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EDITORIAL

Impacts of environmental issues on health and well-being: a global pollution challenge

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Abstract

Every 2 years, the environmental, chemical, and health research communities meet in Costa de Caparica, Portugal to showcase the latest technologies, methodologies and research advances in pollution detection, contamination control, remediation, and related health issues. Since its inception in 2015, the International Caparica Conference on Pollution Metal Ions and Molecules (PTIM) has become a biennial global forum to hear from those who protect the land, the water, and the air at all environmental scales. During past PTIM editions, we have learned about numerous efforts to develop new recovery and clean-up processes to restore the natural equilibria of our planet. Soil, land, water, and air are the key focus of efforts that will require deeper understanding and better control.

Keywords PTIM2019 · Environmental control · Health · Well-being · Caparica

Every 2 years, the environmental, chemical, and health research communities meet in Costa de Caparica, Portugal to showcase the latest technologies, methodologies and research advances in pollution detection, contamination control, remediation, and related health issues. Since its inception in 2015, the International Caparica Conference on Pollution Metal Ions and Molecules (PTIM) has become a biennial global forum to hear from those who protect the land, the water, and the air at all environmental scales. During past PTIM editions, we have learned about numerous efforts to develop new recovery and clean-up processes to restore the natural equilibria of our planet. Soil, land, water, and air are the key focus of efforts that will require deeper understanding and better control. We have also become aware of more and more cases of spill contamination, degradation of land and water, destruction of marine environments, misconduct by cities and enterprises, and the general disrespect of the environment shown by humans.

In 2019 and 2020, we have witnessed once again how deeply health is connected with the environment. Our world is currently experiencing an extreme, yet predictable, health crisis linked to poor stewardship of the planet. Outbreaks of zoonoses, diseases that are transmissible between animals and humans, particularly those caused by coronaviruses, have led scientists to raise repeated alerts since 2002. Indeed, it is a problem followed daily by the environment program of the United Nations (UN 2020) and the World Health Organization (WHO 2020). The global pandemic produced by the dangerous, previously unknown virus SARS-CoV-2, has led to hundreds of thousands of deaths across five continents, with equally widespread economic and social repercussions. This problem resonates all too pertinently with the title of the third Environmental Science and Pollution Research (ESPR) special issue dedicated to the 3rd PTIM 2019—Impacts of Environmental Issues on Health and Well-being—a global pollution challenge.

Special Issue: 3rd PTIM, International Caparica Conference on Pollutant Toxic Ions and Molecules.

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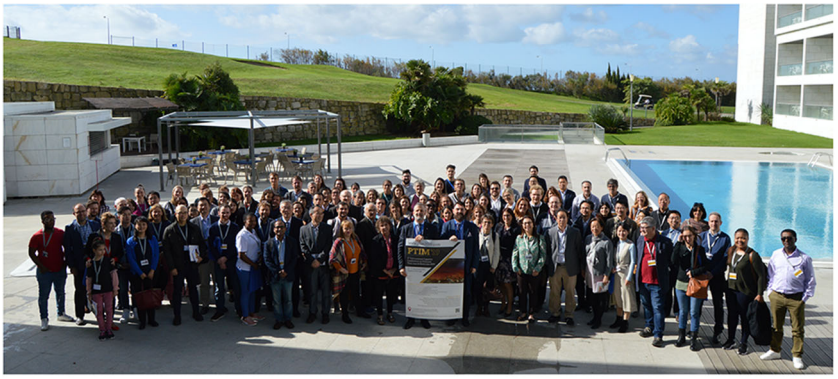

Fig. 1 Participants at PTIM 2019 in Costa de Caparica, Portugal (above), and Professor Joanna Burger receiving the Career Award Ceremony with PTIM chairs Prof. José Luis Capelo-Martínez and Prof. Carlos Lodeiro (below)

A surprising upside of the COVID-19 global pandemic has been the real-time observations of the numerous environmental effects of lockdown with the world becoming visibly greener and more habitable. Unusual benefits such as cleaner air and water, lower CO_2 emissions, and sudden relief from constant physical disturbance and noise were behind many beautiful pictures of wildlife on land and in the oceans. Now, the question is whether humans can consolidate these positive effects.

The degradation of our blue planet is not just an environmental problem, because it presents serious global economic and health risks too. Trade, employment, and well-being all rely on nature, starting with the quality of the food we consume, the stability of our climate and weather, the purity of the air we breathe, the control of emergent and circulating disease, and as we have discovered from the various quarantine measures around the world, essential spaces for human contact, leisure, and relaxation. Without our natural environment, there would be no life and society. The appearance of COVID-19 helped nature send us an important message: our planet is able to restore itself in the absence of persistent pressure from human activities on the land, air, and water.

