N. Jb. Geol. Paläont. Abh.	167	2	251—274	Stuttgart, Januar 1984

Early Cretaceous Platycopina (marine ostracods) from the Andean Neuquén Basin, Argentina

By

Eduardo A. Musacchio, Buenos Aires, and
Alberto H. Abrahamovich, La Plata

With 4 figures in the text

MUSACCHIO, E. A. & ABRAHAMOVICH, A. H. (1984): Early Cretaceous Platycopina (marine ostracods) from the Andean Neuquén Basin (Argentina). — N. Jb. Geol. Paläont. Abh., **167**: 251—274; Stuttgart.

Abstract: Thirteen species (5 n. sp.) of Hauterivian ostracods of the genera *Cytherella* and *Cytherelloidea* from the Agrio Formation in the "El Marucho" cross-section of the Andean Neuquén-Basin in the Pacific-Gondwanic Domain are described.

There are affinities of different rank between some of the present taxa and others common in Neocomian Basins, mainly belonging to the Gondwanic Domain, as well as in other regions.

Key words: New taxa (Cytherelloidea, Cytherella), Platycopina, Lower Cretaceous (Agrio Formation), classification, biogeography, faunal province (Andean province), Gondwana; Argentinian Andes, Neuquén Basin.

Zusammenfassung: In der vorliegenden Arbeit werden die Unterkreide-Ostracoden der Gattungen *Cytherella* und *Cytherelloidea* aus der Agrio Formation von „El Marucho" Profil des Neuquén-Beckens der Anden aus dem Pazifik-Gondwania-Bereich behandelt. Dreizehn Arten werden beschrieben, fünf davon neu aufgestellt. Es gibt Ähnlichkeiten auf verschiedenen Ebenen zwischen einigen der vorliegenden Arten und anderen, die sowohl in den Becken der Unterkreide des Gondwana-Bereiches als auch in anderen faunistischen Regionen vorkommen. Trotzdem kann keine der untersuchten Arten aus Neuquén zu anderen außerhalb der Anden-Provinz gestellt werden.

I. Introduction

The Neocomian marine ostracods in the Gondwanic Region are well represented in the Majunga Basin (GREKOFF, 1963), in South African Continental-Margin Basins (DINGLE, 1969; DINGLE & KLINGER, 1972; MCLACHLAN et al., 1976a, 1976b and BRENNER & OERTLI, 1976) and in

0077-7749/84/0167-0251 $ 6.00

the Central Andean area (Musacchio, 1978, 1979). In many of the known associations several taxa belonging to the representative groups of the Southern-Gondwanic Region as *Amphicytherura (Sondagella)* Dingle and *Rostrocytheridea* Dingle are present. On the other hand, geographically widespread genera such as *Cytherelloidea* Alexander or *Procytherura* Whatley are present here, too, but taxonomically well differentiated at the species level.

The genera *Cytherella* and *Cytherelloidea* deserve paleobiogeographic interest, particularly the second one, due to its high morphological diversification and its worldwide distribution except in regions with very cold or clearly hypohaline waters.

The present paper, just devoted to the last two above mentioned genera, is the first contribution to the systematic revision of the marine ostracods in the Agrio Formation at the El Marucho Section in the Neuquén Basin of Argentina.

One of the purposes of this research is to find out what morphological similarities are there between some Neuquean species and previously known taxa in other Neocomian Gondwanic Basins, as well as in other regions more distant in space and time.

Phyletic relationships between similar or comparable forms have been difficult to define. A proper knowledge of the inter- and intra-population variability in certain forms allowed a better appreciation of possible "morphological gaps" in the comparative analysis. This has been profitable in the sense that possible interrelationships between local Neuquean taxa have been recognized. In other cases, on the contrary, the nature of the relationships between similar forms of different domains has remained in the dark or has been very difficult to confirm.

II. Source of the material

In many places of the Neuquén Basin-area, the Agrio Formation, mainly composed of shales and limestones, is characterized by faunas of Hauterivian ammonoids. The local zones of *Crioceratites andinus, Holcoptychites neuquensis* and *Lyticoceras pseudoregale* (Gerth, 1925; Leanza, 1981) are characteristic of this Formation. Nevertheless, in some areas the basal levels of the Agrio Formation are included by Leanza, 1945, in the zone of *Olcostephanus curacoensis,* late Valanginian in age (cf. Leanza, 1981) and at Ramón Castro, the uppermost part of the same Formation in the zone of ?*Crioceratites emerici,* of probably Barremian age (Giovine, 1950; Leanza, 1981).

The Agrio Formation at C° Lotena — the nearest ammonites to this locality have been noticed by Weaver, 1939 — includes 30 basal meters with invertebrate remains with *Holcoptychites neuquensis* Douvillé. At El

Marucho, the Agrio Formation is close to the proximal part of the basin. The thickness of the Formation is relatively reduced including three litologically differentiated members. The Middle Member is blue-ash colored and includes sandy levels. It contains non-marine intertonguings with faunas of continental ostracods characterized by *Cypridea* and *Darwinula,* and charophytes (SIMEONI & MUSACCHIO, 1983). In this same section, at a level located 150 meters away from the base of the Formation and near the sample n° 110, remains of a neocomitid were found comparable with forms belonging to the early Hauterivian genus *Acanthodiscus,* kindly determined by Dr. HÉCTOR LEANZA.

The Hauterivian age is reliable for the most of the Lower Member and all of the Middle Member of the Agrio Formation at El Marucho. The basal levels of the Lower Member are included in the Uppermost Valanginian—Lower Hauterivian interval. Regarding to the uppermost part of the same cross-section, future findings of ammonoids or more elaborate micropaleontological correlations will enable to explain if the faunas of the Upper Member faunas are also fully Hauterivian, or if the terminal levels belong to the initial Barremian.

Many levels with *Cytherelloidea* at El Marucho are marine, presumably euhaline-normal in origin, including abundant and taxonomically well differentiated foraminiferal faunas. Other levels, on the contrary, seem to derive from hypohaline conditions with a relatively high ostracods/foraminifers rate or with a supremacy of polymorphinids. Hypohaline and changing conditions in salinity have had an influence on the high inter- and intrapopulation variability of several species of *Cytherelloidea.* In spite of this adverse ecological factor, El Marucho and other neighbouring areas were chosen to study the ostracods of the Agrio Formation for their relatively greater number and variety of morphotypes and the better preservation of the faunas as compared with other more complete or thicker sections, such as the type locality of the Agrio Formation, or other deeper parts of the Basin.

III. Systematic descriptions

Abbreviations used in this text:

LV:	Left valve
RV:	Right valve
L:	Length of the carapace
H:	Hight of the carapace
W:	Width of the carapace
BA G CM:	Repository of the type material; Buenos Aires, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia". Collección Musacchio. Geologia.

Subclass Ostracoda LATREILLE, 1806
Order Podocopida MÜLLER, 1894
Suborder Platycopina SARS, 1866
Family Cytherellidae SARS, 1866
Genus *Cytherella* JONES, 1849
Cytherella cf. *inaequivalva* DINGLE, 1969

Fig. 1, 1 to 3.

References: *Cytherella inaequivalva* nov. sp. DINGLE, 1969; p. 145, figs. 5, 14A, B. BRENNER & OERTLI, 1976; p. 482, Plate I, figs. 3—4, fig. text 6.

Material: One carapace and one LV from level EM 100.

Remarks: The sole carapace found has a more regular oval outline than the African one. The RV postero-ventral truncation is, likewise, less sharp. The outer surface of the illustrated carapace is slightly reticulated, particularly near the anterior border.

Repository and dimensions (in mm):
BA G CM 12/1. L: 0,835; H: 0,53; W: 0,355 (Fig. 1, 1—2).
BA G CM 12/2. L: 0,75; H: 0,415 (Fig. 1, 3).

Cytherelloidea ALEXANDER, 1929
Cytherelloidea volkheimeri n. sp.

Fig. 1, 12 to 14; Fig. 2, 1 to 5

Origin of the name: It is dedicated to the paleobotanist Dr. WOLFGANG VOLKHEIMER (CONICET-Museo Bernardino Rivadavia, Buenos Aires).

