OSTRACODS OF QUATERNARY SEDIMENTS OF THE PROVINCE OF BUENOS AIRES, ARGENTINA

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ABSTRACT: We study the benthic ostracods from the vibro-core KP60Bis (39 ° 08'34 .8689" S, 61 ° 46'10 .0278") of the estuary of Bahía Blanca, province of Buenos Aires. In the upper area of the core (Z2) the ostracofauna this domain is diverse with *Loxocythere variasculpta* Whatley, Moguilevsky, Toy, Chadwick and Ramos *Neocytherideis ruidis* Whatley, Moguilevsky, Chadwick, Toy and *Callistocythere litoralensis* (Rossi de Garcia). Within fitales and parafitales ostracods recovered *Paracytherois* sp. and *Pellucistoma elongata* Whatley, Moguilevsky, Chadwick, Toy and Feijó. Towards the top of the core is recorded species of continental origin as *Limnocythere* sp., *Ilyocypris gibba* Ramdhor, 1808 and *Cypridopsis vidua* O.F. Müller, 1776. In the middle sector (Z1) were abundant specimens of ostracods valves assigned to *Ambostracon (Ambostracon) tenuireticulata* Kotzians, 1982, *Cornucoquimba lutziana*, Zabert, 1978 and *Caudites ohmerti* Coimbra and Ornellas, 1987. Micropalaeontological analysis shows that the studied sediments were deposited in intertidal estuarine, affected by changes in sea level during the late Holocene.

KEY WORDS: Ostrcodes, Holocene, Bahía Blanca, estuary.

The ostracods are microcrustaceans with a wide ecological range that inhabit marine, brackish and freshwater environments. They are very sensitive to the chemical and physical changes in the environment, introducing changes in the species composition of the community and individuals morphological level. Are recorded from the Upper Cambrian and have a shell of $CaCO_3$ can be preserved in the register (Horne et al., 2002). Ostracods have a high potential as a proxy (proxy-data) in Quaternary paleoecological studies (Carbonel et al., 1983, 1988). While in Argentina, this branch of Micropaleontology has advanced significantly in the last two decades: Ferrero (1996, 2005) and Bertels - Postka Laprida (1998a,b,c); Bertels & Martínez (1990, 1997); Bertels - Psotka & Martinez (1999), Martínez (2005), Laprida (2006), the contributions made to records in estuarine environments are still rare. The aim of this study was to determine the diversity of ostracods present in Holocene sediments and provide new data for the reconstruction of paleoenvironment of the study area.

Study area

The Bahía Blanca estuary is a mesotidal system formed by a 3000 km² complex of different sized channels crossing large islands and tidal flats. Above mean sea level (m.s.l.), the intertidal areas are densely vegetated by *Spartina*. The largest freshwater contributions come from the Sauce Chico river and a smaller stream, the Napostá Grande. The temperature and salinity of the water masses are vertically homogeneous along the estuary (Fig. 1).

Lithology and radiocarbon age

The core KP60 bis (39 º 08'34 " S - 8689 61º 46'10 .0278 "W) is located in the

external sector to Bahía Blanca estuary , at kilometer 60 of the access channel to the port system and where the km 0 corresponds to port Ingeniero White , located in the innermost portion of the estuary. The roof of this core is located 11.4 m below the level of reduction used in the charts , which is defined as the average of syzygy tides subtracted one standard deviation.

The sedimentological study found that the composition is sandy clay loam over all witness with interbedded layers of clayey silt laminated fine sands.

For the lower section (337-340 cm depth) an age of 5980 ± 70 years BP (Gra - 27128) cal age was obtained. 6616-6952 BP , for the middle section (162-165cm) : 1950 ± 60 years BP (Gra - 27127) 163- 170cm and an age of 1900 ± 40 yr BP (BETA- 216777) and section exceeds 77 -80 cm from the ceiling an age of 2220 ± 60 years BP (Gra - 27126) cal age was obtained. 2043-2332 BP.

