Fakulta rybářství
a ochrany vod
Faculty of Fisheries
and Protection
of Waters

Jihočeská univerzita
v Českých Budějovicích
University of South Bohemia
in České Budějovice

The aerial photograph of the International Environmental Educational, Advisory and Information Centre of Water Protection Vodňany.

Vodňany, Czech Republic, 2020

BIENNIAL REPORT 2018–2019

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Biennial Report

2018–2019

Vodňany, Czech Republic, 2020

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CONTENT

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INTRODUCTORY WORD OF THE DEAN OF THE FFPW USB

Dear colleagues, friends,

Let me summarize in a few paragraphs the most important events in the life of our institution in the past period. In 2019, the Faculty of Fisheries and Protection of Waters USB celebrated 10 years from its foundation. During this relatively short period, the faculty has experienced a dynamic development both, in terms of building and reconstructing its premises, as well as in science and study. The last two years have been no different, even though we have been in great uncertainty regarding the expiring financing of the sustainability of our CENAKVA center by the Ministry of Education. The successful inclusion of CENAKVA as a Large Research Infrastructure of the Czech Republic, including obtaining the support for open access by 2022, is a great achievement. More funds for the development of the center were included into the budget of the University of South Bohemia as part of the Long-Term Conceptual Development of the Research Organization. Both strategic resources allow us to further develop science and are also a challenge to connect with other infrastructures within the European Research Area.

Another important milestone is that we have obtained the possibility of institutional accreditation in the education field of "Biology, Ecology and the Environment" for all levels of study, and within the education field of "Agriculture" – the field of study "Fisheries" for the bachelor's degree. Thanks to this fact we are now, by the end of 2019, accredited in bachelor's degree in the education field of "Protection of Waters" and in the doctoral degree programmes, field of study "Protection of Aquatic Ecosystems". The development in the field of water protection has shifted the faculty from the focus on purely agricultural sciences to natural sciences.

As in previous years, we have received numerous projects that allow us to continue and develop quality research. This gave rise to several very important publications, and we have managed to become more and more successful in prestigious Top 10 magazines. We have improved our infrastructure and modernized instrumentation and scientific equipment. We have put a new greenhouse using aquaponic technology into operation, we have built new recirculation systems, and we are constructing a new building for a fish disease laboratory as well as a new accommodation facility for doctoral students. We have purchased strategic land for further development of the faculty near MEVPIS. However, all of this would be of no value without capable personnel of the faculty. We have invested in new posts of post-docs and hosting professors, we have created several motivational measures for students and scientists, and we have managed to gradually increase the salaries of employees in all positions. I consider the positive motivation of all employees and students, which is stimulating a creative atmosphere towards the work as well as the sense of belonging and pride of the Faculty, as one of the most important priorities from the position of the Dean of the Faculty of Fisheries and Protection of Waters USB.

Finally, I would like to thank all employees for their dedication, and I believe that the next two-year period will also be successful. There is another milestone awaiting us. The celebration of 100 years of the foundation of the parent institution of the Faculty, namely the Research Institute of Fish Culture and Hydrobiology in 2021.

Prof. Pavel Kozák
Dean of the FFPW USB

01 MISSION, VISION AND OBJECTIVES OF THE FACULTY OF FISHERIES AND PROTECTION OF WATERS

I. Mission of the faculty

The Faculty of Fisheries and Protection of Waters is the center of scientific, educational and service activities in the field of fisheries and protection of waters, i.e. in the following areas:

- preserving and expanding attained knowledge, and developing scientific, research, development, innovation and other activities,
- acquisition of appropriate professional qualification and preparation for research,
- offering further forms of education and thus, being involved in lifelong learning,
- playing an active role in public discussion in building of civic society and preparing young people to live in it,
- contributing to development at the national and regional level and co-operating with public administration, local authorities and businesses,
- developing international and especially European cooperation and promoting common projects with institutions abroad and mobility of academic staff and students.

II. Vision of the faculty

1) Within the integrated research program of the faculty we want to understand the ongoing processes in freshwater ecosystems and their importance in the terms of biodiversity conservation, protection of water environment, but also protection of water resources for life and human activities.
2) As the only faculty of this type in the Czech Republic and unique in Central Europe, we want to be a modern, open and dynamically developing in accordance with the surrounding world.
3) As an internally consolidated, stable and financially healthy faculty, united by its internal culture, the faculty intends to continue promoting a creative academic environment where scholars will expand the boundaries of human knowledge and pass on their intellectual wealth to the students and train them to become highly qualified professionals in fisheries and protection of waters.

III. Objectives of the faculty

1) Science and research

Achieving scientific and research excellence in the field of freshwater fishery and protection of waters. To support (motivate) publishing in prestigious journals ranked according to the fields in WOS in Q1. To produce applied results such as patents, licenses and contractual research. To stimulate future principal investigators (coordinators) of European projects.

2) Education

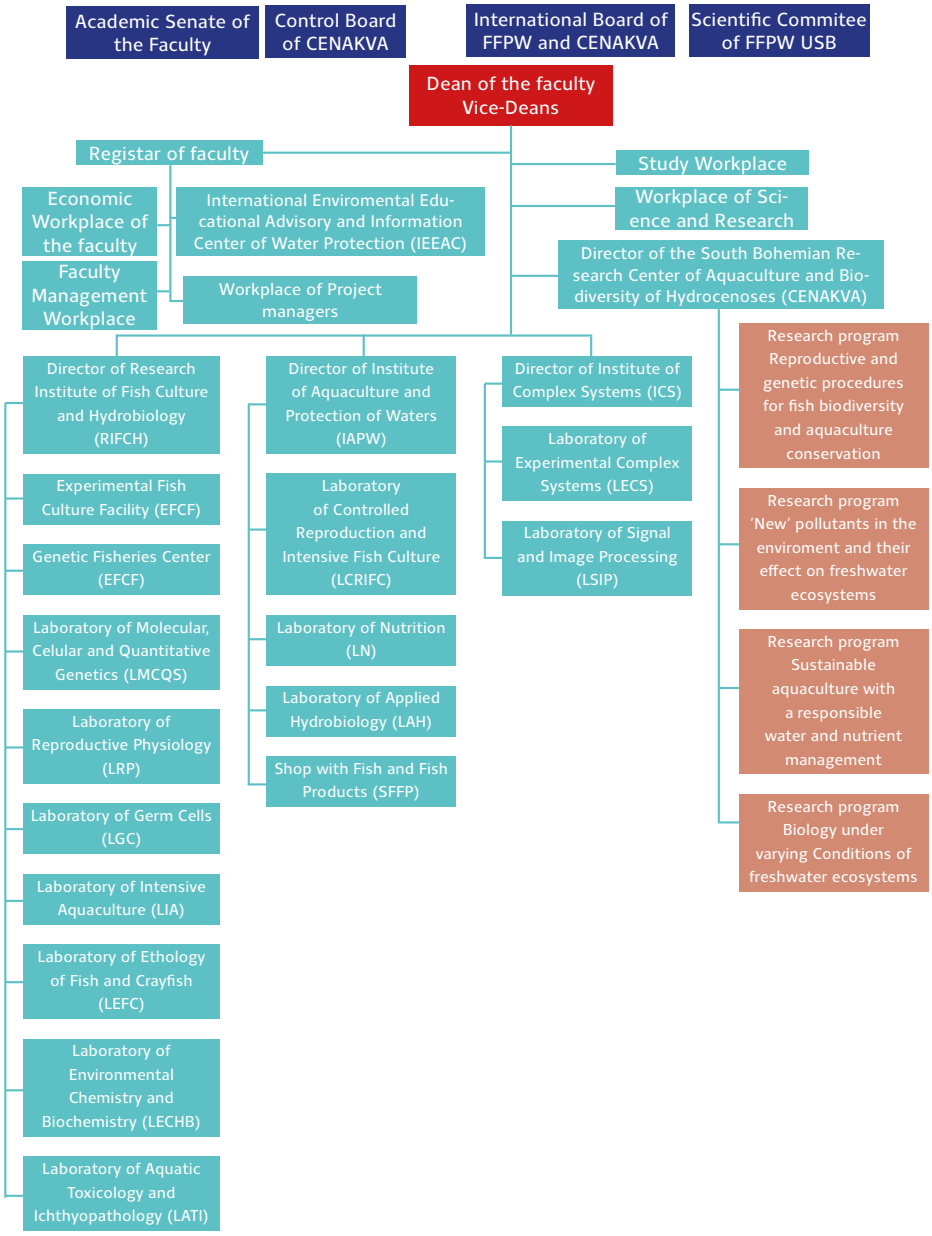
Education of expert and socially excellent graduates in the field of fishery and protection of waters with bachelor, master and doctoral degrees that will be applicable on the labour market.

- Education in the bachelor and master's degree – to bring up independent and highly qualified fishermen and aquatic environmentalists, able to decide and manage, in order to develop fishery, aquaculture and for long-term sustainable exploitation of the environment working in practice, government and self-government, as well as science, research and innovations in the Czech Republic, Europe and worldwide.
- Education on a Ph.D. level – to train future generations of scientists who will be able to solve problems and challenges for development of fishery, aquaculture and long-term sustainable exploitation of the aquatic environment in the Czech Republic, Europe and worlwide.
- Lifelong learning – strengthen the knowledge of the respective specialists in the Czech Republic and Europe about innovations in fishery, aquaculture and the needs of sustainable use of the environment.

3) Service and commerce

Achieving at least a 10% profitability in the field of implemented custom research and commercial activities at the faculty (activities without added value will no longer be supported); see the Dean's decision. To perform specific and targeted contractual research and other commercial activities in the fields of expertise (perspective research fields), esp. analytical chemistry, toxicology, fish breeding, sale of fish products and lifelong learning. To focus on licensing and patents.

1.1. Structure of the FFPW USB



Laboratory of Applied Hydrobiology ended as of 31 December 2019.

1.2. Faculty Management

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1.3. Academic Senate of the FFPW USB

Appointment period 6 November 2017 – 6 November 2020

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	Bořek Drozd, Ph.D., IAPW; drozd@frov.jcu.cz (since 1. 11. 2018)
	Vlastimil Stejskal, Ph.D., IAPW; stejskal@frov.jcu.cz
	Petr Dvořák, Ph.D., IAPW; dvorakp@frov.jcu.cz
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	Oldřich Pecha; pechao03@frov.jcu.cz (since 1. 10. 2018)

1.4. Scientific Advisory Board (SAB) of FFPW USB and CENAKVA

Chairman
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Wageningen University, Graduate School WIAS, The Netherlands

Prof. Mats Tysklind
Umea University, Department of Chemistry, Sweden

Assoc. Prof. Bela Urbanyi
Szent István University, Hungary

Dr. Marc Vandeputte
INRA-IFREMER, France

Prof. Sadasivam Kaushik
INRA, France

Prof. Achim Kohler
Norwegian University of Life Sciences, Norway

Prof. Dr. Werner Kloas
Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Germany

1.5. CENAKVA Center Supervisory Board

Pavel Punčochář, CSc.
Ministry of Agriculture, Head of Water Management Department

Assoc. Prof. Jiří Krechl
CzechInvest

M.Sc. Jan Radoš
Ministry of Agriculture, National Agency for Agricultural Research

Prof. Ivo Pavlík
Mendel University in Brno, Faculty of Regional Development and International Studies

Dipl.-Ing. Jaromír Slíva
České Velenice Mayor

Prof. Ivo Frébort
(since 8/2018)
Haná Region Centre for Biotechnological and Agricultural Research

1.6. FFPW USB Scientific Committee

Chairman	Prof. Pavel Kozák, FFPW USB, Vodňany
Registrar	Antonín Kouba, Ph.D., FFPW USB, Vodňany
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	Assoc. Prof. Vladimír Žlábek, FFPW USB, Vodňany
	Prof. Otomar Linhart, FFPW USB, Vodňany
	Prof. Martin Flajšhans, FFPW USB, Vodňany
	Prof. Tomáš Randák, FFPW USB, Vodňany
	Assoc. Prof. Jan Mráz, FFPW USB, České Budějovice
	Assoc. Prof. Martin Kocour, FFPW USB, Vodňany
	Prof. Dalibor Štys, FFPW USB, Nové Hrady
	Petr Císař, Ph.D., FFPW USB, Nové Hrady
	Assoc. Prof. Roman Grabic, FFPW USB, Vodňany
	Prof. Tomáš Polívka, Faculty of Science USB, České Budějovice
	Assoc. Prof. Josef Matěna, Faculty of Science USB and Biology Centre CAS, České Budějovice
External members	Prof. Petr Ráb, Institute of Animal Physiology and Genetics CAS, Liběchov
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	Assoc. Prof. Pavel Drozd Faculty of Science, University of Ostrava, Ostrava

1.7.

RIFCH

RESEARCH INSTITUTE OF FISH CULTURE AND HYDROBIOLOGY

The Research Institute of Fish Culture and Hydrobiology (RIFCH) is currently the largest and most complex workplace of the faculty, mainly focused on the implementation of good-quality internationally recognized research in the biological, environmental and aquaculture fields.

The main research directions of the RIFCH, currently provided by seven research laboratories supported by two experimental workplaces, include the study of genetic diversity of economically important species of fish and crayfish, reproduction of economically important and endangered species of fish and crayfish, including the development of techniques for their artificial reproduction, prevention and therapy of fish diseases, monitoring the occurrence of foreign substances in aquatic ecosystems, and assessing the impact of pollution on exposed organisms. We also develop water quality monitoring systems using fish and crayfish as bioindicators. A high-tech infrastructure, including state-of-the-art technology and instrumentation, is essential for good-quality research. Modernization of our facilities was carried out within the project of the South Bohemian Research Center for Aquaculture and Hydrocenoses Biodiversity (CENAKVA). There are currently ongoing changes in the key instruments, equipment and installation of new technologies needed for further research.

The RIFCH research teams closely cooperate with the application sphere through projects and commercial activities including knowledge transfer. The academic staff of the institute provides teaching within the faculty degree programs at all levels – bachelor, master and doctoral.

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Selected projects

- NAZV – QK1710310 Utilization of new biotechnological approaches under Czech aquaculture with the aim to reach effective, high-quality and environmentally friendly fish production (2017–2021, principal investigator Assoc. Prof. Tomáš Policar)
- NAZV – QK1910430 Innovation of technological elements in carp farming in order to maximize utilization of high potential of selection programs in conditions of pond management (2019–2023, principal investigator Assoc. Prof. Martin Kocour)
- GAČR – 17-19714Y Nuclear transfer in fish: a chance for restoration of vanishing sturgeon species (2017–2019, principal investigator Assoc. Prof. Martin Pšenička)
- GAČR – 18-03712S Is a new generation of herbicides safer alternative also for aquatic invertebrates? (2018–2020, principal investigator Assoc. Prof. Josef Velíšek)
- GAČR – 18-15802S Environmental transformation of Pharmaceuticals in the common recipient of treated sewage water (2018–2020, principal investigator Assoc. Prof. Vladimír Žlábek)
- GAČR – 18-12465Y An investigation of guidance mechanisms of spermatozoa in freshwater fish (2018–2020, principal investigator: Sergii Boryshpolets, Ph.D.)
- GAČR – 19-04431S Temperature driven changes in interactions and ecological roles of prominent crayfish invaders (2019–2021, principal investigator Antonín Kouba, Ph.D.)

Selected publications

Červený, D., Grabic, R., Fedorova, G., Grabicová, K., Turek, J., Žlábek, V., Randák, T., 2018. Fate of perfluoroalkyl substances within a small stream food web affected by sewage effluent. Water Research 134: 226–233. (IF 2017 = 7.051)

Šauer, P., Stará, A., Golovko, O., Valentová, O., Grabic, R., Bořík, A., Kocour Kroupová, H., 2018. Two synthetic progestins and natural progesterone are responsible for most of the progestagenic activities in municipal wastewater treatment plant effluents in the Czech and Slovak republics. Water Research 137: 64–71. (IF 2017 = 7.051)

Kouba, A., Lunda, R., Hlaváč, D., Kuklina, I., Hamáčková, J., Randák,T., Kozák,P., Koubová, A., Buřič, M., 2018. Vermicomposting of sludge from recirculating aquaculture system using *Eisenia andrei*: technological feasibility and quality assessment of end-products. Journal of Cleaner Production 177: 665–673. (IF 2017 = 5.651)

Prchal, M., Bugeon, J., Vandeputte, M., Kause, A., Vergnet, A., Zhao, J., Gela, D., Genestout, L., Bestin, A., Haffray, P., Kocour, M., 2018. Potential for genetic improvement of the main slaughter yields in common carp with in vivo morphological predictors. Frontiers in Genetics 9: 283. (IF 2017 = 4.151)

Saito, T., Pšenička, M., 2018. Method for labeling germ cells, especially primordial gonocytes of cartilaginous fish. Industrial Property Office CZ, patent No. 307467.

The aerial photograph of the Research Institute of Fish Culture and Hydrobiology of FFPW USB in Vodňany.

LABORATORY OF ETHOLOGY OF FISH AND CRAYFISH

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The main aim of the laboratory is the complex research of freshwater ecosystems using multidisciplinary approaches. Apart from fish and crayfish we use also other aquatic organisms for studying the effects of main biotic and abiotic factors recently influencing freshwater ecosystems. The main important factors are climatic changes, anthropogenic changes (different types of habitat disturbance) and biological invasions. Among others, techniques and approaches used are ethological surveys of intra- and inter-specific interactions, analyses of predator-prey relationships, stable isotopes analyses, and heart rate monitoring together with the use of these techniques in eco-toxicological studies. The key organisms used in our laboratory are crayfish in both, basic and applied research. Besides crayfish we also consider the roles of other invertebrates and fish and their interactions in different aquatic ecosystems. Laboratory targets on basic biological patterns as well as on the transposition of results on natural processes in natural conditions and their subsequent application. The laboratory activities also touch on the problematics of sustainable aquaculture, reproduction and culture of rheophilic fish species. Last but not least, the laboratory is also active in increasing of public awareness, organizing educational sessions for public, biomonitoring and rescue transfers of bivalves, crayfish and fish.

An example of a recent interesting and important result is the description of an ability of highly invasive marbled crayfish to successfully incubate eggs and undergo the early post-embryonal development outside water, only in conditions of high humidity, as a condition in burrows constructed during long-term droughts. Compared to native European species it is a very important competitive advantage especially during the time of common climatic extremes.

Aside from important findings from basic research aimed on the understanding of freshwater ecosystems function is the laboratory also involved in upgrading and application of the water quality monitoring system based on non-invasive observation of motional activity and heart rate in crayfish. Biomonitoring of natural localities and rescue transfers are beside their basic aim also used as a tool for communication with the public. The laboratory also tries to be active in the increasing of public awareness about the conservation of key aquatic species and water environment in general. We hope that these activities may help to involve the public more in nature conservation tasks.

The marbled crayfish (Procambarus virginalis) with juveniles attached at the ventral side of the female's abdomen.

Prepared by: Miloš Buřič, Ph.D.

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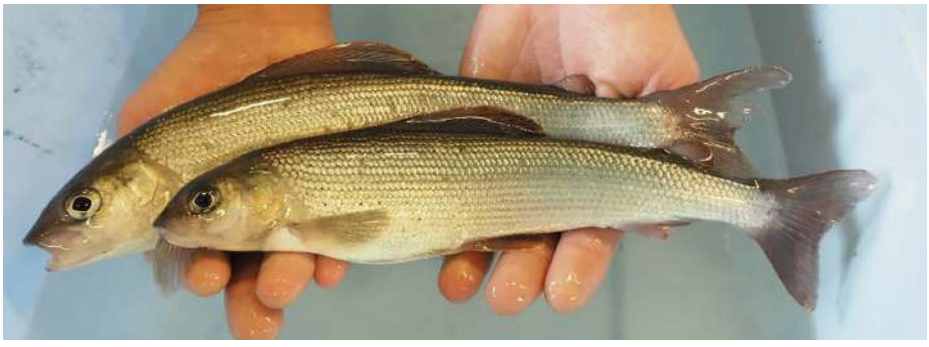
The main aim of the laboratory is applied research and development concerning effective methods of intensive aquaculture of economically important fish species for human consumption, stocking programs and sport angling. In particular, this research has optimized Recirculating Aquaculture System (RAS) technology to achieve continuous, high-quality and profitable fish production of the following fish: pikeperch (*Sander lucioperca*), Eurasian perch (*Perca fluviatilis*), African catfish (*Clarias gariepinus*), largemouth bass (*Micropterus salmoides*), common barbel (*Barbus barbus*), European grayling (*Thymallus thymallus*) and others. In addition to optimizing the RAS operation under experimental or large scale conditions, different production and technological protocols are innovated and optimized for broodstock management, gamete storage and manipulation, egg incubation, larval, juvenile and market-sized fish culture with the elimination of production cost and providing welfare for cultured fish. The mentioned technological research is logically supplemented by research that has studied controlled reproduction, gamete and freshly hatched larvae quality, fish domestication, production of triploid and monosex populations, stress and the physiological state of fish under various aquaculture conditions depending on water quality, light regime, stocking density, nutrition or fish sorting and other handling. In addition to intensive aquaculture, the laboratory has also studied the biology, reproduction and breeding of native European crayfish and food organisms (marine and freshwater rotifers). All activities and obtained research results have been used by the laboratory staff in student teaching of all levels in university education, training of production fishermen and popularization of aquaculture and fish research among the wide professional and laic society.

An example of interesting basic research is a study describing cellular and molecular changes of the oocyte quality in different fish species during their aging process. The aim of the research is to slow down or significantly eliminate negative changes due to broodstock nutrition or the use of various antioxidants during the oocyte incubation. The aim is to allow long-term storage of unfertilized oocytes during transport or in order to synchronize egg fertilization of the obtained oocytes under different conditions and time. These research results may also find an application in human medicine to preserve ovulated and unfertilized oocytes during the in vitro fertilization process.

The laboratory has developed a wide cooperation with Czech and foreign production companies with the aim to make more efficient intensive fish farming with higher profit. Researchers have cooperated with the European Aquaculture Society (EAS) from Belgium to organize international scientific aquaculture conferences, meetings and workshops. The laboratory staff has also provided expert consulting related to the construction and operation of intensive aquaculture production farms of finfish and other aquatic organisms (mainly crayfish). The laboratory has also produced high quality stocking fish of predatory and riverine species, which have been stocked in cooperation with the Czech Fishing Association and other companies into opened waters, sport grounds and other production systems for following culture.



Broodstock of European grayling (Thymallus thymallus) cultured under RAS conditions.

Prepared by: Assoc. Prof. Tomáš Policar

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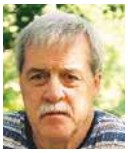

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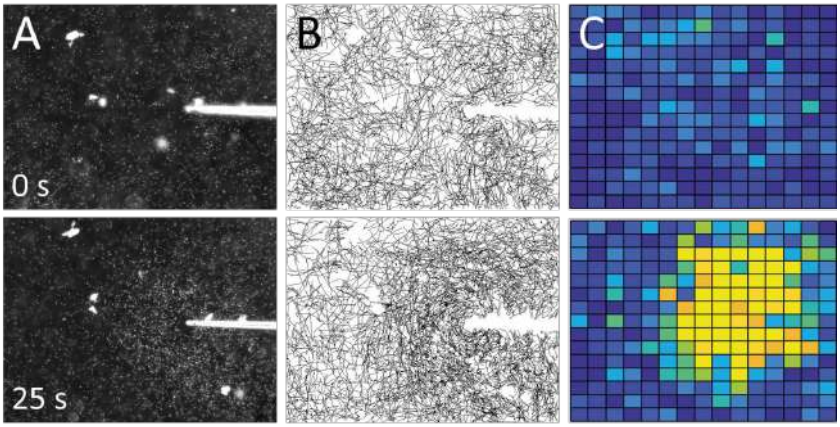
The Laboratory of Reproductive Physiology is focused on the study of fish gametes' functioning, as a factor which basically determines the reproduction success, especially in species with external fertilization. The success of fertilization in these species is highly dependent on the quality and capacity of spermatozoa to reach the egg during a quite short period of time. Currently we are studying different aspects of sperm physiology prior and during motility: energy consumption and involved metabolic pathways, motion of sperm and particularly flagellum, sperm behaviour under different environmental conditions and, last but not the least, cryopreservation of samples for future application. The main goal of our research is to describe and to understand the processes occurring in spermatozoa during their journey to the egg that lead to successful fertilization. We are planning to concentrate more on direct sperm/egg interaction, rather than the study of sperm and eggs separately. In the last few years, we extended the spectrum of our experimental fish species (carp, sturgeons) with rainbow and brown trout, gars, pikeperch, burbot, and freshwater rays and guppies with internal fertilization. In such a way we can follow changes in reproduction strategies and spermatozoa behaviour which were evolved under different environmental conditions in different fish species. This research will use classical as well as modern methods of proteomics, biochemical methods, observation and analyses of sperm/flagellum motion.

As an example of ongoing research is an observation of spermatozoa accumulation close to a signal source, released by the egg or ovarian fluid in freshwater fish (Fig. below). This process is indicating the presence of specific interaction mechanism between egg and sperm, which may affect the sperm journey to the egg and the whole fertilization success. This mechanism could be species-specific, related to a reproduction strategy and condition of spawning. In addition, it may also work as a selection mechanism, which selects more or less responsive cells out of a total sperm population.

The research data and publications of our laboratory are commonly used in basic research worldwide. We have one of the priority statuses in the laboratories all over the world, dealing with gametes of fish. We are actively participating in organizing workshops as well as scientific meetings. We have also developed several guidelines and patents for different aspects of the reproduction technology of various freshwater fish species and sperm cryopreservation, which can be freely used for preserving the diversity of fish species and breeds. Our results can be used for better adaptability of freshwater fish farming under changing climatic conditions, as well as by fishermen in fish farms in the Czech Republic and Europe.



Sterlet spermatozoa accumulation behaviour at 0 and 25 s after egg released compounds introduced by microinjection, A: frame from video record; B: corresponding spermatozoa 2 second-long tracks; C: heat map reflecting the relative number of spermatozoa per observation field.

Prepared by: Sergii Boryshpolets, Ph.D.

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The main goal of our laboratory is research focused on molecular biology and proteomics, cytogenetics, flow and image cytometry and quantitative genetics of freshwater fish species. We also deal with the conservation of genetic resources of fish, including the conservation of the diversity of eleven sturgeon species and increasing the performance of economically important fish species in the Czech Republic – common carp (*Cyprinus carpio*) 15 breeds, tench (*Tinca tinca*) 11 breeds and European catfish (*Silurus glanis*) 2 breeds and albino forms. The laboratory also performs both fundamental and applied research in genetic, biological and physiological aspects of polyploid and unisexual fish populations, both the native and those produced in aquaculture. Over the past few years, the laboratory has focused more on the study of molecular and cytogenetic aspects of polyploidy in acipenserids and their further use in aquaculture. Laboratory members continue to study spontaneous polyploidy and the importance of whole-genome duplications in the evolution of sturgeon fish. In cooperation with foreign scientific institutions as well as Czech fisheries, we are developing modern breeding programs based on the determination of the genetic potential of the newly bred strain of Amur mirror carp.

Our laboratory focuses on fundamental and applied research related to university education and consulting in the field of genetic resources conservation and increasing the genetic potential of economically important fish species. An example of a significant discovery in recent years is the newly bred and recognized breed of Amur mirror carp, which is characterized by good growth and especially higher resistance to Koi herpesvirus, and whose F1 hybrids are sought after by fishing practice.

Applied research is based primarily on the practical verification of modern breeding methods for the production of high performed stocks under the Czech fishery conditions. We continue to breed strains, lines and hybrids of common carp and tench using full-scale performance tests in cooperation with Czech fisheries and furthermore, we statistically process these data for the needs of the Czech Fish Farmers' Association. In addition, we are involved in developing new knowledge in the biology and commercial breeding of sturgeons and *in situ* and *ex situ* conservation of these globally endangered fish species.

Measuring the depth of the abdominal cavity of the Amur mirror carp by ultrasound for selection to increase the proportion of edible body parts.

Prepared by: Prof. Martin Flajšhans

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The laboratory is focused mainly on biology of germ stem cells (precursors of gametes) and their use for modern biotechnological approaches. In this research field, we perform methods of reproduction via surrogate parents for more efficient reproduction. The germ stem cells are isolated from species having generally worse reproductive traits and are transferred into close related species with preferable reproductive traits. An example is our long-term efforts of surrogate reproduction in sturgeons with a long generation cycle (e.g. beluga) via a host with a shorter generation cycle (e.g. sterlet) or the reproduction of fully homozygote carp via surrogate parent goldfish. Prerequisites for the effective surrogate reproduction is isolation, eventually in vitro cultivation and cryopreservation of germ cells and sterilization of the surrogate parent.

The next activity of the laboratory is the nuclear transfer from somatic cell to oocyte and intracytoplasmic sperm injection into oocyte in fish. Although both methods are difficult and have generally very low efficiency, we achieved positive results on a sturgeon model, sterlet, and both procedures can be intended as possible tools for the restoration of genetic resources in the future.

We started to use recent techniques of CRISPR/Cas9 genome editing by which we study functions of particular genes. We focus mainly on genes responsible for development of germ

cells with further utilization for the sterilization of recipients, but we also don't omit other research such as a study on synthesis of polyunsaturated fatty acids.

Recently, we have started to study the distribution of maternal mRNA in fish eggs and early embryos. At the beginning of this research we found that sturgeon eggs present a unique model of transition from holoblastic (as we know in amphibians) to meroblastic (typical for teleostean fishes) cleavage.

Transplantation of carp spermatogonia into the body cavity of goldfish for surrogate production (the cell suspension is labelled with trypan blue).

Prepared by: Assoc. Prof. Martin Pšenička

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The overall research objective of the Laboratory of Environmental Chemistry and Biochemistry is to investigate the ecophysiological impacts of multiple environmental pollutants of anthropogenic origin on aquatic organisms. The basis of our research is the development and application of frontier techniques for sampling and sample analysis of water environment. High performance highly automated methods increase the laboratory capacity and high resolution mass spectrometry (HRMS) provide simplified and improved methods for the determination of emerging pollutants in complex matrices. The use of HRMS has enabled development in the field of detection of micropollutants and their degradation products in different parts of the environment. The distribution of a parent compound and its metabolites together with a biochemical response of an organism shed more light on such complex problems such as chronical exposure to pollutants. An investigation of new pollutants and changes in exposed organisms with non-targeted screening methods still remain a challenging and promising field of research.

The aim of one direction of current research is to find out how effectively pond-type reservoirs, which are often used to purify municipal wastewater, break down drugs and other chemicals that remain in the water even after the purification process in current treatment technologies. During long-term observations it was found that in this environment significant concentrations of foreign compounds in the water are reduced, but some of them remain in the water and in the sediment. This fact can be problematic regarding the potential use of sediments coming from these ponds in agriculture – i.e. for their application to agricultural land. Recent scientific studies have pointed out that contaminants can be released from the sediments by means of rainfall and subsequently penetrate soil, groundwater as well as cultivated crops.

The laboratory actively cooperates in the Czech and Slovak national program for monitoring the contamination of the aquatic environment and is also a contractual partner for foreign companies and agencies dealing with environmental issues. In cooperation with the private sector we are investigating the possibilities of removing a wide range of micropollutants during water treatment processes. We also cooperate with institutions and organizations dealing with environmental protection, environmental risk and contamination assessment.

Prepared by: Prof. Tomáš Randák

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The staff of our laboratory includes experts in the field of veterinary medicine, aquatic toxicology, aquatic chemistry and biochemistry. We are engaged in basic and applied research, give lectures at the university, and consult in the three main areas. The study of influence of emerging pollutants on aquatic organisms represents the first area of expertise. The main focus is on the chronic effects of single pollutants and their mixtures on different aquatic organisms. We also search for new model organisms that can be used in toxicological testing or biomonitoring of the aquatic environment. Together with a commercial company we are engaged in water treatment technology, we cooperate on a project aimed at saving water and the reduction of sewage production during fish storage. Last but not least, we deal with the prevention and therapy of fish diseases. In this regard we develop and verify new strategies in the treatment of the most common diseases in aquaculture.

An example of an interesting and excellent result achieved in recent years is the screening of the occurrence of progestins and the related hormonal (progestogenic) activities in the Czech aquatic environment. Progestins (also known as progestogens) are an important group of such compounds. They are contained e.g. in hormonal contraception and in other hormonal preparations, which predisposes them to have a broad therapeutic use. The research was focus on the "risky" localities including effluents from wastewater treatment plants and the respective downstream surface waters. Based on this research, it has been revealed that progestins do not occur at such high levels in effluents from Czech wastewater treatment plants as they do in other European and Asian countries. Nevertheless, due to the continuously increasing consumption of hormonal preparations and broadening their use, this issue deserves further attention.

In addition, basic research focused on monitoring the effects of xenobiotics on aquatic organisms and prevention and therapy of fish diseases, the laboratory is involved in monitoring the effects of pesticides on non-target aquatic organisms. The laboratory records acute fish losses in the Czech Republic in cooperation with the Ministry of Agriculture of the Czech Republic. We developed therapeutic and rearing procedures to minimize losses caused by various pathogens in fish cultures. These procedures are designed for fish farmers according to their individual needs. The laboratory staff cooperates with police, fishery associations, municipal authorities, and research institutes in the Czech Republic and abroad on the investigation of the causes of acute fish losses. We hope that these activities will be instrumental in a higher involvement of the public in the protection of aquatic ecosystems.

Fixation of decalcified tissue into wax using the embedding line LEICA EG 1150 H.

Prepared by: Assoc. Prof. Josef Velíšek

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The purposes of the Genetic Fisheries Center (GFC) are the breeding program, testing of performance and preservation of genetic resources of existing broodstock and populations of common carp, common tench, European catfish and sturgeons (by the Czech Animal Breeding Act No. 344/2006).

The GFC also provides a functional basis for laboratories of the faculty – see the Laboratory of Molecular, Cellular and Quantitative Genetics, the Laboratory of Reproductive Physiology and the Laboratory of Germ Cells.

We are involved in international scientific collaboration and in national projects supported by the Czech administration.

The GFC has a modern and multi-purpose equipped fish seasonal hatchery, indoor and outdoor tanks for the preparation of broodstock for controlled reproduction, experimental rearing in special troughs and for work with young brood fish. The new constructed outdoor RAS for year-round breeding sturgeons has been in operation since September 2018.

Our center has also been serving for the education of fish breeding for faculty Bachelor, Master and Ph.D. students in the form of field training. We also successfully collaborate with other units of our faculty.

