



The Evolutionary Physiology Team of the Institute of Environmental Sciences

is hiring a postdoctoral fellow (a research assistant) in physiological genomics

Research tasks:

The post-doc will perform the "molecular" part of a project entitled

Experimental evolution of physiological and behavioral adaptations in the bank vole: molecular background and alimentary system bacterial symbionts

funded by the Polish National Science Centre. The project is based on a long-term experimental evolution program, with lines of bank voles selected in three distinct directions. The specific objective is to investigate molecular basis of the evolution of increased aerobic exercise metabolism and propensity towards predatory behavior in the selected lines, through a) identification of genes with modified frequency of Single Nucleotide Polymorphism (SNP) alleles, and b) analyses of the correlation between SNP genotypes and phenotypic values of the selected traits. The specific tasks performed by the post-doc will include laboratory molecular analyzes, bioinformatic and statistical analyzes of high-throughput sequencing data, and participation in physiological measurements on laboratory rodents. This project is a continuation of the research presented in Konczal et al. 2015 ([doi:10.1093/molbev/msv038](https://doi.org/10.1093/molbev/msv038)) and 2016 ([doi:10.1093/molbev/msw121](https://doi.org/10.1093/molbev/msw121)). Additional information can be obtained from the principal investigator, Dr. Paweł Koteja (pawel.koteja@uj.edu.pl).

Key words: animal physiology, behavior, evolution, genomics, high-throughput sequencing, locomotor performance, metabolism, neurophysiology, predation, selection experiment, SNP

The main requirements:

- PhD degree in biology or related sciences obtained not earlier than 7 years prior to employment in the project (note: this period does not include periods of maternity or parental leave, or other circumstances described in the Polish National Science Centre OPUS project regulations),
- or a statement that the PhD dissertation has been submitted and the candidate is expected to obtain the degree before commencing the employment;
- Experience in analyzing data from high-throughput sequencing and working in a Unix/Linux environment.

Conditions of employment:

- full-time contract for 24 months, about 7000 PLN/month (gross),
- benefits of a full-time employee according to the Polish law (health insurance, retirement benefits, etc.)
- all social benefits of the University staff (www.en.uj.edu.pl/en/staff/staff-benefits/office),
- beginning of the employment: between 1.11.2017 and 1.03.2018 (negotiable).

Deadline for applications: 10 Sept. 2017-09-10; Interviews: 18-22 Sept. 2017; Decision: 30 Sept. 2017

If no candidate meets the requirements, the recruitment period will be extended. If you are interested in this position but cannot apply before the deadline, let us know and we will inform you about the extension.

See next page (or [here](#)) for details of the requirements and the recruitment procedure

Contact person: Dr. Paweł Koteja (pawel.koteja@uj.edu.pl) Evolutionary Physiology Team



Detailed information about the recruitment procedure and specific requirements

Specific criteria used in the selection procedure:

- publication record;
- experience in the area of molecular biology, and especially of physiological and behavioral genomics;
- experience in the experimental work with animals, especially with rodents;
- experience in leading projects, working in international teams, internships;
- opinion of the recognized researchers with whom the candidate collaborated;
- communication skills, communication in English language.

The recruitment procedure:

At the first stage, the candidates should send to pawel.koteja@uj.edu.pl (with cc to: binoz@uj.edu.pl) the following documents as pdfs attached to the e-mail (deadline: 10 Sept. 2017):

- 1) An application expressing the interest in getting the position and the following statement: "*I hereby give consent for my personal data included in my offer to be processed for the purposes of recruitment, in accordance with the Personal Data Protection Act dated August, 29,1997 (uniform text: Journal of Laws of the Republic of Poland 2014 item 1182, with further amendments)*";
- 2) CV, including also information about internships and participation in or leading research projects;
- 3) Copy of PhD diploma or a certificate with the statement that the PhD Thesis has been submitted and the candidate can expect receiving the degree before commencing the employment;
- 4) List of publications (for the most important papers provide doi identifiers or links to the texts, the journals' IF, and the number of citations) and conference presentations (only as the presenting author);
- 5) Pdf of up to three publications most important from the perspective of the competition criteria;
- 6) Short description of the research achievements (maximum half page);
- 7) A reference letter from the supervisor or the research team leader, with whom the candidate collaborated;
- 8) Information about at least one additional recognized, independent researcher (with a professor or an equivalent position) with whom the candidate collaborated and who agreed to prepare a confidential opinion by 15 Sept. 2017 (name, affiliation, e-mail address).

Interview: The best candidate or candidates selected based on the above information will be invited for an interview, which will take place in the Institute headquarters or, in justified cases, via the Internet (Skype) on 18 - 22 Sept. 2017. A provisional decision will be made immediately after completing the interviews.

