

POPULATION BIOLOGICAL DIVERSITY AND BIOINDICATOR ASSESSMENT OF THE RED FOX (*VULPES VULPES* L., 1758) IN ITS EUROPEAN AREAL

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Summary of PhD Thesis

On the basis of the overall analysis of the population biodiversity and the subspecies variability of the red fox (*Vulpes vulpes* L., 1758) in 25 local populations in its European areal, the clarified characterization of the fur coloring, the bioindicator role of the species and population size in Bulgaria, were made the conclusions:

In the studied populations of the red fox in Europe, there is a pronounced epigenetic polymorphism in the expression of the craniological characteristics. The analysis of the epigenetic variability of the red fox in Europe shows that it is highest in the local populations of foxes, inhabiting the Scandinavian Peninsula. There is a tendency to decrease of the epigenetic variability towards the south, with lowest epigenetic variability are being the red foxes from the flat part of the Iberian Peninsula, and highest – of the foxes from the mountainous habitats on the Balkan Peninsula. Despite the weak variations, it remains the same order in all investigated local populations in southern Europe. This confirms that in the central and southern parts of the continent, despite the different ecological conditions in the habitats of the species, are realized homogeneous populations in their non-metric craniological characteristics.

The analysis of epigenetic variability, epigenetic distances and uniqueness of the studied red fox populations in Europe, support the notion that foxes from the territory of Northern Europe (Sweden) on the one hand and the populations of the species from Central, Southwestern and Southeast European have well-established craniological distinctness. The lack of statistically significant epigenetic distances among the majority of the local red fox populations in Central Europe, the Iberian and Balkan Peninsula, shows its craniological epigenetic homogeneity in this part of the European continent. On the basis of these results, it can reasonably be assumed that the red fox from the Balkan Peninsula, in its craniological characteristics, belongs to the Central European subspecies *Vulpes vulpes crucigera*.

The characterization of the red fox fur color and the percentages ratio of foxes with different general tint of the body color, indicates that it belongs to the population of the species with homogeneous morphological color characteristic. The established low percentage of “melanogaster” on the fur color, indicates that this type of fur coloring is not typical of Bulgaria and that, according to its morphological exterior characteristic, the Bulgarian red fox belongs to the subspecies inhabiting Central Europe – *Vulpes vulpes crucigera*.

As a bioindicator for the quality of the environment in its habitats, the species was characterized by analyzing of the content of bio-elements - K, Na, Ca, Mg и Fe, elements with a dose-dependent toxic effect - Cu, Mn, Zn, and elements with a strong toxic effect - Cd, Pb, in the organs - "targets" (liver and kidney). It has been developed a normative base for the determination of the individual parameters of the red fox loading in the specific environment of their habitat. It has been showed the possibility of using the species as a bioindicator in the assessment of the quality of the natural environment in natural natural ecosystems and protected territories as well as in areas with different degrees of anthropogenic impact and urbanization.

The established models of linear regression dependency, allow for reliable recalculation of the fresh and air dry weight of the tissues of the "target" organs in the bioindicator species red fox. Was revealed the possibility to perform a comparative analysis of the bioaccumulation of heavy metals in them in a geographical and temporal aspect.

Has been expanded the ecotoxicological characterization of the red fox as bioindicator through the appearance of the content of toxicants in the hair of the species and it has been created a normative base for the individual categorization of each individual indiscriminately from his habitat. It was confirmed the possibility of applying humane attitude to the studied individuals as bioindicators without the need to be killed them.

Has been estimated the population number of the red fox in natural environment on the basis of annual data of the shot individuals of the species, also with its biological characteristics, in view of its planned and science-based regulation of the number.