The mechanisms of interaction between prey and predator are complex and very diverse in snakes, constituting important elements for a deeper understanding of their natural history (Greene, 1988; Maia-Carneiro et al., 2012; Martins, 1996; Martins et al., 2008). In general, snakes use primary defences, such as camouflage, to avoid direct confrontation with predators (Greene, 1988). However, when direct confrontation does occur, snakes will then depend on secondary defences to survive (Silva, 2016). The Dipsadidae Bonaparte, 1840 family (sensu Grazziotin et al., 2012) is widely distributed in the Neotropical region, encompassing a large number of species with different evolutionary lineages and, consequently, the presence of very distinct defensive repertoires among species (Marques et al., 2004; Sawaya, 2010).

Knowledge on the natural history of Neotropical snakes has progressed markedly in the last decades (Marques et al., 2004, Marques et al., 2005, Carreira et al., 2005, Cacciali et al., 2016). However, little is known about the defensive repertoires of many species, especially those considered rare or difficult to encounter (Menezes et al., 2015, Menezes et al., 2017).

Siphlophis longicaudatus (Andersson, 1901) is a medium-sized snake that presents nocturnal activity and semi-arboreal habits (Barbo, 2008; Marques et al., 2004). It displays opistoglyph dentition and its diet is composed, mainly, of lizards (Prudente et al., 1998; Alencar et al., 2009). S. longicaudatus occurs in forested areas (Gaiarsa et al., 2013), in the Atlantic Forest domain, in both the southern and southeastern regions of Brazil (Alencar et al., 2009; Bérmils, 2009; Costa et al., 2010), in the following ecoregions (sensu Olson et al., 2001): Serra do Mar Coastal Forests, Araucaria Moist Forests, Coastal Bahia Forests and Interior Bahia Forests (Thomassen et al., 2015).

Few data in the literature are available on the general biology of S. longicaudatus (Alencar et al., 2009), including on defensive behaviours. Marques et al. (2004) cite four defensive behaviours for this species: erratic movements, striking, tail vibration and cloacal discharge. In this study, we report five other defence behaviours for S. longicaudatus that were, until now, unknown, and compare the repertoire of this species with that of other Neotropical snakes. For this comparison, the dataset from Tozetti et al. (2010) was used, which comprises, in addition to S. longicaudatus, two other species belonging to the same genus, Siphlophis pulcher (Raddi, 1820) and Siphlophis compressus (Daudin, 1803) whose defensive repertoires are described in Marques et al. (2004) and Fraga et al. (2013). Thus, we elaborated the similarity analysis with a binary matrix of the presence/absence of 12 defence behaviours in 25 species. We conducted comparisons between taxa using Jaccard’s similarity index and clustered the species using the Pair Group Average Method (UPGMA). A cophenetic correlation coefficient was calculated to evaluate the representativity of the similarity matrix in the dendrogram where values ≥ 0.8 are considered adequate (Rohlf, 2000). This multivariate analysis was elaborated using the vegan package of the R software (R Core Team 2016) (Oksanen et al., 2015).

On December 18, 2014 at 09:40 PM, in the municipality of Cotia (-23.5993S, -46.9190W), in the state of São Paulo, Southeastern Brazil, a S. longicaudatus specimen was found moving on the ground in a forested area.
snake was captured for identification and released the next morning. When captured, the individual defended itself through erratic movements and cloacal discharge, according to Marques et al. (2004). During the release, on the morning of the following day, the snake presented a series of defensive behaviours not reported in the literature, as follows: elevation of the head and anterior portion of the body (Fig. 1A); triangulation of the head (Fig. 1B); formation of an “S” with the anterior region of the body (Fig. 1C); hiding the head under body turns (Fig. 1D-E) and curling up, assuming a spherical body conformation (Fig. 1F).

Head triangulation was one of the most frequent behaviours observed in the study performed by Tozetti et al. (2009) on *Xenodon dorbignyi* (Duméril, Bibron and Duméril, 1854) associated with elevation of the head and anterior portion of the body. A similar behaviour was observed for *Erythrolamprus miliaris*

Figure 1. *Siphlophis longicaudatus*, found in the municipality of Cotia (São Paulo, Brazil), and its observed defensive behaviours: head elevation (A); triangulation of the head (B); S-shaped neck (C); hiding the head (D and E); body in a spherical conformation (F).
The behaviours of raising and triangulating the head and forming an “S” with the neck possibly make the animal appear larger and more intimidating to visually oriented predators, such as birds and mammals (Tozetti et al., 2009). The presence of these behaviours in *S. longicaudatus* is surprising, since this species displays mainly nocturnal activity (thus, being less likely to encounter visually oriented animals), unlike *X. dorbignyi* and *E. miliaris*, which are predominantly diurnal (Marques et al., 2004; Tozetti et al., 2009). However, the fact that the *S. longicaudatus* specimen presented the behaviours during the day may have influenced the different defensive behaviours exhibited, like in the case of *Simophis rhinostoma* (Schlegel, 1837) that alters its defensive behaviour under different light conditions (Marques, 2000).

The UPGMA dendrogram (Fig. 2) shows a cophenetic coefficient of 0.893 indicative of a good representation of the similarity matrix. Inspection of the dendrogram show similar results as in Tozetti et al. (2009), with the formation of two major groupings (Fig. 2): Group 1 - contains most *Lydophis* Fitzinger, 1843 and *Erythrolamprus* Wagler, 1830 species, including *Siphlophis* Fitzinger, 1843 species; and group 2 - composed mostly of species belonging to the *Xenodon* Boie, 1826 genus. Species belonging to the *Siphlophis* genus, added in this study, form a smaller group, within group 1, with *S. longicaudatus* and *S. compressus* sharing very similar defence tactics. In contrast to species of *Xenodon* and *Erythrolamprus* where defensive behaviours are not phylogenetically informative, the clustering of *Siphlophis* species in our dendrogram suggests that defensive behaviours might be highly conserved in this genus, even independent of the colour pattern of the species, since *S. compressus* is quite conspicuous, while *S. longicaudatus* displays a more cryptic colouring. However, this issue is still under-explored for snakes in the Neotropical region, and further studies with a greater range of species and their respective defensive repertoires could better address this issue.

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