

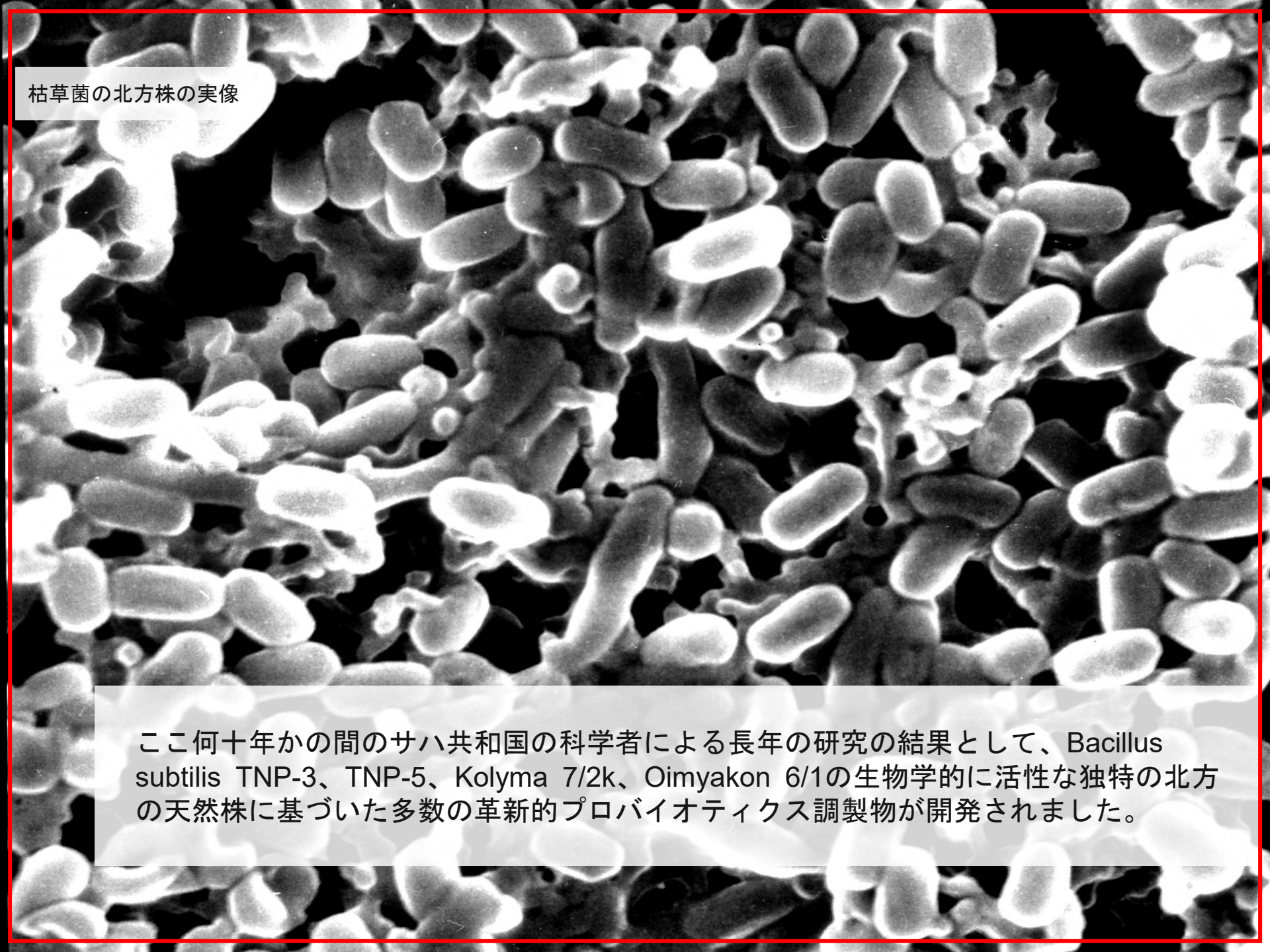
# 有限会社 研究生産センターHotu-Bact



有限会社研究生産センターHotu-Bactは特許取得済みのバイオテクノロジー手法を使用して枯草菌のユニークな北部株に基づいて革新的な製品を開発し製造するのはロシアの北東で唯一の企業です。



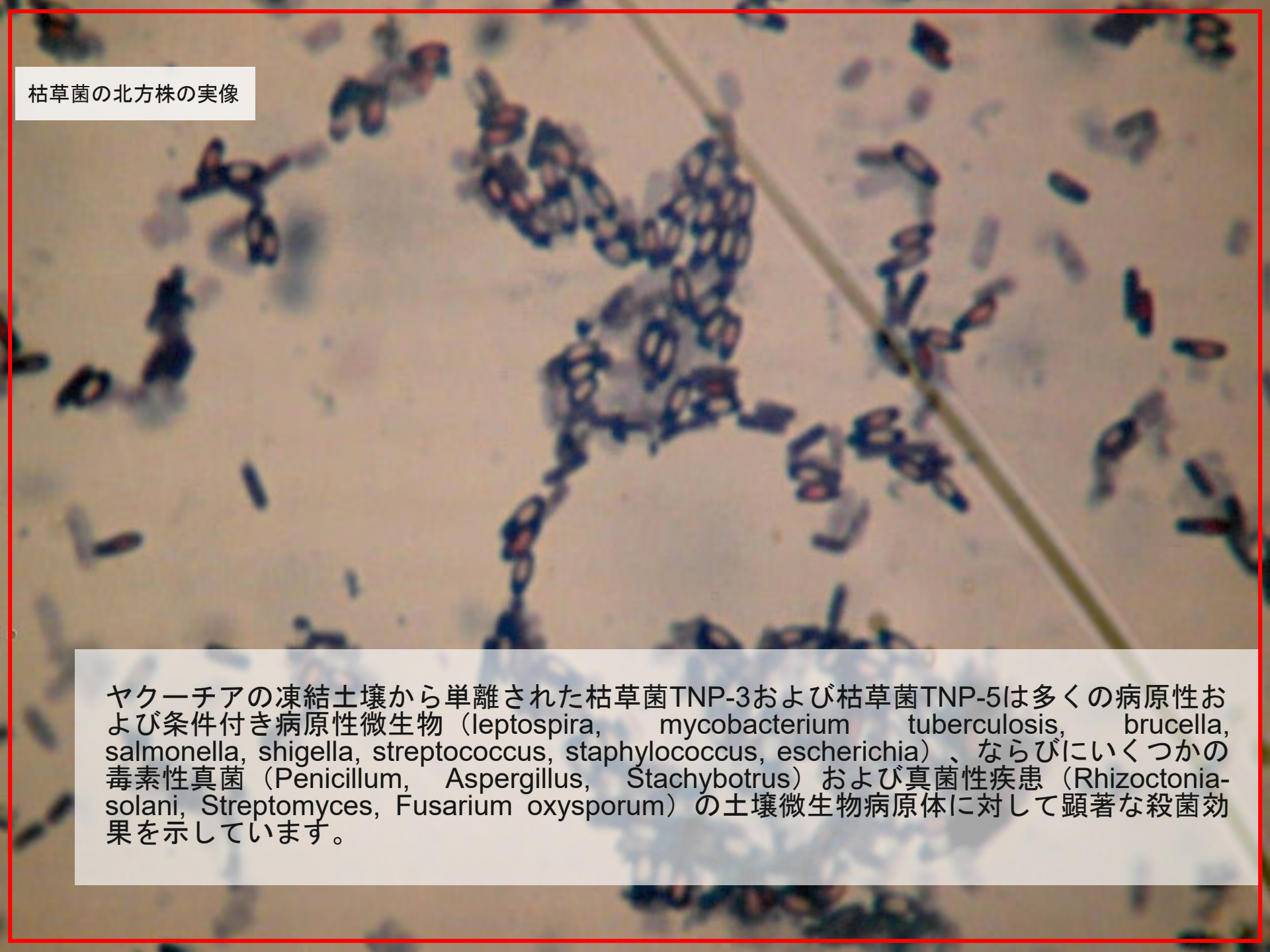
Hotu-BactはステイトイノベーションセンターSkolkovoのリモート居住者です。  
Skolkovoとは新しい技術の開発と商業化のための現代のロシアの科学技術革新複合施設です。



枯草菌の北方株の実像

ここ何十年かの間、サハ共和国の科学者による長年の研究の結果として、*Bacillus subtilis* TNP-3、TNP-5、Kolyma 7/2k、Oimyakon 6/1の生物学的に活性な独特の北方の天然株に基づいた多数の革新的プロバイオティクス調製物が開発されました。





