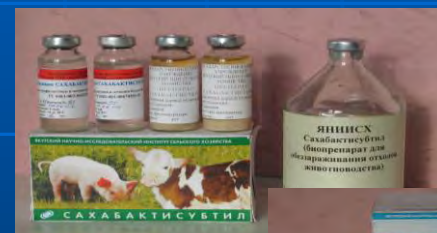


Federal Research Centre "Yakut Scientific Centre of the Siberian
Branch of the Russian Academy of Science M.G.Safronov Yakut
Scientific Research Institute of Agriculture
LLC Scientific-**Production Center "Hotu-Bact"**
Yakutsk, Russia

DEVELOPMENT AND PRODUCTION OF BIOLOGICAL
PREPARATIONS FOR OBTAINING ORGANIC PRODUCTS OF
AGRICULTURE

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The Yakutsk Research Institute of Agriculture and its small innovative enterprise LLC Scientific-Production Center Hotu-Bact develops and produces environmentally friendly veterinary preparations for livestock.



Herd horse breeding is one of the main and promising branches of agriculture in Russia and the Republic of Sakha (Yakutia).



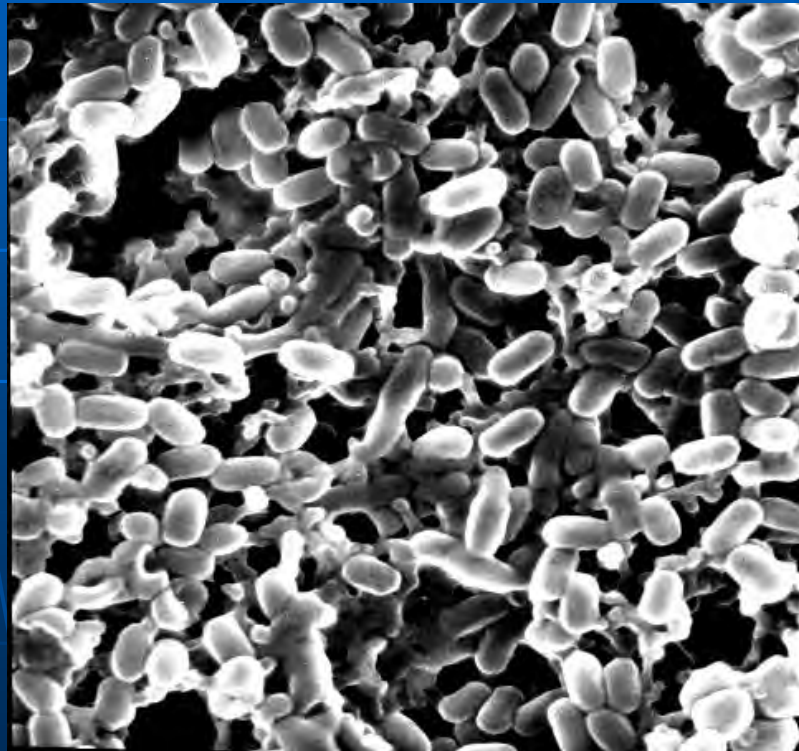
The Yakut horse, adapted to the extreme climatic conditions of the Far North, is characterized by exceptional adaptability and endurance, which allows it to be bred almost throughout the republic - from temperate latitudes to the Arctic Circle. 70% of the total herd of horses of the Russian Federation are in Yakutia.



To further increase the number of livestock, improve the quality of horse breeding products, and ensure the epizootological well-being of horse infectious diseases, for the first time in Russia we have developed highly effective, inactivated vaccines against the wash, salmonellosis and rhinopneumonia of horses, which are widespread in the countries of the Asian continent. Vaccines are approved by the Rosselkhoz nadzor of the Ministry of Agriculture of the Russian Federation.



