Temperature limits the geographic range of many terrestrial ectotherms and understanding the mechanisms that underlie this limitation will allow predictions regarding species’ sensitivity to climate change.

In the cold, most insects enter a state of chill-coma in which movement ceases entirely. In the fall field cricket (*Gryllus pennsylvanicus*) we have learned that the loss of neuromuscular function and the cold-induced injuries that follow are associated with a large flux of Na⁺ and water from the hemolymph to the gut that elevates hemolymph K⁺ concentration and depolarizes muscle cells. Despite the substantial changes in osmotic balance occurring during cold exposure, chill-coma is readily reversible. During recovery, crickets rapidly restore ion concentrations in the hemolymph to permit movement, but more slowly recover total hemolymph volume.

These findings provide exciting hypotheses on mechanisms of adaptive variation in thermal performance, some of which are now being explored in a *Drosophila* system.

**Chill-coma:**
How ion and water homeostasis underlie the onset and recovery of insect cold-induced paralysis

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**Monday June 25th at 10.15 at Plantbiology**