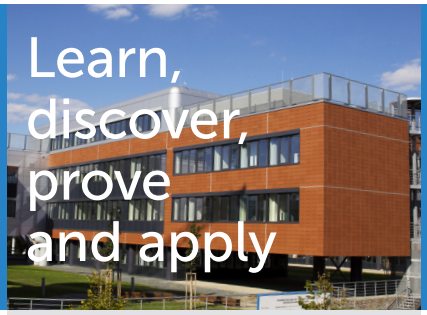
Research Centre for Toxic Compounds in the Environment

VOLUME 5 | ISSUE 4 | DECEMBER 2017 – JANUARY 2018

RECETOX NEWSLETTER

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



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

In this issue

Editorial

Dear readers of this quarterly newsletter,

this issue of the RECETOX newsletter, contains a range of information about our projects, plans and events in the last part of 2017. One of the most significant points is the highest scientific award in the Czech Republic granted to professor Jiří Damborský for development of software with a range of applications in protein engineering and pharmaceuticals. The issue contains an overview of our research infrastructure use throughout the year 2017 and introduction to the NaToxAq Horizon 2020 project. All this is complemented by two interviews, one with Jeff Herrick, US EPA staff who spent some time with us In November 2017 and an interview with Jan Dusík, Director of the European Office of the United Nations Environment Program on global cooperation in environmental protection. Finally, Stockholm Convention Regional Centre reports on its activities in the Balkans and Morocco.

We wish you a pleasant reading, all the best for 2018 and we look forward to bringing you a new look of the RECETOX newsletter in the spring,

Katka Šebková
on behalf of all editors in this issue

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 released in March 2018.

Calendar of Events

- 6–7 November 2017 **annual meeting of directors of BCRC centres,** Barcelona, Spain
- 7–9 November 2017 **Expert meeting on updating GMP guidance document,** Brno, Czech Republic
- 20–22 November 2017 **Scientific Board meeting (SAB) ACTRIS,** Košetice
- 20–24 November 2017 **training for experts in sampling and laboratory analyses for GMP,** Rabat, Morocco
- 30 November 2017 **T-excursion at RECETOX for talented high school students,** RECETOX, Brno
- 1 December 2017 **Excursion to RECETOX research infrastructure by Ostrava primary and secondary schools,** RECETOX, Brno
- 12 December 2017 **Christmas at RECETOX**
- 13 December 2017 **T-excursion at RECETOX for talented high school students,** RECETOX, Brno
- 17 January 2018 **Excursion to RECETOX laboratories by primary school students**
- 20 and 23 January 2018 **Open Door Day - Faculty of Science,** Brno
- 1–2 February 2018 **Expert laboratories meeting on POPs monitoring and 4th round of proficiency testing,** Barcelona, Spain
- 6–8 February 2018 **Workshop on Effective Participation at Work of POPRC and CRC,** RECETOX, Brno
- 13–14 February 2018 **Project meeting Developing a Global Monitoring Plan for Exposure to and Environmental Concentration of Mercury,** Rome, Italy
- 5–9 March 2018 **Expert group meeting on mercury monitoring arrangements and elements for effectiveness evaluation framework under the Minamata Convention,** Ottawa, Kanada
- 13–15 March 2018 **Second interim meeting on future of SAICM,** Stockholm, Sweden
- 23–24 March 2018 **Sub-regional cooperation of public health institutions to build capacities and strengthen information exchange to address hazardous chemicals impact in Ukraine, Belarus and in the Russian Federation,** Minsk, Belarus

OUR COOPERATION/PROJECTS

HORIZON 2020 Projects at RECETOX

RECETOX has been quite successful in bidding for projects in the Horizon 2020 framework. There are seven projects currently at RECETOX (ELIXIR, ERA-Planet, HBM4EU, ICARUS, NaToxAq, OBESOGENS (Marie Sklodowska-Curie Action)) and RISE, which will provide international mobility to our researchers. We are gradually introducing each project in our newsletters, and this time we turn to the NaToxAq project at the end of its first year implementation period.