The hatchery offers sturgeons, common carp, tench and European catfish from stages of fertilized eggs, advanced fingerlings, hobby ornamental fish up to market size weight to our customers not only in the Czech Republic.

Prepared by: David Gela, Ph.D.

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The Experimental Fish Culture and Facility combines a complex of 50 experimental ponds with a total area of almost 7 ha, 90 outdoor troughs of various types and indoor culturing facilities using both flow and recirculation systems. The workplace also consists of laboratory and teaching facilities. The main focus of the workplace is the realization of experiments in semi-operational conditions of pond aquaculture, recirculation systems and a mutual combination of these. The workplace is used by employees and students of particular laboratories to carry out experiments focused mainly on the research of breeding technologies in aquaculture, with particular attention being paid to the following areas:

- intensive methods of aquaculture including those in recirculation systems,
- fish reproduction including hormonal and environmental stimulation,
- rearing of early stages of economically important and endangered fish species, including optimization of culturing environment and nutrition,
- applied hydrobiology,
- feeding biology of fish in ponds and free waters,
- effects of fish predators on fishery production,
- biology and monitoring of native and non-native crayfish species.

Over the last few years, much attention has been paid to culturing technologies aimed at breeding predatory (perch, pikeperch) and riverine fish species (common barbel, vimba bream, common nase) in recirculation systems. Staff of the facility has been actively involved in a range of safety transfers and biomonitoring of native crayfish species. Other activities are the practical exercises of faculty students and excursions for those interested from the general public. Due to the spatial possibilities for rearing different fish species, the workplace has become a significant supplier of hatching material, especially of river fish species, for organizations of the Czech Fishing Union and other fish producers.

The Experimental Fish Culture and Facility.

Prepared by: Pavel Lepič, Ph.D.

1.8.

IAPW

INSTITUTE OF AQUACULTURE AND PROTECTION OF WATERS

The Institute of Aquaculture and Protection of Waters (IAPW) in České Budějovice is an application-oriented institute consisting of three laboratories, a fish processing plant and a shop with fish products.

The laboratories are concerned with a wide range of research, educational and consulting activities in the areas of pond and intensive aquaculture, fish meat processing and quality, fishery in open waters, hydrobiology and water protection, as well as other topics, for instance the issue of invasive species.

Most of the theoretical and practical education of bachelor's degree programmes takes place in the building in Na Sádkách Street 1780, jointly used by the Faculty of Fisheries and Protection of Waters USB and the Faculty of Agriculture USB, while most of the theoretical and practical education of master's degree programmes takes place in the building in Husova Street 458/102.

The fish processing plant and the "Fish for Health" shop with fish products are part of the building in Husova St. in České Budějovice. Having undergone a new re-construction in 2019, the shop is mainly intended for the promotion and distribution of high-quality fish products as well as fish produced by the faculty.

Within the project CZ.02.1.01/0.0/0.0/16_017/0002614 "Research Infrastructure for Educational Purposes of the FFPW USB", an aquaponic hall was built in 2018, intended for the research and development of sustainable food production technologies with minimum consumption of water, energy and nutrients as well as minimum waste products.

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Selected projects

- 17-09310S Fishponds as models for exploring the plankton diversity and dynamics in hypertrophic shallow lakes (2017–2019, principal investigator at the FFPW USB Assoc. Prof. Jan Mráz)
- NAZV – QK1810296 Alternative components and innovative practices in fish nutrition (2018–2022, principal investigator Vlastimil Stejskal, Ph.D.)
- Program of applied research and development of national and cultural identity (NAKI II DG18P02OVV057) – Cultural traditions of Czech fisheries in the light of its utilisation in tourism and landscape creation lakes (2018–2022, principal investigator at the FFPW USB Assoc. Prof. Jan Mráz)

Selected publications

Shah, B.R., Mráz, J., 2019. Advances in nanotechnology for sustainable aquaculture and fisheries. Reviews in Aquaculture, doi: 10.1111/raq.12356. (IF 2018 = 7.190)

Vanina, T., Gebauer, R., Stejskal, V., Toomey, L., Rutegwa, M., Kouřil, J., Bláha, M., Lecocq, T., 2019. Genetic and aquaculture performance differentiation among wild allopatric populations of European perch (Percidae, *Perca fluviatilis*). Aquaculture 503: 139–145. (IF 2018 = 3.022)

Gebauer, R., Veselý, L., Vanina, T., Buřič, M., Kouba, A., Drozd, B., 2019. Prediction of ecological impact of two alien gobiids in habitat structures of differing complexity. Canadian Journal of Fisheries and Aquatic Sciences 76: 1954–1961. (IF 2018 = 2.567)

Rutegwa, M., Gebauer, R., Vesely, L., Regenda, J., Strunecky, O., Hejzlar, J., Drozd B., 2019. Diffusive methane emissions from temperate semi-intensive carp ponds. Aquaculture Environment Interactions 11: 19–30. (IF 2018 = 2.380)

The aerial photograph of the Institute of Aquaculture FFPW in Husova Street in České Budějovice.

The aerial photograph of the building of the FFPW and the Faculty of Agriculture in the University Campus in České Budějovice.

LABORATORY OF APPLIED HYDROBIOLOGY

The laboratory ceased to exist on 31 December 2019. Lab members are deployed to other laboratories of the FFPW USB.

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The key research of the Laboratory of Applied Hydrobiology (LAH) concentrates on fishpond ecosystems. Special attention is paid to the impact of fish farming and its technologies on these ecosystems and the quality of the surrounding aquatic environment in order to find methods to minimize the negative impacts of fish farming in ponds on the environment. Furthermore, the metabolism of important macronutrients and the release of selected greenhouse gases from the bottom of the pond are studied. In cooperation with fishpond and water management practice, issues of water quality and elimination of undesirable "pest" fish are also solved. The research also includes the monitoring of aquatic macrophytes with respect to fish farming intensity. The second key research focus of the laboratory is the study of biological invasions of freshwater ecosystems by non-native species of hydrobionts, with special attention to fish. The research takes place in both field and laboratory conditions.

Three patents for water quality improvement devices are an example of significant research. Another interesting outcome is the knowledge of food and habitat preferences and food intake intensities in some non-indigenous goby species, in interaction with both native and non-indigenous species. In recent years we have successfully tested the technology of building temporary barriers from natural materials in the outflow drainage beneath the ponds during harvesting. Thanks to this measure, the quality of run-off water (in terms of NL105, TP, TOC) is improved by 60–90%. The captured sediments together with barriers are then extracted and reused for nutrient enrichment of agricultural soils.

Lab members are also involved in clarifying the impact of non-native aquatic fauna on freshwater ecosystems and developing applications for the early detection of invasions in these ecosystems. The laboratory staff also seeks to actively popularize the results of their work for the general public and participates in a number of presentation and training events for the general public.

Ichtyological monitoring of the Elbe River in Ústí nad Labem focused upon potential spread of the round goby (Neogobius melanostomus) from the Elbe River to its tributaries.

Prepared by: Bořek Drozd, Ph.D.

LABORATORY OF CONTROLLED REPRODUCTION AND INTENSIVE FISH CULTURE

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The laboratory aims at the optimization and development of new methods of artificial reproduction of economically important species of aquaculture and ornamental fish. Its research activities focus on the improvements in the artificial reproduction of common aquaculture species (e.g. *Clarias gariepinus*), and on the development of new methods for the induced reproduction of species with a low or zero response to a normal hormonal treatment (e.g. pike). Currently, one of the main objectives is the development of an effective drug-delivery system

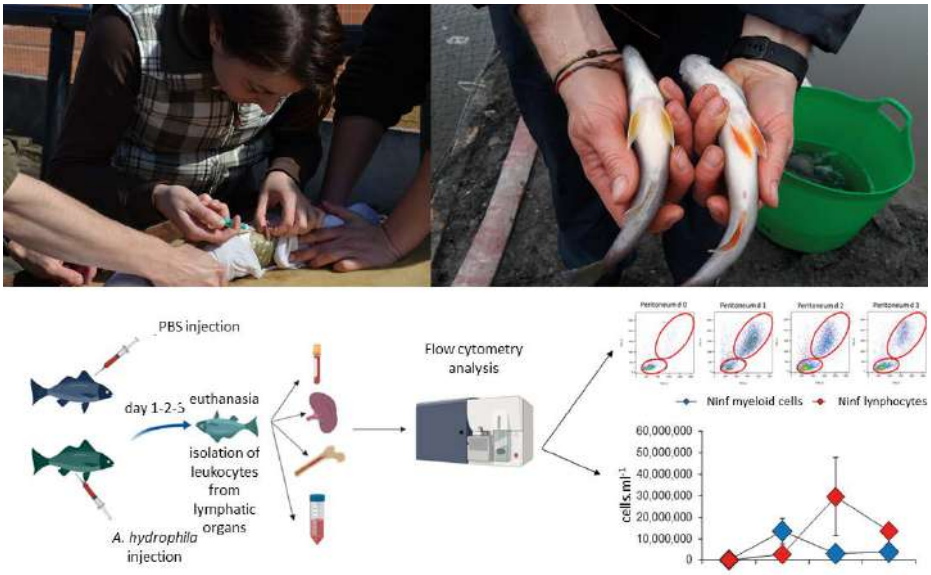
based on the microparticle polymer of lactic and glycolic acid, which would deliver therapeutically effective levels of luteinizing hormone without the need of re-injection.

Another aim of the research activities is the development of technology for the intensive aquaculture with the emphasis on the use of recirculating systems (RAS) for a wide range of traditional and novel aquaculture species. The main areas of interest include the study of the metabolism (oxygen consumption and excretion of metabolites), evaluation of growth rate, mass heterogeneity, survival and morphometric changes in the efficiency of feed utilization and the overall fitness and behaviour of cultured fish. Studies are carried out primarily in the context of abiotic factors such as water temperature, oxygen saturation, feeding frequency, stocking density and length of feeding. The laboratory also focuses on the research and development of functional feeds (implementing various ingredients including plant extracts, by-products of the food industry and insect meal) with the focus on improved growth, feed conversion and improved health and disease resistance.

Finally, the laboratory also focuses on basic and applied research in comparative immunology, with the emphasis on the influence of biotic and abiotic factors on the immune system of the fish in the RAS, a as well as the investigation of the immunomodulatory capacity of feed additives in disease prevention.

One example of the interdisciplinary research in the laboratory is the identification of differences in the adaptability of the European perch of different geographical origin to the aquaculture conditions. These findings help to identify various traits which facilitate faster selection of perch populations suitable for the production in the RAS which can significantly increase production of this species in the near future.

In addition to the activities in basic and applied research, the laboratory is involved in advising on intensive fish farming, RAS planning and the elimination of reproductive dysfunctions of major fish species. Contractual research involves cooperation with feed manufacturers in testing the production efficiency of complete feed mixtures. Within the courses and workshops, the laboratory strives to be active in raising awareness of the possibilities and innovations of reproduction and intensive fish farming.



Hormonal stimulation of Northern pike broodstock (top left), variability in European perch colour (top right) and protocol for the evaluation of fish immune response.

Prepared by: Vlastimil Stejskal, Ph.D.

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The main goal of the laboratory is a comprehensive research of nutrition and quality of fish and technologies for long-term sustainable development of aquaculture. In the field of fish nutrition, the laboratory focuses on research of alternative feeds to replace fishmeal and oil. Research is aimed at increasing the sustainability of aquaculture and increasing / maintaining the nutritional quality of fish for consumers. A modern trend of research is the study of the influence of biologically active compounds from plant feedstuffs on fish metabolism and quality of their flesh. In the area of fish quality, the laboratory deals with factors affecting fillet quality throughout the production chain, from pond to fork. The laboratory also deals with the processing of fish and fish products, especially their quality and stability during storage. It develops fish products with bioactive substances using less marketable parts of fish or by-products. Equally important is the assessment of the impact of kitchen preparations on the final quality of fish products. The laboratory also deals with technologies for efficient and sustainable use of water and nutrients in aquaculture. It develops the use of wastewater and nutrients from intensive fish farming, e.g. for hydroponic production of plants (aquaponics), microbial protein (biofloc) or high-quality vermicompost and earthworms.

An example of interesting and significant research in the laboratory is the development of patented omega-3 carp technology. A special feed based on rapeseed and flaxseed and improvement of the breeding technology results in high levels of omega-3 fatty acids in carp flesh. Together with the Institute of Clinical and Experimental Medicine, the positive effect of this flesh on the treatment and prevention of cardiovascular diseases was verified.

The laboratory improves the sustainability of aquaculture and the quality of fish and fish products for consumers. Our goal is to improve ecological sustainability by, for example, reducing wastewater, designing feedstuffs with reduced leaching of nutrients into water, and preventing eutrophication of water. We strive to raise society's awareness of the nutritional value of fish and fish products and how to handle fish throughout the production chain. To achieve these goals, we work closely with fish producers, processing plants and health institutions and present the results to the broad professional audience and general public.

A newly built research aquaponic hall on the university campus.

Prepared by: Assoc. Prof. Jan Mráz

SHOP WITH FISH AND FISH PRODUCTS

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The main goal of the Shop with Fish and Fish Products is education and promotion in the field of fish processing, fish products preparation, innovation of technological procedures with a specific view to minimize the use of preservatives and wider use of natural antioxidants and health-promoting substances in fish dishes. The education of students (not only of the University of South Bohemia in České Budějovice), but also of the general public in the field of fish processing is met with a very positive response mainly due to the emphasis on practical teaching of the procedures themselves and financial support of OP Fisheries. The acquisition of basic skills enables the general public to process fish themselves, and therefore to include them more frequently in a regular diet. In addition to promotion and education, attention is paid to the history of fish gastronomy. In cooperation with external partners there are activities connected with mapping and recording of oldtimes traditional Czech meals and their application in everyday life, e.g. connection with church holidays. The Shop with Fish and Fish Products also cooperates in the implementation of projects aimed at determining fish yield and assessing the organoleptic characteristics of fish muscle as an output of innovations in production technologies and practical innovations within the traceability of food. For the general public, there is a shop within the premises selling fish products and specialties from our own production, as well as the possibility of ordering a fish buffet.

Low consumption of freshwater fish and fish in general is a long-term problem not only in the Czech Republic for various reasons. We are convinced that this deficit can be reduced by passing on both theoretical and practical knowledge, educating the public about the history of fish dishes and adapting the composition of products to a modern healthy lifestyle. Our premises are equipped with all the necessary equipment for successful teaching and realization of scientific research activities. We believe that by engaging students and the general public in fish processing and fish gastronomy, we will eliminate or mitigate the effects of long-term prejudices, and fish meat will find its firm place in the diet of most of us.

"Země Živitelka" exhibition 2018.

Prepared by: Dipl.-Ing. Jan Kašpar

1.9.

ICS

INSTITUTE OF COMPLEX SYSTEMS

The Institute of Complex Systems in Nové Hrady was founded in 2012. The main goal of the institute is basic and applied research in the field of aquaculture and light microscopy. The institute focuses on the use of knowledge in physics, chemistry, cybernetics and technical solutions in biology. This knowledge is mainly applied in the design of systems for monitoring the behaviour of fish and crayfish depending on the presence of pollutants or systems for optical analysis of water quality parameters. Modern sensing devices are used for automated analysis of fish colour changes for diet detection or satellite images for determining water quality parameters in ponds and reservoirs. The simulation tools estimate the water flow in the tanks and the availability of food in the recirculation systems. This complex of methods pursues the modern goal of fishing, which is called "precision fish farming". By applying methods of information theory and computer vision, the institute creates new technical solutions in the field of light microscopy that result in super-resolved images from which it is possible to automatically detect cells and parameterize their behaviour, for example to analyse the biocompatibility of new materials. The institute cooperates on international projects of the faculty and has its own cooperation mainly in Norway and Austria. The institute also implements data management and open data access solutions and seeks to popularize science through summer schools.

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Selected projects

- AQUAEXCEL 2020 – 652831 Aquaculture infrastructures for excellence in European fish research (2015–2020, INRA, principal investigator Prof. Otomar Linhart)
- INTERREG V-A: Austria – Czech Republic – ATCZ133 Kompetenzzentrum MechanoBiologie in Regenerativer Medizin – Kompetenzzentrum MechanoBiologie (2017–2019, principal investigator Prof. Dalibor Štys)
- NAZV – QK1920102 Automation and objectivization of fish predators monitoring (2019–2021, principal investigator Petr Císař, Ph.D.)

Selected publications

Císař, P., Saberioon, M., Kozák, P., Pautsina, A., 2018. Fully contactless system for crayfish heartbeat monitoring: Undisturbed crayfish as bio-indicator. Sensors and Actuators B: Chemical 255: 29–34. (IF 2017 = 5.667)

Steinbach, C., Císař, P., Šauer, P., Klicnarová, J., Schmidt-Posthaus, H., Golovko, O., Kocour Kroupová, H., 2019. Synthetic progestin etonogestrel negatively affects mating behavior and reproduction in Endler's guppies (*Poecilia wingei*). Science of the Total Environment 663: 206–215. (IF 2018 = 5.589)

Kindermann, S., Papáček, Š., 2019. Optimization of the shape (and topology) of the initial conditions for diffusion parameter identification. Computers and Mathematics Applications 77: 3102–3116. (IF 2018 = 2.811)

Saberioon, M., Císař, P., Labbé, L., Souček, P., Pelisser, P., Kerneis, T., 2018. Comparative performance analysis of support vector machine, random forest, logistic regression and k-nearest neighbours in rainbow trout (*Oncorhynchus mykiss*) classification using image-based features. Sensors 18: 1027. (IF 2017 = 2.475)

Saberioon, M., Císař, P., 2018. Automated within tank fish mass estimation using infrared reflection system. Computers and Electronics in Agriculture 150: 484–492. (IF 2017 = 2.427)

The aerial photograph of the Insitute of Complex Systems FFPW USB in Nové Hrady.

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The main objective of the laboratory is the development of experimental devices for the study of complex systems such as living cells (human, mammalian and other) and communities of organisms, especially fish and humans. We also use new theoretical approaches to data processing, and we are also able to mathematically open new paths, such as non-linear discrete systems with noise or entropy reflecting the surroundings of the object. Our employees also deal with fluid dynamics and metabolic modelling of cyanobacteria. We are also involved in teaching the core bachelor's courses.

Part of the laboratory is a tissue culture workplace that serves experts in the field of biomedical technology. The international project focusing on living cells is the Czech-Austrian Competence Center for Mechanobiology. The laboratory represents the University of South Bohemia in the Czech Optical Cluster, where it cooperates with a number of companies in the field of optics and fine mechanics.

An example of an interesting result is the new NanoTruth microscope (below left), which surpasses all existent optical microscopes in many technical details. While the optical elements and the optical path are standard, the movement of the stage, which is made of carbon composite material for weight and stiffness, is in steps of 4 ± nm. The digital camera has a resolution of 47 Mpx at 36 x 25 mm, allowing very precise location of objects while maintaining a large field of view. Driven by Nvidia's latest Jetson Xavier micro-supercomputer, the microscope enables live cell tracking in three dimensions at a time. We have cooperated with Optax (Prague), Image Code (Brloh) and Synchronics Engineering (Heidenreichstein) on the development of the microscope.

The NanoTruth microscope makes it possible to obtain unique results applicable in medical diagnostics and research, development of nanostructured materials and basic research in cell biology.

Another interesting result is data analysis from the 5iD viewer, which allows objective unscrambling of flock behaviour. Processing software enables the identification of individuals, ensuring zero error propagation. No other similar device allows behavioural analysis down to the hierarchy level of individuals in a flock. The 5iD viewer thus achieves greater sensitivity, credibility through parallel measurements and specificity at a much lower cost than previous monitoring solutions. Some analysis methods developed for the 5iD viewer are also used to analyse people's behaviour where we work with one of the world's largest building managers, Cushman and Wakefield.

Nanotruth microscope (left) and 5iD viewer (right).

Prepared by: Prof. Dalibor Štys

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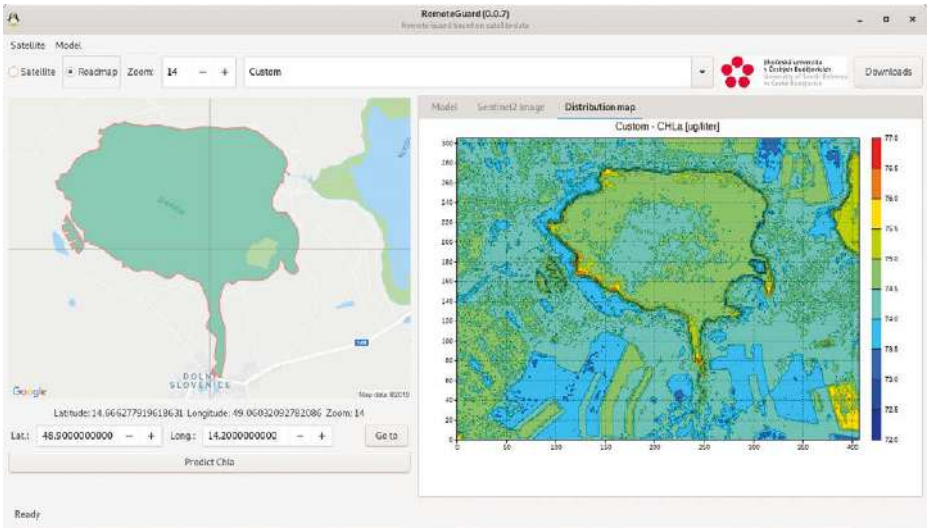
The work of the laboratory is focused on the development and implementation of automatic solutions for the monitoring and evaluation of fish, crayfish and environment parameters in intensive aquaculture using the knowledge of modern methods of biophysics, cybernetics and artificial intelligence. Our goal is to simplify data acquisition during biological experiments as well as subsequent processing, analysis and extraction of information. We use a wide range of software and hardware resources, which we mostly design, build and program for ourselves. The main areas of application are the tasks of biomonitoring, biometrics, colorimetry, aquaphotomics and multispectral analysis. The monitoring of fish flock behaviour, identification of individuals, colour parameterization, grouping and correlation with water quality are typical questions the laboratory deals with from the level of accurate and correct problem determination, mathematical conditionality and experiment design, through sensor testing, microelectronics, measurement system design and calibration, after statistical data processing, algorithmization, modelling and database of measurement protocols. The acquired knowledge should serve for example to predict abnormal situations such as pollution, biological contamination, infection, oxygen deficiency, nutrient deficiency etc. Other examples of laboratory outputs are intelligent aquaculture, remote monitoring and control automation. In addition to the applied research, the laboratory also deals with the basic research in measurement theory for microscopy and

mass spectrometry. The Academic staff participates in teaching and its improvement, supervising doctoral students of three faculties.

Examples of laboratory research and development outputs are software for the determination of chlorophyll in water from ESA data from Sentinel satellites or a microcomputer-controlled darkroom for analysis of fish colouring in the visible and near infrared regions.

Automation, artificial intelligence and the Internet of Things are key areas of Industry 4.0, the trend is also entering the fisheries and water protection sectors. Improving measurement principles, procedures, simplifying operation, maintenance, online access and sophisticated management are prerequisites for keeping animal welfare and health from negative factors, ensuring water management, economic and environmental sustainability. By educating students and popularizing the activity, the laboratory contributes to broadening the knowledge of the issue in the academic, commercial and lay sphere. The laboratory cooperates within an international association of research facilities and participates in the organization of an international bioinformatics conference.



RemoteGuard application, location selection on the left of the map, analysis of the satellite image on the right (date optional).

Prepared by: Jan Urban, Ph.D.

1.10.

CENAKVA

SOUTH BOHEMIAN RESEARCH CENTER OF AQUACULTURE AND BIODIVERSITY OF HYDROCENOSES

The South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses (CENAKVA) was established in 2010 with the support of the Operational Program Research and Development for Innovation (OP RDI) and subsequently the National Sustainability Program (NPU I) on the ground plan of the Faculty of Fisheries and Protection of Waters and the Institute of Biophysics of the University of South Bohemia in České Budějovice.

The main scientific objective of the center is to fully understand the ongoing processes in freshwater ecosystems and their societal importance in terms of conservation of biodiversity, protection of the aquatic environment and protection of water resources for life and human activity.

CENAKVA is the only Large Research Infrastructure (LRI) in the Czech Republic dealing globally with processes in freshwater ecosystems, the circulation of substances in water, including the monitoring of new pollutants in the environment. The unique pond, experimental and scientific background, together with the close links with the fishing public in the Czech Republic, Europe and the world, which CENAKVA has, creates a unique unit that is able to plan and verify future proposals for adjustments to the fisheries management of water resources with regard to climate change in the Czech Republic and Europe. In the future, the main task of fishermen will not be to produce fish, but to maintain quality water in quality landscape with the creation of a regional climate reducing drought and flooding. The research focus of the CENAKVA Center is concentrated in four key scientific multidisciplinary research programs (RP). These four strategic programs represent internationally recognized basic, applied and targeted research focusing on water biodiversity, aquatic ecology and aquaculture. Our long-term strategic goal is also to adapt the activities within the center to minimize carbon production.

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KEY MILESTONES

2010 – establishment of the center (a grant from the OP RDI),

2012 – full instrumentation and final inspection of three newly built and reconstructed buildings,

2013 – start of full operation of the center and successful international evaluation procedure of the project,

2014 – receipt of support from the National Sustainability Program (CZK 129 million by 2018),

2015 – establishment of advisory and evaluation bodies (Supervisory Board of CENAKVA and International Faculty and the CENAKVA Center Board),

2017 – change in the structure of CENAKVA – creation of four new research programs instead of the original six,

2018 – successful completion and evaluation of the NPU I project,

2019 – successful international evaluation and inclusion of the center on the Map of Large Research Infrastructures of the Czech Republic,

2019 – receipt of targeted support for the operation of the Large Research Infrastructure CENAKVA (CZK 69 million by 2022),

2019 – creation of a shared infrastructure DANUBIUS-CZ in cooperation with the CzechGlobe Center focused on environmental research in a pan-European context in the future DANUBIUS-ERIC from 2020–2021.

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MISSION

The mission of the CENAKVA Center is, based on the growing know-how of the research team, its instrumental and experimental background and intensive cooperation with the research and application spheres, including the state administration in the Czech Republic and abroad, to significantly contribute to:

- knowledge in the field of freshwater aquaculture and protection of waters,
- the improvement of water quality and the aquatic environment,
- the biodiversity conservation,
- the development of freshwater aquaculture to maximize the production of quality food with minimal consumption of water, energy and with minimal waste production.

CENAKVA's role as a Large Research Infrastructure (LRI) is also to provide open access to its unique facilities, expertise and related services. LRI CENAKVA has the character of strategic and long-term investment in R&D made by the Government of the Czech Republic on the proposal of the Ministry of Education, Youth and Sports.

STRATEGY

Through the CENAKVA Research Center, with the status of the Large Research Infrastructure with future participation in DANUBIUS-ERIC, the strategy is to concentrate the potential of four flagship scientific multidisciplinary research programs to meet key global R&D topics in basic and applied research focusing on water, biodiversity, aquatic ecology and aquaculture:

- RP 1 Reproductive and genetic methods for aquaculture and conservation of fish biodiversity
- RP 2 'New' pollutants in the environment and their impact on freshwater ecosystems
- RP 3 Long-term sustainable aquaculture with responsible management of water and nutrients
- RP 4 Biology in the changing conditions of freshwater ecosystems

We will strategically create conditions within the center so that our daily activities do not pollute the environment and we are actively involved in the global trend of reducing carbon in the atmosphere.

CENAKVA ACTIVITIES

CENAKVA activities are solved in cooperation with centers, research infrastructures and other research subjects in the Czech Republic and Europe, which have been using our unique infrastructure and know-how since the establishment of the center. Specifically, the CENAKVA Center has a contractually agreed cooperation and sharing of infrastructures with large centers in the Czech Republic, for example, with CEITEC, CzechGlobe and BIOCEV and with centers in regions, namely the Haná Center, ADMIREVET and ALGATECH. The purpose of this cooperation is the possibility of mutual use of a unique research facility with corresponding financial and technological demands of performed R&D activities. Since its establishment, CENAKVA has been interconnected within Europe and used by a consortium of 22 research institutes and faculties in Europe, focusing on fisheries and water protection in the network of the project AQUAEXCEL and with our participation in the ESFRI ELIXIR, EMBRC and Danubius-RI. In view of the growing importance of environmental research, the DANUBIUS-CZ consortium has also been created in cooperation with the CENAKVA and CzechGlobe centers and should be a part of DANUBIUS-ERIC from 2020–21. At the same time, efforts are being made to include in the global network of sharing long-term data series within the ELTER / ILTER ESFRI. CENAKVA also establishes cooperation with a number of important domestic and foreign entities through the implementation of open access to its capacities within the Large Research Infrastructure.

The center has been making strong international strategic partnerships and has supported a specific commercial activity by licensing and patents in order to achieve efficient innovations. Commercially, the center fulfils indicators of contractual research at the level of about CZK 5 mil p.a. in cooperation with partners in the Czech Republic and the EU. It is part of a number of research consortia within EU projects that represent prestigious foreign cooperation. The CENAKVA Center belongs among the smallest research centres in size, but it excels in its importance of its activities, individuality and ambition. The size is proportional to the social demand for output and is a basic prerequisite for the sustainability of its activity. The significance of this infrastructure is well demonstrated by its current position among the other centers, and in particular, a clearly quantifiable cost ratio for the establishment/operation vs. achieved outcomes and their quality. CENAKVA is a leader among centers built in the framework of the Operational Programme Research and Development for Innovation (including in comparison to larger excellent centers with investment costs in the billions of CZK), while the investment of CENAKVA was one of the smallest.

THE EUROPEAN TECHNOLOGICAL UNIQUENESS OF CENAKVA

The CENAKVA infrastructure is unique worldwide with regard to the possibility of the efficient sharing of technological and experimental facilities in the form of open accesses and shared research.

CENAKVA uses two experimental and technological premises, i.e. the Genetic Fisheries Center and the Experimental Fish Culture Facility with a specialized aquarium, recirculation and aquaponic technologies. The workplaces together with specialized technologies enable to conduct complex experiments under controlled conditions according to the needs of planned experiments in connection with four research programs. We manage about 40 hectares of ponds in Vodňany with stocks of 23 species of freshwater fishes of all ages counting about 250,000 specimens (45 t). For example, since 1953 we have maintained 21 breeds, lines and hybrid populations of common carp (*Cyprinus carpio*), 11 breeds and colour varieties of tench (*Tinca tinca*) since 1981, and in catfish (*Silurus glanis*) two breeds and an albino form since 1997. We are proud to have successfully bred 11 species of globally threatened cartilaginous fish, particularly sturgeon in the past years, starting in 2001. We use a total of 71 own ponds ranging from 0.01 to 12 ha in size and we stock fish in another 50 ha under lease agreements. For intensive aquaculture, we have built 3,200 m^2 of various fish breeding halls and aquarium rooms with 18 thermally controlled recirculating low-waste systems of nearly 82 m^3 capacity. We also possess outdoor or flow-through breeding troughs and pools for seasonal breeding of fish and crayfish with a total volume of 260 m^3. We maintain cultures of several non-native crayfish and model fish species. These unique conditions for aquaculture research and a sustainable freshwater management system are on a similar scale to those only in Norway and Spain, but with a different focus. The entire infrastructure is further equipped with necessary instrumentation that fulfils the needs of target CENAKVA research programs.

CENAKVA´S LARGE RESEARCH INFRASTRUCTURE

In 2018 the CENAKVA Center passed a successful international evaluation and was included on the Roadmap of the Czech Republic for large infrastructures for research, experimental development and innovation. As in the whole CENAKVA Research Center, the main content of CENAKVA´s Large Research Infrastructure is to understand the changes in freshwater ecosystems and their societal importance in terms of biodiversity conservation, protection of the aquatic environment and water resources important for human life and activity. CENAKVA's Large Research Infrastructure covers the infrastructure, knowledge and expertise of the Faculty of Fisheries and Protection of Waters and the South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses, allowing open access to 25% of their capacity.

CENAKVA's Large Research Infrastructure operates on the principle of open infrastructure for experimental activities, which comprises a total of 14 specific laboratories and research workplaces. Services and infrastructure can be used by scientists from around the world through open access. Open access allows the experiment to be carried out free of charge and to use the expertise which is available at the infrastructure. For the implementation of the experiment, it is sufficient to prepare an access project that is evaluated in two stages in terms of research quality, technical capability and infrastructure availability. Successful projects are then implemented with technical and scientific assistance from the infrastructure staff.

Selection and realization of the experiment

The call for the submission of proposal is open continuously.

The applicant fills in the electronical form with a structured CV and waits for the evaluation of the project and the decision whether the project will be implemented.

In the case of acceptance of the project for implementation, the project investigator obtains a host status at the USB and subsequently discusses the project directly with the head of the relevant part of the FFPW USB

http://www.frov.jcu.cz/en/science-and-research/large-research-infrastructure

Total summary of results since the establishment of the Center, i.e. since 2010

Publications – papers in journals in Web of Science (J_{imp})	**846**
Publications in journals – other	123
Patents – national	16
Patents – international	2
Applied research results (verified technologies, certified methodologies, pilot plants...)	133
Recognized breed (Amur lysec)	1
Number of licenses	10
Funds from sold licenses	CZK 376 thous.
Contractual research funds	CZK 58,872 thous.

FINANCING OF CENAKVA

In 2018 and 2019, the sources of CENAKVA´s funding were revenues from contractual research, national and international grants, institutional sources, commercialization of research results, the National Sustainability Program (2018) and targeted support to address the Large Research Infrastructure project (2019).

