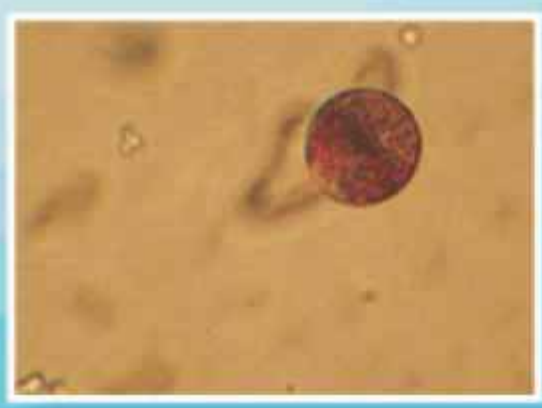
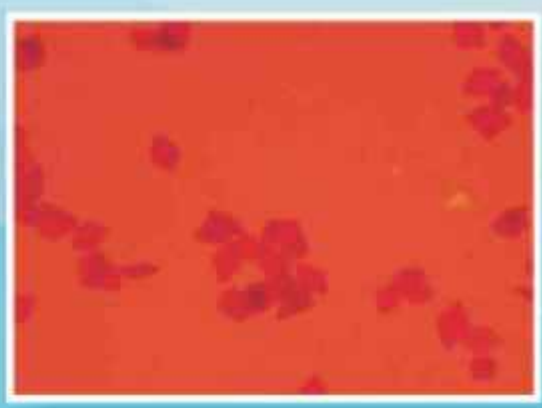


Betacar-X

natural crystalline carotenoids



The Idea

Nature is the source of health, beauty and longevity. We see our mission in meeting customers' demand to consume what is natural only.

The idea of **Betacar-X** project is to produce carotenoid ingredients of truly natural origin not even contacting with synthetic or petrochemical reagents during the technological process with the technology non-hazardous for the environment and the personnel.

The idea originated from studying early works of Ukrainian researchers (V.P. Vendt, I.G. Drokova, N.P. Massjuk, Ju.F. Geleskul et al.), who first in 1959 proposed to use the alga *Dunaliella salina* causing red "bloom" of brine as a natural source of beta-carotene and other carotenoids. Our investigation of salt lakes and salt works of Crimea and Kherson region of Ukraine (Sivash, Sasyk, Sakscoe, Genicheskoe and many others) and Astrachan region of Russia (Elton, Baskunchak) showed that resources of *Dunaliella salina* alga in Ukraine and Russia are very rich and easily renewable.

The project started from elaborating and implementing the new technology of mixed carotenoids production from the alga *Dunaliella salina* growing in the brine of salt works. In comparison to early technologies our new technology uses only physical processes and reagents of natural plant origin. With this technology we can produce carotenoids in highly purified crystalline form.

The technology appeared to be suitable to various carotenoids from various natural sources: other species of algae, e.g. *Haematococcus pluvialis*, cultivated fungus *Blakeslea trispora*, plant and microbial material.

Now our project is growing further in many directions: from developing value added carotenoid formulations, e.g. water dispersible powders, to the complex management of solar salterns.

Our research on solar salterns complex management is focused on Genichesk salt works. The lake Genicheskoe is the largest in Ukraine resource of algal biomass and the best quality table salt enriched with micronutrients. We developed the technology of production of magnesium hydroxide, which can be used in various industries from pharmaceuticals to metallurgy. Simultaneous production of table salt (sodium chloride) and magnesium hydroxide keeps natural ion balance in the salt lake unaltered.

Our present goal is to enter international markets and partnership.

Our Team

The idea was developed and the research based on it was initiated in 1992 by Dr. Alexander Rudas.



Dr. Alexander Rudas

General director. Graduated from Physics Faculty of Kharkov State University in 1982. After graduating from the University he supervised research and technical youth centers, which carried out developing and implementing innovational ideas and projects. He defended his PhD degree in technical sciences in 1993. Recently Dr. Rudas has been occupied in several innovation projects, one of which is devoted to the idea of natural carotenoids production. In 2005 he and his co-workers organized Betacar-X company.

