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Short Note

Stomach Content of a Juvenile Bolivian River Dolphin (*Inia geoffrensis boliviensis*) from the Upper Madeira Basin, Bolivia

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The Bolivian river dolphin (*Inia geoffrensis boliviensis*), also known as bufeo, is an endemic subspecies of the Amazon River dolphin (*Inia geoffrensis*) found in the upper Madeira River basin and is the only cetacean present in Bolivia. The Bolivian river dolphin is isolated from the population of Amazon River dolphin (found in the Amazon basin) through a series of rapids and falls between Guayaramerin (Bolivia) and Portho Belho (Brazil) (Best & da Silva, 1993; Ruiz-Garcia et al., 2008). Several molecular and morphometric studies indicate that the genus of *Inia* found in Bolivia is a distinct species (*Inia boliviensis*) (Bangueera-Hinestroza et al., 2002; Ruiz-Garcia et al., 2006, 2008); however, it is still considered to be a subspecies (*Inia geoffrensis boliviensis*) by the Integrated Taxonomic Information System (ITIS) and the International Union for Conservation of Nature (IUCN) (Reeves et al., 2008). Knowledge of this Bolivian river dolphin is limited, with only a few studies on their distribution and abundance (Pilleri, 1969; Pilleri & Gihr, 1977; Aliaga-Rossel, 2002; Aliaga-Rossel & McGuire, 2010). At a regional level, the Bolivian river dolphin is categorized as "Vulnerable" in the *Libro Rojo de la Fauna Silvestre de Vertebrados de Bolivia* (*Red Book of Bolivian Wildlife Vertebrates*) because of habitat loss and population decline, indicating the need for more basic information on this species (Aguirre et al., 2009). This note presents the first record of the diet of a juvenile Bolivian river dolphin.

During the rising water season (17 and 19 November 2010), a calf and juvenile Bolivian river dolphin were found dead in the Niquisi (65° 11' 6.7194" W; 13° 56' 27.9126" S) and Apere (65° 16' 48.6444" W; 13° 49' 4.7814" S) Rivers, respectively (Figure 1). These clear water rivers are both situated in the Mamoré River basin in the region called *Llanos de Moxos*. Between December and March, 60 to 80% of the annual precipitation occurs (Lauzanne & Loubens, 1988). Noncommercial fishing is currently increasing in the area (Pouilly et al., 2004).

The ictiofauna of the region comprises a total of 35 families and 283 species, with Characiformes and Siluriformes representing 85% of the species (Lauzanne et al., 1991). The most abundant are small-sized fish like Curimatidae, a large diversity of Loricariidae, Doradidae, and small Characidae (locally called sardinas) (Lauzanne & Loubens, 1988). The region also contains large fish (which can exceed 1 m standard length [SL]) like the surubí (*Pseudoplatystoma fasciatum* and *P. tigrinum*) and the pacu (*Piaractus brachypomus* and *Colossoma macropomum*), all of which are fished commercially. Medium-sized fish are the main target of the local fisheries and are used primarily for food and crafts. Some of these species are quite abundant like the sábalo (*Prochilodus nigricans*), piranha or palometa (*Pygocentrus* sp., *Serrasalmus* spp., *Mylossoma duriventre*), and the blanquillo (*Calophysus macropterus*, *Hypophthalmus* sp.).

Standard external measures of the river dolphins were taken before the necropsies following the dissection protocol of Geraci & Lounsbury (1993). According to size (total length 140 cm), the absence of teeth, and the presence of solely milk in the stomach, the dolphin from the Niquisi River was classified as a calf. The dolphin found in the Apere River, classified as a juvenile, had almost all its teeth; however, the majority of the molars were just appearing through the gum. Net marks and cuts in the body and a mutilated tail fluke (possibly by a machete) suggested that the juvenile likely died as a result of interaction with local fisheries (Knieriem & Garcia-Hartmann, 1996). The calf did not show any signs of violence, with the exception of marks around the body likely caused by a fishing net. Skin appearance, organ coloration, and other indicators

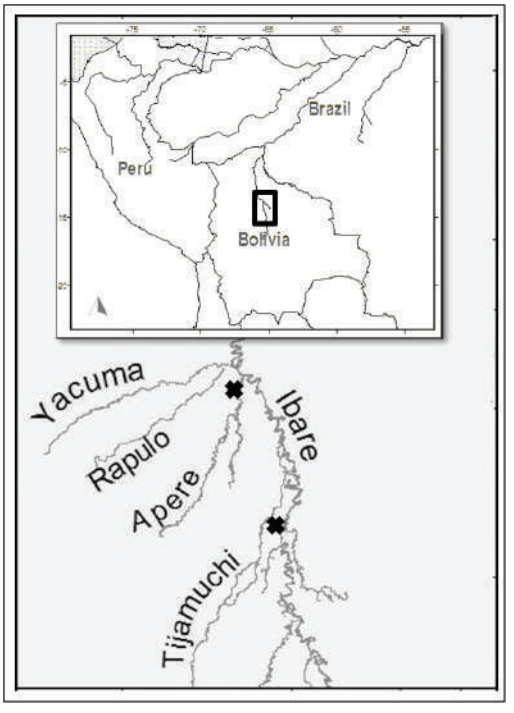


Figure 1. Study site; the areas where dead dolphins were found are marked with an x.

