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FIRST DATA ON CONTAMINATION OF OTTERS IN THE NETHERLANDS

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In the last decades otters became rather rare in The Netherlands. Consequently, during the last years only a few otters that were found dead became available for scientific examination. Recently, the chemical department of the Research Institute for Nature Management analyzed liver and kidney tissue of three otters:

- an adult male, which died in the early summer of 1983 and presumably originated from the vicinity of the village of Warffum in the north-eastern part of the country (Figure 1 W). . From this animal only the skinned and cut trunk was received.
- an adult, lactating female, killed by traffic in the autumn of 1982 and originating from a peat-bog nature reserve named Rottige Meenthe (Figure 1: RM). The skin and skeleton of this animal were entered in the collection of the Dutch National Museum of Natural History in Leiden, number 35136.
- a probably first year male, found dead in February 1986 in the same peat-bog reserve Rottige Meenthe.

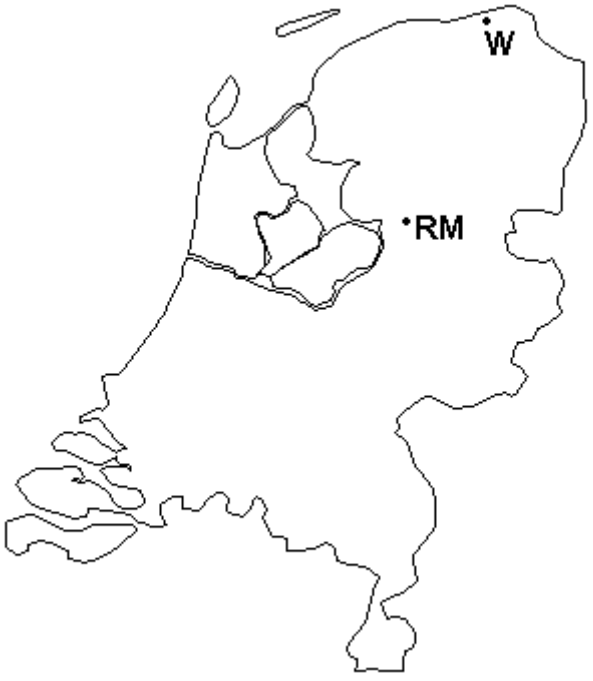

Figure 1: Locations at which Otters were found

Tissues of kidney and liver of all three otters were examined for the heavy metals lead (Pb), cadmium (Cd), mercury (hij), copper (Cu) and zinc (Zn) and for polychlorinated biphenyls (PCBs) . Kidney and liver of the otter found dead in 1986 were also examined for chlorinated hydrocarbon pesticides. The results are summarized in tables 1, 2 and 3. PCBs were detected by gas chromatography with capillary columns, but in 1986 otter PCBs were also detected by gas chromatography with packed columns. The latter method has been used in most otter analyses published up to now.

Table 1: Concentrations of heavy metals (mg/kg^{-1} dry weight) in liver and kidney tissue of three otters

		Origin Otter		
Metal	Tissue	Warffum	Rottige Meenthe	
		1983	1982	1986
Pb	Liver	0.7	0.6	0.2
	Kidney	0.9	1.3	0.3
Cd	Liver	0.5	0.7	0.4
	Kidney	0.6	1.0	0.8
Hg	Liver	3.4	12	2.9
	Kidney	4.0	0.9	5.6
Cu	Liver	16.4	13.7	30.9
	Kidney	21.8	17.8	18.5
Zn	Liver	86.6	87.8	131.0
	Kidney	81.3	87.1	95.0

Table 2: Concentrations of PCBs (mg/kg^{-1} extracted fat) in liver and kidney tissue of three otters

	Origin Otter			
Tissue	Warffum	Rottige Meenthe		
	[1]1983	[1]1982	[1]1982	[2]1986
Liver	155	4.8	243	291
Kidney	51	5.0	210	282

