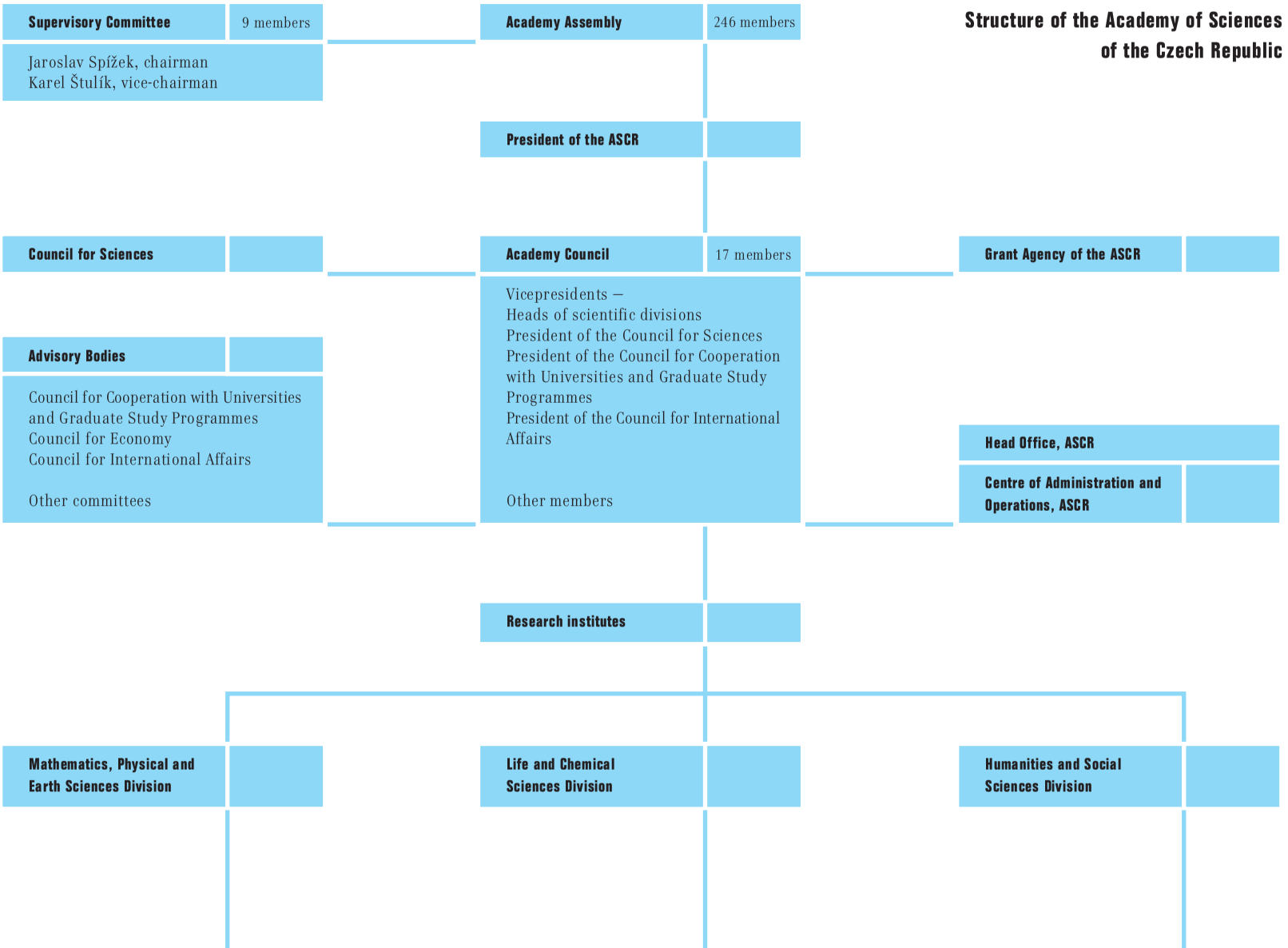
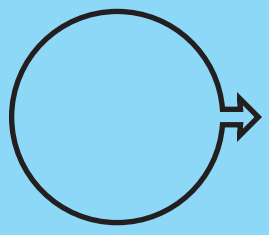
2003

ACADEMY OF SCIENCES OF THE CZECH REPUBLIC — ANNUAL REPORT

Structure of the Academy of Sciences of the Czech Republic



THE ACADEMY
OF SCIENCES
OF THE CZECH
REPUBLIC



Foreword by the President

Dear Readers,

This is Annual Report of the Academy for the year 2003. It is clear from it that the employees of the Academy have been far from lazy. They have brought us valuable and original accomplishments, whether in the realm of monitoring physical, chemical and biological phenomena, or in the fields of the humanities and the social sciences. Much of this knowledge will be applied on a short-term basis, whilst other information has a long-term outlook. What is gratifying, however, is the overall growth in output and the quality of the endeavours, all of which is testified to by rising international acclaim given to the Academy.

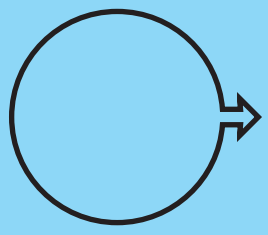
The increasing level of cooperation with universities in handling research projects, the training of students, and the generation of a common area for research and education in the Czech Republic is encouraging. The Academy has also given great attention to the popularisation of science, something it intends to continue doing in the future. Not only that, but the intention is to familiarise the public with the importance of good research and in particular to arouse an interest in learning amongst young people.

The year 2003, for which this report has been submitted, was the final year in which we continued to prepare for accession to the European Union. Indeed the year 2004 is the year in which we actually join. The EU pays a great deal of attention to the three pillars of societal development, *i.e.*, education — research — innovation. It is our hope that the Czech government will also support these pillars as much as possible. The Academy of Sciences is ready to become a fully-fledged member of the education — research — innovation community, both here at home and in the European sphere.

April 25, 2003

Illnerová

Helena Illnerová



Contents

Introduction

1

Outline of the history of the Academy

The Academy of Sciences of the Czech Republic (hereinafter referred to as the ASCR) was created by the Czech National Council under Act No. 283/1992 Col. of May 1992 and began functioning on December 31, 1992.

While theoretically a very young institution, the Academy maintains the long history of science in this country and an enduring tradition of learned societies (for details see http://www.cas.cz).

Principal objectives of the Academy

The Academy consists of 6,500 employees of whom half work in 57 research institutes and in 6 service units and in various advisory and executive bodies.

The Academy of Sciences of the Czech Republic is structured as a complex of research institutes focused primarily on *fundamental* and *strategic applied research* in the broad spectrum of natural, technical, and social sciences as well as the humanities, with its own grant and evaluation system. It is amenable both to cooperation with and evaluation by the international scientific community.

The Academy systematically and increasingly intensifies its collaboration with universities and is engaged in university education in general and PhD studies in particular.

Moreover, the Academy publishes through its publishing house, Academia professional scientific books, literature, publications for a wide company of readers, and a number of scientific and specialised journals.

The Academy has also been granted financial responsibility for 65 Czech scientific societies associated with the Council of Scientific Societies.

Unlike the former Czechoslovak Academy of Sciences and the other academies in the Central and Eastern European countries, the Academy of Sciences of the Czech Republic does not function as the supreme national learned society. In May 1994, the non-governmental *Learned Society of the Czech Republic* was therefore established as an entity independent of the Academy (further details may be found at http://www.learned.cz).

Funding

Structure of the Academy (Tables 1 and 2)

The work and activities of the ASCR are financed primarily from a special chapter of the state budget of the Czech Republic. In 2003, the amount was 3,600 million Czech crowns. This allocated sum is divided mainly among the institutes according to the evaluation of their scientific achievements. Supplementary sources of income include funds acquired from grant agencies on the basis of competition with scientific projects, and from abroad, in particular from the EU.

The pattern of funding research at the Academy conforms to current international standards. Thus, in addition to *basic institutional financing, target-oriented financing* has been introduced and is designated for scientific projects selected in public competition.

The Academy of Sciences of the Czech Republic is headed by a **President** who acts on behalf of the Academy and is responsible for managing the funds allocated to the Academy from the state budget.

The supreme body of the Academy of Sciences of the Czech Republic is the **Academy Assembly** whose 245 members are elected every four years and which meets at least twice a year. It resolves principle issues concerning the organisation and activities of the Academy, approves the allocation of the Academy's budgeted funds, and reports on the Academy's activities. The Assembly also makes decisions on establishing, disestablishing and/or merging Academy institutes, elects the President of the Academy and members of the Academy Council, appoints members of the Council for Sciences and determines the basic scope of activities of these bodies.

The permanent executive body of the Academy, elected for a four-year-period by the Academy Assembly, is the **Academy Council**. It has 17 members and directs the day-to-day activities of the Academy. It also sets guidelines for international cooperation of the Academy and appoints and recalls directors of its Institutes. It is assisted by three main advisory bodies – the **Council for International Affairs, Council for Economy and Council for Cooperation with Universities and Graduate Study Programmes.**

The main body of the ASCR for the preparation of long-range research policy and basic concepts concerning the work of the Academy is the **Council for Sciences** composed of 30 outstanding scientists from various Czech scientific institutions.

The work of the Academy and its executive bodies is supervised by the nine-member **Supervisory Committee of the Academy Assembly**, which is responsible in particular for ensuring the compliance by all Academy bodies with the Statutes of the Academy, for implementing decisions taken by the Academy Assembly and for assuring adherence to the approved Academy budget.

In 2002, the Academy established a new body for ethical issues – **Commission for Scientific Integrity.**

The network of institutes of the Academy (in 2004) includes a total of 57 specialised research institutes, 6 service units responsible for common affairs of research institutes, and the Head Office of the Academy as the executive system of the all-Academy bodies. Research institutes of the Academy are grouped in *nine sections* connected in *three divisions of science – Division for Mathematics, Physics and Earth Sciences, Division for Life and Chemical Sciences and Division for the Humanities and Social Sciences*. The supreme body of each section is the **Assembly of Directors and Chairpersons of the Scientific Councils** of the institutes cooperating in a section.

New governing bodies of the Academy – President of the Academy and the Academy Council – were elected at the XVIII Session of the Academy Assembly for the term of 2001–2005.

Number of publications in impacted magazines

	1999	2000	2001	2002	2003
Czech Republic total	4699	4809	5276	5209	6184
ASCR total	1978	1912	2029	2081	2260

A brief description of the year 2003

The Academy of Sciences of the Czech Republic entered the year 2003 with a concert to commemorate ten years of its scientific, educational and cultural activities as well as its popularisation of science. The year 2003 was no exception in that the ASCR was successfully engaged in all areas of these activities.

The Academy's institutes dealt primarily with long-term research assignments, which were financed from the Academy's budget. Together with the research that was financed from the budget of the ASCR, the institutes also worked on a wide range of specially financed research projects, such as 713 projects funded by the Grant Agency of the Czech Republic in 2003, 464 projects underwritten by the Grant Agency of the Academy of Sciences of the Czech Republic, and a great many programme projects supported by the central bodies of public administration and by other domestic providers. Last but not least, there were also international projects whose importance is increasing considering the accession of the Czech Republic to the EU.

