

Transportation processes of organic matter from whale bones during formation of whale-fall communities

*So Watanabe¹, Robert Jenkins¹

1. Kanazawa University

The whale-fall community is one of the unique biological community formed on decaying whale carcass on the sea floor. Several studies on whale-fall communities have revealed the communities were sustained more than several years even after removal of soft tissue from the bones. After removal of the soft tissues, organic matter within the bones are main energy source for the communities. It is well known that the hydrogen sulfide, released from decaying organic matter within the bones, is the energy source for chemosynthetic microbes and animals harboring the microbes. Recently, it has been revealed that many polychaetes, but restricted species, lives abundantly inside the whale bone (ref). Excrements of them from whale bones would be useful for other animals which lives around the carcass. However, detailed observation of those feces and excretion processes haven't been done yet. Thus, we examined the transportation processes of organic matter from whale bones by observing the whale-fall communities in the aquarium. We deployed two sets of whale bone in shallow sea floor (11 m in depth) in Tsukumo Bay, Noto Peninsula, Japan. After 2 and 3 months, each set of the whale bone was recovered by scuba; one bone was analyzed for species composition at time of recovered and the other bone was put into aquarium (40L) with sea water and sediments from the Tsukumo Bay.

Characteristic species for the shallow water whale-fall communities such as *Xenoskenea* sp., dorvilleid polychaetes, white microbial mat (*Beggiatoa* spp., indicator of sulphophilic stage) and ciliate *Zoothamnium* sp. (indicator of sulphophilic stage) can be observed at time of recovery and during aquarium experiments (most time). As a result of observations of aquariums, accumulations of several types of fecal excretions around the whale bones were observed. 4 types of the excretion style of feces were observed. Transport distance of feces from the bones are depending on the styles. Total organic carbon content (TOC) analysis showed higher contents at shorter distances from the bones. Occurrences of *Zoothamnium* sp. (host of eposymbiotic chemosynthetic bacteria), giant Sulphur-oxidizing bacteria and *Xenoskenea* sp., dorvilleid polychaetes in/on the bones suggest that our aquarium experiments could form shallow water whale-fall communities. From the results of TOC analysis and many feces were observed around the whale bone, it was suggested that organic matter inside the whale bone is transported to the outside of the bone due to excretion of feces. In this study, we observed not only the transportation process that organic matter is eaten and excreted as feces, but also processes related to giant Sulphur-oxidizing bacteria. Detailed observation by further aquarium experiments will make it possible to clarify the whole movement of organic matter around the whale bones.

Keywords: Whale-fall community, Chemical synthesis