BASIC HYDROGRAPHIC AND CHEMICAL DATA FROM TWO MICROLOCATIONS AT THE EASTERN ADRIATIC COAST LINE : THE ROGOZNICA LAKE AND THE ROGOZNICA UNDERWATER CAVE

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Based on time–to–time occurrences of brown–reddish colored surface water, the Rogoznica Lake (Fig. 1) is a locally mystified lake, named "The Dragons eye". The lake covers a surface of about 5000 m^2, with an average depth of 10 m. Salinity data (Fig. 2) indicate the existence of a Lake–Sea connection. The vertical temperature profile (Fig. 2) shows a remarkable "high temperature" layer in spring. Investigations of the basic chemical properties have shown a vertical decrease of oxygen and the occurrence of H_2S in the bottom layer. In the anoxic layer nitrate was converted to ammonia. Phosphate and silicate are found to be strongly enriched. Hydrographic and chemical data for the lake refer to 11 a.m. on March 31, 1993.

The Rogoznica underwater cave, named "The Dragons ear", (Fig. 1) has an opening of d=1.5 m two meters below the sea level. The cave extends to a depth of 28 meters, with an average width of 10 m. In comparison to a nearby reference station, the vertical temperature distribution in the cave showed a higher degree of stratification (Fig. 3). Oxygen saturation in the cave decreases rapidly below the thermocline down to 40% at the bottom layer (Fig. 4). A similar trend was also established for pH. Contrary to oxygen and pH, the vertical distribution of nutrients (Figs. 5, 6) showed much stronger gradients at the reference station then in the cave. Data shown in Figs. 3, 4, 5 refer 11 a.m. (cave) and 1 p.m. (ref. station) on August 18, 1993.

Hydrographic data from these two locations were collected using a TS sonde (Rosemount RS–5), dissolved oxygen was determined by Winckler titration, while nutrients were analyzed on a Technicon AutoAnalyzer II.

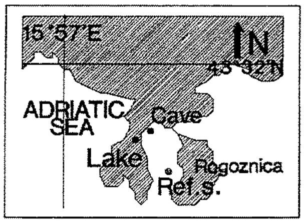

Fig. 1. The Rogoznica area

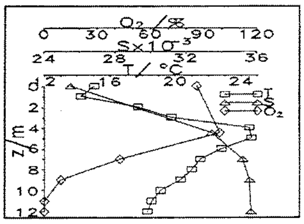

Fig. 2. Vertical distribution of temperature, salinity and oxygen in the lake

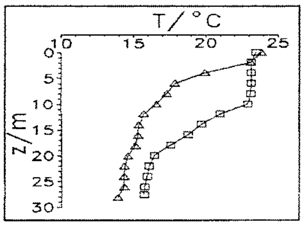

Fig. 3. Temperature distribution in the cave (□-□) and at ref. station (Δ-Δ)

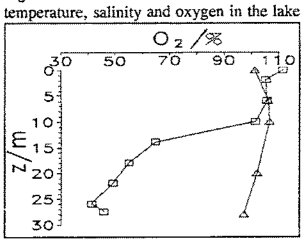

Fig. 4. Oxygen distribution in the cave (□-□) and at ref. station (Δ-Δ)

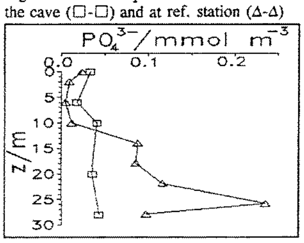

Fig. 5. Phosphate distribution in the cave (□-□) and at ref. station (Δ-Δ)

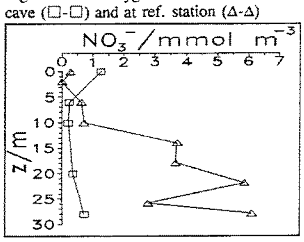

Fig. 6. Nitrate distribution in the cave (□-□) and at ref. station (Δ-Δ)