Vladimír Nekvasil,
Jiří Velemínský,
Václav Klaus, President of the Czech Republic
and Helena Illnerová, President of the ASCR

The development of scientific output by the staff of the ASCR is shown by the following data from the database of the Institute of Scientific Information (ISI), which, naturally, only includes the number of publications in impacted periodicals.

The actual characteristics of the scientific activities of the institutes are presented in the second chapter of this annual report, including more in-depth annotation of the most significant results.

The ASCR acknowledged the results with three ASCR prizes **for outstanding accomplishments of major scientific significance,** three ASCR prizes **for young researchers for outstanding achievements,** and three ASCR prizes **for programme and grant projects.**

The ASCR also rewarded the significant achievements of individual Czech and foreign scientists in their fields and their contribution to international scientific cooperation by awarding them honorary medals of the Academy of Sciences of the Czech Republic. A list of the awards and medals presented is given in a supplement to this report.

Educational activities and ASCR's cooperation with universities and colleges also advanced, as did the transmission of results into the user sphere, communication of the results to the general public, and contact with young people. The broadening of international scientific cooperation was also significant, including as it did participation in framework programmes and the development of activities focused on the formation of a European research zone. The main results achieved in all of these areas are presented in more detail in the chapters that follow and the appendices to the Annual Report.

The ASCR devoted a great deal of attention to stimulating the younger generation of scientists in accordance with its conceptual plan. In addition, it completed part of the internal Junior Programme that was initiated in 2002. It was as part of this that another 28 outstanding young research workers were awarded the **Otto Wichterle Award** and 12 short-term, so-called "start-up projects" were apportioned support in 2003. These start-up projects were intended to financially underwrite promising researchers for a short period of time between defending their dissertations or returning from long-term visits abroad and entering another round of competition for grants. Eighty three young applicants obtained awards in competitions run by the Grant Agency of the ASCR for junior researchers´ grant projects. The Junior Programme at the ASCR will expand with another cycle in 2004, the awarding of the "J. E. Purkyně Fellowship" for talented research workers of promise, with the object to attract outstanding creative scientists to the ASCR institutes from other countries, both scientists of Czech origin who have worked abroad for some time and outstanding foreign scientists, preferably younger than forty years of age.

The year 2003 also saw the ASCR take steps aimed at **improving scientific performance at ASCR institutes**. An internal career path was compiled and research workers were classified in line with 5 qualification levels. This categorisation allowed us to facilitate transferring research workers to new, sixteen-category payment levels with an increased tariff as of January 1, 2004, thereby at least partially increasing their incomes.

Also in 2003, the Council for Sciences of the ASCR compiled regulations for awarding the recently introduced **scientific title of "Doctor of Science" (DSc.)** and began accepting applications for this title (as of October 31, 2003). The establishment of the title of Doctor of Science will allow us to increase the qualifications of research workers at the ASCR and properly award them the highest level of qualification.

The Academy Council of the ASCR began to prepare the **principles of conceptual and organisational changes in the system of institutes**, the purpose of which is to draw conclusions from the existing ten-year operation of this system and create, with sufficient lead time, conditions for the anticipated transition of the Academy's institutes to legal state-and partially self-supported public research institutions. In this connection the Institute of Musicology and the Institute of Ethnology merged on January 1, 2003 and the Institute for Classical Studies became part of the Institute of Philosophy on January 1, 2004.

The **checking system** at the ASCR focused on ensuring proper administration, the protection and use of entrusted assets, and observance of the Public Contracts Act. The suitability and effectiveness of the inspection system was continually assessed by the Academy Council.

The Academy Council also paid year-round and systematic attention to appointments to the important positions of **directors of ASCR institutes**. Directors of 14 institutes were appointed in 2003.

The year 2003 also saw the representatives of the ASCR actively participate in **overseeing general questions concerning research and development in the Czech Republic**, this in close cooperation with the governmental Council for Research and Development and the Ministry of Education, Youth and Sports of the Czech Republic. This principally concerned the preparation of a **draft Act on Public Research Institutions and**

amendments to the Act on the Academy of Sciences of the Czech Republic and other Acts related to this. We can feel confident that the remaining stages of discussion regarding these Acts will be undertaken in 2004.

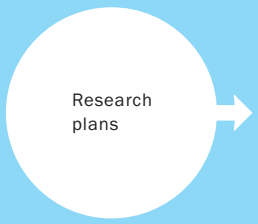
The representatives of the ASCR also actively participated in the preparation of the final version of the draft **National Research Programme I** (NRP), which the government approved in its Resolution No. 417 dated April 28, 2003. Within the scope of the NRP, the ASCR was entrusted with the task of providing public funds for thematic programme TP2, "The Information Society", and for the partial programme DP3, "The Support of Targeted Research Projects" within the sectional programme PP2, "Integrated Research". This partial NRP programme will be announced in 2004 and will enable the ASCR to build on its existing "Programme of Support for Targeted Research and Development", which is due to be completed as an independent programme in 2005.

The final basic general document dealt with was the **National Policy of Research and Development in the Czech Republic for the years 2004–2008**, which the Czech government approved in its Resolution No. 5 dated January 7, 2004. In spite of the intervention made by the representatives of the ASCR during the creative stage of this document, the comments they made were not taken into consideration. The stimulus and tasks to emerge from this document will be projected into the conceptual plan of research and development at the ASCR, a draft of which is under preparation at the Academy's Council for Sciences.

Scientific Activities in 2003 and Annotated Results of Basic and Targeted Research

2

The results of basic and targeted research at the Academy's institutes are presented by sections. Research fields are given for each section, as well as the principal lines of research done at the institutes. Annotations of some of the results are given for team studies, individual discoveries, and major publications (including the names of co-authors not affiliated with the Academy). The annotations listed, whose full texts can be found on the Academy's Web pages, form just a small but representative part of the institutes' efforts.



1 • Section of Mathematics, Physics and Computer Science

Astronomy and astrophysics of the galaxies, stellar systems, stars, the Sun, Sun-Earth relations, interplanetary bodies and artificial satellites of the Earth
• Astronomical Institute

Experimental and theoretical research into condensed systems with pronounced physical properties • Institute of Physics

Acquiring new knowledge on the properties, structure and interactions of matter on the fundamental level, building a unified theory of basic forces in nature
• Institute of Physics

Research of properties of ionized media and study of nonlinear and quantum optical systems • Institute of Physics

Complex development of all branches of mathematics with regard to the needs of physics and technology • Mathematical Institute

New computing technologies — foundations, methodologies, tools and applications
• Institute of Computer Science

Theoretical and experimental investigation of atomic nuclei and exploitation of nuclear methods in interdisciplinary research • Nuclear Physics Institute

Uncertainty methods in theoretical cybernetics: system identification, information processing, decision-making, and control
• Institute of Information Theory and Automation

Illustrative annotation

Complex analysis of the Morávka meteorite fall • Astronomical Institute and Nuclear Physics Institute

The fall of meteorites in Moravia is the best-documented descent of meteorites in history. During the afternoon of May 6, 2000, a number of meteorites landed in the vicinity of Morávka in the Beskydy mountains. Six meteorites were later recovered. In the Astronomical Institute, we succeeded in obtaining instrumental data on the meteorite fall: three video records obtained by casual witnesses, 16 seismic records, one infrasonic record, and data from satellites in the Earth's orbit. These data together with the meteorite samples were used for a detailed analysis. The Astronomical Institute coordinated the work of a number of experts from different countries and fields. The experts from the Astronomical Institute reduced in detail the video records and determined the meteoroid trajectory, fragmentation in the atmosphere and orbit. Morávka became one of only six meteorites with a well-known orbit. The meteoroid atmospheric fragmentation and the dynamics of individual fragments were studied in such detail for the first time in history. Experts from the Nuclear Physics Institute used sensitive methods of the neutron and photon activation analyses to determine the abundance of 38 elements in the meteorite samples and contributed significantly to classify and determine the chemical composition of the meteorite. For four elements, their values deviating from the average abundance in meteorites of the same type were found.

Fragmentation of Morávka meteoroid passing through the atmosphere (recorded by J. Mišák)

Three Morávka meteorites

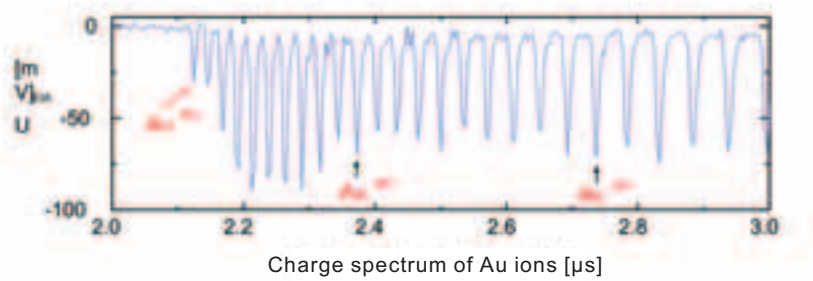
Borovička, J., Brown, P. G., Kalenda, P., Spurný, P., Weber, H. W., Jopek, T., Jakeš, P., Řanda, Z., Brown, P. G., ReVelle, D. O., Schultz, L., Kučera, J., Tagliaferri, E., Haloda, J., Týcová, P., Frýda, J., Brandstätter, F.: The Morávka meteorite fall. 1–4. Meteoritics & Planetary Sci. 38: 975–1043 (2003).
Řanda, Z., Kučera, J., Soukal, L.: Elemental characterization of the new Czech meteorite "Morávka" by neutron and photon activation analysis. J. Radioanal. Nucl. Chem. 257: 275283 (2003).

Illustrative annotation

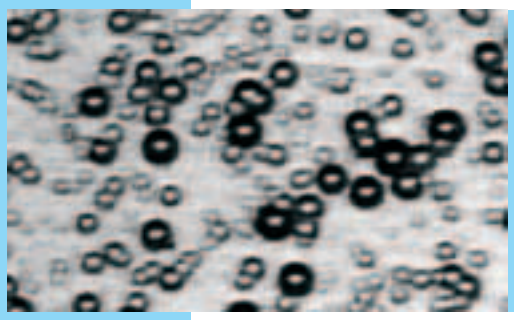
Emission of highly charged ions from laser plasma generated by a high power laser • Institute of Physics

The aim of the experiments was finding the optimum conditions for generation of a given highly charged ion type with the maximum yield and the highest possible kinetic energy. The results are in the form of detailed data concerning properties of the generated ions in dependence on the changing focal geometry with respect to the target, which is either a metal (e.g., Mo, Ta, Cu, Ag, Au) or a plastic (PMMA, PTFE, PET). Using this technique ions Ag^{36+}, Ta^{52+}, Au^{51+} having kinetic energy exceeding 20 MeV were gained. They are suitable for a direct implantation. It was discovered that the optimal ion generation occurs with the position of the geometrical focus in front of the target face at a distance of 100 m to 800 m in dependence on energy of the laser beam. The authors interpreted this fact by auto-focusing of the laser beam inside the beam-formed plasma. The leading edge of the laser pulse generated by the PALS system (pulse duration ~400 ps) creates a laser plasma, within which the main

part of the pulse forms a tapering propagation channel leading to a reduction of the focal spot size to a dimension comparable with the wavelength of the laser light. The consequence is a dramatic increase in the local power followed up by a production of high charge ions with energies of several tens of MeV.



