

RECETOX NEWS ENG

volume VII, issue 2/2019, summer 2019

The RECETOX NEWSLETTER is a quarterly newsletter by the Research Centre for Toxic Compounds in the Environment (RECETOX), Brno, Czech Republic.

In this issue

Calendar of Events

23 March 2019, Open Door Day National Observatory Košetice, Czech Republic

26–28 March 2019, CEE regional consultations prior Basel, Rotterdam and Stockholm Conventions, RECETOX, Brno

2–4 April 2019, SAICM OEWG3, Montevideo, Uruguay

8–12 April 2019, Ad hoc Expert Group on Effectiveness Evaluation of the Minamata Convention, Geneva, Switzerland

16–17 April 2019, Conference Ozduší 2019 (Air 2019), hotel Santon, Brno

23–24 April 2019, Summer School at NUFT, Kiev, Ukraine

29 April–10 May 2019, joint meeting of the Basel, Rotterdam and Stockholm Conventions, CICG, Geneva, Switzerland

11 May 2019, MjUNI at RECETOX (Junior Masaryk University)

13–14 May 2019, IAEA workshop, Monaco

26–30 May 2019, 29th Meeting SETAC, Helsinki, Finland

30 May 2019, 27 meeting of the Council of the National Centre for Toxic Compounds, Prague, CZ

17–21 June 2019, 15th RECETOX International Summer School, RECETOX, Brno

25–30 August 2019, 39th Dioxin Symposium, Kyoto, Japan

8–13 September 2019, ICMGP International conference on mercury as a global pollutant, Krakow, Poland

1–4 October 2019, Third meeting of the Intersessional Process for considering SAICM and the sound management of chemicals and waste beyond 2020, Bangkok, Thailand

16–17 October 2019, CEE regional meeting prior COP3 on mercury, Tallinn, Estonia

25–29 November 2019, 3rd Conference of the Parties to the Minamata Convention, Geneva, Switzerland



New EASAC report on increase in health risks due to climate change

Global meetings in Geneva

Cooperation with the City of Brno

Activities of the Stockholm Convention Regional Centre

Editorial

Welcome to the summer issue of the RECETOX newsletter,

This time, we prepared a rich overview of recent findings from various fields – a scientific report on health risks due to climate change, outcome of global chemicals and waste meetings held in Geneva in May, research on nano-pesticides as well as tools available for studying reaction mechanism in the protein engineering.

In addition, our cooperation with the City of Brno is successfully continuing and broadening, for example, one of deputy mayors is himself involved in the ICARUS sampling campaign in June 2019. We have organized several meetings in the spring, there are 35 participants of the human bio monitoring and risk assessment summer school with us in June.

Finally, the picture below shows the course of the construction works on our biobanking facility. It progresses quickly, one more level to go. The works should be completed next spring.

I wish you a nice reading, pleasant summer, and let the good work go on!

Katka Šebková
on behalf of the editors

PS – The RECETOX newsletter is also available automatically if registered through www.recetox.muni.cz or newsletter@recetox.muni.cz. It is published in English and Czech. The next issue will be published in September 2019.

RECETOX stands for a REsearch Centre for TOXic Compounds in the Environment, an independent university department operating within the Faculty of Science, Masaryk University, Brno, Czech Republic. The RECETOX fulfills three roles: an academic institution providing university education, a research institution working on transformation of environment and health research findings into practical applications and a body supporting the implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) and sound chemicals management in general as well as the science to policy dialogue, nationally and internationally.

RECETOX – research, projects and cooperation

New EASAC report

A new report by European Academies' Science Advisory Council (EASAC) on **"The imperative of climate action to protect human health in Europe"** has been published in early June 2019. The report highlights an alarming range of health risks due to climate change and the benefits of rapid phase out of fossil fuels to reduce greenhouse gas emissions in order to stabilise the climate.

