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PRELIMINARY RESULTS ON THE PRESENCE OF MERCURY (TOTAL AND ORGANIC) AND SELENIUM IN BOOPS BOOPS, MERLUCCIUS MERLUCCIUS, SGOMBER SGOMBRUS, AND NEPHROPS NORVEGICUS FROM THE LIGURIAN SEA

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INTRODUCTION

This study presents the preliminary results obtained on the presence of mercury (total and organic) and selenium in bogue (Boops boops), hake (Merluccius merluccius), mackerel (Sgomber sgombrus), and shrimp (Nephrops norvegicus) from the Ligurian sea.

These species were selected both for their significance as seafood and to extend the number of species from the Ligurian sea already studied (Capelli et al.,1983).

Object of this study is to ascertain the the concentrations of these elements and the recognition of possible correlations between the parameters investigated.

SAMPLING

Samplings have been carried out in the area between La Spezia (East of Genova) and Varazze (East of Genova),both by means of local fishermen (Cooperativa Pescatori Camogli) and by means of fishing cruises organized by Prof. G. Relini and Prof. L. Relini-Orsi of the Departement of Biology of the University of Genova.

Sampling date,area,together with all pertinent information have been recorded for all samples.More precise information from a biological point of view is available for samples collected during the fishing cruises.

Samples have been stored and prepared according to UNEP/FAO/IAEA/IOC Reference Methods (1984).

REAGENTS AND METHODS

Solvents and reagents used were of analytical grade.Mercury and selenium standards were prepared daily from stock solutions commercially available.

Special care was taken in cleaning the glassware,which was washed in 1.5 M nitric acid.

Each sample was divided into three portions.The first portion was used for the determination of organic mercury.Total mercury and selenium were determined in a second portion.And the third one was heat dessiccated at 105 C to constant weight in order to calculate the wet weight/dry weight ratio.

Mercury (total and organic) was determined using the cold-vapour atomic absorption spectrometry (AAS) technique (Capelli et al. ,1986) Selenium was determined by hydride generation AAS technique (Capelli et al.,1986).

Quality control has been carried out by means of Standard Reference Materials from the U.S. National Bureau of Standards and samples from IAEA /Monaco (Capelli et al. 1986).

RESULTS

The following table shows the results obtained (means and ranges).For each species the number of samples analyzed (#) , wet weight/dry weight ratio (wet/dry),weight (in g),and concentration of elements (in ug/g wet weight) are reported.

	#	Weight	wet/dry
Mackerel	14	274 (161- 389)	3.28 (2.09-4.32)
Hake	16	359 (20-1148)	5.13 (4.76-5.59)
Bogue	13	139 (59- 340)	4.23 (3.85-4.57)
Shrimp	17	71 (5- 175)	4.57 (4.06-5.10)

	Mercury (organic)	Mercury (total)	Selenium
Mackerel	0.18 (0.04-0.38)	0.31 (0.19-0.51)	0.33 (0.15-0.63)
Hake	0.20 (0.02-1.03)	0.30 (0.08-1.20)	0.14 (0.08-0.21)
Bogue	0.10 (0.01-0.22)	0.17 (0.07-0.32)	0.31 (0.18-0.43)
Shrimp	0.58 (0.27-1.58)	0.94 (0.43-2.17)	0.88 (0.30-1.73)

DISCUSSION

Results obtained for total mercury agreed with data available in literature (UNEP 1983).

Organic and total mercury concentrations seem to be correlated by weight only for hake,bogue,and shrimp.

For these species the linear regression expression (95% confidence level) are:

Hake: Hg-o(ug/g wet wt.) = 1.370E-02 + 5.238E-04 Weight (g)
Hg-t(ug/g wet wt.) = 3.049E-02 + 7.491E-04 Weight (g)
Bogue: Hg-o(ug/g wet wt.) = 2.554E-03 + 6.598E-04 Weight (g)
Hg-t(ug/g wet wt.) = 6.689E-02 + 7.456E-04 Weight (g)
Shrimp: Hg-o(ug/g wet wt.) = 2.743E-01 + 4.244E-03 Weight (g)
Hg-t(ug/g wet wt.) = 4.756E-01 + 6.567E-03 Weight (g)

As far as selenium is concerned no correlation by weight or mercury (both total and organic) concentration has been found.