NaToxAq: Natural Toxins and Drinking Water Quality – From Source to Tap

Access to a clean drinking water is crucial to human health and wellbeing. Besides anthropogenic pollution of the environment, access to clean and safe drinking water may be impacted by pollutants of natural origin such as toxic metabolites of plants, algae or cyanobacteria. This project, funded by the European Union's Horizon 2020 Research and Innovation program under a Marie Skłodowska-Curie Grant and coordinated by the University of Copenhagen, aims to cooperate through International Training Network (ITN) and secure a high quality of drinking water for EU citizens with a special focus on natural toxins.

Natural toxins are a large and very diverse group of chemicals. They are byproducts of growing plants, algae or cyanobacteria. Except for cyanobacterial metabolites, little or no scientific and regulatory attention has been given to these compounds yet, although there are indications they might cause severe health issues. For instance, bracken ferns (Pteridium sp.) produce ptaquiloside, a terpene glucoside, in vast amounts. Ptaquiloside is considered the major carcinogen in ferns, which can extend to cover large areas, especially in northern Europe.

The scientific focus of NaToxAq is to investigate the impact of natural toxins on drinking water supplies and approaches for their removal to maintain high drinking water safety for future generations. The project will contribute to the development of future drinking water regulations within EU. ITNs and the EU's Horizon 2020 framework program require an exceptional level of communication and collaboration, including non-academic partners and NaToxAq includes several waterworks from different countries are involved to facilitate the access to water samples, implement novel treatment strategies and observe their effectiveness. Also, some of the world-leading enterprises providing and developing analytical instruments are partners of this ITN, facilitating state-of-the-art analyses. The ITN is structured into

four work packages, each comprised of 3-4 PhD students, academic and non-academic beneficiaries and partners:

- WP 2: Emerging Natural Toxins
- WP 3: Sources and Distribution of Natural Toxins
- WP 4: Fate and Transport of Natural Toxins
- WP 5: Safe Water Supply

In terms of skill transfer and networking in the NaToxAq, the RECETOX will host students from the Helmholtz Centre for Environmental Research (UFZ), Leipzig, the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) in Zürich and the Copenhagen waterworks (HOFOR, Denmark) in the next three years. In exchange, RECETOX students will be trained in Danish waterworks, the Leibniz Institute for Plasma Science and Technology (INP) in Greifswald (Germany), and at Fera Science Ltd. in York (United Kingdom). Research findings will be disseminated via the NaToxAq homepage (www.natoxaq.eu), as well as during five summer schools and a final conference, held in Brno in April 2020. Some events are open to public participation; registration details will be announced online.

Two Early Stage Researcher (ESR) positions at RECETOX within this project were advertised in late 2016. As of May 2017, two PhD candidates have started their work: Marcel Schneider (ESR12) is working on Water treatment operations to remove natural toxins from surface water under the supervision of Prof. Luděk Bláha and Barbara Kubíčková (ESR14) is investigating Health risks of natural toxins in surface waters in the team of Assoc. Prof. Klára Hilscherová and Dr. Pavel Babica. Both research topics are part of WP 5: Safe water supply, coordinated by Dr. Carmel Ramwell at Fera Science Ltd., York.

What made both young researchers to become part of this innovative project and what are their expectations?

Barbara Kubíčková: "Even in an international comparison, the conditions for PhD within NaToxAq are unusually good. Student responsibilities and project objectives are clearly defined and the project is very transparent from the outset. I am a very curious person with a master in microbiology, mo-

lecular biology and physiology and I was looking for a position that will challenge me and will trespass the boundaries of a traditional biology. My research on and risk assessment of natural toxins perfectly combines the effect studies with studies of a biological system - human health in this case. I am really glad that the outputs will be used in a wider context and transferred to the public. "

Marcel Schneider: "Since the beginning of my university career, I have been increasingly interested in research of the environment, especially of its contamination and in water treatment. I decided to stay in science after my masters and applied for a PhD in a top-class interdisciplinary department at RECETOX in Brno to improve the environment. The NaToxAq project has brought together students and scientists who share this vision and also want to protect nature, the planet and its inhabitants - and for that I am very proud of being a part of NaToxAq. "