The EASAC mobilised Europe's leading scientists from 27 national science academies to guide EU policy for the benefit of society. One of the co-authors of the report is our very own professor **Blahoslav Maršálek**, specialist in cyanotoxins and water management who suggested we share the outcomes of the report with our readers. He told us: *"More than 4,000 publications in the field have been identified and 338 were selected for a thorough review and discussion. The review shows facts – our climate unquestionably changes and these changes affect human health, both physical and mental."*

The report, though independent scientific evidence, highlights that health risks are projected to increase. Solutions are within reach and much can be done by acting on present knowledge,

but this requires political will. A global average temperature will increase higher over land than the oceans, exposing the world population to unprecedented rates of climate change and extreme events such as floods and droughts, air pollution and allergens, and contributing to the burden of disease and premature mortality. Additional health risks represent weakening of food and nutrition security, increased incidence and changing distribution of some infectious diseases (including mosquito-borne, food-borne and water-borne diseases) and growing risk of forced migration.

The EASAC emphasises that the top priority is to stabilise climate and accelerate efforts to limit greenhouse gas emissions. The economic benefits of action to address the current and prospective health effects of climate change are likely to be substantial. Reducing air pollution through a "zero-carbon" economy could avoid several hundred thousand premature deaths annually in the EU as fine particulate and ozone air pollution arise from many of the same sources as emissions of greenhouse gases and short-lived climate pollutants. A recent estimate suggests that about 350,000 excess deaths annually in the EU can be attributed to ambient air pollution from burning fossil fuels and a total of about 500,000 from all human-related activities.

Understanding of the range of health effects of air pollution on the health of children and adults is growing. Seven million babies in Europe are living in areas where air pollution exceeds WHO recommended limits and such exposure may affect brain development and cognitive function.

In addition, the report recommends promotion of healthier, more sustainable diets with increased consumption of fruit, vegetables and legumes and reduced red meat intake to lower the burden of non-communicable diseases and reduce greenhouse gas emissions.

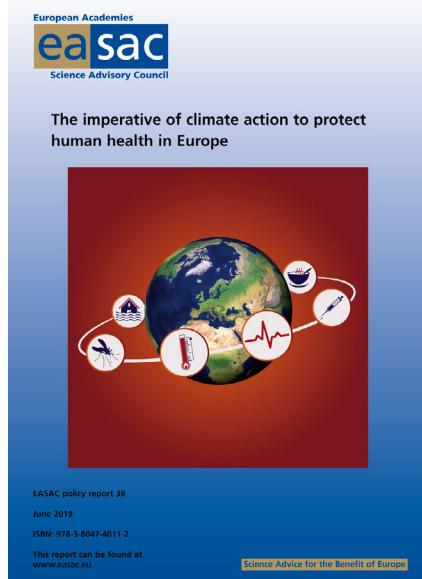
This reductions could attain up to about 40% in greenhouse gas emissions from food systems as well as reducing water and land use demands. Such diets can also lead to major reductions on non-communicable disease burden through reduced risk of heart disease, stroke and other conditions.

Further, actions mitigating temperature rise could avert a significant increase in the spread of infectious diseases by mosquitos and food and water-borne infections for humans and animals alike. Furthermore, the impact of climate change in other regions can have tangible consequences in Europe and the EU has responsibilities in addressing problems outside its area.

Professor Maršálek commented the report: *"In my view, it is not reasonable to drive Europe just towards "zero carbon economy" although undoubtedly there are tasks to improve. But health of the Europeans can be improved faster and cheaper – for example by a change in the food production by moving away from industrial chemical farming in large units with lower biodiversity to smaller units with greater biodiversity and by enhancing the ability to retain water in the landscape. These, together with the change in the waste management and transport, combined with a switch from the current forestry monocultures, are ways to faster improvements that complement and potentiate each other."*

Full report as well as a two page summary is available on EASAC website for further reading:

<https://easac.eu/publications/details/the-imperative-of-climate-action-to-protect-human-health-in-europe/>



RECETOX at the COP in Geneva

The ninth meeting of the Conference of the Parties to the Stockholm Convention (SC COP-9) was held in Geneva International Conference Centre from 29 April to 10 May 2019, back-to-back with the fourteenth meeting of the Conference of the Parties to the Basel Convention (BC COP-14) and the ninth meeting of the Conference of the Parties to the Rotterdam Convention (RC COP-9). The theme of the joint meetings was “Clean Planet, Healthy People: Sound Management of Chemicals and Waste”. The meetings included joint sessions covering matters of relevance to at least two conventions and separate sessions of the meetings of the each of the three COPs.

