

## Mercury and Organochlorines in Eggs from a Norwegian Gannet Colony

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FIMREITE et al. (1980) reported a relatively sharp decline in DDE and PCBs levels and a corresponding increase in mercury levels in eggs collected from a Norwegian gannet (Morus bassanus) colony between the years 1972 and 1978. The procedure was therefore repeated in 1979 to see whether or not these changes represented a trend. In addition to the above pollutants this paper reports data on HCB levels.

### MATERIALS AND METHODS

The materials for this study consisted of addled eggs that were collected shortly after the laying season and stored frozen until analysis took place. The collection site is located near Nordmjele at 69°08' N in northern Norway.

Eggs were analyzed for DDE, PCBs and HCB by a gas chromatographic method described by BJERK & SUNDBY (1970). The PCBs were determined via pattern recognition using the commercial PCB standard Aroclor 1254, and the sum of peaks numbers 7, 8, and 10 was used (JENSEN 1972). Analysis for total mercury by flameless atomic absorption spectrophotometry followed the procedure of HATCH & OTT (1968).

### RESULTS AND DISCUSSION

A significant decrease in DDE as well as PCBs levels had taken place between the years 1972 and 1978. The 1979 data support the hypothesis that this indicates a trend as the average DDE and PCBs concentrations dropped further by 33 and 43 per cent, respectively (TABLE 1). This very favorable development is attributed to the discontinuation of practically all DDT uses in western Europe in the course of the 1970s and the restrictive emission standards that have been set for principal PCBs sources in the recent years.

TABLE 1. Mercury and organochlorines (ppm, wet weight basis) in eggs from a Norwegian gannet colony.

Year:	1972 (n=10)	1978 (n=11)	1979 (n=14)
Compound	$\bar{X} \pm$ S.D.	$\bar{X} \pm$ S.D.	$\bar{X} \pm$ S.D.
Mercury	0.58 $\pm$ 0.12	0.80 $\pm$ 0.09	0.36 $\pm$ 0.11
DDE	2.1 $\pm$ 1.5	0.66 $\pm$ 0.27	0.43 $\pm$ 0.24
PCBs	7.7 $\pm$ 4.6	3.5 $\pm$ 1.7	2.0 $\pm$ 1.7
HCB			0.033 $\pm$ 0.0018

Only the eggs collected in 1979 were analyzed for HCB. The concentrations were very low (0.033  $\pm$  0.0018 ppm), corresponding to those reported in eggs of gulls (Larus argentatus, L. canus, and L. ridibundus) from uncontaminated areas in southern Norway (BØCKMAN et al. 1981)

The average mercury levels increased from 0.58 ppm in 1972 to 0.80 ppm in 1978 and then dropped to 0.36 ppm the following year (TABLE 1). There were small variations within the years and the above changes were by t-test found to be statistically significant ( $p < 0.01$ ). These almost dramatic shifts in residue levels are hard to interpret. They are hardly due to corresponding alternations in the releases of mercury to the environment as a gradual reduction in the mercury discharges has taken place in Europe since the beginning of the 1970s in order to comply with various governmental emission standards (WATSON 1979). Moreover, the persistence of mercury in the environment (WINDOM & KENDALL 1979) makes such sudden changes in its availability unlikely.

A more likely interpretation is that the above findings reflect alternations in the gannets' food supply. Gannets feed on different pelagic fish species which may vary in numbers from year to year and the mercury concentrations in such fish show much variation both within and among species (WINDOM & KENDALL 1979).

As to possible biological effects the present levels of DDE, PCBs, and HCB are well below those that by experience have caused problems as for example eggshell thinning. The mercury concentrations come closer to

such levels as 0.5 ppm of mercury in eggs have been associated with reproductive impairment in pheasants (Phasianus colchicus) (FIMREITE 1971). However, since fish and seafood in general, which constitute the diet of gannets, are rich in selenium, a strong antagonist to mercury (STOEWSAND et al. 1974), such concentrations are probably well within safe limits too, an assumption that is strengthened by the fact that the gannet colony, according to our observations, appear to be reproducing normally.

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