

HUNGARIAN ACADEMY OF SCIENCES

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RESEARCH INSTITUTIONS
AND THEIR ACTIVITIES



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HUNGARIAN ACADEMY OF SCIENCES

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RESEARCH INSTITUTIONS AND THEIR ACTIVITIES

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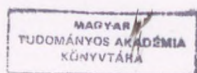


1996

The text of this publication was prepared and approved by the institutes themselves

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RESEARCH INSTITUTIONS
AND THEIR ACTIVITIES



M. TUD. AKADEÉMIA KÖNYVTÁRA

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Compiled by Márton Jolánkai
with the assistance of the respective Departments of the HAS
Responsible editor: Pál Pritz and István Teplán

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CONTENTS

Foreword	5
List of principal officers	6
INSTITUTES FOR NATURAL SCIENCES	9
Mathematical Institute	11
Konkoly Observatory	12
Institute of Nuclear Research	14
KFKI Research Institute for Solid State Physics	16
KFKI Atomic Energy Research Institute	20
KFKI Research Institute for Particle and Nuclear Physics	23
KFKI Research Institute for Materials Science	26
KFKI Research Institute for Measurement and Computing Techniques	29
Computer and Automation Research Institute	32
Research Institute for Technical Physics	35
Institute of Isotopes	37
TTKL Research Laboratory for Crystal Physics	40
TTKL Research Laboratory for Inorganic Chemistry	41
TTKL Research Laboratory for Biophysics	43
TTKL Research Laboratory for Geochemical Research	45
Central Research Institute for Chemistry	46
Research Institute of Chemical Engineering	49
Biological Research Center	53
Balaton Limnological Research Institute	57
Institute of Ecology and Botany	59
Institute of Experimental Medicine	62
Veterinary Medical Research Institute	65
Agricultural Research Institute	68
Research Institute for Plant Protection	72
Research Institute for Soil Science and Agricultural Chemistry	74
Geographical Research Institute	78
Geodetic and Geophysical Research Institute	82
Research Laboratory for Mining Chemistry	85
INSTITUTES FOR SOCIAL SCIENCES AND HUMANITIES	89
Archaeological Institute	91
Institute of Economics	93
Institute of Ethnology	95
Institute of History of Arts	97
Institute of History	99
Research Institute of Industrial Economics	101
Institute for Legal and Administrative Sciences	102

Research Institute for Linguistics	105
Institute of Literary Studies	108
Institute for Musicology	109
Institute of Philosophy	111
Institute for Political Sciences	113
Institute for Social Conflict Research	115
Institute for Psychology	117
Institute of Sociology	120
Institute for World Economics	122
Centre for Regional Studies of the HAS and its Research Units	124
APPENDIX List of university research units	127

FOREWORD

Humans incessantly explore, experiment, create and examine the world. There are so many ways to define these profound intellectual activities. One possible definition labels science as the active process by which physical, biological and social phenomena are studied,

The Hungarian Academy of Sciences is entitled to take responsibility in all fields of sciences in our country. The Academy was founded in 1825. Although initially oriented towards the humanities, by the late nineteenth century the Academy 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 coordinates research, and evaluates the progress being made in the sciences. Secondly the Academy owns and manages the biggest network of research institutions in Hungary. In 1996 there were 49 research units under the auspices of the Academy, of which 32 served natural sciences, and 17 worked in the field of social sciences and humanities.

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

Budapest, September 1996

László Keviczky
Secretary-General

PRINCIPAL OFFICERS OF THE HUNGARIAN ACADEMY OF SCIENCES

President:	Ferenc Glatz C.M.
Secretary-General:	László Keviczky O.M.
Vice-Presidents:	Sylvester E. Vizi O.M. (life sciences) Pál Michelberger O.M. (mathematics and natural sciences) Attila Harmathy C.M. (social sciences and humanities)
Deputy Secretary-General:	Gábor Náray-Szabó C.M.
Elected members of the Presidium:	István Láng O.M. (life sciences) Pál Michelberger O.M. (mathematics and natural sciences) Ernő Marosi C.M. (social sciences and humanities)

Departments of the Hungarian Academy of Sciences and their heads

Department of Natural Sciences

Dept. Head: István Teplán O.M.

Department of Social Sciences

Dept. Head: Pál Pritz S.Cs.

Administrative and Legal Department

Dept Head: László Sáy

Department of Finance:

Dept. Head: István Csomó

Secretariat of the President

Dept. Head: Kálmán Pannonhalmi C.Sc.

Secretariat of the Secretary-General

Dept. Head: Péter Zilahy Ph.D.

Office for International Cooperation

Director: János Pusztai C.Sc.

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

Institutions:

- BRC = Biological Research Center
- CRS = Centre for Regional Studies
- HAS = Hungarian Academy of Sciences
- KFKI = Central Research Institute for Physics
- TTKL = Natural Science Research Laboratories



The symbol of the Academy, painted by Johann Ender in 1821

INSTITUTES
FOR NATURAL SCIENCES



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

MATHEMATICAL INSTITUTE

Address: Budapest, Reáltanoda u. 13–15.
Postal address: H-1364 Budapest Pf. 127
Telephone: (36-1) 117-3151
Telefax: (36-1) 117-7166
Director: Gyula Katona, C.M.

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 to provide active support for the teaching of mathematics and the 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.

Research topics

- Algebra
- Algebraic logic
- Approximation theory
- Differential equations



The building of the institute

- Functional analysis
- Discrete mathematics
- Number theory
- Geometry
- Set theory
- Topology
- Information theory
- Mathematical statistics
- Statistical physics
- Probability theory

KONKOLY OBSERVATORY

Address: Budapest, Konkoly Thege út 15–17.

Postal address: H-1525 Budapest, Pf. 67.

Telephone: (36-1)-175-4122, (36-1)-175-5866

Telefax: (36-1)-275-4668

Homepage: <http://www.konkoly.hu>

Director: Béla Szeidl D.Sc. (Physics)

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.

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 time-scales. 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-borne 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 occurring in the stellar atmosphere) and evolutionary status of the variable stars.



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"

Solar physics

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

Stellar statistics

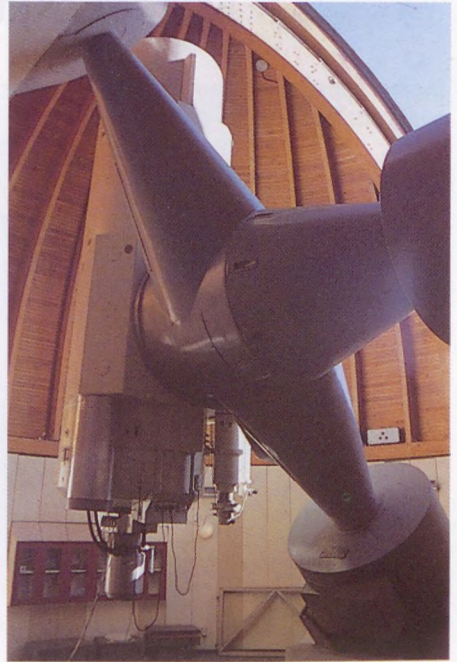
Studies of galactic structure and processes of star formation in Milky Way, mainly from the observational point of view.

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 successfully 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



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

INSTITUTE OF NUCLEAR RESEARCH



The main building of the institute

Address: Debrecen, Bem tér 18/c

Postal address: H-4001 Debrecen, Pf.51.

Telephone: (36-52) 417-266

Telefax: (36-52) 416-181

Director: József Pálinkás, C.M.

E-mail: palinkas@atomki.hu

Scope of activity

- to conduct basic and applied research in nuclear and atomic physics;
- to apply physical methods in other disciplines (materials science, earth sciences, environmental research, medical and biological research, etc.) and in practice;
- to develop research techniques and instruments;
- to contribute to graduate and postgraduate education.

Research objectives

Nuclear physics

- Spectroscopy of medium-heavy nuclei;
- Study of extreme nuclear states;
- Measurement of the neutron-skin thickness of nuclei;
- Study of nuclei far from stability;
- Low-energy light-ion reaction experiments for nuclear spectroscopy and nuclear astrophysics;

- Nuclear structure calculations, nuclear cluster theory;
- Nuclear reaction calculations;
- Measurement of nuclear data for nuclear techniques.

Atomic Physics

- Study of electron correlation in atomic collisions;
- Study of two-centre effects in atomic collisions;
- Investigation of charge exchange processes;
- Study of atomic collisions under extreme conditions (e.g. in strong electromagnetic fields);
- Study of inner-shell ionization phenomena by X-ray and electron spectroscopy;
- Investigation of the interaction of ions with solids;
- Theoretical studies in atomic physics.

Materials Science and Analysis

- Study of high-temperature semiconductors;
- Study of nanocrystalline and amorphous metallic compounds;
- Electron spectroscopy, mass spectrometry and ion spectroscopy for surface physics;
- Measurement of atomic properties in solid-state environments;
- Applications of the activation method in materials research.

Earth and Environmental Sciences, Archaeology

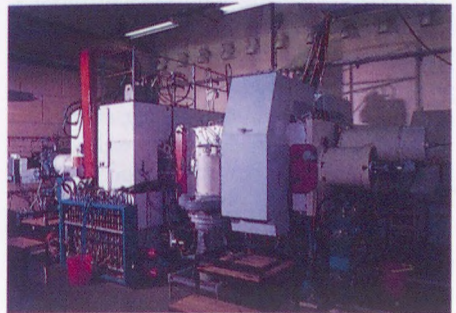
- Geochronological and petrogenetical studies by light-element analysis and by the K/Ar method;
- Application of light-element isotope analysis to hydrological problems, paleoclimatology and hydrocarbon prospecting;
- Application of ^{14}C dating in archeology;
- Investigation of atmospheric aerosol pollution;
- Investigation of the environmental effects of nuclear industry;
- Measurement of environmental radioactivity and the radiation doses received by the population.

Applications of Nuclear Techniques in Medicine and Biology

- Production of positron-emitting radioactive isotopes by a cyclotron and the preparation of radiopharmaceuticals;
- Application of a neutron radiation source in radiobiology;
- X-ray fluorescence analysis of the trace element contents in biological tissues;
- Mass spectrometry of the gas metabolism of plants.

Development of Measuring Techniques and Instruments

- Accelerator physics and development;
- Development of an ECR ion source;
- Methodology of electron spectroscopy, of nuclear analytical techniques and of nuclear tracing;
- Elaboration of digital signal processing and other electronic techniques;
- Developments in quadrupole mass spectrometry;
- Development of electronic devices based on superconductivity;
- Development of plastic nuclear track detection techniques;
- Development of sensitive mixed-field dosimetric methods.



The MGC-20E cyclotron



The building of the institute

Address: Budapest, Konkoly Thege u. 29-33.

Postal address: H-1525 Budapest Pf.49.

Telephone: (36-1) 169-6575

Telefax: (36-1) 169-5380

Director: Norbert Kroó O.M.

Scope of Activities

- Basic research in specific areas of theoretical and experimental solid state physics, partially condensed matter physics, metal physics and laser physics.
- Applied research such as laser development and applications in technology, measuring technique and medicine as well as the production and study of specific new materials (metallic glasses, liquid crystals, fullerenes, etc).
- Development of unique research methods including neutron scattering, neutron and γ -radiography, nuclear magnetic resonance, x-ray diffraction, ultrashort laser pulses,

optical thin films (laser mirrors, filters, etc.).

- 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, espe-

cially 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 systems; 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 structure 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 mesoscopic systems.

Investigations of non-equilibrium alloys

- Study of the macroscopic magnetic properties and the characteristics of the local atomic environments in order to clarify the relation between the magnetic proper-

ties of melt quenched bulk spin-glasses and granular structures.

- Study of the processes 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 the A_1C_{60} phases (A=K,Rb, Cs)
- 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.
- Application of the diffuse interface model (DIM) for the description of bubble nucleation and phase separation. Comparison of DIM with the modern density functional theories, and the study of the underlying microscopic background.
- 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 apparent non-Fermi-liquid behavior of the metallic phases in organic conductors.

- Installation of a new high-field (9 T) solid state NMR spectrometer.

Liquid crystal research

- Synthesis and study of new compounds possessing ferro-, ferri- and antiferroelectric phases around room temperature.
- Switching dynamics of ferroelectric liquid crystals.
- Investigations to understand and improve surface anchoring properties of smectic liquid crystals.
- Synthesis of deuterated liquid crystals and their study by neutron scattering and NMR techniques.
- Study of polymers dispersed in cholesteric materials by chromatography and IR spectroscopy.

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 concentration, 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 structural fluctuations in amorphous metals by means of electron-structural characteristics.
- Investigation of local hyperfine properties and the atomic motions at and around the implanted $^{12}\text{B}^*$ 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 and Cu(Co) type granular metals.
- Studies on formation and properties of nanocrystalline structures in metals and alloys produced by rapid solidification of melts and high-rate heating of amorphous alloys.
- Development of low frequency remote-field eddy current method for inspecting internal and external defects in ferromagnetic and non-ferromagnetic pipes, tubes and storage tanks.

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,
 - =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.

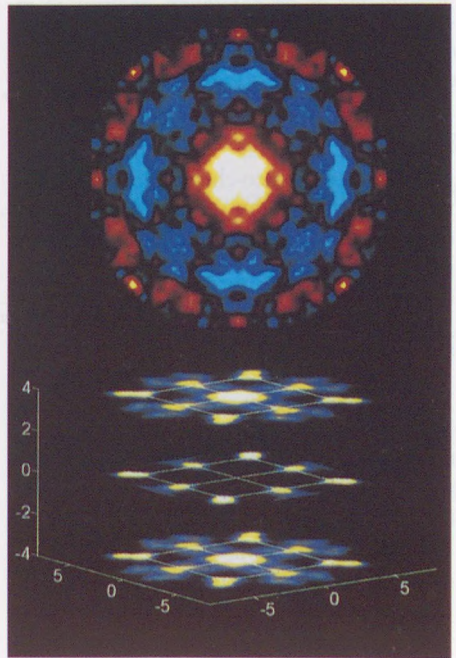
Laser applications

- 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 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 analyzer in material science investigations.

Optical thin films

- Theoretical and experimental investigations on the performance of chirped dielectric mirrors such as bandwidth, smoothness of dispersion functions 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.
- Research on application of optical coatings developed for liquid crystals dispersed in polymers.



X-ray hologram and a reconstructed holographic image of SrTiO_3

KFKI ATOMIC ENERGY RESEARCH INSTITUTE

Address: Budapest, Konkoly Thege u. 29-33.
Postal address: H-1525 Budapest Pf.49.
Telephone: (36-1) 169-6762
Telefax: (36-1) 155-2530
Director: János Gadó C.Sc. (Physics)

Scope of activities

In accordance with the Hungarian law on the uses of nuclear energy, the main activities of the Institute cover basic and applied research as well as development 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 damage, 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 acoustic emission; research into space electronics and aviation diagnostics; operation of a research reactor.

Research aims and topics

Modelling of processes taking place in nuclear facilities and in the environment

- development of new methods and procedures in reactor physics,
- development of special methods and tools for safety evaluation,
- reactor physics calculations for normal operation,



The main building of the Budapest Research Reactor

- modelling of reactivity accidents,
- development of computer code validation matrices for VVER-type reactors,
- thermohydraulic code validation with special respect to quantification of uncertainties,
- development of a Nuclear Plant Analyzer for VVER-440 reactors,
- coupling of three-dimensional neutronic and thermohydraulic system codes,
- modelling of severe accidents leading to core melt,
- questions of transportation and storage of spent fuel,
- modelling of environmental risks.

Experimental 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 vali-

dition 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.

Development of training simulators

Accidents at nuclear power plants generally arise from human errors rather than from constructional errors or mechanical failures. Consequently, in addition to a high level of automation, the proper training of power plant's operators is of crucial importance. The training simulator is the best tool to fulfil this task.

Research activities in this field are concentrated on:

- development of state-of-the-art code generating simulation tools with user-friendly graphic interface,
- development of integrated, platform-independent real-time simulator software environment based on UNIX and X Window,
- expanding simulator model software to simulate severe accidents up to the core melt.

Expert systems and operator aiding systems

- development of systems controlling the reactor core in nuclear power plants,
- development of monitoring, surveillance and operator support systems for nuclear power plants,
- development of learning algorithms for model improvement and prediction,
- development of expert systems in acoustic and noise diagnostics,
- development of diagnostic methods, new numerical procedures and physical models.

Fuel and reactor materials research

Aging of reactor components and behaviour of fuel and core materials under operational, accidental and storage conditions include activities 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,
- study of the embrittlement of fuel cladding caused by oxidation and hydriding,
- creep and creep rupture tests to predict loss of cladding integrity,
- contribution to the experimental database on core material interactions,
- experiments for validation of codes for severe accident analysis.

Environmental protection

The goal of this research is to develop environmental monitoring systems that match international European standards and to solve nuclear and non-nuclear problems:

- development of environmental monitoring systems,
- investigation of certain elements and parameters of the ecological chain,
- localization of radio-isotopes in the soil,
- investigation of the emission and environmental effects of aerosols.

Special electronic devices

Development of electronic measuring instruments for use in space research. This work is strongly based on experience gained during the development of special-purpose reactor electronics.

Health physics research

This research is carried out in order to understand the basic processes in health physics

and to provide theoretical support for radiation protection. It involves:

- development of a stochastic lung model,
- modelling of transport processes,
- improvement of solid-state dosimetry,
- development of new thermoluminescent readers for space dosimetry.

Physico-chemical research

The goal is to explore correlations in the structure of condensed matter and to understand the relationships between certain physico-chemical processes. The main tasks are:

- investigation of the dynamics of processes taking place on electrodes of fractal surface,
- determination of kinetic laws of transport processes,
- elektrochemical determination of corrosion processes,
- investigation of isotope mixtures.

Applications of chemical analysis

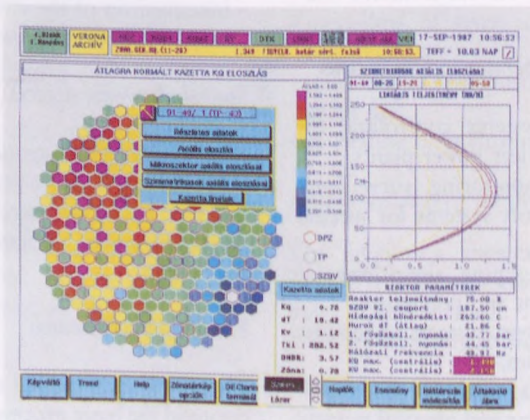
Analytical methods and measurement processes developed during the course of the various research projects are subject to continuous improvement. Applications of neutron activation analysis utilizing the research reactor is an important field.

Utilization of the Budapest Research Reactor

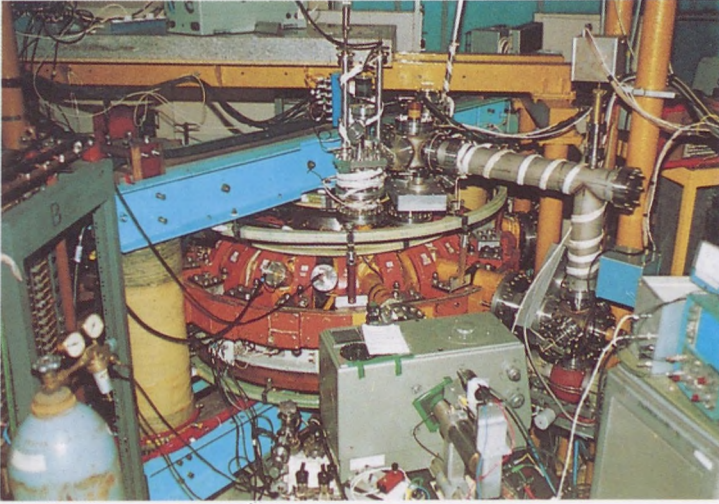
After a major reconstruction and upgrading, the regular operation started November 25, 1993. The upgraded reactor serves for basic and applied research, technological and commercial applications, education and training. These studies will get a much improved tool, when the cold neutron source will be put into operation. The cold source is being designed now. 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.



