Solimões Formation, name proposed by Moraes Rego (1930) by reference to the most remarkable accident in the region.

The designation “Pebas” though used in some publications, is assigned to the fossiliferous locality of Peru referred by Orton (1876) but is was not formalised as a lithostratigraphical unit and it is not referred in the geological literature from Peru as, for example, in the Handbook of South American Geology (Jenks, 1956).”

Caputo, Rodrigues & Vasconcelos (1972) not only propose the name Solimões to be used again but they also gather under this designation several formations considered by the original authors as distinctives.

However it is necessary to point out that a stratigraphical section of Pebas was made by Steere and published by Hartt (1872) as follow:

- V — A bed, ten feet in thickness, of red and white clay, and sand, without fossils. This forms the surface deposit.
- IV — Blue clay, five feet thick, and full of fossils.
- III — A bed of blue clay, thirteen feet in thickness, with occasional shells too badly preserved to be removed.
- II — A well defined seam of lignite, six inches in thickness. For a few inches above and below this, the clay is filled with vegetable remains.
- I — The lowest bed seen is of blue clay presenting a thickness of fifteen feet, uncovered. In the middle there is a band three feet in thickness containing shells.

The enlargement of the Pebas beds to the Brazilian side was assigned by Brown (1879) when he verified the lithological similarity between the section made by him in Canamã and that of Pebas made by Steere.

Moraes Rego (1930) suggests the denomination “Serie de Solimões” to the sediments correspondent to that of Pebas in the Brazilian side. However, he did not make a geological section and the section presented by him, reproduced below, starts with a sentence which invalidates the proposition.

“The classic exposition for this formation is on Pebas, where the section determined by Dr. Avelino is as follows”:

1 — brown soil	0,15
2 — brown reddish clay	0,15
3 — slightly dotted clay	1,20

4 – brown clay, very fine concretions	1,00
5 – dark clay	0,50
6 – dark clay with fossils	0,30
7 – dark clay with fine sand	0,90
8 – dark clay with fossils	1,20
9 – dark clay	1,00
10 – blue clay with lignite remains	0,20
11 – dark brown clay	3,50
12 – dark brown clay with fossils	0,20
13 – clay with betuminous lignite	0,40
14 – gray-bluish clay	1,10
15 – clay with fossils	0,20
16 – dark gray clay	0,30
17 – clay with lignite remains	1,10
18 – dark clay with a fine bed of limestone	4,60

By the exposed it is not justified the changing of the name Pebas to Solimões because: a) the section presented to Solimões is the same as that used to Pebas; b) the name Pebas has been used for about 100 years to those beds presenting a determined lithology and kind of fossils; c) it has a geological typic-section of Pebas made by Steere (in Hartt, 1872).

For all the exposed the name Pebas Formation is maintained to those beds, even to those of the Brazilian side.

SYSTEMATIC DESCRIPTION

Phylum	Arthropoda
Sub Phylum	Mandibulata
Classis	Crustacea
Sub Classis	Ostracoda Latreille, 1806
Ordo	Podocopida Müller, 1894
Sub Ordo	Podocopina Sars, 1865
Super Familia	Cypridacea Baird, 1845
Familia	Ilyocyprididae Kaufmann, 1900
Sub Familia	Cyprideinae Martin, 1940

Genus *Cypridea* Bosquet, 1852

Diagnosis: Oval or oblong valves, with antero-ventral beak. Evenly and moderately convex. Usually widest in anterior half. Carapace fairly thick and strong. Surface punctate or reticulate. Sometimes ornamented with large hemispherical bosses, rounded tubercles or spines, which are always arranged on a definite plan. Left valve larger than the right one, marked overlap on all margins but especially ventrally.

Type-species: *Cypris granulosa* Sowerby, 1836

Cypridea sp.

Pl. 1, fig. 1

Cypridea sp. Purper 1977a. Sixth Intern. Symposium Saalfelden, p. 364-365

Hypotypus: Carapace. M.P., UFRGS
n. MP-0-538

Locus: Outcrop in Atalaia do Norte, Upper
Amazon Valley, Brazil

Stratum: Pebas Formation (reworked material)

Description: Oval carapace, in lateral view. Dorsal margin convex presenting slight constriction at the cardinal angles. Anterior margin strongly rounded, having the well developed beak near the antero-ventral margin, surpassing the ventral margin. Ventral margin slightly convex. Posterior margin very well bent from the posterior cardinal angle, ending in angle near the ventral margin. Greatest height near midlength of the carapace, being larger than half the length.

— The classification used in this report is that proposed in the *Treatise of Invertebrate Paleontology*, Part Q — Moore, 1961.

Dimensions

Hypotypus: Carapace. M.P., UFRGS n. MP-0-538. Length: 0,984mm; height: 0,600mm

Discussion: It was impossible to observe the distinctive characters and, consequently, the comparison with other species was not made, as the material was composed by one compressed carapace only. It was put as *Cypridea* for its characteristic outline and by the presence of the beak.

Occurrence: Outcrop in Atalaia do Norte, near Benjamin Constant city, Upper Amazon Valley, Brazil.

Material: Only one compressed carapace.

Super Familia Darwinulacea Brady & Norman, 1889

Familia Darwinulidae Brady & Norman, 1889

Genus *Darwinula* Brady & Robertson, 1885 emend Pinto & Kotzian, 1961

Diagnosis: Thin, smooth valves, without any sculpture. Seen from the side it is oblong elongated with the greatest height from the center to the posterior portion; seen dorsally, it is lanceolate, normally with the greatest width at the posterior portion and with the anterior end acuminate. Muscle scars six to twelve, in rosette, at the median line in antero-central position. Hingement lophodont. Inner lamella narrow.

Type-Species: *Darwinula stevensoni* Brady & Robertson, 1870

Darwinula sp.

Pl. 1, fig. 2-3

Hypotypus: fragment of the right valve. M.P., UFRGS n. MP-0-565

Locus: Well CPCAN-III-São Paulo de Olivença (31,52 to 32,62m), Upper Amazon Valley, Brazil

Stratum: Pebas Formation

Description: Thin, smooth, ovoid elongate carapace, in lateral view; dorsal margin slightly arched passing smoothly into the acuminate anterior margin; ventral margin almost straight. Muscle scar seven in number, disposed in rosette.

Dimensions

Hypotypus: fragment of the right valve. M.P., UFRGS n. MP-0-565. Length: 0,360mm; height: 0,180mm

Discussion: The material is very scarce, having only one fragmented valve and one completely compressed carapace. Therefore, it was impossible to make the comparison with other species. The elongate ovoid shape, thin valve and the characteristic muscle scars permitted the classification in *Darwinula*.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 to 32,62m) Upper Amazon Valley, Brazil.

Material: One fragmented valve and one compressed carapace.

Darwinula fragilis Purper, sp.nov.

Pl. 1, fig. 4-10

Darwinula sp. Purper 1977a Sixth Intern. Ostracod Symposium, Saalfelden p.364-365

Derivatio nominis: due to the fragility of the carapace.

Holotypus: Female, left valve. M.P., UFRGS n.º MP-0-532

Paratypus: Male, right valve. MP-0-531

Locus typicus: Well CPCAN-III-São Paulo de Olivença (19,50 to 20,78m) Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Elongate carapace, tapering to the anterior and posterior margins in lateral view; six muscle scars in rosette. Inner lamella narrow. Length two times and a half the greatest height.

Description

Female: Oblong carapace in lateral view. Dorsal margin almost straight merging smoothly to the pointed anterior and posterior margins. Ventral margin slightly convex in the posterior portion. Greatest height at the posterior half, approximately one-third the length. Seen dorsally, posterior portion rounded and anterior one acuminate, presenting the greatest width on the posterior half. Smooth surface. Simple hinge presenting, on the right valve, a slight thickness in the extremities which fits on the opposite valve. Inner lamella greatly reduced, easier seen on the anterior border. Six muscle scars disposed in rosette.

Male: It differs from the female, in dorsal view, by having a more pointed posterior portion and, in lateral view, by having the ventral margin almost straight.

Dimensions

Holotypus: Female, left valve, M.P., UFRGS n. MP-0-532. Length: 0,63mm; height: 0,24mm

Paratypus: Male, right valve. MP-0-531. Length: 0,61mm; height: 0,24mm

Discussion: This species resembles *Darwinula aurea* (Brady & Robertson), 1870 (in Swain, 1955), a recent species from Baía de San Antonio, Texas and *Darwinula stevensoni* (Brady & Robertson), 1870 a lacustrine pleistocene species of the Lower Liri Valley (Devoto, 1965). But while *D. aurea* has the anterior margin bent to the ventral portion, *D. fragilis* has the anterior margin medianally directed. *D. fragilis* differs from *D. stevensoni* by having the dorsal margin almost straight.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m) and outcrop in Atalaia do Norte, Upper Amazon Valley, Brazil.

Material: CPCAN-III-São Paulo de Olivença – four adult valves; one valve of juvenile instars and two fragments.

Outcrop – ten complete carapaces and twenty-six adult valves.

Super Família Cytheracea

Família Cytherideidae

Sub Família Cytherideinae Sars, 1925

Genus *Cytheridea* Bosquet, 1852

Diagnosis: Subtrapezoid to subtriangular carapace in lateral view. Anterior margin well-rounded, posterior one obliquely truncated. Dorsal margin straight or convex; ventral margin typically concave. Hingement with four elements presenting terminal elements elongate and coarsely crenulate in the right valve. Subquadrangular in dorsal view; marginal pore canals numerous, enlarged centrally, simple or branching; muscle scars in vertical row of four; anterior scar V-shaped.

Type-species: *Cythere muelleri* Münster, 1830

Cytheridea sulcosigmoidalis Purper, sp. nov.

Pl. 1, fig. 11-18

Cytheridea sp. A, Purper, 1977a. Sixth Intern. Ostracod. Symposium, Saalfelden p.360,361.

Derivatio nominis: due to the dorsal sulcus presented by the carapace in lateral view.

Holotypus: Female, left valve. M.P., UFRGS n. MP-0-508

Paratypus: Male, right valve. MP-0-509

Locus typicus: Well CPCAN-III-São Paulo de Olivença (31,52 to 32,62m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Surface strongly puncturate. Dorsal median sulcus sinuously disposed, surpassing the middle height. Ventral concavity more accentuated in the males than in the females, in lateral view.

Description

Female: Subtrapezoidal in lateral view, with the dorsal margin almost straight; anterior margin rounded, posterior one obliquely truncate; ventral margin slightly concave. Greatest height on the first third, little larger than half length. Subquadrangular in dorsal view, with lateral borders parallel; posterior margin more rounded, anterior one pointed. Hingement with four elements. Anterior and posterior elongate tooth strongly crenulate on the right valve presenting between them the median element. This one is divided in a little anterior portion with negative and shallow elements and in an elongate posterior portion with positive elements. The median element is narrow and crenulate. Hinge-elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Numerous simple or rarely bifurcate pore canals regularly disposed. Surface strongly and chaotically puncturate. Dorsal median sulcus sinuously disposed surpassing the middle line. Muscle scars presenting four vertical close together desigual scars; frontal scar V-shaped, mandibular scar reduced.

