



**FACULTY OF FISHERIES
AND PROTECTION OF WATERS
CENAKVA**

Research Program 2

Responsible leader: *Hana Kocour Kroupová*

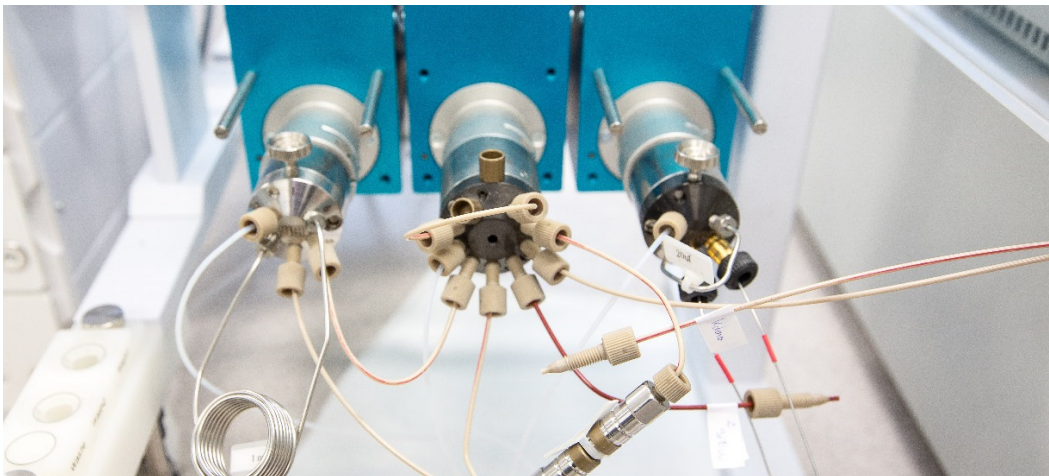
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Research program 2

„New“ pollutants in the environment and their effect on freshwater ecosystems

VISIONS

To significantly contribute to the improvement of the water quality and the aquatic environment in the Czech Republic.



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MAIN OBJECTIVES

- Development of effective analytical methods for the detection of “new” anthropogenic contaminants in different components of the environment
- Research of the fate of emerging pollutants in the environment
- Research of the micropollutants impact on organisms and ecosystems
- **The application of established know-how and technological background in cooperation with application and private sectors in order to improve the quality of water and the aquatic environment and the production of high-quality healthy food.**





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RESEARCH TEAM

2024

Positions	Prof.	Assoc.Prof.	Researcher	Post doc	Ph.D.	Technician
Heads	3	5	14	2	8	9

Laboratory of Environmental Chemistry and Biochemistry (LECHB)

Laboratory of Aquatic Toxicology and Ichthyopathology (LATI)

Laboratory of Experimental Complex Systems (LECOS)

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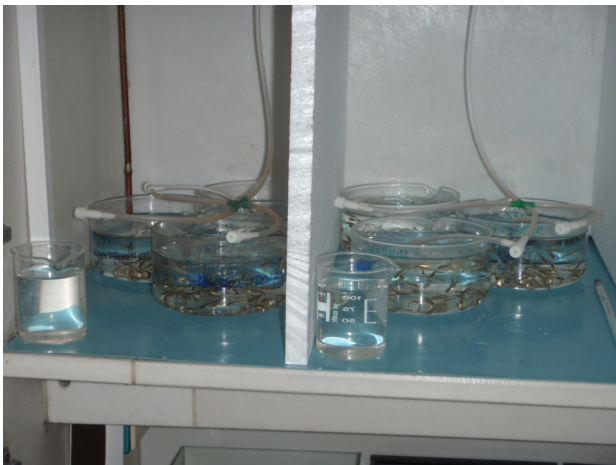
BASIC RESEARCH

CZECH SCIENCE FOUNDATION (6 projects)

- Holistic exposure and effect potential assessment of complex chemical mixtures in the aquatic environment (2020 – 2024)
- From brain to sperm: how psychoactive pollutants can affect fish sperm function (2022 – 2024)
- Bioaccumulation dynamics of emerging contaminants in aquatic invertebrates using marbled crayfish (2023-2025)
- Characterization of effects of substances with anti-progestogenic activity occurring in the aquatic environments on lower vertebrates (2022–2024)
- Effects of warming and pollutants on nutrient flows and lower trophic levels in freshwater communities: from microbes to Daphnia (2024-2026)
- Growing field: Advancing understanding of fish mucosal immunology through molecular farming (2024–2026)

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International Research Projects

HORIZON 2020

- European Partnership for the Assessment of Risks from Chemicals (PARC) - (2022 –2029)
- DANUBIUS Implementation Phase Project - DANUBIUS-IP (2022 –2025)

LIFE

- Implementation of the river basin management plan in selected river sub-basins in Slovakia (2023 –2032)

JPI AMR

- BIOCIDES - Antibacterial biocides in the water cycle – an integrated approach to assess and manage risks for antibiotic resistance development (2022–2024)

