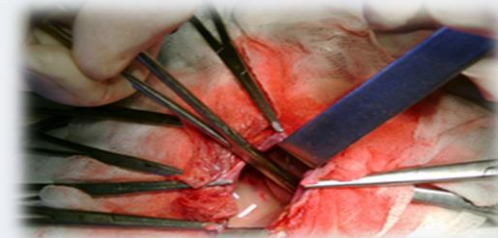




Academy of Sciences of Moldova Life Sciences Division



Vice President of ASM,
Head of the Life Sciences Section of ASM
Academician Eva GUDUMAC

The structure of
LIFE SCIENCE
Section of ASM

A

15 academicians
(full members)

Area of study Horticulture – 1, Genetics and Plant Physiology - 2, Physiology and sanocreatology – 2, Otorhinolaryngology – 1, Surgery – 2, Neurology – 1, Obstetrics and gynecology – 1, Cardiology – 1, Alcoholic and non-alcoholic beverage technology - 1, Zoology – 1

B

14 corresponding members

Area of study: Biochemistry – 1, General medicine – 2, Morphopathology – 1, Dentistry – 1, Epidemiology – 1, Pediatrics – 1, Plant protection – 1, Hydrobiology and Ichthyology – 1, Agronomy – 1, Human and animal biology– 1, Plant biology– 1, food safety– 1, Ecology and environmental protection– 1





C



15 designated members
(PhD and Dr.Hab.)

Area of study: General medicine – 5, Aquaculture – 1, Public health – 1, Pediatrics – 1, Pharmacy – 1, Environmental security– 1, Zootechnics – 1, Veterinary medicine– 1, Agricultural engineering– 1, Forest Science – 1, Cell Biology – 1.

Main institutions

Medical Science

-  **The Nicolae Testemițanu State University of Medicine and Pharmacy**
-  **Free International University of Moldova**
-  **Medical-Sanitary Public Institution Institute of Cardiology**
-  **The Timofei Moșneaga Republican Clinical Hospital**

-  **Public Medical Sanitary Institution Institute of Oncology**
-  **Institute of Neurology and Neurosurgery**
-  **Institute of Mother and Child**
-  **Emergency Medicine Institute**
-  **Phthisiopneumology Institute "Chiril Draganiuc"**

Main institutions

Agriculture, Biology, Environment



Moldova State University

- Institute of Genetics, Physiology and Plant Protection
- "Alexandru Ciubotaru" National Botanical Garden (Institute)
- Institute of Zoology
- Institute of Ecology and Geography
- Institute of Physiology and Sanocreatology



Technical University of Moldova

Institute of Microbiology



"Ion Creangă" State Pedagogical University of Chișinău

National Seed Research and Production Center



Institute of Biotechnology in Animal Husbandry and Veterinary Medicine



Scientific-Practical Institute of Horticulture and Food Technologies



Institute of Pedology, Agrochemistry and Soil Protection „Nicolae Dimo”



Agricultural Technology Institute “Mecagro”.



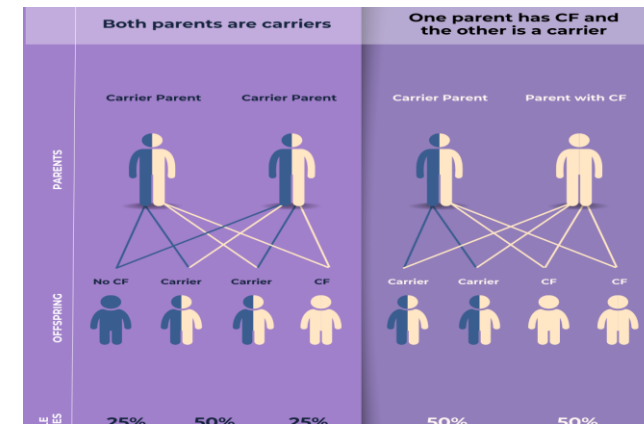


Medical Science



Forward-looking scientific issues

- ▶ **Health** is an important human right and a treasure of the state, a necessary condition for the progress of society
- ▶ A healthy nation is better able to cope with economic shocks, natural disasters and other challenges
- ▶ References from literature provide eloquent arguments in the burden of chronic non-communicable diseases on society and their place in the epidemiological picture of contemporary pathologies
- ▶ The statistics and the increasing number of these diseases are a challenge for clinical medicine, biomedical research, and society because of the disabilities, the costs involved, but also the premature deaths of the working generation. They affect the economic and social development of the world's population





