

# The Accumulation Features of Plants and Bivalves near the Natural Sources of Strontium (Tula Region, Russia)

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The natural sources of elements create a specific ratio in biota even in protected areas. The key task of biomonitoring studies is to define the background levels of elements in order to define areas with the excess of elements associated with presumed sources of pollution. In the case of unusual high levels of selected elements in specific regions it is important to assess the intensity of their effect on biological objects, which could be used as biomonitors.

The study was conducted in three different zones in Tula region, Russia. The samples of water, Bivalvia molluscs, aquatic vegetation, soils and bottom sediments were collected at 12 sites on the floodplains of rivers in the vicinity of suggested sources of natural strontium deposition: near Sebino village on the Morkaya Tabola river, near Beryozovka village on the Nepryyadva river and Strikino village on the Ista river. In addition, the two types of samples (water, soils and bottom sediments) were collected as the background at anthropogenically modified and pristine sites: rivers Don and Moskva, respectively. The concentrations of 30 microelements were determined by using ICP-OES in FLNP.

The creeping buttercup (*Ranunculus repens*) was chosen as a typical aquatic plant, which could accumulate elements from soils in the vicinity of considered rivers and springs. The plants near the outcrops of celestine on the Mokraya Tabola river (Sebino village) contained high levels of Al, P, S, V, Cr, Mn, Fe, Co, Ni, Cu with the highest levels of Sr and S among all studied samples. The highest levels of Al, Co, Pb, V, Cr, Fe, Mn, Ni were found in samples collected in an agricultural zone 300 m down the river. This could be explained by the influence of the agricultural practice, pollution by waste and fuel products, machine oil from the quarry of celestine limestones.

In other zone, the highest levels of strontium were found in the water of spring near the village Beryozovka, which is connected with the swamp and Nepryadva river. However, down the river near this site, the water contained three-four times lower levels of strontium in comparison with the initial source.

The levels of other microelements in plants and Bivalvia shells depending on strontium concentrations in water will be further discussed.

In addition, result of this study could be used for a better understanding of and the mechanisms of elements accumulation in biota of wild and anthropogenic areas with attention to the possible natural inputs and minimal background of selected element.