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NEW GENERA AND SPECIES OF OSTRACODA FROM THE MAASTRICHTIAN AND DANIAN OF THE NEUQUÉN BASIN, ARGENTINA

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Abstract: A total of 113 species belonging to 54 genera are recovered from a study of the Maastrichtian and Danian deposits in the Cerro Azul section of the Neuquén Basin, west-central Argentina. Of these, 9 new genera, 38 new species and 28 species in open nomenclature are recorded. These form the basis of the present study and are listed below. Genera: *Phelocyprideis* gen. nov., *Aleisocythereis* gen. nov., *Apatoleberis* gen. nov., *Mimicocythereis* gen. nov., *Castillocythereis* gen. nov., *Hysterocythereis* gen. nov., *Orthrocosta* gen. nov., *Petalocythereis* gen. nov. and *Sthenarocythereis* gen. nov. Species: *Cytherella saraballentae* sp. nov., *Cytherella semicatillus* sp. nov., *Paracypris bertelsae* sp. nov., *Paracypris imaguncula* sp. nov., *Argilloecia abnormalis* sp. nov., *Argilloecia concludus* sp. nov., *Argilloecia hydrodynamicus* sp. nov., *Bythoceratina cheleutos* sp. nov., *Phelocyprideis acardomesido* sp. nov., *Eucythere dinetos* sp. nov., *Krithe crepidus* sp. nov., *Cytheropteron hyperdictyon* sp. nov., *Cytheropteron bidentinos* sp. nov., *Cytheropteron translimitares* sp. nov., *Aversovalva glochinos* sp. nov., *Eucytherura stibaros* sp. nov., *Hemingwayella verrucosus* sp. nov., *Heinia prostratopleuricos* sp. nov., *Loxoconcha* (s.l.) *posterocosta* sp. nov., *Keijia circulodictyon* sp. nov., *Keijia kratistos* sp. nov., *Paramunseyella epaphroditus* sp. nov., *Munseyella costaevermiculatus* sp. nov., *Ameghinocythere archaios* sp. nov., *Aleisocythereis polikothonus* sp. nov., *Castillocythereis multicastrum* sp. nov., *Castillocythereis albertoriccardii* sp. nov., *Cythereis stratios* sp. nov., *Cythereis clibanarius* sp. nov., *Cythereis trajectiones* sp. nov., *Henryhowella (Wichmannella) praealtus* sp. nov., *Hysterocythereis paredros* sp. nov., *Hysterocythereis coinotes* sp. nov., *Hysterocythereis diversotuberculatus* sp. nov., *Orthrocosta decores* sp. nov., *Orthrocosta atopos* sp. nov., *Orthrocosta phantasia* sp. nov. and *Sthenarocythereis erymnos* sp. nov. The nature of the fauna and aspects of its evolution are discussed.

Key words: marine Ostracoda, Maastrichtian–Danian, Neuquén Basin, Argentina.

THE Neuquén Basin is located in west-central Argentina between latitudes 32° and 40°S. It occurs in the provinces of Mendoza, Neuquén, Río Negro and La Pampa. At latitude 35°S, the basin extends to form the Neuquén embayment that comprises 600 km of extension in a north–south direction and 300–400 km east–west. It has a maximum thickness of 7000 m of marine and non-marine sedimentary rocks, ranging from the Late Jurassic to the Paleocene (Howell *et al.* 2007; Aguirre-Urreta *et al.* 2011; Fig. 1).

During the Maastrichtian, the Neuquén Basin was flooded by the first transgression from the Atlantic Ocean. This extensive sea connected the basin to the South Atlantic and embraced an area from the present-day Andes in the west to the eastern Atlantic Ocean. This basin is well known for its well-exposed outcrops and rich fossil content. A summary of the main micropalaeontological and geological studies can be found in Ballent *et al.* (2011) and Rodríguez *et al.* (2011), respectively.

The pioneer studies on Ostracoda in this basin were carried out by Bertels in the 1960s and 1970s in many outcrops of the Jagüel and Roca formations, mainly at Huantrai-co and Barranca de Jagüel, the latter being the type section of the K–T boundary in this basin. These studies provided an initial contribution to our knowledge of the biostratigraphy, palaeoecology and taxonomy of the Ostracoda of the northern part of the basin.

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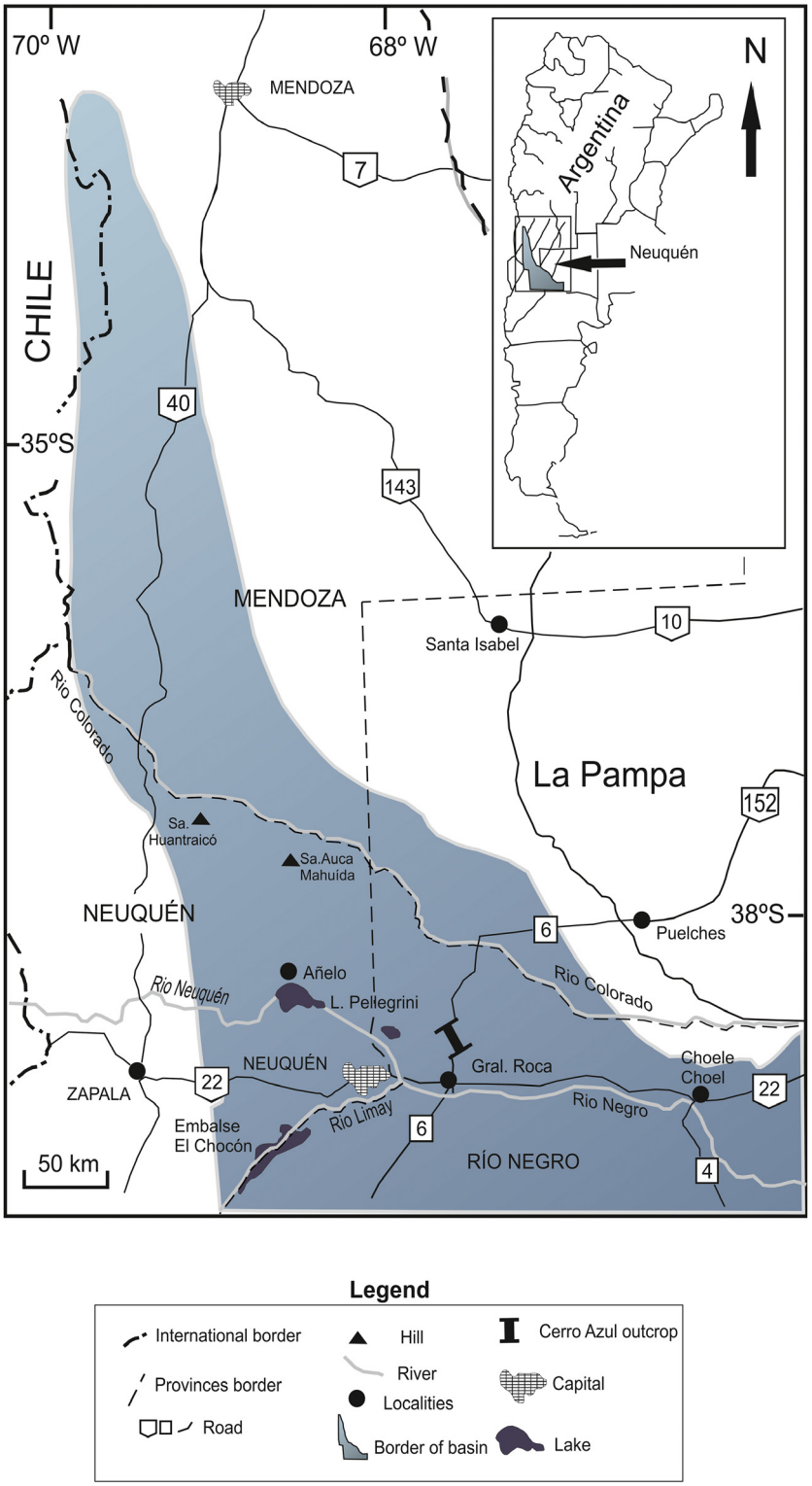


FIG. 1. Location map of Neuquén Basin with Cerro Azul section (modified from Del Río *et al.* 2011). Colour online.

The Cerro Azul section is a relatively new site for micropalaeontological studies in the eastern sector of Lake Pellegrini, where sediments of the Jagüel (late Maastrichtian – early Danian) and Roca (Danian) formations can be seen at outcrop. Musso *et al.* (2012) studied the clay mineralogy, giving an environmental interpretation and identifying the transition between Upper Cretaceous and lower Danian based on calcareous nannofossils.

The present work presents a substantial new marine ostracod fauna from the Neuquén Basin in the Upper Cretaceous – lower Danian transition.

GEOLOGICAL SETTING

The Cerro Azul section is located at S38°50′48″, W67°52′20″ and is composed of calcareous siltstones and claystones from the Jagüel and Roca formations (Fig. 1). Musso *et al.* (2012) described the section they studied of the Jagüel Formation as being a homogenous succession of grey calcareous mudstones. The Roca Formation was defined by an alternation of carbonate rocks and greenish grey calcareous mudstones and the base of the Roca Formation was defined, according to criteria adopted by Uliana and Dellapé (1981), by the first appearance of organogenic limestones. The age was determined by calcareous nannofossils (Musso *et al.* 2012; Fig. 2).

MATERIAL AND METHODS

Twenty-seven outcrop samples were studied, and approximately 20 g of dried rock was crushed and soaked in 200 mL of a hydrogen peroxide solution (H_2O_2) for 24 h, at a concentration of 35%. Residues were then washed and divided into grain fractions 63, 180 and 250 μm and dried at 60°C. All ostracods were hand-picked under a stereo microscope from each size fraction. Selected specimens were imaged in a EVO MA15 Zeiss scanning electron microscope at the Instituto Tecnológico de Micropaleontologia (itt Fossil) of the Universidade do Vale do Rio dos Sinos, Brazil.

SYSTEMATIC PALAEONTOLOGY

This published work and the nomenclatural acts it contains have been registered in Zoobank: http://zoobank.org/References/B77D1DE1-DB15-4AE1-8173-43C8DCEA1C59

The suprageneric classification adopted is that proposed by Scott (1961) with some modifications. Size, based on length, is as follows: very small (<0.400 mm), small (0.410–0.500 mm), medium (0.510–0.700 mm), large (0.710–0.900 mm) and very large (>0.900 mm). Type and figured specimens are deposited in the collections of the Facultad de Ciencias Exactas y Naturales, Laboratorio de Micropaleontología, Universidad de Buenos Aires (UBA), Argentina, under their respective catalogue numbers LM-FCEN 3232–3310; 3400–3539.

Abbreviations. L, length; H, height; W, width; RV, right valve; LV, left valve; CMS, central muscle scar. All dimensions are in mm.

Class OSTRACODA Latreille, 1806
Order PLATYCOPIDA Sars, 1866
Suborder PLATYCOPINA Sars, 1866
Family CYTHERELLIDAE Sars, 1866

Genus CYTHERELLA Jones, 1849

Type species. Cytherina ovata Römer, 1840.

Cytherella saraballentae sp. nov. Ceolin and Whatley
Figure 3A–E

LSID. urn:lsid:zoobank.org:act:096CC30C-C216-4E20-BFE3-D0FEACAAE9AC

1992 *Cytherella NC136* Colin and Hochuli, p. 273, pl. 4, fig. 1.

Derivation of name. In honour of the late Dr Sara Ballent for her great contribution to the study of Ostracoda, and in particular to those of the Jurassic and Cretaceous of the Neuquén Basin, Argentina.

Type material. Holotype: one complete carapace, LM-FCEN 3232 (Fig. 3A–B); paratypes: LM-FCEN 3233–3234 (Fig. 3C–E).

Material. 233 specimens, mainly juveniles from samples 1 and 14 (Maastrichtian); 16, 17, 19, 21, 23, 26, 29, 31, 34 and 39 (Danian).

Diagnosis. A species of *Cytherella*, punctate over most of the valve in most specimens with a large smooth area mid-dorsally and centrally. A deep linear depression occurs between the two valves dorsally.

Dimensions. In mm:

		L	H	W	
Holotype, adult, female	LM-FCEN 3232	0.830	0.521	0.352	Sample 23
Paratype, adult, male	LM-FCEN 3233	0.790	0.495	0.324	Sample 19
Paratype, adult, female	LM-FCEN 3234	0.847	0.512	0.395	Sample 21

Description. A large, very regularly elongate and subovate species with end margins almost equally rounded and with apex at mid-height. RV larger than LV with conspicuous overlap around the entire periphery, especially ventrally. Sagittate in dorsal view. Dorsal margin convex, with a small concavity at mid-length, that declines towards posterior margin. Ventral margin almost straight. Greatest length at about mid-height; greatest height and width at one-third from the posterior margin. Surface essentially

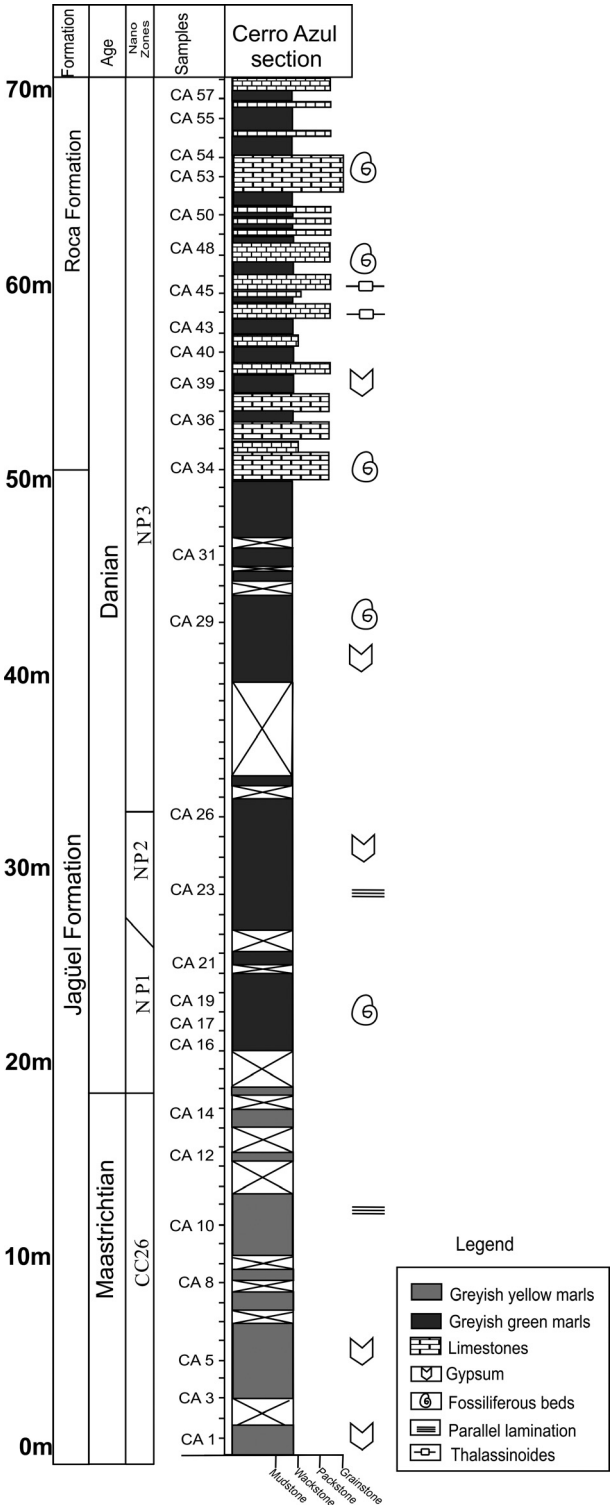


FIG. 2. Cerro Azul profile with samples position (modified from Musso *et al.* 2012).

punctate, with punctae large, mainly circular and covering most of the valve except centrally, mid-ventrally and dorsally. There is some preferential orientation anteriorly and posteriorly parallel to those margins. Internally, females with a characteristic and conspicuous shallow concavity in the posterior part. Inner lamella with a contact groove in the larger right valve into which fits the edge of the smaller valve. Sexual dimorphism marked, with females more inflated posteriorly than males. CMS comprises a leaf-like pattern of two rows of five opposing scars typical of the suborder.

Remarks. This species differs from *Cytherella terminopunctata* Bertels, 1975*a* from the Maastrichtian of the Neuquén Basin, also encountered in this study, in its much larger and more widely distributed punctae. It also differs from *Cytherella* sp. 4 from the Paleocene of the Pelotas Basin (Ceolin *et al.* 2011) in mainly by being more inflated in dorsal view and larger overall.

Stratigraphical range. Upper Cretaceous of eastern Niger (Colin and Hochuli 1992); Maastrichtian and Danian of Cerro Azul, General Roca.

Cytherella semicatillus sp. nov. Ceolin and Whatley
Figure 3F–I

LSID. urn:lsid:zoobank.org:act:6F9CE228-8740-4986-A5AD-D4E3743D168C

Derivation of name. L. *semi*, half; plus *catillus*, a small plate. With reference to the shape of the anterior one-third of the left valve of this species which resembles one-half of a small plate.

Type material. Holotype: one complete carapace, LM-FCEN 3235 (Fig. 3F–G, I); paratype: LM-FCEN 3236 (Fig. 3H).

Material. 176 specimens, mainly juveniles, from samples 3, 5 and 14 (Maastrichtian); 16, 17, 21, 26 and 34 (Danian).

Diagnosis. Carapace with a compressed, broadly rounded anterior margin with a structure similar to the edge of dinner plate. RV overlaps the LV less on the posteroventral margin where it is more inflated.

Dimensions. In mm:

		L	H	W	
Holotype, adult, female	LM-FCEN 3235	0.798	0.542	0.375	Sample 17
Paratype, juvenile	LM-FCEN 3236	0.602	0.392	0.250	Sample 19

Description. Large, subovate in lateral view. Subelliptical with anterior region acuminate in dorsal view. RV larger than LV with conspicuous overlap in lateral view around the entire periphery, except posteroventrally, which is obscured by valve

tumidity. Anterior margin broadly rounded, compressed and with a subtle marginal rim in the left valve, which extends from anterodorsal margin to mid-ventrally. Apex at about mid-height. Posterior margin well rounded, but tumid with apex a little below mid-height. Dorsal margin gently convex in LV, medianly subumbonate in RV. Ventral margin almost straight in LV, gently convex in RV. Greatest height through 'umbo'; greatest length about mid-height; greatest width in the posterior quarter. Surface smooth. There is a distinct marginal rim in LV. Selvage and flange visible anteriorly in the right valve. Other internal features not seen. Sexual dimorphism not observed.

Remarks. This species is similar to *Cytherella harmoniensis* Van den Bold, 1960 from the Lower Eocene of Sergipe, Brazil (Neufville 1973), mainly with respect to male specimens (fig. 2d), but differs in having a more pronounced dorsal overlap and smaller size (*C. harmoniensis* L: 0.9–0.87).

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Order PODOCOPIDA Sars, 1866
Suborder PODOCOPINA Sars, 1866
Superfamily BAIRDIOIDEA Sars, 1888
Family BAIRDIIDAE Sars, 1888

Genus BAIRDOPPILATA Coryell *et al.*, 1935

Type species. Bairdoppilata martyni Coryell *et al.*, 1935.

Bairdoppilata sp.
Figure 3J

Material. 16 specimens, mainly juveniles, from sample 21; Danian.

Dimensions. Adult valve, FCM-LM 3237, 1.110 (L), 0.642 (H).

Diagnosis. A very large, typically bairdioid species in lateral view, with a micropunctate ornament densely developed around the anterior margin and much more scarcely elsewhere.

Remarks. Although there are no complete carapaces, this species is similar to *Bairdoppilata triangulata* Edwards, 1944 from the Palaeogene and Miocene of the Pelotas Basin (Sanguinetti 1979; Ceolin *et al.* 2011) differing in its asymmetrically rounded anterior margin, being more elongate, and in the less symmetrical and more convex dorsal margin. It differs from *Bairdia anachoreta* Bertels 1968*b* in its more angular dorsal margin.

Bairdoppilata? sp.
Figure 3K

Material. 24 specimens from samples 16, 53, 55 and 57; Danian.

Dimensions. Adult carapace, LM-FCEN 3238, 0.782 (H), 0.63 (L), 0.335 (W).

Description. A large, subovate carapace with broadly rounded anterior margin and posterior margin sloping towards its rounded apex. Dorsal margin strongly convex with a slight concavity present anterodorsally in RV. Ventral margin straight with a subtle concavity medianly in RV, LV overlaps RV, mainly ventrally and anterodorsally. Hinge adont. Calcified inner lamella wide anteriorly and posteriorly. CMS not seen.

Remarks. Although similar to what some authors have referred to as species of *Bythocypris* (e.g. *Bythocypris chapmani* Neale, 1975), this species does not belong to that genus due to its bairdioid shape best developed at the anterodorsal margin. A more detailed classification is not possible due to the lack of a well-preserved internal view.

Superfamily CYPRIDOIDEA Baird, 1845
Family PARACYPRIDIDAE Sars, 1923

Genus PARACYPRIS Sars, 1866

Type species. Paracypris polita Sars, 1866.

Paracypris bertelsae sp. nov. Ceolin and Whatley
Figure 3L–O

LSID. urn:lsid:zoobank.org:act:7D506417-38E6-4695-9985-6F6B4079270B

1973 *Paracypris*? sp. Bertels, p. 314, pl. 1, fig. 7a–b.

Derivation of name. In honour of the late Dr Alwine Bertels, in recognition of her important work on Ostracoda, especially those from the Maastrichtian and Danian of the Neuquén Basin.

Type material. Holotype: one complete carapace, LM-FCEN 3239 (Fig. 3L, O); paratypes: LM-FCEN 3240–3241 (Fig. 3M–N).

Material. 102 specimens from samples 16, 17, 19, 21, 23, 26, 29, 31, 34 and 45 (Danian) and the 'numerous' specimens referred to by Bertels (1973; Danian).

Diagnosis. A short and rather high species of *Paracypris* with strong overlap of LV over RV and arcuate dorsal margin with poorly defined cardinal angles.


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Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3239	0.955	0.480	0.368	Sample 31
Paratype, adult	LM-FCEN 3240	0.953	0.527		Sample 16
Paratype, adult	LM-FCEN 3241	0.913	0.501		Sample 16

Description. Elongate, subovate to subtriangular in lateral view. In dorsal view, very regularly subovate and rather thick-shelled for the genus. Anterior margin narrowly rounded with apex below mid-height. Posterior margin subacute somewhat downturned and with subventral apex. Posterodorsal slope long, straight to slightly convex. Dorsal margin slightly concave anteriorly; anteromedianly slightly convex, then straight, but again convex posterodorsally. Ventral margin similarly gently sinuous with very slight oral incurvature. LV larger than RV with conspicuous overlap around entire periphery. Greatest length below mid-height; greatest height at anterior cardinal angle; greatest width in the middle one-third. Internally, the anterior and posterior calcified inner lamellae wide and vestibulate. CMS not seen. Hinge adont with a long smooth groove in the left valve, which is well-buttressed ventrally.

Remarks. This species differs from *Paracypris imaguncula* sp. nov. in its dorsal slope being less acute and in its subovate to subtriangular shape and smaller size. It also differs from *Paracypris* sp. 1 Bertels, 1975*a* from the Maastrichtian of Fortín General Roca, Río Negro Province, in being less elongate with a more convex dorsal margin, the less truncated posterior end and in being less acuminate.

Stratigraphical range. Danian of Fortín General Roca (Bertels 1973) and Danian of Cerro Azul, General Roca.

Paracypris imaguncula sp. nov. Ceolin and Whatley
Figure 3P–S

LSID. urn:lsid:zoobank.org:act:DA2BF932-1FB7-4B5C-87F6-86296117C8FE

1973 *Paracypris* sp. Bertels, p. 315, pl. 1, fig. 8a.

Derivation of name. L. *imaguncula*, a copy. With reference to the general similarity of this species to the type of the genus, *Paracypris polita* Sars.

Type material. Holotype: one complete carapace, LM-FCEN 3242 (Fig. 3P, S); paratypes: LM-FCEN 3243–3244 (Fig. 3Q–R).

Material. 36 specimens from samples 14 (Maastrichtian), 16, 17, 21, 26, 29, 31, 34, 36, 39, 40, 53 and 57 (Danian) and one specimen referred to by Bertels (1973; Danian).

Diagnosis. A species of *Paracypris* of median length with posterior end acute and LV overlapping the RV around the entire margins, except anteriorly where the RV overlaps the LV.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3242	1.041	0.480	0.256	Sample 31
Paratype, adult	LM-FCEN 3243	1.070	0.468		Sample 34
Paratype, adult	LM-FCEN 3244	1.106	0.532		Sample 34

Description. Very large, elongate, subtriangular in lateral view. In dorsal view subelliptical with pointed posterior. LV overlapping the RV around entire periphery, strongly mid-ventrally and anterodorsally. Anterior margin narrowly but symmetrically rounded, extending beyond left valve, with apex below mid-height. Posterior margin acuminate subventrally. In both valves, posterodorsal slope long, straight or slightly concave. Dorsal margin concave anterodorsally, convex medianly and concave posterodorsally in the RV. LV convex throughout and subumbonate anteromedianly. Ventral margin gently biconvex about a slight median incurvature. Surface smooth. There are a few, apparently simple, pore canals on the lateral surface. Internal features not seen.

Remarks. The present species is very similar to *Paracypris polita* Sars, 1866 differing in its less elongate shape, less acute posterior end and less pronounced concavity ventrally. It is also very similar to *P. umzambaensis* Dingle,

FIG. 3. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–E, *Cytherella saraballentae* sp. nov.; A–B, holotype, LM-FCEN 3232, adult carapace, female; A, left lateral view; B, right lateral view; C–D, paratype, LM-FCEN 3233, adult male carapace; C, right lateral view; D, dorsal view; E, paratype, LM-FCEN 3234, male, dorsal view. F–I, *Cytherella semicatillus* sp. nov.; F–G, I, holotype, LM-FCEN 3235, adult female carapace; F, left lateral view; G, right lateral view; I, dorsal view; H, paratype, LM-FCEN 3236, juvenile carapace, left lateral view. J, *Bairdoppilata* sp., LM-FCEN 3237, adult valve, right lateral view. K, *Bairdoppilata*? sp. LM-FCEN 3238, adult carapace, right lateral view. L–O, *Paracypris bertelsae* sp. nov.; L, O, holotype, LM-FCEN 3239, adult carapace; L, right lateral view; O, dorsal view; M, paratype, LM-FCEN 3240, adult valve, left lateral view; N, paratype, LM-FCEN 3241, adult valve, internal view. P–S, *Paracypris imaguncula* sp. nov; P, S, holotype, LM-FCEN 3242, adult carapace; P, right lateral view; S, dorsal view; Q, paratype, LM-FCEN 3243, adult valve, internal view; R, paratype, LM-FCEN 3244, adult valve, left lateral view. All scale bars represent 100 μm.

1969 from the upper Senonian of the Pondoland Coast, South Africa, differing mostly in its pronounced ventral overlap, narrower anterior region and in its larger size (*P. umzambaensis* is L: 0.80, H: 0.33). It is also similar to *Paracypris* sp. Fauth *et al.*, 2013 from the Upper Cretaceous of the Santos Basin, southeast Brazil, but differs in being more convex dorsally and in the greater degree of overlap around the entire margin, which in Fauth's species is absent in the mid-dorsal margin.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca and Danian of Fortín General Roca, Río Negro (Bertels 1973).

Paracypris? sp.
Figure 4A

Material. Six specimens from samples 21, 23, 29 and 36; Danian.

Dimensions. Adult carapace, LM-FCEN 3245, 0.523 (L), 0.25 (H).

Remarks. This species is tentatively classified in *Paracypris* although it lacks the very acute ventral to subventral posterior apex typical that genus. It is poorly preserved and distorted, and its overlap relationship is difficult to assess.

Genus AGLAIOCYPRIS Sylvester-Bradley, 1946

Type species. Aglaia pulchella Brady, 1868*b*.

Aglaiocypris? sp.
Figure 4B

Material. One specimen from sample 31; Danian.

Dimensions. Adult valve, LM-FCEN 3246, 0.591 (L), 0.244 (H).

Diagnosis. Median, elongate subovate in lateral view. Anterior margin rounded; posterior margin obliquely rounded. Dorsal margin convex with a slight concavity anterodorsally. Ventral margin gently concave medianly. Surface smooth. Internal features not seen.

Remarks. This specimen is only tentatively placed in the genus due to the fact that in the one poorly preserved valve, it is impossible to see those internal features necessary to confirm placement within the genus.

Family PONTOCYPRIDIDAE Müller, 1894

Genus ARGILLOECIA Sars, 1866

Type species. Argilloecia cylindrica Sars, 1866.

Argilloecia abnormalis sp. nov. Ceolin and Whatley
Figure 4C–F

LSID. urn:lsid:zoobank.org:act:9164D046-2157-4007-99D5-DDD374225804

1973 *Bythocypris*? sp. Bertels, p. 313, pl. 1, fig. 6a–b.

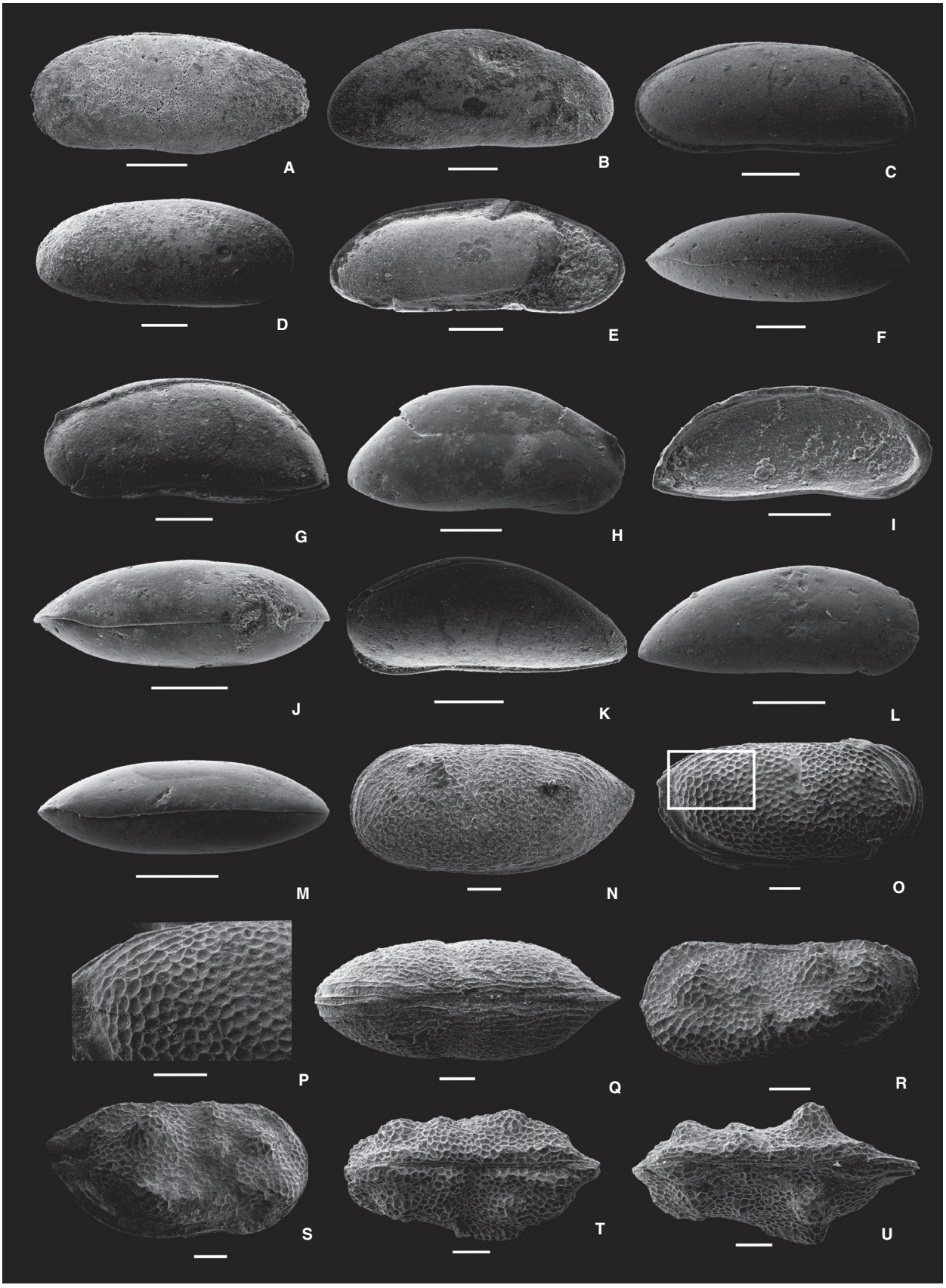
Derivation of name. L. *abnormalis*. With reference to the fact that this is the only species of the genus in which the smaller LV does not overreach the RV anteriorly.

Type material. Holotype: one complete carapace, LM-FCEN 3247 (Fig. 4C); paratypes: LM-FCEN 3248–3250 (Fig. 4D–F).

Material. 232 specimens, mainly carapaces, from samples 8, 12 and 14 (Maastrichtian); 16, 17, 19, 21, 23, 26, 29, 31, 36 and 39 (Danian).

Diagnosis. A medium species of *Argilloecia* characterized by its less pointed posterior end and the anterior margin

FIG. 4. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Paracypris*? sp., LM-FCEN 3245, adult carapace, left lateral view. B, *Aglaiocypris*? sp., LM-FCEN 3246, adult valve, right lateral view. C–F, *Argilloecia abnormalis* sp. nov.; C, holotype, LM-FCEN 3247, adult carapace, left lateral view; D, paratype, LM-FCEN 3248, adult valve, right lateral view; E, paratype, LM-FCEN 3249, adult valve, internal view; F, paratype, LM-FCEN 3250, adult carapace, dorsal view. G–J, *Argilloecia concludus* sp. nov.; G, holotype, LM-FCEN 3251, adult carapace, left lateral view; H, paratype, LM-FCEN 3252, juvenile carapace, right lateral view; I, paratype, LM-FCEN 3253, juvenile valve, internal view; J, paratype, LM-FCEN 3254, juvenile carapace, dorsal view. K–M, *Argilloecia hydrodynamicus* sp. nov., K, holotype, LM-FCEN 3255, adult carapace, left lateral view; L, paratype, LM-FCEN 3256, juvenile valve, right lateral view; M, paratype, LM-FCEN 3257, juvenile, carapace, dorsal view. N–Q, *Bythoceratina cheleutos* sp. nov.; N, Q, holotype, LM-FCEN 3258, N, adult carapace, left lateral view; Q, carapace, dorsal view; O–P, paratype, LM-FCEN 3259, adult carapace; O, right lateral view; P, detail of ornamentation. R–U, *Bythoceratina rocana* (Bertels, 1973); R, T, paratype, LM-FCEN 3260, R, adult, female carapace, left lateral view; T, dorsal view; S, U, paratype, LM-FCEN 3261, adult male carapace; S, right lateral view; U, dorsal view. All scale bars represent 100 μm.


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of the LV not overreaching the RV, as in other species of the genus.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3247	0.528	0.207	0.165	Sample 21
Paratype, adult	LM-FCEN 3248	0.678	0.226		Sample 23
Paratype, adult	LM-FCEN 3249	0.533	0.212		Sample 34
Paratype, adult	LM-FCEN 3250	0.585	0.206	0.162	Sample 21

Description. A medium, elongate subovate species in lateral view. In dorsal view subelliptical, with greatest width medianly and with pointed ends. Anterior margin symmetrically rounded with apex a little above mid-height. Posterior margin narrower and obliquely rounded, with apex below mid-height. Dorsal margin more convex anterodorsally and almost straight but sloping in posterior margin. Ventral margin subconvex, with LV more concave in mid-ventral position. RV overlaps the LV and is least pronounced posterodorsally. Surface smooth. Calcified inner lamella wide anteriorly and narrow posteriorly. CMS typical for the genus. Sexual dimorphism not seen.