枯草菌の北方株の実像

ヤクーチアの凍結土壌から単離された枯草菌TNP-3および枯草菌TNP-5は多くの病原性および条件付き病原性微生物（leptospira, mycobacterium tuberculosis, brucella, salmonella, shigella, streptococcus, staphylococcus, escherichia）、ならびにいくつかの毒素性真菌（Penicillium, Aspergillus, Stachybotrus）および真菌性疾患（Rhizoctonia-solani, Streptomyces, Fusarium oxysporum）の土壌微生物病原体に対して顕著な殺菌効果を示しています。

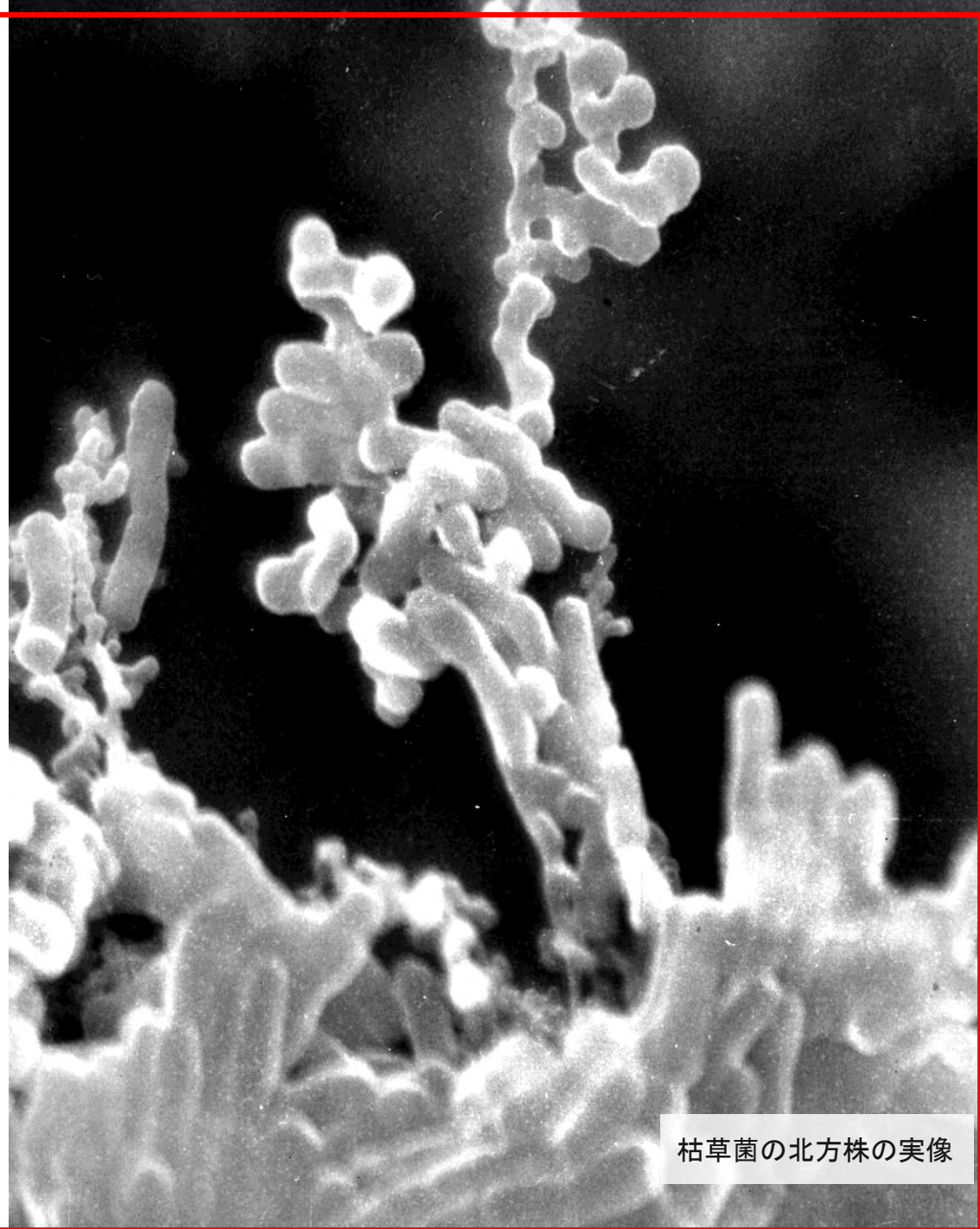
## 枯草菌TNP-3および 枯草菌TNP-5の 菌株

抑制するのではなく、むしろ腸内の有益な微生物叢（ラクトとビフィズス菌）の成長と発達を促進します。

内因性インターフェロンの誘導によってウイルス性疾患に有効があります。

タンパク質分解活性、ゼラチナーゼ活性、アミラーゼ活性、セルロース分解活性、 $\beta$ -グルコナーゼ活性および顕著なキシロナーゼ活性とフルクトシルトランスフェラーゼ活性を有する酵素を生産します。

広範囲の抗生物質に耐性があるため、抗生物質と組み合わせて使用することで、すばやく細菌異化症を解消することができます。



枯草菌の北方株の実像





БИООРГАНИЧЕСКОЕ  
УДОБРЕНИЕ С  
САХАБАКТИСУБИТОМ  
**БОУСС**



枯草菌Kolyma 7 / 2k、Oimyakon 6/1の菌株によって植物の保護、土壌肥沃度の改善、油で汚染された永久凍土土壌のバイオレメディエーションが行われることに対する研究結果があります。

それらは永久凍土において保存されている巨大動物相の代表の古微生物叢から分離された。

現在、枯草菌の細菌株に基づくプロバイオティクス衛生と消毒剤の開発に関する研究が行われています。

バイオ有機肥料

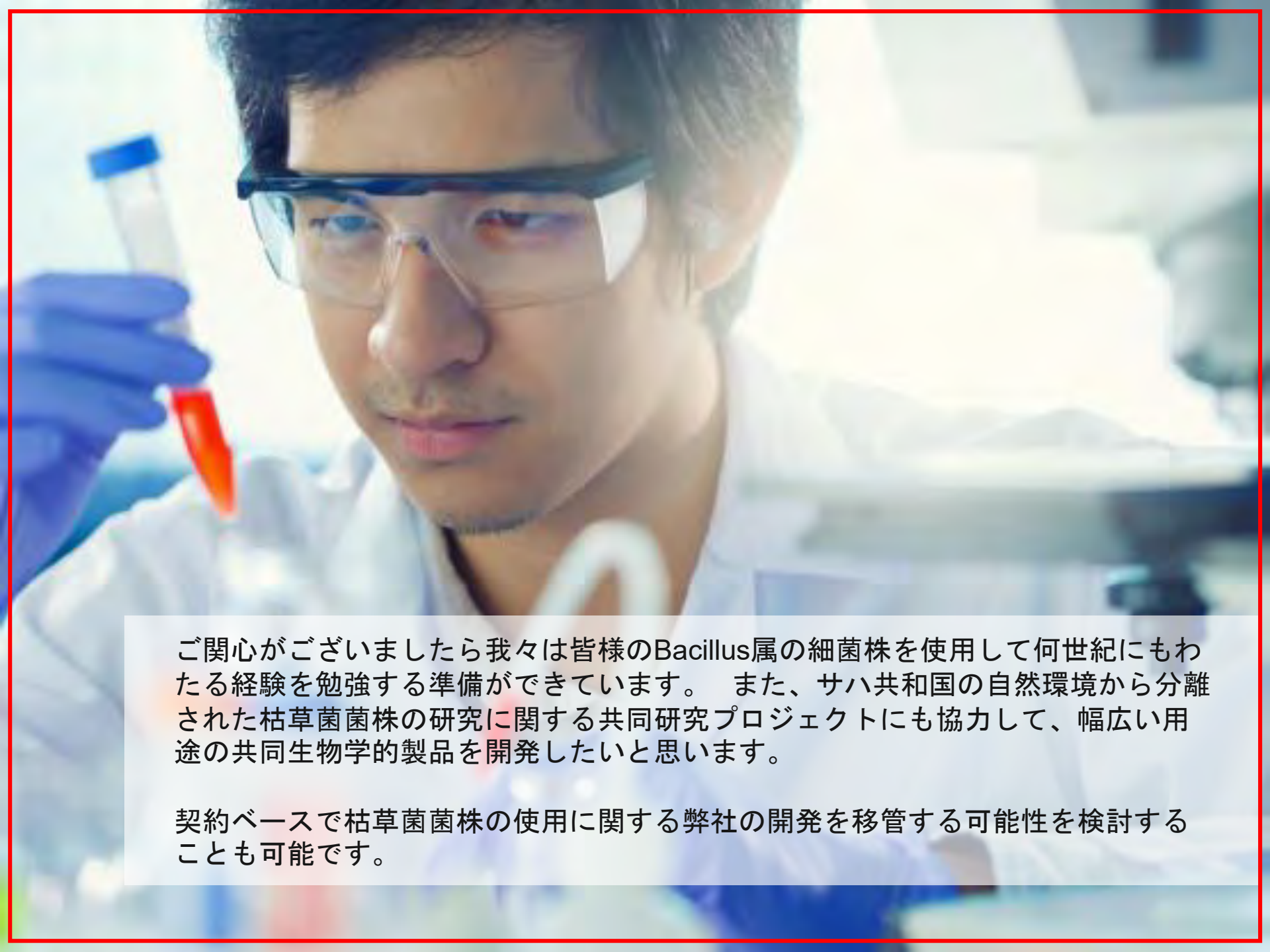
東南アジアの国々、特に日本では、納豆菌の製品として枯草菌発酵製品が伝統的に使用されていることが知られています。