Material: 42 carapaces from the level 100, 20 carapaces from the level 89, both from El Marucho, 33 carapaces from the level LC 3 in similar stratigraphic position from the Las Coloradas cross-section.

Description: RV of the female dimorph having an elongated-subelliptical outline in lateral view, with subparallel dorsal and ventral borders, both concave between each other in the middle, slightly frontwards; anterior margin continuously rounded; posterior margin truncated towards the postero-ventral region, mainly in the RV. The outline of the LV, in lateral view, is relatively rounded in the postero-ventral region, and with sloped dorsal margin, more strongly concave antero-medially. In this form, the adult carapace is swollen in the postero-ventral zone. Outline in posterior view with maximal swelling at, approximately $^5/_6$ of the total length, flattened to the front end.

The male dimorph is relativelly smaller, laterally flattened, with subtrapezoidal outline in lateral view, truncated at the postero-ventral margin; back-dorsal border bent backwards, ending subangularly in the dorsal-posterior end.

In both forms, the outer surface is wrinkled or uneven, with several hollows, different in form and size but similar in design in different specimens, including a fossule in the zone of the adductor muscle scars which extends upwards in a furrow slanted backwards and shallowing near the dorsal border; a second fossule in the dorsal antero-subcentral zone is similar to the first but slighter and irregularly ending near the concavity of the dorsal border; a postero-subventral hollow, located in front of and by the postero-ventral swelling is located in the female dimorph. The outer surface of the valves is finely reticulated, with a polygonal design, aligned to the margins, mainly to the frontal one, and differently patterned in the "populations".

Diagnosis: A species of the genus *Cytherelloidea* with a finely reticulated to smooth carapace and wrinkled surface including a larger slanting hollow from the adductor muscle-scar zone shallowing towards the postero-medial dorsal margin.

Variability and relationships: The more strongly reticulated specimens of the level EM 100 show similarities with *Cytherelloidea amosi* MUSACCHIO, 1978. In the latter species, the length/hight relationships of the carapace is smaller, and the outer surface is more flattened. Some carapaces from the level LC 3 show gradations to *Cytherelloidea andica* MUSACCHIO, 1978 in the external morphology. In these cases, there is a wide but weakly raised rib with a not well defined U-shape in the subcentral furrow-fossule, this weak U-shaped rib is oriented downwards by an adjacent furrow and slighter in the middle. These variants suggest relationships with the two species mentioned.

The carapace of the present species resembles that of *Cytherella collapsa* GREKOFF, 1963 from Callovian beds of the Majunga Basin. The Neuquean species is more truncated in the postero-ventral margin, has a reticulated surface, and the outer surface is more uneven.

Repository and dimensions (in mm):
Holotype (♀) BA G CM 15/1. L: 0,8; H: 0,425; W: 0,3 (Fig. 1, 14).

Paratypes:
(♂) BA G CM 15/2. L: 0,68 ; H: 0,38 ; W: 0,255.
(♀) BA G CM 15/3. L: 0,825; H: 0,455; W: 0,345.
Instar BA G CM 15/4. L: 0,675; H: 0,375; W: 0,25.
Instar BA G CM 15/5. L: 0,39 ; H: 0,225; W: 0,175.

Additional measurements:
9 adult carapaces (♀). L: 0,72—0,785 (0,759); H: 0,4 —0,43 (0,415) EM 100.
5 adult carapaces (♂). L: 0,65—0,72 (0,686); H: 0,35—0,4 (0,377) EM 100.
9 adult carapaces (♀). L: 0,72—0,785 (0,752); H: 0,4 —0,43 (0,418) LC 3.
7 adult carapaces (♂). L: 0,65—0,72 (0,689); H: 0,35—0,4 (0,373) LC 3.

Additional specimen illustrated:
(♀) BA G CM 15/6. L: 0,78; H: 0,45; W: 0,305.

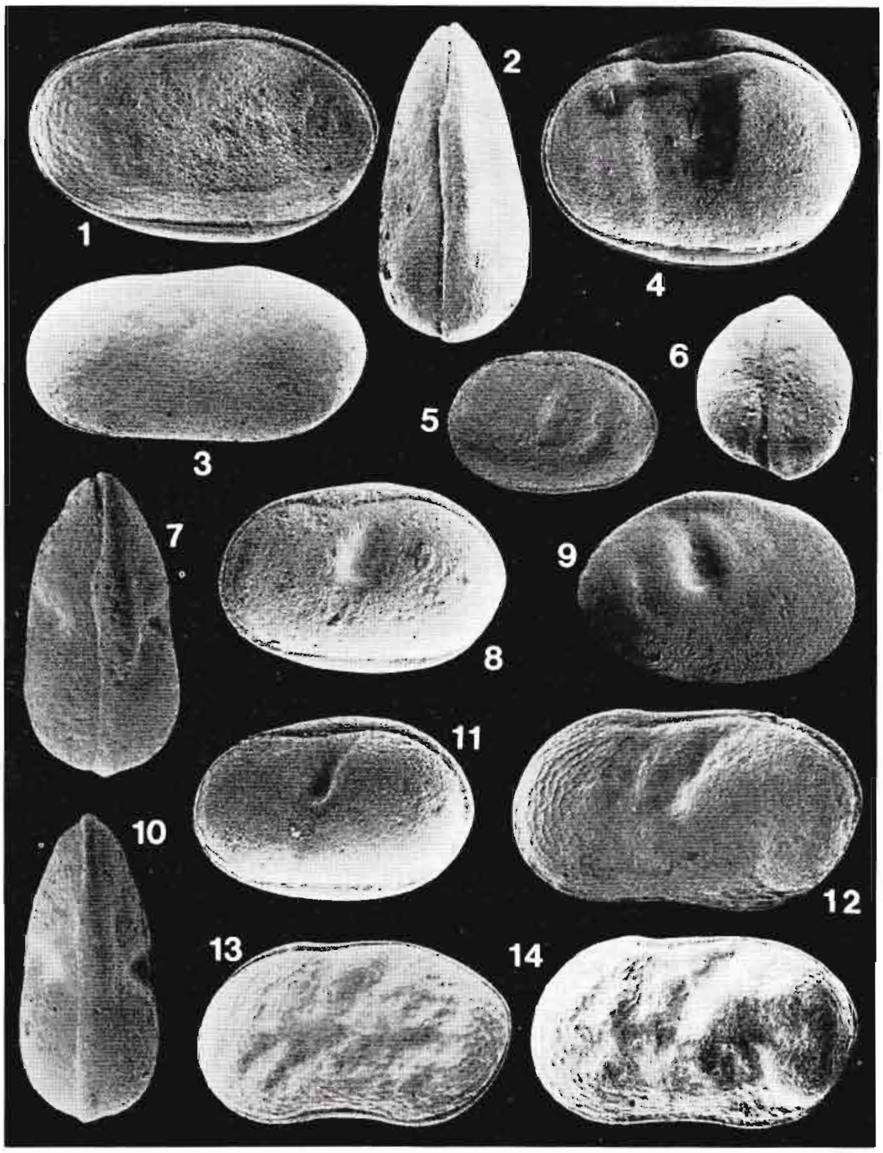

Fig. 1.
1—8 and 10—14: x 57. 9: x 100.

Cytherella cf. *inaequivalva* DINGLE, 1979:
1. Carapace, lef lateral view.
2. Idem, dorsal view.
3. Left Valve, lateral view.

Cytherelloidea argentina n. sp.:
4. Carapace, left lateral view.

T y p e l e v e l : Agrio Formation, level EM 100 (col. MUSACCHIO). Base of the Lower Member at El Marucho; 20 m of biorudites of eulittoral environment, associated with a fauna of ostracods and benthonic foraminifers, which is moderately diversified taxonomically.

Cytherelloidea sp. A cf. *C. volkheimeri* n. sp.

Fig. 3, nos. 9 to 11

M a t e r i a l : Four female carapaces from the level EM 91.