The project leader at RECETOX, Klára Hilscherová, also shared her expectations: "This project will significantly strengthen an international cooperation - not only between academic institutions, but also with the application sector. In addition, we are gaining a lot of new ideas to improve our curricula by experience sharing with other international partners. And, a key positive impact will be a wealth of new information on the levels of a wide range of natural toxins in water, the associated risks, and approaches to mitigate them. "

With a strong background in cyanobacterial research, the RECETOX-based researchers will primarily focus on cyanobacterial metabolites. Presence of toxigenic cyanobacterial strains in European freshwaters is known, therefore the emerging hazard of contamination with toxic cyanobacterial metabolites is evident and needs to be characterized further with a special focus on human health hazards. At the same time, the development of novel mitigation strategies and the application of advanced treatment processes is a priority.

Disclaimer: This project has received funding from the European Union's Horizon 2020 research and innovation program under the Marie Sklodowska-Curie grant agreement No. 722493. This article only contains the Authors' views and the Research Executive Agency is not responsible for any use that may be made of the information it contains.

15 Early Stage Researchers from 12 countries

2 PhD positions at RECETOX

3.9 million EUR H2020 EU contribution

22 major research groups

7 EU member states + USA

5 summer schools

1 conference

www.natoxaq.eu

Horizont 2020 – Teaming

On Friday the 22nd of September 2017, we organized a kick-off meeting of the Teaming project "CETOCOEN Excellence". The project is strenthening the long-standing international partnership and collaboration with four of our partners: University College London (UCL), Swiss Federal Institute of Technology in Zurich (ETH Zurich), Biobanking and Biomolecular Resources Research Infrastructure (BBMRI-ERIC) based in Austria, and the International Clinical Research Centre of St. Anne's University Hospital Brno (FNUSA-ICRC) in the Czech Republic.

The CETOCOEN Excellence project is one of 30 projects, which have passed the so-called Phase 1 of the TEAMING scheme (208 projects have been submitted and six other successful projects in are coordinated by institutions from the Czech Republic). Phase 1 gives us the opportunity to prepare a robust Business plan of the Centre of Excellence and the chance to submit the project application to the TEAMING Phase 2 call in November 2018.

Although the current Phase 1 project only takes 12 months, its outputs will serve in the next decade and will allow us to use the experience and share best practices of our project partners and better focus our research in line with current societal needs. They will also help to create a new and more effective management structure and project support that mirrors the scope of the RECETOX centre and the breadth of our scientific ambitions.

The September kick-off meeting yielded the project timeline and created three specialized working groups to design/establish a) a new organizational structure of the RECETOX centre, b) its scientific ambitions, and c) the establishment of cooperation between all project partners.

Further CETOCOEN Excellence woking group meeting took place in London in early November 2017 to lay down the key pillars of RECETOX's scientific vision.

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RECETOX Research Infrastructure Use in 2017

The RECETOX Research Infrastructure (RRI) is a research platform for implementation of interdisciplinary projects in environmental science, epidemiology, biomedicine, and bioinformatics using state-of-the-art facilities and equipment, excellent expertise and providing a broad range of services. The RRI provides open access (free of charge) to Czech and international researchers and experts to work on their projects and use the expertise and instrumentation available at RECETOX.

There were 112 applications for open access in 2017. Based on the scientific evaluation, time and costs required for activities in the applications, 75% of the submitted project proposals were approved. Thus, 32 external researchers (21 internationals) worked or were trained in the RRI, spending almost 52 man-months at RECETOX in total. almost 80% of incoming researchers are from universities, 19% from research institutions and 3% from government agencies.

