

## MORPHOLOGICAL AND GENETIC VARIABILITY IN ARVICOLINES RODENTS AND QUATERNARY CLIMATIC FLUCTUATIONS

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The variability in size and shape has been studied for many years and provides some results on biogeographical and ecological differentiation of species. For a long time, morphological differentiation has been related to many aspects of systematics, biogeography, ecological distribution or even biochronology. But the relationships between variability in size and shape on one side and the related changes occurring with time or climate are usually complex and difficult to understand and to interpret. Morphological and genetic variability is here studied inside different arvicoline species on both extant (*Microtus (Terricola) multiplex*, *Microtus arvalis* and *Chionomys nivalis*) and fossil species: *Microtus (Terricola) grafi* from Bacho Kiro (Bulgaria, Pleistocene) and *Microtus arvalis* from Gigny (Jura, France, Pleistocene). Whatever the living species, the morphological analysis based on measurements taken on the first lower molar show that (1) at a regional scale, morphological variability is clearly in relation to geography and consequently to climate and environment; and (2) at a local scale, the morphological variability can be due to the fragmentation of some particular areas leading to isolation of small populations characterised by different morphotypes. This geographical structuration is not so clear concerning the genetic variability. There is a hierarchical pattern in the morphological and genetic variability. For fossil, the morphometric analysis shows that the tooth shape is in relation to climatic conditions. For *Microtus (Terricola) grafi*, several shape indexes can separate the morphology of the individuals living in warm or cold conditions. The most significant result concerns the characteristic of the pitymyan rhombus which is less tilted in the individuals living under warm conditions. This index seems to be a good indicator of intraspecific variability in tooth shape according to climatic fluctuations, and the pitymyan rhombus of the individuals living under warm conditions is more archaic in shape. For *Microtus arvalis*, outline analysis is applied on the first lower molars and has shown that (1) the tooth shape is in relation with humidity and (2) the morphological variability seems to be not adaptative at the species level in comparison to the sub-family level.