Remarks. The decision to place this species in *Argilloecia* is based on the valve overlap (RV larger than LV) and in the CMS being characteristic of *Argilloecia*.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels 1973); Maastrichtian and Danian of Cerro Azul, General Roca.

Argilloecia concludus sp. nov. Ceolin and Whatley
Figure 4G–J

LSID. urn:lsid:zoobank.org:act:2F5621D1-5D18-4549-B634-4F6720BCAFE4

Derivation of name. L. *concludo* end, close. With reference to its presence near the close of the Cretaceous.

Type material. Holotype: LM-FCEN 3251(Fig. 4G); paratypes: LM-FCEN 3252–3254 (Fig. 4H–J).

Material. 12 specimens from samples 5 and 12; Maastrichtian.

Diagnosis. A proportionally rather short species of *Argilloecia* in which the carapace at one-third from the posterior margin is higher than that in most other species. Dorsal margin convex and with strong RV over LV overlap. Oral incurvature stronger than in many species.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3251	0.525	0.230	0.150	Sample 5
Paratype, juvenile	LM-FCEN 3252	0.485	0.222	0.135	Sample 12
Paratype, juvenile	LM-FCEN 3253	0.411	0.183		Sample 12
Paratype, juvenile	LM-FCEN 3254	0.502	0.200	0.151	Sample 5

Description. A medium, elongate carapace in lateral view. Anterior margin narrowly rounded with apex below mid-height. Posterior margin acute with ventral apex. Dorsal margin symmetrically convex and elongate; gently concave anterodorsally, mainly in LV. Ventral margin biconvex with pronounced anteroventral oral concavity. Greatest length below mid-height; greatest height at posterior one-third; greatest width medianly. RV overlaps the LV, mainly in dorsal one-third and around ventral margins. Surface smooth. Internal features not seen.

Remarks. The present species resembles *Argilloecia subcylindrica* Alexander, 1934 from the Eocene of Texas, but differs in being narrower anteriorly; the overlap is more developed postero- and anterodorsally, and the postero-dorsal region is higher.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Argilloecia hydrodynamicus sp. nov. Ceolin and Whatley
Figure 4K–M

LSID. urn:lsid:zoobank.org:act:962DFA52-1938-4E5D-A457-8842DA18542C

Derivation of name. Gr. *ὑδρον* hydron, water; plus *δινα*μκυς dynamicus, power, strongly. With reference to the supremely hydrodynamical outline and shape of this species.

Type material. Holotype: one carapace LM-FCEN 3255 (Fig. 4K); paratypes: LM-FCEN 3256–3257 (Fig. 4L–M).

Material. 28 specimens, all carapaces from samples 16, 17, 21, 23 and 26; Danian.

Diagnosis. A very elongate, posteroventrally pointed species of *Argilloecia* with strong RV overlap anterodorsally and the reverse posterodorsally.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3255	0.432	0.178	0.125	Sample 21
Paratype, juvenile	LM-FCEN 3256	0.401	0.158		Sample 21
Paratype, juvenile	LM-FCEN 3257	0.386	0.135	0.122	Sample 21

Description. Small, subtriangular, elongate in lateral view. Subelliptical in dorsal view. Anterior margin narrowly rounded with apex behind mid-height, posterior margin subacute with ventral apex. Dorsal margin convex with posterior one-third sloping towards the posterior margin. Ventral margin almost straight with a weak oral concavity. Greatest length below mid-height; greatest height and width medianly. RV overlaps the LV along the ventral margin, mainly anteroventrally. Along the dorsal margin, the overlap is more pronounced anterodorsally and becomes less posteriorly and finally is not apparent. Surface smooth. Internal features not seen.

Remarks. Differs from *Argilloecia concludus* sp. nov. mainly in being much narrower posteriorly, less incurved ventrally and more convex dorsally.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Superfamily CYTHEROIDEA Baird, 1850
Family BYTHOCYTHERIDAE Sars, 1926

Genus BYTHOCERATINA Hornibrook, 1952

Type species. Bythoceratina mestayerae Hornibrook, 1952.

Bythoceratina cheleutos sp. nov. Ceolin and Whatley
Figure 4N–Q

LSID. urn:lsid:zoobank.org:act:E63671B5-36AB-4393-8B97-0A928AAAC304.

Derivation of name. Gr. *χελευτος* cheleutos, netted. With reference to the net-like reticulum of this species.

Type material. Holotype: one carapace, LM-FCEN 3258 (Fig. 4N, Q); paratype: LM-FCEN 3259 (Fig. 4O–P).

Material. Six specimens from samples 34, 36, 39 and 53; Danian.

Diagnosis. An elongate, ovate species of *Bythocythere* with a well-pronounced median sulcus and anteromedian elevation. Ornament of chaotic reticulation centrally within a peripheral ring where the muri are preferentially aligned to the margins, giving an aspect of riblets surrounding the centre.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3258	0.865	0.398	0.357	Sample 34
Paratype, adult	LM-FCEN 3259	0.892	0.425	0.355	Sample 29

Description. A large, elongate subovate species of *Bythoceratina* in lateral view. Dorsal view spindle-shaped with distinct median sulcus and laterally compressed posteriorly. Anterior margin broadly and regularly rounded with apex at about mid-height. Posterior margin subcaudate, slightly 'upturned' with apex above mid-height. Posteroventral slope long, very gently convex; posterodorsal slope shorter and straight. Greatest length above mid-height; greatest height at anterior third; greatest width equal on either side of median sulcus. Dorsal margin straight to sinuous; ventral margin with gently incurvature at about one-third and posteriorly keel-like. LV slightly larger than RV, with dorsal overlap. Ornament centrally reticulate but rather chaotic with individual cells varying greatly in shape and size. Around the entire periphery, most notably antero- and posterodorsally, a series of five or six subparallel riblets formed from the muri are developed. Median sulcus, which terminates a little below mid-height, extends in a vertical arc across the valve and is floored by reticulae. A large elevated tubercle occurs immediately anterior of this sulcus and is built up from coarse, well-developed muri, and its apex is perforate. Small, rather low, usually conjunctive pore conuli are developed both on the muri, but also within the solae. All the pores seem to be simple.

Remarks. This species differs from *Bythocythere punctatula* Bertels, 1973, from the Danian of Fortín General Roca, Río Negro Province, mainly in its ornamentation pattern, which is reticulate, with a series of subparallel riblets around the entire periphery, while Bertels' species has small tubercles densely distributed across the entire surface.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Bythoceratina rocana (Bertels, 1973)
Figure 4R–U

1973 *Bythocythere rocana* Bertels, p. 328, pl. 5, fig. 6a–b.

Material. Three carapaces from samples 19 and 29; Danian.

Dimensions. Adult carapace, LM-FCEN 3260 (Fig. 4R, T) female, 0.677 (L), 0.304 (H), 0.362 (W); LM-FCEN 3261 (Fig. 4S, U), male, 0.792 (L), 0.424 (H), 0.407 (W).

Remarks. *Bythoceratina rocana* (Bertels, 1973) differs from *Bythocythere* Sars in being strongly nodose and with a developed reticulation pattern. This species has very strong sexual dimorphism that was not recognized by Bertels (1973). The female is lower and longer than males. The male is higher, rounder and narrower dorsally. The specimen figured by Bertels (1973) is female. Internal features are not seen.

Stratigraphical range. Danian of Fortín General Roca (Bertels 1973) and Cerro Azul.

Bythoceratina sp. aff. *Bythoceratina scaberrima* (Brady, 1887) Van den Bold, 1957*a*
Figure 5A

1957*a* *Bythoceratina scaberrima* (Brady); Van den Bold, p. 246, pl. 2, fig. 8a–b.

Material. One specimen from sample 5; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3262 (lost), 0.591 (L), 0.415 (H).

Description. Subrhomboidal, but much modified by the position of the subdorsal caudal process and two large ventrolateral spines. Strongly reticulopunctate ornament with numerous rounded pore conuli, many conjunctive, some blind and some perforated. There is a distinct denticulate marginal rim around the free margins and on the dorsal margin, and a deep median sulcus.

Remarks. Differs from *Bythoceratina scaberrima* (Brady, 1887) in being more reticulate and lacking isolate conuli. This generic group is well-known in the deep sea and is an indicator of that environment.

Bythoceratina sp.
Figure 5B

Material. One specimen from sample 21; Danian.

Dimensions. A broken valve, LM-FCEN 3263, 0.773 (L), 0.433 (H).

Description. A broken LV of *Bythoceratina* with the usual large tubercles in the usual position for this genus and the large broken spine posteroventrally. Entire surface covered by a net-like reticulum of low muri and mainly angular cells. Large numbers of pores on the muri or, if in solum, as eruptive conuli. Most are simple.

Remarks. Although this specimen is broken, it is possible to see the ventrolateral spinose projection, which allows us to classify it. It differs from *Bythoceratina incurvata* (Bertels, 1973) in having more numerous tubercles and in the net-type reticular pattern.

Genus PSEUDOCYTHERE Sars, 1866

Type species. *Pseudocythere caudata* Sars, 1866.

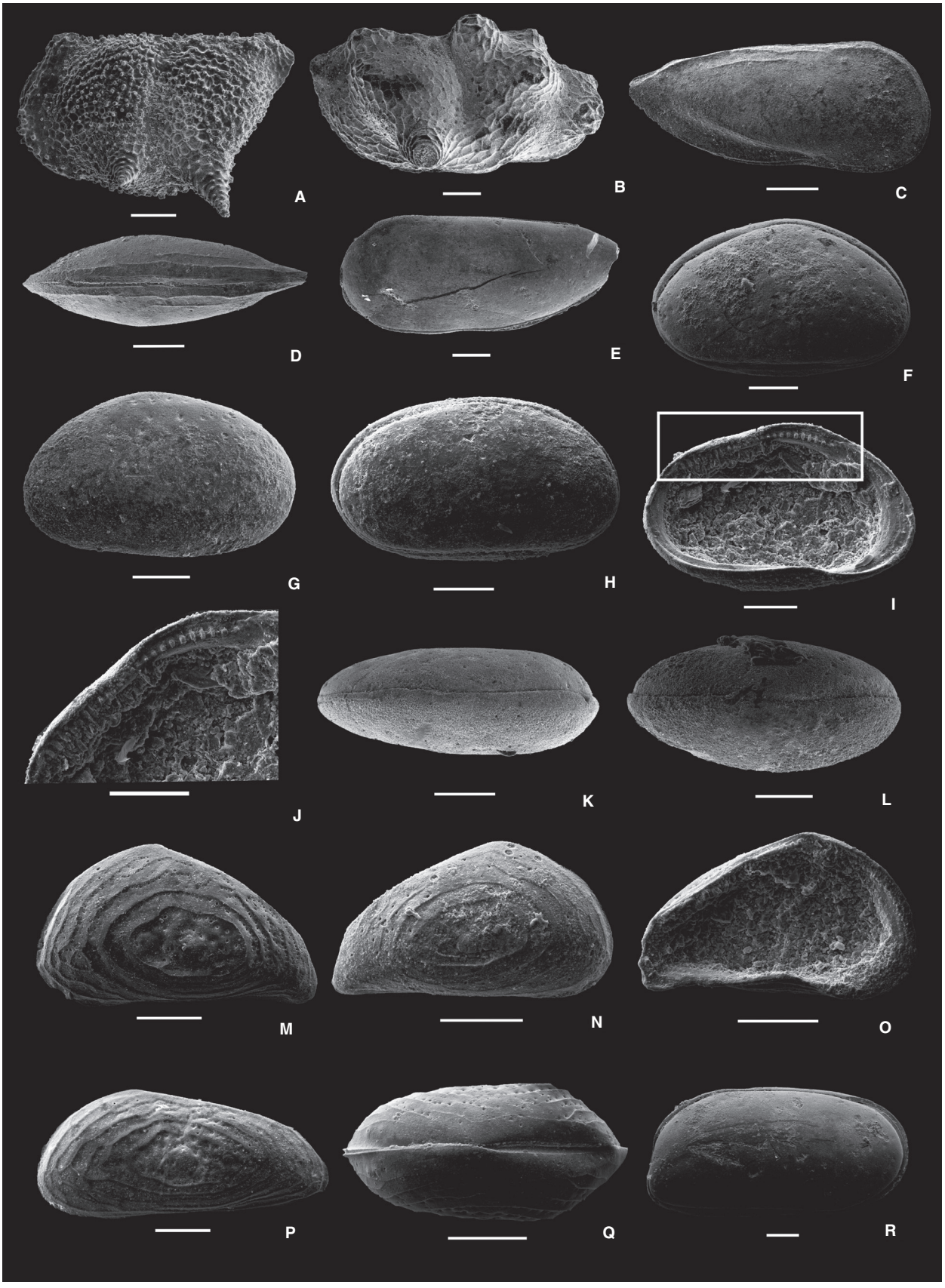
Pseudocythere sp.
Figure 5C–D

Material. One adult carapace from sample 17; Danian.

Dimensions. Adult carapace, LM-FCEN 3264, 0.585 (L), 0.258 (H).

Description. A median, very elongate species of *Pseudocythere*. In lateral view, there are two well-developed ribs, one, the dorsal rib is a very strongly developed, almost flared rib, which extends onto the anterior and ventral margin peripherally where it acts as a marginal rim. This rib has, just below it, another weaker rib, which extends from mid-dorsal just onto the anterodorsal surface and another shorter rib is developed mid-dorsally. These are very well seen in dorsal view. A linear inflated area extends across the valve from about mid-height to the caudal process. This is separated by a linear shallow area, below which a ventrolateral rib crosses the ventrolateral surface and falls away steeply to the ventral surface. Surface smooth.

FIG. 5. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Bythoceratina* sp. aff. *Bythoceratina scaberrima* (Brady, 1887), LM-FCEN 3262 (lost), adult valve, left lateral view. B, *Bythoceratina* sp., LM-FCEN 3263, adult valve, right lateral view. C–D, *Pseudocythere* sp., LM-FCEN 3264, adult carapace; C, right lateral view; D, dorsal view. E, *Thanycythere* sp.; LM-FCEN 3265, adult carapace, left lateral view. F–L, *Phelocyprideis acardomesido* gen. et sp. nov.; F, holotype, LM-FCEN 3266, carapace, female, right lateral view; G, paratype, LM-FCEN 3267, female valve, left lateral view; H, paratype, LM-FCEN 3268, adult male carapace, right lateral view; I–J, paratype, LM-FCEN 3269, female valve; I, internal view; J, detail of alternamerodont hinge; K, paratype, LM-FCEN 3270, adult male carapace, dorsal view; L, paratype, LM-FCEN 3271, adult female carapace, dorsal view. M–Q, *Eucythere dinetos* sp. nov., M, holotype, LM-FCEN 3272, adult female valve, left lateral view; N, paratype, LM-FCEN 3273 female, juvenile valve, right lateral view; O, paratype, LM-FCEN 3274, adult female valve, internal view; P, paratype, LM-FCEN 3275, adult male valve, left lateral view; Q, paratype, LM-FCEN 3276, carapace, female, dorsal view. R, *Krithe crepidus* sp. nov., holotype, LM-FCEN 3277, adult carapace, right lateral view. All scale bars represent 100 μm.


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Remarks. Differs from *Pseudocythere* sp. from the upper Senonian to lower Turonian of Morrocco (Andreu *et al.* 2013) in its more elongate and narrow outline and in the presence of ribs dorsally.

Genus TANYCYTHERE Cabral *et al.*, 2014

Type species. *Tanycythere caudata* Cabral *et al.*, 2014.

Tanycythere sp.
Figure 5E

Material. Three specimens from samples 17 and 21; Danian.

Dimensions. Adult carapace, LM-FCEN 3265, 0.750 (L), 0.324 (H).

Diagnosis. A large, subrectangular to elongate subovate species of *Tanycythere* with anterior margin symmetrically rounded, with apex at mid-height; posterior margin caudate but broken, with apex above mid-height. Dorsal margin straight, ventral margin sinuous with median concavity. Surface smooth. RV overlaps the LV. Subelliptical in dorsal view.

Remarks. It differs from *Tanycythere praecaudata* Cabral and Loureiro *in* Cabral *et al.*, 2014 from the Jurassic of the Portugal in having a less inflated carapace, absence of a keel posteroventrally and in being less rounded.

Family CYTHERIDEIDAE Sars, 1925
Subfamily CYTHERIDEINAE Sars, 1925

Genus PHELOCYPRIDEIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:38FCF68E-0D72-470B-AF96-9C3920752115

Derivation of name. Gr. *φελο* deceitful; plus *Cyprideis*. With reference to the fact that this genus, while superficially resembling *Cyprideis* Jones, has a quite distinctly different hinge, which lacks the median element and which overall is diagonal to the edge of the hinge margin.

Type species. *Phelocyprideis acardomesido* gen. et sp. nov.

Diagnosis. A new genus of Cytherideidae typified by an unusual merodont hinge in which the terminal elements alternate in both structure and position relative to the edge of the valve and the median element is absent. From the LV, for example, the anterior terminal element projects beyond the internal edge of the valve and is mechanically positive (male), while the posterior terminal element is within the valve edge and is mechanically negative (female) and *vice versa* for the RV.

Description. As for the type species.

Remarks. The type of merodont hingement exhibited by this genus we name alternamerodont (from the Latin *alternos*) and from the fact that the terminal elements alternate in structure and function and in their relationship to the edge of the valve and because the entire structure seems to be diagonal to that edge. This hinge also lacks a median element. This Danian species is another element in the complex structure of this generic group throughout the Tertiary, leading to its final end product in the form of the genus *Cyprideis* Jones *via* such important genera as *Fossocytheridea* Swain and Brown, 1964 as outlined by Tibert *et al.* (2003). However, it does seem that *Phelocyprideis* is possibly the first genus in this important lineage leading directly to *Cyprideis* rather than *Fossocytheridea* and the first two authors of this study intend to argue this case in a subsequent paper. One of us (RCW) has already described *Phraterfabanella* (Boomer *et al.* 2001) from the Italian Lower Jurassic, now acknowledged as the primitive genus of the entire Cytherideidae (see Tibert *et al.*, text fig. 6, p. 213). *Phelocyprideis acardomesido* sp. nov. resembles none of the *Fossocytheridea* species described by Bergue *et al.* (2011) species from the Senonian of the Santos Basin in SE Brazil.

Phelocyprideis acardomesido sp. nov. Ceolin and Whatley
Figure 5F–L

LSID. urn:lsid:zoobank.org:act:10B98C03-540A-4424-96D5-3A468249A878

Derivation of name. Gr. *α*, not, without; plus *καρλο*, hinge; plus *μεσιλο*, middle. With reference to the lack of a median hinge element in this species.

Type material. Holotype: LM-FCEN 3266 (Fig. 5F); paratypes: LM-FCEN 3267–3271 (Fig. 5G–L).

Material. 96 specimens from samples 34, 50 and 57; Danian.

Diagnosis. As for genus.

Dimensions. In mm:

		L	H	W	
Holotype, adult, female	LM-FCEN 3266	0.583	0.364	0.268	Sample 34
Paratype, adult, female	LM-FCEN 3267	0.523	0.317		Sample 34
Paratype, adult, male	LM-FCEN 3268	0.517	0.301	0.195	Sample 34
Paratype, adult, female	LM-FCEN 3269	0.557	0.345		Sample 34
Paratype, adult, male	LM-FCEN 3270	0.530	0.320	0.197	Sample 57
Paratype, adult, female	LM-FCEN 3271	0.524	0.325	0.249	Sample 57

Description. A medium, very subovate species of *Phelocyprideis*. Subovate in dorsal view. LV overlaps the RV around entire periphery. Anterior margin broadly rounded with apex well below mid-height. Anterodorsal slope long and gently arcuate; anteroventral slope shorter and strongly convex. Posterior margin more narrowly rounded. Dorsal margin umbonate with apex anterior of the mid-length. Dorsal cardinal angles not marked. Ventral margin very gently orally incurved in both valves. Greatest length below mid-height; greatest height anterior of mid-length; greatest width medianly. LV larger than RV with conspicuous overlap around entire periphery. Surface smooth. Numerous circular pits mark the normal pore canals; the smaller being simple and the larger sieve type. Hinge alternamerodont and oblique to the margin. The anterior terminal element of the LV is a long structure bearing ten large teeth, all of which extend beyond the edge of the hinge margin. The median element is absent. The posterior terminal element comprises some ten large, rectangular locules, separated by vertical walls and all negative with respect to the edge of the valve. CMS a curved row of four adjacent scars and a small V-shaped frontal scar. There is no fulcral point. Sexually dimorphic with males more elongate and less umbonate than females.

Remarks. An extensive search of the pertinent literature has failed to find any taxon resembling this in shape or hingement with which the present species could be compared. It differs from *Cyamocytheridea felix* Bertels, 1973 from the Danian of Fortín General Roca, Río Negro Province, in its more subrounded shape, alternamerodont hinge (Bertels' species has holomerodont hingement) and overlap around the entire periphery. Echevarría (1987) has identified *Cyamocytheridea rossiae* from the Miocene of Tierra del Fuego, but it differs from *P. acardomesido* sp. nov. in shape and in its hinge in which each valve has either an all positive or an all negative elements. The genus *Ovocytheridea* Grekoff has some similarities in shape of the carapace with *Phelocyprideis* gen. nov.; however, the hingement is completely different.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Subfamily EUCYTHERIDEINAE Puri, 1954

Genus EUCYTHERE Brady, 1866

Type species. Eucythere declivis (Norman, 1865) Brady 1868*a*.

Eucythere dinetos sp. nov. Ceolin and Whatley
Figure 5M–Q

LSID. urn:lsid:zoobank.org:act:B75E856F-0D7F-4AE4-B31A-C3A6DC48ABE1

Derivation of name. Gr. δινετος dinetos, whorled around. With reference to the circular disposition of the ribs on the valve surface that somewhat resemble a whirlpool.

Type material. Holotype: adult valve, LM-FCEN 3272 (Fig. 5M); paratypes: LM-FCEN 3273–3276 (Fig. 5N–Q).

Material. 18 specimens from samples 3 and 5 (Maastrichtian); 16, 21, 23 and 26 (Danian).

Diagnosis. A medium, subtriangular species of *Eucythere* with ornamentation composed by six concentric ribs about a subovate median area that decrease in strength towards margins. Dorsal margin very umbonate.

Dimensions. In mm:

		L	H	W	
Holotype, adult, female	LM-FCEN 3272	0.503	0.503		Sample 21
Paratype, juvenile, female	LM-FCEN 3273	0.340	0.187		Sample 16
Paratype, adult, female	LM-FCEN 3274	0.373	0.216		Sample 23
Paratype, adult, male	LM-FCEN 3275	0.308	0.134		Sample 21
Paratype, juvenile, female	LM-FCEN 3276	0.392	0.218	0.191	Sample 16

Description. Median, subtriangular in lateral view. Anterior margin with a bluntly pointed apex well below mid-height; long, gently arcuate anterodorsal slope and shorter, more convex anteroventral slope. Posterior margin bluntly pointed with ventral downturned apex. Dorsal margin convex and umbonate in anterior part and long, gently convex and straight, in posterior part. Ventral margin with broad oral inflexion. Greatest length ventrally; greatest height through umbo; greatest width medianly. Ornament of six irregularly concentric ribs about a subovate,

median area that decrease in strength towards margins. The ribs are approximately parallel to one another and to the margins. There is a distinct perturbation anteroventrally. The median area contains pores that are rather irregularly distributed between the ribs, many of them are sieve type, and others (smaller) are simple pores. Sexual dimorphism not observed. Internal features not seen.

Remarks. The present species is very similar to *Eucythere circumcostata* Whatley and Coles, 1987 from the early Pliocene of ODP Leg 34 in its pattern of concentric ribs, but differs in the dorsal margin that is much more arcuate and declines abruptly towards the posteroventral region. The present species is also larger than *E. circumcostata*. It differs from *Eucythere danica* Colin, 1987 from the Danian of Sénégal, Africa, in its dorsal margin and posterior caudal process being more elongate.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Subfamily KRITHINAE Mandelstam *in* Bubikyan, 1958

Genus KRITHE Brady *et al.*, 1874

Type species. Krithe bartonensis (Jones, 1857).

Krithe crepidus sp. nov. Ceolin and Whatley
Figures 5R, 6A–C

LSID. urn:lsid:zoobank.org:act:F45E36F8-DE71-485E-9944-95A989147497

Derivation of name. Gr. κρεπιδος, a boot or shoe. Referring to the fanciful similarity of this species to a Greek boot or shoe.

Type material. Holotype: one complete carapace LM-FCEN 3277 (Figs 5R, 6C); paratypes: LM-FCEN 3278–3279 (Fig. 6A–B).

Material. 21 specimens from samples 3 and 5 (Maastrichtian); 16, 21, 23 and 26 (Danian).

Diagnosis. A large, elongate, subrectangular species of *Krithe*, LV strongly overlapping the RV around entire periphery. In posterodorsal view, the indentations strongly resemble the open torpedo tubes of a submarine.

Dimensions. In mm:

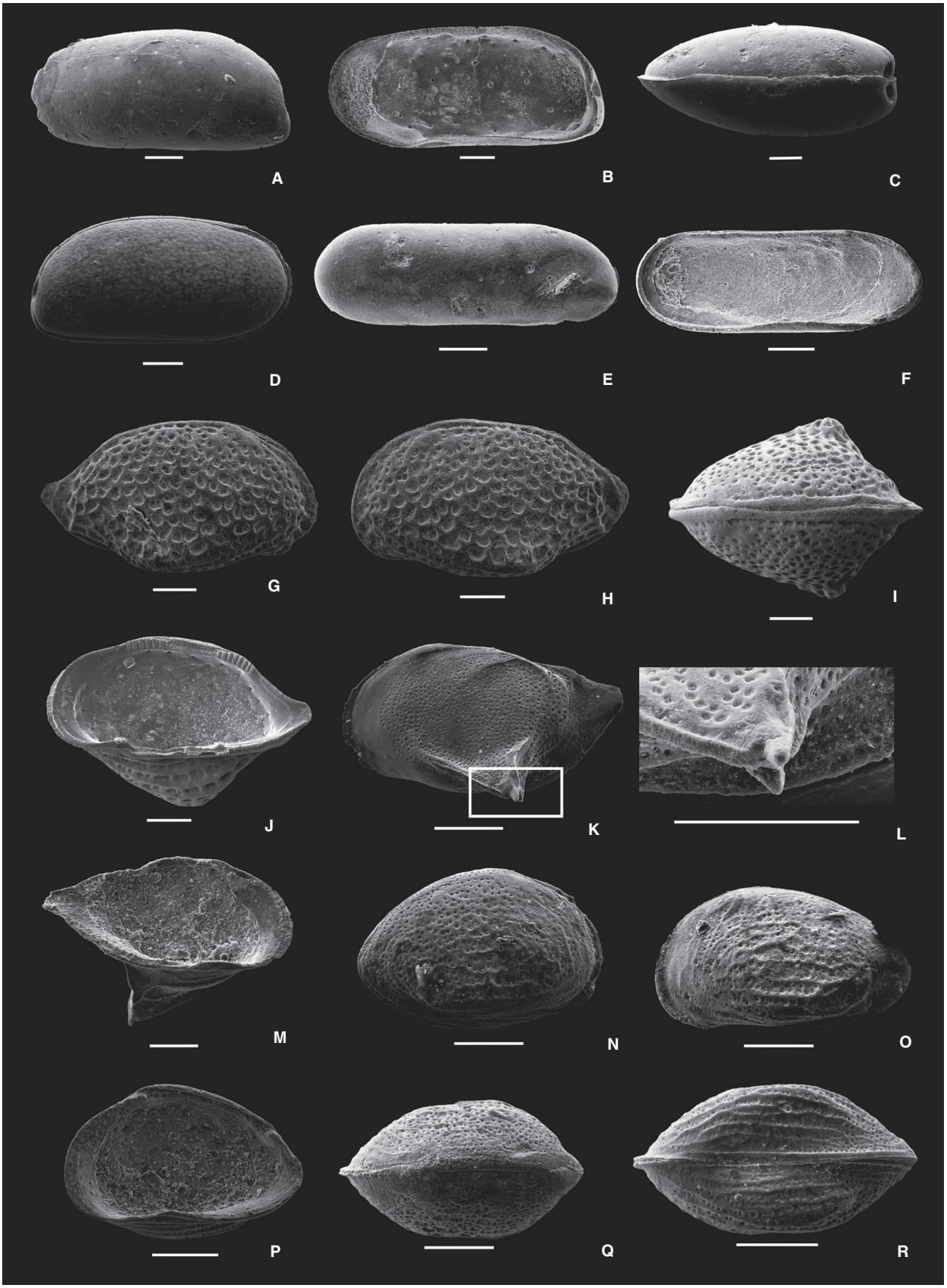
		L	H	W	
Holotype, adult	LM-FCEN 3277	0.805	0.404	0.347	Sample 23
Paratype, adult	LM-FCEN 3278	0.693	0.327		Sample 5
Paratype, adult	LM-FCEN 3279	0.709	0.337		Sample 3

Description. In lateral view, a large, essentially smooth, subrectangular species of *Krithe*. In dorsal view, subovate, but very parallel-sided in posterior half. In this view, a posterior indentation of the lamella is very clearly seen, as is the very strong overlap of the LV over RV. In right lateral view, this seems to occur around the entire periphery. Anterior margin rather narrowly, but symmetrically, rounded about the apex at mid-height. Posterior margin obliquely truncated and tightly rounded subventrally. Dorsal margin straight in anterior two-thirds, more arcuate in posterior third. Ventral margin gently sinuous about oral concavity, best seen in right valve. Greatest length below mid-height; greatest height in posterior third; greatest width medianly. Surface smooth. Internally, all the elements of the hinge are smooth. Anterior radial pore canals not seen due to crystallization of the shell. CMS with the most dorsal adductor being large and 'U'-shaped, frontal scar a broad forward facing 'U' which embraces a single smaller scar.

Remarks. This species differs from *Krithe rocanum* Bertels, 1973 from the Danian of the Neuquén Basin, in its more convex dorsal margin and more rounded and blunter posteroventral margin. It differs from *Krithe nibelaensis* Dingle, 1981 from the Campanian of south-east Africa mainly in its more rounded posterior region and narrower anterior.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

FIG. 6. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–C, *Krithe crepidus* sp. nov.; A, paratype, LM-FCEN 3278, adult valve, left lateral view; B, paratype, LM-FCEN 3279, adult valve, internal view; C, holotype LM-FCEN 3277, dorsal view. D, *Krithe* sp., LM-FCEN 3280, adult carapace, right lateral view. E–F, *Copytus* sp., LM-FCEN 3281, adult valve, E, right lateral view; F, internal view. G–J, *Cytheropteron hyperdictyon* sp. nov.; G, holotype, LM-FCEN 3282, adult valve, right lateral view; H, paratype, LM-FCEN 3283, adult valve, left lateral view; I, paratype, LM-FCEN 3284, adult carapace, dorsal view; J, paratype, LM-FCEN 3285, adult valve, internal view. K–M, *Cytheropteron bidentinos* sp. nov.; K–L, holotype, LM-FCEN 3286, adult valve; K, left lateral view; L, detail of the spine; M, paratype, LM-FCEN 3287, adult valve, internal view. N–R, *Cytheropteron translimitares* sp. nov.; N, Q, holotype, LM-FCEN 3288, adult carapace; N, right lateral view; Q, dorsal view; O, paratype, LM-FCEN 3289, adult valve, left lateral view; P, paratype, LM-FCEN 3290, adult valve, internal view; R, paratype, LM-FCEN 3291, adult carapace, ventral view. All scale bars represent 100 μm.


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Krithe sp.
Figure 6D

Material. One carapace from sample 21; Danian.

Dimensions. Adult carapace, LM-FCEN 3280, 0.672 (L), 0.338 (H).

Diagnosis. A large, subrectangular species in lateral view with surface covered with a very degraded reticulum. In dorsal view, the posterior indentation of the lamella is very clear. Anterior margin rounded; posterior margin obliquely truncate and subrounded ventrally. Dorsal margin weakly convex and ventral margin almost straight, with a small concavity in the oral position. LV overlaps the RV around the entire margin, but most pronouncedly anteriorly. Greatest height just behind mid-length. Internal features not seen.

Remarks. This species differs from *K. crepidus* sp. nov. in its more regularly convex dorsal margin. It is less strongly truncate posteriorly, and the surface of the carapace is covered with a subdued ghost reticulation. Differs from *K. rocanum* Bertels, 1973, from the Danian of Fortín General Roca, Río Negro Province, in its ornamented surface.

Subfamily NEOCYTHERIDEIDINAE Puri, 1957

Genus COPYTUS Skogsberg, 1939

Type species. Copytus caligula Skogsberg, 1939.

Copytus sp.
Figure 6E–F

Material. Eight specimens from samples 3, 5 (Maastrichtian); 21, 23 and 45 (Danian).

Dimensions. Adult carapace, LM-FCEN 3281, 0.649 (L), 0.275 (H).

Diagnosis. A medium, subelliptical species with smooth surface and with an obliquely rounded anterior end. Dorsal and ventral margins straight and posterior end symmetrically rounded.

Remarks. The present species is similar to *Copytus cretaceous* described by Echevarría (1986) from the Maastrichtian of Chubut, Argentina, but differs in its smaller size and slight ventral rim.

Family CYTHERURIDAE Müller, 1894
Subfamily CYTHEROPTERINAE Hanai, 1957

Genus CYTHEROPTERON Sars, 1866

Type species. Cythereis latissimum (Norman, 1865) Brady, 1867.

Cytheropteron hyperdictyon sp. nov. Ceolin and Whatley
Figure 6G–J

LSID. urn:lsid:zoobank.org:act:6882FDD4-041E-49C6-848F-677C6A8913F7

Derivation of name. Gr. *ὑπερ* beyond, above; plus *λικτύον* net. With reference to the very great strength and intensity of the reticulation of this species.

Type material. Holotype: LM-FCEN 3282 (Fig. 6G); paratypes: LM-FCEN 3283–3285 (Fig. 6H–J).

Material. 45 specimens from samples 21, 26, 29, 31, 34, 36, 39 and 40; Danian.

Diagnosis. A strongly, but not extendedly, alate species of *Cytheropteron*, carapace subovate with a very strong reticulation that ranges in size from small circular anteriorly to much larger centrally. Sagittate in dorsal view.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3282	0.641	0.358		Sample 29
Paratype, adult	LM-FCEN 3283	0.632	0.365		Sample 29
Paratype, adult	LM-FCEN 3284	0.635	0.362	0.436	Sample 26
Paratype, adult	LM-FCEN 3285	0.612	0.390		Sample 26

Description. A medium-sized ostracod, thick-shelled for the genus, subovate, caudate posteriorly and strongly alate in lateral and dorsal views. Sagittate in dorsal view. Anterior margin broadly rounded with apex below mid-height and anterodorsal slope more gently convex that anteroventrally. Posterior margin with apex at above mid-height and slightly 'upturned'. Posteroventral slope long and slightly concave, ventral slope shorter and more convex. Dorsal margin straight sloping posteriorly, not overhung. Ventral margin completely obscured in lateral view by the alar process. Greatest length above mid-height; greatest height and greatest width through apex of ala. Ornament very strongly reticulate across entire valve surface. Individual cells

ranging in size from small circles anteriorly and much larger ones centrally. The muri are almost smooth to microcorrugate and bear a few, seemingly simple pore canals. There is some preferential orientation of the muri parallel to the free margins, but not apparent elsewhere. The solae seem mostly to be blind, but some possibly bears sieve plates, as suggested by the internal view of these structures. Hinge very strongly antimerodont. The right valve has a dentate bar with seven strong teeth anteriorly, some of which seems to be secondarily dentate dorsally and a bar with eight teeth posteriorly, also secondarily dentate. The median element is strongly locellate. Inner lamella wide. Surface marked with deep pores. CMS a curved row of four with an oval single scar anteriorly.

