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Scientific note

Hibernation in tropical Madagascar? Unusual roosting sites of chameleons of the genus *Calumma*

(Squamata, Chamaeleonidae)

David Prötzel*, Kathrin Glaw**, Julia Forster* & Frank Glaw*

Chameleons usually live in (sub)tropical habitats and are not associated with hibernation. However, a few species from temperate zones or mountainous habitats are known to hide during winter for several months in the ground, e.g. *Bradypodion thamnobates* (Measey et al. 2014), *Chamaeleo chamaeleon* (Böhme 1981) or *Rhampholeon marshalli* (Broadley 1971). Here we report on two *Calumma* species found hidden and inactive in tropical eastern Madagascar, representing possible cases of hibernation.

During the Madagascan winter, on 2 August 2016 at 7 pm, ca. 15 °C air temperature, we (DP, JF, FG) noticed a hole (ca. 2 × 5 cm diameter, 1–1.5 m above the ground) in a rotten tree stump (Fig. 1A) in the rainforest of the Maromizaha Reserve (18°58'5.43" S 48°27'53.39" E, 1020 m a.s.l.), eastern Madagascar. After opening the hole we found an adult female *Calumma malthe* covered with dew (Fig. 1B). Due to the disturbance, the chameleon slowly started to move and left the stump. Remarkably, in the same night we found more than 15 *C. malthe* of both sexes including juveniles roosting exposed on branches. Another chameleon, probably *C. crypticum*, was observed by KG hiding in a rock wall in Ranomafana rainforest in July 1992 (Fig. 1C). The chameleon was apparently overgrown with liverwort, suggesting that it had been staying in this position for some time. In contrast to Böhme & Fischer (2000) who reported on

different species of mosses that were growing on the skin of *Rhampholeon spectrum*, the liverwort was apparently not attached to the chameleon skin.

We are not aware of similar observations and cannot yet evaluate if they represent a form of hibernation or just endurance of bad (weather) conditions for shorter periods of time. For density studies of chameleon species, however, it is important to take into consideration that some individuals might be invisibly hidden for a longer period of time.

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Fig. 1. Hiding *Calumma* species. **A.** Rotten tree stump in Maromizaha Reserve with a hole (encircled); **B.** opened hole with *C. malthe* female; **C.** *Calumma* sp. (probably *C. crypticum*) at Ranomafana during day covered by liverwort.

* David Prötzel, Julia Forster & Frank Glaw, Zoologische Staatssammlung München (ZSM-SNSB), Münchhausenstr. 21, 81247 München, Germany; corresponding author, e-mail: david.proetzel@mail.de

** Kathrin Glaw, Museum Mensch und Natur, Schloss Nymphenburg, 80638 München, Germany

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Autor(en)/Author(s): Prötzel David, Glaw Kathrin, Forster Julia, Glaw Frank

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