Financing by individual sources in 2018 and 2019 is shown in the table

2018 revenues (in millions of CZK)	
NPU funds	20.82
Institutional revenue incl. income for tuition	25.95
Revenue from national grants	14.51
Revenue from contractual research	4.04
Revenue from international grants	1.57
Total revenues	**66.89**

2019 revenues (in millions of CZK)	
Targeted support for a Large Research Infrastructure project	17.20
Institutional revenue incl. income for tuition	29.87
Revenue from national grants	16.70
Revenue from contractual research	4.98
Revenue from international grants	1.66
Total revenues	**70.41**

THE FIVE MOST IMPORTANT PUBLICATIONS OF CENAKVA IN 2018–2019

Šauer, P., Stará, A., Golovko, O., Valentová, O., Bořík, A., Grabic, R., Kocour Kroupová, H., 2018. Two synthetic progestins and natural progesterone are responsible for most of the progestagenic activities in municipal wastewater treatment plant effluents in the Czech and Slovak republics. Water Research 137: 64–71. (IF 2017 = 7.051; AIS 2017 = 1.500)

Červený, D., Grabic, R., Fedorova, G., Grabicová, K., Turek, J., Žlábek, V., Randák, T., 2018. Fate of perfluoroalkyl substances within a small stream food web affected by sewage effluent. Water Research 134: 226–233. (IF 2017 = 7.051; AIS 2017 = 1.500)

Císař, P., Saberioon, M., Kozák, P., Pautsina, A., 2018. Fully contactless system for crayfish heartbeat monitoring: Undisturbed crayfish as bio-indicator. Sensors and Actuators B: Chemical 255: 29–34. (IF 2017 = 5.667; AIS 2017 = 0.787)

Palíková, M., Piačková, V., Navrátil, S., Zusková, E., Papežíková, I., Kolářová, J., Pojezdal, Ľ., Dyková, I., Scholz, T., Gelnar, M., Svobodová, S., Řehulková, E., Mareš, J., Modrá, H., Blažek, R., Veselý, T., 2019. Nemoci a chorobné stavy ryb [Fish Diseases and Pathological Conditions]. FFPW USB, Vodňany, CZ, 462 pp.

Guo, W., Kubec, J., Veselý, L., Hossain, S.Md., Buřič, M., McClain, R., Kouba, A., 2019. High air humidity is sufficient for successful egg incubation and early post-embryonic development in the marbled crayfish (*Procambarus virginalis*). Freshwater Biology 64: 1603–1612. (IF 2018 = 3.404; AIS 2018 = 1.016)

THE FIVE MOST IMPORTANT CENAKVA PROJECTS IN 2018–2019

- LO1205 Sustainability and Excellence of Center of Aquaculture and Biodiversity of Hydrocenoses (2014–2018, principal investigator Prof. Otomar Linhart)
- AQUAEXCEL 2020 Aquaculture Infrastructures for Excellence in European Fish Research (2015–2020, principal investigator for the FFPW USB Prof. Otomar Linhart)
- 613611 FishBOOST – Improving European aquaculture by advancing selective breeding to the next level for the six main finfish species (2014–2018, principal investigator Assoc. Prof. Martin Kocour)
- LM2018099 Large Research Infrastructures: CENAKVA – South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses (2019–2022, principal investigator Prof. Otomar Linhart)
- CZ.02.1.01/0.0/0.0/16_017/0002614 Research Infrastructure for the Educational Purposes at the FFPW USB (2017–2022, principal investigator Assoc. Prof. Vladimír Žlábek)

SIGNIFICANT ACHIEVEMENTS WITHIN CENAKVA IN 2018–2019

- A total of 4 patents focusing on fishpond management and wastewater treatment were filed. Furthermore, one patent for contactless detection of fish health has been accepted.
- Achieving the HR AWARD (HR Excellence in Research Award), which is awarded by the European Commission to research organizations that aim to support and create an international and transparent working environment.
- Official approval of the AQUAEXCEL 3.0 project for implementation (Horizon 2020, 22 partners, 60 months).
- Involvement in the preparation of the ENVI THREATS project (budget of CZK 2 billion, applicant Biology Center AS CR).
- Production of high-quality hatching material of pike perch for recirculation aquaculture systems with customers throughout Europe and production of Omega3carp for the Czech market have continued.

- Conclusion of a commercial and licensing agreement with company Ceskykaviar.cz s.r.o., which became the exclusive dealer of the previously developed Sturgeon friendly caviar cosmetics.
- The supply of F1 hybrids for market fish farming continued in the breed of the Amur mirror carp due to great interest from the buyers.
- COWI – success in an international tender aimed at identifying new pollutants in environmental compartments in Norway.

Electrofishing at the Čežárka pond, which is used for the final treatment of sewage waters in the town of Vodňany.

Prepared by: Prof. Otomar Linhart, Dipl.-Ing. Martin Vlček, Assoc. Prof. Vladimír Žlábek, Petr Císař, Ph.D., Dipl.-Ing. Michal Hojdekr

RESEARCH PROGRAM (RP) 1: REPRODUCTIVE AND GENETIC PROCEDURES FOR FISH BIODIVERSITY AND AQUACULTURE CONSERVATION

Vision

The vision of the research programme is the biodiversity conservation and development of competitive freshwater aquaculture through the application of a multi-disciplinary approach on the basis of a synthesis of findings of existing scientific and research directions developed at individual workplaces of the center. It involves the development of reproductive physiology and technology, molecular, cellular, quantitative and conservation genetics of individual species and higher taxa, development of reproductive technologies and germline stem cells bioengineering, their improvement by means of new approaches and development of new methods.

Objective

The main objective of the RP is to ensure sustainability and development of excellence of the research and transfer of knowledge in the spheres of fish genetics, reproductive physiology and biotechnology into practice in order to sustain fish biodiversity, establish an internationally acknowledged gene bank and improve competitiveness of the European aquaculture with a significant share of the Czech Republic. Five domains of excellent research of reproductive and genetic procedures have been delimited out of these which are considered to be essential for sustaining fish biodiversity and for the development of Czech and European aquaculture. These domains are: research of fish gametes and their interactions during the fertilization process; study of gametogenesis disorders, biology of such emerged polyploid organisms and optimization of reproduction biotechnology; optimization of technologies and protocols for the international gene bank; germline stem cells bioengineering and application of principles of molecular biology in fish breeding.

Results

As part of the development of alternative strategies for the conservation and subsequent restoration of fish genetic material, the project team published a method of preserving female genetic resources by manipulation with oogonal germ cells. In the area of selective breeding of common carp, it has been reported that the proportions of edible parts of the body can be predicted with high accuracy in live fish and can thus be indirectly increased by selection to values calculated by ultrasound measurements of selected parameters. In sturgeons, where more spermatozoa penetrate the cytoplasm of the egg during its fertilization due to the higher number of micropylar openings, it was found that sperms that did not fuse with the primary nucleus of the egg and escaped the degradation mechanisms, could further develop the so-called polysperm mosaic. The discovery made possible to create the first viable hybrids from three parents of different species. The current live gene bank of sturgeon fish includes 11 species – beluga, Siberian sturgeon, Russian sturgeon, ship sturgeon, stellate sturgeon, Adriatic sturgeon, shortnose sturgeon, white sturgeon, Atlantic sturgeon and American paddlefish. Since the recognition of the Amur mirror carp at the end of 2014, the Genetic Fisheries Center has so far produced more than 88 million pieces of F1 hybrids with this breed for Czech fish farming. Great interest aroused in this breed at requested lectures in Hungary, Germany and at the UN FAO workshop on pond aquaculture.

Prepared by Head of the research program: Prof. Martin Flajšhans

RP 2: 'NEW' POLLUTANTS IN THE ENVIRONMENT AND THEIR EFFECT ON FRESHWATER ECOSYSTEMS

Vision

The vision of the research program is to significantly contribute to the improvement of the water quality and the aquatic environment in the Czech Republic by means of a multi-branch approach on the basis of the research team's increasing know-how, its instrumental and experimental base and intensive cooperation with the research and application sphere, including the state administration.

Objective

The objective of the RP 2 is an excellent comprehensive research of the fate of 'new' extraneous compounds in aquatic and soil environments and a critical assessment of their impacts on exposed organisms and communities. Unique findings from significant spheres of identification, occurrence, fate and comprehensive effects of extraneous compounds of the PPCP type, pesticides and their transformation products under real ecosystems conditions are obtained throughout the RP 2. These newly discovered findings have a key significance for economically meaningful strategic planning in the spheres of wastewater treatment, drinking water treatment and landscape management. At the same time, modern methods for the use of passive samplers in the sphere of national monitoring programmes focused on contamination of the aquatic environment and effective analytical methods for monitoring a wide spectrum of micropollutants in different components of the environment and in passive samplers are available for practice.

Results

The research team actively and regularly participated in the implementation of the national program for the monitoring of surface water quality, coordinated by the Czech Hydrometeorological Institute, and intensively cooperates with Povodí companies, wastewater treatment companies and drinking water treatment facilities in the field of micro-pollutant monitoring. Together with Norwegian (COWI) and Swedish (ExposMeter AB) partners, we have repeatedly succeeded in international tenders aimed at identifying new pollutants in environmental matrices.

The results of the research activities of the research team are regularly published in top international scientific journals. In 2018, two works were published in the top magazine Water Research. The study of Červený et al. (2018) brought new knowledge on the occurrence and fate of emerging pollutants – perfluoroalkylated compounds (PFCs) – in a real aquatic ecosystem affected by effluent from a wastewater treatment plant (WWTP). A unique field experiment methodology and a newly developed effective analytical LC-HRMS method for PFC detection in water, biota and passive samplers were used. It was confirmed that effluents from WWTPs represent a significant source of contamination of the PFC aquatic environment. The study of Šauer et al. (2018) brought important information on the occurrence of progestins, which are contained, for example, in hormonal contraceptives, but also in other hormonal preparations, in municipal wastewater in the Czech Republic. The results of the study also indicated which of these monitored substances can be identified as the most hazardous in our conditions. The acquired knowledge is applicable in the field of environmental protection.

Prepared by Head of the research program: Prof. Tomáš Randák

RP 3: SUSTAINABLE AQUACULTURE WITH RESPONSIBLE WATER AND NUTRIENT MANAGEMENT

Vision

The vision of the research program is the aquaculture as the future solution for maximum production of quality foodstuffs for people, at the same time with minimum consumption of water and energy, minimum production of waste matters, minimum 'food miles' and minimum competition for resources with consumption by people and farm animals. The next objective is that the aquaculture industry, which is dependent on the supply of fish from oceans and pollutes aquatic resources, would become an industry independent on sea fishery with a negative balance of waste production.

Objective

The objective of the research programme is to develop technologies enabling maximum use of nutrients, wastes, including municipal waste of a vegetable and animal origin, and energy for production of fish and plants with minimum released waste products and greenhouse gasses into the environment. The key outputs of the RP will be mutually connected technologies for the production of fish, plants and other organisms with treatment and use of waste, which enables the maximum use of nutrients directly on an aquaculture or aquaponic farm with minimum released waste products into the environment. Target results are those having a significant impact for the entire society, mainly for ensuring enough high-quality foodstuffs, minimization of production of greenhouse gasses, use of waste, reduction in food miles and thus a decrease in fossil fuels, a decrease in water consumption and production of waste, a decrease in water eutrophication and reducing dependence of aquaculture on fisheries.

Results

The research team thanks to their applied research and broad national and international cooperation regularly contributes to technical and technological innovations and optimizations of intensive breeding of valuable fish species such as pike perch (*Sander lucioperca*), perch (*Perca fluviatilis*), burbot (*Lota lota*) and other species. Furthermore, a description of the artificial induction of the production of triploid pike perch took place, so did the optimization of the initial exogenous nutrition in pike perch larvae using rotifers *Brachionus plicatilis*, which increases the survival of reared fish by 30–40%. The research team was engaged in research of serious viral diseases of cyprinids species, which in recent years have contributed to increased carp mortality in ponds in spring and autumn.

The team examined the usefulness of the various dietary components of common carp in ponds and their impact on water quality. Studies have been conducted to investigate ecosystem services and the ecological burden of pond aquaculture. To further develop sustainable aquaculture, a center for research on aquaponics and other technologies efficiently using water and nutrient has been established. Fish products have been developed for different target groups (eg pre-school children), making better use of fish raw materials.

Prepared by Head of the research program: Assoc. Prof. Jan Mráz

RP 4: BIOLOGY UNDER VARYING CONDITIONS OF FRESHWATER ECOSYSTEMS

Vision

The vision of the research program Biology under varying conditions of freshwater ecosystems is the application of a multidisciplinary approach to the evaluation of changes in the aquatic environment caused by climate change, physical, chemical and biological contamination of the environment and related habitat disruption. The vision of the program is based both on the previous scientific and research directions of the Center's workplaces and on the need to respond to new processes in the aquatic environment and the need for new approaches to obtain a significantly larger spectrum of information with a high information value. Specifically, it involves the development of ecological, ethological, physiological and ecotoxicological approaches and their improvement by means of so far not routinely applied approaches and by the development of new methods in the study of a wide range of aquatic organisms.

Objective

The aim is to understand the ongoing and predicted processes in freshwater ecosystems caused mainly by climatic, anthropogenic influences (habitat changes, pollution, agricultural activity, etc.) and by the increasing influence of biological invasions, which consequently lead to changes in species composition of freshwater biota and functioning of freshwater ecosystems. Finally, the aim is to assess the societal relevance of the above-mentioned impacts and their consequences and to apply the results to limit negative impacts on aquatic ecosystems and on water resources in terms of their use by humans. It will be crucial to obtain data for the management of freshwater with an emphasis on the issue of biological invasions and protection of aquatic ecosystems as a whole. The ambition is the ability to predict the ecological and economic impacts of climate, anthropogenic and biological changes on the functioning of ecosystems, but also their monitoring and understanding of the effects of biological invasions, as well as reactions of water organisms of interest to given situations in terms of their physiological state and their resulting response, for example, by an adaptable change in behaviour, eating habits, a change in reproductive performance, and use of alternative strategies. Successfully realized direction is the combination and interconnection of field monitoring with experimental activities together with the development of new methods of monitoring aquatic organisms and aquatic ecosystems, including the use of remote Earth exploration.

Results

The research team is constantly expanding its portfolio of activities with other research methods and approaches, together with the use of a wider range of studied organisms. As a result, the quantity and quality of publications are increasing during this period, which strengthens our attractiveness in the field of international cooperation. The results of the team touch on all the above-mentioned objectives and thus develop individual approaches. Among other things, it is worth mentioning the demonstrative behavioural and physiological reactions of aquatic organisms exposed to environmentally relevant concentrations of selected pollutants, the ability of incubation and early postembryonic development outside the aquatic environment in crayfish, the high success rate of new invasive species in competition with already established non-native species and their high adaptability to environmental conditions. Other results include the use of image analysis in fish nutrition, estimation of stock biomass and in estimation of qualitative parameters of water areas using satellite images by methods of remote Earth exploration. The achieved results create space for the development of concerned topics with the potential to at least maintain a high publication standard with the possibility of applying the achieved results in practice.

Prepared by Head of the research program: Miloš Buřič, Ph.D.

1.11. Units of the Dean's Office, Development, Economics and Human Resources

The Dean's Office is an executive unit that ensures the operation of the faculty in economic and administrative terms. Its workplaces provide, for example, support activities in the field of study and R&D, project administration, economic agenda, technical management of buildings and facilities, lifelong learning, etc.

1.11.1. Project Management Unit

The Project Management Unit constitutes one of the key workplaces of the Faculty of Fisheries and Protection of Waters of the University of South Bohemia in České Budějovice. The main activities of the workplace include the preparation and processing of project applications as well as project management in accordance with the planned project activities and conditions of the grant provider. In addition to larger investment projects, the workplace also participates in administrative support of other projects implemented at the faculty. In the years 2018–2019, we prepared, managed and implemented a number of projects (for more details, see sub-chapter 1.11.4. Investment Development of the Faculty; the complete list of projects is given on page 80–87).

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1.11.2. Faculty Management Office

This workplace ensures normal operation of the faculty (property maintenance, vehicle fleet, IT service, etc.), including the preparation and implementation of construction activities. The workplace is located at the main building in Zátiší in Vodňany with a direct link to its colleagues in České Budějovice and Nové Hrady.

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1.11.3. Economic Office

The Economic office ensures the economic and personnel agenda of the faculty. The workplace is based in Vodňany and operates in close relation to the centralized activities of the Rectorate of the University of South Bohemia in České Budějovice.

In 2018 and 2019, the faculty carried on with its successful development, both from the scientific and financial points of view. In 2018, the faculty disposed of funds amounting to CZK 292,496.63 thous., while in 2019 it was CZK 262,275.53 thous. The difference of CZK 30 million was caused by a CZK 51 million decrease in investment funds and on the other hand by a CZK 21 million increase in operating funds. The scientific profile of the faculty is also reflected in the structure of funding sources, where R&D resources amount to approximately 65% of the volume of funding that the faculty receives.

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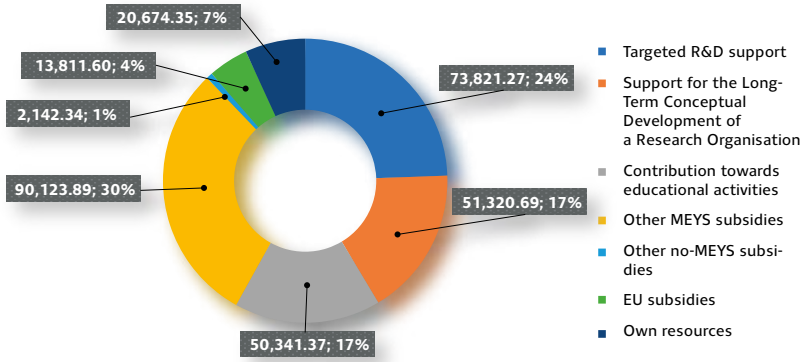
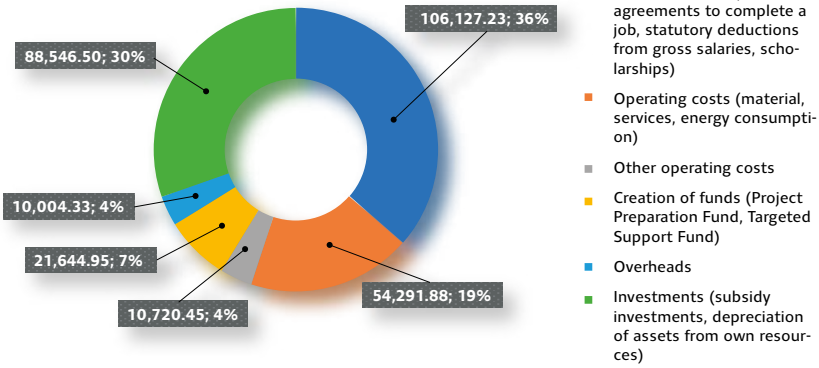
The sources of financing in 2018 and 2019 are detailed in the following charts:

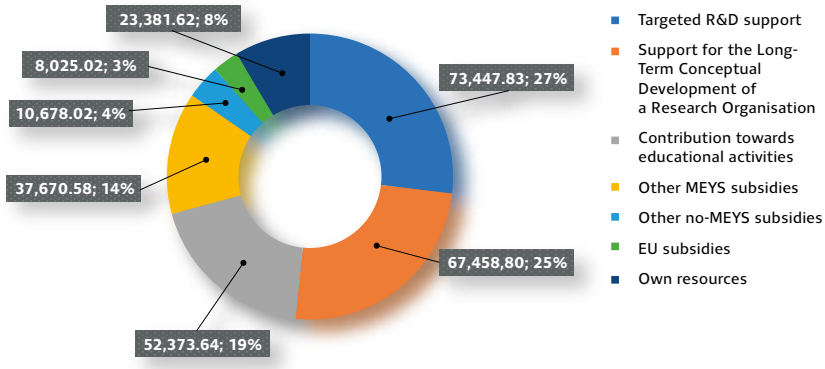
Sources of financing in 2018 including the Targeted Support Fund/ Project Preparation Fund in thousands CZK (292,496.63)

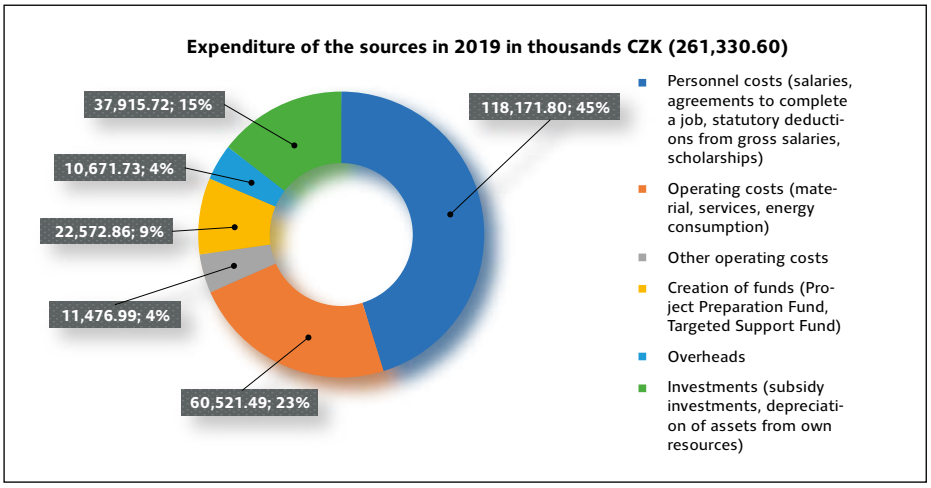


Expenditure of the sources in 2018 in thousands CZK (291,335.33)

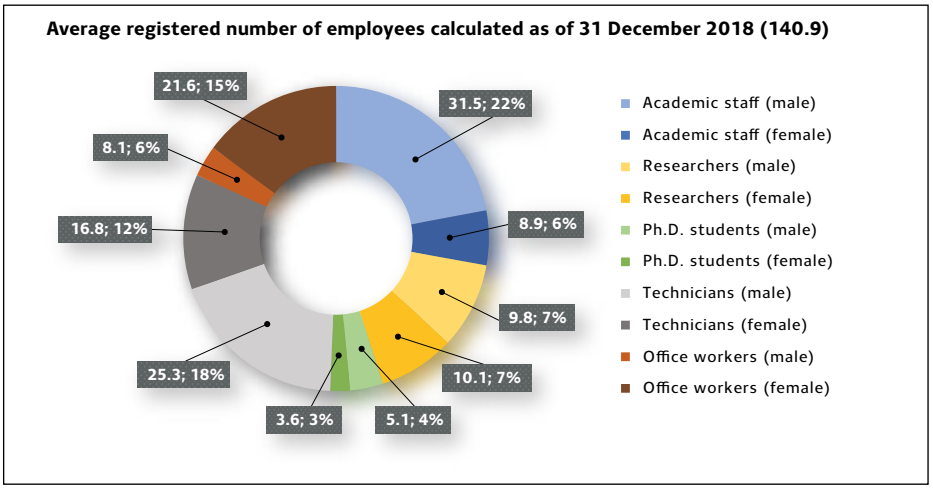


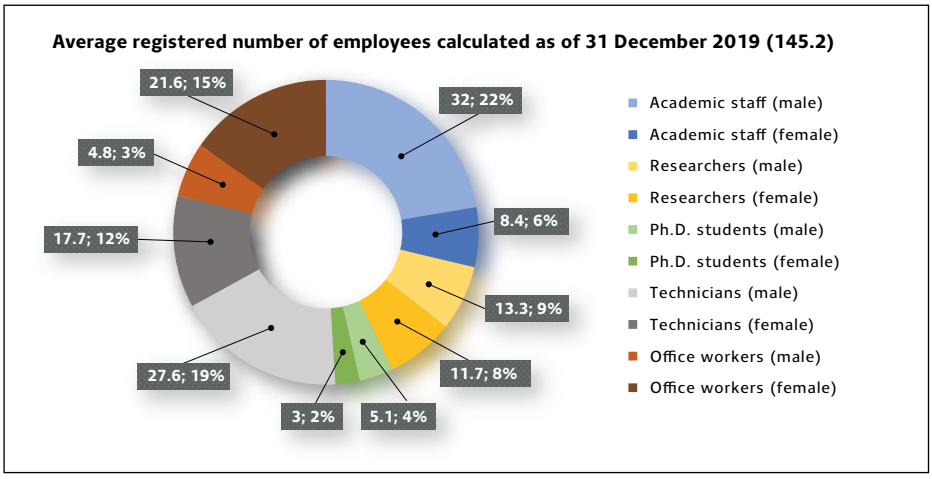
Sources of financing in 2019 including the Targeted Support Fund/ Project Preparation Fund in thousands CZK (262,275.53)





Human Resources





1.11.4. Investment Development of the Faculty (most important construction activities)

In 2018–2019, several investment activities of tens of millions of Czech koruna were carried out. The coordination of these activities was ensured by the Faculty Management Office and we can point out the most important buildings:

Aquaponic greenhouse at the Institute of Aquaculture and Protection of Waters in České Budějovice

The Aquaponic research hall was built in the campus of the University of South Bohemia in České Budějovice. Its main purpose is to operate a unique, modern food production technology that symbiotically connects fish farming and landless growing of plants and the use of chemicals to treat plants. Realization term from 7/2018 to 10/2018, total costs of CZK 14,974,447 without VAT, contractor AEROLUX, s.r.o.

Recirculation aquaculture system at the Genetic Fisheries Center Vodňany

The outdoor recirculation system was built at the Genetic Fisheries Center in Vodňany. It is a unique Danish type of RAS in the Czech Republic that was adapted to our climatic conditions and is used for year-round breeding of sturgeon fish. Implementation term from 2/2018 to 9/2018, total costs of CZK 7,394,900 without VAT, contractor VHS – Vodohospodářské stavby, spol. s r.o.

New laboratories and offices in the building of the Experimental Fish Culture and Facility in Vodňany

New laboratories and offices were built for students and faculty staff on the 3rd floor of the Experimental Fish Culture and Facility in Vodňany. Implementation term from 4/2018 to 9/2018, total costs of CZK 5,207,645 without VAT, contractor INTESTA CZ, s.r.o.

Activities launched in 2019, whose implementation will be completed by mid-2020:

Reconstruction of accommodation facilities for students and employees of the FFPW USB ("barn")

The building was created by the reconstruction of the former "barn" in Říční Street in Vodňany, which used to serve the Municipal Fisheries Vodňany. The building has three housing units, which will serve the faculty students as well as technical facilities. Implementation term from 8/2019 to 4/2020, total costs of CZK 7,591,095 without VAT, contractor David Štefan.

Photograph of the building.

Building of the Laboratory of Fish Diseases

New facilities with aquarium rooms and facilities will be built at the main building of the FFPW USB in Zátiší in Vodňany. After opening, unique spaces will be created for research of infectious diseases of freshwater fish. Implementation term from 9/2019 to 9/2020, total costs of CZK 13,113,112.20 without VAT, contractor ROBRO s.r.o.

Current photograph of the building.

Visualization of the building after completion.

Prepared by: Dipl.-Ing. Michal Hojdekr

1.12 Habilitation and Professorship Procedures

Assoc. Prof. Hana Kocour Kroupová was appointed an associate professor in the field of Fisheries by the Rector of the University of South Bohemia in České Budějovice with effect from 1 June 2019. During the meeting of the Scientific Board of the Faculty of Fisheries and Protection of Waters, she presented a lecture entitled "Nitrogen in the aquatic environment – the main forms of occurrence and transformation" and defended her habilitation thesis on the topic "Selected natural and anthropogenic factors causing endocrine disruption in fish".

Assoc. Prof. H. Kocour Kroupová (*1980) graduated from the Grammar School in Strakonice. After graduation, she received a master's degree at the Faculty of Environmental Protection, University of Chemistry and Technology in Prague, where she defended her diploma thesis entitled "Assessment of the toxic effect of nitrites on fish stock". In 2007 she successfully completed her doctoral studies at the Research Institute of Fish Culture and Hydrobiology in Vodňany with a dissertation entitled "Monitoring the effect of nitrite on fish in order to minimize their negative effects". Shortly after defending her dissertation, she left for a two-year post-doctoral internship at the Leibniz-Institut für Gewässerökologie und Binnenfischerei (IGB) in Berlin, Germany. After returning from the internship in 2010, she joined the newly established Faculty of Fisheries and Protection of Waters of the University of South Bohemia, where she has been working until now.

Her research and teaching activities cover various topics related to aquatic toxicology, environmental chemistry and fish physiology.

Prof. Tomáš Randák was appointed Professor of Fisheries with effect from 14 June 2018. He presented a lecture entitled "Foreign substances in the aquatic environment and their influence on aquatic organisms" to the Scientific Board of the Faculty of Fisheries and Protection of Waters of the USB and the Scientific Board of the University of South Bohemia in České Budějovice.

Prof. T. Randák (*1975) graduated from Grammar School in Prachatice. After graduation he obtained a master's degree at the Faculty of Agriculture of the University of South Bohemia in České Budějovice, where he defended his master's thesis entitled "Monitoring of foreign substances in the ecosystem of surface waters". He completed his doctoral studies at the University of South Bohemia in 2006 with the dissertation entitled "Possibilities of increasing the production of sea trout (*Salmo trutta*) and grayling (*Thymallus thymallus*) for open-water fishing". He defended his habilitation thesis entitled "Influence of aquatic contamination on fish in the Czech Republic" in 2011.

His professional career began in 1998 at the Research Institute of Fish Culture and Hydrobiology in Vodňany (VÚRH), where he gradually worked his way up to an academic worker. In 2009 he became the Deputy Director and subsequently in 2017 the RIFCH Director.

As part of his research and teaching activities, he focuses on various topics related to the presence of contaminants in surface water ecosystems and the study of their impact on exposed organisms.

2. INTERNATIONAL AND NATIONAL RELATIONS

The Vice-Dean for Foreign Relations is responsible for the area of international affairs, i.e. establishing and maintaining international cooperation, programs of study visits and internships of the faculty students and employees and their funding, as well as international evaluation and benchmarking.

Assoc. Prof. Vladimír Žlábek
Vice-Dean for Foreign Relations
vzlabek@frov.jcu.cz

Lucie Kačerová
Officer for Ph.D. Studies and Foreign Relations
lkacerova@frov.jcu.cz

2.1. International Projects

The Faculty of Fisheries and Protection of Waters carried out a wide range of international research projects during 2018–2019. During this period the faculty benefited from a consortia membership under which a number of proposals were submitted within the 7th EU Framework and HORIZON 2020. The FishBOOST project focused on improving European aquaculture by advancing selective breeding to the next level for the six main finfish species received funding for the period 2014–2019. Ongoing attention was also given to the Horizon 2020 project – ITN IMPRESS (Improved production strategies for endangered freshwater species, 2015–2018), which focused on research activities carried out through multilateral education of Ph.D. students. Collaboration of 21 frontier institutions regarding aquaculture is promoted by funding under AQUAEXCEL 2020 (Aquaculture infrastructures for excellence in European fish research) project. The funding for the upcoming AQUAculture infrastructures for EXCELlence in European fish research 3.0. was also accepted for funding.

The FFPW USB collaborated on the Central Developmental Project (CRP) of the Ministry of Education, Youth and Sports in 2018–2019. The CRP project promotes systematic management and further development of capacities for new international research projects. Namely, there were projects Umbrella and Umbrella II, which received funding in 2018 and 2019, respectively. Intensive interinstitutional collaborations were achieved with the MENDEL University and the University of Veterinary and Pharmaceutical Sciences in Brno.

Significant international collaboration was established based on funding the programme INTERREG V-A. Among others, two cross-border projects Kompetenzzentrum MechanoBiologie in Regenerativer Medizin – Kompetenzzentrum MechanoBiologie under the INTERREG V-A Austria – Czech Republic, and project MoBI-aqua received funding under the INTERREG V-A Czech Republic and Freistaat Sachsen 2014–2020. Within the Czech-Austrian research programme, 7 individual projects were supported by the FMP program. In total, about 39 international grant proposals were processed, out of which 7 were funded and 9 are still under evaluation.

2.2. International Summer School Vodňany, ČB and Nové Hrady

The FFPW USB continued to organize the International Summer School for bachelor's, master's and doctoral students from the Czech Republic and abroad in 2018 and 2019. During the four-week course, the summer school students were given lectures by experts from CENAKVA research center and by visiting scientists. A guided tour was offered to all scientific, training and production facilities of the faculty. Each student worked under the supervision of inhouse Ph.D. students and senior scientists on small scientific projects. The 2018 summer school was attended by 15 students from Turkey, Nepal, USA, Spain, Japan, Croatia, Ukraine and Poland, while in 2019, 17 students from the USA, Turkey, Iran, Spain, Poland, Russia, Ukraine participated. Furthermore, 6 students of the Austrian high school Höhere Lehranstalt für Umwelt un Wirtschaft in Yspertal also attended the 2019 summer school for the first time. Their contribution was supported by funding from USB and HLUW Yspertal cooperation project.

The Institute of Complex Systems of the FFPW USB also organised the traditional summer school "Schola Ludus" for university students from the Czech Republic and abroad in 2018 and 2019. The participants attended several excursions, lectures and worked on short scientific projects under the supervision of experts in specific laboratories within a 4-week programme in Nové Hrady. Each student's presentation of their findings was evaluated by an expert committee.

2.3. Cooperation with Foreign Institutions and Companies

The co-operation is based on valid contracts between the FFPW USB and specific foreign institutions. It is carried out by the mutual exchange of knowledge and experience during short-term visits and within collaboration on related research projects.

