

# **THERMAL ECOLOGY AND THERMOREGULATORY ABILITY OF THREE NICROPHORUS SPECIES IN SOUTHEASTERN IDAHO**

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The ability to regulate endogenously produced heat during flight may allow an insect to fly over a wider range of ambient temperatures and environmental conditions. This may be particularly advantageous for *Nicrophorus* (Coleoptera: Silphidae), which require a carcass resource for mating and successful reproduction and require flight to find carcasses. I measured the thermoregulatory ability, seasonal abundance, and daily activity of three species of burying beetle: *Nicrophorus hybridus*, *N. guttula*, *N. investigator* occurring in the Rocky Mountains of southeastern Idaho. I measured thoracic temperatures for beetles flying over a range of natural ambient air temperatures, and operative temperatures of dead insect models simulating flight or ground activity. Flight temperatures and wingloading measurements ( $\text{mg}/\text{mm}^2$ ) were made from beetles flying to a baited trap, and from captive beetles flying in outdoor enclosures. Thermoregulatory ability was assessed using two indices: 1) the slope of thoracic temperature regressed against ambient temperature, and 2) the slope of thoracic temperature regressed against the operative temperature of a beetle in flight, taking into account the effects of biophysical factors such as solar radiation and convective cooling. Thermoregulatory ability increased with body mass and wingloading among the three species considered here. The largest species, *N. hybridus*, had thermoregulatory index values that were 1.7 to 2 times lower (a lower slope indicates better thermoregulation) than those calculated for the smallest species, *N. guttula*, which appears to behave as a thermal conformer. *Nicrophorus* body temperatures are highly influenced by solar radiation, and the wings, elytra, and thoracic pile all serve an insulatory purpose. Beetles with wings and elytra removed (simulating flight conditions) cooled significantly faster. Understanding factors influencing thermoregulatory ability in *Nicrophorus* may provide a better understanding of species distributions, competitive ability and seasonal activity patterns.