The PTIM conference series is already a well-established international scientific forum in the field of environmental, chemistry, health, and well-being sciences, all hot fields in these COVID-19 times. The previous two editions in 2015 and 2017 were devoted to "New toxic emerging contaminants: beyond the toxicological effects", (Lodeiro et al. 2019) and "Global pollution problems, trends in detection and protection" (Lodeiro et al. 2016). Now, the central theme is health. In November 2019, the third edition of this superb conference took place once again in Costa de Caparica, Portugal, keeping to our tradition of collegiality and scientific endeavor to help the environment. We listened to amazing plenary talks by Joanna Burger (USA) on the temporal trends in heavy metals in the US Atlantic Coast Estuaries (Ostrom et al. 1999; Burger 2019) and by Elena Rodica Ionescu (France) on toxicity and biosensing of environmental pollutants (Ionescu et al. 2006; Zhou et al. 2019). Jia-Qian Jiang (UK) spoke about water and wastewater treatments using double hydroxide materials (Wang et al. 2019; Jiang and Lloyd 2002), Shin Takahashi (Japan) delighted us with a presentation about the persistence of organic pollutants in the Asia Pacific Region (Monirith et al. 2003; Anh et al. 2019), and Jose Luis Gomez-Ariza (Spain) captivated us with

a talk combining analysis and health problems in relation to metallomics and metabolomics in environmental metal toxicity assessment (Rodriguez-Moro et al. 2020; Gómez-Ariza et al. 2000). Making this edition even more extraordinary was the presence of outstanding keynote speakers, namely Ana Luisa Fernando (Portugal) (Souza and Fernando 2016), Erika Kothe (Germany) (Haferburg and Kothe 2007), Binoy Sarkar (UK) (Sarkar et al. 2010), Yongchun Zhao (China) (Xin et al. 2020), Jerzy Jozef Zajac (France) (Muller et al. 2019), Tamara Garcia Barrera (Spain) (Callejón-Leblic et al. 2020), Michael Gochfield (USA) (Gochfeld 2003; Burger et al. 2020), and Elisabete Oliveira (Portugal) (Marcelo et al. 2020; Oliveira et al. 2018), who explained their research covering topics as diverse as nanoparticles and food, antibiotic resistance and heavy metals, environmental clean-up applications of clay minerals, power plant wastewater metal analysis, metabolomics and the role of selenium, mechanisms of mercury and selenium toxicity, and the use of mesoporous nanomaterials and chemosensors for removing toxic agents and emerging contaminants. The picture was completed by the participation of close to 170 research fellows from five continents, contributing 70 oral talks, 20 "shotgun" presentations by young researchers, and more than 40 poster communications.

We would like to congratulate Prof. Joanna Burger, who received the Proteomass Scientific Society Career Award 2019 for her contributions to eco-toxicology, behavioral toxicology, ecology, and environmental monitoring and assessment (Ostrom et al. 1999: Burger 2019) (Fig. 1).

Acknowledgments We sincerely thank all our fellows who have contributed to this special issue of the ESPR journal published by Springer Editorial. We thank the ESPR Editor-in-Chief Prof. Philippe Garrigues who agreed to publish this special issue, and to the editorial assistants Ms. Fanny Creusot, Ms. Joanne Berbon, and Ms. Florence Delavaud. Thanks for the acceptance to publish this special issue dedicated to the Third International Caparica Congress on Pollutant Toxic Ions and Molecules, PTIM2019 edition, allowing us to act as Guest Editors. The chairs of the 3rd PTIM 2019 conference, and the Guest Editors Jose Luis Capelo-Martínez, Carlos Lodeiro, Hugo Miguel Santos, and Elisabete Oliveira thank the PROTEOMASS Scientific Society (Portugal) (General Funding Grant) as the main organizer, partners LAQV-REQUIMTE, Green Chemistry Associated Laboratory, NOVA School of Science and Technology, and NOVA University Lisbon.

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Carlos Lodeiro: Dr. Carlos Lodeiro (H-index: 38) graduated in Chemistry in 1995, received his PhD in chemistry in the research group of Prof. Rufina Bastida (Macrocyclic Chemistry) in 1999 by the University of Santiago de Compostela, Spain. In 1999, he moved to the University NOVA of Lisbon (UNL) in Portugal as European Marie Curie postdoctoral researcher in a project concerning molecular devices and machines to the group of Prof. Fernando Pina (Supramolecular Photochemistry), and in 2004, he became a fellow researcher and invited assistant lecturer at the REQUIMTE-CQFB, Chemistry Department (UNL). In 2008, Dr. Lodeiro got the habilitation in Chemistry in Spain, and a year later in 2009, he moved to the University of Vigo, Faculty of Sciences of Ourense (FCOU), Spain as IPP (Isidro Parga Pondal) researcher-lecturer. Since 2012 to 2017, he was Assistant Professor at the Chemistry Department, Faculty of Science and Technology, University NOVA of Lisbon. In 2017, he got the habilitation in Inorganic Analytical Chemistry in Portugal at the FCT-UNL, and in 2018, he became associate professor in the Chemistry Department, LAQV-REQUIMTE Research unit, Faculty of Science and Technology, University NOVA of Lisbon. Presently, he is a co-head of the BIOSCOPE research group (www.bioscopegroup.org), co-CEO of the PROTEOMASS Scientific Society, and founder Co-CEO of the Chemicals start-up Nan@rts. His research interest comprises (i) physical-organic and physical-inorganic chemistry of fluorescent dyes and sensors, (ii) synthesis of functionalized nanoparticles, nanocomposites, and nanomaterials, (iii) applications of nanomaterials in environmental research, (iv) application of nanomaterials in bio-medical research, (v) supramolecular analytical proteomics, (vi) Onco and Nanoproteomics (vii) Nanoproteomics apply to Biomarker development. C. Lodeiro is author or co-author of close to 265 manuscripts, 1 patent, 14 book chapters, and 5 books, and his publications have more than 5698 citations (Google Scholar). Dr. Lodeiro is fellow of the Royal Society of Chemistry since 2014 and a member of the Portuguese Chemistry Society (2003) and American Chemical Society (2016).

