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Short Communication

Infralittoral ostracods from the southern Atacama Desert

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ABSTRACT. This communication examines the distribution of ostracods in the infralittoral zone of northern Chile, situated between 26 and 29°S, at depths ranging from 7 to 12 m. Sixteen taxa have been identified, of which the most abundant are *Paracytheridea granti* Leroy, 1943, *P. longicaudata chilensis* Hartmann, 1962, *Patagonacythere tricostata* Hartmann, 1962, *Hemicythere foveata* Hartmann, 1962, *Loxoconcha fluctushumboldti* Hartmann, 1962, *Propontocypris calderensis* Hartmann, 1962, and *Xestoleberis simplex* Hartmann, 1962. The results obtained are highly useful for their application in biogeographical studies, tsunami research, and the reconstruction of recent Quaternary paleoenvironments, particularly in areas such as the Atacama Desert, where studies focusing on this group are still scarce.

Keywords: Ostracoda; infralittoral; benthic microfauna; applications; Atacama Desert; northern Chile

INTRODUCTION

Ostracods are small crustaceans with a soft body protected by two valves. They are mostly benthic and inhabit almost all aquatic environments. Their distribution is influenced by several environmental variables, including salinity, temperature, grain size, hydrodynamics, organic matter content, and anthropogenic inputs (such as agriculture, mining, and industry) (Okosun 1998, Yousef 2018, El Baz et al. 2025). Knowledge of their assemblages in recent shallow marine zones is very interesting as it has numerous applications, such as: i) ecological studies, ii) sea level changes, iii) inference of transgressive and regressive processes, iv) paleoenvironmental reconstructions, v) delimitation of polluted areas, vi) detection of tsunamigenic layers in Holocene sequences; or vii) proxies for Quaternary climate changes (Penney 1987, Ruiz et al. 2005, 2013, Horne et al. 2012, Baltanás et al. 2025).

Studies on ostracods from the coastal areas of Chile have focused especially on their southern sector, close to the Strait of Magellan (Staunton et al. 1996, Whatley et al. 1997, Wood et al. 1999). In the center and north of this country, studies are scarce and have primarily focused on infralittoral environments or planktonic species (Hartman 1962, 1965, Mujica et al. 2022). Consequently, numerous species in this sector have been defined based on illustrations, lacking electron microscopic photographs in their original descriptions. This work aims to partially alleviate this absence by studying the benthic ostracods present in the infralittoral zone of northern Chile, between 26 and 29°S. It includes photographs of various species for improved future identification.

The study area is located between Pan de Azúcar National Park to the north, and Chañaral de Aceituno, to the south (Fig. 1). This area is part of the southern

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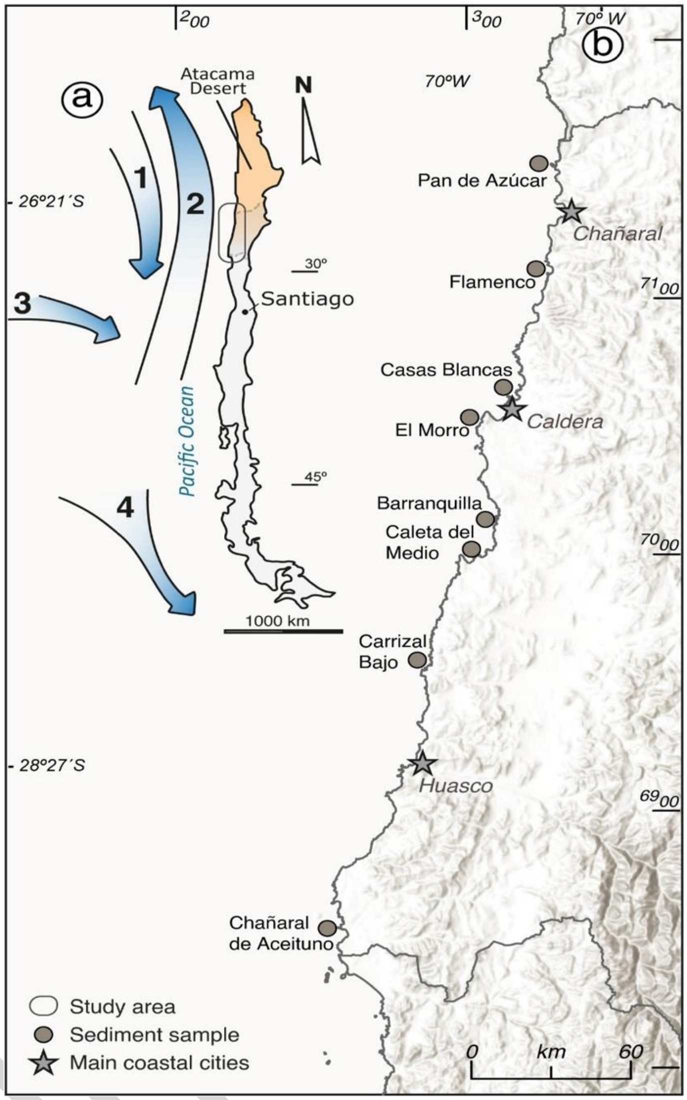