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APPLIED RESEARCH

NATIONAL AGENCY FOR AGRICULTURAL RESEARCH (4 projects)

- **Spectrum extension of medicinal products in aquaculture in the Czech Republic and evaluation of their residues in fish meat (2021–2025)**
- **What we don't know about organic pollution of drinking and irrigation water sources: Identification of emergent compounds through non-targeted screening (2023 – 2025)**
- **Evaluation of hydrological status in trout rivers of Czech rep. and status of salmonid populations (2023 – 2025)**
- **Medium-term trend in the behavior of micropollutants originating from wastewater or sewage sludge in the soil environment (2024–2028)**



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APPLIED RESEARCH

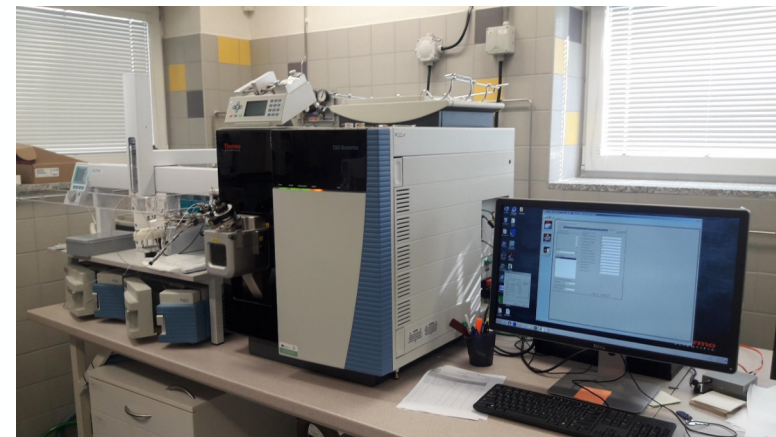
TECHNOLOGY AGENCY OF CR (2 projects)

- **Development of a unit for decellularization by supercritical CO₂, optimization of permeations and recipes for tissue decelularization and production of a bioactive scaffold equipped with mesenchymal cells (2023–2027)**
- **New generation lamellar sedimentation filtration system (2024–2026)**

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COMMERCIAL COOPERATION



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PUBLICATIONS AND APPLICATIONS

2022–2023

70

(43 in Q1)

Articles in IF

1, 3, 1

Book, Chapter in
book, Textbook

4, 1, 0

Methodologies,
Technologies,
Softwares

0

Patents

1, 1, 4

Utility model,
Functional
sample,
Prototype

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SOCIAL RELEVANCE AND APPLICATIONS

FOUR „THE KEY“ FIELDS OF RESEARCH“



Safe drinking water



Wastewater treatment



Monitoring, fate and effects of micropollutants in environment



Pollutants in soil-plant systems

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Safe drinking water

SOCIAL RELEVANCE AND APPLICATIONS



Nováková, P., Švecová, H., Bořík, A., Grabic, R., 2023. Novel nontarget LC-HRMS-based approaches for evaluation of drinking water treatment. Environmental Monitoring Assessment 195, 739. (IF 2021 3.307)



envipur
hospodáříme s vodou

JVS

Cooperation with drinking water producers (JVS, Zelivska provozni, PVK, CEVAK, Vodarna Plzen) and technological companies (EnviPur) focused on **optimization of final treatment technologies** (esp. effectivity of micropollutant elimination of new installed GAC filters during the time) and **continual monitoring of raw drinking water quality** (Zelivska provozni, PVK)



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Wastewater treatment

SOCIAL RELEVANCE AND APPLICATIONS



Grabic, R., Ivanová, L., Kodešová, R., Grabicová, K., Vojs Staňová, A., Imreová, Z., Drtil, M., Bodík, I., 2022. Desorption of pharmaceuticals and illicit drugs from different stabilized sludge types across pH. *Water Research* 220, 118651. (IF 2020 = 11.236)



Fedorova G., Grabic R., Grabicová K., Turek J., Van Nguyen T., Randak T., Brooks B.W., Zlabek V., 2022. Water reuse for aquaculture: Comparative removal efficacy and aquatic hazard reduction of pharmaceuticals by a pond treatment system during a one year study. *Journal of Hazardous Materials* 421: 126712. (IF 2021 = 14.224)



Fialová, P., Grabic, R., Grabicová, K., Nováková, P., Švecová, H., Kaserzon, S., Thompson, K., Vrana, B., 2023. Performance evaluation of a diffusive hydrogel-based passive sampler for monitoring of polar organic compounds in wastewater. *Science of the Total Environment* 864, 161071. (IF 2021 = 10.754; Q1)



Cooperation with wastewater treatment companies (CEVAK) and technological companies (EnviPur) focused on **improving the efficiency of removing micropollutants during treatment processes**



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SOCIAL RELEVANCE AND APPLICATIONS

