



ROMANIAN ACADEMY
INSTITUTE OF BIOLOGY BUCHAREST

Towards Biology of the Next Century - 50 Years of Academic Research in Biology

Bucharest
2010

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BRIEF HISTORY

The **Institute of Biology** was established along several stages, starting with 1948, when several departments were set up: The Fauna of Romania, Plant Physiology and Animal Ecology. Subsequently, in 1950, the departments of Plant Ecology and Animal Genetics were also established. In 1954, other three departments were added, namely: Limnology, Oceanology and Animal Physiology.

In 1957 all these laboratories were gathered to establish the first Center of Biological Research in Romania, headed by Prof. W. Knechtel. The next two years, two more laboratories were established: Plant Genetics Laboratory and Animal Morphology Laboratory.

In 1960, the Center of Biological Research became the **Institute of Biology** “Traian Săvulescu”, headed by Prof. N. Sălăgeanu, member of the Romanian Academy, and in 1964 the actual building was inaugurated. Seven Research Departments were working in this building, including also a green house and a vivarium.

In 1970, by a meaningless decision, the collectives belonging to Phytopathology and Animal Metabolism Departments were transferred to the Academy of Agricultural and Forestry Sciences “Gheorghe Ionescu Sisesti”.

The **Central Institute of Biology** was established in the beginning of 1973 as a national structure required for biological research, having the Institute of Biological Sciences Bucharest, as a pivotal institute, headed by Prof. G. Zarnea, as a General Director.

In 1974, the collectives belonging to Animal Physiology Laboratory, Plant Physiology Laboratory and Genetics Laboratory as well as a large part of the scientists of Terrestrial Ecology Laboratory were separated from the Institute of Biological Sciences and transferred to the Institute of Agricultural Researches.

In 1990, the Central Institute of Biology ceased to exist and the **Institute of Biology** was established, as an institute of the Romanian Academy.

During this long history, the **Institute of Biology** was involved in many research projects, in traditional areas, such as animal and plant taxonomy,

microbiology, animal and plant physiology, while other new areas such as genetics, aquatic and terrestrial ecology were approached. The research also evolved from the study of individual organisms as single entities to the integrative approach of the relationships between different entities and with their environment. The final aims of our studies are not only to elucidate the structure and functionality of living organisms and ecosystems, but also to find viable solutions for some actual problems, such as eutrophication, soil or water pollution with heavy metals or oil, biodiversity conservation etc.

The **Institute of Biology** has been accredited in 2008 as a research unit of national interest according to the Government Decision 551/2007 based on Decision 9634/14.04.2008 of the National Authority for Scientific Research.

In these 50 years of activity, the institute has developed many relations of scientific collaboration with prestigious institutions from Romania and abroad (universities, research institutes, public and local authorities etc.), in the frame of common projects, such as European or national projects, bilateral agreements or conventions of collaboration within the programs of inter-academic exchanges. The researchers of the institute traveled extensively abroad, especially in the last 20 years, both for scientific documentation, participation to international conferences, but also for long-term training in prestigious foreign institutions.



The main research building in Bucharest

THE INSTITUTE ORGANIZATION

Currently, the Institute of Biology Bucharest has 123 employees, working in six departments, three of which are research departments:

I. Department of Ecology, Taxonomy and Nature Conservation

48 people (27 researchers, of which 10 PhD, and 21 technicians)

II. Department of Microbiology

29 people (19 researchers, of which 8 PhD, and 10 technicians)

III. Department of Plant and Animal Cytobiology

26 people (15 researchers, of which 10 PhD, and 11 technicians)

IV. Financial Department:

5 people, of which 4 have different diplomas in economical and juridical fields

V. Library and graphics Department: 5 people

VI. Administrative Department: 9 people

The institute activity is coordinated by a Scientific Board (11 members), an Administrative Board (7 members), a Director, a Deputy Director, a Scientific Secretary and a Financial Director.

CURRENT RESEARCH DIRECTIONS

The main activity of the institute is the fundamental research in the fields of Ecology, Taxonomy and Nature Conservation, Microbiology and Cytobiology, but many of the projects have applicable results (biotechnology, nanotechnology, impact studies, nature conservation etc.). The basic research programs are funded by the Romanian Academy, but the institute is also involved in many other projects, funded by the Romanian Ministry of Research, the National Council for Scientific Research (CNCSIS), by the European Commission and other national and international organizations.

The main research directions in the recent years are:

- Study of biodiversity in Romania (plants, animals, microorganisms) and the relationships with biotic and abiotic factors;
- Study of microorganisms in extreme and hostile environment;
- Bioremediation;
- Study of developmental processes in *in vitro* plant systems;
- Conservation of rare, endangered and endemic plant species;
- Comparative, structural and functional studies on animal cell reactivity and proliferation processes;
- Study of biological processes and cellular and molecular structures;
- Study of different cellular compounds with potential applications in environmental technologies, bio- and nanotechnologies.