The spectrum of Au^{q+} ions emitted from the laser-produced plasma. The ions were measured at a distance of 2.1 m from the Au target with the use of an ion electrostatic analyser.



Ion tracks recorded on the PM-355 detector covered with a 4- m Al-foil. The larger tracks were induced by Ta ions with the impact energy E_{Ta} > 22 MeV and the smaller ones by protons (E_p > 500 keV) produced from surface contamination.

Láska, L., Jungwirth, K., Králiková, B., Krása, J., Pfeifer, M., Rohlena, K., Skála, J., Ullschmied, J., Badziak, J., Parys, P., Wolowski, J., Woryna, E., Gammino, S., Torrisi, L., Boody, F. P., Hora, H.: Generation of multiply charged ions at low and high laser-power densities. Plasma Phys. Contr. F. 45: 585–599 (2003).

Illustrative annotation

Dynamics of Viscous Compressible Fluids • Mathematical Institute

Feireisl, E.: Oxford University Press, Oxford (2003)

The monograph deals with the mathematical theory of viscous compressible fluids. In accordance with the classical continuum mechanics, the state of a fluid at a given instant is determined by the values of the three fundamental state variables: the density, the velocity, and the absolute temperature. The time evolution of these quantities is governed by a system of partial differential equations based on the fundamental physical principles of conservation of the mass, momentum, and energy. It is shown that the system in question possesses a global in time solution for arbitrary (large) data. To the best of the author's knowledge, this is the first result of this kind ever proved. Moreover, the existence of solutions is also shown for the simplified barotropic model, where the pressure depends only on the density, under optimal (in terms of available mathematical techniques) conditions on the state equation characterising a given fluid. Last but not least, the book presents the most recent results on the subject supplemented with elementary as well as self-contained mathematical proofs. It is intended for applied and pure mathematicians, students of mathematics, and theoretically oriented specialists in fluid mechanics.

2 • Section of Applied Physics

Research plans

Behaviour and properties of metallic and non-metallic materials in relation to their structure, research on processes leading to degradation of material quality • Institute of Physics of Materials

Generation and diagnostics of various types of plasmas and their interactions with other states of matter • Institute of Plasma Physics

Research in the domain of electrical power engineering, developing new physical concepts of energy conversion, control strategies and working media • Institute of Electrical Engineering

Mechanics and transport phenomena in liquid systems and hydrosphere • Institute of Hydrodynamics

Research of physical methods, special technologies and principles of instrumentation making use of electron and light beams and radio-frequency spectroscopy • Institute of Scientific Instruments

Study of generation, transmission, and processing of broadband, standard and verbal signals utilising relevant semiconductor and optical structures • Institute of Radio Engineering and Electronics

Mechanics of deformable bodies, structures and continua with parameters of sustainable development • Institute of Theoretical and Applied Mechanics

Dynamics of fluids, solids and their interactions • Institute of Thermomechanics

Illustrative annotation

The effect of revealed receptor clusters on regulation of leukocytes adhesion • Institute of Hydrodynamics

Leukocytes provide the first line of defence of cells in inflammatory response and adhere first to endothelial cells adjacent to infected tissue space and then migrate through the vessel wall into the infected tissue. Our investigation of adherence receptor distribution on the surface of leukocytes by optical scanning microscopy, carried out within the framework of supervising a Ph.D. thesis by a researcher of the Institute of Hydrodynamics at the University of Nancy, revealed their accumulation localised into clusters that changed model used till now of adhesion in the literature. This distribution has an effect on the probability and strength of adhesion to endothelial cells in the initial reverse phase of the adhesion process. It has been determined that the clusters affect the attachment mechanism and leukocyte rolling along the vessel surface. At the same time, it appeared that the rolling velocity is not dependent on the velocity of the blood flow. This rolling stability is apparently important for the activation of leukocytes before the firm adhesion to endothelial cells independently of the local flow conditions.

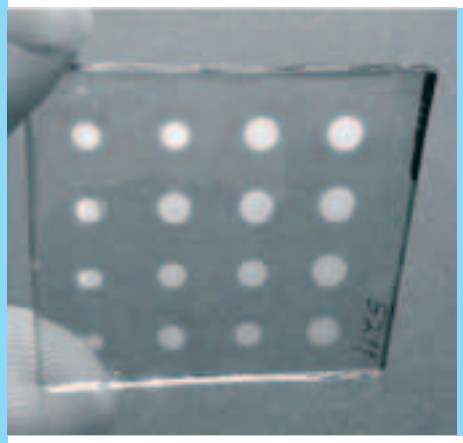
In reference to the firm adhesion when the integrin receptors are expressed on the leukocyte surface, the strength of adhesion links between integrins and ICAM-1 ligand molecules on the endothelial cells was determined. The obtained results will be used for evaluation of pathological changes in the receptor activation and distribution on the leukocyte surface as well as for evaluation of those changes on the mechanism of leukocyte adhesion to the endothelial cells. The obtained results can be used as well for the evaluation of functional properties of blood vessel substitutes from the point of view of their interaction with the leukocytes.

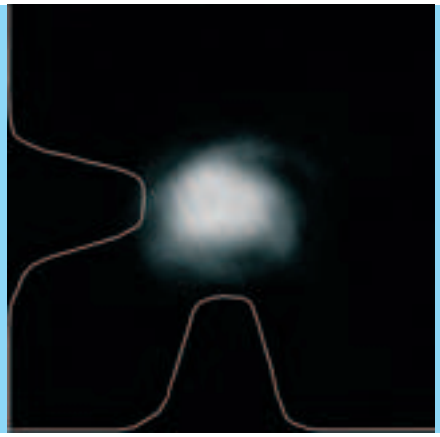
Říha, P., Dumas, D., Latger, V., Muller, S., Stoltz, J. F.: The cooperative effect of L-selectin clusters and velocity-dependent bond formation that stabilizes leukocyte rolling. Biorheology 40: 161–166 (2003).Labrador, V., Říha, P., Muller, S., Dumas, D., Wang, X., Stoltz, J. F.: The strength of integrin binding between neutrophils and endothelial cells. Eur. Biophys. J. 32: 684–688 (2003)

Illustrative annotation

Holographic Gaussian to flat-top beam shaping • Institute of Radio Engineering and Electronics

Spatially uniform illumination or irradiation of particular surface areas by a coherent optical beam is required in many different information processing and printout technological processes, and in industrial and medical applications, etc. The profile of a standard coherent beam is Gaussian, with a rounded top. For more uniform illumination the beam must be expanded and only its central part can be utilised. The surface density of illumination is considerable, however. Another possibility is to re-shape the beam profile so as to get a more flat top. Formation of such beams currently represents a hot research topic in many research laboratories around the world. A viable way to achieve this goal is implementing a non-uniform holographic optical element, the surface profile of its diffraction efficiency acts to suppress the central part and to boost the peripheral parts of the incident beam. Our research in this direction has resulted in the development of a holographic filter in the form of a matrix of non-uniform grating structures. A suitable near-optimal element of this matrix that possesses the required beam uniformity can then be selected experimentally, without any preliminary measurements and/or calculations.





Left — the matrix of realised holographic filters.

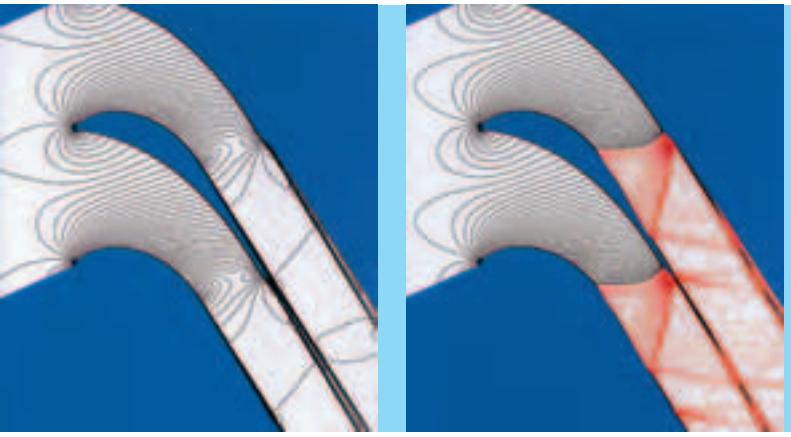
Right — the profile of a flattened beam obtained by the transition of a Gaussian beam by a filter in a suitably chosen matrix element.

Miler, M., Aubrecht, I., Pala, J.: Holographic Gaussian to flat-top beam shaping. Optical Engineering 42: 3114–3122 (2003).
Hradil, M., Miler, M.: Diffraction efficiency of surface-relief gratings with various profiles. SPIE Proceedings 5036: 668–673(2003).

Illustrative annotation

Numerical simulation of transonic flow through a blade cascade • Institute of Thermomechanics

The solution of transonic flow through blade cascades is a crucial problem for many turbo-machinery applications as blade cascades represent the basic element for energy conversion in turbines and compressors. Requirements on the increase of their performance, efficiency and reliability make further demands on improvement of design methods based on computational fluid dynamics. In the Centre of Power Engineering, a joint working group of the Institute of Thermomechanics, ASCR and the Faculty of Mechanical Engineering, CTU in Prague, the numerical solution of the viscous transonic flow through a plane blade cascade was designed and realised. The numerical solution of average Navier-Stokes equations closed by a turbulence model was verified for the transonic flow through a plane turbine blade cascade. Results of numerical simulations agree with experiments carried out in the wind tunnel not only for the general view of flow structure in the blade cascade, i.e., position of shock waves and their interaction with shear layers, but also for the pressure distribution on the blade surface. The results together with experimental data were included in the framework of the project EC Thematic Network "Quality and Trust in the Industrial Application of CFD" into the QNET-CFD database as the selected test case for verification of the reliability of numerical methods used in computational fluid dynamics.



