

## Is cartwheeling a common defensive mechanism in dwarf reed snakes *Pseudorabdion* spp? The case of *Pseudorabdion albonuchalis*, with a link to video evidence

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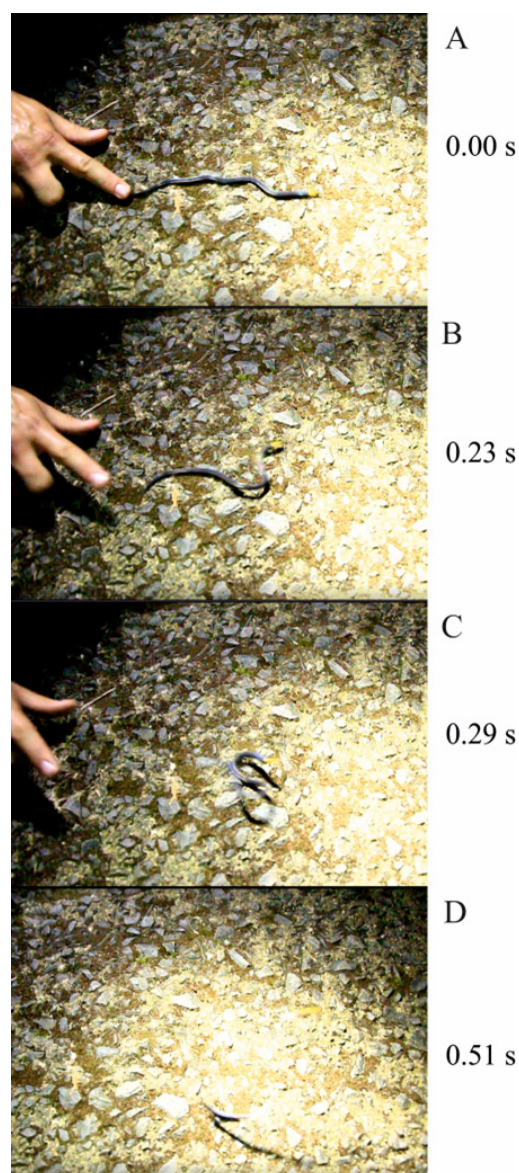
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An unusual escape mechanism for a snake, termed cartwheeling, has recently been described for *Pseudorabdion longiceps* (Quah et al., 2023). On 20 July 2017, I recorded similar behaviour in a closely related species *Pseudorabdion albonuchalis*. This species is a small (up to 400 mm total length), short-tailed snake of the subfamily Calamariinae (Stuebing & Inger, 1999; Zaher et al., 2009). The body is slender with a black dorsum, brown venter and a broad yellow nuchal band. Its distribution is restricted to Borneo where it inhabits lowland dipterocarp forests up to 500 m above sea level, where it lives in the leaf litter and also burrows into the mat of hair roots under leaf litter (Das, 2012; Stuebing & Inger, 1999). However, feeding and reproductive behaviour as well as exact distribution have not been sufficiently investigated.

One individual of *P. albonuchalis* with a total length of 250 mm was found near Matang Family Park, Sarawak, Malaysia (1° 36'51" N, 110° 11'56" E, 120 m a. s. l.). It was encountered crossing a road at night (21:00 h) at an ambient temperature of approx. 27 °C. I did not notice any visible injuries to its body. Illuminated by a lamp it became motionless. When touched on the tail, the snake immediately reacted by two consecutive jumps (combined distance ca 1.5 m) directed away from the investigator (BHS video, 2025). This escape allowed the snake to reach the leaf litter at the edge of the road, where it attempted to conceal itself.

I repeated this provocation of defensive behaviour two more times and the result was the same. Since it is almost impossible to capture such behaviour using still photography, I provide frames extracted from the video recording (Fig. 1). The snake begins by forming a lateral loop using its anterior body followed by a rapid whip-like motion, which lifts the snake into the air. In the air the snake forms a circle and spins, allowing the snake to bounce off the ground after impact from the first jump. The snake always completed two jumps in rapid succession.

