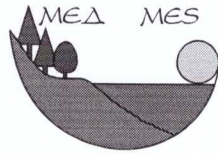**Macedonian Ecological Society**

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ABSTRACT BOOK

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Which cranial view (dorsal, ventral, lateral or occipital) best reflects phylogenetic relationships among five European grayling (*Thymallus thymallus*) populations?

Aleksandar Bajić[1], Saša Marić[2], Branko Miljanović[1], Aleš Snoj[3], Oleg Askeyev[4], Igor Askeyev[4], Vida Jojić[5]

[1] *Department of Biology and Ecology, Faculty of Science, University of Novi Sad, Serbia*
[2] *Institute of Zoology, Faculty of Biology, University of Belgrade, Serbia*
[3] *Department of Animal Science, Biotechnical Faculty, University of Ljubljana, Domžale, Slovenia*
[4] *Institute for Problems of Ecology and Mineral Wealth, Tatarstan Academy of Sciences, Kazan, Tatarstan Republic, Russian Federation*
[5] *Department of Genetic Research, Institute for Biological Research "Siniša Stanković", University of Belgrade, Serbia*

The European grayling, *Thymallus thymallus* (Linnaeus, 1758) is salmonid fish species with complex life history depicted mostly by recent genetic research. As a result, at least five major phylogenetic lineages have been described and fine genetic structure in each of the lineages ·has been discovered. Herein, we analyzed cranial morphology of *T. thymallus* from three different basins that correspond to three previously described phylogenetic lineages. Landmark-based geometric morphometric methods were applied to four cranial views (dorsal, ventral, lateral and occipital). We used specimens from five European grayling populations (Adriatic Sea – Soča River, Black Sea – Sava Bohinjka and Una Rivers, Caspian Sea – Bugurla and Kana Rivers). Cranial size analyses revealed significant size differences for all pairwise comparisons (dorsal cranium: $P<0.05$; ventral cranium: $P<0.01$; lateral cranium: $P<0.05$; occipital cranium: $P<0.05$). When comparing centroid sizes (CS) for all four views, Soča population had the largest mean values, while Bugurla population had the smallest values of centroid size means. Significant interaction between log CS and population was revealed only for ventral cranium ($\lambda_{Wilks}=0.1454$, $F_{92,232.07}=1.58$, $P=0.0031$). Therefore, Canonical variate analysis (CVA) of inter-population ventral cranial shape differences was conducted without correction for the allometry. For the other three cranial perspectives, CVA of non-allometric shape variation showed best separation of studied populations at the level of occipital cranium. Namely, populations from the same basin were grouped more tightly, while Soča population was separated from the other four populations. Specimens from Caspian Sea basin showed overall flattening of the cranium in occipital view. In individuals from Soča population dorsal base of supraoccipital crest was moved more dorsally, resulting in higher skull with pronounced supraoccipital crest. Most of the landmarks digitized on occipital cranium were located on neurocranial skeletal elements that are generally considered more conservative and thus gave best reflection of phylogenetic relationships.

Keywords: Salmonidae, geometric morphometrics, allometry, morphology, shape, skull, size