**DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)**

To maintain heat balance is of major importance for endotherms and maintenance of heat balance involves morphological, behavioral and physiological traits. Intuitively, we focus on the generation of heat as the main evolutionary advances of endotherms, however, the high rates of energy turnover of endotherms also necessitate the dissipation of heat. Heat dissipation may become a limiting factor for whole animal performance, either due to warm surrounding environment or through high rates of metabolic activity, or through both in combination. The relatively novel heat dissipation (HDL) theory puts main focus on the heat balance of endotherms as limiting factor for virtually all situation in an animals' life, but empirical data are so far ambiguous or not available for many contexts.

The here proposed research program aims to build novel knowledge on the HDL theory through different approaches: (1) at present no empirical test exist on how HDL theory would apply to birds. However, the theory is formulated for all endotherms, sensu birds and mammals. We will employ experimental research on two bird species. (2) At present only a single study - on weasels – has been performed in the field, while all the rest of the numerous contributions on the validity of HDL theory have been obtained in the laboratory conditions. We will test the HDL theory on a well maintained nest box colony in Niepołomice forest. (3) It is common knowledge that aging affects heat balance, for example in humans. However, the HDL theory has so far never been tested in an ageing context. We will not only test the HDL theory thoroughly with respect to animal age, but also formulate and test a novel hypothesis for a known, but unexplained phenomenon, the decline of reproductive output with increasing animal age. Heat balance and the loss of the capacity with increasing age may be the underlying mechanism for the know decline in reproductive output.

The HDL theory provides novel and manifold explanations for various situations in an animals' life, but it still awaits strict empirical testing and confirmation. Limitations heat dissipation may indeed govern the endotherm world and their understanding are key to understand many evolutionary processes. This is of special interest in the view of global warming scenarios, with slow and constant rises or with sudden and extreme temperatures. Range expansions and range limitations of many animals likely depend on the maintenance of heat balance and the covering of the associated energetic costs. Improving our understanding of processes off heat balance and their limits will thus also provide important basic knowledge on the species distribution and their changes under current global change. Changes in the ability to maintain heat balance with increasing age are known for humans, but how heat balance itself and increased costs to maintain it may impair physiological and whole animal performance is neither known for non-human endotherms nor for humans.