To avoid predation, snakes use various tactics, sometimes in combination, such as rapid escape; death feigning (thanatosis), often accompanied by the release of musk from cloacal glands; hiding the head beneath body, frequently complemented by defensive tail display; coiling into balls or loops; extending the neck; hissing; rattling; false strikes; biting; biting using venom; venom spitting



**Figure 1.** *Pseudorabdion albonuchalis* defensive reaction, frames taken from a video recording - **A.** The stimulus being applied to the snake, **B.** the snake quickly forms a lateral loop of its anterior body, **C.** followed by a rapid whip-like motion to jump, and **D.** the snake now distant from the potential predator (bottom middle, somewhat blurred as it is still in motion). Time in seconds is shown to the right of each frame. It took only 1 s for snake to complete the two consecutive jumps and the distance travelled was ca 1.5 m.

or using specialised nuchal glands for toxin secretion (Greene, 1973; 1988; Sazima & Abe, 1991; Gregory et al., 2007; Hutchinson et al., 2013; Jablonski & Hegner, 2016). False strikes at the attacker by some snake species might resemble jumping (Greene, 1988). However, none of these aggressive reactions are directed away from the attacker (Lillywhite, 2014) as has been observed with *Pseudorabdion* spp in both this study and by Quah et al. (2023). It would be of interest to investigate other species of the subfamily Calamariinae to establish the extent to which they share this behaviour.

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## REFERENCES

- BHS video (2025). Cartwheeling defensive behaviour by the dwarf reed snake *Pseudorabdion albonuchalis*. <https://youtu.be/3wuCoRCXmik>.
- Das, I. (2012). *A Naturalist's Guide to the Snakes of Southeast Asia: Malaysia, Singapore, Thailand, Myanmar, Borneo, Sumatra, Java and Bali*. John Beaufoy Publishing, Oxford, UK. 176 pp.
- Greene, H.W. (1973). Defensive tail display by snakes and amphisbaenians. *Journal of Herpetology* 7: 43–61.
- Greene, H.W. (1988) Antipredator mechanisms in reptiles. In: *Biology of the Reptilia, Ecology B. Defense and Life History*. 1–134 pp. Gans, C. & Huey, R.B. (Eds.). Alan Liss, New York.
- Gregory, P.T., Isaac, L.A. & Griffiths, R.A. (2007). Death feigning by grass snakes (*Natrix natrix*) in response to handling by human 'predators'. *Journal of Comparative Psychology* 121: 123–129.
- Hutchinson, D.A., Savitzky, A.H., Burghardt, G.M., Nguyen, C., Meinwald, J., Schroeder, F.C. & Mori, A. (2013). Chemical defense of an Asian snake reflects local availability of toxic prey and hatchling diet. *Journal of Zoology* 289: 270–278.
- Jablonski, D. & Hegner, D. (2016). Death feigning behaviour in *Aplopeltura boa*. *The Herpetological Bulletin* 136: 31–32.
- Lillywhite, H.B. (2014). *How snakes work: structure, function and behavior of the world's snakes*. Oxford University Press, New York. 256 pp.
- Quah, E.S.H., Grismer, L.L. & Shahrul Anuar, M.S. (2023). Observations and description of a rare escape mechanism in a snake: cartwheeling in *Pseudorabdion longiceps* (Cantor, 1847)(Squamata, Colubridae). *Biotropica* 55: 568–572.
- Sazima, I. & Abe, A.S. (1991). Habits of five Brazilian snakes with coral-snake pattern, including a summary of defensive tactics. *Studies on Neotropical Fauna and Environment* 26: 159–164.
- Stuebing, R.B. & Inger, R.F. (1999). *A Field Guide to the Snakes of Borneo*. Natural History Publications (Borneo). 254 pp.
- Zaher, H., Grazziotin, F.G., Cadle, J.E., Murphy, R.W., de Moura-Leite, J.C. & Bonatto, S.L. (2009). Molecular phylogeny of advanced snakes (Serpentes, Caenophidia) with an emphasis on South American Xenodontines: a revised classification and descriptions of new taxa. *Papéis Avulsos de Zoologia*. 49: 115–153.

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