HUNGARIAN ACADEMY OF SCIENCES

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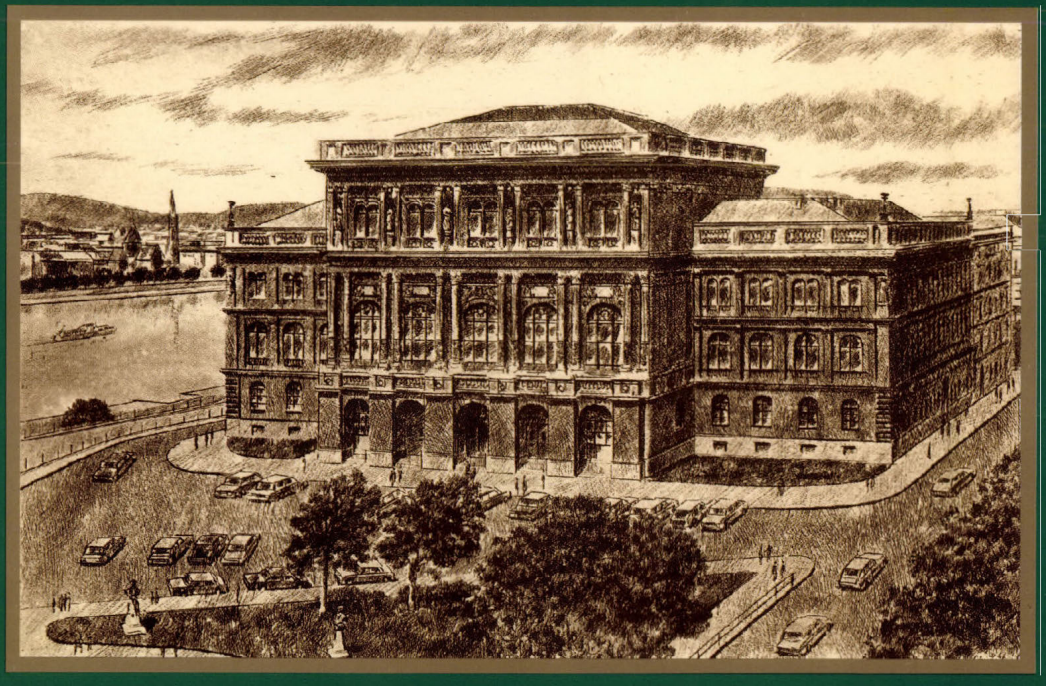
RESEARCH INSTITUTIONS AND THEIR ACTIVITIES



1999

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with the assistance of the respective Departmentes of the HAS
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ABBREVIATIONS

Scientific degrees:

Ph.D. = Doctor of Philosophy
C.Sc. = Candidate of Sciences
D.Sc. = Doctor of Sciences
C.M. = Corresponding Member of the HAS
O.M. = Ordinary Member of the HAS

FOREWORD

Some hundred generations of men and women have given us what is in our minds about the Universe and within that the Earth – the arts and skills and the organized body of knowledge that we now call science. We seek, we learn. One possible definition labels science as a profound intellectual activity by which the system of verifiable knowledge of connections between nature, society and thinking is treated.

Like most countries of Europe, Hungary has understood from the very begining the utility of intellectual power. However there was a centuries long evolution phase of social and mental ripening until in 1825 the Hungarian Academy of Sciences was given a birth. The Academy is entitled to take responsibility in all fields of sciences in our country. Although initially oriented towards the humanities, by the late nineteenth century it was taking an interest in the natural sciences as well.

The Academy has a double task. Firstly, as a scientific body, it takes part in directing of the research going on throughout the country, and in the elaboration, execution and supervision of research programmes. It co-ordinates research, and evaluates the progress being made in the field of sciences. Secondly the Academy owns and manages the biggest network of research institutions in Hungary. Sophisticated political and economic impacts have led the Academy during the past years to refurbish her research strategies, and instead of preserving some survival policies, a real renaissance of the research network has begun in 1998. A smaller than before society of scientists, a slightly shrinking network, together with a very thorough and target oriented funding may label the "consolidation process" of the research institutions of the Hungarian Academy of Sciences.

This booklet has an aim to present a short description of these institutions, their activities and the scope and field of their scientific research. We do hope, that the following passages will give information to the readers and enable them to get acquainted with these workshops.

Budapest, May 1999

Norbert Kroó

Count István Széchenyi (1791–1860) founder of the Academy in 1825

PRINCIPAL OFFICERS OF THE HUNGARIAN ACADEMY OF SCIENCES (HAS)

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INSTITUTES
FOR NATURAL SCIENCES

VETERINARY MEDICAL RESEARCH INSTITUTE

The view of the institute

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Scope of activities

The aim of the institute is to investigate the viral, bacterial and parasitic diseases of farm animals and conduct molecular biology research on these areas. The overwhelming part of the work is basic research. In particular, molecular and genetic aspects are increasingly emphasized. However, the Institute's duties also include participation in different forms of graduate and postgraduate training, promotion of international collaborations, informing the public about scientific achievements, and assisting in the technological transfer of research results for purposes of application. At present, the Institute as an internationally acknowledged site of basic research continues to consolidate its position as a national resource of new knowledge applicable in prevention of infectious animal diseases.

Research aims and topics

Most of the research concentrates on studying the nucleic acids and proteins of various pathogens. Among the viruses, primarily the herpes-, adeno-, paramyxo- and tumor-viruses are investigated. Among the bacteria, members of *Escherichia, Pasteurella, Salmo-*

nella, Bordetella as well as *Mycoplasma* genera are studied to gain information about their less well known virulence characteristics. An important direction of the research is to improve the methods of detecting infections by nucleic acid and peptide analysis. It is also important to study the relationship between virulence and antigenic composition of the pathogenic organisms. Basic research activities on fish parasites are related to the etiology of the diseases and to the biology of protozoa. Environmental health aspects of certain infections are also investigated. A brief overview is given below about the research activity in the three main areas (virology, bacteriology and fish parasitology).

Virology projects

- Molecular studies on Aujeszky's virus: characterisation of the viral genome and its modification to improve immuno-genecity.
- Molecular epidemiology of Newcastle disease virus (NVD).
- Molecular epidemiology of infectious bursal disease virus (IBDV).
- Studies on porcine adenoviruses as possible viral vectors.
- Molecular biology and phylogenetics of animal adenoviruses.
- Molecular pathogenesis of bovine herpes- and adenoviruses in diseases of farm animals.
- Molecular pathogenesis of avian tumor viruses including Marek's disease and avian retroviruses.
- Immunosuppressive viral diseases of poultry.
- Elaboration of polymerase chain reaction (PCR) methods for the detection of different viruses.

Bacteriology and mycoplasma projects

- Study on *Mycoplasma* infections of poultry, swine and cattle. Development of methods for diagnosis and control.
- Immunological studies on the proteins of mycoplasmas.
- Molecular biology of the virulence, epidemiology and immunogenetic characteristics of enteric bacteria (*E. coli, Salmonella*).
- *Bordetella* and *Pasteurella* infection of domestic animals with special regard to the virulence factors.

Fish parasitology projects

- Pathogenesis and therapy of parasitic (myxosporean, coccidian, and helminth) diseases of fishes in Hungary.
- Effect of pollution and environmental stress factors on infestation of Danube fishes by parasites.
- Survey on parasitic infections and diseases of fishes in Lake Balaton and Small Balaton Water-reservoir.

Postgradual and gradual training

There are generally about 10 PhD students supervised by scientists of the Institute in their program, on the subject a of molecular virology, immunology, bacteriology and parasitology. Lectures on veterinary microbiology, fish diseases and hydrobiology are regularly given at the University of Veterinary Sciences.

BALATON LIMNOLOGICAL RESEARCH INSTITUTE

Address: 8237 Tihany, Fürdőtelepi út 1–3.
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Telefax: (36) 87-448-006
Director: Sándor HERODEK, D.Sc. (Biology)
E-mail: herodek@tres.blki.hu

Scope of activities

The Institute was opened in 1927 and since 1951 it had belonged to the Hungarian Academy of Sciences. The Institute has two departments. The Department of Hydrobiology is involved in the ecological research of Lake Balaton, the largest lake in Central Europe. Due to the activities of the institute Balaton became one of the best studied lake of the world and has had an ecologically sound water quality protection program. The Department of Experimental Zoology concentrates on the cellular bases of neuronal regulation in invertebrates, combining neuroanatomical, neurochemical and eletrophysiological techniques, but it also deals with the accumulation of environmental polluatants and their effect on neuronal regulation.

Research aims and topics

The Department of Hydrobiology aims to determine the role of different factors in lake eutrophication and the optimal strategy of the reversal of this process, to monitor the biological diversity of the lake, to clarify interactions in aquatic ecosystems, and to make proposals for the conservation of biodiversity.

The main topics of hydrobiological research are the following:
- Phosphorus metabolism of the lake
- Ammonia, nitrate and urea uptake by phytoplankton

Partial view of the institute

- Characteristics and ecological effects of dissolved humic substances
- Seasonal and long-term changes in phytoplankton
- Distribution and photosynthesis of cyanobacterial picoplankton
- Factors influence on growth and toxicity of filamentous blue-green algae
- Zoology of the tributaries
- Composition and quantity of the littoral macrobenthos
- The littoral food chain
- Production and respiration of planktonic, epiphytic and epilithic crustaceans
- Population dynamics and early development of fishes
- Biomanipulation by fishes

The Department of Experimental Zoology aims to study the comparative neurobiology of signal molecules and their receptors in the central and peripheral nervous systems of model invertebrates, the physiological and membrane effects of antoropogenic pollutants and blue-green algae toxins on aquatic animals, and to monitor the toxic pollution of living organisms of Lake Balaton and its catchment area.

The main topics of the department are the following:

- Colocalization and cotransmission of signal molecules
- Neurochemical characterization of signal moleules and their receptors
- Effect of neuropeptides on membrane currents and ionic channels
- Synaptogenesis and embryogenesis of the chemical specificity of neurons
- Molecular neurobiology of secondary messengers
- Effect of algae toxins on the transmitter and receptor systems of invertebrates and fishes
- Effect of environmental pollutants on the neuronal regulation of aquatic organisms
- Monitoring of toxic pollution of living organisms in Lake Balaton and its catchment area.

The research vessel "Balaton"

INSTITUTE OF EXPERIMENTAL MEDICINE

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E-mail: esvizi@koki.hu

Scope of activities

The Institute of Experimental Medicine was established in 1952. The Institute is the only organization in Hungary dedicated exclusively to medical research. Its activity is focused on basic biomedical research, primarily on brain research, including studies on neurotransmission (using neuroanatomical, electrophysiological, neurochemical and pharmacological methods), on behaviour, ischaemic brain damage and on the central and peripheral control of hormone secretion. The activity of the teams within the Institute is characterized by a multidisciplinary approach; they are trying to combine traditional, well-established methodology with the new technologies of cellular and molecular biology. The main purpose of the basic biomedical research is to provide answers to various theoretical as well as clinical problems, with the aim of improving the quality of human life.

Research aims and topics

Neuropharmacological studies

- Synaptic and non-synaptic communication between neurons.
- Features of neurotransmitter release under physiological and pathological conditions.
- Receptor-mediated pre- and postsynaptic modulation of neurotransmitter release.
- The role of extracellular nucleotides and nucleosides in signal transmission.

The view of the institute

- Ischemia-induced neurochemical changes in the brain.
- Regulatory function of neurotransmitter uptake systems.
- The role of calcium permeable transmitter-gated channels and receptors, influencing $[Ca^{2+}]_i$ in the pre- and postsynaptic modulation of transmitter release: $[Ca^{2+}]_i$ imaging and neurochemical analysis in brain slices.
- Interface role of the sympathetic nervous system in neuroimmune communication.
- Interactions between the nervous and immune systems: *in vivo* and *in vitro* models.
- Bidirectional connections of the noradrenergic neurotransmission and cytokine production.
- Modulation of myelomonocytic differentiation by neurotransmitters.

Studies in endocrine physiology

- Neonatal endocrinology: The regulation of hypophyseal hormone secretion in neonates.
- Hormonal regulation of behaviour: The effect of life experience on the reactivity of rats to stressful stimulation and behavioral manipulation.
- Neurotransmitter and neurohormone receptor expression in neuroendocrine regulation, especially in chronic stress.

Molecular neuroendocrinological studies

- Investigation of stress-related functions at systemic and molecular levels.
- Studying stress-related neural circuitries that mediate physical, psychogenic and immune challenges using functional neuroanatomical techniques.
- Characterization of mechanisms and transcription factors that regulate the expression of stress-related genes *in vivo*.
- Studying the effect of stress and stress hormones on neurodegenerative processes.

Gastrointestinal research

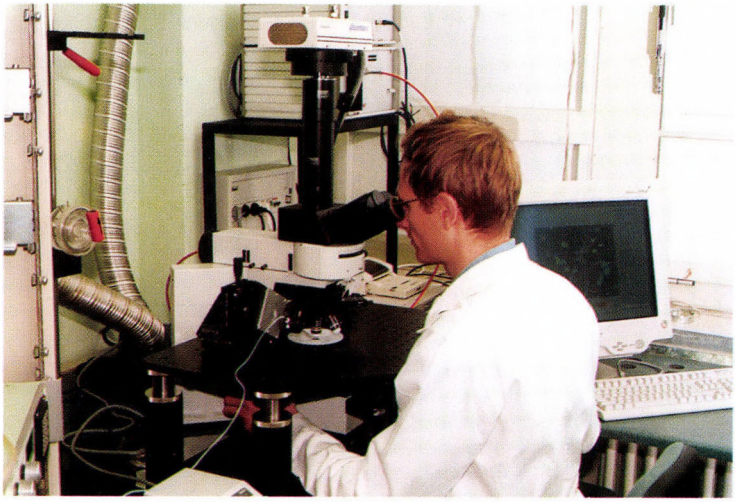
- Studies on the physiological role of endogenous bioactive regulatory substances in controlling salivary, gastric and pancreatic secretion, as well as gastric and intestinal motility.
- Studies on differential gene expression in normal and transformed human pancreas to understand the alterations at the molecular level.

Adrenocortical research

- The role of innervation in the regulation of adrenocortical hormone production.
- The physiological and pathophysiological role of ouabain (natural Na-K-ATPase inhibiting steroid hormone) production.

Functional neuroanatomical studies

- Anatomical, electrophysiological and neurochemical analysis of neuronal networks in archi- and neocortical regions.
- Changes in hippocampal neuronal circuits



Dynamic fluorescence imaging of intracellular calcium concentration in neurons of perfused brain slices

in animal models of epilepsy and in the temporal lobe of human epileptic patients.
- Light and electron microscopic localization and function of K^+ and Cl^- transporters, phosphatases, kinazes and their anchoring proteins involved in the regulation of neurotransmitter receptors.

Molecular neurobiological studies

- Studies on the nervous system and developmental-specific, as well as neuronal activity dependent regulation of the GABA-synthetic enzyme, glutamic acid decarboxylase (GAD65, GAD67) at the level of gene functioning.
- Studies on the role of the truncated embryonic GAD forms in neuronal development and in plasticity of the adult nervous system.
- Generating genetically modified mouse models to study nervous system function, and to test potential drugs for the treatment of neurological disorders.

Neuroendocrinological studies

- Neural and humoral mechanisms regulating the hypothalamo-hypophyseal system.
- Chemical identity, plasticity and synaptology of hypophysiotrophic neurons.
- Modulation of gene expression by steroid hormones in the diencephalon.
- The neuroendocrine centers of the human brain.
- Neuropathology.

Endocrine cell-biological studies

- Hormone co-expression and differential regulation of hormone release in human and rat adenohypophyseal cells.
- Enzyme-cytochemical studies on ecto-ATPases in pituitary and neural cells; supposed roles in cell adhesion and signal transmission.

Cellular neurobiological studies

- Studies on the *in vitro* neurogenesis using immortalized neural progenitor cells derived from embryonic mouse brain.
- Studies on the postnatal neurogenesis, *in vivo*, after implantation of neural progenitor cells into different regions of adult mouse brain.
- *In vivo* and *in vitro* analyses of neural tissue reactions to mechanical injury.

AGRICULTURAL RESEARCH INSTITUTE

The main building of the institute. Late 18th century manor-house, built by the Brunszvik family.

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Director: Zoltán BEDŐ, D.Sc. (Agric.)
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Scope of activities

The main aim of research activities is to investigate the cereals grown on the largest area worldwide. Complex research includes classical and molecular genetics, plant biotechnology, investigation of plant physiological processes and experiments on cell biology. The basic research primarily serves to develop the scientific background required for breeding. Other important research fields are breeding methodology, phytopathology, resistance breeding and crop production experiments. The main tasks facing breeders are the development of new varieties satisfying practical requirements, cereal gene bank research, studies on the effects of global climatic changes on cultivated crops, the investigation of sustainable crop production systems and the application of new methods in the breeding of plants resistant to abiotic and biotic stress factors.

Research aims and topics

Genetic research

- Biochemical, classical and molecular genetic analysis of abiotic stress resistance in cereals.

- Frost resistance research including the use of the RFLP and RAPD techniques to map frost resistance genes on chromosomes 5A, 5B, 5D and 7A of wheat.
- *In vitro* and *in vivo* physiological and genetic research on heat and drought tolerance.
- Transfer of alien chromosomes and chromosome segments into cultivated wheat and their analysis by means of molecular cytogenetics.

Cell biology and physiology research on plants

- Establishment and perfection of *in vitro* systems for the efficient genetic transformation of various cereals.
- Biotechnology of sexual processes in plants (micromanipulation and *in vitro* fusion of gametes, molecular approach to fertilisation).
- Elaboration of cryopreservation methods for the storage of reproductive cells and embryos in the gene bank.
- Development of metal ion tolerance and herbicide resistance using biotechnological methods.
- Studies on the action mechanism of spontaneous and colchicine-induced chromosome doubling during the microspore embryogenesis of various cereals.
- Analysis of the short-term and long-term effects of low temperature in wheat genotypes and in the early developmental stages of maize.
- Application of chlorophyll fluorescence induction and thermoluminescence methods to investigate chilling tolerance processes in maize.
- Elaboration of a frost resistance test with the aid of biochemical and biophysical methods.
- Studies on the significance, intensity and replaceability of polyamine biosynthesis pathways under stress conditions in cereals.
- Analysis of the effect of salicylic acid and its derivatives in abiotic stress processes in maize and wheat.

Maize breeding research

- Continuation of research aimed at developing breeding methods, particularly as regards methods of line development and evaluation, and examinations on morphological and biochemical traits and on the genetic determination of resistance.
- Broadening of the genetic basis of breeding by discovering new basic stocks and developing genetically divergent stocks.
- Studies on the inheritance of resistance to maize pathogens and pests; the development of resistant stocks and the discovery of new resistance sources.
- Studies on the inheritance of tolerance to biotic stress factors and the development of tolerant stocks.
- Studies on the rate of drying down and the process of physiological ripening, and on their genetic determination.
- Investigations into the development of stalk rot and its pathological, physiological and morphological background.
- The development of extra-early (FAO 100–170) inbred lines and hybrids for regions north of latitude 55°.
- UPOV tests on the genetic homogeneity and stability of maize inbred lines, using morphological and biochemical traits at the plant and DNA level.
- The preservation of genetic breeding stocks in gene banks.

Maize agronomy research

- Elaboration of an environmentally sound crop production system.
- Studies on the agronomic responses of new Martonvásár maize hybrids.
- Clarification of the production physiological factors of yield formation, and the quantification of the relationship between these factors and the yield.

- Research into integrated weed control.
- Simulation models (CERES Maize, DSSAT).

Cereal breeding research

- The furthering expansion of the genetic background available for the breeding programme.
- The development of new hybrid combinations using traditional methods and CHA.
- Improvements in selection methods.
- Developments in the testing system for selected lines in field experiments.
- The continuous testing of the disease resistance of basic breeding stock and advanced lines.
- The identification of resistance genes in the breeding stock using molecular markers.
- Tests on the frost resistance of crossing partners and advanced wheat lines in the phytotron.
- Elaboration of new quality testing methods to predict bread quality.
- The selection of competitive experimental lines to suit market demands.
- Selection for quality at the molecular level by means of "marker-assisted selection" using the PCR technique.
- The identification and utilisation of alien additions in breeding.
- The regular development of dihaploid plants of microspore origin from special combinations, aimed at shortening the breeding time.
- Examinations on the frost resistance and daylength sensitivity of barley using RFLP markers.
- The determination of the degree of relationship between wheat varieties by means of pedigree analysis and molecular systems.

Resistance breeding on cereals

- Studies on the effect of biotic stress factors on the yield stability of cereals.
- The clarification of host plant-pathogen relationships by carrying out race and virulence analysis on the pathogen and studying the efficiency of host plant resistance genes.
- Investigations on the effect of abiotic stress factors on cereals.
- Studies on the joint effect of biotic and a biotic stress factors. Evaluation of the relationship between ecological factors and the intensity of pathogen attacks.
- Utilisation of techniques based on genetic markers (RFLP, RAPD, etc.) in the genetic analysis of stress resistance.
- The development of resistant varieties *(T. aestivum)* to serve as a biological basis for environmentally sound, cost-saving plant protection and production techniques.
- Development of complex resistance sources (gene pyramids).
- Identification of the resistance genes present in Martonvásár wheat varieties.
- The breeding of winter-hardy durum wheat varieties with good quality as the raw material for pasta-making.
- Discovery, introduction and development of oat varieties with high -glucane contents for human consumption.

PLANT PROTECTION INSTITUTE

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Telefax: (36-1) 356-3698
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E-mail: tkom@nki.hu
Home page: http://www.nki.hu

Scope of activities

The Institute is the research centre for plant protection and it is involved mainly in basic research in the fields of plant pathology, entomology, pesticide chemistry, herbology and disease resistance of crop plants. In addition to the basic research, most of the individual scientists are involved in postgraduate training, applied research as well as in innovation.

Research aims and topics

The aim of plant protection research is to reduce the crop yield losses by modern management of diseases, insects and weeds are harmful in the field. An additional aim is to help environmental protection by creating environmentally safe and sound methods of plant protection. In fact, the final aim of our activities is to understand the biological basis of environment-friendly pest management. Accordingly, research is carried out in order to understand the biology of plant disease agents, insects and weeds, the physiology of diseased crops, the mechanisms of disease and insect resistance as well as resistance of pests to pesticides. Research also covers the genetic manipulation of crop plants to create resistant cultivars, reduction of pesticide use in agriculture, the development of selective pesticides and seeking for alternative methods of pest management which are environmentally safe and sound.

The view of the institute

Plant Pathology

- Molecular aspects of interspecific interactions in the genus Phytophthora.
- Molecular taxonomy of Fusarium genus, Fusarium toxins.
- Interactions of antagonistic microorganisms as potential biocontrol agents.
- Mycological, pathological and ecological aspects of forest decline.

Physiological and Molecular Aspects of Plant Disease

- Host-pathogen relationships in bacterial diseases. Early induced resistance to bacterial pathogens.
- Characterisation of viruses infecting crop plants. Physiology of virus infected plants.
- Wheat stem rust resistance.

