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Responses of the bed bug, *Cimex lectularius*, to temperature extremes and dehydration: levels of tolerance, rapid cold hardening and expression of heat shock proteins

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Abstract.

This study of the bed bug, *Cimex lectularius*, examines tolerance of adult females to extremes in temperature and loss of body water. Although the supercooling point (SCP) of the bed bugs was approximately −20°C, all were killed by a direct 1 h exposure to −16°C. Thus, this species cannot tolerate freezing and is killed at temperatures well above its SCP. Neither cold acclimation at 4°C for 2 weeks nor dehydration (15% loss of water content) enhanced cold tolerance. However, bed bugs have the capacity for rapid cold hardening, i.e. a 1-h exposure to 0°C improved their subsequent tolerance of −14 and −16°C. In response to heat stress, fewer than 20% of the bugs survived a 1-h exposure to 46°C, and nearly all were killed at 48°C. Dehydration, heat acclimation at 30°C for 2 weeks and rapid heat hardening at 37°C for 1 h all failed to improve heat tolerance. Expression of the mRNAs encoding two heat shock proteins (Hsps), Hsp70 and Hsp90, was elevated in response to heat stress, cold stress and during dehydration and rehydration. The response of Hsp90 was more pronounced than that of Hsp70 during dehydration and rehydration. Our results define the tolerance limits for bed bugs to these commonly encountered stresses of temperature and low humidity and indicate a role for Hsps in responding to these stresses.

Citing Literature

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