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Using Whole-Body Performance to Understand Muscle-Level Mechanisms

In all major ecosystems, temperature plays a fundamental role in the lives of animals. In any given location, the environmental temperature can change daily, seasonally, and topographically. In order to move effectively within their environment, almost all animals must maintain their body temperature within a certain range. Maintaining any given body temperature can have an impact on the ability to secure food and or defend against threats. However, some animals have mechanisms that allow them to move at the same rate, regardless of their body temperature. These are called elastic recoil mechanisms. Elastic recoil mechanisms decouple muscle contraction from body movement and allow animals to perform movements that are independent of their body temperature. Based on recent studies of muscle activity patterns, snakes have been suggested to strike using elastic recoil mechanisms. Given this, we expect their strike performances to have constant rates across a wide range of body temperatures. Despite this recent hypothesis, no recent quantitative data exists that tests it. Using high-speed cameras and motion capture software, we will measure the 3D strike performances of carpet pythons (*Morelia spilota*) with different body temperatures in order to better understand the mechanisms of how they move. If the strikes are dependent upon their body temperature, then their mechanism of movement is not powered by an elastic recoil mechanism but operate by standard muscle mechanics.