

Mercury in the Eurasian otter (*Lutra lutra*) in Denmark



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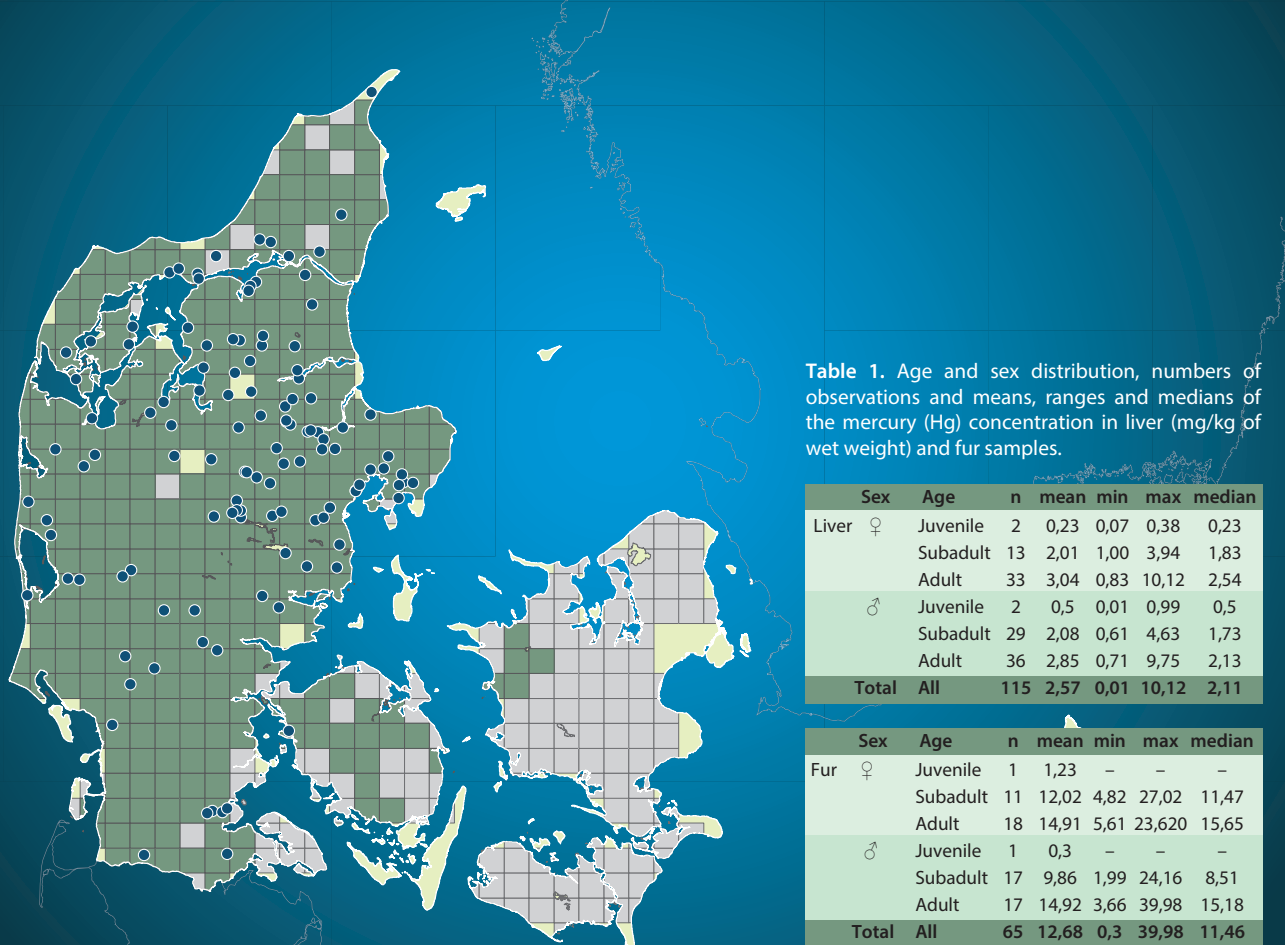


Table 1. Age and sex distribution, numbers of observations and means, ranges and medians of the mercury (Hg) concentration in liver (mg/kg of wet weight) and fur samples.

