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Predation on foam nests of the leptodactylid frog *Physalaemus cuvieri* (Fitzinger, 1826) by *Pipa carvalhoi* (Miranda-Ribeiro, 1937) (Anura, Pipidae)

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Egg deposition in foam nests is a reproductive behavior common in some anuran families (Haddad & Prado, 2005). Several functions have been assigned to the foam nests, such as protection against egg desiccation (Ryan, 1985), acceleration of tadpole growth (Prado et al., 2005) and defense against predators (Downie, 1990). In the Leptodactylid frogs of the genus *Physalaemus* Fitzinger (1826), the construction of foam nests is part of their reproduction (Nascimento et al., 2005).

The first mention of frogs of the genus *Pipa* predating eggs and tadpoles of other amphibians was provided by Gascon et al. (1992), who reported the consumption of eggs and tadpoles of *Osteocephalus taurinus* Steindachner, 1862 by *Pipa arrabali* Izeckshon, 1976. Still involving this Pipid frog, Buchacher et al. (1993) also reported the feeding on the foam nests of *Leptodactylus knudseni* Heyer, 1972.

Pipa carvalhoi (Miranda-Ribeiro, 1937) is distributed from northeastern to southeastern Brazil (Silva et al., 2010; Santana et al., 2014). It occurs in Caatinga and Atlantic Rainforest areas, has aquatic habits and inhabits permanent or temporary ponds, besides streams and wetlands, which frequently have the margins covered by vegetation (Carvalho 1937; 1939). Herein, we report a case of predation on foam nests of the anuran *Physalaemus cuvieri* (Fitzinger, 1826) by the aquatic frog *P. carvalhoi* in northeastern, Brazil.

On March 15, 2012 at 21:45 h, we found some juvenile individuals of *P. carvalhoi* among foam nests of *P. cuvieri* at the margins of an artificial lake in the Floresta Nacional do Araripe (FLONA Araripe-Apodi), Barbalha municipality, Ceará State (7°21'55.55"S, 39°26'26.23"W; 912 m a.s.l.). The observations were conducted during 30 minutes in five different *P. cuvieri* foam nests. For each foam nest, we counted the number of *P. carvalhoi* individuals. We collected twenty individuals of *P. carvalhoi* from the foam nests to confirm the predation of eggs and tadpoles of *P. cuvieri* by *P. carvalhoi*. Voucher specimens were euthanized in lidocaine solution, measured (caliper precision 0.01mm), fixed in 10% formaldehyde, transferred to and kept in 70% ethanol and housed at the Coleção Herpetológica da Universidade Regional do Cariri, Crato, Ceará, Brazil (URCA-H 2395-2404). All nests of *P. cuvieri* harbored individuals of *P. carvalhoi* (16.20 ± 7.22; range 9 – 28 individuals). Ten specimens of *P. carvalhoi* (SVL: 21.22 ± 1.14 mm; range 19 – 23 mm) were dissected and analyzed. The frogs were considered to be juveniles due to lack of developed gonads. Eggs (2.5 ± 0.71 mm) and tadpoles (11.6 ± 4.33 mm) of *P. cuvieri* were found in the stomach of *P. carvalhoi* (N = 7), and were the only items of the diet of the examined specimens. Some authors suggest that the deposition of eggs inside foam nests reduces exposure to aquatic predators (Heyer, 1969), or provides protection against flying and terrestrial insects, as they can be entangled in the viscous foam nests (Villa et al., 1982). However, several records of foam nest predation have

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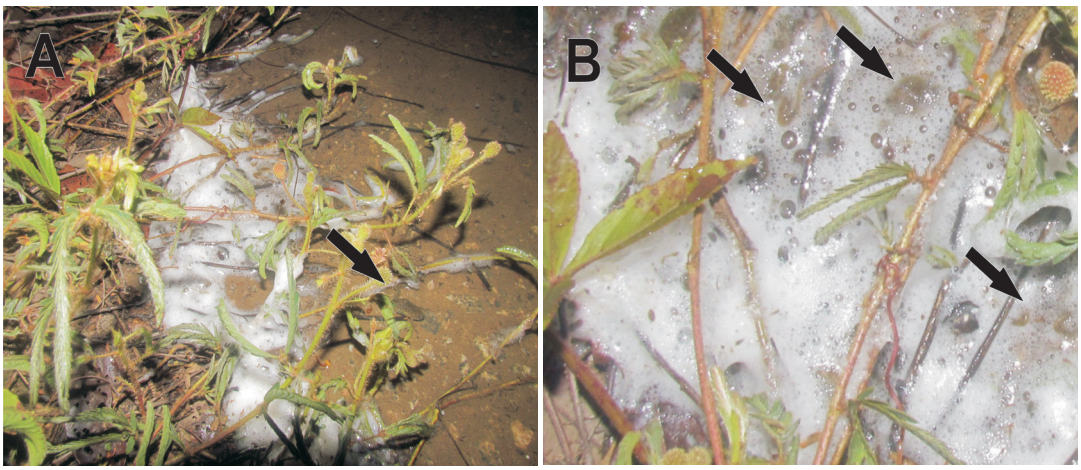

Figure 1. (A) View from the edge of the artificial lake in FLONA Araripe-Apodi; (B) Nest of *Physalaemus cuvieri* in remnant vegetation, arrows indicate the specimens of *Pipa carvalhoi*.

been registered, including predation by tadpoles, aquatic insects, and many terrestrial predators, such as arthropods and even snakes (e.g., Bokermann, 1957; Heyer, 1969; Villa et al., 1982; Menin & Giaretta, 2003; Lingnau & Di-Bernardo, 2006). To our knowledge, our observation represents the first predation report of eggs and tadpoles of *P. cuvieri* by *P. carvalhoi*, which occurs sympatrically in the Cerrado of the Araripe Plateau (Ribeiro et al. 2012).

Due to the fact that all foam nests examined contained juvenile *Pipa carvalhoi* as well as the considerable number of specimens that had ingested eggs and/or larvae of *P. cuvieri* we infer that this is a common event in locations where both species occur in sympatry. The foam nests seem to be ineffective against the predation by semi-aquatic vertebrates as *P. carvalhoi,* which can easily access the nest, feed inside, and still benefit from the shelter provided by the nests.

We emphasize also the opportunism of *Pipa carvalhoi* in relation to the use of an artificial lake at the top of the Araripe, where the soil is composed of porous, well drained soil (arenites), which does not offer suitable conditions for the natural formation of puddles and lakes (Fundação Araripe, 1999). *P. arrabali* and *P. carvalhoi* have been captured with pit-fall traps in terrestrial environments in the Amazon (Garda et al., 2006) and within the forested area of the FLONA Araripe-Apodi (Unpublished data). Different aspects of this species natural history should be investigated, including diet and population dynamics. These data could aid to understand how the available trophic resources are used during different life stages.

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