サハ人の食事生活では昔ながら伝統的な発酵乳製品も長い間使用されてきました。その中で、枯草菌株の優位性が確立されています。

以前、北部の極端な気候条件に住んでいるサハ人はソビエト連邦の長生き民族の一つでした（寒くて長い冬（最大 $-70^{\circ}\text{C}$ ）、短くて暑い夏（最大 $+40^{\circ}\text{C}$ ））。





A close-up photograph of a male scientist with dark hair, wearing safety glasses and a white lab coat. He is holding a test tube with a blue cap that contains a red liquid. The background is a blurred laboratory setting with various equipment.

ご関心がございましたら我々は皆様のBacillus属の細菌株を使用して何世紀にもわたる経験を勉強する準備ができています。 また、サハ共和国の自然環境から分離された枯草菌菌株の研究に関する共同研究プロジェクトにも協力して、幅広い用途の共同生物学的製品を開発したいと思います。

契約ベースで枯草菌菌株の使用に関する弊社の開発を移管する可能性を検討することも可能です。



当社の製品は有効性とスペクトルの幅の点でも多くの外国およびロシアのプロバイオティクスを上回っています。

我々の開発の科学的な新しさはロシア連邦の24の特許によって保護されています。 その開発を商品化するために革新的な有限会社研究生産センターHotu-Bactが組織されました。 医薬品の製造はロシア連邦農業管理局によってライセンスされています。







## ミハイル ネウソトロエフ

有限会社研究生産センターHotu-Bact  
社長、獣医学博士、教授、ロシア連邦  
名誉科学者、ロシア科学アカデミーシ  
ベリア支部の獣医バイオテクノロジー  
研究室長、Skolkovo財団のメンバー、  
Yakutiaテクノパークの居住者

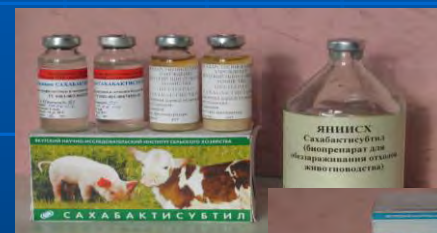
Federal Research Centre "Yakut Scientific Centre of the Siberian  
Branch of the Russian Academy of Science M.G.Safronov Yakut  
Scientific Research Institute of Agriculture  
LLC Scientific-**Production Center "Hotu-Bact"**  
Yakutsk, Russia

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

Tarabukina Nadezhda Petrovna -  
Doctor of Veterinary Sciences,  
Professor, Principal Researcher



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.

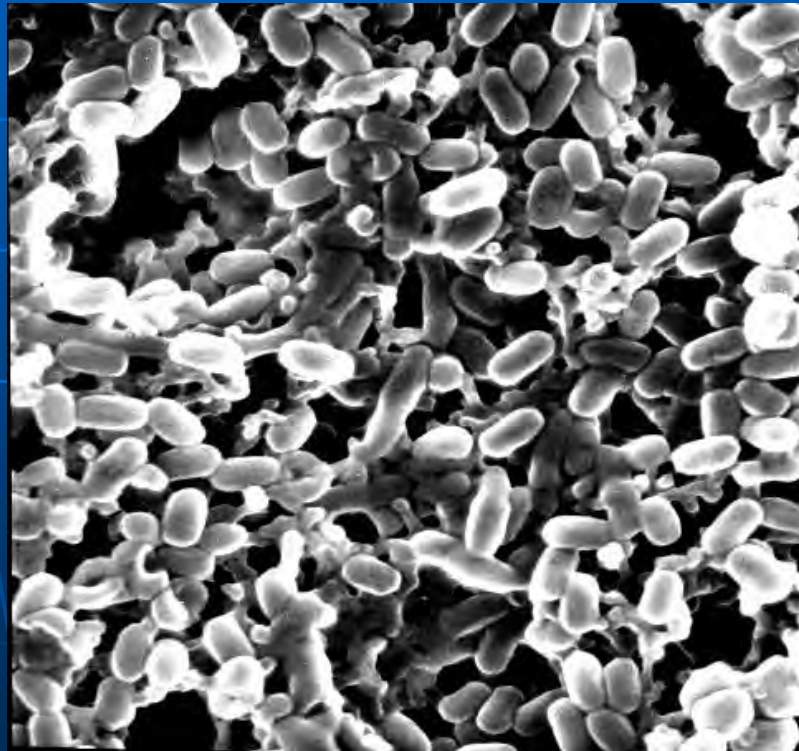


To further increase the number of livestock, improve the quality of horse breeding products, and ensure the epizootological well-being of horse infectious diseases, for the first time in Russia we have developed highly effective, inactivated vaccines against the wash, salmonellosis and rhinopneumonia 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.

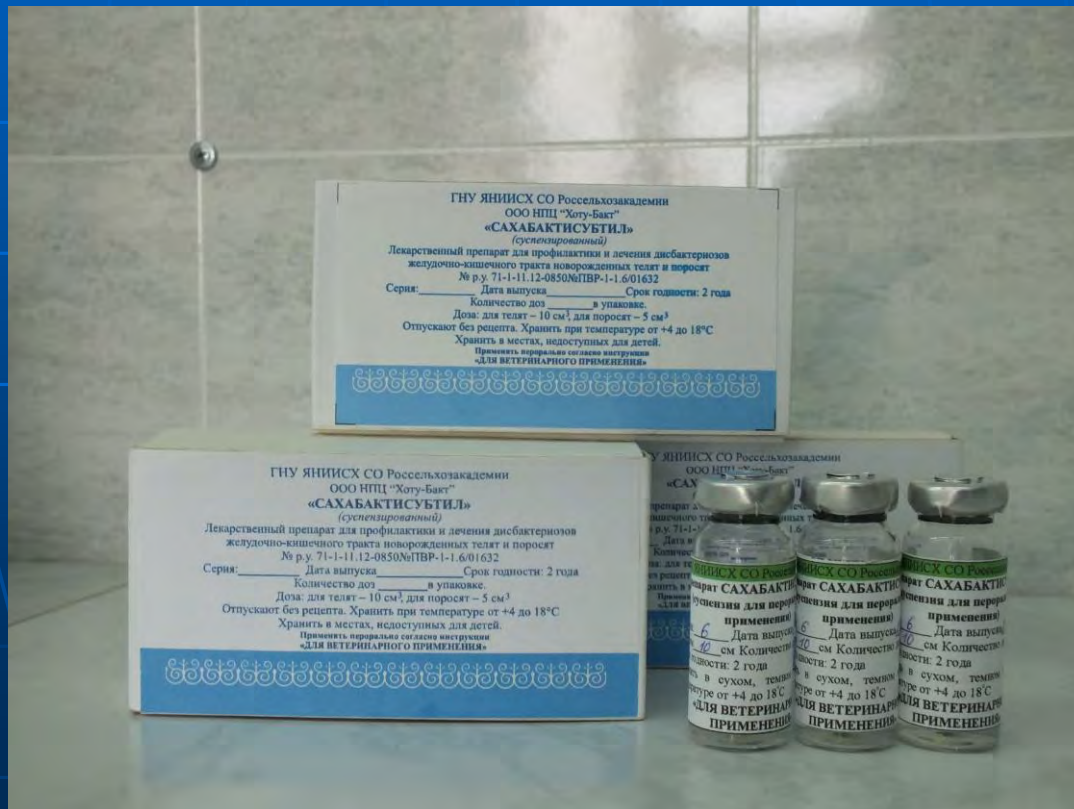




Currently, all over the world, including Russia, there is an active study, development and implementation of safe, effective biological products, as an alternative to chemicals used to control pests, diseases of plants, animals and humans.

