

DECOMPOSITION OF CHITIN BY THE ANTARCTIC  
BACTERIA (EXTENDED ABSTRACT)

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Decomposition of chitin by the Antarctic microorganisms was investigated under laboratory conditions. Flakes of chitin were prepared from the exoskeleton of the Antarctic krill, *Euphausia superba* DANA (BL ca. 3cm). Two types of chitin flake, "crude chitin" and "pure chitin", were used for the decomposition experiment. After separating rostrum, carapace and tail fan parts, the muscle was removed from the abdomen and the remaining chitin flake was thoroughly rinsed with D.W. This chitin flake still contained a small amount of protein and is referred to as "crude chitin". "Pure chitin" is the one from which the protein is almost completely removed by soaking in 1N NaOH solution. Into bottles containing 7.0mg dry weight of either type of chitin flake were added 100ml of seawater samples. The seawater was collected at a 20m depth of Stn. PI-2 (64°17'S, 136°06'E) in the pack ice zone on January 16, 1984. Each sample bottle was opened one by one and was used for the chemical and microbiological analyses.

"Crude chitin" was decomposed rapidly during the 10th to the 20th day, and the dry weight of chitin was kept almost constant after the 60th day. In 2 months, about 80% of "crude chitin" initially presented had been decomposed or solubilized. On the other hand, decomposition of "pure chitin" was much slower than that of "crude chitin" and it had a long lag time before the decomposition started. After the 20th day, the dry weight of chitin decreased gradually until the 60th day. However, only less than 30% of initial weight of "pure chitin" was decomposed in 121 days. The initial amount of protein in the "crude chitin" was about 20% and that of "pure chitin" was about 3% of total dry weight of the flake. So the decrease of the weight of chitin flake does not only mean the decomposition of protein fraction.

Along with the rapid decrease of the weight of "crude chitin", the number of bacteria attached to the chitin flake increased sharply until the 30th day. In the experiment using "pure chitin", however, the growth of bacteria was not as fast as that of "crude chitin" until the 15th day, which coincided with the lag time of the apparent decomposition of chitin.

During the observation of decomposition process, the community of attached bacteria changed remarkably. When the decomposition was still in lag phase, the orange-yellow pigmented bacteria predominated and almost no bacteria isolated could hydrolize the chitin. As the decomposition proceeded, colorless white bacteria occu-

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ped nearly all the colonies and the percentage of chitin-decomposing bacteria in isolates increased.

From the results of the experiment, it is suggested that the exoskeleton of the krill is decomposed within 1 or 2 months even at a lower temperature of the Antarctic Ocean, and the decomposition rate is accelerated if the chitinous exoskeleton contains some protein. In addition, the decomposition of chitin was mainly due to the characteristic community of bacteria.

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