

Stable Elements in Skeletal Formations of Fish Species from Greek Waters

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Abstract - The stable trace elements Se, Cr, Co, Fe, Zn, Cs and Ag were determined by instrumental neutron activation analysis in scales and otoliths of twelve edible fish species collected from Greek waters. Fish scales and especially otoliths may serve as localization sites for certain trace elements in the organism. The incorporation of fission or neutron induced radionuclides of the corresponding stable elements could have hazardous effects to the fish species and their population.

Concentration values of the determined elements in scales and otoliths of the investigated species are reported and discussed from the point of view of their radioecological significance.

Résumé - Les oligo-éléments stables Se, Cr, Co, Fe, Zn, Cs et Ag ont été déterminés par l'analyse par activation instrumentale dans les écailles et les otolithes de douze espèces différentes de poissons comestibles qui ont été collectés par les eaux Helleniques.

Les écailles de poissons et surtout les otolithes pourraient s'en servir, éventuellement, comme des sites de localisation de certaines éléments en trace. L'incorporation des radioisotopes, qui sont produits de fission ou d'activation par neutrons, à la place de leurs isotopes stables pourraient provoquer des effets nuisibles aux poissons et leur population.

Les teneurs des éléments mentionnés aux écailles et les otolithes des espèces étudiées sont données et discutées aux points de vue radioécologique.

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Discussion

Ballester A.N. (Spain) : How do you think can that help to site future nuclear plants adequately ?

Have you determined the radioactivity background in otoliths and scales you have analysed ?

Papadopoulou C. : Knowing the chemical composition of marine species we may use them as indicators in order to control the contamination of oyster beds and fisheries areas from nuclear plants.

We have not measured the radioactivity background in otoliths or scales. We did determine only the stable elements of some radioisotopes released with the nuclear wastes.

Guegueniat P. (France) : Where are otoliths located in a fish ?

What is the percentage of calcium carbonate in scales and otoliths and, if it is important, what is the crystallographic form, calcite or aragonite ? This last fact is important because Zn is accumulated in calcite to a higher extent than in aragonite.

Papadopoulou C. : Otoliths are located in the head of the fish and they serve for the balance and movement of the organism.

Very few and old data are available for the chemical composition of scales and otoliths of fishes, but we know from Vinogradov's compilation that calcium and phosphorous, MgO, aragonite, calcite, FeO, have been detected in otoliths of Gadus morrow (Vinogradov, 1953).

Fowler S.W. (IAEA, Monaco) : Have you looked at Se - Hg relationship in any of the samples you have measured ?

What was the reason for analysing otoliths and fish scales in the context of using your data as an aid in helping to properly site nuclear power plants along your coast ? Usually people undertaking pre-site surveys for this purpose chose edible fish muscle as the tissue of interest.

Papadopoulou C. : No, we have only results on Se in these samples but we have values for Se and Hg in otoliths of fish Scomber japonicus, S. colias.

The scope of this work is to find out the content of certain radioecologically important trace elements in scales and otoliths, and compare later on with the body content and correlate it with various organs. Also to discover any possible accumulation site for these elements in the organisms, in order to be able to protect the organs from the internal irradiation damage in the case of the exchange of the elements with their radionuclides.