Remarks. The present species has similarities with *Cytheropteron rocanum* Bertels, 1973 from the Danian of Fortín General Roca, mainly in the pattern of ornamentation, but differs greatly in shape in dorsal view that is subtriangular, while *C. rocanum* is subovate.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Cytheropteron bidentinos sp. nov. Ceolin and Whatley
Figure 6K–M

LSID. urn:lsid:zoobank.org:act:72BF6B2A-531D-4706-A4F8-CB0436CEBAEE

Derivation of name. L. *bi*, two, *dentino*, of teeth. With reference to the tooth-like apex of the alar process.

Type material. Holotype: one valve, LM-FCEN 3286 (Fig. 6K–L); paratype: LM-FCEN 3287 (Fig. 6M).

Material. 17 specimens from samples 16, 17 and 21; Danian.

Diagnosis. A profoundly alate species of *Cytheropteron* in which both leading and trailing edges of alae are marked by parallel ribs and apex by a double spine. Peripheral surface smooth, remainder punctate.

Dimensions. In mm:

		L	H	
Holotype, adult	LM-FCEN 3286	0.458	0.240	Sample 21
Paratype, adult	LM-FCEN 3287	0.496	0.319	Sample 16

Description. Small, subrhomboidal and strongly alate species of *Cytheropteron*. Anterior margin broadly rounded with small, rounded marginal denticles medianly on the peripheral extended flange. Apex below mid-height. Posterior margin caudate with blunted subdorsal apex; posteroventral slope straight becoming convex and keel-like posteroventrally. Dorsal margins somewhat sinuous medianly, obscured by an arcuate rib. Ventral margin biconvex, but mostly obscured in lateral view by ventral tumidity and alar process. The large alar process has on its leading edge, three parallel ribs between which and on the flanks of external members occur single rows of punctae. These ribs terminate at the base of the alar spine. The trailing edge is shorter and stronger with six ribs and rows of punctae; the most anterior being the strongest. These ribs terminate in a bi-cuspate resembling the gaping bill of a bird. The remainder of the carapace, except for the area around the free margins, is covered by mainly concentric rows of rounded pores; these are smallest distally and largest proximally. The pores are absent from the area of the closing and frontal muscles. An arcuate rib with two roots anteriorly and posteriorly cross the valve dorsally, just behind mid-length. Internal features not seen.

Remarks. This species should not be confused with *Cytheropteron dividentum* Hornibrook, 1952, a species with strong vertical ribs, whose name is seemingly associated with the double-toothed terminal hinge element. Differs from *Cytheropteron inornatun* Brady and Robertson, 1872 in having a longer posterodorsal caudal process, in its more arcuate rib posterodorsally and in its surface being more densely punctate. It is also similar to *Cytheropteron* sp. 2914 Dingle *et al.*, 1990 from the Quaternary of SW Africa, in having the alar spine, but differs in the caudal process, in the anterior margin being narrower, and in its ornamentation.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Cytheropteron translimitares sp. nov. Ceolin and Whatley
Figure 6N–R

LSID. urn:lsid:zoobank.org:act:C92A7CA4-14DB-400C-9685-6721D691408B

Derivation of name. L. *trans*, across; plus *limitares*, boundary. With reference to the occurrence of this species on either side of the Maastrichtian–Danian boundary.

Type material. Holotype: one complete carapace, LM-FCEN 3288 (Fig. 6N, Q); paratypes: LM-FCEN 3289–3291 (Fig. 6O–P, R).

Material. 37 specimens from samples 1, 5 and 10 (Maastrichtian); 16, 17, 21, 23, 26, 31 and 50 (Danian).

Diagnosis. A subovate, reticulopunctate specimen with a short caudal process and strongly convex dorsal margin. Short alar process with ventrolateral ribs that are clearly seen ventrally.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3288	0.368	0.244	0.392	Sample 21
Paratype, adult	LM-FCEN 3289	0.403	0.221		Sample 16
Paratype, adult	LM-FCEN 3290	0.612	0.390		Sample 26
Paratype, adult	LM-FCEN 3291	0.410	0.340	0.189	Sample 26

Description. Small, subovate, alate species of *Cytheropteron* with mainly punctate and, in part, reticulate ornament. Anterior margin well-rounded with apex at about mid-height. Posterior margin much more narrowly and asymmetrically rounded, with long, straight to gently convex posterior dorsal slope and shorter, more convex posteroventral. Dorsal margin strongly convex about an apex a little anterior of mid-length. Ventral margin with a very slight oral concavity in front of mid-length, only partially obscured in lateral view. Greatest length below mid-height; greatest height through dorsal apex; greatest width in posterior one-third. Punctae small peripherally and increasing in size somewhat towards the centre and oriented parallel to margins. Punctae peripherally, but especially ventrally they occur in single rows associated with ventrolateral and ventral ribs. There is a slight marginal rim anteriorly and posteriorly. The alar process is defined by a number of ribs along the ventral surface and the ventrolateral rib. Intercostal areas smooth, except where valve has been abraded, resulting in a coarse, rough surface. Many of the punctae bear sieve-type pores. Some small simple pores occur between punctae. Internally, the hinge is antimerodont and in the right valve, and the median element is a long, denticulate bar widest anteriorly. The terminal elements are strongly elevated with four or five teeth anteriorly and three or four posteriorly. CMS not seen. Calcified inner lamella wide around free margins.

Remarks. Differs from *Cytheropteron inops* Bertels, 1969*a* from the Upper Cretaceous of Huantrai-co, Neuquén Province, in being more rounded, in its punctate surface and the presence of a ventrolateral rib that defines the alar process.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Cytheropteron sp.
Figure 7A

Material. One specimen from sample 5; Maastrichtian.

Dimensions. Adult carapace, LM-FCEN 3292, 0.445 (L), 0.265 (H).

Diagnosis. A subovate, strongly alate species of *Cytheropteron* with main ornament of circular punctae and a number of small ribs that extend from a posterodorsal position onto the ventral surface under the alar process. Caudal process smooth, blunt at mid-height. Anterior apex also at mid-height.

Remarks. Cytheropteron sp. has similarities with *Cytheropteron crassipinatum* Whatley and Masson, 1980. It differs, however, in its alar process being more acuminate, its dorsal margin more convex and in the ornamentation being circulopunctate.

Genus AVERSOVALVA Hornibrook, 1952

Type species. Aversovalva aurea (Hornibrook, 1952) Crane, 1965.

Aversovalva glochinos sp. nov. Ceolin and Whatley
Figure 7B–D

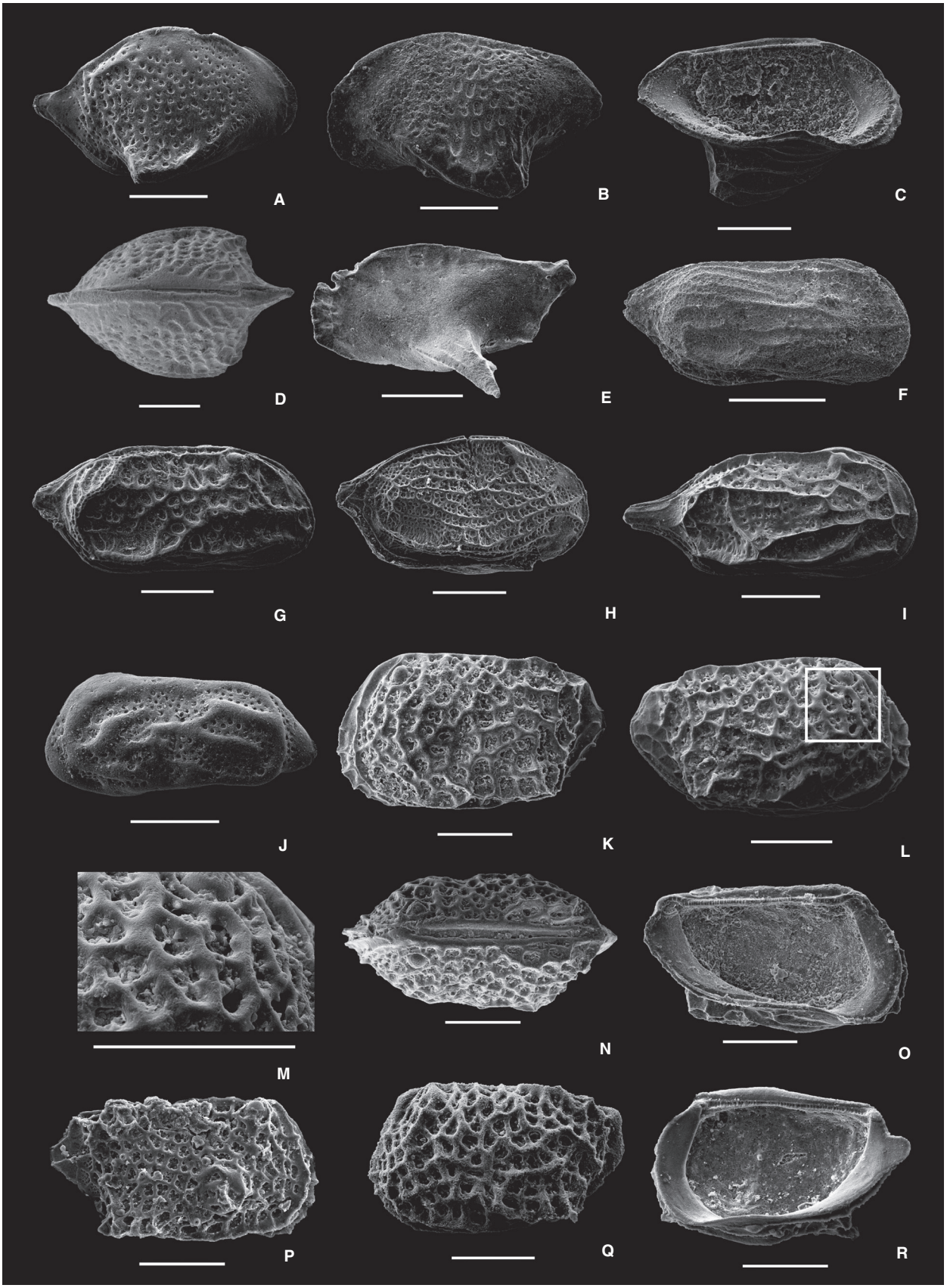
LSID. urn:lsid:zoobank.org:act:635351A8-0F02-4538-B797-B1E4EBBA0C3E

Derivation of name. Gr. γλοχινος glochinos, point of an arrow. With reference to the aspect of an arrowhead that this species presents in dorsal view.

Type material. Holotype: one valve, LM-FCEN 3293 (lost; Fig. 7B); paratypes: LM-FCEN 3294–3295 (Fig. 7C–D).

Material. Nine specimens from samples 3 (Maastrichtian); 16 and 21 (Danian).

FIG. 7. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Cytheropteron* sp., LM-FCEN 3292, valve, right lateral view. B–D, *Aversovalva glochinos* sp. nov.; B, holotype, LM-FCEN 3293 (lost), adult valve, left lateral view; C, paratype, LM-FCEN 3294, adult valve, internal view; D, paratype, LM-FCEN 3295, adult carapace, dorsal view. E, *Pedicythere* sp., LM-FCEN 3296, adult valve, left lateral view. F, *Semicytherura argentinensis* (Bertels, 1974), LM-FCEN 3297, adult carapace, right lateral view. G, *Semicytherura* sp. 1, LM-FCEN 3298, adult carapace, right lateral view. H, *Semicytherura* sp. 2, LM-FCEN 3299, adult carapace, right lateral view. I, *Semicytherura* sp. 3, LM-FCEN 3300, adult carapace, right lateral view. J, *Semicytherura*? sp., LM-FCEN 3301, adult valve, left lateral view. K–O, *Eucytherura stibaros* sp. nov.; K, holotype, LM-FCEN 3302, adult carapace, left lateral view; L–N, paratype, LM-FCEN 3303, adult carapace; L, right lateral view; M, detail of ornamentation; N, dorsal view; O, paratype, LM-FCEN 3304, adult valve, internal view. P, *Eucytherura* sp. 1, LM-FCEN 3305 (lost), adult valve, right lateral view. Q–R, *Eucytherura* sp. 2, LM-FCEN 3306, adult valve; Q, left lateral view; R, internal view. All scale bars represent 100 μm.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R

Diagnosis. An elongate, subovate species of *Aversovalva* with a strong alar process bearing a reticulum, which is medianly subcircular, but which becomes extended and elongate–ovate on the alar process.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3293 (lost)	0.378	0.218		Sample 22
Paratype, adult	LM-FCEN 3294	0.384	0.265		Sample 16
Paratype, adult	LM-FCEN 3295	0.385	0.235	0.388	Sample 3

Description. An elongate, subovate species with a very strong alar process in lateral view. Strongly sagittate in dorsal view. Anterior margin rounded but 'downturned', with apex below mid-height. Posterior margin bluntly caudate at mid-height. Dorsal margin convex anteriorly and straight to the posterior cardinal angle. Ventral margin with pronounced oral incurvature. Ornament virtually smooth in anterior and posterior areas, elsewhere reticulate with large oval cells and low broad muri. Oval cells centrally become 'stretched' on alar process. Alar process very strong with long leading edge, with three parallel ribs. Apex bluntly pointed posteroventrally and short trailing edge defined by three small ribs and intervening locules. Internal features as for genus.

Remarks. Differs from *Cytheropteron* (*Aversovalva*) *westaustraliense* Neale, 1975 from the Gingin Chalk (Santonian) of Western Australia, in the posterior caudal process being less abrupt and in the alar process more rounded. It also differs in reticulation pattern with better developed cells.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Genus PEDICYTHERE Eagar, 1965

Type species. Pedicythere tessae Eagar, 1965.

Pedicythere sp.
Figure 7E

Material. Three specimens from sample 5; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3296, 0.407 (L), 0.227 (H).

Description. Pedicythere with typical upturned blunt subdorsal caudal process. Alar process polygonal in base and conical at termination. Anterior margin deeply indented dorsally and with short radiate riblets in the ventral part. Surface smooth.

Remarks. The present species differs from *Pedicythere australis* Neale, 1975 from the Santonian of Gingin, Australia, in its more regular dorsal margin with 'upturned' caudal process, which in Neale's species is straight; and in the posterior region that is slightly concave towards the caudal process, the opposite of *P. australis* that is convex.

Genus SEMICYTHERURA Wagner, 1957

Type species. Cythere nigrescens Baird, 1838.

Semicytherura argentinensis (Bertels, 1974)
Figure 7F

1974 *Cytherura argentinensis* Bertels, p. 391, pl. 2, fig. 9a–b.

Material. One specimen from sample 16; Danian.

Dimensions. Adult carapace, LM-FCEN 3297, 0.328 (L), 0.145 (H).

Remarks. On the basis of its external character alone, this species is clearly *Semicytherura*.

Stratigraphical range. Maastrichtian of Fortín General Roca (Bertels 1974) and Danian of Cerro Azul, General Roca.

Semicytherura sp. 1
Figure 7G

Material. Three specimens from samples 31, 39 and 50; Danian.

Dimensions. Adult carapace, LM-FCEN 3298, 0.310 (L), 0.139 (H).

Description. A very small species of *Semicytherura*, subovate, elongate and bluntly caudate in lateral view with straight dorsal margin. Anterior apex well below mid-height; posterior apex at about mid-height. Marginal rim and posteroventral rib strongly developed. Anterior part with large reticulum of various shapes, posterior part with smaller, circular reticulum.

Remarks. This seems certainly to be a new species but is left in open nomenclature due to paucity of material.

Semicytherura sp. 2
Figure 7H

Material. One specimen from sample 16; Danian.

Dimensions. Adult carapace, LM-FCEN 3299, 0.361 (L), 0.201 (H).

Description. Subovate *Semicytherura* with gently convex dorsal margin, caudal process above mid-height and anterior margin with apex at mid-height. Dorsal and ventrolateral ribs prominent and ornament reticulate with longitudinal muri dominant. Notable concavity above posteroventral rib and entirely below mid-height.

Remarks. This species differs from *Semicytherura* sp. 1 of this study, mainly in its more rounded and less elongate shape and in the nature of reticulation and without strong ribs on the surface.

Semicytherura sp. 3
Figure 7I

Material. Seven specimens from samples 3 (Maastrichtian); 16, 21, 39 and 53 (Danian).

Dimensions. Adult carapace, LM-FCEN 3300, 0.361 (L), 0.177 (H).

Description. An elongate, subtriangular carapace in lateral view, with well-rounded anterior margin with apex below mid-height. Posterior margin very strongly caudate with apex at about mid-height. Dorsal margin obscured by crest-like rib. Ventral margin in part obscured by ornament, but biconvex about a considerable oral invagination. Several strong, but narrow ribs cross the lateral surface. Intercostal areas reticulopunctate with mainly circular cells.

Remarks. The present species differs from *Semicytherura cretae* Neale, 1975 from the Santonian of Gingin, Western Australia, in its well-developed ornamentation with ribs and intercostal cells, and also with more elongate caudal process.

Semicytherura? sp.
Figure 7J

Material. One specimen from sample 21; Danian.

Dimensions. Adult valve, LM-FCEN 3301, 0.327 (L), 0.148 (H).

Description. Elongate, subrectangular with subtruncated anterior margin, with apex well below mid-height. Posterior margin caudate with almost subventral apex. A series of large, very broad, interconnected ribs cross the surface and the periphery, between which is a circular reticulum.

Remarks. Differs from other *Semicytherura* species in this study mainly in the posterior caudal process and in the presence of thick ribs around the entire margins and the valve surface. It is only tentatively included in this genus.

Genus EUCYTHERURA Müller, 1894

Type species. Cythere complexa Brady, 1866.

Eucytherura stibaros sp. nov. Ceolin and Whatley
Figure 7K–O

Lsid. urn:lsid:zoobank.org:act:6938331E-46F9-435D-A6AF-29BD1569A665

Derivation of name. Gr. *δτιβαρος* strong. With reference to the strongly ornate carapace of this species.

Type material. Holotype: one complete carapace, LM-FCEN 3302 (Fig. 7K); paratypes: LM-FCEN 3303–3304 (Fig. 7L–O).

Material. 15 specimens from samples 5 and 12 (Maastrichtian); 16, 21, 23, 26 and 39 (Danian).

Diagnosis. Subquadrate species of *Eucytherura* with hemispherical eye tubercle. Rather, subdued and dispersed subcentral tubercle, which is strongly reticulate as is the rest of the carapace. Dorsal rib crest-like posteriorly. Muri slightly microstriate, solae often bi-, tri- or quadrifoil and often bearing sieve plates. Very few pore conuli on muri.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3302	0.330	0.194		Sample 3
Paratype, adult	LM-FCEN 3303	0.358	0.206	0.187	Sample 3
Paratype, adult	LM-FCEN 3304	0.315	0.196		Sample 3

Description. A very small, subquadrate, thick-shelled and heavily ornate species. Anterior margin broadly rounded with apex below mid-height. Anterodorsal slope long and gently convex; anteroventral slope shorter and more convex with five marginal denticles. Posterior margin very bluntly terminated with apex above mid-height. Posterodorsal slope concavo-convex; posteroventral straight, interrupted by four marginal denticles. Dorsal margin straight, obscured posteriorly by dorsal rib, sloping gently posteriorly. Ventral margin biconvex about a shallow oral concavity, obscured in lateral view by ventral ribs. In dorsal view, subovate with a central constriction and end margins laterally compressed. Hemispherical eye tubercle very prominent. Greatest length above mid-height, greatest height through eye tubercle, greatest width at posterior one-quarter. Ornament of very coarse reticulation

delimited by broad microtuberculate muri that are preferentially vertically orientated in anterior half and near the posterior margin, but more irregular elsewhere. Muri with rare, usually conjunctive, simple pores; solae with depressed sieve plates, with irregular, often trefoil or bifid outlines. The valve surface drops deeply onto the caudal area, which is largely smooth. A similar smooth area occurs along the anterior margin, separated below mid-height into cells by the muri whose distal extension forms the anteroventral marginal denticles. The posterior termination of the ventrolateral rib is almost spinose and is subalate. Hinge strongly antimerodont with a well-defined, vertically orientated denticulations in a median element of the left valve. Calcified inner lamella wide specially at the ends. CMS not seen.

Remarks. Differs from *Eucytherura* sp. 2 of this study in the nature of its reticulation with sieve plates, its less truncate caudal process and in the well-developed hemispherical eye tubercle. Differs from *Eucytherura* sp. 1 also of this study, in the absence of a subcentral tubercle, in the anteroventral rim being less inflated, in having a blunt reticulation pattern and in the position of the eye tubercle.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Eucytherura sp. 1
Figure 7P

Material. Three specimens from samples 21 and 23; Danian.

Dimensions. Adult carapace, LM-FCEN 3305 (lost), 0.306 (L), 0.168 (H).

Diagnosis. A very small species, subquadrate in lateral view with very heavily reticular ornament with strong muri, which intersect at right angles medianly, more irregularly elsewhere. Eye tubercle large, prominent; subcentral tubercle subcircular and strongly buttressed. Caudal process blunt and slightly downturned. Solae with trefoil to quadrifoil outlines, others polygonal. Large, simple pore conuli at mural intersections and sieve plates in solae together with incipient concealment. Strong anteromarginal rim that passes into a strong ventrolateral rib that terminates in a sub-alar process.

Remarks. This species differs from *Eucytherura antipodum* Neale, 1975 (as figured on p 111, fig. 1) from the Santonian of Australia, in its trefoil and quadrifoil reticulation pattern, in the absence of a posterodorsal rib and in its more subrectangular caudal process. It also differs from *Eucytherura cameloides* McKenzie *et al.*, 1993, from the Eocene of Australia, in its less costellate surface, less pronounced eye tubercle and its ornamented caudal process.

Eucytherura sp. 2
Figure 7Q–R

Material. One valve from sample 3; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3306, 0.336 (L), 0.198 (H).

Diagnosis. A very small and subquadrate species of *Eucytherura* with distinctly subtruncate anterodorsal margin. Surface coarsely ornamented with well-developed muri, with scarce conjunctive simple pores, and solae of very variable shape, depressed sieve plates, with irregular, often simple, trefoil or bifid outlines. Short posterior caudal process and with a ventrolateral rib and non-prominent sub-alar process.

Remarks. Differs from *Eucytherura stibaros* sp. nov. of this study in the shape of its anterior and posterior margins and the less well-developed eye tubercle, which is obscured by surface ornamentation, and more peripherally positioned than in *E. stibaros*.

Genus HEMIPARACYTHERIDEA Herrig, 1963

Type species. Hemiparacytheridea oculta (Herrig, 1963) Gründel, 1975.

Hemiparacytheridea sp.
Figure 8A

Material. Two specimens from samples 5 and 14; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3307 (lost), 0.248 (L), 0.125 (H).

Description. Elongate, subrectangular, well-rounded anterior margin with apex at mid-height. Posterior margin caudate with apex above mid-height. Dorsal margin straight to slightly sinuous and strongly inclined to posterior. Ventral margin with a strong oral concavity. Surface with four prominent elevations; one just behind an ocular position, another posteroventrolaterally and another posterodorsally. The fourth is the circular subcentral tubercle which is connected to the posteroventral tubercle by a pronounced sinuous ridge. There is a deep depressed area between this and the posterior margin which is compressed. Numerous large pore canals, all of which seem to be sieve type.

Remarks. This species differs from *Hemiparacytheridea hemingwayi* Neale, 1975 of Guzel (2012) from the Cretaceous of Western Australia, by its shorter ventrolateral rib, well-developed subcentral tubercle and more distinct median vertical sulcus. It also differs from *Hemiparacytheridea ewingensis* Dingle, 1984 from the early–middle Albian of South Africa, in its less well-developed ornament,

in lacking a caudal process and less well-developed anteromarginal rim and in posterodorsal inflation.

Genus HEMINGWAYELLA Neale, 1975

Type species. *Hemingwayella* (*Parahemingwayella*) *barkeri* Dingle, 1984.

Hemingwayella verrucosus sp. nov. Ceolin and Whatley
Figure 8B–D

LSID. urn:lsid:zoobank.org:act:B61C65E7-E16A-4913-9019-8DCBD1ECAE3A

Derivation of name. L. *verrucosus*, full of warts, many warts. With reference to the many wart-like protuberances on the surface of this species.

Type material. Holotype: adult valve, LM-FCEN 3308 (lost; Fig. 8B); paratypes: LM-FCEN 3309–3310 (Fig. 8C–D).

Material. Four specimens from sample 21; Danian.

Diagnosis. A typical species of *Hemingwayella*, except for its considerably strong reticulation, in which posteriorly the muri are preferentially elongated subhorizontally and interacting with vertical muri forming an open network. Anteriorly, in the dorsal two-thirds, the vertical muri are strongest. There are several parallel ribs on the ventral margin.

Dimensions. In mm:

		L	H	
Holotype, adult	LM-FCEN 3308 (lost)	0.429	0.171	Sample 21
Paratype, juvenile	LM-FCEN 3309	0.374	0.164	Sample 21
Paratype, adult	LM-FCEN 3310	0.382	0.134	Sample 21

Description. Small, very elongate subrectangular, somewhat pointed posteriorly in lateral view. Subhexagonal and alate in dorsal view with compressed ends. Anterior margin broadly rounded with apex below mid-height; anteroventral part more convex and dentate, anterodorsal less convex without denticles. Posterior margin subcaudate and bluntly pointed a little above mid-height. Dorsal margin straight to gently sinuous only overhung by the dorsal rib posterodorsally. Ventral margin notably sinuous. Greatest length a little above mid-height; greatest height anterior of eye tubercle; greatest width at one-fifth posteriorly. Ornament reticulocostate, strongly developed. The eye tubercle is proportionally very large, subcircular and essentially smooth. The subcentral tubercle is very large, rimmed by a riblet and bearing prominently the four elongate adductor scars clearly visible in external view. From an elevated ornate posterodorsal eminence, a short vertical rib extends down to about mid-height and a dorsal rib extends sinuously to a mid-dorsal prominence. Anterior of the subcentral tubercle, the muri of the reticulum are exaggerated in the vertical plane, but terminate in the sinuous ventrolateral rib that extends from the anterocentral margin, circumvents the subcentral tubercle ventrally and forms a distinct edge to the lateral surface before terminating posteroventrally in a sub-alar process. Beneath it, on the ventral surface, are a number of parallel ribs. There is a median sulcus between the eye tubercle and the median prominence and ending posterior of this structure. The reticulation comprises large angular reticular cells, ranging from quadrate to rectangular to polygonal, with the preferential orientation of the muri being horizontally. The extreme posterior surface is less ornamented, almost smooth. The surface is atuberculate although some small pore conuli open virtually flush with the surface.

Remarks. Differs from *Hemingwayella* sp. Guzel, 2012 in its less strongly developed pattern of reticulation and the absence of a hinge ear in LV. It also differs from the type species *Hemingwayella pumilio* (Brady, 1880) in its more reticulate surface and its rounded caudal process. *H. verrucosus* is also higher. The present species exhibits similarities with *H. ornata* Bate, 1972 described from the Santonian of Gingin, Western Australia, but differs in the well-developed and reticulate caudal process and in its well-defined reticulation pattern. Differs from *H.* (*Parahemingwayella*) *barkeri* Dingle, 1984 from the early–middle Albian of South Africa, in having a discontinuous and less developed diagonal longitudinal rib to the posterior cardinal angle and by absence of punctate regions. Differs from *Hemingwayella rionegrina* (Bertels, 1974) in being less inflated in dorsal view, in the absence of three strong horizontal ribs, in its spinose anterior and posterior margins.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Family LOXOCONCHIDAE Sars, 1925

Genus HEINIA Van den Bold, 1985

Type species. *Heinia howei* Van den Bold, 1985.

Heinia prostratopleuricos sp. nov. Ceolin and Whatley
Figure 8E–H

LSID. urn:lsid:zoobank.org:act:444BD07F-1693-4390-A9F8-3BCF54D42D28

Derivation of name. Gr. *προστατος*, prostratos, to be laid flat; plus *πλεύρικος*, pleurikos, of the rib. With reference to the fact that the ribs of this species resemble a recumbent 'U'.

Type material. Holotype: one carapace, LM-FCEN 3400 (Fig. 8E); paratypes: LM-FCEN 3401–3402 (Fig. 8F–H).

Material. Five specimens from sample 21; Danian.

Diagnosis. A small, elongate species of *Heinia* with surface ornament comprising a series of seven individual recumbent 'U'-shaped ribs that do not achieve the anterior margin or posterior end. LV overlaps the RV.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3400	0.386	0.185	0.132	Sample 21
Paratype, adult	LM-FCEN 3401	0.352	0.170	0.125	Sample 21
Paratype, adult	LM-FCEN 3402	0.398	0.182		Sample 21

Description. A small, elongate and subtriangular carapace in lateral view. Subovate with pointed posterior end in dorsal view. Anterior margin well rounded with apex at mid-height and with well-developed marginal rim. Posterior margin bluntly pointed with almost subventral apex. Dorsal margin anteriorly convex, posterior straight and steeply inclined to the posterior. Ventral margin gently concave about an anteromedian oral incurvature. The marginal rim extends around the posteroventral and dorsal margins. LV slightly larger than RV with some dorsal, anterior and posterodorsal overlap. Greatest length below mid-height; greatest height at anterior one-third; greatest width at posterior one-third. Ornament reticulocostate. A series of seven ribs extend across the carapace from individual origin, parallel to one another and do not reach the dorsal or ventral margins. Mid-posterolaterally, they bend round and then extend anteriorly, terminating against the smooth anteromarginal area. They resemble a series of recumbent 'U'-shapes, folded on the posterior side and concave towards the anterior. The intercostal areas are reticulate as is the wide area embraced by the recumbent 'U'. The muri of the ribs and those that defines the reticulation are perforated by pores that seem to be simple. Calcified inner lamella very wide anteriorly. CMS with adductors in a row of four and a 'U'-shaped frontal scar anterior of the second and third adductors, with two mandibular scars ventrally. Hinge gongylodont with, in the RV, the anterior socket enclosing a stepped, strongly elevated tridentine boss, a smooth anteromedian groove and single socket enclosed by a boss-like tooth posteriorly and a smooth ridge tooth dorsally and anteriorly.

Remarks. While the shape and outline of this species resembles that of other, younger members of the genus, its ornament is very different. It seems to be the oldest known species of *Heinia* by some considerable degree.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Genus LOXOCONCHA Sars, 1866

Type species. Cythere impressa Baird, 1850.

Loxoconcha sp. aff. *Loxoconcha cretacea* Alexander, 1936
Figure 8I

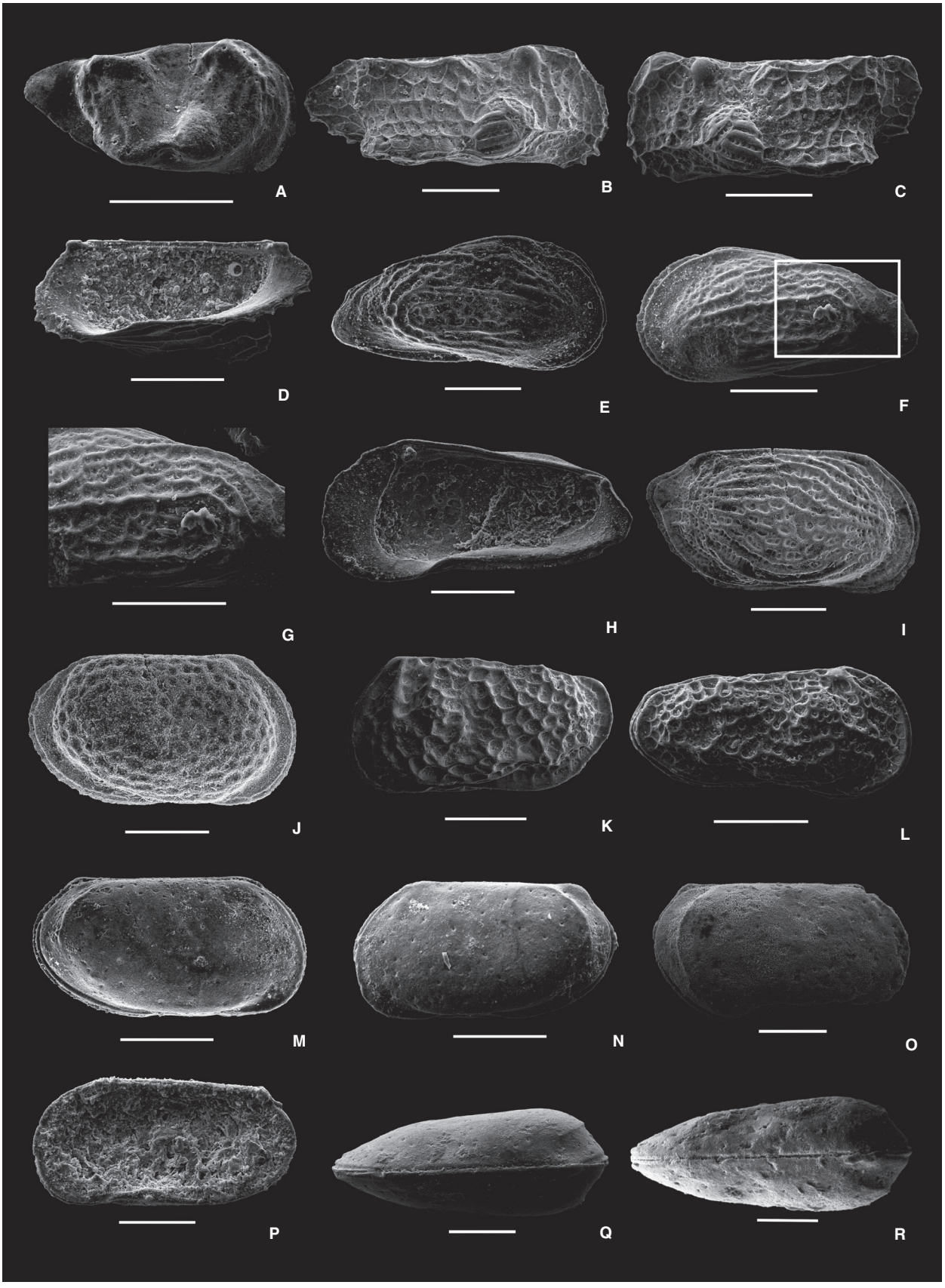
Material. One adult valve from sample 19; Danian.

Dimensions. Adult valve, LM-FCEN 3403, 0.425 (L), 0.226 (H).

Diagnosis. A reticulocostate species of *Loxoconcha* in which the lateral surface is dominated by ribs that in the dorsal half of the valve are convex upwards, but in the ventral half of the valve are strongly concave. Intercostal areas with large punctae between the ribs, although anteriorly and posteriorly they are crosscurrent. Anterior margin rounded but posterior caudate and upturned above mid-height.

Remarks. This species is very similar to *Loxoconcha cretacea* Alexander, 1936, from the Maastrichtian of Maryland. Due to the paucity of material and poor preservation, it has been difficult to confirm the diagnostic characters of *L. cretacea*. There are subtle differences in the dorsal

FIG. 8. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Hemiparacytheridea* sp., LM-FCEN 3307 (lost), adult valve, right lateral view. B–D, *Hemingwayella verrucosus* sp. nov.; B, holotype, LM-FCEN 3308 (lost), adult valve, right lateral view; C, paratype, LM-FCEN 3309, juvenile valve, left lateral view; D, paratype, LM-FCEN 3310, adult valve, internal view. E–H, *Heinia prostatopleuricos* sp. nov.; E, holotype, LM-FCEN 3400, adult carapace, right lateral view; F–G, paratype, LM-FCEN 3401, adult carapace; F, left lateral view; G, detail of the ribs; H, paratype, LM-FCEN 3402, adult valve, internal view. I, *Loxoconcha* sp. aff. *Loxoconcha cretacea* Alexander, 1936, LM-FCEN 3403, adult valve, right lateral view. J, *Palmoconcha similis* (Bertels, 1973), LM-FCEN 3404, adult female carapace, right lateral view. K, *Sagmatocythere*? sp. 1, LM-FCEN 3405, adult valve, left lateral view. L, *Sagmatocythere*? sp. 2, LM-FCEN 3406, adult carapace, right lateral view. M–R, *Loxoconcha* (s.l.) *posterocosta* sp. nov.; M, Q, holotype, LM-FCEN 3407, adult female carapace; M, right lateral view; Q, dorsal view; N, paratype, LM-FCEN 3408, adult female carapace, left lateral view; O, paratype, LM-FCEN 3409, adult male carapace, right lateral view; P, paratype, LM-FCEN 3410, adult female valve, internal view; R, paratype, LM-FCEN 3411, adult male carapace, dorsal view. All scale bars represent 100 μm.


