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Late Cretaceous (Campanian/Maastrichtian) freshwater to restricted marine mollusc fauna from the Loncoche Formation, Neuquén Basin, west-central Argentina

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ABSTRACT

This study is the first detailed account of freshwater to restricted marine molluscs from the Upper Cretaceous sedimentary rocks in the northern sector of the Neuquén Basin. The fossils are from the Campanian–Maastrichtian Loncoche Formation in southern Mendoza, west-central Argentina, which records the initial connection of the Neuquén Basin to the Atlantic Ocean. Six species of bivalves (*Diplodon bodenbenderi*, *Pleiodon*? sp., *Isognomon*? *mechanquilensis*, Mactridae? indet., *Panopea*? sp., and *Laternula* sp.) and three of gastropods (*Paleoanculosa macrochilinoides*, *Paleoanculosa ameghiniana*, and a possible cerithioidean) are described. Specimens were collected from fine to coarse sandstones, which may be massive or with planar stratification, planar-cross stratification or trough-cross stratification, and a few from bioclastic limestones and mudstones. Although the sections are from 50 to 300 m thick, the specimens are found only in the lower 120 m. Molluscs represent autochthonous/parautochthonous assemblages composed of mostly non-broken gastropods and articulated bivalve specimens, some of which show signs of postmortem transport; however, they were not removed far from their original habitat. Review of the habitats of living genera supports the inference of dominantly freshwater palaeoenvironments in the lower and middle part of the Loncoche Formation, with restricted marine influence in the southernmost localities studied where there are a few samples that contain specimens belonging to predominantly marine groups (e.g., *Laternula*, *Panopea*).

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1. Introduction

Scarce taxonomic information is available on mainly freshwater and brackish molluscs from the Late Cretaceous (Campanian–Maastrichtian) in the Neuquén Basin. This is true notwithstanding the fact that these molluscs occur at many localities and in different beds, showing a considerable diversity. The earliest papers recording their presence in the rocks considered were published during the first decades of the last century, with others following during the second half of it (Fritzsche, 1919; Doello-Jurado, 1927; Wichmann, 1927; Weaver, 1927, 1931; Groeber, 1929, 1933, 1946, 1947a, b; Mühlmann, 1937; Camacho, 1969; Parodiz, 1969; Dessanti, 1973, 1978; González Díaz, 1979; Manceñido and Damborenea, 1984; Parras et al., 1996, 1998). However, only a few of these provide detailed descriptions and illustrations of the fossils present, and most referred to fossils from localities in the southeastern sector (Neuquén Embayment) of the basin (Doello-Jurado, 1927; Parodiz, 1969; Manceñido and Damborenea, 1984).

The aim of this article is to fully document, for the first time, the mollusc fauna of the Loncoche Formation exposed in the northern sector of the Neuquén Basin, and to provide details of their stratigraphic distribution. Extensive collections made over the years with detailed stratigraphic data have allowed correct identification of the fauna and detailed knowledge on the stratigraphic range of the different taxa. Taxonomic identification and a study of the taphonomic features of the material dealt with herein are important for correlation among rocks exposed at different localities within the Neuquén Basin, allowing refinement of the palaeoenvironmental and palaeogeographic reconstructions for the Campanian–Maastrichtian in west-central Argentina. All of the material studied comes from the lower and middle section of the Loncoche Formation at the following localities: Puesto La

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Bebida (=Arroyo Agua del Choique, 69° 44′ W, 35° 27′ S), Arroyo Brea (69° 43′ W, 35° 31′ S), Arroyo Loncoche (69° 40′ W, 35° 41′ S), Cerro Butaló (69° 40′ W, 35° 50′ S), Ranquil-Có (69° 30′ W, 36° 12′ S), Malal Vaca (69° 48′ W, 36° 12′ S), El Alambrado (69° 51′ W, 36° 14′ S), Arroyo Calmu-Có (69° 50′ W, 36° 30′ S), Bordo Alto del Payún (69° 27′ W, 36° 31′ S), and Cañadas Coloradas (69° 40′ W, 36° 32′ S). All lie within the Malargüe Department in southern Mendoza (Fig. 1), occurring along approximately 120 km in a N–S direction. The fossil-bearing beds range from fine to coarse sandstones and to a lesser degree limestones and mudstones; the logged sections are shown in Fig. 2. The taxonomic composition of the mollusc faunas, including the number of specimens recovered from each locality, and a synthesis of lithology, structures and associated fauna of the mollusc-bearing beds, are presented in Table 1.

2. Stratigraphy and age

The Neuquén Basin lies in west-central Argentina, including part of the present provinces of Río Negro, Neuquén, La Pampa and Mendoza. It contains marine and continental sedimentary rocks over 7000 m thick that reflect deposition during the Mesozoic and early Palaeogene. It opened along the western edge of the South American plate between the western volcanic arc and the highlands of the North Patagonian Massif in the southeast and the Piedra Pintada System in the northeast (Fig. 1). The basin is broadly triangular in shape and two main regions are commonly recognized: the Neuquén Andes to the west and the Neuquén Embayment to the east and southeast (Howell et al., 2005).