Research priorities MEDICINE

Aims of medical research

Maintenance and improvement of health and quality of life, reduction of disabilities of the population from the period of sexual, reproductive, newborn, infant, child, adolescent, adult health by developing, optimizing and implementing new techniques of diagnosis, differential diagnosis, treatment, early and remote recovery, prophylaxis of complications, including in patients with comorbidities, chronic diseases, *post-COVID-19* complications.

Areas of research in medicine, based on the National Health Strategy, "Health - 2030"



Forward-looking scientific issues

Congenital malformations in children

Congenital malformations present a medical, humanitarian and economic burden on patients and their families. Early diagnosis, antenatal, appropriate treatment, proper monitoring of patients means prevention of complications, exacerbations, a favorable prognosis of the disease evolution

- ▶ 700 children with congenital malformations are born **in Moldova** every year. Medical statistics report that **1-2% of newborns may have a severe malformation**. In 2011-2022 the frequency of congenital malformations was 17.75 per 1000 newborns. Congenital malformations rank second **in infant mortality** and account for **27.8%** (2022). Increase in the number of births of babies weighing <700-800g with major malformities.

Causes of infant deaths – structure

- ▶ CNS – 22%, heart disease – 69%, brain – 4%, kidney – 6,6% tumors
- ▶ Chromosomal aberrations – 10%, mucoviscidosis– 3%, digestive – 3%,
- ▶ **Total – 69,3% deaths**

Special in-depth **epidemiologic, epigenetic, molecular-genetic, biohumoral and metabolic status studies** are needed in congenital malformations, rare diseases, postcovidal states;

Optimization of differential and personalized treatment techniques to reduce complications and disabilities in children;

Evaluation of the results of the National Program for Prevention and Reduction of child mortality and morbidity due to congenital malformations and hereditary pathologies and EUROCAT





Forward-looking scientific issues

Congenital malformations

Congenital and acquired malformative disorders of CNS and peripheral nervous system

- ▶ Prognosis, prevention of complications, disability, death
- ▶ Prospective ways of neurological improvement in stroke, post-traumatic osteitis, amyotrophic sclerosis, ischemic stroke, spontaneous intracerebral hematomas, ischemic myelopathy, vertebro-medullary trauma, cranial tumors, etc.

Congenital and acquired reno-urinary anomalies in children and adults

- ▶ New techniques for diagnosis, treatment, prevention of complications, including infertility, urogenital infections, chronic kidney disease
- ▶ Kidney transplantation
- ▶ Extracorporeal detoxification methods in nephrology and urology



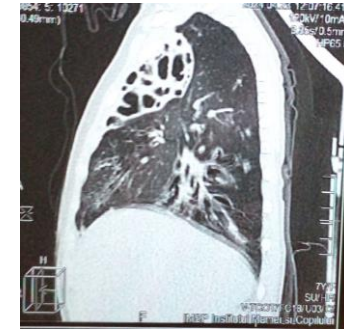


Forward-looking scientific issues

Noncommunicable diseases

– personalized prevention, diagnosis and treatment

- ▶ Noncommunicable diseases are a leading cause of disability and death
- ▶ *In the Republic of Moldova*, diseases of the circulatory system, cancer, chronic obstructive pulmonary diseases, chronic hepatitis, cirrhosis, diabetes, which lead to increased morbidity, disability, mortality, are predominant
- ▶ Health policies are currently focused primarily on disease treatment. The scientific medical community should promote cost-effective risk factor control, primary prevention, primary care screening and health promotion measures.
- ▶ Identification of ecological, psychological, technogenic risks with negative impact on human health