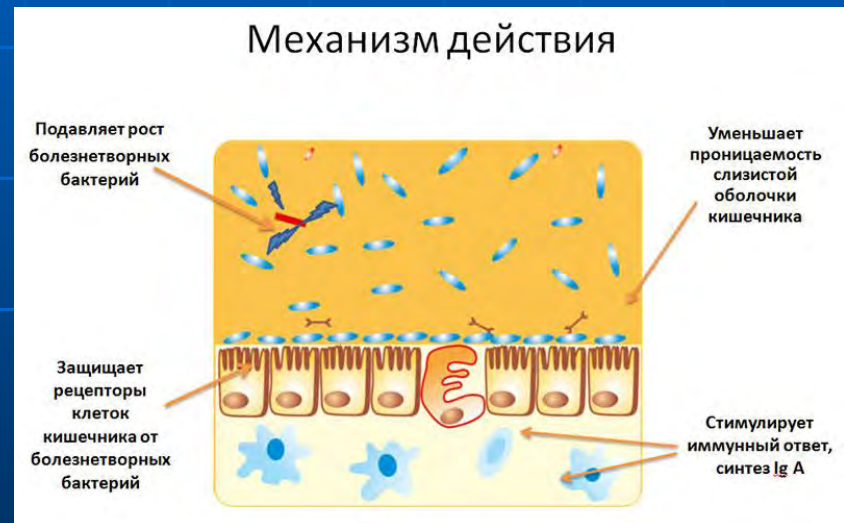
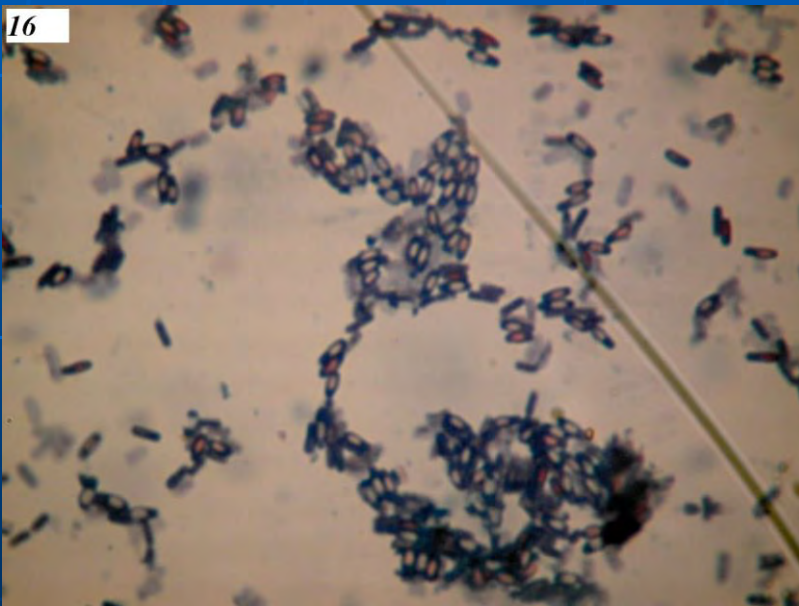


Unique Russian drug, a probiotic called Sahabactisubtil, approved by the Rosselkhoz nadzor, was developed at the Yakutsk Research Institute of Agriculture based on the bacterial strains *Bacillus subtilis* TNP-3 and TNP-5 isolated from permafrost soils. The drug has pronounced bactericidal, antiviral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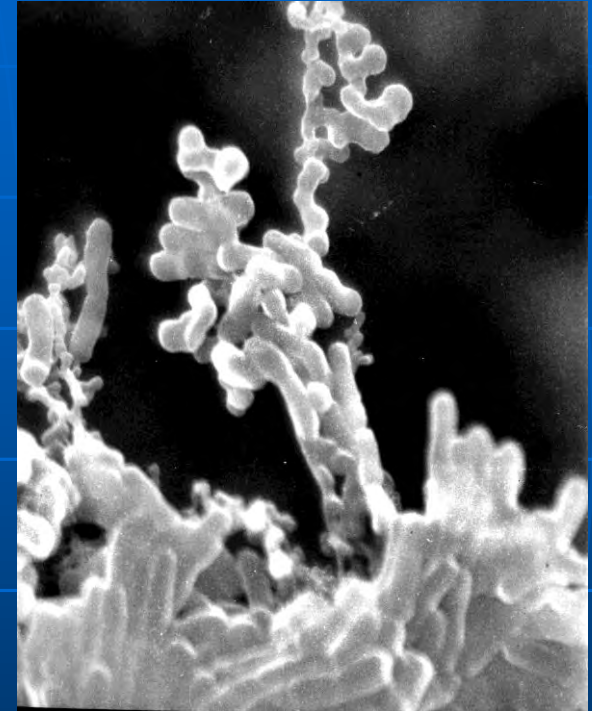


## Biological properties of preparations developed on the basis of the bacterial strains *Bacillus subtilis* "TNP-3" and *Bacillus subtilis* "TNP-5" isolated from permafrost soils of Yakutia:

- 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**,  $\beta$ -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.



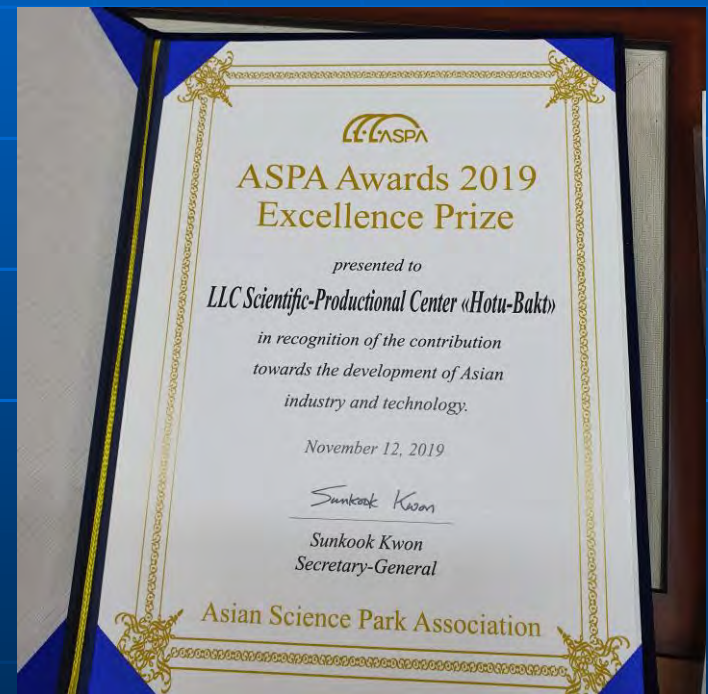
The drugs are not inferior, but also superior in efficiency and of the spectrum of action to many foreign and Russian probiotics. The scientific novelty of the developments is protected by 42 patents of the Russian Federation. In order to commercialize the development, a small innovative enterprise, 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



# Our contacts

- 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
- Address: 677001, Russia, Yakutsk, st. Bestuzhev-Marlinsky 23/1
- Tel: 8 (4112) 21-45-72; 21-00-95; +7(924) 871-45-78; +7 (924) 461-65-95
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**WE THANK YOU FOR YOUR  
ATTENTION!**



## DEAR COLLEAGUES!

Integrated Scientific Expedition Program  
August 14 (Friday) - arrival of participants,  
meeting at the airport of Yakutsk

August 15 (Saturday) - departure to the  
ship "Demyan Bedny" at 19:00 local time, the  
riverport of Yakutsk

Opening ceremony of the International  
Integrated Scientific Expedition

- Location 1 - Zhigansk (crossing on the  
ferry. Evenk ritual Welcome ceremony on the  
shore. Walking tour to the village, stay 4-5  
hours for samples collection).

- Location 2 - Kyusyr Arctic Circle  
(walking tour, stay 4-5 hours for samples  
collection).

- Location 3 - Neyolova (Tiksi - Bulunsky  
district) Transfer by bus to Tiksi 40km, (Visit to  
the Lena-Nordensheld International Biological  
Station, stay 4-5 hours for samples collection).

- Location 4 - Tit-Ary (the northernmost  
border of taiga boundary) and Stolb Island  
(stay 4-5 hours for samples collection, travel  
time on the Tiksi-Yakutsk route 3 days)

Separate program on the way

Green camping - Free program on the  
beach.

- Location 5 - Sottintsy, Transfer by bus to  
the Druzhba open-air museum. (Walking tour,  
stay 4-5 hours for samples collection)

August 25 (Tuesday) - arrival of the ship to  
the riverport of Yakutsk at 04:00 local time.

August 26 (Wednesday) - departure of  
participants, transfer to the airport of Yakutsk

Program changes are possible.

### Inquiries on scientific expedition:

M.G. Safronov Yakutsk Research  
Institute of Agriculture,  
677001, Russia, Yakutsk, ul. Bestuzhev-  
Marlinsky, d. 23, bldg. 1.

Phone: (4112) 21-45-69

Fax: 21-45-72

E-mail: [agronii@mail.ru](mailto:agronii@mail.ru).

Website: <http://agronii.ysn.ru>.