- Role of free radicals in necrotic disease symptoms and the action of antioxidants in disease resistance.
- Biochemical immunisation of cultivated plants.
- Study of biotransformation steps of the formaldehyde cycle with special reference to the stress syndrome.

Biotechnology

- Phytoplasma detection and identification by DNA-based techniques.
- Construction of micro-organisms for biological control of plant diseases.
- Use of genetic transformation to introduce resistance into plants.

Insect Pest and Insect Physiology

- Influence of biotic ecological factors on environmentally safe plant protection methods.
- Study of the spread of population dynamics of insects with respect to climatic changes.
- Pheromone biology of agricultural pests previously unapproachable because of methodological problems.
- Hormonal mechanisms controlling development and reproduction of insects.

Insect Ecology and Ecotoxicology

- Research of the functioning and food web structure of agroecosystems.
- Analyses of the data from long term monitoring networks.
- Development of biological control techniques.
- Establishment of taxonomical and faunistical databases.
- Conservation biological studies in natural parks and nature reserve areas.
- Behavioural ecological and autecological studies.
- Life history and reproductive biology of predatory arthropods.
- Monitoring of the effects of pesticides on the environment and non-target organisms.
- Testing the side effect of pesticides on beneficial organisms.

Chemical Aspects of Pest Control

- Development of new selective anti-insect agents.
- Design and synthesis of selective antifungal agents.
- Design and synthesis low-dose herbicides and herbicide safeners.
- Natural compounds as potential pest and disease control agents.
- Development of immunodetection systems for environmental monitoring.

RESEARCH INSTITUTE FOR SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

View of the main building of the research institute

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Scope of Activity

RISSAC is the scientific centre for soil science, agrochemistry and soil biology in Hungary. The Institute is primarily responsible for fundamental research in these fields with significant applied research, education, advisory and information activities, as well as extensive national and international cooperation. RISSAC is the coordination centre of numerous national and international programmes. The Institute was established in 1949.

Research Objectives and Topics

Soils represent a considerable part of the natural resources of Hungary. Consequently, their rational utilization, conservation and the maintenance of their multipurpose functionality have particular significance both for the national economy and environment protection. The efficiency of soil functions (conditionally renewable natural resource; media for biomass production; primary nutrient resource of the biosphere; storage of heat, water, plant nutrients and pollutants; natural filter; high capacity buffer media; gene

reservoir) is determined by the integrated impacts of soil properties, which are the result of soil processes. The main task of sustainable land use and rational soil management is the control of soil processes: mass and energy regimes, abiotic and biotic transport and transformation and their interactions.

The elaboration of the scientific basis for these actions is the main task of the Institute:

(1) Qualitative and quantitative characterization of soil resources.
(2) Description of the mass and energy regimes of soils.
(3) Development of scientifically based, rational plant nutrition.
(4) Prevention and reduction of soil pollution and its unfavourable environmental consequences.
(5) Analysis of the role of microorganisms in soil processes.
(6) The interpretation of soil data for consultative and modelling purposes.
(7) The analysis of the relationship between the spatial variability of soil and the heterogenity of the flora.

Soil Science

1. Qualitative and quantitative characterisation of soil resources

- The study of soil degradation processes (erosion, structure destruction, compaction, acidification, salinization-alkalinazation, pollution), the evaluation of the consequences, the characterisation of the sensitivity and resilience of soils against degradation processes.
- The joint study of chemical and microbiological processes in soils for assessing the environmental risks of pollution and for characterising the effects of nature farming on soils.
- Identification of various soil functions and their multidisciplinary evaluation from the viewpoints of sustainable biomass production and environmental production.
- The interpretation of soil information and data bases for consultative and modelling purposes by elaborating the methodological basis of GIS application.
- The analysis of the relationship between the spatial variability of soil and the heterogeneity of the flora by geostatistical methods. The extension of site characteristics in space and time.

2. Description of the mass and energy regimes of soils

- The dynamic description of the water- and heat regime of soils, its territorial extension and forecasting.
- The role of phase interactions in mass transport processes in soils.
- The characterisation of water and mass transport in (degraded) soils.

Agrochemistry

1. Plant nutrients in soils

Determination and quantification of the spatial and time variabilities of the various forms of plant nutrients in soils; status and dynamics of plant nutrients in the soil – plant roots micro-environment; the up-to-date evaluation and characterization of the "plant nutrient supply" function of soils and possibilities of its regulation:

- study and modelling of nitrogen transport and transformation in the soil – water – plant system;
- analysis of phosphorus mobility and availability under different weather and soil conditions and land use practices;
- evaluation of the role of biotic and abiotic factors in the micro-scale soil process and plant nutrient regimes in the soil – plant roots micro-environment.

2. Nutrient uptake and fertilizer response

Determination of the nutrient uptake and fertilizer response of the main cultivated crops

and the development of the modern plant nutrition system and advisory service based on soil tests, plant analyses and long-term field experiments:

- the impact of long-term fertilizer application on soil functions, primarily on soil fertility;
- application of plant analysis for the diagnosis of nutrient requirements and nutrient status of various crops;
- identification of the relationships between the nutrient supply of plants and the quality of the yield, disease and insect tolerance of crops, and the efficiency of pesticide application;
- development of a plant stress detecting system for the quick, correct, accurate and territorial registration of natural and/or human-induced plant stresses during the vegetation period, giving potential possibilities for their rapid elimination or moderation.

3. Prevention and reduction of soil pollution and its unfavourable environmental consequences:

- quantitative and qualitative assessment of heavy metal contamination in the environment (soils, sediments, surface- and subsurface waters, plants);
- analysis of sources, identification of pathways (transport, transformation) and evaluation of ecological impacts of various pollution in the soil – water – plant – atmosphere continuum, in agroecosystems and the plant – animal – man food chain;
- evaluation of the potential possibilities of an efficient pollution control (emission, imission reduction; prevention of the time-delayed effect of potentially harmful chemical compounds; reduction of susceptibility of soils, vulnerability of land) with the application of modern analytical, statistical, modelling and forecasting process.

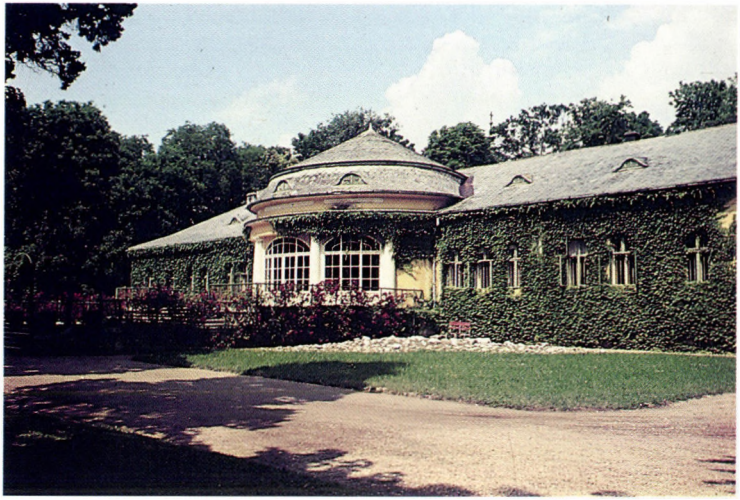
Soil Biology

The role of microorganisms in soil processes

- Analyses of the role of microorganisms in soil processes and identification and quantification of the existing relationships between soil microorganisms, soils and plants in various natural, semi-natural and agroecosystems.

Up-to-date instruments are applied for agricultural and environmental researches

INSTITUTE OF ECOLOGY AND BOTANY



The former manor house of Count Vigyázó in the middle of the richest botanic garden of Hungary is the central building of the institute of Ecology and Botany

Address: 2163 Vácrátót, Alkotmány u. 2–4.
Postal address: H-2163 Vácrátót, Alkotmány u. 2–4.
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Director: Attila BORHIDI, O.M.
E-mail: borhidi@botanika.botanika.hu

Scope of activities

Theoretical, basic and applied research in certain fields of Ecology, Botany an Hydrobiology. Development and care of the collections of the Vácrátót Botanical Gardens. Taking part in postgraduate and professional education.

Research aims and topics

Organization and Dynamics of Terrestrial Plant Communities and Populations

Studies of structures on different levels of supraindividual organization and processes of community dynamics especially after different disturbances to provide scientific principles for preserving and sustaining the natural and seminatural terrestrial communities, revealing the tolerable degree of man-made disturbances as well as decreasing and finally stopping further diversity losses and degradation.

Main Topics:

- simulation of organization and differentiation processes in sandy grasslands
- model oriented long-term ecological inves-

tigations in forest-steppe biom of Kiskunság
- role of adaptive strategies in the cenological invasion
- landscape ecological approach to pattern and dynamics of vegetation
- landscape ecological and biogeographical constrains in the vegetation
- actual habitat mapping of the Duna–Tisza köze region
- improvement of botanical and ecological databases
- coordination and development of the basic methodology of Hungarian Forest Research Program
- vegetation analysis on landscape scales by the method of Geographical Information Systems (GIS)

Hydrobiological Research of Streams and Lakes.

Investigation of river systems, primarily the hydrobiological basic research of the Danube, with special emphasis on the interactions of biological and hydrobiological processes, impact assessment of anthropogenic effects and natural changes involving biodiversity, waterquality regulation, natural conservation and landscape protection.

Comprehensive limnological investigation of the special water bodies of Lake Fertő, characteristic of that part of the lake on Hungarian territory, in order to establish the strategy for its protection, in Fertő-Hanság National Park.

Main Topics:
- hydrobiological investigation of small standing and running water bodies in different protected areas (Pilis Biosphere Reserve, Fertő-Hanság National Park, Duna–Dráva National Park)
- studies of hydrobiological status, biodiversity, and long-term changes of the different sections of the Danube, and their floodplains
- nutrient cycles, degradation process and decomposition of the expanded reed-belts in Lake Fertő.
- theoretical and methodological applicability of macrofauna for monitoring great rivers.

Conservation Biology Basic Research for Natural Protection

Survey of the status of flora and vegetation, terrestrial and aquatic biocenoses, and their populations in Hungary and some tropical countries; creation of data bases from these data. Improvement of the conceptual and methodological basis, management and informatical problems of biodiversity monitoring. Assessment of genetic and ecological variability, vitality, competitive and reproductive ability; assessment of conditions for reproduction and artificial propagation of phanerogam and cryptogam plant populations. Provision of the strategy and techniques for artificial propagation saving and protection of rare endangered species.

Main Topics:
- complex botanical survey of different protected areas in Hungary,
- conservation biology studies of endangered populations of flowering plant species of Hungary,
- investigations of distribution and characteristic properties of certain cryptogam plant populations of Hungary and some tropical regions.

New Plant Resources and their Utilization

Screening of the biologically active chemical components of indigenous and exotic plant species with the aim of introducing the latter. Search for new crops for food and forage, and of new tree and shrub species suitable for green areas of cities.
- Investigation of production of chemical components of native and introduced species, and their chemotaxonomic evaluation.

A special scientitfic task for the Institute is the continuous development and care of the plant collection of the Botanical Garden.

The valuable dendrological collection in the Botanical Garden of the Institute is especially attractive in autumn.

Ecological Center

The Center is a thematical association of four institution of the Academy of Sciences dealing with long-term ecological researches (Institute of Ecology and Botany, Hungarian Danube Research Station, Balaton Limnological Research Institute, Tihany and the Zoological Department of the Institute of Plant Protection) for developing a East-Central European Regional Ecological Center. Financing and management of larger long-term ecological studies coordinating network-activities with the participation of further academic reseach institutes and reserch groups, ecological institutions of other authorities (universities, museums, national network of nature and environment protection etc.).

The valuable dendrological collection in the Botanical Garden of the institute is especially attractive in autumn

BIOLOGICAL RESEARCH CENTER (BRC)

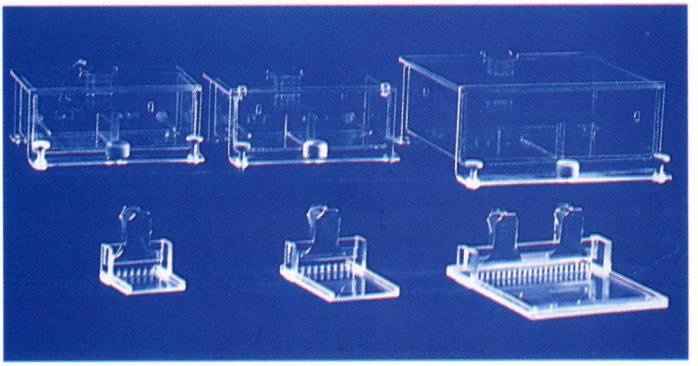
Address: 6726 Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephone: (36) 62-432-232 or 432-080
Telefax: (36) 62-432-576 and (36) 62-433-188
General director: Dénes DUDITS, O.M.
E-mail: dudits@everx.szbk.u-szeged.hu

Scope of activities

Basic research in molecular and cellular biology. Initiation and realization of the practical applications of the results obtained in basic research in agriculture and in the pharmaceutical, food and chemical industries and in medicine. Participation in organized scientific postgradual training, higher education and work of the International Training Course. Publication of the scientific results. Closest possible cooperation with related institutes of Academy, universities, and other Hungarian and foreign research institutions. Methodological training of young scientists.

The Biologial Research Center of the HAS in Szeged

Silicon Graphics workstation used displaying protein sturctures



DNA Gel Electophoresis System

BRC INSTITUTE OF BIOPHYSICS

Address: 6726 Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephone: (36) 62-433-465
Telefax: (36) 62-433-133
Director: Pál ORMOS, O.M.
Email: pali@everx.szbk.u-szeged.hu

Scope of Activities

Basic research in the fields of bioenergetics, membrane biophysics and neurobiology using modern physical, chemical and biological methods. Research on the self organization ability of matter and studies on the regulation processes in living matter primarily by physical methods.

Research aims and topics

- Biological energy conversion and studies of protein and membrane dynamic phenomena at the molecular level
- Molecular mechanism of energy conversion by proteins
- Basic principles of the energy conversion
- Molecular motions important for the energy conversion process
- Charge motions in proteins during conformational changes
- Dynamic properties of protein structure and function: the relationship between structure and function
- Application of proteins in bioelectronic and nonlinear optical devices
- Membrane dynamics: lipid-protein interaction in membranes
- Redox activity of plasma membranes, iron uptake in cells
- Complex morphological, biophysical and molecular biological characterization of nervous tissue
- Effect of gonadal streroids on neuro-glial plasticity
- Cellular basis of neurodegenerative disorders
- Blood-brain barrier
- Mechanism of transmitter release
- Biological utilization and production of gases
- Structure and function of hydrogenase enzymes
- Molecular biology of hydrogenase enzymes
- Molecular biology of proteins from hyperthermophilic bacteria
- Structure and function of proteins from hyperthermophilic bacteria
- Biological methane comsumption
- Waste water treatment with denitrifying bacteria
- Plant stress physiology
- Mechanisms of tolerance to environmental stresses in plants
- Studies on accumulation of inorganic and organic substances at cellular and whole plant level.

BRC INSTITUTE OF BIOCHEMISTRY

Address: 6726 Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephon/fax: (36) 62-433-506
Director: László VÍGH, D.Sc. (biology)
Email: vigh@everx.szbk.u-szeged.hu

Scope of activities

Basic research using various modern methods applicable in natural sciences, studies of nucleic acids, proteins and lipids and their complexes on different organizational levels. The studies are aimed at better understanding of the chemical and physicochemical nature of living matter, its changes, regulation of processes taking places in living matter and laws governing life phenomena.

Research aims and topics

I. Membrane-lipid and molecular stress biology projects

I/1. Composition and molecular architecture of phospholipids in relation to environmental temperature

I/2. Laboratory of Molecular Stress Biology

II. Neurobiology projects

II/1. Structural and functional analysis of opioid (morphine) and antiopiate systems in the brain

II/2. Molecular mechanisms underlying the acute and chronic effects of opioids, the role of G-proteins

II/3. Synthesis and radioactive labelling of biological active compounds

III. Eukaryotic molecular biology projects

III/1. Regulation of intracellular protein breakdown

III/2. The function and possible therapeutic use of cytokines

III/3. Structure, expression and regulation of genes coding for connective tissue proteins

III/4. Regulation of transcription in mammalian cells

III/5. Molecular genetic studies on brain glutamic acid decarboxylase

IV. Nucleic acids research projects

IV/1. Sequence-specific DNA recognition by type II restriction endonucleases and modification methyltransferases

IV/2. Human mitochondrial genetics

IV/3.Genome analysis of pathogenic bacteria

BRC INSTITUTE OF ENZYMOLOGY

The main building of the institute

Address: 1113 Budapest, Karolina út 29–31.
Postal address: H-1518 Budapest, Pf. 7.
Telephon: (36-1) 466-5633
Telefax: (36-1) 466-5465
Director: Péter FRIEDRICH, O.M.
Email: friedric@enzim.hu

Scope of activities

Basic research aimed at elucidating the role of enzymes and other proteins in biological processes, regulation of these processes on molecular level, studies of proteins and polypeptides.
Improvement of experimental methods and development of their theoretical basis.

Research aims and topics

- Structure-function relations in ezymes (proteins)
- Studies of new protease families
- Structure-function studies of the components of the proteolytic cascade playing a critical role in fibrinolysis and tissue remodelling
- Relationship of protein flexibility, stability and function
- Molecular structure-function studies in multidomain enzymes
- Structure and molecular mechanism of multidrug resistance transporters of tumor cells
- Novel methods for DNA-diagnosis of inherited diseases
- Theoretical studies of protein primary and three-dimensional structures, stability, dynamic properties and protein design
- Organization of enzymes and proteins in complex life processes
- Protein structural basis of neuronal plasticity
- Calpain system in health and disease
- Molecular immunology. Molecular mechanisms of the complement system activation
- Role of dynamic enzyme associations in the regulation of mitosis and glycolysis
- Enzyme deficiency
- Mechanism of action of drugs

BRC INSTITUTE OF GENETICS

Address: 6726 Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephone: (36) 62-432-232/284.
Telefax: (36) 62-433-503
Director: István RASKÓ, D.Sc. (biology)
Email: rasko@everx.szbk.u-szeged.hu

Scope of activites

Basic research on the mechanisms of heredity and on the processes regulating and influencing the manifestation of hereditary traits on molecular and various other organizational levels. Teaches and disseminates the science of genetics at high standard.

Research aims and topics

- Genetic and molecular studies of the role of chromatin structure in gene regulation in Drosophila melanogaster.
- New types of vectors for gene therapy.
- Molecular genetics studies and manipulation of symbiotic nitrogen fixation in rhizobium bacteria and leguminous plants.
- Role of heat-shock proteins in regulating gene expression, hormone response and defence mechanism.
- Immune regulation in Drosophila melanogaster.
- Relations of cell communication, signal transduction, cell division and cell differentiation.
- Role of tumour suppressor genes in regulating cell differentiation and proliferation
- Changes in DNA repair during cellular differentiation, consequences of imperfect DNA repair in development of human genetic diseases.

BRC INSTITUTE OF PLANT BIOLOGY

Address: 6726 Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephone: (36) 62-432-232 or 432-080
Telefax: (36) 62-432-576 and (36) 62-433-188
Director: Dénes DUDITS, O.M.
E-mail: dudits@everx.szbk.u-szeged.hu

Scope of activities

Discovery of the basis molecular and cellular events in plant functions such as photosynthesis, environmental adaptation, recovery from damages, growth and development. The complex approaches are based on the methodology of physics, molecular and cell biology. The teaching activities also contribute to the education of the modern plant biology.

Research aims and topics

- Relation between structure and function of the photosynthetic apparatus
- Structure and function of the water-splitting complex
- Charge separation and recombination actions in photosystem II
- Molecular mechanisms of photoinhibition
- Repair systems in UV-B induced damages
- Oxygen and carbon-centred free radicals under stress conditions
- Chlororespiration
- Macrodomain organization of pigment-protein complexes
- Transcriptional control of light-regulated genes
- Light as regulator of biological clock
- Molecular biology of organelle function
- Molecular and cellular biology of plant growth, development and stress response
- Genes and protein complexes in the control of plant cell cycle division
- Components of signal transduction in hormone-treated or stressed plant cells: kinases, phosphatases
- Mode of action of new plant hormones: brassinosteroids
- Stress responsive genes and their use in improving environmental adaptation in transgenic plants
- Molecular events insuring the plasticity of plant development: transition of somatic cells to embryogenesis
- Interacting plant proteins in the regulation of cell division and viral replication
- Structure and function of mRNAs
- Small nuclear RNAs in Chlamydomonas
- Development of in vitro splicing system
- Double strand-specific antibodies in molecular studies on RNA-protein interaction
- Processing of antibodies in transgenic plants

INSTITUTE OF NUCLEAR RESEARCH

The main building of the institute

Address: 4026 Debrecen, Bem tér 18/A.
Postal address: H-4001 Debrecen, Pf. 51.
Telephone: (36) 52-417-266
Telefax: (36) 52-416-181
Director: Rezső LOVAS, D.Sc. (Physics)
E-mail: rgl@atomki.hu

Mission Statement

The institute is devoted to
- conducting research in basic atomic and subatomic (nuclear and particle) physics,
- applying atomic and nuclear physics in other fields (applying X-ray, electron and mass spectroscopy in chemical analysis, surface science, low-temperature physics, earth sciences and environmental research, medical and biological research etc.),
- solving related practical problems,
- developing techniques and instruments for these fields, and contributes to higher education.

Research Program

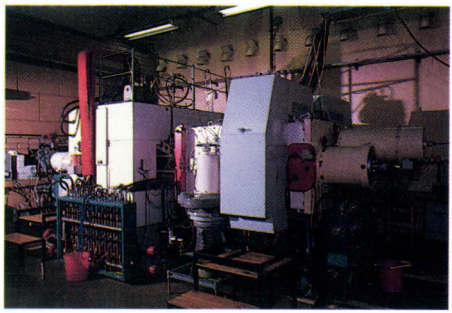
Research in subatomic physics and in applied nuclear physics

- Analytical and numerically exact solution of quantum mechanical problems and their application to atomic, nuclear and subnuclear physics
- Experimental and theoretical study of exotic nuclear systems and states:
- nuclear spectroscopy off the stability region
- resonances of new types
- exotic nuclear shapes
- nuclear clustering

- the neutron skin and neutron halo phenomena
- exotic nuclear decays
- Study of reactions relevant to astrophysics
- Participation in the analysis of the experiments made with the OPAL detector at the LEP accelerator of CERN
- Studies of multiple jets with perturbative quantum chromodynamics
- Measurements of nuclear data for nuclear techniques
- Production of isotopes and labelled compounds for medical purposes

Basic and applied research in atomic physics

- Study of atomic collision processes, induced by particle accelerators, with electron spectroscopy and X-ray spectroscopy
- Study of the interaction of fast light ions and of multiply ionized slow heavy ions with atoms and solids and study of atomic processes in solids
- Study of highly ionized dense plasmas generated by an electron cyclotron resonance ion source,
- Research in theoretical atomic physics
- Study of the electronic structure of surface layers and coatings
- Study of the electrodynamical properties of high transition temperature superconductors
- Study of structural and magnetic properties of nanostructures prepared by mechanical alloying or vacuum deposition



The MGC-20E cyclotron

Research of the environment, earth sciences and archaeology

- Investigation of the effects of nuclear power plants on the environment
- Study of the environmental aspects of the problem of nuclear waste depositories
- Hydrological studies with stable-isotope mass spectrometry
- Examination of the composition and propagation of atmospheric aerosol contaminants with ion beam analysis
- Evironmental research with the measurement of the concentration of atmospheric radon
- Archeometry with the radiocarbon technique
- Geochronological studies with the potassium–argon technique

Elemental analysis with a scanning proton microprobe on micrometeorites and archeological samples.

