Among almost 40 000 living species of fish, the majority belongs to crown group neopterygians. They share a set of highly specialized features, such as a mobile jaw apparatus and membranous fins stretched on flexible rays. Many of these characters contribute to their particularly high efficiency in locomotion and feeding. Simultaneously, they allowed crown-neopterygians to adapt to a variety of environments. Fish belonging to this group occur in nearly all aquatic ecosystems, being crucial participants of trophic webs. Interactions between crown-neopterygians and other taxa are factors controlling sizes of numerous invertebrates and vertebrates populations, and dynamics of aquatic vegetation as well. While crown-neopterygians are subject of intense studies due to their importance for modern ecosystems as well as suitability of numerous neopterygian species for economic and medical applications, little is known about their evolutionary roots, relationships, and how exactly their appearance influenced the biosphere. The fossil record leads to the late Permian and Triassic periods, namely 200-260 million years ago, from when the oldest crown-neopterygians are known.

The main goal of this project is finding a possibly closest relative of crown-neopterygians in the fossil record. It is a difficult task since fossils of fish are relatively common and thousands of fossil species are already recognized. This is why the current project focuses on a comparison of groups most commonly referred as possible relatives of crown-neopterygians due to their morphological similarities. For anatomical comparisons we use a method of imaging of fossils via computed tomography. It is a method never applied to the studied taxa, allowing obtaining morphological information largely unavailable for previous researchers, such as internal structures of a skeleton and three-dimensional shape of bones. Result of the project will be detailed reconstructions of studied species and the reevaluation of hitherto hypotheses about possible relatives of crown-neopterygians in the light of new data. This outcome will be a firm basis for further studies leading to more detailed evolutionary scenarios, but also as a framework for research on functional anatomy, ecological role of the earliest crown-neopterygians, and functioning of the biosphere in times of their existence.