

# Thermally -Guided Responses in Juvenile *Antaresia childreni*

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## Abstract

Snakes in the family Pythonidae possess specialized sensory structures in their supra- and infralabial scales called pit organs. These pit organs allow pythons to detect and respond to environmental infrared radiation (IR), alerting the snakes to thermal stimuli and allowing them to gain a better understanding of their surroundings, and aid in detection of predators/prey and the selection of basking sites. The behavioral response to IR stimuli has been well studied in many species of pitvipers, but studies of pythonids have been largely limited to the genus *Python* (e.g., *Python regius*, *P. molurus*, *P. bivittatus*). Behavioral responses to thermal cues in *Antaresia childreni*, a terrestrial Australian pythonid, have received no attention, despite the presence of well-developed caudal infralabial pit organs (Fig 1). I propose to study the response of *A. childreni* to thermal stimuli at regular intervals from juvenile stages through early adulthood. I hypothesize that the behavioral response of *A. childreni* to infrared radiation will be similar to that observed in other pythonid species and that this response will vary during ontogeny as their pit organs continue to develop and mature.

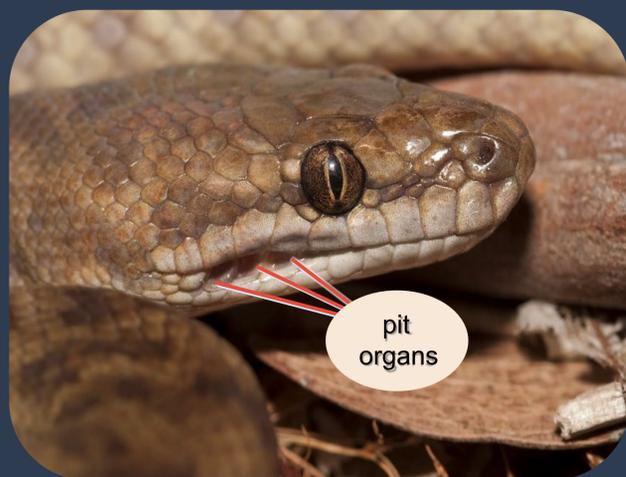


Figure 1: The species of interest, *Antaresia childreni*, with caudal infralabial pit organs indicated



Figure 2: Diagram of the behavioral arena. Arrows indicate the direction of movement for the IR stimulus

## Methodology

- This experiment will use *A. childreni*, N=9 (Fig 1)
- A cylindrical arena with a diameter of 1ft will be constructed from cardboard and coated in visible and infrared-light blocking material (Fig 2).
- For each trial, an individual snake will be placed at the center of the arena and left to acclimate under a hide box for 30min. After the acclimation period, the hide box will be removed from the arena.
- A Peltier element will serve as the IR-stimulus. It will be attached to a track within the arena to allow manual rotation throughout the snake's FOV.
- Each individual will be tested under 4 treatments over each of 4 temperature settings. This will be repeated following each successive shed (~every 2 weeks) for a period of 1 year (Fig 3)
- Trials will be video recorded using a FLIR camera and scored for the following behaviors:
- Data will be analyzed using repeated measures ANOVA in R

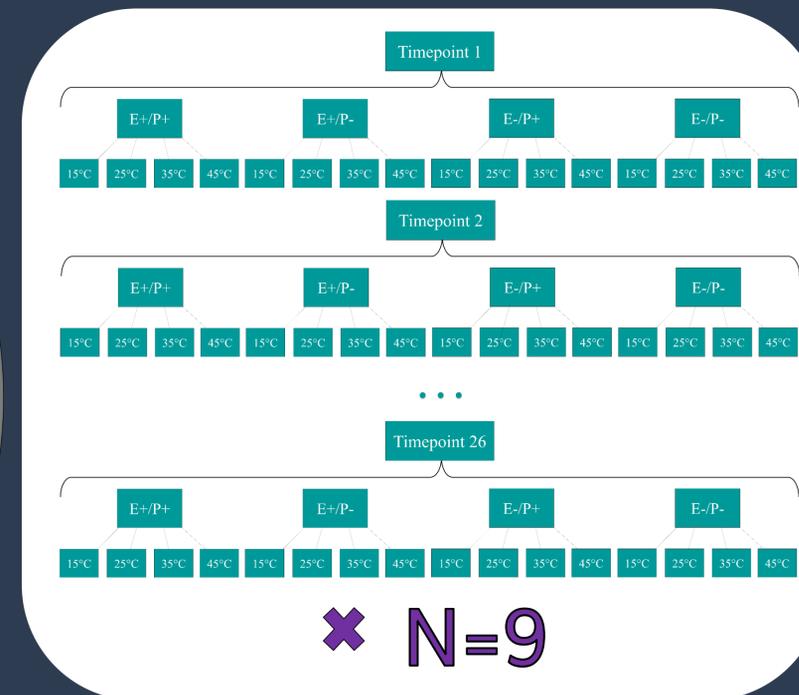


Figure 3: Experimental design. Each condition will be tested for 4 temperature settings and repeated every 2 weeks for a year. This will be done for each of the 9 individuals in the study. E, eyes; P, pit organs; +, not occluded; -, occluded)

## Predicted Outcomes

### Anticipated Results

I expect to see a higher incidence of responses among conditions with pit organs exposed compared to conditions with pit organs occluded. Specifically, I would anticipate that conditions with occluded pit organs would show diminished levels of response to IR compared to conditions with pit organs exposed. I also expect to see little variation in response among conditions with the eyes occluded compared to conditions with the eyes exposed.

### Pitfalls and Alternatives

Pit organs in *A. childreni* may function differently compared to other pythonid species, and may not respond to IR in the expected manner, as *A. childreni* may rely more heavily on their eyes when gathering information about their surroundings, rather than pit organs.

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