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**Out on a limb: thermal microenvironments in the tropical forest canopy and their
relevance to ants**

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Abstract

Small, cursorial ectotherms like ants often are immersed in the superheated air layers that develop millimeters above exposed, insulated surfaces (i.e., the thermal boundary layer). We quantified the thermal microenvironments around tree branches in the tropical rainforest canopy, and explored the effects of substrate color on the internal body temperature and species composition of arboreal ants. Branch temperatures during the day (09:00-16:00) were hottest (often > 50°C) and most variable on the upper surface, while the lowest and least variable temperatures occurred on the underside. Temperatures on black substrates declined with increasing distance above the surface in both the field and the laboratory. By contrast, a micro-scale temperature inversion occurred above white substrates. Wind events (ca. 2 m s⁻¹) eliminated these patterns. Internal temperatures of bodies of *Cephalotes atratus* workers experimentally heated in the laboratory were 6°C warmer on white vs. black substrates, and 6°C cooler than ambient in windy conditions. The composition of ant species foraging at baits differed between black-painted and unpainted tree branches, with a tendency for smaller ants to avoid the significantly hotter black surfaces. Collectively, these outcomes show that ants

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