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SHORT COMMUNICATION

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New records and a compilation of the defensive behaviours of the colubrid snake *Erythrolamprus poecilogyrus*

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Erythrolamprus poecilogyrus (Wied-Neuwied, 1824), a colubrid snake in the sub-family Xenodontinae, is distributed throughout South America (Wallach et al., 2014; Uetz et al., 2021). In Brazil, it is widespread in the Atlantic Forest, Cerrado, Caatinga, Pampas grasslands, and Pantanal, with scattered records in the Amazonia and Guianan savannas (Nogueira et al., 2019). It can be found in a wide variety of habitats, from primary forests to disturbed areas (Martins et al., 2008; Sawaya et al., 2008; Loebmann & Haddad, 2010; Mesquita et al., 2013; Nogueira et al., 2019).

It is a common terrestrial species that primarily eats frogs and is active both during the day and night (Carreira et al., 2005; Alencar & Nascimento, 2014). Although there have been some studies of the defensive behaviour of *E. poecilogyrus* (Carreira et al., 2005; Martins et al., 2008; Sawaya et al., 2008; Mesquita et al., 2013), to date there has been no full account. Here, I present new records of the defensive tactics of this species based on my own field observations together with a compilation of all the defensive behaviours previously recorded for this species, without distinction between subspecies. I have followed the taxonomy according to Nogueira et al. (2019) and the definitions of defensive tactics of Greene (1988), Martins & Oliveira (1998) and Martins et al. (2008).

On 13th November 2020 at 22:00 h, in the municipality of Barras (42.296006° W, 4.253766° S, 85 m a.s.l.), Piauí State, north-eastern Brazil, I observed a domestic cat trying to prey on an adult *E. poecilogyrus*. With my approach the cat ran away and I could capture the snake for identification. The species was identified from descriptive characteristics based on Dixon & Markezich (1992). While I was handling the specimen with a herpetological hook to take pictures, the individual showed five different defensive behaviours in the following sequence: i) immobility (Fig. 1A); ii) raising of the

Figure 1. Adult individual of *Erythrolamprus poecilogyrus* exhibiting defensive behaviours- **A.** Remaining immobile, **B.** Raising the tail, **C.** Coiling the body with the head hidden (notice the injured tail tip after a failed predation attempt), **D.** Hooding behaviour

tail (Fig. 1B); iii) coiling of the body with iv) the head hidden (Fig. 1C). Afterwards, I placed the snake in a plastic container to transport it to a safer location. At this moment, it also exhibited v) hooding behaviour (Fig. 1D). Despite an injured tail, the specimen appeared to in good health so I released it in a safe place.

Previous reports state that *Erythrolamprus poecilogyrus* is not aggressive towards predators and tends to flee (Mesquita et al., 2013). Although this species may bite following provocation, it does not cause severe envenomation in humans (Quintela, 2010; Weinstein et al., 2011). The injured tail and the absence of injuries along the body suggest that raising the tail, body coiling and hiding the head could be efficient defensive behaviours for the protection and survival of this species. These behaviors may reflect several factors, such as vulnerability to visually oriented predators, how the habitat is used, morphological characteristics and phylogeny (Greene, 1979; Martins et al., 2008).

Most of the defensive behaviours observed in *E. poecilogyrus* have been reported for other congeners and even other clades (Martins et al., 2008). For example, immobility, head hiding and tail display are known in *E. aesculapii* (Sazima & Abe, 1991; Hudson & Sousa, 2019; Fiorillo et al., 2020) and *E. miliaris* (Muscat et al., 2016). Neck flattening behaviour, also called hooding, has already been observed in other species of the genus (as *E. miliaris*, Menezes et al., 2015; *E. viridis*, Andrade & Dias, 2017; *E. sagittifer*, Beconi et al., 2019), and also in other members of the Xenodontinae (e.g., *Thamnodynastes*, Franco et al., 2003; *Hydrodynastes*, Young & Kardong, 2010; *Xenodon*, Kahn, 2011).

The terminology for defensive behaviours in the literature appears to have produced some overlapping definitions. For example, 'body compression' that can be dorsoventral and total (as observed in *Crotalus durissus*, Benício & Martins, 2018), just some parts of the body – 'dorsoventral flattening of the anterior region of the body' (e.g., Zoysa et al., 2015), 'dorso-laterally flatten the neck' or 'lateral compression of the anterior region of the body' (as occurs in *Chironius, Philodryas*, *Phrynonax*, *Spilotes*, *Xenodon*, Santos-Costa et al., 2015). Furthermore, it is possible that what some authors are calling 'dorsoventral flattening of the gular region' (e.g., Mesquita et al., 2013) is actually the same thing as 'hooding behaviour'. Thus, as we observe new behaviours, it is necessary to develop better definitions and a standardisation terms in order to fully understand the diversity of snake defensive behaviours.

Previously, 10 defensive behaviours have been attributed to *E. poecilogyrus* but in this study I have been able to add a further five (Table 1). This study draws attention to the redundancy of some of the defensive behaviour terms used in the literature, the need for standardisation, and reinforces the importance of natural history in understanding the behavioral ecology of *Erythrolamprus poecilogyrus*.

Table 1. Defensive behaviours reported for *Erythrolamprus poecilogyrus*

Defensive mechanisms	References
Bite	Quintela (2010), Weinstein et al. (2011)
Body coiling	This study
Body compression (total)	Carreira et al. (2005), Martins et al. (2008), Sawaya et al. (2008), Mesquita et al. (2013)
Crypsis	Martins et al. (2008)
Cloacal discharge	Sawaya et al. (2008), Mesquita et al. (2013)
Dorsoventral flattening of the gular region	Mesquita et al. (2013)
Mouth gapping	Sawaya et al. (2008)
Head triangulation	Sawaya et al. (2008)
Hiding the head	This study
Hooding behaviour	This study
Immobility	This study
Mimicry	Martins et al. (2008)
Tail raising	This study
Body thrash	Sawaya et al. (2008)
Turning the body on its own axis	Mesquita et al. (2013)

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