In the period of 2018–2019, the FFPW USB had valid agreements with the following institutions:

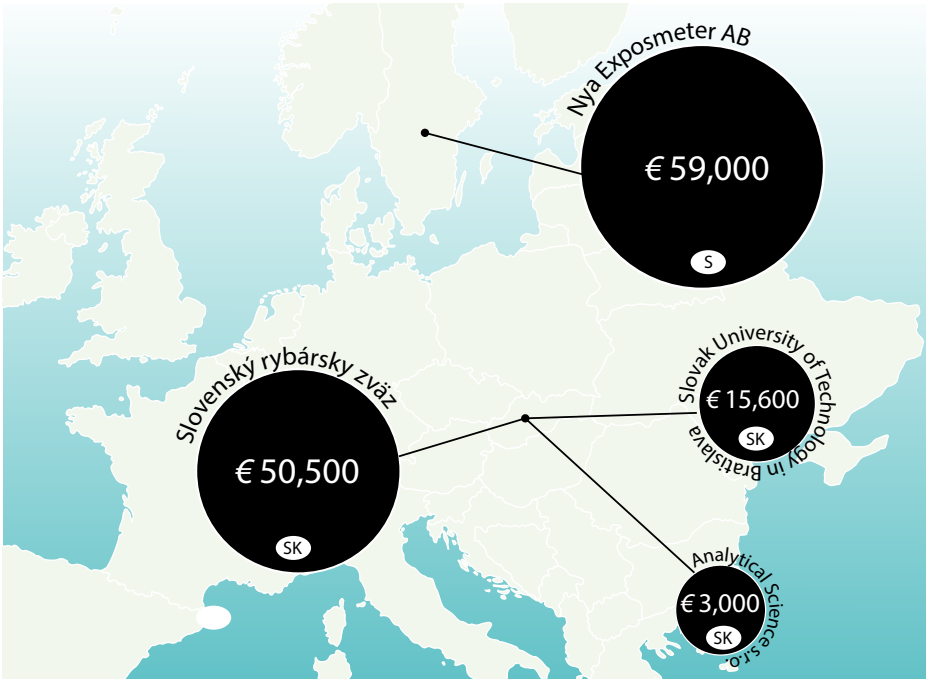
Bavarian State Research Centre for Agriculture, Freising, Germany
Bundesamt fur Wasserwirtschaft Oekologische Station Waldviertel, Schrems, Austria
Departement de la Moselle, Metz, France
Federal State Unitary Enterprise State Research-and-Production Centre of Fishery "Gosrybcenter", Tyumeń, Russia

Fisheries and Oceans Canada, Biological Station, New Brunswick, Canada
Food and Agriculture Organization, FAO
Hanoi University of Agriculture, Faculty of Animal Sciences and Aquaculture, Hanoi, Vietnam
Hellenic Centre for Marine Research, Crete Institute of Aquaculture, Heraklion, Greece
Henan University, Henan, China
Huazhong Agricultural University, Wuhan, China
Chinese Academy of Fishery Sciences, Yangtze River Fisheries Institute, Wuhan, China
Institute of Ichthyobiology Polish Academy of Sciences, Golysz, Poland
International Centre of Ecology Polish Academy of Science, Dziekanów Leœny, Poland
Iranian Fisheries Science Research Institute (IFSRI), Teheran, Iran
Kherson State Agricultural University, Kherson, Ukraine
Leibniz-Institute, Berlin, Germany
Memorial University of Newfoundland, Newfoundland, Canada
Nha Trang University, Faculty of Aquaculture, Nha Trang, Vietnam
Noakhali Science and Technology University, Sonapur, Bangladesh
Nong Lam University, Faculty of Fisheries, Ho Chi Minh City, Vietnam
Research Institute for Aquaculture No. 1, Vietnam
Research Institute for Fisheries and Aquaculture, Szarvas, Hungary
Russian Academy of Science, Saint Petersburg, Russia
Southwest University School of Life Science, Chongqing, China
Swedish University of Agricultural Sciences, Uppsala, Sweden
Universidad Politécnica de Valencia, Valencia, Spain
Universidade Estadual Paulista, São Paulo, Brazil
University College KAHO Sint-Lieven, AQUA-ERF, Sint-Niklaas, Belgium
University of Belgrade, Belgrade, Serbia
University of Calgary, Calgary, Canada
University of California, Riverside, USA
University of Hokkaido, Hokkaido, Japan
University of Johannesburg, Johannesburg, South Africa
University of Kragujevac, Kragujevac, Serbia
University of Lisbon, Faculty of Life Science, Lisbon, Portugal
University of Messina, Messina, Italy
University of Michoacana de San Nicolás de Hidalgo, Michoacana, Mexico
University of Natural Resources and Life Sciences, Vienna, Austria
University of Novi Sad, Novi Sad, Serbia
University of Oklahoma, Norman, Oklahoma, USA
University of Padova, Padova, Italy
University of Parma, Parma, Italy
University of Tokyo, Tokyo, Japan
University of Warmia and Mazury, Olsztyn, Poland
University of Zagreb, Zagreb, Croatia
University Politecnica delle Marche, Ancona, Italy
V.N. Karazin Kharkiv National University, Department of Biological and Medical Physics, Kharkiv, Ukraine

A collaboration agreement was signed between the FFPW USB and the FAO (Food and Agriculture Organization of the United Nations; FAO) on 16 May 2019. The initial joint event was also supported by the Ministry of Agriculture of the Czech Republic. The workshop was held at the MEVPIS Vodňany on 30. 9. – 4. 10. 2019, focused on pond aquaculture, intensive fish farming, artificial reproduction, fish genetics and breeding and conservation of genetic resources. It included not only theoretical parts with lectures, but also practical parts and excursions. There were 18 participants from 10 countries.

The first international workshop FAO held at MEVPIS Vodňany.

In the field of contract research with foreign countries, contracts for the private sector prevail (see the next chart). Collaboration with the Swedish company Nya ExposMeter AB in the field of specialized analyses was further deepened. Similar services based on contract research were also provided to the Slovak company Analytical Science s.r.o. In the field of contract research for the foreign academic sphere and governmental organizations, the cooperation continued in determining illegal drugs and pharmaceuticals in samples of wastewater for the Slovak University of Technology in Bratislava. Collaboration within contract research at the international level was established with the following companies: Analytical Science s.r.o.; Modra, Slovakia; Nya ExposMeter AB, Tavelsjo, Sweden; Slovak University of Technology in Bratislava, Slovakia.



The volume of orders from major partners in Europe implemented in the period 2018–2019.

Prepared by: Lucie Kačerová, Václav Nebeský, Ph.D., Assoc. Prof. Vladimír Žlábek

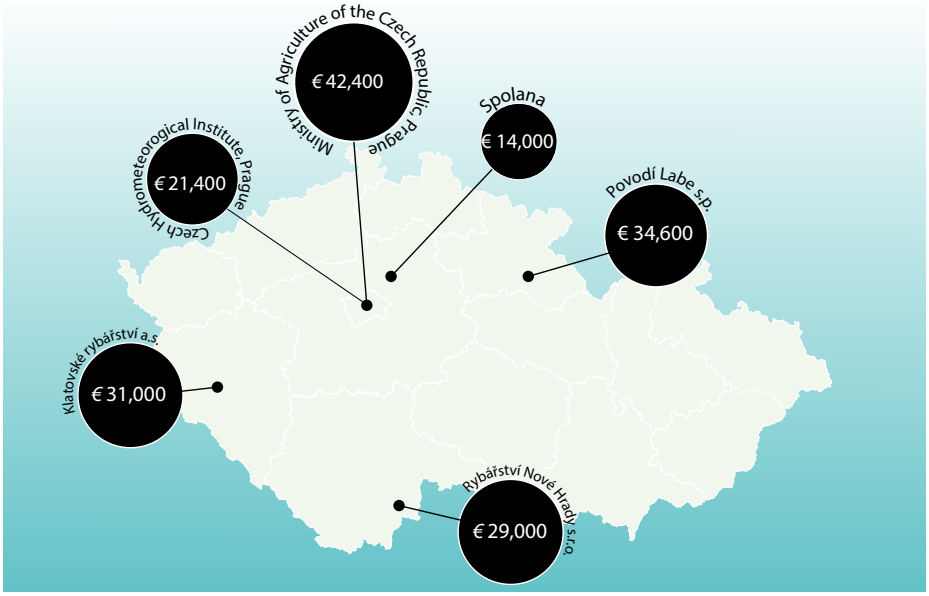
2.4. Cooperation with Czech Institutions and Companies

In the field of contract research at the national level, the cooperation can be divided into two major subcategories. The first is collaboration with the private sector. The rest is focused on the academic sphere and governmental organizations. In the context of contract research for the private sector, the continuous investigation covers a wide range of activities including the testing of fish performance for Rybářství Třeboň, Rybářství Nové Hrady s.r.o., Rybářství Hluboká cz s.r.o., Klatovské rybářství a.s. and Rybníkářství Pohořelice a.s.; hydrobiological and hydrochemical monitoring for Aquatest company; and the breeding of early life stages of African catfish for Tilapia s.r.o.. Moreover, the use of ozone was tested full-scale in an intensive fish farm for FISH Farm Bohemia s.r.o. and the analysis of exposed rainbow trout was measured under a biomonitoring program for Želivská Provozní a.s., including numerous other activities.

In the area of contract research for the academia and government, contracts aimed at biocompatibility tests were carried out for the Brno University of Technology. Continuous analyses of solid particle samples were carried out for Povodí Labe, National Corporation, as well as sampling of adult fish for the Czech Hydrometeorological Institute. The determination of the status of fish stocks in the Vltava floodplain was undertaken for the Czech University of Life Sciences, Prague. We also cooperated on an experimental feeding regime of common carp for the Biological Center, CAS, and the monitoring of the crayfish population in Písecké hory mountains for the Písek municipality. A new collaboration was supported by the Ministry of Agriculture for the follow-up monitoring of hygienic quality of fish from important fishing grounds in the Czech Republic in 2019.

Within the framework of applied research projects, the FFPW USB established cooperation with the following Czech institutions:

Aquatest a.s., Prague
Biology Centre, Czech Academy of Sciences, České Budějovice
Brno University of Technology, Brno
Czech Hydrometeorogical Institute, Prague
Czech Technical University in Prague, Prague
Czech university of Life Sciences, Prague
FISH Farm Bohemia s.r.o., Rokytno
Hofmeister s.r.o., Pilsen
Klatovské rybářství a.s., Klatovy
Masaryk University, Brno
Ministry of Agriculture of the Czech Republic, Prague
Písek Municipality
Povodí Labe s.p., Hradec Králové
Pražské vodovody a kanalizace a.s., Prague
Regional School Economy České Budějovice, Protivín
Rybářství Hluboká cz s.r.o., Hluboká nad Vltavou
Rybářství Nové Hrady s.r.o.
Rybářství Třeboň a.s.
South Bohemian Science and Technology Park a.s., České Budějovice
Spolana a.s., Neratovice
Sudoměřské proudy z.s., Čejetice
Technical University of Liberec
Tilapia s.r.o., Tábor
Ústí nad Labem Region, Ústí nad Labem
Želivská provozní a.s., Prague



The volume of contracts with the most important domestic partners in 2018–2019.

Prepared by: Václav Nebeský, Ph.D.

2.5. The FFPW USB Membership in National and International Networks and Organizations

Association of Chefs and Confectioners*
Czech Fish Farmers Association*
Czech Optical Cluster*
EPFC-CG (EPFC Core Group)
European Aquaculture Society (EAS)
GS1
Krasec*
Local Action Group Vodňanská ryba*
Network of Environmental Education Centres Pavučina*
W.S.C.S. (World Sturgeon Conservation Society)

**Czech organisations*

2.6. Memberships of the FFPW USB Employees in National and International Organisations and Councils

Assoc. Prof. Zdeněk Adámek	Czech Limnological Society
Vladimíra Bendová, Ph.D.	European Association of Aquatic and Marine Science Libraries and Information Centers (EURASLIC)
Martin Bláha, Ph.D.	Czech Limnological Society
Olga Bondarenko, Ph.D.	National System of Researchers, CONACYT, Mexico

Viktoriia Burkina, Ph.D.	Center for Reproductive Biology in Uppsala (CRU) Federation of European Biochemical Societies (FEBS) Society of Environmental Toxicology and Chemistry (SETAC)
Bořek Drozd, Ph.D.	Czech Limnological Society Czech Union for Nature Conservation
Assoc. Prof. Borys Dzyuba	Society for Cryobiology UNESCO Chair in Cryobiology International Embryo Technology Society (IETS)
Viktoriya Dzyuba, Ph.D.	The Ukrainian Biochemical Society (member of FEBS – Federation of European Biochemical Societies) Ukrainian Gerontology and Geriatrics Society (member organization of International Association for Gerontology and Geriatrics)
Prof. Martin Flajšhans	Czech Society for Analytical Cytology Institute of Animal Science – Genetic Resources Council University of South Bohemia – Internal Evaluation Board University of South Bohemia – Scientific Council
M.Sc. Markéta Flajšhansová	Association of Teachers of Czech as a Language for Foreigners, Institute for Language and Preparatory Studies, Charles University Czech and Slovak Association of Language Centers, Language Centre of Masaryk University
Dipl.-Ing. Kateřina Francová	Czech Limnological Society
Assoc. Prof. Roman Grabic	Czech Science Foundation – Expert Panel
Dipl.-Ing. Michal Hojdekr	Institute of Agricultural Economics and Information – Scientific Council
M.Sc. Aiman Imentai	European Aquaculture Society (EAS) – National coordinator of EAS student group in Czech Republic Kazakhstan National Committee for the UNESCO programme "Man and Biosphere" – Scientific Secretary
Jitka Kolářová, DVM	Czech Association of Fish Pathologists European Association of Fish Pathologists (EAFP)
Prof. Pavel Kozák	Czech Science Foundation – Expert Panel Czech University of Life Sciences Prague, Faculty of Agrobiology, Food and Natural Resources – Scientific Council European Fisheries Fund – Monitoring Committee Institute of Animal Physiology and Genetics CAS – Council International Association of Astacology (IAA) University of South Bohemia – Scientific Council
Prof. Jan Kouřil	Czech Limnological Society Czech Zoological Society
Prof. Otomar Linhart	Biological Resource Centers for Domestic Animals (INRA), France – Advisory Committee Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB Berlin) – Scientific Advisory Board Czech Science Foundation – Expert Panel National Accreditation Bureau for Higher Education – Evaluator University of South Bohemia – Scientific Council

Veronika Piačková, Ph.D.	Czech Association of Fish Pathologists European Association of Fish Pathologists (EAFP) Departmental Committee of the Ministry of Education, Youth and Sports for the Approval of Experimental Projects (REKOZ)
Assoc. Prof. Tomáš Policar	European Aquaculture Society (EAS) European Fisheries Fund – Monitoring Committee European Percid Fish Culture (EPFC)
Markéta Prokešová, Ph.D.	Czech Limnological Society
Ján Regenda, Ph.D.	Czech Limnological Society
Prof. Tomáš Randák	Institute of Hydrobiology, Biology Centre CAS – Scientific Council Masaryk University, Faculty of Science – Scientific Board for Ecotoxicology in frame the biology Ph.D. study program Society of Environmental Toxicology and Chemistry (SETAC) National Agency for Agricultural Research – Expert panel University of South Bohemia – Scientific Board of the Grant Agency
Mohammadmehdi Saberioon, Ph.D.	IEEE Life Science Technical Community (LSTC) The Institute of Electrical and Electronics Engineers (IEEE)
Renata Rychtáriková Štysová, Ph.D.	Czechoslovak Microscopy Society
Christoph Steinbach, Ph.D.	European Association of Fish Pathologists (EAFP) International Zebrafish Society (IZFS)
Prof. Zdeňka Svobodová	European Association of Fish Pathologists (EAFP) OECD-Ecotoxicology Cooperative Group Lymphoma
Eva Šálková, M.D.	Czech Association of Pathologists
Prof. Dalibor Štys	Assembly member of the Mission Healthy Oceans, Seas, Coastal and Inland Waters of the Horizon Europe program Czech Optical Cluster Czechoslovak Microscopy Society
Jan Urban, Ph.D.	Czech Society for Mass Spectrometry Czechoslovak Microscopy Society
Eliška Zusková, Ph.D.	European Association of Fish Pathologists (EAFP)
Assoc. Prof. Vladimír Žlábek	Board of Governmental representatives – Danubius PP Czech Science Foundation – Expert Panel Masaryk University, Faculty of Science – Scientific Board for Ecotoxicology in frame the biology Ph.D. study program National Accreditation Bureau for Higher Education – Evaluator National Agency for Agricultural Research – Expert panel Society of Environmental Toxicology and Chemistry (SETAC)

2.7. Memberships of the FFPW USB Employees in National and International Editorial Boards

Assoc. Prof. Zdeněk Adámek	Aquaculture International Croatian Journal of Fisheries Pakistan Journal of Scientific and Industrial Research
Prof. Pavel Kozák	Journal of Limnology and Freshwater Fisheries Research
Prof. Otomar Linhart	Czech Journal of Animal Science Journal of Applied Ichthyology
Václav Nebeský, Ph.D.	Rybníkářství
Assoc. Prof. Tomáš Policar	Turkish Journal of Fisheries and Aquatic Sciences
Prof. Zdeňka Svobodová	Acta Veterinaria Brno
Assoc. Prof. Josef Velíšek	Current Life Sciences Environmental Biotechnology International Aquatic Research International Journal of Zoological Investigations World Journal of Anaesthesiology World Journal of Immunology
Assoc. Prof. Vladimír Žlábek	Aquatic Environmental Health and Toxicology

Prepared by: Zuzana Dvořáková

2.8. Invited Lectures of the Faculty Staff Abroad

Adámek, Z., 2018. The impact of topmouth gudgeon (*Pseudorasbora parva*, Schlegel, 1842) on the aquatic environment in invaded fishponds. In: 8th International Conference Water and Fish, Faculty of Agriculture, Belgrade, Serbia, 13.–15. 6. 2018.

Adámek, Z., 2018. Fischzucht in der Tschechischen Republik – jetziger Zustand, Probleme und Aussicht. In: Fischereifachtagung 2018, Bundesamt für Wasserwirtschaft, Mondsee, Austria, 22.–23. 11. 2018.

Drozd, B., 2019. One of the 100 most wanted European aliens – the round goby (*Neogobius melanostomus*) in the Czech / Saxonian parts of the Elbe River: results of our field surveys and lab experiments. In: Aquatic Invasive Species Meeting – Neozoa 2019, Univerzita Koblenz-Landau, Germany, 25.–27. 2. 2019.

Flajšhans, M., 2019. The use of flow cytometry for study of polyploidy in freshwater fish. In: The First International Workshop on Exotic Flow CytoMetry, ENEA Casaccia, Rome, Italy, 12.–15. 11. 2019.

Flajšhans, M., 2019. Amur mirror carp and its perspectives for commercial breeding programme. In: 9th Meeting of Fisheries, Aquaculture and Angling Professionals, Szent István University, Gödöllö, Hungary, 30. 1.–1. 2. 2019.

Gazo, I., 2018. Invertebrate *Phallusia mammillata* as a marine model for toxicity screening University of Vienna, Wien, Austria, 22.–24. 4. 2018.

Herrera, F., 2019. Osmoregulation in Fish Spermatozoa: Involvement in motility activation and impact on short-term storage outcomes. In: 7th International Workshop on the fish Gametes, Rennes, France, 2. –6. 9. 2019.

Kouba, A., 2018. Non-native crayfish species in the region and their effects on the environment. In: Regional Conference on River Habitat Restoration for Inland Fisheries in the Danube River Basin and Adjacent Black Sea Areas, Bucharest, Romania, 13.–15. 11. 2018.

Kouba, A., 2018. Research on marbled crayfish at the University of South Bohemia, Czech Republic. 1. Division of Epigenetics, DKFZ-ZMBH Alliance, German Cancer Research Center (DKFZ), Heidelberg, Germany, 18. 9. 2018.

Kouba, A., 2019. Crayfish species in Europe. In: The first Irish Crayfish Seminar, Galway, Ireland, 21.–23. 5. 2019.

Kouba, A., 2019. Recent situation with alien crayfish species in Europe. In: The Crustacean Society Mid-Year Meeting 2019, Hong Kong, Hong Kong, 26.–30. 5. 2019.

Kozák, P., 2019. Crayfish species in Europe. In: Active tools for crayfish protection: rescue transfers, breeding, restocking, some examples from practice, Galway, Ireland, 21.–23. 5. 2019.

Linhart O., Mraz, J., 2019. La consommation et production de la carpe en République Tchèque, avec un focus sur les carpes oméga-3. In: Atelier de l´Association Francaise des Pisciculture d'Etang, Chateau-Gontier, France, 5.–7. 4. 2019.

Policar, T., 2019. Innovation of culture in selected predatory fish. In: Bűsum Fishday workshop, Bűsum, Germany, 6. 6. 2019.

Pšenička, M., Baloch, R., Saito, T., 2019. Germ cells technologies in sturgeons. In: 4th International Conference on Agriculture, Food, and Animal Sciences, Tandojam, Pakistan, 21. –22. 1. 2019.

Sabberioon, M., 2018. Application of machine vision system in aquaculture. In: The Norwegian colour and computing laboratory, NTNU, Gjvik, Norway, 3.–5. 11. 2018.

Stejskal, V., 2019. Aquamona fish farm project. In: Aquavlan2 Meeting, INAGRO Kruishoutem, Belgium, 21.–22. 3. 2019.

Štys, D., 2019. The use of changes in fish school hierarchy in the sensitive detection of psychoactive compounds. In: 1. International and 6. National Veterinary Pharmacology and Toxicology Congress, Kayseri, Turkey, 4.–7. 9. 2019.

Štysová Rychtáriková, R., 2018. Super resolution using ordinary microscopes. In: 15th International Life Science Meeting at IMC Krems, Krems an der Donau, Austria, 18.–19. 4. 2018.

Štysová Rychtariková, R., 2019. Use of intracellular dynamics in sensitive detection of xenobiotics in water. In: 1. International and 6. National Veterinary Pharmacology and Toxicology Congress, Kayseri, Turkey, 4.–7. 9. 2019.

2.9. Invited Lectures of the Foreign Scientists at the Faculty

Breithaupt, T.H., University of Hull, United Kingdom, 18. 7. 2018. Chemical communication in aquatic crustaceans.

Brooks, B.W., Baylor University, Texas, USA Brian, 10. 6. 2019. Towards sustainable environmental quality: Identifying priority global research questions in environmental toxicology and chemistry.

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Prepared by: Lucie Kačerová

3. RESEARCH AND EXCELLENCE

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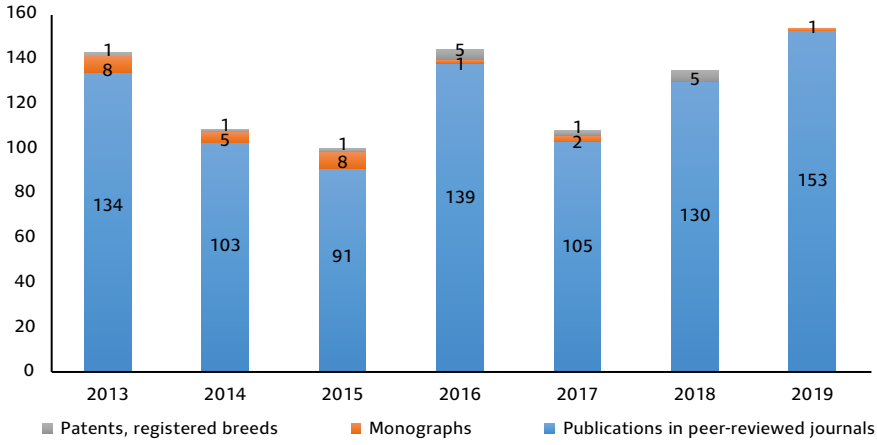
The Faculty of Fisheries and Protection of Waters can primarily be characterised as a research institution, with approximately 65% of the faculty and CENAKVA Research Center budget being allocated to scientific activities. The scientific research activities focus on the fundamental and applied research unique to the Czech Republic with cutting-edge laboratory and technical facilities. The scientific level of the faculty and the research center is illustrated by the internationally recognized publications mainly in the field of fisheries and water protection. The CENAKVA Research Center is a part of the faculty, which is very unique in the Czech Republic. CENAKVA has been listed on the Roadmap of the Czech Republic for large infrastructures for research, experimental development and Innovation since 2019, being an open access infrastructure (more information on pp. 47–57).

The faculty researchers yearly published some 130 articles in prestigious scientific journals in 2018–2019. More than one third belonged to Q1 journal considering the Impact Factor. The research center as well as other institutes of the faculty aim to create strategic international partnerships and support lucrative licensed commercial activities for methodologies, software, technologies and patents to develop efficient innovations. The close relation of the faculty to the commercial sector is evident by the proportion of business contracts, which generate about 8% of the total budget. The faculty achieved important scientific involvement in joint European projects, which accounted for 3,3% of the faculty budget. The high success rate of the faculty in receiving national and international scientific grants is also a result of the work of project managers, who provide the necessary administrative support. The prestigious international scientific reputation is also illustrated by the composition of the Ph.D. students. More than two thirds of them come from abroad.



The publication activity of the Faculty of Fisheries and Protection of Waters USB in 2013–2019 (Web of Science and Scopus).

3.1. Publishing and Editorial Activities

The Faculty of Fisheries and Protection of Waters continuously runs an editorial office and faculty publishing. Most importantly, an extended Czech monograph by Assoc. Prof. Miroslava Palíková and others, entitled Fish Diseases and Pathological Conditions, was published in 2019. Further, a series of technological and methodological manuals for practice was created. The quality level of the published titles is ensured by the Editorial Board (EB) of the FFPW USB, which oversees the Editor in Chief. Administration is secured by the redactor, who is also helpful with the production of further printed materials at the faculty (e.g. dissertations, conference proceedings).

Editorial Board (EB)

Antonín Kouba, Ph.D.
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3.2. Academic Library USB, Branch at the Faculty of Fisheries and Protection of Waters in Vodňany

The library in Vodňany has been a part of the Research Institute of Fish Culture and Hydrobiology since its establishment in 1921. Additionally, it has been a branch of the Academic Library of the University of South Bohemia in České Budějovice since 2012. The library manages a specialized collection of documents amounting to about 20,000 items on fisheries, hydrobiology, ichthyology, aquaculture and similar disciplines. A lot of the documents are unique in the Czech Republic.

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3.3. Research Projects 2018–2019

PROJECTS SUPPORTED BY THE MINISTRY OF EDUCATION, YOUTH AND SPORT OF THE CZECH REPUBLIC

- Promotion and popularization of scientific and research activities at the Czech University of Life Sciences Prague, the University of Chemistry and Technology Prague and the University of South Bohemia in České Budějovice (2018, principal investigator M.Sc. Miroslav Boček)
- Increasing of the absorb capacity for the international science and research projects–H2020 Umbrella (2018, principal investigator Petr Císař, Ph.D.)
- Increasing of the absorb capacity for the international science and research projects–H2020 Umbrella II (2019, principal investigator Dipl.-Ing. Michal Hojdekr)
- LM2018099 Large Research Infrastructures: CENAKVA – South Bohemian Research Centre of Aquaculture and Biodiversity of Hydrocenoses (2019–2022, principal investigator Prof. Otomar Linhart)

National sustainability programme

- LO1205 Sustainability and excellence of centre of Aquaculture and Biodiversity of Hydrocenoses (CENAKVA 2014–2018, principal investigator Prof. Otomar Linhart)

Institutional plan USB

- Support of the cooperation of the FFPW with kindergartens, grammar, high and higher professional schools – professional activity in aquaculture (2016–2018, principal investigator M.A. Jiří Koleček)
- Development of the material and technical base at the FFPW USB (2016–2018, principal investigator Dipl.-Ing. Vladimír Nedopil)
- Development of study and education at the FFPW USB in intensive aquaculture (2016–2018, principal investigator Assoc. Prof. Jan Mráz)
- No. 3 Developing lifelong learning programs at the FFPW USB (2019–2020, principal investigator M.A. Jiří Koleček)
- No. 25 Education of the region in the field of fisheries and water protection and promotion of studies at the USB (2019–2020, principal investigator Assoc. Prof. Jan Mráz)
- No. 26 Support for the creation of foreign language studies in the LMS Moodle (2019–2020, principal investigator Assoc. Prof. Martin Kocour)
- No. 35 Summer school with creative engagement of students from FFPW USB (2019–2020, principal investigator Assoc. Prof. Vladimír Žlábek)

Operational programme Research, Development and Education

- CZ.02.1.01/0.0/0.0/16_017/0002614 Research infrastructure for educational purposes at the FFPW USB (2017–2022, principal investigator Assoc. Prof. Vladimír Žlábek)
- CZ.02.2.69/0.0/0.0/16_018/0002616 Development of research-oriented study programmes at the FFPW USB (2017–2022, principal investigator Assoc. Prof. Vladimír Žlábek)
- CZ.02.2.69/0.0/0.0/16_014/0000628 Development of Technology Transfer Centre at the USB (2017–2021, principal investigator at the FFPW USB, Dipl.-Ing. Michal Hojdekr)
- CZ.02.3.68/0.0/0.0/16_010/0000523 Support of mutual learning among kindergarten teachers (2017-2019, principal investigator at the FFPW USB M.Sc. Miroslav Boček)
- CZ.02.2.69/0.0/0.0/16_015/0002348 Development of USB – ESF (2017–2022, principal investigator at the FFPW USB, Dipl.-Ing. Michal Hojdekr)
- CZ.02.2.67/0.0/0.0/17_044/0008542 Development of the USB – study environment (2017–2019, principal investigator at the FFPW USB, Dipl.-Ing. Michal Hojdekr)

- CZ.02.1.01/0.0/0.0/16_025/0007370 Reproductive and genetic procedures for preserving fish biodiversity and aquaculture (2018–2021, principal investigator Prof. Martin Flajšhans)
- CZ.02.2.69/0.0/0.0/16_028/0006192 Development of the USB – Capacities for R&D (2018–2021, principal investigators at the FFPW USB Assoc. Prof. Vladimír Žlábek/Dipl.-Ing. Michal Hojdekr)
- CZ.02.2.69/0.0/0.0/16_027/0008364 Development of the USB – international mobilities (2018–2020, principal investigator at the FFPW USB Assoc. Prof. Vladimír Žlábek)
- CZ.02.1.01/0.0/0.0/16_019/0000869 Sustainable production of healthy fish in various aquaculture systems – PROFISH (2019–2023, principal investigator at the FFPW USB Veronika Piačková, Ph.D.)

PROJECTS SUPPORTED BY THE MINISTRY OF AGRICULTURE OF THE CZECH REPUBLIC

Projects of National Agency for Agricultural Research

- QJ1510077 Increased and more efficient production of salmonids in the Czech Republic using their genetic identification (2015–2018, principal investigator at the FFPW USB Vlastimil Stejskal, Ph.D.)
- QJ1510119 Effective and sustainable use of nutrients in intensive aquaculture using multitrophic systems (2015–2018, principal investigator Prof. Pavel Kozák)
- QJ1530120 The occurrence of pharmaceuticals and other pollutants originating from communal waste water in basins of important drinking water sources in the Czech Republic (2015–2018, principal investigator Prof. Tomáš Randák)
- QJ1510117 Optimalization of techniques of controlled and semi-controlled fish reproduction (2015–2018, principal investigator Prof. Jan Kouřil)
- • QJ1610324 The study of traditional and new crops as sources of antioxidants and other healthful nutrients and their use in food production (2016–2018, principal investigator at the FFPW USB Assoc. Prof. Jan Mráz)
- QK1710310 Utilization of new biotechnological approaches under Czech aquaculture with the aim to reach effective, high-quality and environmentally friendly fish production (2017–2021, principal investigator Assoc. Prof. Tomáš Policar)
- QK1710114 New viral diseases of common carp – diagnosis and prevention (2017–2021, principal investigator Veronika Piačková, Ph.D.)
- QK1810221 Using of microparticles as carriers of hormonally active substances in artificial reproduction of fish (2018–2021, principal investigator Peter Podhorec, Ph.D.)
- QK1810296 The use of alternative components and innovative techniques in fish nutrition (2018–2021, principal investigator Vlastimil Stejskal, Ph.D.)
- QK1810095 Determination of nitrogen factors for selected species of freshwater fish as indicators of the fish component content of "fresh" fish and products from freshwater fish (2018–2022, principal investigator Assoc. Prof. Josef Velíšek)
- QK1820354 Technical and technological innovation of intensive aquaculture based on new knowledge for future effective and stable fish production (2018–2020, principal investigator Assoc. Prof. Tomáš Policar)
- QK1920102 Automation and objectivization of fish predators monitoring (2019–2021, principal investigator Petr Císař, Ph.D.)
- QK1910428 In vitro conservation of genetic resources of common carp and creation of isogenic lines using transplantation of germ cells (2019–2023, principal investigator Vojtěch Kašpar, Ph.D.)
- QK1910430 Innovation of technological elements in carp farming in order to maximize utilization of high potential of selection programs in conditions of pond management (2019–2023, principal investigator Assoc. Prof. Martin Kocour)

- QK1920326 Aquaculture of rheophilous fish (2019–2021, principal investigator Peter Podhorec, Ph.D.)
- QK1910282 Options for mitigation of the impacts of extreme hydrological events in small catchments with respect to the demands of sustainable agriculture and pond aquaculture (2019–2023, principal investigator at the FFPW USB Assoc. Prof. Josef Velíšek)

Operational Programme Fishery

- CZ.10.5.109/5.2/4.0/17_009/0000372 Book II. – Fish diseases (2017–2019, principal investigator Veronika Piačková, Ph.D.)
- CZ.10.5.109/5.2/4.0/17_009/0000375 Book III. – Aquatic Toxicology for Fishermen (2017–2019, principal investigator Assoc. Prof. Josef Velíšek)
- CZ.10.5.109/5.2/4.0/17_009/0000376 Conference I. – Protection of fish health (2017–2018, principal investigator Veronika Piačková, Ph.D.)
- CZ.10.5.109/5.2/4.0/17_009/0000373 Methodology I. – Freshwater fish food (2017–2019, principal investigator Assoc. Prof. Zdeněk Adámek)
- CZ.10.5.109/5.2/4.0/17_009/0000371 Methodology II. – Monitoring of drugs (2017–2019, principal investigator Assoc. Prof. Roman Grabic)
- CZ.10.5.109/5.2/4.0/17_009/0000369 Promotion – Fish for people (2017–2018, principal investigator, Dipl.-Ing. Jan Kašpar)
- CZ.10.2.101/2.1/0.0/17_011/0000457 Innovation of the fish products (2018–2019, principal investigator Dipl.-Ing. Jan Kašpar)
- CZ.10.2.101/2.1/0.0/17_011/0000459 Development of new fish products for preschool children (2018–2019, principal investigator Assoc. Prof. Jan Mráz)
- CZ.10.2.101/2.1/0.0/17_011/0000455 Optimizing pre-slaughter conditions to increase fish welfare and quality (2018–2019, principal investigator Assoc. Prof. Jan Mráz)
- CZ.10.5.109/5.2/4.0/18_012/0000589 What to do with a fish?! (2019–2020, principal investigator Dipl.-Ing. Jan Kašpar)
- CZ.10.5.109/5.2/4.0/18_012/0000590 Conference III (2018–2019, principal investigator Dipl.-Ing. Josef Příborský)
- CZ.10.5.109/5.2/4.0/18_012/0000592 Publication I (2018–2020, principal investigator Dipl.-Ing. Josef Příborský)
- CZ.10.5.109/5.2/4.0/18_012/0000591 Publication II (2018–2020, principal investigator Dipl.-Ing. Josef Příborský)
- CZ.10.5.109/5.2/4.0/18_012/0000593 Publication III (2018–2020, principal investigator Dipl.-Ing. Josef Příborský)
- CZ.10.5.109/5.2/4.0/18_012/0000595 Publication V (2018–2020, principal investigator Dipl.-Ing. Josef Příborský)
- CZ.10.5.109/5.2/4.0/18_012/0000596 Book IV (2018–2020, principal investigator Petr Dvořák, Ph.D.)
- CZ.10.2.101/2.1/0.0/17_011/0000454 New therapeutic procedures eliminating eye fluke in carp fish farming – especially by grass carp (2018–2019, principal investigator Eliška Zusková, Ph.D.)
- CZ.10.2.101/2.1/0.0/17_011/0000460 Effect of stocking density of African catfish on the efficiency of its intensive farming in RAS (2018–2019, principal investigator Jiří Křišťan, Ph.D.)
- CZ.10.2.101/2.1/0.0/17_011/0000458 Energy audit, remote control and production of container farm with African catfish (2018–2020, principal investigator Vlastimil Stejskal, Ph.D.)
- CZ.10.2.101/2.1/0.0/18_013/0000773 Optimization of Danish-type RAS ensuring increased and high-quality salmonid fish production (2019–2020, principal investigator Assoc. Prof. Tomáš Policar)
- CZ.10.2.101/2.1/0.0/18_013/0000787 Optimization of pond aquaculture management – suppression of negative influence of stone moroco (2019–2021, principal investigator Assoc. Prof. Jan Mráz)

- CZ.10.2.101/2.1/0.0/18_013/0000789 Optimization of procedures to reduce the loss of intracellular water after thawing in fish products (2019–2021, principal investigator Assoc. Prof. Jan Mráz)
- CZ.10.2.101/2.1/0.0/18_013/0000792 Verification of the possibility of improving the welfare of fish when catching a pond (2019–2020, principal investigator Ján Regenda, Ph.D.)
- CZ.10.2.101/2.1/0.0/18_013/0000793 Adaptation and breeding of largemouth bass in intensive aquaculture conditions using RAS (2019–2020, principal investigator Assoc. Prof. Tomáš Policar)
- CZ.10.5.109/5.2/4.0/19_014/0000886 Methodology III (2019–2021, principal investigator Assoc. Prof. Tomáš Policar)
- CZ.10.5.109/5.2/4.0/19_014/0000887 Methodology IV (2019–2021, principal investigator Prof. Zdeňka Svobodová)
- CZ.10.5.109/5.2/4.0/19_014/0000889 Methodology V (2019–2021, principal investigator Roman Franěk, Ph.D.)
- CZ.10.5.109/5.2/4.0/19_014/0000893 Technology II (2019–2021, principal investigator Roman Franěk, Ph.D.)
- CZ.10.5.109/5.2/4.0/19_014/0000894 Technology III (2019–2021, principal investigator Antonín Kouba, Ph.D.)
- CZ.10.5.109/5.2/4.0/19_014/0000895 Technology IV (2019–2021, principal investigator Carlos Yanes-Roca, Ph.D.)
- CZ.10.5.109/5.2/4.0/19_014/0000897 Technology V (2019–2021, principal investigator Vlastimil Stejskal, Ph.D.)
- CZ.10.5.109/5.2/4.0/19_014/0000898 Technology VI (2019–2021, principal investigator Peter Podhorec, Ph.D.)

