



# Thermal biology of *Lanthanotus borneensis* (Lanthanotidae) in Sarawak, Borneo

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**Abstract.** *Lanthanotus borneensis*, the Bornean earless monitor, is a monotypic member of the family Lanthanotidae, and restricted to the island of Borneo. Little has been published on its field ecology. This study investigated aspects of its thermal biology through an analysis of surface body temperatures of free ranging individuals against corresponding environmental temperatures, in order to explore aspects of microhabitat utilisation in relation to thermoregulation. A generalised linear mixed model shows significant effect of air and substrate temperatures, but not of water temperature. Further, the fixed effects of substrate temperature (coefficient estimate 0.396;  $P < 0.05$ ) versus ambient temperature (0.264;  $P < 0.05$ ), is suggestive of thigmothermy as the primary mode of thermoregulation. The species does not appear to utilise specific microhabitat structures to thermoregulate, the results of these observations suggesting that it is a thermoconformer.

**Keywords:** Bornean Earless monitor, microhabitat, thermoconformer, thigmothermy.

## Introduction

Thermoregulation is an often complex behavioural and physiological process by which ectothermic organisms regulate their body temperature ( $T_b$ ) to maintain it within a range optimal to corporal functions, such as locomotion, reproduction, growth and defensive attempts (Carrascal et al., 1992; Brewster et al., 2013). Thermoregulation in squamate reptiles cannot be defined simply by analysing numerical data, but requires the integration of understanding on the behavioural ecology of a species (Huey and Slatkin, 1976). Studies on the behavioural thermoregulation in lizards (Huey and Slatkin, 1976; Muñoz et al., 2016; Yang et al., 2020) bring to the fore the diversity of mechanisms, with individual lizard species adopting different behavioural buffering strategies to counteract daily and annual temperature

fluctuation. These include postural changes, alternating between microhabitats and adjusting activity periods (Adolph and Porter, 1993; Kearney, 2001; Chukwuka et al., 2020). Nonetheless, Díaz et al. (2022) reported that the ability to change thermoregulation related strategies is threatened by rising global temperatures. As the physiology and behaviour of a lizard have a strong dependence on ambient temperatures, an individual lizard's thermal type can also influence its selection of microhabitats (Michelangelo et al., 2018). In ectotherms, squamate reptiles typically rely on external sources of heat and behavioural strategies to thermoregulate. The evolving adaptational strategies observed in lizards yields a continual platform of possible research that can be done on their thermal ecology. Such research is lacking for most parts of the tropics, such as Borneo, which has a rich herpetofaunal diversity.