- Development and scientific substantiation of new policies on epidemiology, risk factors, which, through pathophysiologic mechanisms, develop the most prevalent non-communicable diseases;
- scientific substantiation of diagnostic techniques, differential diagnosis;
- developing, testing, implementing new diagnostic technologies, forecasting complications, relapses and the clinical and pathologic evolution of non-communicable diseases;
- systematization of risk factors and their mathematical modeling for non-communicable diseases;
- reducing oncological morbidity and mortality by developing and implementing methods of population screening, early diagnosis, personalized treatment and palliative care;
- scientific substantiation of the scientific-practical basis, maintenance and strengthening of health through epidemiology research, risk factors with the development of prevention methods;
- Development and implementation of clinical-paraclinical techniques of somatic and vegetative health assessment, monitoring and strengthening criteria in the given field.

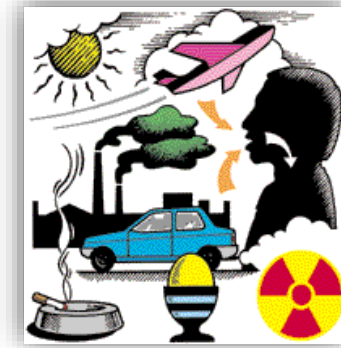


Forward-looking scientific issues

Study of environmental influence on health

Population exposure to natural sources of ionizing radiation

- ▶ increase in respiratory oncologic diseases – lung cancer
- ▶ risk factors for chronic diseases, CNS
- ▶ low-dose ionizing radiation with increased oncological and teratogenic risk, immune, reproductive, CNS disorders in children and adults



Research directions

- Finding new ways of protection in harmful anthropogenic influences (pollutants in soil, water, air), xenobiotics, chemicals, which favor the increase in the number of mutations in sex and somatic cells, the development of congenital anomalies
- Determination of the dependence between the structure of malformations and the state of ecology of geographical areas of the country
- Further research in the development of remedial measures for risk factors and comorbidities associated with ionizing radiation
- Studies aimed at preventing the negative influence of ecological factors on respiratory morbidity (rhinitis, pharyngitis, bronchial asthma, chronic bronchitis), cardiovascular, central nervous system, allergic pathology, immunopathological diseases, etc.
- Achieving this goal requires scientific research and argumentation in molecular biology, genetics, the immune system, somatic and mental health.



Forward-looking scientific issues

Epidemiologic surveillance of communicable diseases – control measures and consequences

Tuberculosis, HIV infection, acute and chronic viral hepatitis (A, B, C, D), including etiologically unidentified, measles, rubella, seasonal influenza, pandemic influenza, Covid-19, associated infections, blood-borne infections, antibiotic-resistant bacterial infections are major public health problems in all European countries.

- the frequency of multidrug-resistant tuberculosis is high at global level
- viral hepatitis is an alarming problem, particularly chronic viral hepatitis, which can develop into cirrhosis and primary liver cancer and is on the increase, presenting a high risk of new strains of influenza viruses with epidemic and pandemic potential, which require in-depth studies, including molecular biology techniques.



Research directions

- development of new scientifically based new methods of diagnosis, treatment
- prophylaxis in order to reduce morbidity, disability, premature mortality caused by communicable diseases;
- scientific substantiation of methods of prophylaxis, prevention of diseases;
- scientific substantiation of criteria for improving health services, differential treatment of diseases and avoiding epidemiological risks.



Forward-looking scientific issues

Research in post-COVID complications on reproductive health, newborn, infant, child, adolescent, adult



To ensure the minimization of the negative health impact of severe post-COVID-19 conditions, the reduction of multi-organ complications, as well as the social and economic effects, in-depth, targeted studies are needed, which would allow the development, implementation, optimization of new methods of diagnosis, differential diagnosis, personalized recovery treatment, based on scientifically reasoned principles of contemporary algorithms of diagnosis and treatment.

