

First record of *Arapaima gigas* (Schinz, 1822) (Teleostei: Osteoglossomorpha), the “pirarucu”, in the upper Paraná River basin, Southeast Brazil

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Abstract: *Arapaima gigas* (Schinz), the “pirarucu”, is one of largest freshwater fish of the Neotropical region, naturally occurring in the Amazon, Essequibo, and Orinoco river basins. Herein, it is first recorded from the Grande River, in the upper Paraná River basin. This record is based on the finding of one dead specimen on the left margin of the Grande River, and in situ observation of juveniles and adults in the river.

Key words: Arapaimatidae, Água Vermelha Dam, nonnative species, Grande River

The genus *Arapaima* Müller includes the largest freshwater fish in the Neotropical region, with individuals known to reach up to 390 cm in length and around 200 kg (Ferraris Jr. 2003; Ferreira 2013). Its natural environment covers lowland lentic waters of the Amazon and Orinoco River basins, and the Guyana drainages (Ferraris Jr. 2003). Until recently, *Arapaima gigas* (Schinz) was the only valid species of the genus (Ferraris Jr. 2003). Recently, Stewart (2013a, 2013b) resurrected *Arapaima agassizii* (Valenciennes) and *A. mapae* (Valenciennes) based solely on the holotypes, and additionally described *A. leptosoma* Stewart. Diagnostic characters for species level identification are not easily applicable due to the lack of type material and few comparative specimens deposited in scientific collections (see Stewart 2013a, 2013b and <http://www.splink.org.br>). The distribution range of each species is equally unknown. Based on the holotype, *Arapaima gigas* is distinguished from all other species by having 30 dentary teeth; 2–2.5 rows of teeth on the dentary; 26 maxillary teeth; orbit diameter 1.7% SL; interorbital width 6.2% SL; parietals exposed, posterior margin of skull roof straight to moderately

concave; caudal fin separated from the dorsal and anal fins by relatively short caudal peduncle; caudal-peduncle length divided by peduncle depth 0.60% SL; 17 total caudal-fin rays; dorsalmost lateralis sensory cavity on preopercle broadly oval (Stewart 2013a, 2013b). The species is listed as ‘Data Deficient’ according to the IUCN (2014) and is considered overexploited or threatened by overexploitation by The Ministry of Environment of Brazil (MMA 2004).

Neotropical freshwater fish comprise the most diverse fish fauna of the world, with a great contribution of small sized species (Castro 1999). Some exceptions to this pattern include the ‘pirarucu’ and other Siluriformes and Characiformes, such as species of *Brachyplatystoma* Bleeker, *Colossoma* Eigenmann & Kennedy, *Hydrolycus* Müller & Troschel, *Phractocephalus* Agassiz, *Piaractus* Eigenmann, *Pseudoplatystoma* Bleeker, *Salminus* Agassiz, and *Zungaro* Bleeker. Large-sized fishes are well appreciated in aquaculture, and typically are cultivated in many fish farms, sometimes far away from their original basin. Fish-farming of exotic species is one of the main causes of species introduction around the world (Vitule 2009).

On 2 August 2014, one of the authors (DCWR) visited the left river bank of the Grande River, in the municipality of Paulo de Faria, state of São Paulo (Figure 1), Água Vermelha Dam (Água Vermelha Power Plant, 19°59’21” S, 049°25’31” W, 379 m above sea level) and recorded a dead *Arapaima* specimen (Figure 2). On 9 August 2014, we returned to the locality to collect the specimen and prepare it as a dry skeleton. Voucher specimen is cataloged at the Departamento de Zoologia e Botânica, Universidade Estadual Paulista “Júlio de Mesquita Filho”, São José do Rio Preto Campus, SP (DZSJR 20000). It was not possible to identify the cause of death, nor the stomach content, because the corpse was in an advanced

