

A model for the elimination of radiocesium by unionid bivalves

Guillaume Chagnon

Department of Biology, McGill University, 1205 Dr. Penfield Ave., Montréal, Québec, Canada, H3A 1B1

Abstract

Elimination of radiocesium by the freshwater mussels *Elliptio complanata* and *Anodonta grandis* was measured at different temperatures under laboratory conditions for 91 days. ^{137}Cs elimination in mussels could be described by a two compartment exponential equation. The length of the experiment allowed for the differentiation of the slow component of cesium elimination; its biological half-life ranged from 147 days (42.4g *Elliptio* kept at 8.0°C) to 26 days (4.8g *Elliptio* kept at 24.5°C). A strong negative relationship between body weight and initial specific activity was observed. A model that predicted elimination rate of cesium from a regression of water temperature, body weight, and a categorical variable for species was developed and compared with values from the literature. The model developed is \ln of elimination rate (d^{-1}) = $-4.759 - 0.197 \ln$ body weight (g) + 0.052 temperature + 0.451(0.093) species (dummy variable) ($r^2 = 0.783$, $\text{SE}_{\text{est}} = 0.215$, $p < 0.0001$, $n = 34$). The comparison suggested that the model might be applicable to many of the common taxa of North American unionids.