Completing the documents needed for signing the contract: The candidate for whom the position has been provisionally granted is required to submit the following documents in printed and signed form to the Institute office (by mail or in person) within 5 days:

- 1) all the documents required for the first stage of the competition,
- 2) a personal questionnaire required by the Jagiellonian University office,
- 3) a statement stating that JU will be the primary and sole place of work for the time of the employment,
- 4) declaration under art. 109 sec. 1 Law on Higher Education (of not being charged for criminal offenses),
- 5) declaration of knowledge and acceptance of intellectual property and intellectual property law.

Failure to provide these documents or not obtaining the doctorate degree before the agreed date of employment results in cancellation of the decision and reopening the recruitment procedure.

The questionnaire form and required statements forms can be downloaded at: www.dso.uj.edu.pl/drukido-pobrania/dokumenty-dla-kandydatow-pracownikow. The forms are offered in Polish; foreign candidates: please contact pawel.koteja@uj.edu.pl. If none of the candidates meets the expected requirements, the University reserves the right to extend or cancel the competition.



The project SUMMARY

Experimental evolution of physiological and behavioral adaptations in the bank vole: molecular background and alimentary system bacterial symbionts

1. Research project objectives/ Research hypothesis

The major challenge in the field of evolutionary physiology is to explain the proximate and ultimate mechanisms behind the evolution of complex behavioral and physiological adaptations, allowing realization of the astonishing variety of animal lifestyles. Studies in this area are largely based on phylogenetic and comparative analyses, paleontological data or phenotypic-level experiments. Our project is based on an alternative, experimental evolution approach, in which the selection factors are under control. Thus, hypotheses concerning genetically-based effects of selection acting on particular traits can be tested. Moreover, distinctly selected lines of organisms provide powerful models to investigate physiological, biochemical and molecular mechanisms underlying the changes in function observed at the organismal level. In our experiment, performed on a non-laboratory rodent the bank vole (*Myodes glareolus*), we simulate evolution towards three directions that played important role in the evolution of mammals: ability to achieve a high aerobic exercise metabolism (A lines), predatory behavior (P lines), and herbivorous capability (H lines). The selection has been effective and all the selected lines diverged markedly with respect to the unselected, control C lines. The major objectives of the project will be:

- To investigate molecular basis of evolution of the increased aerobic exercise metabolism and propensity towards predatory behavior, through a) identification of genes with modified frequency of SNP (Single Nucleotide Polymorphism) alleles in the selected lines, and b) analysis of correlation – at the level of individual variation – between SPN genotypes and phenotypic values of the selected traits.
- To investigate changes in gut bacterial symbiont composition in response to selection towards improved herbivorous capability, and test the hypotheses that the modification of bacteria composition in the selected lines a) is partly resistant to bacteria influx from current environment and to changes in food composition, and b) has functional effects, measurable as improved ability to maintain body mass of voles fed a low-quality diet and an increased efficiency of digesting the food.

2. Research project methodology

To achieve the first objective we will perform molecular analyses, allowing to determine genotypes in about 2000 SNPs (i.e. nearly as many genes) in individuals sampled from base population and generations 13 and 27 of the selection experiment (in the A- and P-selected lines, and C-control lines). Unlike in our previous project, the molecular analyses will be performed at the level of individuals, and will be focused on specific genes, chosen on the basis of the results from a previous project and theoretical considerations. The second objective will be realized by analyzing gut bacteria composition using molecular methods (polymorphism of V4 segment of bacterial 16S rRNA gene). The analysis will be performed for voles from H and C lines, fed two types of diet, and having or not having contact with individuals from other lines, which will allow to check whether the differences in bacterial composition are robust to environmental changes. Simultaneous measurements of body mass changes and food consumption and digestibility will allow to analyze correlations between indexes characterizing the gut bacterial community and the ability to sustain on the low-quality, herbivorous diet.

3. Expected impact of the research project on the development of science, civilization and society

To our knowledge, the scale of the selection experiment is worldwide unique, which warrants a wide reception of the results. The results will allow methodologically strong inferences concerning hypotheses that are in the center of interest of evolutionary physiology of vertebrates, and therefore will provide a major contribution to the development of the discipline. The project has not been designed to solve a practical problem, but because it tackles the issues of obvious importance for human health (exercise performance, gut symbionts) and social live (aggressive behaviors), it is possible that some results may prove to have biomedical implications. The selection experiment provides an unique resource for research in several directions, and a basis for development of young scientists. Therefore, its continuation (financed through this project) is valuable by itself. Finally, the experiment offers also a valuable educational tool in the context of public (non-academic) debate concerning Darwinian theory of evolution, because it offers a clear demonstration of the effectiveness of selection acting on organisms biologically similar to humans.