REGISTRATION FORM FOR CZECH SCIENTIFIC INSTITUTION

1. Research institution data (name and address):

Faculty of Science
University of South Bohemia in České Budějovice
Branišovská 1645/31a
370 05 České Budějovice, Czech Republic

2. Type of research institution: Public university (veřejná vysoká škola)

3. Head of the institution: prof. PhDr. Bohumil Jiroušek, Dr. – rector

4. Contact information of designated person(s) for applicants:

Radim Šumbera
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Branišovská 1760b, České Budějovice, 370 05, Czech Republic

5. Research discipline in which the strong international position of the institution ensures establishing a Dioscuri Centre:

Life Sciences: *Evolutionary and environmental biology* - evolution, ecology, population biology, biodiversity, biogeography

6. Description of important research achievements from the selected discipline from the last 5 years including a list of the most important publications, patents, or other results:

Our research focuses on different aspects of biology of subterranean rodents and on diversity of African small mammals. We study some of puzzling issues concerning their diversity, taxonomy and biogeography and the influence of climatic and geographic factors on forming contemporary small mammal fauna on the continent (Krásová et al. 2021, Uhrová et al. 2022). By employing field and laboratory approaches, we also analyse various behavioural, morphological, ecological, sensory and physiological adaptations to reveal how mammals thrive in an extremely challenging (mainly from the point of mechanical resistance of soil, low food supply, total darkness, high humidity, hypoxy and hypercaphy) subterranean environment (Šumbera et al. 2019, Begall et al. 2018). We also focus on emergence of new species, especially through the process of ecological speciation (Jiao et al. 2021, Li et al. 2020, Lovy et al. 2020). To study adaptations in controlled experimental conditions, we have established the world's largest breeding collection of subterranean rodents (eight species from different rodent lineages) and a fully equipped behavioural and physiological lab.

- Uhrová M, Mikula O, Bennett N.C., Van Daele P, Piálek L, Bryja J, Visser JH, Jansen van Vuuren B, R Šumbera (2022) Species limits and phylogeographic structure in two genera of solitary African mole-rats *Georychus* and *Heliophobius. Mol. Phylogenet. Evol.* 167: 107337.
- Krásová J, Mikula O, Bryja J, R Šumbera (2021) Biogeography of Angolan rodents: The first glimpse based on phylogenetic evidence. *Divers. Distrib.* 27: 2571-2583.
- Jiao, H., Wang, Q., Wang, B. J., Li, K., Lövy, M., Nevo, E., ... & Zhao, H. (2021). Local Adaptation of Bitter Taste and Ecological Speciation in a Wild Mammal. *Mol Biol Evol*, 38(10), 4562-4572.
- Li K, Zhang S, Song X et al. (2020) Genome evolution of blind subterranean mole rats: Adaptive peripatric versus sympatric speciation. *PNAS* 117 (51): 32499-32508.
- Lövy M, Šumbera R, Heth G, E Nevo (2020) Presumed ecological speciation in blind mole rats: does soil type influence mate preferences? *Ethol Ecol Evol* 32(1): 46-59.
- Šumbera R (2019) Thermal biology of a strictly subterranean mammalian family, the African mole-rats (Bathyergidae, Rodentia). *J Therm Biol* 79: 166-189.
- Šumbera R, Krásová J, Lavrenchenko LA, … & J Bryja (2018) Ethiopian highlands as a cradle of the African fossorial root-rats (genus *Tachyoryctes*), the genetic evidence *Mol Phylogenet Evol* 126: 105-115.

7. List of no more than 3 important research projects in the selected discipline awarded in national and international calls to the institution in the last 5 years:

Problems and solutions of thermoregulation in subterranean mammals

GAČR (Czech Science Foundation) n. 2017-2019

PI: Šumbera

budget: 5.9M CZK

Phylogeny, adaptation and evolution of sociality in African mole-rats, a model group in evolutionary and biomedical research

GAČR (Czech Science Foundation), 2020-2022

PI: Šumbera

budget: 14.4M CZK

Life in different soil types: adaptations of blind mole rats *Spalax galili* and their consequences for ecological speciation

GAČR (Czech Science Foundation), 2022-2024

PI: Lovy

budget: 8.2M CZK

8. Description of the available laboratory and office space for a Dioscuri Centre:

An office for the PI and his team of postdocs and/or PhD students (up to 5 people) is available at the Department of Zoology. Separate laboratory space can be used in one of the current laboratories depending on the specialisation of the applicant's project. A bench space is available in the molecular as well as physiology laboratories and small rodent breeding facility.

9. List of the available research equipment for a Dioscuri Centre:

Wide range of equipment is available at the facility. Laboratory of phylogenomics and bioinformatics is well equipped with all necessary instruments and background for laboratory preparations of DNA samples, e.g. Nanopore MinION sequencer, Pippin Prep platform for DNA size fractionalization, Agilent Bioanalyzer (in the facilities of FSci), gradient thermocyclers, DNA vacuum concentrator, autoclaves, fluorometers, automatic dispensers, magnetic separators, electrophoresis devices, centrifuges of different formats, transilluminator with photo documentation system etc. The computational part of our projects is usually processed in the National Grid Infrastructure MetaCentrum (https://metavo.metacentrum.cz) and CERIT-SC (https://www.cerit-sc.cz). These shared facilities offer huge capacity of computational nodes, operational memory, storage place and relevant software and are fully sufficient for large projects including extensive WGS data processing. Experimental laboratory physiology studies of vertebrates are run using facilities and methodology for determination of oxidative stress markers, respirometric system, thermal cameras, thermostatic room and incubator. We have accredited facility for small rodents (space for hundreds of animals) meeting the national and EU laws and guidelines requirements. Custom build automated PIT Tag readers are available for individual monitoring of the rodents. Bioacustics equipment for monitoring and analysing animal sounds and equipment for radiotracking is also present.

10. List of the additional benefits (other than listed in the conditions for hosting a DC, see invitation) that the Institution declares to provide for a Dioscuri Centre (i.e.: additional funds, personal benefits, dual career options, relocation support or other):

The host institution is located on a shared campus with the Biological Center of the Academy of Sciences, a leading institution in the field of biological research in the Czech Republic. In research, the department cooperates mainly with the Institute of Entomology, Institute of Hydrobiology, Institute of Soil Biology and Institute of Parasitology BC AS CR, v.v.i.

The host institution has also very close collaboration with the Department of Zoology, Charles University Prague and Institute of Vertebrate Biology, Brno.

11. Other information about the internationalization of the research institution, international researchers employed at the institution, the availability of English language seminars etc.:

Research at Department of Zoology is internationalised, several of our employers are from institutions abroad and every year we host foreign visitors for short or long-term research stays. We offer courses for PhD students in English and members of our department are involved in new Master's study program in Ecology what is taught in English.