Research directions

- Developing criteria for early and remote diagnostic *screening* for post-COVID complications
- Clinical and exploratory evaluation in multidisciplinary teams of patients with complications, relapses, organ and system chronicization in the evolving stages of post-COVID-19 conditions
- Research results will allow to argue the etiopathogenetic features, pathophysiologic, clinical and paraclinical mechanisms of complications of SARS-CoV-2 coronavirus infection.
- Development of programs of diagnosis, treatment, recovery according to the clinical scores used at European level in confirming the quality of life of patients with complications, pathological conditions at post-COVID evolutionary stages



Forward-looking scientific issues

Prognosis, diagnosis, personalized treatment of COVID-19 sequelae

Studies report on inflammatory multiorgan damage, chronic sepsis and body systems (pulmonary, cardiovascular, nervous, digestive, renal, endocrine), but the incidence of complications and their evolution post COVID are not studied. It is necessary to strengthen and coordinate studies in the field of COVID-19 in order to prevent and reduce the evolutionary risks of complications, sequelae, chronicization of various organs/systems in patients who have suffered this infection



Research directions

- development of clinical-paraclinical criteria for assessing patients at risk of post-Covid-19 complications (clinical-anamnestic *screening* methods at primary care level, inpatient);
- clinical-explorative evaluation at the post-Covid-19 evolutive stages of patients with complications, chronicization of various organ and system disorders;
- research of immuno-biochemical, microbiological, serological, neuro-biological laboratory markers with prognostic potential, at the developmental stages of evolutionary complications of SARS-CoV-2;
- using imaging and functional techniques to determine the extent of lesions in the organs and systems affected in SARS-CoV-2 infection and to develop diagnostic and treatment algorithms;
- developing differentiated medical management, treatment and personalized recovery programs for patients with SARS-CoV-2 infection;
- developing prognostic criteria for complications and chronic diseases in children who have been infected with SARS-CoV-19; creating a national register of patients who developed various complications, with worsening of chronic diseases at post-Covid-19 stages.

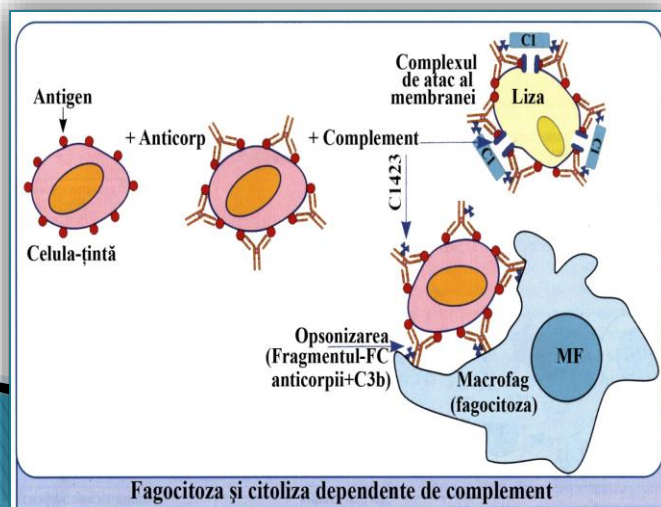


Forward-looking scientific issues

New pharmaceutical preparations from local raw materials

Research, production, approval of antibacterial, antiviral, immunomodulatory, antioxidant, antiseptic preparations, food supplements from local raw materials.

- ▶ Development of the domestic pharmaceutical industry guarantees the provision of essential medicines to the population, the creation of new jobs and the development of the country's economy.
- ▶ Development, synthesis and implementation of local drugs require special studies in the detection of biologically active substances, pharmacological qualities, therapeutic efficacy, etc.
- ▶ It is necessary to optimize analytical techniques, standardization criteria, which will allow their widespread implementation in the treatment of various pathological conditions.
- ▶ Development of new technologies, identification of biologically active chemical substances will make it possible to achieve contemporary standards of living, continuous improvement of the well-being of the population



Research directions

- Development of pharmaceutical preparations from local raw materials;
- use of existing natural sources and indigenous pharmaceuticals in medical practice;
- capitalizing on the potential of indigenous pharmaceutical preparations – vitamins, antioxidants, anti-inflammatory, disinfectants;
- development of food additives of natural origin as means of preventive treatment and support of the body's immune status.