D e s c r i p t i o n : Carapace with rounded-subrectangular outline in lateral view, truncated in the postero-ventral margin, particularly in the RV. Outline in dorsal view with maximum posterior swelling at approximately $^6/_7$ of the total length, flattened frontwards and showing a deep concavity at approximately $^2/_3$ of the total length. Uneven outer surface with subvertical posterior expansion and depression adjacent to the front which is deeper toward the ventral zone. Subcentral fossule becoming weaker to the dorsal border. Very wide reticulum with interspaces of equal dimension and similar diameter. The reticulum becomes less intense towards the central zone.

O b s e r v a t i o n s : The few available specimens do not allow a proper definition of this morphotype. It is closely related to *Cytherelloidea volkheimeri* n. sp. (s. str.) even though it has a rougher outer reticulum, and other minor differences in the outer outline of the carapace.

R e p o s i t o r y a n d d i m e n s i o n s (i n m m) :
BA G CM 16/1. L: 0,715; H: 0,4 ; W: 0,3 (Fig. 3, 9—10).
BA G CM 16/2. L: 0,725; H: 0,405; W: 0,285 (Fig. 3, 11).

Cytherelloidea andica MUSACCHIO, 1978

Fig. 2, 6 to 11, 14

R e f e r e n c e s : *Cytherelloidea andica* MUSACCHIO 1978; p. 461—462, Plate I, figs. 1—3. MUSACCHIO 1979, p. 260, Plate VI, figs. 1—2.

---

5. Instar carapace, left lateral view.
6. Holotype; carapace, posterior view.
7. Idem (Holotype), dorsal view.
8. Idem (Holotype), left, lateral view.
9. Paratype; instar carapace, right lateral view.
10. Paratype; carapace, dorsal view.
11. Paratype; left lateral view.

Cytherelloidea volkheimeri n. sp.:

12. Paratype (♀); carapace, left lateral view.
13. Paratype (♂); carapace, left lateral view.
14. Holotype (♀); left lateral view.

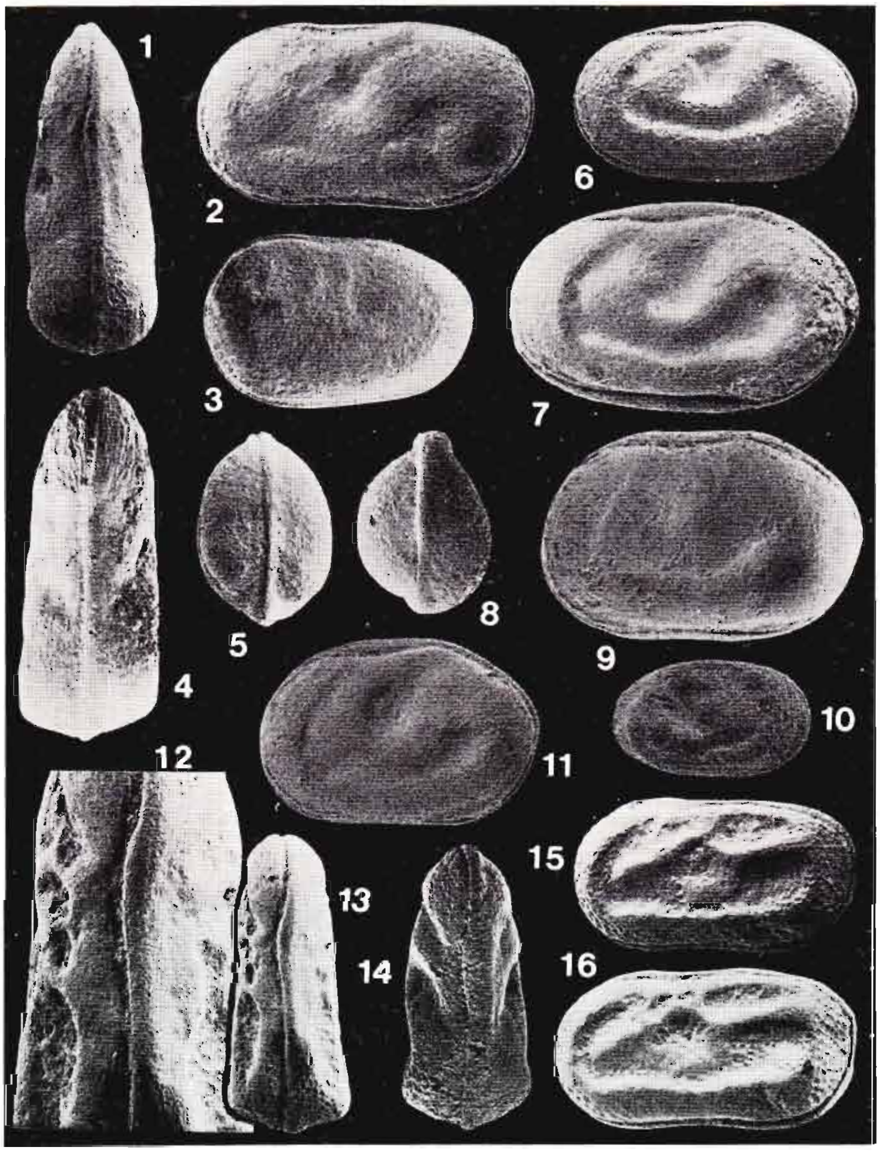

Fig. 2.

1—5, 7—9, 11, 13 and 15—16: X 57. 6 and 14: x 50. 10: X 100. 12: X 125.

Cytherelloidea volkheimeri n. sp.:

1. Carapace (♀), dorsal view.
2. Idem, lateral view.
3. Instar carapace, left lateral view.
4. Holotype (♀); carapace, dorsal view.
5. Idem (Holotype); posterior view.

Material: More than 300 carapaces and valves from the Lower Member of the Agrio Formation at El Marucho; Avilé Member at Río Agrio, and near Río Colorado areas on National Road n° 40.

Description: Carapace heavy and strongly inequivalve. Outline in lateral view subelliptical to suboval, with semicircular anterior margin and a slightly asymmetrical posterior margin with postero-dorsal border rounded and slanted backwards and postero-ventral border rather truncated.

The surface has strongly projecting or swollen ribs which, however, are much less exposed in internal view. There is a continuous lower branch running parallel to the ventral, anterior and posterior margins, which, in the postero-ventral sector coincides with the maximum width of the carapace. A second subcentral branch is asymmetrically U-shaped and slanted to the antero-ventral section. This second branch is joined without constrictions or gaps to the lower branch through the posterior dorsal zone; its anterior sector is less marked in the mid-dorsal zone. This subcentral branch inscribes a mid-dorsal depression, which is deep and rather asymmetric, and which includes the adductor muscle scars. This subcentral branch remains, in turn, separated from the lower-ventral branch by an adjacent furrow which ends backwards at approximately $^2/_3$ of the hight of the carapace and, frontwards, is less marked in the dorsal border of both valves.

Variability: The subrectilinear to convex shape of the RV's dorsal margin correlations in turn with the subelliptical to suboval outline of the carapace in lateral view. The surface may be smooth, or very slightly reticulate. In the outer surface of the carapace, the relative relief between ribs and adjacent hollows is variable. In populations of different levels, the different variants in characters do not show a defined trend with time, and different morphotypes may alternate or revert.

Repository and dimensions (in mm):
Holotype: MLP Mi 327; L: 0,755, H: 0,44; W: 0,315 (Fig. 2, 6).
Paratype: MLP Mi 328; L: 0,735, H: 0,475; W: 0,33.

Cytherelloidea andica MUSACCHIO, 1978:
6. Holotype; carapace, left lateral view.
7. Topotype; carapace, left lateral view.
8. Carapace, posterior view.
9. Carapace (idem), left lateral view.
10. Instar carapace, right lateral view.
11. Instar carapace, left lateral view.
14. Paratype; carapace, dorsal view.

Cytherelloidea agrioensis n. sp.:
12, 13. Holotype; carapace, dorsal view.
15. Paratype; carapace, left lateral view.
16. Holotype; carapace, left lateral view.

Illustrated specimens in the present paper:

Fig. 2, 7: BA G CM 14/1;	L: 0,75, H: 0,475, W: 0,35 (Topotype, PL 73).
Fig. 2, 9: BA G CM 14/2;	L: 0,75, H: 0,45, W: 0,35 (Adult, EM 100).
Fig. 2, 11: BA G CM 14/3;	L: 0,635, H: 0,38, W: 0,28 (Instar, EM 100).
Fig. 2, 10: BA G CM 14/4;	L: 0,25, H: 0,175 (Instar, EM 100).