In the same period, 52 other scientists/institutions used RRI's capacity to analyze samples or data, additional 100 specialists were trained in laboratories, and further 400 participants attended a total of nine conferences, workshops and summer schools organized or co-organized by our infrastructure. Moreover, RRI also supports dozens of doctoral, master and bachelor papers; in 2017, there were 19 bachelor, 48 master and 64 doctoral degree papers. Finally, the RRI has also supported the implementation of 46 projects (32 national and 14 international ones) and a number of public events such as the Regional Science Days, Night of Science, excursions and events for talented students, which were attended by more than 4700 participants in 2017.

Jeff Herrick at RECETOX

Dr. Jeffrey Herrick, researcher at the US Environment Protection Agency (US EPA), joined us in November 2017 for some time. Jeff spent a total of two months in the Czech Republic and he shared his experiences from RECETOX with us:

"I was honored to be hosted by RECETOX for three weeks in November through the U.S. Embassy Science Fellowship Program. I am truly grateful to Dr. Jana Klánová for agreeing to host me and everyone at RECETOX for sharing their research with me.

I was invited to attend both the GMP meeting guidance document meeting in Brno as well as the ACTRIS SAB meeting in Kosetice. During the meetings I learned a lot about POPs and RECETOX's leadership in GMP and ACTRIS. These opportunities allowed me to interact with the other international researchers that recognize RECETOX's expertise. I really enjoyed hearing about all the measurements going on at the Kosetice because it is close to my interests in long range transport of air pollutants.

The next two weeks I had the opportunity to meet with many of the staff at RECETOX and learn about their projects. I was quite impressed by the facilities at RECETOX. The laboratories, equipment and the researchers that run them are world-class and comparable to top-level facilities I've seen in the U.S. My meetings with many of the scientists inspired me to start thinking about how RECETOX research fits in with the goals and projects at the US EPA. I have already begun contacting people at US EPA to make the m aware of specific projects at RECETOX. I hope my presentations and meetings with staff were able connect RECETOX to EPA projects and information. I encourage RECETOX staff to contact me with questions about EPA programs or connections to EPA staff."

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Jan Dusík at RECETOX

Jan Dusík, one of the top ranking Czechs in the United Nations and director of the United Nations Environment Programme European Office, visited RECETOX on 16 June 2017. We discussed a further development of our cooperation on environment and health protection from the negative effects of toxic chemicals and need of a rapid transfer of research findings for sound decision/policy-making. Jan Dusk visited RECETOX premises and also talked to the Masaryk university journal. Short version of his interview is available below:

Advances in Technology Help Protecting the Environment

Global cooperation is necessary to protect environment says Jan Dusík. Toxic chemicals do not respect borders and they can, due to the cycling and long distance transport, affect human health and environment in a totally different location and in other form than that they have been produced, such as mercury, for example. Negative effects of mercury on the environment and humans are recognized by many countries, and therefore a global agreement entered into force on 18 August 2017. "The Minamata Convention on Mercury reduces mercury emissions to the air and to other environmental compartments, will gradually replace mercury in products and improve its waste management and strengthen human health protection," said Dusík. This agreement is one of a number of global instruments that have been developed under the auspices of UNEP/Environment Programme / UN Environment.

"However there is no single global framework for protecting the environment from releases of chemicals, global conventions are of a great importance," explained Dusík. He underlined that these agreements could work very well. "Perhaps the most successful example is the Montreal Protocol on Substances that Deplete the Ozone Layer adopted in 1987, which has made it possible to stop the expansion of the ozone hole. The recovery process is now set. It takes several decades, but thanks to the relatively rapid reaction and involvement of the all countries globally, this problem has been solved. "

He also commented on the announcement by the US President Trump that the United States would withdraw from the Paris agreement leading to a significant reduction in greenhouse gas emissions. "It complicates the situation and makes the implementation of the agreement even more complex, but it is an unstoppable process. States, cities and businesses in the United States have made it clear that, regardless of the withdrawal of the federal government from the Paris agreement, the emission reduction process will continue," says Dusík. According to him, the technologies will also significantly contribute to the implementation of the Paris agreement, i.e. conversion to electric cars and consequently a gradual reduction of diesel engine use.

