



Activity of Zoofauna in the Soil

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Abstract: Soil is a component of the lithosphere layer and serves as an environment for various organisms. Soil is important in the life activity of edaphobionts. The unique hydrothermal regime of the soil environment caused several changes in the morphological structure, even movement, biochemical and physiological characteristics of animals.

Keywords: soil, geophilic insect, hydrothermal regime, biochemical adaptation, physiological adaptation, morphological adaptation, arthropod, epicuticle, nanofauna, microfauna, mesofauna, macrofauna.

Currently, soil zoology is one of the youngest sciences. But the importance of animals in the periodic cycle of substances in nature was known already in the 18th century. At that time, K. Linnaeus wrote that in the tropical region, the offspring of three flies will eat the carcass of a horse faster than one lion. But for a long time, the soil was considered as a dead rock. Only in the 19th century, the German chemist Y. Liebig discovered that all plants contain 10 elements (S, K, N, S, Te, Ca, Mg, N, P, O), and only N, P, K are in the soil. lack of it indicates the need to add (fertilize) these three elements to the soil to increase soil fertility.

The unique hydrothermal regime of the soil environment caused several changes in the morphological structure, even movement, biochemical and physiological characteristics of animals.

1. Adaptation in the behavior of animals includes the actions they take to find the most convenient place and food, to avoid enemies or unfavorable conditions. For example, the main part of geophilous insects is found in the surface part of the soil 5-20 cm. In summer, they fall to a depth of 20-40 cm, and in autumn to a depth of 40-50 cm. In winter, animals move to deeper layers. This migration of animals can be explained by the change in soil hydrothermal (moisture and heat) regime.
2. Biochemical adaptation in the process of evolution consists of the adaptation of the enzymatic system of animals to a certain temperature, temperature and pH level. Each enzyme is active at a specific pH and temperature regime.
3. Physiological adaptation includes reproduction of animals, adaptations in life activities. Water enters the body of soil animals along with food or through the body covering. A part of the food remains in the intestine of ground-dwelling insects. This food acts as a moisture storage depot.
4. Morphological adaptation is the adaptation of the body structure of animals to the external environment. Such adaptations are related to the structure of the animal's body cover, movement organs and internal organs, breathing, digestion and elimination systems.

The body of animals belonging to the arthropod type is covered with a hard chitinous cuticle. Chitin acts as a support for body organs. But chitin is water permeable. For this reason, soil animals can live

in moist soils saturated with water vapor. Calcareous substance is absorbed into the cuticle of grasshoppers that live in the surface layers of the soil.

Arthropods living on land have an epicuticle, a waterproof lipid layer, on the surface of the chitin cover. Together with the formation of the epicuticle, a respiratory organ adapted to land - a lung - appeared in arthropods.

Morphological adaptation is not shown in the same way for all ecological groups of soil animals. Morphological adaptation is mainly characteristic of mego-, macro- and mesofauna animals. Morphological adaptation for nanofauna and microfauna consists of a slight change in body size.

For microscopic animals, soil is microscopic water bodies. They can be considered mainly aquatic animals. Because they live in the water layer above the soil particles or in the gravitational water between the particles.

In representatives of nanofauna and microfauna, respiration occurs through the entire body surface. Oxygen enters their body by diffusion.

The soil for representatives of mesofauna and macrofauna consists of a system of small caves. Arthropods, protura, symphyla, and mites have no tools to help them dig the soil. In most of them, the respiratory system is not developed. It breathes soil air saturated with water vapor through the body cover. They are very intolerant of lack of moisture. As the humidity decreases, they will fall deeper through the pores of the soil. But as the diameter of the soil decreases as it deepens, only small species have the opportunity to migrate. The body of slightly larger representatives of the mesofauna is covered with a partially impermeable shell or epicuticle with a thick impermeable layer. These devices temporarily prevent their bodies from drying out when moisture is depleted. But it does not allow breathing through the body. Therefore, they have a very simple breathing organ - the trachea system. When the soil is flooded, representatives of the mesofauna live in air bubbles. Air animals accumulate on the surface of their bodies covered with hairs and scales. Such an air bubble acts as a physical injury for animals. The animal breathes oxygen that diffuses from the environment into the air bubble.

Macro- and mesofauna animals are somewhat resistant to soil freezing in winter.

For macrofauna animals (insects and their larvae, arthropods, enchytrids, earthworms, molluscs, crustaceans), the soil is a dense environment that provides some resistance to their movement. Their body structure is quite flexible and divided into joints (earthworms, arthropods), adapted to movement between soil particles. Insects and their larvae have thick chitinous heads and legs, enlarged front legs, and are covered with hairs and outgrowths that help push soil particles.

Special respiratory organs of representatives of macrofauna consist of trachea or lungs. At the same time, the skin also participates in breathing. Some representatives (enchytreids, earthworms) breathe only through the skin. These animals lead a very active life. With a decrease in temperature in winter and a decrease in humidity in summer, they penetrate into the deep layers of the soil.

Animals that are part of the megafauna (some earthworms, bats, earthworms, etc.) make a complex system of burrows in the soil. Their external appearance and internal structure show that they are adapted to live in the soil. In particular, their body is compact, their neck is short, their fur is short and thick, their feet are adapted to digging the soil, they are provided with strong claws, and their eyes are not well developed. And some animals dig the soil with the help of sharp spade teeth.

Thanks to the services of scientists, by the middle of the 20th century, a lot of information about the activity of various animals in the soil was collected. M.S. Gilyarov managed to summarize these data. According to him, the soil served as an intermediate environment for animals during the transition from water to land.

Today the study of organisms living in the soil is comprehensively carried out by the scientists of Uzbekistan, V.F. Nikoliuk, YE.S.Kiryanova, Z.N.Norboyev, O.M.Mavlonov, SH.Kh.Khurrarov, N.H.Hakimov, L.Hakimova, J.T.Sidikov, X.E.Eshova, A.Y.Rakhmatullayev, P.B.Khaydarova. The researches of G. Abdurakhmonova, A. SH. Khurrarov, Q. Ibragimov and others should be noted. At

the same time, experts of botany, microbiology, mycology, algology, entomology, protistology, phytohelminthology, soil science, geology, chemistry and other sciences are also participating in this research.

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