Male: It differs from the female, in lateral view, for it is more pointed posteriorly and has the antero-ventral margin strongly more curved surpassing the ventral margin, where it presents a much stronger ventral concavity.

Dimensions

Holotypus: Female, left valve. M.P., UFRGS n. MP-0-508. Length: 1,18mm, height: 0,68mm

Paratypus: Male, right valve, n. MP-0-509. Length: 1,15mm; height: 0,65mm

Discussion: This species somewhat resembles *Cytheridea kollmanni* van den Bold, 1963, from Upper Miocene of the Melajo Clay Member of Springvale. But it differs from that species because it does not present spines on the anterior margin, it has the cardinal posterior angle less prominent and the female is not so much pointed posteriorly. It is much more rounded in dorsal view.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil; Well CPCAN-I-Tamandua (131,19 – 135,27m).

Material: CPCAN-III-SP – 6 adult valves; CPCAN-I-Tamandua, 1 adult valve.

Cytheridea reticulopunctata Purper, sp. nov.

Pl.II, fig. 1-10

Cytheridea sp. B, Purper, 1977a. Sixth Ostracod Symposium, Saalfelden p.360-361

Derivatio nominis: due to the strongly punctate surface, forming reticulum

Holotypus: Female, left valve, M.P., UFRGS n. MP-0-510

Paratypi: Males and juvenile instars MP-0-511, 512, 566, 567

Locus typicus: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnosis: Surface with compose and arranged punctures forming broad reticule; little spines in the anterior margin.

Description

Female: Subovate in lateral view; dorsal margin with slight convexity between the cardinal angles; anterior margin rounded tending to be bent near the anterior cardinal angle. Posterior margin truncate forming a strong posterior cardinal angle, ending in a little rounding in the ventral margin. Ventral margin slightly convex. Greatest height in the anterior portion, larger than half length. Subquadrangular in dorsal view, with slight concavity in the antero-median region; posterior margin slightly rounded; anterior margin pointed. Hingement with four elements. Anterior and posterior teeth strongly crenulate on the right valve, presenting between them the median element. This one is divided in a little anterior portion with negative and shallow elements and in an elongate posterior portion with positive elements. The median element is narrow and crenulate. Hinge elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Numerous simple or rarely bifurcate pore canals regularly disposed. Surface with compose puncture forming broad reticulum. Little spines along the anterior border. A set of four spines in the postero-ventral portion being the lower one much more developed than the others. Muscle scars with four vertical desigual scars; frontal scar V-shaped, mandibular scar elongate.

Male: It differs from the female in lateral view by having the posterior portion acute and a straight dorsal margin between the cardinal angles; in dorsal view by having the posterior extremity not rounded ending in angle just like the anterior portion.

Dimensions

Holotypus: Female, M.P., UFRGS n. MP-0-510. Length: 0,95mm; height: 0,52mm

Paratypi: Males and juvenile instars

MP-0-511. Length: 0,90mm; height: 0,49mm

MP-0-512. Length: 0,91mm; height: 0,49mm

MP-0-566. Length: 0,38mm; height: 0,23mm

MP-0-567. Length: 0,30mm; height: 0,18mm

Discussion: All the already known species are different from this new one in the outline and in the compose puncture of the ornamentation. The more similar ornamentation is that of *C. sulcosigmoidalis* Purper, sp. nov. but the outline is different and *C. reticulopunctata* also presents spines in the anterior and posterior portions. *C. pernota* Oertli & Keij, 1955 from Oligocene-Miocene and *C. intermedia* (Reuss) from Eocene from Belgica (Keij, 1957) were compared with the new species and although they present the right valve outline similar to the new species they differ from it by presenting a strong concavity in the ventral posterior region. Otherwise, the left valve of the new species is subtrapezoidal and those above mentioned have them subtriangular.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62mm), Upper Amazon Valley, Brazil.

Material: Five adult valves and three juvenile instars valves.

Cytheridea pebasea Purper, sp. nov.
Pl. 2, fig. 11-23

Cytheridea sp. C, Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p. 362-363

Derivatio nominis: from Pebas Formation

Holotypus: Female, left valve. M.P., UFRGS n. MP-0-513

Paratypes: Females and males. MP-0-514, 515, 516, 568, 569, 570.

Locus typicus: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnosis: Pitted surface, little spines around the anterior margin; cardinal angles well marked.

Description

Female: Subtrapezoidal in lateral view; straight dorsal margin between the cardinal angles. Anterior margin rounded tending to be straight near the anterior cardinal angle. Ventral margin straight. Posterior margin truncate forming obtuse angle close to the posterior cardinal angle and acute angle close to the postero-ventral extremity. Greatest height longer than half the length, being located close to the anterior cardinal angle. Subquadrangular in dorsal view, with slight constriction at the median portion; anterior border pointed and the posterior one slightly convex. Hingement with four well defined elements. Anterior and posterior crenulate teeth on the right valve, presenting between them the median element. This one is divided in a little anterior portion with negative and shallow elements and in an elongate posterior portion with positive elements. The median element is narrow and crenulate. Hinge-elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Numerous simple pore canals regularly disposed. Pitted surface. Near the median dorsal line the pits are arranged in a line disposed antero-ventrally reaching the mid-height. About seven spines along the anterior margin. Muscle scars with four vertical close together desigual scars; frontal scar V-shaped. Right valve smaller than the left, more pointed posteriorly and presenting a more angulous outline.

Male: It differs from the female because it is narrower, more elongate and lower. In lateral view it has the postero-ventral portion more prominent and elongate. In dorsal view it presents the anterior and posterior borders pointed.

Dimensions

Holotypus: Female, M.P., UFRGS n. MP-0-513. Length: 0,67mm; height: 0,37mm.

Paratypi: Females and males

MP-0-514. Length: 0,64mm; height: 0,33mm

MP-0-515. Length: 0,74mm; height: 0,36mm

MP-0-516. Length: 0,74mm; height: 0,33mm

MP-0-568. Length: 0,71mm; height: 0,39mm

MP-0-569. Length: 0,66mm; height: 0,36mm

MP-0-570. Length: 0,64mm; height: 0,33mm

Discussion: The species *C. acuminata* Bosquet (in Kollmann, 1958) from the Neogene of Austria was compared to the new species but the pitted surface in *C. pebasae* is less strong and more numerous; the female's right valve, in lateral view, is less pointed posteriorly and the male's right valve is more pointed than those of *C. acuminata*. *C. bensoni* Sandberg, 1966 (in van den Bold, 1975b) from La Cruz Formation (Neogene from Cuba) was also compared to this new species. But while *C. pebasae* presents the greatest height near the anterior cardinal angle, in *C. bensoni* (figured by Bold, op. cit.) it is situated much back; the male of *C. pebasae* is also more pointed posteriorly and presents a pitted surface.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), CPCAN-I-Tamandua (211,86 – 214,96m); outcrop in Atalaia do Norte, Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP 72 adult valves; 65 juvenile instars valves; 21 fragments.

CPCAN-I-TM 10 adult valves

Outcrop – 12 adult carapaces, 9 adult valves and one fragment.

Cytheridea graciosa Purper, sp. nov.

Pl. 3, fig. 1-9

Cytheridea sp. D, Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.362-363

Derivatio nominis: due to the beautiful appearance of the carapace

Holotypus: Female, right valve M.P., UFRGS n. MP-0-517

Paratypi: Male, left valve, MP-0-518; juvenile instars, right valve MP-0-571

Locus typicus: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnoses: Pitted surface presenting strong constriction on the anterior-superior third; anterior margin with strong spines throughout; on the postero-ventral margin it presents a set of four spines being the lower one more developed than the others.

Description: Subrectangular in lateral view; dorsal margin almost straight between the cardinal angles. Anterior margin begins with a slight bent near the anterior cardinal angle passing to be rounded frontally. Ventral margin sinuously disposed presenting a concavity close to the selvage lip and a convexity expanded from the median to the terminal end. Truncate posterior margin forming an obtuse angle near the posterior cardinal angle and an acute angle near the postero-ventral extremity. Greatest height on the anterior portion, larger than half length. In dorsal view anterior and posterior borders pointed being the anterior one much more tapered; slight constriction on the median portion. Hingement with four elements. Anterior and posterior teeth strongly crenulate on the right valve presenting between

them the median element. This one is divided in a little anterior portion with negative and shallow elements and in an elongate posterior portion with positive elements. The median element is narrow and crenulate. Hinge-elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide throughout. Numerous simple pore canals regularly disposed. Pitted surface. In the anterior as well as in the posterior region the pits are so fine that seem to be a punctate surface. Anterior border with spines regularly disposed; on the ventral margin a set of four spines being the lower one more developed. Muscle scars with four vertical desigual scars; frontal scar V-shaped; inconspicuous, elongate mandibular scar.

Male: It differs from the female, in lateral view, because it is more pointed posteriorly and, in dorsal view, by having the anterior portion more inflate than the posterior.

Dimensions

Holotypus: Female. M.P., UFRGS n. MP-0-517. Length: 0,76mm; height: 0,41mm

Paratypi: Male: MP-0-518. Length: 0,83mm; height: 0,43mm

Juvenile instar: MP-0-571. Length: 0,34mm; height: 0,21mm

Discussion: The closest species is *C. pebasae* Purper sp. nov. But *C. graciosa* presents, in anterior margin, spines much more developed than those of *C. pebasae*; posteró-ventral spine occurs in *C. graciosa* and lacks in *C. pebasae*; ventral margin is sinuous in *C. graciosa* and straight in *C. pebasae*.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); CPCAN-II-Porere (154,05 – 156,36m), Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP – 9 adult valves and 10 fragments; CPCAN-Po – 2 adult valves and 4 fragments.

Cytheridea longispina Purper, sp. nov. Pl. 3, fig. 10-21

Derivatio nominis: due to the elongate spines on the anterior portion

Holotypus: Female, left valve. M.P., UFRGS, n. MP-0-572

Paratypi: Male, right valve. MP-0-573

Male, right valve. MP-0-593

Locus typicus: Well, CPCAN-I-Tamandua (211,86 – 214,96m) Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnosis: Median to posterior portion with compose puncta. Anterior margin with elongate spines disposed from the median to the ventral portion.