Yours Respectfully,  
Conference Organizing Committee



**FEDERAL RESEARCH CENTER**  
"YAKUT SCIENTIFIC CENTER SB RAS"  
YAKUT SCIENTIFIC RESEARCH INSTITUTE  
OF AGRICULTURE  
NAMED AFTER M.G. SAFRONOV

## DEAR COLLEAGUES!

Siberian Branch of the Russian Academy of Sciences, Federal Research Center "Yakut Scientific Center of the Siberian Branch of the Russian Academy of Sciences", Siberian Federal Scientific Center for Agrobiotechnology of the Russian Academy of Sciences (SFSCA RAS), Yakutsk Agricultural Research Institute named after M.G. Safronov, Institute of Biological Problems of Cryolithozone SB RAS, Melnikov Permafrost Institute of SB RAS will carry out the International Comprehensive Scientific Expedition in 2020:

**"EFFECTS OF GLOBAL WARMING ON TRADITIONAL AGRICULTURAL PRACTICES, PRESERVING THE LIFESTYLE OF INDIGENOUS MINORITIES OF THE POLAR ARCTIC"**

August 14-26, 2020, Yakutsk, Russia

### MAIN TOPICS AND SECTIONS:

- Arable farming, crop and fodder production
- Plant protection
- Ecology and conservation of natural resources
- Economics and land management
- Technology of animal husbandry and biotechnology
- Veterinary medicine
- Earth system science



The international integrated scientific expedition "Effects of global warming on traditional agricultural practices, preserving the lifestyle of indigenous minorities of the Polar Arctic" will be carried out on August 14-26, 2020. Expedition tour will be on the ship "Demyan Bedny" on the route Yakutsk - Tiksi - Yakutsk

Languages - Russian, English.

## ORGANISING COMMITTEE

Co-Chairs of the organizing committee:

Donchenko A.S. - Scientific director SFSCA RAS, Academician of RAS

Lebedev M.P. - Chairman of the Yakut Scientific Center of SB RAS, corresponding member of RAS.

Vladimirov L.N. - Director of M.G. Safronov Yakutsk Research Institute of Agriculture, s, corresponding member of RAS.

Okhlopov I.M. - Director of the Institute of Biological Problems of Cryolithozone SB RAS, candidate of biological sciences.

Zheleznyak M.N. - Director of Melnikov Institute of Permafrost, Doctor of geological and mineralogical sciences.

## GENERAL INFORMATION

Conducting in-depth scientific research on the impact of climate warming on the development of traditional agricultural sectors, maintaining the lifestyle of the indigenous minorities of Yakutia in the land of the Arctic zone of the Russian Federation, included in paragraph 6 in Decree of the President of the Russian Federation dated May 2, 2014 No. 296: Abyysky, Allaikhovsky, Bulunsky, Verkhnekolymsky, Verkhoyansk, Zhigansky, Momsky, Nizhnekolymsky, Oleneksky, Srednekolymsky, Ust-Yansky and Eveno-Bytantaysky districts. An international integrated scientific expedition to study the ongoing climatic changes in the Arctic and their consequences along the middle course of the Lena River to the Arctic territories with parking at the Lena-Nordensheld international biological station in Tiksi.

During the expedition tour, according to a separate program, round table discussions will be organized at the conference hall of the ship "Demyan Bedny". Submission of abstracts is required.



## Yakut Scientific Research Institute of Agriculture offers:

- seeds of grain crops: spring soft wheat "Prilenskaya 19", "Tuymaada", oats "Pokrovsky", barley "Tammi";
- seeds of perennial grasses: brambling grate "Manchaary", "Bootur", red fescue "Myuryunskaya", alfalfa "Yakutskaya yellow", white clover "Nemyugyunskaya", awnless brome "Erkeeni", Siberian wheatgrass "Amginsky", seeds of the sowing spring vetch "Lenskaya 15";
- blackcurrant seedlings "Yakutskaya", "Hara Kytalyk", "Myuryucheene", "Erkeeni", "In memory of Kyndyl";
- seedlings of strawberries, raspberries and honeysuckle;
- seed potatoes of zoned varieties in Yakutia "Yakutyanka" and "Severniy";
- a bacterial strain *Bacillus subtilis* used to disinfect bird droppings and manure from pathogenic microorganisms;
- horse salmonella abortion vaccine;
- probiotic "Sakhabactisubtil" for the treatment and prevention of gastrointestinal diseases of young farm animals;
- development of technical conditions and specifications for food products (obtaining a patent);
- feasibility studies of individual projects;
- preparation of business plans;
- development of social economic programs for the rural development.



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FEDERAL STATE BUDGETARY SCIENTIFIC INSTITUTION  
FEDERAL RESEARCH CENTER  
"YAKUT SCIENTIFIC CENTER SB RAS"  
YAKUT SCIENTIFIC RESEARCH INSTITUTE OF AGRICULTURE  
NAMED AFTER M.G. SAFRONOV  
(YSRIA)



FEDERAL RESEARCH CENTER  
"YAKUT SCIENTIFIC CENTER SB RAS"  
YAKUT SCIENTIFIC RESEARCH INSTITUTE OF AGRICULTURE  
NAMED AFTER M.G. SAFRONOV



The Yakut Scientific Research Institute of Agriculture was founded in 1956 on the basis of the Yakut Republican Experimental Station for Animal Production, the Yakut State Breeding Station and the Animal Production Department of the Yakutsk Branch of the USSR Academy of Sciences.

By order of the Federal Agency for Scientific Organizations of Russia №8 dated January 14, 2016, the Federal State Budgetary Scientific Institution "Yakut Scientific Research Institute of Agriculture" was named after Mikhail Grigoryevich Safronov.

The institute includes 12 laboratories, the Department of Social and Economic Development of the Rural Areas, the Scientific Department, the Financial and Economic Department, the Department of Administration and Management Support, the Scientific Library, the Federal State Unitary Enterprise "Yuchyugeiskoe", 16 scientific stationaries, 2 small innovative enterprises: LLC "Nauka", SPC "Hotu-Bact" LLC is a member of the Skolkovo Foundation, a resident of SAI "Technopark Yakutia". There are also 5 postgraduate programs at the Graduate School.

There is a Council of Young Scientists and Specialists in the institute. The Junior Agricultural Academy coordinates the activities of rural secondary schools specializing on an agrotechnological profile.

The director of the Yakut Scientific Research Institute of Agriculture is Leonid Nikolaevich Vladimirov, Doctor of Biological Sciences, Professor, correspondent member of the RAS.

The main research topics:

- Economics and Land Management;
- Crop Production and Arable Farming;
- Crop Protection;
- Technology of Animal Husbandry;
- Veterinary Medicine;
- Storage and Processing of Agricultural Products.

Research and Development:

- zonal technologies for growing crops based on adaptive landscape farming;

- technology for the creation, improvement and use of natural, old-age, highly productive seeded hayfields, pastures and winter pasture hayfields;

- technology for the improvement and rational use of natural meadows, shortened, shallow valley, lowland and floodplain meadows;

- zonal system of mineral and organic fertilizers use; agricultural technology of cultivation of grain and forage crops; intensive fodder crop rotation on floodplain lands and on saline soils;

- technology for harvesting green cryofeed, creating a "green conveyor" technology, wrapped haylage production, forage conservation techniques;

- technology for conservation cropping system; gypsum remediation for saline soils in Central Yakutia, resource efficient practices for cryosols;

- area-based crop cultivation technology, varieties of potatoes, cereals, fodder and berry crops, perennial grasses and their cultivation technology were selected;

- 15 varieties of perennial grasses, 1 variety of vetch, 1 variety of pea, 11 varieties of soft spring wheat, 5 varieties of spring barley, 7 varieties of oat, 3 varieties of winter rye forage, 6 varieties of black currant; 6 varieties of strawberries, 3 varieties of potato of local selection were bred;

- "Talba" wheat varieties, winter rye "Cholbon", cultivar alfalfa "Myandiginskoe", sowing peas "Saryal", awnless brome "Ayistal", "Aldan" potatoes and 2 varieties of wild strawberries were transferred for state testing.

