Phyllomedusa 1(2):97-100, **2002**

ISSN 1519-1397

Diet of the giant tadpole *Pseudis paradoxa platensis* (Anura, Pseudidae) from Argentina

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Keywords: *Pseudis paradoxa platensis*, Pseudidae, Anura, tadpole, diet, Argentina.

Pseudis paradoxa platensis is restricted to areas along the Paraguay and Paraná Rivers, from Paraguay, Bolivia and Mato Grosso (Brazil) to northeast of Argentina (Cei 1980). In Argentina, this subspecies has been found in Formosa, Chaco, Corrientes, Misiones and Santa Fe provinces (Frost 1985, Gallardo and Varela de Olmedo 1992). The adults are very aquatic, occurring in semipermanent and permanent ponds (Dixon *et al.* 1995, Duré and Kehr 2001). In Argentina breeding occurs between November and March. Tadpoles of *P. paradoxa platensis* reach lengths up to 168 mm (Bokermann 1967, Emerson 1988). Studies on the biology of this giant tadpole in nature are extremely scarce. This study describes the tadpole diet of *P. paradoxa platensis* and presents some behavior data.

Tadpoles were collected in a semipermanent pond located 30 km from the city of Corrientes (27º25'S - 58º44'W, Province of Corrientes, Argentina) during the summer season (December, January and February). The area corresponds to the Oriental Chaqueña phytogeographical region (Carnevali 1994, Burkart *et al*. 1999). Climatically, this area has a mean annual rainfall of 1100 mm and a mean annual temperature of 20º C. The pond area was 800 m^2 and the water depth was 0.30 m. Macrophytes and the common grasses (*Panicum elephantipes*, *Cynodon dactylon*, *Eragrostis* sp.) were found on its border but there were not aquatic floating plants.

Received 10 December 2002
Accepted 30 December 2002

Ten tadpoles were captured with a square fine meshed-net (1 m^2) in different locations in the pond and were anaesthetized and fixed according to ASIH and SSAR. (2001) guidelines. The specimens were deposited in the amphibian collection of the National Institute of Limnology (INALI-CONICET-UNL). The total length (snout to the tip of tail) and body length (snout to the end of proctodeal tube) were recorded. Developmental stages were recorded following Gosner (1960). The coiled intestine was then removed and cut into several pieces. Twenty pieces were chosen at random and their contents mixed with 1 ml of water and one drop of erithrocyne. After 24 h three aliquots of each tadpole intestine sample were analyzed under an optic microscope. To quantify the number of organisms per ml, the Microtransects Drop Method of Lackey (APHA 1976) was followed. For each food item, its numeric frequency (N) and frequency of occurrence (FO) was calculated as percentage based on the total number of quantified food items and the number of intestines analyzed. To determine the trophic diversity (H) Hurtubia's criteria (1973), using Brillouin's formula (1965), was followed. The

Table 1 - Diet of *Pseudis paradoxa platensis* tadpoles in a semi-permanent pond in Corrientes Province (Argentina) (n = 10). N, numerical frequency percentage (based on Lackey's method); FO, percentage of occurrence; ni, non-identified; –, non-quantified; H*, mean trophic diversity; H_k, accumulated trophic diversity.

