



The Thermal Warriors: Strategies of Insect Survival

Bernd Heinrich

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All bodily activity is the result of the interplay of vastly complex physiological processes, and all of these processes depend on temperature. For insects, the struggle to keep body temperature within a suitable range for activity and competition is often a matter of life and death.

A few studies of temperature regulation in butterflies can be found dating back to the late 1800s, but only recently have scientists begun to study the phenomenon in other insects. In *The Thermal Warriors* Bernd Heinrich explains how, when, and in general what insects regulate their body temperature and what it means to them. As he shows us, the ingenuity of the survival strategies insects have evolved in the irreducible crucible of temperature is astonishing: from shivering and basking, the construction of turrets (certain tiger beetles), and cooling with liquid feces to stilting (some desert ants and beetles), "panting" in grasshoppers and "sweating cicada," and counter- and alternating-currents of blood flow for heat retention and heat loss.

In *The Thermal Warriors* Heinrich distills his great reference work, *The Hot-Blooded Insects*, to its essence: the most significant and fascinating stories that illustrate general principles, all conveyed in the always engaging prose we have come to expect from this author.



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