allowed the time of death to be estimated as less than 1 d. From the blubber thickness (30 mm for the neonate and 41 mm for the juvenile) and muscle aspect lateral to the dorsal fin, both individuals were considered to be in good nutritive condition; and based on shape and colour, they appeared to have healthy internal organs. For the diet analysis, the complete stomach was removed from the abdominal cavity, and the contents were examined. The stomach of the juvenile contained a mixture of partially digested fish remains, which were carefully washed out and then collected. Fish otoliths are commonly used to identify fish species and the relative fish size; in Bolivia, however, little research has been conducted in this area, and no local guides are available by which fish can be identified from otoliths. As a result, bones and scales (Table 1) were used for identification at the family level using reference material from the *Bolivian Fauna Collection* (*Colección Boliviana de Fauna*) and guides (Gery, 1977; Burgess, 1989; Higuchi, 1992). The numerical proportion was taken as a measure of the relative frequency of each fish family.

At least 12 individual fish from four families were identified: Doradidae (67%, N = 8), Heptapteridae (17%, N = 2), Auchenipteridae (8%, N = 1), and Characidae (subfamily Tetragonopterinae, 8%, N = 1) (Table 1). The relative size of each fish was estimated through comparison with the reference material, including several specimens in a range of sizes per fish family. The standard length (SL) of the Doradidae was estimated between 100 and 150 mm. The smaller sized fish belonged to Heptapteridae with less than 50 mm SL. Characidae were between 50 and 100 mm SL. For Auchenipteridae, a fragment of the pectoral girdle, including the pectoral spine, was recovered (Table 1). The specimen had a body width size at the pectoral girdle larger than 60 mm, enabling SL estimation at larger than 200 mm. Finally, a nematode was found which could be a fish parasite and would represent a secondary ingestion.

The presence of different families in the Bolivian river dolphin's diet is not surprising since the diet of the river dolphins includes a great variety of prey (Aliaga-Rossel & McGuire, 2010). Pilleri (1969) indicated that adult individuals consumed crabs and several unidentified fish species, including members of the Characidae family (Pilleri & Gihr, 1977). Aliaga-Rossel (unpub. data) reported the presence of two individuals of the Gasteropelecidae family, which are common in the region, in a necropsied adult dolphin. Studies in Brazil on Amazon river dolphins reported 43 different species in 19 families (5 to 80 cm, average 20 cm), including 51% pelagic, 33% benthic, and 16% lacustric (Best & da Silva, 1993). The presence of a small turtle also has been reported (da Silva & Best, 1982). De Carvalho (1961) recorded the Serrasalmidae family; in Colombia, Layne & Caldwell (1964) found *Myleus* sp.; and in Venezuela, Trebbau & van Bree (1974) indicated a Red-tailed catfish (*Phractocephalus hemioliopterus*) as a prey species of Amazon river dolphins. Furthermore, McGuire & Winemiller (1998) reported four species (one individual of the Serrasalmidae family, the Pimelodidae, the Characidae, and one Prochilodontidae [*Semaprochilodus* sp.]).

The circumstances of the death of both dolphins could not be determined but were likely related to fishery interactions. Such interactions are widely reported for newborn and juvenile small cetaceans and are threatening the survival of many species around the world (Aliaga-Rossel, 2002; Reeves et al., 2003; Aliaga-Rossel & McGuire, 2010). Fishery activity is likely to increase with the human population growth in Bolivia (Pouilly et al., 2004), and, as a consequence of more interactions, accidental entrapment of dolphins could increase as well. It is perhaps noteworthy that none of the fish found in the stomach content of the juvenile dolphin were a target species of the local commercial fisheries. To prevent the onset of unrecoverable consequences for the river dolphin in Bolivia, it is therefore important to understand

Table 1. Prey in stomach content of a juvenile Bolivian river dolphin found in the Apere River during the rising water season (November 2009)

Family	% of preys	Item	No.	Size[1]	Remarks
Doradidae	67	Skull	3	37.4-38.4 (38.02)	Complete
		Operculum	3		2 right/1 left
		Hyomandibular	5		3 right/2 left
		Pectoral girdle	8	19.08*	4 complete/4 incomplete
		Vertebrae	117		
		Weberian apparatus	3		
		Hypural bone	4		
		Dorsal fish spines	4	18-22 (20)	1 broken
		Pectoral fish spines	16	20.6-28.5 (25.35)	8 right/8 left
		Fin rays	Various		
		Lateral scales	87		
		Gill segments	Various		
Auchenipteridae	8	Pectoral girdle	1	68.64*	Complete
		Pectoral fish spines	2	55.7	1 right/1 left
		Fin rays	Various	25-37 (30.08)	
Heptapteridae	17	Pectoral girdle	2	9.5*	Complete
		Vertebrae	52		
		Hypural bone	1		
		Fin rays	Various		
Characidae	8	Cleithrum	2		1 right/1 left
		Vertebrae	82		
		Hypural bone	1		
Unidentified	--	Otoliths	13	< 1	
		Bone fragments	Various		Unidentified
		Nematode	Various		Probably a fish parasite

[1]Size in mm, range (mean); *width

its food ecology and to relate this to appropriate fisheries management.

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