New toxic emerging contaminants: beyond the toxicological effects

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As members of the International scientific community, our responsibility to our planet is based on three main pillars. First, to develop new techniques and methodologies to detect and control all class of contaminants; second, to use our abilities to deliver new modes to clean our waters, soils, and polluted air; and third, and much more importantly, to teach the new generations respect for the environment, the land, and all animal species.

If these three pillars are not achieved soon, a future history can be the following:

An extra-terrestrial intelligence approaching planet Earth would see an incredible blue color spotted with white clouds here and there.

Such alien would easily recognize liquid water on Earth's surface, and every member of the space ship's crew would be anxious to contact the intelligent native species of that blue-white-green planet. The aliens know there is intelligence living on Earth for two reasons: one is because they found an invitation to visit the planet traveling through the deep space (Voyager mission), and the second one is because they detected the radio signals coming from our solar system long time ago.

As the spaceship approaches, the scientific instruments with which the ship is provided start to deliver data.

Firstly, the aliens discover that humans organize themselves mostly in colonies, ranging in size and complexity. The data reaching the alien computers also continuously confirms that there are sophisticated structures, such as the pyramids of Egypt and Mexico, the Chinese Wall, the New York and LA skyscrapers, the bridges, the satellites, and even the international spaceships orbiting among the other planets. The aliens are pleased.

After searching for intelligence thousands of years, they find that planet they are traveling to is inhabited by an intelligent species. How much new knowledge does this species treasure? How will the colonies react upon their arrival? However, other more disturbing data soon replace such questions.

Some of the data reaching their computers do not match what the aliens are expecting.

The atmosphere of the planet is full of chemical compounds, which the aliens know are not formed by natural processes. They find molecules that can only be produced by sophisticated processes, other than life. This is not what scares them the most, as they also produce similar compounds. What scares them the most are the amounts of such compounds. These data do not match those of an intelligent species, and so they decide to hide their presence and send in some explorers, to bring back some water and animal samples.

The secret mission goes back to the mother ship and brings water from the Great Lakes and Oceans, some fishes and small animals from the same place, and thousands of pictures from the planet.

The pictures reveal something intriguing to the aliens. The human colonies spread through the entire planet, but in a number that is considered unsustainable. The advanced alien software reveals that the resources needed to maintain such colonies will collapse soon. Furthermore, the pictures reveal that the organisms that sustain life in the planet by producing the molecule that enables chemical reactions in living organisms (O₂) are systematically destroyed by the intelligent species. Even worse, they find out that there is no initiative to stop

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the destruction or to replace such organisms by new ones. The consequence is the increasing levels of another molecule, very stable, which brings death (CO_2). They easily find that this fatal molecule also increases the temperature of the entire planet to unacceptable levels, endangering the lives and well-being of millions of organisms.

The heads of the extra-terrestrial mission meet to decide how to proceed, and then the results from the analysis of the water and the fishes arrive. The conclusions are devastating. The water contains hundreds of substances from non-living sources, and such substances are directly linked to the intelligent species. And, what is found worst, the very same compounds are encountered in the fishes also.

At this point, the intelligent aliens begin to think that perhaps the dominant species on the planet, even being able to create complex things, is not intelligent, but smart because the question to be addressed is this: which intelligent species is able to destroy the only planet it has for living?

And then, a second question comes out: if this species would find a way to travel to the stars, would this be a danger for other planets and other species, either intelligent or not? If such travel was possibly a fact, would it be permitted for this smart species to travel?

The answer to such a question is upon us.

The U.S. Geological Survey established in 2017 (Geological Survey 2018) any emerging contaminants as all chemicals in everyday life that are used comprising medicines and drugs, especially those sold without a medical prescription. Personal hygiene and sanitation products, including soaps, disinfectants, odors, and any food chemical additives, such as preservatives, colorants, and adulterants are present in the environment, the water, the soil, and the atmosphere are related to different sources, such as municipal wastewater treatment plants, excess from agricultural and urban land surfaces, septic systems, oceans, and rivers. Unfortunately, to these contaminants, we can also still add the classic, heavy metal ions such as mercury, lead, cadmium, thallium, silver, and others that can be found in our lands and water, as well as plastics, microplastics, nanoplastics, and the modern nanomaterials, in the form of metal and soft nanoparticles. Air, water, and soil are continuously being exposed to these intruders and, as a direct consequence, human beings, and all living organisms on the planet as well. One of the most mediatic contaminants during the recent years among the aforementioned are plastics, microplastics, and nanoplastics, being a huge problem in our oceans and river waters (Zhu et al. 2018; Alimi et al. 2018; Kroon et al. 2018).