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MERCURY ACCUMULATION BY MYTILUS EDULIS FROM A POLLUTED LAGOON

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Abstract

Hg concentrations were determined monthly for one year in different parts of Mytilus edulis taken from the S.Gilla lagoon(Sardinia) highly polluted by Hg from a chloro alkaly plant.Gonads ,foot and adductor muscle showed the highest metal content however the levels in the total flesh didn't display a bioavailability of Hg in the environment.

Introduction

Previous research works on the S.Gilla lagoon (Sardinia) ,showed high levels of Hg in the sediments (1,2,3) related to the presence of a chloro-alkaly plant .Since the lagoon produces large quantities of mussels of which the consumption is still prohibited , we utilized Mytilus edulis both to evaluate the bioavailaibility of Hg in the lagoon and to show the metal content in individual organs.This study is part of a larger research project still in progress which aims at evaluating the effects of size and season on the accumulation of Hg in Mytilus edulis .

Materials and methods

Mussels were collected monthly from January 1983 to January 1984 (except in August and October) at one sampling station in the lagoon near the confluence with the Mediterranean Sea.The mussels were taken from the bottom of the lagoon.Five individuals of 45 mm to 55 mm lenght shell were selected, cleaned from incrustations and washed. After cutting the adductor muscle the intravalvular water was collected and the soft part of mussels dissected into the following parts by means of stainless scissors and plastic forceps (4):byssus, foot, gonads, mantle,gill,adductor muscle and viscera.All the samples were freeze dried and digested using a mixture of nitric and perchloric acid. The Hg was determined by flameless atomic absorption spectrophotometry.The whole procedure was checked analysing an NBS Oyster tissue SRM 1566.

The superficial layer of the sediments (0-1 cm),taken by a gravity corer from the sampling station four times during the research, was air dried, sieved to 100 mesh and subjected to analytical extractions of different strenght according to Agemian and Chau (5).Subfractions of the sediments were digested by $HF/HNO_3/HClO_4$; 4N HNO_3/0.7N HCl ; O.5N HCl and O.05N EDTA.

Results and discussion

The tables 1 and 2 show respectively the mean concentration of Hg in the different parts and in the total flesh (values obtained by addition of the concentration in individual organs) of the mussel and in the sediments.The foot, the adductor muscle and the gonads displayed the highest content of Hg,while in the other organs it never reached 2 ug/g.According to Eganhouse (6) the Hg in the former organs may indicate the extent of biological incorporation,however the viscera and the total flesh content seems to exhibit informations on relative environmental levels of the metal .The highest content in all the samples were found in January-February and in July-September. However the viscera and total flesh concentrations seem to be low when compared to the total Hg found in the superficial sediments both by the $HF/HNO_3/HClO_4$ and 4N HNO_3/0.7N HCl extractions, but this can be explained if we assume as environmentals levels the values obtained by O.05N EDTA or O.5N HCl extractions.

Table 1.Mercury concentrations (ug/g dry weight) in different parts of Mytilus edulis.

	$\bar{x}$	min.	max.	SD
Intravalvular water	0.81	0.19	1.80	0.49
Byssus	1.87	0.80	4.56	1.08
Gonads	2.66	0.80	8.96	2.67
Foot	4.81	1.76	15.28	3.90
Mantle	0.53	0.60	1.92	0.50
Gill	1.66	1.00	4.62	1.23
Adductor muscle	1.87	0.35	3.69	1.27
Viscera	0.63	0.09	1.61	0.51
Total flesh	0.77	0.21	1.37	0.37

Table 2.Mercury content (ug/g dry weight) in the superficial sediments.

Extractant	$\bar{x}$	min	max
$HF/HNO_3/HClO_4$	8.95	6.50	12.00
4N HNO_3/0.7N HCl	3.12	1.23	6.59
O.5N HCl	0.22	0.21	0.23
O.05N EDTA	0.11	0.07	0.14

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