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(Amphibia: Gymnophiona) from the Xingu River,
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Dieta de Potomotyphlus kaupii (Berthold, 1859) (Amphibia: Gymnophiona) do rio Xingu, Pará, Brasil

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RESUMO

Cecílias são ainda um grupo pouco conhecido em sua história natural, distribuição e ecologia, principalmente devido ao seu hábito de vida fossorial ou aquático. Existem cerca de 231 espécies em todo o mundo, e 39 ocorrem no Brasil. Entre as cecílias brasileiras, a família Typhlonectidae é composta por espécies semiaquáticas ou aquáticas, uma delas é *Potomotyphlus kaupii*. Nosso objetivo neste artigo é descrever novos dados sobre a alimentação e biologia de espécies. Treze espécimes foram obtidos ao longo do Rio Xingu, no Pará, Brasil. Fornecemos observações comportamentais *in-situ* e *ex-situ* e analisamos conteúdos de estômagos e intestinos. Quinze itens intestinais e três itens estomacais foram identificados, pertencendo ao grupo dos insetos, peixes, matéria vegetal e sedimento, todos relacionados ao comportamento de forrageamento sugerido. Esta é a primeira tentativa de entender a biologia alimentar e comportamental da espécie e sua efetiva posição na cadeia alimentar aquática.

Palavras-chave: Cecília; Typhlonectidae; ecologia aquática.



ABSTRACT

Caecilians are still a poorly understood group in terms of their natural history, distribution, and ecology, mainly due to their fossorial or aquatic lifestyle. There are approximately 231 species worldwide, and 39 occur in Brazil. Among the Brazilian caecilians, the Typhlonectidae family is composed of semi-aquatic or aquatic species, one of which is *Potomotyphlus kaupii*, and our goal in this article is to describe new data on the feeding and biology of this species. Thirteen specimens were obtained along the Xingu River in Pará, Brazil. We provide *in-situ* and *ex-situ* behavioral observations and analyze stomach and intestinal contents. Fifteen intestinal items and three stomach items were identified, belonging to the groups of insects, fish, plant matter, and sediment, all related to the suggested foraging behavior. This is the first attempt to understand the feeding and behavioral biology of the species and its effective position in the aquatic food chain.

Keywords: Cecilian; Typhlonectidae; aquatic ecology.

INTRODUCTION

The caecilian group (Amphibia: Gymnophiona) still remains poorly known on its natural history, geographical distribution, and ecology (SILVANO, SEGALLA, 2005). Currently, there are 231 known species of caecilians throughout mainly the tropical regions of the World, 39 of them occur in Brazil. Typhlonectidae presents only aquatic and semi-aquatic species, with five genera and 14 species (SEGALLA et al., 2021; FROST, 2025).

The typhlonectid *Potomotyphlus kaupii* was described by Berthold (1859) as *Caecilia kaupii* and posteriorly was transferred to a new genus described by Taylor (1968), where it remains as a monospecific genus and species. The species is widely distributed along the Amazonas and Orinoco drainages systems (MACIEL, HOOGMOED, 2011; OLIVEIRA et al., 2012; FROST, 2025). Despite its widespread distribution along the rivers, the species

is practically unknown on its habitat, ecology, and natural history (MACIEL, HOOGMOED, 2011).

OBJECTIVES

In this way, our goal here is to determine the *Potomotyphlus kaupii* diet, foraging behaviour and ecological position on the Xingu River ecosystem, based on *in situ* and *ex situ* observations.

MATERIAL AND METHODS

Sample of specimens were carried out along the high (Cachoeira do Xadá and São Felix do Xingu) and mid (Gorgulho da Rita) Xingu River, from the municipality of São Félix do Xingu to Altamira, at Pará state, Brazil (figure 1, table 1). The Xingu is one tributary of the Amazon River, has heterogeneous environment and a great diversity of habitats, variation in current velocities, depths, and topographic features, which allows the coexistence of many species.