Forward-looking scientific issues

Creation, maintenance and targeted strengthening of somatic and mental health, algorithms and methods

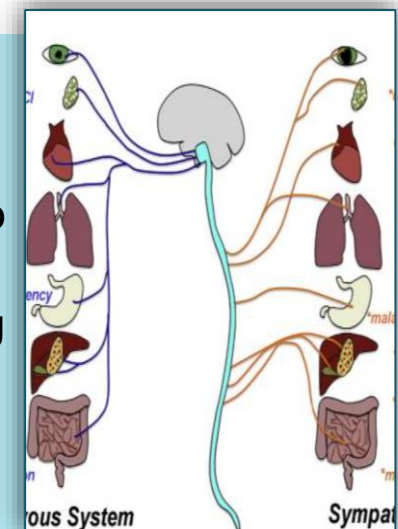
Development, maintenance and targeted strengthening of somatic and mental health is one of the most important issues of contemporary society. The current researches show that the psycho-functional state of man, the success of intellectual activity depends on their solution,

According to recent statistics, today's society has major health problems: 40% of the global population suffers from allergic diseases; 26.4% – from high blood pressure; every 3rd – from respiratory diseases; 15–20% – from diabetes mellitus, diseases of the locomotor system, central and peripheral nervous system, immunological, metabolic resistance, etc. Recent research confirms scientifically and practically that at the age of 40–45 every inhabitant of the planet is or will be affected by 2–3 diseases;

Researches at the Institute of Physiology and Sanocreatology have shown that in the Republic of Moldova in human society there is an early alteration of the general biological and mental health, which requires targeted studies and development of scientific bases not only for the highlighting, but also for monitoring and improving the quality of life starting from the antenatal period, child, adolescent, adult.

Research directions

- Development of well-reasoned criteria of cognitive, creative abilities;
- increase of the ability to manage emotions and behavior in order to reduce psychosomatic disorders;
- development of not only criteria but also procedures for maintaining and strengthening mental health;
- development of new techniques for improving mental capacity;
- new scientifically substantiated health policies are needed.

