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Impact of morphology, reflectance, and hairs on the physiological limits of bees and their response to climate warming

Climate change is an ongoing process and will continue to impact species globally. Refining our ability to predict species' response to changing environmental conditions is of increasing importance. Physiological limits, such as an organism's critical thermal maximum (CT_{max}) and minimum (CT_{min}), are strong predictors of how organisms respond to climate warming. These limits are relatively well studied, however heat-tolerant species may have physical characteristics that better enable them to survive extreme temperatures. To investigate the relationship between heat tolerance and morphological traits, this research will be looking at data from a larger USDA project collecting bees in urban community gardens across the United States. The project is gathering data on bee thermal tolerance and hygric limits, in addition to storing bee specimens available for further study in the lab. To gain a more complete picture of the factors influencing bee species success under increasingly warm conditions, measurements of these specimens will be taken. These measurements will include body size, reflectance and hairiness. Each of these traits influence a bee's thermoregulatory capacity and efficiency. For example, a bee's hairiness impacts its thermal tolerance by trapping heat near the body or reflecting solar radiation to reduce absorbed heat. Undertaking this research is important because it could draw connections between physical traits and bee success in fluctuating climatic conditions, as well as improve the accuracy of predictions about which species will survive under future conditions.