Sex	Age	n	mean	min	max	median
Liver ♀	Juvenile	2	0,23	0,07	0,38	0,23
	Subadult	13	2,01	1,00	3,94	1,83
	Adult	33	3,04	0,83	10,12	2,54
Liver ♂	Juvenile	2	0,5	0,01	0,99	0,5
	Subadult	29	2,08	0,61	4,63	1,73
	Adult	36	2,85	0,71	9,75	2,13
Total	All	115	2,57	0,01	10,12	2,11
Sex	Age	n	mean	min	max	median
Fur ♀	Juvenile	1	1,23	-	-	-
	Subadult	11	12,02	4,82	27,02	11,47
	Adult	18	14,91	5,61	23,620	15,65
Fur ♂	Juvenile	1	0,3	-	-	-
	Subadult	17	9,86	1,99	24,16	8,51
	Adult	17	14,92	3,66	39,98	15,18
Total	All	65	12,68	0,3	39,98	11,46

Figure 1. Sampling locations for the analysed otters (Dots). Green squares indicate 10km-squares where otter tracks were recorded and grey squares 10km-sq. where no tracks were found in the national survey in 2017.

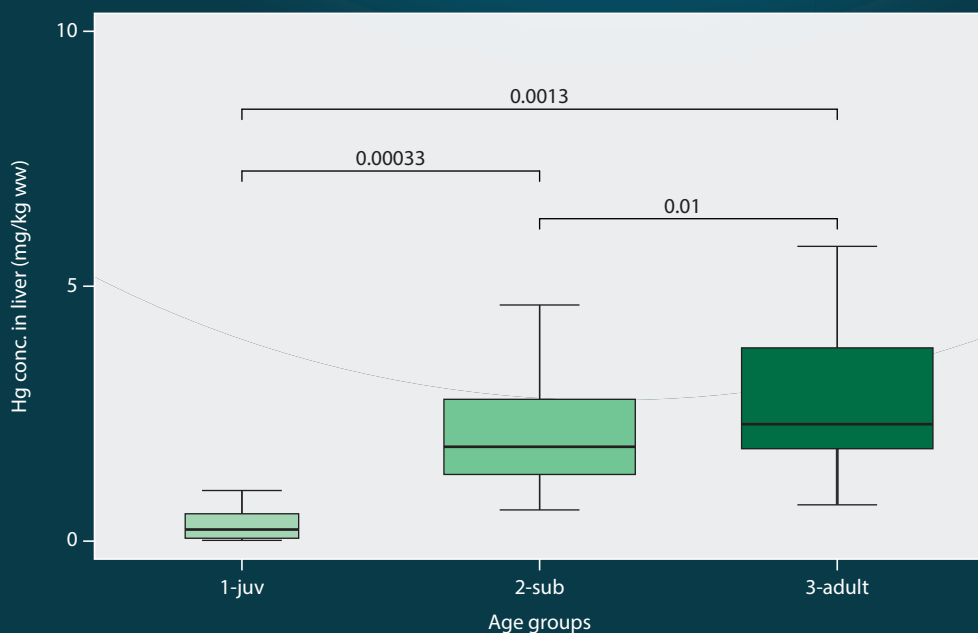


Figure 2. Mercury concentrations (mg/kg) in liver (wet weight) of the three age groups (juveniles, subadults and adults).

