PCB and *p,p'*-DDE in Eggs of Cormorants, Gulls, and Ducks from the Bay of Fundy, Canada

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Relatively high levels of PCB and p,p'-DDE were found in eggs of double-crested cormorants *(Phalacrocorax auritus)*, herring gulls *(Larus argentatus)*, and black ducks *(Anas rubripes)*, from Fatpot Island (The Wolves, Bay of Fundy) and from Hospital Island (Passamaquoddy Bay, New Brunswick), collected in May 1971.

From 3 to 6 eggs taken from several nests were homogenized to yield one sample. Two extracts were prepared from all samples and analysed in duplicate. Extraction, cleanup, and gas chromatography were carried out as previously described (1,2). The heights of 5 out of the 6 major Aroclor 1254 peaks were used to quantify PCB. The results are summarized in Table 1.

TABLE 1

PCB and p,p'-DDE in eggs of cormorants, gulls and ducks

Species	Eggs No.	Av.wt. g	Nests No.	Stn.*	µg/g, wet weight PCB	p,p'-DDE
D.C. Cormorant	11	47.0	11	F	43.5±2.6**	29.4±8.5**
	4	39.3	4	H	17.2±0.79	8.63±1.25
Herring gull	10	99.1	6	F	12.6±6.1	5.67±3.03
	3	80.8	3	H	5.54±0.97	2.83±0.31
Black duck	4	105.6	4	F	9.10±0.53	1.50±0.20

*F = Fatpot Island; H = Hospital Island
**Standard deviation

Traces of hexachlorobenzene (C_6Cl_6) and p,p'-DDT were present in most samples. Cormorant eggs also contained traces of heptachlor epoxide and dieldrin. PCB resembled Aroclor 1254, but contained 3 small additional peaks of Aroclor 1260 with relative retention times (p,p'-DDE = 1.00) of 3.33, 3.76, and 5.28 in most samples.

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The levels of PCB in cormorant eggs are 6-33x higher than those reported by Risebrough (3) for eggs of *P. penicillatus* and *P. pelagicus* from California, 3-15x higher than those found in eggs of *P. aristotelis* from Britain (4), and 6-65x higher than those given for eggs of *P. auritus* from North Dakota and western Canada (5,6). PCB levels in eggs of *P. auritus* from Wisconsin and Manitoba, 25 and 18 µg/g, respectively (5), are comparable to those found in the Bay of Fundy.

Although the quantification of PCB is by no means accurate, the differences are too great to be caused by different quantification techniques and indicate that cormorant eggs from the Bay of Fundy contain higher levels of PCB than eggs from other investigated areas.

It is possible that PCB levels in herring gull eggs from the Bay of Fundy are higher than the levels found in other localities. Herring gull eggs from Britain contain 1 µg/g of PCB (4). The levels of PCB in the eggs of a similar species, California gull *(L. californicus)*, from western Canada are 1.57-1.74 µg/g (6).

Literature data on the PCB content of black duck eggs are not available. The concentration of PCB in mallard duck *(A. platyrhynchos)* eggs from western Canada is 0.09 µg/g (6).

Lower levels of PCB in gull and duck eggs compared to cormorant eggs may reflect different feeding habits of these species. Levels of PCB in herring *(Clupea harengus)* and mackerel *(Scomber scombrus)* from the Bay of Fundy, reported previously (1), indicate that PCB are concentrated by a factor of 44-110 from fish to cormorants. Major Aroclor 1254 peaks 4,5, and 6 are concentrated more in this process than peaks 1 and 2. Thus the sum of heights of peaks 4,5, and 6 as the fraction of the sum of heights of peaks 1,2,4,5, and 6 is 0.56 in Aroclor 1254, 0.38 in fish, and 0.72 in eggs.

Literature Cited

1. Zitko, V., Bull. Environ. Contam. Toxicol. 6, No. 5 (1971).
2. Zitko, V., J. Chromatog. 59, 444 (1971).
3. Risebrough, R.W., in Chemical Fallout, G.G. Berg and M.W. Miller, Editors, Charles C. Thomas, Springfield, Ill. (1969).
4. Prestt, I., D.J. Jeffries, and N.W. Moore, Environ. Pollut. 1, 3 (1970).
5. Anderson, D.W., J.J. Hickey, R.W. Risebrough, D.F. Hughes, and R.E. Christensen, Can. Field Naturalist 83, 91 (1969).
6. Reynolds, L.M., Residue Reviews 34, 27 (1971).