

TRACE METAL CONCENTRATIONS IN THE SEDIMENTS FROM THE ŠIBENIK
AND THE KORNATI ISLANDS AQUATORIUM

D. MARTINČIĆ^(1,2), Z. KWOKAL⁽¹⁾, M. STOEPLER⁽²⁾ and M. BRANICA⁽¹⁾

- (1) Center for Marine Research, "Rudjer Boskovic" Institute, Zagreb (Yugoslavia)
(2) Institute for Applied Physical Chemistry, Nuclear Research Center (KFA), Jülich (Federal Republic of Germany)

The results of concentrations of Zn, Cd, Pb, Cu and Hg in the whole sediment samples from different localities in the Šibenik aquatorium were primarily controlled by particle size of the sediment and, except lead, correspond to the unpolluted sediments. The anthropogenic influence near the harbour and industrial waste-water outflows is well evident.

In the upper 2 cm of the total sediment samples the concentrations of Zn, Cd, Pb, Cu and Hg from the Šibenik and the Kornati Islands aquatorium are well related to the mean grain-size of the sediments (see Table 1). The analysis have been done in a manner described in our previously published work (1). The highest concentration of the trace metals are bounded to the smallest sediment particle fraction and their distribution is caused by settlement. The upper part of the estuary the sediments contain highest percentage of finest particles (<20 μm). Seaward as percentage of finest particles decreases, the metal concentration decreases too. The influence of the metals of an anthropogenic origin on the total metal concentration in the sediments near harbours' sewage outflows and industrial waste-waters sources will be discussed in detail. The particle fraction <75 μm has been separated and analyzed for trace metal content. The obtained data were compared with our recent results on the metal contents of the sediments from different parts of the Adriatic Sea (2). In general, excluding locations which are characterized as points under anthropogenic influence, the results obtained corresponded to the unpolluted marine and estuarine sediments. Recent data obtained for lead concentrations in the sediments all over the Adriatic Sea are significantly higher than those concentrations by Paul and Meischner found in the sediments from 1976 (3). It can be attributed to the higher traffic using leaded gasoline.

TABLE 1. The average metal concentrations in the total sediments of the Šibenik aquatorium (mg kg⁻¹ and μg Hg kg⁻¹ dry weight) at different localities.

Location	Sediment fraction (20 μm (%))	Zn	Cd	Pb	Cu	Hg
E-1	2.5	36.7	0.46	3.4	9.2	6.6
E-2	89	57.7	0.51	27.9	22.3	293
E-3	91.3	100.0	0.46	31.9	20.6	253
E-4	-	60.8	0.29	22.6	10.4	284
E-5	-	98.8	0.50	22.8	31.0	177
C-2	3.7	15.5	0.13	9.0	6.2	59
C-1	0.5	8.9	0.14	6.7	4.5	23
Kornati islands						
R-1	0.8	6.1	0.16	6.1	3.3	12
R-2	6.4	8.2	0.12	6.9	4.3	13
Industrial area						
C-3	2.1	86.8	0.33	37.6	73.7	250

REFERENCES:

- MARTINČIĆ, D., Ž. KWOKAL, H.W. NÜRNBERG, M. STOEPLER and M. BRANICA, *Comm. Int. Mer Medit.*, 29 (1985) 115-116.
- MARTINČIĆ, D., Ž. KWOKAL, K. MAY and M. BRANICA, Presented at the IX Int. Symposium "Chemistry of the Mediterranean" held in Primošten Yugoslavia, May 1-7, 1986.
- PAUL, J., and D. MEISCHNER, *Senchenbergiana Marit.*, 8 (1976) 91-102.

TRACE METALS IN MYTILUS GALLOPROVINCIALIS FROM THE ŠIBENIK
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D. MARTINČIĆ^(1,2), Z. KWOKAL⁽¹⁾, M. STOEPLER⁽²⁾ and M. BRANICA⁽¹⁾

- (1) Center for Marine Research, "Rudjer Boskovic" Institute, Zagreb, Croatia (Yugoslavia)
(2) Center for Applied Physical Chemistry, Nuclear Research Center (KFA), Jülich (Federal Republic of Germany)

From October 1983 till July 1985 the common mussels *Mytilus galloprovincialis*, from the Krka river estuary and the Kornati Islands were analyzed for Zn, Cd, Pb, Cu and Hg content. The metal concentration in the mussels from studied area, excluding animals permanently exposed to industrial and domestic outflows, fall in the range of concentrations pertaining to animals from unpolluted regions.

The distributions of Zn, Cd, Pb, Cu and Hg concentrations of mussels *Mytilus galloprovincialis*, Lmk., from the Šibenik and Kornati Islands aquatorium (studied between October 1983 and July 1985), are very pronounced along the transect from the Krka river falls to the Kornati Islands (see Table 1). It is mainly governed by animals' condition factors and by physico-chemical conditions existing in the surrounding water. The measurements carried out were described previously (1). The dissolved trace metal concentrations in water reached a maximum values near the Šibenik harbour. The mussels from the same area exhibited high metal concentrations as well.

Concentration of cadmium increases in the mussels from the near-shore localities to the Kornati Islands, even though the dissolved metal decreases. It can be attributed to the fact that mussels from the mentioned localities although of the same shell length, are much older than mussels from estuary region, due to the different growth rate (2). Trace metal concentrations in the mussels from the investigated area have been compared with our results obtained studying mussels from other regions on the coast of the Adriatic Sea (3,4). Excluding organisms by which the metal contents are evidently influenced from anthropogenic sources, i.e., mussels living in the vicinity of domestic sewage outflows and industrial waste-water inputs, the metal concentrations in the mussels from the area studied fall in the range of concentrations for animals from unpolluted regions.

TABLE 1. Average metal concentrations in the mussels from the Šibenik and the Kornati Islands aquatorium. Zn, Cd, Pb and Cu concentrations are expressed in mg kg⁻¹ while mercury in μg kg⁻¹ wet weight. Values in the parenthesis are standard deviations.

Metal	Šibenik aquatorium	Kornati islands	Industrial area (Ražine)
Zn	19.2 (2.5)	18.1 (4.5)	31.5 (2.6)
Cd	0.14 (0.04)	0.29 (0.07)	0.12 (0.03)
Pb	0.38 (0.18)	0.20 (0.08)	1.23 (0.75)
Cu	1.1 (0.2)	0.7 (0.1)	3.0 (1.7)
Hg	3.4 (12)	28 (6)	13 (7)

REFERENCES:

- MARTINČIĆ, D., Ž. KWOKAL, H.W. NÜRNBERG, M. STOEPLER and M. BRANICA, *Rapp. Comm. int. Mer Medit.*, 29 (1985) 117-118.
- MARGUŠ, D., M.Sc. Thesis, University of Zagreb, (1982).
- MARTINČIĆ, D., H.W. NÜRNBERG, M. STOEPLER and M. BRANICA, *Thalassia Jugosl.* 16 (1980) 297-315.
- MARTINČIĆ, D., Ž. KWOKAL, M. STOEPLER and M. BRANICA, Presented at the IX Int. Symposium "Chemistry of the Mediterranean", held in Primošten, May 1-7, 1986, Yugoslavia.