Figure 1. a) Location of the studied area and samples, b) ocean currents affecting the Chilean coasts. 1: Warm Countercurrent, 2: Humboldt Current, 3: Western Drift Current, 4: Cape Horn Current.

sector of the Atacama Desert. It is characterized by a semi-arid to desert climate with rainfall not exceeding 30 mm per year (Sarricolea et al. 2017, Navarro et al. 2021). It features a very irregular, rocky, and cliffy coastline with narrow bays (e.g. Casas Blancas, El Morro), as well as several small beaches (e.g. Flamenco). The tidal range is semidiurnal and micromareal with significant wave heights between 1.79 and 2.04 m (Navarro et al. 2021)

Littoral drift currents flow from south to north as part of the Upwelling System of the Humboldt Current, considered one of the most productive systems on the planet (Thiel et al. 2007). The associated productivity is primarily due to the coastal upwelling phenomenon that accompanies the current (Graco et al. 2007).

Eight sampling points have been selected in northern Chile (Fig. 1), distributed in the shallow subtidal zone of open coasts and bays at depths ranging from 7 m (Flamenco) to 12 m (Carrizal Bajo). Sampling was conducted in the summer of 2018 (January-February), and the samples were stored in aluminum boxes in dark conditions at 4°C until they arrived at the INCT Laboratory of the Universidad de Atacama. Fifty grams were separated for granulometric analysis, and the particle size distribution of the sediments was obtained using a column of sieves with a mesh size between 63 μm and 2 mm.

Table 1. Abundance (50 g of sediment), percentages, and density (ind g^{-1}) of the ostracod species (ind g^{-1}). Ind: individuals.

Species/Samples	Pan de Azúcar		Flamenco		Casas Blancas		El Morro		Barranquilla		Caleta del Medio		Carrizal Bajo		Chañaral Aceituno	
	Ind	%	Ind	%	Ind	%	Ind	%	Ind	%	Ind	%	Ind	%	Ind	%
Bairdia sp.									591	21.9	100	0.8			43	3.6
Cyprideis beaconensis													171	9.5		
Hartmannosa chilensis									313	11.6						
Hemicythere faveota	18	5.9			97	2.7	30	3.8	105	3.9	1381	11	178	10	29	2.4
Hemicytheria chilensis	40	11.8	64	0.9											87	7.3
Hemicytherura sp.					159	4.4							346	19.2		
Loxoconcha fluctushumboldti	19	5.9	555	7.8							1823	14.6	157	9.5	101	8.4
Neonesidea sp.			28	0.4							107	0.8				
Paracypris sp.													187	9.5		
Paracytheridea granti	93	29.4	1635	23	100	2.7	478	59.7	243	9	1318	10.5	344	19	410	34.2
Paracytheridea longicaudata chilensis	39	11.8	988	13.9	317	8.8	93	11.4	101	3.9	615	4.9	80	4.4	290	24.2
Paracytheroma sp.			570	7.8	94	2.7										
Patagonacythere tricostata	78	23.5	491	6.9	724	20	202	25	824	30.5	1907	15.2	343	19.1	208	17.3
Propontocypris calderensis		5.9	971	13.9	465	12.9			319	11.6	1732	13.8				
Xestoleberis dichatoensis					454	12.4					452	3.6				
Xestoleberis simplex	16	5.9	1799	25.3	1206	33.5			208	7.7	3125	24.9			29	2.4
Density (ind g^{-1})	**6**		**142**		**72**		**16**		**54**		**251**		**36**		**24**	

