First record of the Russian sturgeon *Acipenser gueldenstaedtii* Brandt & Ratzeburg, 1833 (Acipenseriformes: Acipenseridae) from Argentina

Danilo Demonte[1*], Jorge Liotta[2,3], Eva Rueda[1], Roberto Civetti[4] & Juan Carlos Rozzati[4]

1 Universidad Nacional del Litoral, Facultad de Humanidades y Ciencias, Paraje El Pozo s/n, 3000 Santa Fe, Province of Santa Fe, Argentina
2 Museo de Ciencias Naturales "P. Antonio Scasso", Don Bosco 580, 2900 San Nicolás, Province of Buenos Aires, Argentina
3 Ministerio de Agroindustria de la Nación, Av. Paseo Colón 982, 1083 CABA, Argentina
4 Ministerio de Medio Ambiente, Dirección de Manejo Sustentable de los Recursos Pesqueros, Patricio Cullen 6161, 3000 Santa Fe, Province of Santa Fe, Argentina
* danilodemonte@yahoo.com.ar

Abstract
Acipenser gueldenstaedtii is recorded for the first time from Argentina, from lotic and lentic environments of the lower Paraná and La Plata rivers in the provinces of Santa Fe and Buenos Aires. The species has previously been mentioned as introduced to the Negro river in Uruguay. Probably all known specimens were accidentally released from aquiculture facilities located in this affluent to the Uruguay river.

Resumen
Se registran las primeras citas de *Acipenser gueldenstaedtii* para Argentina, de ambientes lóticos y lénticos de la cuenca baja del río Paraná y el Río de la Plata, en las provincias de Santa Fe y Buenos Aires. Esta especie de esturión ya había sido mencionada en ambientes naturales del río Negro en Uruguay. Probablemente todos los individuos provienen de escapes ocurridos en establecimientos de piscicultura ubicados en embalses de este río.

Introduction

Acipenser gueldenstaedtii is a typical anadromous species which means that mature adults migrate from the sea to the rivers for spawning and return to their feeding grounds in the sea after spawning. The juveniles that are hatching in the rivers also return to the sea for feeding and stay there until maturity. A non-anadromous and freshwater-resident form is mentioned, but it is probably extinct (CITES, 2013).
The natural populations of *A. gueldenstaedtii*, known also as Ossetra, has been assessed as Critically Endangered A2bcde (ver 3.1) in IUCN (2016). The main threat faced by this species is the loss of spawning sites (due to dam construction). Other potential threats are poaching and illegal fishing, high levels of pollution (from oil and industrial waste), genetic pollution because of stock translocations, and Allee effect (Gesner et al., 2010). All the species of the order Acipenseriformes are listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2013). This species is also listed in Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) since 1999.
This species was described from Caspian Sea and its rivers, and Black Sea; according to Sokolov and Berdicheskii (1989), it was found along the Black Sea, Sea of Azov and Caspian Sea, entering all main rivers that empty into them (Don, Kuban, Danube, Dnieper -where is rare-, Dniester). Currently, it is only known from the Caspian Sea, where it spawns in the rivers Ural and Volga, and the Black Sea where spawning occurs in the lower Danube and Rioni rivers; there is no native spawning population remaining in the Sea of Azov, only introduced (stocked) individuals (Gesner et al., 2010).
In Uruguay, three sturgeon species have been identified along natural environments in the rio Negro (Serra et al., 2014): *Acipenser baerii* Brandt, 1869, *Acipenser ruthenus* Linnaeus, 1758 and this species. The origin of all these sturgeons is probably river farms located in the reservoirs of the Río Negro dedicated to the breeding of sturgeons for caviar and meat production. In Argentina, *A. baerii*

was found in different locations of the Río de la Plata river basin since 1998 (Azpelicueta & Almirón, 1999; Liotta et al., 2002). In this work, we confirm the presence of *A. gueldenstaedtii* in the lower Río de la Plata basin in Argentina.