- cereals, perennial herbs, potato seed production systems;

- environmentally safe integrated pest management;

- diversity of species causing fungal infection of cereals and perennial herbs study, environmentally safe protection of white cabbage from pests development, the timing of processing crops from weeds and potatoes from the most common diseases development;

- the breeds of domestic reindeer – "Evensky", "Evenkiysky" and "Chukotsky" were approved with direct participation and coordination of efforts. A system was developed and introduced for the industrial crossing of "Chukotsky" breed Khargin and "Evenskiysky" reindeer, as well as the technology for organizing antler harvesting, the technological standard for reindeer keeping, and technologies for increasing the production and processing of venison;

- the Yakut breed of horses, two new breeds of herd breeding horses – "Prilenskaya" and "Megezhekskaya", and two inbreed types – "Kolymsky" and "Yansky" were bred and entered into the State Register of Breeding Achievements of the Russian Federation;

- load standards for horses, horse capacity of natural pastures and optimization of the number of horses in the areas of their placement;

- the technology of rearing young horses intended for sale at the age of 1.5 years;

- improvement of protein-mineral-vitamin nutrition of young animals and production composition of horses;

- technologies for the creation and use of seeded winter pasture grass stands from perennial and annual (cryofeed) grasses;

- instructions for appraising horses of the Yakut breed, on the methodology for determining stress reactivity in horses, on dressing of Yakut horses, on determining the suit of Yakut horses, a guide for conducting selection and breeding work in productive horse breeding, plans for selection and breeding work from 1970-2016;

- improved design glacier, refrigeration unit using cold outside air;

- vaccines against the horse strangles and salmonella abortion of horses, probiotic preparations "Sakhabactisubtil", "Nord-Bact", "Hongurinobact", "Pantobact";

- methods for disinfecting manure and bird droppings, environmental objects using a local strain of bacteria *Bacillus subtilis*;

- a system of measures to fight parasitic diseases of animals and fish under conditions of Yakutia, technology for protecting reindeer from bloodsucking dipteran insects and adult gadflies under conditions of Yakutia, technology for deworming herd breeding horses using a probiotic preparation;

- a system of measures to fight against reindeer brucellosis;

- 24 technical conditions and 1 organization standard with technological instructions for products (16 of them for dairy products, 5 for meat products and 2 for food plants) have been developed for the processing of agricultural products;

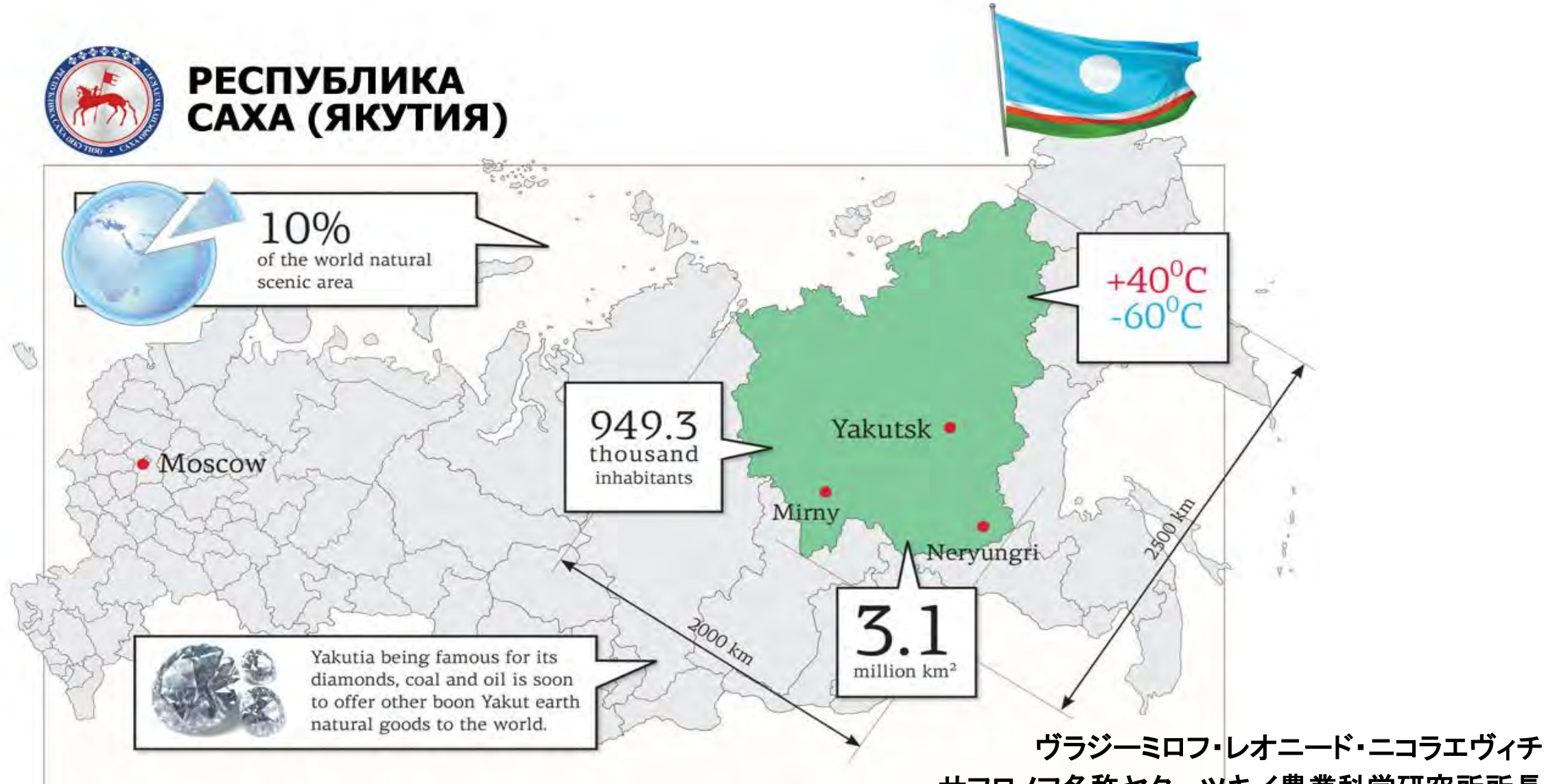
- mechanisms to improve the functioning of the agribusiness sectors of the Republic of Sakha (Yakutia), including the growth of economic efficiency and the formation of effective integration systems, as well as the scientific basis for the development of rural areas through the formation of the cluster development concept of the village and the social nutrition system of the Republic of Sakha (Yakutia);

- a scheme for the complex development and deployment of productive forces in the agricultural sector of the Republic of Sakha (Yakutia);

- a methodology for determining the volume of state support for traditional sectors of the agro-industrial complex of the Republic of Sakha (Yakutia) based on the calculation of normative profitability;

- regional norms, methodology for calculating the standard cost of agricultural products of the Republic of Sakha (Yakutia) taking into account the natural and economic conditions of the Far North.

# 農業科学と農工部門におけるヤクーチアと日本の国際協力の見通し

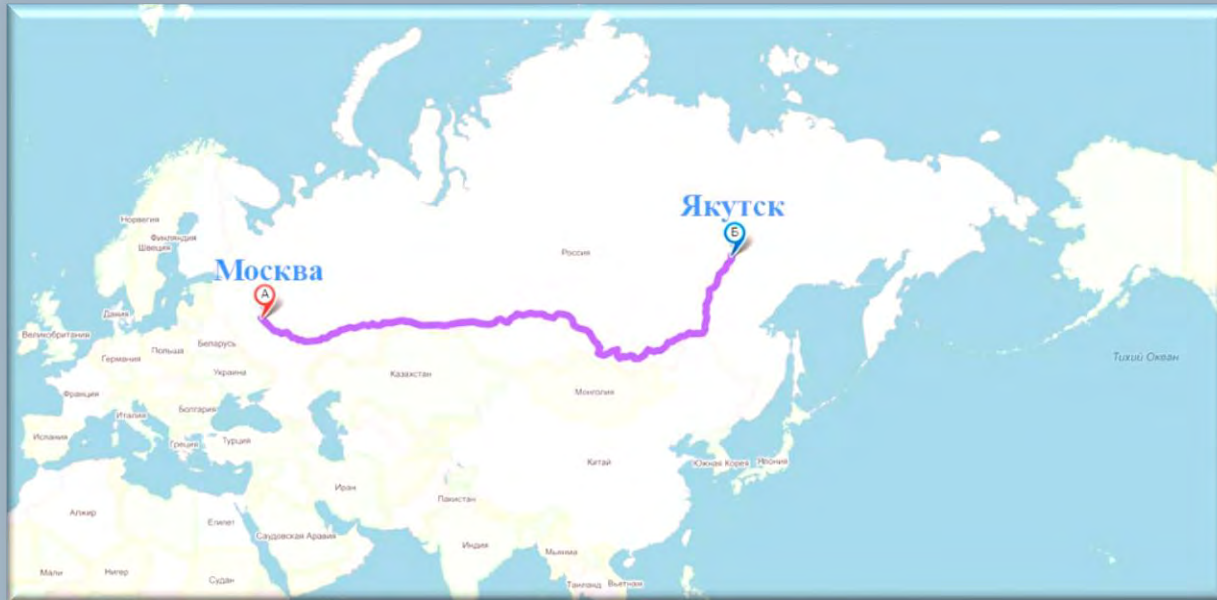


ヴラジーミロフ・レオニード・ニコラエヴィチ  
サフロノフ名称ヤクーツキ農業科学研究所所長  
生物学ドクター、博士、  
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ヤクーツク市 から東京都まで— 3012 KM