Metodologhy

There was sampled the core KP60 Bis every 10cm. The samples were disintegrated in H2O2 to 20 % and washed by means of a sieve with an opening of Maya of 63 microns. The dried one of the samples carried out in stove to 50 º C. From every sample the total of copies extracted to itself under magnifying glass binocular Nikon NI--150. The systematic determinations to generic level were based on the offer by Moore and Pitrat (1961), while for the specific determinations there were in use the works of Bertels & Martínez (1997); Bertels-Postka & Martínez (1999). The photographies of electronic microscopy took with miscroscopio electronic of sweep I read model EVO 40, of the regional center of Basic and Applied investigations of White Bay (CRIBABB). To recognize the autochthonous paleotanatocenosis and alóctonas in the different environments involved in this study, versus calculated the proportion of adult valves the total of juvenile valves (Brouwers, 1988). In addition there was calculated the index of diversity of Shannon-Wiener.

RESULTS

On the basis of the qualitative and quantitative information of the ostrácodos extracted from the samples and the fauna accompanist could divide the same one in two zones. The low section of the core, from them 390cm, turned out to be sterile. The ostrácodos met a good condition of preservation, the copies were very scanty with complete shells, that is to say with both articulated valves. There have differed, up to the moment, a total of 40 species, though for the present I work only they were considered to be those represented by adult and juvenile copies, in an approximate proportion of 1/8.

In the low sector of the core levels were registered of shells of very fragmented mollusks.

Z1 (380-240cm)

There were situated remains of the mollusks *Tagelus plebeius* (Lightfoot, 1786), *Nucula puelcha* Orbigny, 1846, *Nuculana (Costelloleda) whitensis* Farinati, 1978 and briozoos of smoothed morphology. The valves of copies were abundant of ostrácodos euhalinos assigned to *Ambostracon (Ambostracon) tenuireticulata* Kotzian, 1982, *Cornucoquimba lutziana* Zabert, 1978 (Fig. 2D) and *Caudites ohmerti* Coimbra & Ornellas, 1987 (Fig. 2C). The index of diversity of Shannon-Wiener presented values between 1 and 2,5.

Z2 (240- 235 cm)

In this sector it diminishes very much the diversity and density of ostrácodos and there are very abundant the remains of valves of mollusks with high degree of fragmentation.

Z3 (235-0cm)

Recovered valves of mollusks assigned to *Nuculana (costelloleda) whitensis* Farinati, 1978 and *Paraplica* sp. and briozoos of tree-shaped morphology. As for the present ostracofauna two subzone differ: subzone A: he presents a great diversity with domain of species eurihalinas as *Loxocythere variasculpta* Whatley, Moguilevsky, Toy, Chadwick & Branches (Fig. 2E); *Neocytherideis ruidis* Whatley, Moguilevsky, Chadwick, Toy (Fig. 2A) and *Callistocythere litoralensis* (Rossi de García) (Fig. 2F). They turn out to be exemplary adult and juvenile of *Cyprideis salebrosa hartmanni* Ramirez, 1967 (Fig. 2B). Some copies presented the development of nodules of carbonate of calcium in the external face of the valves.

Inside the ostrácodos fitales and parafitales, those that live associated with the vegetation, registered *Paracytherois* sp. and *Pellucistoma elongata* Whatley, Moguilevsky, Chadwick, Toy & Feijó (Fig. 2G). In addition continental species are registered as: *Limnocythere* sp. (Fig. 2J), *Cypridopsis vidua* (Fig. 2I) and *Iliocypris gibba* (Fig. 2H). The index of diversity of Shannon-Wiener presented values between 2 and 3.

Subzone B: the diversity is similar to the descripta for the subfield To but it diminishes the density.