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margin, it being more elongate than Alexander's species and with a less acuminate caudal process.

Genus PALMOCONCHA Swain and Gilby, 1974

Type species. *Palmoconcha laevimarginata* Swain and Gilby, 1974.

Palmoconcha similis (Bertels, 1973)
Figure 8J

1973 *Loxoconcha similis* Bertels, p. 327, pl. 5, fig. 5a–b.

Material. 547 specimens from samples 21, 26, 29, 31, 34, 36, 39, 40, 50, 53, 55 and 57; Danian.

Dimensions. Adult carapace, LM-FCEN 3404, 0.456 (L), 0.258 (H).

Remarks. This is clearly *Palmoconcha*, not *Loxoconcha* on the basis of its shape and the outline of the carapace.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels 1973); Cerro Azul, General Roca.

Genus SAGMATOCYTHERE Athersuch, 1976

Type species. *Sagmatocythere napoliana* (Puri, 1963) Athersuch, 1976.

Sagmatocythere? sp. 1
Figure 8K

Material. Four specimens from sample 5; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3405, 0.410 (L), 0.210 (H).

Description. Subrectangular to elongate, subrhomboidal in LV; more subrectangular in RV in lateral view. Anterior margin broadly rounded with apex below mid-height, posterior margin more narrowly rounded with apex well above mid-height. Dorsal margin straight, ventral margin with shallow oral incurvature and well-developed posteroventral keel. Ornament reticulocostate with large scallop and other shaped cells. Strong ventrolateral ridge in a form of three ribs which define the ventral edge of the lateral surface and which anteroventrally, inclines upwards through 90° into a single rib, which reaches the dorsal margin just anterior of the eye tubercle. A distinct lateral sulcus extends obliquely anteroventrally from the eye tubercle to about mid-height. Posteroventrally, especially in the RV, the ventrolateral rib becomes subalate. Marginal rim absent. Sexual dimorphism well developed with males longer and proportionally less high than females.

Remarks. This species is placed in *Sagmatocythere*, as being the most appropriate genus in the Loxoconchidae to which the gongylodont hinge requires its placement.

Sagmatocythere? sp. 2
Figure 8L

Material. Three specimens from samples 29 and 34; Danian.

Dimensions. Adult valve, LM-FCEN 3406, 0.353 (L), 0.166 (H).

Diagnosis. Elongate, subrectangular, rounded anterior margin, posterior margin bluntly pointed at mid-height. Dorsal margin straight to sinuous, sloping posteriorly. Ventral margin biconvex about oral concavity. Ornament of ribs and reticulae. A strong, smooth peripheral marginal rim surrounds the free margin. A strongly anastomosing and ramifying rib extends anteroventrally from the eye tubercle and is composed of large muri. There is a well-developed ventrolateral rib and a posterodorsal cluster of ribs making an eminence in that position, immediately ventral to which is an excavated area. The median sulcus and all other elements of the carapace are strongly reticulated.

Remarks. This species is tentatively placed in *Sagmatocythere* due to the fact that it shares some external characteristic with the referred genus. This matter will be better resolved on the acquisition of open valves. The appearance of the present species suggests it is male.

Incertae sedis
Loxoconcha (s.l.) *posterocosta* sp. nov. Ceolin and Whatley
Figure 8M–R

LSID. urn:lsid:zoobank.org:act:5156B040-5628-482E-AA4B-3223B0350779

Derivation of name. L. *postero*, the back, behind; plus *costa*, a rib. With reference to the obvious single rib in the posterior area that is parallel to the posterior margin.

Type material. Holotype: one complete carapace, LM-FCEN 3407 (Fig. 8M, Q); paratypes: LM-FCEN 3408–3411 (Fig. 8N–P, R).

Material. 45 specimens from samples 34 and 36; Danian.

Diagnosis. An elongate subovate loxoconchid species, characterized by a smooth lateral surface apart from a curved rib extending down from the posterior part of the dorsal rib, and parallel to the posterior margin.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3407	0.398	0.205	0.178	Sample 34
Paratype, female	LM-FCEN 3408	0.408	0.213	0.175	Sample 34
Paratype, male	LM-FCEN 3409	0.429	0.235	0.167	Sample 34
Paratype, female	LM-FCEN 3410	0.401	0.194		Sample 34
Paratype, male	LM-FCEN 3411	0.471	0.245	0.194	Sample 34

Description. Subquadrate (female), subrectangular (male) in lateral view. In dorsal view, hastate with margins convergent anteriorly. Anterior margin very broadly rounded with apex just below mid-height. Posterior margin poorly rounded with apex at mid-height, posterodorsal slope concave and posteroventral slope strongly convex. Dorsal margin straight between well-marked dorsal cardinal angles. Ventral margin gently convex except for oral incurvature anteroventrally. Weak marginal rims occur in both valves and a pronounced arcuate rib extends from near the posterior termination of the dorsal rib in an arc to its posteroventral termination. Surface smooth in well-preserved specimens with numerous large pores spread around the surface. In male, the oral invagination is stronger than in females. Greatest length above mid-height; greatest height at anterior cardinal angle; greatest width one-third posteriorly. Internal features not seem. Sexual dimorphism with males more elongate and narrower than females.

Remarks. Differs from *Loxoconcha bullata* Hartmann, 1956, figured in Whatley *et al.* (1997, pl. 7, figs 16–17) by its much straighter dorsal margin and subrectangular shape and by lacking ornamentation, apart from a posterodorsal arcuate rib. Differs from *Palmoconcha similis* (Bertels, 1973) from the Danian of Fortín General Roca, Río Negro Province, in being more elongate and in its smooth surface. The main difference is observed in males, with more concave oral incurvature than in Bertels' species.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Family PECTOCYTHERIDAE Hanai, 1957

Genus KEIJIA Teeter, 1975

Type species. Keijia demissa (Brady, 1868*b*) Teeter, 1975.

Keijia circulodictyon sp. nov. Ceolin and Whatley
Figure 9A–E

LSID. urn:lsid:zoobank.org:act:B81FAC54-E9AF-45A5-B83A-5662CF10AB1C

Derivation of the name. L. *circulus* round, circle. (from Gr. *κίρκος*); plus *δικτυον* dictyon, net. With reference to the rounded elements of the reticulum.

Type material. Holotype: one complete carapace, LM-FCEN 3412 (Fig. 9A); paratypes: LM-FCEN 3413–3416 (Fig. 9B–E).

Material. 104 specimens, mainly adults from sample 34 and 36; Danian.

Diagnosis. A strongly built species of *Keijia* with flattened marginal rim around free margins and centrally an elevated area of strong reticulation, with deep rounded cells bearing sieve plates and strong broad muri with micropunctate micro-ornament.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3412	0.419	0.426	0.182	Sample 34
Paratype, female	LM-FCEN 3413	0.408	0.215	0.175	Sample 34
Paratype, female	LM-FCEN 3414	0.406	0.211		Sample 34
Paratype, female	LM-FCEN 3415	0.402	0.207	0.170	Sample 34
Paratype, male	LM-FCEN 3416	0.408	0.215	0.169	Sample 34

Description. Small, elongate, subrectangular in lateral view, also subrectangular in dorsal view with very flared anterior margin. Anterior margin broadly rounded with a smooth, thin, narrow rim that extends onto the ventral margin. Apex just below mid-height. Posterior margin diagonally subtruncated with a distinct angle dorsally and more rounded ventrally. Dorsal margin straight sloping posteriorly. Ventral margin, medianly obscured by valve tumidity and ventrolateral rib, biconvex about oral concavity. Greatest length just below mid-height; greatest height at the anterior cardinal angle; greatest width equal between cardinal angles. LV larger than RV with strongest overlap dorsally and ventrally. Very strongly ornamented with large circular reticulae, bounded by very strong muri, which bear a secondary ornament and are irregularly punctate. Centrally and anteroventrally, extremely strong muri are developed and the larger, inflated dorsal and anterior ribs parallel to the margins become the ventrolateral rib, a less massive, but nevertheless strong structure that terminates with a large pore conulus above the posterior surface. Large sieve plates occur in some fossae and simple pores occur on the muri but are not abundant. In dorsal view, the great strength of the marginal rib is clearly demonstrated. Sexual dimorphism pronounced with males more elongate and less inflated than females.

Remarks. Differs from *Keijia kratistos* sp. nov. in the absence of ribs, in its subcentral tubercle, and also in the

nature of the reticulation and in being more rounded. Differs from *Keijia flexuosa* (Bertels, 1975*a*) in its anterior rim and in the pattern of reticulation, especially anteriorly.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Keijia kratistos sp. nov. Ceolin and Whatley
Figure 9F–J

LSID. urn:lsid:zoobank.org:act:BB516130-83FE-4D1B-9A49-BA6F00B9D31C

Derivation of name. Gr. κρατιστος, strongest. With reference to the fact that, with its particular ornament, this species probably has the strongest carapace of the genus.

Type material. Holotype: one complete carapace, LM-FCEN 3417 (Fig. 9F); paratypes: LM-FCEN 3418–3421 (Fig. 9G–J).

Material. 411 specimens from samples 19, 21, 23, 26, 29, 31, 34, 36, 39, 40, 50 and 53; Danian.

Diagnosis. A very strongly constructed species of *Keijia* with an elevated reticulate area, surrounded by a strong, smooth, boundary rim. A number of strong mural ribs and large reticular cells of varying shape.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3417	0.464	0.241	0.178	Sample 34
Paratype, female	LM-FCEN 3418	0.422	0.226	0.175	Sample 21
Paratype, female	LM-FCEN 3419	0.502	0.253		Sample 21
Paratype, female	LM-FCEN 3420	0.459	0.250	0.206	Sample 21
Paratype, male	LM-FCEN 3421	0.461	0.249	0.183	Sample 21

Description. In lateral view, a median, elongate, subrectangular species. Subovate in dorsal view. LV larger than RV with distinct overlap dorsally and posteriorly. Anterior margin broadly rounded with a distinct but weak marginal rim without denticles. Posterior margin truncate without notable angles of truncation. Dorsal margin anteriorly straight, sinuous in posterior part. Ventral margin bilobate about a shallow oral concavity. Greatest length at about mid-height; greatest height at anterior cardinal angle; greatest width at one-third posteriorly. Ornament of very strong reticulation and ribs. A marginal rib, parallel to the anterior margin and extending ventrolaterally, obscures the ventral margin and comes to a small spinose structure posteroventrally, before extending onto the dorsal margin and eventually to the dorsal margin as a smooth rim. At the posterior cardinal angle, it changes course through 45° to form the posterior border of the elevated area. The reticulum is very strong with large cells and strong muri, which vary in being either smooth or microtuberculate. From the vertical posterior rib, a strong rib extends to the large subcentral tubercle. Below the dorsal rib, a number of strong parallel muri directed anteroventrally, always terminate at the first cell that they encounter. Sexual dimorphism pronounced with males more elongate and narrower than females.

Remarks. This species is similar to *Keijia huantraicoensis* (Bertels, 1969*a*) differing in its smaller size and in the reticulation pattern being less costate, but mainly in the posterodorsal rib, and in being more reticulate.

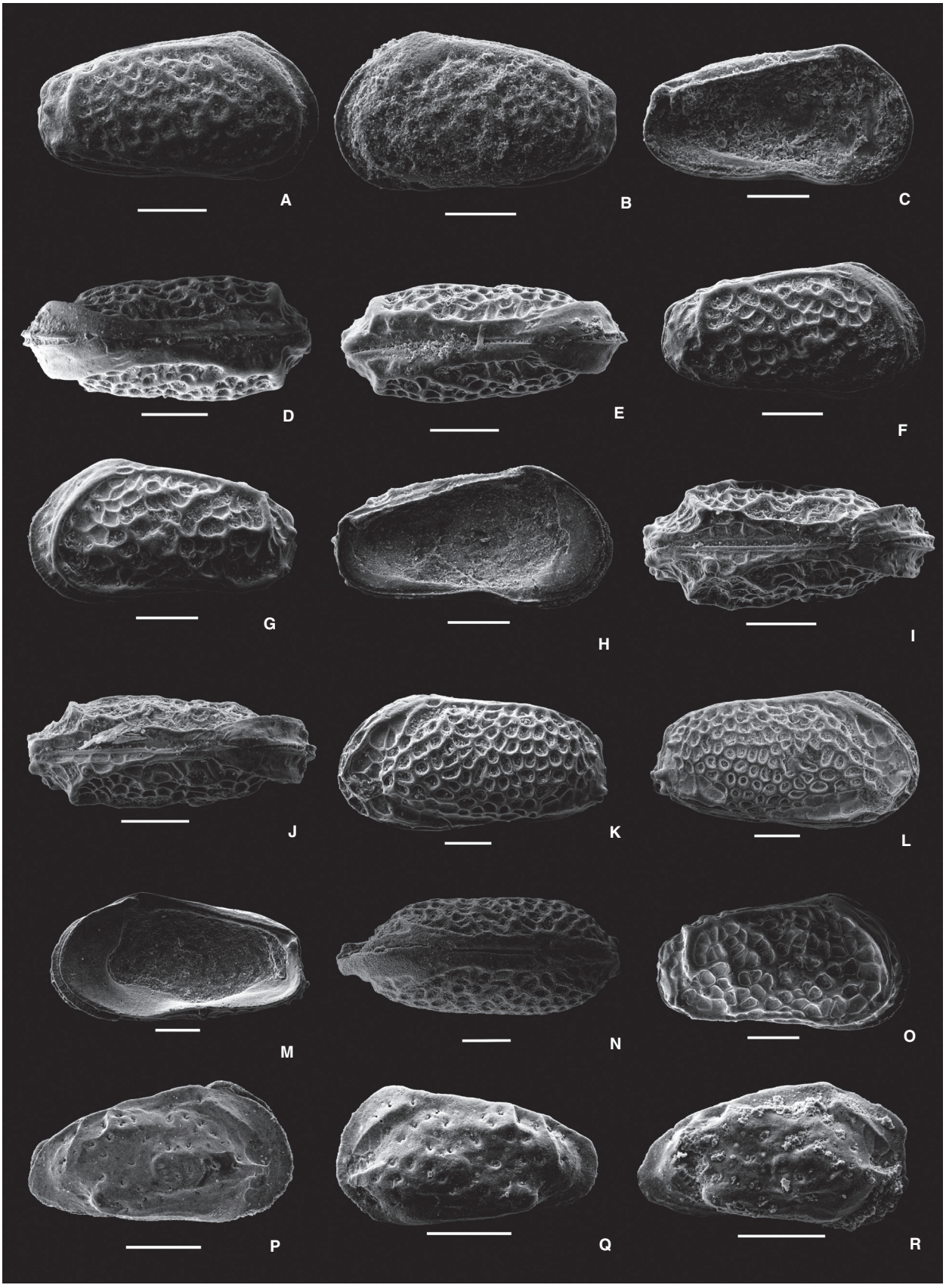
Stratigraphical range. Danian of Cerro Azul, General Roca.

Keijia flexuosa (Bertels, 1975*a*)
Figure 9K–N

1975*a* *Cytheromorpha*? *flexuosa* Bertels, p. 128, pl. 6, fig. 13a–b.

Type material. Specimen described by Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales in holotype LM-FCEN 602, paratypes LM-FCEN 867–868; plus four paratypes from this study: LM-FCEN 3422–3425 (Fig. 9K–N).

FIG. 9. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–E, *Keijia circulodictyon* sp. nov.; A, holotype, LM-FCEN 3412, adult female carapace, right lateral view; B, paratype, LM-FCEN 3413, adult female carapace, left lateral view; C, paratype, LM-FCEN 3414, adult female valve, internal view; D, paratype, LM-FCEN 3415, adult female carapace, dorsal view; E, paratype, LM-FCEN 3416, adult carapace, male, dorsal view. F–J, *Keijia kratistos* sp. nov.; F, holotype, LM-FCEN 3417, adult female carapace, right lateral view; G, paratype, LM-FCEN 3418, adult female carapace, left lateral view; H, paratype, LM-FCEN 3419, adult valve, internal view; I, paratype, LM-FCEN 3420, adult female carapace, dorsal view; J, paratype, LM-FCEN 3421, adult male, carapace, dorsal view. K–N, *Keijia flexuosa* (Bertels 1975*a*); K, paratype, LM-FCEN 3422, adult carapace, left lateral view; L, paratype, LM-FCEN 3423, adult carapace, right lateral view; M, paratype, LM-FCEN 3424, adult valve, internal view; N, paratype, LM-FCEN 3425, adult carapace, dorsal view. O, *Keijia huantraicoensis* (Bertels, 1969*a*); LM-FCEN 3426, adult female carapace, right lateral view. P–R, *Paramunseyella epaphroditus* sp. nov.; P, holotype, LM-FCEN 3427, adult carapace, right lateral view; Q, paratype, LM-FCEN 3428, adult valve, left lateral view; R, paratype, LM-FCEN 3429, adult valve, right lateral view. All scale bars represent 100 μm.


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Material. 33 specimens from samples 1, 5, 8 and 12 (Maastrichtian) plus the type and other material housed in the collections of the Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina.

Diagnosis. A very strong reticulate *Keijia* with a marked smooth rim dorsally and anterodorsally, which reduces ventrally by anastomosis and ramification. Extreme anterior surface demarcated by very weak muri as opposed to those forming the reticulation. Large pore conuli with large pores posteriorly.

Dimensions. In mm:

		L	H	W	
Paratype, adult	LM-FCEN 3422	0.604	0.312		Sample 5
Paratype, adult	LM-FCEN 3423	0.591	0.303	0.248	Sample 5
Paratype, adult	LM-FCEN 3424	0.589	0.293		Sample 5
Paratype, adult	LM-FCEN 3425	0.649	0.305	0.257	Sample 8

Description. Large, elongate, subrectangular in lateral view, ovate in dorsal view and strongly compressed anteriorly with prominent, rounded posterior margin and a strong dorsal rim. The width between the cardinal angles remains approximately the same. Non-sulcate. Anterior margin asymmetrically rounded with apex well below mid-height; anterodorsal slope long and gently convex; anteroventral slope shorter and more strongly convex. Posterior margin truncated with subventral apex. Dorsal margin medianly concave, posteriorly obscured by dorsal rim. Ventral margin biconvex about a distinct oral incurvature whose apex is behind mid-length. Greatest length below mid-height; greatest height through anterior cardinal angle; greatest width medianly. Ornament essentially reticulate. A strong dorsal rim extends anteriorly before ramifying and anastomosing subparallel to the anterior margin and onto the ventral margin. This entire rim is smooth and divided by tubercles. There is a depressed area behind this rim anteriorly, separated into two large cells by weak, narrow muri. This depressed area extends onto the ventral margin. The remainder of the valve surface is a strong reticulum with broad, smooth muri, which in the anterior part shows a diagonal preference from mid-dorsal towards the anteroventral region. Fossil cells mainly circular or oval and possibly floored by sieve plates. Relatively few, simple, small pore conuli occur conjunctively on the muri. Posteriorly, there are several large conuli containing large pores. Hinge pentodont. Inner lamella broad anteriorly, narrower posteriorly. CMS not seen.

Remarks. Differs from *Keijia patagonica* Whatley *et al.*, 1997 from the Recent of Patagonia, in its anterior depression, different pattern of reticulation and in the presence of two posteroventral spines. This species occurs very early, and is possibly the earliest of the genus.

Stratigraphical range. Maastrichtian of Fortín General Roca (Bertels 1975*a*) and Cerro Azul, General Roca.

Keijia huantraicoensis (Bertels, 1969*a*)
Figure 9O

1969*a* *Munseyella huantraicoensis* Bertels, p. 284, pl. IV, fig. 1a.

Material. 199 specimens from samples 14; Maastrichtian; 16, 17, 19, 21, 23, 26, 29 and 31; Danian.

Dimensions. Adult carapace, LM-FCEN 3426, 0.521 (L), 0.280 (L).

Remarks. Differs from all the other *Keijia* species in this study by having stronger ribs, mainly on the dorsal and posterodorsal margin, with the secondary reticulation being less well developed.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca and Danian of Huantrai-co, Neuquén Province (Bertels 1969*a*).

Genus PARAMUNSEYELLA Bate, 1972

Type species. *Paramunseyella austracretacea* Bate, 1972.

Paramunseyella epaphroditus sp. nov. Ceolin and Whatley
Figures 9P–R, 10A–B

LSID. urn:lsid:zoobank.org:act:E9538080-2871-446F-9877-BA40DCD8036C

Derivation of name. Gr. *επαφρολίτος*, lovely, charming. An apt name for such a species.

Type material. Holotype: one compete carapace LM-FCEN 3427 (Fig. 9P); paratypes: LM-FCEN 3428–3431 (Figs 9Q–R, 10A–B).

Material. 24 specimens from samples 3, 5 and 12; Maastrichtian.

Diagnosis. A small, subtriangular species with an anterior hinge ear in LV, flattened marginal rim around margins and elevated central area made up of a series of mounds ribs and riblets. Interornamental surface smooth, but bearing deep slit-like pores.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3427	0.341	0.256	0.125	Sample 3
Paratype, adult	LM-FCEN 3428	0.328	0.178		Sample 5
Paratype, adult	LM-FCEN 3429	0.327	0.175		Sample 5
Paratype, adult	LM-FCEN 3430	0.338	0.175		Sample 5
Paratype, adult	LM-FCEN 3431	0.341	0.254	0.123	Sample 5

Description. A very small, thick-shelled species of *Paramunseyella*, elongate subrectangular in lateral view. Anterior margin broadly rounded with apex below mid-height, with anterodorsal slope longer and more gently convex than anteroventral. Posterior margin subcaudate and bluntly pointed well below mid-height. Dorsal margin straight but appearing sinuous due to periodic overhang by valve surface. Ventral margin mainly overhung by ventrolateral and/or ventral rib. Greatest length below mid-height, greatest height through eye tubercle. Greatest width medianly. Surface ornament rugged and dominated by large tubercles, ribs and very prominent pores. The subcentral tubercle is large and subovate. There is a large tubercle situated just below the dorsal margin, just behind mid-length, and another associated with the termination of the ventrolateral rib. A short, but pronounced rib extends from the eye tubercle subparallel to the anterior margin, terminating in a wide circular pit at mid-height. Above and below this pit are several large, shallow reticulae. A narrow, short, but prominent rib extends from the dorsal margin, a little behind the large dorsal tubercle, obliquely across the valve to its termination above mid-height. The dorsal rib is large, passes above the eye tubercle, and extends as a peripheral rim around the anterior margin and posterodorsally, and also peripherally around the posterior margin. The remainder of the valve and the tubercles bear deep keyhole-like (cribrose) pores, most of which seem to be sieve-type, and some of which contain short calcified rod-like structures resembling setae. Sexual dimorphism not observed. Calcified inner lamella very wide anteriorly with sinuous inner margins. Hinge pentodont with all elements smooth. CMS an oblique line of four small adductors; the antennal scar not seen.

Remarks. This species differs from *Paramunseyella* sp. 5 Guzel, 2012 from the late Maastrichtian, of Western Australia in shape, mainly in straight dorsal and ventral margins and in less 'downturned' posterior subcaudal process. Differs from Genus A sp. Neale, 1975, which is possibly *Paramunseyella*, in the marginal and ventrolateral rims being less well developed.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Genus MUNSEYELLA Van den Bold, 1957*b*

Type species. *Toulminia hyalokystis* Munsey, 1953.

Munseyella costaevermiculatus sp. nov. Ceolin and Whatley
Figure 10C–F

LSID. urn:lsid:zoobank.org:act:9F542D0D-1133-458C-A1BC-3D26D071A286

Derivation of name. L. *costae*; plus *vermiculatus*, worm. With reference to the many ribs on the surface of the species, many of which are notably worm-like.

Type material. Holotype: one valve, LM-FCEN 3432 (Fig. 10C); paratypes: LM-FCEN 3433–3435 (Fig. 10D–F).

Material. Nine specimens from samples 1, 5, 12 and 14; Maastrichtian.

Diagnosis. Species of *Munseyella* with robust rather chaotic costate ornament comprising ribs in a quasi zigzag pattern and lacking a strong intercostal reticulation.

Dimensions. In mm:

		L	H	W	
Holotype, adult	LM-FCEN 3432	0.422	0.224	0.155	Sample 5
Paratype, adult	LM-FCEN 3433	0.428	0.232		Sample 14
Paratype, adult	LM-FCEN 3434	0.420	0.228	0.153	Sample 14
Paratype, adult	LM-FCEN 3435	0.416	0.208		Sample 5

Description. In lateral view, a small, thick-shelled, elongate, subrectangular species of *Munseyella*. Subovate in dorsal view, strongly compressed anteriorly. LV slightly larger than RV with dorsal, anterodorsal and posterodorsal overlap. Anterior margin well rounded with apex below mid-height. Posterior margin more narrowly rounded with apex below mid-height. Greatest length below mid-height; greatest height at anterior cardinal angle; greatest width at one-third posteriorly. Ornament costate. A large, peripheral rib extends around and parallel to all the margins. Posterodorsally, it ramifies with a branch descending subvertically where it branches again, one ramus extending to the marginal rim, another anteriorly where a second very convoluted branch extends to a mid-anterocentral position, where another branch is directed posteroventrally to unite with the marginal rib mid-ventrally. Another short branch extends towards, but does not reach the anterior margin. Another rib from the dorsal margin proceeds very regularly below the dorsal marginal rib and terminates short of the anterior margin. Intercostal areas showing some signs of very irregular ghostly reticulation. Large sieve-type pore canals and simple pores occur mainly on the elevations, but also in

depressions. Internal features not seen. Sexual dimorphism not observed.

Remarks. Differs from *Munseyella laurea* Bertels, 1973, from the Danian of Fortín General Roca, Río Negro Province, in the orientation of its ribs, in having a shorter posterodorsal rib without nodes, in having a more developed posteroventral rib and poorly developed second-order reticulation. It also differs from *Munseyell*a sp. Szczechura, 2001, from the Eocene of Seymour Island, in its narrower ribs, well observed in mid-carapace, and in having stronger ribs on the anteromarginal and posteromarginal margins and in the absence of two dorsomedian nodes.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Genus AMEGHINOCYTHERE Whatley *et al.*, 1997

Type species. Ameghinocythere reticulata Whatley *et al.*, 1997.

Ameghinocythere archaios sp. nov. Ceolin and Whatley
Figure 10G–K

LSID. urn:lsid:zoobank.org:act:BBD27618-B120-4104-9D91-804394D45E7C

Derivation of name. Gr. αρκαιος archaios, from the beginning. With reference to the fact that this seems to be the oldest species of the genus.

Type material. Holotype: One complete carapace, LM-FCEN 3436 (Fig. 10G, J); paratypes: LM-FCEN 3437–3438 (Fig. 10H–I, K).

Material. 13 specimens from sample 21; Danian.

Diagnosis. An early species of *Ameghinocythere* with well-rounded anterior margin, quadrate to rectangular or rhomboidal cells as opposed to rounded in the reticulum, with pore conuli posteriorly.

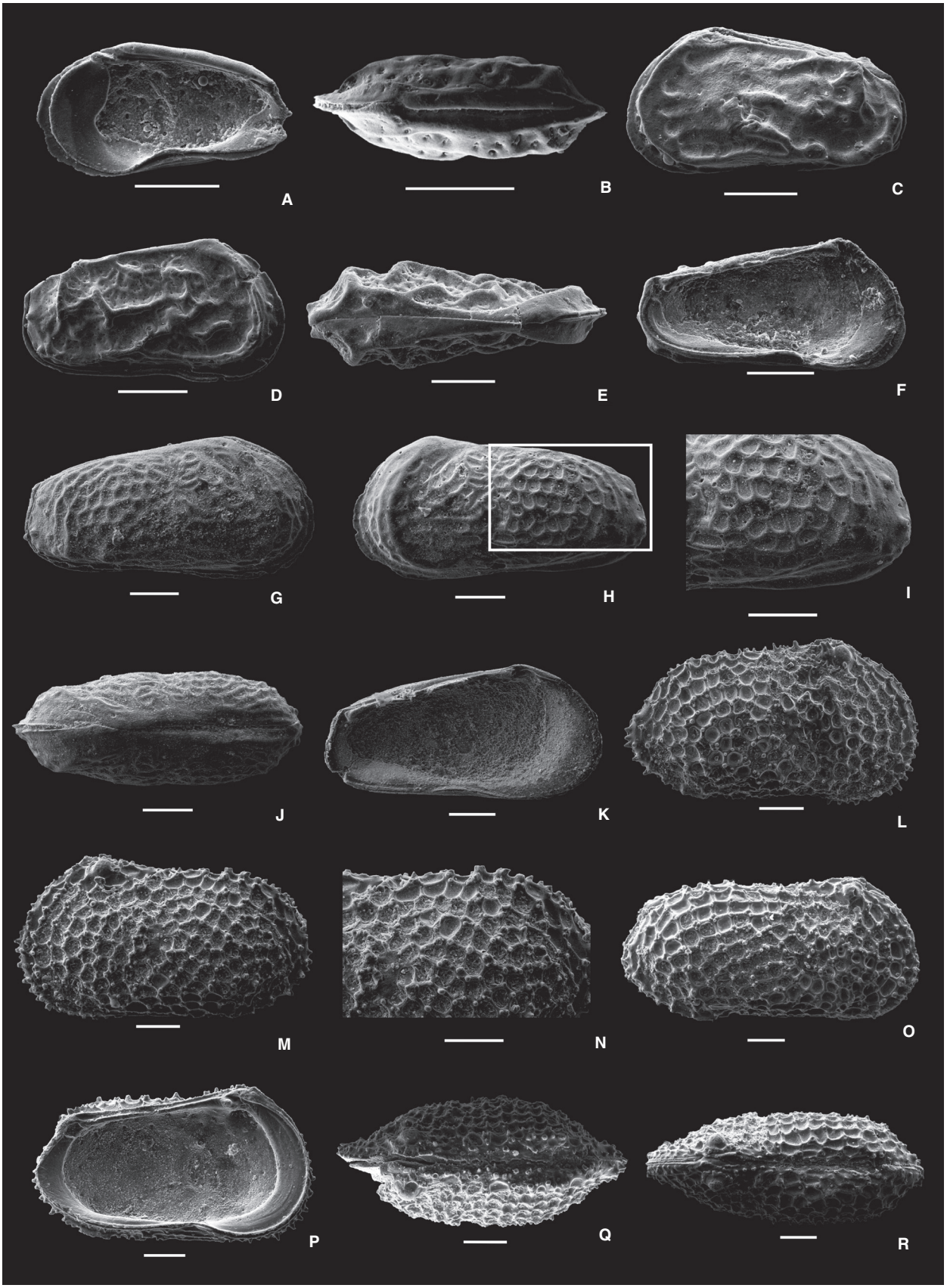
Dimensions. In mm:

		L	H	W	
Holotype adult	LM-FCEN 3436	0.611	0.304	0.233	Sample 21
Paratype, adult	LM-FCEN 3437	0.60	0.296		Sample 21
Paratype, adult	LM-FCEN 3438	0.625	0.311		Sample 21

Description. Median, very elongate in lateral view. Anterior margin broadly rounded with apex well below mid-height. Anterodorsal slope long and gently convex, anteroventral shorter and more strongly convex. Posterior margin obliquely quadrate with apex well below mid-height and defined by a rounded marginal denticle. Posterodorsal slope straight and oblique, posteroventral slope strongly convex. Dorsal margin straight, strongly inclined posteriorly. Ventral margin biconvex about a very gentle oral incurvature. LV larger that RV with conspicuous overlap posteriorly and anterodorsally. Greatest length below mid-height, greatest height through anterior cardinal angle. Ornament reticulate which, in lateral view, resembles rippling waves. The muri at the end margins orientated subparallel to those margins. Simple pore conuli occur conjunctively on the muri and as small rounded perforated tubercles in the posterior area. No apparent eye tubercle. Dorsal marginal area smooth. Hinge pentodont. Calcified inner lamella very wide anteriorly and posteroventrally. CMS not seen.

Remarks. This is a poorly preserved species. It is an important, and probably the earliest, representative of this genus. Differs from *Ameghinocythere reticulata* Whatley *et al.*, 1997 from the Recent of the South West Atlantic, in its less pronounced anterodorsal slope, more concave ventral margin and in its more pronounced overlap posteriorly and ventrally. It is similar to ?*Ameghinocythere* cf. *Cytheromorpha*? *flexuosa* Bertels, 1975*a* identified by Szczechura (2001) from the Eocene of the Seymour Island, Antarctica, by the presence of posterior pore conuli, but differs in the presence of a dorsal marginal rim in the anterodorsal region being without the pronounced slope as observed in Szczechura's species.

FIG. 10. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–B, *Paramunseyella epaphroditus* sp. nov.; A, paratype, LM-FCEN 3430, adult valve, internal view; B, paratype, LM-FCEN 3431, adult carapace, dorsal view. C–F, *Munseyella costaevermiculatus* sp. nov.; C, holotype, LM-FCEN 3432, adult carapace, left lateral view; D, paratype, LM-FCEN 3433, adult carapace, right lateral view; E, paratype, LM-FCEN 3434, adult carapace, dorsal view; F, paratype, LM-FCEN 3435, adult valve, internal view. G–K, *Ameghinocythere archaios* sp. nov.; G, J, holotype, LM-FCEN 3436, adult carapace; G, right lateral view; J, dorsal view; H–I, paratype, LM-FCEN 3437; H, adult valve, left lateral view; I, detail of reticulation; K, paratype, LM-FCEN 3438, adult valve, internal view. L–R, *Aleisocythereis polikothonus* sp. nov.; L, holotype, LM-FCEN 3439, adult female valve, right lateral view; M–N, paratype, LM-FCEN 3440; M, female, left lateral view; N, detail of a cup-like structure; O, paratype, LM-FCEN 3441, adult male valve, right lateral view; P, paratype, LM-FCEN 3442, adult female valve, internal view; Q, paratype, LM-FCEN 3443, adult female carapace, dorsal view; R, paratype, LM-FCEN 3444, adult male carapace, dorsal view. All scale bars represent 100 μm.


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Stratigraphical range. Danian of Cerro Azul, General Roca.

Family TRACHYLEBERIDIDAE Sylvester-Bradley, 1948
Subfamily TRACHYLEBERIDINAE Sylvester-Bradley, 1948

Genus ALEISOCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:80707E98-926B-4340-90C6-475CF6759E52

Derivation of name. From the Gr. *αλεισον*, aleison, a cup; plus *κύθερεις*, cythereis, a common ending for cytheroid Ostracoda. With reference to the fact that many of the reticular cells in this genus contain a cup-like structure, the rims of which abut against the muri and which covers the entire solae.

Type species. Aleisocythereis polikothonus gen. et sp. nov.

Diagnosis. Elongate subovate with rounded anterior margin and bluntly pointed posteriorly. Eye tubercle prominent. Anterior lacking the strong marginal rim, but posterior rim very strong. Ornament reticulate with large, circular, ovate cells, with distinct rims to cup-like structures filling the solae, which are blind and lack sieve plates. Muri relatively weak, bearing small spines, mostly perforate and with simple canals and much more rarely sieve type. Hinge hemiamphidont.

Description. As for the type species.

Included species. Cythereis? *incerta* Bertels, 1975*a* is possibly a member of this genus although the dorsal margin is rather straight. However, we have tentatively included it in *Aleisocythereis* until such time as we can examine in detail its type material in Buenos Aires.