Joint COPs is a regular meeting taking place every two years. It is the highest decision making level for global management of selected toxic chemicals and wastes. This year, there were almost 1500 delegates from 180 countries including many representatives of industry, academia and civil society who considered listing of two chemicals to the annexes of the Stockholm Convention and seven chemicals to the Rotterdam Convention among others. In addition, the Basel Convention considered broadening of waste management categories and adoption of updated/ new technical guidelines for different types of wastes.

Highlights of COPs outcomes are as follows: for the Stockholm Convention, it is the successful adoption of the listing of two chemicals dicofol and perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds, in Annex A to the Convention, decreased amount of the acceptable purposes and specific exemptions for perfluorooctane sulfonic acid (PFOS), its salts and PFOS-F listed in Annex B to the Convention and the review of progress

towards the elimination of PCBs. The Rotterdam Convention succeeded in adopting the listing of two new chemicals in Annex III to the Convention, namely phorate as a pesticide, and hexabromocyclododecane as an industrial chemical and the adoption of procedures and mechanisms on compliance with the Rotterdam Convention as a new Annex VII. The Basel Convention included plastic waste to its annex and established Partnership on Plastic Waste. Overall, there were a total of 52 individual decisions and 7 decisions on joint issues. More detailed information on the outcomes is available on the BRS website at chm.pops.int.

The RECETOX was involved in many activities during the meeting, but we wish to showcase two of them here and also thank our three representatives for an excellent awareness raising about our work – big thanks to Kateřina Nováková, Katarína Řiháčková and Kateřina Šebková.

The first activity was our **booth** during the Information Fair, as the RECETOX, through its Stockholm Convention

Regional Centre, was among 20 selected exhibitors, that helped to emphasize the role of external partners, novel tools and information exchange in the successful implementation of the conventions. Our booth was rich in content. Our visitors could see and discuss the recent outcomes of the FIREexpo study on the occupational exposure of Czech firefighters to perfluorinated chemicals and their impacts on firefighters` health and performance, a range of activities of the EU ICARUS project aiming at improvements the urban air quality, the HERA project on the prioritization of the European research in environment, health and climate nexus in 2020–2030 (see more on HERA in the spring 2019 issue of our RECETOX news) as well as our information databases infrastructure supporting monitoring activities. We also drew visitors` attention to our new study programs at RECETOX and popularization of science tools including an interactive study kit developed by Kateřina Nováková in cooperation with our RECETOX colleagues. We would like to thank in particular Honza Ostřížek for his support in preparations of the posters.

The second event was a **spotlight presentation** on the Information Fair podium where we had 15 minutes to showcase ICARUS project objectives, tools and outcomes. Katka Řiháčková and Katka Šebková approached it in a practical manner – it was a hands-on demonstration of four mobile samplers and sensors measuring air quality and physical activity used in the ICARUS multisensor campaign survey in 9 European cities including Brno. The talk was also followed by several individual discussions in our booth. We hereby wish to acknowledge contribution of the RECETOX ICARUS team in preparation of the poster, presentation and set of samplers as well as instructions and troubleshooting for making the samplers work in Geneva.

More information, photos and videos from the COPs are available on internet – (<http://www.brsmeas.org/2019COPs/Overview/tab-id/7523/language/en-US/Default.aspx>), and on <https://enb.iisd.org/chemical/cops/2019/29apr.html>.



And what was a key experience from this COP for our representatives?