Description

Female: Subtrapezoidal in lateral view, with the dorsal margin almost straight between the cardinal angles. Anterior margin bent downward on dorsal portion; big spines disposed from the median to the ventral border of the anterior margin. Ventral margin sinuous presenting a concavity near the selvage lip and convexities on the anterior and posterior borders. Posterior margin begins in the very well developed cardinal angle and merges in well developed bent to the ventral margin. Greatest height on the anterior portion equivalent to half length. In dorsal view, anterior and posterior margins pointed showing the greatest width medianaly. Hingement with four elements. Anterior and posterior teeth

on the right valve strongly crenulate presenting between them the median element. This one is divided in a little anterior portion with negative and shallow elements and in a bigger posterior portion with positive elements. The median element is narrow and crenulate. Hinge-elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide except anteriorly where it presents a narrow and shallow vestibule. Numerous simple pore canals regularly disposed. Surface punctate being the postero-median area ornamented with puncta. Anterior margin with big spines disposed from the median to the ventral margin. Muscle scars with four vertical desigual scars: three lower ones elongate and the superior one triangular; frontal scar V-shaped; mandibular scar elongate.

Male: It differs from the female by having on the postero-ventral region a set of four spines being the lower one very well developed. In lateral view the greatest height is smaller than half length and in dorsal view the greatest width is anteriorly located.

Dimensions

Holotypus: Female.M.P., UFRGS n. MP-0-572. Length: 0,90mm; height: 0,43mm

Paratypi: Male MP-0-573. Length: 0,86mm; height: 0,83mm

MP-0-593. Length: 0,91mm; height: 0,43mm

Discussion: The closest species is *C. graciosa* sp. nov. But while *C. longispina* presents a punctate surface having the postero-median area ornamented with compose punctae, *C. graciosa* presents a pitted surface. *C. longispina* presents anterior spines bigger than those of *C. graciosa* and the anterior region is bent downward what is not present in *C. graciosa*.

Occurrence: Well CPCAN-I-Tamandua (211,86 – 214,96m), Upper Amazon Valley, Brazil.

Material: 5 adult valves, 45 juvenile instars and 9 fragments.

Genus *Cyprideis* Jones, 1857

Diagnosis: Oval-reniform carapace in lateral view, greatest height longer than half the length. Dorsal and ventral margins almost parallel; dorsal margin slightly concave in anterior half. Anterior end rounded, posterior end obtusely rounded. Ovoide in dorsal view, wider posteriorly. Surface with scattered tubercles on the type species, normally smooth or punctate with a slight sulcus just anterior to middle-length, anterior margin with or without marginal denticles, spurs present or not at the postero-ventral or anterior-ventral side. Narrow duplicature, the inner margin and line of concrescence coincident; porecanals numerous, some simple straight, others bifurcating. Hinge with four elements; in the left valve an elongate coarsely crenulate anterior socket with about 15 pits followed by the antero-median element like a short finely crenulate projecting bar, merging into shallow furrow finely crenulate and short coarsely crenulate socket with about 6 pits. Muscle scars in vertical row of four adductors; one rounded and a V-shaped antennal scar in front of top row; a mandibular scar in front of bottom of row and the 2nd mandibular scar near ventral margin.

Type-species: *Candona torosa* Jones, 1850

Cyprideis amazonica Purper, sp. nov.

Pl. 4, fig. 1-11

Cyprideis B, Purper 1977a. Sixth Intern. Ostracod. Symposium, Saalfelden, p.362-363

Derivatio nominis: in reference to the amazonian region.

Holotypus: Female, left valve. M.P., UFRGS, n. MP-0-524

Paratypes: Females and males. MP-0-523, 525, 526, 527, 528, 574

Locus typicus: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m) Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Surface punctate. Postero-lateral concavity in the females and males right valve.

Description: Subrectangular in lateral view. Dorsal margin of the right valve with slight convexity between the cardinal angles; the dorsal margin of the left valve is almost straight. Anterior margin bent near the cardinal angle merging smoothly to a broad rounded anterior portion. Ventral margin of the left valve sinuous presenting a concavity close to the selvage lip and a convexity extended from the median to the posterior portion. Ventral sinuosity of the left valve less developed. Posterior margin of the right valve slightly truncate just after the cardinal angle where it forms a broad round. Posterior margin of the left valve uniformly rounded. Greatest height near the antero-median portion, larger than half the length. Ovoid elongate in dorsal view; anterior margin of the left valve pointed; posterior margin rounded; greatest width just after the mid-length. The right valve presents anterior and posterior constrictions being the posterior one more accentuate. Hingement with anterior and posterior teeth in the right valve, strongly crenulate, presenting between them the median element. This one is divided in a little anterior portion with negative and shallow elements and in an elongate posterior one with positive elements. The median element is narrow and crenulate. Hinge-elements in the left valve complementary. Inner lamella with regular outline, wider anteriorly. Line of concrescence and inner margin coincide except anteriorly where there is a narrow vestibule. Numerous simple pore canals regularly disposed, some bifurcate on the terminal end. Surface punctate. Muscle scars with four vertical desigual scars; frontal scar V-shaped; mandibular scar reduced and fulcral point reniform.

Male: It differs from the female because it is more elongate in lateral view and more pointed dorsally.

Dimensions

Holotypus: Female, left valve. M.P., UFRGS n. MP-0-524. Length: 0,90mm; height: 0,51mm

Paratypes: Female, right valve. MP-0-525. Length: 0,88mm; height: 0,48mm

MP-0-526. Length: 0,96mm; height: 0,50mm

MP-0-527. Length: 0,93mm; height: 0,44mm

MP-0-523. Length: 0,90mm; height: 0,38mm

MP-0-528. Length: 0,93mm; height: 0,40mm

MP-0-574. Length: 0,93mm; height: 0,50mm

Discussion: For the presence of the postero-lateral concavity of the right valve, the closest species to *C. amazonica* is *C. beaconensis* (Le Roy) figured in Sandberg (1964b), a Pleistocene-Recent form. However, this characteristic in *C. beaconensis* is mentioned only to males while in *C. amazonica* it occurs both in males and females. Another difference is on the marginal denticulation that is lacking in *C. amazonica* and is characteristic to *C. beaconensis*.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); CPCAN-I-Tamandua (131,19 – 135,27m); outcrop in Atalaia do Norte, Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP, 10 adult valves; 8 juvenile instar valves; 8 fragments; CPCAN-I-TM, 1 adult valve; outcrop: 241 adult valves, 17 carapaces, 100 fragments.

Cyprideis truncata Purper, sp. nov.

Pl. 4, fig. 12-22

Cyprideis A, Purper, 1977a. Sixth Intern. Ostracod Symposium Saalfelden p. 362-363

Derivatio nominis: due to the truncate posterior portion of the right valve.

Holotypus: Female, left valve. M.P., UFRGS n. MP-0-522

Paratypi: Females and males. MP-0-520, 521, 575, 576.

Locus typicus: Well CPCAN-I-Tamandua (131,19 – 135,27m), Upper Amazon, Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Surface scattered punctate. Posterior portion strongly truncate specially in the females. Left valve bigger than the right.

Description

Female: Subrectangular in lateral view. Dorsal margin of the right valve arched, merging smoothly to the rounded anterior margin; dorsal margin of the left valve straight between the cardinal angles; anterior margin with a strong bent near the cardinal angle and rounded anteriorly. Posterior margin of the left valve truncate while that of the right valve slopes near the cardinal angle and reaches the postero-ventral portion acutely. Ventral margin of the right valve sinuous presenting a concavity near the sel-vage lip and a convexity between the median and terminal portions. Ventral margin of the left valve slightly convex. Maximum height at the mid-length larger than half the length. Ovoid-elongate in dorsal view, anterior end pointed, posterior one rounded. Greatest width on the terminal half. Hingement with crenulate teeth on the right valve. Median elements inconspicuous. Hinge-elements in the left valve complementary. Inner lamella regularly disposed with the line of concrescence apart from the inner margin forming a shallow vestibule. Numerous short simple pore canals being some ramified in the antero-ventral portion. Surface punctate. Muscle scars with four vertical desigual scars; frontal scar V-shaped; mandibular scar ovate and fulcral point subcircular.

Male: It differs from the female because it is more elongate laterally, more pointed dorsally and the posterior truncation of the left valve is less accentuated.

Dimensions

Holotypus: Female, left valve. M.P., UFRGS n. 522. Length: 0,98mm; height: 0,55mm

Paratypi: Female, right valve. MP-0-520. Length: 0,91mm; height: 0,50mm

Female, carapace. MP-0-521. Length: 0,98mm; width: 0,45mm

Male, right valve: MP-0-575. Length: 0,98mm; height: 0,45mm

Male, left valve. MP-0-576. Length: 0,98mm; height: 0,48mm

Discussion: The present species could be compared to *C. amazonica* but *C. truncata* lacks the characteristic postero-lateral concavity of *C. amazonica*. *C. truncata* presents a strong truncate posterior border which is not present in *C. amazonica*; the anterior marginal pore canals are shorted and the crenulation of the hinge teeth is not so conspicuous.

Occurrence: Well CPCAN-I-Tamandua (131,19 – 135,27m); CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Material: CPCAN-I-TM: 4 adult valves and 1 carapace; CPCAN-III-SP: 5 adult valves and 4 juvenile instars.

Genus *Amazonacytheridea* Purper, gen. nov.

Diagnosis: Elongate, subrectangular carapace in lateral view; dorsal margin straight or slightly convex; ventral margin straight or slightly concave. Anterior and posterior margins rounded. Smooth

surface. Hinge merodont entomodont. Terminal teeth elongate, crenulate. Median element reduced, crenulate. Muscle scars in vertical row of 4; frontal scar V-shaped; mandibular scar big. Broad inner lamella, sinuously disposed. Numerous long and ramified pore canals.

Type species *Amazonacytheridea multiradiata* Purper gen. et sp. nov.

Discussion: Although it was tried to put this species in some genera already known, the characteristics presented did not permit it. So, by the external shape it seems *Paracyprideis*. But while *Paracyprideis* has smooth teeth, *Amazonacytheridea* has crenulate teeth. The pore canals in *Paracyprideis* are simple and in *Amazonacytheridea* are ramified. The new genus was compared also to *Cyamocytheridea* but while the hinge elements are positive in right valve and negative in the left, the new genus presents negative and positive elements in both valves. *Cyamocytheridea* is oval in lateral view and the new genus is subrectangular.

Amazonacytheridea multiradiata Purper, gen. et nov.

Pl.5, fig. 1-9

Ostracoda A, Purper 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.358-359

Derivatio nominis: due to the characteristic multiradiate pore canals

Holotypus: female, left valve. M.P., UFRGS n. MP-0-502

Paratypi: males. MP-0-501, 503, 504.

Locus typicus: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Female subrectangular, male elongate posteriorly, in lateral view. Anterior pore canals ramified, posterior one simple or bifurcate.