Remarks. It differs from *Hysterocythereis* gen. nov. in its much more prominent eye tubercle, the nature of the reticulation and particularly the development of the tubercles on the reticulum. It also differs in the nature of the ribs on the anterior margin, and particularly the dorsal margin, and in its paramphidont hingement. It also differs from *Sthenarocythereis* gen. nov. which, while it has an eye tubercle of similar development, differs fundamentally in the nature of the reticulum, the muri in *Sthenarocythereis* being much larger and the reticular cells almost anything but circular.

Aleisocythereis polikothonus sp. nov. Ceolin and Whatley
Figure 10L–R

LSID. urn:lsid:zoobank.org:act:2381DF91-81C4-4F91-B0DC-B447F9CFF1DE

Derivation of name. Gr. *πολί*, many, *κοθονός*, a cup, many cups. With reference to the large number of small cup-like structures that fill the solae in this species.

Type species. Holotype: one valve LM-FCEN 3439 (Fig. 10L); paratypes: LM-FCEN 3440–3444 (Fig. 10M–R).

Material. 94 specimens from samples 1, 3, 5, 8, 10 and 12; Maastrichtian.

Diagnosis. Lacking major anterior marginal rim although the posterior marginal rim is very strong. Ornament reticulate with cup-like solae, rather, weak muri and numerous conjunctive spines, and some large conjunctive sieve-type structures. Subcentral tubercle small and strongly eroded by the reticulum.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3439	0.677	0.380		Sample 5
Paratype, female	LM-FCEN 3440	0.703	0.396		Sample 5
Paratype, male	LM-FCEN 3441	0.828	0.411		Sample 5
Paratype, adult, female	LM-FCEN 3442	0.707	0.393		Sample 5
Paratype, adult, female	LM-FCEN 3443	0.689	0.378	0.329	Sample 5
Paratype, adult, male	LM-FCEN 3444	0.791	0.359	0.325	Sample 5

Description. A median, thick-shelled and subovate–elongate carapace in lateral view. Anterior margin broadly and symmetrically rounded with apex at about mid-height; ventrally denticulate. Posterior margin subcaudate with apex below mid-height; posteroventral slope convex, posterodorsal slope concave in part to almost straight. Dorsal margin straight and inclined somewhat to the posterior and slightly overhung by surface ornament in posterior part. Ventral margin with broad oral concavity. In dorsal view compressed at end margins, especially anteriorly. Greatest length below mid-height; greatest height at the anterior cardinal angle; greatest width in posterior one-third. Ornament of large reticulae and with relatively subdued muri. Many of the muri are filled with large, smooth cup-like structures that abut against their walls. Most of them have smooth bottoms. The muri bear rather short tubercles with rounded extremities, some of which are perforated, while others seem to be blind. There are fewer tubercles anterocentrally than elsewhere. In some muri, there are a group of three or four small tubercles in the middle of which there is a small sieve-type pore. Subcentral tubercle not prominent. Eye tubercle well developed. In internal view, there is a wide calcified inner lamella; avestibulate. Hemiamphidont hinge and ocular sinus well developed. Antennal muscle scar 'U'-shaped, inserted in the deep projection of subcentral tubercle. Strong

sexual dimorphism with males more elongate and lower than females.

Remarks. Differs from *Cythereis*? *excellens* Bertels, 1969*a*, from the Maastrichtian of Huantrai-co, by its sinuous dorsal margin with a posterodorsal convexity, in the subcircular muri and smooth cup-like structures in the reticulation.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Genus APATOLEBERIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:C35B381E-F7D4-4F29-9745-9A920E6329A1

Derivation of name. Gr. απατολεβερις apatoleberis, from απατω τελος deceptive, illusory; plus λεβερις, sloughed skin. With reference to the fact that one could be deceived into considering this genus to be *Trachyleberis* Brady.

Type species. Trachyleberis noviprinceps Bertels, 1975*a*.

Diagnosis. A subrectangular genus with anterior margin rounded and posterior margin bluntly pointed, with marginal rim anteriorly and posteriorly. Surface ornamented with tubercles bearing sieve-type pores widely distributed over the valve and varying in size. These are absent from the entire periphery. Subcentral tubercle and eye tubercle well developed. Hinge holamphidont. Frontal scar is 'V'-shaped.

Description. As for the type species.

Included species. Trachyleberis princeps Bertels, 1969*a*, *Trachyleberis noviprinceps* Bertels, 1975*a*, ?*Trachyleberis schizospinosa* Dingle, 1981.

Remarks. This genus is not in any way similar to other new trachyleberid genera erected in this study. It differs from *Trachyleberis* Brady in the absence of a ventrolateral ridge, presence of marginal rim, bluntly pointed posterior end and in the absence, in internal view, of a snap-knob structure ventrally. Differs from *Actinocythereis* Puri in the absence of three well-defined spinose ribs of which the ventrolateral is ascendant. Differs from *Cythereis* Jones in the absence of the three longitudinal ribs and in the posterior not being acuminate. The most similar taxon we have encountered in our study search of the literature is *Trachyleberis schizospinosa* Dingle, 1981 from the Alphared Formation, Agulhas Bank of Port Elizabeth, south-east South Africa from Maastrichtian III, Ostracoda assemblage 4b. The present species, however, is more pointed with apex above mid-height, and although the tubercles are situated similarly in the two taxa, the present species lacks the distinct ventrolateral row of tubercles of the latter. The similarities are sufficient to suggest that Dingle's species, evidently not *Trachyleberis*, belongs to a genus very similar, if not the same as *Apatoleberis* gen. nov.

Apatoleberis noviprinceps (Bertels, 1975*a*)
Figure 11A–E

1975*a* *Trachyleberis noviprinceps* Bertels, p. 104, pl. 2, figs 1–6.
1975*b* *Cythereis*?; Bertels, p. 345, pl. 2, figs 3, a–b; 5.

Remarks. We consider it necessary to redescribe this species, as it is now the type of a new genus.

Type material. Specimen described by Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales in Holotype LM-FCEN 731, paratypes LM-FCEN 732–735, 605; plus five paratypes this study LM-FCEN 3445–3449 (Fig. 11A–E).

Material. 14 specimens from samples 3, 5 and 8 (Maastrichtian), plus the type and other material of Bertels, housed in Facultad of Ciencias Exactas y Naturales, Laboratory of Micropaleontology, Universidad of Buenos Aires, Argentina.

Diagnosis. As for genus.

Dimensions. In mm:

		L	H	W	
Paratype, female	LM-FCEN 3445	0.879	0.488	0.410	Sample 5
Paratype, female	LM-FCEN 3446	0.868	0.507		Sample 5
Paratype, male	LM-FCEN 3447	0.895	0.456		Sample 5
Paratype, female	LM-FCEN 3448	0.875	0.488		Sample 5
Paratype, female	LM-FCEN 3449	0.897	0.458	0.413	Sample 5

Description. A large, subrectangular, elongate species of *Apatoleberis*. Subhexagonal in dorsal view with compressed ends. Anterior margin symmetrically rounded with apex at mid-height, with marginal denticles. Posterior margin bluntly pointed with apex above mid-height and with small tubercles. Dorsal margin straight, slightly overhung by a tubercle in posterodorsal margin. Ventral margin almost straight with more pronounced convexity posteroventrally. LV overlaps the RV mainly at the dorsal cardinal angles. Greatest length at mid-height, greatest height at one-third anteriorly and greatest width at one-third posteriorly. Ornamentation tuberculospinose. Anteromarginal region with an

ocular rib that extends towards the anteroventral margin, where it disappears, to reappear on the posterior margin through to the posterodorsal tubercle. Surface covered with tubercles randomly disposed and of a number of different types. Most are small, with sieve-type pores on their summits but others, with narrower terminations, are simple. These bear smaller conuli on their summit. Two further tubercles, intermediate in size between the smaller and the larger tubercles, occur mid-dorsally and between the subcentral tubercle and the most ventral of the large tubercles, respectively. These have tubercular stems and concave summits surrounded by small turrets. There are three large tubercles posteriorly, aligned vertically. Subcentral tubercle well defined and bearing a group of five smaller tubercles; it has a tubercular apophosis anteroventrally. Calcified inner lamella well developed. Hinge holamphidont. CMS with a row of four adductors and a 'V'-shaped antennal scar. Sexual dimorphism well developed with males more elongate and narrower than females and with a conspicuous reticulation on the surface among the tubercles.

Remarks. *Apatoleberis noviprinceps* (Bertels, 1975*a*) differs from *A. princeps* (Bertels, 1969*a*) in the absence of reticulation and the presence of tubercles on the surface.

Stratigraphical range. Maastrichtian of Fortín General Roca, Río Negro (Bertels, 1975*a*, *b*) and Cerro Azul, General Roca.

Genus MIMICOCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:CDEAC622-48D8-445C-8075-1F890F5A26EC

Derivation of name. From L. *mimicus* (via. Gr. *μίμικός* mimikos), separate from. With reference to the fact that although species belonging to this genus have been described as *Bradleya* Hornibrook, they were simply masquerading as that genus in that they differ fundamentally in a number of characters, especially in the CMS and belong to different families.

Type species. *Bradleya*? *attilai* Bertels, 1975*a*.

Diagnosis. A genus of the Trachyleberididae, short, subrectangular, with strongly rounded anterior margin and less well rounded posterior. Dorsal margin of LV with strong anterior hinge ear, lacking in RV. Remainder of dorsal margin straight, not inclined posteriorly and largely obscured by valve surface. Small posterior hinge ear in LV, ventral margin convex with very slight oral concavity. End margins both dentate. Ornament reticulocostate and tuberculate to varying degrees, with pronounced dorsal, median and ventrolateral ribs, strength of which varies between species. Reticulum with angular cells near margins more circular medianly; simple conjunctive pore conuli, strong subcentral tubercle. Eye spot absent. Hinge holamphidont.

Description. As for the type species.

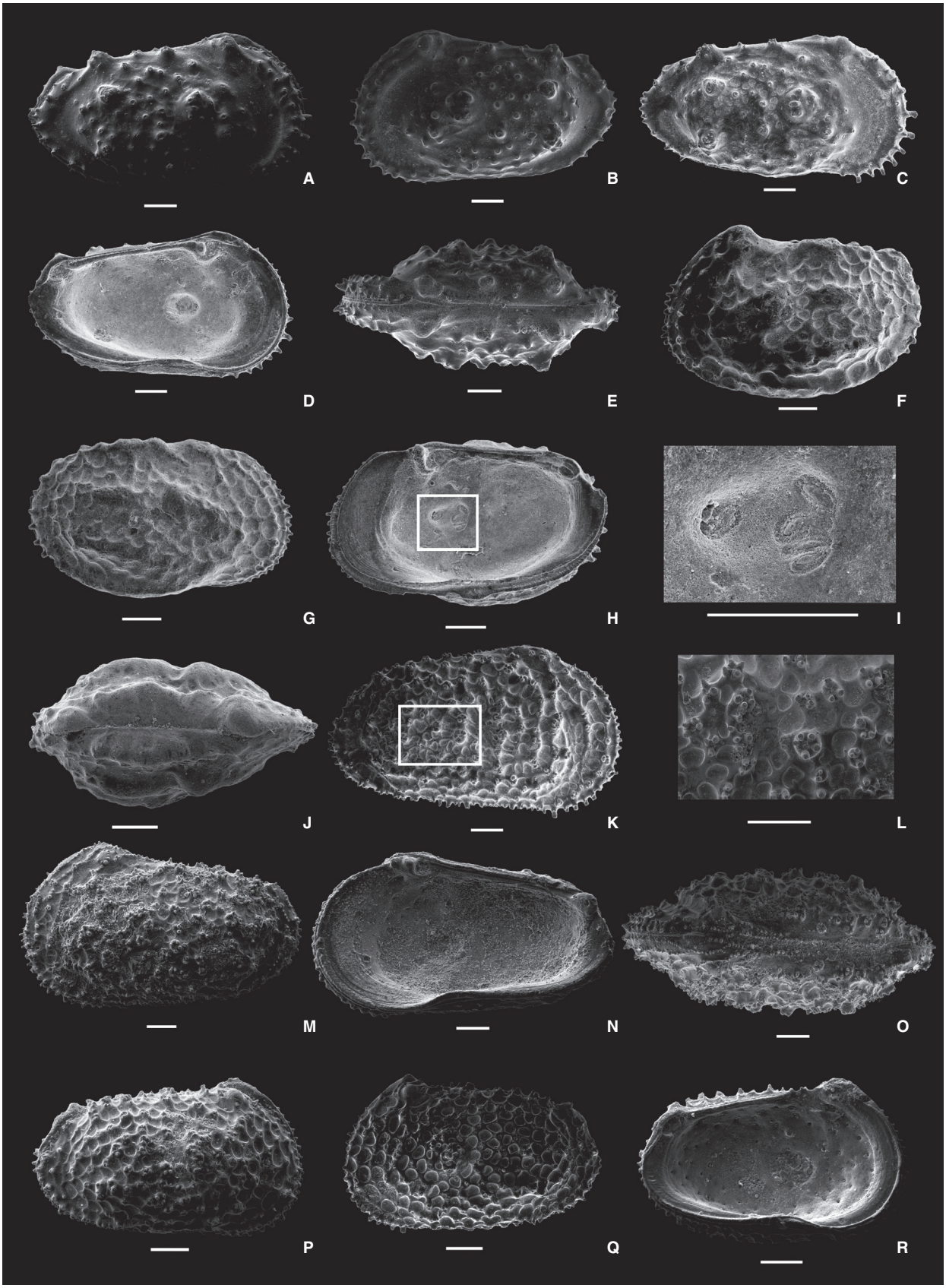
Included species. *Bradleya*? *patagonica* Bertels, 1975*a* and *Bradleya*? *attilai* Bertels, 1975*a*.

Remarks. Bertels (1975*a*) described three species that she assigned to *Bradleya*? Of these, *Bradleya*? *attilai* and *Bradleya*? *patagonica* are clearly congeneric, although they obviously do not belong to *Bradleya.* The third species *Bradleya*? *argentinensis* is a distinctly different genus, possibly related to *Oertliella* Pokorny, because it lacks any traces of the three longitudinal ribs characteristic of *Mimicocythereis*. Although Bertels classified her '*Bradleya*?' species into the Hemicytheridae, they all possess a very evident strongly developed 'V'-shaped frontal scar characteristic of Trachyleberididae. Most modern authors include *Bradleya* within the family Thaerocytheridae Hazel; others, however, prefer to consider this group as a subfamily of Hemicytheridae Puri. In any case, *Mimicocythereis* remains Trachyleberididae due to its frontal muscle scar. The genus differs from *Cythereis* in its holamphidont hinge. *Sthenarocythereis* gen. nov. differs in lacking strong horizontal ribs, in the hinge ear in the LV and in the nature of its reticulotuberculate ornament. *Aleisocythereis* gen. nov. lacks strong horizontal ribs and also differs fundamentally in the nature of the reticulum.

Mimicocythereis attilai (Bertels, 1975*a*)
Figure 11F–J

1975*a* *Bradleya*? *attilai* Bertels, p. 114, pl. 5, figs 6–9.

FIG. 11. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–E, *Apatoleberis noviprinceps* (Bertels, 1975*a*); A, paratype, LM-FCEN 3445, adult female carapace, right lateral view; B, paratype, LM-FCEN 3446, adult female valve, left lateral view; C, paratype, LM-FCEN 3447, adult male, right lateral view; D, paratype, LM-FCEN 3448, adult female valve, internal view; E, paratype, LM-FCEN 3449, adult female carapace, dorsal view. F–J, *Mimicocythereis attilai* (Bertels, 1975*a*); F, paratype, LM-FCEN 3450, adult female valve, left lateral view; G, paratype, LM-FCEN 3451, adult female valve, right lateral view; H–I, paratype, LM-FCEN 3452; H, adult female valve, internal view; I, detail of CMS; J, paratype, LM-FCEN 3453, adult female carapace, dorsal view. K–O, *Castillocythereis multicastrum* gen. et sp. nov.; K–L, holotype, LM-FCEN 3454; K, adult valve, right lateral view; L, multitubercular castle-like pore conuli; M, paratype, LM-FCEN 3455, adult male valve, left lateral view; N, paratype, LM-FCEN 3456, adult male valve, internal view; O, paratype, LM-FCEN 3457, adult female carapace, dorsal view. P–R, *Castillocythereis albertoriccardii* sp. nov.; P, holotype, LM-FCEN 3458, adult carapace, right lateral view; Q, paratype, LM-FCEN 3459, adult valve, left lateral view; R, paratype, LM-FCEN 3460, adult valve, internal view. All scale bars represent 100 μm.


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Remarks. We consider it necessary to redescribe this species, because it has now become the type of a new genus.

Type material. Holotype: specimen described by Bertels, housed in Facultad de Ciencias Exactas y Naturales in Holotype LM-FCEN 821, paratypes LM-FCEN 822–827; plus four paratypes from this study LM-FCEN 3450–3453 (Fig. 11F–J).

Material. 12 specimens from samples 3, 5 and 12 (Maastrichtian), plus the type and other material of Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina.

Diagnosis. A medium, subquadrate species of *Mimicocythereis* with a strong hinge ear in LV and very strong reticulation.

Dimensions. In mm:

		L	H	W	
Paratype, female	LM-FCEN 3450	0.681	0.441		Sample 5
Paratype, female	LM-FCEN 3451	0.695	0.425		Sample 5
Paratype, female	LM-FCEN 3452	1.054	0.527		Sample 5
Paratype, female	LM-FCEN 3453	0.988	0.467	0.343	Sample 16

Description. In lateral view, short, subquadrate in LV; subovate in RV. Subsaggitate in dorsal view with distinct median sulcus and with anterior margin laterally, but conically compressed. Anterior margin broadly but asymmetrically rounded with apex well below mid-height and long gently convex anterodorsal and shorter, more convex anteroventral slopes. There are small denticles in the mid-anterior region. Posterior margin subtruncate to poorly rounded with apex at about mid-height and with small tubercles. Dorsal margin straight, not strongly inclined posteriorly, and obscured in posterior half by dorsal rib. In LV, there is a smaller posterior hinge ear that is absent in RV. Ventral margin gently convex and with a very weak oral incurvature, strongly overhung posteroventrally by ventrolateral rib. Greatest length at about mid-height; greatest height through anterior hinge ear; greatest width in posterior one-third. Ornament reticulocostate. A strong marginal rim comprising two rows of tubercles parallels the anterior margin. The tubercles are perforate with simple and sieve-type pores. This rib extends onto the ventral margin and re-emerges onto the posterior margin as a single row of tubercles. There is a strong dorsal rib overhanging the posterior part of the dorsal margin, and a strong ventrolateral rib without tubercles, but with pore conuli. A median rib extends somewhat diagonally across the valve, being interrupted by the large subcentral tubercle. The reticulum is coarse with angular cells posteriorly and anteriorly and more circular cells medianly. Hinge holamphidont. Calcified inner lamella very wide anteriorly, somewhat less posteriorly. Selvage, lists and striae well developed and numerous peripheral plications at right angles to the margin. CMS with three lower adductors closely adjacent, while the dorsal adductor is at a strong angle to the remainder and is inclined anterodorsally. Frontal scar strongly 'V'-shaped. Sexual dimorphism not observed.

Remarks. Although Bertels described this species as possessing an eye tubercle and internal ocular sinus, we have been unable to observe these characters. This species differs from *Mimicocythereis patagonica* (Bertels, 1975*a*) in its much strong reticulation and less strongly developed lateral ribs.

Stratigraphical range. Maastrichtian of Fortín General Roca, Rio Negro Province (Bertels 1975*a*) and Cerro Azul, General Roca.

Genus CASTILLOCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:5C163507-8F7B-41C0-A725-03A04CB419FD

Derivation of name. L. *castillo*, a fort or castle. With reference to the castle-like tubercle complexes, a number of which occur as part of the reticulum of this genus.

Type species. Castillocythereis multicastrum gen. et sp. nov.

Diagnosis. As for the type species.

Description. As for the type species.

Included species. Castillocythereis multicastrum gen. et sp. nov. Ceolin and Whatley, and *Castillocythereis albertoriccardii* sp. nov. Ceolin and Whatley.

Remarks. Castillocythereis gen. nov. differs from *Trachylebereis* Brady in the absence of an angulate posterior margin, in its dense carapace ornamentation, especially with groups of castellated turrets on the muri, and the absence of a prominent single ocular rib. It differs from *Cythereis* Jones, in the absence of the three longitudinal ribs, the strong anterior peripheral rim; in its bluntly pointed posterior end and in its poorly developed subcentral tubercle. *Apatoleberis* gen. nov. is similar to *Castillocythereis* gen. nov. in shape, but differs in its well-defined anterior and posterior marginal rims, including a strong ocular rib and its prominent subcentral tubercle and in differently tuberculate carapace.

Castillocythereis multicastrum gen. et sp. nov. Ceolin and Whatley
Figure 11K–O

LSID. urn:lsid:zoobank.org:act:816E61A0-D3E5-4D4E-86DD-8581D0B7D286

Derivation of name. L. *multi*, many; plus *castrum*, castles. With reference to the many (often circular) multitubercular castle-like pore conuli on the surface of this species.

Type material. Holotype: one valve, LM-FCEN 3454 (Fig. 11K–L); paratypes: LM-FCEN 3455–3457 (Fig. 11M–O).

Material. 43 specimens from samples 16, 17, 19, 21 and 31; Danian.

Diagnosis. A large, subrectangular valve with reticulate surface and with groups of castellated turrets on the muri, densely distributed over the entire surface. Eye tubercle present. Hinge paramphidont.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3454	0.938	0.529		Sample 16
Paratype, female	LM-FCEN 3455	0.988	0.587		Sample 16
Paratype, male	LM-FCEN 3456	1.054	0.527		Sample 16
Paratype, female	LM-FCEN 3457	0.988	0.586	0.467	Sample 16

Description. Large, elongate subrectangular in lateral view. Subovate in dorsal view with ends largely compressed. Anterior margin broadly rounded with apex below mid-height; long regularly but gently convex, anterodorsal slope with very small marginal denticles and shorter, more convex anteroventral slope with much larger denticles. Posterior margin more narrowly rounded with apex above mid-height, with short posterodorsal slope and small posteromarginal denticles in a double row. Posteroventral slope longer, more convex and with larger denticles in double row. Dorsal margin convex above eye tubercle, behind which this margin is straight and strongly spinose, descending abruptly into a deep sulcus parallel to the posterior margin. Ventral margin strongly spinose with a very gently oral incurvature and not overhung by valve surface or ornament. Greatest length a little above mid-height; greatest height through eye tubercle, greatest width in posterior one-third. Ornament fundamentally of a wide-open reticulum with tubercles and ribs superimposed. Three distinct ribs parallel the anterior margin; they bear the typical clusters of subcircular castellate group of tubercles, which range from having spinose club, or pestle-shape tubercles usually in groups of two to four. Those on the anterior rib are rather small. Others elsewhere on the surface, particularly medianly, are large, circular and bearing five and even seven tubercles, which surround a simple sieve-type pore. These occur conjunctively on the muri and are entirely typical of the ornament of this species. The solae are blind, and all pores seem to occur centrally in the various castra. The eye tubercle is surrounded above by two arcuate rows of very small tubercles. A short median sulcus extends anteromedianly behind the eye and another separates the 'highground' of the anterior from the 'lowground' of the posterior margin. The subcentral tubercle is a very diffuse area of large 'castles'. Calcified inner lamella very wide anteriorly, hinge paramphidont with denticulate median element. CMS with an anterior 'V'-shaped scar. Sexual dimorphism pronounced with males more elongate and narrower than females.

Remarks. The present species differs from *Trachyleberis huantraicoensis* Bertels, 1969*b* mainly in its ornamentation pattern that is less tuberculate and more reticulate, but with well-defined groups of castellated turrets on the muri.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Castillocythereis albertoriccardii sp. nov. Ceolin and Whatley

Figures 11P–R, 12A

LSID. urn:lsid:zoobank.org:act:C5E89FB5-2156-44F1-B6C5-F44DA4CB13C4

Derivation of name. Named in honour of Professor Dr Alberto Riccardi in recognition of his important work on South American Mesozoic palaeontology, especially ammonites, and for his very influential presidency of the IPU, his work with CONICET and other institutions.

Type material. Holotype: one complete carapace, LM-FCEN 3458 (Figs 11P, 12A); paratypes: LM-FCEN 3459–3460 (Fig. 11Q–R).

Material. Ten specimens from samples 1, 3, 5, 12 and 14; Maastrichtian.

Diagnosis. A medium species with 'downturned' and bluntly rounded posterior end. Second-order ornamentation well developed with strong muri and with conjunctive castellated turrets. Hinge holamphidont and pronounced eye tubercle.

Dimensions. In mm:

		L	H	W	
Holotype, carapace	LM-FCEN 3458	0.679	0.417	0.350	Sample 3
Paratype, valve	LM-FCEN 3459	0.726	0.438		Sample 1
Paratype, valve	LM-FCEN 3460	0.665	0.401		Sample 5

Description. A medium-sized slightly elongate, subquadrate species of *Castillocythereis* in lateral view. Slightly saggitate in dorsal view, narrower anteriorly, widest in posterior third and more strongly laterally compressed posteriorly than anteriorly. Anterior

margin broadly, but asymmetrically rounded with apex a little below mid-height and denticulate throughout except from the extreme anterodorsal slope to the umbonate cardinal angle. Posterior margin narrowly and bluntly rounded with apex at about mid-height; posteroventral slope convex and denticulate; posterodorsal slope biconvex with a concave separation; not denticulate. Dorsal margin slightly sigmoidal, largely obscured in lateral view by dorsal rib and its ornament. Ventral margin obscured in lateral view; with oral concavity. Eye tubercle prominent and micropunctate. Sexually dimorphic with females shorter and less high than males and with a vertical rib posteriorly, clearly demarcating a smooth posteromarginal area from the elevated surface of the carapace. This structure is evidently lacking in males. There are three longitudinal ribs in the posterior part of the valve. A dorsal rib extends arcuately towards the dorsal margin and terminates posterodorsally. It contains many tubercles in a double or triple row. The tubercles are rounded and most are not perforated. A short median rib extends from the posterior dorsal rib to within one or two cells short of the median subcentral tubercle. A ventrolateral rib extends along the edge of the lateral surface, terminating at about mid-length. It bears rounded pestle-like tubercles; most are blind, and some are sieve-type. The subcentral tubercle comprises a number of radiating riblets of tubercles. These are contained anteriorly by an arcuate rib. A number of ribs paralleling the anterior margin cross the lateral surface between the anterior rim and the subcentral tubercle. The eye tubercle is buttressed all around by curved rows of tubercles. Clean specimens show that the reticular cells with the prominent ribs of the solae do not bear structures while intervening muri frequently bear tubercles, most of which are blind. Simple marginal pore canals occur on the intersections of the muri on the ribs, but more rarely on the muri of the reticulum. Hinge paramphidont with, in the RV a long anterior element comprising a dentate bar comprising of seven teeth, while the posterior bar seems to bear four teeth. Median element locellate, most strongly posteriorly. The frontal CMS is 'V'-shaped.

Remarks. Differs from *Castillocythereis multicastrum* sp. nov. in its bluntly rounded posterior end, in having more developed secondary reticulation with strong muri and less densely distributed groups of castellated turrets on the muri. Differs from *Cythereis clibanarius* sp. nov. in having a less pointed posterior end, less developed ribs and pore conuli disposed in castellated structures on the muri.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Genus CYTHEREIS Jones, 1849

Type species. Cythereis ciliate Reuss, 1846.

Cythereis stratios sp. nov. Ceolin and Whatley
Figure 12B–F

LSID. urn:lsid:zoobank.org:act:37BF4F1B-C579-4B79-BE6D-1031F3B1E39B

Derivation of name. Gr. *στρατιο*, of soldiers. With reference to the neat line of the tubercles along the dorsal margin, which resemble soldiers on parade.

Type material. Holotype: one complete carapace, LM-FCEN 3461 (Fig. 12B); paratypes: LM-FCEN 3462–3465 (Fig. 12C–F).

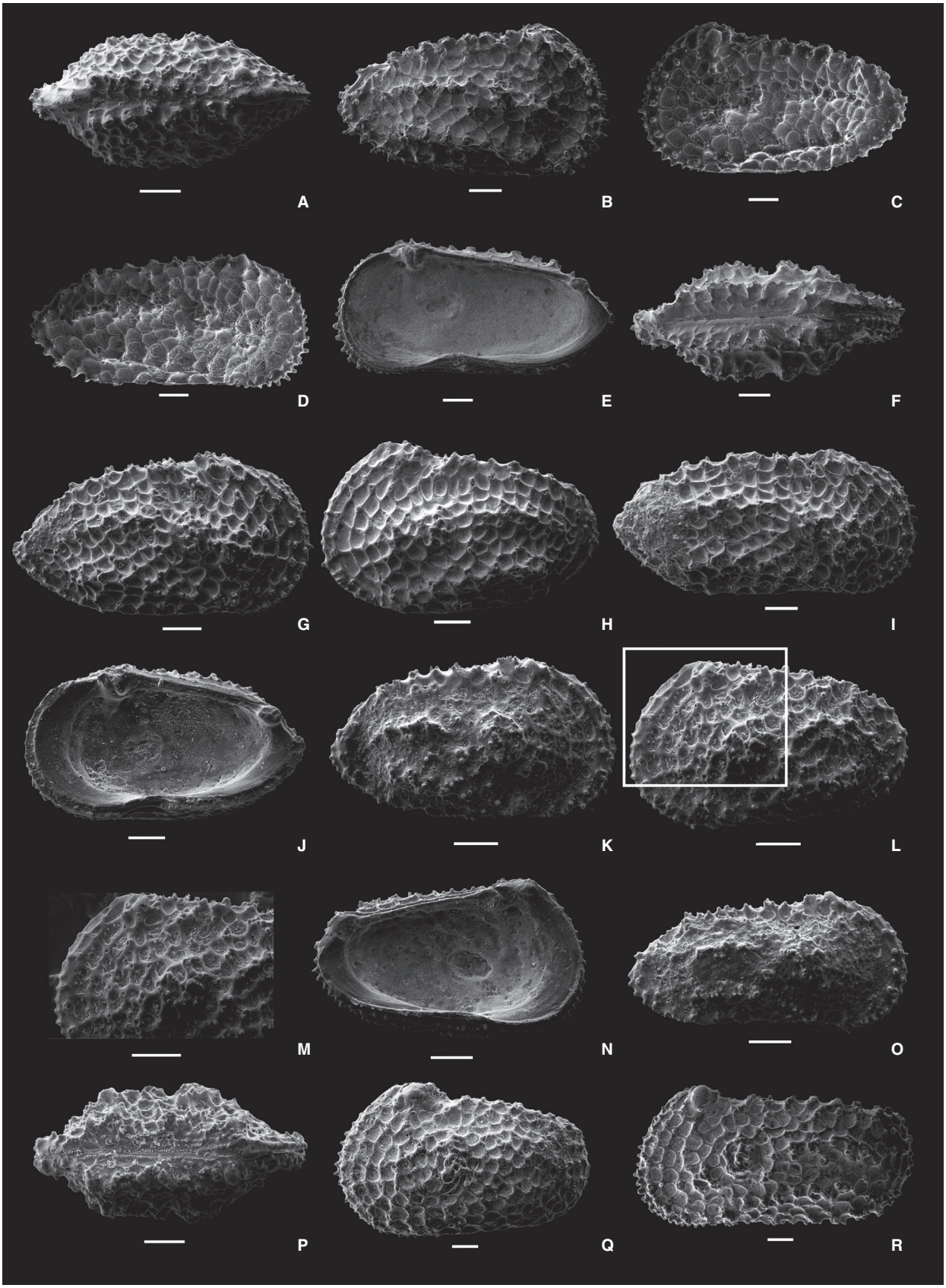
Material. 102 specimens from samples 14; Maastrichtian; 16, 17, 19, 21, 23, 26, 31, 34 and 40; Danian.

Diagnosis. Cythereis with three ribs bearing irregularly spatulate tubercles in straight lines. Marginally dentate at each end with strong tuberculate marginal rim.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3461	0.854	0.489	0.389	Sample 31
Paratype, female	LM-FCEN 3462	0.938	0.530		Sample 14
Paratype, male	LM-FCEN 3463	0.974	0.484		Sample 14
Paratype, male	LM-FCEN 3464	0.978	0.473		Sample 14
Paratype, female	LM-FCEN 3465	0.907	0.510	0.393	Sample 19

FIG. 12. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Castillocythereis albertoriccardii* sp. nov.; holotype, LM-FCEN 3458, adult carapace, dorsal view. B–F, *Cythereis stratios* sp. nov.; B, holotype, LM-FCEN 3461, adult female carapace, right lateral view; C, paratype, LM-FCEN 3462, adult female valve, left lateral view; D, paratype LM-FCEN 3463, adult male valve, right lateral view; E, paratype, LM-FCEN 3464, adult male valve, internal view; F, paratype, LM-FCEN 3465, adult female carapace, dorsal view. G–J, *Cythereis clibanarius* sp. nov.; G, holotype, LM-FCEN 3466, adult female valve, right lateral view; H, paratype, LM-FCEN 3467, adult female valve, left lateral view; I, paratype, LM-FCEN 3468, adult male valve, right lateral view; J, paratype, LM-FCEN 3469, adult female valve, internal view. K–P, *Cythereis trajectiones* sp. nov.; K, holotype, LM-FCEN 3470, adult female valve, right lateral view; L–M, paratype, LM-FCEN 3471; L, adult female valve, left lateral view; M, detail of ornamentation; N, paratype, LM-FCEN 3472, adult female valve, internal view; O, paratype, LM-FCEN 3473, adult male valve, right lateral view; P, paratype, LM-FCEN 3474, adult carapace, dorsal view. Q–R, *Henryhowella* (*Henryhowella*) *nascens* (Bertels, 1969*c*); Q, paratype, LM-FCEN 3475, adult female valve, left lateral view; R, paratype, LM-FCEN 3476, adult male valve, left lateral view. All scale bars represent 100 μm.


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Description. Large, elongate subovate in lateral view. Very thick-shelled. In dorsal view subhexagonal with compressed extremities much modified by surface ornament. LV a little larger than RV with some overlap anteriorly and posteroventrally. Anterior margin very broadly rounded and dentate; apex near mid-height. Posterior margin bluntly rounded with apex a little below mid-height. Dorsal margin straight, entirely obscured in lateral view by dorsal rib and inclined towards posterior. Ventral margin almost straight and not obscured in lateral view. Greatest length through mid-height; greatest height through anterior cardinal angle and greatest width in posterior one-third. Ornamentation extremely robust; reticulocostate with tubercles. A strong marginal rim surrounds the anterior margin peripherally and bears marginal denticulations directed anteriorly and small castellated tubercles projected laterally. On the ventral margin, the rim becomes reduced in strength, but then becomes like that of the anterior marginal rib onto the posterior. However, at mid-height, it reduces in strength and dies out posterodorsally. A strong dorsal rib bearing very large ornate, spatulate, castellate tubercles, in military precision, extends to just behind the eye tubercle. A similar median rib extends to near the subcentral tubercle and the ventrolateral rib similarly, but less strongly constructed. This lateral structure is approximately 'L'-shaped and comprises two blocks of spatulate-sided castellate tubercles. The eye tubercle is ovate and strongly buttressed. The reticulum comprises large individual cells which are subdivided immediately behind the anteromarginal rim. The solae are intact. The larger tubercles on the ribs and some muri, especially conjunctively, bear pores. However, the majority of tubercles seem to be blind. Hinge paramphidont. Calcified inner lamella wide anteriorly and posteriorly. Antennal scar 'U'-shaped.

