TOXIC METALS IN PUFFINS *FRATERCULA ARCTICA* FROM THE ISLE OF MAY AND ST KILDA

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Evidence is accumulating which shows that the marine environment of north-west Scotland may be an area where the fauna accumulate high concentrations of cadmium and mercury in their tissues. It is thought that there may be natural sources for most of the metal accumulated, although care must be taken to allow for a mercury source originating from industries discharging waste into the Irish Sea. Recent work on puffins *Fratercula arctica* supports the view that north-west Scotland is a high metal area, because puffins from St Kilda, an island group west of the Outer Hebrides, have much higher concentrations of toxic metals than do puffins from the Isle of May, an east coast colony in the Firth of Forth (Table 20).

Table 20. Regional differences in mean cadmium and mercury concentrations (mg kg^{-1} dry wt) in puffins *Fratercula arctica* collected from the Isle of May and St Kilda, just after egg-lay.

	Cd		Hg	
Tissue	I.o. May n = 11	St Kilda n = 10	I.o. May n = 11	St Kilda n = 10
Liver	<2	20	<1	5
Kidney	<10	114	1	5
Pancreas	ND	22	<1	<2
Gonda	<3	17	<3	2

Note: ND = none detected

Whilst it is known that all of the birds sampled on St Kilda were breeding, it is possible that the high metal concentrations there may be imposing some 'stress' from which the Isle of May population is free. It has yet to be determined what influence (if any) the metals have on individual survival, breeding success, or the body size differences which exist between St Kilda and the Isle of May puffins. Possibly, however, the high metal concentrations may exacerbate the problems caused by food shortage that the St Kilda puffins are known to be experiencing.

The data in Table 20 were all collected at the same time of year (although collections were made in different years, this is not thought to influence the results). Comparison between samples must be made with due regard to the time of year, for the puffin, like other birds such as starling *Sturnus vulgaris* and dunlin *Calidris alpina*, seems to undergo seasonal variations in the levels of cadmium and mercury in its tissues (Table 21). In starlings and dunlin, this seasonal change was associated with moult, for the highest concentrations occurred in mid-moult and declined thereafter. Because the puffin moults in winter, the recorded decline in metal concentrations could also be associated with a moult-related peak in these concentrations, as the post-moult period of the puffin coincides with the breeding season.

Table 21. Seasonal differences in mean metal concentrations (mg kg^{-1} dry wt) in Isle of May puffins

		Period in reproductive cycle	
Metal	Tissue	Pre-lay n = 6	Rearing n = 6
Cadmium	Liver	2	<< 1
	Kidney	16	5
	Pancreas	3	ND
	Gonad	< 3	ND
Mercury	Liver	2	0·5

Note: ND = none detected.

These findings reinforce our current view that seasonal changes, and regional differences, in toxic chemical concentrations should be a central consideration in the design of any environmental monitoring programme. This, and the possible importance of these seasonal variations in the environmental toxicity of the metals, is discussed more fully elsewhere (see references).

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References

Osborn, D. 1979. Seasonal changes in fat, protein and metal content of the liver of the starling (*Sturnus vulgaris*). *Environ. Pollut.*, **19**, 145–155.

Osborn, D., Harris, M.P., & Nicholson, J.K. 1979. Comparative tissue distribution of mercury, cadmium and zinc in three species of pelagic seabirds. *Comp. Biochem. Physiol., C.* **64**, 61-67.

POLLUTANTS IN GANNET EGGS

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Concern over pollution of the seas has persisted ever since it was realised that many toxic chemicals (eg DDT and its metabolites) appear in many forms of marine life, even those living far from industrial or agricultural sources. Consequently, monitoring of pollutants in, and determining the effects of pollution on, seabird populations is an important part of ITE's work, as there are many large internationally important seabird breeding colonies around the British coast.

As part of a monitoring programme, the concentrations of pollutants in eggs of gannets *Sula bassana* collected from the colonies of the Bass Rock (North Sea) and Ailsa Craig (Irish Sea) are being determined each year.