FOOD ITEMS	N (%)	FO (%)
ALGAE		
Cyanophyceae		
Anabaena spp.	–	100
Merismopedia spp.	–	14
Oscillatoria spp.	–	42
Nostox spp.	0.73	71
Calothrix spp.	–	71
Microcystis spp.	0.37	42
Synechococcus spp.	0.06	28
Nodularia spp.	–	57
	1.16	
Euglenophyceae		
Euglena spp.	1.40	85
Phacus spp.	5.59	100
Trachelomona spp.	17.40	100
	24.39	
Bacillariophyceae		
Navicula spp.	9.84	100
Fragilaria spp.	2.30	100
Pinnularia spp.	3.81	100
Synedra spp.	0.53	57
Nitzschia spp.	1.10	14
Diatoma spp.	2.14	71
Achanthes spp.	1.84	57
Starouneis spp.	0.10	14
Melosira spp.	0.23	28
Terpsinoe spp.	0.03	14
	21.95	
Xantophyceae		
Tribonema spp.	–	14
ni 1	0.06	14
ni 2	0.03	14
	0.09	
Clorophyceae		
Oedogonium spp.	–	57
Scenedesmus spp.	0.80	57
Closterium spp.	2.27	100
Pediastrum spp.	0.33	57
Sphaerocystis spp.	0.90	57
Chlorella spp.	4.28	100
Euastrum spp.	1.27	100
Cosmarium spp.	2.30	100
Ulotrix spp.	–	57
Zygnema spp.	–	85
Desmidium spp.	–	42
Staurodesmus spp.	1.13	85
Staurastrum spp.	0.46	71
Volvox spp.	7.36	100
Spirogira spp.	–	100
Ankistrodesmus spp.	1.37	71
Haematococcus spp.	0.06	28
Tetraedron spp.	0.06	28
Coelastrum spp.	0.30	57
Mesotaenium spp.	1.13	42
Oogonium spp.	–	100
Sirogonium spp.	–	42
Spirocistis spp.	9.77	100
ni 1	1.60	57
ni 2	6.45	100
	42.40	
ANIMALS		
Ciliophora		
Enchelyidae	1.77	85
Holoprhya spp.	0.09	28
ni 1		
Rhizopoda		
Testacea	2.00	85
Cladocera		
Daphnidae	0.90	71
Copepoda		
Cyclopidae		
Ciclopoidea spp.	0.03	14
Ostracoda		
Cyprididae	0.03	14
Amphipoda		
Hyalellidae		
Hyalella spp.	0.03	14
	4.90	
DETRITUS	–	100
PHANEROGAMS		85
Seeds (ni)	**5.11**	
FILAMENTOUS ALGAE REMNANTS (ni)	–	100
H*	3.7 ± 0.5	
H_k	4.29	

individual estimations of items were summed up at random, which constitutes the accumulated trophic diversity. The mean diversity (H*) and accumulated trophic diversity (H_k) were calculated.

The development stages of *Pseudis paradoxa platensis* tadpoles studied ranged from 27 to 31. These pre-metamorphic tadpoles had an average total length of 62.28 mm (± 3.79) and an average body length of 25.8 mm (±1.7).

The diets of the tadpoles are given in Table 1. Algae are the most abundant types of food ingested; occurring in all intestines examined (100%). The most important food items, in terms of numeric frequency, were planktonic algae of the families Clorophyceae (42.4%) and Euglenophyceae (24.39 %). The seeds of phanerogams occurred in 85% of the intestines as well as animal material (also 85%). The most important animals were Crustacea from the Orders Cladocera, Copepoda, Amphipoda, and Ostracoda. Detritus is also a frequent category in the diets (100%). The mean diversity (H*) was 3.70 (± 0,5) and accumulated trophic diversity (H_k) was 4.29. Lajmanovich (2000) found similar values for another pseudid tadpole, *Lysapsus limellus* (H_k = 4.5) that co-habits the same environments.

Pseudis paradoxa platensis tadpoles are basically omnivorous, feeding mostly on phytoplankton, and supplementing their diets with other types of food, such as zooplankton and seeds of phanerogams. The largest proportions of phytoplankton and zooplankton in the composition of the diets are considered indicative of water column rather than benthic habitats. Debris may have been ingested concurrently with other items. Based on the phytoplankton found in the tadpole's intestines, *P. paradoxa platensis* larvae are nectonic. Consistent with our assessment based on diet, we observed these tadpoles in stationary midwater positions at night, maintaining their heads in an upward position by rapidly vibrating their tail tips. This behavior is similar to the *Xenopus* mode as described by Wassersug (1973) and was also observed for *Scinax acuminatus* tadpoles in the same pond.

The intestinal contents of anuran tadpoles may be a good indicator of the floristic composition of the microhabitat they use. In this context, the fact that the tadpoles filter-feed continuously, may cause sudden reductions of the planktonic communities and may influence both the fauna supported directly by phytoplankton as well as for the higher trophic levels in the pond (Lajmanovich, 1998). These interpretations and the present diet analysis suggest that *P. paradoxa platensis* tadpoles could influence the planktonic communities due to the great volume of plankton they consume.

Acknowledgements

We thank Pedro Cacivio and Lucia Federico for collaborating in the field survey. Also we thank Melina Devercelli for checking the classification of algae. We are also grateful to Richard Wassersug, Jaime Bertoluci and three anonymous reviewers for their valuable comments on the manuscript.

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