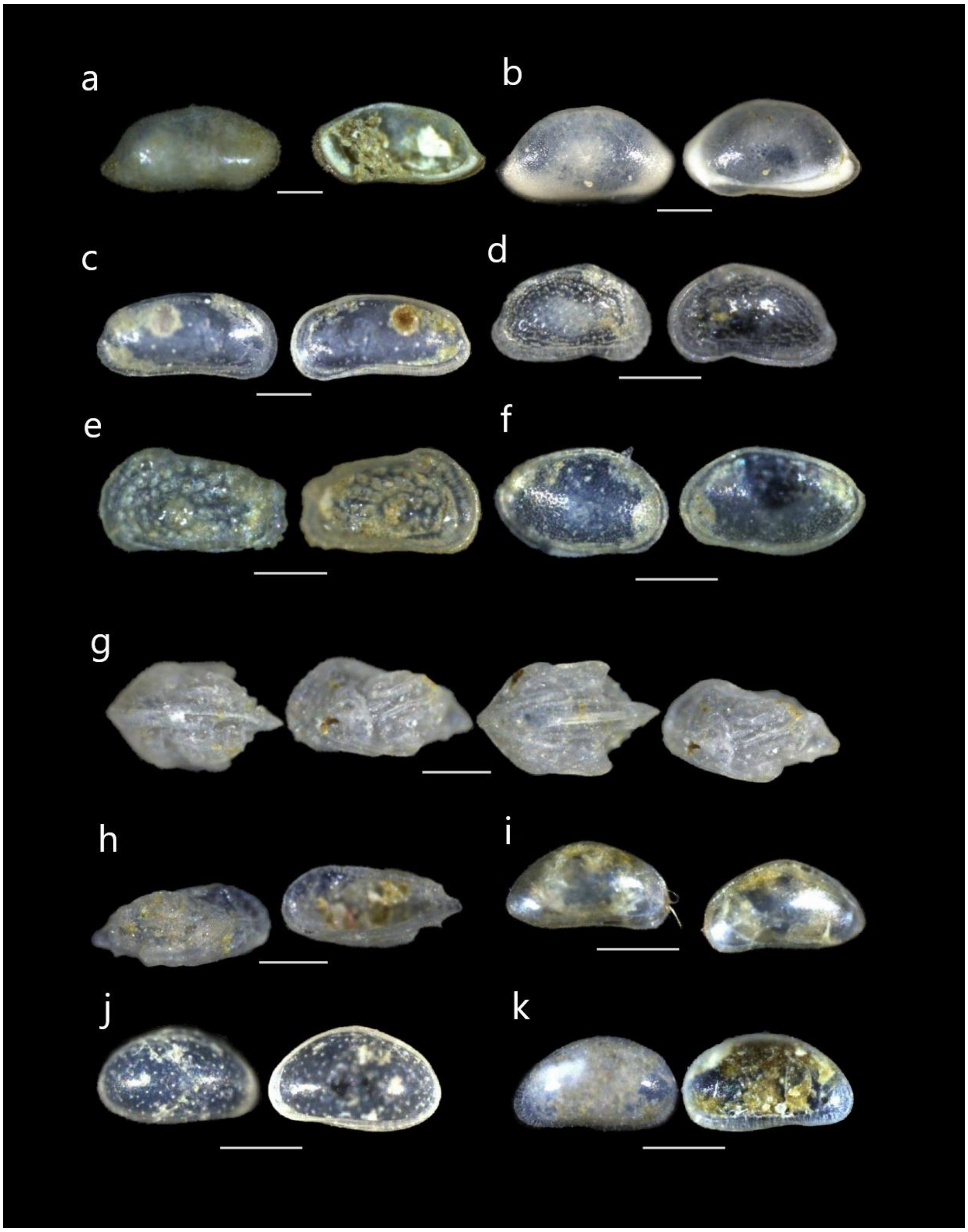

Figure 2. Photographs of some ostracod species. a) *Bairdia* sp., b) *Neonesidea* sp., c) *Paracytheroma* sp., d) *Hemicytheria chilensis*, e) *Patagonacythere tricostata*, f) *Loxoconcha fluctushumboldti*, g) *Paracytheridea longicaudata chilensis*, h) *Paracytheridea granti*, i) *Propontocypris calderensis*, j) *Xestoleberis simplex*, k) *Xestoleberis dichatoensis*. Scale: 100 µm.