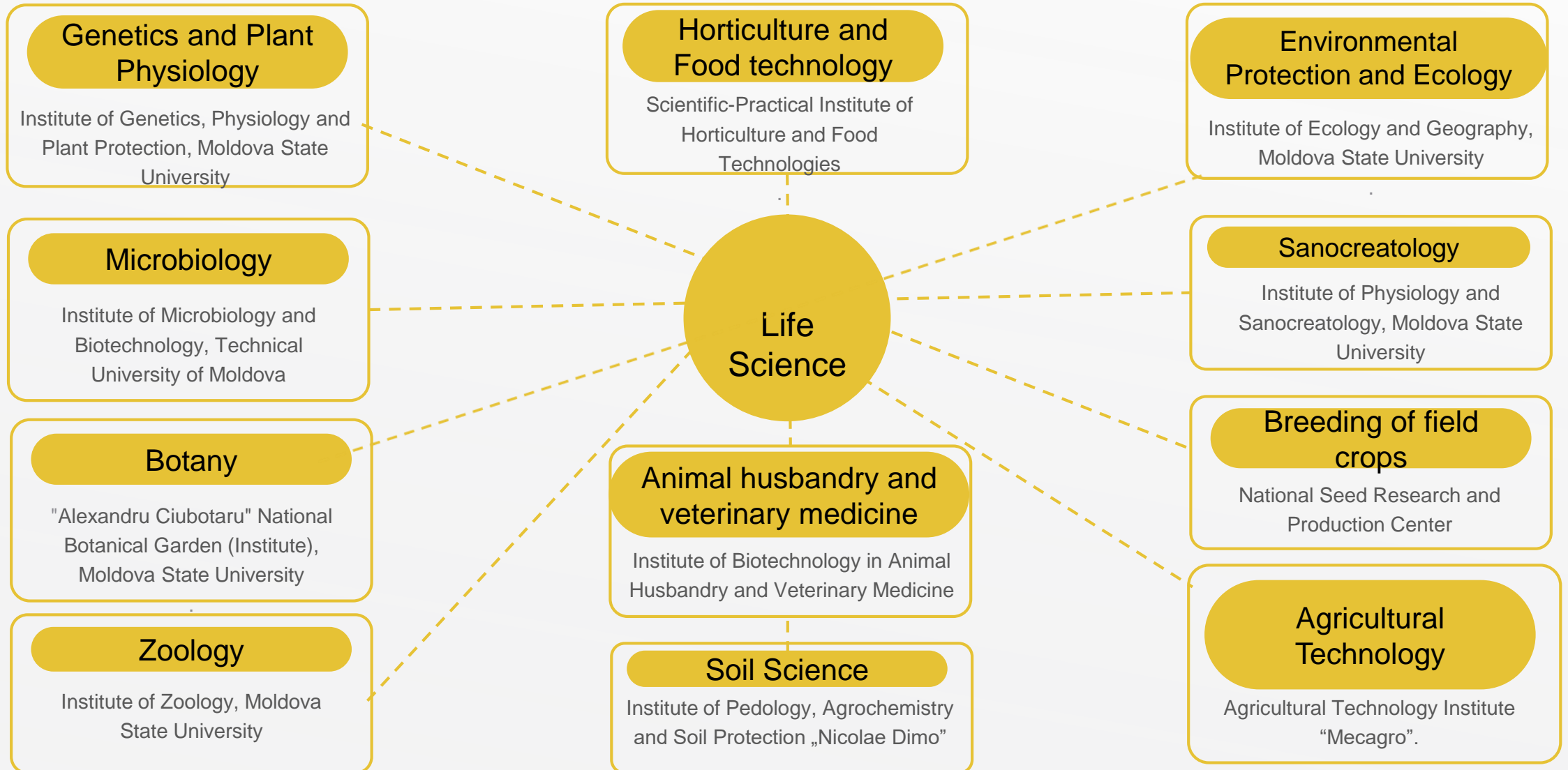




Agriculture, Biology and Environment

Research fields

Agricultural, Biological, Environment Sciences



The National
program in the
fields of
research and
innovation for
the years
2024-2027:
Research
priorities

**SUSTAINABLE AGRICULTURE,
FOOD SECURITY**

Main scientific directions:

- Food security and food safety
- Sustainable management of agricultural ecosystems
- New technologies for processing agricultural raw materials
- high performant plant cultivars, varieties and hybrids, performing and resilient livestock breeds for food and agriculture

**BIOTECHNOLOGIES AND
ENVIRONMENTAL
PROTECTION**

- **Main scientific directions:**
- Ecological security: impact of biotic and abiotic factors on environment and society
- Waste, plastics and pollutants
- Emission-free agricultural and industrial technologies
- Monitoring of aquatic and terrestrial ecosystems
- Protection and conservation of biodiversity
- Sectoral resilience to climate change
- Biotechnologies for various areas of application

Sustainable agriculture



• Scientific direction

- Improving the ecological sustainability of agricultural production by developing and implementing sustainable models of consumption and production
- The development of new technologies that will ensure the sustainable development of the agro-industrial sector in the conditions of global climate changes
- food safety management
- Creation and implementation in the production the competitive varieties with increased resistance to diseases and pests, to extreme temperatures (frost, heat, drought) and abundant precipitation
- Seed production and marketing



• Proposals for cooperation

- Promoting sustainable agriculture systems, including conservative and ecological, capable of providing ecosystem and social services
- Development of sustainable and resilient soil management models under climate change conditions
- Supporting the agricultural market and providing healthy seed materials for farmers
- Development of technologies for obtaining and processing horticultural products in order to increase the quality of the finished product, in accordance with the increasingly demanding requirements of consumers
- Research related to the biology and combating diseases and pests of horticultural plants in accordance with current worldwide requirements





