CHLORINATED HYDROCARBONS IN MUSSELS FROM ALGIERS' BAY

B. SELLALI, S. CHOUAKRI, M. AZZOUZ and B. BOUDJELLAL

ISMAL, Marine Pollution Laboratory,
POBox 90, Algiers 1st. November, 16003 Algeria

Built around a commercial harbour, Algiers is a large metropolitan area with many industries. Urban and industrial wastes are directly discharged in the harbour and the bay (fig. 1). This bay has already been described by many authors (ASSO, 1980 and others). During the winter 1991, two mussels species (*Mytilus galloprovincialis* and *Perna perna*) were selected in order to assess PCBs (arochlors 1254 & 1260), DDT, DDD, DDE, aldrin, gHCH and HCB levels. Two stations are sampled in the harbour (st. 1 & 2) and one at Bordj-el-kiffan (st. 3). A fourth one (st. 4) in Mellah lagoon (east side of Algeria) (fig. 2), is used as a potential reference sector. Analysis is held using GC with electron capture detector, following the UNEP/FAO/IAEA protocole (1982). Intercalibration exercises are made on two reference materials coded 351 and MAB3/OC, (IAEA, Monaco). Hexan extractible organic matter (HEOM) is also estimated in all the samples, in order to see how it is related to the acccumulation of these compounds.

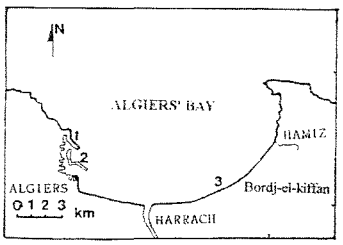

Fig. 1 : Algiers bay; sampling stations.

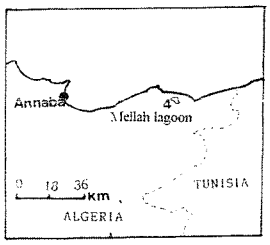

Fig. 2 : Mellah lagoon.

A review of data, expressed in ng/g wet weight, is given in table 1; results in dry weight are shown in fig. 3.

Station	Specie	PCBs	DDTs	Aldrin	γHCH	HCB
1	M.galloprovincialis	51.5	20.2	0.76	0.27	0.05
	P. perna	40.3	13.2	0.21	0.08	0.57
2	M. galloprovincialis	15.5	11.7	0.51	0.30	ND
	P. perna	76.2	28.5	0.70	0.51	0.07
3	M. galloprovincialis	12.2	4.3	0.06	0.16	0.01
4	M. galloprovincialis	4.0	3.0	ND	ND	0.02

Table 1 : Concentrations of chlorinated hydrocarbons (ng/g - wet weight) in the mussels *M. galloprovincialis* and *P. perna*.

In comparison with levels measured by CHOUIKHI *et al.*, 1988 in the same area, concentrations show an increase for PCBs and DDTs in the harbour stations, and are lower in the east side of the bay (st. 3).

As predicted, concentrations detected at Mellah lagoon, which is a protected area, caracterise a reference sector.

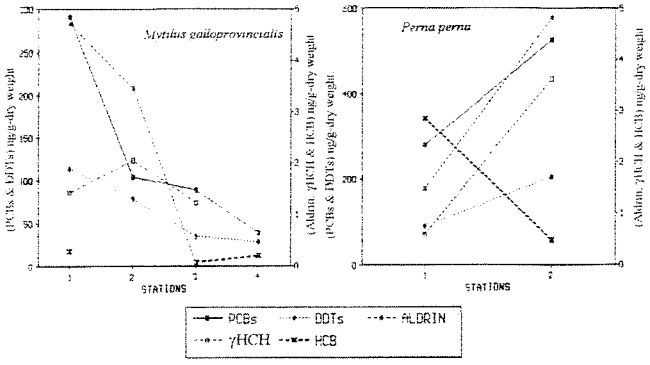

Fig. 3 : Variations of chlorinated hydrocarbons in mussels from Algiers' bay and Mellah lagoon (ng/g- dry weight).

DDTs/PCBs ratios are less than one; this general trend may confirm the predominance of industrial inputs in the study area, where DDT appear to be introduced formerly (AGUILAR, 1984).

Aldrin and HCB are positively correlated to HEOM contents in the mussel *P. perna*. For the other chlorinated hydrocarbons the tendency is similar but not statistically significant. On the other hand, *M. galloprovincialis* presents significant correlations between these chemicals, especially DDT and PCBs, and the percentages of HEOM.

The differences noticed in the accumulation of these compounds between *M. galloprovincialis* and *P. perna* can be attributed to the chronological differences in their reproductive cycles.

REFERENCES

AGUILAR A., 1984. Relationships of DDE/SDDT in the marine Mammals to the chronology of DDT input into the ecosystem. *Can. J. Fish. Aquat. Sci.*, 41 : 840 - 844.

