OPEN ACCESS

Scientific Letters

II TOXRUN
International Congress 2023
27-28 April, 2023 | Porto, Portugal

Oral Communication 11

Seabirds as bioindicators of anthropogenic and chemical pollution

D. M. Matos [1,*], J. A. Ramos [1], L. C. Brandão [2], F. Bessa [1], V. Silva [1], I. Rodrigues [3], S. Antunes [3], I. dos Santos [1], J. Coentro [1], S. C. Cunha [4], J. O. Fernandes [4], L. A. E. Batista de Carvalho [2], M. P. M. Marques [2,5], S. Santos [1] and V. H. Paiva [1]

[1] University of Coimbra, MARE – Marine and Environmental Sciences Centre / ARNET – Aquatic Research Network, Department of Life Sciences, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal
[2] University of Coimbra, Molecular Physical-Chemistry R&D Unit, Department of Chemistry, 3004-535 Coimbra, Portugal
[3] Biosfera Cabo Verde, Sul do Cemitério, Rua 5 – Caixa Postal 233, São Vicente, Cabo Verde
[4] LAQV/REQUIMTE, Laboratório de Bromatologia e Hidrologia, Faculdade de Farmácia, Universidade do Porto, Rua de Jorge Viterbo Ferreira 228, 4050-313 Porto, Portugal
[5] University of Coimbra, Department of Life Sciences, Calçada Martim de Freitas, 3000-456 Coimbra, Portugal

* Correspondence: dianammatos92@outlook.com

Abstract

Background: Marine pollution, caused by anthropogenic debris, is a significant environmental issue that has detrimental effects on marine ecosystems [1]. Finding suitable sentinel species of the human impacts on the oceans, is imperative. As top predators, seabirds are considered sentinels of the marine environment [2]. **Objective:** To provide quantitative data about the distinctive prevalence of anthropogenic pollution on seabirds, five species with different trophic and foraging ecology inhabiting the tropical Atlantic region were used. **Methods:** The occurrence of anthropogenic debris was assessed using faeces as a proxy for ingestion. Particles were chemically analysed using micro-Fourier transform infrared spectroscopy (mFTIR) [3]. Moreover, preen oil and plasma samples were analysed for Polybrominated Diphenyl ethers (PBDEs) and methoxylated PBDEs (MeO-PBDEs), through with gas chromatography–mass spectrometry (GC-MS/MS) [4]. **Results:** There were found 438 items suspected of anthropogenic origin, mostly fragments and fibres in all species. *Phaethon aethereus* (PA n=61), *Calonectris edwardsii* (CE n=119) and *Sula leucogaster* (SL n=82) presented the highest frequency occurrence (FO: 51%, 49%, 48%), while *Bulweria bulwerii* (BB =86) and *Puffinus lherminieri boydi* (PB n=86) the lowest (FO: 30%, 36%) of anthropogenic particles. Particles revealed a high diversity of polymers, from cellulosic particles to synthetic plastics. PBDEs and MeO-PBDEs were detected in all species and matrices, whereby preen oil had higher concentrations and variety of congeners than plasma. PB had the lowest chemical concentrations in both tissues compared to other species. Moreover, it was not found any correlation between chemical compounds concentration and the number or occurrence of anthropogenic particles. However, particles and chemical compounds were more prevalent in species that explore areas associated to anthropogenic activities. **Conclusions:** Overall, anthropogenic pollution is transversal to all species, ranging from particle ingestion to chemical compounds. We considered that it is necessary to continue monitoring the impacts of global anthropogenic pollution considering the declines in seabirds' population.

Keywords: tropical seabirds; anthropogenic debris; PBDEs; foraging ecology; trophic ecology

Acknowledgments

This work received financial and logistic support for fieldwork campaigns, from the project Alcyon – Conservation of seabirds from Cabo Verde, coordinated by BirdLife International and funded by the MAVA foundation (MAVA17022; http://en.mava-foundation.org), through its strategic plan for West Africa (2017-2022). DMM was supported by Fundação para a Ciência e Tecnologia (FCT; SFRH/BD/143659/2019). Molecular Physical-Chemistry R&D Unit financed by FCT (UIDB/00070/2020; UIDP/00070/2020).

References

1. Lewis SL, Maslin MA. Defining the Anthropocene. Nature. **2015,** 519, 171–180.
2. Burger J, Gochfeld M. Marine Birds as Sentinels of Environmental Pollution. Ecohealth. **2004,**1, 263–274.
3. Bessa F, Kogel T, Frias J, Lusher A. Harmonized protocol for monitoring microplastics in biota. Micropoll-Multilevel assessment of microplastics and associated pollutants in the Baltic Sea View project. **2019**, 1–30.
4. Cruz R, Marques A, Casal S, Cunha SC. Fast and environmental-friendly methods for the determination of polybrominated diphenyl ethers and their metabolites in fish tissues and feed. Science of the Total Environment. **2019**, 646, 1503–1515.