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General Scheme of the Process of Soil Formation

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Abstract: This article describes the scheme of the process of soil formation, about the scientists who contributed to it, how important the specific properties of soil are to society, and about the formation of soil in rocks**..**

Key words: Soil, Rocks, scientists, biophysical-chemical processes, wind, radiation.

Enter. The soil was formed from the rocks. However, soil differs sharply from rocks in a number of its properties, especially its fertility, i.e., the ability to provide plants with water, air, nutrients, and other life factors. The processes that take place as a result of the interaction of weathering and soil formation processes are of great importance in the formation of soil, which is considered a natural rock with these characteristics. The general theoretical understanding of soil formation processes was formed due to the scientific activities of V.V. Dokuchayev, P.A. Kostichev, N.M. Sibersev, V.R. Williams, P.S. Kossovich, K.D. Glinka, G. Iyenni, F. Dushofur and other famous scientists. The services of I.P. Gerasimov, V.A. Kovda, B.P. Polinov, I.V. Tyurin, A.A. Rode, S.P. Yarkov and other researchers play an extremely important role in the development of the doctrine of the process of soil formation. Soil formation is an extremely complex biophysical and chemical process. According to A.A. Rode, the process of soil formation refers to the sum of events such as the change and movement of substances and energy in the soil layer. The formation of soil begins with the appearance of living organisms on solid rocks or on their products formed by weathering and re-deposition under the influence of water, ice, wind, gravity (the property of attracting each other). The process of primary soil formation occurs in the first stages of the process in bedrock, igneous or sedimentary rocks, essentially in combination with the weathering process, and the soil formed in dense rock material is formed together with the weathering crust. . At later, more mature stages of surface development, weathering and soil formation are separated in space and time, and soil is formed only in the uppermost zone of the weathering crust, often from its formation and re-formation. formed only after laying. In this regard, it should be noted that during the abiotic period of the earth's surface development in the long geological past, the weathering process took place without the formation of soil, and there was only weathering crust on the surface of the earth, and there was no soil.

It is of great importance to separate the processes of weathering and soil formation and, accordingly, weathering skin and soil as different natural bodies. Therefore, the factors (agents and conditions) of weathering and soil formation are similar to each other, and these processes occur in the same thermodynamic conditions on the surface of the earth, and their respective global differentiation is similar, but the processes are different. and the end products of these processes are different. Weathering crust of rocks is a product of the breakdown of rocks, transformation (change) of mineral components, sorting and re-deposition according to the size of their mass along the way of movement - gravigradational sedimentation (sedimentation). The soil is a newly created specific biocos natural body, which differs from the decaying crust by the presence of humus, its unique morphology, hierarchical structure, and global functions. In the process of weathering, moving from one place to another and redepositing, rocks acquire a number of new properties that are not characteristic of the original dense rocks and are important for the formation of soil: 1) dense , passes from a solid state to a porous,

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fragmented state; 2) has porosity, due to which it has air capacity and air permeability, moisture capacity and water permeability; 3) along with primary rock-forming minerals, the rocks of the weathering crust store secondary minerals, including colloidal and colloid-sized clay minerals that are products of transformation and neosynthesis and have exchangeable absorption capacity; 4) is redistributed on the surface of the earth according to its granulometric, mineralogical and chemical composition; 5) keeps biophilic elements, as well as toxic chemical elements, in a form convenient for living organisms; 6) it has lithological layering, which is formed during the processes of weathering, mixing and redeposition of materials. Thus, rocks acquire a number of properties during weathering, which are very important for the soils formed from them. In the process of soil formation, which occurs simultaneously with weathering or after it, these properties develop further and become soil properties. A weathering rock that remains in place after formation (eluvium of rocks) or is moved from one place to another by water or wind or gravity (rocks of different sizes, composition and properties decomposition products), the emergence of bottom and higher plants and fauna (animal world) associated with them, accordingly, serves as a favorable substrate for the rapid development of soil formation.

