

## **Microbiologic school**

First microbiologic research in Kazan University started in the third decade of its foundation and was connected with the study of animal diseases. In this sphere worked professor **F. Brauell** – the head of Kazan University's cattle cure department from 1841 to 1848.

Critical contribution to the microbiology establishment made **N.V. Sorokin** (since 1871 – the Associate Professor, since 1874 – the Professor of botanics). Sorokin's fundamental work "Entophytes as the cause of human and animal infectious diseases" (1882-1886), consisting of four volumes, is considered to be the first Russian microbiology encyclopedia.

Microbiologic studies connected with medicine were developed by the professor of hygiene **I.P. Skvortsov**, the professor of general pathology department **I.G. Savchenko** to whom belongs the number of works on immunity, cancerous growths, cholera; **S.V. Levashev**, the pioneer in the sphere of studying epidemic typhus agents; the researcher of malaria agents **V.M. Argutinskiy**; the researcher of tubercule bacillus **A.A. Kozlov**; developer of syphilis serodiagnosis **A.A. Khitrovo** and others. "Medical microbiology" published in 1912 under the edition of **L.A. Tarasevich** became the first and especially valuable collective work on microbiology, in which creation participated all outstanding representatives of Russian microbiology, including Kazan scholars: private associate professors **V.A. Barykina** and **A.A. Melkikh**, professor **F.J. Chistovich**.

In 1920 in Kazan University was established the microbiology department guided by professor **V.M. Aristovskiy** (1882-1950), the head of Kazan Spirochetologists School. Later (in 1930) this department was included in the number of Kazan medical institute's subdivisions.

In 1925-1930 microbiologic research developed also in botanic laboratory where under the direction of **A.P. Ponomarev** the studies on microflora of Kazan water bodies, medical and sulphuric sources of Tataria and Bashkiria are carried out. A.P. Ponomarev was the first who began reading the microbiology course in Kazan University; in this time also began the specialization of students on microbiology.

During the Great Patriotic War staff members of microbiologic laboratory (subdivided from botanic in 1932) participated in the development and organization of mill receiving of feed protein on wood hydrolyzate, developed the new method of sterilization of ampule catgut and raw materials used in its preparation. **M.I. Belyaeva**, the head of this research, was awarded with Military Commander diploma. Since 1951 the microbiologic laboratory headed by M.I.

Belyaeva joined the research on the problems of regulating tumor growth with the help of ferments – nucleodepolimeras. In 1958, only in 5 years after the opening of duplex DNA, in KSU was published the first collection of works dedicated to the research of nucleic acids in normal state and during tumor growth. In 1979 young scientists of microbiology department received the award of Tatarstan komsomol Central Committee named after M. Jalil.

Since 1969 KSU microbiology department is an autonomous subdivision of biology-and-soil faculty, since 1977 the graduating speciality “microbiology” is included. Kazan state university’s microbiology department follows historical traditions of microbiologic school of Kazan imperial university’ medical faculty and develops the ideas of fundamental microbiology, the founder of which in Kazan can be considered **N.V. Sorokin**.

The first head of department, Honored Scientist of the Russian SFSR and TASSR, honored Sorosov professor **M.I. Belyaeva** significantly contributed to the research of the microorganisms’ role in circulation of elements in nature. Her works on hydrogen-reducing bacterium and bacterium which acidize natural hydrocarbons initiated the development of fundamental research in microbiology department.

Today microbiology department is called physiologo-genetic current department of biology-and-soil faculty which graduates specialists-microbiologists and conducts specialities “molecular biology” (since 1999), “bioengineering” (since 2003). The department staff consists of 38 persons (11 of them are teachers) within three scientific research laboratories (SRL of biosynthesis and bioengineering of ferments, SRL of ecological biotechnology and biomonitoring, SRL of enzyme engineering). Academic teaching staff includes 7 Professors and 4 Associate Professors. 12 Candidates of Science in Biology and 2 Professors - Doctors of Science in Biology work in the laboratories. Annually 4-6 research students enter the department. Student group of microbiologists usually includes 18-20 people.

The department members have honorary degrees of the highest levels: prof. **I.B. Letschinskaya** – the academician of Academy of Sciences RT, presidium member of Academy of Sciences RT, Honored Scientist of RF and RT, Order of the Red Banner of Labour owner for advances in academic work (1986); prof. **R.P. Naumova** – the academician of REA (Russia ecologic academy), Honored Scientist of RT; Associate Professor **N.G. Zakharova** – honoured member of higher education of RF. In 1987 **D.V. Jusupova, N.P. Balaban, B.M. Kurinenko** and others received USSR Cabinet award.

