1400 Melanie Kimball, Christine Lattin

The "seven deadly sins" of neophobia experimental design

Neophobia, an aversive response to novelty, is a behavior with critical ecological and evolutionary relevance for wild populations because it directly influences animals' ability to adapt to new environments and exploit novel resources. Neophobia has been described in a wide variety of different animal species from arachnids to zebra finches. Because of this widespread prevalence and ecological importance, the number of neophobia studies has continued to increase over time. However, many neophobia studies suffer from one or more of what we have deemed the "seven deadly sins" of neophobia experimental design. These "sins" include: 1) pseudoreplication, 2) lack of sufficient controls, 3) fixed treatment order, 4) non standardized motivation, 5) problems with novel object selection, 6) animals that are not habituated to the testing environment, and 7) using arbitrary thresholds for data analysis. We discuss each of these potential issues in turn and make recommendations for how to avoid them in future research. More consistency in how neophobia studies are designed would facilitate comparisons across different populations and species, and allow researchers to better understand whether neophobia can help explain animals' responses to human-altered landscapes and the ability to survive in the Anthropocene.

1505 Zoe King, Sydney Haywood, Giovanni Morris, Jeffery Anderson-Jr, Joshua Pulliam, Jerry Wong, Beckett Socha, Ulmar Grafe, Salwa Khalid, Jake Socha

Tongue-sticking in arboreal colubrids during gap crossing

Tongue-flicking in snakes is characterized by a rapid, high-frequency oscillation of the tongue, but other behaviors are known to be used. In tongue-sticking, the tongue is protruded statically without oscillation, a behavior previously noted in flying snakes (Chrysopelea) in the context of locomotion, specifically gap crossing and jumping prior to gliding. Is this behavior unique to flying snakes, or do other snakes also employ this form of tongue movement? And if so, how does the arboreal context influence the behavior? To investigate these questions, we recorded tongue behavior in sister taxa to Chrysopelea (Ahaetulla prasina, Dendrelaphis pictus, caudolineatus, and formosus) as well as outgroup species (Dryocalamus subannulatus, Boiga cynodon, drapiezii, and nigriceps, Lycodon capucinus) as snakes traversed a gap between two horizontally oriented perches. Snakes were first allowed to cross the perches in abutted position (a control, with no gap), and then were presented with gaps of 15%, 30%, and 45% SVL (snout-vent length) in random order. Among the species tested, only the close relatives of flying snakes (Ahaetulla and Dendrelaphis spp.) exhibited tongue sticking, present both in the control and gap trials. Furthermore, tongue sticking was more likely at the largest gap sizes, suggesting that tongue sticking plays a mechanosensory role associated with gap-crossing locomotion. This research was supported in part by the National Science Foundation under grant numbers 1922516 and 2027523.

506 Alexandra Kingston, Sarah Woodin, David Wethey, Rebekah Hansen, Daniel Speiser

Helmet-like orbital hoods protect snapping shrimp from shock waves

Shock waves are supersonic high-amplitude pressure waves that cause blast-induced neurotrauma in humans and other animals. Snapping shrimp (Alpheidae) produce shock waves with their snapping claws but do not seem to be harmed by them. We used behavioral trials to ask if snapping shrimp are protected from shock waves by a helmet-like extension of their exoskeleton termed the orbital hood. Then, we used pressure recordings and microCT to ask how orbital hoods may provide this protection. We found shock wave exposure slowed shelter-seeking and caused a loss of motor control in Alpheus heterochaelis from which we had removed orbital hoods but did not affect behavior in shrimp with unaltered orbital hoods. Shock waves thus have the potential to harm snapping shrimp but may not do so under natural conditions because of protection provided by their orbital hoods. We also discovered the orbital hoods of A. heterochaelis dampen shock waves. Sealing the anterior openings of orbital hoods diminished how much they dampened shock waves, which suggests these structures trap and expel water so kinetic energy is released away from the heads of shrimp. Finally, we found that orbital hoods are less dense than the surrounding exoskeleton which may contribute to shock wave dampening. Our results indicate that orbital hoods act as a helmet-like biological armor that dampens shock waves and protects snapping shrimp against blast-induced neurotrauma.

1198 Chase Kinsey, Richard Blob, Danielle Adams, Caleb Ratz

Bone density and mechanical properties across development in generalist and aquatic frogs

Limb bones of vertebrates have a critical role in transmitting forces that power locomotion. The loads that limb bones experience can vary in association with a