The results of the scientific work were published in international and national journals, books and book chapters and presented at several domestic and international conferences. They were well appreciated taking into account the citations in other articles and the prizes obtained in Romania and abroad. Many of the results were patented and they were also awarded with golden or silver medals in international exhibitions.

RESEARCH FACILITIES

- The main research facilities of the institute are in Bucharest:
 - the central building, with more than 4800 m² of laboratories and offices
 - a vivarium, of more than 700 m²
 - a green house, of more than 300 m²
 - Cars, for terrestrial ecology investigations
- Research facilities in Sulina:
 - a building with more than 500 m² of laboratories and annexes for aquatic ecology investigations – permanent staff of this research point: 4
 - research boats

- Research facilities in Posada:

- a building with more than 300 m² of laboratories and annexes for terrestrial ecology investigations
- permanent staff of this research point: 3



Research facilities in Sulina



Research facilities in Posada



The car and research boat used in ecological research

Major research equipments (already purchased or will be purchased this year):

- Q TRAP™ LC/MS/MS system and software
- Genetic Analyzer ABI Prism 3500 (Applied Biosystems) and software
- Atomic Absorption Spectrophotometer and software
- Transmission Electron Microscopy and software
- Scanning Electron Microscopy and software
- Atomic Force Microscopy and software
- X-ray Spectrophotometer and software
- Ultracentrifuge and software

The **Institute of Biology** also hosts a plant herbarium and a mycological herbarium, registered in *Index Herbariorum* under the acronym BUCA and BUCM, respectively.

The **BUCA Herbarium** is the second largest collection of this type from Romania (after the one from Cluj - CL) and it consists of around 400.000 specimens (vascular plants and an important collection of bryophytes collected all across the country). It is included in the international scientific circuit, its main use being for scientific research. The majority of the specimens have unique value (endemic, rare species, herbarium sheets more than 75 years old, collections of illustrious botanists), being easily included in the category FUND of the mobile cultural patrimony.

More informations about BUCA Herbarium can be found on the websites:

<http://sciweb.nybg.org/science2/IndexHerbariorum.asp>

<http://sweetgum.nybg.org/ih/>

The **BUCM collection** includes around 137.000 specimens, most of which are phytopatogens. The herbarium contains specimens collected from Romania but also from other countries and holds 94 type specimens (*Holotypus*, *Lectotypus*, *Isotypus*, *Neotypus* etc.), with international importance, arranged in large systematic groups, easing the search for a certain species. There are also many ancient specimens, of historical importance and specimens included in the National Red List of Macrofungi.

More informations about BUCM Herbarium can be found on the websites:
<http://sciweb.nybg.org/science2/IndexHerbariorum.asp>
<http://sweetgum.nybg.org/ih/>

MAJOR RECENT PROJECTS OF THE INSTITUTE OF BIOLOGY

1. The project - IBB infrastructure development for enhancing the biodiversity investigation capacity, in accordance with global climate changes - DIBIOCLIM

Investment

The project aims to develop research capacities by enhancing the scientific and technical potential, in view of the preservation and the stable management of natural resources and biodiversity, considering the global climate changes, and in accordance with the European Research Area. The main interest of all research departments of the **Institute of Biology** is the study of species biodiversity from all categories of organisms, from microorganisms to plants and animals. The activities proposed in this project (acquisition of modern and performing research equipment, expansion and organization of laboratories and spaces for Research Development and Innovation (RDI), acquisition of RDI software and hardware) **will have a direct contribution to the development of RDI studies of the environment**, and will offer the possibility of new research domains and directions, in accordance with European strategies.

The **Institute of Biology** has an excellent research tradition, marked by prestigious names of national and international recognition, and is known for its constant involvement in priority research directions considered worldwide.

Novelty and expected impact

The current project implanted by the **Institute of Biology** directs to a very prominent and up-to-date scientific area, of high interest worldwide – the quantitative and qualitative evaluation of species, population and ecosystem

diversity, the monitoring of biomarkers, the analysis of space- and time- evolution of populations, of natural and human related ecosystems and socio-ecological complexes for the environment protection and durable development. European research areas are directed to the evaluation and prediction of biodiversity changes and the characterization of ecosystem dynamics, including terrestrial and marine environments.

The implementation of this project for infrastructure development will determine a substantial research progress regarding species diversity, with important impact on the advancing of both scientific knowledge and applications in different economy areas (environment, industry, medicine).

The major Ecological researches in our institute focused on taxonomical studies of invertebrates and plants isolated from terrestrial and aquatic ecosystems, evaluation of the diversity of species, ecosystems and complexes of natural and human related environments, the production and efficiency of these terrestrial and aquatic ecosystems, and the conservation of their biodiversity.