Field of Mach number isolines in the turbine blade cascade for subsonic and transonic flow (M_{2is}=0.716 and 1.198)

(M=0.05, supersonic flow marked by red isolines)

Dobeš J., Fořt J., Fürst J., Halama J., Hyhlík T., Louda P., Kozel K., Příhoda J., Šafařík P.: Experimental and numerical analysis of transonic flow through plane turbine cascade. Engineering Mechanics, 10, No.5, 413–426 (2003)

3 • Section of Earth Sciences

Research plans

Study of the internal structure and physical properties of the Earth and its environs by geophysical methods • Geophysical Institute

Evolution of the lithosphere and palaeo-environments from the early geological past to the present • Institute of Geology

Investigation of selected processes in the Earth's atmosphere • Institute of Atmospheric Physics

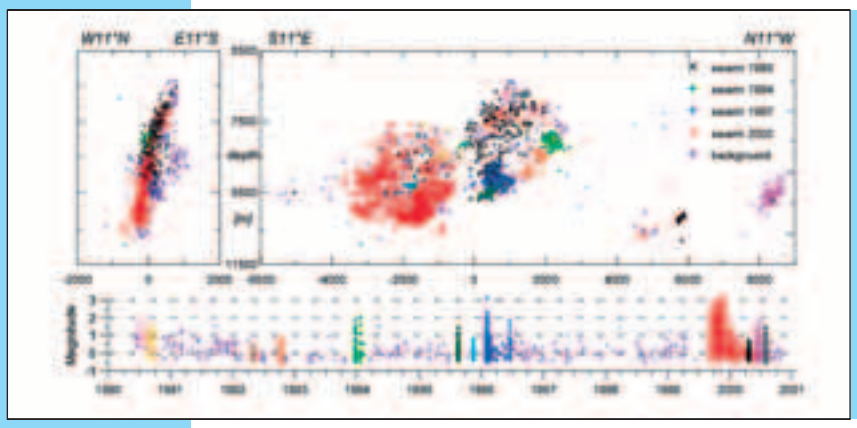
Process in the lithosphere as interaction with human activities • Institute of Geonics

Geodynamical processes in the upper part of the Earth's crust affecting the environment and ecological utilisation of raw materials • Institute of Rock Structure and Mechanics

Illustrative annotation

Repeated earthquake swarms in the western part of the Bohemian Massif • Geophysical Institute

The western part of the Bohemian Massif manifests past-to-recent geodynamic activity. One of its prominent features is the re-occurrence of swarms of weak to moderate earthquakes. The last strong earthquake swarm occurred in August-December 2000. Seismograph stations of the Geophysical Institute recorded more than 25 000 events; the strongest earthquakes of the swarm were felt by citizens of neighbouring towns and villages. The swarm displayed a strongly episodic character – nine swarm phases were distinguished separated by quiescent periods of several days. It was found that the foci of all recorded earthquakes were distributed within an almost circular fault plane with a diameter of 3 km at depths between 7.5 to 10.5 km. The seismic records show that the displacement of rock masses during individual earthquakes was left-lateral along the fault plane. This is in accordance with indicators of displacements derived from GPS observations and precise levelling measurements performed in the region. The first strong seismic events of the August-December 2000 swarm were preceded by distinctive groundwater level changes in a well situated in the vicinity of the focal zone and by anomalous changes of the gravity field.



Space-time distribution of the earthquake hypocentres in the main focal zone in West Bohemia during the period 1991–2001.

Top: distribution of earthquake foci in space (two vertical projections – perpendicular to and along the active fault zone). *Bottom:* earthquake occurrence with time. Colours distinguish individual earthquake swarms.

Fischer T., Horálek J.: Space-time distribution of earthquake swarms in the principal focal zone of the NW Bohemia/Vogtland seismoactive region: period 1985-2001. J. Geodynamics, 35/1–2, 125–144 (2003).

Illustrative annotation

The use of parallel computations on PC clusters • Institute of Geonics

For the solution of large-scale problems of mathematical modelling, it is important to take advantage of the full potential of available computing resources and develop new numerical methods that make such exploitation possible. High performance computing is the domain of parallel computers including clusters of PC's. These computers or computer systems are equipped with a number of processors, which multiplies their computing power. Moreover, parallel computing involves data decomposition, which provides faster feeding of processors with the data, which is necessary for exploiting the increasing processor performance. In the mathematical modelling based on the finite element method, parallel algorithms can be used in all computational steps, but the most important and most difficult task is to develop efficient parallel algorithms for the solution of the emerging large-scale systems of linear or nonlinear algebraic equations (up to tens of millions of equations). With this aim, we analysed and implemented a number of methods based on problem decomposition and developed codes, which were tested on different types of parallel computers as IBM SP (VŠB-TU Ostrava, KTH Stockholm), SUN HPC (KUN Nijmegen, EPCC Edinburgh) and Beowulf type PC clusters (VŠB – TUO, SARA Amsterdam, EPCC Edinburgh). The obtained experience was used for building a PC cluster at the Institute of Geonics. The solution of selected large-scale problems arising from geotechnics, e.g., the computation of the stress field changes induced by mining at the depository Rožná, showed very promising efficiency of the parallel computations.

Blaheta, R., Byczanski, P., Jakl, O., Starý, J., Space decomposition pre-conditioners and their application in geomechanics. Math. Computer Simulation 61: 409–420 (2003).
Blaheta, R., Jakl, O., Starý, J., Linear system solvers based on space decompositions and parallel computations. Engrg. Mechanics/ Inženýrská mechanika 10 (special issue High Performance Computing, Supercomputing, Náročné počítání): 439–454 (2003).

4 • Section of Chemical Sciences

Research plans

The section comprises six institutes with the following research plans:

Development of novel methods of analytical chemistry to meet the needs of other branches of science and technology • Institute of Analytical Chemistry

Synthesis and structure of novel (inorganic) compounds, clusters and composites; mechanisms of conversion and transfer in systems involving inorganic substances • Institute of Inorganic Chemistry

Clarification of the principles governing the relationship between the structure and physicochemical properties of substances and molecular systems • J. Heyrovský Institute of Physical Chemistry

To examine theoretical fundamentals of chemical processes: equilibrium and dynamic behaviour of multiphase reacting systems • Institute of Chemical Process Fundamentals

To explore targeted synthesis and investigation of chemical and physical properties of macromolecular and supramolecular materials and systems for advanced technologies
• Institute of Macromolecular Chemistry

To investigate chemical principles of selected biological phenomena in medicine and ecology
• Institute of Organic Chemistry and Biochemistry

Illustrative annotation

New Data on Retroviral Proteinases, the Most-Studied Proteins Ever • Institute of Organic Chemistry and Biochemistry

Retroviral proteases play a key role in the cleavage of viral polyproteins and represent a successful target of drug design. Paradoxically, these successes have revealed weaknesses of knowledge of protease resistance, function, and activation.

We have performed a biological and structural study of the Mason-Pfizer monkey virus (M-PMV) protease (PR). We reported for the first time the complete 3D structure of a monomer of a retroviral protease, based on NMR experiments. We showed a structural evidence for the existence of folded PR monomer before formation of the fully active homodimer, which is in contrast with the generally accepted unfolded monomer-to-folded dimer reorganization scheme. We observed that modification of Cys residues plays a key role in the regulation of the dimerisation of retroviral proteases[1].

An analysis of M-PMV viral proteins provided further evidence that the protease does not cleave a transframe protein NC-dUTPase and that it is the only form of dUTPase, a DNA repair enzyme, in M-PMV. The results show that NC-dUTPase is a homotrimer with a specific dUTPase activity and ability of NC to bind both nucleic acid and Zn^{2}. Thus the low activity of dUTPase may be compensated by adequate targeting of the fusion protein mediated with the nucleocapsid (NC) domain[2].

An analysis of host cell-associated M-PMV protein revealed a new role of a retroviral protease in the early stage of the virus life cycle. M-PMV protease was shown to cleave the capsid protein (CA), which forms a shell surrounding a complex consisting of viral RNA and nucleocapsid (NC) protein, within a conserved major homology region. Experiments with HIV-1 CA confirmed that this cleavage is a more general feature of retroviruses[3].

[1] Veverka, V., Bauerová, H., Zábranský, A., Lang, J., Ruml, T., Pichová, I., Hrabal, R.: Three-dimensional structure of the monomeric form of a retroviral protease from Mason-Pfizer monkey virus. J. Mol. Biol. 333: 771–780 (2003).
[2] Barabás, O., Rumlová, M., Erdei, A., Pongrácz, V., Pichová, I., Vértessy B.: dUTPase and Nucleocapsid polypeptides of the Mason-Pfizer monkey virus form a fusion protein in the virion with homotrimeric organization and low catalytic efficiency. J. Biol. Chem. 278: 38803–38812 (2003).
[3] Rumlová, M., Ruml, T., Pohl, J., Pichová, I.: Specific cleavage of Mason-Pfizer monkey virus capsid protein: Evidence for a potential role of retroviral protease in early stages of infection. Virology 310: 310–318 (2003).

Illustrative annotation

Electronic Interaction With Redox Centres and Mechanisms of Electron-Transfer Acceleration in Transition-Metal Complexes • J. Heyrovský Institute of Physical Chemistry

Intramolecular electron (or energy) transfer and interactions between metal centres in mixed-valence complexes are elementary processes considered for functional molecular devices, that is, molecular electronics or photonics. These processes require the right strength for coupling between the active centres. Electronic coupling has to be strong enough to enable fast and efficient electron transfer but not too high to smear the differences between the active centres by delocalization.

We have studied these questions within the framework of the COST D-15 project in which the J. Heyrovský Institute of Physical Chemistry, ASCR, the Queen Mary University of London and the University Stuttgart are taking part. Using a combination of state-of-the-art ultrafast time-resolved spectroscopic techniques, electrochemical and spectroelectrochemical methods and quantum chemical calculations we are concerned with selected complexes of rhenium, ruthenium and copper. Rhenium complexes with two redox-active ligands show an ultrafast interligand electron transfer which is accelerated into the picosecond time domain by a combination of large electronic coupling between the ligands and vibrational activation of the precursor state. Back electron transfer is then accelerated by a combination of large electronic coupling and vibrational activation of the product [1—4]. Strong electronic interaction approaching delocalization was found in dinuclear mixed-valence complexes of ruthenium and copper with electron-accepting bridging ligands [5,6]. By contrast, interaction in a tetranuclear rhenium complex is surprisingly weak. Electron delocalization to the tetradentate bridging ligand is negligible despite its strongly electron-accepting properties [7]. Expected ultrafast intramolecular electron transfer makes this complex very promising for further investigations.

In general, research on electron interaction between redox centres and intramolecular electron transfer promotes knowledge for development and design of molecular devices, whose model components are systematically synthesized and studied by us using advanced physicochemical methods.

Liard, D. J., Kleverlaan, C. J., Vlček, A., Jr.: Solvent-dependent dynamics of the $MQ^{\cdot}$ŐRe″ excited-state electron transfer in $[Re(MQ^{\cdot})(CO)_3(dmb)]^{2+}$. — Inorg. Chem. 42: 7995—8002 (2003).
Liard, D. J., Busby, M., Motevalli, M., Toms, H., Vlček, A., Jr.: Molecular structures of electron-transfer-active complexes $[Re(XQ^{+})(CO)_3(NN)]^{2+}$ (XQ^{+} = N-Me-4,4′-bipyridinium or N-Ph-4,4′-bipyridinium; NN = bpy, 4,4′-Me_2-2,2′-bpy or N,N′-bis-isopropyl-1,4-diazabutadiene in the solid state and solution. An X-ray and NOESY NMR study. — Inorg. Chim. Acta 357: 167—176 (2004).
Chanda, N., Sarkar, B., Fiedler, J., Kaim, W., Lahiri, G. K. J.: Synthesis and mixed valence aspects of $[\{(L)ClRu\}_2(m\text{-}tppz)]n+$ incorporating 2,2′-dipyridylamine (L) as ancillary and 2,3,5,6-tetrakis(2-pyridyl)pyrazine (tppz) as bridging ligand. — Chem. Soc., Dalton Trans., 3550—3555 (2003).
Kaim, W., Doslik, N., Frantz, S., Sixt, T., Wanner, M., Baumann, F., Denninger, G., Kümmerer, H. J., Duboc-Toia, C., Fiedler, J., Záliš, S.: Azo compounds as electron acceptor or radical ligands in transition metal species: Spectroelectrochemistry and high-field EPR studies of ruthenium, rhodium and copper complexes of 2,2′-azobis(5-chloropyrimidine). Mol. Struct. 656: 183—194 (2003).
Hartmann, H., Kaim, W., Wanner, M., Klein, A., Frantz, S., Duboc-Toia, C., Fiedler, J., Záliš, S.: Proof of innocence for the quintessential non-innocent ligand TCNQ in its tetranuclear complex with four fac-$[Re(CO)_3(bpy)]^{+}$ groups — Unusually different reactivity of the TCNX ligands. Inorg. Chem. 42: 7018—7025 (2003).