Other grants and programmes

- National programme for conservation and utilization of genetic resources of farm animals– Maintenance of genetic resources in fish (principal investigator Prof. Martin Flajšhans)
- Subsidiary programme 2.A.e.1a): Maintenance and improving of genetic quality of farm animals and plants, controls of performance – fish (principal investigator Prof. Martin Flajšhans)

PROJECTS SUPPORTED BY THE MINISTRY OF INDUSTRY AND TRADE OF THE CZECH REPUBLIC

Operational Programme Enterprise and Innovation for Competitiveness

- CZ.01.1.02/0.0/0.0/16_084/0010345 Installation of closed circuits on fish sheds, water retention in the countryside and minimization of pollutant production and reuse of nutrients in the pond farm (2017–2020, principal investigator at the FFPW USB Assoc. Prof. Hana Kocour Kroupová)

PROJECTS SUPPORTED BY THE MINISTRY OF CULTURE OF THE CZECH REPUBLIC

Programme to support applied research and experimental development of national and cultural identity (NACI II)

- DG18P02OVV057 The cultural tradition of Czech fishery in the light of its use in tourism and landscape development (2018–2022, principal investigator at the FFPW USB Assoc. Prof. Jan Mráz)

PROJECTS SUPPORTED BY THE CZECH SCIENCE FOUNDATION

- 16-09709Y Occurrence and fate of synthetic progestins in aquatic environment and their effect on fish (2016–2018, principal investigator Assoc. Prof. Hana Kocour Kroupová)
- 16-02407Y Transfer in the seminal plasma of carp and some sturgeons can help us to identify the role of some proteins in freezing fish sperm (2016–2018, principal investigator Ping Li, Ph.D.)
- 16-06498S Psychoactive compounds in the aquatic environment and their effects on exposed organisms (2016–2018, principal investigator Prof. Tomáš Randák)
- 16-03754S The evolution of sperm capacitation: pioneering study in taxonomically isolated cartilaginous fish (2016–2018, principal investigator Marek Rodina, Ph.D.)
- 17-19714Y Nuclear transfer in fish: a chance for restoration of vanishing sturgeon species (2017–2019, principal investigator Assoc. Prof. Martin Pšenička)
- 17-09310S Fishponds as models for exploring plankton diversity and dynamics of hypertrophic shallow lakes (2017–2019, principal investigator at the FFPW USB Assoc. Prof. Jan Mráz)
- 17-09807S Why and how animals abandon sex? On the causal ole of hybridization in triggering asexual reproduction (2017–2019, principal investigator at the FFPW USB Assoc. Prof. Martin Pšenička)
- 17-08937S Drug behaviour in the system soil-water-plant (2017–2019, principal investigator at the FFPW USB Assoc. Prof. Roman Grabic)
- 18-09323S Genome duplication in sturgeon evolution and impact on their biology (2018–2020, principal investigator Prof. Martin Flajšhans)
- 18-03712S Is a new generation of herbicides safer alternative also for aquatic invertebrates? (2018–2020, principal investigator Assoc. Prof. Josef Velíšek)
- 18-15802S Transformation of pharmaceuticals in the environment of a common recipient of cleaned communal waste water (2018–2020, principal investigator Assoc. Prof. Vladimír Žlábek)
- 18-12465Y An investigation of guidance mechanisms of spermatozoa in freshwater fish (2018–2020, principal investigator Sergii Boryshpolets, Ph.D.)
- 19-11313S Interspecies comparison of RNA localization within oocytes to elucidate regulation of early development and asymmetric cell division (2019–2021, principal investigator at the FFPW USB Assoc. Prof. Martin Pšenička)
- 19-04431S Temperature driven changes in interactions and ecological roles of prominent crayfish invaders (2019–2021, principal investigator Antonín Kouba, Ph.D.)
- 19-11140Y Embryonic development; DNA repair; genome plasticity; sturgeon (2019–2021, principal investigator Ievgeniia Gazo, Ph.D.)

PROJECTS SUPPORTED BY THE GRANT AGENCY OF THE UNIVERSITY OF SOUTH BOHEMIA

- 012/2016/Z Occurrence and critical evaluation of the effects of contaminants on exposed organisms in aquatic ecosystems and options for prevention and elimination of serious viral diseases in fish culture (2016–2018, principal investigator Prof. Tomáš Randák)
- 125/2016/Z New biotechnological approaches in fish reproduction and genetics II. (2016–2018, principal investigator Vojtěch Kašpar, Ph.D.)
- 017/2016/Z Understanding the experimental results based on contemporary information theory (2016–2018, principal investigator Prof. Dalibor Štys)
- 060/2016/Z Innovation for sustainable aquaculture development (2016–2018, principal investigator Assoc. Prof. Jan Mráz)
- 034/2017/Z A novel method for generation of isogenic line in fish using germ stem cell transplantation (2017–2018, principal investigator Roman Franěk, Ph.D.)
- 095/2017/Z Functional analysis of Δ6-, Δ5- and Δ4- desaturases of carp (*Cyprinus carpio*) (2017–2018, principal investigator Dipl.-Ing. Zuzana Bláhová)

- 079/2017/Z Gene removal dnd by CRISPR / CAS9 technology, its effects on germline development and other functionally related fish genes (2017–2018, principal investigator Abdul Rasheed Khanzai Baloch, Ph.D.)
- 046/2017/Z Efficient use of ecosystem energy in carp fish ponds (2017–2018, principal investigator M.Sc. Marcellin Rutegwa)
- 059/2017/Z Effects of echinacea extract on carp and koi carp experimentally infected with koi herpesvirus (2017–2018, principal investigator M.Sc. Mehrak Mohammadi)
- 068/2017/Z Transfer of individual somatic cells vs. multicellular nuclear transmission as cloning techniques in the most endangered species in the world–sturgeons (2017–2018, principal investigator M.Sc. Fatira Effrosyni)
- 056/2017/Z Do the synthetic progestin contribute to (anti-) androgenic activities in the aquatic environment? (2017–2018, principal investigator Pavel Šauer, Ph.D.)
- 097/2017/Z Development and application of LDTD / TQMS-HRMS methods for determination of psychoactive substances in tissue microsamples (2017–2018, principal investigator Dipl.-Ing. Adam Bořík)
- 085/2017/Z Change in mRNA expression patterns associated with aging fish oocytes (2017–2018, principal investigator Azadeh Mohagheghi Samarin, Ph.D.)
- 008/2018/Z Knock out of dnd1 gene by CRISPR/Cas9 in Sturgeons, and correlation of dnd1 with other related genes in fish (2018–2019, principal investigator Abdul Rasheed Khanzai Baloch, Ph.D.)
- 100/2018/Z Temperature acclimation of delta-6 desaturase and elongase CRISPR/Cas9 knock outs of common carp (*Cyprinus carpio*) in response to nutrition (2018–2019, principal investigator Dipl.-Ing. Zuzana Bláhová)
- 077/2018/Z Evaluation of feasibility of RAD-Seq derived SNPs to predict KHV resistance and growth rate in common carp fish (2018–2019, principal investigator M.Sc. Jinfeng Zhao)
- 102/2018/Z Interaction, growth and maturation racing: comparison of two prominent crayfish invaders (2018–2019, principal investigator M.Sc. Wei Guo)
- 013/2018/Z What is the effect of ovarian fluid on fertilization performance in rainbow trout (2018–2019, principal investigator Vitaliy Kholodnyy, Ph.D.)
- 097/2019/Z New methods and biotechnological procedures in fish reproduction and genetics III (2019–2021, principal investigator Assoc. Prof. Martin Pšenička)
- 061/2019/Z Ecophysiological effects of selected environmental factors on aquatic organisms (2019–2021, principal investigator Prof. Tomáš Randák)
- 013/2019/Z New technologies for aquaculture monitoring with the respect to the water organism welfare (2019–2021, principal investigator Petr Císař, Ph.D.)
- 122/2019/Z Sustainable aquaculture (2019–2021, principal investigator Assoc. Prof. Jan Mráz)
- 102/2019/Z Fish responses to environmental cocktail of psychoactive substances (2019–2020, principal investigator M.Sc. Eugenia Maria Sancho Santos)
- 088/2019/Z Effect of environmentally relevant concentration of an antidepressant sertraline in clonal marbled crayfish at behavioural and biochemical level (2019–2020, principal investigator M.Sc. Md. Shakhawate Hossain)
- 080/2019/Z Using alginate coating coupled with essential oils to modulate microbial communities and improve quality of chill stored Common carp fillets (2019–2020, principal investigator M.Sc. Ruoyi Hao)
- 071/2019/Z Characterization of sturgeon germ cell differentiation through cell sorting and RNA-sequencing (2019–2020, principal investigator M.Sc. Xuan Xie)
- 098/2019/Z Fish on performance enhancers: the efficacy of dietary β-glucans and probiotics at enhancing grass carp *Ctenopharyngodon idella* mucosal immunity against eye fluke *Diplostomum spathaceum* infection (2019–2020, principal investigator M.Sc. Bernard Erasmus)
- 078/2019/Z Boiling crayfish? A comparison of burrowing behaviour under conditions of simulated drought as influenced by herbicide pollution (2019–2020, principal investigator M.Sc. Wei Guo)

- 099/2019/Z Effect of PLGA microparticles on ovulation induction in zander (2019–2020, principal investigator Dipl.-Ing. Jindřiška Matějková)

PROJECTS SUPPORTED BY THE TECHNOLOGY AGENCY OF THE CZECH REPUBLIC

Programme Gama

- TG 03010027–01_11 Early warning system for fish disease detection (2017–2019, principal investigator Petr Císař, Ph.D.)
- TG03010027-2015V001 Individualized behaviour monitoring for i-secure security applications (2018–2019, principal investigator Prof. Dalibor Štys)
- TG03010027-2018V001 Consolidation of the ultra-high resolution microscope software Nano Truth (2018–2019, principal investigator Renata Štysová Rychtáriková, Ph.D.)
- TG 03010027–02_23 Verification of methods, device, and application for photographic chamber and parametrization of fish experiments (2018–2019, principal investigator Jan Urban, Ph.D.)
- TG03010027–01_09 Testing device for improvement of water quality at the outflow from a pond and substrate for evaluation of water quality (2017–2019, principal investigator Ján Regenda, Ph.D.)
- TG 03010027–01_10 Verification and optimization of a stabile production of diploid gametes using surrogate parents in order to produce triploids in aquaculture (2017–2019, principal investigator Assoc. Prof. Martin Pšenička)

PROJECTS SUPPORTED BY THE SOUTH BOHEMIAN REGION

Program grants of the South Bohemian Region

- 435-04-015/18 Support of indigenous populations of *Thymallus thymallus* and *Salmo trutta* in fishing area Blanice vodňanská 4B (2018, principal investigator Prof. Tomáš Randák)
- 458-01-028/18 Contribution to the international workshop on new viral diseases of carp fish (2018, principal investigator Veronika Piačková, Ph.D.)
- 463-03-03/18 Development of technical education in the South Bohemian Region in the field of water protection and fisheries (2018–2019, principal investigator Petr Dvořák, Ph.D.)
- 435-03-001/19 Support of original populations of *Thymallus thymallus* and *Salmo trutta* in the Blanice Vodňanská 4B fishing ground (2019, principal investigator Prof. Tomáš Randák)
- 463-01-002/19 Protection of Water Ecosystems (2019, principal investigator M.A. Jiří Koleček)

INTERNATIONAL RESEARCH PROJECTS

7. Framework programme and HORIZON 2020

- 613611 FishBOOST – Improving European aquaculture by advancing selective breeding to the next level for the six main finfish species (2014–2019, principal investigator Assoc. Prof. Martin Kocour)
- 642893 Marie Curie project IMPRESS Improved production strategies for endangered freshwater species (2015–2018, principal investigator Prof. Otomar Linhart)
- 652831 AQUAEXCEL 2020 – Aquaculture infrastructures for excellence in European fish research (2015–2020, principal investigator Prof. Otomar Linhart)

INTERREG V-A: Austria – Czech Republic

- KPF-01-031 Czech–Austrian cooperation for minimalizing of loses caused by cormorants (2017–2018, principal investigator Petr Císař, Ph.D.)
- KPF-01-016 Strengthening the cooperation between the USB and the Verein für Fisch- und Gewässerökologie (2018–2019, principal investigator M.A. Jiří Koleček)
- KPF-01-017 Strengthening the cooperation between the USB and the HLUW Yspertal in fishery and water protection (2018–2019, principal investigator M.A. Jiří Koleček)
- KPF-01-108 Cooperation of the USB and the Bundesamt für Wasserwirtschaft – sustainable utilization of fish ponds (2018–2019, principal investigator M.A. Jiří Koleček)
- KPF-01-111 Cross-border cooperation – mathematical modelling of multiphysical processes (2018–2019, principal investigator Petr Císař, Ph.D.)
- KPF-01-134 Cooperation of the USB and Verein für Fisch-und Gewässerökologie, Invasive, Non-Native Species (2019, principal investigator M.A. Jiří Koleček)
- ATCZ133 Kompetenzzentrum MechanoBiologie in Regenerativer Medizin - Kompetenzzentrum MechanoBiologie (2017–2019, principal investigator Prof. Dalibor Štys)
- KPF-01-162 Cooperation between JU and HLUW Yspertal – education and praxis 2019 (2019, principal investigator M.A. Jiří Koleček)

INTERREG V-A: DE - CZ - Germany/Saxony-Czech Republic

- 100314623 Cross-border Monitoring of Biological Invasions for conservation of aquatic biodiversity (2017–2020, principal investigator Miloš Buřič, Ph.D.)

Prepared by: M.Sc. Michaela Šmídová

3.4. List of Publications

2018

PAPERS IN JOURNALS IN WEB OF SCIENCE (A TOTAL OF 121)

Adamek, M., Teitge, F., Jung-Schroers, V., Heling, M., Gela, D., Piačková, V., Kocour, M., Steinhagen, D., 2018. Flavobacteria as secondary pathogens in carp suffering from koi sleepy disease. Journal of Fish Diseases 41: 1631–1642. (IF 2017 = 2.004; AIS 2017 = 0.418)

AftabUddin, S., Roman, W.U., Hasan, C.K., Ahmed, M., Rahman, H., Siddique, M.A.M., 2018. First incidence of loose-shell syndrome disease in the giant tiger shrimp *Penaeus monodon* from the brackish water ponds in Bangladesh. Journal of Applied Animal Research 46: 210–217. (IF 2017 = 0.826; AIS 2017 = 0.131)

Andreji, J., Dvořák, P., 2018. Levels of selected contaminants in fish muscle from upper Nitra River. Neuroendocrinology Letters 39: 315–320. (IF 2017 = 0.754; AIS 2017 = 0.192)

Arslan-Alaton, I., Koba, O., Olmez-Hanci, T., 2018. Removal of an X-Ray contrast chemical from tertiary treated wastewater: Investigation of persulfate-mediated photochemical treatment systems. Catalysis Today 313: 134–141. (IF 2017 = 4.667; AIS 2017 = 0.868)

Blabolil, P., Duras, J., Jůza, T., Kočvara, L., Matěna, J., Muška, M., Říha, M., Vejřík, L., Holubová, M., Peterka, J., 2018. Assessment of burbot *Lota lota* (L. 1758) population sustainability in central European reservoirs. Journal of Fish Biology 92: 1545–1559. (IF 2017 = 1.702; AIS 2017 = 0.529)

Bláha, M., Ložek, F., Buřič, M., Kouba, A., Kozák, P., 2018. Native European branchiobdellis on non-native crayfihes: Report from the Czech Republic. Journal of Limnology 77: 164–168. (IF 2017 = 1.277; AIS 2017 = 0.474)

Blecha, M., Dzyuba, B., Boryshpolets, S., Horokhovatskyi, Y., Dadras, H., Malinovskyi, O., Sampels, S., Policar, T., 2018. Spermatozoa quality and sperm lipid composition in intensively cultured and wild burbot (*Lota lota*). Animal Reproduction Science 198: 129–136. (IF 2017 = 1.647; AIS 2017 = 0.421)

Blomqvist, J., Pickova, J., KhaliliTilami, S., Sampels, S., Mikkelsen, N., Brandenburg, J., Sadgren, M., Passoth, V., 2018. Oleaginous yeast as a component in fish feed. Scientific Reports 8: 15945. (IF 2017 = 4.122; AIS 2017 = 1.356)

Boccaletto, P., Siddique, M.A.M., Cosson, J., 2018. Proteomics: A valuable approach to elucidate spermatozoa post – testicular maturation in the endangered Acipenseridae family. Animal Reproduction Science 192: 18–27. (IF 2017 = 1.647; AIS 2017 = 0.421)

Bondarenko, V., Blecha, M., Policar, T., 2018. Changes of sperm morphology, volume, density, and motility parameters in northern pike during the spawning period. Fish Physiology and Biochemistry 44: 1591–1597. (IF 2017 = 1.735; AIS 2017 = 0.477)

Boryshpolets, S., Kholodnyy, V., Cosson, J., Dzyuba, B., 2018. Fish sperm motility analysis: the central role of the flagellum. Reproduction, Fertility and Development 30: 833–841. (IF 2017 = 2.105; AIS 2017 = 0.568)

Boulais, M., Suquet, M., Arsenault-Pernet, E.J., Malo, F., Queau, I., Pignet, P., Ratiskol, D., Le Grand, J., Huber, M., Cosson, J., 2018. pH controls spermatozoa motility in the Pacific oyster (*Crassostrea gigas*). Biology Open 7: bio031427. (IF 2017 = 2.217; AIS 2017 = 0.937)

Burkina, V., Sakalli, S., Pilipenko, N., Žlábek, V., Zamaratskaia, G., 2018. Effect of human pharmaceuticals common to aquatic environments on hepatic CYP1A and CYP3A-like activities in rainbow trout (*Oncorhynchus mykiss*): An *in vitro* study. Chemosphere 205: 380–386. (IF 2017 = 4.427; AIS 2017 = 0.869)

Burkina, V., Sakalli, S., Zlabek, V., Zamaratskaia, G., 2018. CYP1A1 activity in rainbow trout is inhibited by the environmental pollutant p-cresol. Environmental Toxicology and Pharmacology 62: 199–202. (IF 2017 = 2.776; AIS 2017 = 0.533)

Burkina, V., Zamaratskaia, G., Sakalli, S., Pham, T.G., Kodes, V., Grabic, R., Velíšek, J., Turek, J., Kolářová, J., Žlábek, V., Randák., T., 2018. Complex effect of pollution on fish in major rivers in the Czech Republic. Ecotoxicology and Environmental Safety 164: 92–99. (IF 2017 = 3.974; AIS 2017 = 0.738)

Buřič, M., Grabicová, K., Kubec, J., Kouba, A., Kuklina, I., Kozák, P., Grabic, R., Randák, T., 2018. Environmentally relevant concentrations of tramadol and citalopram alter behaviour of an aquatic invertebrate. Aquatic Toxicology 200: 226–232. (IF 2017 = 3.884; AIS 2017 = 0.803)

Císař, P., Saberioon, M., Kozák, P., Pautsina, A., 2018. Fully contactless system for crayfish heartbeat monitoring: Undisturbed crayfish as bio-indicator. Sensors and Actuators B: Chemical 255: 29–34. (IF 2017 = 5.667; AIS 2017 = 0.787)

Czölderová, M., Behúl, M., Filip, J., Zajíček, P., Grabic, R., Vojs-Staňová, A., Gála, M., Kerekeš, K., Híveš, J., Ryba, J., Rybanská, M., Brandeburová, P., Mackuľak, T., 2018. 3D printed polyvinyl alcohol ferrate(VI) capsules: Effective means for the removal of pharmaceuticals and illicit drugs from wastewater. Chemical Engineering Journal 349: 269–275. (IF 2017 = 6.735; AIS 2017 = 1.084)

Červený, D., Grabic, R., Fedorova, G., Grabicová, K., Turek, J., Žlábek, V., Randák, T., 2018. Fate of perfluoroalkyl substances within a small stream food web affected by sewage effluent. Water Research 134: 226–233. (IF 2017 = 7.051; AIS 2017 = 1.500)

de Siqueira-Silva, D.H., Saito, T., dos Santos-Silva, A.P., da Silva Costa, R., Pšenička, M., Yasui, G.S., 2018. Biotechnology applied to fish reproduction: tools for conservation. Fish Physiology and Biochemistry 44: 1469–1485. (IF 2017 = 1.735; AIS 2017 = 0.477)

Demoy-Schneider, M., Schmitt, N., Le Pennec, G., Suquet, M., Cosson, J., 2018. Quality assessment of cryopreserved black-lip pearl oyster *Pinctada margaritifera* spermatozoa. Aquaculture 497: 278–286. (IF 2017 = 2.710; AIS 2017 = 0.602)

Durinikova, E., Plava, J., Tyciakova, S., Skvara, P., Vojs Staňová, A., Kozovska, Z., Kucerova, L., Matuskova, M., 2018. Cytotoxic response of 5-fluorouracil-resistant cells to gene- and cell-directed enzyme/prodrug treatment. Cancer Gene Therapy 25: 285–299. (IF 2017 = 4.044; AIS 2017 = 0.657)

Dvořák, P., Andreji, J., Faltová Leitmanová, I., Petrách, F., Mráz, J., 2018. Accumulation of selected metals pollution in aquatic ecosystems in the Smeda river (Czech Republic). Neuroendocrinology Letters 39: 380–384. (IF 2017 = 0.754; AIS 2017 = 0.192)

Fatira, E., Havelka, M., Labbé, C., Depincé, A., Iegorova, V., Pšenička, M., Saito, T., 2018. Application of interspecific Somatic Cell Nuclear Transfer (iSCNT) in sturgeons and an unexpectedly produced gynogenetic sterlet with homozygous quadruple haploid. Scientific Reports 8: 5997. (IF 2017 = 4.122; AIS 2017 = 1.356)

Fér, M., Kodešová, R., Golovko, O., Schmidtová, Z., Klement, A., Nikodem. A., Kočárek, M., Grabic, R., 2018. Sorption of atenolol, sulfamethoxazole and carbamazepine onto soil aggregates from the illuvial horizonof the Haplic Luvisol on loess. Soil and Water Research 13: 177–183. (IF 2017 = 0.882; AIS 2017 = 0.220)

Gebauer, R., Divíšek, J., Buřič, M., Večeřa, M., Kouba, A., Drozd, B., 2018. Distribution of alien animal species richness in the Czech Republic. Ecology and Evolution 8: 4455–4464. (IF 2017 = 2.340; AIS 2017 = 0.927)

Gebauer, R., Veselý, L., Kouba, A., Buřič, M., Drozd, B., 2018. Forecasting impact of existing and emerging invasive gobiids under temperature change using comparative functional responses. Aquatic Invasions 13: 289–297. (IF 2017 = 1.976; AIS 2017 = 0.713)

Gholizadeh, A., Saberioon, M., Ben-Dor, E., Borůvka, L., 2018. Monitoring of selected soil contaminants using proximal and remote sensing techniques: Background, state-of-the-art and future perspectives. Critical Reviews in Environmental Science and Technology 48: 243–278. (IF 2017 = 7.683; AIS 2017 = 1.519)

Gholizadeh, A., Saberioon, M., Carmon, N., Boruvka, L., Ben-Dor, E., 2018. Examining the performance of PARACUDA-II Data-mining engine versus selected techniques to model soil carbon from reflectance spectra. Remote Sensing 10: 1172. (IF 2017 = 3.406; AIS 2017 = 0.872)

Gholizadeh, A., Zizala, D., Saberioon, M., Boruvka, L., 2018. Soil organic carbon and texture retrieving and mapping using proximal, airborne and Sentinel-2 spectral imaging. Remote Sensing of Environment 218: 89–103. (IF 2017 = 6.457; AIS 2017 = 1.977)

Golovko, O., Šauer, P., Fedorova, G., Kocour Kroupová, H., Grabic, R., 2018. Determination of progestogens in surface and waste water using SPE extraction and LC-APCI/APPI-HRPS. Science of the Total Environment 621: 1066–1073. (IF 2017 = 4.610; AIS 2017 = 1.032)

Grabicová, K., Vojs Staňová, A., Koba Ucun, O., Bořík, A., Randák, T., Grabic, R., 2018. Development of a robust extraction procedure for the HPLC-ESI-HRPS determination of multi-residual pharmaceuticals in biota samples. Analytica Chimica Acta 1022: 53–60. (IF 2017 = 5.123; AIS 2017 = 0.990)

Hematyar, N., Másílko, J., Mráz, J., Sampels, S., 2018. Nutritional quality, oxidation, and sensory parameters in fillets of common carp (*Cyprinus carpio* L.) influenced by frozen storage (-20 °C). Journal of Food Processing and Preservation 42: e13589. (IF 2017 = 1.309; AIS 2017 = 0.261)

Horokhovatskyi, Y., Dietrich, M.A., Lebeda, I., Fedorov, P., Rodina, M., Dzyuba, B., 2018. Cryopreservation effects on a viable sperm sterlet (*Acipenser ruthenus*) subpopulation obtained by a Percoll density gradient method. PLoS One 13: e0202514. (IF 2017 = 2.766; AIS 2017 = 1.000)

Hossain, M.S., Patoka, J., Kouba, A., Buřič, M., 2018. Clonal crayfish as biological model: a review on marbled crayfish. Biologia 73: 841–855. (IF 2017 = 0.696; AIS 2017 = 0.182)

Chupani, L., Niksirat, H., Lünsmannb, V., Haange, S.-B., von Bergen, M., Jehmlich, N., Zusková, E., 2018. Insight into the modulation of intestinal proteome of juvenile common carp (*Cyprinus carpio* L.) after dietary exposure to ZnO nanoparticles. Science of the Total Environment 613–614: 62–71. (IF 2017 = 4.610; AIS 017 = 1.032)

Chupani, L., Niksirat, H., Velíšek, J., Stará, A., Hradilová, Š., Kolařík, J., Panáček, A., Zusková, E., 2018. Chronic dietary toxicity of zinc oxide nanoparticles in common carp (*Cyprinus carpio* L.): Tissue accumulation and physiological responses. Ecotoxicology and Environmental Safety 147: 110–116. (IF 2017 = 3.974; AIS 2017 = 0.738)

Iegorova, V., Havelka, M., Pšenička, M., Saito, T., 2018. First evidence of viable progeny from three interspecific parents in sturgeon. Fish Physiology and Biochemistry 44: 1541–1550. (IF 2017 = 1.735; AIS 2017 = 0.477)

Iegorova, V., Pšenička, M., Lebeda, Y., Rodina, M., Saito, T., 2018. Polyspermy produces viable haploid/diploid mosaics in sturgeon. Biology of Reproduction 99: 695–706. (IF 2017 = 3.184; AIS 2017 = 1.007)

Ivanová, L., Macluľak, T., Grabic, R., Golovko, O., Koba, O., Vojs Staňová, A., Szabová, P., Grenčíková, A., Bodík, I., 2018. Pharmaceuticals and illicit drugs – A new threat to the application of sewage sludge in agriculture. Science of the Total Environment 634: 606–615. (IF 2017 = 4.610; AIS 2017 = 1.032)

Joshi, K.D., Dasa, S.C.S., Pathaka, R.K., Khana, A., Sarkar, U.K., Roy, K., 2018. Pattern of reproductive biology of the endangered golden mahseer Tor putitora (Hamilton 1822) with special reference to regional climate change implications on breeding phenology from lesser Himalayan region, India. Journal of Applied Animal Research 46: 1289–1295. (IF 2017 = 0.826; AIS 2017 = 0.131)

KhaliliTilami, S., Sampels, S., 2018. Nutritional value of fish: lipids, proteins, vitamins, and minerals. Reviews in Fisheries Science & Aquaculture 26: 243–253. (IF 2017 = 4.750; AIS 2017 = 0.947)

Khalili Tilami, S., Sampels, S., Zajíc, T., Krejsa, J., Másílko, J., Mráz, J., 2018. Nutritional value of several commercially important river fish species from the Czech Republic. PeerJ 6: e5729. (IF 2017 = 2.118; AIS 2017 = 0.820)

Khendek, A., Chakraborty, A., Roche, J., Ledoré, Y., Personne, A., Policar, T., Żarski, D., Mandiki, R., Kestemont, P., Milla, S., Fontaine, P., 2018. Rearing conditions and life history influence the progress of gametogenesis and reproduction performances in pikeperch males and females. Animal 12: 2335–2346. (IF 2017 = 1.870; AIS 2017 = 0.608)

Klement, A., Kodešová, R., Bauerová, M., Golovko, O., Kočárek, M., Fér, M., Koba, O., Nikodem, A., Grabic, R., 2018. Sorption of citalopram, irbesartan and fexofenadine in soils: Estimation of sorption coefficients from soil properties. Chemosphere 195: 615–623. (IF 2017 = 4.427; AIS 2017 = 0.869)

Koba, O., Grabicová, K., Červený, D., Turek, J., Kolářová, J., Randák, T., Žlábek, V., Grabic, R., 2018. Transport of pharmaceuticals and their metabolites between water and sediments as a further potential exposure for aquatic organisms. Journal of Hazardous Materials 342: 401–407. (IF 2017 = 6.434; AIS 2017 = 1.182)

Kocour Kroupová, H., Valentová, O., Svobodová, Z., Šauer, P., Máchová, J., 2018. Toxic effects of nitrite on freshwater organisms: a review. Reviews in Aquaculture 10: 525–542. (IF 2017 = 7.139; AIS 2017 = 1.552)

Kouba, A., Lunda, R., Hlaváč, D., Kuklina, I., Hamáčková, J., Randák, T., Kozák, P., Koubová, A., Buřič, M., 2018. Vermicomposting of sludge from recirculating aquaculture system using Eisenia andrei: Technological feasibility and quality assessment of end-products. Journal of Cleaner Production 117: 655–673. (IF 2017 = 5.651; AIS 2017 = 0.816)

Křišťan, J., Zarski, D., Blecha, M., Policar, T., Malinovskyi, O., Samarin, A.M., Palinska-Zarska, K., Nowosad, J., Krejszeff, S., Kucharczyk, D., 2018. Fertilizing ability of gametes at different post-activation times and the sperm-oocyte-ratio in the artificial reproduction of pikeperch *Sander lucioperca*. Aquaculture Research 49: 1383–1388. (IF 2017 = 1.475; AIS 2017 = 0.352)

Kuklina, I., Ložek, F., Císař, P., Kouba, A., Kozák, P., 2018. Crayfish can distinguish between natural and chemical stimuli as assessed by cardiac and locomotor reactions. Environmental Science and Pollution Research 25: 8396–8403. (IF 2017 = 2.800; AIS 2017 = 0.558)

Kumar, G., 2018. Mercury concentrations in fresh and canned tuna: A Review. Reviews in Fisheries Science & Aquaculture 26: 111–120. (IF 2017 = 4.750; AIS 2017 = 0.947)

Kumar, U., Rajaee, A.H., Idris, M.H., Nesarul, M.H., Siddique, M.A.M., Abu Hena, M.K., 2018. Length-weight relationship of *Secutor interruptus* (Valencennes, 1835) and *Opisthopterus tardoore* (Cuvier, 1829) from the South China Sea, Sarawak. Journal of Applied Ichthyology 34: 703–705. (IF 2017 = 0.774; AIS 2017 = 0.232)

Lebeda, I., Steinbach, Ch., Flajšhans, M., 2018. Flow cytometry for assessing the efficacy of interspecific gynogenesis induction in sturgeon. Journal of Fish Biology 92: 1819–1831. (IF 2017 = 1.702; AIS 2017 = 0.526)