Other team members:

Eugeny Tatischev

Deputy general director. Graduated from Kharkov Institute of Radioelectronics, System Techniques faculty, in 1984. Worked for several state organizations and private companies, specializes in management and automation. In the project since 1992.



Lilia Glamazda

Chief economist and accountant. Graduated from Kharkov Engineer and Economics Institute, Faculty of Accounting and Analysis of Economic Activity of Enterprises, 1990. She was invited to the project as highly qualified economist. In the project since 1992.

Dr. Victoria Komaristaya

Chief technologist. Graduated from Biology Department of Kharkov State University (1994), PhD in biology (1999). Also works as assistant professor in Kharkov University, specializes in botany and algal biochemistry. In the project since 2004.



Many others research and technical professionals from research organizations of Kharkov participate in the project or work for Betacar-X on the permanent basis.

Our Technology

The technology is **environmentally friendly** and **non-hazardous** for the personnel.

The technology developed was originally intended for **beta-carotene** extraction and crystallization from the alga *Dunaliella salina* naturally growing in salt lakes and salterns. It includes the following stages:

1. *isolation of the biomass from brine*
2. *beta-carotene extraction*
3. *extract purification*
4. *beta-carotene crystallization*

During the technology development several methods of biomass isolation were tested, but finally preference was given to the two original, producible and cost-effective methods based on **physical means without chemical reagents**. For these methods original nonstandard equipment was designed.

The extraction is performed with the **solvent of plant origin**, which is not toxic or hazardous.

Later on the technology appeared to be equally applicable to **any carotenoid** and **any source** (microbial, algal, fungal biomass, plant material) both wet and dried.

The technology was developed by our highly qualified team and not only summarizes world and **Ukrainian** experience in the area, but also includes **substantial innovations**. The technology and equipment are protected by more than 15 patents. The process of technological and technical improvement never stops that results in further innovations.



Our Production Plant



The production plant was built in 2006 on Kinburn peninsula (Black Sea region) at the salt works Geroiskoe. In 2008 an additional algal biomass isolation mobile modules were installed on Arabat spit (Azov sea region) at the salt works Genichesk. The lake Genicheskoe has productive area of about 1.000 hectares. It is the largest salt lake in Ukraine and the largest source of table salt of the highest quality and *Dunaliella salina* algal biomass.

Our production process is integrated into operation of the oldest in Ukraine salt works and does not hinder salt production.

Negotiations are carried out with the authorities about operating our algal biomass isolation mobile modules on the other Ukrainian and Russian salt works and salt lakes.

All the equipment of the plant is made of stainless steel and polyethylene of food and pharmaceutical grade. The production process is automated and operated by highly qualified personnel.

In our manufacture practice we are governed by internal Ukraine standards, which correspond EU standards:

- quality management system DSTU ISO 9001-2001;
- environment management system DSTU ISO 14001-2006;
- HACCP DSTU 4161-2003; DSTU ISO 22000-2005;
- OHSAS DSTU - P OHSAS 18001:2006.




The plant daily capacity is 5 kg of crystalline carotenoids. The plant can operate on domestic *Dunaliella salina* sources seasonally from March to November, on other sources – full year round. If necessary, meeting market demand, plant capacity can be doubled in 3 months by installing new modules.

Our Products


CONTENT as is proved by SGS Institut Fresenius GmbH (Germany) and accredited Laboratory of Ordered Tests (certificate number SIC.07.017, Ukraine)

1. *Dunaliella salina* crystalline natural mixed carotenoids




total carotenoids – min 96%
all-trans-beta-carotene – 50-70%
9- and 13-cis beta-carotene – 3-5%
alpha-carotene – 30-40%
xanthophylls (lutein, zeaxanthin and others) – 2-4%

2. *Blakeslea trispora* crystalline natural carotene



total carotenoids – min 96%
all-trans-beta-carotene – min 93%
9- and 13-cis-beta-carotene – max 3%
alpha-carotene – max 3%

3. *Blakeslea trispora* crystalline natural lycopene



total carotenoids – min 96%
lycopene – min 90%
beta-carotene – max 6%

For all the products:

Heavy metals – max 10 ppm

Microbiology: total plate count – max 1000 CFU/g

E. coli – absent in 5 g

PRESERVATION METHODS

No preservatives added. Oxygen removed by food grade nitrogen flushing.