A typical display figure of the VERONA-u reactor core monitoring system of the Paks Nuclear Power Plant



Tokamak device for plasma physics experiments

Address: Budapest, Konkoly Thege u. 29–33.

Postal address: H-1525 Budapest Pf. 49.

Telephone: (36-1) 155-1682

Telefax: (36-1) 169-6567

e-mail: szego@rmki.kfki.hu

Director: Károly Szegő D.Sc. (Physics)

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.

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.

- 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).
- Development of on-board devices, software and ground support equipment for future space missions (MARS-96, CASSINI, ROSETTA, CESAR, SPECTRUM-X-GAMMA).
- Participation in the development of a planetary rover in the framework of the EUREKA collaboration of the European Union.

Theoretical research

- 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.

Material 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, corrosion and wear-resistive surface-near layers).



Van de Graaff type particle accelerator

- 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 radiation and of positrons with condensed matter.

Neurobiology and nuclear biophysics

- Computational neuroscience: multicom-

partmental simulations of various types of neurons; applications 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 archaeological and fine art objects.



Central research building

Address: Budapest, Konkoly Thege út 29–33.

Postal address: H-1525 Budapest Pf 49.

Telephone: (36-1) 169-5165

WEBSITE: [\(www.kfki.hu/\(atkihpb\)\)](http://www.kfki.hu/(atkihpb))

Director: József Gyulai, O.M.

RESEARCH CONCEPT The institute was founded in 1992 by restructuring the previous KFKI Research Institute for Microelectronics. Renewed was not only the name but the research concept, too, when scientific bases of different techniques applied in a broader sense of semiconductor devices was put in focus. Equally important part of the activity is the system and device characterization.

Research in materials science cannot exist without adequate facilities for the preparation of sophisticated samples. Research is making use of the Class 10 and 100 clean laboratory equipped with a rather complete processing line for silicon device manufactur-

ing, including a mask shop, too. Although mask and lithography constraints enable the realisation of submicron features, activities focus to devices with less critical dimensions, like sensors (semiconductor, magnetic and optical), and to fundamental understanding of scientific bases of multilayer and thin film structures and techniques. Research labs for physical deposition techniques, thin film production and nanostructuring add to the realisation of structures with improved or new properties. Ion implantation, ion beam modification having a long history here, is still in focus. Ion beam analytic techniques are also traditional research field of the institute

using the jointly operated accelerator facilities of the Research Institute for Particle and Nuclear Physics at the same campus. Another traditional direction is the analysis of magnetic properties of single crystalline (epitaxial and bulk garnet) materials and of thin films. In the last decade optical characterisation techniques, primarily ellipsometry was successfully exploited for quantitative materials evaluation. Ellipsometry was successfully employed for the detection of implantation damage. The computing facilities provide modeling support for the study of equilibrium and non-equilibrium processes on solid surfaces.

Decade long traditions of the institute in image processing HW and SW led to the development of complex analytical systems in a range of fields even exceeding classical materials science. Microscopy for metallography, but also for fluorometric detection of cancer cells, etc. as well as infrared scanning tomography belong to this successful area. As a result of the restructuring of the former Central Research Institute for Physics, a group working on measurement and modeling of electrical potential of human heart finds himself at home in the institute.

LABORATORIES and DIRECTIONS

Ion implantation and analytical research

Investigation of ion beam solid interactions, studies of elementary processes in cascades, MeV and higher energy ion implantation, ion beam analytical techniques

Nanotechnology research

Methodology research of scanning probe techniques, applications for analytical studies and to materials modification

Thin film studies

Research in size dependent effects in thin films prepared and structured both by equilibrium and non-equilibrium processes

Optics based characterization

Research in optics and applications in development of measuring, and materials characterization techniques.



LACVD, a laboratory for laser-assisted CVD equipment

Theoretical studies

Modeling and theoretical studies of equilibrium and non-equilibrium processes on two-dimensional lattices.

Magnetism and crystal growth technology

Preparation and characterization of soft magnetic materials in single and nanocrystalline form, amorphous ribbons, thin films and

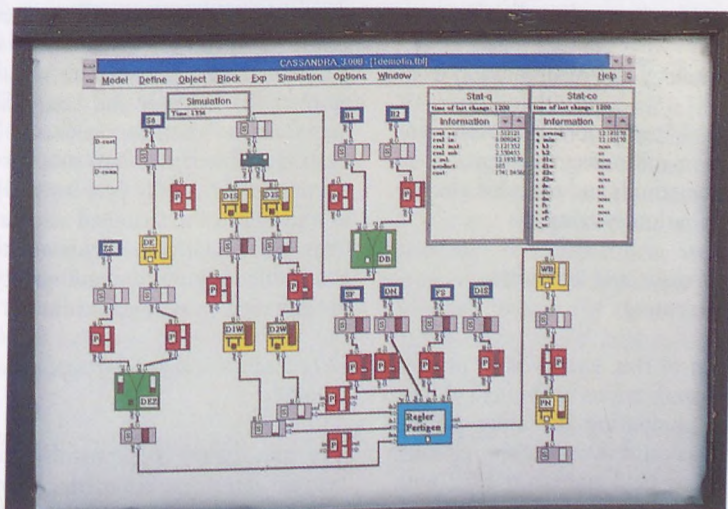
multilayers a/o. for non-linear magneto-optical applications.

Medical engineering

Statistical studies, modeling and extraction of information from the body surface potential induced by the activity of human heart.

Quantitative microscopy by means of image processing for various bio-medical and materials characterisation applications.

KFKI RESEARCH INSTITUTE FOR MEASUREMENT AND COMPUTING TECHNIQUES



Quality Control Optimization for an Assembly Line in Gestra AG, Bremen, Germany with Object Oriented Simulation (FAMOUS-QUACAR EUREKA Project EU-918)

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E-mail: vajda@sunserv.kfki.hu
Director: Prof. Ferenc Vajda, D.Sc.

History and Activity

The KFKI Research Institute for Measurement and Computing Techniques (MSZKI) used to be an institute within a research center called Central Research Institute for Physics (KFKI) founded by the Hungarian Academy of Sciences in 1950 with the aim of conducting research in nuclear physics.

MSZKI originates from the Electronics Group of KFKI, and grew first into a department and later an institute. It has developed the families of NTA multichannel analyzers, TPA minicomputers and CAMAC real-time

peripherals widely applied both in Hungary and abroad in scientific and business environments.

In 1992, MSZKI was founded as an independent research institute of the Hungarian Academy of Sciences to conduct application-oriented basic research and development of methods and tools in the fields of computing, information technology and measurement. The most important fields of activity are as follows:

- parallel architectures and algorithms, distributed computing,

- image processing methods, algorithms and applications,
- object oriented simulation using artificial intelligence methods,
- data communication and application protocols,
- speech technology and rehabilitation techniques,
- methods and tools for laboratory instrumentation and measurement,
- automation methods and tools for electric power distribution systems.

Parallel architectures and algorithms, distributed computing

The main aim of this activity is to provide methods and applications in the field of high performance computing including parallel supercomputers and workstation clusters. Research in this field started in 1992 with parallel programming methodology and environments, concurrent languages and programming tools.

A high speed local area network was set up this year with various workstations connected into a heterogeneous cluster.

Image processing methods, algorithms and applications

Image processing has broadened into a very wide field including new areas such as multimedia tools and methods, high resolution and fast image transfer, visualization of complex three and higher dimensional datasets. Main fields of research activity are mapping algorithms onto architectures, reconfigurable architectures, scientific data visualization, migration processes, motion analysis and knowledge based systems for image retrieval and evaluation. Main applications are biological image processing, food quality control and traffic surveillance.

Object oriented simulation using artificial intelligence methods

Research in the field of simulation methods, algorithms and system architectures has the following goals: (1) using artificial intelligence methods for dynamic simulation to monitor the structure and parameters of the model and to optimize feedback, (2) investigating sophisticated Petri nets for optimizing priority and delay problems, (3) research in the field of distributed simulation systems. Main applications are simulation of urban traffic air pollution and quality control management in production lines.

Data communication and application protocols

The importance of protocols is increasing because interconnection of computers and networks means also interoperation of applications running under different operating systems in computers at various, often remote locations. The aim of MSZKI is to generate automatic, ready-to-use tools for the development, verifying and testing of all kinds of protocols. In addition, the Institute provides protocol consultancy service for the Communications Authority of Hungary.

Speech technology and rehabilitation techniques

The main goal of this research and development is to provide educational and rehabilitation methods and equipment for visually handicapped persons using artificial intelligence, signal processing, artificial speech generation, multimedia and computer communications techniques. In the future, this activity will be extended for other types of disability such as in hearing and mobility.

Methods and tools for laboratory instrumentation and measurement

In this field, MSZKI works in close cooperation with large European research laboratories such as CERN, KFA Jülich and ESRF Grenoble. Main field of interest is research and development of nuclear measurement methods and devices such as low-noise, very high resolution systems for multistrip Ge detectors, analog-to-digital converters, picosecond devices for high resolution time distribution measurement and low cross-talk systems for precision multichannel detector units. Methods and devices developed by the Institute are in use at the nuclear power plant

of Paks, Hungary while biomedical applications have been developed together with the Pediatrics Department of Semmelweis Medical University, Budapest.

Automation methods and tools for electric power distribution systems

Research and development is aimed at special topics in this field such as defining new energy management system functions, short circuit analysis, a system restoration expert system, event recognition and alarm processing filtering. This department works together with electricity distribution companies in Hungary where the theoretical results are verified by practical applications.

COMPUTER AND AUTOMATION RESEARCH INSTITUTE

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Telephone: (36-1) 166-5644, (36-1) 269-8400
Fax: (36-1) 166-7503
WWW server: <http://www.sztaki.hu/t>
Director: Péter Inzelt C.Sc.

Fields of activities:

- Research in computer science, automation and applied mathematics.
- Tasks deriving from the principal research direction of the Hungarian Academy of Sciences: "Applications of Computer Science".
- Graduate and postgraduate education, consulting.
- Management and supervision of the Computer and Networking Center of the Academy to provide high-level infrastructural services for the Hungarian academic community.

The activities cover the C³I (computing, control, communication, and intelligence) quadruple characterizing the Institute's profile.

Research aims and themes:

INFORMATION TECHNOLOGY

Database technologies, multimedia

- Relational data models
- Organization and access problems in data management
- Theoretical issues of multimedia systems



The building of the institute

Theory of computing

- Polynomial factorization over finite fields
- Multi-valued logic
- Software test and data flow analysis

Geometry, Graphics

- Fundamentals of interactive computer graphics
- Discrete geometry
- Structured discrete mathematics

Applied statistics

- Dynamical systems and mathematical statistics

- Performance evaluation
- Finance and insurance mathematics

APPLIED MATHEMATICS

Dynamical structures

- Free boundary problems
- Spatio-temporal behavior of complex systems

Discrete structures

- Tournament theory
- Combinatorial information theory
- Graphs and hypergraphs

Operations research and decision systems

- Analysis of stochastic and deterministic systems
- Global optimization
- Linear programming
- Numerical methods in operations research and mathematical physics
- Tensor optimization
- Financial processes

AUTOMATED CONTROL SYSTEMS

Control theory

- Robust control
- Stochastic complexity in adaptive control
- Integrated design of process and control systems

System modeling and identification

- H_2/H_∞ identification
- Closed loop identification
- Identification for robust control
- Failure detection and identification
- New directions in signal processing
- Qualitative and gray-box modeling

Power electronics

- Increase of switching frequency
- Chaos theory applications

ARTIFICIAL INTELLIGENCE

Expert systems

- New directions in expert systems, cognitive processes
- Early diagnostics in medicine
- Pattern concept in economy
- Financial applications
- Coupling of symbolic and subsymbolic approaches

Multi agent systems

- Formal models
- Natural language processing applications

Intelligent manufacturing

- Process planning and genetic optimization
- Agent based (holonic) manufacturing systems
- Modeling and control of manufacturing processes and systems
- Reactive and proactive scheduling
- Re-engineering, reconfiguration of manufacturing processes
- Learning issues of manufacturing automation

Image and pattern analysis

- Texture analysis
- Stereo vision
- Image segmentation

ANALOGICAL AND NEURAL COMPUTING

Analogical supercomputer architectures

- Theory of cellular neural networks (CNNs)

- CNN chip architectures
- Prototyping systems
- Accelerator engines

Design and application of analogic CNN algorithms

- Medical fields (mammogram, bronhogenic carcinoma detection, chromosome analysis)
- Neuromorphic models and neurobiology related assignments
- Intelligent fax/scanner/copier combos
- Image compression and enhancement
- Real-time solution of partial differential equations
- Emergent computations

INTEGRATED DESIGN AND CONTROL SYSTEMS

Geometric modeling

- Free shape surfaces and volumetric objects

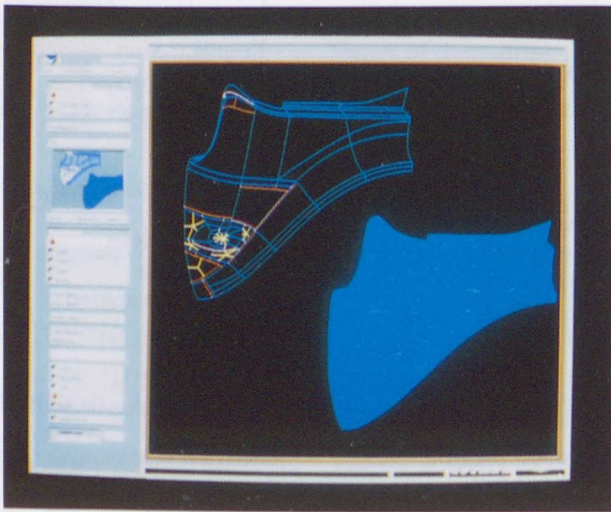
- Reverse engineering
- Blending surfaces

Computer integrated manufacturing (CIM)

- Design, control, simulation of CIM systems
- Scheduling of discrete processes
- Quality control
- Open systems
- Distributed multimedia applications

COMPUTER NETWORKS AND INFORMATION INFRASTRUCTURE

- INTERNET, ISDN, WWW technologies
- Digital libraries
- New technologies in network supervision
- Software quality control
- Office automation, electronic document handling
- Development of low loss laser mirrors for UV metal vapour lasers. -Research on application of optical coatings developed for liquid crystals dispersed in polimers.



Computer-aided design of free shape surfaces

RESEARCH INSTITUTE FOR TECHNICAL PHYSICS

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Telefax: (36-1) 169-8037
Home page: <http://www.mufi.hu/>
Director: Prof. László Bartha D. Sc.
(Chemistry)

Scope of activities

Basic research in the following fields of the materials science and engineering: refractory metals and alloys, compound semiconductors, interfaces, surfaces, thin films and advanced ceramics. Development and application of material characterization methods.

Research topics

Optoelectronics

- Medium and high power laser diodes for frequency conversion
- Optical properties of waveguides and integrated optical devices
- Photobiological effects of UV irradiation
- Radiometry in the UV-VIS-IR wavelength range

Refractory metals and alloys

- Dispersion strengthened tungsten alloys (incorporation of dopants upon chemical powder processing, mechanism of sintering, microstructural evolution upon thermomechanical processing, recrystallization and creep);
- Tungsten and molybdenum oxide-compounds and oxide-processing methods (morphology tailoring of precursor oxide powders);



The central building of the institute

- Environment protecting processes in the hydrometallurgy of tungsten and molybdenum (metal separation, electrochemical and catalytic methods for oxidation of refractory metals).

Surfaces, interfaces and thin films

- Solid state reactions on surfaces, in thin films and in multilayers
- Structure and texture evolution in thin films and multilayers, application of doping for tailoring artificial thin film structures
- Ion beam effects on surface morphology and intermixing
- Contact-layers on new type semiconductors

Microstructure and microchemical characterization methods

- High resolution and analytical transmission electron microscopy
- Auger and EPES high resolution depth analysis
- Ion beam thinning at extremely low ion energies
- Determination of physical parameters for quantitative analysis of thin layers and surfaces

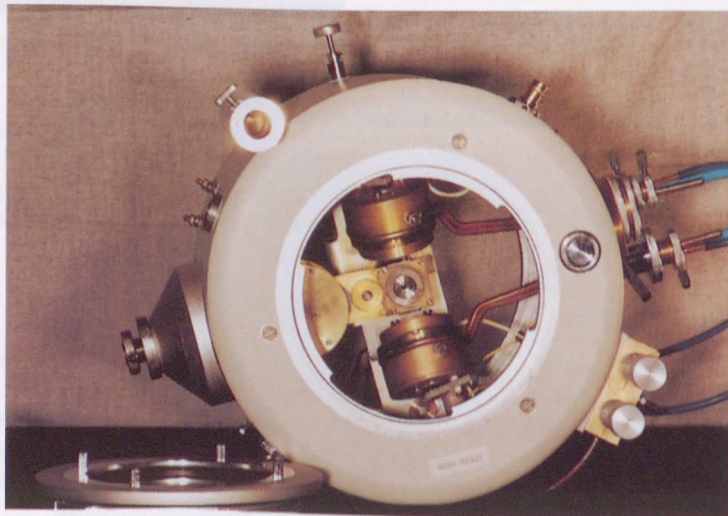
Compound semiconductor layer- and heterostructures

- Epitaxial growth

- from vapour phase
- from liquid phase
- Classical magnetotransport in epitaxial layers and structures
- Quantum magnetotransport in low dimensional electron gases
- Properties of resonant tunnelling structures
- Metal-semiconductor interfaces and structures

Advanced engineering ceramics

- High temperature mechanical and chemical properties of Si_3N_4 based ceramics
- Effect of forming methods on the structure and sintering performance of compacts



The interior of a dedicated ion milling unit of grazing angle incidence and low ion energy developed in the institute for preparing cross sectional foils for TEM as well as in AES depth profiling. The state of art construction was the basis for manufacturing a new generation of ion milling devices installed in more than 200 laboratories.

INSTITUTE OF ISOTOPES



Partial view of the institute

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Phone: (36 1) 169-9499 (exchange),

(36 1) 169-6687 (director),

(36 1) 275-4354 (econ.dir.)

Fax: (36 1) 275 4356 (director),

(36 1) 275 4355 (econ.dir.)

Director: Zoltán Paál, D.Sc.

Scope of activities

The main activities of the institute has been defined as basic research in certain fields of physics and chemistry; acting as an authority in the field of accounting of radioactive and nuclear materials as well as in authorisation of their transport; research and development promoting application of radioactive isotopes.

A peculiarity of all research in the institute is the priority of scientific problems related to nuclear research, isotopes and radi-

ation chemistry, radiotracer and other isotopic methods as well as their development.

A large part of our research serves as a basic for actual practical problems:

in environmental protection: monitoring of radiation burden of the natural environment, of emission and migration of radioactive substances; in nuclear engineering: investigation of the composition of nuclear fuel elements, measurement of large radiation doses, development of new analytical methods, such as prompt neutron-g activation analysis, etc.

Topic for research

These can be classified in one of the following two main areas:

Nuclear and Isotope Research

Research on Surface and Interfaces and on Their Catalytic Properties

Possible field of application: nuclear and isotopic techniques, environmental protection.

A. Nuclear science, isotopes and radiation

1. *Research in nuclear physics*

Research on nuclear structure: development of new methods in order to broaden the range of measurable nuclear level lifetimes; Isomer excitation by (γ, γ^-) reaction experimental and theoretical studies on selected nuclei;

Study of giant resonances (GR).

2. *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 - ray database by combining research and data evaluation efforts in co-operation with the International Nuclear Data Evaluation Network co-ordinated by the IAEA.

3. *Nuclear safety and radiation protection*

Development of high-resolution gamma spectrometric method 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;

Investigation of the sources, migration and

HT-HTO conversion of the environmental tritium by means of analysis of air, soil and vegetation samples;

Study of migration of characteristic isotopes of nuclear wastes in rocks.