ヤクーツク市 からモスクワ市まで8468 KM







シロクマ



ヒクマ



ソテグロツル



エゾスカシユリ



イチゴ



ビッグホーン



オオカミ



雷鳥



セイヨウノコギリソウ



ノイバラ



トナカイ



ヘラジカ



大雷鳥

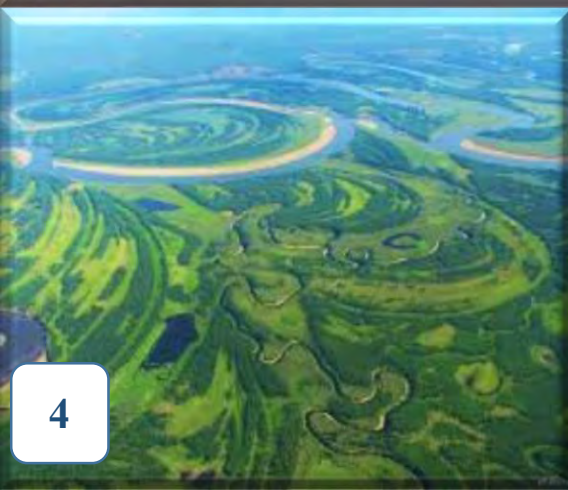


クロマメノキ



すぐり









ヤクート家畜 雄牛



家畜用のトナカイ



ヤクート馬





# サフロノフ名称ヤクーツキイ農業科学研究所

ヴラジーミロフ・レオニード・ニコラエヴィチ所長  
生物化学ドクター、博士、ロシア科学アカデミー準会員

## 種研究部門

- 畜産学
- 耕作
- 植物保護
- 獣医学
- バイオテクノロジー農産物の加工
- 経済

## 研究の主実績

-ヤクート馬の3種, ヤクーカイヤ馬種の2タイプ; トナカイの3種; ヤクート牛の1種  
- 柔らかい夏の小麦の11品種; 春大麦の5品種; 冬ライ麦の2品種; 多年生穀物とマメ科牧草の14品種;  
- 生物農薬の9種類; 微生物の10菌株



ヤクート牛



トナカイのエベン一種



トナカイのエベンキー種



トナカイのチュコトカ種



Якутянка

ジャガイモ「ヤクチャンカ」品種



生物農財



「ヤクーツカヤ」品種の  
クロスグリ



*Psathyrostachys juncea*  
「マンチャーリ」品種

「ヤクーツカヤ・ジョルタヤ」  
品種のカマ状ルーサン







# 馬種

## ヤクート馬種中にあるヤクーツカヤ馬の種



プリレンスカヤ馬種の種雄馬  
(種馬の体重- 482,1 kg, 牝馬の体重 - 431,9 kg,  
高さ 142,1 cm.)



ヤクート馬種の種雄馬  
(種馬の体重- 446,3 kg, 牝馬の体重 -  
401,6 kg, 高さ - 138,7 cm.)



ヤクート種雄馬のコリムスカヤタイプの種  
馬  
(種馬の体重- 486,6 kg, 牝馬の体重 -  
457,0 kg, 高さ - 141,6 cm.)



メゲジェック馬種の種雄馬  
(種馬の体重- 514,2 kg, 牝馬の体重 -  
461,7, 高さ 143,8 cm.)

ヤクート馬種のヤナータイプの種雄馬  
(種馬の体重 - 483,3 kg, 牝馬の体重 -  
437,0 kg, 高さ 140,0 cm.)





## 若い馬の脂肪の科学成分 100 グラム当りグラム



成分	皮下脂肪	頸脂肪	腹部脂肪	腹部内脂肪	腎周囲組織脂肪
水分, %	8,35±0,15	8,74±0,14	10,3±0,54	9,47±0,01	9,05±0,06
脂肪, %	86,2±0,53	87,55±0,5	93,05±1,88	90,11±0,04	88,89±0,38
タンパク%	1,82±0,08	1,92±0,08	2,82±0,30	2,33±0,01	2,13±0,06
灰分, %	0,5±0,01	0,47±0,003	0,46±0,01	0,42±0	0,47±0,03
<b>主要栄養素</b>					
Ca, мкг/100г	180,87±22,90	194,94±8,38	405,01±38,42	325,22±0,52	250,75±23,47
P, мг/100г	21,70±2,75	23,39±1,0	48,60±4,61	39,02±0,06	33,33±1,49
Mg, мкг/100г	790,11±33,29	629,97±55,97	764,94±49,29	988,63±5,83	786,06±64,5
Na, мг/100г	3,03±0,58	3,38±0,21	8,63±0,96	6,64±0,01	5,45±0,31
Cl, мг/100г	7,16±0,92	7,73±0,3	16,18±1,53	12,97±0,02	11,05±0,51
<b>微量元素</b>	-	-	-	-	-
Fe, мкг/100г	36,06±1,72	37,12±0,63	52,87±2,88	46,89±0,04	43,33±0,93
Mn, мкг/100г	0,70±0,06	0,65±0,05	0,91±0,07	0,99±0,003	0,88±0,03
Cu, мкг/100г	17,77±4,47	20,51±1,63	61,48±7,49	45,92±0,1	36,33±2,76
I, мкг/100г	0,70±0,06	0,65±0,05	0,91±0,07	0,99±0,003	0,88±0,03
<b>ビタミン</b>	-	-	-	-	-
Витамин А, мкг/100г	51,29±10,30	62,98±10,37	143,50±9,62	115,88±0,91	90,70±7,96
Витамин Е, мг/100г	0,71±0,05	0,77±0,05	1,36±0,20	1,05±0,007	0,92±0,04
В-каротин, мкг/100г	260,30±18,13	274,81±16,74	402,59±45,04	374,32±6,69	329,76±13,19

**Influence of a biological product from the internal fat of young Yakut horses on the survival and changes in body weight of laboratory mice-males after a single action of X-ray radiation at a dose of 7.8 Gy**

Время проведения анализа с момента облучения Time of analysis from the time of exposure	Концентрация МДА, мкмоль/г <small>ткань печени</small> The concentration of malondialdehyde, $\mu\text{mol/g}$ of liver tissue		
	Группа 1 Group no. 1	Группа 2 Group no. 2	Группа 3 Group no. 3
До облучения Before exposure	62,0 $\pm$ 3,1	62,4 $\pm$ 3,1	62,9 $\pm$ 3,2
Через 12 суток After 12 days	63,7 $\pm$ 3,2	136,7 $\pm$ 6,2	85,6 $\pm$ 5,0
Через 30 суток After 30 days	66,2 $\pm$ 3,4	—	67,5 $\pm$ 3,6

**The effect of a biological product from the internal fat of young Yakut horses at the level of POL in the hepatocytes of male laboratory mice after a single action of X-ray exposure at a dose of 7.8 Gy**

Время между облучением и введением биопрепарата The time between irradiation and the introduction of a biological product	Группы животных Выживаемость (%) / Масса тела (г) Groups of animals Survival (%) / Body weight (g)		
	1 (n = 25)	2 (n = 25)	3 (n = 25)
До облучения Before exposure	100 / 20,1 $\pm$ 1,3	100 / 20,8 $\pm$ 1,4	100 / 19,5 $\pm$ 1,3
Через 1 сутки After 1 day	100 / 20,3 $\pm$ 1,3	100 / 20,5 $\pm$ 1,3	100 / 19,6 $\pm$ 1,3
Через 3 суток After 3 days	100 / 20,7 $\pm$ 1,4	68 / 18,7 $\pm$ 1,3	92 / 19,2 $\pm$ 1,3
Через 5 суток After 5 days	100 / 20,9 $\pm$ 1,4	48 / 17,2 $\pm$ 1,3	84 / 20,0 $\pm$ 1,3
Через 15 суток After 15 days	96 / 21,5 $\pm$ 1,4	—	84 / 20,7 $\pm$ 1,4
Через 20 суток After 20 days	96 / 21,9 $\pm$ 1,5	—	84 / 21,4 $\pm$ 1,4
Через 30 суток After 30 days	96 / 22,9 $\pm$ 1,5	—	84 / 22,5 $\pm$ 1,5

**The effect of a biological product from the internal fat of young Yakut horses on changes in the blood cell composition of male laboratory mice after a single action of X-ray exposure at a dose of 7.8 Gy**