Remarks. This species has a hinge typical of *Cythereis* such as *Cythereis? punctatafoveolata* Majoran, 1989 (pl. 12, figs 12–13) described from the mid-Cretaceous of Algeria. Differs from *Cythereis trajectiones* sp. nov. in the nature of its reticulation and its more elongate ribs.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Cythereis clibanarius sp. nov. Ceolin and Whatley
Figure 12G–J

LSID. urn:lsid:zoobank.org:act:10E4A8C6-2CEB-4F1A-AB0A-80EA4392476E

Derivaion of name. L. *clibanarius*, a soldier clad in mail. With reference to the appearance of this species seen in lateral view, in that the ornament resembles the chain-mail armour of soldiers in Roman and mediaeval times.

Type material. Holotype: one valve, LM-FCE 3466 (Fig. 12G); paratypes: LM-FCEN 3467–3469 (Fig. 12H–J).

Material. Seven specimens from sample 19; Danian.

Diagnosis. Cythereis with strong dorsal but weaker median and ventrolateral ribs. The dorsal bearing strong clusters of club-like tubercles. Marginal rim anteriorly with rounded tubercles paralleled proximally by a similar rib also tuberculate but mural in origin. Eye tubercle strongly buttressed but not prominent.

Dimensions. In mm:

		L	H	
Holotype, female	LM-FCEN 3466	0.803	0.444	Sample 19
Paratype, female	LM-FCEN 3467	0.970	0.500	Sample 19
Paratype, male	LM-FCEN 3468	0.952	0.456	Sample 19
Paratype, female	LM-FCEN 3469	0.785	0.441	Sample 19

Description. Large, subovate in lateral view. Subhexagonal with compressed extremities in dorsal view. Anterior margin broadly rounded with apex at about mid-height. Posterior margin pointed, slightly 'upturned' with apex just below mid-height, with straight to concave posterodorsal slope and straight to gently convex posteroventral slope. Dorsal margin straight, inclined posteriorly and completely obscured in lateral view by dorsal rib. Ventral margin with slight oral indentation, obscured in lateral view by ventral rib. Ornament very strong, reticulocostate and spinose. There is a distinct marginal rim, very peripheral to the anterior and posterior margins where it bears a double row of small conular denticulations of which some on the inner row are perforated terminally. A very strong dorsal rib extends from the posterior cardinal angle to a small sulcus immediately behind the eye tubercle. This rib is eroded on the lateral surface by the reticulum and comprises a number of castellate structures surrounded by blunt pore conuli, some of which are perforate. The eye tubercle, which is smooth but not prominent, is within a heavily buttressed, multiconulate area, the posterior conuli of which are considerably higher than the surface of the eye tubercle. Subcentral tubercle approximately circular, but quite irregular; it contains many conuli most of which are blind. The reticulum comprises largely, circular or ovate cells with the rims of the solae being well defined. The solae are almost all completely smooth. Some, however, have very small pores in their bases. The muri often bear usually conjunctive pores, and they also bear blind conuli. There is a weakly developed median rib, somewhat arcuate in its mid-length which terminates against the subcentral tubercle. There is a rather indistinct ventrolateral rib that extends from an anteroventral position to its termination in a large, distinct conulus, with a sieve-type pore posteroventrally. A narrow rib, formed from the muri of the reticulum, extends anteriorly from the subcentral tubercle to the anteromarginal rim. Greatest length at mid-height; greatest height at anterior cardinal angle; greatest width at one-third posteriorly. Sexual dimorphism very strong, with males more elongate than females. Hinge paramphidont. Calcified inner lamella very wide anteriorly, avestibulate. Frontal scar 'U'-shaped.

Remarks. Differs from *Cythereis stratios* sp. nov. in the less ornamented nature of the anterior and posterior rims, in the more rounded pattern of reticular cells, spinosity on the muri and in a less prominent eye tubercle. Differs from *Cythereis transkeiensis* Dingle, 1969, from the Santonian of the coast of Pondoland, South Africa, in the absence of cup-like structures in the reticule, in the posterodorsal end lacking concavity and in the presence of spines in the posteroventral region.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Cythereis trajectiones sp. nov. Ceolin and Whatley
Figure 12K–P

LSID. urn:lsid:zoobank.org:act:980F6906-2D3E-4BDF-85D6-DFD7214ED2F9

Derivation of name. L. *trajectiones,* a crossing over, part way of passage of something, trajectory. With reference to the fact that this species crosses the Cretaceous–Tertiary boundary.

Type material. Holotype: one complete carapace, LM-FCEN 3470 (Fig. 12K); paratypes: LM-FCEN 3471–3474 (Fig. 12L–P).

Material. 169 specimens from samples 14 (Maastrichtian); 16, 17, 19 and 21 (Danian).

Diagnosis. A species of *Cythereis* characterized by a very tuberculate dorsal rib and ventrolateral rib and the possession of club-like conjunctive tubercles on the muri that also occur on the subcentral tubercle and the median rib.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3470	0.662	0.475		Sample 17
Paratype, female	LM-FCEN 3471	0.639	0.384		Sample 14
Paratype, female	LM-FCEN 3472	0.661	0.384		Sample 14
Paratype, male	LM-FCEN 3473	0.666	0.323		Sample 19
Paratype, female	LM-FCEN 3474	0.698	0.387	0.324	Sample 14

Description. Medium, elongate, subovate in lateral view. In dorsal view with distinct median sulcus. Greatest width about one-third length. End margins compressed. Anterior margin broadly rounded, apex a little below mid-height and anterodorsal slope slightly less convex anteroventrally. Short, strong, blunt marginal denticles. Posterior margin bluntly pointed with apex below mid-height and strongly dentate in ventral half with small strong conical marginal denticles. Dorsal margin straight sloping posteriorly and obscured by dorsal rib. Ventral margin obscured in lateral view and with slight oral inflexion. Greatest length below mid-height; greatest height through eye tubercle. LV slightly larger than RV. Ornament relatively strong, reticulocostate and tuberculate. There is a strong dorsal rib with strong tuberculate buttresses bearing two to six conular tubercles with smooth intertubercular areas. The prominent oval eye tubercle is situated at the anterior end of this rib. Median rib short and tuberculate, terminating against the median sulcus, well before subcentral tubercle. Ventrolateral rib defined by rows of mainly paired tubercles terminating posteroventrally in a considerably profound sulcus. A strong marginal rim, bearing numerous tubercles in an irregular double row, parallels the anterior margin and extends onto the ventral and posterior margins. Subcentral tubercle large with irregular outline and bearing tubercles. Intercostal areas reticulate, with muri anteriorly being directed subparallel to the anterior margin and separated by decreasingly by proximally large reticular cells. The largest cells occur between the most distal riblet and the marginal rim and are elongate–ovate in shape. The remainder of the reticulation is chaotic with solae varying in shape. The area nearest to the posterior margin is not reticulate. Numerous and widespread conjugate pore conuli occur across the valve, and they may be blind, simple or sieve-type pores and possibly sieve plates in the solae and on some elevations hinge paramphidont. Calcified inner lamella very wide anteriorly, avestibulate. Frontal scar 'U'-shaped. Sexual dimorphism strong with males narrower, more elongate and less inflate than females.

Remarks. The present species has some similarities with *Cythereis*? *indocilis* Bertels 1969*a* from the Danian of Huantraico, Neuquén Province, differing in its better developed ribs, the presence of many conjugate pore conuli, absence of a postocular sulcus and in the pattern of second-order reticulation. This species occurs in the upper available sample in the Maastrichtian and in three samples in the Danian.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Genus HENRYHOWELLA Puri, 1957

Type species. Henryhowella evax (Ulrich and Bassler, 1904).

Henryhowella (Henryhowella) nascens (Bertels, 1969c)
Figure 12Q–R

1969*c* *Rocaleberis nascens* Bertels, p. 163, pl. 1, fig. 1a–c.
2002 *Henryhowella* cf. *H. nascens* Miller *et al.*, p. 310, fig. 9a.

Material. 56 specimens from samples 17, 19, 26, 34 and 39; Danian.

Dimensions. Adult carapace, paratype LM-FCEN 3475 (Fig. 12Q), female, 1.07 (L), 0.65 (H), LM-FCEN 3476 (Fig. 12R), male, 1.11 (L), 0.575 (H).

Remarks. Bertels erected this genus claiming that it differs from *Henyhowella* in possessing a different set of structures associate with the calcified inner lamella anteriorly. These characters, however, are common in *Henryhowell*a and do not support this generic proposition.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels 1969*c*), Huantrai-co, Neuquén (Bertels 1973) and Cerro Azul, General Roca.

Subgenus WICHMANNELLA (Bertels, 1969c)

Type species. Wichmannella meridionalis Bertels, 1969*c*.

Remarks. The present authors do not consider that the reasons Bertels' gave to separate her genus *Wichmannella* from *Henryhowella* Puri are profound enough to warrant a separate genus. However, we believe that the differences between their respective type species are sufficient to maintain a separation at the subgenus level. Therefore, we include in *Wichmannella* all those species from the Maastrichtian and Danian assigned to it from the Neuquén Basin (Bertels 1969*b*, 1974, 1975*a*). However, in the discussion of their genus *Apatihowella* (*Apatihowella*), Jellinek and Swanson (2003) considered that Yajima's (1982) use of *Wichmannella* for *Cythere circumdentata* (Brady, 1880) is doubtful. The latter is a Recent genus from the deep southern of Pacific, while *Wichmannella* is from the Late Cretaceous – Early Tertiary of Argentina. The present authors concur with this.

Henryhowella (*Wichmannella) praealtus* sp. nov. Ceolin and Whatley
Figure 13A–F

LSID. urn:lsid:zoobank.org:act:D9D3FEB2-1638-4B8C-B67C-61F6C871D63C

Derivation of name. L. *praealtus* very high. With reference to the proportionally great height of the female of this species.

Type material. Holotype: one complete carapace, LM-FCEN 3477 (Fig. 13A); paratype LM-FCEN 3478–3482 (Fig. 13B–F).

Material. 59 specimens from samples 16, 17, 19, 21, 23 and 31; Danian.

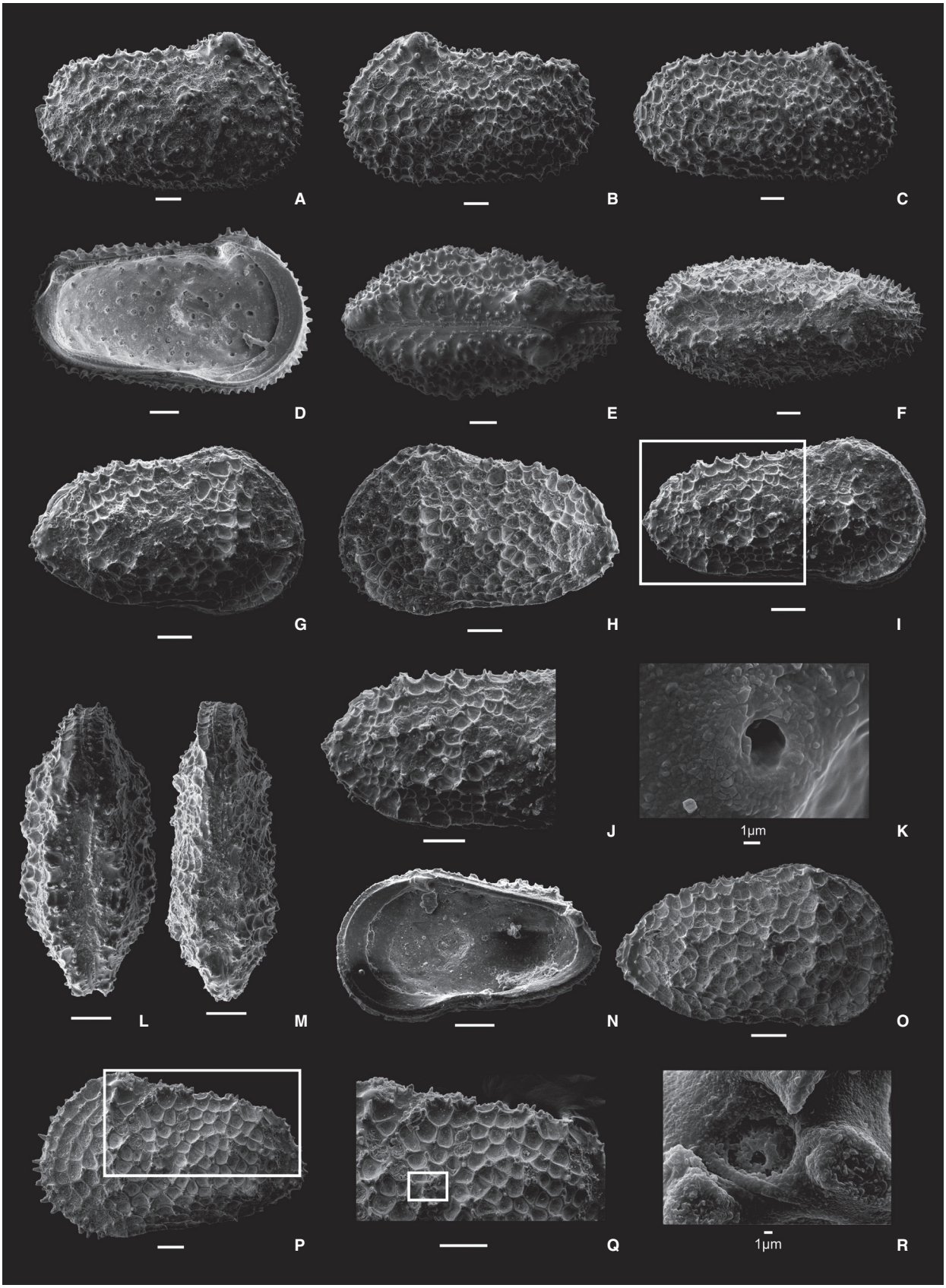
Diagnosis. A species of *Henryhowella* (*Wichmannella*) characterized by its cup-like solae in the reticulum and numerous small, short, mostly conjunctive tubercular spines on the muri. Eye tubercle hemispherical, large and protuberant and, in internal view, very large sieve pores.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3477	1.083	0.643	0.525	Sample 17
Paratype, female	LM-FCEN 3478	1.063	0.637		Sample 19
Paratype, male	LM-FCEN 3479	1.171	0.629		Sample 23
Paratype, female	LM-FCEN 3480	1.014	0.602		Sample 23
Paratype, female	LM-FCEN 3481	1.018	0.671	0.529	Sample 26
Paratype, male	LM-FCEN 3482	1.241	0.592	0.589	Sample 19

Description. A very large, subovate to subrectangular, thick-shelled species of *Henryhowella* (*Wichmannella*); subovate in dorsal view. Anterior margin very well rounded about an apex at mid-height and with marginal denticles in lower half. Subovate in dorsal view with clear median sulcus behind the eye tubercle. Posterior margin narrow and less regular, with posterodorsal slope less rounded than posteroventral part; apex a little below mid-height. Dorsal margin straight, interrupted by numerous small spines and by the large eye tubercle and its surrounding ring of spines. Ventral margin gently concave medianly with median part obscured in lateral view by valve tumidity and ventral spines. Larger spines occur posteroventrally. Ornamentation reticulospinose. There is a large reticulum of fairly large cells, disposed peripherally and superipherally, parallel to the margins and more randomly centrally. Solae filled with cup-like structures whose rims abut against the muri. The solae do not

FIG. 13. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–F, *Henryhowella (Wichmannella) praealtus* sp. nov.; A, holotype, LM-FCEN 3477, adult female carapace, right lateral view; B, paratype, LM-FCEN 3478, adult female carapace, left lateral view; C, paratype, LM-FCEN 3479, adult male valve, right lateral view; D, paratype, LM-FCEN 3480, adult female valve, internal view; E, paratype, LM-FCEN 3481, adult female carapace, dorsal view; F, paratype, LM-FCEN 3482, adult male carapace, dorsal view. G–N, *Hysterocythereis paredros* gen. et sp. nov.; G, L, holotype, LM-FCEN 3483; G, adult female carapace, right lateral view; L, dorsal view; H, paratype, LM-FCEN 3484, adult female carapace, left lateral view; I–K, paratype, LM-FCEN 3485, I, adult male carapace, right lateral view; J, detail of ornamentation; K, simple pore; M, paratype, LM-FCEN 3486, adult male carapace, dorsal view; N, paratype, LM-FCEN 3487, adult female valve, internal view. O–R, *Hysterocythereis coinotes* sp. nov.; O, holotype, LM-FCEN 3488, adult female valve, right lateral view; P–R, paratype, LM-FCEN 3489; P, female valve, left lateral view; Q, detail of ornamentation; R, sieve-type pore. All scale bars represent 100 μm, except those in K and R, which are 1 μm.


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1µm
K
L
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1µm
R

bear pores or sieve plates. The muri bear both simple and sieve-pores and numerous spinose tubercles, often in clusters. Some are perforate but most are blind. There are faint traces of dorsal and ventrolateral ribs. There is a shallow, posteroventrally directed sulcus behind the eye tubercle and an irregularly circular subcentral tubercle. Greatest length at mid-height; greatest height at anterior cardinal angle; greatest width in posterior one-third. Sexually dimorphism with males narrower and more elongate than females. Hinge holamphidont with the posterior part of the posteromedian element strongly developed and locellate in the LV. Anteriorly, there is a vestibulum. Antennal scar large 'V'-shaped. Internal surface with numerous, larger sieve-type pores that must correspond with those situated on conjunctive muri externally.

Remarks. The present species differs from *Henryhowella* (*Wichmannella*) *meridionalis* (Bertels 1969*c*) in being longer, more subrectangular in shape and by having an irregular, rounded reticulation pattern, in contrast to *Henryhowella* (*Wichmannella*) *meridionalis* that has polygonal cells with small, conjunctive spines. It also differs from other of Bertels' species of *Wichmannella* in reticulation pattern and in carapace shape.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Genus HYSTEROCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:1B9ED9E0-22C1-482C-9413-D7EF2BC60CF2

Derivation of name. Gr. *ὑστρος* hysteros, after, later; plus *Cythereis*, a well-known ostracod genus. With reference to the fact that *Cythereis* Jones is an essentially Cretaceous genus, while *Hysterocythereis* occurs in both the Maastrichtian and Lower Paleocene, and is a very possible descendent. Two other species, erroneously attributed to *Anticythereis* by Bertels (1973, 1975*a*), are also included in the present genus.

Type species. Hysterocythereis paredros gen. et sp. nov.

Diagnosis. A strongly reticulate genus of Trachyleberididae resembling *Cythereis* Jones, in many aspects of its morphology, but lacking the three transverse ribs on the posterior part of the lateral surface typical of that genus and also lacking a prominent subcentral tubercle. Posterior end acuminate. Hinge paramphidont. Eye tubercle small, but prominent.

Included species. Anticythereis? *inconnexa* (Bertels, 1973), *Anticythereis*? *attenuata* (Bertels, 1975*a*), *H. paredros* sp. nov., *H. coinotes* sp. nov., *H. diversotuberculatus* sp. nov., *Hysterocythereis*? sp.

Remarks. Neither of the two species of Bertels included above, conform to the generic diagnosis of *Anticythereis* Van den Bold, 1946. They do not exhibit reverse overlap, and they have strongly reticulate rather than punctate ornamentation. *Hysterocythereis* gen. nov. differs from *Sthenarocythereis* gen. nov. in the shape and nature of the solae of the reticulum and in the nature of the conjunctive tubercles in the present genus, being much smaller and less spinose. Early members of *Sthenarocythereis* have paramphidont and later members have holamphidont hingement.

Hysterocythereis paredros sp. nov. Ceolin and Whatley
Figure 13G–N

LSID. urn:lsid:zoobank.org:act:E6F84DC8-BC71-4134-9B32-5521F6A0E492

Derivation of name. Gr. *παρεδρος*, paredros, a near associate, sitting beside. With reference to the close relationship between this species and the genus *Cythereis* Jones.

Type material. Holotype: one valve, LM-FCEN 3483 (Fig. 13G, L); paratypes: LM-FCEN 3484–3487 (Fig. 13H–K, M–N).

Material. 25 specimens from sample 19 and 21; Danian.

Diagnosis. A strongly, sexually dimorphic species of *Hysterocythereis*, with strong reticulate ornament and some conjunctive tubercles, mostly as singles or doubles, but with some tubercles. Eye tubercle well-developed, subcentral tubercle very reduced.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3483	0.823	0.511	0.377	Sample 19
Paratype, female	LM-FCEN 3484	0.788	0.425	0.375	Sample 19
Paratype, male	LM-FCEN 3485	0.774	0.420		Sample 19
Paratype, male	LM-FCEN 3486	0.747	0.376	0.325	Sample 19
Paratype, female	LM-FCEN 3487	0.686	0.404		Sample 19

Description. A large, elongate subovate (female) to very elongate, subrectangular (male) in lateral view. In dorsal view subovate with compressed ends. Anterior margin broadly rounded and slightly extended below the ventral margin. Posterior margin bluntly rounded below mid-height, both margins dentate, especially anteriorly. Dorsal margin straight, sloping posteriorly; the dorsal cardinal angles are anteriorly pronounced and posteriorly rounded. Ventral margin biconvex about a gentle oral inflexion. Ornament reticulopunctate. The resultant reticulum is strong, and

the intersecting muri enclose reticular cells that range in shape from circular to oval to quadrate, rectangular and polygonal. The cells and stronger muri are orientated parallel to the free margin peripherally but much more chaotically centrally. Most of the tubercles are conjunctive and the rather short, globose tubercle occurs singly, as doubles, triples and quadruples. Many of the tubercles are blind, and other bears single pores and some sieve-type pores. The pore conuli are well developed on the several ribs that parallel the anterior margins. Larger pore conuli occur on the dorsal margin. Hinge paramphidont. Frontal scar 'U'-shaped and directed anterodorsally. Calcified inner margin wide anteriorly and posteriorly with well-developed selvage.

Remarks. This species differs from *H. diversotuberculatus* sp. nov. mainly in its much stronger reticulation and tuberculation.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Hysterocythereis coinotes sp. nov. Ceolin and Whatley
Figures 13O–R, 14A–C

LSID. urn:lsid:zoobank.org:act:9DA57B14-7550-46D4-9CA2-536066A77A08

Derivation of name. Gr. κοινοτες, sharing in common. With reference to the fact that it shares many of its biocharacters with other species of the genus.

Type material. Holotype: one valve, LM-FCEN 3488 (Fig. 13O); paratypes: LM-FCEN 3489–3492 (Figs 13P–R, 14A–C).

Material. 73 specimens from sample 14 (Maastrichtian); 16, 17 and 19 (Danian).

Diagnosis. A species with spinose anterior and posterior margin, with a well-developed postocular sulcus and a reticulation pattern with cup-like cells, not perforated by sieve plates and ranging in shape from rounded to sub-rectangular. A few pore conuli on the muri are of smaller size.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3488	0.760	0.460		Sample 16
Paratype, female	LM-FCEN 3489	0.814	0.485		Sample 16
Paratype, male	LM-FCEN 3490	0.889	0.416		Sample 21
Paratype, female	LM-FCEN 3491	0.904	0.487		Sample 16
Paratype, female	LM-FCEN 3492	0.829	0.466	0.362	Sample 19

Description. A large, subrectangular species of *Hysterocythereis* subovate in dorsal view. Anterior margin broadly and symmetrically rounded with apex at mid-height. Posterior margin bluntly pointed with apex below mid-height. Dorsal margin sinuous, sloping posterodorsally and slightly obscured, in lateral view by a spinose dorsal surface. Ventral margin almost straight. Ornamentation reticulospinose with cells and muri concentrically oriented anteriorly with the most distal cells subrounded and subrectangular with cup-like fossae. Anterior and posterior margins spinose with a posterior marginal rim. A sigmoidal row starts below the eye tubercle, where it is most strongly developed and extends to a posteromedian position; less well defined in RV. Some small conjunctive tubercles can be observed in single, double or triple groups. Some bear simple pores, and others are blind. The subcentral tubercle is subdued by concentrically oriented cells. Postocular sulcus present. Hinge paramphidont. Anterior CMS in a 'U'-shape. Sexual dimorphism very strong with males more elongate and narrower than females, less spinose and with ventral margin convex.

Remarks. Differs from *Hysterocythereis diversotuberculatus* sp. nov. in the presence of the postocular sulcus, in having more spinose ornamentation, mainly on anterior and posterior margins; in less conjunctive spines and in the shape of cells being less diverse than in *H. diversotuberculatus*. Also differs in having a shorter anterior margin that does not extends below the ventral margin.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Hysterocythereis diversotuberculatus sp. nov. Ceolin and Whatley
Figure 14D–J

LSID. urn:lsid:zoobank.org:act:996D069D-13E6-43AC-8B98-7098D30F8401

Derivation of name. L. *diversotuberculatus*. With reference to the very diverse expression of the conjunctive tubercles on the reticulum, which varies between individual specimens and within a single specimen.

Type material. Holotype: one valve, LM-FCEN 3493 (Fig. 14D, I); paratypes: LM-FCEN 3494–3496, 3497 (lost) (Fig. 14E–H, J).

Material. 67 specimens from samples 21, 23, 26, 31, 34 and 36; Danian.

Diagnosis. A species of *Hysterocythereis* characterized by a reticulum in which the cells vary from circular and cup-like to quadrate, rectangular, hexagonal and polygonal, with complex grouping of small conjunctive tubercles.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3493	0.799	0.471	0.380	Sample 21
Paratype, female	LM-FCEN 3494	0.966	0.482	0.350	Sample 23
Paratype, female	LM-FCEN 3495	0.812	0.380		Sample 21
Paratype, male	LM-FCEN 3496	0.911	0.320		Sample 26
Paratype, female	LM-FCEN 3497 (lost)	0.809	0.456	0.319	Sample 23

Description. A large, subovate (female) to subrectangular (male) specimen in lateral view. Elongate, ovate in dorsal view with very compressed end margins and carapace approximately the same in between the cardinal angles. Anterior margin very broadly rounded and extending below the ventral margin, with apex at mid-height in females, slightly below in males. Posterior margin bluntly rounded with apex at about mid-height. Dorsal margin straight, inclined to posterior, largely obscured in lateral view by spinose dorsal surface. Ventral margin largely obscured in lateral view and with slight oral concavity. Greatest length at about mid-height; greatest height at anterior cardinal angle; greatest width equal between cardinal angles. Eye tubercle small and not prominent. Ornament very strongly reticulate. Reticular cells and muri concentrically orientated anteriorly with the most distal cells being large, but subdivided anteroventrally. The succeeding two rows of cells are smaller, but rectangular. The reticular cells in the anterior and anteromedian part are circular and cup-like; while in the posterior part, they are mainly quadrate to rectangular. The posterior margin has a spinose marginal rim and an area without reticulae containing some pore conuli. Virtually unvaryingly, each conjunction in the reticulum bears small club-like tubercles; some single, more commonly in pairs but groups of four and six also occur, the latter resembling castellate fortifications. Some simple pores are perforated, others are blind, and some groups of blind pores seem to surround sieve-type pores. The base of the solae is without ornament or pores. Feebly well-developed subcentral tubercle. Hinge paramphidont. Inner lamella fairly wide terminally with selvage strong all around the free margin, and lists and striae developed posteriorly and posteroventrally.

Remarks. Differs from *Hysterocythereis inconnexa* (Bertels, 1973) in having different pattern of reticulation, with cells varying in shape, in the presence of spines at its posterior end, which is more acuminate and with a better developed subcentral tubercle.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Hysterocythereis attenuata (Bertels, 1975*a*)
Figure 14K–L

1975*a* *Anticythereis*? *attenuata* Bertels, p. 115, pl. 5, figs 19a–b, 20–21.

Type material. Specimens described by Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales: holotype LM-FCEN 842, paratypes: LM-FCEN 843–846; plus two paratypes in this study LM-FCEN 3498–3499 (Fig. 14K–L).

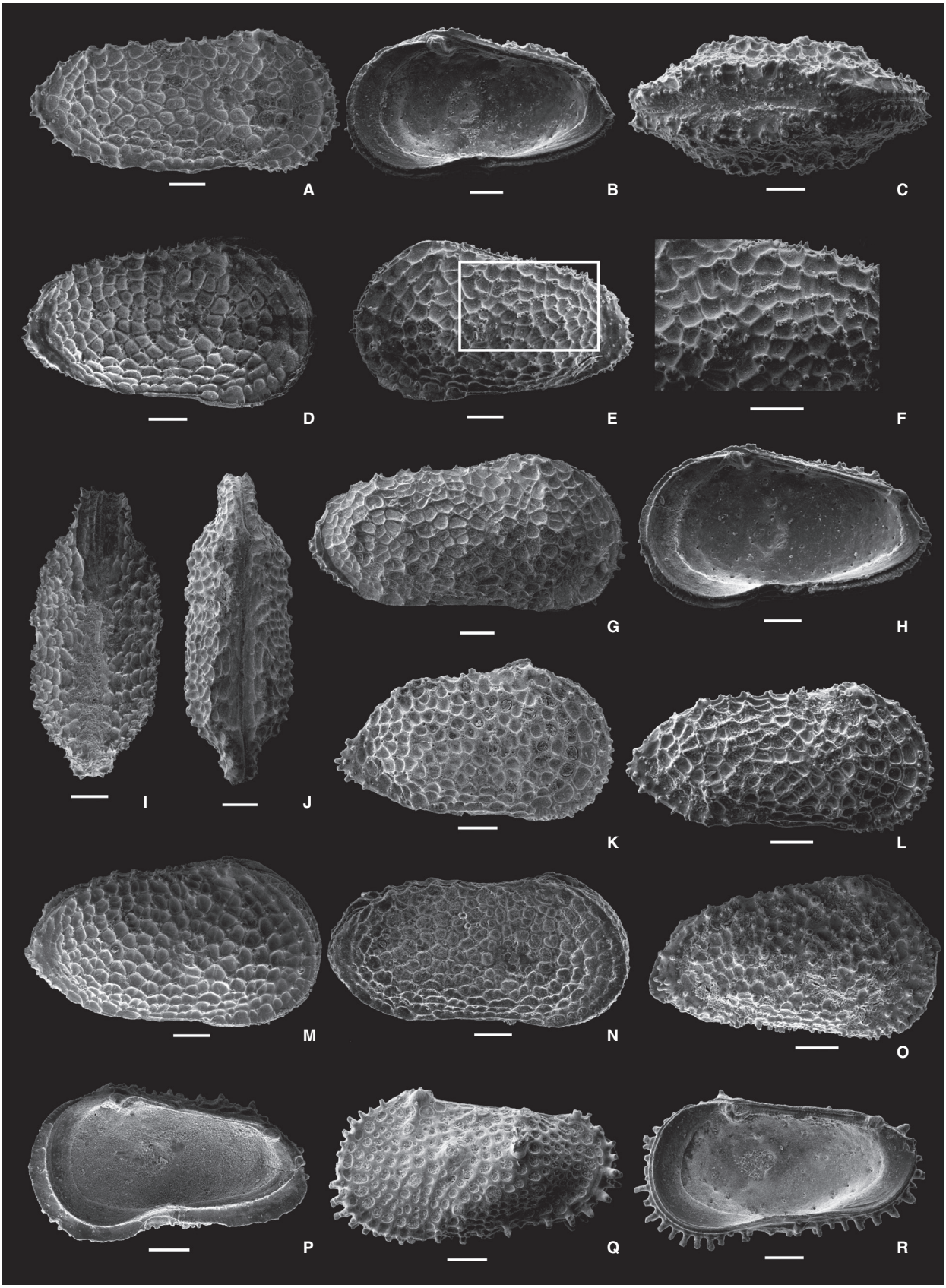
Material. 12 specimens from samples 3 and 5 (Maastrichtian), plus the type and other material of Bertels, housed in Facultad of Ciencias Exactas y Naturales, Laboratory of Micropaleontology, Universidad of Buenos Aires, Argentina.

Dimensions. Adult valve, LM-FCEN 3498 (Fig. 14K), 0.974 (L), 0.545 (H), female; LM-FCEN 3499 (Fig. 14L), 0.749 (L), 0.371 (H), male.

Diagnosis. A species of *Hysterocythereis* with posterior end pointed with five conical spines, dorsal margin convex posterodorsally and surface covered with subrounded cells, fewer anteriorly where they are subrectangular. Pore conuli less developed than in all the other species of the genus.

Description. Subovate to subtriangular in lateral view. Anterior margin broadly rounded with apex about mid-height and not extending below mid-height, dentate with short, strong, conical tubercles. Posterior margin well pointed with apex below mid-height. Dorsal margin sloping strongly posteriorly obscured by dorsal surface through most of its length in lateral view. Pronounced anterodorsal hinge ear in both valves. Ventral margin

FIG. 14. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–C, *Hysterocythereis coinotes* sp. nov.; A, paratype, LM-FCEN 3490, adult male valve, right lateral view; B, paratype, LM-FCEN 3491, adult female valve, internal view; C, paratype, LM-FCEN 3492, adult female carapace, dorsal view. D–J, *Hysterocythereis diversotuberculatus* sp. nov.; D, I, holotype, LM-FCEN 3493, adult female carapace; D, right lateral view; I, dorsal view; E–F, paratype, LM-FCEN 3494; E, adult female carapace, left lateral view; F, detail of ornamentation; G, paratype, LM-FCEN 3495, adult male valve, right lateral view; H, paratype, LM-FCEN 3496, adult female valve, internal view; J, paratype, LM-FCEN 3497 (lost), adult male carapace, dorsal view. K–L, *Hysterocythereis attenuata* (Bertels, 1975*a*); K, paratype, LM-FCEN 3498, adult female valve, right lateral view; L, paratype, LM-FCEN 3499, adult male valve, right lateral view. M–N, *Hysterocythereis inconnexa* (Bertels, 1973); M, paratype, LM-FCEN 3500, adult female carapace, right lateral view; N, paratype, LM-FCEN 3501, adult male carapace, right lateral view. O–P, *Hysterocythereis*? sp.; O, LM-FCEN 3502, adult carapace, right lateral view; P, LM-FCEN 3503, adult valve, internal view. Q–R, *Oertliella*? sp., LM-FCEN 3504; Q, adult valve, left lateral view; R, internal view. All scale bars represent 100 μm.


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largely overhung by valve tumidity in lateral view, with slight oral inflexion. Greatest length below mid-height; greatest height through hinge ear; greatest width at one-third posteriorly. Ornament essentially reticulate plus an arcuate dorsal rib, strongly eroded by reticulum, bearing tubercles obscured by the dorsal margin. A strong rim occurs on the ventral margin above which is a gentle slope from the lateral surface. A sub-alar tubercle occurs posteroventrally. Two mural riblets extend from the eye tubercle parallel to the anterior margin. Proximal to the first of these two ribs is a single row of large rectangular cells that separates the main reticulum from the tuberculate anteromarginal rib. A double row of reticular cells separates these ribs from the second and most proximal of the riblets originating from the eye tubercle. These riblets extend onto the ventral margin and coalesce to form the ventral rim. Reticular cells range from circular to quadrate and are chaotically distributed. Small, simple pore conuli and open pores occur conjunctively on some conjunctions. Hinge paramphidont. Inner lamella wide on end margins. Anterior CMS scar in a 'U'-shape.

Remarks. This species from the Maastrichtian of Fortin General Roca differs from *Hysterocythereis paredros* sp. nov. in having a more acuminate posterior end, and reticulation pattern with small subrounded solae. Its posterodorsal margin is also more convex.

Stratigraphical range. Maastrichtian of Fortín General Roca, Río Negro (Bertels, 1975*a*) and Cerro Azul, General Roca.

Hysterocythereis inconnexa (Bertels, 1973)
Figure 14M–N

1973 *Anticythereis*? *inconnexa* Bertels, p. 326, pl. 4, figs 3a–b, 4a–b.

Type material. Specimens described by Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales: holotype: LM-FCEN 439, paratypes: LM-FCEN 470–475; plus two paratypes in this study LM-FCEN 3500–3501 (Fig. 14M–N).

Material. Five specimens from samples 23, 26, 29 and 31 (Danian), plus the type and other material of Bertels, housed in the collections of the Facultad of Ciencias Exactas y Naturales, Laboratory of Micropaleontology, Universidad of Buenos Aires, Argentina.

