

<sup>48</sup>V PRELIMINARY EXPERIMENTAL DATA ON  
UPTAKE BY THE MOLLUSK VENUS VERRUCOSA

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Resumé: Des expériences, utilisant du <sup>48</sup>V comme radiotraceur, ont permis l'étude de la bioaccumulation à partir de l'eau de mer, du vanadium envers un mollusque édible, Venus verrucosa, collecté dans le Golfe Saronique. Des valeurs des facteurs de concentration sont faibles (K=16-17) dans les tissus mous de V. verrucosa; 90 à 95% du <sup>48</sup>V accumulé par l'animal est localisé au niveau de sa coquille. Cette coquille après avoir subi pendant quatre jours un traitement de décapage à l'acide chlorhydrique (0.5M) garde 60 à 70% du <sup>48</sup>V qu'elle a incorporé.

Vanadium is released into the atmosphere, mainly by the burning of fossil fuels, and eventually finds its way into the oceans. Moreover, the release of industrial and urban wastes is another source of vanadium in the marine environment, especially in coastal areas. It has been found that anthropogenic sources contribute soluble vanadium which biologically could be more dangerous, whereas natural sources contribute mainly insoluble vanadium (1). Vanadium is considered as a potential marine pollutant. Despite the low concentrations in the ambient seawater, vanadium is accumulated to relatively high levels in certain tunicates (2). This fact has led to the study of vanadium distribution in different tunicate families and in other invertebrates, plankton and fish (3,4,5).

The bioaccumulation from water and elimination of vanadium in four invertebrate species have been studied in a series of radiotracer experiments using <sup>48</sup>V (6,7). It has been reported that different species accumulate vanadium in their tissues to varying levels. This is important for the characterization of potential bioindicator organisms and also for the control of suitability of edible marine species in case of pollution of the environment. In an attempt to gain further information on vanadium uptake from water in different mollusc species, we studied the accumulation of <sup>48</sup>V in the clam Venus verrucosa. This species is common in Greek waters and is of commercial value since it is cultivated and used for human consumption. The distribution pattern of stable vanadium in the body of V. verrucosa has been reported in our previous work (3).

Seventy individuals of V. verrucosa (size 4-5 cm) were sampled in 1983 from a farm in Steno, Salamis Island, in the Saronicos Gulf. Seawater was also taken from the same area. Four groups of V. verrucosa (n=14) were placed in plastic aquaria with seawater containing the gamma emitting radioisotope  $^{48}\text{V}$  (as vanadyl chloride, H.L.=16d), all at the same temperature (20°C). The concentrations of  $^{48}\text{V}$  in each aquarium were as follows: 7.5, 15, 30, 60, uCi/25L. During the 12-day uptake experiment each clam was removed from the aquarium at the same hour every day, rinsed with clean seawater, placed in a plastic bag and its  $^{48}\text{V}$  content measured in a sodium iodide crystal. Also seawater samples from each aquarium were counted every day for  $^{48}\text{V}$  content. Corrections were made for decay of the radioisotope and for geometry of the samples. The results of this experiment were expressed as concentration factors (k) which are defined as  $\text{cpm}^{48}\text{V/g wet}$  (body weight) divided by  $\text{cpm}^{48}\text{V/ml}$  seawater.

In order to determine the distribution of  $^{48}\text{V}$  in the body of V. verrucosa, each individual at the end of the uptake experiment, after being counted, was dissected and the shell, soft tissues, and body fluid carefully collected and counted separately for  $^{48}\text{V}$  activity. Moreover, leaching experiments were performed by placing each counted shell in 0.5 M HCL. Four days later the shells were recounted for  $^{48}\text{V}$ , and the difference between the analyses was recorded. Corrections for the decay of  $^{48}\text{V}$  were also made by using appropriate standards.

The results of this preliminary study can be summarized as follows: after 12 days of  $^{48}\text{V}$  accumulation at constant temperature and salinity, V. verrucosa reached concentration factors  $K=17$ ,  $K=16$ ,  $K=17$  and  $K=16$  in the corresponding concentrations of 7.5, 15, 30, 60 uCi/25 L.

The study of the distribution of  $^{48}\text{V}$  in the body of V. verrucosa indicated that 90-95% of the radioisotope was associated with the shell, 0.8-1.5% in soft tissues and 2-2.5% in body fluid.

The leaching experiment showed that 60-70% of the adsorbed  $^{48}\text{V}$  remained on the shell and was not removed by the acid.

Published data on concentration factors for  $^{48}\text{V}$  in V. verrucosa appear to be lacking. However, our results are in accordance (as far as is concerned the low K for  $^{48}\text{V}$  in tissues and the high adsorption of this radioisotope in shells) with those reported by other investigators for mussels (6). In order to obtain a complete picture of  $^{48}\text{V}$  uptake by V. verrucosa, a more extended research programme will be needed.

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