

Shelled baby food: Newly hatched goo-eating snakes of the genus *Dipsas* (Squamata: Dipsadidae) prey on snails in nature

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Snakes that feed on soft-bodied prey such as earthworms, slugs, and snails are often referred to as goo-eaters (Cadle and Greene, 1993; Zaher *et al.*, 2014). Among the Neotropical Dipsadini goo-eaters, the genus *Dipsas* stands with about 30 to 50 recognised species (MacCulloch and Lathrops, 2004; Sheehi III, 2013). This richness aside, most information on the natural history of *Dipsas* is based on studies of captive snakes or museum specimens (Peters, 1970; Cunha and Nascimento, 1978; Hartmann *et al.*, 2002; Alves *et al.*, 2003, 2005; Ray *et al.*, 2012; Torello-Viera *et al.*, 2012), and very few published records derive from observations in nature (Sazima, 1989; Martins and Oliveira, 1999; Marciano Jr. *et al.*, 2015). Natural history information is even scarcer for juvenile individuals, particularly for those with few days or weeks after hatching (Braz and Almeida-Santos, 2008).

Several Neotropical snake species display dietary ontogenetic changes and main prey types differ for juveniles and adults (*e.g.*, Martins *et al.*, 2002 for Viperidae) and the same applies for the Dipsadidae (Gaiarsa *et al.*, 2013; Stender-Oliveira *et al.*, 2015). Snakes of the genus *Dipsas* feed mostly on snails and slugs (Peters, 1970; Cunha and Nascimento, 1978; Sazima, 1989; Alves *et al.*, 2003, Zaher *et al.*, 2014; but see Ray *et al.* 2012 for a more varied diet for some *Sibon* and *Dipsas* species). *Dipsas bucephala* adults feed on snails and slugs, and these two prey types pose distinct obstacles when handled by the snake:

snails must be removed from the shell and slugs release plenty of mucus (Sazima, 1989). Thus, snail handling is time-consuming and slug handling may cause the snake to stick to the substratum (Sazima, 1989).

We are unaware of reports of newly hatched individuals of any *Dipsas* species feeding under natural conditions, and postulate that they would feed on snails because the great amount of mucus released by slugs may pose a real risk to a small snake. Herein we report on newly hatched individuals of two species, *Dipsas bucephala* and *D. albifrons*, feeding on native prey in nature.

We recorded the snakes at two localities in São Paulo state, Southeast Brazil: *Dipsas bucephala* in the semi deciduous forest of the Mata de Santa Genebra reserve (22°49'37.07"S, 47°06'19.08"W; 621 m a.s.l.), Campinas, on 28 April 1990, and *D. albifrons* in the Atlantic rain forest of the Projeto Dacnis reserve (23°27'32.22"S, 45°8'34.20"W; 12 m a.s.l.), Ubatuba, on 8 August 2016. The snakes were found at early night (19:00-19:30 h), observed under subdued light of spotlights, and photographed. The total size of the snakes was visually estimated against nearby leaves and twigs, which were measured latter with a ruler.

A juvenile *Dipsas bucephala* with about 20 cm total length (TL) was found on the forest ground, extracting the native snail *Bulimulus tenuissimus* (Orthalicidae) from its shell. The snake



Figure 1: Newly hatched *Dipsas bucephala* on the forest ground extracts the native snail *Bulimulus tenuissimus* with long alternating excursions of the mandibular units deep into the shell, propping the snail against a body coil.



Figure 2: Recently hatched *Dipsas albifrons* on forest vegetation extracts the native snail *Helicina angulata* with the same technique but holds the snail free of contact with any surface.

had its mandibles drawn into the shell and propped the snail against a body coil (Fig. 1). The snake extracted the snail from the shell with alternating long excursions of its mandibular units, and discarded the empty shell dragging it on the leaf litter. The snail was extracted from the shell in about 90 sec. A second juvenile of similar size was found on a shrub about 1.5 m above the ground, holding a small individual of the native snail *Mesenbrinus interpunctus* (Orthalicidae) in its jaws. The extraction of the snail was in its final phase, and the shell was held free of contact with any surface. A juvenile *Dipsas albifrons* about 25 cm TL was found on a shrub about 1 m above the ground, holding the native snail *Helicina angulata* (Helicinidae) in its jaws. The snake had its mandibles drawn into the shell, which was held free of contact with any surface (Fig. 2). Movements of the mandibular units were perceived while the snake was extracting the snail from the shell.

Thus, three newly hatched individuals of two *Dipsas* species were recorded preying on snails instead of slugs. The feeding behaviour here described for newly hatched juveniles of both *Dipsas* species is similar to that recorded for *D. bucephala* adults preying on native snails (Sazima, 1989 as *D. indica*). However, it remains to be verified if and when in the course of their ontogenetic changes juvenile individuals would start preying on slugs as adults regularly do (Sazima, 1989).

The size of the juveniles we recorded agrees with those of newly hatched *Dipsas bucephala* and *D. albifrons* (Hartmann *et al.*, 2002; Braz and Almeida-Santos, 2008). The juvenile *D. bucephala* photographed while preying on *B. tenuissimus* was probably a male, judging from the sexual dimorphism of hatchlings reported by Braz and Almeida-Santos (2008). Adult *Dipsas bucephala* and *D. albifrons* display mostly nocturnal behaviour and use the ground and vegetation to forage, both in captivity and nature (Sazima, 1989; Hartmann *et al.*, 2002; Torello-Viera *et al.*, 2012), and the same applies to recently hatched individuals (present paper). Thus, it seems that there are few or no ontogenetic changes in the activity period and substrata use by *D. bucephala* and *D. albifrons*, unless further data prove otherwise.

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Lygophis dilepis, Groaíras, CE. Foto: Daniel Passos.