required for their registration as plant protection products. However, they have a number of disadvantages, in particular, a relatively narrow range of action, too short a lifetime, high cost, which does not allow them to become a full-fledged alternative to chemical insect control agents. Various approaches are used to overcome these shortcomings. For example, reducing the cost of bioinsecticide production can be achieved and is achieved by optimizing the conditions for growing bacteria and using cheaper nutrient media. To increase the duration of action of insecticidal Bt proteins, special additives are added to the formulations. To increase the effectiveness and / or expand the spectrum of insecticidal activity construct strains Bt containing certain combinations of determinants of crystalline proteins. About 60 subspecies of Bacillus thuriengiensis have been described so far. Different strains of Bt differ significantly in the spectrum of insecticidal action and toxicity of their crystalline proteins. This is due to the large variety of δ-endotoxins synthesized by different strains of Bt, and the production in cells of one strain of parasporal inclusions containing several different insecticidal proteins. For example, B.thuriengiensis subsp. kurstaki is toxic to scale pupae, thick-headed, mermitid and caterpillars of spruce buds. B. thuriengiensis subsp. israelensis kills dicotyledons: mosquitoes and flies, etc. Bt-based drugs are available in many countries around the world. They have different commercial names: entobacterin, dendrobacillin, dipel, turicide, agritol, bactan and others.

In Ukraine, in the Vinnytsia region, there is a plant of microbiological synthesis drugs "Enzyme", which produces bioinsecticide "Bactoculicide" - a sporocrystalline complex containing delta-endotoxin of entomopathogenic spore bacteria Bacillus thuringiensis var. israelensis, which is formed during the fermentation of the culture. The drug is an intestinal poison for the larvae of all types of mosquitoes. The toxin, getting into the body of larvae with food, causes digestive disorders, toxicosis and death.

Conclusion. Thus, research has shown that one way to solve the problem of creating effective and environmentally friendly drugs to control insects is the use of bioinsecticides, such as recombinant strains based on Bacillus thuriengiensis.

SKIN MICROBIUM AND ITS INTERACTION WITH THE ENVIRONMENT

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Introduction. The microbiome of human skin plays an important role in homeostasis and the protective function of the skin. An important role in the formation of the microbiome of human skin is the environment, because it is in constant interaction with the skin, for example through washing, hygiene habits and else. Identification of normal and pathogenic microbes and determining their relationship with the host, will help to decipher their functions in healthy skin, as well as in dermatological diseases.

Aim. The skin microbiome plays an important role in the skin barrier function, so it must remain dynamic, adapt to changes in the environment that occur in different parts of the body throughout life. The purpose of the work is to determine the factors that most affect the function of the skin microbiome, to identify communities of microorganisms that can contribute to changes in normal physiology and the development of skin diseases.

Materials and methods. We used the descriptive research method: literary and Internet sources that are freely available were analyzed.

Results and discussion. Healthy skin microbiome has been thoroughly studied, it is thousands of species of bacteria on one person. Bacteria are present on the surface of the skin, in the deeper layers of the epidermis, even in the dermis and skin adipose tissue. The total skin area in adults is usually estimated at about 2 m2; the surface area of the skin suggests that microbial communities living on the skin can have a significant impact on human health.

Most types of bacteria on the skin are non-pathogenic and saprophytic, but some can become pathogenic. Fungi, viruses and mites are also found on the skin, with seborrheic regions dominated by fungi of the genus *Malassezia*. Each of these microorganisms have different metabolic adaptations for survival in different microenvironments of the skin.

The most common types of bacteria found on human skin belong to only four genera: *Actinobacteria*, *Firmicutes*, *Proteobacteria* and *Bacteroidetes*. The predominance of these genera in specific areas of the skin depends on factors such as moisture levels, sebum content, temperature, pH and UV exposure. Sebaceous areas are mostly colonized by *Cutibacterium* (*Propionibacterium*), and their microbiomes are generally less diverse, less evenly distributed, and less abundant than wetland microorganisms containing predominantly *Corynebacterium* and *Staphylococcus* species.

The environment in which we live has a great influence on the skin microbe, because the epithelial surface of the skin is in direct contact with the external environment. In particular, changes in skin microbial communities can be observed between people living in rural areas and those living in cities. Such variations in the microbial composition of the skin between rural and urban residents can be explained by different levels of exposure to soil, aquatic and host-associated microbial sources. Different cultural lifestyle habits and factors can also cause disproportions in skin microbiomes.

In particular, urbanization correlated with an increase in the relative number of human skin-associated fungi and bacteria in homes, as well as an increase in the diversity of fungi at home and on the skin. A negative correlation between bacterial skin diversity and detergents has been observed, suggesting that these products may take into account, at least in part. In general, the results of these studies indicate that urbanization has a large-scale effect on the chemical and microbial composition of human skin. Many factors are involved in these changes, such as lifestyle, home architecture, number of occupants in the house, air pollution, detergents and the use of cosmetics, among many others.

Conclusions. Microbiomes can serve as sensors for planet health and its inhabitants. Understanding the interactions between our surrounding and internal microbial communities is important for accurately predicting the impact of pollution or environmental change on human health. In particular, urbanization can disrupt the condition of the skin and, as a consequence, human health, because the skin is the first line of physical protection against external aggressors. Therefore, the study of the microbiome of human skin in order to create complex means with pro- and prebiotics, by normalizing its own microflora for the treatment of dermatological diseases is an important aspect of modern biotechnology.

CRISPR – THE MAIN MEDICINE OF THE FUTURE

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Introduction. Is it possible to cure genetic diseases? How can humanity leave AIDS, cancer and malaria in the past forever? Genetic engineering answers these questions.