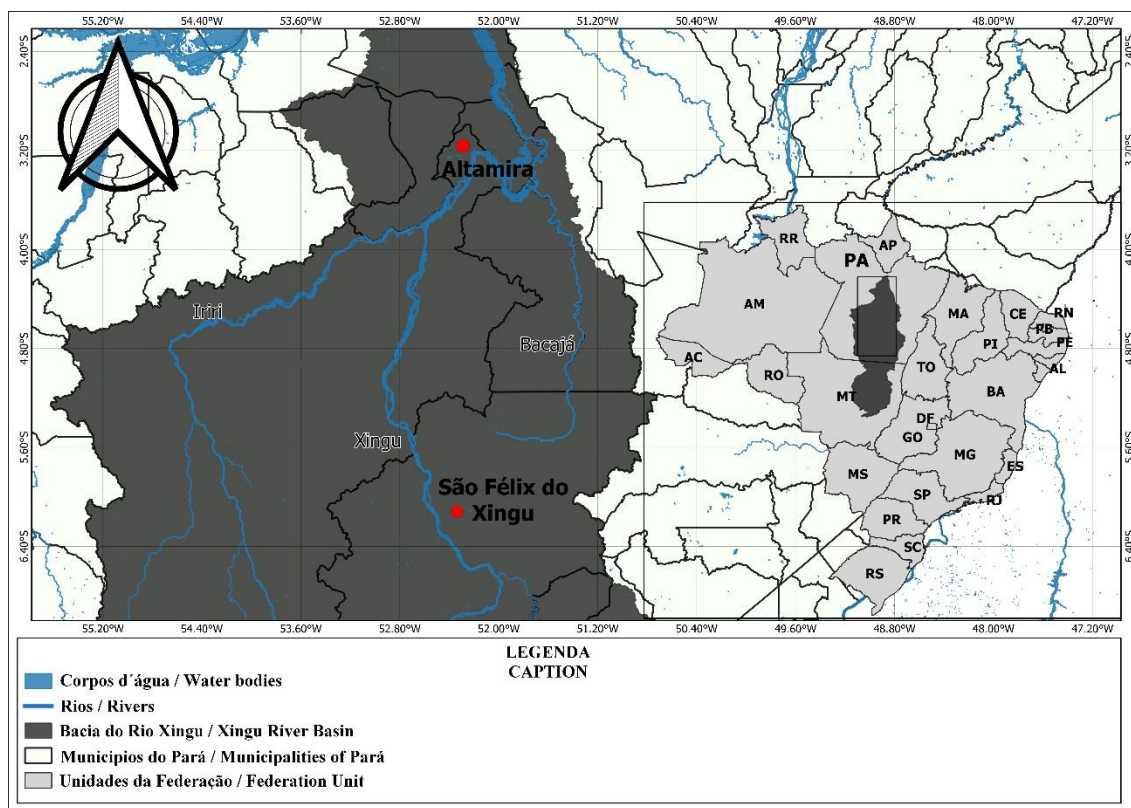


Figure 1. Localization of sample places along the Xingu River, from São Felix do Xingu to Altamira PA.

Figura 1. Localização de amostragens ao longo do Rio Xingu, de São Félix do Xingu a Altamira, PA.

The specimens were collected by autonomous dive (manually and by net), kept on plastic bags, and posteriorly in laboratory sacrificed using lethal dose of eugenol anesthetics, fixed in formol 10%, and preserved in alcohol 70%. Two specimens were kept in aquariums at Laboratório de Aquicultura de Altamira – LAQUA-X (Universidade Federal do Pará – UFPA - Campus Altamira) for behavioural observations for eight days and were sacrificed later. In captive we observed (animal focal and all occurrences methods) all possible behaviours, by day and night (indirect light). To the specimens were offered fish pieces, commercial fish