Показатель Indicators	Группа 1 Group no. 1	Группа 2 Group no. 2	Группа 3 Group no. 3
До облучения Before exposure			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,66 $\pm$ 0,30	5,62 $\pm$ 0,30	5,58 $\pm$ 0,30
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,56 $\pm$ 0,10	1,60 $\pm$ 0,10	1,63 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,16 $\pm$ 0,20	4,20 $\pm$ 0,20	4,25 $\pm$ 0,20
Через 1 сутки After 1 day			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,70 $\pm$ 0,30	1,48 $\pm$ 0,10	3,74 $\pm$ 0,20
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,55 $\pm$ 0,10	1,18 $\pm$ 0,10	1,48 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,20 $\pm$ 0,20	0,25 $\pm$ 0,10	2,78 $\pm$ 0,20
Через 3 суток After 3 days			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,65 $\pm$ 0,30	0,72 $\pm$ 0,10	3,25 $\pm$ 0,20
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,60 $\pm$ 0,10	0,38 $\pm$ 0,10	1,30 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,18 $\pm$ 0,20	0,15 $\pm$ 0,10	2,90 $\pm$ 0,15
Через 5 суток After 5 days			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,68 $\pm$ 0,30	0,68 $\pm$ 0,10	3,15 $\pm$ 0,30
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,62 $\pm$ 0,10	0,28 $\pm$ 0,10	1,25 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,23 $\pm$ 0,20	0,11 $\pm$ 0,10	2,82 $\pm$ 0,20
Через 15 суток After 15 days			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,75 $\pm$ 0,30	—	2,75 $\pm$ 0,30
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,60 $\pm$ 0,10	—	0,80 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,26 $\pm$ 0,20	—	3,88 $\pm$ 0,20

Окончание табл. 3  
Table 3, end

Показатель Indicators	Группа 1 Group no. 1	Группа 2 Group no. 2	Группа 3 Group no. 3
Через 20 суток After 20 days			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,62 $\pm$ 0,30	—	3,98 $\pm$ 0,30
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,58 $\pm$ 0,10	—	1,30 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,19 $\pm$ 0,20	—	4,01 $\pm$ 0,20
Через 30 суток After 30 days			
Лейкоциты, 10 <sup>9</sup> /л Leukocytes, 10 <sup>9</sup> /l	5,75 $\pm$ 0,30	—	5,48 $\pm$ 0,30
Нейтрофилы, 10 <sup>9</sup> /л Neutrophils, 10 <sup>9</sup> /l	1,64 $\pm$ 0,10	—	1,60 $\pm$ 0,10
Лимфоциты, 10 <sup>9</sup> /л Lymphocytes, 10 <sup>9</sup> /l	4,20 $\pm$ 0,20	—	4,20 $\pm$ 0,20



# ヤクト馬の肉と牛の肉の脂肪酸成分表 (%, M±m)

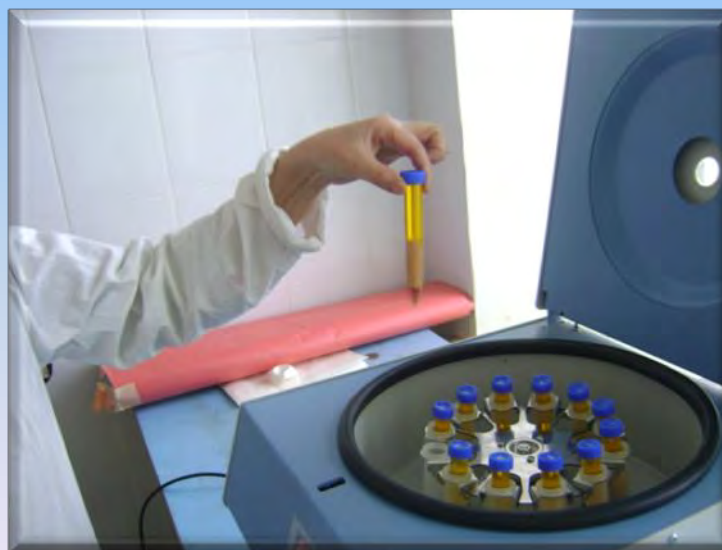
脂肪酸	生後六ヶ月子馬の肉	2.5歳の子馬の肉	牛肉脂肪
カプリン酸 (C10:0)	0,82±0,07	0,12±0,02	0,10±0,03
ラウリン酸 (C12:0)	3,03±0,16	0,32±0,03	0,46±0,23
ミリスチン酸 (C14:0)	7,25±0,35	4,46±0,19	3,30±0,37
ペンタデカン酸 (C15:0)	0,45±0,08	0,26±0,02	0,38±0,03
パルミチン酸 (C16:0)	26,87±0,38	29,84±1,48	27,68±1,42
マルガリン酸 (C17:0)	0,98±0,10	0,86±0,06	1,08±0,18
ステアリン酸 (C18:0)	5,08±0,34	4,7±0,18	15,80±2,41
アラキジン酸 (C20:0)	0,18±0,06	0,12±0,02	0,20±0,05
ベヘン酸 (C22:0)	0,47±0,04	0,36±0,04	-
リグノセリン酸 (C24:0)	-	-	0,08±0,05
飽和脂肪酸の合計	<b>45,13±0,68</b>	<b>41,04±1,70</b>	<b>49,08±2,75</b>
ミリストレイン酸 (C14:1)	0,83±0,14	0,66±0,09	1,66±0,56
パルミトレイン酸 (C16:1)	6,53±0,28	7,80±0,38	6,18±0,56
オレイン酸 (C18:1)	21,65±0,40	31,18±0,68	37,04±2,52
Eicosenic酸 (C20:1)	0,27±0,04	0,42±0,03	0,46±0,11
エルカ酸 (C22:1)	0,22±0,11	0,26±0,08	0,38±0,17
一価不飽和脂肪酸の合計	<b>29,5±0,49</b>	<b>40,32±0,82</b>	<b>45,72±2,03</b>
リノール酸 (C18:2)	9,27±0,55	5,7±0,40	2,12±0,46
Eykozadienovaya酸 (C20:2)	-	-	0,22±0,04
Dokozadienovaya酸 (C22:2)	-	-	0,08±0,02
α-リノレン酸 (C18:3)	16,03±0,45	12,68±0,62	1,06±0,71
Eykozatrienovy酸 (C20:3)	-	-	0,34±0,06
Dokozatrienovaya酸 (C22:3)	-	-	0,08±0,02
アラキドン酸 (C20:4)	0,22±0,01	0,26±0,02	0,70±0,17
ドコサテトラエン酸 (C22:4)	-	-	0,08±0,02
エイコサペンタエン酸 (C20:5)	-	-	0,32±0,10
ドコサペンタエン酸 (C22:5)	-	-	0,08±0,02
ドコサヘキサエン酸 (C22:6)	-	-	0,12±0,03
多価不飽和脂肪酸の合計	<b>25,52±0,28</b>	<b>18,64±0,98</b>	<b>5,2±1,40</b>
ω-3	16,03	12,68	1,58
ω-6	9,49	5,96	3,24



ロシア連邦の発明特許「食品添加物用原料。ヤクート馬の脂肪から作られた濃縮物」が取得されました。

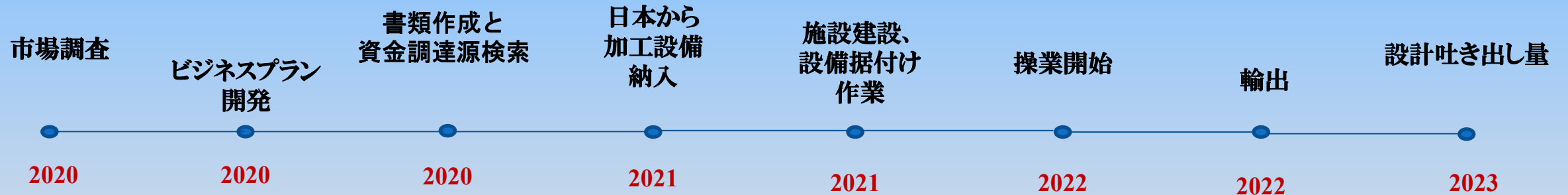


幾つかの馬が入っている群れで飼育されたヤクート馬の肉の脂肪に含まれているポリ不飽和脂肪酸から濃縮物を製造する技術的プロセスが開発され、プロトタイプが作られました。



# ヤクート馬の肉の加工企業設立

- ・ 事業内容
- ・ サハ共和国では、ヤクート馬の肉の加工企業を設立し、対日本輸出と販売します。
- ・ サハ共和国で飼育馬の頭数は2020年初に186200頭であります。
- ・ 市民向き販売量は6000トンにたつします。
- ・ 輸出可能ルート: 鉄道、空便、船舶で輸送。輸送ルートは市場調査のとき確認されます。
- ・ 本プロジェクトはサハ共和国国内で実施する予定で、場所はニジニイ・ヘスチャック町とかんがえられます。



**2023年の定格出力: 1000 トン.**

馬肉の仕入れ価格 : 1キロ当たり11,3-32,5 \$

ご清聴を頂き、ありがとうございます。