Considering the global climate changes, the proposed studies concerning plant and invertebrates biodiversity will be directed in accordance with the international tendencies and strategies.

Microbiology researches focuses on (1) the evaluation of taxonomical and physiological diversity of microorganisms isolated from environments characterized by normal and extreme conditions of temperature, hydrostatic pressure, pH, high concentrations of salt, heavy metals and carbohydrates, and (2) the identification of cellular and molecular structures and metabolites with bio(nano)technology potential, as well as microbial biomarkers for polluted environments.

Period of implementation and costs

This Project will be implemented during a period of **36 months**, starting in March, 2009. The total budget is **39.174.210 Lei (11.000.000 €)**, 90% of this costs representing a direct investment in infrastructure and RDI equipment.

2. The project – *Growth and Survival of Coloured Fungi in Space – Experiment in the SURE project (AO-2006-022) – PECS*

The major goal of the project is to test the survival of coloured fungi in the extraterrestrial space, with a spatial flight scheduled in 2010. The tasks of the **Institute of Biology's** team are:

- Elaboration of the documentation for the spatial experiments;
- Research activities concerning the growth and sporulation of the strain *Ulocladium chartarum* in microcapsules (at laboratory level, in special conditions);
- Researches activities for obtaining the spores for the extraterrestrial experiments;
- Experiments under simulated conditions; the effect of micro-gravitation on the biology of the strain *Ulocladium chartarum* and on the spores of *Ulocladium chartarum*, *Cladosporium herbarum*, *Aspergillus niger* and *Basipetospora halophila*;
- Organization of extraterrestrial experiment; the effect of micro-gravitation and cosmic radiations on the biology of *Ulocladium chartarum* and spores of *Ulocladium chartarum*, *Cladosporium herbarum*, *Aspergillus niger* and *Basipetospora halophila*.

RESEARCH PROGRAMS

I. Department of Ecology, Taxonomy and Nature Conservation

Research directions:

- Biodiversity assessment in natural (aquatic and terrestrial) ecosystems;
- Evolution of natural ecosystems under environmental and anthropic factors;
- Taxonomy and chorology of endemic, rare and endangered plant and macrofungi species from the Romanian Flora;
- Identification of endangered habitats and their importance in the Natura 2000 network of protected areas;
- The impact study for various investment projects.

Aquatic Ecology – Following the most comprehensive research program conducted throughout a period of over 50 years, we know today the life evolution of the most important aquatic ecosystem of Romania, Danube Delta. The long term investigations revealed the dynamics of the structure and functions of the phytoplankton and macrophytes, zooplankton, zoobenthos, bacterioplankton, and bacteriobenthos. The research on the aquatic flora and fauna showed a decrease of biodiversity, the decline of some species and the disappearance of others. Due to pollution and higher amount of nutrients, an enhanced process of eutrophication took place. The studies conducted in order to determine the biological production and productivity in the Danube Delta, in dam lakes and in several rivers allowed a quantification of the negative effects of this process. The obtained data contributed to a better understanding of control and functional mechanisms governing the biocoenotic production of the ecosystems, and their evolution.



Aquatic ecosystems in Danube Delta

Terrestrial Ecology – The laboratory has two research orientations: animal and plant ecology. The main research topics of the laboratory are the following: - structure of the biocoenoses and functions of the forest, shrub land and pasture ecosystems; anthropic impact on the evolution of the structural and functional changes of the natural terrestrial ecosystems. Based on the structural indices of the major biocoenotic components and on the basis of the site indices, the types of ecosystems in Romania were differentiated. The current main research objective is to evaluate the biodiversity in Romania. Complex studies were conducted on the Romanian flora, which allowed the phytocoenological characterization of the

spontaneous flora and plant communities spread. Another research subject brings new data on the structural and functional parameters of some rare or endemic populations.



Corvus corax – Retezat Mountain Area

Dianthus gelidus – Făgăraș Mountains

Taxonomy – The laboratory has two research orientations: animal and plant taxonomy. The main research topics of the laboratory are the following: - taxonomy of fungi, lichens, bryophytes, high plant species and taxonomy of animal species (Acari-Oribatida, Collembola, Coleoptera – Carabidae, Chrysomelidae, Miriapoda – Chilopoda, Pisces, Aves). In the past 50 years of taxonomical research in the Institute of Biology, over 50 animal and plant taxa were described as new for science. For example: *Stipa danubialis* Dihoru and Roman 1969, *Stipa crassiculmis* subsp. *heterotricha* Dihoru and Roman 1977, *Protaphorura ionescui* Radwański, Fiera & Weiner 2006 and *Leiocolea bantriensis* subsp. *wallfischii* Ştefanuț 2008.



