A World-class Environmental Specimen Bank

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The Center for Marine Environmental Studies (CMES) at Ehime University has an environmental specimen bank called *es*-BANK. The facility has frozen and stored diverse biological and environmental samples from around the world for the past half century. As of January 2022, 119261 samples from 1456 animal species, fish, shellfish, reptiles, birds, aquatic mammals, terrestrial mammals, have been stored in this bank (http://esbank-ehime.com/dnn/).

Es-BANK building, located near EU main gate

-25°C freezer with samples

In recent years, environmental pollution caused by chemical substances has become a social problem. In order to solve the problem, we must understand the actual situation and impact of environmental pollution, e.g., where the sources of chemical pollutants are, how large the pollution is, when it occurred, and how the chemical pollution affects living organisms. To understand the actual state and impact of such environmental pollution, it is necessary to research and investigate using not only present, but also past environmental and biological samples collected before the pollution occurs. Thus, the es-BANK plays an important role.

We will introduce one research project using es-BANK. The purpose is to clarify the actual state of chemical contamination using marine mammal samples. CMES has been measuring persistent organic pollutants (POPs) in the bodies of cetaceans stranded along Japanese coastal waters. Cetaceans tend to accumulate POPs in their blubber. Whereas concentrations of POPs in male cetaceans generally increase with age, females show decreasing trends of POP levels. This is due to the massive transfer of POPs to their

offspring through breast-feeding. From this fact, we found it is difficult to eliminate POPs in cetacean bodies even if marine pollution decreases. CMES research has also shown that cetaceans have less drug-metabolizing enzyme activities compared with other animal species, and it may be hard for them to metabolize harmful substances such as POPs.

Future research deals with the effects of plastics taken into the bodies of marine organisms. Various surveys have been conducted on microplastics in recent years, but no such survey has yet been conducted on cetaceans in Japan. We hope to understand the actual status and effects of contamination through such microplastic surveys on cetaceans.

The *es-BANK* collection of various environmental and biological samples can clarify not only the present status, but also the comparison with the past, and identify future trends in environmental pollution, which can be used for risk assessment of the ecosystem, leading to the creation of treaties and policies.

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