Description

Female: Subrectangular in lateral view; dorsal margin slightly convex; anterior margin more rounded than the posterior; ventral margin almost straight. Greatest height on the anterior half little less than half length. In dorsal view posterior end rounded, anterior one pointed; greatest width at midlength. Hinge merodont, entomodont with the three elements strongly crenulate. Anterior element more elongate than the posterior, both at the right valve, being positive. The median negative element in the same valve is very little. Hinge-elements in the left valve complementary. Inner lamella broad, disposed sinuously throughout the free margin. Line of concrescence apart from the inner margin forming at the antero-median region a narrow vestibule. Numerous, long and ramified pore canals in the anterior region; simple and/or bifurcate in the posterior region. Muscle scars with four vertical desigual scars; frontal scar V-shaped; mandibular scar big, very well seen. Surface smooth.

Male: It differs from the female, in lateral view, by having the posterior portion more pointed ventrally directed and by having the length two times and a half the height.

Dimensions

Holotypus: female, M.P., UFRGS n. MP-0-502. Length: 0,81mm; height: 0,38mm

Paratypi: males. MP-0-501. Length: 0,88mm; height: 0,33mm

MP-0-503. Length: 0,82mm; height: 0,35mm

MP-0-504. Length: 0,83mm; height: 0,35mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); (31,52 – 32,62m), CPCAN-I-Tamandua (131,19 – 135,27m), (211,86 – 214,96m); Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP (31,52 – 32,62) 13 adult valves, one adult carapace; (19,50 – 20,78m) – 9 adult valves, 3 fragments; CPCAN-I-TM (131,19 – 135,26m) 2 carapaces; (211,86 – 214,96m) 8 adult valves, 3 fragments.

Genus *Paulacoutoia* Purper gen.nov.

Diagnosis: Subrectangular in lateral view; dorsal margin slightly convex; ventral margin straight or slightly concave; anterior margin rounded, posterior one truncate. Hinge merodont lophodont to entomodont. Muscle scars in a row of 4 vertically disposed; frontal scar V-shaped and the mandibular elongate. Broad inner lamella regularly disposed. Pore canals short, simple, bifurcate or ramified. Broad vestibule.

Type species: *Paulacoutoia olivençai* Purper gen. et sp.nov.

Discussion: The new genus was compared to *Krithe* and *Parakrithella*. However it differs from both because of the merodont, entomodont hinge which is not present in any genera of the subfamily Kri-thinae. On the other hand this new genus does not present the posterior incision characteristic to *Krithe*. The name was given in honour of the Brazilian Paleontologist Prof. Carlos de Paula-Couto.

Paulacoutoia olivençai Purper, gen. et sp. nov.

Pl. 5, fig. 10-17

Derivatio nominis: in reference to São Paulo de Olivença

Holotypus: female, left valve. M.P., UFRGS n^o MP-0-578

Paratypes: males, right valves. MP-0-577, 579.

Locus typicus: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon, Valley Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Greatest height at midlength. Muscle scars disposed in curve. Female presenting the same size of the male or greater. Surface smooth.

Description

Female: Subrectangular in lateral view presenting the dorsal margin slightly arched passing smoothly to the rounded anterior border; posterior margin truncate till the midheight where it curves and reaches the almost straight ventral margin. Greatest height at midlength almost half the length. In dorsal view greatest width at the level of the median hinge element continuing backward, for about one quart of the length. Anterior and posterior extremities pointed. Hinge merodont, entomodont with the three elements shallow and faintly crenulate. Lamine anterior and posterior teeth in the right valve separated by a little bar. Hinge-elements in the left valve complementary. Inner lamella broad anteriorly decreasing posteriorly. Line of concrescence apart from the inner margin anteriorly, forming a broad vestibule which almost reaches the free margin. Pore canals short, simple, some of them ramified near the ventral margin. Muscle scars with four vertical scars forming a slight arch; frontal scar V-shaped close to the superior adductor scar; mandibular scar elongate, well seen. Surface smooth.

Male: It differs from the female, in lateral view by having a posterior truncation surpassing the median line, almost reaching the ventral margin and by the ventral sinuosity.

Dimensions

Holotypus: female, left valve. M.P., UFRGS n. MP-0-578. Length: 0,81mm; height: 0,38mm

Paratypi: males, right valves. MP-0-577. Length: 0,79mm; height: 0,37mm

MP-0-579. Length: 0,80mm; height: 0,37mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Material: 5 adult valves.

Paulacoutoia kroemmelbeini Purper, sp. nov.

Pl. 5, fig. 18-24

Derivatio nominis: in honour to Prof. Karl Krommelbein

Holotypus: female, left valve. M.P., UFRGS n. MP-0-580

Paratypus: male, left valve. MP-0-581

Locus typicus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Conspicuous posterior cardinal angle. Sexual dimorphism present being the male more elongate and more tapered than the female. Mandibular scar narrow and elongate.

Description

Female: Subrectangular in lateral view; dorsal margin almost straight near the hinge. Posterior margin truncate. Anterior margin bent near the anterior cardinal angle and rounded anteriorly. Ventral margin sinuous presenting two concavities: the greater on the half anterior portion, near the selvage lip and the smaller near the posterior border. Greatest height at midlength almost equal to half the length. In dorsal view the outline is parallel to the hinge, tapering smoothly posteriorly and more bent anteriorly. Hingement wear away along almost all its extent being only seen a slight crenulation on the anterior and posterior ends. Inner lamella broad anteriorly decreasing posteriorly. Line of concrescence apart from the inner margin forming a broad vestibule which almost reaches the free margin. Pore canals short and simple. Muscle scars with four vertical desigual scars; frontal scar V-shaped; mandibular scar narrow, elongate, well seen.

Male: It differs from the female, in lateral view, because it has the posterior border more pointed, the sinuosity of the ventral margin more smooth and its greatest height is less than half the length. In dorsal view the outline is continuously arched presenting the greatest width at midlength tapering equally to the anterior as to the posterior borders.

Dimensions

Holotypus: female, left valve. M.P., UFRGS n. MP-0-580. Length: 0,86mm; height: 0,44mm

Paratypus: male, left valve MP-0-581. Length: 0,88mm; height: 0,41mm

Discussion: The present species differs from *P. olivençai* for it is bigger, has the antero ventral margin more projected downward and the posterior margin, in lateral view, is more tapered ventrally.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Material: 2 adult valves, 1 juvenile instar valve and 2 fragments.

Genus *Chlamydocytheridea* Purper, gen. nov.

Diagnosis: Hinge merodont with strong crenulate teeth on the right valve and a bar faintly crenulate on the left valve. Anterior margin of the left valve presenting the selvage and the flange very well apart leaving between them a broad flange groove. Muscle scars with four vertical scars; frontal scar elongate.

Type-species: *Chlamydocytheridea machadoi* Purper gen. et sp. nov.

Discussion: The characters of the new genus with such peculiar shape of the carapace, the typic merodont hinge and the ramified marginal pore canals did not permit it to be included in any already known genera of the Family Cytherideidae. The anterior margin presenting the selvage very well apart from the flange forms a structure similar to that presented by *Chlamydotheca*. Due to these characteristics associated to those of the cytherideidae was given the name to the new genus.

Chlamydocytheridea machadoi Purper, gen. et sp. nov.

Pl. 6, fig. 1-6

Ostracoda B, Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.358-359

Derivatio nominis: in honour to Prof. Eurico Romulo Machado

Holotypus: carapace. M.P., UFRGS n^o MP-0-505.

Paratypes: Incomplete valves. MP-0-506, 507

Locus typicus: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Subrectangular in lateral view; dorsal margin straight between the cardinal angles; ventral margin with little anterior concavity. Anterior margin directed downward, surpassing the ventral margin. Posterior margin rounded. Surface smooth. Numerous, long and ramified pore canals. Anteriorly, the selvage and the flange are very well apart leaving between them a broad flange groove.

Description: Subrectangular in lateral view; dorsal margin straight, bent from the anterior to the posterior cardinal angle; anterior margin sloping sharply from the cardinal angle, passing to be rounded at one third of the height, ending in a flap projected below the ventral margin line. Posterior margin strongly truncate dorsally, passing to be arched on the inferior half. Ventral margin slightly sinuous. Greatest height at the anterior half equal to half length. In dorsal view greatest width at midlength, posterior extremity more rounded than the anterior. Hingement merodont. In the right valve, laminae anterior and posterior tooth strongly crenulate and the groove slightly crenulate. Hinge-elements in the left valve complementary. Broad inner lamella on the anterior region. Line of concrescence apart from the inner margin forming the vestibule. Flange groove of the right valve is uniformly broad and deep throughout the inner margin. On the anterior extremity of the left valve this groove expands

forming a structure with a "lip" form. Anterior marginal pore canals ramified, some branched. Muscle scars with four vertical desigual scars; frontal and mandibular scars elongate.

Dimensions

Holotypus: carapace. M.P., UFRGS n. MP-0-505. Length: 1,54mm; height: 0,74mm

Paratypi: incomplete valves. MP-0-506. Length: 1,20mm; height: 0,74mm

MP-0-507. Length: 1,19mm; height: 0,68mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m); CPCAN-I-Tamandua (211,86 – 214,96m), Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP: 3 adult valves, 1 carapace, 2 juvenile instars valves, 4 fragments; CPCAN-I-TM: 1 adult valve, 3 juvenile instars valves.

Sub Família Krithinae Mandelstam in Bubikan, 1958

Genus *Pseudoparakrithella* Purper, gen. nov.

Diagnosis: Subrectangular in lateral view; dorsal margin straight or slightly convex; ventral margin straight or concave. Anterior margin rounded, posterior one truncate. Surface smooth to punctate. Hinge merodont presenting crenulate terminal bars and a little crenulate groove in the left valve. Muscle scars with four vertical desigual scars; frontal scar V-shaped. Inner lamella with regular outline wider anteriorly. Marginal pore canals straight and simple.

Type species: *Pseudoparakrithella paralela* Purper, gen. et sp.nov.

Discussion: Although *Parakrithella* Hanai, 1959 presents some similarity to the new genus, this one differs from that one by the following: the anterior margin presents the inner lamella narrower and the line of concrescence presents regular outline forming a simple vestibule. The pore canals are simple and the frontal scar is V-shaped; the groove is located in the right valve and not in the left one. It is not possible to compare other hinge elements because the generic diagnosis of *Parakrithella* is incomplete. Hanai (op. cit.) describing the hinge of the type-species (*Neocyprideis pseudadonta*) says: "Hinge pseudadont, the groove of the left valve has a faint crenulation in its posterior one-third. Flange projected slightly at the anterior and posterior parts of the hinge margin. In the right valve, the hinge margin is indented in its middle."

Pseudoparakrithella paralela Purper, gen. et sp.nov.

Pl. 6, fig. 7-14

Derivatio nominis: due to the parallelism of the outline carapace in dorsal view.

