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SETAC EUROPE 31ST ANNUAL MEETING

ABSTRACT BOOK

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ABSTRACT BOOK
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This book compiles the abstracts from the platform and poster session presentations at the 31st Annual Meeting of the Society of Environmental Toxicology and Chemistry - Europe (SETAC Europe), conducted as a virtual conference from 3–6 May 2021.

The abstracts are reproduced as submitted by the author and accepted by the Scientific Committee. They appear in order of abstract code and alphabetical order per presentation type. The poster spotlight abstracts are included in the list of poster abstracts. The presenting author of each abstract is underlined.

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cetaceans and represents a substantial advance in our understanding of the relationship between PCB exposures and male reproductive biology in cetaceans. As testes weight is a strong indicator of male fertility in seasonally breeding mammals, we suggest the inclusion of such effects in population level impact assessments involving PCB exposures. Given the re-emergent PCB threat our findings are globally significant, with potentially serious implications for long-lived mammals. We show that more effective PCB controls could have a substantial impact on the reproductive health of coastal cetacean species and that management actions may need to be escalated to ensure adequate protection of the most vulnerable cetacean populations.

2.05.16
Does Microplastic Ingestion Affect Fatty Acid Composition in the Japanese Quail?
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Plastics are pervasive pollutants in the environment and birds are among the most highly exposed groups of animals. High amounts of plastics and microplastics (MPs: < 5 mm) have been found in bird stomachs, which can result in altered physiology and starvation. Several studies in invertebrates have shown MPs to decrease lipid accumulation, and recent research has shown that polystyrene MPs influence lipid metabolism and fatty acid composition in zebrafish. Triglycerides and fatty acids are integral for energy storage and use in birds, especially in fledglings. However, very little research has focused on how MP ingestion affects fatty acid composition in birds. In the present experiment, we orally exposed Japanese quail (*Coturnix japonica*) to two different size classes of MPs to determine their effect on the composition and abundance of fatty acids in the liver. Fifty-six quails were randomly divided into four groups (n=14) including one control and three treatment groups exposed to either < 125 µm MP powder, 3 mm MP pellets, or a combination of the two size classes. The MP consisted of a mixture of polystyrene, polyethylene, and polypropylene with doses ranging from 25 mg to 75 mg per exposure. Starting at one week old, quails were fed MPs every third day for six weeks. After six weeks, the quails were sacrificed and liver samples were collected. Livers were flash frozen in liquid nitrogen and stored at -80 ºC until further analysis. After hydrolysis and extraction, fatty acid composition was analyzed using supercritical fluid chromatography with mass spectrometry (SFC-MS). The results of this ongoing study will be presented at the conference.

2.05.17
Analysing Avian Reproduction Studies Via Bioenergetics Modelling: DEB - TKTD for the Bobwhite Quail and the Mallard
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Current environmental risk assessments addressing chronic exposure of chemicals to birds is based on complex and controlled reproduction laboratory experiments. These experiments produce many response variables that are usually separately analysed which hampers a better understanding of the effects of the tested chemical as well as extrapolation to field conditions. In addition, behavioural responses are rarely considered. A way to better understand the avian reproduction data is to use mechanistic modelling, such as Toxicokinetic – Toxicodynamic (TKTD) modelling.
Specifically, Dynamic Energy Budget (DEB) models coupled with TKTD modules (DEB-TKTD) are the leading approach to assess sublethal effects of chemicals on individuals by making holistic use of all data available through integration in a unique framework. In their current state, DEB models do not include the necessary flexibility to accurately capture the variety and specificity of data from avian reproduction studies. Here we present a tailored DEB-TKTD model able to overcome this challenge. We tested our model on 10 avian reproduction studies conducted on 5 different pesticides. The new implementation accurately captured the growth and reproduction observed in these studies. In addition, with this implementation, possible behavioural and direct physiological effects of the pesticides were quantified separately and in combination. This approach has the potential to make better use of existing and future data sets and provides means for a more accurate extrapolation of effects to birds from pesticide exposures in the field.