Sustainable agriculture: Animal husbandry and veterinary medicine



Scientific direction

- Development of scientific principles for the conservation and diversification of the genetic fund of animals, assessment of the productive potential of purebred animals through genetic control of productively useful quantitative and qualitative characteristics;
- Development of new principles for increasing the hereditary variability of animal breeds, creation of breeds, types, lines, new hybrids with increased productivity and adaptability for through the use of domestic and imported genetic resources;
- Development of technologies for breeding, exploitation, reproduction and feeding of animals;
- Development of new technologies for feed production to realize the genetic potential of livestock production;
- Development of procedures, methods and schemes for the prevention and control of animal diseases, quality control of dairy and meat products.

Proposals for cooperation

- Innovative system of solutions for the production of antimicrobials in animal health and the production of animal products
- The development of digital monitoring in the efficient management of pasture for ruminant growth
- Genetic improvement of agricultural animals in the context of adaptation to climate change and ensuring security and food safety

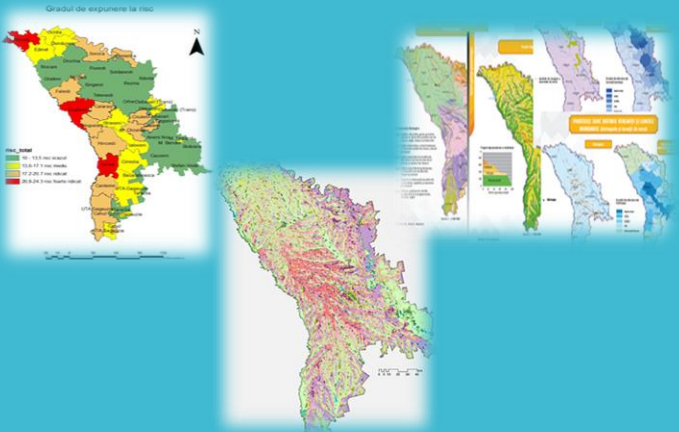
Scientific direction

- Climate change. Ecological security in the context of accelerated environmental changes
- Management of pollution sources, reduction of greenhouse gas emissions and implementation of climate change adaptation measures
- Monitoring and forecasting dangerous natural hazards
- Reducing the impact of toxic chemicals on the environment and public health
- Scientifically reasoned solutions for the remediation of lands contaminated with persistent organic pollutants
- Water pollution and contamination.

Proposals for cooperation

- The study of the quality and protection of the environmental components;
- Creation of environmental, natural and human resources geo-information systems;
- Performing integrated environmental monitoring for ecological reconstruction;
- Assessing the impact of environmental changes (including climate change) on natural and anthropical ecosystems;
- Elaboration of the scientific informational base regarding the natural and anthropic risk factors.
- Determining the changes in the aquatic environment, evaluating the migration and impact of pollutants, establishing the legitimacy of the functioning of hydrobiocenoses and preventing harmful consequences on ecosystems

Biotechnologies and environmental protection



Dinamica volumului de emisii de la sursele staționare din mun. Bălți
Conform Inspecției Ecologice Bălți, dinamica volumului emisiilor în mun. Bălți este în creștere pentru perioada 2014-2021 de la 855,13t la 1544,86 t.

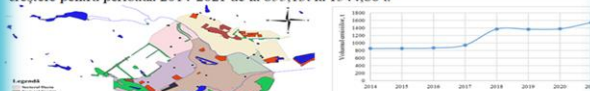


Fig. Dinamica volumului emisiilor de la sursele staționare din mun. Bălți (2014 - 2021) [Sursa: Inspecția Ecologică Bălți]