Kateřina Nováková: For the first time, I participated as an observer in a part of the global meeting on chemicals management. In the margins of the Information Fair, I could get a glimpse of negotiations by experts and policy makers in a group discussing exemptions to restrictions on the production and use of perfluorooctanoic acid (PFOA) and decision making on listing of chemicals into annexes of the Stockholm Convention in plenary. Despite the hard work, objections by one country were raised in plenary, followed by the addition of new text (exemptions) and the proposal was reassessed and finally approved by consensus. (see more at www.chm.pops.int). I felt a great sense of importance in watching the final plenary meeting with headphones "playing" a simultaneous translation of the decision making into six official UN languages (English, French, Russian, Spanish, Arabic and Chinese).

Katarína Řiháčková: I got two. It was also a first time participation in such a meeting for me and the clear highlight

was to witness the political negotiations about the listing of PFOA into annexes of the Stockholm Convention and the final decision making with a global impact. The other is non-work related – it was the traditional Swiss cheese fondue at the Geneva Lake and seeing the sunset at the lake shore with the Mont Blanc on the horizon.

Kateřina Šebková: This was my seventh meeting of the Stockholm Convention and I would like to appreciate the energy and spirit in constructive

work of highly technical nature that prevailed for over majority of the meeting in contrast to an unpleasant experience from in 2017. Nevertheless, discussions linked to broadening the range of exemptions for use of PFOA aroused concerns about the proper use of the scientific expertise and its weight in decision making in the future. Overall, I am very proud of our presence at this meeting – we were visible, active and sparked interest in our work in many delegates.



Cooperation with the City of Brno

On Tuesday 2 April 2019, a working meeting of representatives of the City of Brno and the RECETOX Centre took place. The aim of the meeting was not only to inform each other about ongoing events and projects, but also to discuss further opportunities and directions of the joint long-term cooperation. The City of Brno was represented by Brno Deputy Mayors Petr Hladík and Tomáš Koláčný, Councilor for Education and Sports Jaroslav Suchý, and four directors of departments of the City of Brno. The RECETOX was represented by its director, professor Jana Klánová, and researchers overseeing implementation of European projects (Pavel Čupr, Ondřej Mikeš) and coordinators of the epidemiological study CELSPAC – Lenka Andřysková and her team.

During the meeting, the city representatives were informed about the implementation of the ICARUS project, where Brno is one of nine project cities

in Europe that implement smart solutions to improve air quality and climate resilience on the basis of the project recommendations. Then, the RECETOX presented the European human biomonitoring project (HBM4EU) and linked activities that may impact our region and the city, including those related to the implementation of the longitudinal cohort study CELSPAC investigating factors affecting human health. In addition, the participants of the meeting also discussed a project currently carried out by the RECETOX in co-operation with five kindergartens and five elementary schools in Brno. The project investigates indoor and outdoor air contamination and provides recommendations on specific measures that would improve the quality of that indoor environment where children spend a lot of time.

Finally, both partners, City of Brno and the RECETOX agreed on the continuation and strengthening of their

cooperation that will not only continue to implement the framework agreement on cooperation between Brno and the RECETOX signed in 2018, but will also strive to jointly participate in the European research projects actively seek other fields to expand the joint cooperation.



Nanopesticides in Soil and Water

Nanopesticides are increasingly being developed for agricultural use, but knowledge concerning their environmental fate and effects is limited. Dr. Jakub Hofman, lead of the Soil environmental chemistry and toxicology group at RECETOX, says: “Nanopesticides are plant protection product formulations that intentionally contain particles smaller than 1 micrometer in order to change the environmental and/or toxicological properties of the pesticide. The

research community is concerned that pesticides bound to nanoparticles will significantly alter their environment fate, toxicity/ecotoxicity and risks as shown in the current scientific literature. Sadly, the current plant protection evaluation and authorization processes are unable to capture these specificities of nanoparticles in any way.”