Ema Wiesnerová (online.muni.cz), shortened

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RECETOX News

Award Česká hlava 2017

Professor Jiří Damborský, leader of the Protein Engineering Division at RECETOX, and his team were awarded by the "Kapsch Invence" award at the 16th "Česká hlava" contest for their work on software tools supporting protein engineering and modification of enzymes. Česká hlava is the best national contest aimed at popularizing science, outstanding research and education achievements of Czech researchers, PhD students, and companies among the general public.
The software designed by Jiří and his team is used to analyze protein structures and design their modifications so they are safe, stable and functional. The software is used, for example, by pharmaceutical companies to develop vaccines, and biosensors are its other application field. The software is now used in more than 120 countries. Congratulations!

Jiří Damborský (in the middle) – credits: Czech Press Agency (ČTK)

Activities of the Stockholm Convention Regional Centre

The Stockholm Convention Regional Centre in the Czech Republic 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 as well as generates data in monitoring program, MONET and operates the global POPs data visualization portal www.pops-gmp.org.

Past Events

RECETOX in Southern Europe

Director of the Stockholm Convention Regional Centre participated in two mercury-related meetings in October 2017: In Sarajevo, Bosnia and Herzegovina, she lectured at the national workshop to Support the Ratification and Effective Implementation of the Minamata Convention in Bosnia and Herzegovina organized in the frames of the GEF/UNDP project "Strengthening Bosnia and Herzegovina's Decision-Making Towards Becoming a Party to the Minamata Convention and Build Capacity for Implementation of Future Provisions" preparing a mercury initial assessment and developing the first national inventory on mercury in Bosnia and Herzegovina. Katka presented the latest developments and outcomes of the first meeting of the Conference of Parties of the Minamata Convention held in Geneva 24-28 September 2017, presented opportunities and areas of cooperation at bilateral and regional level and the capacity available in RECETOX. The second event were consultations on the scope of mercury contamination from industrial activities in Serbia. The Stockholm Convention Regional Centre in the Czech Republic was asked to elaborate an assessment of the existing mer-

New Academic Positions

We are proudly announcing that two of our colleagues successfully completed their habitation and became Associated Professors at Masaryk University. Congratulations to Radka Chaloupková, in the field of environmental chemistry and Dominik Heger in the field of Physical Chemistry.
Likewise, we are very pleased to announce that two of our young scientists became full university professors and we applaud to Vladimír Šindelář for his achievements in organic chemistry and to Zbyněk Prokop, professor of environmental chemistry.

3× PhD Talent

We are pleased to inform that 7th year of the Brno Ph.D. Talent contest yielded three new awards to our current PhD students for the excellence in their PhD topic: Ondřej Vávra, who will work on the preparation of a new tool useful for drug design and protein modification within the CaverDock software at Jiří Damborský Group, Peter Lenárt from Julie Bienertová-Vašků team, and Stanislav Smatana from group doc. Eva Budínská.
The contest is organized by the South Moravian Center for International Mobility (JCMM) and the South Moravian Region supports each of the award winners with an additional scholarship of 100,000 CZK per year for three years.

Awarded Master Thesis

Hip hip hoorey for Veronika Musilová receiving Evaluators Award at the XV. contest of the Bachelor and Master Theses on Environment and Ecology in the South Moravian Region that was announced in November 2017. The contest is organized by Lipka (educational institution for environmental training) and South Moravian Region. The evaluators greatly appreciated Veronika' work on Hepatotoxic and Hepatocarcinogenic Effects of Chemicals in Cultures of Cellular Spheroids as it significantly improves our knowledge on impacts of toxic chemicals on cells simulating liver tissues.

cury contamination in the Pančevo and Kruševac chlor-alkali facilities using mercury electrodes on the basis of its expertise. The work undertaken 11-13 October 2017 consisted of a range of meetings with experts, agencies and stakeholders, site visits to both facilities including a survey of their equipment, operation and storage facilites as well as a preparation of a report assessing the amount of mercury present on site. The report also contained proposals for technologies to remove these mercury hot-spots by the sound management technologies so that both sites would not constitute a risk/ burden for health and the environment. The preliminary findings were presented to the National Steering Committee in Belgrade including options and technologies that Serbia could use in the next stage of preparation of he national mercury inventory and get closer to the ratification of the Minamata Convention on Mercury.