José Luis Capelo-Martínez: Dr. José Luis Capelo (H-index: 39) got his PhD in the University of Vigo (2002) in the group of Prof. Carlos Bendicho (Analytical Chemistry), made a post-doc in the IST in Lisbon in the group of Prof. Ana Mota (2002–2005), and then, he was appointed as researcher at REQUIMTE (FCT-UNL, 2005–2009). Then, he moved to the University of Vigo as principal investigator as IPP (Isidro Parga Pondal) researcher-lecturer (2009–2012). He was appointed assistant professor in the FCT-UNL in 2012, where currently he is based. In 2017, he got the habilitation in Biochemistry Analytical Proteomics in Portugal at the FCT-UNL, and in 2018, he became associate professor in the Chemistry Department, FCT-UNL. Dr. Capelo is fellow of the Royal Society of Chemistry since 2014, and a member of the Portuguese Chemistry Society and American Chemical Society. He co-leads the BIOSCOPE research group (www.bioscopegroup.org) and he is co-CEO of the PROTEOMASS Scientific Society and founder co-ceo of the Chemicals start-up Nan@rts. J. L. Capelo has developed research on the following topics: (i) quantification of metal and metal species in environmental and food samples, (ii) new methods to speed protein identification using mass spectrometry-based workflows, (iii) accurate bottom-up protein quantification, (iv) bacterial identification through mass spectrometry, (v) fast determination of steroids in human samples, (vi) biomarker discovery and development, (vii) application of sensors and chemosensors to the detection/quantification of metal ions, and (viii) nanoproteomics and nanomedicine. J.L Capelo is author or co-author of more than 245 manuscripts, 2 patents, 12 book chapters, and 4 books. His publications have more than 5500 citations.

Hugo M. Santos: Dr. Hugo Miguel Santos (H-index: 22) graduated in Applied Chemistry from University NOVA of Lisbon and completed a Ph.D. degree in Biochemistry from the same university in 2010 in the group of Prof. José Luis Capelo (Analytical Proteomics). During his Ph.D., he stayed 6 months at the Turku Centre for Biotechnology (Finland) working with state-of-the-art MS instrumentation for biomedical research with Prof. Garry Corthals. H.M. Santos took up a post-doc at the University of Vigo (2010–12 to 2011–03) followed by a move to the Institute of Biomedicine and Biotechnology (Barcelona, Spain, 2011–04 to 2012–03) to advance biomedical applications of mass spectrometry and translational research in the group of Prof. Xavier Avilés. In 2011, H.M. Santos moved to FCT NOVA to continue his research in Biological Mass Spectrometry. Currently, he is an assistant researcher – FCT Investigator Program

at LAQV-REQUIMTE FCT NOVA (Portugal). H.M. Santos published 105 articles in international peer review journals which have received more than 2100 citations. H.M. Santos is a member of the Royal Society of Chemistry and American Chemical Society. His scientific interests are focused on (i) the identification of molecules involved in complex biological processes, characterize their structure, and monitor how their abundance may change during these processes, in order to gain insights into the underlying molecular mechanisms; (ii) nano-proteomics and nano-medicine; (iii) application of chemosensor to the detection/quantification of metals; (iv) mass spectrometry analysis of organic molecules, metal complexes, and supramolecular systems; (v) phosphoproteomics and personalized medicine; and (vi) biomarker development.

Elisabete Oliveira: Dr. E. Oliveira (H-index: 22) graduated, in 2006, in Applied Chemistry from FCT-University Nova of Lisbon, Portugal, in 2007, she obtained a Master in Biotechnology and completed a PhD degree in Biotechnology in 2010 in the Group of Prof. Carlos Lodeiro, at the same University. In 2013, she obtained a second PhD degree in "Food Science and Technology" by Science Faculty of Ourense Campus in the University of Vigo, Spain; actually, she is an assistant researcher in the LAQV REQUIMTE FCT UNL by the "Estimulo" in Science FCT Program. E. Oliveira is author or co-author of more than 70 papers in international peer review journals, 5 book chapters, and 3 books which have received more than 1380 citations. 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 fluorescence chemosensors, (ii) supramolecular chemistry (photophysics and photochemistry), (iii) their multifunctional applications in vitro (solution and solid studies) and in vivo (cell imaging studies); and (iv) synthesis of new emissive nanomaterials, as Quantum Dots and Mesopourous Silica for drug delivery and biomarker discovery in biological and environmental samples.