Dimensions. Adult carapace, LM-FCEN 3500 (Fig. 14M), 0.842 (L), 0.491 (H), female; LM-FCEN 3501 (Fig. 14N), 0.828 (L), 0.403 (H), male.

Diagnosis. A subovate species of *Hysterocythereis* with subrounded reticulae, with solae covered with cup-like structures and single conjunctive conical tubercles. Bluntly rounded posterior end and ventral margin with four horizontal riblets.

Description. As for Bertels (1973, p. 337), except to add that small club-like tubercles occur conjunctively on the muri, many are blind, some are perforated by simple pores, and others by small sieve-type pores.

Remarks. Bertels described this species from the Danian of Río Negro Province. In this study, it occurs in the Danian of samples 23, 26 and 31. This species is most similar to *Hysterocythereis diversotuberculata* sp. nov. differing essentially in the nature of marginal rim and in the fact that *H. diversotuberculatus* has groups of two to six small club-like tubercles conjunctively on the muri of the reticulum and a very spinose dorsal rim.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels, 1973) and Cerro Azul, General Roca.

Hysterocythereis? sp.
Figure 14O–P

Material. Five specimens from samples 3 and 5; Maastrichtian.

Dimensions. Adult carapace, LM-FCEN 3502 (Fig. 14O), 0.94 (L), 0.402 (H); adult valve, LM-FCEN 3503 (Fig. 14P), 0.694 (L); 0.391 (H).

Description. A large, subovate to subrectangular species, with anterior margin broadly and symmetrically rounded, with apex at mid-height. Posterior margin bluntly pointed with apex below mid-height. Dorsal margin almost straight, declining towards posterior end. Ventral margin asymmetrical, with small oral concavity at mid-length. Greatest length below mid-height, greatest height at one-third anteriorly, greatest width at one-third posteriorly. Ornament reticulotuberculate with cells of about the same size varying in shape from ovate to subovate to quadrate, over most of the reticulum. Anteriorly, and to a lesser extent posteriorly, parallel to those margins, are large subrectangular cells in a single row. There are conjunctive, mostly single and perforate, tubercles on the muri, some in groups of four. Anterior and posterior margins with small tubercles. Eye tubercle developed and subcentral tubercle defined by a group of six conjunctive spines. LV overlaps the RV mainly in anterior and posterior margins. Hinge paramphidont. Calcified inner lamella well developed with a large flange.

Remarks. The present species is left in open nomenclature and only tentatively within the genus because of its better developed eye tubercle, by comparison with other members of the genus. The posterior margin is of different shape and has a well-developed flange, absent in others species of the genus.

Genus OERTLIELLA Pokorny, 1964

Type species. Oertliella reticulata (Kafka, 1886) Pokorny, 1964.

Oertliella? sp.
Figure 14Q–R

Material. Five specimens from samples 3 and 5; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3504, 0.769 (L), 0.414 (H).

Diagnosis. Large, subrectangular, with anterior margin symmetrically rounded. Posterior margin bluntly pointed above mid-height. Dorsal margin straight and ventral margin slightly biconvex. Ornament reticulospinose, with reticulation ranging from small, rounded muri around entire periphery, largest centrally. There are large broken spines disposed across the valve; the only one preserved has three ramifications on its top. From the posterodorsal cardinal angle, there is a spinose marginal rim that extends towards the ventral margin, where it is less well developed, ending at the anterocardinal angle, near the well-developed eye tubercle. Subcentral tubercle slightly developed, defined by a large spine base. Hinge holamphidont. Calcified inner lamella large; CMS not seen.

Remarks. This species is left in question due to the lack of a ventrolateral spinose rib, present in all other species of *Oertliella*.

Genus ORTHROCOSTA nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:3B935CC0-6C99-45D6-9212-B9845F442A7E

Derivation of name. Gr. *ορθρος*, daybreak, dawn; plus L. *costa*, rib, and *Costa* a well-known ostracod genus. With reference to the fact that this genus, which is evidently related to *Costa* Neviani, and other related genera, is an early member of this generic group.

Type species. Orthrocosta decores gen. et sp. nov.

Diagnosis. Subtriangular to subtrapezoidal species of *Orthrocosta* with anterior margin broadly and symmetrically rounded and acuminate posterior end. Ornamentation reticulocostate with three main ribs longitudinally and a fourth one posteriorly, almost vertically, that unites the ventral and median ribs. Eye tubercle well developed with an ocular rim anteriorly. Subcentral tubercle absent. Hinge holamphidont.

Description. As for the type species.

Remarks. This genus differs from *Protocosta* Bertels in having well-developed median and ventrolateral ribs, and, in some species, there is a vertical rib that links the posterior end of the ventrolateral rib with the posterior end of the median rib. Differs also in lateral shape, varying between subtriangular and subtrapezoidal, while species of *Protocosta* are subrectangular. Differs from the classic genus *Costa* Neviani, in its acuminate posterior end and in its very well-developed ribs, with a sinuous median rib that is not recurved at the posterior. Differs from *Paracosta* Siddiqui, in general shape, in its more acuminate posterior end and in the ornamentation pattern. Also differs from *Cativella* Coryell and Fields in its non-perforated ridges and in the presence of a vertical rib posteriorly that joins the median and ventrolateral ribs. Differs from *Potiguarella* Piovesan *et al.* in its pattern of reticulation, in its three longitudinal ribs being longer and less arcuate, and in the absence of a subcentral tubercle.

Orthrocosta decores sp. nov. Ceolin and Whatley
Figure 15A–G

LSID. urn:lsid:zoobank.org:act:3AED3140-C099-4A6F-BB96-27B9B2C44FED

Derivation of name. L. *decores*, ornamented, elegant, beautiful. With reference to the elegance of the ornament of this attractive species.

Type material. Holotype: one complete carapace, LM-FCEN 3505 (Fig. 15A, F), paratypes: LM-FCEN 3506–3508 (Fig. 15B–E, G).

Material. 19 specimens from samples 16, 17 and 19; Danian.

Diagnosis. A species with a curved median rib that is subdivided into two anteriorly. Ocular rib closely paralleling the anterior margin and extending across the ventral surface.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3505	0.936	0.552	0.428	Sample 16
Paratype, female	LM-FCEN 3506	0.899	0.525		Sample 16
Paratype, male	LM-FCEN 3507	1.04	0.531	0.392	Sample 16
Paratype, female	LM-FCEN 3508	0.891	0.489		Sample 16

Description. A large, thick-shelled, subtrapezoidal species in lateral view, subhexagonal in dorsal view, strongly compressed at

extremities and slightly compressed medianly in RV. Anterior margin broadly and symmetrically rounded with marginal denticles, especially anteroventraly. Apex at mid-height. Posterior margin strongly pointed at mid-height with marginal denticles posteroventrally. The dorsal margin obscured by a flared rib which is eroded into a series of re-entrants by strong reticulation. This rib extends dorsal to the eye tubercle and unites with the anterior peripheral rib. All the ribs are similarly affected by the reticulation. There is a third rib in the ventral region. The second and third ribs do not achieve the anterior and posterior margins. An ocular rib extends from the eye tubercle and, closely paralleling the anterior margin, then extends across the ventral surface and in so doing obscures that margin in lateral view. It further extends closely parallel to the posterior margin before becoming lost in the elevated posterior structure of the dorsal rib. Immediately below this elevated structure, the median rib extends in a slightly arcuate curve, obliquely across the valve to its termination, one reticulum short of the marginal ocular rib. From this median rib, shortly after its inception, a narrow rib extends ventrally to a position one reticulum above the ventral marginal rib, where it bends through 45° and extends in an arc towards the termination of the median rib. Between the median rib and this latter rib, a series of riblets extends anteroventrally, the strongest being the anterior. Intercostal areas strongly reticulate. The reticulae are largest on the flank of the ribs. The muri are rather narrow and do not normally bear spines. Some perforate tubercles occur, but very rarely. Solae are smooth and lack pore or sieve plates. Some sieve-type pores occur on muri, but very few. Internal features not seen. Sexual dimorphism present with males more elongate and narrower posteriorly than females.

Remarks. Differs from *Orthrocosta* sp. in its less elongate and acuminate posterior end, in the more strongly developed features of the ribs, mainly in the anterior margin that connects to the eye tubercle, and in the well-developed anterior subdivision of the median rib.

Orthrocosta atopos sp. nov. Ceolin and Whatley
Figure 15H–M

LSID. urn:lsid:zoobank.org:act:408937F4-FFBA-495B-93E8-F39A53EA6085

Derivation of name. Gr. *ατοπος* atopos, strange, out of place. With reference to two strange elements of the ornament (the box-like structure in the dorsal rib and the arcuate riblet above the ventrolateral rib) that are most unusual and entirely characteristic of the species of *Orthrocosta.*

Type material. Holotype: one complete carapace, LM-FCEN 3509 (Fig. 15H); paratypes: LM-FCEN 3510–3512 (Fig. 15I–M).

Material. 40 specimens from samples 26, 29, 31, 34, 36, 40, 50, 53 and 55; Danian.

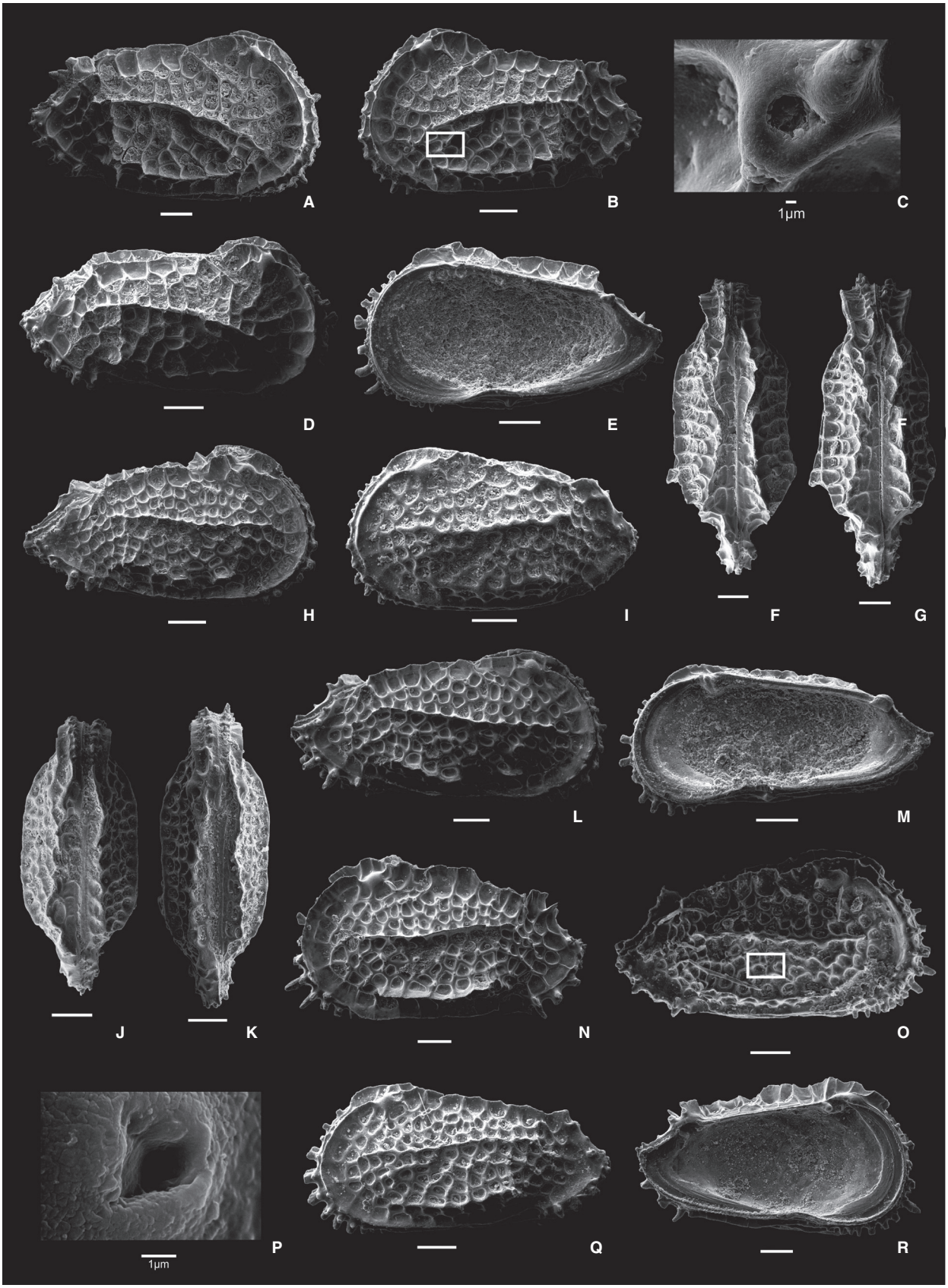
Diagnosis. An elongate, subtriangular species of *Orthrocosta* with a very strong median rib extending diagonally across most of the lateral surface. Dorsal rib less well developed; ventrolateral rib, short convex upwards and irregular. Eye tubercle prominent, intercostal reticulation strong with circular, oval, triangular and quadrate cells.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3509	0.904	0.452	0.301	Sample 26
Paratype, female	LM-FCEN 3510	0.804	0.440	0.410	Sample 29
Paratype, male	LM-FCEN 3511	0.904	0.452	0.285	Sample 26
Paratype, male	LM-FCEN 3512	0.787	0.373		Sample 34

Description. Elongate subtriangular in lateral view; subhexagonal with compressed ends in dorsal view. Thick-shelled and strongly ornamented. LV larger than RV, with overlap well developed around much of the free margin. Anterior margin broadly rounded with strong spatulate marginal denticles. Greatest height below mid-height in female and at mid-height in male. Posterior margin bluntly pointed at about mid-height. Dorsal margin straight, inclined to the posterior, but greatly obscured in lateral view by the dorsal ornament. Ventral margin with a slight oral concavity. Greatest length at about mid-height; greatest height just anterior of the eye tubercle. Ornament reticulocostate with some blunt, terminally performed, pestle-like, conjunctive tubercles. There are three principal ribs; one extends from the prominent hemicircular eye tubercle paralleling the anterior margin and bears very strong spatulate marginal tubercles. This becomes the ventrolateral rib and extends

FIG. 15. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–G, *Orthrocosta decores* sp. nov.; A, F, holotype, LM-FCEN 3505, adult female carapace; A, right lateral view, F, dorsal view; B–C, paratype, LM-FCEN 3506; B, adult female valve, left lateral view; C, sieve-type pore; D, G, paratype, LM-FCEN 3507; D, adult male carapace, right lateral view; G, dorsal view; E, paratype, LM-FCEN 3508, adult female valve, internal view. H–M, *Orthrocosta atopos* sp. nov.; H, holotype, LM-FCEN 3509, adult female carapace, right lateral view; I–J, paratype, LM-FCEN 3510, adult female carapace; I, left lateral view; J, dorsal view; K–L, paratype, LM-FCEN 3511, adult male carapace; K, dorsal view; L, right lateral view; M, paratype, LM-FCEN 3512, adult male valve, internal view. N–R, *Orthrocosta phantasia* sp. nov.; N, holotype, LM-FCEN 3513, adult female valve, left lateral view; O–P, paratype, LM-FCEN 3514; O, adult female carapace, right lateral view, P, simple pore; Q, paratype, LM-FCEN 3515, adult male valve, left lateral view; R, paratype, LM-FCEN 3516, adult female valve, internal view. All scale bars represent 100 μm, except those in C and P, which are 1 μm.


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onto the posterior margin, where it loses its identity in an eminence with five tubercles, and then extends upwards to form the dorsal rib. A ventral rib extends below this lateral rib, and a median rib extends diagonally across the valve to terminate at two cells distance from the anterior ocular rib. In its posteromedian part, an unusual rib extends upwards in an arc from the ventrolateral rib. The dorsal rib, which extends above the eye, forms a box-like structure immediately behind that organ and is very well seen in the male paratype. A second, but double box-like structure occurs immediately above the posterior termination of the median rib. Intercostal ornament of large, somewhat chaotically distributed reticulae, in which the circumference limits of the solae are clearly marked by a circular or oval rim. The median rib is eroded by the adjacent solae given it a serpentine outline. Very large reticular cells parallel the ocular–ventrolateral–posterior margin and dorsal ribs. Some muri and the median rib seem to bear sieve-type pores. Internal details imperfectly seen. Calcified inner lamella narrow with holamphidont hinge. CMS not seen. Sexual dimorphism strongly pronounced with male being more elongate and lower than female.

Remarks. This species differs from *Orthrocosta phantasia* sp. nov. in having an arcuate and shorter rib anteroventrally that initiates in a group of four modified reticular cells, while *O. phantasia* has a continuous and concave ventrolateral rim.

Stratigraphical range. Danian of Cerro Azul, General Roca.

Orthrocosta phantasia sp. nov. Ceolin and Whatley
Figures 15N–R, 16A

LSID. urn:lsid:zoobank.org:act:5BA73307-A879-4DA1-8753-63E052E0C64A

Derivation of name. Gr. *φανταστα*, phantasia 'an image of the imagination'. With reference the very unusual appearance of this species, particularly in the development of its dorsal rib.

Type material. Holotype: one complete carapace, LM-FCEN 3513 (Fig. 15N); paratypes: LM-FCEN 3514–3516 (Figs 15O–R, 16A).

Material. 54 specimens from samples 12 and 14 (Maastrichtian); 16, 17, 19, 21, 26 and 34 (Danian).

Diagnosis. Subtriangular species of *Orthrocosta* with strongly flared dorsal, ventrolateral and ventral ribs. Median rib distinct and extending across the valve surface. Eye tubercle pronounced and linked to tuberculate marginal rim, extending onto ventral surface. Anteroventral and posteroventral margins strongly dentate. Intercostal reticulation strong and eroding flanks of ribs.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3513	0.899	0.503		Sample 21
Paratype, female	LM-FCEN 3514	0.841	0.446	0.403	Sample 29
Paratype, male	LM-FCEN 3515	0.826	0.405		Sample 31
Paratype, female	LM-FCEN 3516	0.884	0.503		Sample 21

Description. A large, subrectangular to subtriangular species in lateral view, fairly thick-shelled; subhexagonal with compressed ends in dorsal view. Anterior margin very broadly, but asymmetrically rounded, with apex well below mid-height; anterodorsal slope gently curved, anteroventral slope more convex. Margin bearing large tubular and spatulate denticles. Posterior margin subcaudate and appearing upturned due to posteroventral slope being convex and the posterodorsal slope being slightly concave. Very large marginal denticles posteroventrally. Dorsal margin straight, strongly inclined to the posterior and completely obscured, in lateral view, by the large, very flared dorsal rib. Ventral margin almost entirely obscured by strong ventral rib. Greatest length below mid-height, greatest height at the anterior cardinal angle. Ornament reticulocostate with small, usually conjunctive tubercles on the muri, most of which are terminally perforated, while others seem blind. There are five ribs. A dorsal rib extends from anterior to the dorsal posterior cardinal angle passing dorsal to the eye tubercle which is a large complex structure comprising a vertically directed blade-like tubercle and two posteriorly directed, more tubular tubercles. The dorsal rib is strongly flared and separated into two long rectangular cells by near vertical muri. This rib is perforated by what seems to be simple, normal pore canals, some of which are situated on the flanks of the muri, although the majority pass through their crest. The median rib, depending on the individual specimen, is straight or sinuous, but to a degree always eroded by the reticulum on its flanks, with variable resulting corrugation. This rib terminates two cells from the anteromarginal rib and one cell below the large structure at the posterior cardinal angle. The ventrolateral rib extends from a posterior ventrolateral process, a two-bladed structure approximately one-third of the distance from the posterior margin to a similar structure approximately one-quarter of the distance from the anterior margin. It is concave, very flared and blade-like in lateral view. From the posterior end of this rib, a short, ill-defined riblet extends dorsally to the median rib. The fourth, or ventral, rib is slightly longer than the ventrolateral rib to which it is subparallel; it is also subparallel to the ventral margin. It is flared and divided into rectangular to quadrate cells by vertical muri. From the large, prominent, oval eye tubercle, a flared rib with large cells dorsally and multiple cells ventrally, parallels the anterior margin. All these ribs, or the tubercles they bear, are perforated by simple pore canals. The muri of the reticulum are strong and bear usually conjunctive tubercles that range from subspinate to cylindrical; most are terminally perforate. The cells are smooth and seem to lack sieve-type pores. CMS not seen. Hinge holamphidont but not strongly developed. Calcified inner lamella rather feebly developed.

Remarks. Differs from *Protocosta spinosa* Bertels, 1975*a* from the Maastrichtian of Fortín General Roca, in its well-developed ribs, mainly medianly and ventrally.

Stratigraphical range. Maastrichtian and Danian of Cerro Azul, General Roca.

Orthrocosta sp.
Figure 16B

Material. One specimen from sample 17; Danian.

Dimensions. Adult valve, LM-FCEN 3517, 1.019 (L), 0.552 (H).

Description. A very large, subtriangular species of *Orthrocosta* with a very well rounded but asymmetrical anterior margin, bearing in its lower half very strong marginal denticles. Posterior caudate with a slightly upturned apex at about mid-height and with strong tubercles on ventral dorsal slope. Dorsal rib crest-like, strongly reticulate with large reticulum over lateral surface that erodes the flanks of the ribs. Strong dorsal rib. Median rib divides at subcentral tubercle, which has smaller, rounder reticulae, into a rib that defines the dorsal limit; another which defines the ventral limit and the central rib that passes through the subcentral tubercle. Internal features as for genus.

Remarks. Differs from *Orthrocosta phantasia* sp. nov. by the presence of a subdivided median rib, by the posterior end being longer and acuminate and with the anterior and posterior ends being almost smooth.

Genus PETALOCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:A17F47E8-9870-49E4-AC2C-E7C759A3694D

Derivation of name. Gr. *πεταλος* petalos, of leaves; plus *κύθερεις* cythereis, a common ending used for cytheroid Ostracoda. With reference to the petaloid outline of the reticular cells in this genus.

Type species. Petalocythereis schilleri (Bertels, 1973).

Diagnosis. A median to large member of the Trachyleberididae, subovate, with small, subdued eye tubercle. Free margins surrounded by mural ribs bearing tubercles, but lacking strong marginal rims. Strongly reticulate ornament, muri ranging from smooth to strongly microtuberculate and from bearing numerous spinose tubercles to rather few. Shape of reticular cells petaloid. Hinge paramphidont. Anterior CMS in a 'U'-shape.

Description. As for the type species.

Included species. Afranticythereis shilleri (Bertels-Psotka, 1995) and *Afranticythereis venusta* (Bertels-Psotka, 1995).

Remarks. This genus differs from *Cythereis* Jones in lacking three longitudinal ribs. It differs from *Apatihowella* Jellinek and Swanson 2003, which lacks an eye, although there are some similarities in the nature of the conjunctive tubercular spines on the respective muri. *Sthenarocythereis* gen. nov. differs from *Petalocythereis* in its much stronger muri, much larger eye tubercle and its very strong marginal rim. *Petalocythereis* also differs from *Anticythereis* Van den Bold, in that the latter genus has reversed overlap (RV over LV). Although Carbonnel and Johnson (1989) had included all of Bertels' species erroneously in *Afranticythereis*, that genus differs from *Petalocythereis* in the presence of a vestibulum and subcentral tubercle, and in the ornamentation pattern without spines. *Anebocythereis* Bate differs in its hemimerodont hinge, narrow inner lamella and anterior CMS in a 'V'-shape.

Petalocythereis schilleri (Bertels, 1973)
Figure 16C–G

1973 *Anticythereis schilleri* Bertels, p. 326, pl. 4, figs 5a–d, 6a–b.
1995 *Afranticythereis schilleri* Bertels-Psotka, p. 168, pl. 2, fig. 16.

Type material. Specimens described by Bertels, housed in Facultad de Ciencias Exactas y Naturales: holotype: LM-FCEN 476, paratypes: 477–479; plus the paratypes from this study LM-FCEN 3518–3521 (Fig. 16C–G).

Material. 220 specimens from samples 16, 17, 19, 21, 23, 26, 31 and 34 (Danian), plus the type and other material of Bertels, housed in the collections of Facultad de Ciencias Exactas y Naturales, Laboratory of Micropaleontology, Univerisidad de Buenos Aires, Argentina.

Remarks. We consider it necessary to rediagnose and redescribe this species, as it is now the type species of a new genus.

Diagnosis. A subovate, strongly tuberculate species of *Petalocythereis* gen. nov. Tubercles mostly single and conjunctive on muri. Muri smooth. Solae petaliform in shape.

Dimensions. In mm:

		L	H	
Holotype, female	LM-FCEN 3518	0.825	0.506	Sample 16
Paratype, female	LM-FCEN 3519	0.950	0.512	Sample 16
Paratype, male	LM-FCEN 3520	0.916	0.561	Sample 19
Paratype, male	LM-FCEN 3521	0.977	0.497	Sample 23

Description. A large, thick-shelled species, subovate in lateral view. Subovate in dorsal view but medially constricted with posterior half strongly inflated. Valves subequal with little overlap. Anterior margin broadly rounded, bearing strong but with short, terminally perforate marginal denticles; apex at about mid-height. Posterior margin more narrowly rounded, strongly denticulate and apex at about mid-height. Dorsal margin straight but overhung by numerous, perforate tubercles. Ventral margin largely obscured by valve tumidity and tubercular spines. Well-developed oral invagination seen in internal view. Surface ornament strongly reticulospinose. Around the entire periphery, the muri are preferentially oriented concentrically parallel to the margins. This preference becomes less apparent distal from the margins and the central part is almost without this influence. In all parts, the solae are occupied by large sieve plates rather deeply inserted. These are quadrifoil embayments of greater or lesser intensity and separated by spike-like 'headlands', probably the product of celation. The muri are strong and often bear conjunctive spiny tubercles. The spines are terminally perforate and probably bore, in life, a single seta. Some tubercles occur as 'doubles' and others are quadruple. Associated with the tubercles on the muri are small sieve-type pores flush with the surface. There are no horizontal ribs. Eye tubercle small. Internally, the calcified inner lamella is strongly developed, particularly anteriorly and mid-posteriorly, and is avestibulate. Hinge modified paramphidont with, in the RV, the terminal element showing evidence of divisions into a number of denticles on a boss-like bar. Central muscle scar with a 'U'-shaped frontal. A small internal ocular sinus occurs below the anterior terminal element of the hinge. Sexually dimorphic, with males notably more elongate than females.

Remarks. Differs from *Anebocythereis amoena* Bate, 1972 from the Campanian of the Carnavon Basin, Australia, in its more rounded shape, less well-developed eye tubercle, more strongly developed muri and spines and in its paramphidont hinge.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels 1973) and Cerro Azul, General Roca.

Petalocythereis venusta (Bertels, 1975*a*)
Figure 16H–L

1975*a* *Anticythereis venusta* Bertels, p. 114, pl. 5, figs 10–16.
1995 *Afranticythereis venusta* Bertels-Psotka, p. 168, pl. 2, fig. 15.

Type material. Specimens described by Bertels, housed in Facultad de Ciencias Exactas y Naturales: holotype: LM-FCEN 608, paratypes: LM-FCEN 828–837; plus the four paratypes from this study LM-FCEN 3522–3525 (Fig. 16H–L).

Material. 60 specimens from samples 1, 3, 5, 8 and 12 (Maastrichtian), plus the type and other material of Bertels, housed in the collections of Facultad de Ciencias Exactas y Naturales, Laboratory of Micropaleontology, Univerisidad de Buenos Aires, Argentina.

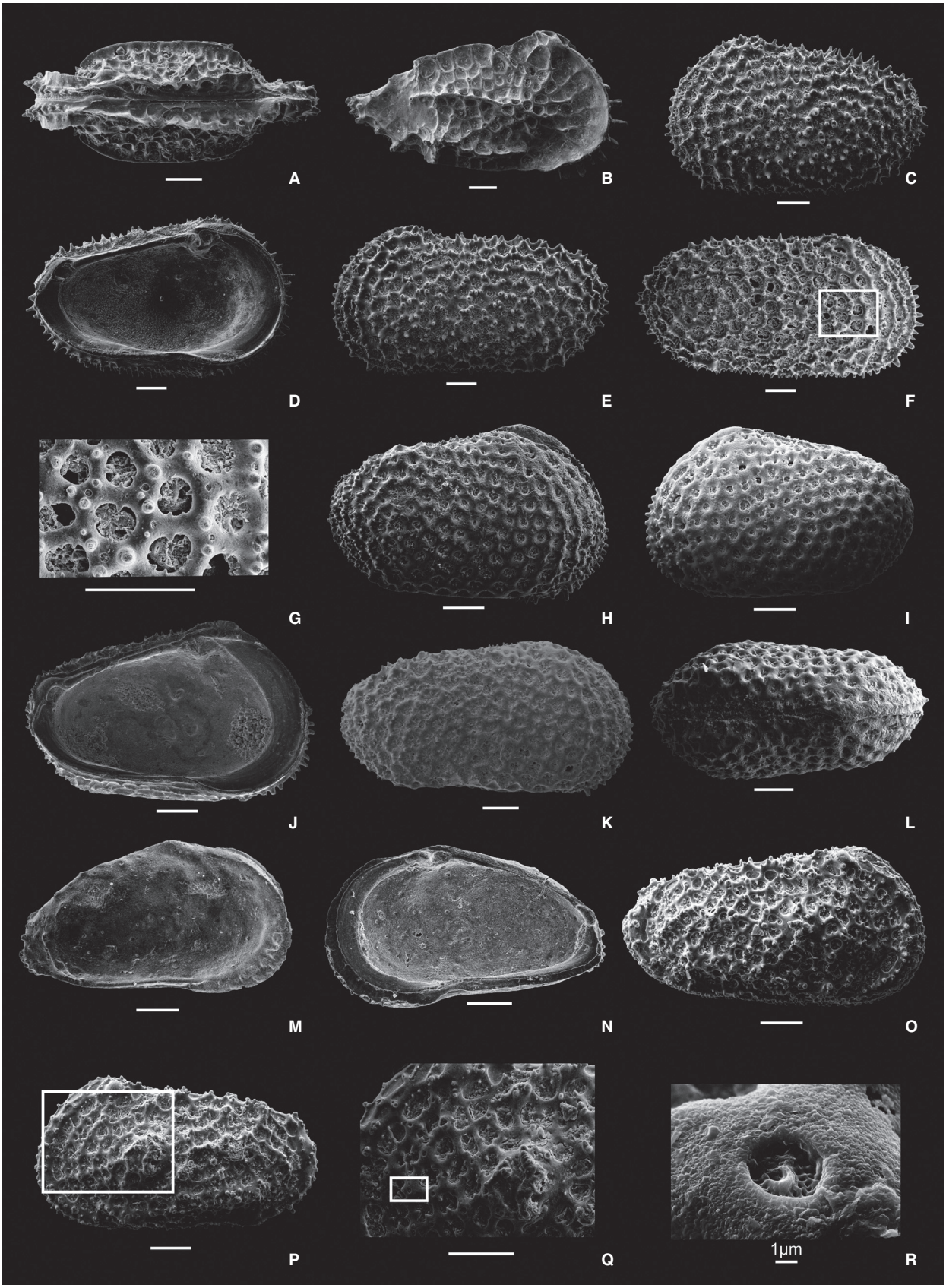
Dimensions. In mm:

		L	H	W	
Paratype, female	LM-FCEN 3522	0.687	0.445	0.365	Sample 5
Paratype, female	LM-FCEN 3523	0.663	0.422	0.355	Sample 1
Paratype, female	LM-FCEN 3524	0.729	0.453		Sample 5
Paratype, male	LM-FCEN 3525	0.831	0.444		Sample 5

Diagnosis. Subovate with strong anterior hinge ear in LV. Much more tuberculate posteriorly than anteriorly. Muri microtuberculate. Solae petaliform.

Description. A median, thick-shelled, ovate ostracod. Anterior margin broadly but asymmetrically rounded, with the anterodorsal slope longer and much less strongly rounded than the anteroventral slope, the latter being more strongly curved and bearing strong, terminally perforated marginal denticles. Apex somewhat below mid-height. Posterior margin bluntly rounded with apex at mid-height. Dorsal margin straight but largely obscured by valve surface. Ventral margin appears straight in lateral view due to the presence of a strong ventrolateral rib. Greatest length at about mid-height; greatest height at the anterior cardinal angle, greatest width in posterior one-third. Ornament reticulate and spinose peripherally, especially dorsally. Particularly around the free margin, the muri are preferentially oriented parallel to the margins, strongly enough to resemble peripheral riblets. The muri are strongly secondarily ornamented with 'ropey' microriblets than extend along the muri more than crossing them. This is most strongly developed anteriorly although it also occurs elsewhere. Particularly posteriorly, the

FIG. 16. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A, *Orthrocosta phantasia* sp. nov., paratype, LM-FCEN 3514, adult female carapace, dorsal view. B, *Orthrocosta* sp., LM-FCEN 3517, adult valve, right lateral view. C–G, *Petalocythereis schilleri* (Bertels, 1973); C, paratype, LM-FCEN 3518, adult female valve, left lateral view; D, paratype, LM-FCEN 3519, adult female valve, internal view; E, paratype, LM-FCEN 3520, adult male valve, left lateral view; F–G, paratype, LM-FCEN 3521; F, adult male valve, right lateral view; G, detail of petaliform shape of the solae. H–L, *Petalocythereis venusta* (Bertels, 1975*a*); H, L, paratype, LM-FCEN 3522, adult female carapace; H, right lateral view; L, dorsal view; I, paratype, LM-FCEN 3523, adult female carapace, left lateral view; J, paratype, LM-FCEN 3524, adult female valve, internal view; K, paratype, LM-FCEN 3525, adult male valve, right lateral view. M–N, *Philoneptunus*? sp.; LM-FCEN 3526, adult valve; M, right lateral view; N, internal view. O–R, *Sthenarocythereis arcana* (Bertels, 1975*a*); O, paratype, LM-FCEN 3527, adult carapace, right lateral view; P–R, paratype, LM-FCEN 3528; P, adult valve, left lateral view; Q, detail of ornamentation; R, sieve-type pore. All scale bars represent 100 μm, except that in R, which is 1 μm.


A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
1µm

muri bear rather small tubercles most of which are terminally perforate; these are largely absent medianly. The solae contain deeply recessed sieve plates, many quadrilobate. What appear to be other small sieve-type plates occur on the muri. Eye tubercle well developed, but not prominent. Internally, the hinge seems to be paramphidont as distinct teeth can be seen on the terminal element of the RV. Calcified inner lamella wide, avestibulate. The frontal muscle scar is 'U'-shaped. A well-developed ocular sinus occurs below the anterior terminal element of the hinge. Sexual dimorphism with male more elongate, more pointed posteriorly and with the ventral margin biconvex about a mid-ventral concavity.

Remarks. Differs from *Petalocythereis schilleri* (Bertels, 1973) in that spines occur only on anterior and posterior surfaces, and in the shape of the dorsal and ventral margins, this being more evident in males than females.

Stratigraphical range. Maastrichtian of Fortín General Roca, Río Negro (Bertels 1975*a*) and Cerro Azul, General Roca.

Genus PHILONEPTUNUS Whatley *et al.*, 1992

Type species. Cythereis gravezia Hornibrook, 1952.

Philoneptunus? sp.
Figure 16M–N

Material. Ten specimens from sample 5; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3526, 0.640 (L), 0.353 (H).

Description. A median, subovate carapace in lateral view. Anterior margin broadly rounded with a marginal rim that extends from an anterodorsal to the posterodorsal region and, which below mid-height, is closely and strongly re-entrant with structures forming approximately triangular elevations. These are distally nodose and perforate, probably representing the exit of true radial pore canals. Posterior margin truncate and straight at just about mid-height. Dorsal margin convex and subumbonate anterodorsally, straight and declining steeply posteriorly. The ventral margin is weakly biconvex about a long weakly indented oral concavity. The dorsal rib is broad and low and is marked by a number of large, but low pore conuli. An anteroventrally directed median sulcus occurs approximately mid-dorsally. The ventrolateral rib is strongly developed and extends diagonally, from an anteroventral position, across the ventral margin to form the posteromarginal rim. Surface smooth. CMS with 'V'-shaped antennal scar.

