Comparison of ^{65}Zn loss-rates of *Mytilus galloprovincialis* determined in the field and under laboratory conditions*

by

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Abstract

Experiments on the loss-rate of ^{65}Zn by *Mytilus galloprovincialis* have been carried out in the laboratory and in the field. It is concluded that the results obtained in the field and laboratory can be comparable if the physical and chemical parameters in the field remain relatively constant.

Résumé

Avec des *Mytilus galloprovincialis* à différentes sortes d'accumulation de ^{65}Zn, on a fait des expériences *in situ* et en laboratoire. D'après les résultats, si les conditions physiques et chimiques *in situ* ne varient pas rapidement, les valeurs de perte obtenues en laboratoire et *in situ* peuvent être comparées; elles ne peuvent l'être dans le cas contraire.

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The various experimental conditions applied in laboratories rely on the hypothesis that isotope accumulation and loss kinetics are the same of uptake and loss studies in the field and laboratory. HEYRAUD & FOWLER [1973] have shown that no significant differences could be detected in ^{65}Zn loss rate by the mollusc *Tapes decussatus*, the polychaete *Hermione hystrix* and the crustacean *Pachygrapsus marmoratus* in a laboratory flowing sea water system (LSW) and open sea water collected some distance from offshore (OSW). They have also carried out simultaneous experiments in the laboratory and in the field and the results obtained were similar to their first experiments.

On the contrary, KANE *et al.* [1972] have reported that ^{65}Zn loss by the crab *Pachygrapsus* was effected by holding the animals in either (LSW) and (OSW) systems. FOWLER & BENAYOUN [1974] reported that ^{109}Cd loss from *Mytilus galloprovincialis* in the field was significantly slower than those maintained in the laboratory. Considering the foregoing, we planned simultaneous ^{65}Zn excretion experiments in the laboratory and in the field using *Mytilus galloprovincialis* as a test animal.

Similar sized animals were selected and maintained for 10 days in the laboratory for purposes of acclimation. The activity of the basin (6/μCi ^{65}Zn/1) was kept constant during the uptake. For the loss experiment, 2 stations were chosen in the Küçükçekmece lagoon (A and B station 'brackish water') and one in Marmara Sea. The salinity at station B was slightly higher than that at station A. Animals held below the water surface in plastic baskets. Water for laboratory experiments was collected from the station every 5 days. The flow rate of water in laboratory was 1 l/hour. Animals were periodically monitored for ^{65}Zn content and returned to containers for further loss. We used the 0.05 level as a criterion of significance. The experiments were performed in two series. First series : The uptake period lasted 23 days.

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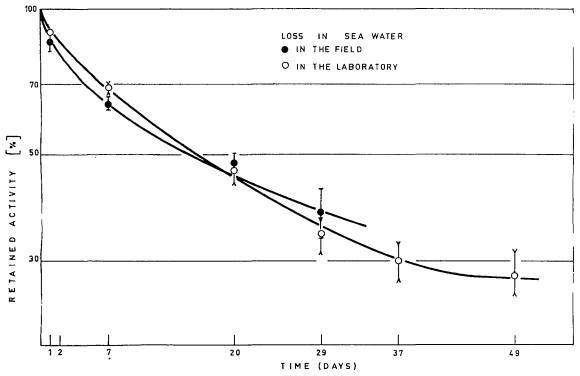

FIG. 1. — Relative biological loss of ^{65}Zn from *M. galloprovincialis* kept in the Marmara Sea and in the laboratory. Vertical bars represent standard errors.