ASTRONOMICAL INSTITUTE (KONKOLY OBSERVATORY)

Address: 1121 Budapest, Konkoly T. út 15–17.
Postal address: H-1525 Budapest, Pf. 67.
Telephone: (36-1) 375-4122, (36-1) 375-5866
Telefax: (36-1) 275-4668
Director: Lajos G. BALÁZS, C.Sc. (Physics)
E-mail: balazs@ogyalla.konkoly.hu
Homepage: www.konkoly.hu

Scope of activities

Carrying out observational astronomical studies, mainly related to the physics of the variable stars, galactic structure, solar activity and the terrestrial upper atmosphere. These tasks imply operation of the internationally recognized observational network developed during the last three decades. A very important task – perhaps the most important one – is the development of the national astronomical information system, including the observatory's library.

The main building of the Astronomical Institute (Konkoly Observatory) of the HAS (designed by Gyula Sváb) and János Pásztor's sculpture: "Sic itur ad astra"

Research aims and topics

Studies concerning the behaviour of variable stars: investigation of multiple periodicity and period changes of pulsating variables, as well as research on stellar activity of various timescales. Studies related to the galactic structure and physics of interstellar matter with an emphasis on the star-forming processes. Studies of the upper atmosphere of the Earth and Mars with space-born equipment. Studies on solar activity, investigation of the problems of the problems of sunspots and prominences.

Variable Stars

A better insight into the physics (mechanism of light variation, processes occuring in the

Image of the M3 globular cluster taken with the CCD camera attached on the RCC telescope

stellar atmosphere) and evolutionary status of the variable stars.

Solar physics

Research on the active regions, kinematics of spots, spot-groups, prominences and flares.

Stellar statistics

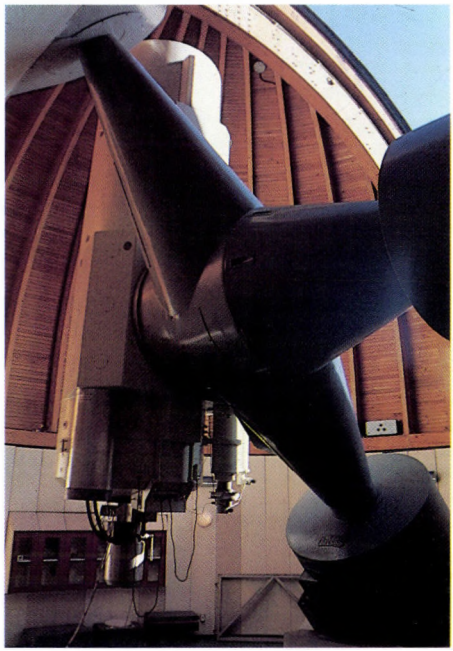
Studies of galactic structure and processes of star formation in Milky Way, mainly from the observational point of view.

Upper atmosphere

A better insight into the physical condition of planetary atmospheres (Earth, Mars), correction of the atmospheric models.

Miscellaneous

Other minor topics which have been succesfully studied, mainly in the fields of interdisciplinary and/or space research, in cooperation with the staff of other institutes.



The 1 m RCC (Ritchey-Chrétien-Coudé) telescope equipped with a five colour photon-counting photometer

RESEARCH CENTRE FOR EARTH SCIENCES (RCES)
GEOGRAPHICAL RESEARCH INSTITUTE

Address: 1063 Budapest, Andrássy út 62.
Postal address: H–1388 Budapest, Pf. 64.
Telephone: (36-1) 311-6832; (36-1) 331-7325
Telefax: (36-1) 331-7991
Director: Ferenc SCHWEITZER, D.Sc. (Geography)
E-mail: schweitf@helka.iif.hu

The building of the institute

Scope of activities

Development of theoretical basis and methodology for physical, socio-economic and regional geography; survey of spatial processes and interrelationships; temporal and spatial investigations of the interactions between man and environment; assessment of factors of the geographical environment with a special reference to natural and socio-economic resources and to development of the socio-geographical problems of Hungary and of distinct territorial units within the country (natural macro-, meso- and micro-regions, districts and administrative units); international cooperation; documentation and propagation of results (through Hungarian and foreign-language studies, periodicals and other publications).

Aims of research

The Geographical Research Institute of the Hungarain Academy of Sciences (GRI HAS) has all the personal and infrastructural prerequisites to meet the European professional requirements.

Priorities should be given to the following topics:

a) In the field of *physical geography:*
- the analysis of the geographical consequences of global natural processes;
- studies on the use of domestic resources and on the environmental load;
- the degradation of the natural environment and related local social tensions.

b) In the field of *social and economic geography:*
- the present European processes intensify inter regional socio-economic relations upgrading comparative geographical studies. This new aproach renders a closer cooperation between physical, social and economic geography indispensable.
- regional interests need an exact knowledge of the resources and endowments in particular areas. A growing demand is expected in complex studies on territorial

units and settlements of various hierarchical level. International comparative studies might be instrumental in "bringing closer" regions to each other.

c) Physical, economic and social information serves geographical learning only if the former is organised in an adequate information system. Based on this system supplementary sheets of the National Atlas of Hungary are to be published regularly in the form of supplementary map lift-out series, to update selected topics of the 1989 edition. A major task for the forthcoming years is to build an information system coveris both physical and social domains in geography.

d) The *library* of the institute serves research, education and culture. These efforts might be successful due to the library having become part of the national information system. It seems reasonable to develop the library into the main centre of the geographical culture which should be accompanied by a rapid dissemination of the scientific results achieved by the institute.

Research topics

I. A comprehensive research of recent and paleomorphological processes, of regional and local phenomena; landform assessment and environmental analysis; interpretation and evaluation of human impact.

- Methodical development of detailed geoecological mapping and its application for type localities in mining-industrial areas. In the course of an *environmental impact assessment* of a given crisis region an information system is to be established through the survey of the contamination of the main geoecological components (with fluorine, heavy metals), which could serve as a basis for the rehabilitation, physical planning and regional development.
- Utilisation of geomorphological methods to identify the site in the surroundings of the Nuclear Power Plant, Paks, where might increase radioisotope concentration.
- Study of the Late Cenozoic formations in the Carpathian Basin aimed at the identification of paleoclimatic, lithological and paleogeographic events for stratigraphic and geochronological purposes. The main subtopics are as follows: a) A major ecological event during the Upper Miocene–Lower Pliocene: desertification of the partial basins of the Paratethys and the Carpathian Basin; b) Loess formation and evolution of fluvial terraces; c) Paleogeography of the Holocene related to archeological findings. This international activity is run in the framework of the INQUA and of several bilateral programmes (in projects established with Austrian, Croatian, Serbian, Russian, Chinese institutions).
- Landscape geography of Hungary: geology, mineral resources, paleogeography, relief, climate, hydrology, soils and vegetation cover of the North Hungarian Mountains; to be summed in a monograph of the series "Landscapes of Hungary".
- Paleogeographic Atlas of the World: the Late Pleistocene paleogeography of the southern hemisphere is to be presented in a series of thematic map are going to be produced in international cooperation. Compilation and design is supported by UNESCO IGBP Global Change Programme (PAGES), INQUA and by bilateral collaborations.
- Complex and special geomorphological investigations and mapping: geomorphic evolution in the Carpathian Basin with the interpretation of changes in climatic morphology, neotectonism and of those brought about by river regulation and flood control. A new geomorphological map of Hungary at a scale of 1:500 000 is to be drawn with a detailed explanatory text. Mapping of areas affected by mass movements with classification of processes and landform typology.

II. Studies on trends of transformation in the natural environment are to be performed in type localities

- Aridification in the Carpathian Basin. Investigations into the physico-geographical consequences of a presumable climatic change continue in the framework of the MEDALUS III Programme (in cooperation with the countries of the Mediterraneum, United Kingdom, Belgium and the Netherlands). One of the objectives of the research programme is the identification and mapping of environmentally sensitive areas. Criterias of the liability to aridification are shown in maps, stored in GIS and the regions are to be delimited using GIS techniques also. Another project within the frame of MEDALUS III is purposed for the application of the MEDRUSH model in a medium sized catchment of affected by aridification (in the Croat Plain). Parameters of the model are to be established by a detailed field survey. This research is aimed at forecasting changes in physico-geographical factors under conditions of the assumed climatic change (scenarios for 1–2 decades and for a century) in comparison with the southern European trends.
- Studies on soil erosion. After having completed the survey in the northern catchment of Lake Balaton, a project was launched in 1996 to investigate the role of soil erosion and of the related water pollution in siltation and contamination of the lake.
- State of the environment of the Fertő Lake (Austro-Hungarian project on the territory of the National Park). The project is targeted to establish the extent to which environmental pollution of agricultural source endangers the ecological balance of the lake.

III. Socio-economic transformation in Hungary and European trends (a comparative social geographical analysis)

- Relationship between the socio-economic changes and the transformation of the urban structure. Studies on Budapest are purposed for the socio-economic effects of privatisation (housing market, industrial structure). Important changes are expected and to be investigated at the levels of the urban hierarchy (big cities, medium-size and small towns). Comparative studies in the international context are becoming typical (medium-size towns in the Carpathian Basin, Budapest–Prague–Warsaw–Cracow in Central Europe or in the whole of Europe). Urban living spaces are significantly taken into consideration in master-plans, but theoretical and methodological approaches to their identification are highly disputable. This research trend has recently gained an importance in urban geography.
- Identification and research of field of tension in social geography (social effects due to large-scale technical establishments, regional and structural pattern of unemployment, various aspects of international migration).
- An international cooperation investigations has began to reveal interrelationships between nature conservation, tourism and local social conflicts.
- Research activities in ethnic and political geography carries on. The former is aimed at the state of Hungarian minorities in the Carpathian Basin, at the presentation of the geographical background behind ethnic conflicts in the Carpatho-Balkan region, at ethnic geographical studies and mapping in the past.
- Historical geographical studies are a new research topic and conceived to focus on a period of international migration between 1918 and 1948.

RCES GEODETICAL AND GEOPHYSICAL RESEARCH INSTITUTE

Magnetic relative observatory at Nagycenk

Address: 9400 Sopron, Csatkai E. u. 6–8.
Postal address: H-9401 Sopron, Pf. 5.
Telephone: (36) 99-314-290
Telefax: (36) 99-313-267
Director: Péter VARGA, D.Sc. (Geology)
E-mail: varga@ggki.hu

Scope of activities

Basic research in geodesy and geophysics; running and development of geohpysical observatories for seismology, geodynamics, geomagnetism, ionosphere and atmospheric electricity; publication of results. Development of geodetic and geophysical methods and instruments; providing assistance and support for various institutions in solving their geodetic and geophysical problems; participation in international scientific organizations and cooperations in geodesy and geophysics.

Research aims and topics

In geodesy: research in mathematical and physical geodesy; development of methods and instruments for measurement purposes; study of various branches of geodynamics as earthtides and gravimetry, recent crustal movements, rotation of the Earth, etc.

In geophysics: application of electromagnetic induction in the study of the Earth's structure; the study of the geomagnetic variation field, of magnetospheric physics (space physics); study of certain fields of solar – terrestrial physics as upper atmosphere and ionosphere.

In seismology: precise and rapid localization of earthquake epicentres; study of earthquake physics and the seismicity of the Carpathian Basin.

Great part of the observatory network has been integrated into international networks.

Development of theoretical and experimental methodology in environmental sciences.

The structure of the Institute allows the complex application of geodetic and geophysical investigation methods and opens integrated new and up-to-date research methods; e.g. geodynamic stations used as long-periodical seismological observatories, investigation of pre- and postseismic phenomena by geodetic movement determination, determination of the total electron content of the ionosphere by GPS measurements.

Main topics

Aeronomy

- Study of the lower atmosphere by resonances of the Earth-ionosphere wave guide.
- Study of the relation between atmospheric electricity and solar activity.
- Coupling between thermosphere ionosphere, and magnetosphere.
- Study of ionospheric effects on terrestrial and space communication.

Geodetic measuring methods

- Improving the accuracy and the degree of automation of geodetic measure-ments by means of up-to-date electronic and image-sensing devies.
- Development of instruments for the observation of geodynamics processes changing in time.
- Environmental monitoring

Geodynamics

- Study of the evaluation methods of measurements by gravimeter, extensometer and borehole pendulum and interpretation of the results from geodynamical point of view.
- Application of Global Positioning System (GPS) to geodynamical and geophysical purposes.
- Study of the rotation of the Earth around its axis.
- Forward and inverse modelling of the Earth's gravity field.

Electromagnetic induction

- Study of the electrical structure of the Earth's crust and upper mantle in the Pannonian Basin and in its surroundings (Alps, Carpathians, East European Platform) and their relatioship with the physical state of the Earth's interior.
- Three-dimensional interpretation of electromagnetic induction methods by analogue and mathematical modelling.

Magnetosphere – geomagnetic pulsation

- Study of the solar wind and the interplanetary magnetic field, and their coupling to the magnetosphere.
- Study of geomagnetic field line resonances by station arrays.
- Space weather forecast.

Mathematical geodesy

- Application of mathematical methods in geosciences.
- Up-to-date processing methods and mathematical modelling.
- Geoinformatics
- Applying wide area networking capabilities
- Spectral analysis in geodesy

Seismology

- Investigation of structure and earthquake soruces of the Carpathian Basin by seismological data.
- Study of the seismically active areas in Hungary and the estimation of the seismic risk.
- Methodological problems of seismology
- Development of the seismological observatory network and seismological service.
- Seismic control of the prohibition of underground nuclear experimental explosions.
- Tomographic investigation of the structure of the Pannonian Basin.

Seismological observatory in Budapest

RCES LABORATORY FOR GEOCHEMICAL RESEARCH

Address: 1112 Budapest, Budaörsi út 45.
Postal address: H-1502 Budapest, Pf. 132.
Telephone/fax: (36-1) 319-3145
Director: György PANTÓ, O.M.
E-mail: panto@sparc.core.hu

Scope of activities

Basic research in the fields of petrogenesis, formation of mineral deposits, isotope and environmental geochemistry. Special attention is paid to the complex geochemical processes related to the formation and accumulation of mineral deposits and their various utilizations. Investigations on the geochemical processes taking place in the geospheres and at their boundaries provide the basis of special fields of environmental research.

Research aims and topics of the Laboratory

With respect to the research topics continuity has an essential role in the research strategy of the Laboratory. The three main fields described below has been regarded as an appropriate framework for our activity, in which the topics are closely and inseparably connected, easy to plan and follow. The research activity, thus, can be outlined in the three fields as follows.

Mineralogy, petrology and geochemistry of petrogenetic processes

- Investigations on the formation processes of sedimentary and metamorphic rocks.
- Investigations on igneous petrogenesis and on the formation of related raw materials (ore, zeolite and clay mineral deposits).
- Applications of rare earth element geochemistry in genetic studies of mineral and rock formations.

Geochemical characterization of fossil fuels and modelling their genetics

- Organic geochemical studies of hydrocarbon deposits in order to investigate, maturation, migration and formation conditions (temperature, pressure, redox and pH conditions).
- Organic geochemical investigations on organic matter bearing sedimentary series and their correlation with facies determined by palynological studies.
- Theoretical evaluation of surfacial features and hydrocarbon migration related to deep seated hydrocarbon deposits.

Finnigan MAT delta S isotope ratio mass spectrometer

- Coal petrology and geochemistry of brown coals and lignites.

Geochemical investigations on the state and evolution of the environment

- Investigations on bioessential trace elements in the rock-soil-living organism system.
- Investigations on the trace elements and polluting compounds of waste materials produced during coal processing.
- Isotope hydrological and organic geochemical studies on surfacial and deep seated waters.
- Investigations on the effects of anthropogenic weathering processes for monument protection.

CHEMICAL RESEARCH CENTER (CRC)

The view of the institute

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Postal address: H-1525 Budapest, Pf. 17.
Telephone: (36-1) 325-7900, 325-7933
Telefax: (36-1) 325-7554, 325-7750
General director: Gábor PÁLINKÁS, C.M.
E-mail: palg@chemres.hu

The Research Center incorporating the Central Research Institute for Chemistry, the Isotope Research Institute, and the Research Laboratory of Inorganic Chemistry was established by the Hungarian Academy of Sciences with a view to offering better potentials – for conducting research with higher economic efficiency and successful scientific results. The Research Center started on its activity in 1998.

Research institutes and laboratories of the Chemical Research Center have carried out pioneering work on several scientific fields in Hungary. Their activities cover fundamental as well as applied research topics. The total scientific output is represented by 350–400 scientific publications, annually. The Research Center has a staff of ca. 450, incl. 220 research scientists. Among the latter 9 are members of the Hungarian Academy of Sciences, 51 hold D.Sc. and 105 Ph.D., C.Sc. degrees.

Fundamental scientific activities of the Research Center involve: research in vital fields of chemistry and related scientific areas, with special regard to correlations between chemical structure and reactivity, characteristic parameters and biological effect, where most research projects require the coordinated work and specialized knowledge of highly qualified researchers, various approaches to the solution of problems as well as high level instrumentation.

Research activities cover the following main areas:

- Organic and Bioorganic Chemistry
- Surface Reactions and Heterogeneous Catalysis
- Kinetics and Mechanism of Chemical Reactions
- Electrochemistry and Corrosion
- Polymer Chemistry and -Physics
- Environmental and Analytical Chemistry
- Material and Molecular Structure
- Nuclear Chemistry

CRC INSTITUTE OF CHEMISTRY

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Research aims and topics

Organic and Bioorganic Chemistry

- Investigations of ring closure reactions to heteroaromatic systems
- Study of synthesis and reactivity bridgehead nitrogen containing heteroaromatic systems
- Application of cross-coupling technique for the synthesis of hetero-fused systems
- Study of selective ring opening reactions
- Experimental and quantum chemical investigation of selective alkylation of heteroaromatic systems containing several nitrogen atoms
- Study on ring transformations of fused azoles and azolium salts
- Investigation on the total synthesis of alkaloids e.g. lysergic acid, bromocryptine
- Stereo- and enantioselective synthesis of indol alkaloids and derivatives with eburnane skeleton
- Study on "umpolung" reactivity of enamines with indolo 2,3-aquinolizidine skeleton
- Investigation on the total synthesis of Galanthamine
- Synthesis of various derivatives of melatonin e (N-acetyl-5-methoxytryptamine)
- Enzyme (e.g. lypase) catalyzed enantioselective acylation of prochiral 1,3-diols
- Synthesis of radioactive and nonradioactive compounds labeled with 14C
- Custom synthesis of pesticides, drugs, and intermediate compounds
- Synthesis and study of polymeric drug conjugates
- Synthesis of antitumor agents covalently bound to macromolecular carriers
- Study on synthesis, structure and physiological action of essential metal complexes of acidic polysaccharides
- Investigation of active substances and metal content of medicinal plants
- Synthesis, bioorganic and molecular-pharmacological study of new nucleosides and oligonucleotides
- Research of antiviral, antifungal and anticancer pro-dugs
- Study on ligand binding and ionophore function of GABA, glycine and 5HT-3 neurotransmitter receptors
- Study on drug binding on plasma proteins; allosteric binding interactions with serum albumin; chiral recognition by α-1 acid glycoprotein; chromatographic separations on protein columns
- Computer assisted molecular modelling: stereoselective docking on human serum albumin; chiral neurotransmitter conformations of selective action
- Investigations of ionotropic and metabotropic receptor functions in vitro and in vivo
- Study on neurotransmitter release and transport
- Study on Ca^{2+} ion oscillation
- Nucleotides: a novel class of signalling molecules in the central nervous system
- Investigations of neurotoxicity of xenobiotics
- In vitro metabolism studies
- In vitro toxicity studies
- Drug interaction studies
- Studies on the mechanism of enzyme inductions (Cytochrome P-450 and conjugation enzymes)
- Study of enzymes (e.g. GST, cytochrome P-450, HPPD) involved in metabolism and mode of action of herbicide safeners
- Investigation of herbicide metabolism in plants

- Biotests of herbicides, safeners and synergists in plant growth room

Surface Reactions and Heterogeneous Catalysis

- Preparation of reforming type $PtSn/Al_2O_3$ catalysis with exclusive Sn-Pt or $Sn\text{-}Al_2O_3$ interactions via controlled surface reactions
- Preparation of tin or lead modified bimetallic supported or Raney Type Group VIII metal catalysts using tin or lead alkyls in controlled surface reactions
- Conversion of alkanes, cycloalkanes and gasoline on mono- and bimetallic supported platinum catalysts under the condition of naphta reforming
- Transient kinetic and ageing studies of hydrocarbon reactions over supported platinum and tin-platinum catalysts
- Enantioselective hydrogenation of α-keto-esters over cinchona alkaloids-Pt/Al_2O_3 catalyst system
- Preparation of optically active amines via reductive transamination of ketones on chirally modified supported palladium catalysts
- Selective hydrogenation of unsaturated aldehydes and ketones over tin modified supported platinum catalysts
- Stereoselective hydrogenation of carbohydrates over supported and Raney copper catalysts
- Study on the origin of asymmetric induction
- Preparation of fine chemicals and organic intermediates using hydrogenation, hydrodechlorination and carbonylation reactions on different supported Ni, Pd and Rh catalysts
- Stucture, catalytic and surface properties of strong solid acids, such as zeolites, fluorided alumina, and sulfated zirconia and zirconia-containing mixed oxides
- Isomerization and cracking of C_4–C_8 alkanes and alkenes over Pt/solid acid bifunctional catalysts
- Study on the H-D exchange between perdeuteromethane and Brönsted acidic contact catalysts
- Activity of transition metal zeolite catalysts in hydration of acetylenes
- Synthesis and physicochemical characterization of zeolites and structurally related materials (ALPO's, SAPO's)
- Incorporation of cationic In- and Ga-species into zeolites and mesoporous materials and investigation of their redox behavior
- Study on the solid-state interactions between metals (e.g. Zn, Fe, Ni, Co, Ga, In) and acidic zeolites in mechanical mixtures
- Development of catalysts with zeolites or mesoporous materials as catalytically active components for petrochemical processes