INTERACTION OF LANTHANUM WITH CADMIUM INFLUX ACROSS ISOLATED *CARCINUS* GILL

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The effect of the non specific Ca channel blocker La on the ^{109}Cd influxes in isolated perfused *Carcinus* gills were studied. The influx of ^{109}Cd are shown to be lanthanum concentration dependent processes. The half-maximum inhibition of cadmium influxes by La was at 1.4 x 10^{-6} mol l^{-1}. Cadmium transport is discussed in terms of non-specific influx utilizing Ca channels. The gills are the most important interface barriers of the cadmium transport between the marine organisms and their environment. In spite of the large number of reported evidences on cadmium bioaccumulation and toxicity, there has been poorly studied transport mechanisms of cadmium through the cells and tissues of aquatic organisms. In isolated membrane vesicles lanthanum was shown to be a powerful blocker of a Na^+/Ca^{+2} exchanger (KACZOROWSKI *et al.*,1984) and membrane Ca^{+2} ATPase activity (WUYTACK and RAEYMAEKERS, 1992). In freshwater trout gills basolaterally located Ca dependent ATPase and Na^+/Ca^{+2} exchanger with extremely high Cd affinity was found experimentally (SCHOENMAKERS *et al.*,1992). Studies of the effects of lanthanum on Cd influxes have been undertaken as a means of further characterization of Cd transport mechanisms. Adult male crabs, *Carcinus mediterraneus* Csm. (5.5 ± 0.5 cm carapace width), were collected from estuaries of the Venice lagoon. They were acclimated to controled laboratory conditions for at least 2 weeks to aerated sea water diluted by distilled water (DSW;18 x 10^{-3} salinity) at room temperature (t = 20 ± 2°; pH = 7.8 ± 0.1). The animals were fed once a week on slices of bovine heart.The posterior 7th and 8th gill pairs, which are rich in mitochondria-containing chloride cells and which have high Na, K ATPase activity were excised from the adult crabs and perfused, according to the technique described by LUCU and SIEBERS (1986). The effect of lanthanum ($LaCl_3$) on ^{109}Cd influxes is presented on Fig.1. Lanthanum was added to the DSW in concentrations ranging from 10^{-7} to 10^{-6} mol l^{-1}. Lanthanum clearly inhibited ^{109}Cd influxes. Half-maximum inhibition (IC50) of cadmium influx in the gills after 2 h exposure in $LaCl_3$ were 1.4 x 10^{-6} mol l^{-1}. In addition, ^{109}Cd influx is strongly inhibited by $LaCl_3$ acting particularly from the external medium at the apical gill epithelium surfaces. Moreover, apically applied 9 x 10^{-6} mol La l^{-1} in the bathing solution has been found to reduce Ca influxes (IC_{50}) for 50 % of the control group (LUCU, 1994). In the perfused *Carcinus* gills, when Ca was added apically Cd influx inhibition was more pronounced than in the experiment when Ca was added basolaterally.

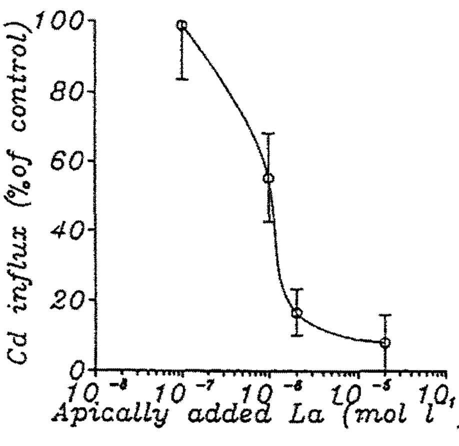

Fig. 1 Response of $LaCl_3$ (10^{-7} to 10^{-5} mol l^{-1}) on ^{109}Cd influxes determined at the steady state level. Values are a mean of 5 determinations ±SEM. Total cadmiumconcentration in medium was 0,26 μmol Cd l^{-1}. Dilute sea water (DSW) wasenriched by Ca (15 mmol Ca l^{-1}).

This suggests that Cd enter the gill epithelium via a lanthanum-sensitive apical Ca channel. We have used La as an non specific blocker acting selectively from apical perfused *Carcinus* gill surfaces.The entry of cadmium over the apical membrane of gill epithelium cells via Ca^{2+} channels has already been described for the freshwater-adapted trout (PERRY and FLIK, 1988).Vital mechanism of the postmoult Crustacea is the ability to increase Ca absorption for the purpose of rapid calcification of their exoskeleton.It will be stimulating, in the future, to continue studies on the interaction mechanisms of calcium with highly toxic metal cadmium, which effects could be especially hazardeous during such a sensitiver living phase of Crustacea as it is moulting.

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