

Squamate reptiles (lizards and snakes) are the most species-rich terrestrial vertebrates, surpassing even birds in this regard. Lacertoidea is one of the major groups of squamates, including amphisbaenians (worm lizards), the true lizards (lacertids) known from Poland, as well as teiids and gymnophthalmids. Their distribution is rather puzzling: the predominantly subterranean amphisbaenians occur on the greatest number of continents, even though they only originated in the Cretaceous period. Other groups — which might seem more mobile — are restricted to either the New or the Old World. Unfortunately, we know little about their early history. Undisputed representatives of these groups usually appear in the fossil record only in the Cenozoic, and their highly distinctive morphology makes it difficult to identify features that unite the major clades. This gap in our knowledge has broader implications, because molecular data place Lacertoidea alongside snakes, iguanians, and anguimorphs, yet we have no idea what anatomically links them. This, in turn, hinders discussions about the origins of snakes, iguanians, or mosasaurs, as we do not know what to expect from the ancestors of these groups.

The aim of this project is to determine the early evolution of Lacertoidea, their biogeographic history, and the traits of their ancestors. To achieve this, data will be collected on the phenotypic diversity of living representatives, Cenozoic and Mesozoic species, and especially the rich collection of Cretaceous lizards from the Gobi Desert in Mongolia housed at the Institute of Paleobiology of the Polish Academy of Sciences. Broader sampling of species and phenotypic traits will make it possible to build more reliable phylogenetic trees and to test the phylogenetic position of a wide range of fossils. This will then be used to identify ancestral characteristics, places of origin, and patterns of dispersal of these lizards.

Reconstructing the early history of Lacertoidea is important because these animals are used as model species in ecomorphological and evolutionary developmental studies. These lizards help us understand processes responsible for limb reduction, test the principle of evolutionary irreversibility, and even examine the selectivity of mass extinctions. The planned research will provide the evolutionary context for the issues mentioned above.