Oribatoid mite complexes as the soil type bioindicator

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The study of the oribatoid mites ecology and distribution in the soils of the USSR represents a fragment of pedozoological investigations, being carried out under the guidance of M. S. Ghilarov. The materials were collected in 1960-1972 from the tundra, taiga, mixed and broad-leaved forests, forest-steppe, steppe, desert and subtropical natural zones. Samples were extracted in the modified Berlese's funnels. There were some aspects of our investigations.

Vertical migrations of mites. There is close correlation of the vertical distribution of oribatids, humus and root systems in the soil profile (Fig.1). Mites can inhabit all parts of the soil profile to the depth 100-200 cm, but their vertical distribution varies widely at different seasons. For example, the vertical distribution of oribatids in the soddy-podzol, podzol and brown forest soil types near Moscow differ especially in the winter, as a result of different depth of the hard frozen soil horizon. Oribatoid mites inhabit the forest litter and all parts of the soil profile at a depth 115 cm, in the soddy-podzol soil type of Piceetum-myrtillusum. There were daily and seasonal migrations of the mites in upper soil layer (0-10 cm) at all the seasons, except winter, when the soil was frozen. The mites migrate in the inner parts of soil profile (10-115 cm) at all the seasons during the periods of long weather change. They can react upon a temperature gradient as low as 0.1 °C.

Some regularities in the zonal distribution of mites. The oribatoid mite population density is very low, mites inhabit only the litter and upper soil part (0-10 cm). In subarctic or tundra zone the population density reaches 10000-20000 spec./m², they penetrate in the soil to 5-30 cm depth. The population density in taiga, where the podzol soils predominate, reaches 60000-100000 spec./m². The majority of the mites concentrate in the litter and upper soil layer (0-10 cm), but many of the mites penetrate to 20-40 cm. In chernozems
under broad-leaved forests the oribatids penetrate to a depth of 1-2 m and their population density is 40000 spec./m². The oribatid mite number in the arid territories decreases gradually in southern direction (steppe, semi-desert, dry mediterranean regions, desert), it reaches 20000 spec./m² in North steppe, 5000 in South steppe, 200 spec./m² in deserts. Oribatid mites occupy more than 1 m² and can migrate in the inner soil layers in the summer period. The population density of the oribatids in the natural habitats depends on the soil moisture quality of the fallen dead plant materials and intensivness of the decomposition processes. Number of mites can be calculated by the coefficient of suitability (A) by the formula $A = \frac{F + L}{P \cdot n} \cdot R \cdot K$. ($R$ - index of radiation balance, $F$ - annual amount of the fallen plant material, $K$ - coefficient of humidity, $L$ - weight of the litter, $n$ - number of the annual generation of oribatids). The close correlation between "A" and real population