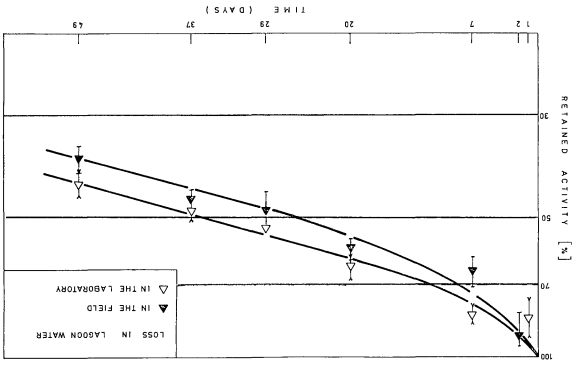

FIG. 2. — Relative biological loss of ^{65}Zn by *M. galloprovincialis* kept in the Kuçukçekmece lagoon and in the laboratory. Vertical bars represent standard errors.

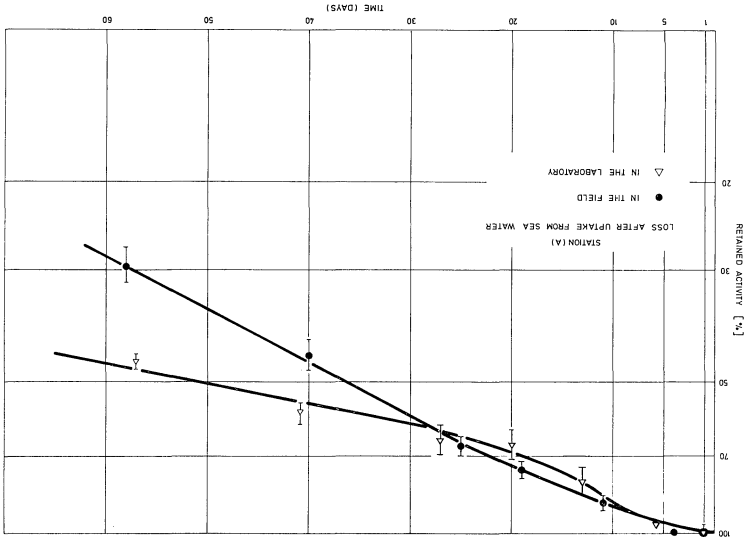

FIG. 3. — Relative biological loss of ^{65}Zn from *M. galloprovincialis* kept in the Küçükçekmece lagoon at station A and in the laboratory. Mussels accumulated ^{65}Zn from the sea water. Vertical bars represents standard errors.

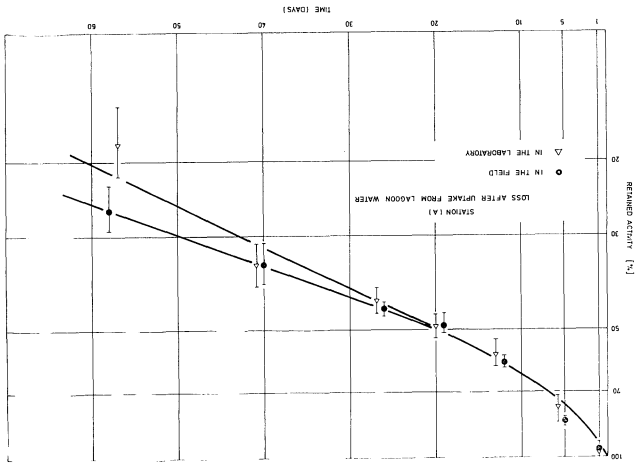

FIG. 4. — Relative biological loss of ^{65}Zn from *M. galloprovincialis* kept in the Küçükçekmece lagoon at station A and in the laboratory. Mussels accumulated ^{65}Zn from the lagoon water. Vertical bars represents standard errors.