[1] Gas chromatography with capillary column

[2] Gas chromatography with packed column

Table 3: Concentrations of chlorinated hydrocarbon pesticides (mg/kg-1 extracted fat) in liver and kidney tissue of the otter Rottige Meenthe 1986[1]

Compound	Liver	Kidney
HCB	3.1	0.7
Hepox	0.9	
Dieldrin	2.0	
Endrin	<0.5	<0.5
α,β, γ HCH	<0.5	<0.5
DDE	8.0	3.0
DDD	<0.5	<0.5
DDT	<0.5	<0.5

Looking at the data, attention will be caught by the figures of PCBs. To compare these data with those from other European countries, the mean values of table 2 are fitted into figure 2, obtained from Mason and Macdonald (1986) and based on data from Olsson et al. (1981), to which data from Great Britain (Mason et al., 1986) were added. The wide variation in concentrations also

occurs in the Dutch material. The cause of this variation is unclear, as the animals with the lowest and the highest concentration both originated from the same area and the hydrology of that area has not changed essentially during the last years.

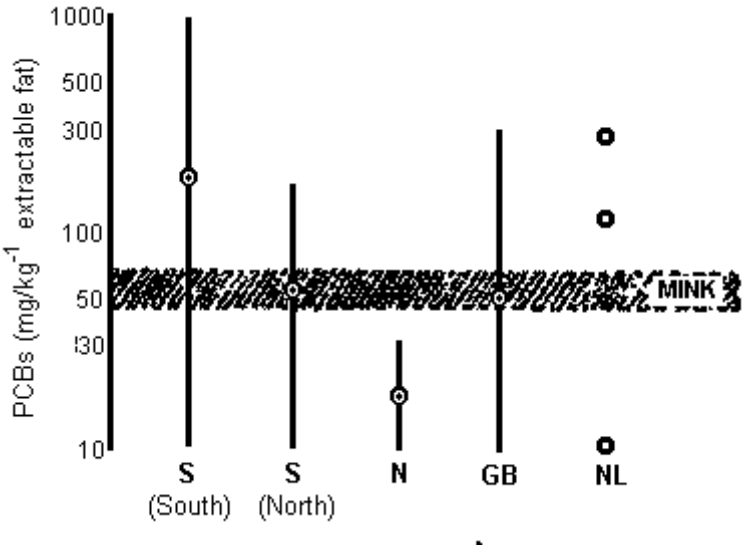

Figure 2: Ranges and mean values of PCB concentrations found in otters from southern- and northern Sweden (S), Norway (N) and Great Britain (GB), and the concentrations found in The Netherlands (NL), in comparison with the PCB level in the muscle of mink, exhibiting reproductive failure

In the first-year male from 1986, in which the highest concentrations of PCBs were found, a walnut-sized tumour was found at the back side of the liver, while in one of the kidneys a coral-shaped renal calculus was found (Broekhuizen, 1986). This animal was in a poor condition, without any fat deposit, and had actually died of pneumonia. In the other two otters no abnormalities were recorded.

Since, in two out of the three analysed otters, PCB concentrations in extractable fat exceeded significantly the minimum concentration causing reproductive impairment in experimental mink, and these two otters originated from non-industrial areas, it seems possible that PCB pollution contributed significantly to the decline of the Dutch otter population during the last decades. However, the low PCB concentration found in the lactating female shows that the situation is not that simple. As the otter with the highest PCB concentration was in a very poor condition, without any fat deposit, the very high PCB concentration in extractable fat in this animal could be mainly the result of the exhaustion of the fat reserves.

As to the chlorinated hydrocarbons and heavy metals, the detected concentrations do not seem very alarming, although we have hardly any information about synergistic effects of the different chlorinated hydrocarbons, PCBs and the biologically non-functional heavy metals, and little is known about the toxicology in European otters. The high concentrations of copper and zinc seem quite normal. These are functional elements in the metabolism of the animals and they have mechanisms to regulate these concentrations.

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