Illustrative annotation

Direct continuous supercritical fluid extraction of aqueous media • Institute of Analytical Chemistry

A fully automated apparatus featuring a vertically mounted packed column was developed for direct extraction of aqueous media with supercritical carbon dioxide. There are multiple opportunities to apply the apparatus. In a concurrent mode when both water and carbon dioxide flow through a column in the same direction, an extractor may be employed for precise measurements of the partition coefficients of low-volatility substances between the two phases. In countercurrent mode, the extractor provides for a sample treatment technique that can be combined with a suitable chromatographic method to analyze a wide variety of important aqueous mixtures. In an off-line combination with gas chromatography, the extractor was employed in an extensive study of 121 wine samples of 21 wine

varieties produced in South Moravia. Within the range of varieties included, we even scored fair success in identifying an "unknown" wine variety. In an on-line coupling to liquid chromatography, the extractor made possible a reliable analysis of aqueous solutions of pyrethrins, "green" natural insecticides from *Chrysanthemum cinerariaefolium* Vis. flowers.

Karásek, P., Pól, J., Planeta, J., Roth, M., Vejrosta, J., Wičar, S.: Partition coefficients of environmentally important phenols in a supercritical carbon dioxide–water system from cocurrent extraction without analysis of the compressible phase. Anal. Chem. 74: 4294–4299 (2002).
Pól, J., Wenclawiak, B. W.: Direct on-line continuous supercritical fluid extraction and HPLC of aqueous pyrethrins solutions. Anal. Chem. 75: 1430–1435 (2003).
Karásek, P., Planeta, J., Varaďová-Ostrá, E., Mikešová, M., Goliáš, J., Roth, M., Vejrosta, J.: Direct continuous supercritical fluid extraction as a novel method of wine analysis: comparison with conventional indirect extraction and implications for wine variety identification. J. Chromatogr. A 1002: 13–23 (2003).

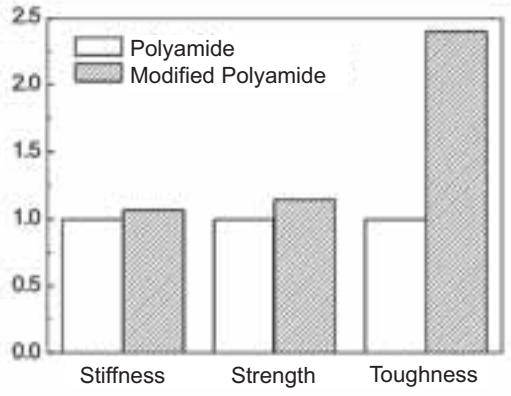
Illustrative annotation

Polymer blends with increased stiffness and toughness • Institute of Macromolecular Chemistry

The application range of polymeric materials is limited by their low stiffness and toughness (impact resistance). Common toughness enhancement by blending with elastomers is accompanied by a decrease in stiffness and, vice versa, the methods used for stiffness improvement negatively affect the toughness.

We have developed a modification of polyamide based on a synergistic action of very fine dispersed particles of a rigid polymer and elastomer. Blending polyamide with such particles results in a material with simultaneously higher stiffness, strength and toughness than those of the original polyamide. The synergy consists in interactions of stress fields around the added particles leading to a higher extent of polyamide matrix microdeformations absorbing mechanical energy. Also important is simultaneous stabilization of the microdeformations against their merging into undesirable cracks due to formation of microfibres from plastically deformed rigid polymer particles.

The general mechanism was confirmed by finding analogously improved parameters with thermoplastic polyesters.



The effect of modification on relative increase of basic mechanical properties

Kelnar, I., Kotek, J., Munteanu, B. S., Fortelný, I.: Influence of properties and morphology of elastomeric phase on the behaviour of ternary reactive blends polyamide 6 / rigid polymer / elastomer. J. Appl. Polym. Sci. 89: 3647–3651 (2003).

Research plans

5 • Section of Biological and Medical Sciences

Biophysical properties of living systems and their changes under the influence of environmental factors • Institute of Biophysics

The use of insects for quality assessment and possible management of the ecosystems in Central Europe • Institute of Entomology

Investigation of normal and pathological physiology of animals — clarification of the physiological mechanisms operating in humans in health and disease • Institute of Physiology

Study of cellular and molecular biology, genetics, physiology, ecology of microorganisms, microbial biotechnologies, investigation of immunological processes • Institute of Microbiology

Physiological and genetic bases of plant development, cell cycle, morphogenesis, stress reactions and biotechnologies. Genome organization and function • Institute of Experimental Botany

Revealing the mechanism underlying the effect of therapeutic drugs modulating the activity of the immune and nervous systems in order to find new types of substances for clinical practice • Institute of Experimental Medicine

Research on molecular organization of plant genome, analysis of targeted changes and expression of heritability interacting with the environment and pathogens • Institute of Plant Molecular Biology

Regulation and signalling pathways involved in gene expression, immunity, oncogenesis, virus replication, cell structure formation, cell behaviour and development • Institute of Molecular Genetics

Basic research of genetic structures, physiological functions and developmental biology of vertebrate species important in medicine, agriculture or ecology • Institute of Animal Physiology and Genetics

Illustrative annotation

Development towards the efficient propagation and regulatory differentiation of embryonic stem (ES) cells • Institute of Experimental Medicine

Recent rapid progress in embryonic stem (ES) cell research has wide implications for developmental biology and has evoked increasing expectations for cell therapy. To establish strategies that permit the propagation and differentiation of ES cells under cell therapy-compatible conditions, we analyzed the ability of ES cells to grow and differentiate on different types of degradable and non-degradable porous hydrogels. As a result, several types of hydrogels were found to be suitable. We further employed several cellular systems, including mouse oocytes, ES cells, embryonal carcinoma cells, and early mouse embryos, to investigate the functions of cell cycle regulators, particularly p27 and A- and D-type cyclins, in cell differentiation. Finally, we tested the applicability of the recently developed reverse tetracycline controlled transactivator rtTA2^{S}-S2 for the stable and inducible expression of genes in ES cells. We expect that our results obtained in mouse embryos, embryonal carcinoma and ES cells will be efficiently transferred to recently isolated human ES cell lines.

Horák, D., Dvořák, P., Hampl, A., Šlouf, M.: Poly(2-hydroxyethyl methacrylate-co-ethylene dimethacrylate) as a mouse embryonic stem cell support. J. Appl. Polymer Sci. 87: 425—432 (2003).
Kohoutek, J., Dvořák, P., Hampl, A.: Temporal distribution of CDK4, CDK6, D-type cyclins, and p27 in developing mouse oocytes. Biol. Reprod. 70: 139—145 (2003).

Anger, M., Bryja, V., Jirmanová, L., Hampl, A., Carrington, M., Motlík, J., Dvořák, P., Kubelka, M.: The appearance of truncated cyclin A2 correlates with differentiation of mouse embryonic stem cells. Biophys. Biochem. Res. Commun. 302: 825–830 (2003).
Horák, D., Kroupová, J., Šlouf, M., Dvořák, P.: Poly(2-hydoxyethy l methacrylate)-based slabs as a mouse embryonic stem cell support. – Biomaterials (Internet, 3 February 2004)

Illustrative annotation

Discovery of the adenosine deaminase-related growth factors (ADGF) multigene family • Institute of Entomology

In Drosophila melanogaster we discovered a six protein family of ADGF, homologous to a growth factor from Sarcophaga. Similar proteins were identified in other organisms, including humans. We produced two highly expressed family members (ADGF-A and -D) in a baculovirus system and used them in further characterization. In insect cell lines we showed that they are mitogenic and also function as enzymes – adenosine deaminases. The enzymatic activity is required for their mitogenic function, making them unique among growth factors. We found that adenosine blocks cell division of Drosophila cells, since a culture medium without adenosine stimulates cell proliferation. Thus ADGFs secreted *in vivo* may promote tissue growth by reducing the levels of extracellular adenosine. We have isolated a Drosophila mutant in the ADGF-A gene that has a lethal phenotype and highly increased level of adenosine in the hemolymph.

Žurovec, M., Doležal, T., Gaži, M., Pavlová, E., Bryant, P. J.: Adenosine deaminase-related growth factors stimulate cell proliferation in Drosophila by depleting extracellular adenosine. Proc. Natl. Acad. Sci. USA 99: 4403–4408 (2002).
Dolezal, T., Gazi, M., Zurovec, M., Bryant, P. J.: Genetic analysis of the ADGF multigene family by homologous recombination and gene conversion in Drosophila. Genetics 165: 653–666 (2003).

Illustrative annotation

LIME: A New Membrane Raft-associated Adaptor Protein Involved in CD4 and CD8 Co-receptor Signalling • Institute of Molecular Genetics

Lymphocyte membrane rafts are microdomains characterized by a specific lipid composition (rich in cholesterol and glycosphingolipids). Importantly, these membrane "islets" contain several molecules critical for immunoreceptor signalling (Src-kinases, G-proteins, transmembrane adaptor proteins such as LAT and NTAL). In this paper, identification of a new raft-associated adaptor protein LIME (Lck interacting molecule) is described, expressed predominantly in T lymphocytes. Human LIME is a strongly basic polypeptide of 295 amino acid residues. In its cytoplasmic domain it contains 5 tyrosine residues which become tyrosine phosphorylated after cross-linking of the CD4 or CD8 coreceptors. Phosphorylated LIME associates with the Src-family kinase Lck and its negative regulator, Csk. Ectopic expression of LIME in Jurkat T cells results in an increase of Csk in lipid rafts, increased phosphorylation of Lck and a higher Ca^{2+} response to a T-cell receptor complex stimulation. LIME thus appears to be involved in regulation of T cell activation by co-receptors. A model is proposed how LIME may regulate activity of the key kinase Lck.

Brdičková, N., Brdička, T., Angelisova, P., Horváth, O., Špička, J., Hilgert, I., Pačes, J., Simeoni, L., Kliche, S., Merten, C., Schraven, B., Hořejší, V.: LIME: a new membrane raft-associated adaptor protein involved in CDS4 and CD8 coreceptor signalling. J. Exp. Med. 198: 1453–1462 (2003).