4. *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 oxygenated and halogenated aromatics with the aim of environmental protection;

Research of solid state dosimetry, construction of a quantitative model for interpretation of the physical parameters, development of industrial dosimeters;

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

B. Structure of interfaces and their catalytic properties

1. *Preparation of model systems and their surface properties*

Research is aimed at understanding catalytic processes on the molecular level providing opportunity to the scientific design of these surfaces and their tailoring to achieve desired surface reactivity and selectivity. Preparation of model systems; investigation of surface morphology, agglomeration, electronic and chemisorption properties of small metal particles (nanometer size);

Study of structure and sulphur uptake of supported MoO_x catalysts containing metals of Group 8-10 of the periodic system of the elements;

Study of formation, stability and migration of nanostructured metallic clusters produced in the cages of zeolites and pores of layered supports;
Study of the surface supported and unsupported noble metal catalysts and foreign components accumulated on them.

2. Study of the interaction of the surface with substrates

Comparison of the adsorption propensity of metals of different morphology, analysis of the interaction of the surface metal and the substrate;

Study of adsorption of CO (NO) and investigation of the metal-carbon bond on metals by means of emission spectroscopy;

Study of adsorption of C1-C5 hydrocarbons on thin metal foils and study of behaviour of simple molecules in the transient period of adsorption;

Study of the uptake, incorporation and exchange of sulphur on MoOx.

3. Heterogeneous catalytic reactions

Research is focused on seeking correlation between composition, physical, electronic and adsorption properties of the surface and their catalytic activity. The main objective is interpretation of the relation between structure and reactivity of the substrates in the different type of catalytic processes:

Effect of synergy on catalytic activity in bimetallic and metal-oxide systems;
Role of ion assistance (metal-ion interaction) in catalytic behaviour of bimetallic systems;
Development of the catalytic activity in the course of the oxide-sulphide transformation.

4. Control of quantum systems

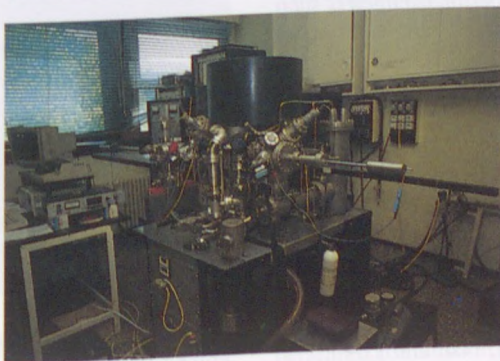
Shaped pulses of femtosecond duration may be used to modify the rates of chemical reaction in gases or on surfaces in a selective way. The aim of the research on selective laser chemistry is to bring the theoretical thoughts on optimal control into the laboratory practice by developing adaptive algorithms:

Solution of the time-dependent Schrodinger equation with the help of the model potentials. Theoretical predictions are given for the best selectivity for model reactions;

Application of adaptive algorithms in laboratory practice;

Research-development of adaptive algorithms for the construction of "procedure" for control of general non-linear systems and for developing their goal-oriented behaviour.

Other applied research activities include the control of chemical plants, the development of adaptive optics and the control of surface processes such as ablation or laser material processing.



ESCA facility

TTKL RESEARCH LABORATORY FOR CRYSTAL PHYSICS

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E-mail: janszky@sparc.core.hu
www: //www.crystal.core.hu
Director: József Janszky D.Sc. (Physics)

Scope of activities

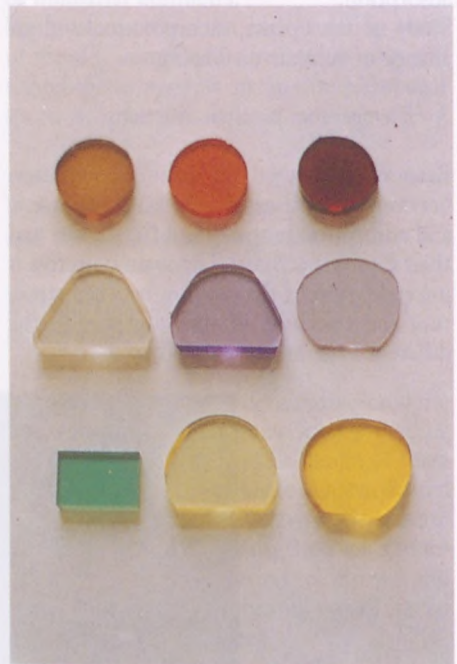
Elaboration and development of material preparation, purification and crystal growth technologies for optical single crystals; investigation of the effect of crystal preparation parameters on defect structure; research in the field of crystal growth theory; investigation of the relationship between defect structure and physicochemical properties of crystals; non-linear optical studies; preparation of single crystals of new materials required by recent applications.

Research aims and topics

Preparation and investigation of optical single crystals

- Preparation and investigation of new optical crystals with superior parameters such as stoichiometric LiNbO_3 and the borates BBaB_2O_4 , LiB_3O_5 and $\text{CsLiB}_6\text{O}_{10}$ for non-linear optical and $\text{Li}_2\text{B}_4\text{O}_7$ for surface acoustic wave applications and the photorefractive bismuth oxides Bi_2TeO_5 , $\text{Bi}_{12}\text{SiO}_{20}$, $\text{Bi}_{12}\text{GeO}_{20}$ and $\text{Bi}_{12}\text{TiO}_{20}$, as well as mixed sillenites.
- Device-oriented technological research, based on earlier results, to meet special quality requirements for optical crystals such as TeO_2 , LiNbO_3 , $\text{Bi}_4\text{Si}_3\text{O}_{12}$, $\text{Bi}_4\text{Ge}_3\text{O}_{12}$, ZnWO_4 , NaF and LiF .

- Investigation of the real structure and physical properties of crystals. In particular, studies of the effect of dopants and growth induced real structure on the photorefractive, photochromic, paramagnetic, dielectric, spectroscopic, mechanical properties.
- Nonlinear optical studies concentrated on the properties, engineering and diagnostics of light with special statistics, such as squeezed and entangled states and produced in non-linear processes having perspective applications.



Slices of doped LiNbO_3 crystals. Dopants are from left to right: Mn, Cu, Fe, / Mg, Co, Er, / Cr, Ni, Mg-Mn

TTKL RESEARCH LABORATORY FOR INORGANIC CHEMISTRY

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Postal address: H-1518 Budapest, Pf. 132.

Telephone: (36-1) 319-3142, 319-3162

Telefax: (36-1) 319-2537

Director: János Szépvölgyi Ph.D.Ch

Scope of activities

Researches in the field of materials chemistry and environmental science. Researches related to particular problems of inorganic chemistry, solid state chemistry, electrochemistry and corrosion, and plasma- and laserchemistry. Applied researches to facilitate the practical implementation of the above basic researches. The Laboratory is responsible for research activities in the following complex fields: - thermal decomposition of natural and synthetic macromolecules, - environmental chemistry, - electrochemistry and corrosion, - surface reactions of solids induced by fast atom and ion beams, - chemical reactions in spaces of high energy density.

Research aims and topics

Researches in the field of materials science

Researches in this field are aiming at making clear the chemical aspects of the synthesis-composition-structure-properties relationships of materials. Special emphasis is being placed on the non-traditional initiation of chemical reactions, such as particle beams, high temperature plasmas and laser beams.

Main activities:

- XPS and XAES studies of chemical transformations on solid (metal, oxide, nitride

and polymer) surfaces induced by particle beams.

- Synthesis of nanosize nitride and carbide powders in thermal plasmas from different precursors.
- Sintering of advanced nitride, oxynitride and carbide ceramics in thermal plasmas.
- Studies on the carbonization of liquid and solid precursors in thermal plasmas.
- Generation of carbon deposits by laser ablation with special regard to fullerene formation.
- Studies of laser-induced gas-phase reactions and products by semiempirical and "ab initio" calculations.

Researches in the field of electrochemistry and corrosion.

Development of novel measuring techniques and instruments based on electrochemical noise analysis, Faradaic distortion, and electrochemical impedance spectroscopy (EIS). Characterization of electrochemical and corrosion processes. Development of corrosion protection methods. Research activities in trace analysis of metals by stripping voltammetry.

Main activities:

- Studies on the rate of corrosion processes through noise analysis.
- Studies on mechanisms and kinetics of metal dissolution by harmonic analysis and EIS.
- Control of surface treatment of metals.
- Determination of metals in very low concentration by electroanalytical methods in biological matrices.

Researches in the field of environmental chemistry

Thermal decomposition and controlled temperature combustion of macromolecular

materials using thermogravimetry-mass spectrometry, pyrolysis-gas chromatography and infrared spectrometry. Kinetics of gas-solid reactions of environmental impact. Characterization of oxide surface in terms of their structure, acid-base properties, reactivity and catalytic activity. Chemical aspects of the treatment of hazardous wastes. Study of the effect of heat recirculation in evaporation by solar or low temperature waste energy. In all these fields special emphasis is placed on the environmental issues.

Main activities:

- Formation of pollutants during the controlled temperature combustion of coals, cokes and biomass chars. Feedstock analysis in clean coal research and development programs.
- Kinetics and mechanism of thermal decomposition and thermal oxidation reac-

tions of cellulose, lignin, biomass materials, chars and coals. Mathematical modeling of char reactivity in oxygen-containing ambient gases.

- Thermal decomposition of polyolefins, silicon organic polymers, chlorine containing polymers, phenolic resins and plastics additives.
- Evolution of harmful compounds under pyrolysis and combustion of synthetic polymers.
- Development of special experimental systems and computer programs.
- Preparation La_2O_3 based catalysts for the selective hydrogenation of aniline and for the COS synthesis.
- Development of methods for the utilization of halocarbon wastes, spent barium salts, vanadia containing flying dusts, waste CaF_2
- Development of efficient methods for seawater distillation by solar and/or waste energy.



The X-ray Photoelectron Spectroscopy (XPS or ESCA) laboratory dedicated to surface chemical and structure investigations

TTKL RESEARCH LABORATORY FOR BIOPHYSICS

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Telephone: (36-1)-267-6261
Telefax: (36-1)-266-6656
Director: Györgyi Rontó D.Sc.
(Biology)

Scope of activities

The main scientific direction in the Laboratory have been traditionally: molecular biophysics and environmental biophysics. The first category involves structural studies concerning the conformation of biological macromolecular systems and its change under the influence of binding of special molecules (chemicals, pollutants, substrates, pharmaceuticals etc.) and of external physical conditions (high pressure, low temperature, radiation etc.). The second category involves the further development and refinement of previously elaborated methods to assess the biological hazard originated from UV radiation (from environmental and artificial sources) and possibly combined with chemical pollution. The aim is to elucidate the molecular mechanisms behind these effects.

Research aims and topics

Molecular biophysics

The techniques to be used are mostly available in the Laboratory at present, however, some further development is planned according to the future progress.

Current topics:

- Study of the conformational stability of fundamental protein structures by using a

variable temperature pressure cell and combined FTIR, laser excited low temperature and conventional luminescence spectroscopy both in steady state and time resolved mode.

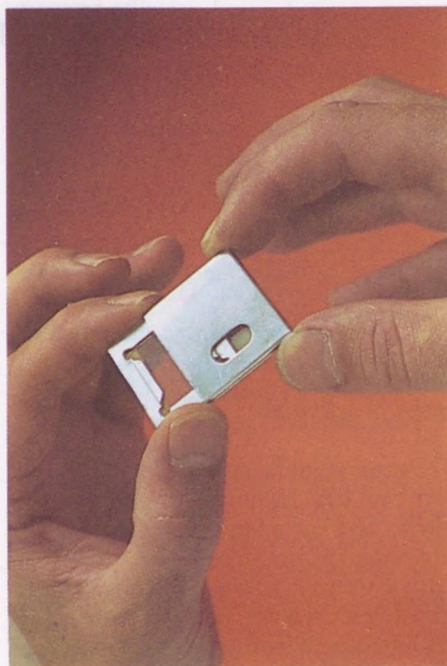
- Energy selective spectroscopy (FLN and hole burning) to study the interaction of metal free- and Mg-Porphyrins and their protein environments relevant to the understanding of electrontransfer processes
- Studies based on tryptophan luminescence to understand the mechanism of enzyme inhibition (HIV protease) and that of the functioning of heat-shock proteins (α -crystalline)
- Steady state and time resolved luminescence spectroscopy of porphyrin derivatives based on the emission of tryptophan in human serum albumine (HSA) and that of the porphyrins to study the binding mechanism of HSA.
- Photophysical characterization of porphyrin derivatives designed for using in tumor diagnosis and therapy
- Raman spectroscopic studies of the structure of normal and mutant phage coat-proteins in native and UV irradiated (UVA, UVB and combined) conditions
- Qualitative and quantitative investigation of the photoproducts in phage T7, used successfully as detector in biological UV dosimetry. Photoproducts will be induced by UV radiation of different wavelengths, in absence and in presence of photosensitisers and photoprotective substances
- PCR method will be used for the determination of UV photoproducts in specific genes (important for the phage development) of phage T7
- Comprehensive investigation of the effect of new membrane active drugs (e.g. melittin, syringomycin) which form ion conducting channels in red blood cell membrane.

Environmental biophysics

Research adjoins the aforementioned molecular biophysical investigations elaborated in a wide international cooperation.

Current topics:

- To develop more accurate and sensitive procedures for the measurement of biologically effective UV dose
- Study of the fidelity and applicability of the different UV-dosimeters of various spectral sensitivities
- Evaluation, comparison of the biologic effectiveness of doses coming from various UV sources with different spectral irradiances
- Based on the established and checked national UV monitoring network to join the European/world monitoring network
- To extend the use of phage T7 biological dosimeter system for measuring the biological damage caused by simultaneously occurring environmental UV radiation and chemical pollution
- To study the superposition/cooperativity/antagonism of environmental radiation and chemical pollution



Personal dosimeter consisting of polycrystalline uracil developed in the RLB for measuring the biologically effective UV doses

TTKL LABORATORY FOR GEOCHEMICAL RESEARCH

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Postal address: H-1502 Budapest, Pf.132.

Telephone: (36-1) 319-31-45

Telefax: (36-1) 319-31-45

Director: György Pantó O.M.

Scope of activities

Basic research in the fields of petrogenesis, formation of mineral deposits and of environmental geochemistry. Special attention is paid to the complex geochemical-petrological processes related to the formation of the mineral raw materials of Hungary, to the factors determining their accumulation and many-sided utilization. Investigation of the geochemical processes taking place in the geospheres and at their boundaries ensures the basis for the special trends of environmental research.

Research aims and topics

Taking into consideration the advantages of continuity in activities, the research aims are

based on the methods and topics which have successfully been applied and elaborated in the last few years. The Laboratory intends to improve its activities in fields which derive from the inherent necessity of the development of geosciences in Hungary and to initiate new research fields either in a methodological or in a regional context. This research is to be realized in the following scientific fields: geochemistry of the processes of mineral- and petrogenesis, theoretical and methodological research related to energy-producing and other mineral resources and the introduction of promising topics, and the improvement of traditional research. The research topics are as follows:- Mineralogy, petrology and geochemistry of the processes of sedimentary and metamorphic rock formation;- Geochemistry of fossil fuels (petroleum, coal), (extensive knowledge of their genesis enables to promote their exploration as a means of improving their many-sided utilisation);- Geochemistry of igneous processes and isotope geochemical investigation of geological problems in Hungary;- Research of the geochemical state of Hungary, primarily to determine the extent of supply of bioessential elements.



Finnigan MAT delta S isotope ratio mass spectrometer

CENTRAL RESEARCH INSTITUTE FOR CHEMISTRY



View of the institute

Address: Budapest, Pusztaszeri út 59–67.

Postal address: H-1525 Budapest, Pf. 17.

Telephone: (36-1) 325-7900, (36-1) 325-7933

Télex: (36-1) 325-7554

Director: Ferenc Márta O.M.

The Central Research Institute for Chemistry was founded in 1954. From the beginning, research on the relationship between the structure and reactivity of molecules played a central role in its activities. The Institute has carried out pioneering work in several disciplines in Hungary. Its activity covers fundamental as well as applied research topics on chemistry and related subfields. The scientific output is represented by 220–240 papers in international journals and 20–30 books and book chapters, annually.

The Institute currently has a staff of ca. 380, incl. 154 scientists. Among the latter, nine are members of the Hungarian Academy of Sciences, 35 hold D.Sc. and 54 Ph.D., C.Sc. degrees.

Scope of Activities of the Institute

The basic activities of the Institute are as follows:

- Basic research conducted in the field of chemistry and related branches of science, with special regard to correlation between chemical structure and reactivity.
- Joint research projects carried out under international and national scientific cooperative programs.
- Strategic investigations aimed at development of the pharmaceutical industry, chemical industry, agricultural and food industry, as well as public health, and environmental protection.

- Participation in solving research and development tasks for domestic and foreign enterprises of the chemical and pharmaceutical industries.
- Based on the results attained, scaling up experimental preparative procedures, and the preparation of special compounds requiring high level technology.
- Contribution to the dissemination of knowledge and cultural development in Hungary, in the field of chemistry as well as in higher education and scientific post-graduate training.
- Maintaining a special chemical library.

Research aims and topics

In the period 1996–1998, scientific investigations have been planned in the following areas:

- bioorganic chemistry,
- organic chemistry,
- physical chemistry,
- macromolecular chemistry,
- structural chemistry and analysis.

Bioorganic chemical investigations contribute to the development of novel original pharmaceutical preparations through the elucidation of the mechanism of biopolymer reactions playing an important role in physiological processes.

Investigations in organic chemistry cover the elaboration of novel methods of syntheses – and the preparation of new molecules of both scientific interest and therapeutic significance owing to their favourable physiological properties.

Through a closer insight into the kinetic and catalytic properties of reaction mechanisms, physical chemical research offer a theoretical basis for the elaboration of new, environmentally benign, economical technologies for the chemical industry and for the solution of environmental problems.

Macromolecular chemical research lays

the foundation for the preparation of novel synthetic substances on the basis of correlation between polymer structure and properties, by means of polymerization kinetics and polymer degradation studies.

Structural and analytical chemical investigations contribute to realizing tasks in other research areas, and by developing special spectroscopic, diffraction- and analytical techniques and determining the correlation between material properties and their corresponding (spectroscopic, analytical) parameters, lead to important information in the field of basic research, as well.

The research projects of the Institute planned are as follows.

Bioorganic Chemistry

- Bioorganic chemical and instrumental analysis of biopolymers
- Bioorganic and medicinal chemical research of nucleosides and nucleotides
- Induction of cytochrom P-450 and conjugation enzymes. In vitro biotransformation of xenobiotics
- Investigation of transmembrane flux of ions and molecules by chemical fast kinetic techniques
- Chirality of drugs and chiral recognition, significance of conformation
- Synthesis, structural investigation and physiological effect of polysaccharide metal complexes

Synthetic Organic Chemistry

- Synthesis, investigation of structure and reaction ability of heterocyclic compounds
- Synthesis and investigation of nitrogen, sulfur and phosphorus containing sugar derivatives
- Stereo and enantioselective synthesis of natural organic compounds
- Synthesis of isotopically labelled compounds
- Studies on herbicide biochemistry

Physical Chemistry

- Environmentally benign homogeneous catalytic oxidation and carbonylation
- Experimental studies of chemical and biological model systems and their computer analysis
- Photochemical research aimed at problems of photobiology
- Characteristics of oxide catalysts modified by anions and/or cations
- Design and preparation of heterogeneous catalysts and their test in model reactions
- Study of "host-guest" type interactions in different heterogeneous catalytic reactions
- Study of elementary reactions by laser chemistry and physics
- Study of heterogeneous photocatalytic reactions in non-aqueous media
- Studies on synthesis, structure and new applications of zeolites and isomorphically substituted layer silicates

- Electrocatalysis and electrosorption on metal and modified electrodes
- Theoretical and quantum chemical studies

Macromolecular Chemistry

- Studies on polymerization and polycondensation kinetics and degradation of polymers
- Structure-property correlations in polymers

Structural Chemistry and Analysis

- Crystal and molecular structure investigations by X-ray diffraction
- Structural investigations by IR, Raman, NMR and MS spectrometry
- Studies by molecular graphical methods
- New applications of ESR spectroscopy in the solid-state physics and structural research
- Basic principles of chromatography and their applications



Mass spectrometry laboratory of the institute

RESEARCH INSTITUTE OF CHEMICAL ENGINEERING

Address: Veszprém, Egyetem u. 2., Hungary
Postal address: H-8201 Veszprém, Pf. 125
Telephone: (36-88)-425-206
Fax: (36-88)-424-424
Director: János Gyenis D.Sc.

