Institute of Bioorganic Chemistry

Technical Area Keywords: biotechnology, chemical technology, bioorganic chemistry, organic chemistry, molecular biology, biochemistry, enzymology, spectroscopy, pharmacology

General Information

The Institute of Bioorganic Chemistry of the Academy of Sciences of Uzbekistan was founded in 1977. The Institute is the only research center in Central Asia working in the field of bioorganic chemistry.

The Institute employs over 200 scientists, including 3 Academicians, 23 Doctors of Science, and 60 PhDs.

The Institute has 10 laboratories:

- Chemistry of proteins and peptides;
- Chemistry of enzymes;
- Polyphenols;
- Bioregulators;
- Fine organic synthesis of physiologically active compounds;
- Physico-chemical methods of research;
- Chemistry of cellulose;
- Processing of secondary resources;
- Pharmacology;
- Experiments & technology.

Institute's Focus

The main research directions of the Institute are:

- Study of bioorganic processes in animals and plants;
- Study of the structural and functional dependence of biologically active substances;
- Creation of environmentally friendly plant protection products;
- Development of science-intensive technologies for the processing of secondary products extracted from animals and plants.

Valuable Technology Offerings

- Phytohormone receptors and their regulatory role in defoliation of cotton;
- Role of enzyme systems and biosynthesis of cellulose in formation of cotton fiber;
- Development of the methods for creation of biosensors for testing the presence of toxic substances in food and environment;
- Study of the structure and function of poison components of animals/spiders of Central Asia and development of effective serum against the venoms.
- Complex chemical study of substances of cotton and soybeans, extraction of more than 100 individual compounds.

- Development of new technologies in:
  - Reception of cottonseed oil and cake, containing trace amounts of gossypol, which were introduced at 11 vegetable oil extracting companies in Uzbekistan;
  - Development of more than 30 drugs on the basis of gossypol and its derivatives;
  - Development of drugs based on plants growing in Uzbekistan (Lagoden, Rutan, Providin, Timoptin, Polizhel, Biolon).
- Annually, the Institute produces over 200 thousand sets of pheromone traps against the cotton pest of winter cutworm and more than 1 million for the cotton cutworm, which fully covers the demand of cotton farms in Uzbekistan.

Scientific Cooperation and Technology Transfer

- University of Milan, University of Cagliari, Italy;
- University of Ghent, Belgium;
- Adam Mickiewicz University, Poland;
- University of Stuttgart, Germany;
- National Technical University of Athens, Greece;
- Harvard Medical School, Beth Israel Deaconess Medical Center, USA;
- Institute of Bioorganic Chemistry, Russia;
- Moscow State University. University, Rusia;
- Institute of Immunology of the Federal Medical-Biological Agency of Russia;
- Institute of Virology, Russia.

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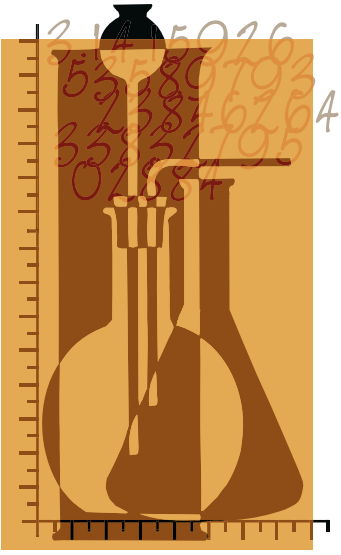


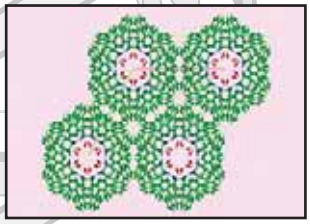
A.S.SADYKOV INSTITUTE OF BIOORGANIC CHEMISTRY OF THE ACADEMY OF SCIENCES OF UZBEKISTAN

The Institute of Bioorganic Chemistry was established in 1977. Currently it has in excess of 200 employees working in 10 laboratories that are equipped with state-of-the-art scientific equipment and instrumentation. This is a unique scientific center in Central Asia undertaking research on plants and animals that are endemic to the region. The institute targets its research at the following areas:

- Studying of bioorganic processes in animals and plants;
- Structure-function dependence of biologically — active substances;
- Creation of non-polluting means of plants protection;
- Processing of by-products of animal and plant origin.

The Institute has extensive experience in materials processing and small-scale manufacturing technologies. With the support for the strategically important agricultural sector as well as other sectors of the Uzbekistan economy the Institute has earned a strong reputation throughout the former Soviet Union. Examples of manufacturing include:

- High quality refined cotton oil, manufactured to international standards
- Gossypol for manufacture of medicines and export
- Medicinal preparations of Thimoptin®, Lagoden®, Gozalidon®, Megosin® (3% ointments), Polyjel®, non-absorbent surgical suture — Biolon®



A study of gossypol

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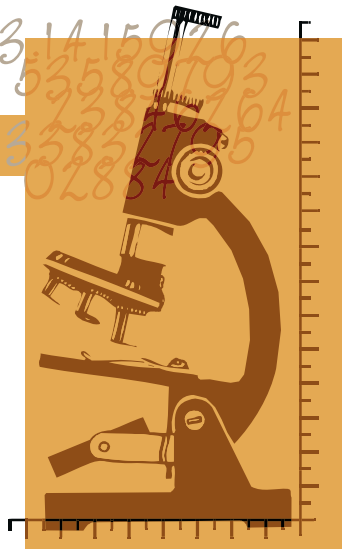

• Complete sets of pheromone traps against cotton pests (over 1.5 million produced annually)

• Production of low-tonnage Emulsol® oil for use in the preparation of reinforced concrete.

The Institute has widespread scientific collaboration with leading scientific institutions in England, USA, Germany etc. and has received grant funding from a variety of international organizations including, STCU, INTAS, CRDF, SCOPES, USDA/ARS etc.

The Institute was the first to develop effective serums (using toxin conjugates of latrotoxin and cobratoxin) against Central Asia endemic spiders Latrodectus tradecimguttatus and *Segestria florentina*, *Vespa orientalis* and *germanica* and the green toad *Bufo viridis*. The toxins of scorpions with the synthetic and natural polymers showing high immunogeniety are also being investigated.

The development of cotton technologies is one of institute's most promising areas of study

Physico-chemical characterization of gossypol and its derivatives were undertaken. Mechanisms of antiviral, anti chlamidial, immunomodular actions of medical products have been suggested and over 10 medical products have been produced on a basis of gossypol and its derivatives (including Megosin® (anti-herpes remedy); Gossypols Liniment® (antiviral remedy), Tablets of Batriden® (immunosupressor), Gazolidon® (anti-clamidios remedy), Ragosin® (anti-virus remedy)).

Medical and surgical products have been developed at the Institute and introduced into medical practice. These include Lagoden® — styptic (injections), Rutan® — the inductor of interferon, Providin® — antihypoxant, preparations on the basis of an animal organism (Timoptin® — immunomodulating drug), preparations of a synthetic origin (Polijel® — a contact gel for ultrasonic diagnostics, Biolon® — non-absorbent surgical suture).

Synthesizing pheromones in insects

Methods of synthesis of pheromones in the following kinds of insects have been *developed: Agrotis segetum, Spodoptera exiqua, Lygus lineolaris, Pectinophora gossypiella, Sitotroga cerealela, Plodia interpunctella, Cryptolestes pusillus, Musca domestica, Ephestia elutella, Sitophylus granaries, Sitophylus oryzae, Plutella xylostella.*

The Institute has also developed technologies with useful defoliatory and growth acceleration activities in cotton.