
Global patterns in predation pressure on sea urchins

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Abstract

The concept of latitudinal gradients in biotic interaction strength has been hotly debated for many years but empirical evidence for the expectation of more intense predation, herbivory and competition at low latitudes has been mixed. This talk examines spatial patterns in predation on a group of consumers with a particularly strong influence on community structure in the world's oceans, the sea urchins. We use a global meta-analysis to test the prediction that predator-sea urchin interactions are strongest in the tropics, and to examine which biotic and abiotic factors best correlate with biogeographic patterns. Our results indicate that predator impacts on sea urchins are strongest at low latitudes and decrease towards the poles, but that this gradient is dictated by habitat. Predation pressure was consistently high on tropical coral reefs with no latitudinal pattern. Predation pressure was lower in temperate rocky reefs (> 25° absolute latitude) and declined with increasing latitude. Localised differences were important and strong consumer pressure was present in kelp forests and coralline flats. Despite the correlation between temperature/habitat and consumer effects the strongest predictor of predator impacts was, unexpectedly, prey identity. This highlights the importance of prey traits such as behaviour, physical defence, and chemical defence in determining interaction strength. Sea urchins' can deforest marine habitat and, when unchecked, can cause extensive ecosystem damage prompting ecological phase shifts. Thus a better understanding of spatial patterns in predation on sea urchins will aid in predicting the benefits of maintaining predator populations in managed areas such as marine reserves.

Keywords: Latitudinal gradients, coral reef, rocky reef, predation, biotic interactions, sea urchins, biogeography

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