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CLIMATE-RELATED SHELL VARIATION IN *TROCHULUS STRIOLATUS* (GASTROPODA: HYGROMIIDAE) AND ITS IMPLICATIONS FOR SUBSPECIES TAXONOMY

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The shell size of the land snail *Trochulus striolatus* varies widely within and between populations. Its shells from four biotic zones (lowland, submontane, montane and subalpine) were measured to identify the potential effect of bioclimatic factors and spatial variables (altitude, latitude and longitude) on the shell size and shape. Many of the shell features describing its size were significantly negatively correlated with precipitation parameters, temperature range and seasonality, longitude and altitude, and positively correlated with minimum temperature of coldest month, mean temperature of driest and coldest quarter as well as latitude. The shells were smaller at higher altitudes and in colder environment with larger temperature amplitudes. We propose that the reduced growth period is an adaptive response to the shorter vegetation season in mountainous regions, compared to lowland oceanic areas, where the longer season permits a longer growth resulting in larger mean adult body size. Our results suggest that in temperate climate the synergetic interactions between seasonality, temperature and moisture availability explain best the size variation. The ultimate size of *T. striolatus* is mostly a response to prevailing local environmental and/or climate variables. In this context, we show that the shell measurements and features do not justify the recognition of subspecies. Aperture width and height showed the strongest correlation coefficient with altitude, which was at best described by linear rather than non-linear models. It indicates a continuous cline of these features. However, relationships of most other shell characters were better fitted by non-linear models.

Keywords: altitude, phenotypic plasticity, subspecies, *T. s. abludens, T. s. danubialis, T. s. juvavensis*

ONGOING SPECIATION AND GENE FLOW BETWEEN TAXONOMICALLY CHALLENGING *TROCHULUS* SPECIES COMPLEX (GASTROPODA: HYGROMIIDAE)

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Geographical isolation, selection and genetic drift can cause the geographical diversification of population and lead to speciation. Due to the lack of a clear morphological diversity and complicated taxonomy, land snails of the genus *Trochulus* is an ideal object to study the evolutionary processes. An identification of the *Trochulus* species remains problematic because of big shell similarity of many taxa and a significant influence of environment on variation in their shell size, which lead to recognition of extremely distinct morphological forms in the same species. Recent studies revealed very complicated relationships among some taxa and still raised questions about the status of forms resembling *T. hispidus*, such as *T. sericeus, T. plebeius* and *T. coelomphala*. Another poorly known species that can be involved in this taxonomic Gordian knot is *T. graminicola*. Adopting an integrated approach, that utilises both morphological and molecular markers (COI and microsatellites), as well as ecological preferences, we show an intricate evolutionary history within the genus, which includes frequent inter-specific gene flow and the permeability of species barriers. We suggest an incomplete speciation coupled with rapid morphological divergence within the genus. The current isolated populations could also inherit the same markers from an ancestral widespread population and are differentiated in shell morphology because of local environmental conditions.

Keywords: canonical discriminant analysis, c, cytochrome c oxidase subunit I, ecological preferences, microsatellites, phylogenetic analyses, land snail, species delimitation