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FIRST RECORD OF *Corbicula fluminea* (MÜLLER, 1774) IN THE LIMAY RIVER BASIN, NEUQUÉN, ARGENTINA

*Primer registro de Corbicula fluminea (Müller, 1774) en la cuenca del río Limay,
Neuquén, Argentina*

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Abstract. A new *Corbicula fluminea* geographic record is provided from Argentina. I present the first record for Limay River in the Neuquén province and the westernmost for this species in the Patagonian region. The presence of *Corbicula fluminea* upstream of the Limay River dams implies that these physical barriers, as well as water temperature differences do not represent a constrain to the dispersion of this species.

Key words. Bivalves, Corbiculidae, invasive species, Patagonia.

Resumen. Se presenta un nuevo registro geográfico de *Corbicula fluminea* para la Argentina. El nuevo registro es el primero para el río Limay en la provincia de Neuquén y el más occidental para esta especie en la región patagónica. La presencia de *Corbicula fluminea* aguas arriba de la represa El Chocon sobre el río Limay implica que los diques como barreras físicas, así como las diferencias de temperatura del agua, no representan un obstáculo para la dispersión de esta especie.

Palabras clave. Bivalvos, Corbiculidae, especies invasoras, Patagonia.

INTRODUCTION

Invasive species such as *Corbicula fluminea* (Müller, 1774) and *Corbicula largillierti* (Philippi, 1844), can cause economic and ecological damage and might have negative effects on native species (Darrigran, 1992; Darrigran and Damborenea, 2005). In Argentina, these species accidentally entered the Río de la Plata by transoceanic shipping boats from Asia in the 1960's and early 1970's (Ituarte, 1994). These organisms probably arrived from their origin places through means of ballast water from ships or by the negligent release of transported live specimens as living food by the crew (Darrigran and Damborenea, 2005). Currently, its distribution ranges from 28°S in Misiones (north of Argentina) and 65°W in Catamarca (northwest of Argentina) and, and 25°S 54°W to 39°S 66°W in northern Patagonia (Cazzaniga, 1997; Cazzaniga and Pérez, 1999; Darrigran and Damborenea, 2005; Martín and Tiecher, 2009; Rumi et al., 2008; Semenas and Flores, 2005; Torre and Reyna, 2013). Specifically, *Corbicula fluminea* has been recorded for the provinces of Córdoba, Chaco, Misiones, Corrientes, Entre Ríos, Buenos Aires, Neuquén and Río Negro (Cazzaniga, 1997; Cazzaniga and Pérez, 1999; Darrigran and Damborenea, 2005; Martín and Tiecher, 2009; Molina et al., 2015; Semenas and Flores, 2005; Rumi et al., 2008). Here I report further range expansion of this species by providing the first record of *Corbicula fluminea* in the Limay River, Neuquén Province.

MATERIALS AND METHODS

Sixteen specimens of *Corbicula fluminea* were collected on April 15, 2017

on the shore line of the Ezequiel Ramos Mexía Reservoir, Neuquén province (39°15'47.63" S, 68°46'57.89" W, WGS84, 382 m.s.n.m.), near El Chocón Village (Figure 1). The new locality record is a small bay near to the El Chocón Village (Figure 2). The specimens were found in sandy substrate intermingled with sandstone (Figure 3), together with valves of *Diplodon chilensis* and live specimens of *Chilina gibbosa*. The specimens were deposited in the General Collection of Invertebrates of the IBIOMAR, CCT CONICET-CENPAT with numbers CNP-INV 1324 (twelve specimens stored in 70% ethanol) and CNP-INV 1325 (four valves): Argentina: Neuquén Province: Confluencia Department: El Chocón Village, Ezequiel Ramos Mexía Reservoir, Cristian H. F. Pérez collector. Specific identification of the specimens was based on external morphology and in accordance with characters described by Ituarte (1994). *Corbicula fluminea* can be distinguished from *Corbicula largillierti* for the presence of spaced concentric ridges, uneroded umbo, with prominent and inflated shells, and posterior region with rostrum.

Length (anterior-posterior measurement), height (dorso-ventral measurement) and width (greatest distance between the outsides of the closed valves) of the clams were measured with a digital caliper (to the nearest 0.1 mm). Measurements are shown in Table 1, as well as the L/W and L/H ratios.