Three main themes of scientific research works are registered at the department:

1. Biosynthesis, biogenesis, classification and physiological functions of new microbic ferments and possible spheres of their practical use (official registration N 01.2.00 104982) scientific supervisor prof. **I.B. Letschinskaya** (staff members **F.G. Kuprijanova-Ashina, M.N. Filimonova, O.N. Ilinskaya, M.R. Sharipova, A.M. Mardanova, V.I. Vershinina, A.I. Kolpakov, N.P. Balaban, L.A. Gabdrakhmanova, M.A. Kharitonova**, etc.)
2. Stable toxic chemic pollution in environment objects: mechanisms of deactivation and implication in natural biogeochemical cycles (official registration N 01.2.00 106145) scientific supervisor prof. **R.P. Naumova** (staff members **S.K. Zaripova, I.M. Skipina, A.V. Garusov, E.V. Nikitina**, etc.)
3. Molecular mechanisms of cell reaction on irritation. Influence of nature and stimulus force, cell's functional condition and its differentiation level on the content of cell reaction (official registration N 01.2.00.1.15733) scientific supervisor prof. **B.M. Kurinenko** (staff members **G.J. Jakovleva, N.V. Kalacheva, R.E. Davydov**, etc.)

Main achievements of molecular-biologic direction research are reflected in the number of monographs. In the collective monograph "Bacterium nuclease" (**I.B. Letschinskaya, V.P. Varlamov, B.M. Kurinenko**, 1991) materials of biosynthesis and biogenesis mechanisms, mechanisms of microorganism ferment secretion are generalized; the first data on molecular cloning and heterologous genes expression, coding nucleases, are given. For the first time the aspects of biologic activity and practical use of nuclease are studied. **F.G. Kuprijanova-Ashina's** monograph "The influence of desoxyribonuclease on the DNA synthesis, growth and division of microorganism cells" (1992) became the pioneer work in the sphere of using exogenous DNA as growth and development stimulators of microorganisms. Today the problem of using bacterial ribonuclease as antitumoral preparations is developed on the new level, from the positions of directed mutagenesis and forcing molecular determinants, responsible for selective damage of cancer cells (see Makarov A.A. Ilinskaya O.N. Cytotoxic ribonucleases: molecular weapons and their targets. FEBS Lett., 2003). Though nowadays the most famous RNA with antitumoral effect is oocyte RNA of Ranapiens frog, the research of interacting microbial RNA with tumoral cells is highly prospective and contributes not only to the understanding of cell destruction mechanisms caused by RNA, but also to the theory of molecular design of antitumoral preparations on the basis of RNA. Practical results of using ribonuclease microdoses for stimulating plant growth are expressed in the monograph of V.A. Engelgardt prize winner **S.J.**

**Jegorov** “Regulation of microorganisms’ – stimulators’ of plant growth - life-sustaining activity” (2003).

The collective monograph “Tonarol. Medico-biologic characteristics” (**F.B. Gershanov, G.Z. Gilmutdinov, I.M. Skipina, B.R. Khamitov, V.M. Chesnovskiy**, 2001) worked out by the Scientific Research Institute of Biology and research and production association “Tonar” staff (Nizhnekamsk), dedicated to the new prospective antiulcer preparation, shows the active collaboration of the department with the regional business organizations. Today the microbiology department and Scientific Research Institute of Biology staff pays special attention on the development of innovational projects connected with the preparing of new preparations and technologies to their implementation in practice. Under the direction of **R.P. Naumova** in OJSC “Nizhnekamskneftekhim” was developed, patented and implemented the biotechnology of deactivation and cleaning of high concentrated ecologically dangerous waste water of sterol and propylene oxide production. Developed, patented and is in the state of implementing the biological method of deactivation and recultivation of petro-chemistry and oil sludge solid waste.

The problem of agriculture biologization, put on the level of RT government, is being solved with the participation of the microbiology department staff - Associate Professors **F.K. Alimova, N.G. Zakharova**, Professor **S.J. Jegorov**, working on the theme “Creating the technology of biopesticide production on the base of RT’s food processors waste and evaluation of its influence on plant pathogen and productivity of vegetable, decorative and grain crops”. In bioplant of experimental agriculture “Kazan glass-grown”, in biolaboratory of “Maiskiy” state farm and in Republic Station of plant protection implemented the technology of producing plant growth’s biofungicides and bioregulators, patented and confirmed with implementation certificates.

Fundamental basis of microorganisms’ life-sustaining activity, regulation of genes expression and mechanisms of microbial ferments biosynthesis form the powerful cluster of molecular-biologic research of cross-disciplinary character. The study of microorganisms’ physiology and biochemie, metabolic methods and possibility of practical application of classic knowledge about microorganisms’ life-sustaining activity forms the second basic direction of microbiologic research in KSU. At the beginning of XXI century the scientist-microbiologists staff continues the traditions of classic microbiology and successfully uses collected fundamental knowledge in practice.