



FACULTY OF SCIENCE
Charles University

Department of Zoology

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LABORATORY FOR EVOLUTIONARY AND ECOLOGICAL IMMUNOLOGY



RESEARCH AREA & EXCELLENCE

Genetics of evolutionary adaptations in immunity leading to animal disease resistance.

Mission

Our aim is to conduct outstanding research focused on the mapping of animal interspecific and intraspecific genetic variability responsible for variation in disease resistance, and the investigation of the association between genotype and environment in forming the immunophenotype in health and disease. Since any knowledge in this field should lead to improvements in biomedicine and biotechnology, our goal is also to support the transfer of the results of our basic research into applied practice in agriculture and nature protection.

KNOW-HOW & TECHNOLOGIES

Content of Research

- Genetic mapping of interspecific and intraspecific variability in immune-related genes (e.g. MHC, pattern recognition receptors – TLRs, antimicrobial peptides)
- Investigation of natural selection acting on individual genetic variants (including predictions of protein functional changes in response to pathogen-mediated selective pressures)
- Comparative immunology: characterisation of avian inflammation and identification of cytokines responsible for modulation of inflammation in birds

- Disentangling associations between the genotype, gene expression, immunophenotype, health, and condition in natural avian populations and domestic breeds

Main Capabilities

- Molecular genetics and bioinformatics
- Avian cell biology techniques (mainly focused on innate immunity) and methods of avian haematology
- Functional immunological testing *in vivo* and *in vitro* (e.g. inflammatory immune responsiveness, detection of antimicrobial peptides)

Fields of Research

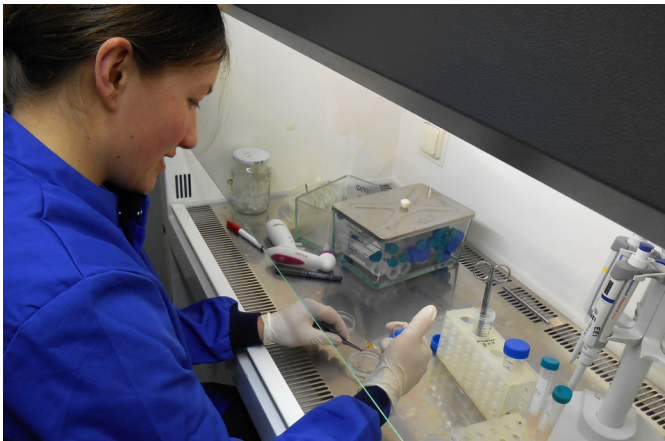
Agriculture | Animal breeding | Biomedicine | Biotechnology | Nature protection | Veterinary diagnostics

EXPECTATIONS & OFFERS

We are open to a wide spectrum of collaboration with partners from applied research, industry, and state and non-profit organisations.

Offers

- Expertise in the field of evolutionary adaptations in vertebrate immunity
- Highly qualified and enthusiastic human resources
- Genetic, bioinformatic and immunological analyses of biological data and samples
- Experience with animal field research



Requirements

- Access to publicly relevant host-pathogen systems
- New complementary technologies
- Access to animals or biological samples
- Novel methods in genetics, bioinformatics, cell and tissue culturing, immunophenotype detection and health monitoring

KEY RESEARCH EQUIPMENT

- Fully equipped laboratory for molecular genetics (including cyclers, real-time PCR instruments, in-house sequencing systems, etc.)
- Cell and tissue culture laboratory
- Luminometry, photometry and fluorometry (Varioskan Flash Multimode Reader)
- Flow cytometry (LSR II)
- Microscopic facility
- Genomic sample biobank

PARTNERSHIPS & COLLABORATIONS

Academic partners: Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic (Brno, Czech Republic) | Masaryk University (Brno, Czech Republic) | Czech University of Life Sciences (Praha, Czech Republic) | The Roslin Institute, University of Edinburgh (Edinburgh, UK) | University of Cambridge (Cambridge, UK) | Centre de Biologie pour la Gestion des Populations, l'Institut National de la Recherche Agronomique (Montferrier-sur-Lez Cedex, France) | University of Oslo (Oslo, Norway) | Virginia Tech (Blacksburg, USA) | Institute of Molecular Genetics, Academy of Sciences of the Czech Republic (Praha, Czech Republic) | Institute of Experimental Medicine, Academy of Sciences of the Czech Republic (Praha, Czech Republic) | Institute of Experimental Botany, Academy of Sciences of the Czech Republic (Praha, Czech Republic)

Main Projects

- 2012–2014: Pattern recognition receptor allelic diversity in domestic chicken breeds (The Czech Science Foundation, grant No. P502/12/P179)
- 2015–2017: Biology of ageing: mechanisms and patterns of senescence in free-living birds (The Czech Science Foundation, grant No. P506/15-11782S)
- Participation in four other projects funded by the Czech Science Foundation, five projects funded by the Charles University Grant Agency and one project funded by the Grant Agency of the Academy of Sciences of the Czech Republic.

ACHIEVEMENTS

Publications in respected international journals with high impact factors: *Functional Ecology* | *Journal of Evolutionary Biology* | *BMC Evolutionary Biology* | *Developmental and Comparative Immunology* | *Animal Behaviour* | *Genetics Selection Evolution*