Holotypus: female, right valve. M.P., UFRGS n. MP-0-582.

Paratypus: Male, left valve. MP-0-583

Locus typicus: well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: Punctate surface. In dorsal view, lateral borders straight and parallel.

Description

Female: Subrectangular in lateral view; dorsal margin straight between the cardinal angles; anterior margin rounded, posterior one truncate near the posterior cardinal angle forming an arched line near the ventral margin. Ventral margin almost straight. Greatest height at the anterior half equal to half

length. Surface punctate. In dorsal view the lateral borders are straight and parallel tapering acutely to the anterior end and rather rounded to the posterior one. Greatest width at midlength. The left valve presents anterior and posterior crenulate bars and short crenulate groove. Hinge-elements of the right valve complementary. Inner lamella with regular outline wider anteriorly. Line of concrescence apart from the inner margin forming a narrow vestibule. Simple pore canals, regularly disposed. Muscle scars with four vertical, desigual scars; frontal scar V-shaped. Mandibular scar indistinct.

Male: It differs from the female, in dorsal view, in that it is more tapered posteriorly and, in lateral view, in that it has the dorsal margin more convex and the posterior truncation more developed.

Dimensions

Holotypus: female, right valve. M.P., UFRGS n. MP-0-582. Length: 0,64mm; height: 0,30mm

Paratypus: male, left valve. MP-0-583. Length: 0,62mm; height: 0,29mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m); CPCAN-I-Tamandua (211,86 – 214,97m); Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP: 2 adult valves; CPCAN-I-TM: 4 adult valves.

Sub Família Neocytherideidinae Puri, 1957

Genus *Hulingsina* Puri, 1958

Diagnosis: Carapace elongate, ovate, almost two and a half to one. Anterior end broadly rounded; posterior end compressed, sometimes strongly produced, generally angled obliquely in the dorsal half of the carapace. Surface of the carapace tuberculate, reticulate or coarsely pitted. Hinge non-denticulate, valves articulate by means of three pairs of smooth flanges and smooth grooves. Hinge in the right valve with an anterior smooth, elongate, curved flange, above which there is an incised groove and below it is narrow incised groove. The central area shows an elongate groove below a flange and a posterior flange. Hinge in the left valve consists of an anterior elongate curved groove which opens into the inner cavity. Below this groove, there is a flange approximately the same size as the groove above. The central flange is almost straight, narrow, and is separated from the dorsal margin by an incised groove. The posterior elements of the hingement consists of a small, depressed socket opening towards the interior of the carapace. These flanges fit into their corresponding smooth grooves in the opposite valve. Other internal features similar to *Cushmanidea*.

Type species: *Hulingsina tuberculata* Puri, 1958

Hulingsina? sp.

Pl. 7, fig. 1-5

Hypotypus: right valve. M.P., UFRGS
n. MP-0-584

Locus: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Subtrapezoidal in lateral view. Dorsal margin almost straight passing through a slight bent to the semi-circular anterior margin; ventral margin slightly sinuous at the selvage lip; posterior margin truncate ending ventrally in a protuberant process. Greatest height a little after the midlength almost

half the length. In dorsal view the outline is parallel to the hinge almost throughout. Anterior extremity more pointed than the posterior one. Hinge of the right valve presenting an inconspicuous anterior and posterior laminate teeth. No other hinge element is distinguishable. Line of concrescence and inner margin coincide throughout. Simple pore canals regularly disposed. Surface reticulate. Anterior margin and inner side of the postero-ventral process with denticulations. Muscle scars do not visible due to the heavy ornamentation.

Dimensions

Hypotypus: right valve. M.P., UFRGS n. MP-0-584. Length: 0,78mm; height: 0,39mm

Discussion: It was put in *Hulingsina*? because it was not possible to verify in only one valve, the complete characteristics and the eventual variations a population could present. The studied valve does not present all the characteristics attributed to the genus. For example, it was observed only the terminal plates on the right valve hinge. The rate length/height also presents some difference because, according Puri (1958), the length of *Hulingsina* is almost two times and a half the height and the specimen studied presents a length a little larger than two times the height. Despite the doubt, it was classified in *Hulingsina* because the population could present in the eventual variations the real characteristics of the genus and because the other characteristics presented correspond to those of the genus.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Material: Only one adult valve.

Família Cytheruridae G.W. Müller, 1894

Genus *Paracytheridea* G.W. Müller, 1894

Diagnosis: Carapace elongate, moderately to strongly alate, flattened ventrally. Rounded anterior and pointed posterior extremities. Surface heavily ornamented with ridges and/or tubercles. Backwardly directed aliform ridge, often terminating into a spine. Line of concrescence and inner margin coincide throughout. Hinge weak, with smooth or crenulate teeth and groove between them, in the right valve. Muscle scars with a vertical row of four scars and the frontal kidney or V-shaped. Radial canals slender, thickened near middle.

Type species: *Paracytheridea depressa* Müller, 1894

Paracytheridea? sp.

Pl. 7, fig. 6-14

?*Paracytheridea* sp. 1 Purper, 1977a. Sixth Intern. Ostracod Symposium Saalfelden p.364-365

?*Paracytheridea* sp. 2 Purper, 1977a. Sixth Intern. Ostracod Symposium Saalfelden p.364-365

Hypotypi: right valve. M.P., UFRGS
n. MP-0-545

Left valve: MP-0-544

Juvenile instars? MP-0-534, 535

Locus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description

Right valve: Subrectangular in lateral view; dorsal margin straight between the cardinal angles. Anterior margin begins in an almost straight line near the anterior cardinal angle passing at the midheight to a round line which reaches the ventral margin. Posterior margin with a strong bent towards the midheight where it turns abruptly towards the ventral border. Anterior region with two nodules and prominent ocular eye disposed in such a way to form two distinct antero-dorsal sulci. At the posterior region two nodes and a ridge. The ventral node is more angulous and prominent and it is directed backward forming the aliform process. The ridge is sinuous, beginning dorsally and ending ventrally running obliquely through the posterior extremity of the valve. Maximum height at the ocular tubercle shorter than half the length. In dorsal view the outline is irregular due to the nodes of different sizes. Maximum width just after the half length, at the end of the wing process. Posterior region more pointed than the anterior. Hinge merodont with anterior and posterior weak, crenulate teeth and long crenulate groove at the right valve. Hinge-elements in the left valve complementary. Inner lamella with regular outline. Line of concrescence and inner margin coincide throughout. Simple pore canals. Muscle scars with four vertical, desigual scars; frontal scar reniform. In front of the frontal scar two little scars and ventrally two scars; the anterior circular and the mandibular ovoid.

Left valve: It differs from the right valve, in lateral view, by having the posterior margin more pointed ending in a very well defined caudal process directed upward and by its nodes more distinct.

Dimensions

Hypotypi: right valve. M.P., UFRGS n. MP-0-545. Length: 0,44mm; height: 0,19mm

Left valve: MP-0-544. Length: 0,44mm; height: 0,22mm

Juvenile instar?: MP-0-534. Length: 0,26mm; height: 0,34mm

Juvenile instar?: MP-0-535. Length: 0,24mm; height: 0,12mm

Discussion: The scarce and fragile material did not allow a secure classification nor established certainly if they are adult or juvenile instar forms. It would be necessary more material to permit an accurate conclusion.

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); CPCAN-II–Poreré (154,36 – 156,36m); CPCAN-I-Tamandua (211,86 – 214,96m); Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP: 3 valves and one fragment; CPCAN-II-Po: one valve; CPCAN-I-TM: 2 valves.

Genus *Proparacytheridea* Purper, gen. nov.

Diagnosis: Small to median size, elongate, acuminate carapace; dorsal margin straight; ventral margin sinuous; anterior margin rounded, posterior one pointed ending in a long caudal process. Hinge merodont. Surface reticulate, with nodes or tubercles. Muscle scars in vertical row of four; frontal scar reniform. Few simple, long pore canals.

Type species: *Proparacytheridea acuminata* Purper, gen. et. sp. nov.

Discussion: The present species was put in the Family Cytheruridae because of its small size, the presence of caudal process, its ventral flattening, the ornamented surface and the type of hingement. However, as the more similar genera *Paracytheridea* and *Paracytheropteron* differ from the new genus by presenting ventro-lateral wing process and swelling carapace, it was created the new genus.

Proparacytheridea acuminata Purper gen et sp.nov.

Pl. 7, fig. 15-20

Ostracoda C, Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Derivatio nominis: due to the acuminate form of the valve, in lateral view.

Holotypus: female, left valve. M.P., UFRGS n. MP-0-539

Paratypus: male, carapace. MP-0-585.

Locus typicus: well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnosis: Ocular tubercle faintly developed. Surface finely reticulate formed by very thin ridges. Antero-median node salient. Hingement with shallow and crenulate elements. Near the caudal process the pore canals are long and diverge from one central point.

Description

Female: Elongate, subtriangular in lateral view, with dorsal margin straight between the well distinct cardinal angles. Anterior margin rounded. Ventral margin concave near the selvage lip and convex posteriorly. Posterior margin acuminate ending in a truncate and long caudal process. Greatest height at the anterior portion, smaller than half the length. In dorsal view it is equally tapered anteriorly and posteriorly ending in an acute point. Greatest width at the posterior half. Hinge merodont. Small, short and crenulate teeth in the right valve; long, shallow and crenulate groove in the same valve. Hinge-elements in the left valve complementary. Broad inner lamella with regular outline. Line of concrescence and inner margin coincide throughout. About ten simple pore canals disposed regularly anteriorly. Near the caudal process about five pore canals diverge from one central point. Surface finely reticulate formed by very thin ridges. Ocular tubercle faintly developed immediately followed by a prominent node. Muscle scars in vertical row of four subequal scars; frontal scar reniform and mandibular reduced and rounded.

Male: It differs from the female in lateral view because it has the postero-ventral margin less convex and in dorsal view because the greatest width is median.

Dimensions

Holotypus: female, M.P., UFRGS n. MP-0-539. Length: 0,48mm; height: 0,21mm

Paratypus: male, MP-0-585. Length: 0,50mm; height: 0,19mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), (19,50 – 20,78m); CPCAN-II-Poreré (154,05 – 156,36m); CPCAN-I-Tamanduá (211,86 – 214,96m), Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP (31,52 – 32,62m): 1 carapace; CPCAN-III-SP (19,50 – 20,78m): 2 valves; CPCAN-II-Po: 1 valve; CPCAN-I-TM: 4 valves.

Família Limnocytheridae Klie, 1938

Genus *Cytheridella* Daday, 1905

sin.: *Onychocythere* Tressler, 1939

Diagnosis: Carapace cordato-pyriform in dorsal view, divided into two parts by a strong sulcus anterior to the mid-length which is associated with the four, perpendicular muscle scars; strong sexual dimorphism, female strong inflated posteriorly with the development of a broad pouch, male tapering posteriorly.

