

**DEMONSTRATION OF AN ENHANCED ABILITY TO TOLERATE HIGH
TEMPERATURE IN UNFED LARVAE OF THE BROWN DOG (KENNEL) TICK,
RHIPICEPHALUS SANGUINEUS (ACARI: IXODIDAE)**

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ABSTRACT - Reported are the results of a five-species comparison of heat tolerance in unfed tick larvae. Resistance to heat stress was quantified by scoring the behavioral tasks completed by larvae following 1 hour of exposure at 20 °C, 30 °C, 40 °C, 50 °C, or 60 °C. Notably, all larvae were similar in age, reared under standardized thermal, photoperiod and relative humidity conditions, and had not yet fed, which minimized interference from potential acclimatization factors. Heat injury was signified by curling the front pair of legs (legs I) into a box-like shape, but none of these larvae survived. This 'all or nothing' (alive or dead) response in tick larvae differs from most insects, which typically undergo reversible, intermediate levels of injury. The most heat tolerant species was *Rhipicephalus sanguineus* (Latreille). Specifically, over 90% of the larvae resisted injury at 40 °C, and about 1/3 were capable of surviving treatment at 50 °C, a temperature where most other species were killed. *Ixodes scapularis* Say represented the opposite extreme, displaying significant injury and mortality at 30 °C and increased mortality at higher temperatures. Between these two extremes were the responses by *Amblyomma americanum* (L.), *Amblyomma maculatum* Koch and *Dermacentor variabilis* (Say), all of which overlapped with each other. We concluded that enhanced heat tolerance contributes to the ability of *R. sanguineus* to function in a dry environment, but this capacity is less important for ticks that are differentially adapted for a moisture-rich environment. There was no evidence in any of these larvae that protection against high temperature could be generated by a brief exposure to a sublethal temperature similar to the rapid hardening response observed in certain insects.

Key words - Acari, Ixodidae, temperature effect, heat tolerance, tick larvae.

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