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Studies on Adaptability of Antarctic Krill to Environmental Salinity Changes to Estimate the Influence of Global Warming

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Summary

Global warming, possibly caused by “greenhouse gases”, has been recognized as a serious problem because it causes melt of ice sheets in the polar region and resultant elevation of sea level. Moreover, melting of polar ice sheets, “the largest freshwater reservoir in the world”, will cause freshening of the seawater (SW), especially, in the Antarctic Sea, which has limited water exchange with oceans around. Thus, it is important to grasp the adaptability of each member of the ecosystem to salinity changes to estimate the impact of decreased salinity.

In this study, I attempted to examine the adaptability of Antarctic krill *Euphausia superba* to environmental salinity changes. Antarctic krill is known as a key species or a keystone species in the Antarctic ecosystem because it is the major feed of most animals at higher tropic levels. Antarctic krill may be exposed to freshened water directly because it complete the life history around the ice shelves. However, information is quite insufficient concerning tolerance to salinity changes in this species because it is difficult to maintain it in the laboratory.

Fortunately, an excellent system has been established to maintain a large number of krill in the laboratory tanks in Australian Government Antarctic Division (AAD). By collaboration with AAD staff, I could perform salinity challenge experiments. I exposed krill to diluted or concentrated (50 to 150%) SW, and monitored the survival. Although juveniles successfully adapted to 75% to 125% SW, most adults died or lost activity in 75% SW within 24 h. Thus, it was shown that adaptability to salinity decreases with growth. I also measured osmolality of the hemolymph of survived individuals and found that the hemolymph osmolality is almost the same as that of environmental seawater, i.e., this species is an “osmoconformer”. I also cloned cDNAs encoding the taurine transporter (TAUT) and farnesoic acid *O*-methyltransferase（FAMeT）. Using information thus obtained, I will study the detail of osmoregulatory mechanisms in this important species in the Antarctic ecosystem.