Lépesová, K., Kraková, L., Pangallo, D., Medveďová, A., Olejníková, P., Mackuľak, T., Tichý, J., Grabic, R., Birošová, L., 2018. Prevalence of antibiotic-resistant coliform bacteria, *Entrococcus* spp. and *Staphylococcus* spp. in wastewater sewerage biofilm. Journal of Global Antimicrobial Resistance 14: 145–151. (IF 2017 = 2.022; AIS 2017 = 0.498)

Li, P., Xi, M.D., Du, H., Qiao, X.M., Liu, Z.G., Wei, Q.W., 2018. Antioxidant supplementation, effect on post-thaw spermatozoan function in three sturgeon species. Reproduction in Domestic Animals 53: 287–295. (IF 2017 = 1.422; AIS 2017 = 0.375)

Linhartová, Z., Havelka, M., Pšenička, M., Flajšhans, M., 2018. Interspecific hybridization of sturgeon species affects differently their gonadal development. Czech Journal of Animal Science 63: 1–10. (IF 2017 = 0.955; AIS 2017 = 0.222)

Linhartová, Z., Krejsa, J., Zajíc, T., Másílko, J., Sampels, S., Mráz, J., 2018. Proximate and fatty acid composition of 13 important freshwater fish species in central Europe. Aquaculture International 26: 695–711. (IF 2017 = 1.283; AIS 2017 = 0.344)

Linhartová, Z., Lunda, R., Másílko, J., Dvořák, P., Lundová, K., Stejskal, V., Matoušek, J., Mráz, J., 2018. Impact of photostimulation for delayed maturity on flesh quality of brook trout (*Salvelinus fontinalis*) stored under refrigerated conditions. Aquaculture Research 49: 3817–3829. (IF 2017 = 1.475; AIS 2017 = 0.352)

Lipták, B., Liptáková, P., Veselý, L., Kouba, A., 2018. Length frequency and morphometric analysis of the non-indigenous red-rimmed melania (*Melanoides tuberculata*) populations in Slovakia. Biologia 73: 505–511. (IF 2017 = 0.696; AIS 2017 = 0.182)

Lundová, K., Kouřil, J., Sampels, S., Matoušek, J., Stejskal, V., 2018. Growth, survival rate and fatty acid composition of sterlet (*Acipenser ruthenus*) larvae fed fatty acid-enriched *Artemia nauplii*. Aquaculture Research 49: 3309–3318. (IF 2017 = 1.475; AIS 2017 = 0.352)

Malinovskyi, O., Veselý, L., Blecha, M., Křišťan, J., Policar, T., 2018. The substrate selection and spawning behaviour of pikeperch *Sander lucioperca* L. broodstock under pond conditions. Aquaculture Research 49: 3541–3547. (IF 2017 = 1.475; AIS 2017 = 0.352)

Mohagheghi Samarin, A., Sampels, S., Krzyskow, A., Burkina, V., Křišťan, J., Gela, D., Flajšhans, M., Policar, T., Samarin, A.M., 2018. Egg oxidation status, antioxidant enzyme activities, lipid classes, fatty acid composition profile and embryo survival rates during *in vitro* oocyte ageing in tench *Tinca tinca* (Linnaeus, 1758). Aquaculture Research 49: 2305–2316. (IF 2017 = 1.475; AIS 2017 = 0.352)

Mohagheghi Samarin, A., Sampels, S., Policar, T., Rodina, M., Hematyar, N., Mohagheghi Samarin, A., 2017. mRNA abundance changes during *in vitro* oocyte ageing in African catfish *Clarias gariepinus* (Burchel, 1822). Aquaculture Research 49: 1037–1045. (IF 2017 = 1.475; AIS 2017 = 0.352)

Niksirat, H., Steinbach, Ch., 2018. Ultracytochemical visualization of calcium distribution in heart cells and erythrocytes of zebrafish *Danio rerio*. Micron 111: 19–27. (IF 2017 = 1.728; AIS 2017 = 0.549)

Novák, J., Vrana, B., Rusina, T., Okonski, K., Grabic, R., Neale, P.A., Escher, B.I., Macová, M., Ait-Aissa, S., Creusot, N., Allan, I., Hilscherová, K., 2018. Effect-based monitoring of the Danube River using mobile passive sampling. Science of the Total Environment 636: 1608–1619. (IF 2017 = 4.610; AIS 2017 = 1.032)

Palaiokostas, C., Kocour, M., Prchal, M., Houston, R.D., 2018. Accuracy of genomic evaluations of juvenile growth rate in common carp (*Cyprinus carpio*) using genotyping by sequencing. Frontiers in Genetics 9: 82. (IF 2017 = 4.151; AIS 2017 = 2.287)

Palaiokostas, Ch., Roblede, D., Veselý, T., Prchal, M., Pokorová, D., Piačková, V., Pojezdal, L., Kocour, M., Houston, R.D., 2018. Mapping and sequencing of a significant quantitative trait locus affecting resistance to koi herpesvirus in common carp. G3 – Genes Genomes Genetics 8: 3507–3513. (IF 2017 = 2.742; AIS 2017 = 1.221)

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Patoka, J., Magalhães, A.L.B., Kouba, A., Faulkes, Z., Jerikho, R., Vitule, J.R.S., 2018. Invasive aquatic pets: failed policies increase risks of harmful invasions. Biodiversity and Conservation 27: 3037–3046. (IF 2017 = 2.828; AIS 2017 = 0.913)

Patoka, J., Wardiatno, Y., Mashar, A., Yonvitner, Wowor, D., Jerikho, R., Takdir, M., Purnamasari, L., Petrtýl, M., Kalous, L., Kouba, A., Bláha, M., 2018. Redclaw crayfish, *Cherax quadricarinatus* (von Martens, 1868), widespread throughout Indonesia. BioInvasions Records 7: 185–189. (IF 2017 = 1.189; AIS 2017 = 0.544)

Pham, T.G., Sakalli, S., Fedorova, G., Khalili Tilami, S., Bakal, T., Najmanová, L., Grabicová, K., Kolářová, J., Sampels, S., Zamaratskaia, G., Grabic, R., Randák, T., Žlábek, V., Burkina, V., 2018. Biomarker response, health indicators, and intestinal microbiome composition in wild brown trout (*Salmo trutta m. fario* L.) exposed to a sewage treatment plant effluent-dominated stream. Science of the Total Environment 625: 1494–1509. (IF 2017 = 4.610; AIS 2017 = 1.032)

Pilipenko, N., Rasmussen, M.K., Doran, O., Zamaratskaia, G., 2018. 7-Hydroxylation of warfarin is strongly inhibited by sesamin, but not by episesamin, caffeic and ferulic acids in human hepatic microsomes. Food and Chemical Toxicology 113: 14–18. (IF 2017 = 3.977; AIS 2017 = 0.722)

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Prepared by: Pavlína Nováková

3.5. Scientific Citation Index (SCI) according to the Web of Science

Source: Web of Science	Citations incl. self-citations		A total of citations without self-citations
Worker	**2018**	**2019**	
Laboratory of Ethology of Fish and Crayfish			
Miloš Buřič, Ph.D.	87	162	466
Prof. Pavel Kozák	188	215	1,243
Antonín Kouba, Ph.D.	226	380	964
Assoc. Prof. Zdeněk Adámek	74	125	589
Hamid Niksirat Hashjin, Ph.D.	73	150	424
Martin Bláha, Ph.D.	74	112	300
Iryna Kuklina, Ph.D.	26	48	136
Lukáš Veselý, Ph.D.	20	49	86
Boris Lipták, Ph.D.	9	11	34
Martin Fořt, Ph.D.	6	13	27
Jan Kubec, Ph.D.	3	35	26
M.Sc. Shakhawate Hossain	0	21	12
M.Sc. Sara Roje	1	4	7
M.Sc. Wei Guo	4	1	6
Dipl.-Ing. Filip Ložek	0	4	3
Laboratory of Intensive Aquaculture			
Assoc. Prof. Tomáš Policar	156	210	730
Samad Rahimnejad, Ph.D.	82	160	316
Křišťan Jiří, Ph.D.	61	83	187
Azin Mohagheghi Samarin, Ph.D	48	62	111
Miroslav Blecha, Ph.D.	51	82	110
Carlos Yanes-Roca, Ph.D.	11	14	76
Hadiseh Dadras Asyabar, Ph.D.	25	35	60
Oleksandr Malinovskyi, Ph.D.	8	26	21
M.Sc. Aiman Imentai	5	7	17
Azadeh Mohagheghi Samarin, Ph.D.	5	11	13
Nima Hematyar, Ph.D.	2	5	6
Laboratory of Reproductive Physiology			
Sergii Boryshpolets, Ph.D.	103	105	454
Jacky Cosson, Ph.D., Dr.h.c.	501	605	4,590
Prof. Otomar Linhart	398	418	3,602
Marek Rodina, Ph.D.	310	365	1,336
Ping Li, Ph.D.	154	113	1,015
Assoc. Prof. Borys Dzyuba	156	220	694
Hermes Augusto Buarque Gadelha, Ph.D.	77	116	455
Viktoriya Dzyuba , Ph.D.	27	70	147
Mohammad Abdul Momin Siddique, Ph.D.	38	37	93
Olga Bondarenko, Ph.D.	16	36	75
Volodymyr Bondarenko, Ph.D.	16	17	66
MiaoMiao Xin, Ph.D.	11	13	35
Vitaliy Kholodnyy, Ph.D.	5	13	29
Yevhen Horokhovatskyi, Ph.D.	6	12	17
M.Sc. Vladimíra Tučková	2	7	12
M.Sc. Yu Cheng	1	3	5
Laboratory of Molecular, Cellular and Quantitative Genetics			
Prof. Martin Flajšhans	144	157	1,381
Assoc. Prof. Martin Kocour	88	83	792
Vojtěch Kašpar, Ph.D.	34	61	293
Ievgenia Gazo, Ph.D.	62	94	273
Anna Kolešová, Ph.D.	59	67	241
Ievgen Lebeda, Ph.D.	17	26	50
M.Sc. Olena Shaliutina	16	15	47

Girish Kumar, Ph.D.	15	12	34
Eva Prášková, Ph.D.	5	9	22
Martin Prchal, Ph.D.	8	19	20
Sahana Shivaramu, Ph.D.	0	7	7
M.Sc. Jinfeng Zhao	4	4	7
Laboratory of Germ Cells			
Assoc. Prof. Martin Pšenička	122	211	770
Dipl.-Ing. Zuzana Bláhová	12	2	89
Abdul Rasheen Khanzai Baloch, Ph.D.	17	35	65
Hilal Güralp, Ph.D.	2	13	18
Viktoriia Iegorova, Ph.D.	0	9	9
M.Sc. Tomáš Tichopád	0	1	4
M.Sc. Xuan Xie	0	3	3
M.Sc. Fatira Effrosyni	0	3	2
Roman Franěk, Ph.D.	0	4	0
Laboratory of Environmental Chemistry and Biochemistry			
Prof. Tomáš Randák	325	316	1,948
Assoc. Prof. Roman Grabic	609	704	3,350
Assoc. Prof. Vladimír Žlábek	234	235	1,507
Jitka Kolářová, DVM	123	108	898
Ganna Fedorova, Ph.D.	188	203	767
Oksana Golovko, Ph.D.	154	236	525
Jan Turek, Ph.D.	66	75	325
Kateřina Grabicová, Ph.D.	89	119	307
Andrea Vojs Staňová, Ph.D.	21	53	209
Viktoriia Burkina, Ph.D.	62	63	190
Daniel Červený, Ph.D.	44	60	144
Pavlo Fedorov, Ph.D.	14	39	64
Sidika Sakalli, Ph.D.	11	10	19
Dipl.-Ing. Adam Bořík	1	14	16
M.Sc. Pham Thain Giang	0	6	5
Helena Švecová, Ph.D.	0	1	4
Dipl.-Ing. Marie Šandová	0	0	1
Laboratory of Aquatic Toxicology and Ichthyopathology			
Assoc. Prof. Josef Velíšek	362	319	1,934
Prof. Zdeňka Svobodová	495	513	3,138
Jana Máchová, Ph.D	182	149	1,374
Assoc. Prof. Hana Kocour Kroupová	117	116	791
Veronika Piačková, Ph.D.	86	80	735
Alžběta Stará, Ph.D.	152	187	571
Eliška Zusková, Ph.D.	104	132	543
Christoph Steinbach, Ph.D.	25	30	120
Latifeh Chupani, Ph.D.	20	56	100
Dipl.-Ing. Olga Valentová	8	20	65
Dipl.-Ing. Josef Příborský	14	35	65
Dalibor Koutnik, Ph.D.	24	9	56
Pavel Šauer, Ph.D.	3	28	26
Dipl.-Ing. Jaroslava Lidová	4	6	10
Experimental Fish Culture and Facility			
Pavel Lepič, Ph.D.	12	18	109
Dipl.-Ing. Jitka Hamáčková	344	40	502
Dipl.-Ing. Andrea Lepičová	5	3	94
Genetic Fisheries Center			
Gela David, Ph.D.	156	157	1,401
B.Sc. Martin Kahanec	0	2	1
Laboratory of Applied Hydrobiology			
Bořek Drozd, Ph.D.	15	23	75

Otakar Strunecký, Ph.D.	69	81	480
David Hlaváč, Ph.D.	11	29	59
Adéla Stupková, Ph.D.	9	15	49
Jan Potužák, Ph.D.	10	22	43
Jindřich Duras, Ph.D.	3	12	41
Pavel Hartman, CSc.	4	18	38
Dipl.-Ing. Pavel Franta	4	12	25
Ján Regenda, Ph.D.	2	8	10
M.Sc. Marcellin Rutegwa	0	3	2
Dipl.-Ing. Kateřina Francová	0	1	1
Laboratory of Controlled Reproduction and Intensive Fish Culture			
Vlastimil Stejskal, Ph.D.	55	75	259
Prof. Jan Kouřil	43	47	410
Tomáš Korytář, Ph.D.	74	98	387
Peter Podhorec, Ph.D.	20	24	111
Dipl.-Ing. Jan Matoušek	12	19	74
Markéta Prokešová, Ph.D.	8	10	59
Roman Šebesta, Ph.D.	1	7	18
Tatyana Gebauer (Vanina), Ph.D.	1	6	6
Dipl.-Ing. Jindřiška Knowles (Matějková)	0	1	3
M.Sc. Katsiaryna Lundová (Novikava)	0	1	1
Laboratory of Nutrition			
Assoc. Prof. Jan Mráz	56	42	171
Aleš Tomčala, Ph.D.	82	100	615
Bakht Ramin Shah, Ph.D.	117	145	419
Jinfeng Pan, Ph.D.	30	46	147
Zuzana Linhartová, Ph.D.	25	37	126
Jan Kolek, Ph.D.	28	48	65
Petr Dvořák, Ph.D.	19	4	59
M.Sc. Hui Jia	10	8	36
Dipl.-Ing. Roman Lunda	2	6	11
M.Sc. Koushik Roy	5	18	8
Radek Gebauer, Ph.D.	0	5	5
Laboratory of Experimental Complex Systems			
Prof. Dalibor Štys	72	42	697
Štěpán Papáček Ph.D.	26	18	115
Jiří Jablonský, Ph.D.	13	15	75
Renata Štysová Rychtáriková, Ph.D.	11	1	16
M.Sc. Kirill Lonhus	0	2	2
M.Sc. Daria Malakhova	3	2	0
Laboratory of Signal and Image Processing			
Jan Urban, Ph.D.	22	14	118
Mohammadmehdi Saberioon, Ph.D.	110	127	323
Petr Císař, Ph.D.	43	39	134
Aliaksandr Pautsina, Ph.D	22	17	47
M.Sc. Oleksandr Mashchenko	12	8	26

Prepared by: Zuzana Dvořáková

3.6. Excellent Research

Excellent outputs in 2018–2019

Červený, D., Grabic, R., Fedorova, G., Grabicová, K., Turek, J., Žlábek, V., Randák, T., 2018. Fate of perfluoroalkyl substances within a small stream food web affected by sewage effluent. Water Research 134: 226–233.

This study of the research group from the Laboratory of Environmental Chemistry and Biochemistry brought new information concerning the presence and fate of emerging contaminants, specifically per- and polyfluoroalkyl substances (PFAS), in the real aquatic environment affected by a sewage treatment plant (STP) effluent. PFAS represent a group of extensively used chemicals, e.g. as components in protective layers of textile or in dishes (Teflon, Gore-Tex) and so they frequently occur in municipal sewage water. During the sewage treatment process, PFAS are not completely removed and contaminate the aquatic environments. The unique design of field-based experiments together with the state-of-art LC-HRMS analytical methods for PFAS analysis in water, in biota (benthos, fish), and in POCIS passive samplers were used in this study. Such an experimental design allowed describing the occurrence and fate of 14 PFAS compounds in a small stream affected by STP´s effluent. From 14 target PFAS, 12 were detected in various components of studied aquatic environment, including the food chain. Results of the study represent an important piece of knowledge exploitable in the field of environmental protection.

Císař, P., Saberioon, M., Kozák, P., Pautsina, A., 2018. Fully contactless system for crayfish heartbeat monitoring: Undisturbed crayfish as bio-indicator. Sensors and Actuators B: Chemical 255: 29–34.

Crayfish are widely accepted as very sensitive and fast bio-indicators of changes in water quality. Studies based on heartbeat analysis demonstrated the potential of using crayfish as a detector of pollutants. Consequently, several computer-aided systems were developed to use this mechanism. The main complication with applying such a system is the necessity of using metal wires or optical fibres to transmit the signal from a sensor that is placed on the back of the crayfish to the processing hardware. These attachments restrict the system design to one crayfish in one aquarium, partly influencing the regular behavioural response of the animal, and decreasing its welfare.

The multidisciplinary collaboration of the two laboratories (Laboratory of Signal and Image Processing and Laboratory of Ethology of Fish and Crayfish, FFPW USB) led to an original system for crayfish heartbeat monitoring based on completely non-invasive/contactless hardware. The system can determine crayfish heartbeat frequency using only the combination of a near-infrared illuminator and sensitive camera. The heart rate is the only parameter needed in most of the studies using crayfish as bio-indicators. The low-cost system needs no attachment, so more crayfish in one aquarium can be monitored simultaneously. It also provides accurate information on heart rate, while crayfish behave regularly with no need of adaptation to the contact sensor. This approach can be used as an equivalent to the existing systems to simplify the crayfish studies and acquires more reliable data.

Šauer, P., Stará, A., Golovko, O., Valentová, O., Bořík, A., Grabic, R., Kocour Kroupová, H., 2018. Two synthetic progestins and natural progesterone are responsible for most of the progestagenic activities in municipal wastewater treatment plant effluents in the Czech and Slovak republics. Water Research 137: 64–71.

Global research refers to various xenobiotics in treated municipal wastewater. Progestins (also known as progestogens) are an important group of such compounds. They are contained

e.g. in hormonal contraception and in other hormonal preparations, which predisposes them to have a broad therapeutic use. Thus, progestins occur in municipal wastewaters and their concentrations rather tend to increase. Progestins can pass through municipal wastewater treatment plants unchanged and then contaminate surface waters. Indeed, various studies have shown their presence in surface waters worldwide. In some cases, progestins were found in surface waters at levels that exceed the concentrations inducing adverse effects on aquatic organisms under laboratory conditions. Despite that there is only little information on this topic, the risk posed by progestins to the aquatic environment should not be underestimated. Given that progestins mimic natural hormones, their uncontrolled entry into a body can seriously disrupt the established hormonal balance and could result in a myriad of other consequent adverse effects.

For these reasons, scientists from the Faculty of Fisheries and Protection of Waters in Vodňany, USB aimed at screening the occurrence of progestins and the related hormonal (progestagenic) activities in the Czech aquatic environment. They focus on the "risky" localities including effluents from wastewater treatment plants and the respective downstream surface waters. Along with monitoring the occurrence of progestins and hormonal activities, experiments in the laboratory were carried out in order to determine progestagenic activity of these compounds. It has been revealed that progestins do not occur at such high levels in effluents from Czech wastewater treatment plants as they do in other European and Asian countries. Nevertheless, due to a continuously increasing consumption of hormonal preparations and broadening their use, this issue deserves further attention. The results of this research also indicate which compounds, out of a wide spectrum of progestins, could pose the highest risk to the aquatic environment and therefore they should get the highest priority in further testing. These include medroxyprogesteron acetate, megestrol acetate and progesterone, which have been detected most frequently at studied localities and also possess relatively strong hormonal (progestagenic) activity.

Iegorova, V., Pšenička, M., Lebeda, Y., Rodina, M., Saito, T., 2018. Polyspermy produces viable haploid/diploid mosaics in sturgeon. Biology of Reproduction 99: 695–706.

Sturgeons are famous for black caviar – the most expensive luxury roe. Nowadays, most of Acipenseridae members have become critically endangered (17 out of 27 species) due to various reasons and the restoration of their population is dependent on artificial reproduction. However, sturgeon reproduction is not easy. Sturgeons reach maturation quite late. Some species, such as beluga, mature in around 20 years. Therefore, it is very important to understand the biology of reproduction of these fishes.

Viktoriia Iegorova and colleagues described fertilization aspects, which are unique throughout the whole animal kingdom. Namely, two fertilization mechanisms were observed: 1) physiological polyspermy (penetration of numerous spermatozoa into an egg) and 2) karyogamy (fusion of sperm and egg pronuclei) with an additional plasmogamy (fusion of egg cytoplasm with accessory spermatozoa). The study demonstrates that during fertilization, numerous spermatozoa (up to 10) penetrate into the egg cytoplasm due to a higher number of micropyles. These spermatozoa tend to degenerate with time, and usually only one sperm pronucleus fuses with the egg pronucleus. However, some spermatozoa that did not fuse with the egg pronucleus and escaped from the degradation mechanisms can also participate in the development and give rise to fish, called "polyspermic mosaics". Such mosaics were distinguished by a characteristic cleavage pattern and demonstrated a higher number of blastomeres at the 2 to 4 cell stage with a characteristic mosaic haploid/diploid ploidy. In this research it was confirmed that the diploid cells contain maternal and paternal genetic information, while the haploid cells only possess a paternal genome. Surprisingly these mosaics develop in a normal way and survive similarly to the control fish. These findings can open a new approach in biotechnology, such as the production of clonal gametes.

Guo, W., Kubec, J., Veselý, L., Hossain, S.Md., Buřič, M., McClain, R., Kouba, A., 2019. High air humidity is sufficient for successful egg incubation and early post-embryonic development in the marbled crayfish (*Procambarus virginalis*). Freshwater Biology 64: 1603–1612.

Severe weather events, such as long-term droughts, are challenging for many freshwater species. To survive drought, freshwater crayfish tend to inhabit shelters or burrows where they can remain in contact with water or high humidity environments. However, it is not known whether embryogenesis or post-embryonic development can occur without free standing water.

To address this question, the members of the Laboratory of Ethology of Fish and Crayfish conducted experiments using artificial burrows with high air humidity and marbled crayfish as a model species. The ovigerous females were transferred to simulated burrows without free water, but with high air humidity. A control group of females was kept in burrows with free water. Successful hatching was achieved in both groups. In the further experiment, ovigerous females were transferred to simulated burrows with no free water but high air humidity and post-embryonic development were observed. Following successful hatching, offspring moulted to the second developmental stage (stage 2 juveniles). Stage 2 juveniles remained viable without free water for 20 days, but further development was not observed. However, when placed back into fully aquatic conditions, they moulted to independent stage 3 later on.

These results demonstrated the ability of marbled crayfish to undergo terminal phases of embryogenesis, including hatching, as well as early post-embryonic development under high air humidity conditions only, which is not achievable in the European native crayfish. Post-embryonic development was suspended in the absence of free water, and successfully resumed when re-immersed. This highlights the importance of drought-oriented adaptations of freshwater organisms as well as capacities of marbled crayfish as an invasive parthenogenetic species.

Fish Diseases and Pathological Conditions

Palíková, M., Piačková, V., Navrátil, S., Zusková, E., Papežíková, I., Kolářová, J., Pojezdal, Ľ., Dyková, I., Scholz, T., Gelnar, M., Svobodová, S., Řehulková, E., Mareš, J., Modrá, H., Blažek, R., Veselý, T., 2019. Nemoci a chorobné stavy ryb [Fish Diseases and Pathological Conditions]. FFPW USB, Vodňany, CZ, 462 pp.

The book Fish Diseases and Pathological Conditions is, by its concept, the first book of its kind written by Czech authors in the Czech language. Its publishing arose from the long-term need for up-to-date study materials for students of the University of Veterinary and Pharmaceutical Sciences Brno as well as other students specialized in fish farming. The team of authors consists of fifteen experts from several Czech universities and institutions of the Academy of Sciences of the Czech Republic (three of them from FFPW USB) and their work under the editorial supervision of Assoc. Prof. Miroslava Palíková resulted is a recognized contribution which will be basic material for acquiring knowledge in the field of fish diseases for a long time. The latest scientific and practical knowledge of viral, bacterial, parasitic, fungal and non-infectious fish diseases is included in the individual chapters, including an up-to-date overview of treatment options in fish farming, largely applicable in practice. The book follows recent taxonomy of organisms, thus it is significantly different from older publications of similar focus.

Awards for the Faculty, CENAKVA Center, staff, student and publications

Otomar Linhart's work awarded

Prof. Otomar Linhart is a leading expert in the field of fish reproduction and breeding. He held the position of Director of the Research Institute of Fish Culture and Hydrobiology in Vodňany (RIFCH) in 2005–2009 and initiated the establishment of the Faculty of Fisheries and Protection of Waters, serving as its Dean since its foundation (September 2009) until 2017. He was responsible for the establishment of the CENAKVA Research Center (2010–2019) and its transformation into a large open infrastructure in the Czech Republic. In addition to his extensive publishing and project activities, he has always worked on the creation of good relations at national as well as international level. In doing so, he contributed to the development of the field, faculty, university and region. Not only thanks to these achievements, he received the Person of the Year Award in the South Bohemian Region (2013) and in the Strakonice Region (2018). In 2018–2019 he was awarded the Memorial Medal of the University of South Bohemia in České Budějovice, the Memorial Medal of the RIFCH and was appointed the title professor *honoris causa* at the St. Stephen's University in Gödöllő, Hungary.

Jana Picková awarded *doctor honoris causa*

Prof. Jana Picková was awarded *doctor honoris causa* of the University of South Bohemia in České Budějovice. The ceremony took place in the Ceremonial Hall of the Town Hall in České Budějovice on 31 October 2018.

Prof. Jana Pickova is an internationally recognized scientist dealing with the importance of lipids for biological processes, in particular research oriented on aspects of dietary fat composition, the role of fatty acids and their metabolic transformations, the effect of lipid composition on fish reproduction, composition, degradation and stability of fish oil and last but not least a role of unique fish fats for the dietetic quality of the consumed fish. Jana Pickova has been an active collaborator of the Research Institute of Fish Culture and Hydrobiology, later the Faculty of Fisheries and Protection of Waters USB, for more than twenty years. This fruitful cooperation is evident in the field of projects, publications and mutual exchange of students. She has thus greatly helped with the development of CENAKVA and the establishment of today's Laboratory of Nutrition, thus contributing to the development of the faculty.

"Týden" Magazine

Almost traditionally, as a part of the survey conducted by the "Týden" Magazine ("Where to Study at University"), the Faculty of Fisheries and Protection of Waters USB ranked the first in the category of Agricultural, Forestry and Veterinary Sciences. We believe that we will continue to achieve this prestigious award.

Casting sport

A student of our faculty, Kateřina Marková, shone in casting sport in the 2018/2019 season. At the Czech Republic Championship in Kroměříž Kateřina won the first place in both the all-round pentathlon and heptathlon. She reasserted her success at the Vienna International Championship as well as at the Swiss International Championship a few weeks later, where she again was the best. The whole season culminated in the World Championship in Sweden (Ronneby), where Kateřina won five gold, two silver and two bronze medals, thus becoming the world champion in both the all-round pentathlon and heptathlon, and at the same time in Event 5 (Spinning Distance Single Handed, 7.5 g plug) set a new women's world record with a 78.64 m long distance throw, bettering the previous one by nearly 3 meters. In spring 2019 Kateřina was nominated for the World Championship by winning three qualifying competitions. She defended the title of champion of Vienna, further stamping herself as favourite at the international championship of the Czech Republic, where she won several gold medals. At the World Championships alone, she won the World Champion titles in the following disciplines: Fly Accuracy (skish), Spinning Accuracy Arenberg Target and Multiplier Skish. Last but not least, she defended the title and became world champion in the women's all-round pentathlon and heptathlon for 2019.

Science for Earth

Our student B.Sc. Alžběta Strouhová took part in the nationwide Science for Earth competition organized by the National Agricultural Museum. In the category of Bachelor's Theses, she succeeded by shared 1st–3rd place with her thesis entitled "Neonicotinoids in Aquatic Ecosystems and Their Influence on Non-Target Organisms" (supervised by Alžběta Stará, Ph.D.).

4. EDUCATION AND TEACHING ACTIVITIES

Study Department

The Vice-Dean for Study Affairs manages the faculty's Study Department, methodically coordinates other activities associated with study, and takes care of the development of educational activities at the faculty. The Study Department keeps files of Bachelor's, Master's, and Doctoral degree studies as well as procedures of admission to study, organizes final state exams and academic ceremonies, and administers study programmes, curricula, schedules, teachers, and classrooms in an information system called IS/STAG (**I**nformation **S**ystem of **S**tudy **A**genda). Furthermore, the Study Department manages the Alumni Club and mediates job offers to the faculty graduates in order to increase their employability on the job market.

Assoc. Prof. Martin Kocour
Vice-Dean for Study Affairs
kocour@frov.jcu.cz

Dipl.-Ing. Jitka Plecerová
Study Officer for Bachelor's and Master's Studies (since 5/2018 till 5/2019)
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Head of Study Department
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Lucie Kačerová
Study Officer for Doctoral Studies and Foreign Affairs
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M.A. Kateřina Bártová
Study Officer for Bachelor's and Master's Studies (till 11/2019)
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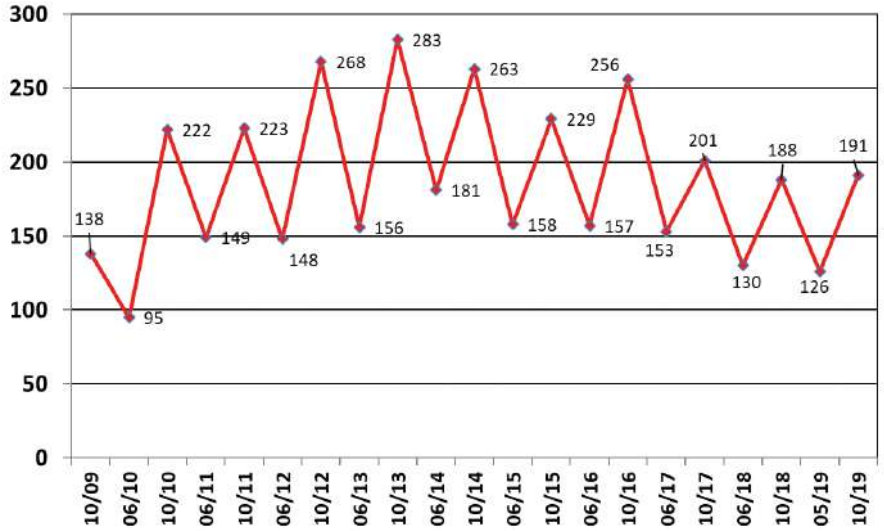
The Faculty of Fisheries and Protection of Waters of the University of South Bohemia in České Budějovice (FFPW USB) offers all levels of study programmes (Bachelor's, Follow-up Master's and Doctoral) in both full-time and combined forms. Teaching of Bachelor's and Follow-up Master's studies is held mainly at the Institute of Aquaculture and Protection of Waters on the campus of the University of South Bohemia in České Budějovice (ZR building) and nearby (Building at Husova Street). Most of the Ph.D. students work at the Research Institute of Fish Culture and Hydrobiology in Vodňany.



The development of the total number of students at the FFPW USB since 2009 (XX/YY = month/year; the October figures of a given year indicate the situation at the beginning of corresponding academic year while the June figures indicate the situation at the end of corresponding academic year).

BACHELOR'S STUDIES

Accredited study programmes and fields

Study programme (SP)	Code of SP	Study field	Code of SF (KKOV)	Form of study	Stand. length of study (years)	Language	Accredited until DD.MM. YYYY
Zootechnics	B4103	Fishery	4103R003	Full-time, combined	3	Czech	31. 12. 2024
Ecology and Environmental Protection	B1601	Protection of Waters	1601R004	Full-time	3	Czech	31. 12. 2024

Profile and objectives of study

In the study field of Fishery, students obtain professional knowledge in the area of biological-ecological relationships of water organisms, modern technologies in fish culture, fish farming in specialized facilities, and water management. In addition, issues concerning legislation of fishery and water protection, aquatic environment, and water management are studied. The graduate is qualified to perform activities connected to fish farming, to exercise fishing and hunting rights, and to do specialized work in the fields related to the protection of the environment, water management, and water quality at the level of lower and middle management. The study field of Fishery is offered in both full-time and combined forms of study.

The field of Protection of Waters is more focused on chemical processes in the aquatic environment, physical properties of water, ecology, EU legislation in water use and protection, water cycle in the landscape, waste water treatment, waterworks engineering, water management, and water constructions. The study field of Protection of Waters was offered solely in a full-time form of study. The aim of this study field is to train qualified specialists who would guarantee fulfilling, respecting and improving the legislation concerning the protection of waters and environment at the level of lower and middle management.

Both study fields put emphasis on student's language skills; the graduate should be able to communicate in English, both in spoken and written form.

Numbers of students admitted and enrolled in the 1st year of study

Academic year	Study programme (code of programme)	Study field	Form of study	Number of received applications	Number of admitted applicants	Number of enrolled students
2018/2019	Zootechnics (B4103)	Fishery	full-time	47	47	28
2018/2019	Zootechnics (B4103)	Fishery	combined	26	25	20
2018/2019	Ecology and Environmental Protection (B1601)	Protection of Waters	full-time	43	40	15
Total				**116**	**112**	**63**
2019/2020	Zootechnics (B4103)	Fishery	full-time	45	44	20
2019/2020	Zootechnics (B4103)	Fishery	combined	21	18	16
2019/2020	Ecology and Environmental Protection (B1601)	Protection of Waters	full-time	63	56	27
Total				**129**	**118**	**63**

A 2nd year – bachelor's student during a traditional admitting ceremony into the fishermen's guild.

