SIMILARITY IN CRITICAL TRANSITION TEMPERATURE FOR TICKS ADAPTED FOR DIFFERENT ENVIRONMENTS: STUDIES ON THE WATER BALANCE OF UNFED IXODID LARVAE

Jay A. Yoder and Justin L. Tank
Department of Biology, Wittenberg University, Springfield, OH 45501, USA (e-mail: jyoder@wittenberg.edu).

ABSTRACT - Unfed tick larvae were used to gain insight into the critical transition temperature (CTT) due to their absence of spiracles. The study consisted of five species of medical-veterinary importance, *Amblyomma americanum* (L.), *Amblyomma maculatum* Koch, *Dermacentor variabilis* (Say), *Ixodes scapularis* Say and *Rhipicephalus sanguineus* (Latreille). Results show that each species has its own characteristic water loss rate consistent with ecological classification. The lowest water loss rates were recorded for the dry-adapted *R. sanguineus*, and the highest rates were observed for more hydrophilic species, *I. scapularis* and *A. americanum*. Body water content averaged 61 % and appears to be a useful secondary characteristic for ecological classification, as xeric-adapted species had slightly lower water content. For each of the species examined, a loss in the ability to retain water indicative of a CTT occurred between 30-35 ^{o}C in spite of these differences in water loss rate and water content, suggesting that this threshold is not species-specific and has little value for predicting habitat preference. An explanation for the similarity is that the CTT is independent of the lipid melting model as demonstrated by Boltzmann temperature function on an Arrhenius plot. Killed larvae (freezing or HCN) also showed a CTT of 30-35 ^{o}C revealing for the first time that heightened respiratory metabolism and inoperable spiracular closing mechanisms as the temperature rises play a minimal role in transition phenomena. Evidence implies that CTT is a stage-specific characteristic that may serve as a protective mechanism to cluster larvae in microhabitats with high moisture content.
Key words - Water balance, critical transition temperature, habitat selection, tick larva.

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