

ANIMAL PHYSIOLOGY

Modulation of immune response by probiotic bacteria in colorectal carcinogenesis

supervisor: doc. RNDr. Monika Kassayová, CSc.

study form: full time

Annotation: Slovakia is one of the five countries in the world with the highest incidence and mortality of colorectal cancer. Modulation of intestinal flora by regular consumption of probiotic bacteria appears to be an effective strategy of colorectal cancer prevention. Probiotics may influence local (intestinal) or systemic immune response of the host. These changes can play a key role in the intestinal malignant transformation. The mechanisms of probiotic action, however, are not sufficiently investigated yet and strongly depend on the probiotic strain used. Therefore, the detailed testing of probiotic preparations is essential. The aim of the work is to study properties of the combination of *Lactobacillus plantarum* and *Lactobacillus salivarius* strains in the form of a new probiotic product designed for fermentation of human foods. Effects of lactobacilli will be evaluated using *in vitro* models of immunocompetent cells, enterocytes and colorectal cancer cells as well as *in vivo* using chemically induced colorectal carcinogenesis in rats. Changes in cytokine production and tumour microenvironment will be studied.

Convergent osteo-physiological patterns in the evolution of the flapping flight: Pterosaurs (Reptilia) versus bats (Mammalia)

supervisor: doc. RNDr. Martin Kundrát, PhD. - CIB UPJŠ

consultant: prof. Lü Junchang - Chinese Academy of Geological Biosciences, Peking, Čína

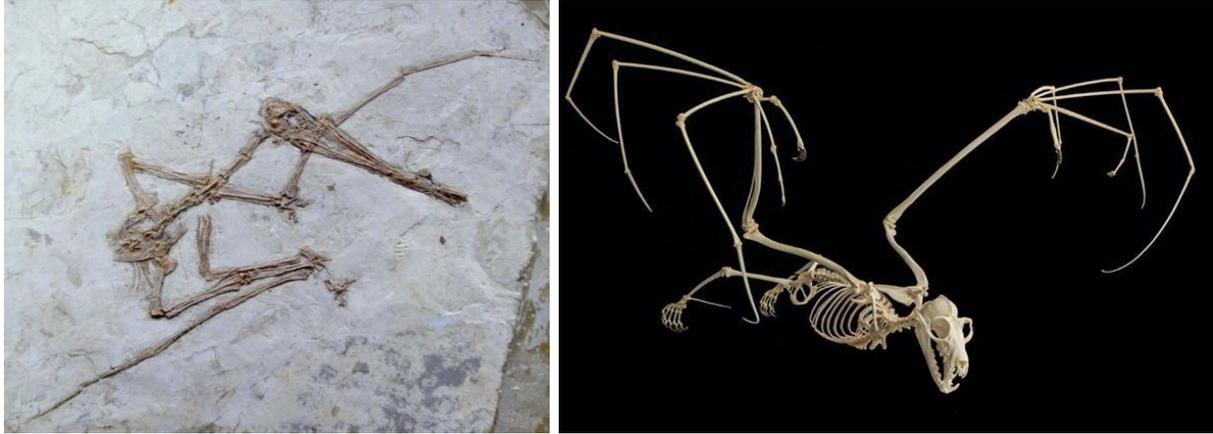
consultant: prof. RNDr. Beňadik Šmajda, CSc. - ÚBEV PF UPJŠ

study form: full time

Annotation: There are three groups of vertebrates that colonized aerial environment: pterosaurs (Reptilia), avialan dinosaurs (Aves), and bats (Mammalia). Apart from distinct ancestry, bats and pterosaurs are the well-known example of functional convergence of forelimb in the evolution of flapping flight. In contrast to birds, the wing airfoil is formed by skin membrane called patagium in bats and pterosaurs. Patagial wings consists of the same bone elements, however, their active involvement into flying mechanics was specially modified in each group, respectively. Furthermore, pterosaurs and bats exhibit ability to employ the patagial wing in quadrupedal locomotion.

This doctoral project is centered for evaluation of adaptive changes of the wing bones of pterosaurs and bats at the microscopic scale. Bone tissue is considered here as a functional interface useful for correlation of osteonal bone patterns with growth dynamics, locomotor performance, metabolism and thermoregulation. The main aim of the project is the reconstruction of physiological characteristics in the evolution of the first active flying vertebrates - pterosaurs.

We expect the applicants to be fluent in spoken and written English, to show high work engagement, to work along and in a team, in lab as well as in field, to handle correctly fixed biological material and fossils, and being interested in 3D imaging, phylogenetic and statistic methods.



Bioefficacy and antioxidant activity of phytoadditives and zinc in animals

supervisor: RNDr. Klaudia Čobanová, PhD.- Institute of Animal Physiology Slovak Academy of Sciences Košice

study form: full time

Annotation: To ensure animal health, its reproductive potential and maximize the production the feed of livestock is supplemented with various feed additives. Introduction of new organic compounds as source of microelements into the diets of farm animals represent one of a many current trends in the animal food production. Zinc as the essential microelements is structural components of several metalloenzymes which play an important role in biological processes. Polyphenolic compounds of plant additives are known for their many beneficial effects on health, mainly for their antioxidative properties. The dissertation thesis will be focused on the evaluation of the antioxidant potential of various medicinal plants as well as the effect of phytoadditives and dietary organic zinc on the parameters of antioxidant status of ruminants and monogastric animals will be determined too. Since the mechanism of action for bioactive compounds of plant additives on mineral metabolism is not precisely elucidated, aim is to obtain new information on this subject. For this reason the impact of phytoadditives on zinc utilization and tissue deposition will be investigated in farm animals. The specific metalloenzymes activities and metalloproteins levels in animal tissues will be measured too. All analytical methods for evaluation of antioxidant and microelements status are routinely used in our laboratory.

Experimental peripheral nerve regeneration.

supervisor: MVDr. Ivo Vanický, PhD. - Institute of Neurobiology Slovak Academy of Sciences Košice

study form: full time

Annotation: Peripheral nerves can regenerate after injury. After extensive tissue loss, tubulization techniques can be used in order to bridge the gap between the proximal and distal stumps of the transected nerve. However, the distance of regeneration is limited. In our experiments, we are using a rat model of ventral caudal nerve transection, and with tubulization techniques, the different conditions are tested to stimulate the regeneration of the injured nerve. The experiments require microsurgical techniques and the regeneration is evaluated quantitatively using histological and electrophysiological analyses.

In Vitro Systems for Modulation of Spinal Cord and Brain Injury and their Use in the Study of Repair of Damaged Nervous Tissue.

supervisor: RNDr. Lucia Slovinská, PhD. - Institute of Neurobiology Slovak Academy of Sciences Košice

study form: full time

Annotation: Traumatic CNS damage generates a sequence of destructive processes in cells, resulting in tissue damage. There are currently a lot of animal models allowing to modulate a large number of different diseases and CNS damage. Organotypic slices- OTS- represent a transient system between cell culture screening in vitro and animal models in vivo. This system is accessible to experimental manipulations, with inducing the neurodegeneration by many mechanisms.