

## **Restoration of the gnathostome fauna from the Lower Devonian of the Holy Cross Mountains, Poland**

The aim of the project is the detailed analysis of the components of Early Devonian marginal-marine ecosystem in the area of the Holy Cross Mountains (central Poland), and particularly the revision of the hitherto known collections and the description of new specimens of gnathostome vertebrates (placoderms, chondrichthyans, acanthodians and osteichthyans) from the so-called “placoderm sandstone”. The major stress will be placed on the revision and restoration of a sarcopterygian fish *Porolepis* the skeletal fragments of which are common in the sandstone and on the description of the representatives of Chondrichthyes, thus far omitted in the literature. The placoderms and osteichthyans require collecting of a new material and complementing of the existent descriptions.

The other aspect of the project will be the research on biological processes at the land-sea interface, comprising the taphonomy of fossils, presence of palaeosols and the character of trace fossils and palaeorelief. The palaeoenvironmental analysis will permit to determine whether the material from the bone breccia is a mixture of elements from various environments or it really reflects the relative abundances of particular groups in the Early Devonian.

A synthesis of the information on vertebrates from the Lower Devonian of the Holy Cross Mountains is planned as the major result of the project. Such a synthetic picture of the “placoderm sandstone” fauna will be used as a comparative source by the future students of Palaeozoic vertebrates worldwide.

The Holy Cross Mountains will be the main area of study and the material will mostly originate from the outcrops, those well known like Podłazie and Bukowa Góra, as well as those recently found (the neighbourhood of Iwaniska and Bieliny). Selected data from the boreholes in the Carpathian Foredeep will also be included. All the profiles and samples will be dated using biostratigraphy (sporomorphs) and radiometry (zircons).

The most important innovation in the research on gnathostome fossils will be the application of the digital analysis of the material: high energy computer tomography (CT-scanning) and the preparation of data in order to obtain the 3D digital models of the skeletal elements. In the case of “placoderm sandstones” this method is very useful, because all the vertebrate fossils occur in the form of natural moulds, cavities left after the removed phosphatic material. Thus far, such cavities were filled with latex rubber or silicon, but the casts obtained in that way lost much of the important information. The preliminary trials of the computer tomography showed that remarkable 3D images of fossils from within the sandstone can be acquired with no necessity of any destruction of the rock sample.