Stipa danubialis Dihoru and Roman

Nature Conservation – is a specialized structure oriented towards the issues of the protected areas. In cooperation with the Romanian Academy's Commission for the Monuments of Nature, it approaches various aspects connected with the strategy of network development in protected areas and elaborates scientific documentation for new protected areas proposals. At the same time, the activities are focused on monitoring the national network of these areas, in order to improve the related informational system, to prepare syntheses, to develop the concepts and to participate in the fulfillment of the obligations assumed by the Romanian Government (selection, coding and inclusion in database of the knowledge concerning the areas of major interest for their integration in the European network of protected areas, Natura 2000).



The colonization of stone wall in Bucegi Mountain by *Bucegia romanica* (left) and *Cerastium transsilvanicum* in Piatra Craiului Massif (right)

II. Department of Microbiology

Research directions:

- Taxonomical, structural and physiological diversity of microorganisms from natural environments in normal and extreme conditions (temperature, pH, ions concentration);
- Studies concerning the structure-function relationship in the context of adaptation to extreme and hostile environmental conditions;

- Identification and study at cellular and molecular level of some structures and metabolites with bio(nano)technological potential;
- Study of microorganisms from extremely polluted environments for their use in complementary technologies in the bioremediation.

Microbiology of Extremophiles – The topics approached by the members of this research group concern worldwide priority subjects targeting the biology of extremophilic microorganisms (halophiles, thermophiles and acidophiles), encountered in environments with extreme life conditions (hypersaline lakes, hot springs, acidic waters etc.). The main goal is to improve the knowledge on the biology of extremophilic micro-organisms belonging to Bacteria, Archaea and Eucarya, with special emphasis on the structure-function relationships at molecular, cellular and population levels and on their biotechnological potential. The physiological, biochemical and ecological studies, including the isolation of new extremophytic microorganisms, will allow a better understanding of the basic topics in Life Sciences such as the borders and origins of life, dimension of biodiversity and bio-nanotechnology.



Gelatin hydrolysis by halophilic archaea isolated from Telega salt lakes



Colony of microorganisms isolated from subterranean rock salt

Bioremediation – The activity of this group focuses on the study of microorganisms having the capacity to remove pollutants (oil, hydrocarbons or heavy metals) in laboratory experiments as well as in outdoor (*in situ*) applications.

Special attention is given to a better understanding of different mechanisms (oxidation, binding, biosorption, bioaccumulation) involved in the bioremediation of different sites (including marine/saline environments) polluted with different chemicals, but also to the possibility to increase the resistance towards a given pollutant based on molecular approaches. Thus, the bioremediation strategies further developed take into account the interactions between the microorganisms and a given polluted environment.



Petroleum polluted site in Boldești-Scaieni area, Prahova County

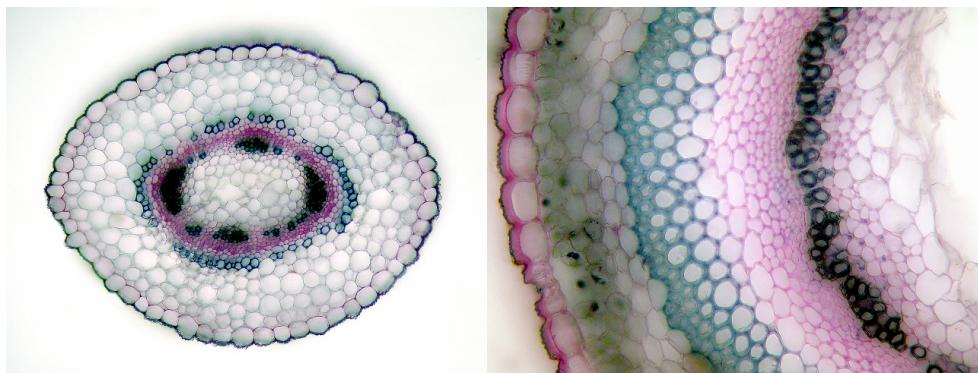
III. Department of Plant and Animal Cytobiology

Research directions:

Plant Cytobiology

- Cellular and biochemical characterization of developmental processes in *in vitro* systems on threatened plant species from Romania's Flora for *ex situ* conservation and biotechnological applications;
- Organization of an active gene bank of plant tissue cultures in order to preserve endangered wild species from autochthonous flora;
- The use of the *in vitro* cell and tissue cultures system for identifying and characterizing the secondary metabolites of biotechnological interest.

The experimental activities of this group bring theoretical contributions in several basic concepts of the developmental biology, such as informational plasticity of plant cells, cellular competence, morphogenetic causality and determinism, which form the basis for the expression of the totipotency character, bearing deep biotechnological implications for breeding program. Fundamental studies targeting the modulation of cellular and molecular processes of plant development in *in vitro* systems, under stress conditions, were carried on. The possible signaling role of polyamine in the control of development was investigated. Currently, the research objectives are focused on fundamental studies of the modulation of cellular and molecular processes of plant development using *in vitro* systems. This group investigates also some protected species from Romanian Flora, with theoretical and biotechnological impact in biodiversity conservation strategy.

