POLYBROMINATED DIPHENYL ETHERS IN BIRDS FORAGING ON A LANDFILL SITE IN PRETORIA SOUTH AFRICA

Emereole Chino, Ray Jansen, Okechukwu Jonathan Okonkwo*,

[1]Department of Environmental, Water and Earth Sciences, Tshwane University of Technology, Private Bag X680, 175 Nelson Mandela Drive, Arcadia, Pretoria 0001, Gauteng South Africa.

Introduction: Polybrominated diphenyl ethers (PBDEs) were commonly used flame-retardants (FRs) until recently.[1-4] Consequently, they are present in various environmental matrices such as soil, air, plants and wildlife.[5-6] Avian wildlife has frequently been used as an indicator of chemical pollution exposure and toxicity for assessing the health of ecosystems.[2-3] Whereas PBDEs have been studied in different types of birds from varying ecosystems, few of these studies have focused particularly on scavenger birds. It is important to study these birds since many scavenger birds forage on sites close to human population. Therefore, in the present study, PBDE concentrations were determined in two species of birds Grey-headed gull (*Larus cirrocephalus*) and African Sacred Ibis (*Theskiornis aethiopicus*). The aforementioned birds scavenge at Ondestepoort landfill site in Pretoria, South Africa.

Materials and methods: Four primary flight feathers (two from each wing) were sampled from each bird, wrapped in aluminium foil and transported to the laboratory. The birds were released immediately after sampling. The feathers were dried overnight at room temperature and cut into ~ 1 mm. PBDEs was extracted from the feathers using ultra-sonication with hexane/DCM as the extracting solvents. The extracts were cleaned in a column and analysed using Shimadzu 2010 Plus gas chromatograph coupled with a model QP 2010 Ultra mass spectrometer operated in electron ionization (EI) mode. Eight PBDE, BDEs -28, -47, -99, -100, -153, -154, -183 and -209, were targeted. Injection was by Shimadzu A0C-20i auto sampler, and separation was achieved using a 15 m DB 5 column (0.25 mm id, 0.25 μm df). Analysis was conducted in selective ion monitoring (SIM) mode. The oven temperature programme was started at 100°C (1 min), ramped up to 160°C at 15°C/min, ramped again to 300°C at 30°C/min, and finally to 325°C at 10°C/min. Helium (99.999% purity) was used as the carrier gas, and the flow rate was kept constant at 1.5ml/min. The injector, transfer line and ion source temperatures were set at 225, 300 and 250°C, respectively.

Results: PBDEs were detected in all the feathers sampled. The PBDE concentrations obtained are shown in Figure 1. Median ∑PBDE values were 95.10 ng/g, and 179.08ng/g for Grey-headed gull and African sacred ibis respectively. Of all the eight PBDEs investigated, a total of seven were detected in the Grey-headed gull and African Sacred Ibis. As can be seen in Figure 1, BDE209 and BDE100 are the dominant congeners in grey-headed gull and the African sacred ibis respectively. It should be noted that the PBDE values observed in the feathers would most probably represent *both* internal and external deposition. Internal deposition can occur during feather formation, in which case the PBDEs are incorporated into the feather structure from the blood circulating at the time of feather formation; external deposition, on the other hand, can occur as PBDE-bearing particles from the surrounding environment adhere to already formed feathers. External deposition could also occur during pruning, in which case PBDEs picked up during foraging get deposited on the feathers.

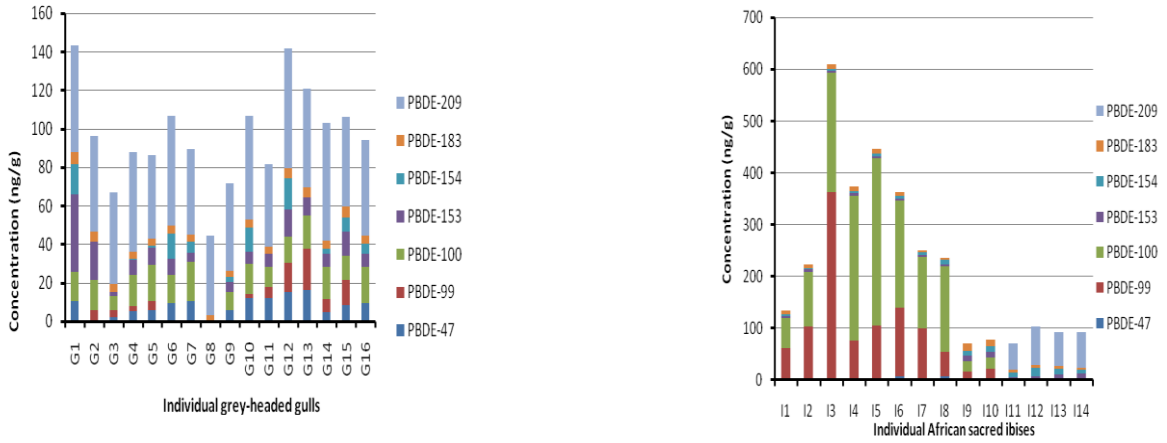

Figure 1: PBDEs in Grey-headed gull and African sacred ibis feathers

Conclusions: In the present study, PBDEs were identified in the feathers of grey-headed gulls and African sacred ibises from a landfill site in Pretoria, South Africa. The observed concentrations were generally high. The observed PBDEs may have originated from the landfill site soil and may have been picked up during feeding and pruning from contaminated soil.

References

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