Training in Morocco

Training of Moroccan laboratory experts to enhance implementation of the Stockholm Convention by building capacities for POPs monitoring in Africa was organized in the premises of National Laboratory of Research and Environmental Monitoring (LNESP) in Rabat, Morocco 20-24 November 2017. There were four RECETOX staff providing the training: Sampling and processing of samples was led by Roman Prokeš, collection and analyses of biotic samples, chemical analyses on gas chromatograph, method validation/calibration and QA/QC, were lectured and demonstrated by Petr Kukučka, Kateřina Šebková spoke on use of information from science to policies, visualization of results and data management and Céline Degrendele provided language support and shared her experience with POPs air monitoring. Training was delivered in French and all materials were translated.
There were 12 experts from four institutions - LNESP, the National Institute of Marine Research (INRH), the National

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Activities of the Stockholm Convention Regional Centre

Institute of Hygiene (INH) and water branch experts from Morocco's National Electricity and Drinking Water Authority (ONEE-BO).
This capacity building project supported by GEF and implemented by UNEP chemicals in cooperation with expert laboratories in Europe was launched in the summer of 2016. It consists of a two-year sampling of air, water and breast milk in partner countries and analyses of levels of POPs in collected samples. RECETOX's task for the training was to strengthen the knowledge available in Morocco, to check analytical skills and laboratory equipment, and to improve the QA / QC practices used in national laboratories. We also collected water and air samples and introduced a calibration method for the analysis of samples by gas chromatography. The RECETOX team also visited the INH and ONEE laboratories in Rabat and became familiar with their activities. Thank you for your hospitality and we will be very pleased to return to sunny Rabat again!

Events in the Pipeline

What stems from a membership in the expert bodies of the Rotterdam and Stockholm Conventions? A a Regional Meeting for Central and Eastern European Countries on enhancing the effective participation of Parties to the Rotterdam and Stockholm conventions in the work of the Rotterdam Convention's Chemical Review Committee and the Stockholm Convention's POPs Review Committee will be held in our premises in Brno 6-8 February 2018. We are looking forward to welcoming 20+ experts from 15 countries!
Meeting of the Global Monitoring Plan (GMP) of the Stockholm Convention experts will be held in Brno 30 May - 1 June 2018. The members of five regional organization groups from all continents will meet to begin the third stage of collection of global data on POP levels in the environment, data management and data visualization online on www.pops-gmp.org.

We are also organizing a 14th RECETOX Summer School "Toxic Compounds in the Environment 2018" 18-22 June 2018 on Smart and Healthy Cities. Participants will be exploring how can cities use information on chemicals in the environment, more effectively improve lives of their citizens/residents. More details and registration will be available on RECETOX website by the end of February 2018.
And last but not least, our monitoring networks MONET in Europe and Africa, including active air samplers in Ghana, Kenya and Košetice will continue to collect and analyze environmental samples for levels of toxic chemicals. In addition, we will further enhance our cooperation with the World Health Organization (WHO), UNIDO and UNDP in our partner countries and prepare new projects.
If you are interested in cooperation, contact us – whether you wish to use our research infrastructure, consult our experts, prepare joint project proposals or undertake other forms of cooperation.

RECETOX research infrastructure provides open access (free of charge) to Czech and international researchers and experts to work on their projects and use the expertise and instrumentation available in our Centre.
Please note the following deadlines for submitting application forms or project proposals in 2018: 31 March, 30 June, 30 September, and 31 December.
Visit www.recetox.muni.cz/RI for the application procedure and further relevant details. Should you have additional questions, please contact Petra Růžičková, coordinator of the RECETOX research infrastructure (ruzickova@recetox.muni.cz).

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