1. Scope of activities

The main task of the institute is to carry out chemical engineering research, to reveal laws, reasons and general relations concerning transformation and general transport processes in chemical, physical and bioengineering methods. Within this general aim, the institute is carrying out experimental and theoretical investigations. Basic and applied research are in close relation within this activity.

The institute is also responsible for monitoring and coordinating chemical engineering research within our country, for international cooperation, and for transferring the scientific results to the undergraduate and post-graduate education.

2. Brief description of research fields

The institute carries out research in the following fields:

2.1. Research of chemical processes, on heat- and mass transfer, on physical (thermal and/or micro mechanical) operations, technologies, procedures and equipments.

Mathematical modelling and simulation of chemical engineering systems and processes.

2.2. Research on bioconversion, biocatalytic and down stream processing and procedures,



The main building of the Institute

mainly in the field of non-conventional bioreactors, biotechnology processes and procedures based on new principles, as well as environmental engineering research.

Applied research and strategic research projects connected to the above mentioned basic research is to be carried out in order to develop effective, economical and environment-friendly procedures and technologies.

2.1. Chemical reactions, heat- and mass transfer, physical and mechanical operations

Synthesis and structural analysis of new compounds:

Research on polycondensed heterocyclic compounds containing nitrogen, addition of

function groups suitable for ring-closure reactions. Production of new, five member heterocyclic aldehydes containing two hetero atoms condensed on benzene ring by a previous addition of the aldehyde group and by formylating the heterocyclic compounds.

Comparative study of alternative production technologies of bioactive materials:

Theoretical and experimental study of synthesis applied in the production of medicines and plant protective agents, research on the separation and analysis of optical isomers.

Application of microwave energy in organic chemical synthesis:

Study of inorganic and organic reagents fixed on montmorillonite minerals and their application in Friedel-Crafts reactions, in acid catalysed transformations and in oxidation reactions. Study of the effect of periodic irradiation by thermic and microwave energy on reaction rate, on reaction yield, on product composition and on the applicability.

Research with static mixers:

Study of hydrodynamics, heat transfer, mixing and mass transfer in homogeneous and heterogeneous systems, large scale applications and scaling up. Investigations of static mixers with special respect to the intensification of heat transfer through heat transferring walls. Mixing and segregation process in homogenisation of heterodisperse particulate solids.

Mass crystallization:

Study of the basic relationships describing precipitation processes, production of materials of good morphological properties, using spherical crystallisation and agglomeration, study on crystal form and particle size

modification using different tailor-made agents and solvents. Investigation of liquid-solid boundary surface instabilities, and kinetic processes affecting crystal properties in precipitation crystallisation processes.

Heat-treatment processes:

Investigation of the effect of convective and microwave energy transfer on the thermal treatment and drying of granular materials, suspensions, gels, crystalline and amorphous materials. The objective is to study the product quality improvement and the changes taking place in microstructure of new and valuable materials.

Processing granular materials:

Drying, granulation and coating of granular materials using intensive procedure combinations and equipment. The objective of this research is to find basic laws and relationships for fluidization and rolling bed procedures - and equipment suitable for producing granular materials from solutions and solid-liquid suspensions with respect to production of solid pharmaceutical, fertilizer, plant protective and fodder products.

Development of computer based process design,

control and monitoring systems to be applied for continuously operated fluidized bed driers, granulators and technologies. Theoretical study of the synthesis of integrated chemical engineering systems based on mathematical programming.

2.2. Bioconversion, biocatalytic processes and environmental engineering research

Multiphase biocatalytic systems:

Mass transfer and hydrodynamic study of multiphase bioreactors, process analysis of organic biosynthesis and biodegradation in

biocatalyst processes taking place on biocatalysts (enzyme or living cells) fixed on solid granular supports or on polymer or liquid membranes.

Bioconversion by integrated systems:

The bioconversion and the production yield are studied to decrease production inhibition and to increase product yield efficiency. Separation is usually carried out with polymer or liquid membrane, using extraction or adsorption.

Enzyme catalytic reactions taking place in organic solvents

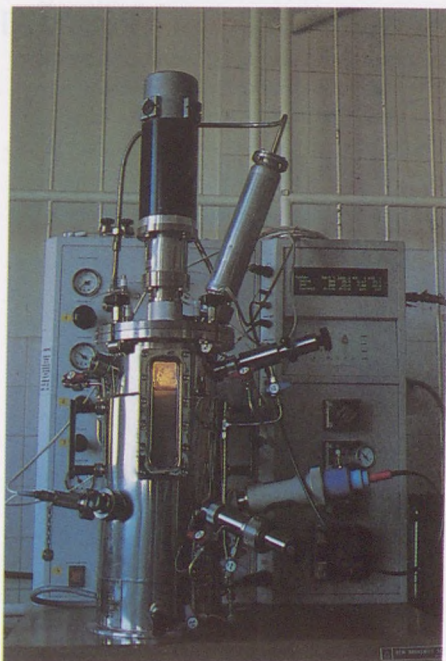
Processes developed in non-conventional solvents are studied in reactors of intermittent, semi-continuous and continuous operation, with special respect to the kinetics of the synthesis and to the parameter dependence of enantioselectivity. A special problem to be studied is the role of water content and the effect of temperature on enantioselectivity, a causal description of the enantioselectivity of biocatalysts, using the scientific results of solvent engineering.

Production of natural hexanal and hexanol

The multistep procedure of hexanol production with enzymes yields to two important aromas of natural origin, namely hexanal and hexanol. The following processes are studied in the sequence of enzyme reactions: Extraction, stability and fixing of hidroperoxide-liase enzyme. — Optimum parameters of reactions with hidroperoxide-liase catalyst. — Solutions of recovery hexanal from enzyme reaction composite.

Separation of enantiomers of racemic composites

From the separation processes mainly the utilization possibilities of liquid or solid



Bioreactor

phase membranes or on other type solid surfaces will be studied. A new element in the selection of solid granular supports is the substitution of amorphous supports with crystalline structures (for example, zeolites). In the case of these chemically modified supports separation is achieved on the basis of chromatography. The research includes chemical modification of polymer membrane surfaces. Using the enantioselective membranes obtained in this way the resolution of racemic composites can be achieved with continuous operation.

Research on environmental engineering fields

Separation, regeneration, recycling of harmful air, water and soil pollutants and their transformation into harmless formations.

Within this scope, special attention is paid to the production and application of new type, heavy metal selective cation exchanging resins and to the environment protective procedures involved in production technology. — Study of interactions between heavy metal salts and hydraulic binding materials in solid phase with solvent extraction, with respect to applications in environment protection.

Research concerning water purification and waste water treatment

Complex oxidative treatment (ozone, H_2O_2 , UV light) and biological treatment of drinking water and industrial sewage. After having studied the special methods applicable for this two fields, the possibilities of their optimum combination will be studied.

BIOLOGICAL RESEARCH CENTER

Address: Szeged, Temesvári krt. 62.
Postal address: H-6701 Szeged, Pf. 521.
Telephone: (36-62) 432-232
Telefax: (36-62) 432-576 and (36-62) 433-188
Director: Pál Venetianer O.M.

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.

Research Conception of the
INSTITUTE OF BIOPHYSICS
Director of Inst.: Pál Ormos D.Sc.

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 of the regulation processes in living matter primarily by physical methods.



The Biological Research Center of the HAS in Szeged

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 connection of 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 steroids 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 consumption
 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

Research Conception of the
INSTITUTE OF BIOCHEMISTRY
 Director of the Inst: László Vígh D.Sc.

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 physico-chemical nature of living matter, its changes, regulation of processes taking places in living matter and laws governing life phenomena.

Research aims and topics

Neurobiology project
 Signal transduction through opioid receptors in brain
 Regulation of GAD gene expression, its function in the developing nervous system
 Function of kappa opioid receptors in the development of the nervous system
 Structure and ligand binding properties of opioid receptors
 Membrane-lipid biology projects
 Molecular composition of phospholipid membranes and molecular structure and temperature adaptation of phospholipids constituting the membranes
 Studies of temperature stress and adaptation on membrane and molecular levels
 Molecular biology projects (gene structure, regulation of gene expression)
 Mechanism of controlled proteolysis
 Cytokines: effect on gene regulation
 Manipulation of bacterial-, yeast- and higher eukaryotic genomes
 Structural analysis of human mitochondrial DNA; mitochondrial RNA processing
 Sequence-specific DNA recognition by type II restriction endonucleases and modification methyltransferases
 Role of protein-nucleic acid interactions in the regulation of gene expression
 Structural and functional studies of genes of extracellular matrix proteins

Research Conception of the
INSTITUTE OF ENZYMOLOGY
 Director of the Inst: Péter Friedrich C.M.



The old building of the Institute of Enzymology

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 enzymes (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

Molecular biology of active transport proteins

Theoretical and experimental 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

Molecular immunology. Molecular mechanisms of the complement system activation

Role of dynamic enzyme associations in the regulation of mitosis and glycolysis.

Design of selective cytostatic drugs.

Research Conception of the INSTITUTE OF GENETICS

Director of the Inst: István Raskó C.Sc.

Scope of activities

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. Teach and disseminate the science of genetics at high standard.

Research aims and topics

Chromatin structure and gene regulation
Genetic and molecular studies of the role of chromatin structure in gene regulation in *Drosophila melanogaster*



Silicon Graphics workstation used for displaying protein structures

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 mechanisms

Plasmid functions in *B. megaterium*

Immune regulation in *Drosophila melanogaster*.

Relations of cell communication, signal transduction, cell division and cell differentiation

Genetic regulation of cell division

Role of tumour suppressor genes in regulating cell differentiation and proliferation

Mechanisms of cellular communication and signal transduction in the course of immune responses

Changes in DNA repair during cellular differentiation, consequences of imperfect

DNA repair in development of human genetic diseases.

Research Conception of the
INSTITUTE OF PLANT BIOLOGY
Director of the Inst.: Dénes Dudits O.M.

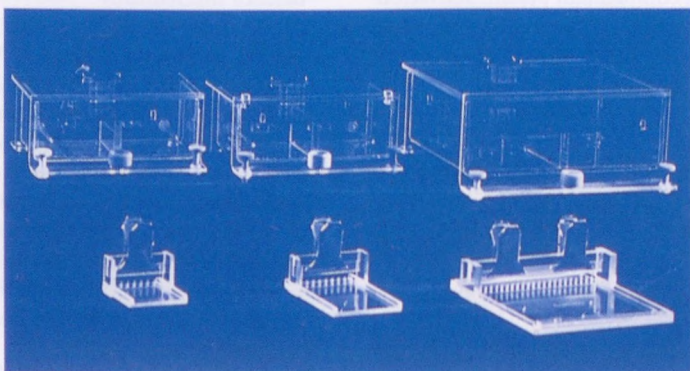
Scope of activities

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



DNA Gel Electrophoresis Systems

BALATON LIMNOLOGICAL RESEARCH INSTITUTE

Address: 8237 Tihany, Fűrdőtelep út 1-3.
Postal address: H-8237 Tihany Pf.35.
Telephone: (36-87) 448-143
Telefax: (36-87) 448-006
Director: Sándor Herodek D.Sc. (Biology)

Scope of activities

Eutrophication studies in Lake Balaton. Feeding and production biological studies of invertebrates and fishes. Physiological studies of aquatic organisms with special reference to regulatory environmental factors. Comparative neurobiological studies.

Research aims and topics

Hydrobiological research

The Department of Hydrobiology is involved in basic limnological research. The main topics of research are factors influencing phytoplankton growth in Lake Balaton, competition between algae for the limiting nutrients, and the role of bacteria in the phosphorus cycle. Special attention is given to the littoral zone including faunistic exploration studies of feeding and production of the dominant crustaceans and molluscs, and filtering activity of the periphytes. Early development stages of fishes are intensely studied in the littoral zone.

- Studies of factors influencing production and structure of phyto- and bacterio-plankton.
- Taxonomic and ecological studies in the littoral zone of Lake Balaton.



Partial view of the institute

- Studies of reed-attached periphytes, fish communities and trophic interactions in the littoral zone.

Comparative neurobiological studies

Research in the Department of Experimental Zoology concentrates on the cellular basis of neuronal regulation in invertebrates. In order to understand the functional, neurochemical and chemical-neuroanatomical bases of nervous activity organization, well identifiable regulatory processes are analysed in a complex way.

- Accumulation of environmental pollutants and their effects on the neu-

ronal regulation. The role of different signal systems in elementary and complex regulation of integration and learning processes.

- Comparative neurobiology of neurotransmitters and transmitter receptors: inter and intracellular connections.



The research vessel "Balaton"

INSTITUTE OF ECOLOGY AND BOTANY



The former manor house of Count Vagyázó in the middle of the richest botanic garden of Hungary is the central building of the institute

Address: Vácraót, Alkotmány u. 2-4.

Postal address: H-2163 Vácraót,
Alkotmány u. 2-4.

Telephone: (36-27) 360-147, (36-27) 360-122

Telefax: (36-37) 360-110

Director: Edit Kovács-Láng C. Sc. (Biology)

Scope of activities

Theoretical, basic and applied research in certain fields of Ecology and Botany.

Development and care of the collections of the Vácraót Botanical Garden. 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:

- long-term analysis of coenostate-transformations during secondary successions and investigation of the generating mechanisms
- study of degradative and regenerative processes

- plant-soil tolerance relations
- landscape ecology and vegetation-history
- investigation and simulation of changes in the pattern of the vegetation
- scaling problems in space and time
- community controlled population dynamics
- developing botanical and ecological databases
- 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 Fer-

tő, characteristic of that part of the lake on Hungarian territory, in order to establish the strategy for its protection, in Fertő-Hanság National Park.

- Hydrobiological investigation of small water courses of biosphere reserves: physical, chemical and biological measurement of their status, and natural protection evaluation.
- studies of hydrobiological status, biodiversity, and long-term changes of the different sections of the Danube, and their floodplains
- limnological investigation of Lake Fertő, special attention is given to the expanded reed-belts.
- hydrobiological investigation of small water courses of Pilis Biosphere Reserve.

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



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

data. Elaboration 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.

- 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 for 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 scientific task for the Institute is the continuous development and care of the plant collection of the Botanical Garden.

INSTITUTE OF EXPERIMENTAL MEDICINE

Address: H-1083 Budapest, Szigony u. 43.
Postal address: H-1450 Budapest Pf. 67.
Telephone: (36-1) 210-0819
Telefax: (36-1) 210-0813
Director: E. Sylvester Vizi O.M.

Scope of activities

The Institute of Experimental Medicine is the only dedicated medical research institute in Hungary. Its focus is on basic research in biomedical sciences, emphasizing brain research, including studies of neurotransmission (using neuroanatomical, electrophysiological, neurochemical, pharmacological methods), behaviour, ischemic brain damage, central and peripheral control of hormone secretion. All teams use multidisciplinary approaches trying to combine traditional, well-established methodology with new technologies of cell and molecular biology. Most of the research encompasses fields in the basic biomedical sciences or seeks answers to practical or clinical problems, aiming to improve the quality of life.

Research aims and topics

Neuropharmacological studies

Progress made in neuropharmacology is respected by the scientific community as evidenced by the very high citation rate of their publications. Research topics include:
Non-synaptic connections in neural networks (hippocampus, striatum).
- Identification, localization, determination of subtypes and elucidation of the physiological role of auto- (α_2 , M2, A1, etc.)



The view of the institute

- and hetero- (cholin, α_2 , A1, M2) receptors.
- The function of presynaptically colocalized receptors.
- The transmitter and modulatory role of extracellular nucleotides and nucleosides (in the habenula, ganglion, etc.)
- ATP as a fast transmitter.
 - Immunocytochemical elucidation, localization and functional enzymkinetical determination of ecto-ATP-ases.
 - The effects of adenosine- and ATP (ADP)-receptors on ion-channels (patch clamp, $(Ca^{2+})_i$ -determination).
- The role of the sympathetic nervous system in the modulation of immune responses using an animal model of septic shock.

Neuroendocrinological studies

Neonatal endocrinology.

- The regulation of hypophyseal hormone secretion in neonates.

Hormonal regulation of the behaviour.

- The effect of life experience on the reactivity of rats to stressful stimulation and behavioral manipulations.

The role of neurotransmitter and neurohormone receptor expression in neuroendocrine regulation.

Functional neuroanatomical studies

- Anatomical, electrophysiological and neurochemical analysis of neuronal networks in archi- and neocortical regions.
- Changes in hippocampal neuronal circuits in animal models of epilepsy and in the temporal lobe of human epileptic patients.

Molecular neuroendocrinological studies

- Investigation of stress-related functions at systemic and molecular levels.

- Using functional neuroanatomical techniques, studying stress-related neural circuits that mediate physical, psychogen and immunec challenges.

- Characterization those mechanisms and factors that regulate the expression of stress-related genes in vivo.

Gastrointestinal research

- Studies on neuronal and hormonal mechanisms regulating gastrointestinal secretory and motor function.
- Analysis of differential gene expression in the pancreas in health and disease (cancer and pancreatitis).

Cell-biological studies

- Hormone co-expression and differential regulation of hormone release in human and rat adenohypophyseal cells; modulation of growth hormone, prolactin and corticotropin secretion with regulatory molecules and drugs.
- Enzyme-cytochemical studies on exto-ATP-ases in pituitary and neural cells; sup-



Patch-clamp recording from GABA-containing inhibitory neurons, from in vitro hippocampal slices, visualized by infrared or fluorescence microscopy attached to a CCD camera

posed roles in cell adhesion and signal transmission.

Adrenocortical research

- The role of innervation in the regulation

of adrenocortical hormone production (functional and morphological studies).

- The regulation of endogenous ouabain (natural Na-K-ATPase inhibiting steroid hormone) production.

VETERINARY MEDICAL RESEARCH INSTITUTE



The view of the institute

Address: Budapest, Hungária krt 21.

Postal address: H-1581 Budapest, Pf. 18.

Telephone: (36-1) 252-2455

Telefax: (36-1) 2521069

Director: Béla Nagy D.Sc. (Veterinary Medicine)

Scope of activities

The aim of the institute is to investigate the bacterial, viral and parasitic diseases of farm animals and to conduct molecular biology research on these areas. The overwhelming part of the work is basic research. In particular é molecular and genetic aspects are increasingly emphasized. However, the Institute's duties also include participation in different forms of "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 in-

ternationally negotiable nest of basic research continues to consolidate its position as a national resource of new knowledge applicable in prevention of infectious animals diseases

Research aims and topics

Most of the research is concentrated on studying genetic material and proteins and glycoproteins of various pathogens. Among the viruses, primarily the Herpes-, Adeno-, Paramyxo-, and tumor-viruses are investigated. Among the bacteria: E. coli, Pasteurella, Salmonella, Bordetella as well as Mycoplasma are studied to gain informations about

their less well known virulence characteristic. 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 the protozoa and 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. About the research activity in the three main areas (virology, bacteriology and fish parasitology) a brief overview is given below.

