Sub-Lethal Salt Level Impacts on the Upper Thermal Limit of Copepods

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The temperature and salt concentration of freshwater bodies around the world are increasing due to environmental disruption. As a result, copepods, a keystone species, are being impacted, as well as other organisms in their shared environment. This project endeavored to determine whether increased salt concentrations were detrimental to copepods' critical thermal maximum (CTmax), which is the maximum temperature preceding an organism's immobilization. Copepods were acclimated in two different types of salt solution over the course of a week; instant-ocean aquarium salt (3000mg/L), and pet-safe road salt (3000mg/L) (n=10). Controls were run alongside each test using freshwater. Following their acclimation, copepods were placed in a thermal limit assay device to test the CTmax of each organism. The time and temperature that the copepods hit their CTmax were recorded. Collected data was examined using a linear mixed effects model, analyzing the variation in the CTmax as a function of salt type and treatment. This test indicated no significant difference between test groups in the instant-ocean experiments($p= 0.33$), but there was a significant difference between test groups in the road salt experiments ($p= 0.00012$). The addition of road salt decreased the copepod's CTmax on average by 2.77 degrees Celsius. Based on these results it was concluded that road salt decreases the copepod's CTmax, supporting the hypothesis. Further experiments should be run to determine what chemicals in road salt cause the decreased CTmax; thereby allowing for safer salt formulations to be used on roadways.

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