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Titre et résumé de la thèse – Title and abstract of the thesis

New insights into the evolution of the Cenozoic ectothermic vertebrate assemblages in Western Eurasia

Background. Though the Cenozoic European record of freshwater fishes, amphibians and reptiles is rather extensively studied, its affinities with the records from other regions (Asia, Africa) as well as the roots of the present-day faunas are poorly understood or nearly unknown. These vertebrates are known as ectotherms, the physiology of which depends mainly on the surrounding environment (temperature and water availability). This makes them more sensitive to climatic changes, suggesting the climatic evolution to be a rather critical parameter for their distribution. How the Cenozoic fauna of ectothermic vertebrate in Europe responded to the dynamic paleogeographic and paleoclimatic evolution stays largely unclear due to lack of sufficient knowledge on this group from other parts of the world. Several hypotheses exist, explaining the paleobiogeographic history of certain fish, amphibian and reptilian groups, which, however, have been formulated based exclusively on the European fossil record and the present-day distribution of closest relatives of those groups.

Aim. The present study aims: to review critically the European Cenozoic record of certain ectothermic vertebrates; to study the fossil assemblages from so far poorly-studied regions of Europe; to study stratigraphically continuous records of fishes, amphibians and reptiles from Anatolia and Western Asia; to compare and analyze these records and test available hypotheses on paleobiogeographic history of these groups; to provide, if possible, climatic reconstructions based on amphibian and reptilian assemblages.

Approaches and Methods. Fossil remains of fishes, amphibians and reptiles from three selected research areas: 1) Europe; 2) Anatolia and Southern Caucasus and 3) Northwestern Asia have been studied. The material comes from more than 70 Eocene to Early Pleistocene age localities from Central Europe to Western Asia. The studied material has been mainly collected by screen washing of sediments or directly during the excavation. The identification of the fossil material relies on the osteological comparison. The fossiliferous horizons have been dated using different bio- and geochronological methods. The paleoclimatic estimates have been generated by bioclimatic analysis of the herpetofauna. The paleobiogeographic analysis has been done by considering the first and last occurrences within the studied and compared fossil records.

Discussion and conclusion. The present study significantly enlarges the knowledge on cyprinid fishes, amphibians and reptiles from three research areas. Based on the results, the unity of fish, amphibian and reptilian faunas during Neogene Period over large territories of Western Eurasia can be suggested. The comparison of stratigraphic occurrences, e.g. earliest or last occurrences, of several groups in the selected research areas, enabled to test the available paleobiogeographic hypotheses and to propose new ones. An important role of Anatolia, at the crossroad of three continents, also for the dispersal ectothermic vertebrates at least during the Miocene Epoch, has been demonstrated. The Western Siberian record of amphibians and reptiles allowed to reconstruct a higher-amplitude change (than earlier suggested) in precipitation development in the region during the late Miocene and early Pliocene.

These investigations demonstrate the importance of studying the assemblages of the ectothermic vertebrates from the Anatolia and other parts of Asia for the understanding of the Eurasian history and evolution of fishes, amphibians and reptiles and the ways of formation of the present-day faunas. A critical revision of European fossil record in the general context of the climatic and environmental changes of the past will provide an opportunity for a better understanding of the spatial and temporal distribution of different faunistic elements. Future detailed studies of continuous stratigraphic records of ectothermic vertebrate from other parts of Eurasia, e.g., Eastern Europe, Anatolia, Western Asia, will enable to shed light on the history of these groups at the larger geographic scale as well as on the history of faunistic interchanges between continents.

Titre et résumé de la leçon d'essai – Title and abstract of the inaugural lecture

Paläogenetik

Paläogenetik als Wissenschaft beschäftigt sich mit dem Studium des Erbgutes von vorzeitlichen Organismen. Trotz der vorherbestimmten Einschränkungen, die mit dem Erhaltungspotenzial des Erbgutes verbunden sind, gibt es in den letzten zwei Jahrzehnten erhebliche Fortschritte in der paläogenetischen Forschung. Die neuen Erkenntnisse sind insbesondere wertvoll für die Paläontologie und Biologie, da sie außergewöhnliche Einblicke in die Vergangenheit werfen und genauere verwandtschaftliche Beziehungen der Organismen rekonstruieren.

Während der Vorlesung werden alle bis jetzt für die Wissenschaft bekannte bzw. nachgewiesene Fossilberichte des genetischen Materials mit Beispielen vorgestellt. Es wird nicht nur der namhafte Ansatz von «ancient DNA» behandelt, sondern auch die weniger bekannten Arbeiten über die einzigen fossilerhaltenen Chromosomen oder Methoden der Quantifizierung des gesamten Genoms angesprochen.