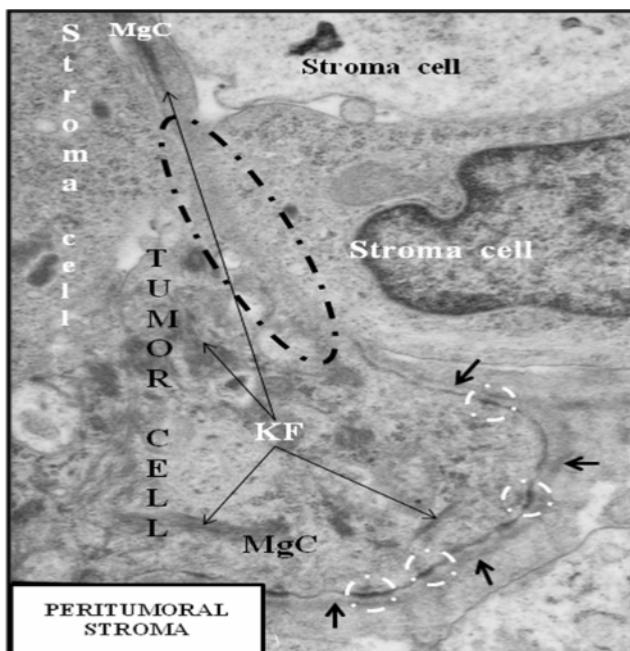


Shoot cross-sections of in vitro regenerated Dianthus callizonus

Animal Cytobiology

- Study of the cell and molecular interactions at the tumor-peritumoral stroma interface;
- Evaluation of the role of activated stroma during carcinogenesis and tumor angiogenesis;
- Study of the modulator effects of the peritumoral stroma during invasivity and reversion of the malignant phenotype.

The activity of this group focuses on the study of the infrastructural changes and some associated molecular alterations at the tumor-stroma interface. The main interest is to investigate the dynamics changes in the epidermal carcinoma phenotypes (basal epithelioma and squamous cell carcinoma), especially at the tumor-stroma interface, co-related with the desmosomal and hemidesmosomal junctions, as well as the basement membrane alterations during the process of tumor cells invasion. In order to get knowledge about the malignant cell behaviour, molecular investigations at the ultrastructural level for some important molecules involved in cell polarisation loss and tumor angiogenesis, as well as in the invasive growing process of the malignant cells into the host tissue are performed.



A sector of a malignant cell (MgC), showing an invadopodium which penetrates among stromal cells. To some extent, the plasma membranes of the tumor cell and an adjacent stroma cell (elliptic area delimited by black dots and lines) perform a recombinant membrane process. At the border with amorphous peritumoral stroma, invadopodium is delineated by a basement membrane (black small arrows). Keratin filaments (KF) fail to connect defective hemidesmosomes (encircled areas). (Basal cell carcinoma).

PhD PROGRAMS

The Institute of Biology organizes PhD programs since 1993, in the fields of Biology and Ecology, under the supervision of the Romanian Academy. Up to now, there were 51 public thesis defenses, elaborated under the supervision of 12 PhD coordinators. At present, we have six scientific coordinators, in the field of biology and 44 PhD students, including one with a double coordination (Romania and France).

PROMOTION OF SCIENCE

The Institute of Biology organizes every year:

- Advanced, post-graduated courses: ***Results and Perspectives in Biology***, with a different topic each year, dedicated mostly to young researchers, Master and PhD students.
- The Annual Scientific Session
- “Open gates days” for the promotion of science

The institute also supports the scientific journals *Romanian Journal of Biology – Plant Biology* and *Romanian Journal of Biology – Zoology*, edited by the Publishing House of the Romanian Academy.



Cover of last number of the journal “Romanian Journal of Biology”

RECENT SCIENTIFIC MEETINGS ORGANIZED BY THE INSTITUTE OF BIOLOGY

- International workshop LIFE NAT 99 RO 006429 - **Survival of *Romanichthys valsanicola***, organized in 2003
- First Meeting for the launch of the Romanian **National Platform of Biodiversity, in the frame of “BIOPLATFORM” European Platform for Biodiversity** - EVK2-2001-00043, organized in 2003
- International workshop: **Screening for isolation and purification of novel bacteriocins**, organized in 2003
- International workshop: **Biodiversity and prebiotic effects of heteropolysaccharides produced by lactic acid bacteria**, organized in 2003
- Conference: **Plant Cell Cytoskeleton - *in vivo* and *in vitro***, organized in 2003
- Danube Day “**Danube, Cultures & Worlds**”, organized in June 2007
- The XVI National Symposium of Tissues and Vegetal Cells Culture « **The Vegetal Biotechnology for XXI Century** », organized in 2007
- National workshop “**Strategy of ex situ conservation of natural genofound by biotechnological methods**”, organized in 2007
- Exploratory international workshop “**Extremophilic microorganisms: molecular adaptations and bio-nanotechnological applications**”, organized in 2008
- The national seminar “**Polypliody and hybridization - the major processes in angiosperm evolution**”, organized in 2009
- International workshop “**BIOWETMAN – wetlands management and conservation - A science based approach to understand biodiversity driven functions and services for improving wetland management**”, organized in 2009