Illustrative annotation

Arrangement of genes, chromosomes and genomes in interphase nuclei of normal and malignant cell lines and its relationship to gene expression • Institute of Biophysics

Using automated confocal microscopy, 3D FISH (fluorescence in situ hybridization) and other techniques of molecular and cell biology the systematic study of the 3D arrangement of genetic elements and its relationship to gene expression in the nuclei of normal and malignant cell types has been completed. The main conclusions are as follows: (i) a non-random radial arrangement of the genome corresponds to gene activity in such a way that clusters of highly expressed genes are localized

in the nuclear interior meanwhile silent genetic regions are mostly near the nuclear periphery or on the periphery of nucleoli; (ii) the higher-order chromatin structure is strikingly similar in various human cell types, which correlates with the fact that the profiles of gene expression are also similar; (iii) mutual positions of chromosome territories under the nuclear membrane are as a rule random; there are, however, exceptions when some loci are found in close association, (iv) direct evidence has been provided for polar and oriented chromosome territories in cell nuclei; the arrangements of chromosome territories reflect their expression profiles; (v) the nuclear arrangement of the genome, chromosome territories and gene positions can undergo changes in malignant cell types during differentiation or in apoptotic cells; (vi) these changes are of genetic or epigenetic origin; epigenetic phenomena manifested in changes of the large-scale chromatin structure are tightly related to gene activation or silencing. Studies of mechanisms of epigenetic phenomena using transfection of living cells with HP1-GFP constructs showed that an important role in gene silencing is played by heterochromatic foci formed by HP1 protein; the absence of this protein in terminally differentiated cells suggests another pathway of heterochromatin formation and gene silencing. These results may be of theoretical as well as practical importance.

Amrichová, J., Lukášová, E., Kozubek, S., Kozubek, M., Jirsová, P.: Nuclear and territorial topography of chromosome telomeres in human lymphocytes. Exp. Cell Res. 289: 11—26 (2003).
Bártová, E., Jirsová, P., Fojtová, M., Souček, K., Kozubek, S.: Chromosomal territory segmentation in apoptotic cells. CMLS 60: 1—12 (2003).
Taslerová, R., Kozubek, S., Lukášová, E., Jirsová, P., Bártová, E., Kozubek, M.: Arrangement of chromosome 11 and 22 territories, EWS and FLI-1 genes, and other genetic elements of these chromosomes. Hum. Genet. 112: 143—155 (2003).

Research plans

6 • Section of Bio-Ecological Sciences

Plant biodiversity: its variation, evolution and functions at organismal, community and ecosystem levels; its use in Průhonice Park • Institute of Botany

Biotic interactions in the pelagic zone of lenitic ecosystems, reservoirs and lakes of different trophy after reduction of emissions in post-communist Europe • Institute of Hydrobiology

Parasites and symbionts in animals and humans: their interactions on the level of populations, organisms, cells and molecules • Institute of Parasitology

Diversity and life history of free-living vertebrates and the implication of results in the strategy of conservation and sustainable management of natural resources • Institute of Vertebrate Biology

The ecology of man-influenced landscape • Institute of Landscape Ecology

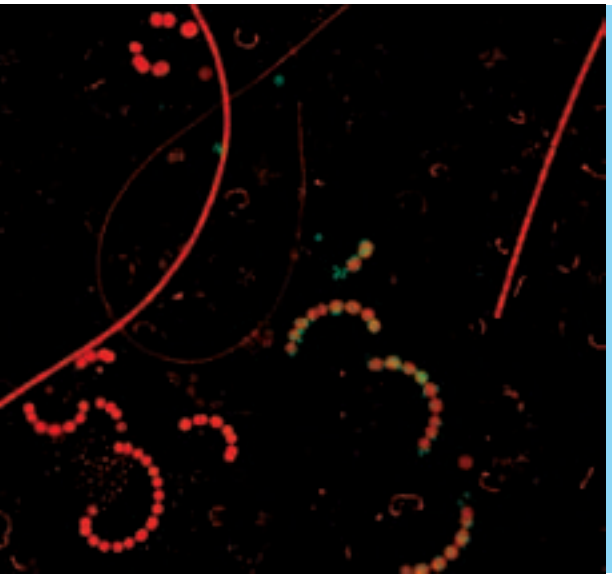
Communities of soil organisms in ecosystems differing in anthropogenic pressure — their structures, functions and interactions • Institute of Soil Biology

Illustrative annotation

A microscopic look on enzymes changes a view on competition of planktonic microbes for phosphorus • Institute of Hydrobiology

Overall availability of phosphorus (P) for organisms' growth controls trophic status of freshwaters. Cells of phytoplankton (algae and cyanobacteria) and bacteria are able to take up only orthophosphate, thus, its depletion in ambient water leads to a limitation of cell growth. Micro-organisms use different strategies in competition for P. Among others, they release extracellular phosphatases, which hydrolyse

organic P compounds by cleaving phosphate. Hitherto, we have been able to estimate only total phosphatase activity of all planktonic organisms and supposed that most phytoplankton species react on the P depletion in a similar way, *i.e.*, they produce extracellular phosphatases. Recently, the novel fluorescent substrate (ELF®97 phosphate) enabled a direct microscopic localisation of phosphatases on algal, cyanobacterial, and bacterial cells. Combining the new method with PC-based image analysis, we are now able to measure cell-specific activity of particular micro-organism species. The method reveals surprising results – the particular phytoplankton species differ remarkably in their production of extracellular phosphatase, *i.e.*, in its employment in their struggle for P. The use of this method allows for more detailed understanding of life strategy of the particular phytoplankton species, their seasonal development, driving forces of phytoplankton blooms, *etc.*



Phytoplankton in an epifluorescence microscope red – autofluorescence of chlorophyll visualises algal and cyanobacterial cells, their extracellular phosphatases fluoresce in green

Nedoma, J., Štrojsová, A., Vrba, J., Komárková, J., Šimek, K.: Extracellular phosphatase activity of natural plankton studied with ELF97 phosphate: fluorescence quantification and labelling kinetics. Environ. Microbiol. 5: 462–472 (2003).
Štrojsová, A., Vrba, J., Nedoma, J., Komárková, J., Znachor, P.: Seasonal study on expression of extracellular phosphatases in the phytoplankton of an eutrophic reservoir. Eur. J. Phycol. 38: 295–306 (2003).

Illustrative annotation

Monograph of the cosmopolitan family Juncaceae (Rush Family) as a part of an international programme Species Plantarum: Flora of the World • Institute of Botany

The development of plant taxonomy has reached a stage when work exhaustively summarizing plant diversity, either within plant families or in important regions, represents a research priority. One of the reasons is that a great amount of data and knowledge does not allow timely orientation or easy exploitation. In particular, the plant conservation specialists are among the end users of the results of taxonomic research. One of the ways to provide summarized taxonomic data is the three-volume work presented here. The author, assisted by 18 world specialists from 14 countries of five continents, compiled a complete monograph of the Juncaceae, a family found in most parts of the world and usually forming an important part of wetland and mountain vegetation. The work includes a complete treatment of 442 species (537 taxa), with detailed descriptions, distribution maps and about 300 drawings. During the preparation of the monograph, the authors revealed and described six new species and five subspecies, and by numerous finds and corrections contributed to the knowledge of several continental floras. The recently launched programme of *Species Plantarum: Flora of the World* aims at a similar inventory of the diversity of plant families of the whole world. The monograph of the *Juncaceae*

represents the first treatment of a larger plant family within the programme and serves as a positive example of broad international collaboration effectively summarizing existing knowledge and experience.

Luzula indica Kirschner,
one of the new species of Juncaceae.

Kirschner, J. et al.: Juncaceae 1—3. — Species Plantarum: Flora of the World. Part 6—8: 237, 336 and 192 pp. ABRS, Canberra, Australia (2002—2003).

Illustrative annotation

Methyl 3-chloro-4-methoxybenzoate, a new candidate semiochemical inhibiting the copulation behaviour of Ixodes ricinus males • Institute of Parasitology

The common tick, *Ixodes ricinus*, is an important vector of some serious diseases of man and animals. All developmental stages need to feed on the blood of a terrestrial vertebrate host. For successful feeding, females need to be fertilised. Negative influence of male copulation behaviour could contribute to the decrease of the number of fertilised females, which cannot successfully feed on a host and lay eggs. Females of *Ixodes ricinus* emit several semiochemicals influencing copulatory behaviour in males. One of these candidate compounds, emitted exclusively by engorged females, shows a copulation inhibiting effect in males. This volatile substance was isolated and identified using the Solid Phase Microextraction method (SPME) and gas chromatography with mass spectroscopy (GC-MS) as methyl 3-chloro-4-methoxybenzoate. It was also prepared synthetically by methylation of 3-chloro-4-hydroxybenzoic acid. In Y-tube experiments, the synthetic analogue of this compound attracted males in 26% of tests, while repelling in 74% of cases. The number of contacts between males and unengorged females treated with methyl 3-chloro-4-methoxybenzoate decreased to 28% compared with the control level of 80%, and the percentage of copulating pairs to 12% (49% in control) during 2 hours.

Bouman, E. A. P., Dusbábek, F., Šimek, P., Zahradníčková, H.: Methyl 3-chloro-4-methoxybenzoate, a new candidate of semiochemical inhibiting copulation behaviour of Ixodes ricinus (L.) males. Physiol. Entomol. 28: 276—282 (2003).

7 • Section of Social and Economic Sciences

Research plans

Research on the life and work of T. G. Masaryk in topical and contemporary contexts, and research on the Czech question as a part of the problem of democracy • Masaryk Institute

The economy in an advanced stage of transformation • Economics Institute

Basic research in psychology on an interdisciplinary basis, particularly psychology of personality and health, and cognitive psychology • Institute of Psychology

Sociological analysis of changes in contemporary society • Institute of Sociology

Implementation of rule-of-law principles and supranational law • Institute of State and Law

Illustrative annotation

Democratic citizenship in comparative perspective. Psychological theory and empirical studies in four Central and Eastern European nations • Institute of Psychology

The first part presents theoretical analyses: personality dimensions relevant to good citizenship (activity and responsibility), a model illustrating how various types of citizens (parochial, dependent, antisocial, hedonistic and democratic) influence establishment of different political regimes (authoritarianism, anarchy or democracy) and how democratizing agents (education, socialization, prosperity and law) foster the development of citizenship. Significant factors in transition to democracy are explained: the post-communist syndrome, the rule of unrealistic expectations and patterns of need satisfaction under totalitarian and democratic regimes. The empirical part describes a survey of representative samples from Belarus, Bulgaria, the Czech Republic and Slovakia. Questionnaires on civic culture were administered to 3447 subjects. Results proved that the democratic, civic culture of "Model Citizens" was a dominant international factor. However, it was followed by "Negativistic Alienated Inhabitants," "Parochials Loyal to the Regime," "Confused Potential Rebels" and "Obedient Subjects" – factors expressing "a-civic" (apolitical, confused, passive) or distinctly "anti-civic" attitudes.

Klicperová-Baker, M. (ed.): Democratic citizenship in comparative perspective. Psychological theory and empirical studies in four Central and Eastern European nations. Montezuma Publishing, San Diego State University, San Diego 2003, 178 pp.