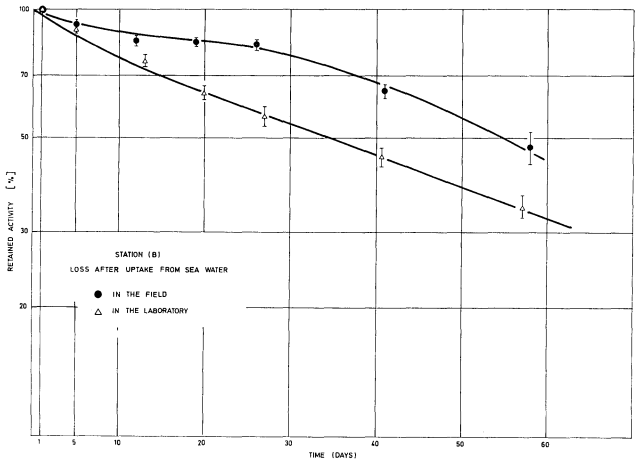

FIG. 5. — Relative biological loss of ^{65}Zn from *M. galloprovincialis* kept in the Küçükçekmece lagoon at station B and in the laboratory. Mussels accumulated ^{65}Zn from the sea water. Vertical bars represents standard errors.

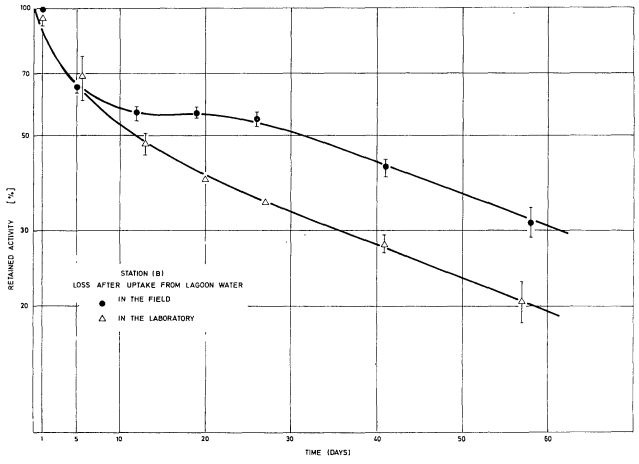

FIG. 6. — Relative biological loss of ^{65}Zn from *M. galloprovincialis* kept in the Küçükçekmece lagoon at station B and in the laboratory. Mussels accumulated ^{65}Zn from the lagoon water. Vertical bars represents standard errors.

For the loss experiments the animals were divided into 4 groups, each group with 10 experimental animals which were monitored for 49 days. The first group was anchored in the Marmara Sea near to the shore, the second in the lagoon. The other two groups were maintained in the laboratory as a paralel experiment for the 2 field groups. The laboratory animals were fed with phytoplankton culture twice a week during the loss period. The salinity in the Marmara Sea ranged between 21.14-25.04 ppt, and the temperature between 5.9-8.7° C. Correspondingly in the lagoon the salinity ranged from 7.7-9.7 ppt and temperature from 4.3-8.4° C. In the laboratory the temperature was held constant at 8.0 ± 1.0° C. Second series : The accumulation of ^{65}Zn in mussels occured at 21.92 ‰ in the Sea water and 7.68 % OS in the lagoon. During 15 days uptake period the temperature of the basins water was regulated according to the water temperature of the field (18-23° C) and mussels were fed with phytoplankton. The loss experiment lasted for 58 days. As a result of seasonal variation, the temperature in the lagoon water changed from 23.7 to 15.2° C, and at station A the salinity ranged from 8.2 to 9.3 ppt, at station B from 9.1 to 10.68 ppt. The temperature of the water in the laboratory was regulated to follow the variation measured at the stations. During the loss animals were not fed.

The result showed that in the first series of experiments no significant differences could be observed between the ^{65}Zn loss rates, although in Figs. 1 and 2 the loss rates for animals held in the field were slightly faster than the laboratory derived loss rates. In the second series of experiments the ^{65}Zn loss rates at station A (figs. 3 and 4) were similar in the field and laboratory for at least 23 days. After that the difference became greater. At station B (figs. 5 and 6) the loss curves are quite different for the field and laboratory principally because of frequently changing chemical and physical conditions in the field. In view of our experimental results, we conclude that the loss rates obtained both in the field and laboratory, may or may not be in agreement with each other, due to the fact that certain conditions in the field cannot be adequately simulated in the laboratory for some experiments.

References

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