INTERPRETATIONS PALEOENVIRONMENTAL AND DISCUSSION

The information offered to the ostrácods and fauna accompanist allows to characterize the core KP60Bis. The low sector of the core (240-380 cm) presents a low density of ostrácodos. The low values of the index of diversity Shannon-Wiener indicate an environment with low content of nutrients and a level of energy raised. This is demonstrated, in addition, by the presence of strata by numerous fragments of valves of mollusks and colonies of briozoos of smoothed morphology. The number of individuals would have been controlled by two factors: the quantity of nutrients in the column of water and the level of energy of the environment (Carbonel, 1988). The form of the colonies of briozoos is considered to be a warning element of the degree of stability of the environment in which they develop since the development of colonies incrustantes is observed only in environments of high energy and tree-shaped colonies only they can develop in environments of low energy due to his fragility (Moyano, 1979; Hageman et al., 1997). On the other hand, the abundant presence of copies of species euhalinas as *Ambostracon (Ambostracon) tenuireticulata*; *Cornucoquimba lutziana* and *Caudites ohmerti* demonstrate an environment submareal since these species only develop in environments submareales of the estuary in conditions of stable salinity and without air exhibition. The specimens of recovered *Tagelus plebeius* shallow. For the exposed thing it is possible to deduce that the sediments were deposited in an environment submareal by low levels of nutrients and a high level of energy. The increase of the density and high values of the index of Shannon-Wiener in the top part of the core (230-0cm) indicate conditions of minor energy with major quantity of available nutrients. The presence of briozoos tree-shaped fragile that only can develop in environments of low energy is another indicator of the environmental conditions. As for the present ostracofauna, the dominant species *Loxocythere variasculpta* Whatley, Moguilevsky, Toy, Chadwick and Branches; *Neocytherideis ruidis* Whatley, Moguilevsky, Chadwick, Toy characterize to current sediments submareales of little depth of the internal sector of the estuary of White Bay (Martínez et to. 2005), and *Callistocythere litoralensis* (Rossi de García), this

species was found in current samples of the Channel *Tres Brazas*. The presence of species fitales and parafitales (*Paracytherois* sp. and *Pellucistoma elongata*) and of *Cyprideis salebrosa hartmanni* like that how the record of copies of mollusks *Nuculana (costelloleda) whitensis* and *Paraplica* sp. permits to indicate that the studied sediments were deposited in shallow environments. The presence of nodules of CaCO3 in specimens of the genus *Cyprideis* prove to be a character linked to the environment, and develop only under high salinity (Carbonel, 1988).

CONCLUSIONS

On the basis of the results obtained in this study they could have identified the dominant species along the core like that how his preferences to a particular habitat. Consequently, due to the sedimentological characteristics, specific composition of ostrácodos and of molluscos found, the dominancia of *Loxocythere variasculpta*; *Neocytherideis ruidis* and *Callistocythere litoralensis*; and the presence of mollusks *Nuculana (costelloleda) whitensis* and *Paraplica* sp., in the top part of the core; as well as *Ambostracon (Ambostracon) tenuireticulata*; *Cornucoquimba lutziana* and *Caudites ohmerti*, the valves of *Tagelus plebeius* and the marked decrease of the density of ostrácodos in the average sector; it is possible to infer that the commanding conditions of deposit were corresponding to subenvironments estuarinos of low depth in the area of the Bahía Blanca estuary. The ostracods are an effective tool to enhance and paleoenvironmental ecological studies.

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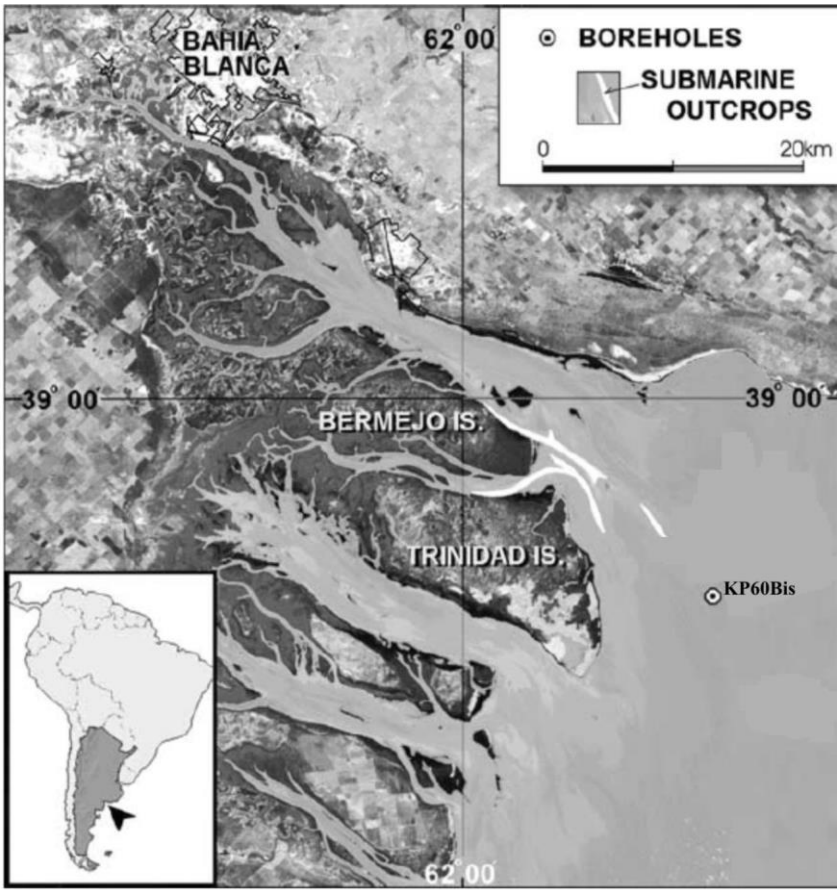