Remarks. The generic status of this species is somewhat in question due to the absence of one of the three ribs as required in the generic diagnosis.

Genus STHENAROCYTHEREIS nov. Ceolin and Whatley

LSID. urn:lsid:zoobank.org:act:DFD95985-BBB5-4DB0-BBDF-EA6FAB45C205

Derivation of name. Gr. σθεναρος, strong, mighty; plus *κύθερεις*, *Cythereis.* With reference to its extremely strong and ornate carapace.

Type species. Anticythereis arcana, Bertels 1975*a*.

Diagnosis. Large, thick-shelled, elongate subovate genus of the Trachyleberididae with very strongly reticulate ornament, in which strong muri and solae, that range in shape from circular, trefoil to polygonal, and contain large inserted sieve plates. Large strong eye tubercle, very strong anterior and posterior marginal rims. Multituberculate dorsal rib and similar ventrolateral and ventral ribs. Many conjunctive tubercles, single or paired, bearing simple pores; more rarely sieve type. Subcentral tubercle prominent. Paramphidont or holamphidont hinge and large 'U'-shaped frontal scar.

Description. As for the type species.

Included species. Anticythereis arcana Bertels 1975*a* and *Sthenarocythereis erymnos* sp. nov.

Remarks. This genus is erected to embrace two species, one of which was placed in *Anticythereis* by Bertels, and the other is new. Both species are manifestly not *Cythereis*, lacking three major longitudinal ribs and in possessing heavily complex reticulae. This genus differs from *Aleisocythereis* gen. nov. in that the latter possesses a reticulum in which the solae are circular or ovate. *Anebocythereis* Bate, 1972 has a hemimerodont hinge and narrow inner lamella. *Sthenarocythereis* differs from *Petalocythereis* gen. nov. in lacking a strong, ornate marginal rim and in lacking petaloid solae in the reticulum. Also, *P. schilleri* (Bertels) is much more strongly spinose and *P. venusta* (Bertels) has a strong microornament on the muri. The species identified by Bertels as *Anticythereis arcana* cannot belong to that genus mainly because the valves have normal overlap, and quite different ornament. The two species of this genus bear different hinge structures, *S. arcana* being holamphidont while *S. erymnos* is paramphidont. This is not necessarily surprisingly, given that at this time, there was rapid evolution in the amphidont hinge towards the more efficient holamphidont variety.

Sthenarocythereis arcana (Bertels, 1975*a*)
Figures 16O–R, 17A–B

1975*a* *Anticythereis arcana* Bertels. p. 115, pl. 5, 19 a–b, 20–21.

Remarks. Although this species was described by Bertels (1975*a*), now that it has become the type species of a new genus, it is necessary to redescribe and rediagnose.

Type material. Specimens described by Bertels, housed in Facultad de Ciencias Exactas y Naturales: holotype: LM-FCEN 838, paratypes: LM-FCEN 839–841; plus the three paratypes from this study 3527–3529 (Figs 16O–R, 17A–B).

Material. 18 specimens from sample 14 (Maastrichtian), plus the type and other material of Bertels, housed in the collections of the Facultad de Ciencias Exactas y Naturales,

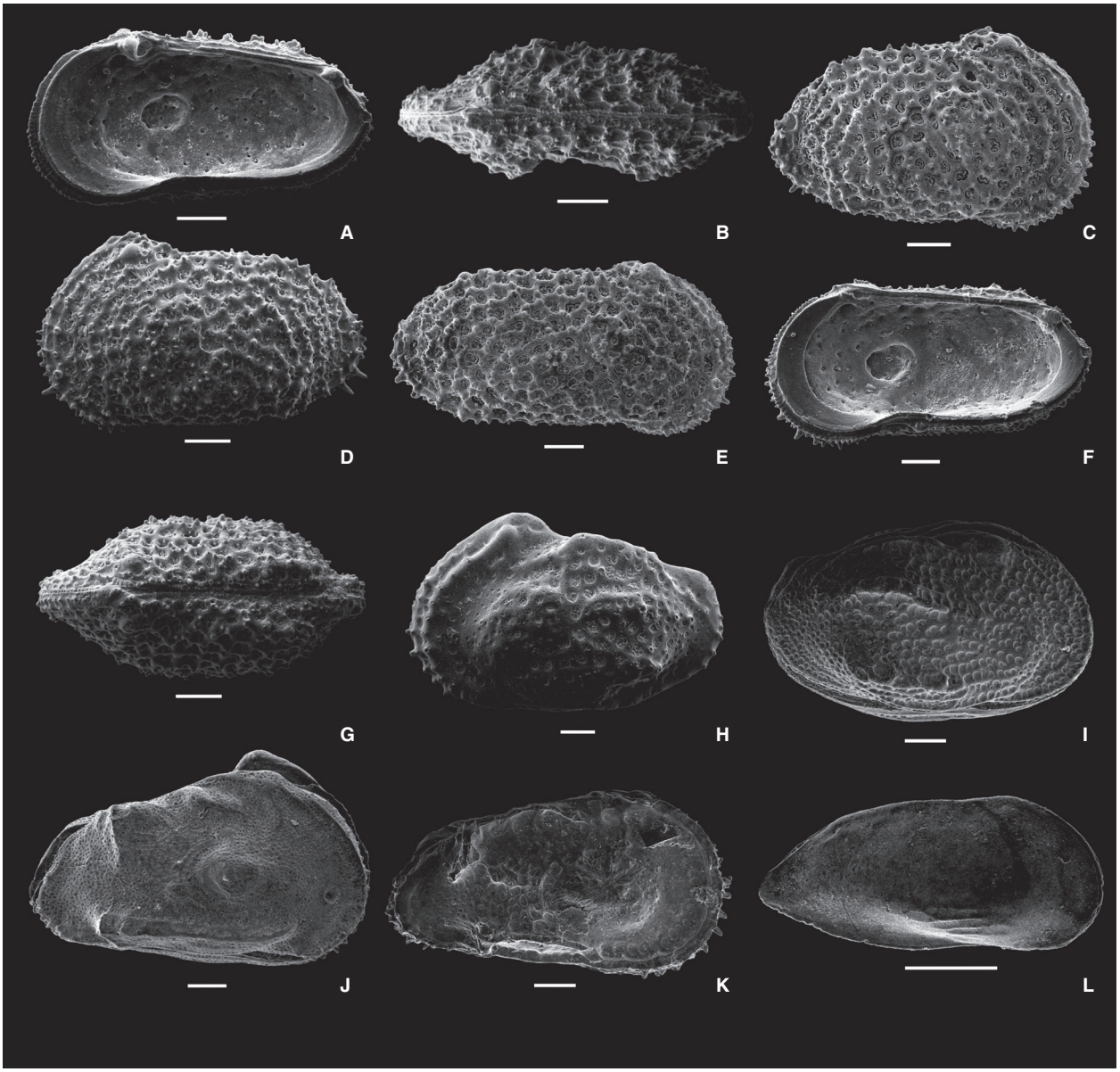


FIG. 17. Photomicrographs of Ostracoda from the Cerro Azul section, Neuquén Basin. A–B, *Sthenarocythereis arcana* (Bertels, 1975*a*); A, paratype, LM-FCEN 3529, adult valve, internal view; B, paratype, LM-FCEN 3527, dorsal view (broken). C–G, *Sthenarocythereis erymnos* gen. et sp. nov.; C, holotype, LM-FCEN 3530, adult female valve, right lateral view; D, paratype, LM-FCEN 3531, adult female valve, left lateral view; E, paratype, LM-FCEN 3532, adult male valve, right lateral view; F, paratype, LM-FCEN 3533, adult male valve, internal view; G, paratype, LM-FCEN 3534, adult female carapace, dorsal view. H, *Veenia tumida* (Bertels, 1975*a*), LM-FCEN 3535, adult female valve, left lateral view. I, *Huantraiconella costata* (Bertels, 1975*b*), LM-FCEN 3536, adult carapace, right lateral view; J, *Unicapella*? sp. 1; LM-FCEN 3537, adult carapace, right lateral view. K, *Unicapella*? sp. 2; LM-FCEN 3538, adult carapace, right lateral view. L, *Clinocythereis* sp.; LM-FCEN 3539, adult carapace, right lateral view. All scale bars represent 100 μm.

Laboratory of Micropaleontology, Univerisidad de Buenos Aires, Argentina.

Dimensions. In mm:

		L	H	W	
Paratype, adult	LM-FCEN 3527	0.662	0.475	0.241	Sample 14
Paratype, adult	LM-FCEN 3528	0.719	0.394		Sample 14
Paratype, adult	LM-FCEN 3529	0.716	0.368		Sample 14

Diagnosis. An elongate species, subovate with extremely strong reticulate ornament, with strong peripheral rims at each end and ovate to polygonal reticular cells with strong tubercles, mainly conjunctive, single paired or multiple. Hinge holampidont.

Description. A large, thick-shelled ostracod, subrectangular in lateral view, elongate in dorsal view. Anterior margin broadly and symmetrically rounded with small, blunt marginal denticles and apex a little below mid-height. Posterior margin bluntly pointed with apex just above mid-height and with short, concave posterior dorsal slope and longer convex posterior ventral slope. Dorsal and ventral margins straight and subparallel. LV larger than right with overlap at end margins and dorsally. Greatest length above mid-height, greatest height at anterior cardinal angle, and greatest width medianly. Surface strongly reticulate with distal reticulae parallel to the free margins. Muri polygonal, strong, smooth with rounded profile. They bear numerous rounded pestle-like tubercles often occurring in pairs or triplets, frequently conjunctive; most seem blind but others are terminally perforate. Sieve-type pores also occur on the muri, frequently conjunctively. Reticulae varying in shape, largest and most elongate occur anteroventrally and posteriorly. Elsewhere, they range from circular, bifid, trefoil, quadrifoil to irregularly hexagonal. Most of the solae seem to have large inserted sieve plates. Valve surface with three longitudinal ribs. The dorsal rib, which is very peripheral, and well defined with a well-developed series of multiple tubercles along its length. The ventrolateral rib is similar, although the median rib, strongest in posterior half, is less well developed. Subcentral tubercle with very strong large irregularly, but poorly defined smooth area. Eye tubercle prominent. Internally, the calcified inner lamella is wide with a very narrow anterior vestibulum. Central muscle scar insert in the subcentral depression with a large obliquely orientated 'U'-shaped frontal scar. The hinge is holamphidont, robustly developed with a smooth anteromedian element and stepped anterior tooth in the right valve. Sexual dimorphism not observed.

Remarks. This species differs from *Sthenarocythereis erymnos* sp. nov. in the nature and aspect of its reticulation, in its strong peripheral rims on the end margins and in the less strong tuberculate dorsal rib.

Stratigraphical range. Maastrichtian of Fortín General Roca, Río Negro (Bertels 1975*a*) and Cerro Azul, General Roca.

Sthenarocythereis erymnos sp. nov. Ceolin and Whatley
Figure 17C–G

LSID. urn:lsid:zoobank.org:act:CB7F2234-6BBC-4979-96D4-1CF18DD4AC42

Derivation of name. Gr. *ερυμνος* erymnos, strong, fortified. With reference to the very strong ornament of reticulum and conjunctive spines and tubercles.

Type material. Holotype: one complete carapace, LM-FCEN 3530 (Fig. 17C); paratypes: LM-FCEN 3531–3534 (Fig. 17D–G).

Material. 92 specimens from samples 1, 3, 5 and 12; Maastrichtian.

Diagnosis. A strongly reticulocostate species of *Sthenarocytereis* with the reticulum around the margins comprising muri that are preferentially orientated to those margins. Subcentral tubercle very strongly developed with a ramifying extension dorsally. Eye tubercle strongly developed. Anterior and posterior marginal rims not strongly developed, but strongly denticulate antero- and posteroventrally. Hinge paramphidont.

Dimensions. In mm:

		L	H	W	
Holotype, female	LM-FCEN 3530	0.733	0.477		Sample 3
Paratype, female	LM-FCEN 3531	0.725	0.437		Sample 5
Paratype, male	LM-FCEN 3532	0.905	0.457		Sample 3
Paratype, male	LM-FCEN 3533	0.875	0.446		Sample 5
Paratype, female	LM-FCEN 3534	0.734	0.386	0.386	Sample 5

Description. A large, thick-shelled ostracod, subrectangular in lateral view, subovate in dorsal view with compressed extremities. Valves subequal with the LV overlapping the RV mainly in ventral region. Anterior margin broadly rounded with apex at mid-height and denticulate. Posterior margin subcaudate with apex at mid-height. Dorsal margin straight but overhung by valve tumidity and ornamentation. The ventral margin is obscured by valve tumidity; oral invagination is well seen internally. Greatest height at the anterior cardinal angle. The surface is strongly reticulate with rather short, mostly conjunctive mural spines; less developed centrally. Peripherally, the muri have a circular orientation parallel to the margins. This orientation is largely lost centrally. The muri bear rather small tubercles that are terminally blind and these are largely absent medianly. The solae contain deeply recessed sieve plates, mostly of trefoil or quatrefoil pattern. The muri also bear smaller sieve-type pores. Only in the

extreme posterior is this pattern of ornamentation absent. Subcentral tubercle largely low and strongly reflected internally. Eye tubercle well-developed. Calcified inner lamella very wide; avestibulate. Central muscle scar in subcentral tubercle depression. Frontal scar very large and 'U'-shaped. Hinge clearly paramphidont. Internal eye-sinus well developed and positioned below the anterior element of the hinge. Strong sexual dimorphism with males more elongate and lower than females.

Remarks. Sthenarocythereis erymnos sp. nov. differs from *Sthenarocythereis arcana* (Bertels, 1975*a*) in that the reticulation pattern that is less strongly developed, although fossae are somewhat similar in both species.

Stratigraphical range. Maastrichtian of Cerro Azul, General Roca.

Genus VEENIA Butler and Jones, 1957

Type species. Cythereis ozanana Israelsky, 1929.

Veenia tumida (Bertels, 1975*a*)
Figure 17H

1975*a* *Veenia (Nigeria) tumida* Bertels, p. 123, pl. 4, fig. 7.
1995 *Nigeria tumida* Bertels-Psotka, p. 167, pl. 2, fig. 8.

Material. Five specimens from samples 5 and 12; Maastrichtian.

Dimensions. Adult valve, LM-FCEN 3535, 0.941 (L), 0.594 (H).

Stratigraphical range. Maastrichtian of Fortín General Roca, Río Negro (Bertels 1975*a*) and Cerro Azul, General Roca.

Subfamily BUNTONIINAE Apostolescu, 1961

Genus HUANTRAICONELLA Bertels, 1968*a*

Type species. Huantraiconella prima Bertels, 1968*a*.

Huantraiconella costata (Bertels, 1975*c*)
Figure 17I

1975*c* *Harringtonia costata* Bertels, p. 263, pl. 1, fig. 1, a–b.
1968*a* *Huantraiconella prima* Bertels, p. 254, pl. 1, figs 1, a–c; 2, a–b.

Material. 22 specimens from samples 16, 17, 21, 26 and 40; Danian.

Dimensions. Adult carapace, LM-FCEN 3536, 0.821 (L), 0.497 (H).

Remarks. We do not consider that *Harringtonia* (Bertels, 1975*c*) differs in any significant manner from *Huantraiconella* Bertels, 1968*a* and we therefore subsume the former within the latter.

Stratigraphical range. Danian of Fortín General Roca, Río Negro (Bertels 1975*b*), and Cerro Azul, General Roca.

Subfamily UNICAPELLINAE Dingle, 1981

Genus UNICAPELLA Dingle, 1980

Type species. Unicapella sacsi Dingle, 1980.

Unicapella? sp. 1
Figure 17J

Material. Two complete carapaces from sample 3; Maastrichtian.

Dimensions. Carapace, LM-FCEN 3537: 0.941 (L), 0.596 (H).

Diagnosis. Large, elongate, subrectangular in lateral view. Anterior margin broadly rounded with apex below mid-height. Posterior margin subcaudate with apex a little above ventral margin. Dorsal margin straight, overhung by dorsal rib and posterodorsal tubercle. Ventral margin very gently sinuous. LV larger than RV especially anterodorsally. Ornament with several large tubercles, with large free marginal rim and ventrolateral rib. Subcentral tubercle well developed. Eye tubercle present and a hinge ear in LV. A deep conical depression occurs on the anterior margin. Surface covered with a net of small circular meshes. Internal features not seen.

Remarks. Differs from *Unicapella sacsi* Dingle, 1980 from the Campanian of Richard Bay, South Africa, in the absence of spines, in the anterior and posterior marginal rims being less strongly developed and in the reticulation pattern that is absent at anterior and posterior ends. Differs from *Curfsina kafkai kafkai* Pokorny, 1967 from Cretaceous of Czech Republic, in having a less developed marginal rim and by the absence of a median rib. Also in *C. kafkai kafkai,* the intercostal surface is smooth.

Unicapella? sp. 2
Figure 17K

Material. Six specimens from samples 16, 17, 19 and 21; Danian.

Dimensions. Adult carapace, LM-FCEN 3538, 0.840 (L), 0.342 (H).

Diagnosis. Large, elongate subrectangular in lateral view. Irregularly subovate with compressed terminal end margins (especial anteriorly) in dorsal view. Anterior margin broadly rounded with apex at mid-height and strongly denticulate, posterior bluntly rounded with apex well below mid-height and denticulate. Dorsal margin straight, rising to dorsal cardinal angle. Ventral margin straight. Ornamentation reticulocostate and very irregular. Subcentral tubercle large. Five structures, the dentate antero- and posteromarginal rims, the ventrolateral rib, the median rib and a short, but prominent rib that extends near vertically from a posterodorsal position, are all well developed. Intercostal area, particularly posteriorly, with circular and oval reticulae. Few normal pore canals, mostly simple. Internal features not seen.

Remarks. This species is left in question due to the absence of spines on its surface, absence of a hinge ear in LV at anterocardinal angle, in being larger in size than the type species of genus (L: 0.60, H: 0.33). Differs from *Unicapella*? sp. 1 in the nature of its reticulation and in the absence of a hinge ear in LV.

Subfamily *incertae sedis*

Genus CLINOCYTHEREIS Ayress and Swanson, 1991

Type species. Clinocythere australis Ayress and Swanson, 1991.

Clinocythereis sp.
Figure 17L

Material. Four specimens from samples 17 and 21; Danian.

Dimensions. Adult carapace, LM-FCEN 3539, 0.397 (L), 0.175 (H).

Description. Small, elongate subtriangular, with LV slightly larger than RV. Anterior margin rounded, posterior margin subcaudate, slightly 'upturned' with concave posterodorsal slope. Surface smooth except for four short parallel longitudinal ribs on the ventrolateral surface.

Remarks. Differs from the type species *Clinocythereis australis* Ayress and Swanson, 1991, from the Oligocene of New Zealand in that the caudal process is less 'downturned' and by the presence of four small ribs ventrolaterally. These two characters also differentiate it from *C.* aff. *C. australis* Bergue *et al.*, 2006 from the Quaternary of the Santos Basin.

THE NATURE OF THE FAUNA

In essence, there are three faunas: the Maastrichtian, the Danian and that which is both Maastrichtian and Danian. Each of these faunas has certain characteristics, some of which can be conveyed in simple statistics, others in taxonomic appreciation.

Maastrichtian

From the seven samples studied from the Maastrichtian, 53 species belonging to 33 genera were recovered. Of these, 18 species were previously described; 19 species are new and 12 species are left in open nomenclature due to either poor preservation or paucity of material. Experience shows that the majority that these species in open nomenclature will eventually be described as new. Therefore, there is in the Maastrichtian of the Neuquén Basin, a total potential of some 31 new species. This newness is further emphasized by our discovery of six new genera.

Danian

Twenty samples were collected from the Danian of the Cerro Azul section, and these yielded 81 species belonging to 40 genera. Of these 81 species, 27 are previously described, 32 are new, and 19 are left in open nomenclature. Of these, however most or all must be new, as time eventually will show, so the Danian has a potential of some 59 new species. The newness of this fauna is further emphasized by the seven new genera that we have erected from the Danian in this study.

Both Maastrichtian and Danian

A total of 21 species belonging to 16 genera occur in both the Maastrichtian and Danian. Given the allegedly catastrophic effects on both vertebrate and invertebrate faunas of events at the K–T boundary, this is a surprisingly high number and percentage (18.6%) of fauna to have survived and crossed the boundary.

Of the 21 species crossing the boundary, the number of the samples in which they occur in the Maastrichtian ranges between one and four (mean 1.80) and the number of samples in which they occur in the Danian ranges from 1 to 15 (mean 6.61). This latter figure illustrates that this is not a chance phenomenon but that these species evolved in the Maastrichtian and passed the boundary with no ill-effects in order to be able to flourish in the Danian.

Another study will commence shortly to analyse in greater detail the nature of the effect on the Ostracoda of the K–T boundary from four additional outcrop localities in the Neuquén Basin.

The taxonomic and evolutionary aspects of the two faunas: Maastrichtian and Danian

Maastrichtian. Table 1 lists the Maastrichtian fauna, showing it to be very diverse, containing platycopids (7.5%), marine Cyproidea (5.6%) but overwhelmingly Cytheroidea (86.8%). In terms of number of species within the Cytheroidea, certain families, such as the Cytheruridae and the Pectocytheridae, are very well represented. The latter probably better so than in any other Maastrichtian deposit known to the authors. However, it is the Trachyleberididae that are so totally dominant, representing by 24 species (45.3%) of the fauna and more than 50% of all Cytheroidea.

It is notable that 8 of the 24 trachyleberid species belong to new genera (33.3%). These are *Apatoleberis*, *Mimicocythereis*, *Castillocythereis*, *Orthrocosta*, *Hysterocythereis*, *Petalocythereis* and *Sthenarocythereis*, and these comprise a very considerable body of hitherto undescribed taxa.

Details of what can be called an evolutionary explosion of these trachyleberid genera in both the Maastrichtian and Danian are discussed separately in this section.

Danian. The Danian fauna of this study (Table 2) is even more richly endowed than the Maastrichtian and even more diverse, as shown below.

The Cytherellidae are represented by four species (4.9%) and the Bairdiidae by two species (2.4%), both rather low figures. However, while the marine Cyproidea comprise eight species (9.8%), the remainder of the fauna are Cytheroidea (79%), of which six species are Bythocytheridae (7.6%) and 5.1% belong to a currently un-named subfamily (Ceolin *et al.* in press) (5.1%).

TABLE 1. Maastrichtian ostracod fauna from Cerro Azul section with all identified species in this work.

Family CYTHERELLIDAE Sars, 1866
Cytherella saraballentae sp. nov.
Cytherella semicatillus sp. nov.
Cytherella terminopuntata Holden, 1964
Cytherelloidea spirocostata Bertels, 1973
Family PARACYPRIDIDAE Sars, 1923
Paracypris imaguncula sp. nov.
Family PONTOCYPRIDIDAE Müller, 1894
Argilloecia abnormalis sp. nov.
Argilloecia concludus sp. nov.
Superfamily CYTHEROIDEA Baird, 1850
Family BYTHOCYTHERIDAE Sars, 1826
Bythoceratina sp. aff. *Bythoceratina scaberrima* (Brady, 1887)
Family CYTHERIDAE Baird, 1850
Nodoconcha? sp.
Family CYTHERIDEIDAE Sars, 1925
Subfamily EUCYTHERINAE Puri, 1954
Eucythere dinetos sp. nov.
Subfamily KRITHINAE Mandelstam *in* Bubikyan, 1958
Krithe crepidus sp. nov.
Copytus sp.
Family CYTHERURIDAE Müller, 1894
Cytheropteron translimitares sp. nov.
Cytheropteron sp.
Aversovalva glochinos sp. nov.
Pedicythere sp.
Semicytherura sp. 3
Eucytherura stibaros sp. nov.
Eucytherura sp. 2
Hemiparacytheridea sp.
Family LOXOCONCHIDAE Sars, 1925
Sagmatocythere? sp. 1
Family PECTOCYTHERIDAE Hanai, 1957
Keijia flexuosa (Bertels, 1975*a*)
Keijia huantraicoensis (Bertels, 1969*a*)
Paramunseyella epaphroditus sp. nov.
Munseyella costaevermiculatus sp. nov.
Munseyella minima Bertels, 1975*a*
Family TRACHYLEBERIDIDAE Sylvester-Bradley, 1948
Actinocythereis tuberculata Bertels, 1974
Aleisocythereis polikothonus sp. nov.
Apatoleberis noviprinceps (Bertels, 1975*a*)
Mimicocythereis attilai (Bertels, 1975*a*)
Castillocythereis albertoriccardii sp. nov.
Cythereis stratios sp. nov.
Cythereis incerta (Bertels, 1975*a*)
Cythereis rionegrensis (Bertels, 1975*a*)
Cythereis trajectiones sp. nov.
Henryhowella (Henryhowella) splendida Bertels, 1975*a*
Henryhowella (Wichmannella) meridionalis (Bertels, 1969*c*)
Hysterocythereis attenuta (Bertels, 1975*a*)
Hysterocythereis coinotes gen. et sp. nov.
Hysterocythereis? sp.
Oertiella? sp.
Oertiella exquisita Bate, 1972
Orthrocosta phantasia sp. nov.
Petalocythereis venusta (Bertels, 1975*a*)
Philoneptunus? sp.
Sthenacythereis erymnos sp. nov.
Sthenacythereis arcana (Bertels, 1975*a*)
Unicapella? sp. 1
Veenia tumida (Bertels, 1975*a*)
Sphaeroleberis? *abnormalis* Bertels, 1975*a*
Subfamily BUNTONIINAE Apostolescu, 1961
Togoina cretacea Bertels, 1975*a*
Togoina argentinensis Bertels, 1975*a*
Nigeria punctata Bertels, 1975*a*

TABLE 2. Danian ostracod fauna from Cerro Azul section with all identified species in this work.

Family CYTHERELLIDAE Sars, 1866
Cytherella saraballentae sp. nov.
Cytherella semicatillus sp. nov.
Cytherella terminopunctata Holden, 1964
Cytherelloidea spirocostata Bertels, 1973
Family BAIRDIIDAE Sars, 1888
Bairdoppilata sp.
Bairdoppilata? sp.
Family PARACYPRIDIDAE Sars, 1923
Paracypris bertelsae sp. nov.
Paracypris imaguncula sp. nov.
Paracypris? sp.
Paracypris jonesi Bonnema, 1940
Aglaiocypris? sp.
Family PONTOCYPRIDIDAE Müller, 1894
Argilloecia abnormalis sp. nov.
Argilloecia hydrodynamicus sp. nov.
Superfamily CYTHEROIDEA Baird, 1850
Family BYTHOCYTHERIDAE Sars, 1826
Bythocythere costata Bertels, 1973
Bythoceratina cheleutos sp. nov.
Bythoceratina meana (Bertels, 1973) comb. nov.
Bythoceratina sp.
Pseudocythere sp.
Tanycythere sp.
Family CYTHERIDAE Baird, 1840
Nodoconcha sp. nov. 1
Nodoconcha sp. nov. 2
Nodoconcha sp. nov. 3
gen. et sp. nov.
Family CYTHERIDEIDAE Sars, 1925
Subfamily CYTHERIDEINAE Sars, 1925
Phelocyprideis acardomesido sp. nov.
Subfamily EUCYTHERIDEINAE Puri, 1954
Eucythere dinetos sp. nov.
Subfamily KRITHINAE Mandelstam, 1958
Krithe crepidus sp. nov.
Krithe sp.
Subfamily NEOCYTHERIDEIDINAE Puri, 1957
Copytus sp.
Family CYTHERURIDAE Müller, 1894
Cytheropteron hyperdictyon sp. nov.
Cytheropteron bidentinos sp. nov.
Cytheropteron translimitares sp. nov.
Aversovalvaglochinos sp. nov.
Semicytherura argentinensis (Bertels, 1974) comb. nov.
Semicytherura sp. 1
Semicytherura sp. 2
Semicytherura sp. 3
Semicytherura? sp.
Eucytherura stibaros sp. nov.
Eucytherura sp. 1
Hemingwayella verrucosus sp. nov.
Family LOXOCONCHIDAE Sars, 1925

(continued)

TABLE 2. (Continued)

Heinia prostratopleuricos sp. nov.
Loxoconcha sp. aff. *Loxoconcha cretacea* Alexander, 1936
Palmoconcha similis (Bertels, 1973)
Sagmatocythere? sp. 2
Loxoconcha (s.l.) *posterocosta* sp. nov.
Family PECTOCYTHERIDAE, Hanai 1957
Keijia circulodictyon sp. nov.
Keijia kratistos sp. nov.
Keijia huantraicoensis (Bertels, 1969*a*) comb. nov.
Keijia flexuosa (Bertels, 1975*a*) comb. nov.
Ameghinocythere archaios sp. nov.
Family TRACHYLEBERIDIDAE Sylvester-Bradley, 1948
Subfamily TRACHYLEBERIDINAE Sylvester-Bradley, 1948
Actinocythereis biposterospinata Bertels, 1973
Actinocythereis indigena Bertels, 1969*a*
Actinocythereis rex Bertels, 1973
Castillocythereis multicastrum sp. nov.
Cythereis stratios sp. nov.
Cythereis clibanarius sp. nov.
Cythereis trajectiones sp. nov.
Henryhowella (Henryhowella) nascens (Bertels, 1969*c*)
Subgenus WICHMANNELLA Bertels, 1969*c* subgen. nov.
Henryhowella (Wichmannella) praealtus sp. nov.
Henryhowella (Wichmannella) meridionalis (Bertels, 1969*c*)
Hysterocythereis paredros sp. nov.
Hysterocythereis coinotes sp. nov.
Hysterocythereis diversotuberculatus sp. nov.
Hysterocythereis inconnexa (Bertels, 1973) comb. nov.
Neoveenia argentinensis Bertels, 1969*c*
Orthrocosta decores sp. nov.
Orthrocosta atopos sp. nov.
Orthrocosta phantasia sp. nov.
Orthrocosta sp.
Petalocythereis schilleri (Bertels, 1973) comb. nov.
Trachyleberis weiperti Bertels, 1969*a*
Unicapella? sp. 2
Subfamily BUNTONIINAE Apostolescu, 1961
Togoina argentinensis Bertels, 1975*a*
Togoina australis Bertels, 1968*b*
Togoina semiinornata Bertels, 1975*a*
Huantraiconella costata (Bertels, 1975*c*) comb. nov.
Huantraiconella prima Bertels, 1973
Subfamily INCERTAE SEDIS
Clinocythereis sp.

However, these newly found taxa are of great importance in allowing us to understand the fossil history of the previously monotypic Antarctic genus *Nodoconcha*.

The subfamily Cytherideinae with the single taxon *Phelocyprideis acardomesido* gen. et sp. nov. is numerically and in percentage terms insignificant; however, it represents a genus with a entirely new hinge type and is a precursor of the Pleistocene and Recent *Cyprideis* Jones. The Krithinae and Neocytheridinae together, with three

species make up (3.7%), but the two subfamilies of Cytheruridae, however, with 12 species, make up the substantial percentage of 14.8%.

With five species representing 4.9% of the fauna, the Loxoconchidae are exceeded by the Pectocytheridae, whose five species are numerically abundant forming a significant and important component of the fauna at 6.2%. The Pectocytheridae are represented by well-developed early members of the two genera *Keijia* and *Ameghinocythere*. Once again, however with 29 species (35.8%), the Trachyleberididae truly dominate the Cytheroidea and the new genera *Sthenarocythereis*, *Castillocythereis*, *Hysterocythereis*, *Petalocythereis* and *Orthrocosta* represent a dynamic evolutionary component within the family which will be discussed below.

The Trachyleberididae

The trachyleberids that we have encountered in this study include two new species of *Cythereis*. Bertels (1969*a*, 1975*a*) had already described another three species of the same age. We encountered one new species of the genus *Henryhowella* which we consider is in fact the subgenus *Wichmannella* (Bertels, 1969*c*).

Of some importance zoogeographically, we encountered very small numbers of two species of the genus *Unicapella*, which was described by Dingle (1980) from the Campanian of Richard Bay, South Africa. We encountered a single species of *Veenia* Butler and Jones, *Veenia tumida* (Bertels, 1975*a*), a single species of *Philoneptunus*? sp. Whatley, Millson and Ayres, 1992 and another single specimen of a species that we tentatively included in *Oertliella* Pokorny.

One of the new genera of trachyleberidid is *Apatoleberis* gen. nov. (ex. *Trachyleberis*, Bertels 1975*a*). This clearly is not *Trachyleberis*, lacking all the basic features of that genus (Brandão *et al.* 2013). Similarly, Bertels (1975*a*) described the species *Bradleya*? *attilai*. However, as because of its musculature, this species is clearly a trachyleberidid while *Bradleya* is usually classified in the Thaerocytheridae Hazel, we have named this species *Mimicocythereis* gen. nov.

Orthorocosta gen. nov. has three new species, *O. phantasia*, *O. atopos* and *O. decores* plus *Orthrocosta* sp. We make the assumption that this genus is somehow ancestral to *Costa* Neviani although the evidence for this is not entirely convincing.

The five new genera *Aleisocythereis*, *Castillocythereis*, *Hysterocythereis*, *Sthenarocythereis* and *Petalocythereis* form an interesting and complicated complex of genera. We cannot be certain of their ancestry in the Maastrichtian, but despite the fact that they all lack three transverse ribs in the posterior part that carapace and not all have paramphidont hinges, we suspect that the ancestor was *Cythereis* Jones. They differ from *Cythereis* not just in those features mentioned above, but also in the nature of the reticulum, which is always strongly and very diversely developed. Indeed, it is the principal characteristic on which both genera and species are classified in this group.

All of these genera originated in the Maastrichtian where they appear quite suddenly and without any direct evidence for their ancestry. From their first appearance, they already exhibit a great diversity in the nature of the reticulum. For example, *Castillocythereis* already has its ornament which includes the strong fortress-like complexes of tubercles and *Sthenarocythereis* appears with its extremely strong muri and mural tubercles surrounding reticular cells ranging in shape from circular to polygonal and enclosing strong sieve plates. Similarly, *Aleisocythereis* with its large circular, reticular cells containing distinct cup-like structures, *Hysterocythereis* with its large open reticular cells and poor development of the mural tubercles and *Petalocythereis* with its numerous petal-shaped reticular cells all appear suddenly with these structures fully developed.

This is an almost unrivalled example of such rapid diversity. All these genera, except *Aleisocythereis*, continue up into the Danian where they are a significant component of the fauna. Within these five genera, it is very difficult to find a particular relationship. Perhaps the closest relationship is between *Sthenarocythereis* and *Petalocythereis*, but it is impossible on either stratigraphical or morphological grounds to propose which of the two is the ancestor. Although beyond the scope of the present study, it is interesting to wonder what the fate of this vigorous group of rapidly evolving trachyleberids was, as there seems to be no trace of them in post-Danian deposits in Argentina or elsewhere. We hope, in a detailed survey of the Maastrichtian and Danian of other outcrops in the Neuquén Basin, to find evidence which will help to resolve this enigma.

CONCLUSION

Although this study is based on only one of the five localities of Maastrichtian and Danian strata in the Neuquén Basin available to us, we have been surprised at the richness and diversity of the fauna we have encountered. The total fauna comprises 113 species belonging to 54 genera, and of these, 9 genera and 38 species are new. The fauna is dominated by Cytheroidea and these are dominated by the Trachyleberididae. A group of five new trachyleberid genera *Aleisocythereis*, *Castillocythereis*, *Hysterocythereis*, *Sthenarocythereis* and *Petalocythereis*, which may have evolved from *Cythereis* Jones, are discriminated principally on the nature of the reticulum which varies greatly within the group, but is always strongly reticulate. The

ultimate fate of this group is of as great an interest as is their origin. We intend at the earliest opportunity to investigate the other four outcrop localities with the aim to resolving these outstanding problems, and also to encounter additional material of the many species in open nomenclature, so that can be properly named and described.

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