Opportunism and migration increase PCB levels in Arctic seabirds

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Protecting the Arctic ecosystems against effects from chemicals is a global concern. Because persistent organic pollutants (POPs) accumulate in lipid tissues, body concentrations tend to increase with the trophic level of the organism, reaching highest body concentrations in top predators. To assess POP accumulation, body concentrations are often predicted from the species' trophic level and the octanol-water partitioning coefficient of the chemical. However, for Arctic seabirds such predictions have been shown to deviate up to a factor of 10 from observed body concentrations (Fisk *et al.*, 2001ab; Hop *et al.,* 2002*;* Buckman *et al*, 2004). Using an extensive dataset of PCB concentrations in Arctic seabirds, we developed a mechanistic model which included migration and opportunistic feeding that predicts PCB body concentrations within a factor of 3 from observed body concentrations in 4 seabird species from the Barents Sea area. Our mechanistic bioaccumulation model suggests that the migrant Black-legged Kittiwake had a 10-fold higher PCB body concentrations than Brünnich's Guillemot, an ecologically equivalent species that does not migrate. Opportunistic feeding on mammalian carcasses and chicks increased PCB body concentrations in the Glaucous Gull by a factor of 4 compared to a scenario where this species feeds on fish only. This thoroughly tested mechanistic model (Hendriks *et al.,* 2001) demonstrates that current assessments of PCBs – and possibly of other POPs that are not readily metabolized – underestimate body concentrations. As such the ecological risk caused by PCBs may currently be underestimated.

References

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