Additional measurements:

7 adult carapaces from the level EM 100, L: 066—0,8 (0,724) H: 0,4—0,49 (0,43).
12 adult carapaces from the level PL 73, L: 0,66—0,8 (0,734) H: 0,4—0,49 (0,446).
4 adult carapaces from the level EM 91,L: 0,65—0,75 (0,72) H: 0,4—0,49 (0,429).
3 adult carapaces from the level EM 109, L: 0,66—0,75 (0,677) H: 0,4—0,48 (0,433.)
4 adult carapaces from the level LC 3, L: 0,67—0,8 (0,718) H: 0,4—0,48 (0,442).

Type level: Agrio Formation, Lower Member at Picún Leufú (PL 73. Coll. MUSACCHIO, 1978).

Relationships: In *Cytherelloidea anomala* KAYE, 1963, of the English Barremian, the U-shaped subcentral rib is more symmetric, and the surrounding furrow is not so clearly defined. In *Cytherelloidea pulchra* NEALE, 1960, also of the European Barremian, the ribs are less rounded on the surface; in addition, the ventral rib is not joined to the anterior rib, the mid-rib is less contracted, and it is not always joined to the dorsal one. Nevertheless, it should be emphasized that this form is more similar to "*Cytherelloidea pulchra*" NEALE in KAYE, 1963, Plate 19, fig. 13, than to any other form in our bibliography.

Finally, in the Neuquean material there is no dorsal rib, not even traces of it. The similarities between the present and the others subboreal species mentioned may be due to morphological convergence only, without true relation.

Cytherelloidea frenguellii n. sp.

Fig. 3, 15 to 18; Fig. 4, 3 to 7

Origin of the name: Dedicated to the Italian Palaeontologist JOAQUIN FRENGÜELLI (1892—1956) in recognition of the volume and quality of his investigations in Argentina.

Reference: *Cytherelloidea* sp. 141, MUSACCHIO, 1978, p. 462, Plate I, fig. 6.

Material: 25 Carapaces from the level EM 100; 25 carapaces from the level LC 3, in similar stratigraphic position.

Description: Carapace heavy and strongly dimorphic, and inequivalve. The female dimorph is rounded-subrectangular in lateral view, with broken outline at the dorsal margin in RV, sloping backwards posteriorly, slightly projecting in the middle; in LV dorsal margin sloped with a major concavity in the mid-anterior zone; the subvertical posterior margin is more slanted forwards in the lower zone; concave ventral border in the middle zone. Outline in dorsal view elongated-pyriform, truncated at the ends.

Outline in posterior view sub-quadrangular in the central zone, tapering in dorsal and, mainly, ventral ends.

Surface with variably rounded projecting ribs. Two dorsal ribs arranged "en échelon", bent forwards, turning less marked in the same direction, the back one beginning at $^8/_9$ and the front one at $^1/_2$ of the total length. A long ventral rib, subparallel to the ventral border, slightly concave in the middle, with a slight inflection at the back end where it joins a strong subvertical expansion. This expansion coincides with the maximum width of the carapace in the lower section, and it is joined to the posterior dorsal rib. In the antero-ventral median zone, a slight elongated projection may appear, which is more bent forwards than the dorsal ones; the latter is not, nevertheless, clearly observed in all specimens under study. Finally, there is an anterior peripheral rib, thinner in the dorsal area, in the front cardinal angle zone, and extending ventrally much less prominently; this anterior-subventral peripheral rib is separated from the others by an adjacent furrow which is also subparallel to the outer margin and, in the female dimorph, ends just in the posterior ventral sector.

The outer surface is covered by a polygonal reticulum. The anterior and antero-ventral margin with marginal denticulations in the truncated marginal border of both valves is more projecting in the front margin; very few papillae in the mid-dorsal zone. There is a small fossule in the adductor muscle scar zone which is not always manifest.

The male dimorph has a comparatively laterally flattened carapace, and a subtrapezoidal outline in lateral view, with maximum height in the zone of the front cardinal angle, and a truncated back margin bent forwards. Both the postero-dorsal and the ventral rib are differing from the homologous expansion by a furrow, that reaches the ventral and front section now as in the female dimorph. In lateral view, young specimens have a more clearly trapezoidal outline, and the posterior margin is more notably truncated.

Diagnosis: A species of the genus *Cytherelloidea* having a carapace ornamented by two dorsal ribs arranged "en échelon", which are bent and thinner forwards; a subventral rib, long and subparallel to the base of the carapace, and an anterior-ventral-posterior peripheral rib which is smaller in the middle. In the female dimorph, the subventral rib joins the peripheral rib; in contrast, both are segregated in the male dimorph. The outer surface is reticulated, with papillae and/or marginal denticulations.

Relationships: This species differs from *Cytherelloidea knaptonensis* KAYE, 1963, of the English Albian showing the ventral rib posteriorly joined to the posteroventral expansion, and lacking of a mid-rib, even a badly defined one. It presents also similarities to the *Cytherelloidea salimaensis* BISCHOFF, 1964, of the Lebanon Upper Jurassic, mainly as to the ♂ form; nevertheless, the design and number of the ribs are different, as well as the outline details; the present species has, in the ♂ morph, a comparativelly less truncated postero-ventral border.

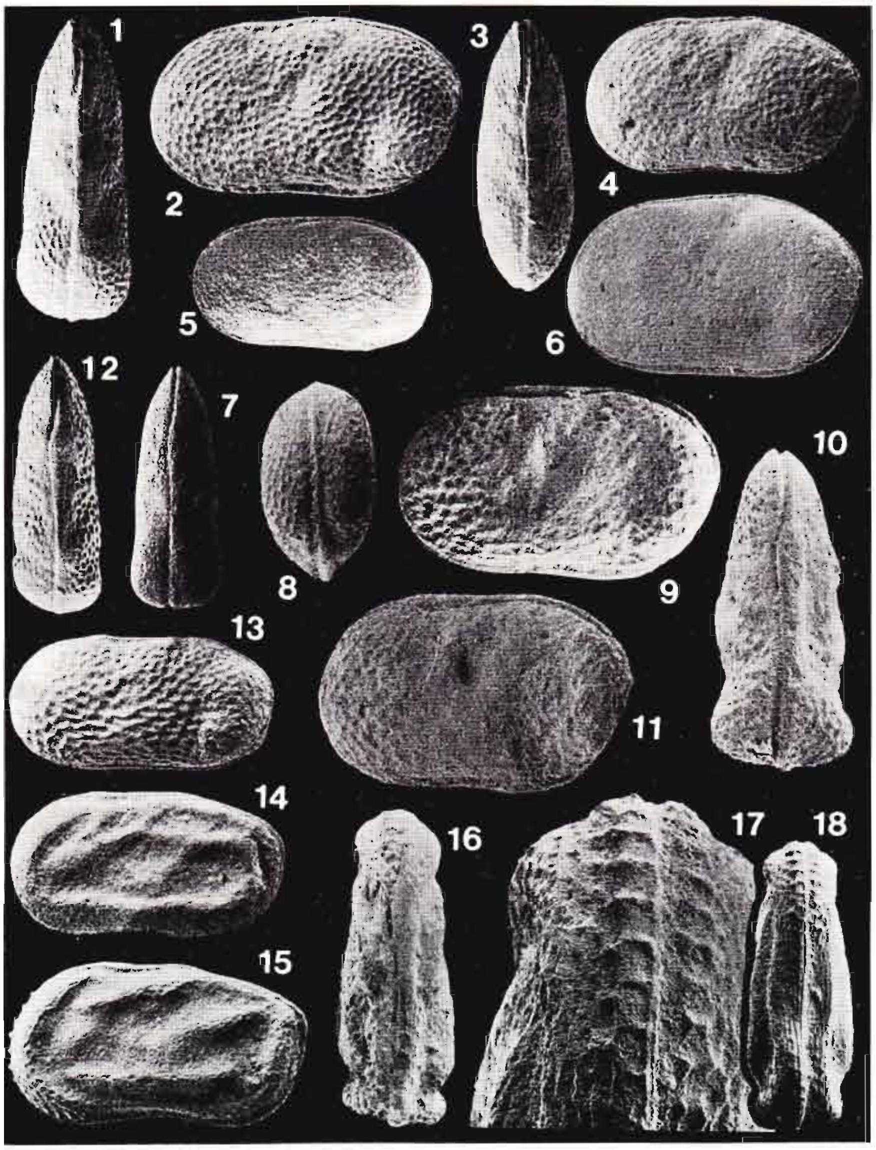

Fig. 3.
1—4, 6, 8—16 and 18: X 57. 5 and 7: X 50. 17: X 300.