Kinetics and Mechanism of Chemical Reactions

- Homogeneous catalytic activation of dioxygen by cobalt and iron complexes. Kinetics and mechanism of biomimetic oxidations of phenols and catechols
- Homogeneous catalytic carbonylation of arenesulfonamide derivatives. Synthesis of arylsulfonyl isocyanates
- Synthesis, structure and reactions of dinuclear palladium A-frame complexes involving nitrene and azide ligands
- Fast redox reactions of manganese complexes. Kinetics and mechanisms
- Catalytic oxidations with hydrogen peroxide. Bleach catalysts for environmental pollutants
- Kinetics and thermochemistry of the decomposition reactions of alkyl-, alkenyl-, and halogen-substituted acyl radicals in relevance to atmospheric chemistry studied by laser flash photolysis
- Investigations of the atmospheric reactions of environmentally friendly organic solvents: reactions of OH-radicals with formate-esters, ketones and alcohols
- Kinetics of Br-atom reactions studied by the fast flow method and determinations of thermochemical data for free radicals

- Kinetics of radical-radical reactions of combustion importance
- Development and analyses of the combustion and flame mechanisms of methane and methanol
- Effect of the microenvironment on the photophysical properties of photosensitisers
- Photodynamic therapeutical aspects of singlet oxygen production and its reactivity
- Theoretical and experimental investigations on spatially inhomogeneous reacting systems
- Study of the luminescence of aromatic ketones with time-resolved methods
- New-type dual liminescence of aromatic compounds capable of conformation
- Change in excited state: the photophysics of N-aryl-naphthalimides and N-aryl-phenanthridinones
- Effect of hydrogen-bonding on the deactivation pathways of excited molecules
- Laser flash photolysis studies of the photo-induced electron transfer
- Detection and quantification of free radicals in cellular and chemical model systems
- Study on primary steps of mechanism of the photodynamic therapy
- Linear free energy relationships in radical reactions
- Computer modelling of reaction mechanism for hydrocarbon oxidation and biological processes

Electrochemistry and Corrosion

- The role of alloying elements on the adsorption of organic inhibitor molecules and exopolysaccharides
- The effect of self-assembled systems and Langmuir-Blodgett layer on corrosion processes
- Application of conducting polymers in coating systems
- Study of inhibiting processes on non-ferrous metals
- Application of scanning probe techniques in study of adsorption and inhibition processes
- Study on corrosion inhibitors and mechanism of inhibition in neutral and acidic media
- Study on metal catalysts and catalytic reactions in polar solvents
- Study on metal adsorption on foreign metal surfaces
- Investigation of electrosorption and electrocatalytic processes at metal and modified metal electrodes by combined radiotracer and electrochemical techniques

Polymer Chemistry and -Physics

- Structure/property correlations in heterogeneous polymer systems (blends, particulate filled polymers, fiber reinforced composites)
- Degradation and stabilization of polyolefins
- Solubility and diffusion of small molecular weight additives in polymers
- Melting and crystallization of polymers, study on nucleation
- Synthesis of liquid crystalline polymers
- Development of adhesives
- Reprocessing of waste from PET bottles
- Computer simulation of the injection moulding process
- Instrumented impact testing of polymers and polymer systems
- Quasiliving carbocationic polymerization: fundamental problems, new polymer architectures, structure and properties of the resulting materials
- New polymer strcutures and topologies by quasiliving radical polymerizations
- Amphiphilic conetworks: new synthetic techniques and investigations on the structure and property of the new materials, especially in relation to their potential biometerial applications
- Degradation and stabilization of PVC: deeper understanding of the mechanism of

these processes, and application of the gained new knowledge from environmental point of views

Environmental and Analytical Chemistry

- Application of modified natural zeolites in waste water treetments
- Study on purification of waste waters, especially removal of fats, proteins, sodium, phosphate, manganese and ferric ions
- Removal of valuable metal content from galvanising wastes
- Synthesis and characterization of simple and complex permanganate salts and investigation of selective oxidation of organic compounds with complex permanganates
- Synthesis and investigations of new fuels and fuel mixing components based on simple organic compounds manufactured from biomass
- Study on chromatographic separation and mass spectrometric detection of some amphetamine salts
- Separation of hydrogen isotopes by chemical reactions
- Development of new supports and new chromatographic methods for the quantitative determination and separation of drugs, xenobiotics and environmental pollutants
- Determination of binding of environmental pollutants, drugs, xenobiotics by various chromatographic techniques
- Study on relationship between molecular structure and chromatographic retention behaviour using multivariate statistical methods

Material and Molecular Structure

- Studies on the molecular structure of solvents and solutions by X-ray and neutron diffraction methods
- Study on hydrogen bonding and ion solvation phenomena in liquid phase
- Molecular dynamics and Monte Carlo simulations of liquids
- Reverse Monte Carlo study of molecular liquids
- Simulation of electrode/electrolyte interface
- Development and applications of the formalism of "Chemical Hamiltonian Approach"
- Theoretical studies on the dynamics of reactive and nonreactive molecular collisions
- Ab initio calculations of the potential surfaces and rates of chemical reactions using ab initio quantum chemical methods
- Structural investigations and conformation analysis of polycyclic and heterocyclic condensed aromatics, β-lactanes and nucleotide derivatives
- Study on ion transport processes by NMR spectrometry
- Study on ion-molecule collisional processes by MS-methods
- Study on chiral recognition, distinction of isomers, stereo isomers, non-covalent complexes by Mass Spectrometry
- Quantum chemical applications in Mass Spectrometry
- Structure elucidation of organic and organometallic compounds, study of fragmentation mechanisms
- Analysis of biomolecules (peptides, glycopeptides, saccharides, nucleotides) by various MS-methods
- IR and Raman spectroscopic study of amino acids and peptides
- Investigation of polarized IR and Raman spectra of ordered and oriented molecular systems
- Application of ab initio quantum chemical calculations in the interpretation of vibrational spectra of medium size molecules
- Experimental determination of Raman scattering intensities and their use in solving structural problems
- Application of the GC-IR method to various problems in metabolism research and in identification of reaction intermediates
- ESR determination of species distribution in copper complexes as a function of pH

- Study on magnetic properties of charged fulleren compounds by EPR methods
- Spin-trapping studies of short lived organic free radicals
- Magnetic properties of high Tc superconductors
- Study on dynamic phenomena in ESR spectra
- Synthesis, X-ray structure determination and characterization of coordination compounds
- Structural studies (hypervalent bonds, non-bonded interactions, etc.) of organometallic compounds formed by group-14 elements (Si, Ge,...)
- Molecular recognition, packing and complementarity. Synthesis and characterization of supramolecules, inclusion complexes (clathrates). Study of their stability, phase transition, polymorphy and frequently occuring isostructurality; study of pseudo (local, non-crystallographic) symmetries and migration of symmetry elements in organic crystals
- Theoretical approach to (by Genetic Algorithm and Metropolis Monte Carlo minimization) and experimental study (NMR: 3J, T1) of the aqueous solution conformation of glyconjugates.

CRC INSTITUTE OF ISOTOPE AND SURFACE CHEMISTRY

Partial view of the Institute

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E-mail: wojn@alpha0.iki.kfki.hu

Research aims and topics

Nuclear Chemistry

Research in nuclear physics

Research on nuclear structure: development of new methods in order to broaden the range of measurable nuclear level lifetimes

Nuclear data evaluation activity, creation of discrete nuclear level library for nuclear reaction calculations in co-operation with IAEA. Isomer excitation by (γ,γ') reaction; experimental and theoretical studies on selected nuclei

Research in nuclear elemental analysis

Prompt gamma activation analysis with cold neutrons: methodology developments; application to environmental problems and material testing related to nuclear energetics

Nuclear data evaluation activity; development of a new neutron capture gamma-ray database by combining research and data evaluation efforts in co-operation with the International Nuclear Data Evaluation Network co-ordinated by the IAEA

Nuclear safety and radiation protection

Development of high-resolution gamma spectrometric methods for determination of the uranium content and enrichment of fresh reactor fuel assemblies

Development of spectrometry with portable CdTe detector for burnup verification of spent fuel cassettes in power plants

Study on migration of characteristic isotopes of nuclear wastes in rocks

Radiation chemistry, radiation physics and radiochemistry

Research on radiation induced hydrocarbon reactions

Research on polymers and biopolymers, production of hydrogels, their application in therapy

Photolysis and radiolysis of oxigenated and halogenated aromatics with the aim of einvironmental protection

Research of solid and liquid state dosimetry, development of dosimetric systems for validation process control of radiation processing

Study on co-ordination and oxidation states of metallic components in microporous and nanodisperse systems by in-situ Mössbauer spectroscopy

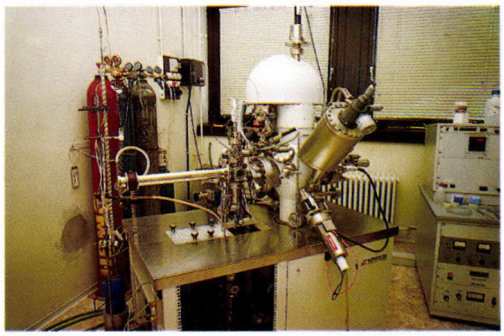
Surface Reactions and Heterogen Catalysis

Preparation of model systems and their surface properties

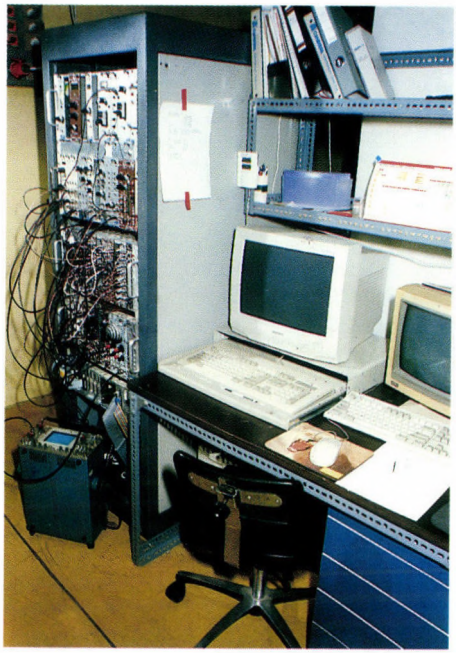
The research is concerned with molecular level understanding of the surface chemistry of heterogeneous catalysts. This provides surface science approach to catalyst preparation, scientific design of improved catalyst systems, manipulation of surface reactivity with the final goal to achive specific surface reactivity and selectivity. Well defined model catalysts are to be prepared and advanced surface spectroscopy is applied to investigate surface morphology, electron and chemisorption properties of metal nanoparticles, their stability, agglomeration, etc.

Studies are focused on:

- the supported and unsupported metal catalysts modified by a second metal or by surface adspecies;
- structure and sulphur uptake of supported MoO_x catalysts containing metals of Group 8–10 of the periodic system of elements;
- formation, stability and migration of metallic nanoclusters created in the zeolite cages and pores.



XSAM 800 photoelectron spectrometer



Cold neutron induced prompt-gamma activation analysis (PGAA) facility at the Budapest Research Reactor. The experimental station with neutron beam tube, sample box, pulled-out sample holder frame and gamma-ray detectors are on the right, while the electronic parts of the PC-controlled spectrometer are shown on the left side.

Study of the interaction of the surface with substrates

Comparison of the adsorption properties of metals with different morphology, analysis of the interaction between surface metal atoms and substrate:

- adsorption of simple molecules, e.g. CO, NO, C_1–C_5 hydrocarbons, etc. to elucidate the structure of adsorbed molecules by means of various methods (transmission, diffused reflexion and emission FTIR spectroscopy);
- adsorption of simple hydrocarbons on thin metal foils and study their behaviour;
- modelling of the interactions of simple molecules with surfaces by applying quantum-chemical calculations and semi-emipirical approximations;
- theoretical study of metal-ligand interaction;
- investigation of atmospheric pollutants by highly-sensitive FTIR spectroscopy.

Heterogeneous catalytic reactions

The research is focused on surface intermediates and reaction pathways to find correlation between structure (composition, physical, electron and adsorption properties) of the catalyst surface and its catalytic activity. The main objective is to interpret relation between structure and reactivity in different types of catalytic processes:

- structure and activity (selectivity) relationship is to be determined over bimetallic catalysts prepared on oxide, zeolite using various methods (sol/gel, ion exchange, impregnation, etc.) in various reactions such as CH_4 conversion, CO/O_2, CO/H_2 reactions, hydrocarbon transformations, selective hydrogenation, NO_x decomposition;
- development of the catalytic activity is to be followed during oxide-sulphide transformation.

CRC RESEARCH LABORATORY OF MATERIALS AND ENVIRONMENTAL CHEMISTRY

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E-mail: szepvo@chemres.hu

Research aims and topics

Materials chemistry

Researches in this field are aiming at making clear the chemical relationships among the composition, structure, properties and production of selected material systems. The studies cover the changes of particular materials on use, as well. Special emphasis is being placed on chemical reactions initiated by non-traditional methods such as particle beams, high temperature thermal plasmas and laser beams.

Main research topics include:
- studies of surface reactions induced by fast ion and atom beams;
- formation of nanosize ceramic powders and thin surface layers in thermal plasmas;
- researches of carbonizaton in thermal plasmas;
- laser chemistry and laser spectroscopy.

Electrochemistry and Corrosion

Development of the AC methods of electrochemistry

Application of electrode impedance spectroscopy (EIS) to perturbations of medium and high amplitude, respectively (non-linear impedance spectroscopy)

Characterization of the corrosion resistance of paints and inhibitors being effective in acidic and neutral conditions by electrochemical methods (EIS, measurement of potential noise, Faradaic distortion) developed previously in RLMEC

Study on specific methods of electroanalysis

Environmental and Analytical Chemistry

Development and adapting of analytical and detection methods to measure parameters of environmental importance in complex systems

Studies on the decrease of environmental impacts due to traditional energy production and industrial technologies

Researches to facilitate the use of renewable sorts of energy

Researches to establish the processing of industrial wastes and by-products with a minimum environmental impact

Development of new processing technologies with a special emphasis on the environmental issues (green chemistry)

Specific research topics include:
- Basic researches to decrease the environmental impacts of coal-based power generation
- Thermal utilization of biomass materials
- Formation of toxic compounds in high temperature processes
- Effect of stabilizers on the thermal degradation of PVC
- Recycling of polymer mixtures and blends by pyrolysis
- Researches on the development of solar stills producing sweet water from sea water
- Application of sol-gel processes in the environmental protection
- Processing of hazardous wastes in high temperature thermal plasmas

KFKI ATOMIC ENERGY RESEARCH INSTITUTE

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Scope of activities

The main activities of the Institute cover basic and applied research as well as developments in the fields of reactor physics, reactor diagnostics, thermohydraulics, real-time information, monitoring and surveillance systems, reactor simulation, probabilistic and deterministic assessments of reactor safety, analysis of severe accidents, radiation damege, fracture mechanics, leakage detection, radiation protection. Further tasks involve development of environmental monitoring systems; risk evaluation; methods used in analytical, chemical and physico-chemical processes and in a coustic emission; research into space dosimetry; operation of a research reactor.

Research aims and topics

Reactor physics

- development of new methods and procedures,
- development of special methods and tools for reactor safety evaluation,
- reactor physics calculations for normal operation,
- modelling of reactivity and boron dilution accidents,
- coupling of 3D neutronic and thermohydraulic system codes,
- reactor safety evaluation considering new-type fuel elements,

The main building of the Research Reactor

Thermohydraulics

The institute's integral-type test facility PMK-2 is used to produce test data for computer code validation. This activity concentrates on areas where the VVER-specific validation matrices have indicated a lack of experiments. The following fields are of special interest: phenomena of anticipated transients without scram (ATWS), specific methods for accident management.

Other fields are as follows:

- Scientific and technical support to the development of state-oriented emergency operating procedures,
- Development of methodology for the nuclear safety authority to support their activities in the fields of design basis and ATWS accidents.

Development of training simulators

Accidents at nuclear power plants generally arise from human errors rather than from

constructional errors or mechanical failures. The simulator is the best tool to train the plant's operators.

After 10 years of continuous development and testing of the simulator's model system, a high level of confidence has been achieved. Nowadays the simulator is used not only to train the operators; but practically every new development in the plant is tested first on the simulator system. Recently the proposed new Reactor Protection System and Plant Computer System are evaluated by the simulator.

Research activities in this field are concentrated on

- development of state-of-the-art user-friendly graphic software tools to delegate the modelling tasks more and more to the experts of the customer,
- enhancement of the integrated, platform-independent real-time simulator software environment,
- improvement of the real-time response using elaborated I/O systems to increase the fidelity for the tests of the investigated new equipment,
- expanding simulator model software to simulate severe accidents up to the core melt.

Research on the process information, operator support and signal analysis systems

- development of core surveillance and analysis systems for nuclear power plants,
- development of on-line process information, monitoring and operator support systems for nuclear power plants,
- development of safety parameter display systems and critical safety functions monitoring systems for nuclear power plants,
- development of expert systems for reactor noise diagnostics,
- development of signal validation and early warning systems based on fuzzy theory and artificial neural networks.

Fuel and reactor materials research

Aging of reactor components and behaviour of fuel and core materials under operational, accidental and storage conditions include activities such as follows:

- development of methods for investigating radiation damage and aging,
- setting-up of a data bank and evaluation of international data on aging,
- investigation of the effects of thermal aging,
- contribution to the experimental database on core material interactions,
- study of mechanical strenght of VVER fuel cladding,
- high temperature experiments with fuel components,
- integral tests for severe accident conditions, including air ingress,
- application of computer codes for the simulation of fuel behaviour under normal, accidental and strorage conditions.

Radiation and Environmental Physics Research

Extensive research is carried out aiming at the

- study of deposition of aerosol particles in the human lung,
- modelling of atmospheric transport of radionuclides,
- investigation of methods of external and internal dosimetry,
- improvement of new solid state dosimeters for neutron measurements,
- development of software simulator of accidental environmental contamination,
- study of retrospective determination of long-term radon exposure,
- improvement of methods for environmental monitoring around nuclear installation in case of major nuclear accidents,
- health and environmental impacts and resulting damage costs from fossil energy generation,

– development of instruments for use in space research.

Physico-chemical research

The aim is to understand structure of condensed matter and of solid/liquid interfaces and to reveal correlations between structure of, and transport across these interfaces. The particular tasks:

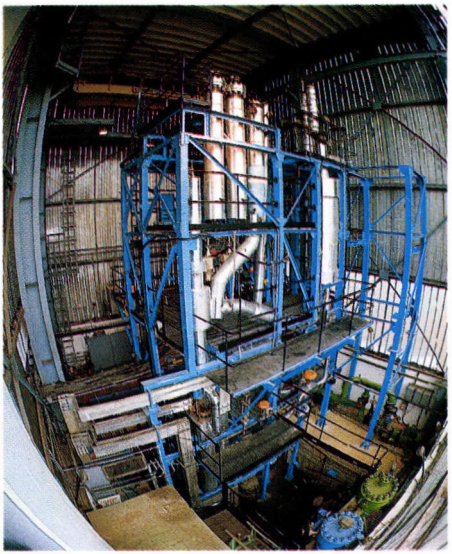
– determination of the kinetic laws of adsorption and transport processes in electrochemical systems,
– electrochemical characterization of corrosion processes on reactor materials,
– investigation of liquid mixtures by nuclear methods.

Utilization of the Budapest Research Reactor

After a major reconstruction and upgrading, the regular operation started November 25, 1993. The upgraded reactor serves for basic and applied research, technological and commercial applications, education and training. These studies will get a much improved tool, when the cold neutron source will be put into operation. The cold source is being constructed now. It will be operational by 1999. A lot of technical problems are solved by means of the reactor, as radioisotope production, neutron radiography, activation analyses, and pressure vessel surveillance studies.

The Budapest Research Reactor is the only source of radioactive isotopes in Hungary. Radioactive isotopes are widely used, mainly in the medical practice. Neutron radiography is a well accepted method to investigate turbine blades, pipelines, compressors of refrigerators, heat-exchangers, valves. Activation by reactor neutrons is a very sensitive analytical method. An extended national programme for the surveillance of the power plant's pressure vessels is going on.

For the utilization of the reactor in the field of basic research the Budapest Neutron Centre (BNC) has been set up by three research institutes of the Hungarian Academy of Sciences. BNC has an international advisory board.



The PMK-2 Thermohydraulics experimental facility

KFKI RESEARCH INSTITUTE FOR PARTICLE AND NUCLEAR PHYSICS

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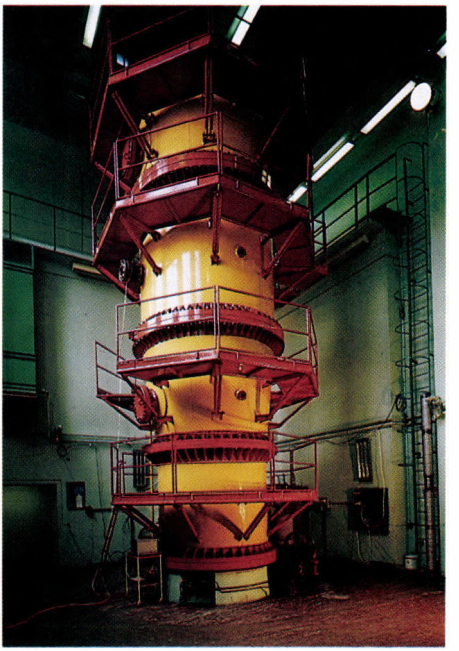
Scope of activities

Fundamental research in high energy nuclear and particle physics, plasma physics, space physics, theoretical research, materials science and biophysics. Applied research and development in the field of laser techniques, nuclear analytics, space electronics, fast data processing, and optical and X-ray spectroscopy. Most of the institute's work is connected with the so called "big sciences", which are realized within the framework of international cooperation.

The Computer Networking Center is working as a department of the institute. Its responsibility includes the management of the local campus network, the connection to the wide area networks and providing information services to the whole campus.



Van de Graaff type particle accelerator

Research aims and topics

Ultrarelativistic heavy ion physics and particle physics

The fact that Hungary is a member state of CERN basically determines the main trends of our research. The previously separated nuclear and particle research groups are coming closer to each other. Research topics:

- investigation of relativistic heavy ion collisions in GSI-Darmstadt
- research for quark-gluon-plasma in the frame of CERN NA49 experiment
- development of hardware elements for the planned LHC experiments (ALICE, CMS)
- data analysis for the L3 and OPAL experiments (LEP).

Thermonuclear plasma physics and laser physics

Continuing the research activity that started in 1975, the institute envisages cooperation in various research projects of the European Communities. Research subjects:

- the movement of neutral and charged particles in the plasma

- the movement and the interaction with laser beams of plasmas produced by laser radiation
- the collisions and interaction of atoms and molecules with the laser radiation.

Space physics

- Scientific interpretation of the data from former and ongoing space missions (VEGA, PHOBOS-2, PIONEER VENUS ORBITER, ULYSSES, SOHO, CLUSTER, CASSINI).
- Development of on-board devices, software and ground support equipment for future space missions (ROSETTA, CESAR, SPECTRUM-X-GAMMA, NETLANDER).

Theoretical physics

- Relativistic heavy ion collisions: phenomenology of the NA49 experiment at CERN and related problems.
- Elementary particle interactions: quark confinement, Higgs-particle, W decay.
- Quantum field theory: integrable models, lattice models.
- General relativity and gravitation: new solutions of Einstein's equation, black hole final states, quantum gravitation.
- Few-body problem in nuclear physics.

