

Copper effects in the copepod *Tigriopus angulatus* Lang, 1933: natural broad tolerance allows maintenance of food webs in copper-enriched coastal areas

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Abstract

Some coastal areas of northern Chile have received copper mine tailings for more than 60 years. At these areas, the toxic effects of copper have eliminated most intertidal seaweed and macroinvertebrate populations. However, the harpacticoid splashpool copepod *Tigriopus angulatus* seems unaffected, inhabiting heavily impacted sites. Because this species of copepod makes the energy of photosynthesis available to higher trophic levels, it becomes ecologically relevant to define the range of copper it can tolerate without affecting its population size. This was assessed through the analysis of demographic responses measured in a life-cycle experiment with copepods from a site with no history of heavy metal pollution. Results showed that juvenile survival was the most sensitive endpoint and that the species' intrinsic rate of natural increase (r_m) remains unaffected (without showing a fitness cost associated with tolerance) at copper concentrations within the range measured at these impacted areas. Thus, despite the high levels of dissolved copper measured at those sites, the local population of *T. angulatus* apparently can persist in exploiting its ecological niche and contributing to the overall ecosystem functioning, highlighting an unforeseen role of this copepod in the maintenance of food webs at the copper-enriched environment of northern Chile.