Cytherelloidea amosi (MUSACCHIO, 1978):

1. Carapace (♀), dorsal view.
2. Idem, left lateral view.
3. Carapace (♂), dorsal view.
4. Idem, left lateral view.
5. Holotype (♀); carapace, left lateral view.

Repository and dimensions (in mm):
Holotype BA G CM 17/1; L: 0,755, H: 0,44, W: 0,33 (Fig. 4, 4—5).
Paratype BA G CM 17/2; L: 0,75, H: 0,44, W: 0,33 (Fig. 4, 6).
Paratype BA G CM 17/3; L: 0,705, H: 0,415, W: 0,25 (Fig. 3, 15—18).

Additional measurements:
10 adult carapaces (♀) from the level EM 100:
L: 0,725—0,780 (0,749), H: 0,4 —0,475 (0,465).
11 adult carapaces (♂) from the level EM 100:
L: 0,65 —0,725 (0,712), H: 0,33—0,425 (0,387).
4 adult carapaces (♀) from the level LC 3:
L: 0,725—0,78 (0,752); H: 0,4 —0,475 (0,436).
5 adult carapaces (♂) from the level LC 3:
L: 0,65 —0,725 (0,684), H: 0,33—0,425) (0,382).

Type level: Agrio Formation, level EM 100 (col. MUSACCHIO, 1982). Base of the Lower Member at El Marucho; 20 m of biorudites of eulittoral environment, associated with a fauna of ostracods and benthonic foraminifers, moderately diversified taxonomically.

Cytherelloidea sp. B cf. *C. frenguellii* n. sp.

Fig. 4, 1—2

Material: Two carapaces from level EM 97.

Observations: The design of the ornamentation of the carapace is well compared to that of the *Cytherelloidea franguellii* n. sp.; the ribs are, on the other hand, sharp, and the carapace is relatively flattened. The small number of specimens recovered does not allow more precisions about the undoubted kinship of both taxa.

Repository and dimensions (in mm) of the illustrated specimen: BA G CM 18/1. L: 0,725, H: 0,43, W: 0,3.

---

6. "Smooth" morphotype (EM 4b); carapace, left lateral view.
7. Holotype; carapace, lateral view.
8. Carapace (♀), idem Fig. 1, posterior view.

Cytherelloidea sp. A cf. *volkheimeri* n. sp.:
9. Carapace, left, lateral view.
10. Idem, dorsal view.
11. Carapace, left lateral view.

Cytherelloidea sp. D cf. *amosi* (MUSACCHIO, 1978):
12. Carapace, dorsal view.
13. Idem, left lateral view.

Cytherelloidea agrioensis n. sp.:
14. Instar carapace, left lateral view.

Cytherelloidea frenguellii n. sp.:
15. Paratype (♂); carapace, left lateral view.
16. Idem, dorsal view.
17, 18. Idem, ventral view.

Cytherelloidea argentina n. sp.

Fig. 1, 4 to 11

Origin of the name: Republic of Argentina.

Reference: *Cytherelloidea* sp. 3, MUSACCHIO, 1979, p. 260, Plate VI, fig. 3.

Material: 500 carapaces of adults and instars.

Description: Carapace ovoid, strongly inequivalve. Outline oval in lateral view with its maximum height at mid to mid-posterior position; postero-dorsal margin more strongly bent backwards than the antero-dorsal one; the postero-ventral margin is variably truncate; outline in lateral view of the LV (the smallest) subelliptical, higher at the postero-median zone, slightly concave in the antero-median dorsal zone and almost rectilinear in the mid-ventral margin.

The outer surface is smooth, with a subcentral depression in the central muscle-scar aera, which runs more slightly to the dorsal border, and is inscribed in a very weak asymmetric U-shaped rib which is not always present and becomes weaker before reaching the dorsal end, or is separated from the latter by a submarginal, slightly visible, rim.

Diagnosis: *Cytherelloidea* of ovoid shape and oval outline, in lateral view with a slanting, subcentral fossule, thinner to the dorsal margin.

Variability: It is mainly related to the relative development of the RV to the LV and to the intensity of the ornamentation. Whenever the development of the RV is strong, it is more conspicuous in the overlapping at the dorsal region, and, likewise, at the ventral region. The L/H relationship reaches minimum values of 1,5 in adults of the level EM 96, and maximum values of 1,68 in the level EM 104. In some "populations" the subcentral depression is weak, in others, on the contrary, it is deeper, and it is surrounded by the asymmetric U-shaped rib, which is partly limited by adjacent depressions.

The variability does not exhibit definite trends along the stratigraphic column; there is, instead a recurrence of similar morphotypes with time.

Relationships: The more strongly ornamented carapaces are similar to those of *Cytherelloidea andica* MUSACCHIO, 1978, showing a clear homology in the asymmetric U-shaped rib, whenever the latter is visible, and in the nature of the overlapping. In four levels at least, both species appear together, but it has been impossible, nevertheless, to find clear intermediate types between both of them. We must note though, that in young specimens it seems more difficult to distinguish the two morphotypes. *Cytherelloidea argentina* n. sp. differs from *Cytherelloidea anomala* KAYE, 1963, by the more strongly inequivalve condition of the Andean "type" that results in a more oval carapace outline.

Repository and dimensions (in mm):

Holotype BA G CM 13/1;	L: 0,7, H: 0,425, W: 0,305 (Fig. 1, 6 to 8).
Paratypes BA G CM 13/2;	L: 0,7, H: 0,45, W: 0,325 (Fig. 1, 4).
BA G CM 13/3	L: 0,685, H: 0,435, W: 0,320 (Fig. 1, 10).
BA G CM 13/4	L: 0,495, H: 0,32, W: 0,225 (Fig. 1, 5).

other Paratype; not illustrated:
BA G CM 13/5a8.

Type level: Agrio Formation, Lower Member at El Marucho cross-section. Level EM 104.

Cytherelloidea agrioensis n. sp.

Fig. 2, 12—13, 15—16; Fig. 3, 14

Origin of the name: Agrio Formation, lithostratigraphic unit where the material under study comes from.

Description: Outline of the carapace rectangular in lateral view with anterior semicircular margin, ventral margin weakly concave in the middle; posterior margin slightly truncated ventrally; the dorsal margin of the RV is subrectilinear, the dorsal margin of the LV (the smallest) is scarcely prominent in the postero-median zone. In dorsal view, the outline is truncated to both ends, evenly widening backward; the outer margin of both valves is rounded and slightly separated from each other, except in the mid-dorsal zone.

The surface is ornamented by a subperipherical and a mid-sublongitudinal rib. The peripherical rib is semicircular towards the anterior margin (slightly more strongly rounded to the middle-ventral zone); ventrally, it is subrectilinear, clearly marked in the posterior zone, with a subvertical position, running smoothly and near to the border of the valves in the dorsal margin. The sublongitudinal rib bends forwards; it runs from the postero-dorsal border, where it is joined to the peripheral one, and widens to the middle, bordering the subcentral fossule of the adductor muscle scars, where, in addition, it is joined to the dorsal periphery by uneven small rims, slanting frontwards, one of which is more developed in the middle zone; finally, the sublongitudinal rib runs slantly forwards, where it ends near, but separated from, the front peripheral rib.

The space in between the ribs is moderately depressed, particularly toward the postero-subcentral zone. The surface of the valves is covered by a subpolygonal reticulum which is more distinct in the depressed zones.