During these 2 years, since the publication of the special issue devoted to the first edition of the PTIM Conference in Caparica (Lodeiro et al. 2014), more than 1000 documents appear in the literature (source Scopus engine) related to this hot topic, emerging contaminants (Rodriguez-Narvaez et al. 2017; Rodriguez-Navas et al. 2017).

Topics, such as nanomaterials (Fang et al. 2017; Bundschuh et al. 2018), drugs (Thelusmond et al. 2018), antibiotics (Christou et al. 2017; Sanganyado et al. 2017; A. Mirzaei et al. 2017; Szekeres et al. 2018), personal care products (Ebele et al. 2017), mycotoxins (Gruber-Dorninger et al. 2017), heavy metals (Schuler and Relyea 2018; Liu et al. 2018), pesticides, and polycyclic aromatic hydrocarbons (PAHs) (Kuppusamy et al. 2017; Primel et al. 2017), have been deeply addressed.

The second edition of the International Caparica Conference on Pollutant Toxic Ions and Molecules (PTIM 2017) was focused on joining superb minds running in any way within the fields of sensing, monitoring, eliminating, or creating pollutant toxic ions and new molecules. The plenary speakers are as follows: Prof. Gerald Zagury (Canada), Prof. Erika Kote (Germany), Prof. Irene Lo (Hong Kong), Prof. Luoping Zhang (USA), and Prof. Tomás Torroba-Perez (Spain). The keynote speakers are as follows: Prof. Aiguo Wu (China), Prof. Ji Qian Jiang (Glasgow, UK), Prof. Javier Arebola (Spain), Prof. Henriqueta Louro (Portugal), Prof. Maria Joao Silva (Portugal), and Prof. Didier Robert (France). There will also be 165 delegates at the conference who will show the most important advances relating to the topic, “New Toxic Emerging Contaminants: Beyond the Toxicological Effects.”

The compendium of manuscripts that are presented in this special issue will highlight the work that the scientific community is involved in to save the world for the future generations. We would like to thank all the contributors, as well as the Editor-in-Chief of the Environmental Science and Pollution Research Journal, Professor Philippe Garrigues, and the Springer editorial team, for allowing us to launch this second special issue.

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Dr. Carlos Lodeiro (H-index: 35) graduated in Chemistry in 1995, received his PhD in chemistry in 1999 by the University of Santiago de Compostela, Spain, under the supervision of Prof. Rufina Bastida and Prof. Adolfo Rodríguez in the field of Inorganic Supramolecular Chemistry. In 1999, he moved to the University NOVA of Lisbon (UNL) in Portugal as European Marie Curie postdoctoral researcher under the supervision of Prof. Fernando Pina

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Campus in the University of Vigo, Spain. E. Oliveira is author or co-author of more than 62 papers in international peer review journals, 5 book chapters, and 3 books. In 2008, E. Oliveira received the prize in Creativity and Quality in Research Activity in sensors area, attributed by Foundation Calouste Gulbenkian, Portugal, and in 2016, she was awarded with the Prize For Women in Science, “Medalhas de Honra L’Oréal Portugal para as Mulheres na Ciência” in healthy sciences field. Her scientific interests are focused in (i) synthesis of new bio-inspired emissive peptide as fluorescence chemosensors, (ii) supramolecular

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Dr. J. Fernández-Lodeiro (H-index: 10) received his PhD in 2012 by the University of Vigo-Spain under the supervision of Prof. José Luis Capelo and Dr. Cristina Nuñez. In 2013, he was a postdoctoral researcher at the Faculty of Science and Technology at the University Nova of Lisbon in the REQUIMTE-UCIBIO, working in the BIOSCOPE research group with a PROTEOMASS Scientific Society Research Contract. Lately, during the

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