Significance of the Apuseni Mountains (the Carpathians) in the origin and distribution of Central European earthworm fauna

(Oligochaeta: Lumbricidae)

Adriana Antonia Pop, Victor V. Pop, Csaba Csuzdi

Abstract. The earthworm fauna of the Apuseni Mountains is very rich in species, most of them are narrowly distributed endemics. Till now 37 Lumbricidae taxa are known from the Apuseni Mts. of which 13 occur exclusively here. This high number of local endemism is in accordance with the tectonic history of the region. In the southern part, with patchily distributed limestone areas, an accelerated insular-like speciation resulted in presence of many endemic large-bodied *Octodrilus* species. In the northern volcanic region other endemics such as *Dendrobaena sp. nov.* and *Allolobophora prosselodacica* were found. These species show an allopatric distribution with their Carpathian vicariant sister species *D. attemsi* and *A. sturanyi dacidoides* respectively. The origin of such Apuseni–Carpathian species pairs is possibly due to the Parathethys transgressions which repeatedly isolated the Carpathians from the Apuseni Mts. in the Tertiary period for a long time. After the final retreat of the Parathetys from the Carpathian Basin some species with larger dispersion capabilities such as *Dendrobaena clujensis, Allolobophora sturanyi dacica, Allolobophora mehadiensis* etc. migrated to lower altitude hilly and plain habitats forming the so called Dacian faunal element in Central Europe. Our molecular phylogenetic investigations (16S and COI sequences) corroborate this scenario. The high number of endemic species, as well as their distribution patterns places the Apuseni Mts. as a hot-spot of lumbricid earthworms' diversification and distribution in Central Europe.

Key words. Earthworms, Apuseni Mts., the Carpathians, evolution, rDNA, endemisms.

Introduction

The major hypotheses on the origin and distribution of earthworms start with the works of MICHAELSEN (1903, 1921) who was the first to observe the great disjunctions among different terrestrial Oligochaeta families. This is explained by the low dispersal capacity of earthworms due to their vulnerable morphological, physiological, and reproductive peculiarities. Original nuclei of earthworms evolved in a place, isolated from one another, by the tectonic events which resulted in the creation of barriers such as oceans, seas, mountain chains, etc. Therefore, families or even genera possess isolated insular-like distribution patterns. These peculiarities led to an unusually great number of endemic taxa. Due to the lack of fossils, all hypotheses rely on the actual distribution data and the speculative timing of the tectonic events with the possible evolution of different phylogenetic earthworm lineages.

There is a general agreement among the specialists that the distribution patterns of endemic terrestrial earthworms should be connected to some centres of the tertiary landmasses

Advances of the 4th International Oligochaeta Taxonomy Meeting
Zoology in the Middle East, Supplementum 2, 2010: 89–110.
ISSN 0939-7140 © Kasparek Verlag, Heidelberg