Monitoring, fate and effects of micropollutants in environment



Šauer, P., Vrana, B., Escher, B.I., **Grabic, R.**, Toušová, Z., Krauss, M., von der Ohe, P.C., König, M., **Grabicová, K.**, Mikušová, P., Prokeš, R., Sobotka, J., **Fialová, P.**, Novák, J., Brack, W., Hilscherová, K., 2023. Bioanalytical and chemical characterization of organic micropollutant mixtures in long-term exposed passive samplers from the Joint Danube Survey 4: Setting a baseline for water quality monitoring. *Environment International* 178, 107957. (IF 2021 = 13.352)



Kocour Kroupová, H., Grimaldi, M., **Šauer, P.**, **Bořík, A.**, **Zálohová, K.**, Balaguer, P., 2023. Environmental water extracts differentially activate zebrafish and human nuclear progesterone receptors. *Science of The Total Environment* 859, 160232. (IF 2021 = 10.753)



Sancho Santos, M.E., Horký, P., **Grabicová, K.**, **Steinbach, C.**, Hubená, P., Šálková, E., Slavík, O., **Grabic, R.**, **Randák, T.**, 2023. From metabolism to behaviour – Multilevel effects of environmental methamphetamine concentrations on fish. *Science of the Total Environment* 878, 163167. (IF 2021 = 10.754)



Tresnakova, N., Famulari, S., Zicarelli, G., Impellitteri, F., Pagano, M., Presti, G., Felcia, M.C., Caferro, A., Gulotta, E., Guiliano, S., **Sandova, M.**, Vazzana, I., Imbrogno, S., Capillo, G., Savoca, S., **Velisek, J.**, Faggio, C., 2023. Multi-characteristic toxicity of enantioselective chiral fungicide tebuconazole to a model organism Mediterranean mussel *Mytilus galloprovincialis* Lamarck, 1819 (Bivalve: Mytilidae). *Science of The Total Environment* 862, 160874. (IF 2021 = 10.753)



Participation in the national and international monitoring programs – development of effective sampling and analytical methods for detection of new contaminants in the environment; pilot studies; generating data for decision makers and stakeholders; **identification of the causes and culprits of accidental pollution in the aquatic environment**

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SOCIAL RELEVANCE AND APPLICATIONS

Pollutants in soil-plant system



Brunetti, G., Kodešová, R., **Švecová, H.**, Fér, M., Nikodem, A., Klement, A., **Grabic, R.**, Šimůnek, J. 2022. A novel multiscale biophysical model to predict the fate of ionizable compounds in the soil-plant continuum. Journal of Hazardous Materials 423: 127008. (IF 2021 = 14.224)



Menacherry, S.P.M., Kodešová, R., **Fedorova, G.**, **Sadchenko, A.**, Kočárek, M., Klement, A., Fér, M., Nikodem, A., Chroňáková, A., **Grabic, R.**, 2023. Dissipation of twelve organic micropollutants in three different soils: Effect of soil characteristics and microbial composition. Journal of Hazardous Materials 459: 132143. (IF 2022 = 13.600)



Kodešová, R., **Fedorova, G.**, Kodeš, V., Kočárek, M., Rieznyk, O., Fér, M., **Švecová, H.**, **Nováková, P.**, Klement, A., **Bořík, A.**, Nikodém, A., **Grabic, R.**, 2023. Assessment of potential mobility of selected micropollutants in agricultural soils of the Czech Republic using their sorption predicted from soil properties. Science of the Total Environment 865, 161174. (IF 2021 = 10.754)



Cooperation with wastewater treatment companies (CEVAK)

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SOCIAL RELEVANCE AND APPLICATIONS

Development of research instruments

Microscope for cornea implant preparation and in-depth quality control

Consultations at Brno trade fair



Four new prototypes:

- Microscope Visible Truth UltraEasy
- PADES
- Adopted Zeiss Stemi 508
- Filiqa 1.1

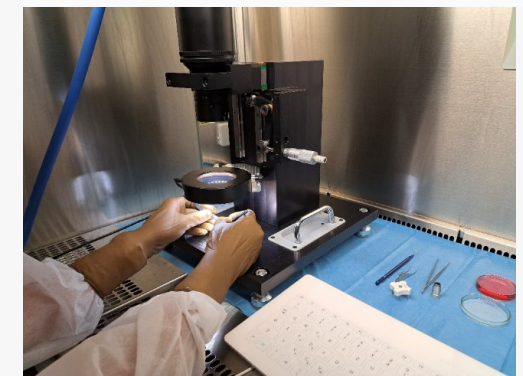
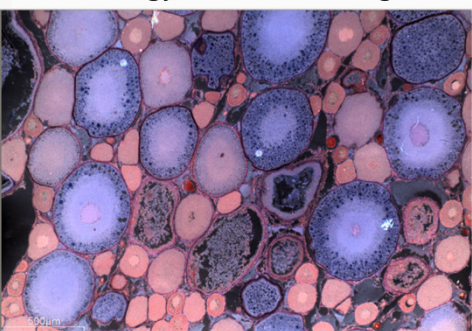
One new functional sample:

- Filiqa 0.1.

Verified technology

- Procedure for evaluation and preparation of corneal transplant

Full histology slide in one image



Human cornea with implant cut





All the best in 2024

