Emerging contaminants in biota

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The determination of emerging contaminants in biota is a difficult task and a major analytical challenge because of both the complexity of biological matrices, for example algae, fish, shellfish, mammals, or eggs, and the low parts per trillion levels at which the target compounds are present. However, examining emerging contaminants in biota has becoming a very important issue because it reveals their movement within organisms and through food chain, and provides the context for understanding and quantifying injuries to organisms and their communities. Let us not forget that human beings—the top of the trophic chain—are the foremost step in the links between exposure to chemicals in the environment and the resulting human and environmental health effects.

The analysis of biota is significantly more demanding than the analysis of water or soil. Specific methods for biota analysis, which ensure accurate measurement of the analytes of concern, must be developed. Overall trends in analytical methods for biota analysis include:

1. greater use of generic extraction methods able to extract as many compounds as possible, but simply, rapidly, and ecologically;
2. increased use of fast gas chromatography–mass spectrometry (GC–MS) and liquid chromatography–mass spectrometry (LC–MS) in all its forms; and
3. more biological detection and integrated approaches combining chemical and biological methods.

An ideal method for emerging contaminants analysis in biota should be sensitive, selective, accurate, precise, automated, inexpensive, applicable to a wide range of contaminants, and capable of providing unambiguous structural information. Although such ideal methods are not encountered in practice, it is necessary to look for them.

The scope of this special issue focuses on the application of currently used or novel developments of analytical methods in the determination of emerging contaminants in biota. The critical reviews and numerous original research papers reflect the scope, extent, and difficulty of these analyses. The target of the critical reviews is to detail state-of-the art analytical and bioanalytical methods and/or techniques with emphasis on recent advances and future prospects. Several reviews focus specifically on the techniques used to identify and characterize emerging contaminants and the analytical and bioanalytical techniques applied to biota analysis, for example in-vitro test systems, cell-based bioassays, and nanoSIMS. Most of the reviews cover different classes of emerging contaminants—dechlorane plus and related compounds, pharmaceuticals, UV-filters, organohalogen and perfluorinated compounds, including dioxin-like compounds, nanomaterials, phthalates, pesticides and their metabolites, and endocrine-disrupting chemicals. The final topics deal with newest contaminants found

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in humans, applicable analytical techniques, and exposure routes, which are important in environmental risk assessment.

The original research articles report latest developments in the analysis of endocrine-disrupting compounds, pharmaceuticals, chlorinated, brominated, and perfluorinated emerging contaminants, and contain selected examples—from aquatic organisms to human beings, using a variety of analytical techniques (from gas chromatography and liquid chromatography–tandem mass spectrometry to bioassays). These applications are large advances in the global objective of achieving reliable analysis of biota. An added value of this special issue will be the information of environmental interest that will be covered as side aspect, for example:

1. improved biota spatial and temporal trends datasets on the occurrence of emerging organic contaminants;
2. information about their transformation products and the bioaccumulation, biomagnification, and fate of these contaminants and their toxicology, including the effect of mixtures; and
3. new human health data on contaminant intake and exposure levels, and new toxicological and epidemiological data that will enable conclusions to be drawn regarding the risks posed by these compounds.

Altogether, this special issue should be a valuable source of information for all readers with an interest in emerging contaminants in biota or related fields.

In this context, we would like to thank all the authors for their effort in submitting excellent contributions. They have made it possible for this project to result in a high-quality and exciting special issue. We also express our gratitude to the referees for providing valuable ideas and feedback that have been essential in achieving the high quality and timely manuscripts, and the editorial office and the editors for their competent assistance and cooperation. Last, but not least, we sincerely hope that the readers enjoy their reading experience and find the content useful. We are sure you will

agree with us and appreciate these significant contributions from these authors to this vast field of research.

Yolanda Picó is Full Professor of Nutrition and Food Science at the University of Valencia since 1998. Her research interests are the development of new analytical methods to determine organic contaminants in food and the environment, identification of unknown compounds by liquid chromatography–mass spectrometry, microextraction separations, and environmental and food safety. She is author of nearly 180 peer-reviewed papers, 140 scientific papers in SCI journals, and

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