Reconstruction of stable isotope chronology by asegmental analysis of bone.

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Isotope analysis is a powerful tool in ecological studies of animals for reconstructing their dietary sources, trophic positions, and movements. One of an important point to apply stable isotope analysis in ecological study is the timescale of the isotopic records in the target tissue, because different tissues have different turnover time of stable isotope elements.

For instance, stable isotopes in blood plasma of animal reflects information in shorter timespan which is 1 to 2 weeks, whereas that of muscle records isotopic information of last 1 to 2 month. Most of previous isotope studies focused on a single tissue and timeframe, and compared the differences of isotope values among individuals or populations within the same timescale. However, the utility of isotope analysis would be greatly improved if we could reconstruct the history of isotope values at multiple growth stages of animal using single tissue.

In this presentation, I present a new analytical method to reconstruct isotope chronology of multi-isotope elements by segmental analysis of bone of teleost fish and mammal species. I also show the validity of this method by incremental sulfur stable isotope analysis for an anadromous salmon, masu salmon (*Oncorhynchus masou*), and incremental radiocarbon analysis for mammals which lived in the end of 20th century. If this method correctly reconstruct stable isotope chronology of these species, I can detect isotopic information in their early life stage from their bone sections.

In all samples of masu salmon, the bone section closest to the center of the vertebral centrum had the lowest sulfur isotope ratios, which were similar to those of freshwater. The sulfur stable isotope ratios gradually increased from the center to marginal sections, finally reaching constant values similar to those of seawater. For this reason, my results show that the vertebral centra of teleost fish record isotopic information from juvenile to adult life-stages. In mammal, radiocarbon isotope ratios in later age have been detected from center and margin of femur, whereas other parts showed isotope values in former age. The result showed that the central part of femur is the subject of bone metabolisms and thereby the turnover of bone influenced the radiocarbon values in the central part of the bone. However, we also confirmed that there are few effect of turnover in the other part than central part of bone, and this method can be used for the reconstruction of stable isotope chronology of mammal species.

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