Foraging response and acclimation of ambush feeding and feeding-current feeding copepods to toxic dinoflagellates

Copepods exposed to toxic algae in "black box" incubation experiments show highly varied responses, but the mechanisms cannot be revealed from such experiments and the implications to copepod and phytoplankton population dynamics consequently not evaluated. Here, we use direct video observations to examine the response and temporal acclimation (5 d) of two copepods with different foraging behaviors to toxic dinoflagellates. Feeding-current feeding Temora longicornis and ambush feeding Acartia tonsa were offered three strains of toxic Alexandrium tamarense and a nontoxic control Protoceratium reticulatum. We hypothesize (1) that ambush feeders are less affected by toxic algae than feeding-current feeders, (2) that copepods acclimate to the toxic algae, and (3) that phytoplankton cells previously exposed to copepod cues elicit stronger responses. Both copepod species consumed the toxic algae at a reduced rate and there was no difference in their net-response, but the mechanisms differed. T. longicornis responded in strain-specific ways by reducing its feeding activity, by rejecting captured algae, or by regurgitating consumed cells. A. tonsa reduced its consumption rate, jump frequency, and jump distance on all strains of the toxic dinoflagellate, and most so on copepod-cue induced cells. There was limited acclimation to algal toxins, although some behavioral responses relaxed or intensified during the first one to several days. Mortality rates were low and the various responses, thus, all allow the copepods to survive harmful algal blooms. However, the implications to algal population dynamics are species/strains specific, with only prey selection providing the toxic algae with a competitive advantage.