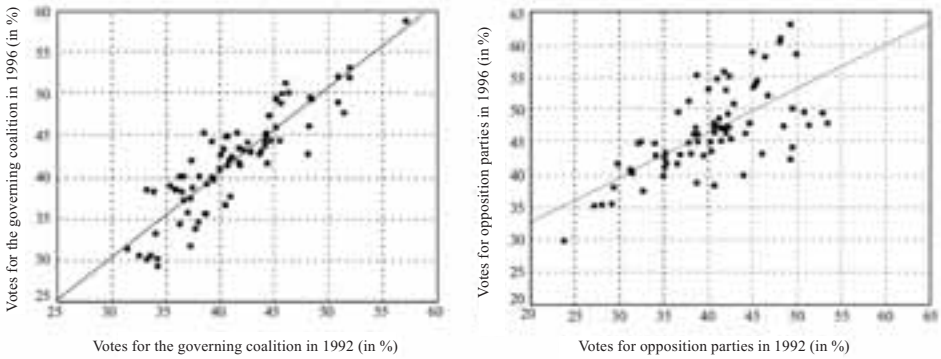
Illustrative annotation

Czech Republic: The First Elections in the New Republic, 1992–1996. Analyses, Documents and Data • Institute of Sociology

This publication concentrates on analysing the 1992 and 1996 elections for the Parliament of the Czech Republic and the two legislative terms in a wider context of legislative changes. It also explores the political climate and electoral behaviour, the search for social consensus, formation of the cabinet and regional differences in the election results from the perspective of Czech democracy. The two election terms are used as a background for examination of the development of a competitive political party system in the country. The study claims that the party system has gradually crystallised along an interest-class-party line, but the process is gradual and incomplete. This leads to two questions: On what are cleavage lines based, what cleavages have appeared in the first years of the transformation, who has represented them; and on what is the stabilisation of the political party system based?

The publication also examines the impact of election results on the formation of a certain type of government, on the stability of the cabinet and the fall of the cabinet. It strives to explain why there is a danger of cabinet instability in the framework of the existing system of elections to the Chamber of Deputies.

The publication examines the expected consequences of elections (including problems with cabinet formation) as well as unexpected and unintended ones (the dissolution of the Czechoslovak federation after the 1992 elections and the creation of the independent Czech Republic). A new constitution, which provided for a two-chamber parliament, is closely linked to the dissolution of the country, and the study follows the long and often conflicting debates about the meaning of the Senate, the electoral system and the first elections to the upper chamber of the Parliament.



Results by districts: elections to the Czech Parliament in 1992 and 1996 are compared.

Mansfeldová, Z. (ed.), Czech Republic: The First Elections in the New Republic, 1992-1996. Analyses, Documents and Data — Founding Elections in Eastern Europe book series, Edition Sigma, Berlin 2003, 371 pp.

Illustrative annotation

Constitutional Law of the European Union • Institute of State and Law

The monograph deals with all fundamental aspects of the emerging constitution of the European Union. On the basis of juristic, politological and comparative methods, the authors examine and interpret the present legal form of the European Union and its future, at present already predictable trends. Chapter VII — Human rights and EU, elaborated by Josef Blahož, presents empirically ascertained values of human and civil rights in EU member states, the role of European citizenship in the formation of human rights in the EU and particularly the formulation of human and civil rights of the European Union by the European Court of Justice in Luxembourg. The focal point consists particularly in the research on the prerequisites for the constitutional codification of human and civil rights as a field of social relations in which the consensus of EU member states is most mature at present.

Blahož, J., Klíma, K., Skála, J. a kol.: Ústavní právo Evropské unie [Constitutional Law of the European Union] — Aleš Čeněk, Dobrá Voda 2003, 939 pp.

Research plans

8 • Section of Historical Sciences

Key problems of prehistoric and early historic development north of the Middle Danube in the context of actual results of archaeological research • Institute of Archeology, Brno

Primary research on Bohemian prehistory and history within European contexts, archaeological service to the national heritage • Institute of Archaeology, Prague

Science and culture in the Czech lands: structure of institutions and personages — conservation, processing and utilization of the base of resources • Archives of the ASCR

Czech history in the context of international relations until 1945 • Institute of History

Research of the history of visual arts from the early medieval period until contemporary times • Institute of the History of Art

Scholarly research into Czech/Czechoslovak history during the period of two totalitarian regimes (1938–1989) and the period following the collapse of Communism • Institute for Contemporary History

Illustrative annotation

Medieval canonical law in manuscripts of the Czech Republic. ***Summae confessorum*** **and other works** ***pro foro interno*** **in manuscripts of the Czech and Moravian libraries • Archives of the ASCR**

The work is a Czech contribution to the diverse international research on medieval scholarly literature which served the needs of church administrators and confessors and which also dealt with law and theology. It is the result of systematic research into manuscripts preserved in libraries in the Czech Republic and covered by collective cataloguing of manuscripts. The general introductory section consists of characterization of this type of literature and indicates its theoretical value and developmental changes. A special section of three chapters provides a study of individual authors (57 in total) and their works with information on manuscripts in Czech archives and libraries (approximately 350 manuscripts) and a commentary on their theoretical basis and practical import in church administration. Works of Czech origins are of special consideration. The following detailed indexes also include a list of abbreviations, incipits, manuscripts used and index of names.

Kejř, J. (ed.): Středověké kanonické právo v rukopisech České republiky. Summae confessorum a jiná díla pro foro interno v rukopisech českých a moravských knihoven. – Studie o rukopisech – Monographia, sv. VIII., Archives of the ASCR, Prague 2003, 144 pp [translation].

Illustrative annotation

Czech Tribal Myths. Three Studies on "Old Czech Tales" • Institute of History

An analysis of the *Old Czech Tales* by the modern methods of comparative mythology brings – along with the remarkable re-construction of an ethnologic myth of the birth of the Slavs – an assessment of the significance of two basic motives of the Czech mythical complex by which the Czech tribe explained and repeatedly established the order of the world and human society. The first of the principal mythical motives was a myth of the ur-father Čech that documented the not always evident will of various Slavic peoples that settled in the Czech basin in the 6th through 7th centuries to join together in a united tribe. The second one is a Přemyslide myth that was transformed in the statehood-constructive idea of the Czechs as a "family" of St. Wenceslaus, an eternal guarantee of "peace" understood as an order of human society. At the turn of the 11th century, the country was only "leased" temporarily to actual Přemyslide princes to govern it. The parts in textbooks of historical anthropology reserved for the Slav mythology, modest as a rule until now due to the scarcity of sources, can be substantially enlarged and enriched by the outcome and arguments of this innovative and smart book.

Třeštík, D.: Mýty kmene Čechů. Tři studie ke starým pověstem českým, Nakladatelství Lidové noviny, Praha 2003, 350 pp.

Illustrative annotation

Mikulčice. Burial grounds of the 6th and 12th churches • Institute of Archaeology, Brno

To make the results of long-term research in the hillfort of Valy by Mikulčice available to experts and the general public is one of the priorities of Czech archaeology. Within this effort, monographic evaluation of discoveries in the burial grounds by two churches on this probably most important Great-Moravian locality represents a decisive act. A detailed analysis of the field situation, equipment of graves and traces of surrounding settlements at that time enabled archaeologists to particularize knowledge about the hillfort history, both during the period of Great Moravia and in the subsequent

period of the 11th and 12th centuries. This brought valuable information on the social structure of the population, level of crafts and some top categories of material culture (for example, on Great-Moravian women's jewellery) so that it was possible to perform a more precise chronological classification. With church No. 12 we succeeded in confirming its dating in the ending of Great-Moravian settlement of the hillfort, which significantly contributes to the overall interpretation of this important historical period.

Four graves at the bottom of a chamber by the southern side of the presbytery (burial ground discovered at Valy near Mikulčice)

Kavánová, B., Profantová, N.: Mikulčice. Burial grounds by the 6th and the 12th church. The Papers of the Institute of Archaeology, ASCR, Brno, No. 22. Brno 2003, 474 pp.

Illustrative annotation

The Institute for Art History of the Academy of Sciences of the Czech Republic 1953—2003 • Institute of Art History

This book was published by the Institute of Art History (ÚDU AV ČR) at its own publishing house, Artefactum, for the 10th anniversary of ÚDU AV ČR and the 50th anniversary of the founding of the Institute for Art Theory and History of the Czechoslovak Academy of Sciences. Based on archival research, it presents an overview of the fifty-year history of the institute, introducing a number of hitherto unknown facts about the work and development of the institute and its research focus. It documents the fields of research from the art of the Middle Ages through the Renaissance, the era of Rudolf II, the Baroque and the 19th and 20th centuries, including the major role of the history and theory of architecture. The major undertakings described in the book include the treatment of the topography of art history and work at the Prague Castle. The establishment of the photo collection (with the unique negatives of Josef Sudek, Josef Ehm and Emila Medková, among others) is described, as well as the building of other collections. The authors focus in particular on the collections of the former Kondakov Institute in Prague from the first Czechoslovak Republic, which the Institute for Art History inherited (rich collections of documents and artwork, including a collection of Russian icons). The authors describe the establishment and current state of the library, one of the largest libraries of its kind in the Czech Republic, and provide profiles of the major figures, now deceased, who worked at the institute (for example, Josef Krása, Emanuel Poche, František Šmejkal). The publication includes a bibliography of researchers at the institute from 1952—2002 and a list of Ph.D. theses defended at the institute. A complete list of the researchers who worked at the institute is also provided.

Konečný, L., Hausenblasová, J., Šroněk, M. (eds.): Ústav dějin umění AV ČR 1953—2003 Artefactum, Praha 2003, 176 pp. [translation]

Illustrative annotation

The Czechoslovak Socialist Party 1945—1948. Organisation, programme, politics.

A contribution to historical evaluation of the internal structure, formation and operation of the Socialist Party during the post-war years. An essentially material and analytical study in concept, based on the results of several years of source research, contemporary press reports and historical and memoir literature. Some statistical data and certain hitherto unpublished documents complete the author's work.

Kocian, J., Čs. strana národně socialistická v letech 1945-1948: Organizace, program, politika Doplněk, Brno 2003, 268 pp.

Research plans

9 • Section of Humanities and Philology

Czech lands and the Czech ethnic element in its tradition, historical changes and European circumstances • Institute of Ethnology

Music culture of the Czech lands in the international context • Institute of Ethnology

Complex research on selected key problems of philosophy and the philosophical dimensions of changes in the CR, editing and publishing of the corresponding text bases • Institute of Philosophy

Research on open problems of history, languages (quantitative linguistics, lexicography, phonology) and cultures (literature, religions) of Asia and Africa • Oriental Institute

Research in the field of Palaeo-Slavonic and Byzantine studies, Slavonic languages and literatures, history of Slavonic studies and activities of Russian immigrants in Czechoslovakia • Institute of Slavonic Studies

Researching and forming an information data base of the history and theory of Czech literature from the ancient times to the present • Institute of Czech Literature

Scientific investigation of standard and non-standard varieties of the national language. Contrasting aspects of Czech and general linguistic problems • The Czech Language Institute

The Latin context of Czech culture • Institute for Classical Studies

Illustrative annotation

The Forgotten Potash. Potash Producers and Potash Production in the 18th and 19th Centuries • Institute of Ethnology

A monograph dealing with the topics related to the production of and trading in potash (potassium carbonate, K_2CO_3) in Bohemia in the 18th and 19th centuries with excursions into the times before and after this period. This industry is understood to form part of a wider group of so-called forest trades which is substantiated, in the introduction to the work, on both theoretical and methodological grounds. This interdisciplinary monograph also addresses economic, environmental and technological aspects of the production. Attention is also paid to the issues of foreign trade, state regulation of the production, regional specifics of the field, historical terminology and a typical ethnic definition of the field. The monograph is based on a comparative study of both written and iconographic resources available in the Central and Eastern Europe and Scandinavia as well as on ethnological field research.