2.05.18
Land Use in Habitats Affects Metal Concentrations in Wild Lizards Around a Former Lead Mining Site
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Several studies have described environmental hazards preceding city development. Examples are environmental contamination in developing countries that is caused by poorly managed electronic waste-recycling facilities, dumping grounds, and mining sites. Until remediation is complete, humans and animals continue to be exposed to toxic substances. Moreover, even if the environment is not suitable for people to live in since contamination sources often correspond with local economic drivers, social communities and economic activities continue to flourish and fuel urbanization regardless. Therefore, appropriate city planning should be conducted before mass construction begins, so that people can receive the benefits of urbanization while their exposure to environmental pollutants is mitigated. We investigated the potential effects of different land use and other environmental factors on animals living in a contaminated environment. The study site in Kabwe, Zambia, is currently undergoing urban expansion, while lead contamination from former mining activities is still prevalent. We focused on a habitat generalist lizards (Trachylepis wahlbergii). The livers, lungs, blood, and stomach contents of 224 lizards were analyzed for their lead, zinc, cadmium, copper, nickel, and arsenic concentrations. Habitat types were categorized based on vegetation data obtained from satellite images. Multiple regression analysis revealed that land use categories of habitats and three other factors significantly affected lead concentrations in the lizards. Further investigation suggested that the lead concentrations in lizards living in bare fields were higher than expected based on the distance from the contaminant source, while those in lizards living in green fields were lower than expected. In addition, the lead concentration of lungs was higher than that of the liver in 19% of the lizards, implying direct exposure to lead via dust inhalation besides digestive exposure. Since vegetation reduces the production of dust from surface soil, it is plausible that dust from the mine is one of the contamination sources and that vegetation can reduce exposure to this.

2.05.20
Assessing the Impacts of Pesticide Exposure on Farmland Birds in England
P. Vijendra, University of Sussex / Evolution, Behaviour and Environment; D. Goulson, School of Life Sciences, University of Sussex
Pesticides have played a significant role in the agricultural landscape, by protecting crop from damage, and improving and increasing yields. However, there is strong evidence for their negative impact on ecosystems. Pollinators have significantly declined, predatory bird populations have only recently recovered from the lethal effects of organochlorines, and aquatic systems remain contaminated from long-term exposure. Extensive research has led to lethal pesticides to be banned from agricultural use but there have since been more toxic pesticides introduced, and the long-term effects of these are often unknown. Using bird abundance data and pesticide usage data for England, we conducted a spatio-temporal analysis to understand the changes in population of farmland bird species over 23 years and whether any of the associations were explained by exposure risks. The data will help us understand the risk posed by pesticides to farmland birds and identify the species most threatened by pesticide use.

2.05.21
Persistent Organic Pollutants in Feathers of the Greater Rhea (Rhea americana), a Near-Threatened Flightless Bird of the Pampas Grasslands
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Persistent Organic Pollutants (POPs) are still globally distributed and can exert different effects on ecosystems. Little is known about the occurrence of these contaminants in terrestrial birds from South America. In this study, POPs were assessed for the first time in a flightless herbivorous species from the Pampas grasslands, the Greater rhea (*Rhea americana*). Concentrations of polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs) and organochlorine pesticides (OCPs), were determined in 18 samples of feathers from free-ranging and captive individuals inhabiting four sites with different land use in central Argentina. Among the 16 POPs tested in those

feathers, 6 PCBs (28, 52, 101, 138, 153 and 180) and 8 OCPs (α-HCH, β-HCH, γ-HCH, p,p'-DDE, p,p'-DDD, o,p'-DDT, p,p'-DDT and HCB) were quantified. No PBDEs were detected. Total concentration of POPs was higher in populations living in an intensive crop production area (Agriculture: 159 $ng.g^{-1}$ and Farm: 97.53 $ng.g^{-1}$) compared to the population in an urban area (Zoo: 45.86 ng/g) and an agroecosystem with extensive rearing of livestock (Cattle rearing: 36.77 $ng.g^{-1}$). PCBs were the most abundant pollutants in all the populations studied. Lower chlorinated CB 52 and CB 101 were the principal PCB congeners detected, representing at least 70% of the total quantified. All populations studied showed a DDE + DDD / DDT ratio > 1, indicating a historical application of this insecticide. This study provides a new contribution to the scarce data on POP concentrations in South American bird species. Further investigations are needed to evaluate their potential effects on the health individuals and populations.

