

ORGAN AND TISSUE DISTRIBUTION OF TOTAL MERCURY IN SOUTHAMERICAN FUR SEAL,  
ARCTOCEPHALUS AUSTRALIS.

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ABSTRACT

The levels and distribution of total mercury in muscle, liver and kidney of the Southamerican fur seal (Arctocephalus australis) were studied. Corresponding analysis were carried out through flameless atomic absorption spectrophotometry. The highest concentrations of mercury were recorded in liver, followed by those of kidney and muscle. Relationships between metal concentration and total length of the animals, as well as between metal contents vs. age were considered. Feeding and dietary habits showed to be the most important source of mercury for the studied species. When the present data were compared with previous reports of trace metals on similar marine mammal species, it was observed that mercury levels in A. australis were relatively low; this allows to sustain that the Southamerican fur seal population inhabiting Mar del Plata coast, in Argentina, is not strongly affected by anthropogenic mercury pollution.

INTRODUCTION

Studies concerning the accumulation of heavy metals, particularly mercury, in marine mammals, have drawn increased attention in view of heavy metal pollution in the marine environment and their bioaccumulation in marine animals (Ref. 1; Ref. 2; Ref. 3). Concerning this, data on coastal mammals are of the outmost importance, reflecting the environmental pollution degree. Seals are useful sources of information on the accumulation of mercury since -being high-order carnivores- they contain relatively large quantities in certain of their tissues.

Even though many papers concerning with mercury on seals are available (Ref. 4; Ref. 5; Ref. 6; Ref. 7), scarce information on this topic for Southamerican Atlantic populations exists, and only several papers on Otaria flavescens (Ref. ) and on Arctocephalus australis (Ref. 9) may be mentioned.

The present paper deals with the determination of the organ and tissue distribution of total mercury in the Southamerican fur seal, Arctocephalus australis inhabiting the coast of Mar del Plata, in Argentina.

MATERIALS AND METHODS

Muscle, liver and kidney of 16 specimens of A. australis from the colony at Mar del Plata (Argentina) were analyzed in order to determine their total mercury contents. These samples were obtained from animals which were found dead in the beaches of the mentioned area (33° 00'S and 57° 2'W), at South-east Buenos Aires Province, in Argentina, and were stored in plas-

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tic bags at  $-20^{\circ}\text{C}$  until treatment in the laboratory. Total mercury determinations were carried out by flameless AAS, after wet acid digestion (Ref. 10). A Shimadzu AA-540-13 was utilized, and the obtained signals were processed with a Shimadzu C-R4A computer.

#### RESULTS AND DISCUSSION

Total mercury contents and distribution in muscle, liver and kidney of Arctocephalus australis from Mar del Plata colony were assessed (TABLE 1).

ANALYZED TISSUE	TOTAL MERCURY CONCENTRATION (ppm, wet wt.)			
	Mean Value	Standard Deviation	Coefficient of Variation	Min-Max Values
Muscle	0.33	0.23	69.7%	0.16-1.03
Liver	6.89	3.30	120.4%	1.19-35.1
Kidney	0.67	0.31	46.3%	0.29-1.50

TABLE 1: Total mercury distribution in tissues of A. australis.  
(Number of analyzed specimens: 16).

Liver of A. australis showed to have significantly higher concentrations of total mercury ( $p < 0.01$ ), with values varying between 1.19 g/g and 35.1 g/g, and a mean value of 6.89 g/g. These levels may be compared with those reported on liver of Phoca vitulina from the Bay of Fundy and Gulf of Maine, U.S.A. (0.52-7.90 g/g) (Ref. 11), on P. vitulina from the German North Sea coast (3.5-96.0 g/g) (Ref. 1), or on Arctocephalus pusillus from SE Australian waters (mean value: 62.3 g/g) (Ref. 6).

Total mercury concentrations as found in kidney of A. australis from Mar del Plata coast varied between 0.29 and 1.50 g/g, with a mean value of 0.67 g/g. These results were compared with the reports on kidney of Callorhinus ursinus from Washington coast (0.6-1.6 g/g) (Ref. 5), on Phoca vitulina from East Anglia and West of Scotland (0.2-4.7 g/g) (Ref. 12), or on Arctocephalus pusillus (mean value: 0.63 g/g) (Ref. 6).

The muscular mercury concentrations as determined on A. australis (0.16 to 1.03 g/g; mean value: 0.33 g/g), may be compared with values reported on muscle of P. vitulina (0.21-1.54 g/g) (Ref. 11), or on Callorhinus ursinus (0.1-1.6 g/g) (Ref. 5). On the other hand, tissular distributions of mercury similar to those reported here were previously presented, among others, on Callorhinus ursinus (Ref. 5), Phoca vitulina (Ref. 1; Ref. 12), or on A. pusillus (Ref. 6).

Looking for the study of the mercury accumulation process, the size of specimens vs. mercury concentrations were correlated. In all cases, the correlation coefficients were highly significant ( $p < 0.01$ ), demonstrating that mercury concentration linearly increases with the growth of the fur seals, and showing a strong dependence of metal contents with the age of the organism. Similar results have been previously reported on Phoca vitulina (Ref. 12), Arctocephalus pusillus (Ref. 6), or Leptonychotes weddellii (Ref. 13).

Arctocephalus australis is basically an ichthyophagus species (Ref. 14). Thus, fish would be the most important source of mercury for the fur seals; considering fish species of the area has been recognized as accumulators of the mentioned metal (Ref. 15).

Finally—and within a regional frame—these results may be compared with those reported for populations of the same species from Uruguay, (Ref. 9), and it can be observed that both groups have relatively low concentrations of mercury. This allows to sustain that these populations of South-American fur seal are not strongly affected by anthropogenic mercury pollution.

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