Diagnosis: A species of the genus *Cytherelloidea* with subrectangular outline and projecting ribs, including a subperipheral and a slanting mid-sub-longitudinal rib; the latter surrounds a subcentral fossule. The outer surface is reticulate particularly in the depressed zones in between the ribs.

Relationships: This species is very similar in shape and ornamentation to *Cytherelloidea zoetgeneugdensis* DINGLE, 1969. The mid-sublongi-

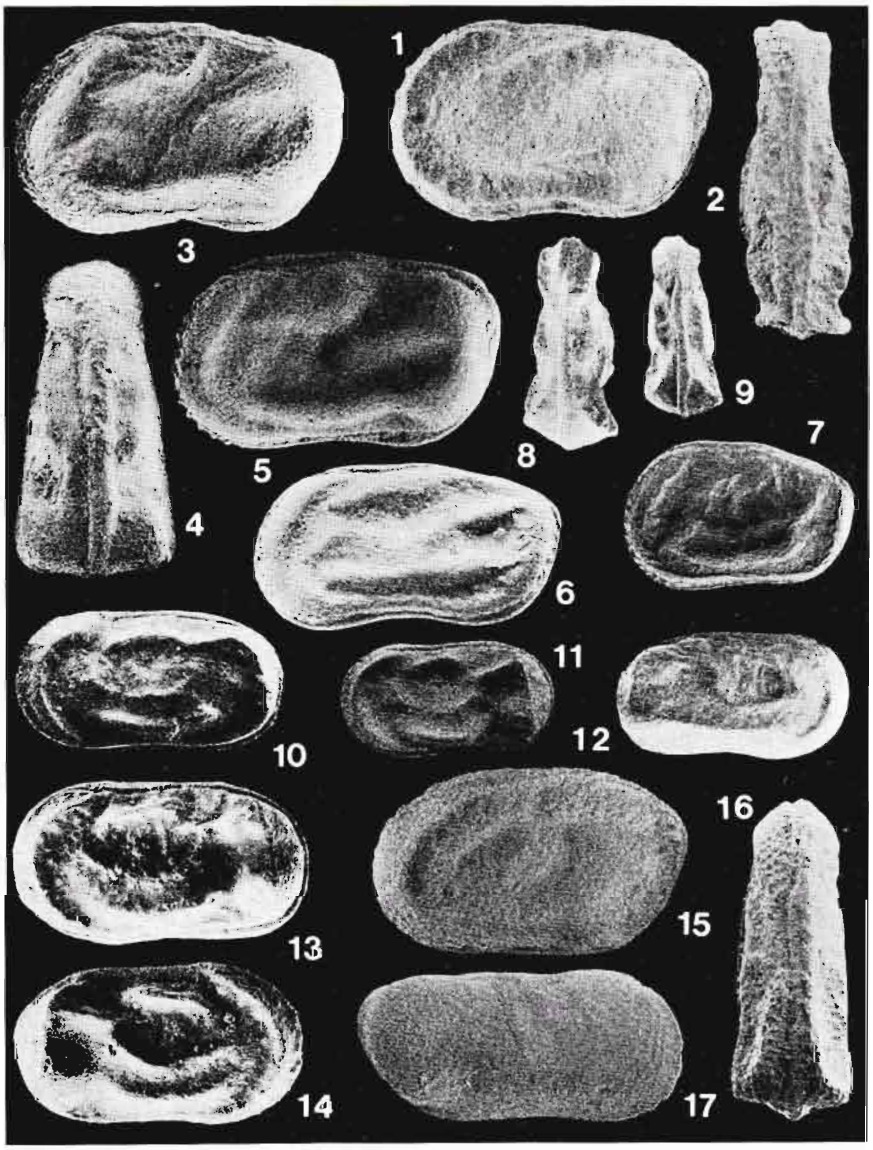

Fig. 4.

1—9, 11, 12 and 15—17: X 57. 10, 13 and 14: X 80.

Cytherelloidea sp. cf. *frenguellii* n. sp:

1. Carapace, left lateral view.
2. Idem, dorsal view.

Cytherelloidea frenguellii n. sp.:

3. Carapace (♀), left lateral view.
4. Holotype (♀), carapace, dorsal view.

tudinal rib, nevertheless, is separate from the front-peripherical one, and the outer reticulum is limited to, or at least more evident in the depressed zones in between the ribs. The ribs are more raised and the posterior cardinal angle is more conspicuous.

Repository and dimensions (in mm):

Holotype BA G CM 19/1;	L: 0,715, H: 0,395, W: 0,295 (Fig. 2, 12—13).
Paratypes BA G CM 19/2;	L: 0,65, H: 0,37, W: 0,295 (Fig. 2, 15).
BA G CM 19/3;	L: 0,64, H: 0,375, W: 0,225 (Fig. 3, 14).

Type level: Agrio Formation, Lower Member at Las Coloradas Section, at the base; together with marine ostracods associated with a moderately diversified fauna of foraminifers of presumably eulittoral environment.

Cytherelloidea sp. C

Fig. 4, 15 to 16

Material: Four instar carapaces and valves and two adult ones from the level EM 91.

Description: Carapace laterally flattened, with a subrectangular outline and postero-ventral margin somewhat truncated (truncation is stronger and cardinal angles more conspicuous in young carapaces). The dorsal border of the LV forms is weakly sloped with a slight mid-front concavity.

The ornamentation is made up of a subperipheral and a bifurcated sublongitudinal median ribs. The subperipheral rib is strongly rounded towards the antero-ventral zone, and runs slightly to the mid-dorsal zone a bit away from the margin in the antero-dorsal zone; it is clearer at the back where it equals the widest part of the carapace and forms sharp inflections, just when it reaches the dorsal and ventral sectors, respectively. The median

---

5. Idem (Holotype), left lateral view.
6. Paratype (♂), carapace, left lateral view.
7. Instar carapace, left lateral view.

Cytherelloidea pseudoagyroides n. sp.:

8. Carapace, dorsal view.
9. Carapace, dorsal view.
10. Paratype; instar carapace, left lateral view.
11. Carapace (idem fig. 9), left lateral view.
12. Carapace, right lateral view.
13. Paratype, carapace, left lateral view.
14. Holotype, right valve, external view.

Cytherelloidea sp. C:

15. Carapace, left lateral view.
16. Idem, dorsal view.

Cytherelloidea sp. E:

17. Right valve, external view.

rib, joined backwards to the subperipheral one at approximately $^2/_3$ of the total height, runs frontwards almost rectilinearly and horizontally bifurcating into two open branches; a shorter and strongly bent lower one, and a slanting upper one which becomes thinner to the front-central part, both bordering the subcentral adductor zone. The upper branch is joined to the dorsal peripheral crest by uneven rims, one of which is clearer in the middle.

Relationships: Although the few specimens under study do not allow a more complete definition, this species is closely related to *Cytherelloidea agrioensis* n. sp. except for (mainly) the design of the mid-rib.

Repository and dimensions (in mm):
BA G CM 20/1; L: 0,725, H: 0,425, W: 0,28 (Fig. 4, 15—16).
BA G CM 20/2; L: 0,705, H: 0,4, W: 0,27.

Cytherelloidea pseudoagyroides n. sp.

Fig. 4, 8 to 14

Origin of the name: From *Cytherelloidea agyroides* DINGLE, 1969.

Reference: *Cytherelloidea* sp. cf. *agyroides* DINGLE, MUSACCHIO, 1978, p. 461, Plate I, figs. 4—5.

Material: 90 carapaces.

Description: A relatively small carapace, with porcellanaceous-like surface in many of the specimens under study. Outline in lateral view subrectangular and rounded, with subparallel dorsal and ventral margins, slightly concave between each other.

The outer surface of the valves is smooth and ornamented by projecting ribs. Two peripheral ribs, an anterior one parallel to the margin, and a prominent posterior one which is subvertical. They tend to join themselves lenghtwise to the dorsal and ventral margins; to the middle of those margins, notwithstanding, they become thinner toward their end. In the central zone there are three sublongitudinal ribs, clearly separated from the front periphery by a strong depression which runs also subparallel to the anterior margin. Of the three above mentioned ribs, the upper or subdorsal and the middle-one are concave between each other and tending to coalesce backwards in an upwards branch, which is joined to the peripheral back rib at approximately $^2/_3$ of the total height of the carapace. The lowest of the three or the subventral rib is running concavely and parallel to the middle one. It is vaguely joined to the back one in a depressed area.