Virology projects

- Molecular studies on Aujeszky's virus: characterization of the viral genome and its modification to improve immunogenicity.
 - Molecular epidemiology of Newcastle disease virus (NDV).
 - Molecular characterization and recombinant studies of bovine Adeno- and Herpes viruses.
 - Molecular pathogenesis of bovine Herpes and Adeno viruses in diseases of farm animals.
 - Immunopathology of reticuloendotheliosis- and chicken anaemia virus infection of birds.
 - Immunological and immundiagnostic studies of Newcastle Disease Virus and of avian infectious bronchitis.
 - Elaboration of polymerase chain reaction (PCR) methods for differentiation of coronaviruses of swine.
- Bacteriology and Mycoplasma projects**
- Immunological studies on the proteins of mycoplasmas in order to explore new ways of diagnostic and protection.
 - Molecular biology of the virulence, epidemiology and immunogenic characteristics of enteric bacteria (*E. coli*, *Salmonella*).



Separation of avian immunoglobulins using LKB Chromatographic System

- Bordetella and Pasteurella infection of domestic animals with special regard to the virulence factors.

- Faunistic and systematic studies on coccidia and myxosporea of geographically related Iranian freshwaters.

Fish parasitology projects

- Pathogenesis and therapy of parasitic (myxosporean, coccidian and helminthic) diseases of fishes in Hungary.
- Effect of environmental stress factors on infestation of fishes by selected indicative parasites.

Postgradual and gradual training

There are 8 PhD students lead by scientists of the institute in their program, on the area of molecular virology and bacteriology. Lectures on veterinary microbiology are regularly given (mostly at the University of Veterinary Sciences, Budapest).

AGRICULTURAL RESEARCH INSTITUTE



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

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Telephone: (36-22)-460-016, (36-22)-460-215

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Director: Zoltán Bedő D.Sc. (Agric.)

Scope of activities

The main task laid down in the foundation deeds of the Institute is the execution of research connected with the biology, breeding and production of wheat and maize, the two most important crops of Hungarian agriculture. In addition to a broad spectrum of basic research, great significance is also attached to methodological research, including the improvement of breeding methods and the elaboration of cost-saving, environmentally sound cultivation techniques.

Research aims and topics

The main task of the research institute is to carry out complex research on plant breeding and production, in addition to participating in university education and agricultural advisory services.

Cell biology and physiology research

The cell biology and physiology research is aimed at studying the *in situ* and *in vitro* manipulation of reproductive processes and

interactions between the plant and its environment at various levels of the metabolism in higher plants. The research team is currently involved with the following projects:

- Induction of homozygous dihaploid plants from anthers containing uninucleate microspores via direct colchicine treatment to provide genetically stable DH lines in cereals.
- *In vitro* selection for tolerance of low pH and aluminium using haploid techniques in wheat and maize, and studies on the development and mechanism of tolerance.
- Establishment and maintenance of highly embryogenic haploid cell suspensions in cereals.
- Histological studies on embryo sac development in order to isolate viable egg cells of wheat species with different ploidy levels.
- Isolation and *in vitro* fusion of viable egg and sperm cells of wheat to carry out artificial fertilization.
- Transformation of somatic and gametic cells of wheat and maize via particle bombardment.
- Cryopreservation of pollen, zygotic and microspore-derived embryos of highly androgenic germplasm to establish a "Generic Gene Bank" in maize.
- Molecular analysis of the development of frost tolerance.
- Studies on the effect of cold stress and photoinhibition in wheat and maize.

Genetic research

The chief task is the classical and molecular genetic analysis of the agronomic traits of cultivated wheat and of species related to it; research also involves the broadening of the gene pool and the creation of up-to-date genetic stocks for use in breeding. The following projects are in progress:

- *In vivo* and *in vitro* research on the biochemical and genetic mechanisms of adap-

tation to environmental abiotic stress factors in cereals.

- Introduction of molecular methods (RFLP, RAPD) for the mapping of frost resistance and drought tolerance genes.
- Transfer of alien genes from related species into cultivated wheat by chromosome manipulation, and identification of chromosome segments by C-banding and *in situ* hybridization.
- Collection, preservation, evaluation and classification of gene sources from cultivated cereals and related wild species.

Wheat breeding and improvement in the genetic background

- Investigations on *in vitro* and *in vivo* stress resistance in order to develop new initial genetic stock.
- Development of selection methods designed to improve efficiency and to reduce the time required for breeding.
- Improvement in the genetic variability of wheat under suboptimum environmental conditions.
- Elaboration of the genetic and physiological basis for the creation of an extra early maturing wheat.
- Studies on the stability of traits determining wheat quality and on genotype-environment interactions.
- Examinations on the genetic and agronomic effects of different chromosome translocations.
- Inheritance and correlation of grain colour, protein content and quality traits.
- Development of wheat genotypes resistant to biotic stress and adapted to cost-saving, environmentally sound production.
- Research on wheat genotypes resistant to abiotic stress factors.
- Research into wheat genotypes with various grain quality types.
- Research on alternative cereal species.
- Application of molecular markers in studying traits related to winter survival and adaptation features.

Wheat resistance research

- Studies on host plant-pathogen relations in the case of wheat powdery mildew: dynamics of changes in races and virulence.
- Investigations on the genetic background of resistance to major diseases in wheat (powdery mildew, leaf rust, stem rust, scab).
- Research on the methodology of resistance breeding.
- Collection, testing and maintenance of resistance sources for use in breeding.
- Development of standard inocula from major pathogens for the purpose of artificial infection experiments.
- Studies on the genetic background of the pathological resistance of wheat cultivated in the Carpathian Basin.
- The department cooperates in the breeding of resistant varieties serving as the biological basis of environmentally sound, cost-saving plant protection and production technologies.
- Studies on the winter hardiness and frost resistance of cereals under natural (field) and artificial (phytotron) conditions.
- Work is underway in the department to study the combined effect of biotic and abiotic stress factors on plants and the phenomena to be expected due to global climatic changes.
- Breeding or introduction of high-yielding, good quality spring oats, and winter durum wheat and winter oats with good winter hardiness.

Maize breeding and improvements in the genetic background

- Broadening of the genetic basis of maize breeding by making use of exotic and adapted genotypes.
- Development of high-yielding maize hybrids with excellent adaptability, strong stalks and good disease resistance in the FAO 100-500 maturity groups for produc-

tion in Hungary and the surrounding countries as grain or silage maize.

- Development of maize hybrids with special endosperm compositions suitable for human consumption or industrial use, e.g. waxy, sweetcorn, etc.
- Improvements in prediction methods for selecting genotypes capable of increasing the frequency of favourable genes.
- Application of reproduction and selection methods to increase the frequency of genes controlling agronomic traits.
- Studies on changes in the frequency of genes and genotypes in heterozygotic populations.
- *In vivo* and *in vitro* testing of the homogeneity and genetic divergence of maize genotypes.
- Studies on the inheritance of tolerance to abiotic stress factors under different ecological conditions.
- Investigations on the ecological responses of homozygotic and heterozygotic maize genotypes.
- Improvements in selection methods.
- Elaboration of a selection system for "winter" generations raised in the phytotron and "summer" generations grown in the nursery.
- Studies on the effect of artificial and natural ecological systems on maize genotypes with different genetic compositions and vegetation periods.
- Investigations on the disease resistance and tolerance of various maize genotypes with respect to major pathogens.

Maize agronomy research

- The agroecological approach is emphasised, concentrating not only on yields, but also on the ecological sustainability of the production system.
- Long-term studies on the effect of crop rotation and fertilization systems on soil fertility and on the sustainability of various crop production technologies.

- Effect of various ecological and plant production factors on the dynamics of biomass production and growth in maize.
- Research designed to promote improvements in maize production: measurements on the direct and indirect effects of plant production factors.
- Elaboration of an integrated weed control system for maize.
- Characterization and control of interactions between maize production factors and ecological factors.
- Establishing an environmentally sound crop production system which makes use of a rotation of crops and the balanced application of organic manure and fertiliser in order to achieve a further increase in yields, together with an improvement in quality, while also preserving or ameliorating the fertility of the soil.
- The aim of wheat agronomy experiments is to utilise biotic and abiotic factors in environmental protection.
- In addition to field experiments, ever more importance is attached to the adaptation of simulation models, which allow plant growth and the relationships between en-

vironment and yield to be studied or predicted under diverse ecological conditions.



Small plot field trials

RESEARCH INSTITUTE FOR PLANT PROTECTION

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Télex: (36-1) 156-3698
Director: Tamás Kőmíves C.Sc. (Chemistry)

Scope of activities

This Institute is the research center for plant protection and as such 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 post-graduate training, applied research as well as in innovation.

Research aims and topics

The aim of plant protection research is to reduce crop yield losses by modern management of diseases, insects and weeds 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 creation of selective pesticides and seeking for alternative methods of management which are environmentally safe and sound.



The view of the institute

Plant Pathology Research

- Host-pathogen relationships in bacterial diseases. Early induced resistance to bacterial pathogens.
- Characterization of viruses infecting crop plants.
- Wheat stem rust resistance.
- Molecular taxonomy of *Fusarium* genus, *Fusarium* toxins.
- Mechanism of resistance to late blight of potato.
- Interactions of antagonistic microorganisms and plant pathogenic fungi.
- Role of free radicals in necrotic disease symptoms and the action of antioxidants in disease resistance.

Biochemistry Research

- Biochemical immunization of cultivated plants.
- Study of biotransformation steps of the formaldehyde cycle with special reference to the stress syndrome.

Biotechnology Research

- Phytoplasma detection and identification by NDA-based techniques.
- Construction of microorganisms for biological control of plant diseases.
- Use of genetic transformation to introduce Agrobacterium resistance into grapevine rootstocks.

Insect Pest and Insect Physiology Research

- Influence of biotic ecological factors on environmentally safe plant protection methods.

- Study of the spread and 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.

Pesticide Chemistry Research

- Development of new selective insecticides.
- Natural compounds as potential pesticides.
- Synthesis of low-dose herbicidal ingredients.
- Design and preparation of selective antifungal agents.

Weed Biology and Herbological Research

- Naturally occurring phytoherbicides in the Hungarian flora.

RESEARCH INSTITUTE FOR SOIL SCIENCE AND AGRICULTURAL CHEMISTRY (RISSAC)



View of the main building of the research institute

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Director: György Várallyay, C. M.

Scope of activities

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

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; reactor, transformer and integrator of the impacts of

other resources; 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: Qualitative and quantitative characterization of soil resources.

Quantification and prediction of soil processes for their efficient control.

Development of scientifically based, rational plant nutrition.

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

Analysis of the role of micronutrients in soil processes.

Soil Science

(1) Quantitative characterization of the spatial (vertical and horizontal) and temporal variabilities of soil properties (soil mapping, soil monitoring) with the application of up-to-date GIS facilities (in the newly established GIS Laboratory), geostatistical analyses and remote sensing.

Main research projects:

updating of the AGROTOPO and TIR soil databases (HunSIS) with the development of dialogue expert systems for their practical applications;

Hungarian coordination of the soil information and monitoring system for rational soil management and soil conservation (TIM);

Central and Eastern European coordination of the GLASOD (Global Assessment of Soil Degradation), SOTER (Soil and Ter-

rain Digital Database), SOVEUR (Soil and Terrain Vulnerability Mapping); European Soil Database and Soil Conservation Monitoring Systems programmes;

digital mapping of land degradation with the application of remote-sensing (MERA project);

development and testing of optimum methods for rational resolution soil- and land-site mapping, especially of salt affected areas.

(2) Identification of various soil functions and their multidisciplinary evaluation from the viewpoints of sustainable biomass production and environment protection.

(3) Description, quantification and modelling of the mass and energy regimes of soils, their determining and influencing factors and mechanisms for an efficient prediction and control.

Main research projects:

territorial (spatial) estimation of hydrophysical properties and moisture regime of soils, their quantitative mapping and monitoring, and the evaluation of their agroecological impacts;

study of the static and dynamic characteristics of soil solution and the mechanisms of phase interactions (solution - dissolution, ion transport, ion exchange);

description, quantification and modelling of soil degradation processes (with particular attention to acidification, salinization-alkalization, structure destruction and compaction) for their prediction and prevention.

Agrochemistry

(1) 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.

Main research projects:
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 processes and plant nutrient regimes in the soil - plant roots micro-environment.

(2) Determination of the nutrient uptake and fertilizer response of the main cultivated crops and - on this basis - the development of a modern plant nutrition system and advisory service based on soil tests, plant analyses and long-term field experiments.

Main research projects:
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 quantity and 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 agricultural and environmental consequences.

Main research projects:
quantitative and qualitative assessment of heavy metal contamination in the environment (soil sediments, surface- and subsurface waters, plants);
analysis of sources, identification of pathways (transport, transformation) and evaluation of ecological impacts of various pollutants in the soil - water - plant - atmosphere continuum, in agroecosystems and in the plant - animal - man food chain;



Recent publications in soil science and agrochemistry

evaluation of the potential possibilities of an efficient pollution control (emission, imission reduction; prevention of the time-delayed effect of potentially harmful chemical compounds (CTB effect); reduction of susceptibility of soils, vulnerability of land) with the application of modern analytical, statistical, modelling and forecasting procedures.

Soil Biology and Biochemistry

(1) 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.

Main research projects:
characterization and quantification of the biological activity of soils;

evaluation of the role of various soil enzymes (primarily amidase and phosphatase) in the nutrient regime of various ecosystems;

evaluation of the potential possibilities for the biological improvement of the efficiency of available nitrogen in soils;

quantitative and qualitative characterization of monocotyledon-associated N₂-fixing *Azospirillum* species under various ecological conditions;

study of the distribution and population-dynamics of endomycorrhizae in natural, semi-natural and agroecosystems and characterization of their role in the moisture, mass and nutrient regimes of the soil - water - plant system;

study of the microbial decomposition of plant residues under various land use practices and agrotechnical systems.

GEOGRAPHICAL RESEARCH INSTITUTE

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Director: István Berényi D.Sc. (Geography)

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 into 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 microregions, 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 Hungarian Academy of Sciences (GRI HAS) has all the personal and infrastructural prerequisites to meet the European professional requirements.

- a) Priorities should be given to the following topics:
- the analysis of the geographical consequences of global natural processes;
 - studies on the use of domestic resources and on the environmental load;



The building of the institute

- The degradation of the natural environment and local social tensions.
- b) In the field of social and economic geography:
- The present European processes intensify interregional socio-economic relations upgrading comparative geographical studies. This new approach 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 serve 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 covering 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 a 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 paleogeomorphological processes, of regional and local phenomena; landform assessment and environmental analysis; interpretation and evaluation of human impact.

- Engineering-geomorphological and environmental studies of the high bluffs along the Danube posing landslide hazard. The Danube valley between Dunaalmás and Mohács is flanked from the west by a nearly 250 kilometre long and 20 to 40 m high steep bluff liable to landslides and slumps causing serious damage to settlements, industrial objects and agriculture. A complex survey and analysis are necessary for the delineation, evaluation and inventory of the potentially endangered areas. Engineering-geomorphological and environmental effects of landslides are reasonable to show on thematic maps that might be instrumental in physical planning of the settlements affected.

- 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 five 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 site in the surroundings of the Paks Nuclear Power Plant where there may be increased 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) Palaeogeography of the Holocene related to archaeological 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 maps to be produced in international cooperation. Compilation and design is supported by an 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 is to be constructed 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 Mediterranean, United Kingdom, Belgium and the Netherlands). One of the objectives of the research programme is the identification and mapping of environmentally sensitive areas. Criteria 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 in the frame of MEDALUS III is purposed for the application of the MEDRUSH model in a catchment of medium size mostly affected by aridification. 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 has been launched in 1996 to investigate the role of

soil erosion and of the related water pollution in siltation and contamination of the lake.

- Danube Euromonitor. In the framework of the COPERNICUS programme a joint (with German, Austrian, Slovak, Hungarian, Romanian and Bulgarian participation) project has been launched with an objective to make measurements on the ecodegradation of the groundwater along the bank filtered subsurface waters. A monitoring system is to be established fixing 30 biological, chemical, toxicological and bacteriological parameters both of the river and ground waters.
- 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). Urban living spaces are increasingly taken into consideration in masterplans, but theoretical and methodological approaches to their identification are highly disputable so 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).

- In international cooperation investigations began to reveal interrelationships between nature conservation, tourism and local social conflicts.
- Research activities in ethnic and political geography are to be continued. The former are 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. The main problems to be investigated are those of the Hungarian refugees from the successor states after First World War and of Germans expatriated from Hungary following Second World War (German-Hungarian project).



Some recent geographical publications



Seismological observatory in Budapest

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e-mail: varga@ggki.hu

Director: Péter Varga D.Sc. (Geology)

Scope of activities

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

Research aims and topics

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

In the field of geodesy: research in mathematical and physical geodesy; development of methods and instruments for meas-

urement purposes, and studying various branches of geodynamics, such as earthtides and gravimetry, recent crustal movements, rotation of the Earth, etc.

In seismology the main task is a precise and rapid localization of earthquake epicentres as well as the study of earthquake physics and the seismicity of the Carpathian basin.

The observatory network becomes integrated more and more into international networks.

The structure of the Institute allows the complex application of geodetic and geophysical investigation methods and opens up new and up-to-date research themes for the institute by means of the cooperation e.g. between physical geodesy and seismology (geodynamic stations can be used as long-period seismological observatories); moreover pre- and postseismic phenomena can be investigated by the geodetic study of movements. Further field of cooperation is the application of GPS measurements for the determination of the total electron content of the ionosphere. Environmental sciences need more and more geophysical and geodetic methods. In this respect, an important task of the institute is to develop theoretical and experimental methodology.

Main topics

Aeronomy:

- Study of lower atmosphere by resonances of the Earth-ionosphere wave guide
- Study of the relation between atmospheric electricity and solar activity
- Coupling between the thermosphere, ionosphere and magnetosphere

Geodetic measuring methods:

- Improving the accuracy and the degree of automation of geodetic measurements with the aid of up-to-date electronic and image-sensing devices

- Development of instruments for the observation of geodynamic processes changing in time

Geodynamics:

- Study of the evaluation methods of measurements by gravimeter, extensometer and horizontal pendulum and interpretation of the results from a geodynamic point of view
- Application of Global Positioning System (GPS) to geodynamic 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 the surroundings (Alps, Carpathians, East European Platform) and their relationship with the physical state of the Earth's interior
- Three-dimensional interpretation of electromagnetic induction methods by analogue and mathematical modeling

Magnetosphere – geomagnetic pulsations:

- Study of the magnetosphere by geomagnetic pulsations
- 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 the geosciences
- Up-to-date data processing methods and mathematical modelling
- Geoinformatics
- Applying wide area networking capabilities

Seismology:

- Investigation of structure and earthquake sources 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



Magnetic relative observatory at Nagycenk

RESEARCH LABORATORY FOR MINING CHEMISTRY



The Research Laboratory for Mining Chemistry

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Director: Prof. Dr. István Lakatos, D.Sc.

Scope of activities

Mining chemistry is a special branch of the sciences. Basically it deals with the chemical problems of exploration and recovery of solid, liquid, and gaseous systems existing in underground reservoirs. The fundamental and applied research in this scientific field covers the whole spectrum of phenomena that influence technical efficiency. Thus, mining chemistry aims not only at a better understanding of different mechanisms but also at a contribution to the development of advanced technologies.

The Laboratory consists of three Scientific Departments dealing with research in chemistry, reservoir engineering, informatics and development of special instruments.

Research aims and topics

Fundamental and applied research in the Chemical Engineering Department covers the analytical, physico-chemical and colloid chemical aspects of the following problems:

- Determination of the composition of reservoir fluids (oil, natural gas and forma-

- tion water) by up-to-date analytical techniques (IR, UV-VIS, GC, VPO, AAS, OES).
- Equilibrium conditions in gas/oil/water/rock systems at different pressures and temperatures up to 200 bars and 150 SZIMBLUM 176 °C including the study of ionic processes (dissolution, ion exchange, inorganic chemical reactions, etc.) in the presence of EOR chemicals and dissolved gases (hydrocarbon gases, CO₂ and N₂).
 - Surface and interfacial properties (interfacial tension and viscosity and wettability) in multiphase systems in presence of different chemicals.
 - Complex rheological studies on homogeneous and disperse systems (crude oils, suspensions, emulsions, molecular colloids) under low shear rates and oscillation frequency.
 - Profile modification in oil and/or gas producing and injection wells, the corresponding fundamental and applied research in controlling horizontal water and gas coning by in-situ generated gels.