food, and earthworms. The tank was set up with sand and conglomerate of pebbles substrate, and high-water velocity and oxygenation, like their natural habitat. In laboratory, the sacrificed specimens were had its stomachs and intestines extracted by a longitudinal incision, and its contents were identified under stereomicroscope to the lowest possible taxonomic level by literature. To test the differences of items on stomachs and intestines, were used a Qui-Square analyses. Specimens sample were authorized by IBAMA #48948-1 and #5859-3 collect license, and are housed at Coleção do Laboratório de Ictiologia de Altamira (LIA and PK



codes) and Coleção Científica do Laboratório Multidisciplinar de Pesquisas em Biodiversidade, Grupo de Estudos em Comportamento e Ecologia Animal (GECEA codes) (table 1).

RESULTS

Thirteen individuals of *P. kaupii* were collected. The mean of intestinal length was 65.0 mm and the stomach were 43.4 mm. The items were identified based on exoskeleton fragments as heads, legs, seta, external gills, as complete bodies (invertebrates) and fish eggs, and each item represent an individualized specimen of prey. In the stomachs were identified four food items, distributed in one insect order and family (Trichoptera: Hydropsychidae, three items, 75% of total), and one vertebrate order (Siluriformes: Loricariidae, thirty two eggs, 25%) while in the intestines were identified 15 food items, distributed in two orders (Trichoptera and Ephemeroptera), and four families: Hydropsychidae (six items, 40% of total), Leptophebiidae (six items, 40%), Baetidae (two items, 13%) and Polymitarcyidae (one item, 7%). Sediments (sand grains) have also been found in some intestines and in one stomach and were considered accidentally ingested. There were not difference between the items found in the stomach versus intestines ($X^2 = 0,057$) (table 1).

The specimens were collected by diurnal diving and were found under rock plates or, plate-like geological formation of conglomerates of pebbles incrustated with iron dioxide (popular name “gorgulho

or mocororô”) (figure 2). The rocky or conglomerates plates are naturally overlapped and create small cracks and holes, ideal for shelter or foraging substrata. Some individuals were found under the most basal plates, and semi-buried in the sandy bottom.

In captivity the set up was rocky environment-like. During the day, the specimens kept sheltered under the plates or semi-buried in the sand. During the night the individuals were observed in activity in two mains behaviours. Or actively, swimming completely exposed around the plates as rocks and groping surfaces and bottom, or passively, sheltering about one third of the body while meandering the head and groping bottom and water. The two specimens were kept eight days, and were offered small fish pieces, fish food, worms and shrimps, like pet maintenance (common in Europe and United States), but there was no consumption. At the eighth day when the specimens were sacrificed were noted fat loss, mainly on the last third part of the body.

DISCUSSION

Gymnophiona is the less known group of amphibians (FROST 2025), and the absence of knowledge on its breeding and feeding ecology and behaviour could turns a problem for conservationist actions and programs, mainly when the environment are under anthropogenic disturbances and modifications (SILVANO, SEGALLA, 2005). In general, terrestrial caecilians are considered generalist predators (MEASEY et al., 2004), and probably this



affirmation could be inferred to aquatic species, presenting a tendency to insects and other arthropods (GUDYNAS, WILLIAMS, 1986).

Table 1: Especimens of *Potomotyphlus kaupii* analyzed, measurements and identified food items. Reading: STOM – stomach, INTES – intestine, * Individual temporally kept in captive.

Tabela 1: Espécimes de *Potomotyphlus kaupii* analisados, medidas e itens alimentares identificados. Legenda: STOM – estômago, INTES – intestino, * Indivíduos mantidos temporariamente em cativeiro.