Diagnosis: A species of the genus *Cytherelloidea* with three central sublongitudinal ribs; a subdorsal and a mid-one concave between each other, and tending to coalesce backwards in an upwards branch, and a subventral one which is parallel to the mid-one. The three of them are clearly separated from an anterior subperipherical rib.

Relationships: Unlike in *Cytherelloidea agyroides* DINGLE, 1969, the central subdorsal rib in this species is not in connection with the anterior peripheral rib, and, furthermore, it is clearly convex upwards. In many specimens, the former and the middle-rib coalesce vaguely in only one upper rib which joins backwards the posterior subvertical peripheral one through an inflection in a lower part. In addition, the size of this species is smaller.

Repository and dimensions (in mm):
Holotype (RV) BA G CM 21/1; L: 0,475, H: 0,28 (Fig. 4, 14).
Paratype BA G CM 21/2; L: 0,485; H: 0,275, W: 0,205.
Paratype BA G CM 21/3; L: 0,435, H: 0,26, W: 0,125.

Additional specimens illustrated:
BA G CM 21/4 (EM 104); L: 0,465, H: 0,275, W: 0,205.

Additional measurements:

AF 20	(9 specimens); L: 0,530—0,585 (0,555), H: 0,305—0,325 (0,315).
EM 104	(4 specimens); L: 0,455—0,475 (0,465); H: 0,275—0,280 (0,277).
EM 109	(4 specimens); L: 0,46, —0,475 (0,47), H: 0,265—0,29 (0,284).
EM 103	(2 specimens); L: 0,52—0,525 (0,522), H: 0,3—0,325 (0,312).

Cytherelloidea amosi (MUSACCHIO, 1978)

Fig. 3, 1 to 8

Reference: *Cytherella amosi* MUSACCHIO, 1978, II: 460, Plate I, figs. 8—10.

Material: 500 carapaces from different levels of the Upper Member of the El Marucho cross-section.

Description: Carapace of the female morph slightly flattened towards the subcentral dorsal zone and swollen towards the postero-subcentral part. In lateral view the outline is subelliptic, variably truncated in the postero-ventral margin; the dorsal border is subrectilinear, more asymmetric in the LV (the smallest), whereas in the mid-front it is slightly concave, and slightly projecting in the middle posterior, and, finally, bending backwards in the posterior $^1/_3$. In dorsal view, the outline is thinner in the anterior part where the margins of both valves are slightly separated from each other.

The surface shows a not well defined shallow depression in the zone of the adductor muscle scars. In specimens where the depression is better defined, it runs slanting towards the back of the postero-middle tenuous convexity of the dorsal margin, disappearing before reaching the margin. In the type-morph there is a subpolygonal wide and dense reticulum.

The male morph is smaller, laterally flattened, with subtrapezoidal outline in lateral view, having a dorsal margin bent backwards in the posterior $^1/_3$, and clearly truncated in the postero-ventral margin.

V a r i a b i l i t y : The outer surface of some carapaces is smooth, while clearly reticulated in associated other specimens. A transition in the relative intensity of the reticulum in intermediate specimens suggests a conspecific condition of the "fossil populations". In the central area, the reticulum may have an isotropic as well as a longitudinal aligned design. In the additional sampling carried out for this research, several hundred of carapaces were found to be usually reticulated in the lower part of the Upper Member of the Agrio Formation. In lateral view, the postero-ventral truncation of the female morph varies from an almost semicircular outline in some populations (EM4, Coll. MUSACCHIO, Type level) to a weak even though clearly truncated one in others (level EM 136, Coll. MUSACCHIO, 1982, fig. 3, 6 here).

R e l a t i o n s h i p s : The reticulate morphotype of this species is very similar in its outer morphology to *Cytherelloidea besrineensis* BISCHOFF, 1964, of the Lebanese Aptian. The latter has been described as having two posterior globular expansions in each valve for the female morph. In the Argentine species, the posterior expansion is continuous, being globular only in its lower end towards the postero-subventral zone (cf. Fig. 4, 8). The dorsal margin outline is slightly different, tenuously concave mid-frontally, and tenuously convexe mid-posteriorly, particularly in the LV, of the Argentine specimens.

The smooth morphotype is similar to *Cytherella hausmani* BRENNER & OERTLI, 1976. In this species, the overlapping of the RV on the LV is slighter towards the back-ventral region. It is also similar to the *Cytherella* sp. C MCLACHLAN et al., 1976. As to the *Cytherella masugulnesis* BATE 1975, the RV overlaps the LV more strongly, and the dorsal border is entirely straight. *Cytherella* sp. MUSACCHIO, 1977, in DELLAPÉ et al. is similar to the smooth carapace of this species, even though the Jurassic form is thinner and smaller.

D i a g n o s i s : *Cytherelloidea* of relatively even carapace, having a low expansion at the back, ending subglobularly towards the lower end in the postero-ventral part, and outer surface normally covered by a subpolygonal reticulum of variable intensity.

H o l o t y p e a n d r e p o s i t o r y :
Holotype: MLP-Mi 323 (female carapace); Paratype MLP-Mi 323—324.
(MLP-Mi: La Plata Museum, Micropaleontology, La Plata, Argentina.)

T y p e l e v e l : Agrio Formation, Upper Member, terminal part; level EM 4 (Coll. MUSACCHIO, 1978).

Illustrated specimens in the present paper:
BA G CM 22/1. L: 0,725, H: 0,41, W: 0,275 (Fig. 3, 1, 2—8).
BA G CM 22/2. L: 0,66, H: 0,35, W: 0,23 (Fig. 3, 3—4).
BA G CM 22/3. L: 0,7, H: 0,4, W: 0,275 (Fig. 3, 5, 7).
BA G CM 22/4. L: 0,7, H: 0,38, W: 0,285 (Fig. 3, 6).

Additional measurements:

7 adult carapaces (♀) from EM 136:
L: 0,68 —0,75 (0,727); H: 0,35—0,4.

6 adult carapaces (♀) from EM 5:
L: 0,69 —0,8 (0,717); H: 0,35 —0,4 (0,385).

4 adult carapaces (♂) from EM 5:
L: 0,63 —0,685 (0,657); H: 0,35 —0,4 (0,362).

7 adult carapaces (♀) fom EM 137:
L: 0,675—0,71 (0,685); H: 0,375—0,4 (0,381).

4 adult carapaces (♂) from EM 137:
L: 0,645—0,66 (0,652); H: 0,35 —0,36 (0,357).

10 adult carapaces (♀) from AF 20:
L: 0,675—0,725 (0,694); H: 0,37 —0,42 (0,385).

2 adult carapaces (♂) from AF 2:
L: 0,6 —0,61 (0,602); H: 0,345—0,35 (0,347).

6 adult carapaces (♀) from EM 6:
L: 0,675—0,755 (0,716); H: 0,37 —0,43 (0,394).

2 adult carapaces (♂) from EM 6:
L: 0,64 —0,65 (0,645); H: 0,35 (0,35).

3 adult carapaces (♀) from EM 4:
L: 0,66 —0,7 (0,679); H: 0,375—0,38 (0,378).

3 adult carapaces (♂) from EM 4:
L: 0,63 —0,65 (0,638); H: 0,35 —0,375 (0,36).

Cytherelloidea sp. D cf. *amosi* (MUSACCHIO, 1978)

Fig. 3, 12—13

M a t e r i a l : Two carapaces (?penultimate instars) from the level LC 3 (Lomas Coloradas cross-section).

O b s e r v a t i o n s : This species is easily comparable with the reticulate morphotype of *C. amosi*. The reticulum is less dense, relatively stronger, and the interspaces stretch longitudinally in the central part of the valves.

I l l u s t r a t e d s p e c i m e n :
BA G CM 23/1. L: 0,61, H: 0,34, W: 0,3. L/W: 181.

