

extensive range of *A. kitaibelii* (Uetz & Hosek, 2012) subsequent study of populations from other areas in its range are warranted to ascertain if there is geographic variation in reproduction.

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- 734, 739, 740, 743, 747, 749, 1437, 2528-2531, 2904, 2966- 2968, 3859, 3883, 6026, 6057, 6060, 6062, 11143, 12073, 12371, 12688, 12968, 13406, 15710; Southern, (TAUM) 5980, 8504, 8951, 12960, 13781; Tel Aviv, (TAUM) 3957, 3958, 9375.

## Body-bending behaviour: a new instance in a terrestrial snake from Brazil

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Snakes exhibit a wide range of antipredator tactics including cryptic colouration, immobility, struggling, cloacal discharging, sound production, S-coil posture, vibrating the tail, actively breaking the tail, exuding blood from the eyes, feigning death, biting and spitting venom (Greene, 1997). In addition, a defensive behaviour called body-bending has been described for the first time for two species of arboreal colubrids, *Pseustes poecilonotus* and *P. sulphureus* (Beebe, 1946; Abuys, 1986). This behaviour was then interpreted as a defensive tactic in which, by bending its body, a snake can increase the resemblance it may already have to some portions of its habitat as bent sticks and lianas that are often found among branches in the canopy or on the forest floor,

#### APPENDIX

*Ablepharus kitaibelii* from Israel examined by District: Center, (TAUM) 736, 11436; Haifa, (TAUM) 746, 4936, 5154, 5155, 13789; Jerusalem, (TAUM) 12372, 14869; Northern, (TAUM) 732,



**Figure 1.** View of “Restinga” habitats at Lençóis Maranhenses National Park, Maranhão state, Northeastern Brazil.



**Figure 2.** *Psomophis joberti* from Lençóis Maranhenses National Park, Maranhão state, Northeastern Brazil, exhibiting body-bending behaviour.

hence escaping potential predators (Beebe, 1946; Abuys, 1986). In recent years, new instances of body-bending behaviour have arisen: Marques et al. (2006) reported the body-bending behaviour for two species (*Philodryas viridissimus* and *Spilotes pullatus*) from Brazil and Doherty-Bone (2009) reported it for *Pantherophis spiloides*, a species from North America. Considering that until then body-bending behaviour was known only for arboreal snake species, Marques et al. (2006) suggested that it could have evolved independently in the Xendontinae and Colubrinae as an adaptation to arboreal life. However, Maddock et al. (2011) described body-bending behaviour in another two species from Northwest Ecuador: the terrestrial *Coniophanes fissidens* and the semi-arboreal *Chironius monticola*. Maddock et al. (2011) argued that body-bending behaviour in Neotropical snakes could be more widespread than previously thought and that the adaptive value of that behaviour could extend further than the arboreal life style.

Herein, we provide a new instance of body-bending behaviour in *Psomophis joberti* (Sauvage, 1884) from Northeastern Brazil, which is the first report of this behaviour in a terrestrial species which lives in open habitat. The genus *Psomophis*, in the subfamily Dipsadinae, has three species that are found in South America (Myers & Cadle, 1994). *P. joberti* is a diurnal and terrestrial species distributed in central and northeastern Brazil, with a disjunct population in Marajó Island, Pará (Myers & Cadle, 1994; França et al., 2006). On June 23rd 2005 at 16:00 h, we observed an individual

of *P. joberti* (Male, SVL: 236 mm) moving on sand in an open area of “Restinga” in Lençóis Maranhenses National Park (LMNP), Maranhão, Northeastern Brazil (02° 32' 31.7”S and 43° 11' 28.3” W, SAD69). “Restinga” habitats in LMNP are mosaics of open areas with herbaceous and shrubby vegetation (Figure 1). Initially, the snake was in a normal posture, but upon our approach it began to display the body-bending behaviour (Figure 2). We took a picture and collected the individual, which kept its bending posture even after collection and handling. On March 10th 2006 at 16:01 h, we observed another individual of *P. joberti* (Male, SVL: 292mm) in the same park (02° 36' 27.8” S and 45° 05' 10.4” W, SAD69) and upon our approach it performed the body-bending display too. However, this later individual stopped bending its body after collection and immediately began to press its tail spine against the hand of the collector, a typical defensive behaviour of *P. joberti*, known as spine-press behaviour (Lima et al., 2010).

Our observations strengthen the hypothesis that body-bending behaviour is not an adaptation to arboreal life (Maddock et al., 2011) and that even snake species from open areas, where lianas are uncommon, can benefit from this kind of behavioural trait. We expect that as fast as new examples of body-bending behaviour were reported, we may improve our knowledge about it and decipher the real meaning of this interesting behaviour in snakes.

The specimens of *P. joberti* cited here are

deposited in Coleção Herpetológica “Claude d’Abbeville”, Museu de História Natural do Leste Maranhense at Universidade Federal do Maranhão (CCAA/UFMA), Maranhão state, Brazil (CHMA 500 and CHMA 501, respectively).

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