



Transgenerational marking of a freshwater fish species, *Salmo trutta f.f. L.*, using an enriched ^{84}Sr spike solution

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Transgenerational marking with enriched isotopes has been proven to be a suitable method for marking otoliths of fish larvae via the transmission of the maternal isotope signal to study dispersal and migration in aquatic ecosystems. However, so far the method has been mainly applied to marine fish species by using barium isotopes only. Herein, we present for the first time the results of maternal transmission of an artificially introduced strontium isotope signal (^{84}Sr) on the example of a typical European freshwater fish species, the brown trout, *Salmo trutta f.f. L.*.

Brown trout mother fish were intraperitoneally injected with 1, 2.5 and 5 ml of ^{84}Sr solutions resulting in doses of 15.4, 38.6 and 77.1 $\mu\text{g }^{84}\text{Sr kg}^{-1}$ fish, respectively, with strontium bearing the advantage of being non-toxic. Fish were then stripped, and the resulting progeny reared in a hatchery for about a year before sampling.

Strontium ratios were measured over the otoliths' cross sections of both the mother fish and the offspring by doing line scans using laser ablation - multiple collector - inductively coupled plasma - mass spectrometry (LA-MC-ICP-MS).

The analysis of the maternal otoliths showed a clear increase of the $^{84}\text{Sr}/^{86}\text{Sr}$ ratio at the edge of the otolith independent of the amount of ^{84}Sr solution injected. Otolith cores of the juveniles showed a significant elevation of $^{84}\text{Sr}/^{86}\text{Sr}$ whereas control fish showed stable $^{84}\text{Sr}/^{86}\text{Sr}$ ratios along the entire cross section of the otoliths.

The results proved that transgenerational marking with enriched strontium isotopes represents a new and effective method for mass-marking of freshwater fish larvae in the field without the necessity of handling the eggs, allowing for studying natural dispersal of fish in river systems.

Future experiments comprise spiking experiments using other enriched strontium isotopes (e.g. ^{86}Sr) and other fish species such as the carp (*Cyprinus carpio L.*), representing cyprinid species with very small egg sizes.