A recently published study by Hofman’s team contributes to an improved

understanding of fate, bioavailability, effects and risks of nanopesticides. Their paper in the Environmental Chemistry special issue on nanopesticides (<https://doi.org/10.1071/EN19057>) proved that nanoformulations (polycaprolactone and solid lipid nanoparticles) of chlorpyrifos and tebuconazole significantly altered their soil degradation and uptake by earthworms and plants in the real-world and complex conditions microcosm.

13th New Enzymology Kinetics Workshop in Brno

Modern kinetic methods coupled with high resolution structural data provide a powerful tool to establish reaction mechanisms. Novel electronic instruments are now available to develop a path from experimental design to data collection and analysis to yield new mechanistic insights.

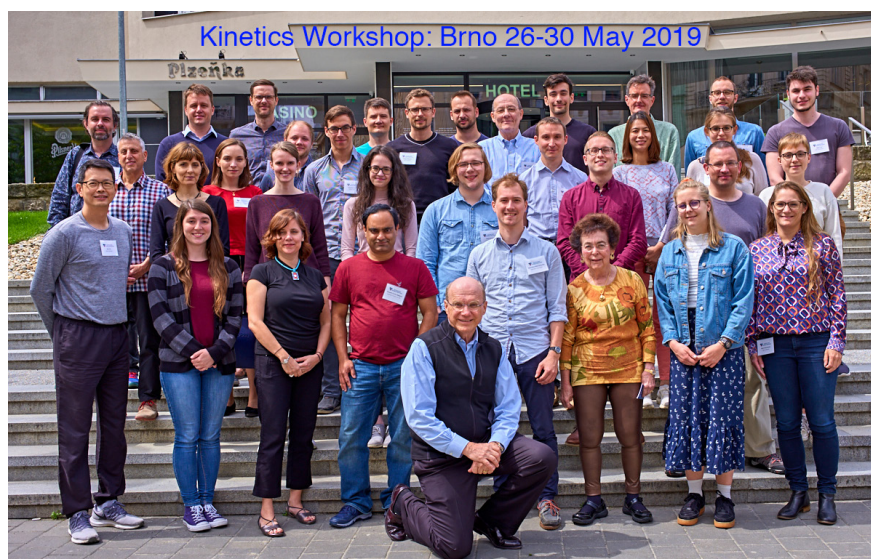
With the help of the KinTek Explorer software to learn kinetics and rigorously fit data, an intense four-day course took place in the Hotel International in Brno, Czech Republic, 26–30 May 2019, for 32 participants worldwide. Dr. Kenneth A. Johnson held a first European course of modern kinetic analysis using a variety kinetic and equilibrium methods and learning by doing using numerous examples on proteins and nucleic acids to develop an intuitive understanding of reaction kinetics.

Participants from academia (for example University of Cambridge, University of Boston, Univ. of Münster, Francis Crick Institute) as well as from

the private sector (i.e. Roche, MyoKardia, Pentapharm, Tango Therapeutics) benefited from a one-month license for the KinTec software (for Mac and Windows) to use during and after the course as well as ample materials and tutorials on the use of computer simulation and problem solving. It was a very

successful course and congratulation to professor Zbyněk Prokop for organizing the successful workshop.

More details are available on the website <https://www.kintekexplorer.com/workshop/>



RECETOX analyzes samples from Africa

A sampling campaign on exposure to pesticides of 1000 children in the Western Cape in South Africa was carried out in October-November 2018 (a work done by RECETOX jointly with the Swiss TPH and the University of Cape Town. A follow up is carried out this spring:

The RECETOX hosted Ms. Mufaro Mugari, from South Africa who worked on the sample preparation and analysis of currently used pesticides in urine samples collected in the South Africa last year. In addition, two ERASMUS students from France also work with our data – Marine

Beyssier helps with pesticide data analysis from air samples collected in South Africa (3 months stay) and Nils Paragot currently works on perfluorinated chemicals (PFCs) observed in air samples from the National Atmospheric Observatory at Košetice, Czech Republic – during a four month stay.