Type species: *Cytheridella ilosvayi* Daday, 1905

Cytheridella danielopoli Purper, sp. nov.

Pl. 7, fig. 21-27

Cytheridella A, Purper 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Derivatio nominis: in honour of Dr. Dan Danielopol

Holotypus: female, left valve. M.P., UFRGS n. MP-0-529

Paratypes: male, left valve. MP-0-530

Male, left valve. MP-0-586

Locus typicus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil

Stratum typicum: Pebas Formation

Diagnosis: Dorsal and ventral margins parallel, in lateral view; anterior and posterior margins equally arched. In dorsal view the male presents the outline of the posterior portion slightly arched, directed backward towards the junction of the valves. Short marginal pore canals.

Description

Female: Rhomboid in lateral view; dorsal margin straight, ventral margin sinuous presenting a concavity to one-third of the length and another to two-thirds and between them a slight convexity; anterior margin bent in the region of the anterior cardinal angle passing to be arched above the mid height and continuing smoothly into the ventral margin; posterior margin strongly rounded and inflated presenting a slight flattening near the dorsal margin forming a gentle posterior cardinal angle and passing evenly towards the ventral margin. A strong sulcus begins dorsally immediately after the middle portion and continues in the form of an arch directed downward ending near the ventral margin. Maximum height at mid-length greater than half length. In dorsal view the shape is cordato-pyriform being widest towards the posterior end. Hinge adont. The right valve presents the positive elements fitting into the negative elements of the opposite valve. Inner lamella broad anteriorly, tapering posteriorly. Line of concrescence near the internal margin forming vestibule. Short, simple pore canals regularly disposed. Muscle scars consist of four perpendicular scars on a ridge which divides the carapace into two parts; surface punctate.

Male: It differs from the female for the smaller length and in dorsal view for its oval shape, the female being wider posteriorly.

Dimensions

Holotypus: female, left valve. M.P. UFRGS n. MP-0-529. Length: 0,88mm; height: 0,50mm

Paratypes: male, left valve. MP-0-530. Length: 0,83mm; height: 0,45mm

Male, left valve. MP-0-586. Length: 0,94mm; height: 0,50mm

Discussion: This species is similar to *Cytheridella ritzkowskiana* Carbonnel & Ritzkowski, 1969 from Lower Oligocene from Germany (Melanienton). But while the male of *C. danielopoli* presents, in dorsal view, a smooth outline from the maximum width towards the extremities, in *C. ritzkowskiana* this outline is abruptly directed towards the junction of the valves, almost forming a straight line towards the posterior portion. Another difference concerns the rate height/length. In *C. danielopoli* the height is greater than half length while *C. ritzkowskiana* the height is smaller than half length.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), (19,50 – 20,78m); CPCAN-I-Tamandua (211,86 – 214,96m), Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP (31,52 – 32,62m): 1 adult valve; (19,50 – 20,78m): 4 adult valves and one fragment; CPCAN-I-TM: one adult valve and one fragment.

Genus *Bisulcocypris* Pinto & Sanguinetti, 1958

Diagnosis: Shell in side view rhomboid or oblong, the dorsal margin straight or slightly concave; the ventral margin straight or slightly convex; the anterior end rounded and the posterior broadly rounded to flattened; the cardinal angles normally are very well marked. Typically it presents two sulci that run, more or less obliquely downward to form the dorsal margin; the posterior one terminates dorsal to the mid-length or slightly further; the anterior is shorter and runs more obliquely forward and downward. The surface is slightly or strongly pitted, coarsely and in a reticulate fashion; along the ventrum the longitudinal elements of the reticulum are stronger giving an appearance of longitudinal ridges only. In some forms are found tubercles, nodes, spines, and in a few, one longitudinal and ventral ridge is stronger and end in an ala or spine. Hingement lophodont. One valve has a flat anterior tooth which is smooth and semicircular and a more triangular smooth and sharp posterior tooth; between the teeth, a narrow and straight sulcus to receive the hinge-bar from the opposite valve. The opposite valve has one anterior socket and one posterior socket to receive the teeth from the other valve and between them a straight and narrow hinge-bar. Muscle scars consist of a subventral row of four closely spaced scars. They lie ventral to the dorso-median sulcus and are slightly ventral to mid-length. In dorsal view the female is triangular rounded and the male oblong, showing two sulci on each side in the anterior midway.

Type species: *Bisulcocypris pricei* Pinto & Sanguinetti, 1958

Bisulcocypris sp.

Pl. 7, fig. 28-29

Bisulcocypris sp. Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Hypotypi: female, carapace. M.P., UFRGS n. MP-0-536

Male. Carapace MP-0-537

Locus: outcrop in Atalaia do Norte, Upper Amazon Valley, Brazil.

Stratum: Pebas Formation (reworked material).

Description

Female: Dorsal margin straight between the cardinal angles, in lateral view. Anterior margin bent near the cardinal angle, passing smoothly to be rounded anteriorly. Posterior margin broadly rounded and inflated. Ventral margin straight. Posterior sulcus very well developed rising dorsally at midlength ranging midheight. In dorsal view pyriform elongate with a posterior reentrance, at the junction of the valves and lateral reentrances just at the level of the sulci. Surface punctate. Maximum height greater than half length.

Male: It differs from the female, in dorsal view, because it presents an oval outline tapering equally to the extremities. In lateral view ventral margin with slight posterior convexity and small concavity near the selvage lip.

Dimensions

Hypotypi: female, carapace. M.P., UFRGS n. MP-0-536. Length: 0,98mm; width: 0,62mm; height: 0,57mm

Male, carapace. MP-0-537. Length: 0,93mm; width: 0,43mm; height: 0,50mm

Discussion: The material is formed by casts not permitting the observation of some details as the ornamentation and, consequently, not permitting the comparison to other species. However, for the external shape and mainly for the presence of the two dorsal sulci it was put as *Bisulcocypris*.

Occurrence: Outcrop in Atalaia do Norte, near Benjamin Constant, Upper Amazon Valley, Brazil.

Material: Internal casts of 12 carapaces and two incomplete valves.

Genus *Leptocytheromorpha* Purper, gen. nov.

Diagnosis: Small carapace, surface finely reticulate, with two sulci at the dorso-anterior region. Hinge merodont; simple, thick marginal pore canals. Muscle scars in a row of four vertical desigual scars; frontal scar reniform. Sexual dimorphism.

Types species: *Leptocytheromorpha ornellasae* Purper gen. et sp.nov.

Discussion: The present species was compared to *Leptocythere* and *Cytheromorpha*. However the characteristics assigned to the Family Leptocytheridae Hanai, 1957 in the Treatise of Invertebrate Paleontology Part Q and also in Morkhoven (1963) do not correspond to those of the new genus in the following: ramified pore canals, vestibule and frontal scar V-shaped. It also differs from *Cytheromorpha* because it does not present hinge gongylodont and it has a different frontal scar.

Leptocytheromorpha ornellasae Purper gen. et sp.nov.

Pl. 8, fig. 1-12

Perissocytheridea A. Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Derivatio nominis: in honour of Prof^a Lilia Pinto de Ornellas

Holotypus: female, left valve. M.P., UFRGS n. MP-0-540

Paratypi: male, right valve. MP-0-541

Female, carapace. MP-0-542

Male, carapace. MP-0-543

Male, right valve. MP-0-587

Locus typicus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum typicum: Pebas Formation

Diagnosis: In lateral view, female subrectangular to subtriangular; male subtriangular to subrectangular, tapering posteriorly. Surface reticulate, bulgy elongate wing process in the vertical region.

Description

Female: In lateral view, subrectangular; dorsal margin straight. Anterior cardinal angle more developed than the posterior one. Anterior margin rounded reaching the selvage lip region. Ventral margin irre-

gular due to the wing process. Posterior margin less rounded than the anterior margin. Two sulci in the dorsal-anterior region: the smaller near the ocular tubercle area and the largest just before the half length. Surface reticulate. Maximum height at the anterior half, little less than the half length. In dorsal view a constriction just at the level of the posterior dorsal sulcus. Maximum width at the posterior half. Hinge merodont with small crenulate teeth at the right valve and a long crenulate groove at the same valve. Hinge-elements in the left valve complementary. Inner lamella regularly disposed. Line of concrescence and inner margin coincide throughout. Simple and thick pore canals. Muscle scars in vertical row of four desigual scars; frontal scar reniform.

Male: It differs from the female for its more triangular shape, in lateral view; for having a not so well developed centro-ventral inflated region and for its more tapered shape in dorsal view.

Dimensions

Holotypus: female, right valve. M.P., UFRGS n. MP-0-540. Length: 0,39mm; height: 0,17mm

Paratypi: male, right valve. MP-0-541. Length: 0,35mm; height: 0,17mm

Female, carapace. MP-0-542. Length: 0,39mm; height: 0,19mm; width: 0,14mm

Male, carapace. MP-0-543. Length: 0,35mm; height: 0,19mm; width: 0,14mm

Male, right valve. MP-0-587. Length: 0,38mm; height: 0,17mm

Occurrence: Well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); CPCAN-I-Tamandua (211,86 – 214,96m); Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP: 13 adult valves, 2 adult carapaces, 3 fragments; CPCAN-I-TM: 7 adult valves and 2 adult carapaces.

GENERA ET SPECIES INCERTAE SEDIS

Super Família Cypridacea Baird, 1845

Família Cyclocyprididae Kaufmann, 1900

Genus *Cypria* Zenker, 1845

Diagnosis: Subovate, compressed carapace, highest medially to postmedially; dorsum strongly arched, venter straight to slightly concave; anterior margin narrower and more elongate; left valve slightly larger than right; surface smooth or punctate.

Type species: *Monoculus punctatus* Jurine, 1820

Cypria? sp. 1

Pl. 8, fig. 13-16

?*Cypria* sp. Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Hypotypus: Left valve. M.P., UFRGS
n. MP-0-533

Locus: well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Subovate in lateral view; dorsal margin convex passing through a slight bent to the rounded anterior margin; posterior margin semi-circular; ventral margin slightly concave anteriorly. Maxi-

mum height at the posterior portion, equalling about two-thirds of length. In dorsal view greatest width approximately central being the anterior extremity wider than the posterior one. Hinge adont. Muscle scars consisting of five desigual scars.

Dimensions

Hypotypus: left valve. M.P., UFRGS n. MP-0-533. Length: 0,48mm; height: 0,31mm

Discussion: The distinctive characters among *Cypria*, *Cyclocypris* and *Physocypris* are not clearly defined and need revision as was pointed out by Staplin (1963). Nevertheless *Physocypris* differs from *Cypria* for the presence of marginal tuberculations, and *Cyclocypris* differs from both in being strongly inflated. It was put *Cypria*? because the scarce material did not permit the verification of the total characteristics of the specimen.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Material: Three valves.