- Physico chemical fundamentals and displacement mechanism of chemical (polymer, micellar and alkaline) flooding.
- Fundamentals of physical adsorption of different materials on heterogeneous surface and application of adsorption/desorption theories to methane outburst and artificial release from coal seams.

The Reservoir Engineering Department deals with fundamental and applied research concerning petrophysical studies under reservoir conditions and improved oil recovery as follows.

- Reservoir geological characterization of formation rocks and fluids.
- Basic flow phenomena in porous and fractured reservoir rocks.
- Mechanism of displacement phenomena in ideal and natural systems.
- Diffusion and dispersion phenomena in reservoirs.
- Effect of lithostatic pressure and temperature on reservoir rocks behaviour.
- Physical (lab) modelling of conventional



Flow and rheological measurements at the Chemical Engineering Department

and EOR methods including polymer, micellar, alkaline, IFT and microbial flooding.

- Two-dimensional study of well treatment techniques.
- Manufacturing of synthetic porous systems.
- Development of lab and industrial devices for measurements of water saturation and water contents in emulsion.
- Theoretical and practical investigations of formation damage and bore hole stability problems.

The activities of the Department for Research Instrumentation and Informatics are concentrated on development of new laboratory instruments (corresponding to standard and special requirements) and industrial informatics system. The current equipments developed and manufactured by the Department for Research Instrumentation are follows:

- Single or double cylinder (tandem or twin) high pressure volumetric pumps in horizon-

tal or vertical arrangements for liquid (e.g. mercury) or gas displacement up to 1000 bars with constant or variable rates.

- Blind PVT cells.
- High pressure rolling ball viscometer for liquids operating up to 500 bars and 150 °C
- Capillary pressure apparatus operating up to 200 bars and 120 °C
- High pressure IFT meter for the determination of interfacial tension (IFT) in transparent liquid or liquid/gas systems by the pendant drop method up to 300 bars and 200 °C
- Industrial control and communication systems for process control in oil and gas fields including gas flow meter database for industrial net works, implementation of automation systems ranging from stand-alone unit control (tank-station, cells, etc.) to integrated plant facilities (Distributed Control System for industrial automation and Industrial Communication Network for Field Management).

ARCHAEOLOGICAL INSTITUTE

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E-mail: csanak@bilal.d.n
(Historical Archaeology)

INSTITUTES FOR SOCIAL SCIENCES AND HUMANITIES

Scope of activity

Archaeological and historical research in the natural sciences, from the Neolithic to the late Medieval period.

Research aims and topics

The Archaeological Synthesis of Hungary

Aims: systematic synthesis and classification of data from Prehistory to the late-medieval Turkish period in Hungary. Field excavations are arranged according to results of scientific investigations.

Projects in progress

- 1) archaeological site of Csoma, Bihar;
- 2) archaeological site of Csoma, Bihar;
- 3) archaeological site of Csoma, Bihar.

The Roman Empire and the Carpathians

Within the framework of this theme the history and archaeology of ancient research in Pannonia, the Sarmatian fields and related areas are researched.

- 1) excavation of a Roman villa in San Donato (Italy);
- 2) excavation of a Roman villa in Pannonia (Hungary);
- 3) the excavation of an extended Roman settlement (Medak-estate);
- 4) the survey of the Roman Empire.

Historical sources and archaeological horizons of Nubia

Survey, Hungary and their relations

This topic is focused on the aspects of contacts between the Carpathian Basin and South East Europe in the 6-10th century

Excavation of the Carpathian Basin in the 6-10th century

Excavation of the Carpathian Basin (6-10th century)

1) research of a dimension stone of the 4-11th centuries (Zalony)

2) research of the 10-11th century remains in the Carpathian Basin

3) Hungarian site, mining and survey in the 10th century

4) survey of the 10-11th century

5) the medieval architecture history and archaeological heritage of Transylvania

Hungarian medieval architecture

1) survey of the 10-11th century

2) survey of the 10-11th century



1. The archaeological survey

ARCHAEOLOGICAL INSTITUTE

Address: Budapest I. Úri u. 49.

Postal address: Budapest, Pf. 1250

Telephone: (36-1)-564-567

Fax: (36-1)-564-567

Director: Csanád Bálint D. Sc.

(Historical (Archaeological) Sciences)

Scope of activities

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

Research aims and topics:

The Archaeological Topography of Hungary

Aims: systematic exploration and documentation of sites from Prehistory to the late medieval Turkish period in Hungary. Publications are arranged according to recent administrative boundaries.

Projects in progress:

- archaeological sites of County Békés,
- archaeological sites of County Fejér,
- archaeological sites of 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 at a road station in Pannonia (Sárvár),
- the excavation of an extended local settlement (Ménfőcsanak),
- the coinage of the Roman Empire,

- historical sources and archaeological heritage of Nubia.

Avars, Hungarians and their neighbours.'

This topic is focused on the research of contacts between the Carpathian Basin and South East Europe in the 6–13rd centuries. Main topics:

- contacts between the Carpathian Basin and South East Europe in the 6–10th centuries,
- the pottery of the Avar period (6–9th centuries) in the Carpathian Basin,
- research of a dominion centre of the 9–11th centuries (Zalavár),
- register of the 10–11th century cemeteries in the Carpathian Basin,
- Hungarian coin minting and coinage in the 11–12th centuries,
- pottery of the 10–13th centuries,
- the medieval settlement history and archaeological heritage of Transsylvania.

Hungarian medieval archaeology.

- small fortresses of the Arpadian period (12–13rd centuries),



A view over archaeological research

- b) medieval towns (Székesfehérvár, Székelykeresztúr, Vác),
- c) medieval village structure and field exploitation,
- d) the archaeological finds of the Turkish period (16–17th centuries).

Microregional research programmes.

Within the frames of this topic the settlement 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.

- a) investigations on settlement history in the Hungarian Plain (Gyoma),

- b) the settlement history of the Hahót Basin (S-W-Hungary) from the Neolithic to the 16th century,
- c) the settlement history of the Kerka Basin (S-W-Hungary) from the Neolithic to the 16th century.

Researches on archaeobotany and physical anthropology.

- a) the cultivation of cereals and fruit from the Neolithic to the Turk period. These investigations are supported by the Interdisciplinary Analytical Centre of the Institute and the Hungarian Scientific Research Fund,
- b) the evaluation of anthropological material gained mainly from excavations of the Archaeological Institute.



The library of the institute

INSTITUTE OF ECONOMICS

Address: Budapest XI., Budaörsi út 45.
Postal address: H-1502 Budapest Pf.262
Phone: (36-1) 319-3157
Fax: (36-1) 319-3151
Director: Jenő Koltay, C.Sc. (Economics)

Research field:

fiscal policy, local government finance,
labour economics, industrial relations

The Institute of Economics has gained international reputation with the empirical and theoretical analysis of the Hungarian and Eastern European economies. The Institute is a non-profit, autonomous institution conducting fundamental and applied research. Ongoing research embraces a broad range of economic and social issues, with emphasis on fundamental research in economics. The

Institute offers competence extending from formalised economic analysis and methodology to the critical appraisal of actual economic policies. Facing the challenge of current systemic changes in Central-Eastern Europe the Institute of Economics IE also took a lead in investigating the peculiarities of transition from command economy to a market-based system.

Current projects:

Macroeconomics:

business fluctuations and economic cycles; the link between the real and financial spheres of the economy; applicability of game theory; fiscal and monetary policy, with special focus on taxation, interest rates, exchange rates, inflation and prices; stabilisation issues and sustainable growth in post-socialist economies.



The library of the institute

Mathematical economics:

macroeconomic models, economic control structures, theory of planning, input-output analysis, mathematical analysis of investment cycles, long-term economic regulation; modelling of the transition; stationary economic populations and implications for social security.

Labour economics, industrial relations and human resources:

empirical and theoretical analysis of unemployment; collective bargaining, wage determination and discrimination; unemployment compensation, employment policy and local labour markets, theory, of financ-

ing the human life-path and social security systems; longitudinal analysis in population economics.

Economics of transition:

the ways and means of creating the institutions of a market economy; macro- and micro economic development, with special attention to privatisation and other changes in institutions and corporate governance, understanding the complex nature of the transformation process through analysis of various issues including evolving capital and labour markets, industrial restructuring and agricultural reorganization, foreign trade re-orientation.



Periodicals and recent publications

INSTITUTE OF ETHNOLOGY

Address: H-1250 Budapest Pf. 29.
Telephone: (36-1) 1566-67
Telefax: (36-1) 1759-764
Director: Attila Paládi-Kovács D. Sc.
(Ethnography)

Scope of activities

- 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. (Photo - M. Hoppál)

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 between 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 "canonical visitation"
- The status of vineyards in the law of wine-growing 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



Wedding in Kisterenye, Hungary.
(Photo - M. Hoppál)

- Economic anthropological questions about the coffee production of the Kikuyu people (Africa)
- The belief-system and social organization of the Bru tribe (Middle Vietnam)

INSTITUTE OF HISTORY OF ARTS

Address: H-1014 Budapest Úri u. 49

Phone: (36-1) 1750-493

Telefax: (36-1) 156-1849

Director: Ernő Marosi C.M.

(Medieval Art, Methodology of Art History)

Scope of Activities:

- research of history, sources and monuments 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
 - church and altar patronia, 11th to 13th 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

- Hungarian art, 19th to 20th centuries
- monographic researches - researches in the



A view of the institute's library

history of art institutions, in iconography
and in history in art 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 artist /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 HISTORY

Address: 1014 Budapest, I. Úri u. 51-53.

Postal address: H-1250, Budapest, Pf. 9.

Telephone: (36-1)-561- 539

Telefax: (36-1)-566-373

Director Zoltán Szász, C.Sc. (History)

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 fori 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



The main building of the institute

- 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

RESEARCH INSTITUTE OF INDUSTRIAL ECONOMICS

Address: 1112 Budapest, Budaörsi út 45.
Postal address: H-1502 Budapest Pf. 1324.
Telephone: (36-1) 319-3164
Telefax: (36-1) 319-3169
Director: Ádám Török D.Sc. (Economics)

Scope of activities

- to carry out basic and applied research in economics
- enterprise surveys
- operating the Department of Industrial Economics at the Janus Pannonius University in Pécs
- editing and publishing of the review "Ipar-gazdasági Szemle"

Research aims and topics

- Industrial and trade policy (forecasts of structural changes in the Hungarian indus-

- try, toolkits of industrial policy, issues of EU integration on industrial and competition policy, impacts of trade liberalization, import penetration)
- Privatisation (strategic alliances, venture capital, management buy-out, public utility sector)
- Business economics (management consulting, firm behaviour)
- Quality management (quality improvement techniques, improvement of quality on efficiency)
- Human resource management (structural changes and employment in industry, changes in structure of labour force)
- Regional issues (regional differences, backward regions)
- Domestic trade (structural changes in wholesale and retail trade, effects of privatization)
- environment policy (effects of privatization on environment protection)
- diffusion of innovation (technology transfer, R+D institutions)



Publications of the institute

INSTITUTE FOR LEGAL AND ADMINISTRATIVE SCIENCES



The building of the institute

Address: 1014 Budapest, Országház u. 30.

Postal address: H-1250, Budapest, Pf. 25.

Telephone: (36-1) 155-7384

Fax: (36-1) 175-7858

Director: Prof. Vanda Lamm, D.Sc.

(International Law)

Scope of activities

- theoretical and applied research in law and legal sciences;
- comparative analysis of legal systems,
- study of the European law and the harmonization of Hungarian law with the European law;
- research in international law and human rights law;
- editing and publishing fundamental and reference works in and about Hungarian law and legal science in general;
- cooperation in research and education with research institutions and universities in Hungary and abroad

Research aims and topics (selection)

Constitutionalism and the rule of law

- revision of the constitution in Hungary: theoretical aspects;
- constitutional law and constitutionalism: theoretical and comparative aspects;
- Constitutional Courts and constitutional review in Hungary and abroad;
- constitutional problems of transition in Hungary and in Central and Eastern Europe

Human Rights

- human rights in international law (including the European Convention on Human Rights) and their implementation in national legal systems;
- social rights: their nature, scope and guarantees

Legal aspects of the protection of environment

- legal problems connected with the use of nuclear energy;
- settlement of environmental disputes in international law,
- the right to protection of environment: its basis and scope;
- legal questions of disposal of hazardous wastes

Law and market economy

- private property: its protection and regulation;
- legal forms and protection of foreign investment;

- law of privatization in Hungary and Central and Eastern Europe;
- corporate law: business corporations partnerships etc.;
- law of banking and insurance; legal regulation of the stock exchange;
- law of unfair competition, corporate mergers;
- constitutional aspects of economic regulation: its limits and forms;
- economic freedoms in constitutional law, in particular the constitutional limits of taxation

European integration and Hungarian law

- European law: institutional structures, decision-making procedures in the European Union and in the European Community;
- European law as a legal system and its relationship to the national legal systems, harmonization of Hungarian law to the European law: general problems;
- harmonization in the field of private law: consumer protection, and law of competition;



A view of the library

- harmonization of the Hungarian criminal law with European criminal law, especially in economic crimes

Other selected topics in law and legal science

- theory of legal science: nature and status;
- theory of legal interpretation, judicial application law;
- the theory of legal systems: the structure of the legal system;

- law and ethics: old and new problems;
- peaceful settlement of international disputes, in particular the law and practice of the International Court of Justice and its system of compulsory jurisdiction;
- problems of state succession in international law, in particular in Central and Eastern Europe after 1989;
- international criminal law;
- the rights of victims in criminal procedure and their right to compensation

RESEARCH INSTITUTE FOR LINGUISTICS



A view of the institute

Address: Budapest I., Színház utca 5–9.

Postal address: H-1250 Budapest, Pf. 19.

Telephone: (36-1) 175-8285, (36-1) 175-8011/276 est.

Fax: (36-1) 212-2050

E-mail: kiefer@ny01.nytud.hu,

banreti@ny01.nytud.hu

Director: Ferenc Kiefer O.M.

(Linguistics; Morphology, Semantics, Pragmatics)

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
(Lea Haader)

- First stage: Old Hungarian (to 1530's: Proto-Hungarian, Early Old Hungarian and Late Old Hungarian).

*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 (Miklós Kontra)

- 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.

*Sociolinguistic study of the Hungarian
language in neighboring countries
(Miklós Kontra)*

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

*Speech synthesis and speech perception
(Gábor Olasz)*

- 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
(Gábor Olasz)*

- Study of models for lexical access in perception considering the 'world' as phonetic unit.
- Research to clarify serial processes in speech perception.

*The structural grammar of Hungarian
(Ferenc Kiefer)*

Project aims at a theoretical description of Hungarian.

*Three-volume grammar (morphology, syntax)
already published.*

- Second stage (started in 1995): development of Hungarian from early 16th century to late 18th century.
- 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 1996): morphology. Vol. 4 to be devoted to the lexicon (lexical representations).

Child language (Zita Réger)

- 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.

Aphasia and patholinguistics (Zoltán Bánréti)

- Investigation of patholinguistic phenomena with tests to answer fundamental ques-

tions 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 (Éva B. Lőrinczy)

- Dictionary containing attested dialect words from all regions including Hungarian-speaking regions outside Hungary (started early 50's, to be finished by late 1997). Three published volumes (1: A-D (1979); 2: E-J (1988), 3: K-M (1992)). Volume 4 in preparation.

Uralic Etymological Archives (Mária Sipos)

- 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.



The library of the institute

INSTITUTE OF LITERARY STUDIES

Address: H-1118 Budapest, Ménesi út 11-13.
Telephone: (36-1) 181-1156
Telefax: (36-1) 185-3876
Director: György Bodnár D.Sc.
(literary history)

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.

Research aims and topics

- Textology
- The history of Hungarian literary criticism
- Literary theory:
the theory of interpretation,
poetics, theory of science and history of science,
understanding of literature,
sociological aspect of the Hungarian literature in the eighties
- Contemporary Hungarian literature



The building of the Eötvös College houses the institute

- 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, Croatian, Slovak, Italian, French and German institutions as well as with the Hungarian Department of Novi Sad University

INSTITUTE FOR MUSICOLOGY



The courtyard of the institute

Address: Budapest, Táncsics Mihály u. 7.

Postal address: H-1250 Budapest, Pf. 28.

Telephone: (36-1) 214-6770

Telefax: (36-1) 175-9282

Director: Zoltán Falvy D.Sc. (Musicology)

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 are internationally of outstanding importance and unique to Hungary in their field,
- to conduct research in all areas of Hungarian music history and in various special 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 conduct basic and applied research in the fields of systematic musicology,
- 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 different branches of liturgical music of medieval Hungary and Europe in the context of cultural history (plainchant, early polyphony, notation).
- Preparation of a complete edition of

gregorian antiphons from the territory of medieval Hungary.

- Publication of *Musicalia Danubiana*, a series of critical editions of musical sources, originating from 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* and of the *Thematic Catalogue of Bartók's Musical Works*.

Researches in Ethnomusicology and Ethnochoreology

- Edition of the series *Collection of Hungarian Folk Music*, initiated by Béla Bartók and Zoltán Kodály, which, prospectively,

will present the main corpus of the Hungarian folk music material.

- 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.
- Categorization of the younger layer (the 'New Style') of Hungarian folk songs.
- Collection and recording of Hungarian folk music and folk dances from the ever-smaller areas still conserving their folkloristic tradition.

Systematic Musicology

- Researches in the fields of computer-aid sound analysis and sound restoration.
- Application of methods of computerized (digital) sound analysis for the examination of recorded folk music.

INSTITUTE OF PHILOSOPHY

Address: Budapest V., Szemere u. 10.
Postal address: H-1398 Budapest, Pf. 594.
Telephone: (36-1) 11-20-243
Telefax: (36-1) 1 11-20-243
Director: Kristóf J. Nyíri, C.M. (Philosophy)

Scope of activities:

- researches in the history of philosophy,
- researches in political philosophy,
- researches in the philosophy of religion,
- researches in the philosophy of science,
- contribution to graduate and postgraduate education,
- library collection and documentation.

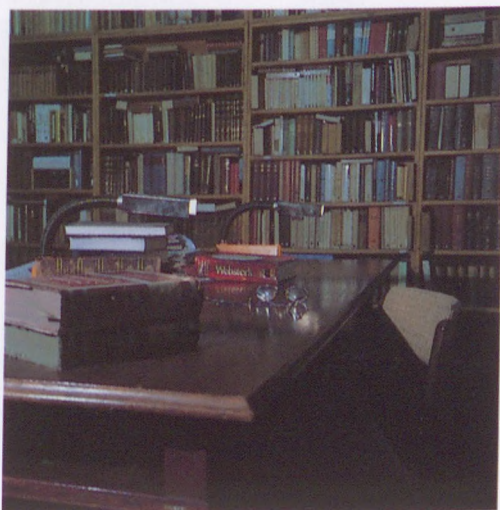
Research aims and topics:

Fundamental Researches in the History of Philosophy

- The publication of original sources of philosophy, the compilation of readers, researches in the history of patristics and scolasticism
- Researches on outstanding twentieth century philosophical ouevres

The Changing Function of European Universities

- Studies in the history of the European university, the present and future role of the universities



The library of the institute

The Role and Function of Philosophy in the Intellectual Life of Society

- The editing of a handbook and a reader for scholars of political philosophy

Orality and Literacy in the History of Philosophy

- Research on the relationship of communication technologies and philosophical ideas

Fundamental Researches in the Philosophy of Science

- The interpretation of modern sciences from the point of view of the philosophy of science
- Adaptation of foreign approaches and results in the philosophy of science

The Study of the Relationship of Human Beings and Nature in Public Education

- Research cooperation in the realization of natural science projects of the National Curriculum

Fundamental Researches in Political Philosophy

- Problems of European modernization.