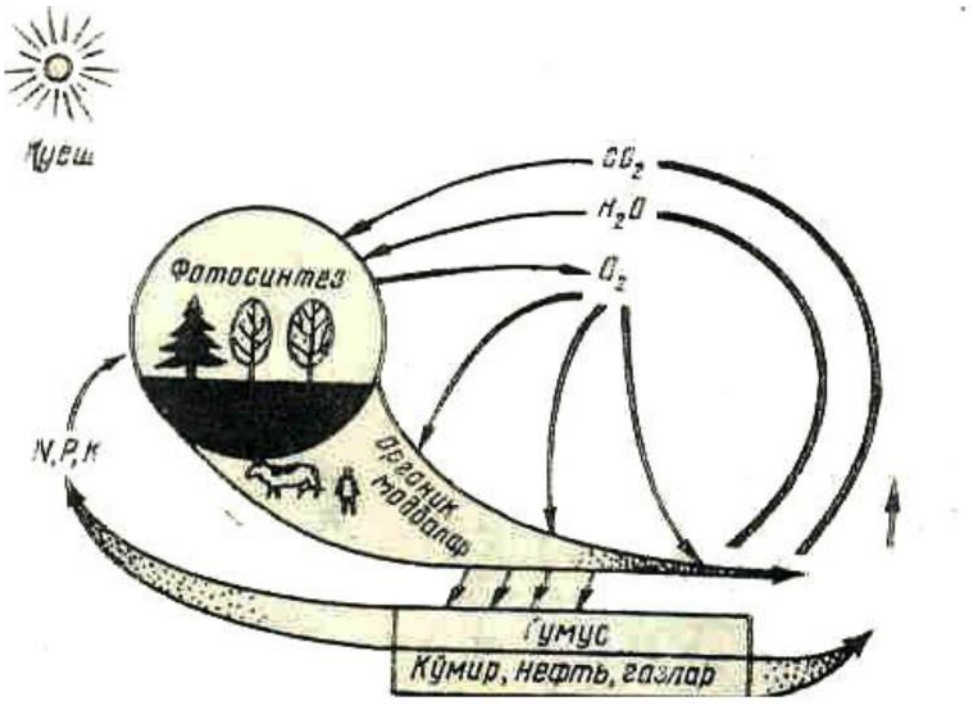
The formation of soil is mainly due to the formation of a unique structure (hierarchical soil structure) at the limit of the thickness of the original rock that is exposed and exposed, the newly formed soil has special properties and functions, and in the general dynamics of geospheric processes on the surface of the earth, this structure (structure), causing regular dynamic re-creation of properties and functions.

Large geological and small biological cycle of substances in nature.

It is known that the soil originates from the rocks. However, during the period when living organisms have not yet affected the rocks that have come out of the earth's surface, only the weathering process takes place in the rocks. As a result, the ash elements (Ca, Mg, K, P, S, etc.) contained in the decomposition products, which are nutrients for plants, are washed away under the influence of atmospheric precipitation and are transported to the seas and oceans under the influence of surface currents and seepage waters. carried away and deposited in whole or in part, resulting in the formation of marine sediments. Every year, 20-25 billion tons of water flows into the oceans of the world. mineral particles are discharged, the main part of which is soil are particles. Due to the long-term geological processes in the history of the earth, the seas turn into land, the sediments in it are released to the surface of the earth, and it undergoes a series of complex weathering processes. This circulation of substances between land and oceans is called the great geological cycle. Due to its direction, in this cycle, ash elements necessary for plants in weathered crust rocks do not accumulate in it, but on the contrary, they decrease and become impoverished.

The transformation of rocks into soil occurs as a result of the simultaneous action of two processes, such as weathering and soil formation. The process of soil formation takes place only due to the interaction of living organisms, including higher plants and microorganisms. Plant roots growing on the surface of rocks penetrate to a certain depth and occupy a large part of it. As a result, nutrients such as P, S, Ca, Mg, K, scattered in the rocks, are absorbed by the roots, and nitrogen also begins to accumulate. Formation and accumulation of nitrogen in rocks is mainly the result of biochemical activity of microorganisms. Plants synthesize organic substances using the energy of carbon dioxide, water, ash elements, nitrogen and sunlight in the air. Plant residues containing ash begin to accumulate in the rocks and their upper parts. These substances, in turn, are a source of food and energy for microorganisms. Organic residues are decomposed under the influence of microorganisms, and part of them turns into new organic matter - humus. These substances begin to accumulate in the upper parts of the rocks due to the slow decomposition and change under the influence of microorganisms, and partially mineralized and separated into nutrients such as nitrogen and ash elements. These substances go into solution, form new complex, low-mobility compounds with the mineral part of the soil and humus substances, and the new generation plants absorb them through the roots. As a result, ash elements in the rocks, as well as nitrogen, begin to accumulate in the soil under the influence of higher plants and microorganisms and undergo a number of biochemical changes. These newly formed substances in a much less mobile form are collected in the upper layers of the rocks. So, there is a cycle of ash elements and nitrogen between the vegetation and the rocks turning into soil, which is connected with the continuous synthesis and

decomposition of organic substances. As a result of this, mineral and nitrogenous nutrients, which are an important factor of soil fertility, gradually accumulate biologically in the upper parts of the rocks. This cycle of substances in nature is recommended by V.R. Williams to be called a small biological cycle of substances (Picture. 2).



Picture 2. The circulation of substances in nature

As a result of this process, which in its essence is opposite to the geological cycle of substances, as a result of this process, the substances formed from the mineralization of organic substances and easily soluble weathering products in water are absorbed by plants, and as a result, these substances are partially or completely in the upper parts of the body. accumulates and gets caught. The accumulation of biological assets or elements necessary for the life of plants in the upper parts of rocks that become soil is closely related to the ability of selective absorption characteristic only of plants. This biological cycle of substances that occurred at a certain stage of the earth's development takes place on the basis of geological cycle. So, these two processes are related to each other. Part of the nutrients produced by the decomposition of mineral and organic substances and not absorbed by plants can be washed from the soil into seepage waters under the influence of atmospheric precipitation and added to the geological cycle.(Figure 2).

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