Cypria? sp. 2 Pl. 8, fig. 17-18

Hypotypus: left valve. M.P., UFRGS
n. MP-0-588

Locus: well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Ovate in lateral view; dorsal margin convex passing smoothly to the rounded anterior and posterior margins. Anterior margin slightly concave anteriorly. Maximum height approximately central and equalling about two-thirds of length being the anterior extremity slightly wider than the posterior one. In dorsal view greatest width approximately central. Hinge adont. Muscle scars indistinct.

Dimensions

Hypotypus: left valve. M.P., UFRGS n. MP-0-588. Length: 0,60mm; height: 0,36mm

Discussion: *Cypria*? sp. 2 is similar to *Cypria*? sp. 1 but while the greatest height in *C. sp. 1* is located posteriorly, in *C. sp. 2* it is median. For the same reasons exposed to *C. sp. 1* the classification of *C. sp. 2* is not definite.

Occurrence: CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Material: One fragile valve.

Cypria? sp. 3 Pl. 8, fig. 19-21

Hypotypus: left valve. M.P., UFRGS
n. MP-0-589

Locus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Subcircular in lateral view; dorsal margin convex passing smoothly to the rounded anterior and posterior margins. Ventral margin almost straight. Maximum height approximately central and equalling about two-quarts of length. In dorsal view greatest width approximately central tapering equally to the anterior and posterior ends. Hinge adont. Muscle scars in number of four being three vertically disposed and one anteriorly disposed.

Dimensions

Hypotypus: left valve. M.P., UFRGS n. MP-0-589. Length: 0,29mm; height: 0,22mm

Discussion: *Cypria?* sp. 3 is similar to *Cypria* sp. 2 but the height/length is different. In *C* sp. 2 the rate is two-thirds and in *C*. sp. 3 the rate is three-quarts. The muscle scars are not very well defined and could be an young instar. The scarce material does not permit further conclusions.

Occurrence: CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Material: One fragile valve.

Super Família Cytheracea Baird, 1850
Família Cytherideidae Sars, 1925

Genus Incertus 1
Pl. 8, fig. 22-25

Hypotypus: right valve. M.P., UFRGS
n. MP-0-590
Locus: CPCAN-III-São Paulo de Olivença
(31,52 – 32,62m), Upper Amazon Valley,
Brazil.
Stratum: Pebas Formation

Description: Subtriangular in lateral view; dorsal and ventral margins slightly sinuous. Anterior margin broadly rounded; posterior margin tapering posteriorly with a little terminal spine. Maximum height at the anterior portion being smaller than half the length. In dorsal view compressed laterally, tapering anterior as well as posteriorly. Greatest width approximately central. Hinge merodont, entomodont. Laminate, shallow and crenulate teeth in the right valve; between them the short crenulate groove. Hinge elements in the left valve complementary. Very little inner lamella with regular outline throughout the free margin. Rare simple pore canals. Muscle scars formed by four vertical subigual scars; frontal scar V-shaped.

Dimensions

Hypotypus: right valve. M.P., UFRGS n. MP-0-590. Length: 0,52mm; height: 0,26mm

Discussion: Although the smooth and triangular carapace is similar to the Cypridids, it differs from them for the merodont hinge, the muscle scars presenting four vertical scars and the frontal V-shaped. Due to these last characteristics it was put among the Cytherideidae. The closest subfamily is Eucytherinae Puri, 1953 but the present specimen lacks the broad marginal area and the vestibule. The scarce material and the possibility of being an young instar did not permit the classification.

Occurrence: Well CPCAN-III-São Paulo de Olivença (31,52 – 32,62m), Upper Amazon Valley, Brazil.

Material: Two valves.

Família Cytheruridae G.W. Müller, 1894

Genus Incertus 2

Pl. 8, fig. 26-28

Ostracode D, Purper, 1977a. Sixth Intern. Ostracod Symposium, Saalfelden, p.364-365

Hypotypus: left valve. M.P., UFRGS

n. MP-0-546

Locus: well CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Subtriangular in lateral view; dorsal margin almost straight; anterior margin beginning with a strong bent near the cardinal angle and reaching near the midheight, a rounded portion which ends near the ventral margin; ventral margin convex; posterior margin with caudal process at midheight. Maximum height at the first third, little bigger than half length. In dorsal view the outline is almost parallel to the hingement presenting at midlength a slight constriction; anterior portion inflated and posterior one pointed. Greatest width just in front and behind the medially constriction. Hinge merodont; little crenulate teeth in the left valve and between them the long, shallow and crenulate groove. Hinge-elements of the right valve complementary. Inner lamella broad anteriorly and posteriorly. Line of concrescence apart from the inner margin leaving a narrow vestibule. Simple, straight pore canals at the anterior margin; near the posterior margin the pore canals are scarce but two are long, rising from one central point. Surface reticulate, presenting little nodes on the apex of some reticles. Ocular tubercle faintly developed. Muscle scars indistinct. Ventral flattening characteristic to the family. Wing process inconspicuous.

Dimensions

Hypotypus: left valve. M.P. UFRGS n. MP-0-546. Length: 0,34mm; height: 0,18mm

Discussion: The present specimen presents some similarity to *Hemicytherura* Elofson, 1941. However the scarce material did not permit to verify the total characteristics as, for example, the muscle scars. Moreover, the teeth in the present specimen are located in the left valve and in *Hemicytherura* the teeth are located in the right valve.

Occurrence: CPCAN-III-São Paulo de Olivença (19,50 – 20,78m); CPCAN-II-Porere (154,05 – 156,36m); CPCAN-I-Tamandua (211,86 – 214,96m), Upper Amazon Valley, Brazil.

Material: CPCAN-III-SP: 2 valves and one fragment; CPCAN-II-Po: one valve; CPCAN-I-TM: 5 valves and 4 carapaces.

Super Família Cypridacea Baird, 1845
Família Cyclocyprididae Kaufmann, 1900

Genus Incertus 3

Pl. 8, fig. 29-30

Hypotypi: left valve. M.P., UFRGS

n. MP-0-591

Left valve: MP-0-592

Locus: CPCAN-III-São Paulo de Olivença, Upper Amazon Valley, Brazil.

Stratum: Pebas Formation

Description: Subtriangular in lateral view. Dorsal margin convex presenting medially a spine-shape structure. Anterior and posterior margins equally rounded; ventral margin straight. Maximum height at midlength almost equal to the length. Hinge adont. Very narrow inner lamella, with regular outline throughout the free margin. Surface smooth.

Dimensions

Hypotypi: left valve. M.P. UFRGS n. MP-0-591. Length: 0,24mm; height: 0,18mm
Left valve. MP-0-592. Length: 0,23mm; height: 0,19mm

Discussion: The scarce material and the fragility of the specimens did not permit the observation of some characteristics, as the muscle scars. However, for the shape and hingement presented it was put in the Super Família Cypridacea, Família Cyclocyprididae.

(?) *Bythocypris heterodoxa* Chapman, 1910 presents certain similarities to the present specimen, such as anterior arched margin and convex dorsal margin with a spine-shape projection. However, the localization, shape and disposition of this projection differ in the two specimens and also the ventral and posterior margins are distinct.

For its little size, fragility of the valves and some characteristics not completely developed it could be considered as a juvenile instar. However, much more material should be studied to reach an exact conclusion.

Occurrence: CPCAN-III-São Paulo de Olivença (19,50 – 20,78m), Upper Amazon Valley, Brazil.

Material: 4 valves.

CONCLUSIONS

Based on the study of the sample of the well cores (CPCAN-I, II, III) and the outcrop (Atalaia do Norte) and based on the previous studies made on that region it was possible to conclude the following:

1. The ostracode fauna is endemic and mixohaline.
2. The rare and fortuitous presence of fresh water forms suggests the occurrence of a lagoon or pool in the proximities, with temporary intercommunications;
3. The material is reworked as ostracodes from different typical ages were found all together;
4. The presence of continental ostracodes of Upper Jurassic-Lower Cretaceous ages (*Bisulco-cypris* and *Cypridea*) in the association suggests a coastal environment such as these of Reconcavo Baiano Basin;
5. The presence of Brachiopodes and Foraminifera (Gold, unpublished) in the Formation and the presence of mixohaline ostracodes suggest a proximity to the sea and the possibility of a marine transgression;
6. By the presence of ostracodes typically not older than Miocene it is clear that the sediments are not from an older age and may even be younger, perhaps Pliocene, as it is understood by the majority of the experts on molluscs;
7. The environment of the Pebas Formation in the researched region is typically mixohaline presenting occasional fresh water influence. The environment is of calm water and low energy.

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Map 1. Geographical position of the drillings and outcrop

Plate 1

- Fig. 1 — *Cypridea* sp.
Lateral view. Hypotypus MP-0-538 50x
- Fig. 2-3 — *Darwinula* sp.
2. Right valve, lateral view. Hypotypus MP-0-565 50x
3. Muscle scars of the same 228x
- Fig. 4-10 — *Darwinula fragilis* Purper, sp. nov.
4. Female left valve in lateral view Holotypus MP-0-532. 50x
5. Male right valve in lateral view. Paratypus MP-0-531. 50x
6. Lateral view in transmitted light. MP-0-532 50x
7. Dorsal view. MP-0-532. 50x
8. Dorsal view. MP-0-531 50x
9. Anterior marginal pore canals. MP-0-531 287x
10. Muscle scars. MP-0-532. 233x
- Fig. 11-18 — *Cytheridea sulcosigmoidalis* Purper, sp. nov.
11. Female left valve muscle scars. Holotypus MP-0-508. 136x
12. Lateral view of the same. 50x
13. Male right valve in lateral view. Paratypus MP-0-509. 50x
14. Internal view. MP-0-508. 50x
15. Internal view. MP-0-508. 50x
16. Anterior marginal pore canals. MP-0-508. 83x
17. Dorsal view. MP-0-508. 50x
18. Dorsal view. MP-0-509. 50x

Plate 2

Fig. 1-10 — *Cytheridea reticulopunctata* Purper, sp. nov.

1. Female left valve in lateral view. Holotypus MP-0-510 50x
2. Male right valve in lateral view. Paratypus MP-0-511 50x
3. Internal view, MP-0-510. 50x
4. Muscle scars, MP-0-511. 161x
5. Dorsal view, MP-0-510. 50x
6. Male right valve in dorsal view. Paratypus MP-0-512 50x
7. Lateral view in transmitted light, MP-0-510. 50x
8. Anterior marginal pore canals of the same. 91x
9. Juvenile instar. Paratypus MP-0-566. 50x
10. Juvenile instar. Paratypus MP-0-567. 50x

Fig. 11-23 — *Cytheridea pebasae* Purper, sp. nov.

