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Brief Communication

LEVELS OF POLYCHLORINATED BIPHENYLS (PCB) AND ORGANOCHLORINE INSECTICIDES IN EGGS FROM EIDER (SOMATERIA MOLLISSIMA)*

For the evaluation of the biological significance of trace amounts of persistent pollutants such as PCB and organochlorine insecticides in the marine environment, the burden of these substances in increasing populations of seabirds might be helpful. On a small island Hov Røn, located in Kattegat south east of Århus, the population of the molluscivorous eider has increased from 340 breeding pairs in 1969 to 670 pairs in 1972. The island is protected by the Game Biology Station at Kalø (*Fog* 1966), and the eider colony here is known to be very stationary and to spend the winter close to the breeding locality.

A total of 36 eggs, each one from different nests, were collected in the spring of 1970, 1971, 1972 and analyzed for residues of organic chlorinated compounds.

The homogenized content of each egg was grounded with seasand and anhydrous sodium sulphate. The fat and the chlorinated compounds were extracted from the sample in a glass column; eluation liquids were acetone, n-hexane, petroleum ether and ether. The combined and washed organic solvents were evaporated in a water bath (80°C), and the isolated fat was dissolved in n-heptane and divided into two portions. One portion was treated with fuming sulphuric acid in order to destruct the fat, and the second portion was cleaned up by passing through an Al_2O_3-column according to *Holden & Marsden* (1969). The purified extracts were analyzed by electroncapture (^3H) gas chromatography with the column containing 8 % QF-1 and 4 % SF-96 on Chromosorb W, 100/120 Mesh mixed in the ratio 65:35.

Besides dieldrin and the DDT-metabolite DDE the chromatograms showed only PCB in a pattern which mostly resembled that of a 60 %-chlorinated type. Due to this, the sum of the heights of the two main peaks in the technical product Clophen® A60 was used as a standard for the PCB-estimation. The results of the chemical analysis are presented in Table 1 as mg chlorinated compound/kg extractable fat, in order to eliminate the differences in fat content due to the occurrence of embryos of varying size in many of the eggs.

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Table 1. PCB and organochlorine insectides in eggs from eider.

No.	Levels in ppm of fat weight								
	1970			1971			1972		
	Dieldrin	p,p'-DDE	PCB	Dieldrin	p,p'-DDE	PCB	Dieldrin	p,p'-DDE	PCB
1	—	1.84	60.8	0.508	2.35	19.2	0.257	1.73	11.1
2	0.336	1.10	16.0	—	—	—	0.178	1.72	9.9
3	0.123	2.12	22.2	0.256	1.14	34.6	0.240	1.43	10.4
4	0.093	1.74	9.9	0.292	1.45	8.4	0.362	1.05	21.4
5	0.567	1.95	44.5	0.232	1.01	15.9	0.164	1.05	11.3
6	0.265	2.63	58.0	0.236	2.44	10.2	0.211	1.51	10.9
7	0.660	2.32	47.8	0.109	1.52	14.9	0.258	1.07	23.0
8	0.323	2.52	8.6	0.670	1.91	48.5			
9	0.990	2.42	65.0	0.124	1.49	7.8			
10	0.158	2.55	17.4	0.313	1.44	19.3			
11				0.190	1.99	36.4			
12				0.372	1.51	7.4			
13				0.289	1.15	10.5			
14				0.522	1.26	18.7			
15				0.080	2.14	42.3			
16				0.408	1.56	8.0			
17				0.207	2.22	22.4			
18				0.214	1.33	16.4			
19				0.309	1.89	18.2			
Mean	0.39	2.12	35.0	0.29	1.66	19.9	0.24	1.37	14.0
± s	±0.30	±0.48	±22.4	±0.15	±0.44	±12.4	±0.07	±0.31	± 5.6

A gradual decrease of the contamination of all measured compounds is seen during this three year-period. It might be a result of restrictions for use of the persistent organochlorines, but more observations are needed.

The thickness of egg-shells was measured by a micrometer at the equatorial plane of the dried shells after removal of the membranes. The results (m.±s) were: 0.33±0.03 mm in 1970. 0.34±0.03 mm in 1971 and 0.35±0.03 mm in 1972. The lack of a significant difference in the thickness of the shells is seen as a proof that even the highest level of contamination in 1970 is too small to affect egg-shell thickness of eiders.

In order to compare these results with similar investigations in other countries in the same geographical area, available data from Norway, Finland and Holland are listed in Table 2. These residues are all calculated on a wet weight basis. Furthermore, the egg-shell indices measured according to *Ratcliffe* (1967) are given for comparison.

Like in Denmark the Dutch population of eiders is lately reported to be increasing (*Swennen* 1972), after a decline in

Table 2. PCB and organochlorine insecticides in eider eggs from different countries.

Country	Year	Number of eggs	Levels in ppm of wet weight			Egg-shell index mg/mm² (± s)
			Dieldrin	p,p'-DDE	PCB	
Norway[1] (Tromsø)	1970	12	not detected	0.40	0.27	2.28 ± 0.09
Finland[2] (near Helsinki)	1970	14	0.07	1.05	1.74	2.16 ± 0.13
Holland[3, 4]	1967	10	0.23	0.23	6.2	
(Wadden Sea)	1968	10	0.19	0.49	16.0	2.23 ± 0.15
	1970	5	0.065	0.22	5.8	(1964—1970)
Denmark	1970	10	0.095	0.56	9.3	
(Hov Røn)	1971	19	0.063	0.36	4.4	
	1972	7	0.050	0.29	2.7	2.33 ± 0.13

[1] Norway-report, OECD collaborative study 1969/71.
[2] Finland-report, OECD collaborative study 1969/71.
[3] J. H. Koeman: The occurrence and toxicological implications of some chlorinated hydrocarbons in the Dutch coastal area in the period from 1965 to 1970. Thesis, Utrecht 1971, pp. 79 and 81.
[4] TNO-nieuws 1972, October, p. 566.

1964—68 obviously related to intoxications with telodrin and dieldrin (*Koeman et al.* 1972). Thus it seems that the above presented burden of the investigated eggs does not adversely influence the eider population.

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