

## **Population diversification of the amphibians from the Late Triassic locality Krasiejów – paleohistology and geochemistry as a tool in paleoecological studies.**

The fossil-rich locality of Krasiejów remains still to be unexplored but extremely promising for vertebrate paleontologist working on the Triassic fauna, even though many other localities have been discovered in the meantime. The bones' quantity and preservations quality provides the opportunity to apply more complex studies on them, not possible with e.g. a small sample size or poor preservation rate. Paleohistology -a study area working on hard tissues- is one of these promising methods for which a large sample size is essential. Those studies shed new light on the animals' biology e.g. individual age, growth rate, mode of life, biomechanics (paleohistology), diet (geochemistry) and many more information not available on simple morphological studies.

The aim of this study is to explain the two distinctive growth patterns observed in *Metoposaurus krasiejowensis* bones. The examined material comes from the excavation site "Trias" located in the vicinity of Krasiejów. After a long excavation history there have been many specimens dug out. Until now, the research focus was on the bone morphology (from the outside), but also from the bones' inside the information can be gained by the use of histology. Palaeohistology gives the opportunity to study the well preserved primary bone tissue in the specimens. It is a great tool to reconstruct the prehistoric life. In addition, the pit preserves a huge "bone grave yard" that can be seen as a treasure chest for a vertebrate paleontologist since the material can be easily used for the destructive histological analyses. For the project we study *Metoposaurus* long bones and dermal bones (clavicle and interclavicle).

The projects' results will answer the causes of the histological variability observed in a large sample size of the upper arm bones (humeri) of *Metoposaurus*, which showed two distinct types of bone growth. The preliminary study carried out on other long bones enhanced the divided growth pattern. It is important to find out if it has an interspecific or intraspecific origin. With the assumption that the present histotypes represent two species of *Metoposaurus* or that they show a sexual dimorphism e.g. type I represents a male and type II is a female. Another working hypothesis is that we deal with two separated populations of amphibians. This way, we can distinguish between a space and/or a time separation. In the first case, we would have a scenario of two *Metoposaurus* populations living in different, from each other separated, water basins. Therefore, if the life conditions were not the same, by the varying dimensions of the basin, different environment or the nutrition availability, the bone growth type has to be different in different settings. A time separation would imply a different type of bone growth in context of the evolutionary change. For testing the hypotheses, geochemical analyses should be applied. By achieving different chemical impulses – from the elemental composites, rare earth elements or isotopes ratios – a plausible data set will be given. Therefore, the environmental realm can be reconstructed and the problem of two hypothetic populations can be solved. To test the environmental signals, another amphibian species from Krasiejów will be tested for comparison: *Cyclotosaurus intermedius*. Additionally, a comparative analysis with other *Metoposaurus* taxa from Germany, Portugal, Morocco and India will be applied.

The reason for choosing this research topic is because of its novel character, which will give the opportunity to explain the reasons of histological variability rather it is a separation in time or space, sexual dimorphism or even a new species. Our systematic methodology is broadly applicable on other taxa. Since the osteohistological analyses performed on fossil amphibians remain still rare, it will have a huge impact on the scientific society.