Morphometric ratios of corbiculids are influenced by environmental factors, as substrate composition and habitat hydrodynamics (Torre and Reyna, 2013). Morphometric measurements presented here (Table 1) are similar to the results showed by Ituarte (1994) for specimens from Río de la Plata (L / H mean 1.17 ± 0.04 and L

/ W mean 1.77 ± 0.05), found in substrate depressions along the upper intertidal zone with small, sandy micro-habitats. Cazzaniga and Pérez (1999) reported similar measurements for specimens from Chimpay (L/H mean 1.16 ± 0.04 and L/W mean 1.62 ± 0.04), found in sandy interstices of the pebbles at the bottom of the Negro river. These similarities may be due to the environment, characterized by sandy substrates with stones (Figure 3) and periodic fluctuations of the water level (see Figure 2).

Semenas and Flores (2009) cited *Corbicula fluminea* for the Neuquén River and its confluence with the Limay River, both headwaters of the Negro River (Figure 1). The locality reported here is located 74 km further to the west of those records. This species can tolerate temperatures as cold as 2°C (Darrigran and Damborenea, 2005), nevertheless, Semenas and Flores (2009) hypothesized that the lower temperatures of the Limay and Neuquén rivers could be a limiting factor for the invasion of this species. According to Darrigran and Damborenea (2005) the pedivelíger and juvenile stages of *C. fluminea* have great capacity of dispersion, even upstream, when being transported in the intestine of fishes or being attached to the paws of aquatic birds. Adults dispersion is caused mainly by anthropocoria and is favored by they

are hermaphrodites with self-fertilization. The arrival of a single specimen is considered sufficient to initiate a new population (Darrigran and Damborenea, 2005). The Ezequiel Ramos Mexía Reservoir is formed by El Chocón dam, one of the five dams on the Limay River, so it can be hypothesized that the arrival of *C. fluminea* would have been mediated through some of the mechanisms previously mentioned.

Kamburska et al. (2013) describes the dynamics in the establishment of a population of *Corbicula fluminea* in Maggiore Lake, northern Italy, of glacial origin at the foot of the Alps. Given that the upper basin of the Limay River connects with numerous Andean lakes, such as Nahuel Huapi, Gutiérrez and Traful, with characteristics similar to Maggiore Lake, we could expect further colonization of these waterbodies in the future. If this is the case, assisted dispersal to Andean lakes that drain towards the Pacific Ocean (e.g. Lake Mascardi) could also result in the colonization of Chile.

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Table 1 - Measurements (in mm) of voucher specimens of *Corbicula fluminea* collected near El Chocón Village, Argentina.

N = 16	Length	Height	Width	Length/Height	Length/Width
Mean	21.87	19.39	13.62	1.12	1.60
Standard dev.	4.44	4.06	2.50	0.03	0.06
Maximum	29.46	26.54	17.92	1.19	1.66
Minimum	16.22	13.68	9.86	1.05	1.48

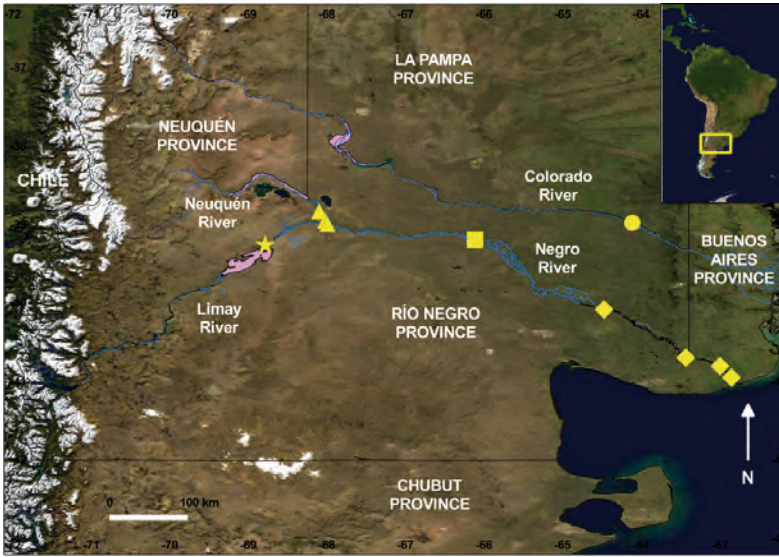


Figure 1 - Locality records of *Corbicula fluminea* in north Patagonia, and area location in South America (inset). References: star: new locality reported in this study; square: Cazzaniga (1997); circle: Cazzaniga and Pérez (1999); triangles: Semenas and Flores (2005); rhombs: Molina et al. (2015). Black lines are province limits.



Figure 2 - Collection site of *Corbicula fluminea* near El Chocón Village, Confluencia Department, Neuquén Province, Argentina.



Figure 3 - *Corbicula fluminea* between the interstices of sandstones on the Ezequiel Ramos Mexía Reservoir banks, Confluencia Department, Neuquén Province.

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