

Impact of neuroinflammation on brain development and learning in cognitively advanced birds

Available from May 2018 to December 2020 (the starting date is flexible)

Application deadline: 1st March 2018

Neuro-immune interactions involved in neuroinflammation directly influence psychological processes including mood and cognition. Inflammation plays an important role in aetiology of depression, a mood disorder that affects 350 million people worldwide. Since ~40% of patients do not respond to current therapy, novel research approaches are needed to allow deeper insight into evolutionarily conserved interactions between immunity and brain function.

The objective of this PostDoc project is to link local inflammation in birds with neuroinflammation and provide evidence for its effect on brain development and function. Methods such as immunocytochemistry, isotropic fractionation, tissue-specific RNA-seq, RT-qPCR and proteomic analysis of cerebrospinal fluid through gel-free quantitative LC-MS/MS will be used and biodiversity-based approach adopted. Focusing on birds that represent superior models for research in cognition to rodents (passerines and parrots), this PostDoc project opens new possibilities for interdisciplinary research of neuroimmunology.

This project solves 3 main scientific questions:

1) What is the effect of inflammation in periphery on immunological activity in avian brain?

Inflammation in periphery triggers cytokine signalling that acts systemically to affect distant organs. Inflammation may be propagated across the blood-brain barrier to induce neuroinflammation in which microglia are activated in brain.

Task 1 (T1): To describe the gene expression changes (transcriptomic and proteomic) in brain regions that respond to acute/chronic inflammation in periphery in selected species.

T2: To show the patterns of inflammation-induced microglia activation in distinct brain regions.

2) How the neuroinflammation influences neurogenesis and neuronal activity in birds?

Activated microglia alter synthesis of monoamine neuromodulators, which disturbs neurocircuits involved in decision-making, mood-regulation and memory. Long-term failure to regulate neuroinflammation may significantly affect brain function including neurogenesis.

T3: To explore brain neurogenesis and neuronal activity changes induced by experimentally induced neuroinflammation (adult/early-life).

3) Does neuroinflammation alter avian learning or mood?

Inflammation-induced changes in brain may alter behaviour. In birds, behaviour indicating cognitive abilities and mood can be measured. The early-life inflammation may increase probability of developing mood disorders later in life.

T4: To investigate the effect of inflammation in early life/adulthood on cognition and mood.

Requirements:

We seek for a researcher with experience in neurobiology, histology, immunology and/or zoology - PhD degree in one of these or related fields, good English language skills and (at least basic) statistical skills required.

Offers:

We offer a Research Fellow position at the Department of Zoology, Faculty of Science, Charles University based in Prague, Czech Republic, EU. This is a full time, ~ two and half (~2.5) year fixed term contract **starting from April-June 2018 (flexible), ending on 31.12. 2020 (fixed). Salary: 37,000 CZK per month*** (444,000 CZK ~ €17,500 per annum; * above local average salary, fully sufficient to cover living costs in Prague) plus moving in allowance of **72,000 CZK** (~ €2850 – will be spread over the 1st year salary).

The research fellow will be part of a young and enthusiastic interdisciplinary team

(<http://web.natur.cuni.cz/zoologie/biodiversity/eei/people>) and where she/he will be co-supervised by Dr. Michal Vinkler

(<http://web.natur.cuni.cz/zoologie/biodiversity/eei/people/#post-73>) and Dr. Pavel Němec

(<https://web.natur.cuni.cz/zoologie/biodiversity/index.php?page=nemec>). Despite close collaboration with several co-workers, the project allows independent intellectual input. We expect at least three articles being published in international peer-review journals in the course of the fellowship. Active participation at international scientific conferences will be encouraged and

supported. The research fellow will also contribute to the supervision of students as needed.

Application:

Please send (1) CV including a list of publications, (2) copy of PhD diploma, (3) motivation letter, and (3) contact details for 2–3 referees (references) to Dr. Michal Vinkler (michal.vinkler@natur.cuni.cz) by 1st March 2018.

About:

Charles University was founded in 1348, making it one of the oldest universities in the world. Yet it is also renowned as a modern, dynamic, cosmopolitan and prestigious institution of higher education. It is the largest and most renowned Czech university, and it is also the best-rated Czech university according to international rankings. There are 17 faculties at the University, plus 3 institutes and 6 other centres. **The Faculty of Science** was established in 1920 as the fifth faculty of Charles University. It currently has 29 departments, 3 museums and a Botanical Garden. **The Laboratory for Evolutionary and Ecological Immunology** (team leader Dr. Michal Vinkler) at the Department of Zoology is oriented at research in animal defence against infectious diseases, animal immunology, immunogenetics (e.g., innate immunity receptors, antimicrobial peptides, to lesser extent acquired immunity molecules such as MHC) and investigation of functionally relevant variability in the ecological context. Our strength is in application of the evolutionary medicine theory and methodological approaches of evolutionary biology (including tests of natural selection acting on individual genetic variants involving predictions of protein functional changes in response to pathogen-mediated selective pressures). We use non-model avian species and traditional poultry breeds for our investigation. This project is a collaborative project with Laboratory of Sensory and Evolutionary Neurobiology (team leader Dr. Pavel Němec) that performs research in the fields of comparative vertebrate neuroanatomy and neurobiology. The research facility is located at the very centre of Prague being ideally situated for interaction with several other internationally recognised institutions.

Links:

For further information see the EEI group web page (<http://web.natur.cuni.cz/zoologie/biodiversity/eei>), Pavel Němec web page (<https://web.natur.cuni.cz/zoologie/biodiversity/index.php?page=nemec>) and the web of the Faculty of Science, Charles University (https://www.natur.cuni.cz/eng?set_language=en) or contact Dr. Michal Vinkler at michal.vinkler@natur.cuni.cz.

We look forward to receiving your on-line application until 1st March 2018.