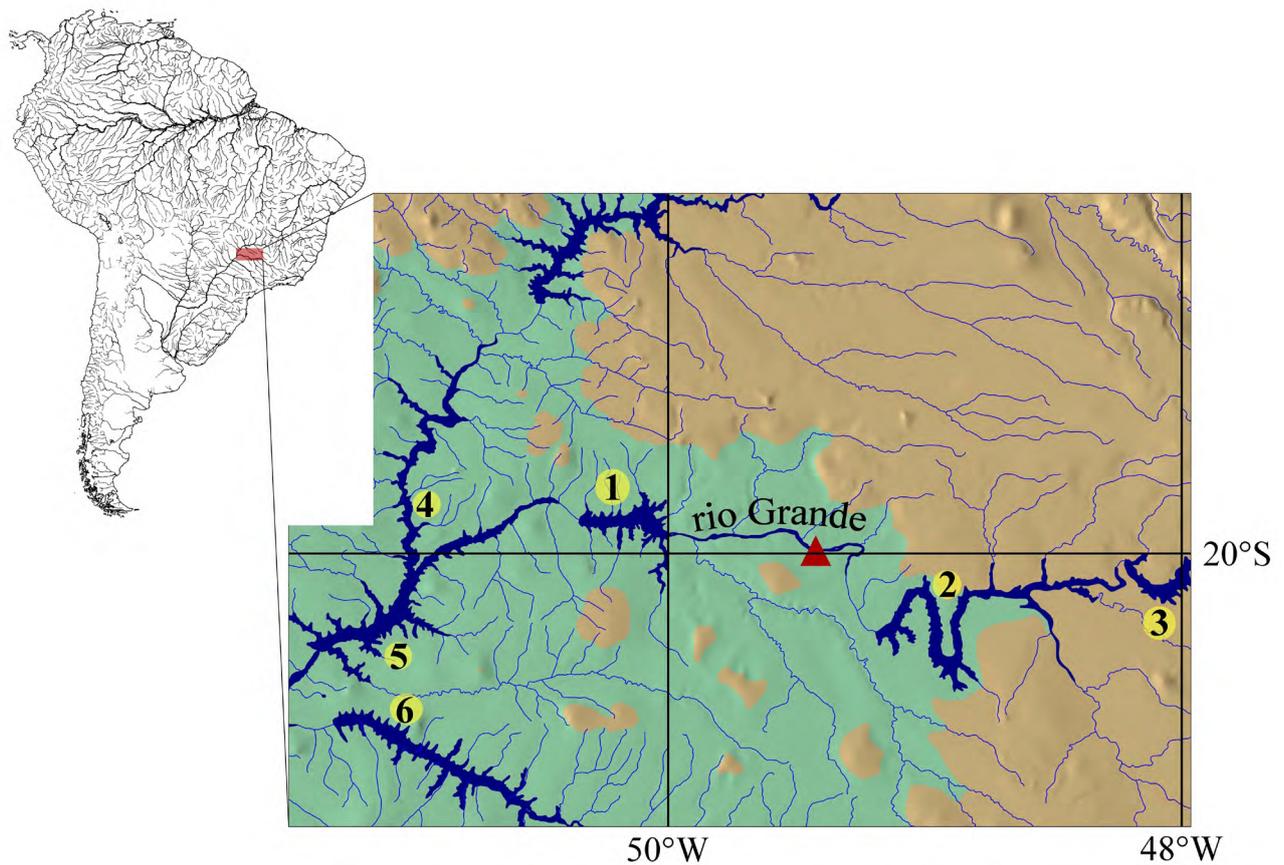


Figure 1. Record of *Arapaima gigas* (red triangle) in the Grande River, Paulo de Faria Municipality, state of São Paulo, upper Paraná River basin, Southeast Brazil. Dams of the upper Paraná River basin: 1. Água Vermelha, 2. Marimondo, 3. Porto Colômbia, 4. Ilha Solteira (Paranaíba River), 5. Ilha Solteira (Paraná River), and 6. Três Irmãos (Tietê River).



Figures 2 and 3. *Arapaima gigas* from the Grande River, Paulo de Faria Municipality, state of São Paulo, upper Paraná River basin, Southeast Brazil. **2:** Ventrolateral view of a dead specimen (DZSJRP 20000), 120 cm total Length. **3:** Dorsolateral view of a fresh specimen, not cataloged and not measured.



Figure 4. Left bank of Grande River, where *Arapaima gigas* were recorded.

stage of putrefaction. Apparently, the population of the “pirarucu” is already established at the site. In this same occasion, we observed, *ad libitum* from the riverbanks, shoals of 20 young and adult fish in average, indicating local recruitment. On 16 August 2014, we recorded a live “pirarucu” specimen caught with line and hook by a local fisherman (Figure 3).

The specimen obtained by us is about 120 cm in total length (TL) and 113 cm in standard length (SL) (Figure 2), dentary teeth 29, maxillary teeth 26, orbit diameter 2% SL, interorbital width 5.3% SL; parietals exposed, posterior margin of skull roof straight to moderately concave; caudal fin separated from dorsal and anal fins by relatively short caudal peduncle; pectoral-fin rays I, 11; branched caudal-fin rays 18; dorsalmost lateralis sensory cavity on preopercle broadly oval. We were not able to obtain caudal peduncle measurements due to the poor condition of the specimen. The set of available characters fits the diagnosis of *A. gigas*, according to Stewart (2013a, 2013b), with the exception of the number of teeth rows on the dentary, mentioned by Stewart (2013a) as 2–2.5 rows of teeth in *A. gigas*, whereas in the examined specimen there is a single row of teeth.

With these registers, we confirm the presence of *Arapaima* in the upper Paraná River basin. The locality where the “pirarucu” was found is a lentic (Figure 4) and shallow environment (1–1.5 m deep), formed after the impoundment of the Grande River by the Água Vermelha Power Plant. Based on reports from local people, in the mid-2010s, there were tank ruptures in a “pirarucu” fish farm near the riverbanks after a major rainfall period. This event occurred in the Frutal Municipality, state of

Minas Gerais, and possibly released young and adult specimens into the river channel. Lately, professional and amateur fishermen began to catch specimens of small and medium size in the river, with line/hook and gill nets. The Grande River and other major rivers in the Paraná River basin were transformed in cascading reservoir systems, with lentic characteristics in most sites that resemble those of the original habitat of the “pirarucu” (Ferreira 2013). In Brazil, other confirmed records of the “pirarucu” outside their original geographic distribution are from the upper Parnaíba River (Ramos et al. 2014) and the upper Madeira River (Ferreira 2013). Notwithstanding, to our knowledge, there is no assessment evaluating the consequences of *Arapaima* introduction on the native fauna. In order to contribute to this knowledge, we started an investigation on the ecology, biology, abundance, and possible dispersal routes of the “pirarucu” with the aim to evaluate the consequences of such introduction in the Grande River.

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