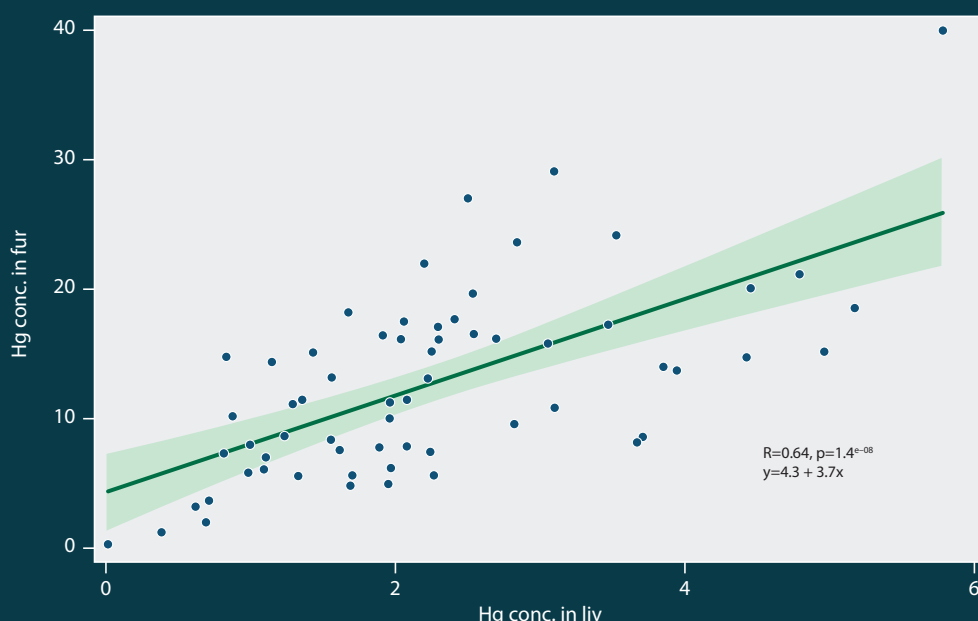


Figure 3. Correlation of the mercury concentrations in liver and fur.



Photo: Colourbox/Peter Ralph.

Mercury (Hg) is a toxic heavy metal which is widespread in the environment. The primary source of mercury is the burning of coal and waste incinerations. When mercury is deposited in an aquatic environment, it bioaccumulates through the food chain.

Recent studies from Hungary and Luxembourg describe levels of mercury in fish that might affect the otter populations negatively^{1,2}. The same has been reported for Denmark in 2010³. We analysed mercury levels in Danish otters to assess the potential effects on the present population.

SAMPLES AND LABORATORY ANALYSIS

We analysed liver and fur samples from primarily road-killed Danish otters collected between 2011-2019 (Fig. 1). The samples were analysed for Hg at the Environmental Trace Elements Laboratory at Aarhus University, Risø, using a Milestone DMA-80 Direct Hg Analyzer (Soriso, Italy) after U.S. EPA Method 7473⁴.

PRELIMINARY RESULTS

The concentrations of Hg in liver tissue ranged from 0.1 to 10.12 mg/kg, with a mean of 2.57 mg/kg (Tab. 1).

An increase with age was shown and summarized in Figure 2. Mercury was significantly higher in adults than in subadults and juveniles as well as between subadult and juveniles (ANOVA, $p \leq 0.001$). However, there were no significant differences in Hg concentrations in males and females ($t = 0.87$, $p > 0.05$).

A significant, positive correlation between Hg values in liver and fur was found ($R = 0.65$, $p < 0.005$) (Fig. 3).

DISCUSSION

The levels of Hg found in otters in Denmark are generally lower than the proposed toxicological threshold of 10 mg/kg in liver (wet weight) for sublethal effects⁵. A single female adult otter exceeded this threshold.

These values are slightly lower than values in Eurasian otter from Hungary⁵, Finland⁶ and Scotland⁷. Meanwhile, higher values were found in North American river otters (*Lontra canadensis*)⁸.

The correlation between Hg concentrations in liver and fur has been found in other studies as well. It has been proposed that otters are able to excrete mercury via hair⁹.