

Description for the general public:

Testing species concepts and studying mechanisms of speciation in snails from the genus *Trochulus* Chemnitz, 1786

The main aim of biological sciences such as ecology and evolutionary biology is recognition of particular species. In classifications of different organisms, morphological features still constitute the dominant approach. However, determination of species based solely on such data, may not reflect the real evolutionary relationships. This concerns particularly species which are morphologically indistinguishable (cryptic), and show the great variability of external features. This also applies to molluscs. In many cases, determining molluscan species is also ambiguous due to the substantial influence of the environment on size and shape of their shells. Therefore, only the integrated morphological and genetic studies complemented by breeding and common garden experiments can explain changes at the genetic and morphological levels occurring during reproductive isolation of differentiating populations, which can lead to their speciation, i.e. the formation of new species. The great challenge for taxonomy are land snails from the genus *Trochulus*, which well suit to such studies and are the subject of this project. To this genus, belong species that are very similar to each other, and their individual shell variability does allow for unambiguous differentiation. There are also snails with the great morphological variation but minor genetic differences. Such taxonomic puzzles are ideal objects to study the mechanisms of evolution and speciation.

In this project, we want to find answers to the following questions: (1) Is there a basis for distinguishing species and subspecies defined morphologically? (2) Is there a concordance between genetic results and the traditional approach based on shells? (3) Which snails can interbreed? (4) To what extent are populations reproductively isolated? (5) Does the shell variation result from morphological plasticity in response to environmental conditions, or has it an adaptational significance? We try to answer these questions after studies of snails collected during field studies from the whole Europe. Moreover, we carry out breeding and common garden experiments in the laboratory.

Morphological features will be documented with the high-end optical equipment with an integrated system for a documentation of digital images. In molecular studies mitochondrial and nuclear markers, including microsatellite sequences will be used. We apply appropriate statistical and bioinformatic methods to compare agreement between morphometric, geographic and molecular data.

The integration of knowledge from zoology, ecology, evolutionary biology, bioinformatics and statistics will allow to determine which taxa should be considered species or subspecies. Complementary competencies of the research experienced team, confirmed by joint significant publications, and applying the holistic approach should succeed and yield answers for the raised question.