INTERNATIONAL RESEARCH PROJECTS FINANCED DURING THE LAST YEARS

Project: ***BIVEP - Balcan In Vitro depot of Endangered Plants***

Program/Financed by: *Austrian Science and Research Liaison Office (ASO)*

Project: ***A science based approach to understand biodiversity driven functions
and services for wetland management***

Program/Financed by: *Austrian Science and Research Liaison Office (ASO)*

Project: ***Assessing the impact of environmental change on aquatic ecosystems in
the Danube Delta***

Program/Financed by: *SCOPES/ Swiss National Science Foundation - EAWAG,
Switzerland*

Project: ***Mures River Catchment Approach – Scientific Background Information***

Program/Financed by: *IAD, Austria*

Project: ***Monitoring of pollution in a Danube tributary (Mures-Tisza system)
using biomarkers techniques***

Program/Financed by: *IAD, Austria*

Project: ***Biodiversity and prebiotic effects of heteropolysaccharides produced by
thermophilic lactic acid bacteria***

Program/Financed by: *Bilateral cooperation Romania – Belgium*

Project: ***Screening for isolation and purification of novel bacteriocins from dairy
lactic acid bacteria isolated from fermented foods with a potential
to inhibit pathogenic bacteria***

Program/Financed by: *Bilateral cooperation Romania – Belgium*

Project: ***Development of the national biosafety framework for Romania***

Program/Financed by: *UNEP GEF*

Project: ***Developing the EU Biodiversity Strategy***

Program/Financed by: *BIOSTRAT – PC6/European Commision*

Project: ***European Platform for Biodiversity extension of partners from NAS***

Program/Financed by: *BIOPLATFORM – PC5 Programme/EC*

Project: ***Biodiversity Information Management System (BIMS)*** Program/Financed by: *World Bank (GES project)*

Project: ***LIFE AIR-AWARE: AIR Pollution Impact Surveillance and WArning System for URban Environment***

Program/Financed by: *LIFE/European Commision*

Project: ***Survival of Romanichthys valsanicola***

Program/Financed by: *LIFE/European Commision*

Project: ***Improving the protection of subalpine bogs in Romania***

Program/Financed by: *Peatland Biodiversity Programme/University of Dundee*

Project: ***Strenghtening capacity in Phare accession countries in environmental reporting***

Program/Financed by: *PHARE*

Project: ***Phare Topic Link on Nature Conservation***

Program/Financed by: *PHARE*

Project: ***Controlled production of functional exopolysaccharides by thermophilic***

lactic acid bacteria to obtain uniform high-quality fermented milks

Program/Financed by: *COPERNICUS/ European Commision*

INTERACADEMIC EXCHANGES

The Institute of Biology Bucharest have projects, cooperations, interacademic exchanges, with several countries: Austria, Belgium, Bulgaria, China, Czech Republic, England, France, Germany, Hungary, Israel, Japan, Moldavia, Poland, Russia, Slovakia, Spain, Sweeden, Ukraine

MAIN RESEARCH GRANTS FINANCIALLY SUPPORTED BY ROMANIAN ACADEMY IN LAST YEARS

- Characterization of taxonomic diversity of edafic acarians (Acari: Mesostigmata; Oribatida) from some ecosystems with *Picea abies* and *Fagus sylvatica* in Bucegi Mountains
- Conservation of faunistic biodiversity by saving endangered species from endangered habitats
- Floristic diversity in botanical reservation of superior basin of Prahova river
- The research concerning conservation by *in vitro* cultures techniques for some endangered endemic plant
- The study of some oxidative events associated with installation of apoptosis in tumor tissue of “crown-gall” type
- Molecular biology of the answer of cyanobacteria at hypersaline shock: the study of respiration under light and investigation of putative role of multi-functional catalase (katg) and thioredoxin peroxidase
- The inventory and characterization of natural habitats NATURA2000 in natural protected sites in Brasov and Prahova county
- The cumulative effect of glutathione and ascorbic acid on plants apoptosis
- The stimulation of metallic ions removals from gold pyrite concentrated by bio-oxidative controlled processes
- The structural and biochemical modification induced by hydrocarbons to Gram-negative hydrocarbon-oxidant bacteria
- The site Marnele Roșii from Gura Beliei, Prahova county – the research for development of protected area network in Romania

