



WHERE THE SEA

Photography: Jakub Ostałowski

To learn about fish of the Oligocene period, one must first travel to the Carpathian Mountains and slowly smash rocks.



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Fig. 1
A close relative of the sardine – *Sardinella sardinites* (Heckel, 1850) preserved in shale.

ONCE WAS

The project "Paleobiogeography of ray-finned fish from the mackerel family during the Oligocene":

- **Dr. Małgorzata Bieńkowska-Wasiluk** – Faculty of Geology of the University of Warsaw
- **Radosław Wasiluk** – National Geological Institute, National Research Institute

Assistants:

- **Albin Jamróz** ■ **Marcin Pałdyna** ■ **Robert Szybiak** – Museum of Fossils and Minerals, Dubiecko



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Fig. 2
 Preliminary selection of
 specimens is done in situ at
 excavation sites.

Specimens of ray-finned fish fossilized in shale have been found in the Przemyskie and Dynowskie Foothills, the Low Beskids and the Bieszczady Mountains. Those from the Carpathian Mountains date back to the Oligocene, around 30 million years ago. They have been preserved due to the specific conditions in the geological past, similar to those found today in the Black Sea. In the Oligocene Sea, there was a shortage of oxygen near the seabed, which meant bottom-feeding scavengers could not survive. As a result, everything which sank to the bottom was covered with silt and became fossilized.

The Oligocene Sea was inhabited by over 50 species of pelagic fish, some of which were adapted to living at great depths and had developed light-emitting organs. A small subset of this population was demersal (bottom feeders) or dwelling just above the seabed in the water column. Fish living in shallow tropical waters, such as pipefishes and razorfishes, were rare. Many species of Oligocene fish have close relatives still living today. Studying them is making a major contribution to our understanding of the evolution of ray-finned fish, which have been thriving since the Cenozoic. The Oligocene Sea was extensive in its day, spanning today's Mediterranean, Black and Caspian seas and the lands connecting them. We know little about fish migration and evolution throughout the basin. The most pressing matter concerning researchers is defining the taxonomic affiliation of the ever-growing collection of fish fossils and verifying some of the early designation taking into account the latest data on their anatomy and taxonomy.

Dr. Bieńkowska-Wasiluk is continuing the work of other researchers – including Prof. Anna Jerzmańska from the University of Wrocław and Prof. Janusz Kolarczyk from the AGH University of Science and Technology in Kraków – by expanding and promoting our understanding of fish species from the Carpathian Mountains. She works in conjunction with various scientists, volunteers, collectors and owners of the land where excavations of fish fossils are taking place. She is currently studying the close relatives of sea bass, tuna and mackerel species to reconstruct their evolution and migrations in the Oligocene Sea. Specimens found in the Carpathian Mountains will soon go on display at the PAS Museum of Evolution.



Fig. 3
Dr. Małgorzata Biełkowska-Wasiluk and Radosław Wasiluk searching for fish fossils in marlstone in a quarry in the Dynowskie Foothills.



Fig. 4
Fossilized fish impressed on two sides of rock split into shale plates, as though between pages of a book. Pictured: deep-water fish from the Myctophidae family.

Fig. 5, 6, 8
Excavation is a labor-intensive process of extracting shale and marlstone, and breaking the fossils down using knives and hammers.

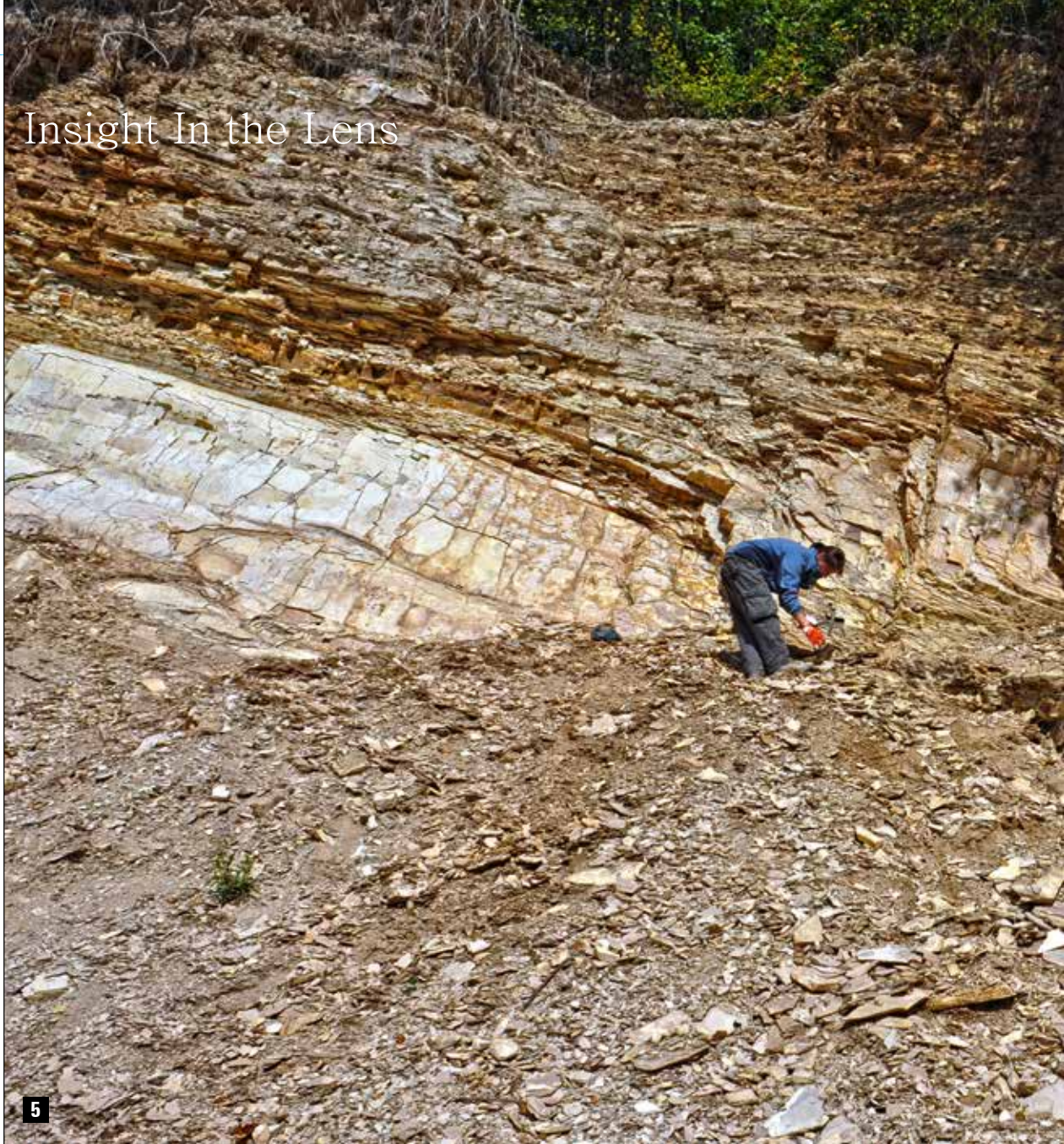




Fig. 7, 9
Specimens a few centimeters in size (tail and an incomplete perciform fish) provide valuable information on the anatomy of fossil fish.