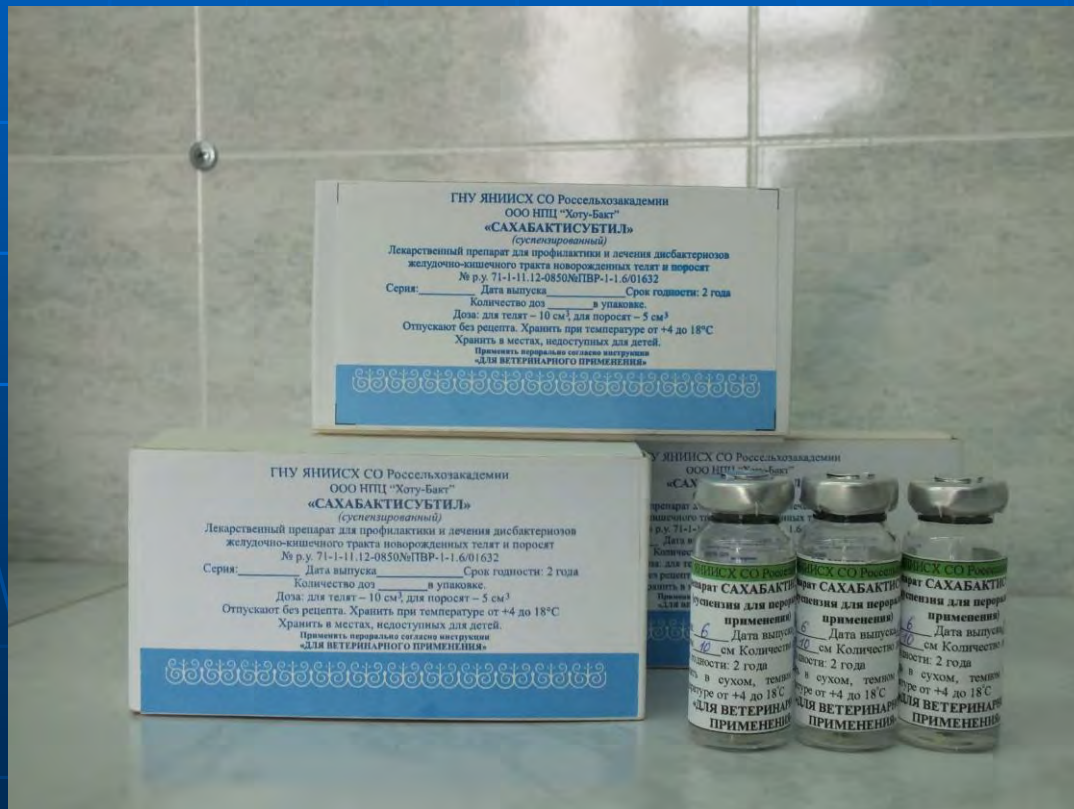
The Republic of Sakha (Yakutia) has rich natural resources, but few people know that the nature of Yakutia and especially its frozen soils are rich in unique microbial raw materials that are so in demand by modern mankind.





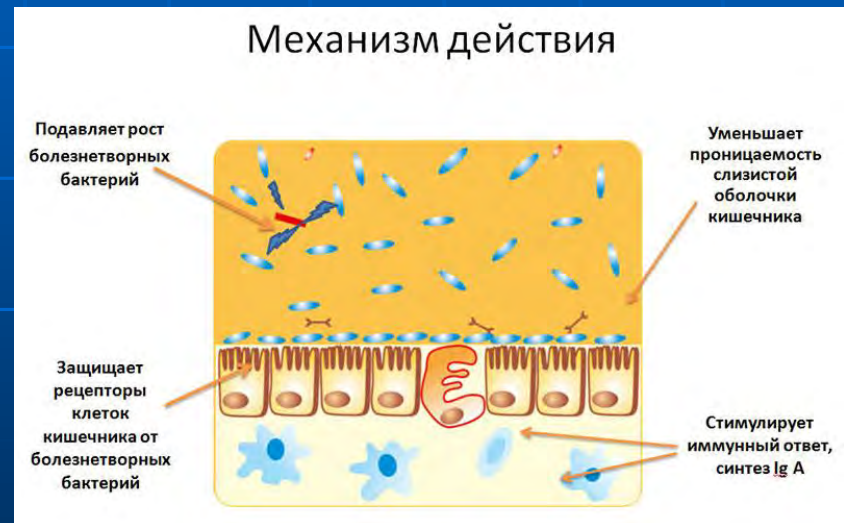
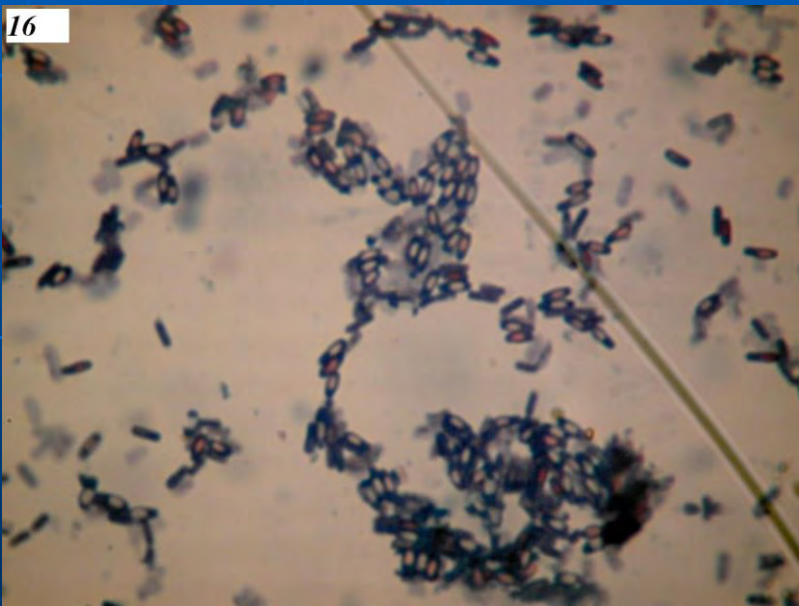
Currently, all over the world, including Russia, there is an active study, development and implementation of safe, effective biological products, as an alternative to chemicals used to control pests, diseases of plants, animals and humans.