2.05.22

Presence of Organic Micropollutants in Greater Flamingo From Ebro Delta Natural Park

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Ebro delta is a wetland of international importance for water bird conservation. In a relatively small surface, it comprises a great diversity of habitats and species: a total of 343 species of birds have been observed in the delta, from which 100 species breed regularly and 15 occasionally (1). Over the last 150 years the extensive wetland reclamation for rice cultivation has resulted in the loss of 65% of the natural habitats (2). The agricultural activities and the runoffs inputs from industries and wastewater treatment plants are an important source of organic contaminants to Ebro delta. In the recent years the presence of pesticides, pharmaceuticals, perfluorinated compounds and organophosphorus compounds has been reported in soils, sediments and water from Ebro delta. These organic contaminants can be bioaccumulated and transferred along the food chain affecting avifauna. The accumulation of pollutants in Yellow-legged gulls and Audouin's gulls from the delta Ebro have been reported in the recent years (3). The Greater Flamingo (*Phoenicopterus roseus*) is an emblematic species of the Ebro Delta Natural Park, since it is the only place where it breeds in Catalonia and one of the few stable places in the western Mediterranean. Conserving the species in one of the main objectives of the Natural Park, implying an accurate monitoring program. However, polluted sediments and water can affect flamingos and induce potential adverse effects on reproduction and survival, although this has never been assessed before. In this study, we have analysed for the first-time a near one hundred of contaminants, including pharmaceuticals, perfluorinated compounds, organophosphorus flame retardants and pesticides in blood from chicks of greater flamingos with aim to value their potential impact in the conservation status of the species. Our results suggest ovo- transfer of pollutants and sediment ingestion as a source of contamination of flamingo's flagging's. 1. Bigas D, Curcó A. Llista patró dels ocells del delta de l'Ebre. Parc Natural del Delta de l'Ebre, Generalitat de Catalunya [Internet]. 2015. Available from: http://parcsnaturals.gencat.cat/web/.content/home/delta_de_lebre/coneix-nos/centre_de_documentacio/fons_documental/publicacions/revistes_i_butlletins/noticiari_ornitologic/Nova_Edicio_llista_patro_ocells_Delta2015_web.pdf 2. Prado P, Alcaraz C, Benito X, Caiola N, Ibáñez C. Pristine vs. human-altered Ebro Delta habitats display contrasting resilience to RSLR. Sci Total Environ [Internet]. 2019;655:1376–86. Available from: https://doi.org/10.1016/j.scitotenv.2018.11.318 3. Zapata P, Ballesteros-Cano R, Colomer P, Bertolero A, Viana P, Lacorte S, et al. Presence and impact of Stockholm Convention POPs in gull eggs from Spanish and Portuguese natural and national parks. Sci Total Environ [Internet]. 2018;633:704–15. Available from: https://doi.org/10.1016/j.scitotenv.2018.03.081

2.05.24

A Novel Role for Natural Science Collections in European Contaminant Monitoring

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Natural science collections (NSCs) increasingly engage in a wide range of applied research. Monitoring of contaminants in biota is relatively novel for NSCs, but has potential for high environmental, social and economic impact, which can in turn enhance the value of collections. Tens of thousands of chemical substances are released into Europe's environment and the tonnage of toxic substances used increases annually. Their increasing ubiquity carries high costs for wildlife and human health. EU regulations seek to address this challenge and the European Green Deal aims for a non-toxic environment with better monitoring of environmental pollutants and of the effectiveness of chemicals legislation. Yet regulators struggle to assess and manage chemical risks, given the vast number of substances involved and the lack of data on exposure and hazards. Raptors, as apex predators, are particularly well suited to contaminant monitoring. The European Raptor Biomonitoring Facility (ERBFacility) aims to put in place a distributed 'Facility' that brings together field ornithologists, collections and analytical laboratories, for the gathering, storage and analysis of raptor samples to deliver data at pan-European scale on contaminants in raptor tissues. Such data can usefully inform the prioritisation of substances for risk assessment, provide early warning of emerging contaminant problems, and throw light on the effectiveness of chemical risk management measures. This poster focuses on ERBFacility work to develop a distributed European Raptor Specimen Bank, including: (a) a review of existing collections of frozen raptor carcasses/tissues; (b) a protocol for NSCs for gathering, processing and storing of raptor carcasses/tissues for contaminant monitoring; (c) guidance for shipment of samples; (d) a European raptor specimen database aligned with the Distributed System of Scientific Collections (DiSSCo) Research Infrastructure and linked to the LIFE APEX tissue sample catalogue and contaminant databases. ERBFacility is already identifying and sourcing relevant raptor samples from collections across Europe for a pan-European proof of concept study and for pan-European demonstration studies under the LIFE APEX project. These studies are expected, inter alia, to aid EU agencies in the prioritisation of substances for persistence, bioaccumulation and toxicity (PBT) assessment. Eventual savings in terms of reduced impacts on human and wildlife health could be substantial.