RECETOX in brief

This section provides brief information on papers, events and other issues relating to RECETOX.

Two ICARUS sampling campaigns in Brno

In March 2019, a multisensor campaign characterizing the personal exposure of Brno citizens took place as a part of the implementation of the European Horizon 2020 project ICARUS. In total, 86 participants aged 9 to 73 years from 36 households took part. For one week, each survey participant wore 3 types of sensors (a smart watch, a personal sensor for air quality, and a silicone wristband) and filled questionnaires and time activity diaries. Moreover, a static sensor

measuring various air pollutants was placed and operating in their houses. Further data analysis is needed prior to obtain validated scientific outcomes and to compare the exposure to air pollutants of Brno citizens with citizens of other European cities involved in the project. At present, the second campaign is carried now (early June) to allow researchers to study differences in urban air quality between the seasons (end of winter and summer).

Awards to RECETOX Students

We are pleased to announce that two of our students received Award of the Dean of the Faculty of Science at Masaryk University for 2019. Congratulations to Pavel Vaňáček and Antonín Kunka.

RECETOX Publications 2019

In 2019, the RECETOX researchers already published 78 articles in the peer reviewed literature so far. A selection of six articles below covers the breadth of our research until June 2019:

Demirtepe, H., Melymuk, L., Diamond, M. L., bajard, L., Vojta, S., Prokes, R., Sanka, O., Janova J., Palkovicova Murinova, L., Richterova, D., Rasplava, V., Trnovec T., Linking past uses of legacy SVOCs with today's indoor levels and human exposure. *Environment International* (2019), 127, 653-663.

Musil, M., Konegger, H., Hong., J., Bednar, D., Damborsky, J., Computational Design of Stable and Soluble

biocatalysts, *ACS Catalysis* (2019), 9 (2), 1033-1054.

Lenters, V., Iszatt, N., Forns, J., Cechova, E., Kocan, A., Legler, J., Leonards, P., Stigum, H., Eggesbo, M. Early-life exposure to persistent organic pollutants (OCPs, PBDEs, PCBs, PFASs) and attention-deficit/hyperactivity disorder: A multi-pollutant analysis of a Norwegian birth cohort. *Environment International* (2019), 125, 33-42.

Tousova, Z., Vrana, B., Smutan, M., Novak, J., Klucarova, V., Grabic, R., Slobodnik, J., Giesy, J.P., Hischerova, K. Analytical and bioanalytical assessments of organic micro

pollutants in the Bosna River using a combination of passive sampling, bioassays and multi-residue analysis. *Science of the Total Environment* (2019), 650, 1599-1612, Part I.

Vasickova, J., Hvezdova, M., Kosubova, P., Hofman, J. Ecological risk assessment of pesticide residues in arable soils of the Czech Republic. *Chemosphere* (2019, 2016), 479-487.

Mikes, O., Vrbova, M., Klanova, J., Cupr, P., Svacara, J., Pikhart, H. Early-life exposure to household chemicals and wheezing in children. *Science of the total Environment* (2019), 663, 418-425.

New recruitments at RECETOX

We keep on enlarging our research teams and administration alike and more calls are now open. Kindly help us to disseminate RECETOX open posts and share information on calls available at the RECETOX Facebook or through EURAXESS to new potential colleagues, researchers and admin staff. Interested candidates are asked to send their CV at rcx-hr@recetox.muni.cz.



Activities of the Stockholm Convention Regional Centre in the Czech Republic

The Stockholm Convention Regional Centre in the Czech Republic (SCRC) hosted at RECETOX continues to provide support to other countries and regions, in particular in relation to monitoring, sampling and analyses of toxic chemicals in the environment and biota by providing capacity building projects and trainings. In addition, it supports development of the legal and institutional frameworks as well as generates data in monitoring program MONET and operates the global POPs data visualization portal www.pops-gmp.org.