Materials science

- Utilization of methods of nuclear physics to determine the structure of materials and of microscopic processes determining the macroscopic properties (semiconducting thin layers, surfaces and interfaces in thin magnetic layers, fundamental processes in ion implantation, defect structures in semiconductors and insulators, porous systems with extended internal surface).
- Development of the methodology of nuclear condensed matter physics mainly based on the institute's accelerators, Mössbauer- and positron annihilation laboratories as well as on external synchrotron radiation laboratories. The methods are based on (partly in situ) ion beam analytical techniques, on resonant and nonresonant interaction of gamma or synchrotron radiatiton and of positrons with condensed matter.

Neurobiology and nuclear biophysics

- Computational neuroscience: multicompartmental simulations of various types of neurons; application of a kinetic model to the description of the behaviour of large neural populations.
- Study of the concentration, distribution and binding of essential (or toxic) trace elements in proteins and enzymes in order to clarify their structure and function by combining special nuclear analytical techniques with biomechanical separation processes.
- The application of nuclear methods for the analysis of archeological and fine art objects.

RESEARCH INSTITUTE FOR TECHNICAL PHYSICS AND MATERIALS SCIENCE

Central research building

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E-mail: gyulai@ra.atki.kfki.hu
Website: www.kfki.hu/mfahp

The institute was organized in 1998 by a merger of the Research Institute for Technical Physics and the KFKI Research Institute for Materials Science on the location of the latter. The research concept of the new institute tries to build on the synergism offered by the joint scientific potential and the united research infrastructure. Thus, the area of the Class 10 and 100 clean laboratory was enlarged to accommodate research on compound semiconductors and the mask laboratory with a complex goal of research on integrated sensors. Another infrastructural complex, the Laboratory of structural research and thin films, continues the long traditions on electron microscopies and Auger Electron Spectrometry is located next to the clean laboratory. A third large scale facility used and financed in part, is the Accelerator Laboratory of the KFKI Campus, an ion beam laboratory in the building of the KFKI-Institute for Particle and Nuclear Physics.

Basic scientific directions sustained, i.e., basic studies on semiconductors, metals (including magnetic materials) are performed. Applied research on sensing devices (semiconductor, magnetic and optical type), on

ceramics are still in focus. Computer programs written by software groups are employed mostly in the field of bio- and medical engineering and diagnostics. The institute performs a broad range of teaching activities, both on undergraduate and graduate level.

Two divisions make the institute and each consists of several laboratories.

Semiconductor and Sensorics Division

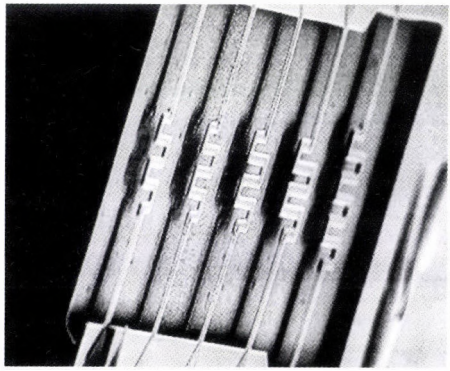
- Laboratory of Compound Semiconductors, medium and high power laser diodes and optical waveguides
- Laboratory of Device Physics, focusing besides high frequency studies, on quantum magnetotransport in low dimension electron gases
- Laboratory of Ion Implantation and Ion Beam Analysis, Ion-soild interactions, new methods in ion beam analysis techniques, jointly operates the Accelerator Laboratory of the KFKI Campus with the KFKI-Inst. for Paricle and Nuclear Physics
- Laboratory of Sensorics, mainly semiconductor based
- Laboratory of Diagnostics, focus on software development, mainly for purposes of medical diagnostics
- Laboratory of Magnetooptics, sensors based on magnetic properties
- Laboratory of Optical Characterization, in situ and real time analysis, sensors based on optical principles

Structure Research Division

- Laboratory of Theoretical Physics and Modelling, computer studies of surface physics and ion-solid interactions
- Laboratory of Nanostructures, production and study of carbon structures
- Laboratory of Thin Film Physics, solid state reactions on surfaces, in thin films and multilayers
- Laboratory of Thin Film Structures, studies of structured thin films, quantum size effects
- Laboratory of Surface Physics, surface reactions on films
- Laboratory of Ceramics, preparation of structural and functional ceramics
- Laboratory of Bioengineering studying body electrical biopotentials, adds to this structure

At present, we quote the following as points of excellence

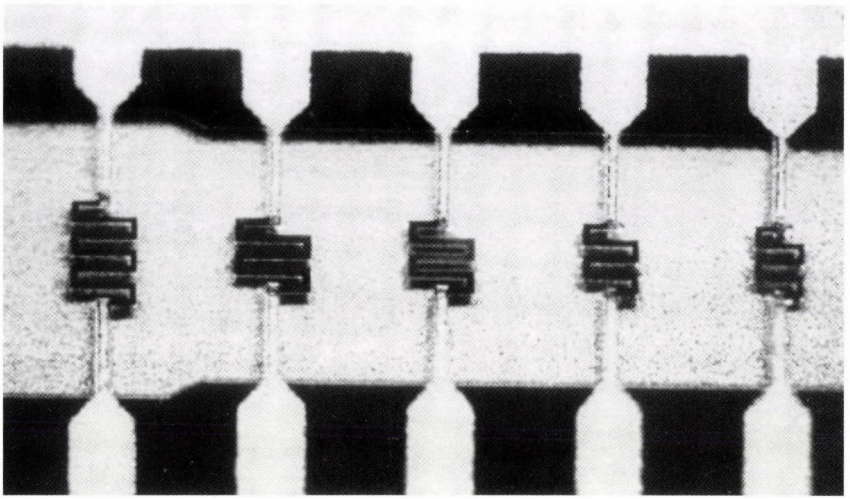
- Clean laboratory (600 m^2, Class 10–10000) and Mask facility, enabling to produce devices down to one micron resolution
- Electron Microscopy, Auger and Scanning Probe Lab making use of a unique sputter gun enabling in Transmission Electron Microscopy a special thinning and in Auger Spectroscopy 1 nm depth resolution
- Thin film, Surface Physics and Structures revealed new results in physics of film growth
- Ion Implantation and Ion Beam Analysis, using also facilities in part of the KFKI-Inst. for Particle and Nuclear Research, resulted in new beam-generated structures, like carbon nanotubes, and in improved methods in detecting certain marker iso-



SEM view of microheaters suspended across a channel of 300μm width

topes to reveal solid state chemical reactions

- Optical Characterization, Ellipsometry developed new neural network based programs to study in situ and real time reactions on semiconductor surfaces
- Semiconductor Lasers and different LPE techniques resulted in new types of semiconductor lasers with tailored emission wavelengths
- Sensorics includes semiconductor pressure sensors and studies on porous silicon to detect gas composition, and a microwave antenna structure to study effects of microwaves on human tissues; magnetism-based ones to detect cracks in steel vessels; optical waveguide type sensors for biosensors to detect hormone activity, the latter needed the production of an optical grid with a pitch of <0.4 μm
- Computing applications; medical studies to measure heart originated biopotentials of the whole body to study risk factors of heart attack, an automatic identification and distinction between healthy and cancer cells), and, as a spin-off, the programs are used for acoustic noise reduction in archaic sound recordings
- Porous silicon preparation and studies led to light emitting diodes and gas sensors
- Carbon nanotubes, preparation by swift heavy ion irradiation and studies by Scanning Probe Techniques
- Computational physics to apply the Ising Model to surface studies and a work on modelling of ion implantation into silicon carbide
- Ceramics, resulting in perfect samples of silicon nitride ceramics produced in a high pressure, high temperature press, studies on ion irradiation on mechanical properties
- Refractory metal studies focus on studies of tungsten and tungsten carbide



Microscopic view of microheaters. The central one is glowing at cca. 600°C

RESEARCH INSTITUTE FOR SOLID STATE PHYSICS AND OPTICS

The building of the institute

Address: 1121 Budapest, Konkoly Thege u. 29–33.
Postal address: H-1525 Budapest, Pf. 49.
Telephone: (36-1) 395-9153
Telefax: (36-1) 395-9278
Director: János KOLLÁR, D.Sc. (Physics)
E-Mail: szfki@power.szfki.kfki.hu
Website: www.kfki.hu/~szfkihp/

Scope of Activities

- *Basic research* in the field of *theoretical and experimental solid state physics*, including the physics of condensed materials, metals, thin films and surfaces and also in the field of *theoretical and experimental optics*, including the physics of optical crystals, nonlinear and quantum optics as well as laser physics.
- *Applied research*, including the development, study and applications of specific *new materials*, new *test methods*, new *optical crystals, thin film devices* and *lasers*.
- Development of *unique research methods* including neutron scattering, neutron and gamma-radiography, nuclear magnetic resonance, X-ray diffraction, Mössbauer-specroscopy, ultrashort laser pulses.
- Gradual and postgradual *education*.

Research aims and topics

Theoretical study of strongly correlated systems

- Properties of low-dimensional magnetic models, using both analytical and numerical methods.

- Description of the properties of several newly discovered materials with Ladder models of localized spins..
- Low-dimensional fermionic models, especially the one and two-dimensional Hubbard and t–J models.
- Study of two level systems (TLS); the scattering of ultrasound in metallic glasses and nonequilibrium theory of structured TLS.

Theoretical study of complex systems

- Phase transitions and scaling; analytical and numerical study of the effect of quenched disorder on the critical behaviour in lower dimensional systems.
- Similarities with and differences from equilibrium systems in non-equilibrium phase transitions.
- Systems with stochastic dynamics; numerical studies of simple cellular automaton models.
- Quantum-many body sytems; contributions to the mathematical proofs of itinerant magnetism, superconductivity and Bose condensation.
- Non-linear systems; calculation of important – mainly non-linear – properties of gases exhibiting Bose-Einstein condensation; the linear response theory of the transient chaotic state and its applications in statistical physics.

Theoretical study of electronic states in solids

- Development of band structure methods.
- Stability of structures and surfaces, elastic properties from first principles.
- Magnetic properties of surfaces.
- Nested Fermi liquid theory of high temperature superconductors.
- Properties of spin- and charge density waves.
- Strongly correlated electron systems.
- Superconductivity in mezoscopic systems.

Investigations of non-equilibrium alloys

- Study of the macroscopic magnetic properties and the characteristics of the local atomic environments in order to clarify their relation in melt quenched bulk spin-glasses and granular structures.
- Study of formation of the nanophases with special magnetic properties; formation of nanocrystals from the amorphous state in different processes. The samples will be investigated by calorimetry, Mössbauer spectroscopy, and other methods.
- Determination of the partial atomic correlations by neutron diffraction in amorphous Au-Ti, Ti-Si, Ti-Zr-Si and La-Ni alloys.
- Dynamic neutron radiography studies on flow processes in multi component two phase systems.

X-ray diffraction

- Structural studies of high charge state C_{60}-alkali polymers.
- Structural studies of alkaline-earth-C_{60} compounds, specially concentrating on the superconducting compositions.
- Preparation of C_{60} thin films and C_{60}-metal layered structures. Investigation of the effect of laser light treatments using grazing incidence X-ray diffraction and infrared spectroscopy.
- High pressure synthesis of C_{60} compounds and the study of their structural properties.
- Field theoretic study of first order phase transformations.
- Experimental and theoretical study of atomic resolution X-ray holography.

Charge- and spin-density waves

- Study of the collective excitations of the ground states and the apperent non-Fermi-liquid behavior of the metallic phases in organic conductors.

Liquid crystal research

- Synthesis and study of compounds possessing ferro-, ferri- and antiferroelectric phases.
- Synthesis of deuterated liquid crystals and their study by neutron scattering and NMR techniques.
- Rheological investigations of pyramidic columnar liquid crystals.
- Synthesis and study of ferroelectric liquid crystals formed by bent shaped molecules.
- Orientation of smectics by light.

Instabilities and non-linear phenomena in liquid crystals

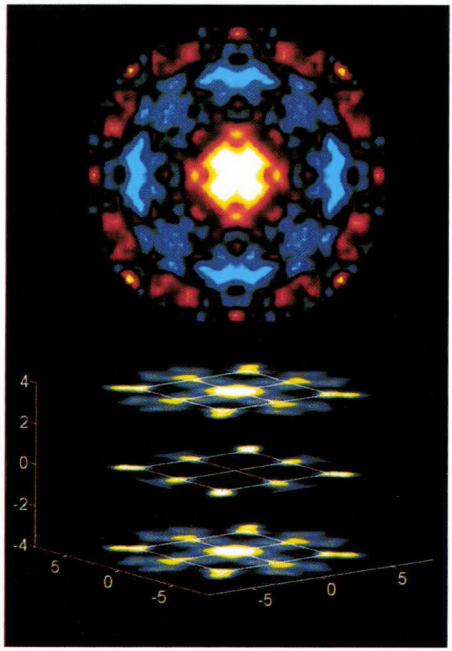
- Study of pattern forming instabilities in nematic and smectic liquid crystals induced by different applied fields (electric, magnetic, temperature – concentration – and velocity gradient).
- Investigations on the possibilities of storing and retrieving information optically in dyed nematics.

Metal physics

- NMR investigations of metal-hydrogen systems; measurement of hydrogen-hydrogen distance and hydrogen-mobility, the clarification of the electronic structure of hydrogen in metals, the determination of the dependence of these parameters on the composition of amorphous alloys and on the hydrogen charging-discharging technology.
- Investigation of local hyperfine properties and the atomic motions at and around the implanted $^{12}B^{*}$ in high purity FCC metals.
- Investigation of the possible correlation of the low-spin high-spin transition and the molecular motions existing in transition-metal complexes by NMR method.
- Studies on magnetoresistance and magnetic properties (including the scanning electron microscopic study of the magnetic domain structure) of electrodeposited Ni-Co-Cu/Cu type multilayers.
- Studies on formation and properties of nanocrystalline structures in metals and alloys produced by rapid solidification of melts, high-rate heating of amorphous alloys, ball milling and elektrodeposition.

Neutron research

- Neutron diffraction and inelastic scattering investigations on the following fields:
  - short and medium range ordering of metals and alloys,
  - texture and strain distribution in model and real metallic as well as composite materials and objects,
  - medium and short range structure of amorphous semiconductors,
  - structure and dynamics of liquid crystals and their composites,



X-ray hologram and a reconstructed holographic image of $SrTiO_3$

- structure and dynamics of liquid based materials such as solvents, suspensions etc. (gels, ferroliquids, micelles).
- The development of novel neutron physical devices and technologies at the modernised 10 MW Budapest Research Reactor.

Interactions of intense laser fields with matter

- Experimental revealing and theoretical interpretation of the fundamental photon-electron interaction processes induced by superintense, ultrashort laser pulses.
- Quantised spectra for both high energy photoelectrons and high harmonic light beams. Development of attosec light pulses from the latter beams.
- Study of the anomalously high tunnel-photoelectron yield found by this group for long laser wavelengths.
- Development and realisation of the new idea found by this group for obtaining new "table-top" size laser driven electron accelerator up to multi-GeV energies and strong X-ray laser pulses up to TW/cm^2 intensities.

Laser physics

- Modelling of basic processes of gas discharges and gas lasers by means of Monte Carlo simulation.
- Development of high power UV gas lasers using cathode sputtering in segmented hollow cathode discharges.
- Development of gas discharges with new geometry.
- Research on optimum output coupling of microdisc lasers.
- Investigations of the electrolyte cathode atmospheric glow discharge; plasma light emission mechanisms and plasma-electrolyte interface processes.
- Investigations of the optical parameters of noble metal and dielectric thin layers by means of attenuated total reflection (ATR) method.
- Development of the optical STM.

Laser applications

- Development of solid state lasers with improved parameters for industrial and medical applications by using piezo-ceramic driven Fabry-Perot mirror Q-switch.
- Development of diode laser pumped solid state lasers by using new active materials with broad absorption band.
- Development of Ti:sapphire laser.
- Development of optical measuring devices for the determination of size distribution, concentration and electrical charge of particles of submicron and micron size.
- The application of the interferometric sampling motion analizer in material science investigations.
- Development of experimental equipment for the generation of entangled photon states and its application for quantum optical measurements.

Optical thin films

- Theoretical and experimental investigations on the performance of chirped dielectric mirrors such as bandwidth, smoothness of dispersion function and stability.
- Investigation of the optical coating materials and their deposition technology used in femtosecond laser mirrors.
- Development of optical coatings for diode pumped solid state lasers.
- Development of low loss laser mirrors for UV metal vapour lasers.

Crystal technology

- Growth of nonlinear optical crystals by melt and high temperature solution techniques. Orientation and processing of the crystals for research and application. Characterization of the crystals by chemical analytical, optical microscopic, etching, optical and absorption spectroscopic methods. Investi-

gation of specific physical effects in pure and doped crystals: photorefractive and photochromic processes, light emission, scintillation and nonlinear optical effects.
- The actual crystals in the program: TeO_2, $LiNbO_3$, $ZnWO_4$, Bi_2TeO_5, $Bi_4Ge_3O_{12}$, sillenites: $Bi_{12}SiO_{20}$ (BSO), $Bi_{12}GeO_{20}$ (BGO), $Bi_{12}TiO_{20}$ (BTO) and borates: β–BaB_2O_4 (BBO), Li_2B4O_7 (LTB), LiB_3O_5 (LBO), $CsLiB_6O_{10}$ (CLBO), $YAl_3(BO_3)_4$ (YAB).

Crystal Physics

- Investigation of the real structure and physical properties of crystals. In particular, studies of the effect of dopants, growth and irradiation induced real structure on the photorefractive, photochromic, dielectric and spectroscopical properties, including also magnetic resonance.

Nonlinear and Quantum Optics

- Quantum state engineering and reconstruction.
- Nonclassical light, nonlinear optical processes.
- Cavity quantum electrodynamics and atom optics
- Quantum informatics
- Oscillator systems, molecules, atom traps.

"RÉNYI ALFRÉD" MATHEMATICAL INSTITUTE

Address: 1053 Budapest, Reáltanoda u. 13–15.
Postal address: H-1364 Budapest Pf. 127.
Telephone: (36-1) 317-3151
Telefax: (36-1) 317-7166
Director: Gyula KATONA, C.M.
E-mail: ohkatona@math-inst.hu

Scope of activities

The principal function of the institute is to perform systematic basic research in various topics in mathematics and its applications, concentrating on theoretical studies inspired partly by the internal development of mathematics, partly by the applications of mathematics in other sciences. Other important functions of the institute are provide active support for the teaching of mathematics and education of mathematicians of various levels, to participate in the postgraduate training of mathematicians working in other institutes, and to contribute to the general progress of mathematical culture. To accomplish these goals, the Institute organizes postgraduate courses, publishes textbooks, participates in postgraduate education and offers visiting research positions.

The building of the institute

Research topics

- Algebra
- Algebraic logic
- Approximation theory
- Differential equations
- Functional analysis
- Discrete mathematics
- Number theory
- Geometry
- Set theory
- Topology
- Information theory
- Mathematical statistics
- Statistical physics
- Probability theory

Director's room

COMPUTER AND AUTOMATION RESEARCH INSTITUTE

Address: 1111 Budapest, Kende u. 13–17.
Postal address: H-1518 Budapest, Pf. 63.
Telephone: (36-1) 466-5644
Telefax: (36-1) 466-7503
Director: Péter INZELT, C.Sc. (Tech.sci.)
E-mail: peter.inzelt@sztaki.hu
Website: www.sztaki.hu

Fields of activities

- Basic and applied research, experimental development in the field of computer science, information technology and computer applications;
- development of special (prototype) hardware and software systems related to the basic R&D activities;
- running the Computer Centre of the Academy and the computer network of the research institutes of the Academy;
- graduate and postgraduate education;
- consulting;
- supplementary activities related to basic research.

The activities cover the C^3I (computing, control, communication, and intelligence) quadruple characterising the Institute's profile.

Research topics

Computer science and information technology

- Theoretical computer science (symbolic computation, algebraic methods).
- Data flow analysis, software testing.
- Research on high-performance, parallel computing systems (parallel and distributed programs, databases).
- Discrete and algorithmic geometry.
- Dynamic systems and statistics.
- World Wide Web software technology.
- Distributed digital libraries.

The main building of the institute

Applied mathematics

- Operations research and decision systems.
- Dynamic structures (free boundary problems, growth processes).
- Discrete structures (graphs, hypergraphs, combinatorial information theory).
- Financial mathematics and management.

Automated control systems

- System theory, system identification, control theory.
- Signal processing, picture analysis, visual information processing.
- Failure detection and diagnostics.
- Power electronics.

Artificial intelligence

- Knowledge representation with ill structured patterns.
- Engineering applications.
- Computer science models of multi-agent systems (distributed and co-operative problem solving systems, ecosystems, formal language description of knowledge networks, DNA sequences).

Analogical and neural computing

- Analogical supercomputer architectures, system module development based on new chip realisations and chip set architectures.
- Neuromorf algorithms, computational complexity.
- Novel tools towards the analogical bionic eye.

Integrated design and control systems

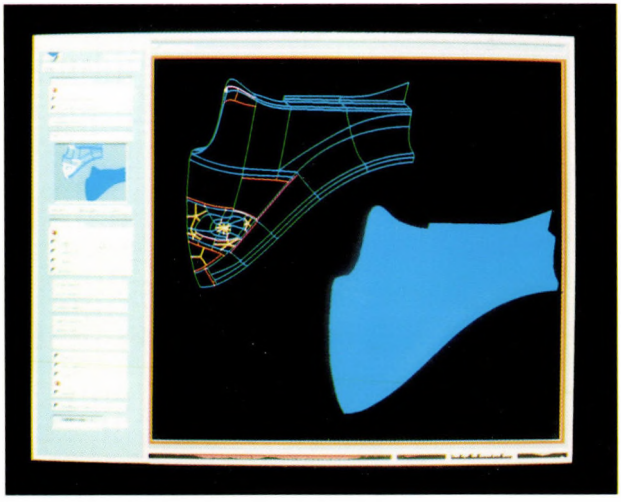
- Design, control, simulation of flexible manufacturing and assembly systems, open architectures.
- Intelligent manufacturing processes and systems (artificial neural networks, fuzzy systems, agents, hybrid structures, machine learning).
- Modelling of free-form surfaces, and solids.
- Reserve engineering, reconstruction and analysis of complex objects based on laser scanned data.
- Management of changes and disturbances in production, distributed systems, extended enterprises.

Distinguished partners (selected)

Nuclear Power Plant, Paks; Office of the Prime Minister, National Savings Bank (OTP), KNORR BREMSE GmbH, Motorola Inc., National Health Board, National Pension Board.

Graduate and postgraduate education

The Institute contributes to the educational activities of the following universities and colleges in Hungary:



Computer-aided design of free shape surfaces

- Technical University of Budapest (BME),
- Eötvös Loránd University of Sciences, Budapest (ELTE),
- Budapest University of Economic Sciences (BKE),
- University of Veszprém (VE),
- Janus Pannonius University of Sciences, Pécs (JPTE),
- University of Miskolc (ME),
- Gábor Dénes Technical College, Budapest.

