



ArCS Program for Overseas Visits by Young Researchers
Final report (Simplified Version for Web Publishing)

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Research Title (English)

Importance of olfaction in plastic ingestion by seabirds

■ The progress of the research conducted during the dispatch period and its results

[Please describe the progress of the research conducted during the dispatch period and its results. Regarding the specific research content, methodology, and results, please take into consideration the future promotion of your research and keep it within the scope of what you can reasonably publish.]

In the past month of July I had the opportunity to travel to Middleton island, Alaska, to conduct my research about plastic ingestion by seabirds. In collaboration with the Institute for Seabird Research and Conservation (ISRC), and sponsored by ArCS Program for Overseas Visits by Young Researchers, I had the possibility to conduct my experiment on Black-legged Kittiwakes.

Seabirds are amongst the most threaten groups of birds, in terms of conservation status, and they are particularly vulnerable to plastic pollution, with reports of plastic ingestion since the 1960s. From physical damage to the digestive system, impairment of digestive efficiency to the release of toxic chemicals, plastic ingestion can be a major threat to the preservation of seabirds populations. Therefore it is important to understand the mechanisms behind plastic ingestion and to find solutions to lower its rates.

Past studies have proven that plastic fragments are an excellent substrate for biota that produce Dimethyl Sulfide (DMS), an info-chemical produced when phytoplankton cell are crushed by zooplankton grazing and used as an olfactory cue by many species. The same studies have suggested that the level of response to DMS might be related to the frequency of plastic ingestion in seabirds. This hypothesis was concerning a specific order of seabirds, the Procellariiformes, known for they high olfactory capacity and for using olfactory cues to forage. However, species from different order have been proven to have olfactory capacities as well and plastic ingestion is found in many orders of seabirds, like the studied species the Black-legged kittiwake, from the Charadriiformes order.

Therefore, with my research in Middleton island I wanted to experimentally determine the kittiwakes response to DMS odor and have a better understanding of its role in plastic ingestion in seabirds.

To do so, I conducted and “in-nest” experiment, in which the odor was placed in the nest, testing the kittiwakes chicks reaction to the introduced odor. Besides DMS, two other odors were tested: distilled water, to serve as control, and capelin water, a fish part of the kittiwake’s diet and used in past olfactories experiments.

The period of stay in Middleton island had to be shorter than what was initially planned. The dates of arrival and departure of the island were changed. The trip to Middleton had to be delayed for 3 days,

due to intense sea fog surrounding the island. The Federal Aviation Administration of the US, have strict rules about the conditions in which charter flights can operate. Therefore it was only possible to arrive in Middleton island on July 10th. Considering that there was prevision of bad weather surrounding the scheduled departure date, July 30th, and that I had an international flight to Japan on the morning of July 31st and a Summer Course on August 2nd at the Sapporo Campus, Hokkaido University, after consulting with the Charter company the departure date was set on July 28th.

It's worth mentioning that the island is isolated in terms of communication and means of transportation, being that the only way in and out of the island is through a charter flight. In this scenario, I took the time of stay in Anchorage city, July 28th- 31st to conduct activities related to my research project.

I arrived in Anchorage city on July 28th late afternoon, and had a meeting with conservationist Martha Hatch representative of the Institute for Seabird Research and Conservation, to make a brief report on the experiments conducted during my stay and to present my initial results.

On July 29th, and considering that the island had poor internet connection, I took the opportunity to insert all the data from my experiments, to analyze the data and to interpret my results. This was a rather critical task, since was my data as only saved in notebooks, so during the time I ensured to save my data digitally and to properly communicate it to my supervisor.

On July 30th I had another meeting with Mrs Martha Hatch and researcher Siera Pete, who conducted her own experiments in Middleton during my period of stay, with whom I discussed in more details my methods and results, and reflected with about the next stage of my research project. We also discussed about past studies developed in the island and the research perspectives for the upcoming years. On the same day, I cleaned and inventoried all the field work materials, packed it and shipped it back to Japan.

During my stay in Middleton island, I had the opportunity not only to conduct my research, but also to learn more about seabirds behaviour and ecology, to discuss and learn with experienced researchers from different parts of the world, stimulating me to develop my critical thinking. This experience has allowed me to develop my research skills and techniques.

■ Presentations in academic conferences, awards, and outreach activities during the dispatch period

[In case of presentations in academic conferences, awards, and outreach activities during the dispatch period, please include a summary description. This applies to individuals for whom traveling expenses and participation fees have been paid by this project to dispatch young persons (for those who have not received expenses from other project budgets, such as Grants-in Aid for Scientific Research)]

※ You can include diagrams, etc. When using this style, it should be around 1-2 pages.