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SENSORY RESPONSES OF THE FIRST ANTENNAE OF ANTARCTIC KRILL RECORDED WITH AN ELECTROPHYSIOLOGICAL TECHNIQUE (ABSTRACT)

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In the Antarctic marine ecosystem, Antarctic krill are known to be the dominant primary consumers which transfer organic matter from primary producers to higher trophic animals. The food selectivity of krill on particles, such as phytoplankton, is of primary importance in understanding not only the feeding behavior of krill but also the transport process of particles through the food chain. In this process, chemical substances in the water also seem to play an important role in triggering the behavior. The sensory mechanisms of krill, however, are poorly understood so far. Electrophysiological technique is one of the choices to analyze the problem. We recorded neural responses of the antenna to sea water with different chemical composition.

The experimental system primarily consisted of a perfusion chamber, an amplifier with a band pass filter, an oscilloscope and a Digital Audio Tape (DAT) recorder. Antarctic krill (*Euphausia superba*) were collected in the Prydz Bay area with a Rectangular Midwater Trawl net and were kept in a container at the surrounding water temperature (<4°C). The first antenna (*ca.* 1.5 cm long) of a living krill was isolated, and placed in a ditch, which was compartmentalized with petroleum jelly, at the bottom of a lucite perfusion chamber. Further spottings of the jelly on the walls of three compartments made them water-tight and minimized electrical leakage. Then, each compartment was filled with 3%NaCl solution and an Ag-AgCl wire (electrode) was also set, one in each.

A reference electrode and a monitoring electrode were attached to the first and the second compartments, respectively. The third compartment was exposed to stimulant solution. The electric potential between the first and the second compartments was measured according to the degree of the sensory response. The perfusion chamber was enclosed in a Faraday cage to remove electrical noises. The sensory mass responses of the antenna exposed to stimulant solutions (seawater with particles of different quality and quantity) were amplified and recorded on DAT. Off-line processing of the sensory responses by using a computer revealed apparent correlation between the spectral power density of the responses and the stimulant solution.

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