Numbers of students in higher years (Data as of 31 October of the given academic year)

Academic year	Study programme (programme code)	Study field	Form of study	2nd year of study	3rd year of study	Study longer than 3 years	Total
2018/2019	Zootechnics (B4103)	Fishery	full-time	8	8	1	17
	Zootechnics (B4103)	Fishery	combined	3	1	1	5
	Ecology and Environmental Protection (B1601)	Protection of Waters	full-time	8	5	1	14
Total				**19**	**14**	**3**	**36**
2019/2020	Zootechnics (B4103)	Fishery	full-time	14	7	1	22
	Zootechnics (B4103)	Fishery	combined	6	1	–	7
	Ecology and Environmental Protection (B1601)	Protection of Waters	full-time	6	8	2	16
Total				**26**	**16**	**3**	**45**

Graduates of bachelor's studies in 2018 and 2019

Year of grad.	Student	Topic of bachelor's thesis	Supervisor	Result
2018	Lenka Kajgrová	Benthic macroinvertebrates of littoral plant beds and free muddy substrate of carp ponds	Assoc. Prof. Zdeněk Adámek	graduated with honours
2018	Ondřej Bartoš	The use of enriched Artemia nauplii for feeding larvae stages of fish	Prof. Jan Kouřil	graduated
2018	Tomáš Doležal	Fish communities of selected streams of the Jizera Mountains	Petr Dvořák, Ph.D.	graduated
2018	Pavel Duda	Use of hormonal preparations for spawning vimba bream (*Vimba vimba*)	Pavel Lepič, Ph.D.	graduated
2018	Jiří Jakš	Shoal behaviour as a response to environmental changes, review	Jan Urban, Ph.D.	graduated
2018	Marek Kodras	Possibilities of use of insect meal in feed for pikeperch (*Sander lucioperca*)	Pavel Lepič, Ph.D.	graduated
2018	Tomáš Kolařík	Efficiency evaluation of European grayling (*Thymallus thymallus* L.) reintroduction to the selected areas of South Bohemian rivers/ streams	Jan Turek, Ph.D.	graduated
2018	Petr Kovář	Feeding behavior of alien gobiids under different habitat complexities	Radek Gebauer, Ph.D.	graduated
2018	Miloslav Krejčí	Shelter competition between western tubenose goby and round goby	Bořek Drozd, Ph.D.	graduated
2018	Tadeáš Přibyl	A test of vinegar nematode (*Turbatrix aceti*) as a live food and substrates for oily substances elimination from the surface water layer for aquaculture of early life stages of European perch (*Perca fluviatilis*)	Roman Šebesta, Ph.D.	graduated
2018	Alžběta Strouhová	Neonicotinoids in aquatic ecosystems and their impact on non-target organisms	Alžběta Stará, Ph.D.	graduated
2018	Ondřej Tunys	The influence of natural extracts on sensory properties and prolongation of shelf life of meat of rainbow trout (*Oncorhynchus mykiss*)	Zuzana Linhartová, Ph.D.	graduated

2018	Jan Volský	The effect of enrichment *Artemia* on growth and survival of *Acipenser ruthenus*	M.Sc. Katsiaryna Lundová	graduated
2019	Oldřich Pecha	The use of preparations for the controlled release of hormone in the artificial reproduction of fish	Peter Podhorec, Ph.D.	graduated with honours
2019	Jan Rytíř	Estimation of the ecological impact of the round goby (*Neogobius melanostomus*) on macrozoobenthos assemblages of the lower part of the Elbe River using functional response of foraging behavior: effect of predator size	Bořek Drozd, Ph.D.	graduated with honours
2019	Jan Janík	Hematological examination of fish after antiparasitic bath	Eliška Zusková, Ph.D.	graduated
2019	Martin Kareš	Reach the fish reared in the biological pond fed with water from the WWTP of the requirements for the hygienic quality of the meat?	Assoc. Prof. Vladimír Žlábek	graduated
2019	Josef Mareš	Feed digestibility for common carp	Assoc. Prof. Jan Mráz	graduated
2019	Josef Mareš	Behaviour of aquatic organisms and contamination of watercourses? Unwanted treatment of crayfish depression and insomnia	Miloš Buřič, Ph.D.	graduated
2019	Jan Materna	The effect of herbicide s-metolachlor on early life stages of marbled crayfish	Assoc. Prof. Josef Velíšek	graduated
2019	Taisiya Stechkina	Advances in fish sperm cryopreservation: taxonomical consideration	Assoc. Prof. Borys Dzyuba	graduated
2019	Martin Svoboda	Dynamics of phytoplankton in carp fishponds	Otakar Strunecký, Ph.D.	graduated
2019	Jan Toman	Mexican dwarf crayfish (*Cambarellus patzcuarensis*) – an overview	Antonín Kouba, Ph.D.	graduated
2019	Ondřej Tomášek	Critical swimming speed in intensively cultured European perch (*Perca fluviatilis* L.): Influence of fish size, production system and repeated testing	Vlastimil Stejskal, Ph.D.	graduated

Bachelor's study graduates after their graduation ceremony in 2018 with the Dean, Prof. Pavel Kozák.

Awards for excellent study results

The full-time students could gain merit-based and premium scholarships for their excellent study results.

Merit-based scholarship

A merit-based scholarship was awarded to students who enrolled in courses with the amount of 60 credits minimum in the previous academic year and gained the weighted study average of 1.60 or lower.

The conditions for awarding the merit-based scholarship were specified by the USB Scholarship Regulations, Dean's Decision No. 12/2017, Dean's Measures No. 30/2018 and No. 14/2019.

Awarded merit-based scholarships by awardees

Academic year	Student	Scholarship awarded/month (CZK)	Total (CZK)
2018/2019	Vendula Bryllová	800,-	7,200,-
	Václav Kučera	800,-	7,200,-
	Aneta Mondeková	800,-	7,200,-
	Jan Materna	1,200,-	10,800,-
	Oldřich Pecha	1,200,-	10,800,-
	Jan Rytíř	1,200,-	10,800,-
	Pavel Švejda	1,600,-	14,400,-
Total		**–**	**68,400,-**
2019/2020	Vendula Bryllová	2,000,-	18,000,-
	Jana Krulová	1,000,-	9,000,-
	Václav Kučera	1,500,-	13,500,-
	Andrea Martanová	1,000,-	9,000,-
	Aneta Mondeková	1,500,-	13,500,-
Total		**–**	**63,000,-**
Total both years		**–**	**131,400,-**

Premium scholarship

A premium scholarship was awarded to students with excellent study results during the whole course of their study, for bachelor's theses graded excellent at the defence or for publishing scientific findings in.

Premium scholarships awarded for the results in the academic year 2017/2018 by individual categories

Premium scholarships in the academic year 2017/2018		Scholarship (CZK)	Number of students awarded	Awarded total (in CZK)
a)	For a bachelor's thesis with outstanding research, innovation or other creative results contributing to deepening knowledge, i.e. a thesis graded "excellent" by the final state exam committee	1,000,-	2	2,000,-
b)	For students of bachelor's studies for results in the RIV for purposes of research and development evaluation	–	–	–
c)	For students of bachelor's studies for excellent study results during the whole study – Dean's and Rector's awards:	10,000,-	1	10,000,-
Total				**12,000,-**

Premium scholarships awarded for the results in the academic year 2017/2018 by awardees

Student	Awarded premium scholarships by categories – see the table above		Total (in CZK)
	a)	c)	
Lenka Kajgrová		10,000,-	10,000,-
Petr Kovář	1,000,-		1,000,-
Alžběta Strouhová	1,000,-		1,000,-
Total	**2,000,-**	**10,000,-**	**12,000,-**

Premium scholarships awarded for the results in the academic year 2018/2019 by individual categories

Premium scholarships in the academic year 2018/2019		Scholarship (CZK)	Number of students awarded	Awarded total (in CZK)
a)	For a Bachelor's thesis with outstanding research, innovation or other creative results contributing to deepening knowledge, i.e. a thesis graded "excellent" by the final state exam committee	1,000,-	3	3,000,-
c)	For students of Bachelor's studies for excellent study results during the whole study – Dean's awards:	10,000,- 8,000,-	1 1	18,000,-
Total				**21,000,-**

Premium scholarships awarded for results in academic year 2018/2019 by awardees

Student	Awarded premium scholarships by categories – see the table above		Total (in CZK)
	a)	c)	
Josef Mareš	1,000,-		1,000,-
Jan Materna	1,000,-		1,000,-
Oldřich Pecha		10,000,-	10,000,-
Jan Rytíř		8,000,-	8,000,-
Ondřej Tomášek	1,000,-		1,000,-
Total	**3,000,-**	**18,000,-**	**21,000,-**

Specific extraordinary scholarships

Since the academic year 2012/2013, the faculty has introduced two new types of extraordinary scholarships – Extraordinary scholarship for talented students and Extraordinary sport scholarship. In 2018, the faculty introduced another type of scholarship, Extraordinary scholarship to support bachelor students with great study assumptions.

Extraordinary scholarship for talented students

The purpose of this scholarship is to support and attract capable and diligent students, and to motivate such students for a closer cooperation with the faculty.

"A talented, capable and diligent student doesn't experience a financial stringency at our faculty."

Students eligible for this scholarship are those who enrolled in courses at the FFPW USB with the amount of 60 credits minimum in the previous academic year, gained the weighted study average of 1.5 or lower and in addition actively worked in the FFPW USB laboratories,

participated in the promotion of the faculty, assisted the faculty academic staff with the teaching or represented the university at a major sport event. The amount of the scholarship is allocated according to the student's weighted study average and activity. The conditions for awarding the scholarship were specified by the Dean's Measures No. 4/2018 for the academic year 2018/2019, for the academic year 2019/2020 by the Dean's Measures No. 2/2019. The scholarship was not awarded in 2018/2019 to any bachelor students and in the academic year 2019/2020 it was awarded to 1 student.

Extraordinary scholarships for talented students by awardees

Academic year	Student	Scholarship/month (CZK)	Total (in CZK)
2019/2020	Václav Kučera	14,000,-	112,000,-
Total			**112,000,-**

Extraordinary sport scholarship

The scholarship was awarded for outstanding achievements in sport and to support sports activities in accordance with the Dean's Decision No. 7/2013. Outstanding achievements is sport means excellent placement in the national, international or university competitions. The scholarship to support sports activities can be awarded to students in order to facilitate participation in major sports events, to support training or performance. The scholarship was awarded to one student in the academic year 2018/2019 and one student in 2019/2020.

Extraordinary sport scholarship in the academic years 2018/2019 and 2019/2020 by awardees

Student	Excellent sports performance	Support sports activities	Total (in CZK)
Kateřina Marková	15,000,-	16,000,-	31,000,-
Zdeněk Polívka	–	6,000,-	6,000,-

Kateřina Marková, the winner of the World Cup 2019 in casting.

Extraordinary scholarship to support bachelor students with great study prerequisites

A new type of an extraordinary scholarship was targeted at students who were not eligible for scholarships aimed at talented students in higher years of study. Our aim was to motivate students with study prerequisites to enrol in our faculty and to reduce the failure rate in the first semester. The scholarship was divided into two categories. In the first category, the scholarship was awarded to first-time enrolled students, who had great results at secondary schools. The second category was for all students who achieved 20 credits for compulsory and compulsory elective courses in the first semester. The amount of scholarship and the conditions for granting was governed by the Dean's Measures No. 21/2018 and No. 1/2019.

Extraordinary scholarships awarded to the 1st-year-bachelor students with great results from secondary school

Academic year	Student	Scholarship (CZK)
2018/2019	Jan Blafka	5,000,-
	Vojtěch Sloup	5,000,-
	Daniel Štefan	5,000,-
	Pavel Koukolík	8,000,-
	Jana Krulová	8,000,-
	Alexandr Nádaský	10,000,-
	Jiří Paroulek	10,000,-
	Jan Pastejřík	10,000,-
Total		**61,000,-**
2019/2020	Ondřej Lorenc	5,000,-
	Jan Slabý	5,000,-
	Lucie Žaloudková	5,000,-
	Monika Dušánková	8,000,-
	Jakub Kocour	8,000,-
	Jakub Meisner	8,000,-
	Eliška Pejcharová	8,000,-
	Anna Hovorková	10,000,-
	Natalie Tomasová	10,000,-
Total		**67,000,-**
Both years total		**128,000,-**

Extraordinary scholarships awarded to the 1st-year-bachelor students for achieving 20 credits for the compulsory and compulsory elective courses during first semester

Academic year	Student	Scholarship (CZK)
2018/2019	Jaroslav David	8,000,-
	Jan Fábrik	8,000,-
	Jiří Kadlec	8,000,-
	Pavel Koukolík	8,000,-
	Jana Krulová	8,000,-
	Alexandr Nádaský	8,000,-
	Jiří Paroulek	8,000,-
	Jan Pastejřík	8,000,-
	Vendula Puhanová	8,000,-
	Martin Řehořek	8,000,-
	Daniel Štefan	8,000,-
Total		**88,000,-**

FOLLOW-UP MASTER'S STUDIES

Accredited study programmes and fields

Study Programme (SP)	Code of SP	Study field	Form of study	Stand. length of study (years)	Language	Accredited to DD.MM.YYYY
Agricultural Specialization	N4106	Fishery and Protection of Waters	full-time, combined	2	Czech	31. 12. 2024
Agricultural Specialization	N4106	Fishery and Protection of Waters	full-time, combined	2	English	31. 12. 2024
Zootechnics	N4103	Fishery	full-time, combined	2	Czech	31. 5. 2020*

** only to enable the current students to complete their studies.*

Profile and objectives of study

The study field of **Fishery and Protection of Waters** is a coherent and, in its essence, combined study field that along with knowledge of biological, ecological, and technological aspects of fishery also focuses on the issues of water management and the protection of aquatic environments. This field interconnects the issues of fishery and protection of waters based on both the legislative requirements and current trends and needs. The graduates of this field are qualified for specialized work in the upper management of fishing companies and unions, in institutions focused on the protection of aquatic environments, in the area of water management, and in laboratories specialized particularly on water quality assessment. The graduates are also qualified to exercise fishing rights and to work as a fishing ground manager.

The aim of the Follow-up Master's studies is to train qualified specialists in the areas of fishery, fish farming, and the protection of aquatic environments, who are able to use their acquired knowledge and capabilities in the management of higher organisation units, i. e. large work teams in fishery, water management, public and state administration at the level of top management.

Numbers of students admitted and enrolled in the 1st year of study

Academic year	Study programme (Code of SP)	Study field	Form of study	Number of received applications	Number of admitted applicants	Number of enrolled students
2018/2019	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	full-time	14	13	11
	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	combined	10	9	8
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	full-time	2	0	0
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	combined	0	0	0
Total				**26**	**22**	**19**
2019/2020	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	full-time	15	14	11
	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	combined	8	7	5
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	full-time	4	0	0
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	combined	5	4	1
Total				**32**	**25**	**17**

Numbers of students in higher years (Data as of 31 October of the given academic year)

Academic year	Study programme (Code of SP)	Study field	Form of study	2nd year	3rd and higher	Total
2018/2019	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	full-time	9	2	11
	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	combined	4	2	6
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	full-time	–	–	–
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	combined	–	1	1
Total				**13**	**5**	**18**
2019/2020	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	full-time	10	6	16
	Agricultural Specialization (N4106) (CZ)	Fishery and Protection of Waters	combined	3	0	3
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	full-time	0	0	0
	Agricultural Specialization (N4106) (EN)	Fishery and Protection of Waters	combined	0	0	0
Total				**13**	**6**	**19**

Graduates of follow-up master's studies who defended their thesis in 2018 and 2019

Year of grad.	Student	Topic of diploma thesis	Supervisor	Result
2018	B.Sc. Martin Hubálek	The possibilities of sample fixation for measurement of DNA content in fish by means of flow cytometry	Prof. Martin Flajšhans	graduated with honours
2018	B.Sc. Martin Růžek	Induction of triploidy in pikeprech (*Sander lucioperca*)	Miroslav Blecha, Ph.D.	graduated with honours
2018	B.Sc. Jakub Čejka	The Effect of temperature and hyperoxia regimes on growth, feed uptake and physiology of hybrid between Brook trout (*Salvelinus fontinalis*) and Arctic charr (*Salvelinus alpinus*)	Vlastimil Stejskal, Ph.D.	graduated
2018	B.Sc. Martin Fojt	Evaluation of fertility of signal crayfish including postovulation conditions of ovaries	Miloš Buřič, Ph.D.	graduated
2018	B.Sc. Michaela Fučíková	Cryopreservation and transplantation of common carp spermatogonia	Assoc. Prof. Martin Pšenička	graduated
2018	B.Sc. Petr Hanzlík	Adaptation and intensive farming of largemouth bass (*Micropterus salmoides*) in comparison with intensive aquaculture of pikeperch (*Sander lucioperca*)	Assoc. Prof. Tomáš Policar	graduated

2018	B.Sc. Markéta Hlávková	The evaluation of the sub-chronic exposure to atrazine on crayfish	Alžběta Stará, Ph.D.	graduated
2018	B.Sc. Ondřej Homola	The use of self-feeding systems for percid fish	Vlastimil Stejskal, Ph.D.	graduated
2018	Ing. Jaroslav Jelínek	Operational verification of monosex populations in african catfish (*Clarias gariepinus*) farming	Prof. Jan Kouřil	graduated
2018	B.Sc. Marek Let	Monitoring of polychlorinated biphenyls contamination in Bezdrevsky stream	Assoc. Prof. Roman Grabic	graduated
2018	B.Sc. Viktoriia Malinovska	Effect of hygienically treated water on crayfish heart rate and their subsequent mortality	Prof. Pavel Kozák	graduated
2018	B.Sc. Václav Melka	The potential of compound feed and cereals as a tool for keeping the production of carp at a good level in relation to the water quality.	Ján Regenda, Ph.D,	graduated
2018	B.Sc. Jakub Morava	Optimization of intensive breeding larvae pikeperch (*Sander lucioperca* L.)	Assoc. Prof. Tomáš Policar	graduated
2018	B.Sc. Tomáš Plaňanský	Sperm collection with catheter and its use in artificial reproduction of northern pike (*Esox Lucius* L.)	Assoc. Prof. Tomáš Policar	graduated
2018	B.Sc. Jakub Starý	Operational verification of the influence of feeding of the early fry of sturgeon fish by enriched artemia salina on their survival and growth rate	Prof. Jan Kouřil	graduated
2018	B.Sc. Kateřina Švagrová	Interaction of non-native species of crustaceans in Czech waters: Predator or prey?	Miloš Buřič, Ph.D.	graduated
2018	B.Sc. Jakub Vlček	Ozone use in intensive breeding of selected fish species	Assoc. Prof. Tomáš Policar	graduated
2019	B.Sc. Dominik Boňko	Intensive breeding of largemouth bass (*Micropterus salmoides*) in RAS with a different mode of light	Assoc. Prof. Tomáš Policar	graduated with honours
2019	B.Sc. Andreas Andoniu	Influence of temperature on maintenance of fertilization and hatching ability when keeping unfertilized eggs at tench	Prof. Jan Kouřil	graduated
2019	B.Sc. Jan Chábera	Study of fundamental mechanisms of peritoneal inflammation of pike perch (*Sander lucioperca*)	Tomáš Korytář, Ph.D.	graduated
2019	B.Sc. Milan Man	Comparison of marbled crayfish and spiny-cheek crayfish: direct interaction and competion for resources	Antonín Kouba, Ph.D.	graduated
2019	B.Sc. Martin Musil	Benthic communities in River Labe and River Ohře and their tributaries	Miloš Buřič, Ph.D.	graduated
2019	B.Sc. Michal Pech	Effect of synthetic progestin etonogestrel on the secondary sexual characteristics and gonad histology of Endler´s guppy (*Poecilia wingei*)	Assoc. Prof. Hana Kocour Kroupová	graduated
2019	B.Sc. Eliška Peřinová	Diversity of macrozoobenthos in a site of European importance with the occurrence of stone crayfish (*Austropotamobius torrentium*)	Martin Bláha, Ph.D.	graduated
2019	B.Sc. Pavel Válek	The impact of vertical distribution of zoobenthos in a pond in response to the biomass stocking of carp ponds	Assoc. Prof. Zdeněk Adámek	graduated

Awards for excellent study results

Full-time students were able to get a merit-based scholarship and a premium scholarship. The conditions for the payment were governed by the Scholarship regulations of the USB, Dean's Decision No. 12/2017 and Dean's Measures No. 20/2018 and no. 14/2019.

Merit-based scholarship

A merit-based scholarship was awarded to students who enrolled in courses in the amount of 60 credits minimum in the previous academic year and gained the weighted study average of 1.60 or lower. In academic year 2018/2019, the 60-credit limit was not applied to students who completed their Bachelor's studies in a due manner and continued in the Follow-up Master's study programme. The conditions for the payment were governed by the Scholarship regulations of the USB, Dean's Decision No. 12/2017 and Dean's Measures No. 20/2018 and no. 14/2019.

Awarded merit-based scholarships by awardees

Academic year	Student	Scholarship/month (CZK)	Total (CZK)
2018/2019	B.Sc. Dominik Boňko	1,200,-	10,800,-
	B.Sc. Michal Pech	800,-	7,200,-
	B.Sc. Vít Profant	800,-	7,200,-
	B.Sc. Martin Vágner	800,-	7,200,-
Total		**–**	**32,400,-**
2019/2020	B.Sc. Jiří Jakš	1,000,-	9,000,-
	B.Sc. Jan Rytíř	1,500,-	13,500,-
	B.Sc. Lenka Kajgrová	2,000,-	18,000,-
	B.Sc. Marek Kodras	2,000,-	18 000,-
Total		**–**	**58,500,-**
Both years total		**–**	**90,900,-**

Premium scholarship

Premium scholarships were awarded for outstanding academic achievements throughout their studies and for diploma theses that were assessed by the State Final Examination Commissions as sufficiently innovative and contributing to deepening of knowledge.

Premium scholarships awarded for the results in the academic year 2017/2018 by individual categories

	Premium scholarships in 2017/2018	Scholarship (CZK)	Number of students awarded	Total (CZK)
a)	For a Diploma thesis with outstanding research, innovation or other creative results contributing to deepening knowledge	3,000,-	2	6,000,-
c)	For students of Follow-up Master's studies for excellent study results during the whole study – Dean's and Rector's awards:	15,000,-	1	15,000,-
Total				**21,000,-**

Premium scholarships awarded for the results in the academic year 2018/2019 by individual categories

Student	Awarded premium scholarships by categories – see the table above		Total (CZK)
	a)	c)	
B.Sc. Michaela Fučíková	3,000,-		3,000,-
B.Sc. Martin Hubálek	3,000,-	15,000,-	18,000,-
Total	**6,000,-**		**21,000,-**

Premium scholarships awarded for the results in the academic year 2018/2019 by individual categories

	Premium scholarships in the academic year 2018/2019	Scholarship (CZK)	Number of students awarded	Awarded in total (CZK)
a)	For a Diploma thesis with outstanding research, innovation or other creative results contributing to deepening knowledge	3,000,-	2	6,000,-
c)	For students of Follow-up Master's studies for excellent study results during the whole study – Dean's and Rector's awards:	12,000,-	1	12,000,-
Total				**18,000,-**

Premium scholarships awarded for results in academic year 2018/2019 by awardees

Student	Awarded premium scholarships by categories – see the table above		Total (CZK)
	a)	c)	
B.Sc. Dominik Boňko	3,000,-	12,000,-	15,000,-
B.Sc. Michal Pech	3,000,-		3,000,-
Total	**6,000,-**	**12,000,-**	**18,000,-**

The graduates after the graduation ceremony.

Specific extraordinary scholarships

Since the academic year 2012/2013, the faculty has introduced two new types of extraordinary scholarships – Extraordinary scholarship for talented students and Extraordinary sport scholarship.

Extraordinary scholarship for talented students

Details related to extraordinary scholarship for talented students are introduced in the bachelor's studies chapter.

Extraordinary scholarship for talented students by awardees

Academic year	Student	Scholarship/month (CZK)	Total (CZK)
2018/2019	B.Sc. Dominik Boňko	10,000,-	84,000,-
	B.Sc. Lenka Kajgrová	7,000,-	56,000,-
	B.Sc. Vít Profant	7,000,-	56 000,-
Total		**–**	**196 000,-**
2019/2020	B.Sc. Lenka Kajgrová	14,000,-	112,000,-
	B.Sc. Oldřich Pecha	14,000,-	112,000,-
Total		**–**	**224,000,-**
Both years total		**–**	**420,000,-**

The follow-up Master's degree extraordinary scholarship awardees and the members of the Dean's committee for granting extraordinary scholarships.

DOCTORAL (PH.D.) STUDY

Profile and objectives of study

The doctoral study field of **Fishery** represents an interesting opportunity to continue the acquisition of new scientific findings according to an individual study plan. A Ph.D. student deepens his/her knowledge and abilities acquired in the Master's studies in relation to a detailed professional specialization usually in the context of current scientific and research issues. The aim of the study is to prepare students for future academic, research or teaching careers in higher education or research institutions. The study is offered in full-time and combined forms and in Czech and English language.

Accredited study programmes and fields

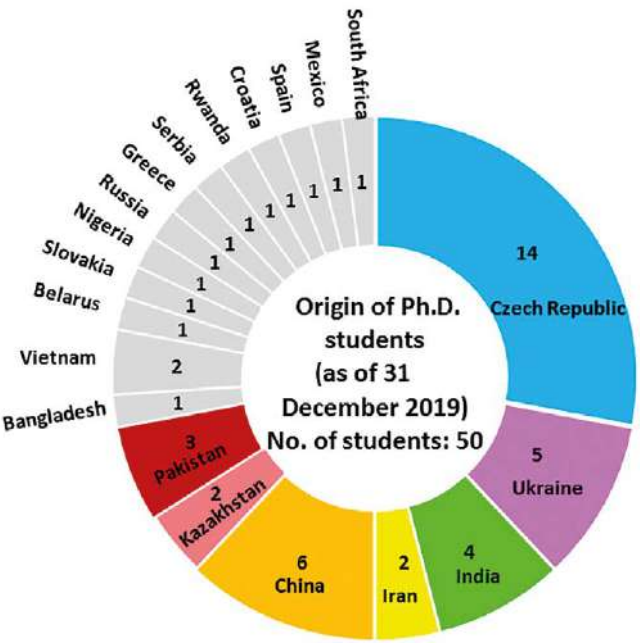
Study programme (SP)	Code of SP	Study field (SF)	Code of SF	Form of study	Stand. length of study (years)	Language	Accredited to
Zootechnics	P4103	Fishery	4103V003	full-time, combined	4	Czech	31. 12. 2024
Zootechnics	P4103	Fishery	4103V003	full-time, combined	4	English	31. 12. 2024

Numbers of students admitted and enrolled in the 1st year of study

Academic year	Study programme (Code of SP)	Study field	Form of study	Number of received applications	Number of admitted applicants	Number of enrolled students
2018/2019	Zootechnics (P4103) (CZ)	Fishery	full-time	4	3	3
	Zootechnics (P4103) (CZ)	Fishery	combined	1	1	1
	Zootechnics (P4103) (EN)	Fishery	full-time	16	11	8
Total				**21**	**15**	**12**
2019/2020	Zootechnics (P4103) (CZ)	Fishery	full-time	1	1	1
	Zootechnics (P4103) (CZ)	Fishery	combined	1	1	0
	Zootechnics (P4103) (EN)	Fishery	full-time	15	10	5
Total				**17**	**12**	**6**

Numbers of Ph.D. students in higher years (data as of 31 October of the given academic year)

Academic year	Study programme (Code of SP)	Study field	Form of study	2nd year	3rd year	4th year	5th year	6th year	Total
2018/19	Zootechnics (P4103) (CZ)	Fishery	full-time	2	9	9	0	0	20
	Zootechnics (P4103) (CZ)	Fishery	com-bined	0	0	2	2	3	7
	Zootechnics (P4103) (EN)	Fishery	full-time	9	0	2	0	0	11
Total				**11**	**9**	**13**	**2**	**3**	**38**
2019/20	Zootechnics (P4103) (CZ)	Fishery	full-time	4	2	10	2	1	19
	Zootechnics (P4103) (CZ)	Fishery	com-bined	1	0	0	2	5	8
	Zootechnics (P4103) (EN)	Fishery	full-time	9	8	0	0	0	17
Total				**14**	**10**	**10**	**4**	**6**	**44**



Structure of nationalities of students studying or working at FFPW USB as of 31 December 2019.

Graduates of doctoral studies in 2018 and 2019

Grad. year	Ph.D. student	Title of doctoral thesis	Supervisor
2018	Dipl.-Ing. Radek Gebauer	Foraging behavior of non-indigenous gobiid fish species	Bořek Drozd, Ph.D.
2018	M.Sc. Hadiseh Dadras Asyabar	Temperature dependency of sperm motility in different fish species	Assoc. Prof. Borys Dzyuba
2018	Dipl.-Ing. Martin Prchal	Estimation of genetic variation of performance traits in common carp to predict potential of selective breeding under pond management conditions	Assoc. Prof. Martin Kocour
2018	M.Sc. Yevhen Horokhovatskyi	Applied aspects of fish sperm cryopreservation	Assoc. Prof. Borys Dzyuba
2018	M.Sc. Azadeh Mohagheghi Samarin	Alteration of mRNA abundance, oxidation products and antioxidant enzyme activities associated with fish oocyte ageing	Assoc. Prof. Tomáš Policar
2018	M.Sc. Thai Giang Pham	Biological effects of anthropogenic pollutants present in recipients of treated sewage water	Assoc. Prof. Vladimír Žlábek
2018	M.Sc. Sidika Sakalli	Bioactive compunds in the aquatic environment and their effects on fish. Special focus on piscine cytochrome P450	Assoc. Prof. Vladimír Žlábek
2018	Dipl.-Ing. Roman Šebesta	Selected aspects of intensively cultured European whitefish (*Coregonus maraena*, Bloch) and peled (*Coregonus peled*, Gmelin)	Vlastimil Stejskal, Ph.D.
2018	M.Sc. Viktoriia Iegorova	Polyspermy produces viable mosaics in sturgeon	Taiju Saito, Ph.D.
2019	M.Sc. Sarvenaz KhaliliTilami	Factors influencing nutritional value of fish	Assoc. Prof. Jan Mráz
2019	Dipl.-Ing. Dalibor Koutnik	The effect of triazine based pesticides and their metabolities on no-target aquatic organisms	Assoc. Prof. Josef Velíšek
2019	Dipl.-Ing. Pavel Šauer	Environmental pollutants progestins: occurrence, hormonal activities and effects on fish	Assoc. Prof. Hana Kocour Kroupová
2019	Dipl.-Ing. Roman Franěk	Germ stem cell manipilations as a tool to manage and produce isogenic lines in fish	Assoc. Prof. Martin Pšenička
2019	M.Sc. Tatyana Gebauer	Growth, genetics and morphological characteristics of different perch (*Perca fluviatilis*) populations in intensive aquaculture	Prof. Jan Kouřil
2019	M.Sc. Nima Hematyar	Protein and lipid oxidation in fish: pathways, kinetics and products	Assoc. Prof. Jan Mráz
2019	M.Sc. Sahana Shivaramu	Hybridization of sturgeons	Prof. Martin Flajšhans
2019	Dipl.-Ing. Jan Kubec	Decision making in crayfish: behavioural and reproductive issues	Miloš Buřič, Ph.D.
2019	M.Sc. Abdul Rasheed Khanzai Baloch	Utilization of CRISPR/Cas9 and novel germ cells labelling technique for surrogate production in sturgeons	Assoc. Prof. Martin Pšenička
2019	M.Sc. Boris Lipták	Non-indigenous crayfish species in Slovakia	Antonín Kouba, Ph.D.
2019	M.Sc. Aleš Pospíchal	Susceptibility of cyprinid and non-cyprinid fish species to CyHV-3	Veronika Piačková, Ph.D.
2019	M.Sc. MiaoMiao Xin	The role of some proteins in freezing fish sperm	Prof. Otomar Linhart
2019	M.Sc. Oleksandr Malinovskyi	Broodstock management of pikeperch (*Sander lucioperca* L.) and it´s effect on eggs and larval production	Assoc. Prof. Tomáš Policar

The graduation ceremony of doctoral students in 2018. Photo from left: Prof. Pavel Kozák – Dean USB FFPW, Martin Prchal, Ph.D. – a new Ph.D. graduate.