ASSO A., 1980. Etude des métaux lourds chez *Perna perna* (L) dans la région d'Alger. Ve journées Etud. Pollutions CIESM, pp. 163 - 168.

CHOUIKHI A., NACEUR. I et TABTI D., 1988. Niveaux en pesticides organochlorés et en PCBs dans les moules présentes dans la baie d'Alger. *Rapp. Comm. Int. Mer Médit.*, 31, 2 : 142.

UNEP/FAO/IAEA, 1982. Determination of DDTs and PCBs in selected marine organisms by gas-liquid chromatography - References methods for Marine Pollution Studies, n. 14 (rev. 1), 20 p. UNEP.

THE ROLE OF CLAY MINERALS IN TRANSPORT AND ENVIRONMENTAL CAPACITY FOR TRACE METALS

Ivan SONDI[1], Mladen JURACIC[2], and Velimir PRAVDIC[1]

[1] Center for Marine Research, Ruder Boskovic Institute, Bijenicka 54, POB 1016
[2] Department of Geology, Faculty of Science, Univ. of Zagreb, Zvonimirova 8, POB 153, 41000 Zagreb, Croatia

This investigation aims at understanding the ultimate environmental capacity of the estuarine coastal region for selected contaminants. In this sense the role of clay mineral particulates in the transfer of trace metals and radionuclides from land to sea was studied. Field studies were done in the Rasa River estuary (Northern Adriatic), a small karstic river originating in a Eocene flysch region.

Most of the clay minerals are carried by the river sediment in the upper part of the estuary at low water salinity. By sampling estuarine surface sediments segregation of clay minerals was observed with illite preceding the sedimentation of chlorite (SONDI *et al.*, 1994). Such a phenomenon was reported earlier in other estuaries and attributed to different rates of flocculation and flocks sedimentation (EDZWALD and O'MELIA, 1975).

The concentration of Zn, Cu and Mn in clay minerals of the estuarine sediments was found to be three times higher than in the source rocks (Table 1).

Table 1. Surface characteristics and concentration of metals for clays separated from source rock and the surface riverine and estuarine sediments

Sample	SSA ($m^2 g^{-1}$)	ASI (meqv/100g)	Concentration of metals (ppm)						
			Zn	Cu	Pb	Cd	Cr	Mn	Ti
Source rock: 5	56.0	68	67	80	62	2.1	234	104	2594
Riverine sediment: 6	54.1	62	113	141	89	2.5	228	166	2518
Estuarine sediments: 10	48.3	66	216	236	83	2.9	287	393	3805
11	62.5	72	153	127	66	2.4	218	247	2654

Minerals present in the clay fraction (< 1 μm) were exclusively illite, chlorite and smectite.

Table 2 shows results of measurements of the activities of natural 40K, and 137Cs, of sediment samples from the Rasa River and from the estuary. Highest values were obtained in estuarine surface sediments at the river mouth. This is in accordance with the observation that prevalent sedimentation of fine grained particles (clay minerals) occurs in the estuary proper. Previous research already indicated that 40K and 137Cs are strongly associated with fine grained particles, particularly with illite (TAMURA and JACOBS, 1960; FRANCIS and BRINKLEY, 1976).

Table 2. Specific activities (Bq/kg) of 40K and 137Cs in riverine and estuarine surface sediments

Izotop	Riverine sediments*				Estuarine sediments**			
	4	6	7	8	9	10	11	12
^{40}K	516±24	497±23	571±17	674±20	680±18	464±19	470±18	534±21
^{137}Cs	n.o.	14±1	n.o.	n.o.	27±1	25±1	14±1	12±1

n.o. - below the detection limit
** salinity of river waters was < 1 ‰, pH = 7.1*
*** salinity of estuarine waters 36-38 ‰, pH = 7.9 - 8.1*

Field sampling and analysis of sediments corroborated by laboratory experiments (SONDI *et al.*, 1994) indicates that the accumulation of heavy metal contaminant is probably the result of two concurrent processes :

1. Flocculation followed by fast sedimentation;
2. Strong adsorption of heavy metals to clay minerals due to their specific surface physico-chemical properties.

REFERENCES

EDZWALD, J.K. and O'MELIA, C.R., 1975. Clay distributions in recent estuarine sediments. *Clays Clay Minerals*, 23 : 39-44.

FRANCIS, C.W. and BRINKLEY, F.S., 1976. Preferential adsorption of 137Cs to micaceous minerals in contaminated freshwater sediments. *Nature*, 260 : 513-519.

SONDI, I., JURACIC, M., PROHIC, E. and PRAVDIC, V. 1994. Particulates and the environmental capacity for trace metals. A small river as a model for a land-sea transfer system : The Rasa River estuary. *Science of the Total Environment*, 155 : 173-185.

TAMURA T. and JACOBS D.G. 1960. Structural implications in caesium sorption. *Health Phys.*, 2 : 391-398.