SCRC Czech Republic to continue for another 4 years

We are very happy to announce that the Stockholm Convention COP has re-endorsed the SCRC Czech Republic for another four years. The Centre was evaluated as excellent and it got a full score card in the performance evaluation (together with five other SCRCs out of the total 28). See more in the COP information document (UNEP-POPS-COP.9-INF-27-Rev.1.English.pdf). In addition, report of our activities in the past biennium is also available in the COP document UNEP/POPS/COP.9/INF/28 and on our website. We are proud to helping countries implementing management of toxic chemicals by supporting their capacity building, organize monitoring activities and protecting human health and environment.

Sustainable Development Workshop in Ukraine

The SCRC CZ helped organization of a two day event in Kiev – a **Spring school on sustainable development and an International conference** and hands-on workshop on at the National University of Food Technologies (NUFT) in Kiev, Ukraine on 23 and 24 April 2019.

More than 80 participants from academia (students and researchers alike), representatives of civil society organizations, small companies and industry provided insights into approaches and implementation of the sustainable development goals. There were 6 key lectures on the first day and almost 80 presentations organized in 5 sessions on economic, environmental and social pillars of the sustainable development, issues related to the sustainable consumption and European studies for sustainable development.

Director of the SCRC, Kateřina Šebková presented input from the EcoPro project supported by the Jean Monnet Program as keynote on „**Approaches to the Sustainable Development – Case studies in several EU Member States**“ related to the framework of sustainable development in the European Union and activities that are reflected in legislation and the principles of the circular economy following the EU sustainable development policy and activities related to it at a national level and on Yulyia Voytenko-Palgan from the International Institute for Industrial Environmental Economics at Lund University provided keynote on Sustainable consumption: principles, challenges and solutions. There were many questions from the audience to both keynote speakers. In addition, the second day presentation was about the need to enhance links between health and the environment in the EU's scientific programs – „**Horizon Europe – Cooperation on Health and Environment in Europe**“ that spiked interest of both students and authorities.



Side Event at the COP

A successful side event was organized by RECETOX jointly with the SCRC-BCRC Uruguay and UNEP Chemicals on 1 May 2019 during the joint meeting of the Basel, Rotterdam and Stockholm Convention held in Geneva, Switzerland. The side event presented experience in capacity building for POPs monitoring and Kateřina Šebková from SCRC CZ presented recommendations for

sustainability of the POPs monitoring for further considerations on behalf of experts involved in those activities. There was also a national panel of country representatives who shared their experience and a supporting document summarizing all development and recommendations in greater detail (available online as **UNEP/POPS/COP.9/INF/37**).



CEE Regional Meeting in Brno

A CEE regional meeting prior triple COPs was organized in the hotel Continental, Brno, Czech Republic 26–28 March 2019. There were 20 countries of the Central and Eastern Europe and Central Asia, with a total of 55 participants. Also, there were three regional centres operating in the CEE region (BCRC Slovakia and BCRC Russian Federation, in addition to the SCRC CZ), GEF representative as well as several international organizations and civil society representatives. It was a very successful meeting and we had good discussions on the topics to be discussed at the COP.



15th Summer School at RECETOX

15th RECETOX international summer school takes place at the RECETOX premises 17–21 June 2019. It is co-organized by the HBM4EU project as the 3rd training school for human biomonitoring, by the RECETOX Research Infrastructure and by the Stockholm Convention Regional Centre in the Czech Republic. The topic for this year is human biomonitoring and risk assessment including adverse outcome pathways, mechanistic toxicology, fate and transport of toxic chemicals including human exposure and epidemiological surveys.

There are 35 participants from all around Europe and also beyond. We are very happy to welcome participants from the Stockholm Convention Regional Centre in India CSIR-NEERI and also four participants from the Central and Eastern Europe (two participants from Ukraine, one from Serbia and one from

North Macedonia) that have been kindly supported by the Czech Ministry of the Environment.

We hope that despite a very hot weather the information that was shared during the course is cool and cooperations that are established among participants become persistent.



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