External university departments are run at the Institute, i.e. the Department of Decisions in Economy (with BKE), the Department of Information Sciences (ELTE) and the Department of Integrated Production Information Systems (BME). The Dynamics and Control Systems Centre was founded together with the Faculty of Transportation at the BME.

A number of Ph.D. Programmes at various universities in Hungary were accredited with the contributions of the members of the Institute, e.g. Computer Science (ELTE), Vehicle Dynamics (BME) and Analysis, planning and production of machines and instruments (BME). The interdisciplinary Neuromorphic Information Technology Doctoral Program-me and the corresponding Postgraduate Centre was established by the Institute in co-operation with the BME, JPTE, VE and the Pázmány Péter Catholic University and the Neurobiology Unit of the Hungarian Academy of Sciences – Semmelweis University of Medicine, Budapest.

Research activity of about 30–40 Ph.D. students is supervised regularly by leading scientists from the Institute.

INSTITUTES FOR SOCIAL SCIENCES AND HUMANITIES

ARCHAEOLOGICAL INSTITUTE

Address: 1014 Budapest, Úri u. 49.
Postal address: 1250 Budapest, Pf. 14.
Telephone: (36-1) 375-9011
Telefax: (36-1) 356-4567
Director: Csanád BÁLINT, D.Sc.
(Archaeology)
E-mail: hbal10164@mail.iif.hu

Scope of activities

Archaeological and connecting research of natural sciences from the Neolithic to the Late Medieval Period.

Research topics

The Archaeological Topography of Hungary

Systematic exploration and documentation of sites from the Prehistory to the late medieval Turkish Period in Hungary. Publications are arranged according to recent administrative units. Projects in progress:
- archaeological sites in county Békés,
- archaeological sites in county Pest.

The Roman Empire and its provinces

Within the frames of this theme the history and archaeology of distinct areas such as Pannonia, the Barbaricum, Nubia and others are researched:
- excavation of a Roman villa at San Potito (Italy),
- excavation of a road station in Pannonia (Sárvár),
- historical sources and archaeological heritage of Nubia.

Avars, Hungarians and their neighbours

This topic is phocused on the research of contacts between the Carpathian Basin and

A view over archaeological research

South East Europe in the 6–13th centuries. Main topics:
- contacts between the Carpathian Basin and South-East Europe in the 6–10th centuries,
- the pottery of the Avar Pertiod (6–9th centuries),
- sytematic research of the 9–11th centuries dominion centre at Zalavár,
- inventory of the 10–11th century cemeteries,
- pottery of the 10–13th centuries,
- the medieval settlement history and archaeological heritage of Transylvania

Medieval researches

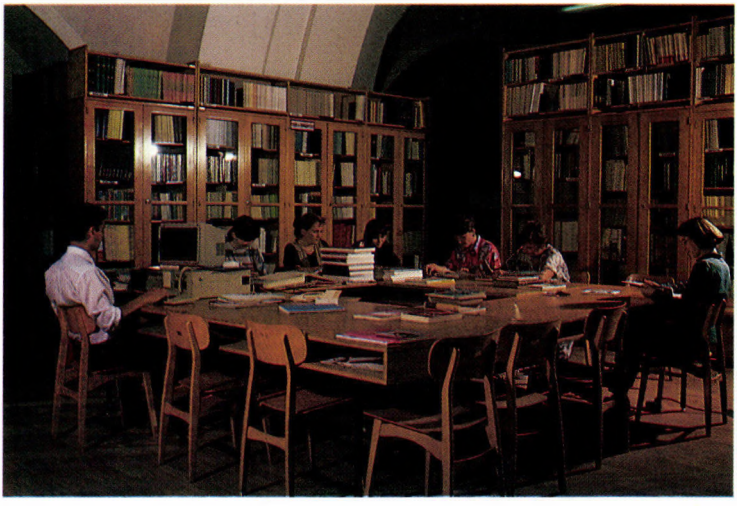
- small fortresses in the Period of the Árpád Dynasty,
- medieval towns (Székesfehérvár, Vác),
- medieval village structure and field exploitation,
- the archaeological heritage of the Turkish Period (16–17th centuries)

Microregional research programmes

Within the frames of this topic the settlemet history of certain smaller geographical districts are researched systematically, with both archaeological and with all available methods of natural sciences, supplying traditional

methods with environmental archaeology. Projects in progress:

- the settlement history of the Kerka Basin (S-W-Hungary) from the Neolithic to the 16th century,
- the Danubius project investigates the role of the river in the settlement history, its economical and environmental effects during the archaeological periods.



The library of the institute

INSTITUTE OF ART HISTORY

Address: 1014 Budapest, Úri u. 49.
Postal address: 1250 Budapest, Pf. 27.
Telephone: (36-1) 375-0493, 375-9011
Telefax: (36-1) 356-1849
Director: Ernő MAROSI, C.M.
E-mail: h4517mar@ella.hu

Scope of activities

- research of history, sources and monuments of art in Hungary from the beginnings to date
- researches concerning art theory, methodology and the history of art studies
- activity concerning resources of Hungarian art
- management of and curatorial work in the Art Collection of Hungarian Academy of Sciences

Research aims and topics

History of Art in Hungary, History of Hungarian Art

Medieval, Renaissance and Baroque Art

- art in Hungary 11th to 18th centuries
- monographies on art and architecture
- corpus of seals of medieval Hungarian kings
- critical repertory of church architecture, 11th to 13th centuries
- studies in codicology
- researches in the field of Gothic, Renaissance and Baroque art: monographic and iconographic investigations, studies in art sociology and art patronage
- history of gardens, 18th–19th centuries

A view of the institute's library

Hungarian art, 19th to 20th centuries

- monographic researches
- researches in the history of art institutions, in iconography and in history of reception

Researches on art topography

- regional inventories of historical monuments
- architecture in Budapest between the two World Wars
- liturgical works of art in possession of the Catholic dioceses

Theoretical studies

- history of the discipline of the Hungarian art history

Sources of Hungarian Art History

- publication of source materials
- archives of Hungarian art, artists and art historians
- photographic archives of Hungarian art and architecture (11th to 20th centuries)
- "dictionary" of Hungarian artists (printed and written files and datas concerning artists of 17th to 20th centuries
- abstracts of archivalia concerning earlier periods of Hungarian art history (11th to 19th centuries)

INSTITUTE OF ECONOMICS

Address: 1111 Budapest, Budaörsi út 45.
Postal address: H-1502 Budapest, Pf. 262.
Telephone: (36-1) 319-3157
Telefax: (36-1) 319-3136
Director: Jenő KOLTAY, C.Sc. (Economics)
E-mail: secretary@econ.core.hu
Website: www.econ.core.hu

The Institute is committed to international standards of fundamental and applied research in economics. It has focused increasingly on the analysis of the modern market economy and the transition related issues of the Hungarian economy. Findings of the research programs of the Institute are made available for and are regularly used by policy making bodies and universities.

The Institute puts emphasis on promoting academic cooperation with other Hungarian and European research centres. It also considers as a priority to develop stronger links with university departments and to take part in the education of the new generation of researchers.

Research fields

Macroeconomics and Economic Policy

- Macroeconomics: Macroeconomic performance and its micro foundations in developed and emerging market economies;
- Research related to economic policy issues: Growth and anti-inflationary policies, tools and efficacy of monetary and fiscal policy;
- International economics: The competitiveness of the Hungarian economy and its place in European integration.

Public and Institutional Economics

- Public economics: The role of central and local governments in market economies, competition policy, the transformation of public utilities;
- Institutional economics: Changes in property rights and the evolution of institutions in Hungary and other Central-Eastern European countries.

Human resources

- Human resources: the transformation of the Hungarian labour market, the economic and institutional aspects of labour market flexibility, the means of employment and wage policies;
- Income formation and private consumption: changes in consumer behaviour and in consumption and income patterns with special attention to age-group related problems.

Microeconomics and Sectoral Economics

- Industrial Organisation: Strategies of firms, markets and monopolies;
- Agricultural Economics: Structural policy in the agriculture, market development in connection with the accession to the European Union;
- Industrial Policy: competition and trade policy, impacts of trade liberalisation;
- Business Economics: quality management, firm behaviour.

Other

- Mathematical Economics: developing mathematical methods for supporting research in economics;
- History of Economic Thought: comparative analysis of various schools of economic thought
- Dissemination of Research Output

INSTITUTE OF ETHNOLOGY

*Address:*1014 Budapest, Országház u. 30.
Postal address: H-1250 Budapest, Pf. 29.
Telephone: (36-1) 356-6167
Telefax: (36-1) 375-9764
Director: Attila PALÁDI-KOVÁCS, D.Sc. (Ethnography)
E-mail: h12214iga@ella.hu

Scope of activites

- Research into the popular culture (folklore, cultural and social systems) of European (especially Hungarian) societies
- Non-European ethnological researches
- Contemporary problems of the rural population, religious and national minorities
- Coordination of ethnographical synopses (ethnological atlas, encyclopaedia, handbook)
- Participation in international projects
- Contribution to university, graduate and postgraduate education

Research aims and topics

Hungarian Ethnography, an eight-volume handbook

Systems of folk-beliefs and customs

- Influences, conflicts and changes in popular mentality in modern times
- System of Hungarian witchcraft in parallel with European connections
- Database of mythological motives and Hungarian folk-beliefs
- Catalogue of the folk-beliefs and customs of the peoples in the Carpathian basin
- Beliefs and customs of the life cycle

Archaic folklore genres

- Creating the image of the "national hero"
- Narratives and medieval allegories in the fine arts
- Catalogue of Hungarian folk-tales
- Catalogue of Hungarian folk-legends

Mongolian Shaman

The role of literature in folklore

- Role of writing and reading culture in early modern Hungarian villages and country-towns
- Texts of codices, sermons and proverbs in the fine arts
- Popular knowledge of history in the 19th and 20th centuries

Social anthropology

- Comparative researches into the ways of living in different regions and local communities
- Social change in Hungarian society and traditional culture in the 19th–20th centuries
- Culture of work in the changing villages
- Connections between the social norms, tradition and individual attitudes
- Jews in Hungary betweeen the two world-wars

Traditions, identity and national symbols

- Identity problems of Hungarians outside Hungary
- Creation of national identities in Middle East Europe in 19th century
- Culture and identity of the religious and national minorities in Hungary

Historical ethnography

- Historical periods of Hungarian popular culture
- Comparative analysis of the élite, popular and peasant cultures
- Different regions of Hungarian peasant culture on the basis of the Atlas of Hungarian Folk Culture
- Ethnographical lessons of the "canonica visitation"
- The status of vineyards in the law of winegrowing communities
- Food and material culture in European food history
- Unpublished artisan price-lists from the 17th to the 19th centuries

Non-European researches

- Hungarian ethno-genesis
- History and ethnography of Finno-Ugrian peoples
- Social system, folklore, linguistic problems and revival of ethnic identity among the Voguls and Ostyaks
- Encyclopaedia of Uralic Mythology
- Contemporary ethnic problems of peoples of the Caucasian Mountain
- Economic anthropological questions about the coffee production of the Kikuju people (Africa)
- The belief-system and social organization of the Bru tribe (Middle Vietnam)

Wedding in Hungary

INSTITUTE OF HISTORY

Address: 1014 Budapest, Úri u. 51–53.
Postal address: H-1250 Budapest, Pf. 9.
Telephone: (36-1) 355-8539
Telefax: (36-1) 356-6373
Director: Zoltán SZÁSZ, C.Sc. (History)

The main building of the institute

Scope of activities

- Publication of basic sources of Hungarian history
- Editing and publishing manuals of Hungarian and universal history
- Editing and publishing specialized monographs
- Organizing conferences on Hungarian and universal history, dissemination of the results of Hungarian historical scholarship to the of international scholarship
- Popularization of the results of historical scholarship
- Participation in university education, graduate and post-graduate programs

Research aims and topics

Source-publications

- Historical geography of Hungary during the time of the Árpád dynasty
- Diplomas of the time of the Árpád dynasty
- Sources of the time of the Ottoman-Turkish conquest of Hungary
- Documents on the Habsburg administration in Hungary after the Turkish conquest
- Jesuit missionaries in Hungary
- Collected works of Lajos Kossuth
- Minutes of the sessions of the ministers of common affairs of the Austro-Hungarian Monarchy
- Documents of the Ministry of National Minority Issues (1918–1919)
- Correspondence of Mihály Károlyi
- French diplomatic documents on the Danubian Basin 1918–1932
- Diplomatic documents of the Hungarian cease-fire agreement and of the peace treaty after World War II

Manuals

- Historical atlas of Hungary
- A new chronology of Hungarian history
- Archontological manuals

Preferred research fields

- The mediaeval Hungarian state
- Economic and social development in the three parts of Hungary in the 16th–17th centuries Turkish-Hungarian co existence
- Hungary in the Habsburg Empire

- Minorities in Hungary, Hungarian minorities in the neighbouring countries
- Social history of the "age of Kádár": 1956–1989

An interior view

INSTITUTE FOR LEGAL STUDIES

A view of the institute

Address: 1014 Budapest, Országház u. 30.
Postal address: 1250 Budapest, Pf. 25.
Telephone: (36-1) 355-7384
Telefax: (36-1) 375-7858
Director: Vanda LAMM, D.Sc. (Law)

The predecessor of the Institute for Legal Studies was founded in 1941 by an Order of the Prime Minister, since 1955 it has belonged to the Hungarian Academy of Sciences. The Institute's research activity covers a wide range of legal topics i.e. administrative law, civil law, comparative law, constitutional law, European law, international public and private law, legal philosophy, criminal law, etc. The current research work of the Institute is based on a three-year research programme approved by the Academy of Sciences.

The main concern of the Institute is to advance the legal scholarship in Hungary; in addition it assists in various form legislative drafting, legal practice and legal education.

Research objectives and areas

The main research topics are following
- European law and the Hungarian legal system
- Current issues of business law and private law
- Environmental law
- Rule of law and the Hungarian legal order
- The European system of protection of fundamental and human rights
- General questions of the theory of the legal system

1) European law and the Hungarian legal system. This research stream focuses on the

harmonization of Hungarian law with European law which is relevant to Hungary's accession to the European Union. This research field affects different branches of law. Special attention is given, beyond the harmonization of Hungarian private law, in particular business law, to the legal aspects of international cooperation in criminal matters and the struggle against organized crime as well as to research on public law issues relating to the prospective entry of Hungary into the Union, such as transfer of sovereignty, regionalism, Union citizenship, and the law of parliamentary elections to the European Parliament.

2) Current issues of business law and private law. Research in this field covers in particular questions of company law, law of bankruptcy, banking law, law of civil responsibilities (torts), law of insurance, and medical law. In private law research priority is given to studies dealing with the new Hungarian Civil Code, interrelation between private (business) law and public (constitutional) law, in general, public law of economy, administrative law, financial law and criminal law.

3) Environmental law. This research stream focuses on the link between environmental protection and criminal law, the administrative aspects of environmental protection, questions of international law connected with the preservation of the natural and man-made environment, the economic implications of environmental regulation and the related requirements of harmonization of laws, as well as the status and importance of environmental protection within the ambit of business law.

4) Rule of law and the Hungarian legal order. Research on this subject examines the following questions: theoretical and practical aspects of constitutionality and legality, study and analysis of the constitutional systems of the Member States of the European Union and in Hungary. European standards and the Hungarian public administration: protection of individual rights in administrative law.

5) The European system of protection of fundamental and human rights. This research subprogramme is devoted to the theoretical

The library of the institute

aspects of human rights on the one hand and, on the other, it addresses problems connected with the functioning and case law of the European Court of Human Rights and to the practice of the European Court of Justice in Luxembourg. As part of the main topic, priority is given to problems concerning the implementation of human rights, motivated by the fact that while the norms of international and domestic law governing human rights have been elaborated in great depth, their implementation lays considerably behind the law making.

6) General questions of the theory of the legal system. In this domain the Institute is concerned with studying general problems in the operation of the legal system, such as the foundations of the legal system, gaps in law, contradictions of legal systems, legislation with retroactive effect, constitutional aspects of the legal system, and problems of constitutional review. One aspect of this research project is the study of the concept and foundation of legal culture in general and the characteristics of legal culture in Hungary.

Other activities

In addition to research and teaching, the fellows of the Institute are involved in a wide range of projects managed by other academic and governmental organizations, and they advise different governmental and non-governmental agencies as independent experts. Projects of collaboration are undertaken with Hungarian and foreign universities and research institutes in various countries.

INSTITUTE FOR LINGUISTICS

The building of the institute

Address: 1014 Budapest, Színház u. 5–9.
Postal address: H-1250 Budapest, Pf. 19.
Telephone: (36-1) 375-8285, (36-1) 375-8011/276
Telefax: (36-1) 212-2050
Director: Ferenc KIEFER, O.M.
E-mail: kiefer@ny01.nytud.hu

Scope of activities

- synchronic and diachronic description of Hungarian,
- research in both theoretical and applied linguistics,
- a 4-year undergraduate and a 3-year graduate program in theoretical linguistics (a joint program with Eötvös Loránd University, Budapest [ELTE])

Research aims and topics

Historical Grammar of Hungarian

- First stage: Old Hungarian (to 1530's: Proto-Hungarian, Early Old Hungarian and Late Old Hungarian). Three-volume grammar (morphology, syntax) already published.
- Second stage (started in 1995): development of Hungarian from early 16th century to late 18th century.
  The Comprehensive Dictionary of the Hungarian Language (Lajos Kiss)
- Dictionary (200.000–250.000 entries) to be based on corpus of approx. 40 million running words. 2/3 of texts selected from 20th

century writings (journals, novels, scientific, religious literature, etc.). 1/3 mainly from 19th century, some from 18th century works. Multi-functional lexical data base under construction. Text files tagged by morphological analyzer (designed for this task, operative also as spellchecker). OPEN TEXT (PAT) software used for retrieval.

Survey of spoken Hungarian

- Transcription and computerization of tape-recorded interviews conducted with a random stratified sample of Budapest population (n=200).
- Pen-and-paper survey conducted with a nationally representative sample of adult Hungarian population. Data in computer-readable form.
- Papers published on some grammatical (phonological, morphological, syntactic) peculiarities of spoken language.

Socio-linguistic study of the Hungarian language in neighbouring countries

- Socio-linguistic study among Hungarian minorities in Slovakia, the Ukraine, Rumania, Yugoslavia (Serbia), Slovenia and Austria, with special attention to bilingualism.

Speech synthesis

- Multilingual text-to-speech real-time speech synthesizing system developed for several languages (Hungarian, German, Dutch, Spanish, Portuguese, Esperanto). Refinement in preparation.

Speech perception and comprehension

- Study of models for lexical access in perception and comprehension considering the 'word' as phonetic unit.
- Research of temporal organisation of speech
- Evaluation of speech perception and comprehension processes.

A view of the library

The structural grammar of Hungarian
Project aims at a theoretical description of Hungarian.

- Volume 1 (published in 1992): syntax, using the theoretical framework of generative syntax and lexical-functional grammar.
- Vol. 2 (1994): phonology of Hungarian, using mainly post-structural methodology.
- Vol. 3 (manuscript to be completed by late 1998): morphology. Vol. 4 to be devoted to the lexicon (lexical representations).

Child language

- Construction of Hungarian data base for child language according to CHILDES (Child Language Data Exchange System), used to study effects of adult-child interaction on development of grammar, the lexicon and communicative competence (socialization) in the child.
- Linguistic socialization of Gipsy children in traditional communities.
- Child bilingualism.

Neurolinguistics

- Investigation of patholinguistic phenomena with tests to answer fundamental questions of organization of grammar (e.g. its modular/non-modular structure, interrelationships between syntax, morphology and the lexicon) and of relationship between grammar and the human language processor.

The Dictionary of Hungarian Dialect Vocabulary

- Dictionary containing attested dialect words from all regions including Hungarian-speaking regions outside Hungary (started early 50's, to be finished 1999).

Uralic Etymological Archives

- Computer-readable data base containing over 3000 etymologies of the Uralic language family, based on the Uralisches Etymologisches Wörterbuch. Construction of multi-functional retrieval system in progress.

Theoretical linguistics (individual projects)

- Study of Hungarian to clarify theoretical issues in phonology, morphology, syntax and semantics. Frameworks used: autosegmental phonology, government and charm phonology, natural morphology, generative morphology, government and binding theory, lexical-functional grammar, discourse representation theory.

INSTITUTE OF LITERARY STUDIES

Address: 1118 Budapest, Ménesi út 11–13.
Telephone: (36-1) 385-8790
Telefax: (36-1) 385-3876
Director: László SZÖRÉNYI, Ph.D.
(Literary History)
E-mail: 44492bod@ella.hu

The building of the Eötvös College

Scope of activities

Research on

- the history of Hungarian literature from its beginnings to the present
- literary theory
- the history of literary criticism
- Central and East European literature

Critical editions and source studies in Hungarian literature

Editing of reference books and bibliographies

Publishing of reviews: Irodalomtörténeti Közlemények, Helikon, Literatura, Magyar Könyvszemle

- Textology
- The history of Hungarian literary criticism
- Literary theory: the theory of interpretation, poetics, theory of science and history of science, dialogicity in literature and literary studies understanding of literature, sociological aspect of the Hungarian literature in the eighties
- Contemporary Hungarian literature
- Literary currents, periods and institutions
- Comparative study of Central and East European literatures the relations of Hungarian literature to Central and East European literatures typological studies
- Comparative literature studies in international cooperation

The history of literary cults Renaissance studies Joint research programs with Bulgarian, Czech, Croatian, Estonian, Slovak, Italian, French, Russian and German institutions as well as with the Hungarian Department of Novi Sad University.

INSTITUTE FOR MUSICOLOGY

The courtyard of the institute

Address: 1014 Budapest, Táncsics Mihály u. 7.
Postal address: H-1250 Budapest, Pf. 28.
Telephone: (36-1) 214-6770
Telefax: (36-1) 375-9282
Director: Tibor TALLIÁN, C.Sc. (Music.)

Scope of activities

- to maintain and enlarge the primary collections hosted by the institute: the Hungarian Folk Music and Folk Dance Archives, the Bartók Archives, and the Museum of Music History, all of which have international importance, and unique to Hungary in their field,
- to conduct research in all areas of Hungarian music history, and in various fields of general music history,
- to carry out research in the domain of ethnomusicology and ethnochoreology (Hungarian and European folk music and folk dance),
- to participate in graduate and postgraduate education in musicology in cooperation with the Ferenc Liszt Music Academy).

Research aims and topics

Researches in Music History

- Study of liturgical music of medieval Hungary and Central Europe (plainchant, early polyphony, notation).
- Publication of Musicalia Danubiana, a series of critical editions of musical sources, originating in Hungary before cca 1820.

- Preparation and publication of the comprehensive series Music History of Hungary.
- Documentation of, and research into Béla Bartók's life and work, preparation of the Béla Bartók Complete Critical Edition, of the Thematic Catalogue of Béla Bartók's Musical Works, and of Bartók's Hungarian Folk Songs, Complete Edition.
- Researches into organology and musical iconography. Development of a computer-aid catalogue system for the iconographical collection of the Museum of Music History.