For microfaunistic analysis, 100 g of sediment was sieved through 125 and 250 µm sieves. After counting and classifying the specimens, the most significant taxa were extracted into cells and photographed using a camera attached to a Flexacam C3 Leica loupe. Their taxonomic classification has been based on Hartmann (1962, 1965) and the World Register of Marine Species.

Textural analysis makes it possible to differentiate between two groups of samples: i) Casas Blancas and Flamenco (7-9.3 m depth), with leptokurtic distributions dominated by fine sands (64-82.7%), and ii) the remaining six samples (9.5-12 m depth), composed of bioclastic sediments with important percentages of gravels (up to 55.8%), very coarse sands (up to 43.9%) and coarse sands (up to 38.7%). Turritellid gastropods are very abundant in all samples.

The density of ostracods is very variable, ranging from 6 ind g^{-1} in Pan de Azúcar to 251 ind g^{-1} in Caleta del Medio. In the remaining samples, only Flamenco exceeded 100 ind g^{-1}. Sixteen taxa have been identified, 11 of them at the specific level. The number of species per sample varied between 8 and 10 in most samples, with the highest diversity observed in Caleta del Medio and the lowest diversity in El Morro, which had only four species (Table 1). This low diversity contrasts with that observed in other infralittoral areas, where more than 120 species have been identified (Aiello et al. 2021). There is no direct relationship between these data and the grain size distribution previously described.

The most abundant species are *Paracytheridea granti* Leroy, 1943 (2.7-59.7%) (Fig. 2h), *P. longicaudata chilensis* Hartmann, 1962 (3.9-24.2%) (Fig. 2g), and *Patagonacythere tricostata* Hartmann, 1962 (6.9-30.5%) (Fig. 2e), which are present in all samples. *Hemicythere foveata* Hartmann, 1962 is only absent in Flamenco, while *Loxoconcha fluctushumboldti* Hartmann, 1962 (Fig. 2f), *Propontocypris calderensis* Hartmann, 1962 (Fig. 2i), and *Xestoleberis simplex* Hartmann, 1962 (Fig. 2j) have been found in five samples. This distribution, along with the data extracted from Hartmann (1962, 1965), enables us to identify this ostracod assemblage as the most representative of the shallow infralittoral environments in northern Chile.

This study also has direct applications:

i) Biogeographical notes. Some species have been found in other littoral areas of Latin America: *P. granti* and specimens resembling *P. longicaudata chilensis* have been reported from the Pacific coasts of Mexico (Machain-Castillo & Gio-Argaez 1993); specimens of *P. tricostata* (described as *Patagonacythere* sp.) and *Xestoleberis dichatoensis* (Hartmann 1962) have been collected at Anahuac beach (Puerto Montt, Chile) (Riveros-Gómez 2013), and the former has been found as well in southern Chile and Argentina (Hartmann 1962, Whatley et al. 1997). Consequently, these records should contribute to a more precise delimitation of the biogeographic provinces of Latin American ostracods in the future.

ii) Identification of tsunamigenic layers in coastal cores and trenches. *P. longicaudata chilensis* and *Cyprideis beaconensis* (Leroy, 1943) have been identified in sandy beds deposited by the 1922 Atacama tsunami (Abad et al. 2023).

iii) Reconstruction of coastal uplift in Holocene sequences with *C. beaconensis* (Encinas et al. 2006).

In summary, this brief communication presents new data on the distribution of ostracods in northern Chile, their relative abundance, and their potential applications in various geological fields. In addition, it includes some of the first photographs of species initially described through drawings (Hartmann 1962, 1965).

Contribution credits

C. Gómez Martín: methodology, formal analysis, writing-original draft; F. Ruiz: conceptualization, validation, methodology, writing-original draft, review and editing; E. Bonnail: conceptualization, funding acquisition, project administration, supervision, review; E. Cruces: project administration, supervision, review; M.L. González-Regalado: methodology, formal analysis and review; T. Izquierdo: funding acquisition, project administration, writing-original draft, supervision, review; M. Abad: funding acquisition, conceptualization, validation, methodology, writing-original draft, review and editing. All authors have read and accepted the published version of the manuscript.

Conflict of interest

The authors declare no potential conflict of interest in this manuscript.

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