Figure 1. Studied area. Locations of the core KP60Bis in the external area of Bahia Blanca estuary.

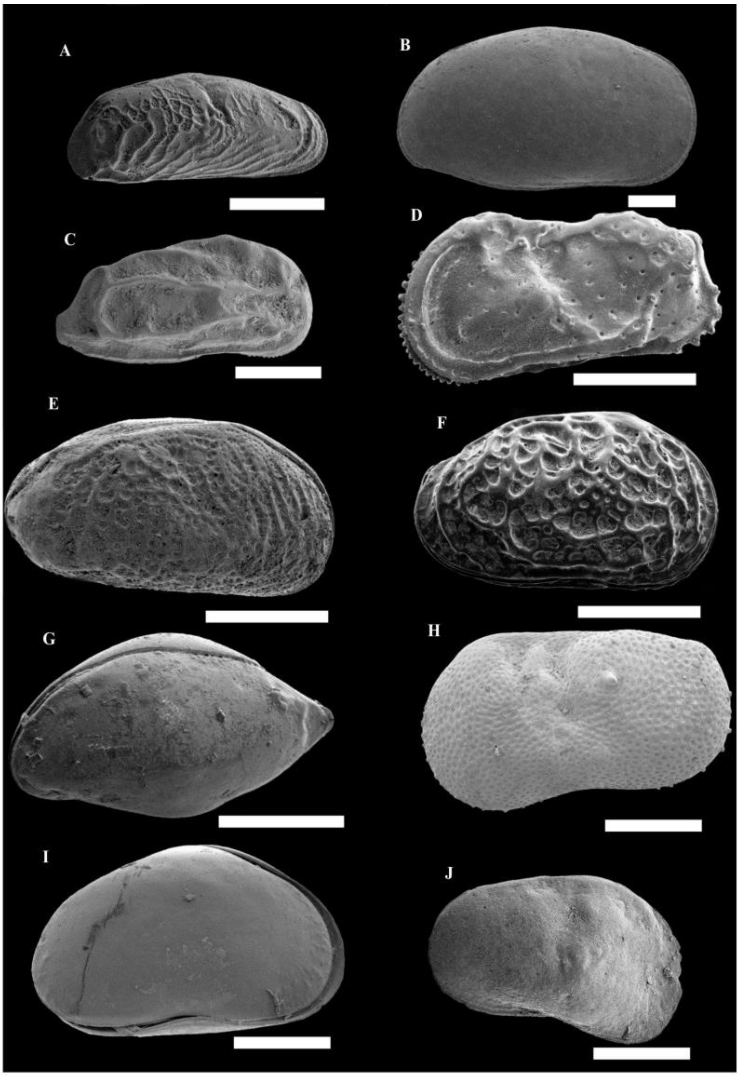

Figure 2. Ostracod species present in the estuary of Bahia Blanca: A. *Neocytherideis ruidis,* B. *Cyprideis salebrosa hartmanni,* C. *Caudites ohmerti,* D. *Cornucoquimba lutziana,* E. *Loxocythere variasculpta,* F. *Callistocythere litoralensis,* G. *Pellucistoma elongata,* H. *Iliocypris gibba,* I. *Cypridopsis vidua,* J. *Limnocythere* sp. (Scale: 100 µm).