Examined material

Argentina, Paraná river basin:

MFA-ZV-ic 2963 (fig. 1,2), 1 ex., 662 mm TL (broken caudal fin), female, Santa Fe province, laguna de Coronda, 32°03'44''S 60°55'15''W, 21.09.2016, col. Nelson Kaczaluva.

MPS-ZI-1521 (fig. 3,4), 1 ex., 774 mm TL (broken caudal tip), female, Buenos Aires province, río Paraná Guazú, 33°16'12''S 60°14'20''W, 15.10.2017, col. Gustavo & Tomás Carbonell.

fig. 1,2. *Acipenser gueldenstaedtii*. MFA-ZV-ic 2963, Coronda lagoon, Santa Fe. 662 mm LT (broken caudal fin)

Analysis

Specimens analyzed were identified by the diagnostic characters provided by Sokolov & Berdicheskii (1989) and Lafleur et al. (2001). Because of earlier studies demonstrated certain variability of morphological characters in Russian sturgeon, with at least three stocks or populations: Danube stock, Caspian stock and Azov stock (Lafleur et al., 2001), morphometric and meristic measurements of *A. gueldenstaedtii* from different populations (Timoshkina et al., 2009) were compared with Argentinean specimens (table 1). Samples of tissues of Arocena´s specimen were conserved in ethanol 96° for ADN analysis. Mitochondrial gen cytochrome c oxidase subunit 1 (COI) was amplified and sequenced for genetic identification. 608 pb were obtained; using the bioinformatics tool Basic Local Alignment Search Tool (BLAST) and performing searches in Barcode of Life Database (BOLD) they were assigned to *Acipenser gueldenstaedtii*.

According to Lafleur et al. (2001), *Acipenser gueldenstaedtii* can be distinguished from the other species of the familiy Acipenseridae by the following characters: 1) body with 5 rows of scutes, snout short with 4 barbels, 2) snout conical with rounded edges, spiracle present, 3) position of highest body not at first dorsal scute, 4) plates absent on sides of anal-fin base, 5) first dorsal scute slightly separated from head plates, and 6) base of barbels close to tip of snout, less than 44 dorsal fin rays. In particular, *A. gueldenstaedtii* can be distinguished from *A. baerii* and *A. ruthenus*, the other two species known so far to occur in the lower La Plata basin, by the position of the barbels (close to tip of snout vs. close to mouth) and the number of dorsal fin rays (less than 44 vs. more than 44 rays). *A. baerii* and *A. ruthenus* are different in the colour of the lateral scutes (same color as body in *A. baerii* vs. lighter than body in *A. ruthenus*) and gill rakers shape (with 3 nodules, fan-like in *A. baerii* vs. without nodules in *A. ruthenus*).

fig. 3,4. *Acipenser gueldenstaedtii*. MPS-ZI 1521, Río Paraná, San Nicolás, Buenos Aires. 774 mm LT (broken caudal fin)

fig. 5,6. (left 2) *A*. cf. *gueldenstaedtii*. La Plata river, Atalaya, Buenos Aires, Sep.2014
fig. 7. (middle) *A*. cf. *gueldenstaedtii*. Lower Paraná river, Zárate, Buenos Aires, Sep.2015
fig. 8. (right) *A*. cf. *gueldenstaedtii*. La Plata river, Punta Lara, Buenos Aires, Oct.2017

Remarks on further, unpreserved specimens

In September 2014 a sturgeon (fig. 5,6) has been captured in the La Plata river, near Atalaya (35°1'S 57°32'W), Buenos Aires province (Julio César Torres, pers.com.). In September 2015, one specimen (fig. 7) was fished near Zárate, Buenos Aires province, in the lower Paraná river (Rodolfo Rossi, pers.com.); on 01.Sep.2017 an individual (fig. 8) was captured by local fishermen in San Nicolás, Buenos Aires province (Gustavo Carbonell, pers.com.), and on 07.Oct.2017, a further sturgeon (fig. 9) was captured by artisanal fishermen in the La Plata river, near Punta Lara (Darío Colautti, pers.com.). These specimens shown in figures 5 to 9 resemble *A. gueldenstaedtii* in the general shape of the head, the body and its colour, the presence of a series of little dorsolateral scutes, and the location of the barbels on the snout. As none of these has been deposited in ichthyological collections we tentatively identify these specimens as *A.* cf. *gueldenstaedtii.*

fig. 9. *Acipenser* cf. *gueldenstaedtii*. Lower Paraná river, San Nicolás, Buenos Aires, 01.Sep.2017