PACKAGING

100 g in light-proof vacuum alu-bag.

STORAGE

The product may be stored for 24 months from the date of manufacture in unopened original container in a cool dry place. Once opened, use content quickly or re-seal and store in a freezer at -20 C.

USES

A natural raw material provided in crystallized form that may be further value added in various formulations for:

- natural food colors
- functional foods
- pharmaceuticals
- dietary supplements
- animal nutrition

Suitable for mixing with oil and water dispersible powder preparation.

Current Developments

We have finished the research on producing **crystalline astaxanthin** from the alga *Haematococcus pluvialis* and purified **9-cis-beta-carotene** from the alga *Dunaliella salina*, both the most powerful among natural antioxidants.



Dunaliella salina crystalline natural 9-cis-beta-carotene

Our plans for the nearest future are mastering **crystalline lutein and other xanthophylls** production from plant and algal sources and the development of the technology of **carotenoid water dispersible powders** formulation with the use of natural reagents only.

We have done some preliminary research on the development of **carotenoid containing animal feed and veterinary preparations** and **antipyrotic preparations** for human.

We can supply *Dunaliella salina* algal biomass for dietary supplements, animal feed and cosmetics.

We participate in restoring salt lake Genicheskoe and **sea salt production** at Genichesk salt works. We have developed the technology of **magnesium hydroxide** production to supply it for pharmaceutical and other industries and to restore natural ion balance in the lake.

We are exploring ways to develop **environmental tourism and recreation** in the area. We can propose "salt flower" (*Fleur De Sel*) in souvenir packaging.



Haematococcus pluvialis crystalline natural astaxanthin

We are open to partnership in further **technological developments and research, building production plants and entering markets**. We propose our **products** to food, feed, pharmaceutical and cosmetic ingredients and finished products producers. We propose our **service** of extraction your raw materials and production crystalline carotenoids for you. We propose collaboration to salt works in implementing our technologies.

Contacts

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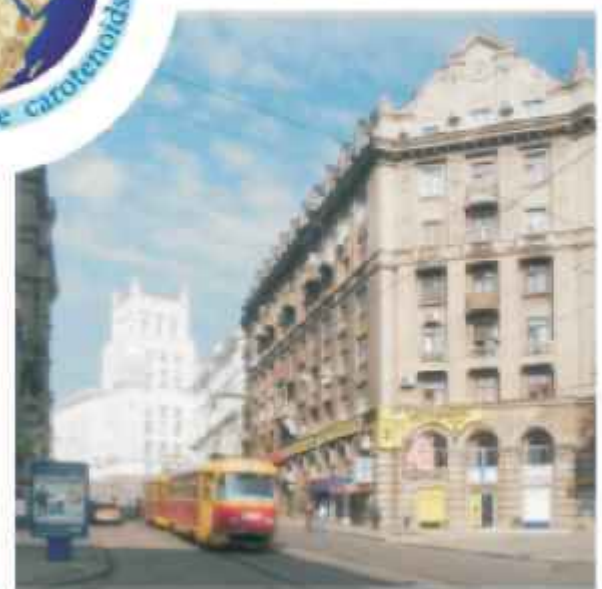
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The Environment



Our production plant is located in the native pure environment of national reserves Chernimorskiy and Kinburn peninsula.

Betacar-X advocates support and conservation of solar salterns because they represent the only example in the history of human activity not destroying but creating habitat for various and unique wildlife.

Betacar-X donates into Geroiskoe and Genicheskoe salt works reconstruction.

Another outcome from using only natural reagents in our technological process is that no hazardous wastes form.



At old salt works excess magnesium salts accumulates because of several centuries of sea water evaporation and sodium chloride withdrawal.

Our technology of magnesium hydroxide production serves to restoring and keeping natural ion balance in the salt lake during sea salt production.



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