Topics of ongoing dissertations of the study field of fishery

Supervisor	Ph.D. student	Title of doctoral thesis
Martin Bláha, Ph.D.	Dipl.-Ing. Marek Let	Communities of macroinvertebrates in aquatic ecosystems affected by human activities
Sergii Borsyhpolets, Ph.D.	M.Sc. Vitaliy Kholodnyy	Study of sperm/egg interaction in fish: Influence of environment on fertilization process
	M.Sc. Fabio F. R. Herrera	Osmoregulation in fish spermatozoa: involvement in motility activation and impact on short-term storage outcomes
Miloš Buřič, Ph.D.	M.Sc. Shakhawate Hossain	The marbled crayfish: parthenogenetic invasive species as an applicable biological model
	M.Sc. Sara Roje	Cocktail of invaders in European inland waters – ecologival characteristic, interactions and consequences
Bořek Drozd, Ph.D.	Dipl.-Ing. Pavel Franta	Foraging efficiency and capacity of non-native gobiids under various biotic and abiotic conditions
	M.Sc. Marcellin Rutegwa	Pond ecosystem dynamics in terms of production ecology
	Dipl.-Ing. Martin Šindler	Revitalization of the sterlet (*Acipenser ruthenus*) population in the Slovakian part of Danube
VIktoryia Dzyuba, Ph.D.	M.Sc. Deepali Rahi	Enzymatic activities involved in energy supply of fish sperm motility
Assoc. Prof. Borys Dzyuba	M.Sc. Anatolli Sotnikov	Fish sperm cryopreservation: the quality versus quantity
Prof. Martin Flajšhans	Eva Šálková, M.D.	Comparative haematology of polyploid sturgeons
	Dipl.-Ing. Martin Hubálek	Polyploidization capacity of sturgeons and its influence on fitness
Assoc. Prof. Roman Grabic	Dipl.-Ing. Adam Bořík	Tracing of PPCPs from sources to recipients
	Dipl.-Ing. Petra Nováková	High resolution mass spectrometry for investigation of new pollutants in water/soil
Ievgeniia Gazo, Ph.D.	M.Sc. Olena Shaliutina	The effect of xenobiotics on fish spermatozoa
Astrid S. Holzer, Ph.D.	M.Sc. Pudhuvai Baveesh	Proteases and their inhibitors as mediators of host-parasite interplay in a cnidarioan parasite-fish host system
Jiří Jablonský, Ph.D.	M.Sc. Anushree Bachhar	Role of isoenzymes in metabolic regulation of cyanobacteria
Vojtěch Kašpar, Ph.D.	M.Sc. Kseniia Pocherniaieva	The foundation of maternal factors in sturgeon: from oocyte to embryo
Antonín Kouba, Ph.D.	M.Sc. Wei Guo	Burrowing behaviour in crayfish
	Dipl.-Ing. Martin Musil	Interactions between invasive crayfish and predators
Assoc. Prof. Martin Kocour	M.Sc. Jinfeng Zhao	Using of molecular data for selective breeding in common carp
Prof. Pavel Kozák	Dipl.-Ing. Filip Ložek	Characterization of crayfish cardiac physiology: behavioural activation and beta-adrenergic pharmacology
	Dipl.-Ing. Martin Fořt	Competitive abilities as a factor of invasive potential in crayfish
	Dipl.-Ing. Viktoriia Malinovska	Monitoring of crayfish reaction to the different stimuli: are the crayfish good bioindicators?
Assoc. Prof. Hana Kocour Kroupová	Mgr. Jitka Tumová	Newly emerging endocrine discruptors in aquatic enviroment and their effect on fish

Prof. Jan Kubečka	M.Sc. Ievgen Koliada	Fish detection near the water surface by scientific echosounders
Prof. Otomar Linhart	M.Sc. Yu Cheng	Sperm quality affects the fertilization in freshwater fishes
Assoc. Prof. Jan Mráz	Dipl.-Ing. Roman Lunda	Alternative feeds and technologies in fish culture
	M.Sc. Koushik Roy	Carp nutrition in pond aquaculture and effects on water quality
	M.Sc. Ruoyi Hao	Freshness and shelf-life of fish product
	M.Sc. Azeez Ewumi Folorunso	Integrates pest management and nutrient availability in aquaponics
	M.Sc. Hui Jia	Processing and quality of fish products
Azin Mohagheghi Samarin, Ph.D.	M.Sc. Swapnil Gorakh Waghmare	Cellular and molecular study of fish oocyte ageing
M.Sc. Hamid Niksirat Hashjin	M.Sc. Kifayatullah	Cellular and molecular aspects of the limb regeneration in crayfish
Veronika Piačková, Ph.D.	M.Sc. Ali Asghar Baloch	Susceptibility of common carp strains reared in CR to the disease caused by CEV (Carp Edema Virus)
Assoc. Prof. Tomáš Policar	M.Sc. Aiman Imentai	Pikeperch aquaculture (*Sander lucioperca* L.) with focus on production monosex population
Peter Podhorec, Ph.D.	Dipl.-Ing. Jindřiška Matějková	The influence of different hormonal treatments and a route of administration on the reproduction of commercially important fish species
Assoc. Prof. Martin Pšenička	M.Sc. Mujahid Ali Shah	Comparative study on egg cleavage pattern in *Xenopus* (Amphibian), sturgeon (Chondrostean) and zebrafish (Teleostean)
	M.Sc. Xuan Xie	*In vitro* culture of sturgeon germ stem cells
	Mgr. Tomáš Tichopád	The effect of polyploidization and hybridization on reproductive physiology in fish
	Dipl.-Ing. Zuzana Bláhová	Regulation of biosynthesis of LC-PUFA in fish
Prof. Tomáš Randák	M.Sc. Maria Eugenia Sancho Santos	Psychoactive compounds in aquatic environment and their effects on fish
	M.Sc. Mladen Avramovič	Perspectives of reintroduction of European grayling (*Thymallus Thymallus*) into open waters
Taiju Saito, Ph.D.	M.Sc. Effrosyni Fatira	Nuclear transplantation in sturgeon eggs
Vlastimil Stejskal, Ph.D.	Dipl.-Ing. Jan Matoušek	Technological aspects of intensive culture of whitefish (*Coregonus peled*)
	M.Sc. Katsiaryna Lundová	Technology for efficient prevention of early maturation in brook trout (*Salvelinus fontinalis* Mitchill)
	M.Sc. Tran Quang Hung	Insect meal as feed source in nutrition of percids, eurasian perch (Perca fluviatilis) and pikeperch (*Sander lucioperca*)
	M.Sc. Mahyar Zare	Biologically active compounds in nutrition of percids
Otakar Strunecký, Ph.D.	M.Sc. Anna Pavlovna Ivanova	The taxonomical and physiological diversity of cyanobacteria from water environment
Jan Urban, Ph.D.	M.Sc. Dinara Bekkozhayeva	Fish biometric using machine vision
	M.Sc. Hassan Nazari	Changes in fish behaviour under stress conditions

Assoc. Prof. Josef Velíšek	Dipl.-Ing. Josef Příborský	The effect of pyrethroids on aquatic organisms
	Dipl.-Ing. Jaroslava Lidová	Biodiversity of carp pond ecosystems and environment quality with respect to
Prof. Jaroslav Vrba	Dipl.-Ing. Kateřina Francová	farming technologies and intensity
Eliška Zusková, Ph.D.	M.Sc. Bernard Erasmus	Antiparasitic treatment possibilities in aquaculture
Assoc. Prof. Vladimír Žlábek	M.Sc. Tuyen Van Nguyen	Environmental transformation of pharmaceuticals in the common recipient of treated sewage water

ALUMNI

Since the faculty foundation in 2009 there were 389 graduates till 31 December 2019 that successfully completed their studies. 389 graduates successfully completed their studies at the FFPW USB from its foundation in 2009 up to the 31 December 2019.

Level of study	Field	Form	Number of graduates		Average number of graduates per year
Bachelor's	Protection of Waters	full-time	24	183	18
	Fishery	full-time	135		
		combined	24		
Follow-up Master's	Fishery	full-time	82	126	13
		combined	9		
	Fishery and Protection of Waters	full-time	21		
		combined	11		
	Aquaculture (EN)	full-time	1		
	Fishery and Protection of Waters (EN)	full-time	2		
Master's	Fishery	full-time	3	3	–
Doctoral	Fishery	full-time	60	75	8
		combined	13		
	Fishery (EN)	full-time	2		
Total			**387**		**39**

FFPW USB graduates registered at the Employment Office during 2018–2019.

Period	Number of FFPW USB registered at the EO	
	Total	Number of women
Up to 30 April 2018	1	1
Up to 30 September 2018	1	0
Up to 30 April 2019	0	0
Up to 30 September 2019	3	0

In 2015, an Alumni Club was founded at the FFPW USB. The FFPW USB endeavours to keep in touch with its graduates and to continue cooperating with them as much as possible.

The graduates registered in the Alumni Club may enjoy the following benefits:

- the opportunity to participate in various events organized by the faculty,
- the opportunity to contact their colleagues they have lost touch with,
- the possibility to establish professional relationships with workplaces at the FFPW USB in scientific, research, or educational areas,
- a 10% discount on accommodation, rental of training premises and services at the International Environmental Educational, Advisory and Information Centre of Water Protection in Vodňany (IEEAIC) and on products from the faculty's e-shop (with the exception of fish),
- the opportunity to be individually informed about life-long learning courses or other educational or professional events organized by the FFPW USB or held within the faculty premises,
- the opportunity to ask our reputable experts for minor advice.

The benefits for the graduates registered in the Alumni Club will gradually be extended. Each graduate can register with the Alumni Club on the faculty's website.

Prepared by: Dipl.-Ing. Martina Vorlová, M.A. Kateřina Bártová, Lucie Kačerová and Assoc. Prof. Martin Kocour

5. LIFELONG LEARNING AT THE MEVPIS UNIT VODŇANY

The International Environmental Educational, Advisory and Information Centre of Water Protection Vodňany (MEVPIS/IEEAIC), which coordinates most of the lifelong learning at the faculty, has been a part of the dean´s office since 2014. Thanks to our activities, we had an opportunity to invite at the MEVPIS centre, respectively at the FFPW USB, almost 21,000 people during 2018–2019.

The MEVPIS unit organizes conferences, seminars, lectures, summer schools (you can read more on page 68), courses and workshops not only for the faculty, but also for the general public, companies, government and educational institutions (schools). The unit significantly participates in faculty educational activities in the field of fishery and water protection. MEVPIS employees continued in a well-established trend of educational events for kindergartens, elementary and secondary schools in 2018 and 2019. Half-day, daylong, two-day and multi-day educational programs fully utilize the conference and accommodation premises of the centre. Traditionally, we continued the cooperation with the higher vocational school HLUW Yspertal which is focused on the environmental field. Each year we prepare a week full of theoretical, practical and cultural experiences for its students. We also continued the cooperation with the Faculty of Education USB in organizing many one- and multi-days seminars, mainly for kindergarten and elementary school teachers. We were successful in the University of the Third Age, as well as in the programmes of Children and Junior Universities. Many of our educational programs involve excursions to workplaces of the Faculty of Fisheries and Protection of Waters USB with professional guides of our employees.

Moreover, the MEVPIS employees also processed the administrative agenda of a part of faculty scientific projects, provided faculty students with Czech (for foreigners) and German lessons and secured publishing activities.

International Environmental Educational, Advisory and Information Centre of Water Protection Vodňany (MEVPIS/IEEAIC)

Klára Nachlingerová
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Academic Worker
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Deputy Head
Coordinator of MEVPIS Educational Activities, Academic Worker
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Michaela Dirnová
Coordinator of MEVPIS Educational Activities (since 3/2018)
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B.Sc. Dana Brožová
Coordinator of MEVPIS Educational Activities
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Dipl.-Ing. Blanka Nováková
Coordinator of MEVPIS Educational Activities (1–3/2018)

M.Sc. Miroslav Boček
Faculty Creative Manager
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Eva Šimoníková
Cleaner (since 10/2019)
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In general, we can divide events organized by the MEVPIS centre Vodňany to these groups:

1) Scientific meetings (conferences, workshops, seminars etc.)

Conferences, workshops and seminars focused on various themes are organized by the MEVPIS centre Vodňany, both for professional and the general public. We organized these events on our own or in cooperation with other organisations. During 2018–2019 the most significant events were the Biotechnology conference, Conference of New viral Diseases in Freshwater Fish Aquaculture, Seminar of the Protection of Fish Health, Conference of the Faculty of Science USB, Fishing conferences of the Fishing association of the Czech Republic, XIX. Toxicological conference with international participation, Meeting of the Association of the universities of the third age, Project weeks for the higher vocational school HLUW from Yspertal (Austria) and international workshops: Biomark workshop, 1st Practical Workshop on Fishery and Biodiversity of Hydrocenoses for Professional Teachers, Biorigin seminar, FAO workshop – training in pond aquaculture. During 2018–2019, we also organized many lectures and seminars led by foreign or Czech experts, which were focused on fishery, science and research and environmental protection.

The MEVPIS centre continued in cooperation with the Fire Rescue Service of the South Bohemian Region within the organization of the conference Safe and Secure society, which was held at the premises for the third time in 2018.

Not a small part of these events is formed by year-round courses of education for kindergarten and elementary school teachers. The courses are prepared in cooperation with the Faculty of Education USB and the Faculty of Theology USB and are mainly organized as two-day courses focused on Pedagogy of Franz Kett and many other two-day courses focused on personality and social development of pedagogues.

Seminar "Protection of Fish Health" organized at the MEVPIS centre Vodňany on 26–27 March 2018.

2) Annual meetings

Among the most important events of this section, we can include the Meetings of the Fish Breeding Council of the Czech Fish Farmers Association of the Czech Republic, the Plenary meeting of the Czech Fish Farmers Association of the Czech Republic, Departmental Boards of the FFPW USB, Scientific Boards of the FFPW USB. The MEVPIS centre Vodňany was also successful in securing the long-term perspective cooperation with the company České dráhy a. s., which regularly organizes two-week meetings.

3) Educational programs for kindergartens, elementary schools, high schools and grammar schools

As part of the educational programs, students learn interesting facts about nature, fishing and fish farming and environmental protection in a playful and interactive way. The theoretical knowledge is interspersed with physical and artistic activities as well as the opportunity of closer contact with fish and crayfish.

Educational programs are often accompanied with excursions to the RIFCH FFPW USB workplaces, or outdoor activities with the fulfilment of tasks connected with the paths of Water is Science or Eel's Path. Most of the kindergartens, elementary schools, high schools and grammar schools came from the Regions of South Bohemia and Central Bohemia.

We also organize educational programs for special target groups such as talented students, the ARPIDA centre, family centres, children with hearing impairments, orphanages and families with children with home education.

Another specific group are seniors, for whom we organize educational programs including professional excursions.

Participants of the Children's University captured in performing tasks.

4) Events and courses for the public including commercial and other events

In 2018–2019, we continued to organize various events for the public. See more about these activities on pp. 145–146.

During academic year, the MEVPIS centre opens English and German language courses for children and adults. Another activity of the centre is to provide facilities for dance classes for adults and yoga classes. A novelty in the past two years has been the organization of International Yoga Day celebrations in the form of yoga exercises accompanied by lectures of active relaxation and a healthy lifestyle. Also new is the organization of courses focusing on the preparation of fish processing and the basics of fish gastronomy.

We also partially arrange the faculty's public relations, which is most noticeable at the Open Days of the faculty or the Fishing Days of the Vodňany town, which the faculty co-organizes.

Various seminars, conferences and turnkey courses can also be included among commercial events, e.g. soft skills courses. Very popular are traditional educational programs or multi-day courses within Children and Junior universities, which include education within the Summer suburban camps of the FFPW USB and programs to enhance the knowledge of foreign languages – English summer camps, where children meet not only with Czech lecturers, but also native speakers. Summer suburban camps focused on creativeness and creation from commonly available materials without the creation of excess waste, so called zero waste, are also a significant part of these programs.

We also rent out our premises for private events of various kinds, such as birthday parties, weddings, etc. and we continue to organize picnics with music, concerts and art exhibitions.

Prepared by: Klára Nachlingerová

6. "CULTURAL AND EDUCATIONAL" FACULTY – FREE TIME ACTIVITIES OF THE FFPW USB

Our aim is to bring the Faculty of Fisheries and Protection of Waters USB into the public awareness of the town of Vodňany and its surrounding not only as a purely scientific and intellectual institution, but also as an organization which has plenty to offer in the field of culture and education. We try to offer to the citizens cultural and entertainment events, but we also try to simply and understandably introduce topics we are working on and which are actual for the whole society. The most important events within this section are FROVfest (musical festival), traditional Open Days during the Vodňany Fishing Days, faculty "FROVples" (ball), International Water Day and jazz picnics. The aim of these activities is to create enjoyable and friendly meetings of faculty employees and students with the general public of the Vodňany town and its surrounding area.

Traditional rock multi-genre music festival **FROVfest** has been organized since 2013 as a celebration of a new academic year. The festival has gradually gained its good reputation and has been more and more requested both from performers and visitors. Czech and foreign bands perform here, besides professional musicians, there is also space for new, local and regional bands. For those who are not fans of "harder" rock music we have organized **music picnics** since 2017 in cooperation with the PNUtí, z. s. association. The beautiful environment around the MEVPIS pavilion offers itself for "parties". We welcome the Petra Ernyei & jazz quartet every year, but also the rock & roll band Element from Český Krumlov and the "Výborný trio" honoured us with their visit.

Fans of Pipes and Pints band, which performed at the 7th FROVfest festival.

We join the **World Water Day Celebration** every year, which is on 22 March. We prepare entertainment afternoon programs for families with children and evening professional lectures for adults. Children learn in a playful way a lot of information about drought issues, how not to waste water and how important water is to everyone. There was also a debate on environmental plastic pollution after a projection of the movie Plastic Ocean.

The 1st Representation Ball of the Faculty of Fisheries and Protection of Waters USB, called FROVples, was held on 2 February 2019. The event was attended by 458 people. Participants of the dance competition StarDance Daniela Šinkorová and Michal Padevět provided the accompanying program. The ball culminated with the raffle, the main prize being a trip to Paris.

Daniela Šinkorová and Michal Padevět, who danced at the 1st FFPW USB Representation Ball.

The faculty dean Prof. Pavel Kozák is drawing the winners of the raffle.

LIST OF THE FACULTY STAFF IN 2018–2019

List of the faulty staff in 2018–2019	Beginning / end of employment	Position	List of the faulty staff in 2018–2019	Beginning / end of employment	Position
Assoc. Prof. Zdeněk Adámek		Academic Worker	Bořek Drozd, Ph.D.		Academic Worker
Dipl.-Ing. Milan Aldorf		Technician	Jaroslava Dubová, Bbus.	since 1. 4. 2019	Economy Officer
M.Ed. Hana Ash		Lecturer	M.Sc. Dubbala Prshanthi Divya Vani	since 26. 1. 2018 till 5. 11. 2018	Ph.D. student
M.Sc. Mladen Avramovič	since 1. 10. 2019	Ph.D. student	Petr Dvořák, Ph.D.		Academic Worker
M.Sc. Ali Asghar Baloch	since 10. 9. 2018	Ph.D. student	Zuzana Dvořáková		Editor
M.Sc. Anushree Bachhar	since 1. 5. 2019	Ph.D. student	Assoc. Prof. Borys Dzyuba		Academic Worker
Antonín Bárta	till 31. 3. 2019	Technician	Viktoriya Dzyuba, Ph.D.		Researcher
M.A. Kateřina Bártová	till 11. 10. 2019	Study Officer	M.Sc. Bernard Erasmus	since 14. 6. 2018	Ph.D. student
M.Sc. Dinara Bekhoznayeva		Ph.D. student	Josef Ertl, DiS.	since 9. 12. 2019	Technician
Šárka Beranová		Technician	M.Sc. Effrosyni Fatira	till 31. 7. 2018	Ph.D. student
Dipl.-Ing. Eva Bílá		Economy Officer	Pavlo Fedorov, Ph.D.	till 31. 12. 2018	Researcher
Martin Bláha, Ph.D.		Academic Worker	Gana Fedorova, Ph.D.		Academic Worker
Dipl.-Ing. Zuzana Bláhová		Ph.D. student	Prof. Martin Flajšhans		Academic Worker
Miroslav Blecha, Ph.D.	till 31. 10. 2018	Academic Worker	M.A. Markéta Flajšhansová		Lecturer
M.Sc. Miroslav Boček		Creative Manager	M.Sc. Ewumi Azeez Folorunso	since 3. 6. 2019	Ph.D. student
Olga Bondarenko, Ph.D.		Researcher	Pavel Fořt	till 31. 3. 2019	Technician
Volodymyr Bondarenko, Ph.D.	till 31. 12. 2019	Specialist	Dipl.-Ing. Jaroslav Frajman	since 1. 7. 2019	Technician
Luboš Borovka	till 31. 12. 2018	Technician	Dipl.-Ing. Kateřina Francová		Ph.D. student
Serhii Boryshpolets, Ph.D.		Academic Worker	Roman Franěk, Ph.D.		Researcher
Dipl.-Ing. Adam Bořík		Ph.D. student	Dipl.-Ing. Pavel Franta	since 12. 2. 2018	Ph.D. student
M.Sc. Vladysla Bozhynov		Ph.D. student	B.Sc. Michaela Fučíková		Technician
B.Sc. Dana Brožová		Coordinator of IEEAIC events	B.Sc. Pavlína Gápová	since 1. 3. 2019	Fish Shop deputy head
Buargue Gadelha Hermes Augusto, Ph.D.	since 4. 7. 2018	Researcher	Ievgeniia Gazo, Ph.D.		Researcher
Viktoriia Burkina, Ph.D.		Researcher	Radek Gebauer, Ph.D.		Researcher
Miloš Buřič, Ph.D.		Academic Worker	Tatyana Gebauer, Ph.D. (born Vanina)		Researcher
Petr Císař, Ph.D.		Academic Worker, Dicrector of ICS, Vice-Dean	David Gela, Ph.D.		Academic Worker
Jacky Cosson, Ph.D., Dr.h.c.	till 31. 12. 2018	Academic Worker	M.Sc. Ali Ghaznavi	since 1. 3. 2019	Ph.D. student
Daniel Červený, Ph.D.		Researcher	Oksana Golovko, Ph.D.		Researcher
Hadiseh Asyabar Dadras, Ph.D.		Researcher	Assoc. Prof. Roman Grabic		Academic Worker
Michaela Dirnová	since 26. 3. 2018	Coordinator of IEEAIC events	Kateřina Grabicová, Ph.D.		Academic Worker
B.Sc. Petr Dobrovolný	since 3. 9. 2018	Assistant	M.Sc. Guo Wei		Ph.D. student
B.Sc. Jan Dofek	since 8. 1. 2018	Technician	Hilal Güralp, Ph.D.		Researcher

List of the faulty staff in 2018–2019	Beginning / end of employment	Position
Dipl.-Ing. Jiří Hájíček		Technician
Dipl.-Ing. Jitka Hamáčková	till 31. 12. 2019	Specialist
Dipl.-Ing. Jan Hampl	till 30. 4. 2018	Specialist
M.Sc. Hao Ruoyi	since 28. 5. 2018	Ph.D. student
B.Sc. Vojtěch Havlis	till 7. 4. 2019	Project Manager
Dipl.-Ing. Kristýna Havrdová (born Siglová)		Technician
Nima Hematyar, Ph.D.		Researcher
M.Sc. Herrera Rodríguez Francisco Fabio	since 2. 5. 2018	Ph.D. student
Dipl.-Ing. Michal Hojdekr		Registrar
Yevhen Horokhovatskyi, Ph.D.	till 20. 9. 2018	Ph.D. student
M.Sc. Dipl.-Ing. Jana Horová		Personal Officer
M.Sc. Md. Shakhawate Hossain		Ph.D. student
Dipl.-Ing. Martin Hubálek	since 1. 10. 2018	Ph.D. student
M.Sc. Yu Cheng	since 25. 10. 2018	Ph.D. student
Chupani Latifeh, Ph.D.		Researcher
Viktoriia Iegorova, Ph.D.	till 12. 12. 2018	Ph.D. student
M.Sc. Aiman Imentai		Ph.D. student
M.Sc. Anna Pavlovna Ivanova	till 30. 4. 2019 since 2.10.2019	Ph.D. student
Jiří Jablonský, Ph.D.		Researcher
M.Sc. Hui Jia	since 21. 11. 2019	Ph.D. student
Irena Jindrová	since 1. 7. 2019	Cleaner
Lucie Kačerová		Study Officer
B.Sc. Martin Kahanec		Technician
Jiří Kasl		Technician
Dipl.-Ing. Jan Kašpar		Director of IAPW, Head of the Fish Shop
Vojtěch Kašpar, Ph.D.		Academic Worker
Sarvenaz Tilami Khalili, Ph.D.	till 30. 9. 2018, since 12. 4. 2019 till 31. 7. 2019	Ph.D. student
M.Sc. Kifayatullah	since 2. 10. 2019	Ph.D. student
Vitaliy Kholodnyy, Ph.D.		Researcher
Abdul Rasheen Baloch Khanzai, Ph.D.	till 30. 9. 2019	Ph.D. student
Dipl.-Ing. Jindřiška Knowles	till 31. 12. 2019	Ph.D. student
Dipl.-Ing. Ivana Kobernová		Economy Officer,
Šárka Kocmichová, DiS.		Economy Officer
Assoc. Prof. Martin Kocour		Academic Worker, Vice-Dean
Assoc. Prof. Hana Kocour Kroupová		Academic Worker
Jitka Kolářová, DVM		Researcher
Jiří Koleček, M.A.		Project Manager
M.A. Jan Kolek	till 31. 8. 2018	Researcher
Anna Kolešová, Ph.D.		Researcher
M.Sc. Reihaneh Kooshkestani	since 1. 2. 2018 till 26. 4. 2018	Ph.D. student
Dipl.-Ing. Jana Kopecká	since 1. 8. 2018 till 31. 7. 2019	Assistant
Vladimír Kotal	till 15. 1. 2019	Technician
Antonín Kouba, Ph.D.		Academic Worker, Vice-Dean
Prof. Jan Kouřil		Academic Worker
Tomáš Korytář, Ph.D.		Researcher
Prof. Pavel Kozák		Academic Worker, Dean
Miroslava Krtková	till 16. 8. 2019	Technician
Jiří Křišťan, Ph.D.		Researcher
Dipl.-Ing. Michal Kříž	till 31. 1. 2018	Assistant
Jan Kubec, Ph.D.		Researcher
Iryna Kuklina, Ph.D.		Researcher
Kamil Kuneš	till 31. 5. 2018	Technician
Filip Kupka, DiS.	since 1. 3. 2018	Technician
Daniel Kvapil	since 3. 9. 2018	Technician
Jana Langová, DiS.		Officer of Work and Wages
Ievgen Lebeda, Ph.D.		Researcher
Pavel Lepič, Ph.D.		Academic Worker
Dipl.-Ing. Andrea Lepičová		Specialist
Dipl.-Ing. Marek Let	since 1. 10. 2018	Ph.D. student
Dipl.-Ing. Eduard Levý		Technician
Ping Li, Ph.D.	till 31. 12. 2018	Academic Worker
Zhihua Li, Ph.D.	till 31. 12. 2018	Academic Worker
Prof. Otomar Linhart		Academic Worker, Director of CENAKVA
Zuzana Linhartová, Ph.D.		Academic Worker

List of the faulty staff in 2018–2019	Beginning / end of employment	Position	List of the faulty staff in 2018–2019	Beginning / end of employment	Position
M.Sc. Kirill Lonhus		Ph.D. student	Jinfeng Pan, Ph.D.	since 21. 11. 2019	Researcher
Dipl.-Ing. Filip Ložek		Ph.D. student	Štěpán Papáček, Ph.D.		Researcher
Michal Macho, DiS.		IT Worker	Aliaksandr Pautsina, Ph.D.	till 31. 12. 2018, since 1. 7. 2019	Researcher
Dipl.-Ing. Zdeňka Machová	since 11. 6. 2018	Technician	Marie Pečená		Technician
Jana Máchová, Ph.D.		Researcher	Giang Thai Pham, Ph.D.	till 20. 9. 2018	Ph.D. student
Dipl.-Ing. Viktoriia Malinovska	since 4. 7. 2018	Ph.D. student	M.A. Monika Peka Kolafová		Lecturer
Oleksandr Malinovskyi, Ph.D.		Researcher	Tomáš Pešta		Technician
B.Sc. Monika Malkusová		Project Manager	Veronika Piačková, Ph.D.		Academic Worker, Vice-Dean
Petra Martínková		Technician	B.Sc. Eliška Plachtová		Project Manager
Dipl.-Ing. Jana Martynková	since 3. 9. 2018	Technician	Dipl.-Ing. Petra Plachtová		Project Manager
M.Sc. Oleksandr Mashchenko	since 1. 6. 2019	Ph.D. student	M.Sc. Ganna Platonova		Ph.D. student
Dipl.-Ing. Jan Matoušek		Ph.D. student	Dipl.-Ing. Jitka Plecerová		Study Officer
Dipl.-Ing. Markéta Mlčáková		Assistant	Dipl.-Ing. Vítězslav Plička		Technician
Azadeh Samarin Mohagheghi, Ph.D.		Researcher	Peter Podhorec, Ph.D.		Academic Worker
Azin Samarin Mohagheghi, Ph.D.		Researcher	Assoc. Prof. Tomáš Policar		Academic Worker
M.Sc. Mehrak Mohammadi	till 8. 4. 2019	Ph.D. student	Eva Prášková, Ph.D.		Technician
M.Sc. Oleksandr Movchan	since 24. 5. 2018	Ph.D. student	Martin Prchal, Ph.D.		Researcher
Assoc. Prof. Jan Mráz		Academic Worker, Director of IAPW	B.Sc. Mario Prečanica	since 5. 11. 2018	Technician
Dipl.-Ing. Martin Musil	since 1. 10. 2019	Ph.D. student	Markéta Prokešová, Ph.D.	since 1. 11. 2018	Research Worker
Klára Nachlingerová		Head of IEEAIC	Ilona Prokopová		Technician
M.Sc. Hassan Nazari	since 27. 11. 2018	Ph.D. student	B.Sc. Vít Profant	since 7. 10. 2019	Technician
Václav Nebeský, Ph.D.		Sales Manager	Dipl.-Ing. Mirka Průšová		Personal Officer
Dipl.-Ing. Vladimír Nedopil		Head of the Faculty Management Office	Dipl.-Ing. Josef Příborský		Technician
M.Sc. Tuyen Van Nguyen	since 6. 11. 2019	Ph.D. student	Assoc. Prof. Martin Pšenička		Academic Worker
Hamid Hashjin Niksirad, Ph.D.		Researcher	M.Sc. Baveesh Pudhuvai	since 26. 1. 2018 till 31. 10. 2018	Ph.D. student
B.Sc. Jan Novák		Technician	Pavel Punčochář, Ph.D.	since 16. 4. 2018 till 31. 8. 2019	Academic Worker
Dipl.-Ing. Blanka Nováková	since 8. 1. 2018 till 2. 3. 2018	Coordinator of IEEAIC events	M.Sc. Deepali Rahi	since 17. 1. 2018	Ph.D. student
Pavlína Nováková		Assistant	M.Sc. Samad Rahimnejad	since 18. 7. 2019	Researcher
Dipl.-Ing. Petra Nováková		Ph.D. student	Prof. Tomáš Randák		Academic Worker, Director of RIFCH
M.Sc. Katsiaryna Novikava	till 31. 5. 2018	Ph.D. student	Ján Regenda, Ph.D.		Academic Worker
Dipl.-Ing. Samanta Pajerová		Assistant	Marek Rodina, Ph.D.		Academic Worker
Dipl.-Ing. Ondřej Palíšek		Technician	M.Sc. Sara Roje		Ph.D. student

List of the faulty staff in 2018–2019	Beginning / end of employment	Position	List of the faulty staff in 2018–2019	Beginning / end of employment	Position
M.Sc. Marcellin Rutegwa		Ph.D. student	B.Sc. Tram Nguyen Thi	since 2. 12. 2019	Technician
M.Sc. Koushik Roy	since 13. 2. 2018	Ph.D. student	Pavlína Tláskalová		Technician
Petr Řezníček		Technician	Aleš Tomčala, Ph.D.	since 1. 4. 2019	Researcher
Mohammadmehdi Saberioon, Ph.D.		Researcher	M.Sc. Hung Guang Tran	since 3. 9. 2018	Ph.D. student
Sidika Sakalli, Ph.D.	till 31. 12. 2019	Researcher	Dipl.-Ing. Svatava Trnavská	since 3. 9. 2018	Assistant
Ivana Samková		Technician	M.Sc. Vladimíra Tučková		Specialist
M.Sc. Eugenia Sancho Santos		Ph.D. student	Jan Turek, Ph.D.		Academic Worker
M.Sc. Olena Shaliutina	till 30. 4. 2019	Ph.D. student	Jan Urban, Ph.D.		Academic Worker
M.Sc. Ali Mujahid Shah	since 21. 1. 2019	Ph.D. student	M.Sc. Pavla Urbanová		Ph.D. student
Bakht Ramin Shah, Ph.D.	since 6. 8. 2018	Researcher	Dipl.-Ing. Olga Valentová		Academic Worker
M.Sc. Ali Mujahid Shah	since 21. 1. 2019	Ph.D. student	Elek Varga	since 3. 4. 2018	Technician
Sahana Shivaramu, Ph.D.		Researcher	B.Sc. Zuzana Vavrušková		Economy Officer – Cashier
Dipl.-Ing. Pavel Souček		Technician	Milada Vazačová		Assistant
M.Sc. Anatolii Sotnikov	since 2. 10. 2019	Ph.D. student	Assoc. Prof. Josef Velíšek		Academic Worker
Alžběta Stará, Ph.D.		Academic Worker	Jana Veselá		Cleaner
Christoph Antonius Steinbach, Ph.D.		Researcher	Lukáš Veselý, Ph.D.		Researcher
Vlastimil Stejskal, Ph.D.		Academic Worker	Dipl.-Ing. Andrea Vlačihová		Project Manager
Otakar Strunecký, Ph.D.		Academic Worker	Dipl.-Ing. Martin Vlček		Project Manager
Dipl.-Ing. Adéla Stupková		Technician	B.Sc. Josef Vobr		Technician
Pavel Svoboda		Technician	Lukáš Vojík		Technician
Prof. Zdeňka Svobodová		Researcher	Andrea Vojs Staňová, Ph.D.		Researcher
Dipl.-Ing. Július Szabó		Technician	Dipl.-Ing. Jaromíra Vondrášková		Head of Economic Office
Dipl.-Ing. Pavel Šablatura		Technician	Dipl.-Ing. Martin Vorlová		Study Officer
Dipl.-Ing. Marie Šandová		Technician	M.Sc. Swapnil Gorakh Waghmare	since 17. 1. 2018	Ph.D. student
Pavel Šauer, Ph.D.		Researcher	Erik Werner	since 1. 9. 2019	Technician
Roman Šebesta, Ph.D.	till 12. 12. 2018	Ph.D. student	M.Sc. Xuan Xie		Ph.D. student
Eva Šimoníková		Cleaner	Miaomiao Xin, Ph.D.		Researcher
M.Sc. Michaela Šmídová	since 19. 2. 2018	Project Manager	Carlos Yanes-Roca, Ph.D.		Researcher
prof. Dalibor Štys		Academic Worker	Dipl.-Ing. Kateřina Zánová	since 21. 5. 2018 till 26. 6. 2018	Assistant
Renata Štysová Rychtáriková, Ph.D.		Academic Worker	M.Sc. Mahyar Zare	since 27. 11. 2018	Ph.D. student
B.Sc. Nikola Šulcová (born Jelínková)	since 15. 1. 2018	Assistant	M.Sc. Jinfeng Zhao		Ph.D. student
Helena Švecová, Ph.D.		Researcher	Magdalena Zíková, DiS.	since 29. 1. 2019	Economy Officer
Lenka Tesařová	since 8. 10. 2018	Project Manager	M.Sc. Anna Zhyrova	till 28. 2. 2018	Ph.D. student
Petra Tesařová		Assistant	Eliška Zusková, Ph.D.		Academic Worker
M.Sc. Tomáš Tichopád		Ph.D. student	Assoc. Prof. Vladimír Žlábek		Academic Worker, Vice-Dean