- Improvement of the adaptability of plants to extremely environmental conditions (hydric deficiency) by administration of pre-treatments with inductive molecules involved in activation of defensive antioxidant system
- Studies concerning the conservation in *in vitro* collection of two *Dianthus* taxa, rare for the Romanian flora – opportunity for protection of endangered status plant
- The effect of physical-chemical parameters on the activity and biotechnological potential of extracellular hydrolytic enzymes produced by halophilic microorganisms
- New data on the structure of extremely halophilic archaeal community from hypersaline lakes in Prahova county. Biotechnological applications
- The adapted answer of Gram-positive and Gram-negative bacteria at high hydrocarbons concentrations. Biotechnological potential

BREVETS/PATENTS

Many of the results obtained by the researchers of the institute were patented. Some of the patents included in Derwent Innovation Index are listed below:

1. RO104281-A

Title: Prolonged preservation of bony tissues-by adding collagen-and keratin-hydrolysate, antibiotics and calf-serum contg. Morgan-Morton-Parker

Assignee: INST STIINTE BIOLOGICE

2. RO95354-A.

Title: Collagen based membranes for ophthalmic and dermatological dressings – contain collagen, PVA, ethyl-alcohol and glycerol

Assignee: INST STIINTE BIOLOGICE

3. RO105013-A

Title: Bio-stimulant culture medium prepn.-contains collagen and chondroitin-sulphate in dil. acetic acid soln.

Assingee: INST STIINTE BIOLOGICE

4. RO95352-A

Title: Modified collagen-cuprous-ion complex – for treating copper deficiency in pregnant and young animals

Assignee: INST STIINTE BIOLOGICE

5. RO95353-A

Title: Ferrous-collagen complex – for treating and preventing anaemia in pregnant and young animals

Assignee: INST STIINTE BIOLOGICE

6. 1993-247943RO103361-A

Title: Glass percolator for ore metal solubilisation testing of microorganisms - consists of lean ore solubilisation tester employing liquid and ore samples

Assignee: INST STIINTE BIOLOGICE

7. 1984-235432RO83695-A

Title: Bio-gas prepn. by decomposition of sludge mixts. - obtd. from pig-rearing farms or town sewage purificn. and from sugar factories

Assignee: INST STIINTE BIO

8. 1984-235333RO80407-A

Title: Substrate for bio-gas prodn. - contg. sludge from filters of sugar mfr., water from washing beetroot, inoculum and opt. molasses

Assignee: INST STIINTE BIO

9. 1988-344101RO94340-A

Title: Hydrophilic insol. gels prepn. - based on crosslinked cpd. of microbial xanthan bio-polymer and of hetero-polysaccharide

Assignee: INST STIINTE BIO

10. RO110680-B1

Title: Multivalent enzymatic compsn. to remedy digestion inadequacy - based on cultures of Aspergillus niger I, Aspergillus niger Kr, Aspergillus niger A5 and Aspergillus oryzae 63

Assignee: INST STIINTE BIOLOGICE

11. 1992-396244RO101191-A

Title: Device for biological fixing for sterile dumps and settling dams - consists of provision of mining waste with vegetable cover of dactylis glomerata l. etc.

Assignee: INST STIINTE BIOLOGICE

Some of them were awarded with golden or silver medals to various international exhibitions, such as:

- Silver medal – International Salon of Innovation, Research and New Technology “EUREKA”, Bruxelles, for the brevet “Method of bioremediation of wastewater from chemical-pharmaceutical industry using system type bio-filter” - 2004
- Silver medal - International Salon of Innovation, Research and New Technology “EUREKA”, Bruxelles, for the brevet “Microbiological method for removing heavy metals from galvanic wastewater” - 2004
- Golden medal – International Salon of Invention – Geneva, for the brevet “Microbiological method for removing heavy metals from galvanic wastewater” – 2005
- Silver medal - International Salon of Invention – Geneva, for the brevet “Materiau carbonique pour la biosynthese des anthocianiques et son procede d`obtention” – 2006
- Golden medal – International Salon of Innovation „ZLATNA ARCA”, Zagreb, for the brevet “Microbiological method for removing heavy metals from galvanic wastewater” – 2007
- Silver medal – International Salon of Invention and New Technologies „INVENTIKA” – Romania, for the brevet “Microbiological method for removing heavy metals from galvanic wastewater” – 2007

ROMANIAN ACADEMY AWARDS

The activity of the institute was also awarded by the Romanian Academy as follows:

- The award EMANOIL TEODORESCU, received for 11 times in the years: 1970, 1973, 1975, 1980, 1981, 1983, 1986, 1987, 1996, 2005 and 2007;
- The award EMIL RACOVITĂ, received for seven times in the years: 1972, 1974, 1981, 1990, 1998, 2001 and 2004;
- The award GRIGORE ANTIPA, received once in 2001;
- The award NICOLAE SIMIONESCU, received once in 2006

THE RED BOOK OF VASCULAR PLANTS OF ROMANIA

A monographic book “The Red Book of Vascular Plant of Romania” has been published in 2009 at the Publishing House of the Romanian Academy. This book, of national and regional Balkan interest contains, in more than 600 pages, the description of 548 taxa (species and subspecies). A micro-monography is presented for each taxon, with information concerning the description of the taxon, conservation status, taxonomy (with iconography), chorology (including the map of distribution at national level), area, habitat, cenology, biology, importance, limitative factors, conservation measures, and references.