ANALYZED SPECIMENS				ORGANS LENGHT		FOOD ITEMS	
N.	COLLECTION CODE	LOCALITY - PROVINCE	DATE	STOM.	INTES.	STOM.	INTES.
1	LIA006246(1)	Cachoeira do Xadá, São Felix do Xingu	11/08/2016	43,75	91,61	Trichoptera	-
2	LIA006246(2)	Cachoeira do Xadá, São Felix do Xingu	11/08/2016	57,96	77,21	-	Trichoptera
3	LIA006246(3)	Cachoeira do Xadá, São Felix do Xingu	11/08/2016	52,65	60,78	Trichoptera	Ephemeroptera
4	LMS2016081101N3	Cachoeira do Xadá, São Felix do Xingu	11/08/2016	42,96	115,31	sediment	Ephemeroptera
5	PK020915Δ1FBRG	Gorgulho da Rita, Altamira	02/09/2015	21,06	57,84	sediment	sediment
6	PK020915Δ2FBRG	Gorgulho da Rita, Altamira	02/09/2015	19,74	63,69	-	Ephemeroptera
7	PK040915Δ3FBRG*	Gorgulho da Rita, Altamira	02/09/2015	32,2	34,16	-	-
8	PK020915Δ4FBRG	Gorgulho da Rita, Altamira	02/09/2015	43,82	51,94	Trichoptera	-
9	PK260515Δ5FBRG / APG2015052604	São Félix do Xingu	26/05/2015	41,45	69,48	-	Trichoptera
10	PK260515Δ6FBRG / APG2015052604	São Félix do Xingu	26/05/2015	55,71	66,33	-	Ephemeroptera
11	PKTEMP1Δ01	Gorgulho da Rita, Altamira	02/09/2015	71,39	83,63	-	Trichoptera
12	GECEA-LAB 02092015Δ1	Gorgulho da Rita, Altamira	02/09/2015	-	-	Loricaridae eggs	-
13	GECEA-LAB 02092015Δ2	Gorgulho da Rita, Altamira	02/09/2015	38,23	44,32	sediment	Sediment



Figure 2: *Potomotyphlus kaupii* captured in Xingu River, at Altamira, PA, on “gorgulho” pebbles conglomerate.

Authorship: Gomes, F.B.R.

Figura 2: *Potomotyphlus kaupii* capturado no Rio Xingu, em Altamira, PA, sobre conglomerado de seixos “gorgulho”.

Autor: Gomes, F.B.R.

Our data shows that *P. kaupii* presents only aquatic invertebrates (Trichoptera and Ephemeroptera), and fish eggs as diet. Terrestrial caecilians used to dig on the ground to feed on worms, ants and termites (SAN MAURO et al., 2014). If *P. kaupii* exhibit this generalist behaviour in the river bottom probably we should find aquatic worms (e.g. Annelida) and other subterranean invertebrates. Instead of this, *P. kaupii* probably presents a bottom surface forage, groping the rocky substrate looking for benthonic invertebrates as the insect's larval stage we find.

The *P. kaupii* specimens were collected associated to high flow regions of Xingu River, under the rocks. De Jesus et al. (2009) recorded along the Xingu about 43 taxa of benthonic macroinvertebrates, where the rapids present the highest diversity. The

most abundant groups are Leptophlebiidae (Ephemeroptera) and Hydropsychidae (Trichoptera) (DE JESUS et al., 2009), also the principal items on *P. kaupii* diet (except Chironomidae, Diptera). The absence of terrestrial invertebrates, scales of fish, or even abundant organic or inorganic unidentified matter in our data, might suggest a non-detritivore or saprophagous diet to the species, while the invertebrate larvae indicate a selective and predatory feed behaviour, and the fish eggs recorded suggest an opportunistic diet to *P. kaupii*.

We do not find any paper about the diet and feeding ecology of *P. kaupii*, except some informal information of aquarists for pet maintenance, and probably this is the first paper of *in situ* and *ex situ* observations on its diet and behaviour. Besides its wide distribution along the Amazonian rivers, this is the second record of *P. kaupii* to the basin of Xingu river (VAZ-SILVA et al., 2015), primarily on the rapids, the most transformed micro-habit by Belo Monte Hydropower dam build (SAWAKUCHI et al., 2015), a great threat to the species ecology and maintenance.

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