BIOACCUMULATION OF RADIONUCLIDES IN DRAGONFLIES (ODONATA) FROM THE MURA–DRAVA–DANUBE BIOSPHERE RESERVE

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Introduction

The presence and distribution of radionuclides are important indicators of the environmental health of aquatic ecosystems. However, detecting radionuclides in environmental samples can be challenging, particularly when they occur at low concentrations. To assess the potential of biological indicators for monitoring environmental radioactivity, this study investigated the accumulation of naturally occurring radionuclides in dragonflies (Odonata) associated with aquatic habitats



Figure 1. Sampling station Križnica



Figure 2. Sampling station Okrugljača

Materials & Methods

Dragonflies were sampled at eight locations within the Mura–Drava–Danube Biosphere Reserve, in close proximity to their aquatic habitats. Gamma spectrometry using an ORTEC HPGe detector system was employed to determine the activity concentrations of 238U, 228Th, and 40K in river water and dragonfly samples

Table 1. Activity concentrations of ^{238}U, ^{228}Th and ^{40}K in dragonfly samples and river water, and calculated activity ratios.

	Activity concentration						Activity ratio		
	Dragonfly A_D (Bq/kg)			Water A_W (Bq/m^3)			A_D/A_W		
	A (^{238}U)	A (^{228}Th)	A (^{40}K)	A (^{238}U)	A (^{228}Th)	A (^{40}K)	^{238}U	^{228}Th	^{40}K
Sopje-Noskovci	1,3	3	240	100	10	250	13	300	960
Budakovac-Vrbik	23	6	157	80	10	210	288	600	748
Budakovac - Rječina	19	5	120	90	12	360	211	417	333
Detkovac-Neteča	11	3,9	250	80	13	350	138	300	714
Detkovac-Liman	17	4,3	170	90	10	300	189	430	567
Lanka-Leševo	28	3,7	220	100	18	370	280	206	595
Okrugljača-Neteča	13	4,4	200	100	9	240	130	489	833
Križnica	25	2,7	110	90	10	240	278	270	458

Results

The results demonstrate that dragonflies can accumulate naturally occurring radionuclides from their surrounding aquatic environments and may therefore play an important role in radionuclide transfer within aquatic ecosystems. Their capacity to accumulate radionuclides suggests that dragonflies have potential as bioindicator organisms for monitoring environmental radioactivity and assessing the radiological condition of aquatic habitats within the Mura–Drava–Danube Biosphere Reserve

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