Researches in Ethnomusicology and Ethnochoreology

- Edition of the series Collection of Hungarian Folk Music (Corpus Musicae Hungaricae Popularis), which, prospectively, will present the main corpus of the Hungarian folk music material.
- Systematization of the melodies of the 'New Style' layer of Hungarian folk songs.
- Development of a computer-aid catalogue system for the complete folk music material recorded and/or transcribed in the period of the past more than 100 years.
- Collection and recording of Hungarian folk music and folk dances from the ever smaller areas still conserving their folkloristic tradition.
- Computerized (digital) analysis of recorded folk music.

INSTITUTE OF PHILOSOPHY

Address: 1054 Budapest, Szemere u. 10.
Postal address: H-1398 Budapest, Pf. 594.
Telephone/fax: (36-1) 312-0243
Director: János Kristóf NYÍRI, C.M.
E-mail: nyiri@ludens.elte.hu,
nyiri@osiris.elte.hu

Fields of activities

Central research project: philosophical questions of information society. Our project is based on a wide philosophical basis and applies traditional philosophical analysis, employing classical philosophical background which was accumulated in our Institute.

Research groups

Research Group for Information Society

Activity: Studies on the relationships of local communites and global networking, including social structures and the basic forms of communities. Investigations in the relationships of the notions of deregulation, hierarchy; globalization and national interest; monoploization and individuality.

Research Group for the Philosophy of Language and Science

Activity: Studies on the linguistic and scientific background of knowledge based societies; in the relationship of thought, language and writing, orality and literacy, including the new structures provided by electronic communication. Investigations in the history and philosophy of science, including the hermeneutical analysis of the natural sciences.

Research Group for Social Philosophy

Activity: Studies on the new perspectives provided by information society for social philosophy, including the new forms of social organizations, political and ethical consequences.

Research Group for the History of Philosophy

Activity: Studies on the history of philosophy form the perspective of communication technologies; applied philosophy.

Research Group for the Philosophy of Religion

Activity: Religious studies concerning on the problems of religion as language and a form of communication; verbal and non-verball religious language and its relation to communication; changes in social values.

Projects

The Changing Function of European University

Activity: Studies on the general sympthoms of crisis in higher education via the method of conceptual analysis; the relationship between the cognitive and social aspects of the university.

Screen Pedagogy

Activity: Studies on the new possibilities provided by the new technologies in basic education, especially in dyslexia. The group includes a variety of experts; our international partner is University of Essen.

Trends in Global Networking and Controlling the NET

Activity: Studies oin the phenomena of computerized work and communication; the relationship between virtual and real life worlds, their political and social aspects, the new concept of community.

Institute serves as a scientific background for UNIWORLD

UNIWORLD is a virtual university based on the studies in the history of universties and on the achievements of our studies in information society. It tries to apply the experiences of networking in higher education thus trying to conform to the international trends.

UNIWORLD tries to achieve a double aim

- It conducts scientific research concerning the application of the Net in education, in the communication of new knowledge.
- It holds courses on philosophy, ethics and other subjects from the perspective of the theory of communications, and is trying to develop its activities.

The library of the institute

INSTITUTE FOR POLITICAL SCIENCES

Address: 1068 Budapest, Benczúr u. 33.
Telephone: (36-1) 321-4830
Telefax: (36-1) 322-1843
Director: József BAYER, D.Sc.
(Political Sciences)
E-mail: ipshas@mtapti.hu
Website: www.mtapti.hu

Scope of Activities

- The Institute conducts theoretical, empirical and comparative interdisciplinary research into the main fields of political sciences, in co-operation with Hungarian and foreign research institutions and universities. It also pursues studies and analyses of tendencies related to Hungary's European and Atlantic integration, with reference to the integration process of other East-Central European countries.
- The Institute publishes books, monographs, conference and working papers; edits and publishes the Political Science Review, the Hungarian-language quarterly of political sciences.
- The Institute organises conferences and discussions; its members participate in teaching at the university, in graduate and postgraduate programs, as well as in expert advising to governmental bodies.

Research Programs and Aims of Studies

Political theory

Modern theoretical questions of politics; cleavages; theories of the nature of political power, democracy, pluralism, legitimacy; views about the relationships between the processes of modernisation and politics, about changing values; critical analyses of modern and post-modern theories of political knowledge, and (on an empirical basis)

The research building

the related discursive interpretation of political reality and political knowledge, some features of which indicate new, yet to be explored possibilities of political sciences.

Political institutions

The constitution and the legal system; problems of legal harmonisation; role and functions of the parliament; concrete forms of the exercise of power and power-sharing. State intervention and its control, openness and publicity. Local governments, the structure and functioning of local power; public participation; the relationship between 'high politics' and the locality; local autonomy; civil society.

The analysis of European integration, with special regard to Hungary's preparation

The core of the research is the politics of the process of integration, including the fol-

lowing questions: the nature of European integration from the angle of comparative political analysis and international relations; the changing relationships between the strategic and current motivations of the process of integration; sovereignty and integration, institutional structure (with special regard to the levels of the Union, nation-state and regions and their relationships) and the decision-making process; migration. A separate point of consideration for research is the assessment of Hungarian and East-Central European efforts towards accession in respect of the changing realities of integration, the problems of adjustment and bargaining position.

Research in the field of security and defence policies

The main fields of research of the Institute's Centre for Security and Defence Policy Studies are the following: the changing concept of security policy in the process of Atlantic integration, the key areas and elements of a national security and defence strategy; alternatives of foreign policy strategies in a changing regional context; elements of the architecture of European security policy; changes in the armed forces and the army and its new relationship with the society in democracy.

The Centre provides information and for that purpose collects, systematises and records earlier and current Hungarian research materials. It publishes information, organises conferences and discussions with the participation of Hungarian and foreign researchers and of the circles of decision makers and advisers; it provides expert advising and PR activities in connection with presenting the achievements of research in the fields of security, defence and foreign policy in the media.

Parties, party systems and the articulation of the Hungarian society

Analysis of the characteristics and functioning of Hungarian political parties (their ideological features, social base and roots, the brain trusts of parties); changes of the shape of political articulation; the major political trends; a comparative study of Hungarian and European party systems.

The library of the institute

Elections – electoral behaviour

Analysis of the preparations, campaigns and results of parliamentary and local elections; changes of electoral behaviour and attitudes; the issue of participation, with special regard to the motivations of the behaviour of 'non-voters'; a comparative study of the Hungarian and European election results and electoral behaviour.

Interrelationships of political and societal group formation

The formation, composition and relationships of the (national and local) economic and political elites; the system of regional area development and accession to the EU; agricultural policy, agricultural producers and accession to the EU; black (illegal) and grey economy, the issues of legal regulation. Economic policy and multinational companies; the assertion of employees' interests in the system of industrial relations.

Political culture

Political culture as an integral element of modernisation, some issues of political anthropology; political symbolisation, changes of political discourse, the unification and differentiation of the language of politics; the new trend of political communication; the European impact on political culture; political culture and elections. Comparative research is being conducted in the majority of the topics of the program.

Ethnic and regional structure

The ethnic structure of Hungary and Eastern Europe, problems of national minorities, special features of ethno-culture and self-government, the role of ethno-regional movements, forms and changes of cultural local-determination, interrelationships of smaller regions over national boundaries, minority conflicts and forms of political representation. The program of the Institute's Ethno-regional Research Centre is linked to several inter-institutional researches and an international network of researchers is being developed.

INSTITUTE FOR PSYCHOLOGY

The building of the institute

Address: 1067 Budapest, Teréz krt. 13.
Postal address: H-1394 Budapest, Pf. 398.
Telephone: (36-1) 322-0425
Telefax: (36-1) 342-0514
Director: György KARMOS, C.Sc. (Physiology)

Scope of activities

Considering all its predecessors and direct antecedents, the Institute for Psychology of the Hungarian Academy of Sciences closed its ninth decade in 1992. Rich in traditions and critical challenges, this reputable past highly determines the general objectives and real possibilities of the Institute both in the near and the farther future.

The aim of the Institute is to perform basic psychological research in order to promote universal scientific progress and to apply and develop new research methods; to participate in gradual and postgradual education; to develop scientific cooperation with related foreign research institutions; to publish and disseminate the psychological research results and to promote their application, thereby contributing to the progress of Hungarian psychology in general.

Research aims and topics

1. Study of elementary information processing. Analysis of the development of cognitive processes and brain mechanisms underlying the cognitive processes in human and animal experiments.

- Analysis of event-related brain potentials (ERPs) which correlate with cognitive phenomena, as well as the analysis of spontaneous brain electrical activity (EEG) based on chaos theory and psychopharmacological techniques in humans and in animals.

- The dimensional analysis of the ERP and EEG changes in patients with localised brain lesions.
- The study of brain mechanisms of ERP genesis in animal models.
- Analysis of attentive and preattentive processes in vision and hearing using ERPs. Investigation of the role of audio-visual interaction in speech generation, in object constancy, in lexical and semantic processing.
- Neuropsychological and psycholinguistical study of elementary levels of speech understanding in aphasic patients. Analysis of factors modifying access to word meaning.
- Research on early cognitive development: rational perception, the development of predictive inferences, the connection between self-perception and deduction. Research on attributions of mental states.

2. Determinants of mental development in the early stages of the socialization process

- Investigations of early cognitive development
- Role of parent –infant interaction in developing emotional consciousness and self-control.
- Longitudinal investigations of attachment

3. The role of psychological processes in effective education

- Competition in school-age children: attitudes and indirect behavior. Parental rivalisation through children.
- Identifiction of talented children

4. Processes underlying decision processes

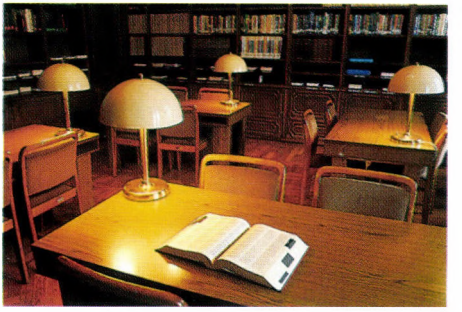
- Characteristics of basic processes of decision
- Strategies in information gathering

5. Cognitive constructs in the control of social behavior, text comprehension and communication

- Comprarative investigations on literary and historical texts
- Authentic communication, investigations on "laymans psychology" individual forms of the representation of success
- Social representations theory
- Life history and reality

6. Psychological mediation and representation of social processes

- Social psychological investigations on deviant life histories
- Relationships between social and individual indentity crises
- Investigations of Jewish identity in Hungary
- Political attitudes in young population
- Human resources in economy.



The institute's library

CENTRE FOR REGIONAL STUDIES

Address: 7621 Pécs, Papnövelde u. 22.
Postal address: 7601 Pécs, Pf. 199.
Telephone: (36–72) 212-755
Phone/fax: (36–72) 233-704
General director: Gyula HORVÁTH, C.Sc. (Economics)
E-mail: horvath@dti.rkk.hu
Website: www.rkk.hu

Research units:

Great Plain Research Institute
6000 Kecskemét, Rákóczi u. 3.
(6001 Kecskemét, Pf. 261.)
Tel.: (36–76) 322-331
Fax: (36–76) 482-193
Director: Bálint Csatári, C.Sc. (Geography)
E-mail: csatbal@rkk.hu

Transdanubian Research Institute
7621 Pécs, Papnövelde u. 22.
(7601 Pécs, Pf. 199.)
Tel.: (36–72) 212-755
Fax: (36–72) 233-704
Director: Ilona Pál-Kovács, C.Sc. (Political Sciences)
E-mail: palne@dti.rkk.hu

Central and North Hungarian Research Institute
1014 Budapest, Úri u. 49.
(1538 Budapest 114. Pf. 527.)
Tel.: (36–1) 212-9525
Fax: (36–1) 212-9526
E-mail: h10136bar@ella.hu
Director: Györgyi Barta, C.Sc. (Geography)

West Hungarian Research Institute
9002 Győr, Liszt Ferenc u. 10.
(9002 Győr, Pf. 420.)
Tel.: (36–96) 516-570
Fax: (36–96) 516-579
Director: János Rechnitzer, D.Sc. (Geography)
E-mail: rechnj@edo.rkk.hu

The Pécs headquarters of the Centre for Regional Studies

Mission

The Centre for Regional Studies, which is an institute of complex social science researches, was founded in 1983 and operates in the form of a network. It is a base of the Hungarian regional development researches, played and still plays a dominant role in the creation, carrying out and training of regional sciences, in co-operation with the European system of science.

The strategic objectives of the Centre are

Research of the long term Hungarian and international processes of regional and urban development, the globalising (European, Euro-regional, Central-Eastern European,

Hungarian) spatial structures, their division of labour, their system of institutions and tools; Establishment of decisions concerning regional development in Hungary and the country's accession to the European integration; Training and further training of the experts of regional and urban development.

The Centre for Regional Studies, by research organisation based on programmes, acts as a framework institute in theoretical researches and in the implementation of strategic programmes. The CRS initiated the setting up and operation of the Committee for Regional Sciences of the Hungarian Academy of Sciences. The research fellows of the institute direct the special committees of regional and urban development in the regional committees of the Academy, also, they lead graduate and postgraduate and PhD courses on regional economics in Hungarian higher education institutions.

Scientific profile

Great Plain Research Institute

- Study of the economic, societal and environmental renewal of the Great Hungarian Plain
- Methodology of micro regional researches
- Rural development strategies
- Development concept and strategy for the Great Hungarian Plain
- Survey of the Carpathians Euro-region and the Tisza–Maros–Danube cooperation

Transdanubian Research Institute

- Survey of Hungarian and international regionalism
- Regional development and policy in Europe
- The institutional system of public administration and regional development
- Methodology of regional development programming
- Regional requirements of sustainable development
- Complex survey of the infrastructure systems and networks
- Reginal development strategy for South Transdanubia
- Analysis of the development of the Alpine–Adriatic region

Central and North Hungarian Research Institute

- Study of the regional structure of urban network and of society
- Analysis of the spatial structure of urban functions and urban network
- Survey of Budapest and its agglomeration based on international comparisons
- Development strategy for North Hungary

West Hungarian Research Institute

- Survey of the spatial spreading of innovation
- Analysis of regional financial and income processes
- Study of the Vienna-Bratislava-Győr cooperative region
- Comparative analysis of success regions, cities
- Regional development concept and strategy for North Transdanubia

Research programmes

Regional development and policies in Europe

- Topics
- Driving forces of regional development in Western Europe
- The systems of regional policy tools and institutions in the advanced market economies
- Structural and cohesion policy of the European Union

Regional transformation in East-Central Europe

- Topics
- Regional development processes in East-Central Europe
- Transformation of the urban network
- Cross-border co-operations
- Euro-regions
- Directions of development in the Danube regions (VISION-PLANET programme)

The regional development strategy of Hungary

- Topics
- The impact of the European processes on the Hungarian spatial structure
- The development of the regional economic structure in Hungary
- Spatial types in Hungary
- Transformation of the settlement structure
- Success settlements and regions
- Regional policy and the EU-accession
- Environment protection and regional development

The institutional system of territorial administration and regional policy

- Topics
- The institutional system of regional development
- New functions of the territorial administration
- The role of local governments in regional development
- Regions as an institute and their functions
- Co-operation of the actors in regional development

Regional development concepts and strategies

- Selected concepts made and strategic studies carried out by the Centre for Regional Studies
- National Development Concept of Hungary, 1997
- Regional development concepts
- County development concepts
- Urban development concepts
- Regional establishment of sectoral and business strategies

Training of regional science

- Joint PhD programme on regional policy and economics with the Faculty of Business and Economics of Janus Pannonius University, Pécs
- Post-graduate courses on regional and urban development
- Institute of Sociology and Social Policy, Faculty of Arts of Eötvös Lóránd University, Budapest
- Faculty of Business and Economics of Janus Pannonius University, Pécs
- Graduate training
- Faculty of Business and Economics of Janus Pannonius University, Pécs, two-year specialisation on regional economics, Pécs
- Széchenyi István College, two-year training of urban economists, Győr
- Training of the subjects of regional science and participation in the PhD training in the following higher education institutes: Faculty of Arts and Faculty of Natural Sciences of Janus Pannonius University, Pécs;
- Faculty of Economics, Miskolc; Faculty of Natural Sciences of József Attila University, Szeged;
- Berzsenyi Dániel Teacher Training College, Szombathely; Körös College, Békéscsaba–Szarvas; College of Trade and Economics, Szolnok.

INSTITUTE OF SOCIOLOGY

The Institute of Sociology was founded in 1963. Sience then it has become a major research centre of social sciences in Hungary

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Telefax: (36-1) 375-4891
Director: Pál TAMÁS, C.Sc. (Sociology)
E-mail: h4786vet@ella.hu

Fields of activity

Communication; cultural research; East and Central European comparative research; the elderly; empirical research on social transformation; environmental concepts; innovation processes; institutional changes; modernisation of the economic and technological systems; the role of human resources; social anthropology and social history; social policies; social trends; sociology of values; systems of management; publication of research results.

Research aims

The basic aim of the Institute is twofold. First, to conduct "classical" sociological research, that is, basic research in sociological theory and methodology; and secondly, to examine the dynamics of changes in Hungarian society and to work out methods for solving the emerging social problems and conflicts. Consequently, it carries out empirical and interdisciplinary social research on the one hand, while it also pursues a kind of policy science on the other. In carrying out research, it applies both the analytic and the normative

methods. Wherever possible, international co-operation is involved.

The main research topics are as follows

Transformation of Hungarian society:

- The emergence of a new bourgeois society in Hungary;
- Old and new poverty in Hungary;
- The new apparatus;
- Workers' changing course of life;
- The Roma/Gypsy population in Hungary;
- Research into mortality;
- Research into civil society;
- Changing provincial societies;
- Changing family structures;
- The changing role of women;
- Research into social (environmental, women's, trade union) movements;
- Self-reliant society

Social consciousness, values, culture, identity:

- Political trends in Hungary;
- Changes in the conception of justice;
- Activity structure of Hungarian society;
- Value changes in Hungarian society;
- Attitudes and values of the enterprise elite;
- The state of culture and its changes in Hungary;
- Cultural aspirations of the new elite;
- European and Hungarian identity;
- European society at the turn of the century

Transformations in the system of institutions:

- Changing property relations;
- Structure of the labour market;
- Communication systems of economic organisations;
- New methods of production;
- The institutionalisation process of technology and innovation;
- Systems of knowledge creation and distribution;
- Transformation of the health care system;
- Development of local self-governments;
- Co-operation between state and private organisations in social policy

European studies:

- East and Central European comparative studies (models of development, situation of minorities, comparison of elites);
- Nationalism and democratisation in an all-European context
- Centre periphery relations in Europe;
- Winners and losers of European integration;
- Regional co-operation in Europe

Theoretical, methodological and historical issues of social research

The institute's library

INSTITUTE FOR WORLD ECONOMICS

A view of the institute

Address: 1124 Budapest, Kálló esperes u. 15.
Postal address: H-1535 Budapest Pf. 936.
Telephone: (36-1) 319-9382
Telefax: (36-1) 319-9384
Director: András INOTAI, D.Sc. (Economics)
E-mail: vki@vki3.vki.hu

Scope of activities

The Institute for World Economics (IWE), as part of the Hungarian Academy of Sciences, carries out research and formulates policy recommendations on an objective, non-partisan basis, since its establishment in 1973 on the institutional background of the former Afro-Asian Research Centre founded in 1965, three years before the first wave of economic reform in Hungary. The Institute has become one of the major policy-oriented international research institutes in Central Europe.

Its main task is to study the underlying trends and factors behind international economic developments and their present and future impact on the Hungarian economy. In addition, it sets out to contribute to global research through cooperation with top research institutes throughout the world.

Because of its location, history and human and material resources, the IWE is particularly well placed to be a leading centre for research on the integration of Central and Eastern Europe into the global market economy.

The change of political system in Hungary and the transition to a market economy have greatly enhanced the importance of world economic research and altered the emphasis of it. Both scientific research and practical economic policy-making now face

a double challenge for which there is no international precedent. The IWE sets out to give strategic support during this historic change of course:

- by drawing on the Institute's long experience and extensive and effective system of international connections to build up a reformulated programme of research, and
- by using the techniques of comparative economic analysis and interdisciplinary investigations.

Research Priorities

Research activities have been characterised by 39 major projects during the last year. There was a clear shift from longer-term to shorter-term and highly policy-oriented research. 23 principal research projects were finished during the year (out of which 12 had a duration of less than a year), and 6 new projects were initiated in 1997. 10 research projects started earlier and spread beyond 1997.

Research is fundamentally carried out on two basic levels: regional (geographic) and functional. Almost all research projects combine these two approaches, while staff members have to specialise themselves on one regional and at least on one functional topic.

Priority areas of research in 1997

Global economic development and transformation fundamental medium-term changes in the world economy and their impact on Hungary:

- globalization and regionalization, with special reference to international capital and labour markets;
- the role of the United States in the world economy;
- relevant features and development trends of the new regionalism;
- role of the transnational companies in the shaping of a new global economic system;
- current issues of international trade and the role of WTO;
- interrelation between globalization and economic transformation;
- basic trends of consumption globally and in Central and Eastern Europe.

Economic developments in Europe, with special attention paid to the European Union and Eastern enlargement:

- Europe's role and medium-term prospects in the global economy;
- key integration processes in the European Union (common agricultural policy, economic and monetary union, experience of the Union's periphery with catching up, Intergovernmental Conference, experience of EFTA countries in the European Union, regional development, budgetary issues, developments in major EU member countries);
- the prospects for, conditions and costs of Eastern enlargement, and Hungary's preparation for full membership (including trade policy issues);
- main features of "developmental integration" and Eastern enlargement;
- interdependence between European integration and subregional cooperation.

Economic transformation in Central and Eastern Europe comparative analysis of the CEFTA countries:

- transformation and external trade relations, including the changing pattern of East-West division of labour;
- recent economic developments in Bulgaria and Romania;
- impact of foreign direct investment on the macro- and microeconomic performance of transforming countries;
- transformation of the agricultural sector;
- the Russian economy and chances of Hungarian-Russian relations;
- chances of regional cooperation.

New economic developments in Japan, East and South East Asia

- the Asia-Pacific region in the world economy;
- transformation patterns in China and Vietnam;
- constant and changing elements in the Japanese model of development;
- the economic impact of special economic zones;

Other key research areas

- experience of national programs of economic modernization in international comparison;
- micro-level adjustment and cooperation;
- the role of infrastructure and services in the modernization process;
- future of national and Community-level agricultural policies;
- critical areas of the welfare state;
- impact of socio-economic values on the pattern of development;
- sectoral studies.