Fig. Schema amplasării principalelor întreprinderi în EU Bălți

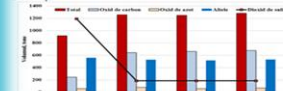
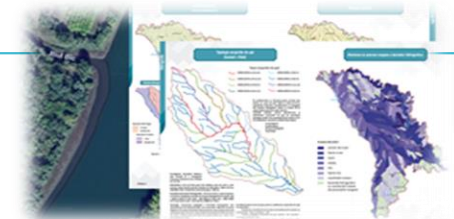
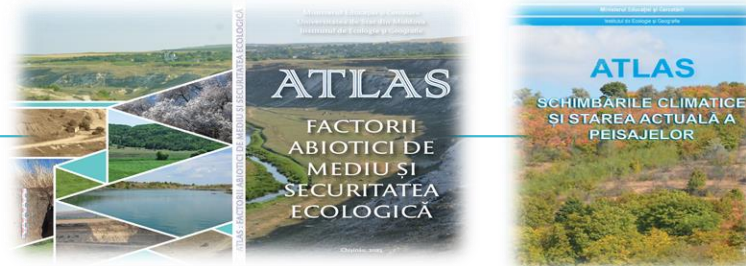
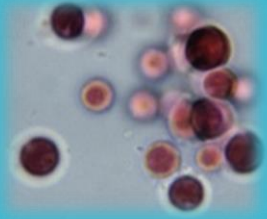


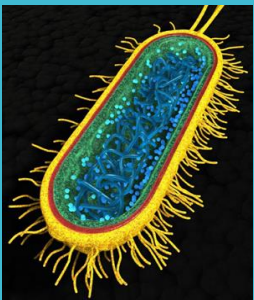
Fig. Dinamica emisiilor de substanțe poluante în aerul atmosferei de la sursele staționare ale activităților economice

Fig. Dinamica volumului de emisii pe sectoare de activitate în mun. Bălți (2014 - 2021) [Sursa: Inspecția Ecologică Bălți]

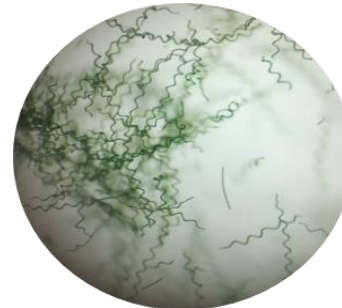
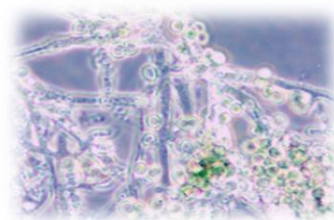




Biotechnologies and environmental protection: Microbiology Proposals for cooperation:



- **Soil Microbiota Monitoring:** Investigating the complex interactions within soil microbial communities and their impact on soil health and ecosystem functions.
- **Microbial Bioremediation:** Developing effective strategies for the use of microorganisms in the remediation of contaminated environments.
- **Microorganism Collections:** Enhancing and utilizing microbial collections for various applications in research and industry.
- **Biosynthesis of Nanomaterials Using Microorganisms:** Exploring innovative microbial processes for the production of nanomaterials with unique properties.
- **Microbial Biotechnologies:** Advancing microbial technologies for applications in agriculture, environmental, industrial, and medical sectors.





Biotechnologies and environmental protection: Conservation of biodiversity



Scientific direction

- Integrated management of biodiversity;
- Ensuring appropriate measures for biodiversity conservation;
- Biodiversity protection and the management of protected natural areas
- Conservation and improvement of forest biological diversity
- Conservation and exploitation of microbial biodiversity;
- Conservation of animal diversity



Proposals for cooperation

- The *ex situ* conservation of plant germplasm and the valorization of cultivated plant collections under conditions of increased genetic erosion and climate change;
- Ensuring adequate measures for the *in situ* conservation of plant agrobiodiversity;
- Protection of plant biodiversity and administration of protected natural areas;
- Establishing, harmonizing and implementing the system for monitoring the state of wild relatives of cultivated plants conservation;
- Inventory, collection, evaluation of landraces, their preservation and use for improvement purposes in the creation of new economically important varieties and hybrids;
- Conservation, protection and valorization of animal diversity
- Combating invasive species
- Evaluation, conservation, documentation and efficient use of microbial diversity,
- Facilitating the exchange of information and data on biodiversity

Contacts

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Thank you for your attention!

