

DESCRIPTION FOR THE GENERAL PUBLIC

The three following stages can be distinguished in the postembryonic development of holometabolous insects: larva, pupa and imago. The proposed project aims to study all of them in order to examine changes, which occur in respiratory system structure during the metamorphosis. This analysis will be based on a wingless beetle species, *Gonopus tibialis* (F.). Research will be mostly focused on investigating the anatomy of respiratory tagmata (functional modules of the respiratory system) and changes of the wing and wing-connected tracheae. Moreover, a comparison between the analyzed flightless species and winged *Tenebrio molitor* L. (mealworm beetle) will be performed in order to examine the evolutionary changes in respiratory system linked to the wing loss process (aptery). Models concerning the mealworm beetle were already obtained during the author's previous studies. The exact moment in the development of *G. tibialis* will be indicated when the tracheae of wings, which are already present in larvae of a mealworm beetle, are reduced or lost. Because aptery is often correlated with reduction of various muscles and nerve tissues, the examination of the muscular and nervous systems of *G. tibialis* and *T. molitor* will be performed using microCT techniques. This step will enable a search for correlation between those organs and the respiratory system in winged and wingless insects.

The proposed project will be first to show metamorphosis of the respiratory system in a secondarily apterous beetle species, and to provide insights on the tracheal system plasticity in the context of aptery. Moreover, the outcome of this project will better our understand of evolutionary changes of the tracheal system, which might be treated as one of the major adaptations of the most biodiverse group of animals, the holometabola. Acquired models besides scientific purposes can be also used in education process.