Cytherelloidea sp. E

Fig. 4, 17

M a t e r i a l : Two LV from te levels EM 136 (Coll. MUSACCHIO, 1983) and EM 4 (Coll. MUSACCHIO, 1978), respectively.

O b s e r v a t i o n s : Two valves are here separately described which are similar to the *C. amosi* but have a very elongated outline in lateral view, with the postero-dorsal margin bending backwards, strongly truncated postero-ventrally, and with a reticulate surface.

R e p o s i t o r y a n d d i m e n s i o n s (i n m m) :
BA G CM 24/1 (RV). L: 0,745, H: 0,33. L/H: 225 (Fig. 4, 17).
BA G CM 24/2. L: 0,75, H: 0,35. L/H: 214.

IV. Results

1. In the studied material, 13 species of ostracods belonging to the genera *Cytherella* (1) and *Cytherelloidea* (12) are recognized, five of which are proposed for the first time.

2. Among the Neuquean morphs and above the species level, two informal groups could be distinguished:

a: one group includes only *Cytherelloidea pseudoagyroides* n. sp., characterized by a peculiar pattern of ribs in the outer ornamentation, and a relatively small and, in part of the material, porcellanaceous-like carapace.

b: the other group — typically represented by *Cytherelloidea volkheimeri* n. sp. — is characterized by several homologous similarities in the outline of the valves in lateral view; mainly: the low-sloped dorsal margin in the LV and the postero-ventral truncation in the RV, and by the nature of the sexual dimorphism whenever it exists.

At the same time, within this second group, three sets of carapace morphs may be informally differentiated, however, without taxonomical status:

The first, consisting only of *Cytherella* cf. *inaequivalva* DINGLE, has a smooth outer carapace surface.

The second, consisting only of *Cytherelloidea frenguellii* n. sp., and *Cyutherelloidea* sp. B cf. *C. frenguelli* has a strong ornamentation with sublongitudinal ribs.

The third, finally, represented by *Cytherelloidea andica,* and including the rest of the species, has a subcentral depression variedly developed in the adductor muscle scar zone.

3. In comparison with ostracods from other basins, there are different rank affinities mainly among the following taxa:

a) With South-African basins:

Cytherella sp. cf. *C. inaequivalva* DINGLE and *Cytherella inaequivalva* DINGLE, 1969.

Cytherelloidea agrioensis n. sp. and *Cytherelloidea zoetgeneudensis* DINGLE, 1969.

Cytherelloidea pseudoagyroides n. sp. and *Cytherelloidea agyroides* DINGLE, 1969.

b) Mediterranean region (Lebanon):

Cytherelloidea amosi (MUSACCHIO, 1967) and *Cytherelloidea besrineensis* BISCHOFF, 1964

c) Transitional-Boreal region:

Cytherelloidea andica MUSACCHIO 1978 and *Cytherelloidea pulchra* NEALE 1960.

Notwithstanding, there are no species common to the Andean Province (MUSACCHIO, 1979) and to other similar palaeobiogeographic entities of the

Neocomian of the Austral-Gondwanic Region, or any other faunal provinces.

V. Acknowledgments

This research was financially sponsored by the Argentine Council of Scientific and Technical Research (CONICET).

We are indebted to Mr. JORGE HOHMANN and Mr. GUILLERMO GARBINO who obtained the illustrations from the Service of Scanning Electronic Microscopy of the CONICET (Buenos Aires). We are also indebted to Lic. MICHAEL GRIFFIN (La Plata University) who corrected the English of the original manuscript.

VI. Literatur

BATE ,R. H. (1979): Ostracods from Callovian to Tithonian sediments of Tanzania, East Africa. — Bull. Brit. Mus. (Nat. Hist.) Geol. **26** (5): 163—223, 14 Plat., 22 figs., 1 tab.

BISCHOFF, G. (1964): Die Gattung *Cytherelloidea* im Oberen Jura und in der Unterkreide. — Senckenb. Lethaea, **45** (1/4): 1—27, Taf. 1—3.

BRENNER, P. & OERTLI, H. J. (1976): Lower Cretaceous Ostracodes (Valanginian to Hauterivian) from the Sundays River Formation, Algoa Basin, South Africa. — Bull. Centre Rech. Pau-SNPA, **10** (2): 471—533, 28 fig., 2 tabl., 8 pl.

DINGLE, R. V. (1969): Marine Neocomian Ostracoda from South Africa. — Trans. r. Soc. South Afr., **38** (2): 139—163, pl. 9.

DINGLE, R. V. & KLINGER, H. C. (1972): The stratigraphy and ostracod fauna of the Upper Jurassic sediments from Brenton, in the Knysna outlier, Cape Province. — Trans. r. Soc. South Afr., **40** (4): 279—298, pl. 15—18.

GERTH, H. (1925): La fauna neocomiana de la Cordillera argentina, en la parte meridional de la Provincia de Mendoza. — Act. Acad. Nac. Cienc., **9** (2): 57—132, 6 pls. 16 text-figs.

GIOVINE, A. T. (1950): Algunos Cefalópodos del Hauterivense de Neuquén. — Rev. Asoc. Geol. Arg., **5** (2): 36—75, pls. 1—7, 5 text-figs.

GREKOFF, N. (1963): Contribution a l'étude des Ostracodes du Mésozoique moyen (Bathonien—Valanginien) du Bassin de Majunga, Madagascar. — Rev. Inst. franç. Pétr., **18** (12): 1709—1762, 10 pls.

KAYE, P. (1963): Species of the Ostracod Family Cytherellidae from the British Lower Cretaceous. — Senckenb. Lethaea, **44** (2): 109—125.

LEANZA, A. F. (1945): Amonites del Jurásico Superior y del Cretácico Inferior de la Sierra Azul, en la parte meridional de la Provincia de Mendoza. — Anales del Museo La Plata (N.S.), **1**: 1—99, 23 pls., 13 fig.-text, 1 tab.

LEANZA, H. A. (1981): The Jurassic-Cretaceous boundary beds in West Central Argentina and their ammonite zones. — N. Jb. Geol. Paläont. Abh., **161** (1): 62—92.

MUSACCHIO, E. A. (1978): Ostrácodos del Cretácico Inferior en el Grupo Mendoza, Cuenca del Neuquén, Argentina. — Act. VII Congr. Geol. Argentino, II: 459—473, 2 pls.

— (1979): Datos paleobiogeográficos de algunas asociaciones de foraminíferos y ostrácodos del Jurásico y el Cretácico Inferior de Argentina. — Ameghiniana, **16** (3—4): 247—271, 7 pls., 7 text-figs.

NEALE, J. W. (1960): Marine Lower Cretaceous from Yorkshire, England. — Micropal., 6: 203—224.

McLACHLAN, I. R., BRENNER, P. W. & McMILLAN, I. K. (1976a): The stratigraphy and micropaleontology of the Cretaceous Brenton Formation and the PB/A/1 Well, near Knysna, Cape Province. — Trans. geol. Soc. S. Afr., 79 (3): 341—370, 18 figs.

McLACHLAN, I. R., McMILLAN, I. K. & BRENNER, P. W. (1976b): Micropaleontological study of the Cretaceous beds at Mbotyi and Mngazana, Transkey, South Africa. — Trans. geol. Soc. S. Afr., 79 (3): 321—340, 18 figs.

SIMEONI, M. & MUSACCHIO, E. A. (1983): Ostrácodos no marinos y carófitos hauterivianos de la Formación Agrio en la localidad de El Marucho, Neuquén, Argentina. — Rev. Univ. San Juan Bosco, en prensa.

Bei der Tübinger Schriftleitung eingegangen am 27. Juni 1983.

Anschriften der Verfasser:

Dr. EDUARDO A. MUSACCHIO, Consejo Nacional de Investigaciones Científicas y Técnicas de Argentina (CONICET), Museo "Bernardino Rivadavia", Avda. Angel Gallardo 470, 1045 Buenos Aires; Lic. ALBERTO H. ABRAHAMOVICH, Universidad da La Plata, Facultad de Ciencias Naturales (Micropaleontología), Paseo del Bosque s/r., 1900 La Plata, Argentinien.