The sedimentary infill of this basin was divided by Groeber (1946) into three sedimentary cycles, which he called "Jurásico" (Hettangian–Kimmeridgian), "Ándico" (Tithonian–Coniacian) and "Riográndico" (Santonian–Danian). This contribution focuses on the upper part of the "Ciclo Riográndico" (Groeber, 1946), which was subdivided into a lower subcycle comprising the Neuquén Group (Digregorio, 1972) and an upper subcycle comprising the Malargüe Group (Uliana and Dellapé, 1981). These two units are separated by an unconformity (Andreis et al., 1974).

The Malargüe Group encompasses the late Campanian–Palaeocene and is characterized by the record of the first marine transgression from the Atlantic Ocean into the Neuquén Basin (Windhausen, 1914, 1926; Wichmann, 1927; Bertels, 1979; Uliana and Dellapé, 1981). These deposits accumulated in a foreland basin along a belt less than 120 km wide and running in a NNW–SSE direction, to the east of the magmatic arc (Malumián et al., 1983; Uliana and Biddle, 1988).

In the northwestern sector of the basin, the Malargüe Group is exposed over a wide area along the foothills of the Andes, where it is over 500 m thick and composed from bottom to top of the

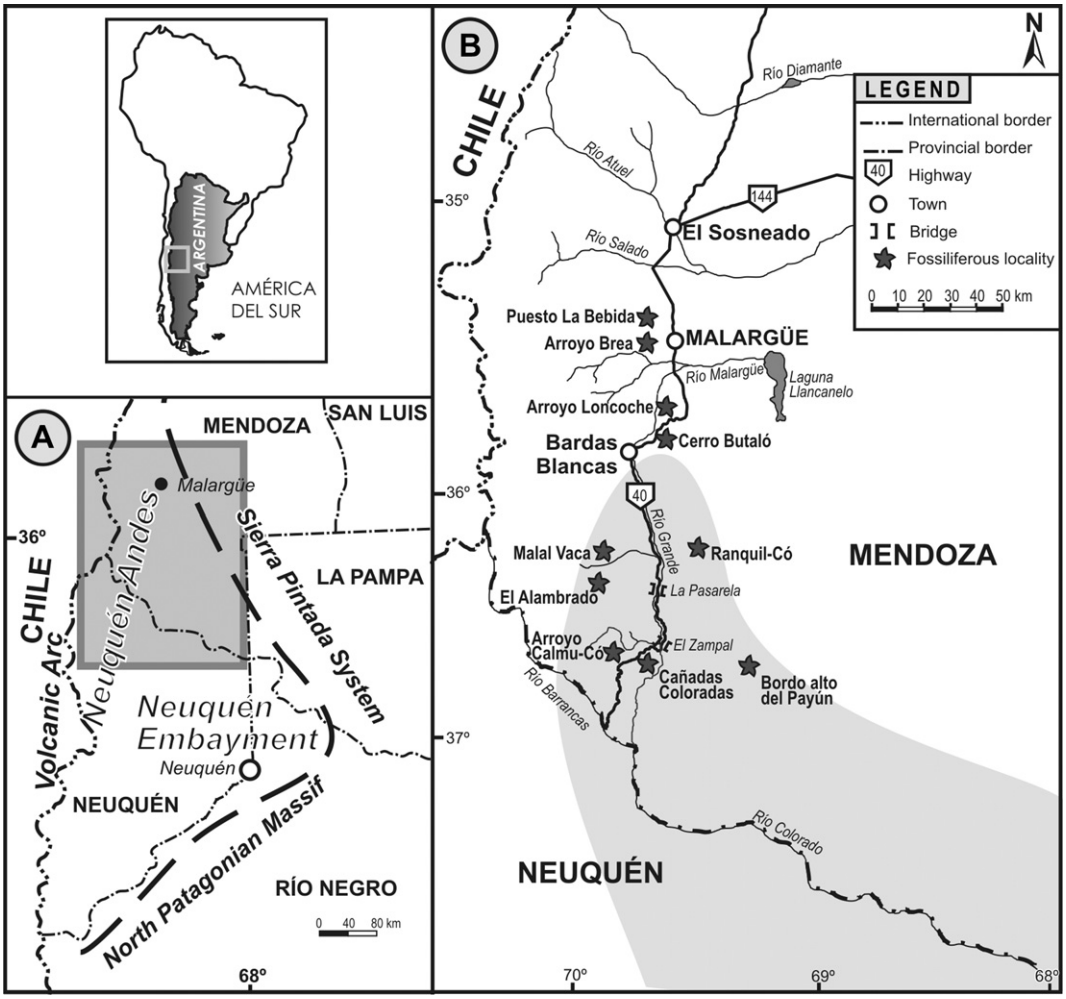

Fig. 1. A, general location of area studied within the Neuquén Basin in southern Mendoza. B, detailed map of shaded area in A, showing fossil localities studied along the foothills of the Andes, northern Patagonia, west-central Argentina. Probable extent of marine influence (based on mollusc content) during the beginning of the Atlantic (SE) transgression shown as shaded area.

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