- The past and present of liberalism and conservatism.

Political and Social Philosophy in the Age of Networked Communication

- Austrian-Hungarian research project on the fundamental philosophical questions of the topic.

Fundamental Researches in the Philosophy of Religion

- Systematic analysis of the modern philosophical theories of religion
- The study of modern religiousness and secularization

Religiousness and the Churches in Hungary

- Researches on the intellectual history of Hungarian religious communities in the twentieth century

The Preparation of PhD courses in Philosophy in cooperation with university departments

The Collection and Documentation of Hungarian and International Literature in Philosophy

INSTITUTE FOR POLITICAL SCIENCES

Address: Budapest, Benczúr u. 33.

Postal address: H-1068 Budapest,
Benczúr u. 33.

Telephone: (36-1) 321-4830

Telefax: (36-1) 322-1843

Director: Kálmán Kulcsár, O. M.
(Political Science, Sociology, Sociology
of Law and Legal Studies)

The Institute provides with or participates in:

- basic and applied research in political science;
- the propagation of interdisciplinarity;
- undergraduate and graduate schooling both in Hungary and abroad;
- expert advising on request to governmental branches;
- political analyses with special regard to the European integration of Hungary;
- publications of books, series (working papers), a periodical (Political Science Quarterly), and organization of bilateral and multilateral conferences and seminars;

- receives and accommodates Hungarian and foreign scholars, students and researchers.

Research tasks and topics

Political theory

- theoretical problems of modern politics
- the nature of (political) power
- democracy, pluralism, legitimacy
- modern and postmodern theories of political knowledge
- political semantics

Political institutions

- political system, constitution-building, parliamentary mechanisms
- local self-governments and power mechanisms
- civil society

Political layout of the Hungarian society

- political parties and the Hungarian party system



The library of the Institute for Political Sciences.
(Photo Mérei)

- political layout and socialization
- the relationship of social and political structure

Election research, elector behaviour

- comparative analyses of parliamentary and local elections
- party preferences as apparent from elector behaviour
- election symbols and propaganda
- political culture
- the motivation of absentees

Embourgeoisement

- group and class formation in a new proprietary and power context
- the concept of the elite, its social role
- the way of the middle class
- winners and losers of the social transformation
- transformation of the country society in view of general post-socialist tendencies (a comparative analysis)
- management of the economy, entrepreneurship, privatization
- economic and social role of the banks

Euro-Atlantic integration

- political conditions
- globalization and regional processes
- perspective effects on Hungary
- possibility of a normative conception of Europe

Migration and the question of refugees

- comparative analyses of Hungarian and European problems
- follow-up of refugee movements
- movement of peoples as a result of the European integration
- migratory potential of ethnic Hungarians
- black market, black labour



The research building which houses both the Institute for Political Sciences and the Institute for Social Conflict Research. (Photo Mérei)

INSTITUTE FOR SOCIAL CONFLICT RESEARCH

Address: Budapest, Benczúr u. 33.

Postal address: H-1068 Budapest,

Benczúr u. 33.

Telephone: (36-1) 322-16-85

Fax number: (36-1) 351-54-55.

Director: Pál Tamás, C.Sc. (Sociology)

Scope of activities:

Empirical research on social transformation; modernization of the economic and technological systems; innovation; institutional changes; the role of human resources; the elderly; systems of management; environmental concepts; communication; East and Central European comparative research; publication of research results.

Research aims and topics:

The basic aim of the Institute is twofold. First, to conduct "classic" sociological research, i.e. basic research in sociological theory and methodology; and secondly, to examine the dynamics of transition, and work out methods for solving a wide range of emerging social conflicts. This latter aim needs empirical and interdisciplinary social research on the one hand, and the pursuance of a kind of policy science on the other. As regards methodology, it is aimed to interpret the confrontation and agreement of the analytic and the normative methods of approach in working out the ways to deal with the main tensions in policy science. Just like up to now, research will be carried out in an interdisciplinary way and in international co-operation wherever possible.

The main research topics are as follows:

- Transformation in the workplace. Being a traditional area of research, it concentrates on the significant problems in the structure of the labour market, the new methods of production, and the different forms of property relations. A special section of the research is the investigation of the enterprise elites. Great attention is paid to the organizational dimensions and the communication systems of economic organizations.
- Research into civil society. The three main pillars of this research are: attempts to outline models for possible connections between the state and the civil movements; analysis of the relations between tradition and modernization in villages and small- and medium-sized towns; and finally, the elaboration of a theoretical framework for the differences and interferences affecting the civil and the state functions in the various forms of post-socialist society.
- Research into mortality. The focus of the Institute's research into the sociology of health has gradually moved to concentrating on the social factors of increased mortality rates. One of the central issues in this respect has become the complex analysis of the connections between state of health, the ecological environment and the settlement structures.
- Research into movements. One of the most important elements of conflict research is the examination of social movements. The Institute carries out research in three areas: environmental and women's movements and the activities of the independent trade unions.
- Research into the effects of technology, innovation and regional structure. Besides

- studying the institutionalization of technology, regional innovation systems and economic strategies, and making technology assessment, it is also aimed to work out new methodology in this field.
- Research into systems of knowledge creation and distribution. The four central areas are: labour science approach connected with the use of human capital; connections between the use of communications media and political culture; studies of the intellectual elites; and social and political history of the samizdat intellectuals of earlier periods.
 - East and Central European studies. In this

- context, the following issues are in the focus: different work-types in the period of planning; development models; the situation of Hungarian minorities in other countries; comparative studies on the region.
- Research into the internal effects of EU-integration. As the social effects of EU-integration will grow, the Institute is increasing its efforts to investigate the related issues, like: external centre-periphery relations; how current conflicts in Hungarian society might influence the country's accession to the EU; who will be the winners and who the losers of this process.

INSTITUTE FOR PSYCHOLOGY



The building of the Institute

Address: Budapest VI., Teréz krt. 13.

Postal Address: H-1394 Budapest, Pf. 398.

Telephone: (36-1) 322-0425

Telefax: (36-1) 342-0514

Director: György Karmos M.D., 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 promoting universal scientific progress and being di-

rectly or indirectly utilizable in the Hungarian practice; to make complex studies on scientific questions concerning different fields of psychology; to introduce and develop up to date research methods in Hungary; to participate in gradual and postgraduate education; to develop scientific cooperation with related foreign research institutions; to publish and disseminate the psychological research results and to promote their application; participate in public scientific life to improve the implementation of scientific and ethical values of psychology.

Research aims and topics

Basic processes and brain mechanisms of information processing

- Brain mechanisms of event - related potential genesis, and localization of their neuronal processes
- Elementary processes of auditory information processing and perception of speech; cognitive psychophysiological investigation on aphasic patients; event - related potential investigations in different brain diseases
- Development of speech perception, intermodal and inter - lingual comparisons, by using event - related potential methods
- Audio-visual interactions in automatic and attentional information processing; event - related potential investigations on lexical and physical stimulus features
- Cognitive psychophysiological investigations of age - related changes of mental activity

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

- Investigations on early cognitive development
- Emergence of the self
- Longitudinal investigations of attachment

The role of psychological processes in effective education

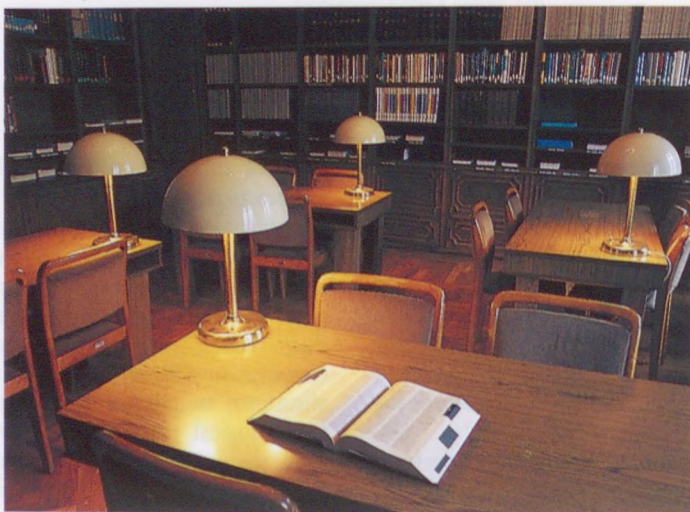
- Competition in school age children: attitudes and indirect behavior
- Identification of talented children

Processes underlying decision processes

- Characteristics of basic processes of decision
- Decision processes in visual arts

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

- Comparative investigations on literary and historical texts



The institute's library

- Authentic communication, investigations on "layman's psychology" individual forms of the representation of success
- The role of personal experiences and autobiographical memory in the representation of social objects
- Life history and reality

Psychological mediation and representation of social processes

- Social psychological investigations on deviant life histories
- Relationships between social and individual identity crises
- Investigations on Jewish identity in Hungary, antisemitism in religious context
- Political attitudes in young population

INSTITUTE OF SOCIOLOGY



The one time Carmelite cloister houses research institutions of the HAS in Buda Castle

Address: 1014 Budapest Úri u. 49.

Postal Address: H-1250 Budapest Pf. 20

Tel/Fax: (36-1) 175-4891

Director: Elemér Hankiss D. Sc. (Literary)

The Institute of Sociology was founded in 1963. It has become since the major research center of social sciences in Hungary.

Fields of activity:

Sociology of Values
Cultural Research
Social Trends
Social Anthropology and Social History
Social Politics

Research Topics:

Social Consciousness, Culture, Values, Identity

Comparative research of the political trends in Hungary

Value changes in the Hungarian society
Activity structure of the Hungarian society
The state of culture in Hungary
Cultural aspirations of the new elite
Changes in the conception on justice
Value changes, cultural changes in Hungary

European and Hungarian identity
European society at the turn of the century

Transformation of the Hungarian society

Relations of the economic actors
The Roma /Gipsy/ population in Hungary
Old and new poverty in Hungary
The emergence process of a new bourgeois society in Hungary
The new apparatus
Theoretical problems of social research
Historical problems of social research
Workers changing course of life
Changing provincial societies
Changing family structures
The changing role of women
Self-reliant society

Transformation of the socio-political system of institutions

Transformation of the health system
Development of local self-governments
Cooperation of state and private organisations in social policy
Social state of the employed pauper

Theoretical and practical questions of the European integration

Nationalism and democratisation
Regional cooperation in Europe



Library of the Institute of Sociology

INSTITUTE FOR WORLD ECONOMICS



A view of the institute

Address: 1124 Budapest, Kálló esperes utca 15.

Postal address: H-1535 Budapest PF. 936

Phone: (36-1) 319-9382

Fax: (36-1) 319-9384

e-mail: vki@vki3.vki.hu

Director: András Inotai, D.Sc. (Economy)

Scope of activities

The Institute for World Economics (IWE) was founded in 1965, three years before the first wave of economic reform in Hungary. It 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 aims and topics

Aims. The IWE's research programme in 1995 covered 15 principal research projects, two thirds of which were started before 1995, while altogether 5 new projects have been initiated in the last year. The main subjects can, however, be classified according to the traditional basic research categories, as follows:

- The main factors and trends in the development of the world economy in the medium and long term, with special attention to Hungary's situation in the changing Eastern and Central European region.
- The global world economic effects of scientific and technical development: the effect of technical change on international political and economic power relations, on the alteration of comparative advantages, on the operation of the world economy and the world market.
- The global and regional effects of the mechanisms and factors of economic and political integration, and the main conclusions to be drawn from the existence and development of an integrating Europe when formulating Hungary's development strategies. The European Union, the effect of the Association Agreement on the Visegrád-countries, immediate steps to be done in order to achieve full membership.
- The development of economic policies, trade and cooperation possibilities in the CIS (mainly Russia and the Ukraine) and Eastern and Central Europe, mutual capital flows in Central and Eastern Europe.
- Examination of aspects of the services, the

global environment and environmental protection.

- The Pacific region: lessons and cooperation opportunities for Hungary.
- The development problems of the Third World, particularly the problem of indebtedness and the experience of newly industrialized countries.

Major research topics

- Europe's place in the world economy at the end of the century
- The role of the Asia-Pacific region in the world economy and the integration of the APEC-countries
- Globalization and regionalization trends in the world economy
- Decisive world economic trends in the nineties and the main requirements, instruments and areas for adjustment of the Hungarian economy
- Hungary's External Economy. Strategic Lines of Reorientation
- The new regionalism and its impact on economic development, security and environment
- Correlation between European integration and subregional cooperation
- Development patters of the European Union in the uineties
- European integration and its impact on the Hungarian integration strategy
- Hungary's investment worthiness: A new economic strategy to attract foreign direct investments
- Contemporary Japanese studies in Hungary: literature, linguistics and language teaching
- Contemporary Japanese studies in Hungary: Arts
- Major economic issues in the transforming Central and Eastern European Countries and subregional cooperation patterns
- Agricultural transformation in East-Central Europe

CENTRE FOR REGIONAL STUDIES OF THE HUNGARIAN ACADEMY OF SCIENCES AND ITS RESEARCH UNITS

1. Centre for Regional Studies of the HAS
Pécs, Papnövelde u. 22.

Postal address: 7601 Pécs, Pf. 199

Phone: (36-72) 212-755

Phone/Fax: (36-72) 210-390

Director General: Illés, Iván

Managing Director: Ferenc, Csefkó

Chairman of the Research Board:

György, Enyedi, O.M.

Research units:

1.1 Transdanubian Research Institute

Pécs, Papnövelde u. 22.

Postal address: 7601 Pécs, Pf. 199

Phone: (36-72) 212-755

Phone/Fax: (36-72) 233-704

Director: Gyula, Horváth

1.2 "Alföld" Institute

Kecskemét, Rákóczi u. 3.

Postal address: 6001 Kecskemét, Pf. 261

Phone: (36-76) 322-331

Phone/Fax: (36-76) 482-193

Director: Bálint, Csátári

1.2.1 Settlement Research Team

Kecskemét, Rákóczi u. 3.

Postal address: 6001 Kecskemét, Pf. 261

Phone: (36-76) 322-331

Phone/Fax: (36-76) 482-193

Head of Department: Bálint, Csátári

1.2.2 "Békéscsaba" Research Group

Békéscsaba, Szabó Dezső u. 40-42.

Postal address: 5601 Békéscsaba, Pf. 185

Phone: (36-66) 328-577

Fax: (36-66) 441-801

Head of Department: Judit, Timár



The Pécs headquarters of the Centre for Regional
Studies

1.2.3 Society Research Group

Szolnok, Kossuth u. 2.

Postal address: 5001 Szolnok, Pf. 41

Phone/Fax: (36-56) 378-774

Group Leader: Zsolt, Szoboszlai

1.2.4 "Debrecen" Group

Debrecen, temető u. 2-4.

Postal address: 4015 Debrecen, Pf. 49

Phone/Fax: (36-52) 414-047

Group Leader: Süli-Zakar, István

1.3 "Budapest" Department

Budapest I. Országház u. 9.

Postal address: 1538 Budapest 114. Pf. 527

Phone: (36-1) 175-7449

Phone/Fax: (36-1) 155-2856

Head of Department: Barta, Györgyi

1.4 West Hungarian Research Institute

Győr, Liszt Ferenc u. 10.

Postal address: 9002 Győr, Pf. 420

Phone/Fax: (36-96) 329-244

Director: Rechnitzer, János

1.4.1 "Vas" County Research Group

Szombathely, Berzsenyi tér 1.

Postal address: 9701 Szombathely, Pf. 471

Phone: (36-94) 331-457

Fax: (36-94) 313-191

Group Leader: Csapó, Tamás

1.5 North-Hungarian Department

Miskolc, Széchenyi u. 61. I.em.

Postal address: 3501 Miskolc, Pf. 389

Phone/Fax: (36-46) 350-688

Head of Department: Gadócziné Fekete, Éva

The Centre for Regional Studies (CRS), the only social science research institute whose headquarters is not in the capital, was founded by the Secretary General of the Hungarian Academy of Sciences in 1984.

Until the middle of the 90's, the research work conducted by the CRS is focusing on the following main fields:

- spatial dimensions and regional diversity of the political and economic changes;
- spatial development of the new dynamic sectors in economy (including the regional interconnections of the financial institute system);
- the role and the activity of regional-local governments and of new deconcentrated administrative institutes;
- social consequences originated in the different development of regions and the method of their management;
- spatial differentiation of agricultural changes;
- settlements, districts and areas suffering from underdevelopment or being in a crisis situation;

- conditions, methods and programs of re-establishing regional-local information systems;
- new challenges of environment management in the open market economy and their legal and economic means and institutions;
- regional consequences due to the economic and social integration into Europe;
- the experience of European regional policy and its adaptability in the special Hungarian circumstances;
- fundamental issues of regional science and regional economics;
- urbanization and the new elements of rural transformation.

The fundamental characteristics of the CRS (and of its research places set up in different regions in the country, each of them with an individual profile) is that it works as an intellectual co-ordinating centre; that is it tries to co-ordinate and to involve local intellectual resources in the given area, to carry out scientific "public services", to promote local, regional and central decision making, and to operate as a link between local and national research and also between international regional projects (through its international contacts).

The CRS developed broad international research connections in the last few years. A great number of bilateral (Czech, American, Dutch, Polish, Austrian, Spanish, Slovenian etc.) co-operations were started, and the Centre is involved in several multilateral research projects as well. For example: West Virginia University (Morgantown, USA), Institute of Economics of the Estonian Academy of Sciences, Institute of Sociology of the Polish Academy of Sciences, Klagenfurt University Geographical Institute, The Urban Institute (Washington), the Economical, Geographical and Regional Development Departments of the Bayreuth University, etc. One part of the international connections is related with scholarships and compe-

tions among which the PHARE-, the TEMPUS- and the ATHENEUM- program (the EC-competition, the Agnelli Foundation, the CNRS scholarship, the SASAKAWA and TOYOTA foundations etc.) are

worth being mentioned. Many of the researchers participate in international scientific organisations (e.g.: IGU) or in international regional co-operations (e.g.: the Alps-Adria Working Community).

OFFICE FOR ACADEMY RESEARCH GROUPS ATTACHED TO UNIVERSITIES AND OTHER INSTITUTIONS

Address: Budapest, Nádor u. 7.
Postal address: H-1051 Budapest,
Nádor u. 7.
Telephone: (36-1) 117-3117, 118-2747
Telefax: (36-1) 117-4017, 117-4808
Head: Huba PAÁL
E-mail: 412331 paa@ella.hu

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

Research Groups according to Universities and Institutions:

Budapest University of Economics

Research Group for Economic and Social
History
Head: János BUZA, C.Sc. (History)
Research topic: Studies on Economic and
Social History in the 18th-20th
centuries.

Research Group for East and Central
European History
Head: Éva RING, C.Sc. (History)
Research topic: Economy, Society and
History in East and Central Europe
during the 18th and 20th centuries.

Research Group for Very Long-Term
Complex Futures Research
Head: Géza KOVÁCS, D.Sc. (Economics)
Research topic: Complex Study of Distant
Future with Special Consideration to
Newly Emerging Generating
Components.

Research Group for International Relations
Head: Zolt ROSTOVÁNYI, D.Sc.
(Economics)
Research topic: Writing Textbook and a
Reader in the Field of European
Communities.

World Economy Department Research
Group for Europe
Head: Tibor PALÁNKAI, C.M.
Research topic: Integration and
Development in Europe

Technical University of Budapest

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

Research Group for Alkaloid Chemistry
Head: Csaba SZÁNTAY, O.M.
Research topic: Synthesis of Natural
Products.

Research Group for Metals Technology
Head: János GINSZTLER, D.Sc.
(Engineering)
Research topic: Research of the Connection
Between the Microstructure and
Properties of Metallic Structural
Materials.

