Investigations of elementary composition of some marine organisms from North Adriatic region by activation analysis

by

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The data concerning the elementary composition of marine organisms may indicate some important processes such as possible levels of radiocontamination of a certain biota, the physiological role of a certain microconstituent, and their concentration in various organs and tissues. In our work we applied neutron activation analysis to studies of elementary composition of marine biota.

Published data on the elementary composition of marine biota were collected and published by VINOGRADOV (1953), CHIPMAN (1958), FUKAI & MEINKE (1962), BOWEN & GIBBONS (1963), BERNHARD (1964), POLIKARPOV (1966) and others. However, as they indicated, the present data are rather scarce and therefore some additional investigations in this field are suggested. On the other hand, by knowing the elementary composition of certain biota, one may calculate the concentration factors valid for conditions when equilibria between aqueous system and biota is reached.

Activation analysis was performed in a standard way using thermal reactor neutrons for the irradiations. Biological samples were either dried at moderate temperature (60 to 110°C) or mineralized by careful heating at 450°C, powdered, and sealed in quartz or polyethylene tubes for irradiation. Such prepared samples were irradiated together with standards, and after irradiation chemical separation was performed. The quantitative determination of each particular radionuclide was done by gamma spectrometry.

Knowledge on the distribution of certain trace elements between various organs and tissues is often very important for understanding the possible way of contamination, especially from the physico-chemical point of view. To add new results to those already obtained on organisms from North Adriatic [STROHAL *et al.*, 1969] and to clarify some of our laboratory experiments, we investigated the distribution of cerium in various organs and tissues of Mytilus galloprovincialis. Results presented in Table 1. indicate that stable cerium is present only in bysus and shell, while in other parts it may be present only in very low concentrations, lower than sensitivity of the method applied. From these results one is able to conclude that radiocontamination of Mytilus with Ce^{141} is due only to its adsorption. Results presented by JELISAVČIĆ *et al.* (1969) illustrated this well.

The distribution of certain metals in various organs and tissues of Xantho hydrophylus has been examined to shed more light on their transport, locations and functions in the investigated organisms. Concentrations of zinc, iron and cobalt in Xantho hydrophylus are presented in Table 2.

In conclusion one can say that activation analysis finds its place in the trace elements concentration studies connected to marine environment investigations. From the knowledge of the chemical composition of marine organisms a number of contaminations as well as physiological processes can be understood and various mechanisms proposed.

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TABLE 1.

Distribution of cerium in Mytilus galloprovincialis

Organ	g Ce/g of wet weight
Shell	1.2×10^{-4}
Bysus	6.7×10^{-5}
Other organs	less than 10^{-9}

TABLE 2.

Distribution of certain trace elements in Xantho hydrophylus
(in g/g of wet weight)

	Zn	Fe	Co
Hepathopancreas	8.2×10^{-4}	$6,5 \times 10^{-4}$	4.8×10^{-6}
Muscle	2.1×10^{-3}	4.6×10^{-5}	2.7×10^{-7}
Gills	1.3×10^{-4}	4.6×10^{-4}	1.6×10^{-6}
Haemolimpha	4.7×10^{-5}	1.1×10^{-4}	1.1×10^{-6}
Whole animal	5.7×10^{-5}	8.0×10^{-5}	2.3×10^{-7}

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