

Several strategies ensuring the optimization of the reproductive success arose during animal evolution. The most common and certainly the dominant one is oviparity. Females of the oviparous species lay eggs (protected by thick coverings and filled with nutritional substances) in environment most suitable for further development of offspring. The entire development of embryos and subsequent juvenile (larval) forms takes place outside the mother organism. Viviparity, another reproductive strategy, is much less frequent. In this strategy, embryos develop inside the female body, either within the body cavity or uterus (a modified distal part of the reproductive system) and it is the female organism, that ensures proper nutrition, gas exchange (breathing), and the removal of metabolic wastes (excretion) for the embryo. Viviparity is best characterized in mammals; within the female reproductive system of these vertebrates arises a placenta - a multifunctional organ securing proper development of a new organism within the mother's body (i.e. inside the uterus). Viviparity in insects is considerably less known. This strategy was described in a few insect groups, e.g. cockroaches, flies and earwigs. In the last group, viviparous species belong only to two (out of 11) families: Arixeniidae and Hemimeridae. These species inhabit exclusively the tropical zone and are specialized ectoparasites of certain mammals (bats and Gambian rats). Our preliminary and already published studies have revealed that embryonic development in *Arixenia esau* (Arixeniidae) initially takes place in the ovary, and subsequently in highly modified lateral oviducts (termed uteri). Such a unique mode of development of the embryo (and later larvae) has never been described in any other group of viviparous animals (including insects). What is even more interesting, during the second phase of development, highly characteristic appendages appear on the abdomen of the *Arixenia* embryos. These abdominal appendages maintain a close contact with the wall of the uterus. The above mentioned observations strongly suggest that in *Arixenia*, the appendages together with the uterus tissues form a structure functionally similar to the mammalian placenta. The objective of our project is to gain original insight into the exact relationships between tissues of the developing embryos/larvae and their mother. We will explain how the embryos (and larvae) are nourished, breathe and excrete during their development inside the uterus. We also plan to analyze in detail the embryonic development of another viviparous earwig, *Hemimerus talpoides*. This will allow us to make comparison of the developmental strategies in Arixeniidae and Hemimeridae, as well as to draw phylogenetic conclusions regarding the appearance of viviparity during evolution of earwigs. In the last part of the proposed project, we will seek answer to the following question: Are the abdominal appendages of the embryos/larvae an evolutionary novelty of viviparous earwigs or a result of transformation (modification) of the abdominal legs/wings?