11. Female left valve in lateral view. Holotypus MP-0-513 50x
12. Female right valve in lateral view. Paratypus MP-0-514 50x
13. Lateral view in transmitted light, MP-0-513. 50x
14. Female left valve in dorsal view. Paratypus MP-0-568. 50x
15. Female right valve in dorsal view. Paratypus MP-0-569. 50x
16. Female hinge right valve. Paratypus MP-0-570. 99x
17. Male right valve in lateral view. Paratypus MP-0-516. 50x
18. Male left valve in lateral view. Paratypus MP-0-515. 50x
19. Anterior marginal pore canals, MP-0-513. 117x
20. Posterior marginal pore canals of the same. 122x
21. Dorsal view, MP-0-515. 50x
22. Dorsal view, MP-0-516. 50x
23. Muscle scars, MP-0-513. 223x

Plate 3

- Fig. 1-9 — *Cytheridea graciosa* Purper, sp. nov.
1. Female right valve in lateral view. Holotypus MP-0-517. 50x
 2. Lateral the same in transmitted light. 50x
 3. Male left valve in lateral view. Paratypus MP-0-518. 50x
 4. Dorsal view of the same. 50x
 5. Dorsal view. MP-0-517. 50x
 6. Anterior marginal pore canals of the same. 93x
 7. Muscle scars of the same. 159x
 8. Posterior marginal pore canals of the same. 88x
 9. Juvenile instar. Paratypus MP-0-571. 50x
- Fig. 10-21 — *Cytheridea longispina* Purper, sp. nov.
10. Female left valve in lateral view. Holotypus MP-0-572. 50x
 11. Anterior marginal pore canals of the same. 92x
 12. Male right valve muscle scars. Paratypus MP-0-573. 162x
 13. Posterior marginal pore canals. MP-0-572. 104x
 14. Dorsal view of the same. 50x
 15. Male right valve in dorsal view. Paratypus MP-0-593. 50x
 16. Lateral view in transmitted light. MP-0-573. 50x
 17. Posterior marginal pore canals of the same. 100x
 18. Lateral view of the same. 50x
 19. Anterior marginal pore canals of the same. 104x
 20. Hinge. MP-0-572. 101x
 21. Hinge. MP-0-593. 118x

Plate 4

Fig. 1-11 — *Cyprideis amazonica* Purper, sp. nov.

1. Female left valve in lateral view. Holotypus MP-0-524. 50x
2. Female right valve in lateral view. Paratypus MP-0-525. 50x
3. Male left valve in lateral view. Paratypus MP-0-526. 50x
4. Male right valve in lateral view. Paratypus MP-0-527. 50x
5. Female carapace in dorsal view. Paratypus MP-0-523. 50x
6. Male carapace in dorsal view. Paratypus MP-0-528. 50x
7. Male hinge left valve. Paratypus MP-0-574. 103x
8. Hinge, MP-0-525. 120x
9. Posterior marginal pore canals. MP-0-527. 123x
10. Muscle scars of the same. 123x
11. Anterior marginal pore canals of the same. 120x

Fig. 12-22 — *Cyprideis truncata* Purper, sp. nov.

12. Male right valve muscle scars. Paratypus MP-0-575. 143x
13. Male left valve in dorsal view. Paratypus MP-0-576. 50x
14. Dorsal view. MP-0-575. 50x
15. Female right valve. Anterior marginal pore canals. Paratypus MP-0-520. 106x
16. Lateral view of the same. 50x
17. Female left valve in lateral view. Holotypus MP-0-522. 50x
18. Female carapace in dorsal view. Paratypus MP-0-521. 50x
19. Lateral view. MP-0-575. 50x
20. Lateral view. MP-0-576. 50x
21. Hinge, MP-0-522. 134x
22. Hinge, MP-0-520. 121x

Plate 5

- Fig. 1-9 — *Amazonacytheridea multiradiata* Purper, gen. et sp. nov.
1. Male right valve lateral view in transmitted light. Paratypus MP-0-501. 50x
 2. Female left valve lateral view in transmitted light. Holotypus MP-0-502. 50x
 3. Lateral view. MP-0-501. 50x
 4. Lateral view. MP-0-502. 50x
 5. Dorsal view of the same. 50x
 6. Dorsal view. MP-0-503. 50x
 7. Internal view. MP-0-502. 50x
 8. Male right valve muscle scars. Paratypus MP-0-504. 190x
 9. Anterior marginal pore canals. MP-0-502. 116x
- Fig. 10-17 — *Paulacoutoia olivençai* Purper gen. et sp. nov.
10. Male right valve lateral view in transmitted light. Paratypus MP-0-577. 50x
 11. Female left valve lateral view in transmitted light. Holotypus MP-0-578. 50x
 12. Muscle scars. MP-0-577. 160x
 13. Lateral view. MP-0-578. 50x
 14. Lateral view. MP-0-577. 50x
 15. Dorsal view. MP-0-578. 50x
 16. Male right valve in dorsal view. Paratypus MP-0-579. 50x
 17. Anterior marginal pore canals. MP-0-578. 94x
- Fig. 18-24 — *Paulacoutoia kroemmelbeini* Purper, sp. nov.
18. Female left valve lateral view in transmitted light. Holotypus MP-0-580. 50x
 19. Dorsal view of the same. 50x
 20. Male left valve in dorsal view. Paratypus MP-0-581. 50x
 21. Anterior marginal pore canals. MP-0-580. 79x
 22. Muscle scars of the same. 109x
 23. Lateral view. MP-0-581. 50x
 24. Lateral view. MP-0-580. 50x

Plate 6

- Fig. 1-6 — *Chlamydocytheridea machadoi* Purper gen. et sp. nov.
1. Female carapace in lateral view. Holotypus MP-0-505. 50x
 2. Muscle scars. Paratypus MP-0-507. 104x
 3. Dorsal view. MP-0-505. 50x
 4. Internal view. Paratypus. MP-0-506. 50x
 5. Internal view. MP-0-507. 50x
 6. Anterior marginal pore canals. MP-0-506. 50x
- Fig. 7-14 — *Pseudoparakrithella paralela* Purper, gen. et sp. nov.
7. Female right valve lateral view in transmitted light. Holotypus MP-0-582. 50x
 8. Male left valve lateral view in transmitted light. Paratypus MP-0-583. 50x
 9. Lateral view of the same. 50x.
 10. Lateral view. MP-0-582. 50x
 11. Muscle scars of the same. 309x
 12. Anterior marginal pore canals. MP-0-583. 123x
 13. Dorsal view of the same. 50x
 14. Dorsal view. MP-0-582. 50x

Plate 7

Fig. 1-5 — *Hulingsina?* sp.

1. Posterior marginal pore canals of the right valve. Hypotypus MP-0-584. 101x
2. Lateral of the same in transmitted light. 50x
3. Lateral view of the same. 50x
4. Anterior marginal pore canals of the same. 102x
5. Dorsal view of the same. 50x

Fig. 6-14 — *Paracytheridea?* sp.

6. Female right valve in lateral view. Hypotypus MP-0-545. 50x
7. Male left valve in lateral view. Hypotypus MP-0-544. 50x
8. Hinge of the same. 180x
9. Hinge, MP-0-545. 180x
10. Muscle scars of the same. 137x
11. Dorsal view, MP-0-544. 50x
12. Dorsal view, MP-0-545. 50x
13. Juvenile instar. Hypotypus MP-0-534. 50x
14. Juvenile instar. Hypotypus MP-0-535. 50x

Fig. 15-20 — *Proparacytheridea acuminata* Purper gen. et sp. nov.

15. Female left valve lateral view in transmitted light. Holotypus MP-0-539. 50x
16. Lateral view of the same. 50x
17. Male carapace in dorsal view. Paratypus MP-0-585. 50x
18. Anterior marginal pore canals, MP-0-539. 150x
19. Muscle scars of the same. 145x
20. Posterior marginal pore canals of the same. 160x

Fig. 21-27 — *Cytheridella danielopoli* Purper, sp. nov.

21. Male left valve internal view. Paratypus MP-0-586. 50x
22. Male left valve in lateral view. Paratypus MP-0-530. 50x
23. Female left valve in lateral view. Holotypus MP-0-529. 50x
24. Dorsal view of the same. 50x
25. Dorsal view, MP-0-530. 50x
26. Anterior marginal pore canals, MP-0-529. 103x
27. Muscle scars, MP-0-530. 130x

Fig. 28-29 — *Bisulcocypris* sp.

28. Male carapace in dorsal view. Hypotypus MP-0-536. 50x
29. Female carapace in dorsal view. Hypotypus MP-0-537. 50x

Plate 8

- Fig. 1-12 — *Leptocytheromorpha ornellasae* Purper gen. et sp. nov.
1. Female left valve in dorsal view. Holotypus MP-0-540. 50x
 2. Male right valve in dorsal view. Paratypus MP-0-587. 50x
 3. Lateral view. MP-0-540. 50x
 4. Male right valve in lateral view. Paratypus MP-0-541. 50x
 5. Female carapace in dorsal view. Paratypus MP-0-542. 50x
 6. Male carapace in dorsal view. Paratypus MP-0-543. 50x
 7. Hinge. MP-0-540. 121x
 8. Hinge. MP-0-587. 188x
 9. Lateral view. MP-0-540. 50x
 10. Anterior marginal pore canals of the same. 279x
 11. Muscle scars of the same. 330x
 12. Posterior marginal pore canals of the same. 370x
- Fig. 13-16 — *Cypria?* sp. 1
13. Left valve lateral view in transmitted light. Hypotypus MP-0-533. 50x
 14. Lateral view of the same. 50x
 15. Internal view of the same. 50x
 16. Muscle scars of the same. 178x
- Fig. 17-18 — *Cypria?* sp. 2
17. Left valve internal view. Hypotypus MP-0-588. 50x
 18. Internal view of the same in transmitted light. 50x
- Fig. 19-21 — *Cypria?* sp. 3
19. Left valve lateral view in transmitted light. Hypotypus MP-0-589. 50x
 20. Lateral of the same. 50x
 21. Muscle scars of the same. 98x
- Fig. 22-25 — Incertus genus 1
22. Right valve in lateral view in transmitted light. Hypotypus MP-0-590. 50x
 23. Lateral view of the same. 50x
 24. Dorsal view of the same. 50x
 25. Muscle scars of the same. 206x
- Fig. 26-28 — Incertus genus 2
26. Female hinge left valve. Hypotypus MP-0-546. 290x
 27. Lateral view of the same. 50x
 28. Dorsal view of the same. 50x
- Fig. 29-30 — Incertus genus 3
29. Left valve in lateral view. Hypotypus MP-0-591. 50x
 30. Left valve in lateral view. Hypotypus MP-0-592. 50x