Unique Russian drug, a probiotic called Sahabactisubtil, approved by the Rosselkhoz nadzor, was developed at the Yakutsk Research Institute of Agriculture based on the bacterial strains *Bacillus subtilis* TNP-3 and TNP-5 isolated from permafrost soils. The drug has pronounced bactericidal, antiviral and fungicidal properties.



Unlike antibiotics, when the drug Sahabactisubtil enters the gastrointestinal tract, it literally scans the intestinal microbiota and inhibits only the growth of pathogenic and opportunistic microorganisms, including toxigenic fungi, without affecting the beneficial microflora.

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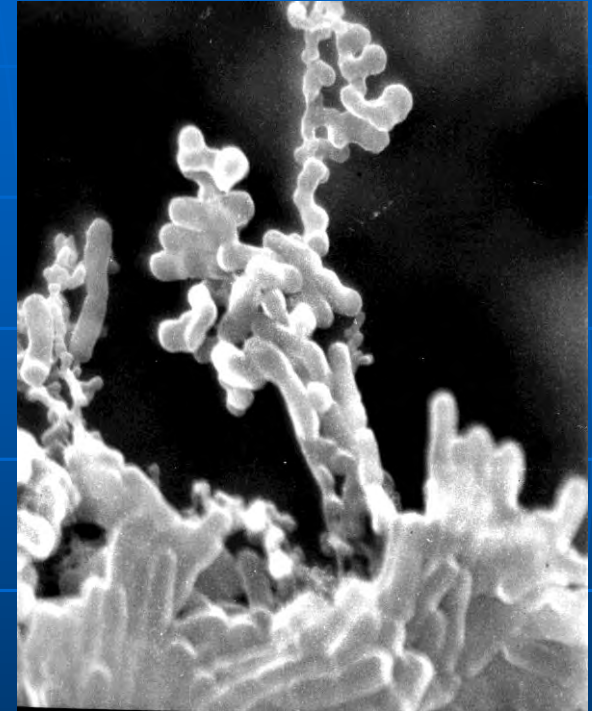


Biological properties of preparations developed on the basis of the bacterial strains *Bacillus subtilis* "TNP-3" and *Bacillus subtilis* "TNP-5" isolated from permafrost soils of Yakutia:

- pronounced bactericidal action against many pathogenic and conditionally pathogenic microorganisms (*leptospira*, *mycobacterium tuberculosis*, *brucella*, *salmonella*, *shigella*, *streptococcus*, *staphylococcus*, *escherichia*), as well as some toxigenic fungi (*Penicillium*, *Aspergillus*, and organisms of pathogenic fungi) (*Rhizoctonia-solani*, *Streptomyces*, *Fusarium oxysporum*);
- - do not inhibit, but rather stimulate the growth and development of their own beneficial intestinal microflora: lacto - and bifidobacteria;



- effective in viral diseases due to the induction of endogenous interferon;
-
- - produce enzymes with proteolytic, gelatinase, amylase, **cellulolytic**, β -gluconase and pronounced xylonase and fructosyltransferase activities;
- - resistant to a wide range of antibiotics, therefore, it is possible to use in combination with antibiotics to quickly eliminate dysbiosis.



There are developments on plant protection, improving soil fertility, bioremediation of oil-marked permafrost soils using bacterial strains *Bacillus subtilis* "Kolyma 7 / 2k", *Bacillus subtilis* "Oymyakon 6/1" isolated from paleomicrobiota of representatives of mammoth fauna preserved in permafrost.

Currently, research is underway on the development of probiotic sanitary-hygienic and disinfectants based on bacterial strains of *Bacillus subtilis*.



It is known that, products fermented with *Bacillus subtilis* are traditionally used in the countries of Southeast Asia, especially in Japan as a product of soybeans - Natto.

Traditional sour-milk products (koumiss, suorate, bipps, tar, etc.) have long been used in the nutrition of Yakuts, in the microbiota of which the dominance of *Bacillus subtilis* strains was established. Previously, the Yakuts, living in extreme climatic conditions of the North (severe, down to minus 50-70°C, long winters, short hot summers up to plus 30-40°C) occupied one of the first places by the number of centenarians in the Soviet Union.

Unfortunately, the use of *Bacillus* bacteria strains is not accepted in the food industry in Russia.

When fermented with strains of *Bacillus subtilis* TNP-3 and *Bacillus subtilis* TNP-5 of cow's milk, a fermented milk product is obtained with a pleasant taste and unique biological properties.



The drugs are not inferior, but also superior in efficiency and of the spectrum of action to many foreign and Russian probiotics. The scientific novelty of the developments is protected by 42 patents of the Russian Federation. In order to commercialize the development, a small innovative enterprise, LLC Scientific-Production Center Hotu-Bact, was organized. The production of drugs is licensed by the Rosselkhoznadzor.





Hotu-Bakt Research and Production Center LLC is a resident of the Technopark of Yakutia, a member of the Russian Skolkovo Foundation, a member of the Asian Scientific Park Association, and the holder of the Excellence Prize ASPA Awards 2019



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