OFFICE FOR ACADEMY RESEARCH GROUPS ATTACHED TO UNIVERSITIES AND OTHER INSTITUTIONS

Address: 1051 Budapest, Nádor u. 7.
Postal address: H-1051 Budapest, Nádor u. 7.
Telephone: (36-1) 317-3117, 318-2747
Telefax: (36-1) 317-4017
Head: Huba PAÁL

Council of the Research Group's Representatives
President: Béla HALÁSZ, O.M.
Vice president:
Kálmán MEDZIHRADSZKY, O.M.
György HUNYADY, D.Sc. (Psychology)

Research Groups Attached to Universities and Institutions:

Budapest University of Economics

Research Group for "Together for Europe"
Head: Attila ÁGH, D.Sc. (Political Scineces)
Research topic: Political modernisation and integration

Research Group for Economy and Social History
Head: János BUZA, C.Sc. (History)
Research topic: History of the money and banking (16th–20th), history of the agrarian development and rural society (17th–20th)

Research Group for Complex Future Studies
Head: Erzsébet NOVÁKY, D.Sc. (Economics)
Research topic: Complex future research, especially the renewed methodology and methods

Research Group for Europe (WEDGE)
Head: Tibor PALÁNKAI, C.M.
Research topic: Analysis of our EU access with particular emphasis on economy policy adjustment and coordination

Research Group for International Relations
Head: Zsolt ROSTOVÁNYI, D.Sc. (Economics)
Research topic: Writing texbook and a reader in the field of Europen Communities

Research Group for Development of World Economic
Head: Tamás SZENTES, O.M.
Research topic: Economic development world-economic adjustment and competitiveness of nations in the light of theorics, historical experience and case studies

Technical University of Budapest

Research Group for Physical Geodesy and Geodinamics
Head: Péter BÍRÓ, O.M.
Research topic: Physical geodesy and geodynamics

Research Group for Stochastics
Head: Imre CSISZÁR, O.M.
Research topic: Randomness, information, dynamical systems

Research Group for Geoinformatic Research
Head: Ákos DETREKŐI, O.M.
Research topic: Geoinformatic research

Research Group for Reinforced Concrete
Head: Endre DULÁCSKA, D.Sc. (Engineering)
Research topic: Theoretical and experimental research in the statics and dynamics of reinforced concrete structures

Research Group for Research and Development
Head: János FARKAS, D.Sc. (Sociology)
Research topic: Theoretical and methodological problems of research and development

Research Group for Geotechnics
Head: József FARKAS, D.Sc. (Engineering)
Research topic: Interaction between soil and construction

Research Group for Technical Analytical Chemistry
Head: Sándor GÁL, C.M.
Research topic: Research and development in the field of instrumental analysis

Research Group for Computational Structural Mechanics
Head: Zsolt GÁSPÁR, O.M.
Research topic: Computational structural mechanics

Research Group for Metals Technology
Head: János GINSZTLER, D.Sc. (Engineering)
Research topic: Investigation for optimal properties of metallic structural materials

Research Group for Informatics and Electronics
Head: László GYŐRFI, C.M.
Research topic: Information transmission and processing

Research Group for Design Theory of Structures
Head: Miklós IVÁNYI, D.Sc. (Engineering)
Research topic: Design theory of engineering constructions

Research Group for Solid States in Magnetic Fields
Head: András JÁNOSSY, O.M.
Research topic: Solid state physics studies in high magnetic fields

Research Group for Dynamics in Machines and Vechicles
Head: Pál MICHELBERGER, O.M.
Research topic: Dynamics of machines and vechicles

Research Group for Control Theory
Head: István NAGY, O.M.
Research topic: Research and applications in control theory

Research Group for Alkaloid Chemistry
Head: Lajos NOVÁK, D.Sc. (Chemistry)
Research topic: Preparation and biological evaluation of natural product

Research Group for Organic Chemical Technology
Head: László TŐKE, O.M.
Research topic: Organic chemistry and organic chemical technology

Research Group for Theory of Condensed Matter
Head: Alfréd ZAWADOWSKI, O.M.
Research topic: Theory of condensed matter

University of Agricultural Sciences, Debrecen

Research Group for Land Use
Head: János NAGY, D.Sc. (Agriculture)
Research topic: Relationship between soil cultivation, fertilization and water management realted to environmental protection

Medical University of Debrecen

Research Group for Cell-Biophysics
Head: Sándor DAMJANOVICH, O.M.
Research topic: Supramolecular organization of cell surface receptors and antigens in the plasmamembrane and the physiological importance of protein colocalizations in the immunological and cell activation processes

Research Group for Signalling and Apoptosis
Head: László FÉSŰS, C.M.
Research topic: Molecular mechanism and signal pathways determining the cell fate

Research Group for Tumor Viruses
Head: Lajos GERGELY, D.Sc. (Medicine)
Research topic: Pathological role of human tumor viruses

Research Group for Cell Phisiology
Head: László KOVÁCS, C.M.
Research topic: Molecular mechanism of intracellular signal transduction under physiological conditions

Research Group for Tissue and Neuroscience
Head: László MÓDIS, D.Sc. (Medicine)
Research topic: Cell-cell and cell-matrix interactions in the organization of connective and nervous tissues

Research Group for Thrombosis and Haemostasis
Head: László MUSZBEK, O.M.
Research topic: Structural organisation and functions of plasma cellular factor XIII.

Research Group for Microbial Development Genetics
Head: Mátyás SIPICZKI, D.Sc. (Biology)
Research topic: The genetic regulation of differentation of Ascomycetes and Actinomycetes

Research Group for Autoimmune Diseases
Head: Gyula SZEGEDI, C.M.
Research topic: Autoimmune diseases as risk factors for the association with other autoimmune illnesses and for the development of complications related to the irregular system and tumors

Research Group for PET
Head: Lajos TRÓN, D.Sc. (Biology)
Research topic: PET investigation of cortical regions involved in processing of speech and acoustic stimuli

Etövös Loránd University, Budapest

Research Group for Roman and Migration Age
Head: István BÓNA, O.M.
Research topic: Research for Roman and Migration Age

Research Group for Comparative Ethology
Head: Vilmos CSÁNYI, C.M.
Research topic: Study of the behavior analogies between man and dog

Research Group for Immune Regulation
Head: Anna ERDEI, D.Sc. (Biology)
Research topic: The role of receptor cross-talk in the regulation of immune processes

Research Group for Biotechnology
Head: László GRÁF, C.M.
Research topic: Proteases and inhibitors: Biotechnological applications

Research Group for Hungarian–French Workshop on Social Sciences
Head: György GRANASZTÓI, C.Sc. (History)
Research topic: Hungarian-French studies on social sciences

Research Group for Geology
Head: János HAAS, D.Sc.
Research topic: Geological research of Hungary and its surroundings

Research Group for Structural Chemistry
Head: István HARGITTAI, O.M.
Research topic: Determination and modelling of molecular structure by electron diffraction, computation and other techniques

Research Group for Theoretical Physics
Head: Zalán HORVÁTH, C.M.

Research topic: Investigations in theoretical particle and statistical physics

Research Group for Peptide-Chemistry
Head: Ferenc HUDECZ, D.Sc. (Chemistry)
Research topic: Chemical synthesis and structure-function studies of peptides with biological activity

Research Group for Communication Studies
Head: György HUNYADY, D.Sc. (Psychology)
Research topic: Research of communication theory

Research Group for Neurobiology
Head: Gábor JUHÁSZ, C.Sc. (Biology)
Research topic: Processing of sensory information in the brain

Research Group for Altaic Studies
Head: György KARA, D.Sc. (Linguistics)
Research topic: Altaic studies

Research Group for Applied Number Theory
Head: Imre KÁTAI, O.M.
Research topic: Applied and algorithmic number theory

Research Group for Philosophy of Language
Head: János KELEMEN, D.Sc. (Philosphy)
Research topic: Philosophy of language

Research Group for Studies of the Periodical "Nyugat"
Head: Zoltán KENYERES, D.Sc. (Literature)
Research topic: The document of the periodical Nyugat (1908–1941)

Research Group for Jewish Studies
Head: Géza KOMORÓCZY, C.Sc. (Linguistics)
Research topic: Jewish studies

Research Group for Systematic Zoology
Head: Sándor MAHUNKA, C.M.
Research topic: Research in various field of systematic zoology to explore the biodiversity of soils and other systems

Research Group for Classical Philology
Head: Miklós MARÓTH, C.M.
Research topic: Dictionary of the medieval latin in Hungary and classical aesthetics

Research Group for Geophysiscs and Environmental Phyiscs
Head: Attila MESKÓ, O.M.
Research topic: Geophysics, environmental physics

Research Group for Comparative Legal History
Head: Mihály RÉVÉSZ T., D.Sc. (Law)
Research topic: Comparative analysis on legal development of the Hungarian and European constitutions, focusing on the global challenges affecting European societies

Research Group for Structural Chemistry and Spectroscopy
Head: Pál SOHÁR, D.Sc. (Chemistry)
Research topic: Synthesis and complex spectroscopic study of metallorganic and heterocyclic compounds

Research Group for Interdisciplinary Archaeology
Head: Miklós SZABÓ, C.M.
Research topic: Interdisciplinary research in archaeology

Research Group for Ecology and Theoretical Biology
Head: Eörs SZATHMÁRY, D.Sc. (Biology)
Research topic: Ecology and theoretical biology

Research Group for Statistical Physics
Head: Péter SZÉPFALUSY, O.M.
Research topic: Statistical physics of mesoscopic systems

Research Group for NATO Information and Research Centre
Head: László VALKI, D.Sc. (Law)
Research topic: Legal and institutional problems of military and political integration

Research Group for Nuclear Methods in Structural Chemistry
Head: Attila VÉRTES, O.M.
Research topic: Nuclear methods in structural chemistry

Research Group for Evolutionary Genetics
Head: Gábor VIDA, O.M.
Research topic: Studies of evolutionary changes on molecular and cytological level

Research Group for Early Hungarian Manuscripts and Printed Books
Head: András VÍZKELETY, C.M.
Research topic: Early Hungarian manuscripts

Research Group for Environmental and Macromolecular Chemistry
Head: Gyula ZÁRAY, D.Sc. (Chemistry)
Research topic: Effects of heavy metal pollutants on biochemical processes in plant and human biological system

University of Agricultural Sciences, Gödöllő

Research Group for Animal Breeding
Head: János DOHY, O.M.
Research topic: Elaboration, utilisation and development of new biotechnological possibilites in animal breeding

Research Group for Process Control
Head: István FARKAS, D.Sc. (Engineering)
Research topic: Computer aided process control in agriculture

Research Group for Molecular Genetics
Head: László OROSZ, D.Sc. (Biology)
Research topic: The molecular basis of genetic regulation with special emphasis on DNA-protein sequence specific interaction

Research Group for Hungarian Enlightenment
Head: János RATHMANN, D.Sc. (Philosphy)
Research topic: Kantian enlightenment in Hungary

Research Group for Modeling of Processed Plant Structures
Head: Péter SZENDRŐ, D.Sc. (Agriculture)
Research topic: Determination of function between the internal structure and the mechanical properties of chopped green forages

Research Group for Global Climate Change
Head: Zoltán TUBA, D.Sc. (Biology)
Research topic: The plant ecophysiological effectes of elevated air CO_2 and temperature

Imre Haynal Health Science University, Budapest

Research Group for Membrane Biology and Immunepathology
Head: Balázs SARKADI, D.Sc. (Biology)
Research topic: Membrane biology and immunopathology

József Attila University, Szeged

Research Group for Hispanic Studies
Head: Ádám ANDERLE, D.Sc. (History)
Research topic: Hungarians and the Hispanic World

Research Group for Organic Catalysis
Head: Mihály BARTÓK, O.M.
Research topic: The stereo- and enantioselective heterogeneous catalysis in organic chemistry

Research Group for Laser Physics
Head: Zsolt BOR, O.M.

Research topic: Generation of ultrashort pulses theoretical and experimental studies of their propagation properties. Lasers in material science, medical and enviromental research

Research Group for Biocoordination Chemistry
Head: Kálmán BURGER, O.M.
Research topic: Coordination chemistry of biologically active molecules and metal complexes

Research Group for Artifical Intelligence
Head: János CSIRIK, D.Sc. (Matematics)
Research topic: Artifical intelligence

Research Group for Nanostructured Materials
Head: Imre DÉKÁNY, D.Sc. (Chemistry)
Research topic: Controlled colloid synthesis and properties of nanoparticles and nanocomposites

Research Group for Microbiology
Head: Lajos FERENCZY, O.M.
Research topic: Formation and molecular genetic analysis of transgenic fungal strains

Research Group for Hungarian Medieval Studies
Head: Gyula KRISTÓ, C.M.
Research topic: Charters of the Angevin era in Hungary

Research Group for Ability Development
Head: József NAGY, D.Sc. (Pedagogy)
Research topic: Basic cognitive skills

Research Group for Early Hungarian History
Head: András RÓNA-TAS, O.M.
Research topic: Complex research on the formation of the Hungarian people in the Early Middle Age

Research Group for Reaction Kinetics
Head: Frigyes SOLYMOSI, O.M.
Research topic: Surface science and heterogeneous catalysis

Janus Pannonius University

Research Group for Adaptation Biology
Head: Ernő FISCHER, D.Sc. (Biology)
Research topic: Comparative neurobiology. Adaptation in plant taxonomy

Research Group for Chemical Sensors
Head: Géza NAGY, D.Sc. (Chemistry)
Research topic: Chemical sensor

Research Group for Hungary and Europe
Head: Mária ORMOS, O.M.
Research topic: Hungary and Europe in the 19th–20th century

University of Horticulture and Food Industry, Budapest

Research Group for Plant Physiology
Head: Gábor HORVÁTH, D.Sc. (Biology)
Research topic: Effects of various environmental stress factors on physiological responses on both natural and stress-tolerant transgenic plants

Research Group for Postharvest
Head: Pál SASS, D.Sc. (Agriculture)
Research topic: Ultrastructural and biochemical investigations in order to establish the molecular biology of softening in the stone and pome fruits

Kossuth Lajos University, Debrecen

Research Group for "Number theory"
Head: Kálmán GYŐRI, O.M.
Research topic: Effective, quantitative and numerical investigations in Diophantine number theory

Research Group for Homogeneous Catalysis
Head: Ferenc JOÓ, D.Sc. (Chemistry)
Research topic: Metal complex catalysis in inorganic, organic and biochemistry

Research Group for Carbohydrates
Head: András LIPTÁK, O.M.
Research topic: Synthesis and biological investigations of carbohydrate ligands

Research Group for Microbiology and Botany
Head: Attila SZENTIRMAI, D.Sc. (Biology)
Research topic: Regulation of production secondary metabolite in autotrophic and heterotrophic microorganism

Research Group for Antibiotics
Head: Ferenc SZTARICSKAI, D.Sc. (Chemistry)
Research topic: Synthesis and structural elucidation of antibiotics and related substances

Research Group for Ethnography
Head: Zoltán ÚJVÁRY, D.Sc. (History)
Research topic: Interethnic relations and regional anthropological researches in East-Central Europe

Research Group for "Vulgus "
Head: Mihály VAJDA, D.Sc. (Philosphy)
Research topic: Inter- and intradisciplinary potential-conditions and process-characterisitics of vulgarization and regestheticization

University of Miskolc

Research Group for the Harmonization Private Law
Head: László GÁSPÁRDY, D.Sc. (Law)
Research topic: Harmonization in the private law with the European Standards

Research Group for Textology
Head: Lóránt KABDEBÓ, D.Sc. (Literature)
Research topic: Textological researches

Research Group for Geotechnics
Head: Ferenc KOVÁCS, O.M.
Research topic: Research on geotechnical possibilites of waste disposal and assessment their environmental risk

Research Group for Numerical Mechanics
Head: István PÁCZELT, O.M.
Research topic: Numerical investigation of nonlinear problems of continuum mechanics

Research Group for "Rudolf von Jehring"
Head: Tamás PRUGBERGER, D.Sc. (Law)
Research topic: Civil law, company law, competition law, labour law and environmental law tools for fair balancing of economic and social interests and for mutual enforcemenet of legal security

Research Group for Material Science
Head: András ROÓSZ, D.Sc. (Engineering)
Research topic: Rapid crystallisation of alloys

Research Group for Mechanical Technology
Head: Miklós TISZA, D.Sc. (Engineering)
Research topic: Application of the methods of artificial intelligence in mechanical technological processes

Research Group for Production Information Engineering
Head: Tibor TÓTH, D.Sc. (Engineering)
Research topic: Application of new information technology (IT) tools for supporting computer intergrated production

Pannon University of Agriculture, Keszthely

Research Group for Animal Breeding and Hygiene
Head: Péter HORN, O.M.
Research topic: Kinetics and toxicity of harmful substances in the food chain

Research Group for Virology
Head: József HORVÁTH, C.M.
Research topic: Biology and ecology of plant viruses and virus resistance

Research Group for Process Engineering of Agricultural Products
Head: Miklós NEMÉNYI, D.Sc. (Agriculture)
Research topic: Investigation and modelling of processing of agricultural products

Medical University of Pécs

Research Group for Neurophysiology
Head: László LÉNÁRD, D.Sc. (Medicine)
Research topic: Mechanism of motivation, learning and reinforcement

Research Group for Clinical Genetics
Head: Károly MÉHES, O.M.
Research topic: Analysis of the human genom's abnormalities

Research Group for Neurohumoral Regulations
Head: György SÉTÁLÓ, D.Sc. (Medicine)
Research topic: Investigations of neuronal systems elaborating hypophysiotropic neurohormones and study of hypophysiotropic hormone analogs

Research Group for Fluorescence Spectroscopy
Head: Béla SOMOGYI, D.Sc. (Biology)
Research topic: The functional role of intramolecular protein dynamics and its environmental coupling in molecular and supramolecular systems

Research Group for Neuropharmacology
Head: János SZOLCSÁNYI, C.M.
Research topic: Pharmacology of nociceptive primary afferents

Semmelweis Medical University, Budapest

Research Group for Neurobiochemistry
Head: Veronika ÁDÁM, D.Sc. (Medicine)
Research topic: The effect of oxidative stress in the central nervous system

Research Group for of Molecular Genetics
Head: Rudolf DE CHATEL, D.Sc. (Medicine)
Research topic: Molecular genetics of cardiovascular and metabolic diseases

Research Group for Molecular Immunology
Head: András FALUS, D.Sc. (Biology)
Research topic: Molecular mechanism and modulation of signal transduction through cytokine receptors in immune response, infection and inflammation

Research Group for Neuroendocrin Mechanism
Head: Ida GERENDAI, D.Sc. (Medicine)
Research topic: Structural and functional analysis of neuroendocrine mechanism operating at the CNS and the endocrine gland level

Research Group for Neurobiology
Head: József HÁMORI, O.M.
Research topic: Functional morphology of plasticity of the nervous system

Research Group for Neuropsychopharmacology
Head: Berta KNOLL, D.Sc. (Medicine)
Research topic: Analysis of the mechanism of action of (-) deprenyl and its followers

Research Group for Neurochemistry
Head: Kálmán MAGYAR, O.M.
Research topic: Studies of neurodegenerative and neuroprotective mechanism

Research Group for Pathobiochemstry
Head: József MANDL, D.Sc. (Medicine)
Research topic: Ascorbate/dehydroascorbate

transporters in endoplasmic reticulum and their role in protein folding

Research Group for Neuromorphology
Head: Miklós PALKOVITS, O.M.
Research topic: Neuroanatomical localization and chemical characterization of neuron pathways in the central nervous system

Research Group for Metabolism, Genetics and Immunology
Head: László ROMICS, C.M.
Research topic: Complex study of the pathomechanism of atherosclerosis with genetical, immunological and cell biological methods

Research Group for Biophysics
Head: Györgyi RONTÓ, D.Sc. (Biology)
Research topic: Global and molecular dosimetry of the DNA damaging effect due to natural and artifical polychromatic UV radiation

Research Group for Gene and Environment
Head: Péter SÓTONYI, D.Sc. (Medicine)
Research topic: The damaged family

Research Group for Cellular and Molecular Physiology
Head: András SPÄT, O.M.
Research topic: Signal transduction mechanism in the plasma membrane

Research Group for Molecular Pathology
Head: Béla SZENDE, D.Sc. (Medicine)
Research topic: Cellular and extracellular regulation of basic functions of normal and neoplastic cells

Research Group for Peptid-Biochemistry
Head: István TEPLÁN, O.M.
Research topic: Synthesis, characterisation and mechanism of action studies of peptides and peptidomimetics

Research Group for Paediatrics and Nephrology
Head: Tivadar TULASSAY, D.Sc. (Medicine)
Research topic: The role of endothel cell activation in the progression of cardiovascular diseases. Risk factors for diseases of bone metabolism

Research Group for Gastroenterology and Endocrinology
Head: Zsolt TULASSAY, D.Sc. (Medicine)
Research topic: Clinical research in gastroenterology and endocrinology

Szent-Györgyi Albert Medical University, Szeged

Research Group for Heterocyclic Chemistry
Head: Gábor BERNÁTH, D.Sc. (Chemistry)
Research topic: Synthesis and investigation of fused-skeleton satured heterocycles

Research Group for Dermatology
Head: Attila DOBOZY, C.M.
Research topic: Pathogenesis of inflammatory skin diseases

Research Group for Cardiovascular Pharmacology
Head: Gyula PAPP, O.M.
Research topic: Novel directions of the pharmacotherapy of heart failure: experimental investigation of the efficiency and mechanism of action of phospholamban inhibitors, calcium sensitizers and neutral endopeptidase inhibitors

Research Group for Neurohumoral Studies
Head: Gyula TELEGDY, O.M.
Research topic: Neural and humoral regulation of adaptative processes

University of Veszprém

Research Group for Air Chemistry
Head: Ernő MÉSZÁROS, O.M.
Research topic: Research in air chemistry

Research Group for Analytical Chemistry
Head: János MINK, D.Sc. (Chemistry)
Research topic: Investigation of new spectroscopic methods for material science and environmental chemistry

Research Group for Petrochemistry
Head: Ferenc UNGVÁRY, D.Sc. (Chemistry)
Research topic: Synthetic application of metal compounds in organic chemistry

Berzsenyi Dániel Teacher's Training College

Research Group for Biological Databases
Head: Attila SZABÓ T., D.Sc. (Biology)
Research topic: Studies on the new possibilites in processing and use of data in applied botany, ethnobotany and history of biology

Eszterházy Károly Teacher's Training College

Research Group for Bryology
Head: Tamás PÓCS, C.M.
Research topic: Complex research of the taxonomy, phytogeography and ecology of bryophytes

National Archives of Hungary, Budapest

Research Group for Archives of Sigismund's Age
Head: Iván BORSA, D.Sc. (History)
Research topic: Research and publication of the archives of Sigismund's age

The Library of the Hungarian Academy of Sciences

Research Group for Information Science and Scientometrics
Head: Tibor BRAUN, D.Sc. (Chemistry)
Research topic: Science studies on the use of specialized databases for the evaluation of basic research in chemistry and related fields

Hungarian Natural History Museum, Budapest

Research Group for Animal Ecology
Head: László PAPP, O.M.
Research topic: Spatio-temporal patterns of animal communities and populations

National Széchenyi Library, Budapest

Research Group for the History of the 1956 Hungarian Revolutions
Head: György LITVÁN, D.Sc. (History)
Research topic: The 1956 Hungarian Revolution

Research Institute of Demography of the Central Statistical Central

Research Group for Demographic Methodology
Head: Emil VALKOVICS, D.Sc. (Sociology)
Research topic: Demographic analysis