SHORT TERM SCIENTIFIC MISSION (STSM)
SCIENTIFIC REPORT

This report is submitted for approval by the STSM applicant to the STSM coordinator

Action number: CA16224
STSM title: Review of analytical methods for contaminant monitoring
STSM start and end date: 01/07/2021 to 30/09/2021
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PURPOSE OF THE STSM:

The main purpose of this STSM is to elucidate future directions in order to improve techniques that detect pollutants and create a useful database for analysing them in the laboratories. To achieve that, a literature survey was performed about analytical techniques used for research and monitoring pollutants. Through this work, a basis for a peer reviewed papers that summarize the main methods used for biomonitoring of environmental contaminants in raptors in Europe will be established.

DESCRIPTION OF WORK CARRIED OUT DURING THE STSMS

To perform the review, tasks that carried out during this STSM are as followed:
1. Literature search of main journal articles (indexed, peer reviewed) and book chapters or technical reports from official institutions regarding the analytic methods used for research and monitoring pollutants in avian species, in order to achieve that key-words were defined.
2. Different types of pollutants studied separately (eg heavy metals, pesticides), with the same procedure like first step.
3. Creation of a dataset matrix which includes analytical methods and references used. This dataset, also includes core parameters like sample size, levels of detection (LOD) and quantification (LOQ), when it is available.

The above steps were taken before the stay in Murcia. Between July and August, a communication was establised between me and prof. García-Fernández' about the literature search and structure of the information collected.

During my stay in prof. García-Fernández' laboratory, I had the opportunity to see and work by myself in all these analyticals techniques used in toxicology. An application of methods mentioned in the literature about analytical pollutant techniques was carried out in the laboratory, in order to gain a better understanding of the methods used. Specifically, samples of feathers, liver and bones of Cinereous vulture were analysed. Following the method described by Garcia-

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Fernandez et al. (1995). Also, we prepared blood samples of raptors for pharmaceuticals (antibiotics and non-steroideal anti-inflammatory drugs) analysis, with QuEchERs method and analysis was performed with LS/MS.

This experience was very useful for my work on the review as I was not familiar with these specific techniques. Therefore, it enlightened me on how to analyze heavy metals and pharmaceuticals and made my work on the review way easier. Also, Prof. García-Fernández helped me a lot on how to structure the collected information from the published work and recognize the importance of some steps in the analytical process.

DESCRIPTION OF THE MAIN RESULTS OBTAINED

The results obtained from the STSM are the following: (a) Folder containing the main journal articles and book chapters or technical reports published about contamintants (b) Excel file with all the papers published so far, extracting the main information (title, authors, journal, year of realization) (c) Excel file with the analytical techniques used in each paper used and columns that include core parameters like sample size, limits of detection (LOD) and quantification (LOQ).

At the moment tha dataset about heavy metals is completed and the same procedure is on going about pesticides detected in raptors.

Overall, the output of this STSM has been the revision of all papers published (from the 2000 to the 2021) in contamination in raptors, resulting in a dataset with all papers organized by author, year of publication and country. Also, important information extracted and summarized (see Table 1) in order to build the skeleton of the review.

Table 1 : Iinformation extracted from literature survey constituting the columns of the excel matrix

Species	Type weight (dry weight or wet weight)	Analytical technique(s)
Sample size (n)	Contaminant (Chemical element or type of pesticide)	LOD (Limit of Detection)
Country of study	Concentration ("Arithmetic Mean ± SD" or/and "Median or Geometric Mean ± SD" or/and "Range")	LOQ (Limit of Quantification)
Sampling Year of study	Volume/ Weight of Sample (g or/and mL)	Recoveries (%)
Matrix	Preparation of Sample (Cleaning,Digestion Method, Reagents for Digestion)	Reference (Authors, Year of publication)
		Aim of the study

FUTURE COLLABORATIONS (if applicable)

The template is a 'work in progress' at the moment, but, it should be completed this in the coming months or so. We are now finalizing data obtained from the literature survey about heavy metals. Then after this step is finished, work will be focused on developing a scoring system on those techniques like Valverde et al. (2021)[1], rank will consider different criteria (i.e. sample amount required, recoveries, levels of detection (LOD), limits of quantification (LOQs)). Then, a final summary of current analytical methods will be carried out and the limitations of them, in European laboratories, will be noted. Finally, we expect to prepare a scientific paper publication and a powerpoint presentation for the next COST meeting.

[1]Valverde et al. 2021. Wildlife poisoning: a novel scoring system and review of analytical methods for anticoagulant rodenticide determination. Ecotoxicology. 2021 Jul;30(5):767-782. doi: 10.1007/s10646-021-02411-8.

I approve this scientific report by Eirini Trypidaki