Research Group for Physical Geodesy and
Geodynamics
Head: Péter BÍRÓ, O.M.
Research topics: Physical Geodesy and
Geodynamics

Research Group for Geoinformatic
Head: Ákos DÉTREKŐI, O.M.

Research topic: Geoinformatics Research

Research Group for Dynamyc of Machines and Vehicles

Head: Pál MICHELBERGER, O.M.

Research topics: The dynamical behavior, linear and nonlinear oscillations of machines and vehicles. The research includes the study of stability and the deterministic chaos in such systems by using models with finite and infinite degrees of freedom.

Research Group for Informatics and Electronics

Head: László GYÖRFI, C.M.

Research topic: High Speed Telecommunication Networks.

Research Group for Control

Head: Róbert TUSCHÁK, O.M.

Research topic: Research in Control Theory and their Application.

Research Group for Condensed Matter Physics.

Head: Alfréd ZAWADOWSKY O.M.

Research topic: Condensed Matter Physics

Research Group for Continuum Mechanics

Head: Gyula BÉDA, D.Sc. (Engineering)

Research topics: Constitutive Equations and Coupled Fields of Solid Continuum, Granular and Fiber Reinforced Materials.

Research Group for Research and Development

Head: Zoltán BOROSS, D.Sc. (Economics)

Research topic: Theoretical and Methodological Problems of Research and Development

Research Group for Technical Analytical Chemistry

Head: Sándor GÁL, O.M.

Research topic: Development and

Application of Combined Instrumental Analytical and Structural Chemical Methods for Complex Analytical Purposes

Research Group for Organic Chemical Technology

Head: László TÓKE, C.M.

Research topic: Chemistry and Chemical Technology of Biologically Active Compounds and Fiber Forming Natural Polimers.

Research Group for Design Theory of Structures

Head: Miklós IVÁNYI, D.Sc. (Engineering)

Research topic: Design Theory of Engineering Contructions.

Research Group for Theory of Structural Stability

Head: Zsolt GÁSPÁR, C.M.

Research topic: Theory of Structural Stability

Research Group for Reinforced Concrete

Head: Endre DULÁCSKA, D.Sc. (Engineering)

Research topic: Characteristic Properties of Reinforced Concrete

Medical University of Debrecen

Research Group for Biophysics

Head: Sándor DAMJANOVICH, O.M.

Research topic: Biophysical, Biochemical and Physiological Aspects of the Mechanims of Transmembrane Signalling.

Research Group for of Clinical Chemistry

Head: László MUSZBEK, C.M.

Research topic: Morphological and Functional Aspects of Cell-cell and Cell-extracellular Matrix Interactions.

Research Group for Microbial

Development Genetics

Head: Gábor SZABÓ, O.M.
Research topic: Genetical Regulation of the
Differentiation Process of
Actinomycetes and Ascomycetes
species.

Research Group for Positron Emission
Tomography

Head: Lajos TRÓN, D.Sc. (Biology)
Research topic: Role of the Receptor
Regulation in the Control of
Physiologic and Pathologic Processes:
Kinetic Investigations with Positron
Emission Tomograph.

Research Group for Tumor Virus
Head: Lajos GERGELY, D.Sc. (Medicine)
Research topic: Role of Papiloma and
Retroviruses in Etiopathogenesis of
Human Tumors.

Eötvös Loránd University, Budapest

Research Group for Applied Number
Theory
Head: Imre KÁTAI, O.M.
Research topic: Analytical and Algorithmic
Theory of Numbers, Computer algebra.

Research Group for Biotechnology
Head: László GRÁF, C.M.
Research topic: Serine Proteinases:
Comparative study of molecular
mechanisms of zymogen activation and
substrate-specific catalysis.

Research Group for Theoretical Physics
Head: Károly NAGY, O.M.
Research topic: Theoretical Particle
Physics and Statistical Physics

Research Group for Evolutionary Genetics
Head: Gábor VIDA, O.M.
Research topic: Genetic and Ecological
Constraints in Evolution.

Research Group for Geophysics and
Environmental Physics

Head: Attila MESKÓ, O.M.
Research topic: Global and regional studies
in geophysics, research and
development in applied and
environmental geophysics, applications
of space physics and remote sensing in
earth sciences.

Research Group for Geology
Head: János HAAS, D.Sc.
Research topic: Geology of Hungary -
Mesozoic

Research Group for Immunology
Head: János Gergely, O.M.
Research topic: FcγII-receptor Mediated
Regulation of the Antibody Production
of Human β-lymphocytes.

Research Group for Nuclear Techniques in
Structural Chemistry
Head: Attila VÉRTES, C.M.
Research topic: The applications of nuclear
techniques (Mössbauer Spectroscopy
and Positron Annihilation
Spectroscopy) to the study of
electronic-, and crystal-structures of
materials.

Research Group for Ecological Modeling
Head: Tibor SIMON, D.Sc. (Biology)
Research topic: The application of
information theoretical models, and the
methods of population biology,
coenology and ecology to the study of
supraindividual organization and its
development. Theories on biological
evolution, including macro- and
microevolutionary processes.

Research Group for Peptide Chemistry
Head: Kálmán MEDZIHRAZSZKY, O.M.
Research topic: Synthesis and
Characterization of Biologically Active
Peptides.

Research Group for Psychophysiology
Head: Tibor KUKORELLI, C.Sc. (Medicine)

Research topic: Processing of sensory information in the brain.

Research Group for Statistical Physics
Head: Péter SZÉPFALUSSY, O.M.

Research topics: Statistical Physics – chaotic Systems and Systems with Bose-Einstein condensate

Research Group for Structural Chemistry
Head: István HARGITTAY, O.M.

Research topic: Determination and Modelling of Molecular Structure by Experimental and Computational Techniques.

Research Group for Soil Zoology
Head: András ZICSI, D.Sc. (Biology)

Research topics: Systematics, Taxonomy, Zoogeography and Ecology of Soil Animals (Annelids, Nematods, and Spiders)

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

Research topic: Altaic Studies and Inner-Asian Cultural History

Research Group for Security Studies
Head: László VALKI, D.Sc. (Jurisprudence)

Research topic: Security Issues in the East-central European Region

Research Group for Philosophy
Head: Tamás FÖLDESI, D.Sc.

(Philosophy)

Research topic: Human Rights – Sociology of Knowledge

Research Group for Sociology of Law
Head: László BOROS,

Research topic: The Sociological Relations of the Independency of Judges to the Legislation.

Research Group for Jewish Studies
Head: Géza KOMORÓCZY, C.Sc.

(Linguistics)

Research topic: Research into Hebrew, Jewish Studies, History of Jews in Hungary.

Research Group for Communication Studies

Head: György HUNYADY, D.Sc. (Psychology)

Research topic: Communication theory research: communication in society, mass communication, methodological and interdisciplinary investigation of public thinking.

Research Group for Hungarian-French Workshop for Research in Social Sciences.

Head: György GRANASZTÓI, C.Sc. (History)

Research topic: Intensive postgraduate education within the frame of the agreement between the Hungarian Academy of Sciences and the Ecole des Hautes Etudes en Sciences Sociales for scholars beginning their professional career of social sciences according to the ideas of the French Annales School.

Research Group for Hungarian Literature
Head: Zoltán KENYERES, D.Sc.

(Literature)

Research topic: The 20th Century History of Literature.

Research Group for Hungarian Historical Linguistic

Head: Erzsébet ABAFFY, D.Sc. (Linguistics)

Research topic: The Continuation of the Historical Grammar of Hungarian.

Research Group for Social Policy

Head: Zsuzsa FERGE, D.Sc. (Sociology)

Research topic: Social Policy of the European Union. Social Rights and Welfare Remiges in Europe.

University of Agricultural Sciences, Gödöllő

Research Group for Animal Breeding
Head: János DOHY, C. M.
Research topic: Finding Development and
Making use of new Genetic-
biotechnological Possibilities in Animal
Breeding.

Research Group for Process Control
Head: István FARKAS, D.Sc. (Engineering)
Research topic: Process Control in
Agriculture.

Research Group for Molecular Genetics
Head: László ÓROSZ, D.Sc. (Biology)
Research topic: The Molecular basis of
Genetic Regulation with Special
Emphasis on Sequence Specific
DNA-protein Interactions.

Research Group for Botany and Plant
Physiology
Heads: Margit KOVÁCS, D.Sc. (Biology);
Zoltán TUBA, D.Sc. (Biology)
Research topic: The Effect of Global CO₂
Rise on the Production and Element
Concentration of Plants

József Attila University, Szeged

Research Group for Biocoordination
Chemistry
Head: Kálmán BURGER, O.M.
Research topic: Coordination Chemistry of
Biologically Active Compounds and
their small Molecular Models.

Research Group for Reaction Kinetics
Head: Friegyes SOLYMOSI, O.M.
Research topics: Heterogeneous Catalysis,
Surface Science, Solid State Chemistry,
Relation of CO₂, CH₄, hydrocarbons,
elimination of NO pollutant.

Research Group for Laser Physics
Head: Zsolt BÖR, O.M.
Research topic: Generation and
Measurement of Ultrashort Light
Pulses; Propagation of Ultrashort
Pulses through Optical Systems.

Research Group for Artificial Intelligence
Head: János CSIRIK, D.Sc. (Mathematics)
Research topic: Syntactical Methods in
Pattern Recognition.

Research Group for Microbiology
Head: Lajos FERENCZY, O.M.
Research topic: Formation and Molecular
Genetic Analysis of Transgenic Fungal
Strains.

Research Group for Organic Catalysis
Head: Mihály BARTÓK, O.M.
Research topic: Investigation of
Stereoselective and Enantioselective
Catalytic Reaction of Organic
Compounds.

Research Group for Ability Development
Head: József NAGY, D.Sc. (Pedagogy)
Research topic: Structure and Development
of Cognitive Abilities.

Research Group for Hungarian Literature
Head: Lajos CSETRI, D.Sc. (Literature)
Research topic: Researches on the Cultural
History and History of Ideas in the
Field of Old and Classic Hungarian
Literature

Research Group for Early-Hungarian
History
Head: András RÓNATAS, O.M.
Research topic: Complex Researches into
the Formation of the Hungarian
People in the Early Middle Age.

Janus Pannonius University

Research Group for Taxonomic Botany
Head: Attila BORHIDI, C.M.

Research topic: Phanerogam Biotaxonomy
Research Group for Industrial Economy,
Management Consulting
Head: Zsuzsanna KURUCZ, C.Sc.
(Economy)

Research topic: International
Competitiveness of Hungarian
Economy, Privatization Theory and
Practice.

University of Horticulture and Food Industry, Budapest

Research Group for Plant Physiology
Head: Gábor HORVÁTH, D.Sc. (Biology)
Research topic: The effect of environmental
pollutant heavy metals on the
regulatory physiological processes of
plants and the elaboration of heavy
metal tolerant, transgenic plants.

Kossuth Lajos University, Debrecen

Research Group for Antibiotics
Head: Ferenc SZTARICKAI, D.Sc.
(Chemistry)

Research topic: Basic chemical research is
carried out on the structure elucidation
and chemical synthesis of different
antibiotics, especially their
carbohydrate constituents, synthesis of
mono- and oligosaccharide moieties, β -
lactam antibiotics and other
biologically active natural products.

Research Group for Physics
Head: István LOVAS, O.M.
Research topic: Applications of the
Methods of Field Theory and
Statistical Physics.

Research Group for Homogeneous
Catalysis
Head: Ferenc JOÓ, D.Sc. (Chemistry)
Research topic: Metal Complex Catalysis in
Inorganic, Organic and Biochemistry.

Research Group for Microbiology and
Biotechnology
Head: Attila SZENTIRMAI, D.Sc.
(Biology)

Research topic: Regulation of Biosynthesis
of β -lactam Compounds.

Research Group for Ecology
Head: Pál JAKUCS, O.M.
Research topic: Complex Research of
Terrestrial Ecosystems.

Research Group for Number Theory
Head: Kálmán GYÓRI, C.M.
Research topic: Dihantine Number
Theory, Effective and Quantitative
Investigations.

Research Group for Carbohydrate
Head: András LIPTÁK, C.M.
Research topic: Chemoenzymic Synthesis
of Cell-surface Oligosaccharides.

Research Group for the Textology
of the Enlightenment
Head: István BITSKEY, D.Sc. (Literature)
Research topic: Csokonai and his Era.

Research Group for 20th Century
Hungarian Literature
Head: Attila TAMÁS, D.Sc. (Literature)
Research topic: Postmodernism as a Typical
Tendency in Contemporary Literature
and as an Umbrella Term Subsuming
Various Tendencies.

Research Group for 20th Century
Hungarian Literature
Head: András GÖRÖMBEI, D.Sc.
(literature)
Research topic: The Literatures of
Hungarian Minorities of Today.
Research Group for Anthropology
Head: Zoltán ÚJVÁRY, D.Sc. (History)

Research topic: Interethnic Relations and Regional Anthropological Researches in East-Central Europe.

University of Miskolc

Research Group for Material Science
Head: András ROÓSZ, D.Sc. (Engineering)
Research topic: The Theory of the Rapid Solidification of Alloys.

Research Group for Mining and Geotechnical Engineering
Head: Ferenc KOVÁCS, O.M.
Research topic: Geotechnological Methods of Final Disposal of Materials, Damaging the Environment.

Research Group for Production Engineering
Head: Illés DUDÁD, D.Sc. (Engineering)
Research topics: The complex analysis of machine industrial technologic, concentrated on the production geometry of sophisticated geometrical forms, and Computer Aided Production Engineering research fields.

Research Group for Thermál Energy
Head: Attila BÍRÓ, D.Sc. (Engineering))
Research topic: Combustion, Heat and Mass Transfer at 1000...1600 K Chamber Temperature.

Research Group for computational Mechanics
Head: István PÁCZELT, O.M.
Research topic: Nonlinear Analysis and Computational Procedures for Solids and Structures.

Research Group for "Szabó Lőrinc"
Head: Lóránt KABDEBÓ, D.Sc. (Literature)
Research topic: Preparation of the Critical Edition of the Works of Szabó Lőrinc.

Pannon University of Agriculture, Keszthely

Research Group for Agricultural Chemistry
Head: Béláné DEBRECZENI, D.Sc. (Agriculture)

Research topic: Interactions between Plant Nutrients Supply and Soil Fertility.

Research Group for Animal Science and Animal Hygiene
Head: Péter HORN, O.M.
Research topic: Study of Kinetics and Toxicity of Noxious Substances in the Food Chain.

Research Group for Plant Virology
Head: József HORVÁTH, C.M.
Research topic: Research on Biology, Ecology and Resistance of Plant Viruses.

Medical University of Pécs

Research Group for Clinical Genetics
Head: Károly MÉHES, O.M.
Research topic: The aim of group is to get more information on the pathomechanism of congenital human genom abnormalities, particularly of somatic mosaicism by molecular and cytogenetic techniques applied on various tissues.

Research Group for Fluorescence
Head: Béla SOMOGYI, D.Sc. (Biology)
Research topic: Interrelationship between protein dynamics and function: investigation of proteins in solution and in structured environment by means of fluorescence spectroscopy.

Research Group for Neuropharmacology
Head: János SZOLCSÁNYI, C.M.
Research topic: Capsaicin and the Pharmacophysiology of the Primary Afferent Neurons.

Research Group for Neurophysiology
Head: László LÉNÁRD, D.Sc. (Medicine)
Research topic: Studies on neural mechanisms of motivation, learning and reinforcement by means of behavioural, electrophysiological, neuroendocrinological and neurochemical.

Research Group for Neuroendocrinology
Head: György SÉTÁLÓ, D.Sc. (Medicine)
Research topics: Investigation of neurohormone producing neuronal systems and the structure-function relationship of hypophysiotropic hormone analogs.

Semmelweis Medical University, Budapest

Research Group for Neuroendocrinology
Head: Béla HALÁSZ, O.M.
Research topic: Structural and functional analysis of neuroendocrine mechanisms with a special emphasis on the hypothalamo-hypophysealtarget endocrine gland system.

Research Group for Cellular and Molecular Physiology
Head: András SPÄT, C.M.
Research topic: Biological Signal Transduction in the Plasma Membrane.

Research Group for Gastroenterology and Endocrinology
Head: Zsolt TULASSAY, D.Sc. (medicine)
Research topic: Clinical Gastroenterology and Endocrinology.

Research Group for Microbiology and Virology
Head: István NÁSZ, O.M.
Research topic: Study of the structure and function of viral antigens, polypeptides, viral and host cell genes at molecular and cellular level and in the macroorganisms.

Research Group for of Molecular Genetics
Head: Rudolf de CHATEL, D.Sc. (Medicine)

Research topic: Molecular pathophysiology - Molecular Medicine.

Research Group for Molecular Pathology
Head: Béla SZENDE, D.Sc. (Medicine)
Research topic: Examination of the factors influencing and regulating the development, proliferation, propagation and regression of neoplastic cell populations.

Research Group for Neurobiochemistry
Head: Veronika ÁDÁM, D.Sc. (Medicine)
Research topic: Mechanisms of the hypoxic and Free Radical-mediated Brain Damage.

Research Group for Neurobiology
Head: József HÁMORI, C.M.
Research topic: Functional Morphology of Synaptic Organization in the Central Nervous System.

Research Group for Neurochemistry
Head: Kálmán MAGYAR, O.M.
Research topic: The Effects off Drugs on Neurochemical Transmission.

Research Group for Neuromorphology
Head: Miklós PÁLKOVITS, O.M.
Research topic: Neuroanatomical and Neurochemical Identification and Characterization of Neuronal Pathways in the Central Nervous System.

Research Group for Neuropsychopharmacology
Head: Berta KNÖLL, D.Sc. (Biology)
Research topic: Deprenyl Resecarch. A Strategy to Improve the Quality of Life in Sencescence.

Research Group for Peptide Biochemistry
Head: István TEPLÁN, O.M.

Research topic: Synthesis of Biologically Active Peptides, Studies of their Biological Activity and Mechanism of Action.

Szent-Györgyi Albert Medical University, Szeged

Research Group for Neuroendocrinology
Head: Gyula TELEGDY, O.M.
Research topic: Endocrine and Neural Regulation of Adaptative Processes.

University of Veszprém

Research Group for Petrochemistry
Head: László MARKÓ, O.M.
Research topic: Organometallic Chemistry of the Transition Metals.

Research Group for Air Chemistry
Head: Ernő MESZÁROS, O.M.
Research topic: Air Chemistry

Research Group for Analytical Chemistry
Head: János MINK, D.Sc. (Chemistry)
Research topic: Investigation of new Possibilities in Fourier-Transform Analytical Spectrometry.

Imre Haynal Health Science University, Budapest

Research Group for Membrane Biology and Immunopathology
Head: Balázs SARKADI, D.Sc.
Research topic: Cellular and humoral factors in the normal and pathological functions of biological membranes in cell activation and in the regulation of the immune response.

Hungarian Natural History Museum, Budapest

Research Group for Animal Ecology
Head: László PAPP, C.M.
Research topic: Structure of Animal Communities.

National Széchenyi Library, Budapest

Research Group for "Fragmenta Codium"
Head: András VIZKELETY, D.Sc. (Literature)
Research topic: Exploring Old Hungarian Written and Printed Relics.

Petőfi Literary Museum, Budapest

Research Group for Mór Jókai
Head: Miklós NAGY, D.Sc. (Literature)
Research topic: An Annotated Edition of the complete Work of Mór Jókai.

Research Group for History of the Hungarian Literature
Head: Mihály SZEGEDI-MASZÁK, C.M.
Research topic: Research in the Field of 19th Century History of Literature Kálmán Mikszáth.

Research Group for Vajda János
Head: János MIKLÓSSY,
Research topic: Complete Works of János Vajda (critic edition).

**Institute for the History of the
1956 Hungarian Revolution, Budapest**

Research Group for the Research and
Documentation of the 1956 Hungarian
Revolution

Head: András B. HEGEDŰS,

Research topic: The pre-history, the History
and the Aftermath of the 1956
Hungarian Revolution and Fight for
Freedom

**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.



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