Aquatic Toxicity of Sunscreen Ingredients in Freshwater Ecosystems

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The impact of the main inactive ingredient in sunscreens was tested on freshwater ecosystems using Daphnia magna as a model species. My previous experiments (2023) showed that "reef-friendly" non-nano zinc oxide caused the most detriment to Daphnia magna, and further experimentation has been done to understand the impact of active versus main inactive sunscreen ingredients on the results. In this year's experiment, four non-nano zinc oxide sunscreens were tested, three water-based, one alcohol-based, and pure zinc oxide powder at concentrations of 1 and 2 mg/L. Five daphnia were added to each solution in three replicates. I hypothesized that the non-nano zinc oxide powder would have the least detrimental effects to the daphnia due to the lack of inactive ingredient, while the alcohol-based sunscreen would be the most harmful, due to the presence of alcohol as main inactive ingredient. The mortality of the Daphnia magna was recorded and contrary to my hypothesis, the results revealed that solubility of the sunscreen was the main factor contributing to mortality, regardless of the main inactive ingredient. In addition, the zinc oxide powder proved itself to be harmful, exposing the harm of the substance on freshwater environments. The supposed "environmentally friendly" UV filter was not safe to Daphnia magna and advertising regarding sunscreens can be misleading as the full scope of the toxicity of zinc oxide beyond coral reefs is neglected. Marketing as "environmentally friendly" should be regulated further to improve awareness of the consumer's impact on the natural world.

Awards Won:
University of Arizona: Renewal Tuition Scholarship