The cover of Red Book of Vascular Plants of Romania

NATURE CONSERVATION ACTIVITY IN THE INSTITUTE OF BIOLOGY BUCHAREST

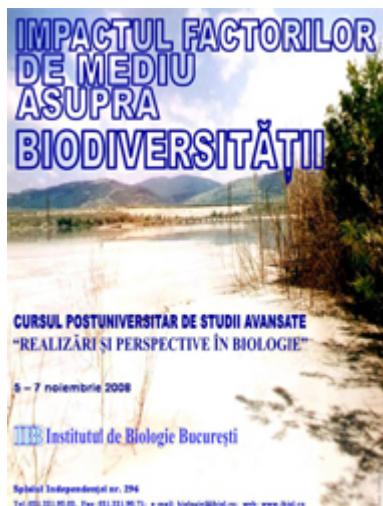
The nature conservation activity in the Institute of Biology has been all the times in good correlation with the activity of the Romanian Academy's Commission for the Protection of Nature Monuments. Several researchers from the institute have been members in this Commission. Most of the results from the Institute's research activities became proposals for protected areas and some of them were transferred into legislation mainly Law 5/2000 - section III - protected areas, as well as several Governmental Decisions for new protected areas: H.G. 2151/2004; H.G. 1581/2005; H.G. 1143/2007 or H.G. 1284/2007 for protected areas, as part of European network Nature 2000.

Based on the scientific documentation from the **Institute of Biology** and its partners, several areas have been proposed to be "**National Parks**", such as: Retezat, Piatra Craiului, Munții Măcinului, Domogled-Valea Cernei, Semenic-Cheile Carașului, Cheile Bicazului-Hășmaș, or "**Natural Park**", such as: Bucegi, Comana, Balta Mică a Brăilei, Apuseni, Cozia, Porțile de Fier, Grădiștea Muncelului-Cioclovina, Vânători Neamț. Researchers from the Institute of Biology are currently members in the Scientific Councils of the above mentioned Natural and National Parks.

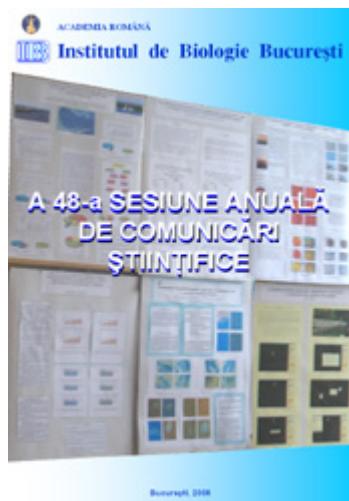
The high quality of the research activity in this field conducted also to the preparation of scientific documentation for the "**Biosphere Reservation Delta Dunării**".

THE ADVERTISING POSTERS OF VARIOUS SCIENTIFIC EVENTS ORGANIZED BY INSTITUTE OF BIOLOGY

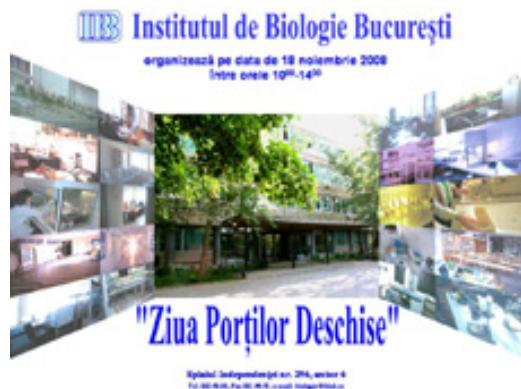
Post-graduated course



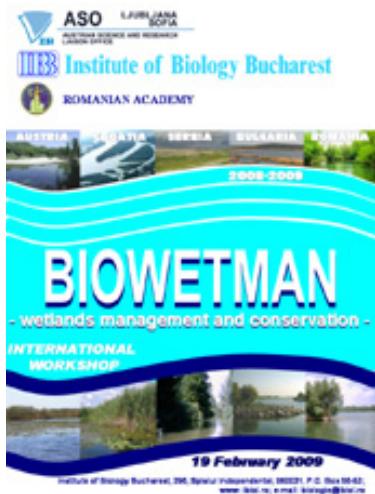
Scientific session



Science dialogue promotions (Open Gates Day)



Scientific events (workshop)



Associated books for post-graduated course



2006 edition



2007 edition

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