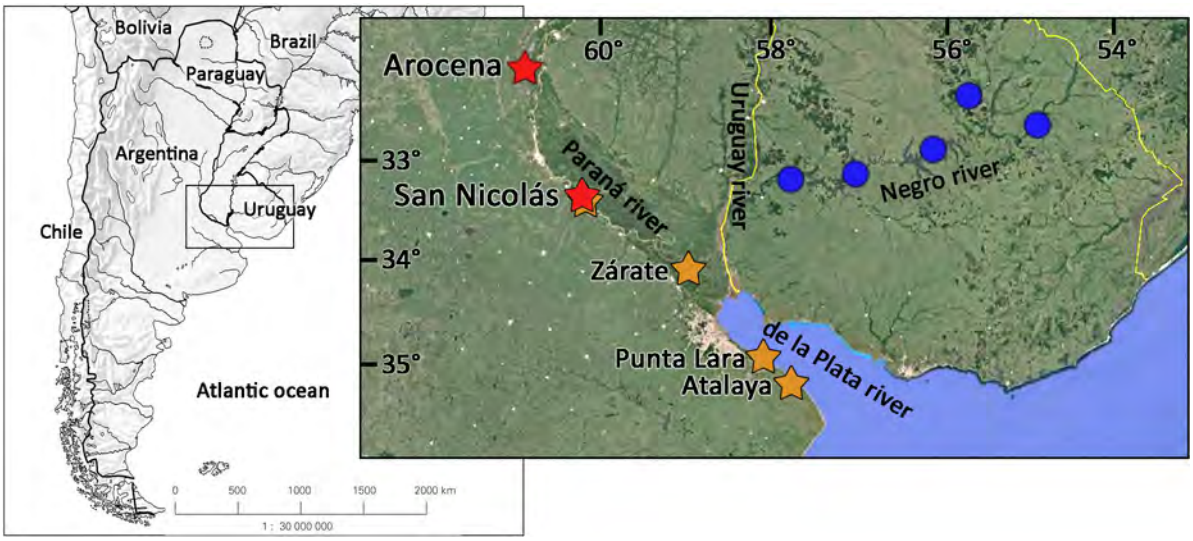

fig. 10. Localities of *A. gueldenstaedtii* with voucher specimen (red stars), not preserved individuals tentatively identified by photos (orange stars), and records from literature (blue circles).

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The following institutions have allowed us to deposit the specimens in their collections: Museo Provincial de Ciencias Naturales "F. Ameghino" (MFA), Santa Fe and Museo de Ciencias Naturales "P. A. Scasso" (MPS), San Nicolás, Buenos Aires.

table 1. Morphometric and meristics of the specimens analyzed, compared with different populations of *A. gueldenstaedtii* (from Timoshkina et al., 2009).

Character		Populations			Arocena	Río Paraná
		Caspian	Azov	Black Sea	lagoon	San Nicolás
Head length / total length (%)	mean	18,1	16,4	17,5	18,8	18,2
Number of rays in dorsal fin	mean	41	35,7	36,3	40	36
	range	33 - 51	27 - 41	30 - 43		
Number of rays in anal fin	mean	25,8	21,9	23,9	28	27
	range	21 - 33	18 - 25	20 - 28		
Number of gill rakers	mean	23,5	21,5	21,8	25	26
	range	19 - 29	16 - 26	17 - 27		
Number of dorsal scutes	mean	12,1	11,9	12	11	12
	range	9 - 18	8 - 15	9 - 15		
Number of lateral scutes	mean	39	30,5	34,2	34	38/40
	range	30 - 50	25 - 36	27 - 38		
Number of ventral scutes	mean	9,8	9,6	9,6	9	10/11
	range	7 - 12	8 - 11	7 - 12		

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