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Impacts Associated with Bather Use of Sunscreen in the water

Toxicity tests reveal certain sunscreen formulations as emerging threat to coral reef ecosystems

Sunscreen is a necessity for a day at the beach, but not all sunscreens are made the same. Evidence of compounds acting as UV filters in many formulations have been shown to exhibit endocrine disrupting effects in lab rats and fish¹. By binding to hormone receptors, these chemicals have the potential to alter development and reproduction in many organisms. When we use sunscreens, we expose not only ourselves to potentially harmful chemicals but also the aquatic environment.

Nina Sarmiento, an undergraduate at Binghamton University and summer intern working at the National Oceanic and Atmospheric Administration (NOAA), conducted research to investigate this question: how toxic are sunscreens to marine life?

Sarmiento's mentor Dr. Cheryl Woodley is a leader in coral health research at NOAA and began to study the potentially damaging effects of sunscreens on reefs after coastal managers pointed out an oily sheen on the water's surface after tourists left the beach. Sunscreen compounds such as benzophenones and others have been measured in coastal waters where people swim and in effluent wastewater from showering that is released into the environment².

Dr. Woodley explains, "Sunscreen compounds are a double edged sword; they protect peoples skin, however also represent a danger to corals at a local scale." Research is focused on how these compounds reduce the fitness of the organism, which makes the individual and population unable to compete with larger environmental changes, such as climate change.

Sarmiento performed sunscreen toxicity tests this summer and used a common model organism, sea urchins, to help understand potential effects on coral. She looked at adverse effects on reproduction and early development after she exposed urchin sperm and embryos to common sunscreen products. In her results, the sunscreens she tested did not kill sperm, but some formulations had a significant effects on embryo development.



Nina, left, with sunscreens being used for blind toxicity testing; right, she spawns sea urchins in the lab to collect gametes. Photo credit: Zac Moffit

As more research is done on just how these products are affecting coral reef ecosystems, she hopes the public will keep an eye out for news on which sunscreen formulations should be avoided. The public can do their part in preserving coral reefs by using recommended reef safe sunscreens as well as covering up to avoid the sun.

Sarmiento is one of ten selected students who participated in the National Science Foundation (NSF)'s Research Experience for Undergraduates (REU) through a partnership with the College of Charleston. To learn more about her research and the CofC REU program visit the blog: <http://www.blogreu.wordpress.com/> and CofC Web site: <http://reu.cofc.edu/>.

Citations:

- ¹ Krause M., Klit A., Bloomberg Jenson M., Soeborg T., Frederiksen H., Schlumpf M., Lichtensteiger W., Skakkebaek NE., Drzewiecki KT. 2012. Sunscreens: are they beneficial for health? An overview of endocrine disrupting properties of UV filters. *International Journal of Andrology*. 35 424-436.
- ² Kim Sujin, Choi Kyungho. 2014. Occurrences, toxicity and ecological risks of benzophenone-3, a common component of organic sunscreen products: A mini-review. *Environment International*. 70, 143-157.

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