Ground plan of an old potashery, scheduled to be demolished

Woitsch, J.: Zapomenutá potaš. Drasláři a draslářství v 18. a 19. století, Institute of Ethnology of the Academy of Sciences of the Czech Republic, Prague 2003, 305 pp.

Illustrative annotation

Baroque in Italy, Baroque in Bohemia. The Czech-Italian Forum on Baroque Research • Institute of Philosophy

The collection comprises papers prepared for the international Symposium of the same name, which was held in Prague in 1999. It presents the results of research on the post-White Mountain period, which has not been a popular topic for Czech historiography for many years. It was the organizers' intention to opt for the widest possible scope, embracing not merely the most varied aspects of this epoch of spiritual history, from political history, social and cultural development to the history of individual disciplines. All this is examined in the political and cultural contexts, philosophical origins, music and theatre, boundaries between Maneerism and Baroque in the arts, the role of the word, the demarcation of space. The authors also deal with the Italian influence and Italian contribution to the cultural development in Bohemia, as well as with J. A. Komenský as a representative of Baroque universalism.

St. Cecily by Onorio Mariani (17th century).
The painting belongs to the Archbishopric of Olomouc and is exhibited in the Art Museum in Olomouc
(photo by Ivo Přeček for the cover of Proceedings)

Herold, V., Pánek, J. (eds.): Baroko v Itálii, baroko v Čechách. Setkávání osobností, idejí a uměleckých forem Filosofia, Praha 2003, 622 pp.

Illustrative annotation

A History of India • Oriental Institute

A comprehensive treatment of the history of India represents a major achievement in the field of South Asia studies. The work examines the political, economic, and cultural history of the region from prehistory through the ancient civilizations, the Middle Ages and the colonial era up to the contemporary period. The result of the project is the first and only work of this kind in Czech scholarly literature. Detailed and comprehensive supplements (288 pp.) are attached to this voluminous work. The supplements contain encyclopaedic data, chronologies, lists of rulers, comprehensive bibliographies and a detailed index.

Strnad, J., Filipský, J., Holman, J., Vavroušková, S., Dějiny Indie. Nakladatelství Lidové noviny, Praha 2003, 1185 pp.

Illustrative annotation

Language, Media, Politics • The Czech Language Institute

The book followed the research project on Czech and Slovak public speech in the 1990´s. Research focused on the impact of democratic changes on public oral discourse in the Czech and Slovak societies. Czech and Slovak authors collected rich linguistic material comprising video recordings of parliamentary sessions broadcast by TV, audio recordings of radio debates, chats and call-in radio programs, video recordings of TV interviews and discussion programs, and TV and radio political advertising materials. This material was transcribed, analysed and evaluated. The question posed was to what extent Czech and Slovak speakers have adapted to the new communication situation and how they have been overcoming clichés of the past regime. The book shows that the communication gap between the public and private spheres has diminished, existing genres of public oratory have been reshaped (e.g., those connected with parliamentary discourse), media genres have moved from a monologue to a dialogue form of talk (manifested in interviews with public figures, discussions, debates and polemics), and completely new genres oriented toward the public have appeared (e.g., those connected with pre-election campaigns). Changes in discursive practices usually take time and are necessarily accompanied by the lingering persistence of old habits and strategies. Consequently, we can characterise the dialogical situation using the word in-between (*i.e.*, also in-between monologue and dialogue).

Čmejrková, S., Hoffmannová, J. (eds): Jazyk, média, politika – Academia, Praha 2003, 258 pp.

Illustrative annotation

Stories of the Apostles. New Testament Apocrypha II. • Institute for Classical Studies

Centre for Biblical Studies, ASCR and Charles University

The core of the second volume of Czech translations of the New Testament apocrypha consists of five oldest stories about apostles arising from the Second Century in the Greek-speaking Mediterranean region: The Apocryphal Acts are of Peter, Paul, Andrew, John, and Thomas. In comparison with the canonical Acts from the First Century, the alleged apostolic teaching is here influenced by contemporary spiritual trends (gnosis, encratism). The book further contains a shorter Coptic text, "Acts of Peter and the Twelve Apostles", two earlier versions of the *Transitus Mariae Virginis* and three pseudo-epigraphs that used to be popular even in the early Middle Ages: the Latin "Correspondence of Seneca and St. Paul", the Latin "Letter to the Laodiceans" and the Greek "Letter from Heaven on the Observance of the Lord's Day". The individual translations are preceded by introductions, bibliographic information and footnotes dealing with the biblical and other literary parallels and adducing major palaeographic versions. The whole volume concludes with four indices (the index of writings, personal and local names, and selected terms).

Dus, J. A. (ed.), Příběhy apoštolů. Novozákonní apokryfy II, Vyšehrad, Praha 2003, 568 pp.

3 Cooperation with Universities and the State of Accreditation and Training of Researchers

Cooperation with universities developed intensely in 2003, particularly in the number of combined departments working on joint research projects, in the training of graduate students based on comparable accreditation of doctoral study programmes, *etc.* Mutual co-ordination of the work of the two types of institutions proved itself in, *e.g.*, the participation of university employees in the associations of the ASCR (Academy of Sciences of the Czech Republic), *i.e.* the Academy Assembly, Academy Council, Supervisory Committee, and in special councils of the Grant Agency of the ASCR. Similarly, a number of ASCR employees have worked in a great many university bodies, *e.g.*, in academic councils of universities and faculties. Work meetings of leading representatives of the ASCR and officials of universities were numerous; close collaboration exists with the Presidium of the University Council and the Czech Rectors' Conference. University employees and ASCR employees continued cooperating on numerous research projects. The Grant Agency of the CR and the Grant Agency of the ASCR supported 599 joint research projects and programmes. Cooperation with universities resulted in successful collaboration on the basis of 17 agreements and contracts. Collaboration with universities was also carried out at 10 research centres operated by ASCR institutes, and another 13 centres that the institutes co-direct. New joint research departments with universities were established, attaining a total of 50.

A new stimulus for collaboration resulting from the effective assistance of the **Council for Collaboration with Universities and Graduate Study Programmes of the ASCR** was the establishment of numerous doctoral teams within the framework of the programme announced by the GACR in 2003. Of the total number of 42 doctoral teams founded in the first round of the programme in 2003, the recipient, *i.e.*, the project leader in 7 cases was from an ASCR institute, and in 16 cases the Academy's institutes acted as co-recipients. Of the total number of 680 graduate students participating in this GACR programme, about one quarter had supervisors at ASCR institutes.

Collaboration between the ASCR and universities in doctoral programmes has been continuing favourably. By the end of 2003 the Accreditation Committee of the Ministry of Education, Youth and Sports of the CR, considering applications for the accreditation of fields of study filed by 51 research institutes of the Academy together with universities, decided to extend the **accreditation of doctoral programmes.** (For the survey of doctoral programmes accredited so far at the institutes see the website of the ASCR, Doctoral Programmes: http://www.cas.cz/cz/spol/VS/akreditace-tabulka.html.) At present, the Mathematical Institute cooperates extensively with universities in a total of 25 accredited disciplines. However, five institutes still lack accreditation (the Archives, Masaryk Institute, Oriental Institute, Institute of Slavonic Studies, and The Czech Language Institute).

Attention of the Council for Cooperation with Universities and Graduate Study Programmes of the ASCR focused, among other matters, on preparing a **course of** introduction to **research fundamentals for beginner graduate students.** At ASCR institutes, 1786 **students** took part in **doctoral programmes** (full-time, part-time or distance forms of study). However, negative trends in graduate studies persist, such as a growing proportion of drop-outs and unwarranted protraction of studies. In all fields of research, only 161 graduates achieved the Ph.D. title, which is 13 graduates fewer than in 2002. Most of the graduate students were trained at institutes of life and chemical sciences (882). Institutes with relatively large numbers of graduate students compared with the size of the institute include, in the Division of Mathematics, Physics and Earth Sciences, the Mathematical Institute, Institute of Information Theory and Automation, and Institute of Computer Science; in the Life and Chemical Sciences Division, the Institute of Vertebrate Biology, Institute of Inorganic Chemistry, J. Heyrovsky Institute of Physical Chemistry, and Institute of Microbiology; in the Humanities and Social Sciences Division, the Institute of Psychology and the Economics Institute, which has a special position and has recently been training 183 doctorate students. Generally speaking, institutes of the Second and Third Divisions show greater activity in graduate student training than the institutes of the First Division.

Landscape and House, Distance and Proximity, Up and Down…,
a conference of students of literature
organized by the Institute of Czech Literature
and Charles University

Foreign graduate students were trained at 29 institutes of the ASCR, above all at the Institute of Physics (27) and Institute of Experimental Medicine (11). Again, a specific situation was found in the Economics Institute, where of the total number of 183 graduate students, 143 came from abroad (mostly from post-communist countries). In 2003, 17 foreign graduate students successfully completed their doctoral programmes within the framework of the accreditation of our institutes. A barrier preventing a significant increase in the number of foreign students is, among other things, the intricate process of obtaining permits and visas for graduate studies in the Czech Republic.

In 2003, the long-term tendency toward an increase in all indices of active involvement of **ASCR staff at** universities continued. In total, 1,673 ASCR employees taught at universities and 442 persons were employed at universities in secondary employment (similarly, 282 university personnel had secondary employment at some ASCR institutes). A positive development was the interlinking of ASCR institutes and faculties of universities, where 190 professors and 281 associate professors worked part-time at ASCR institutes in 2003, which is a slight increase as compared with the previous year.

Cooperation with the Business Sphere, Industrial Enterprises, and Other Institutions

4

The results of ASCR basic research are applied in industry, agriculture, environmental protection, safeguarding of cultural values, in the national health sector, and in studies of the state of Czech society. For diffusion of the results of basic research into applications, the institutes made use of not only the "Support Programme for Targeted Research and Development" provided by the ASCR, but also programmes established by ministries and other governmental institutions. Industrial enterprises and private research institutes were partners of the Academy's institutes in work on several dozens of projects of the Grant Agency of the CR. Results of the research work are put into practice also in the form of economic contracts (in 2003, institutes of the First, Second and Third Divisions entered into about 250, 180, and 170 such contracts, respectively), and/or by direct collaboration based on agreements between the academic and non-academic establishments.

Cooperation with industrial enterprises

Projects within the programmes of the Ministry of Industry and Trade focused on the introduction of **new technologies and product innovations.** At ASCR institutes, 30 such programmes were running mostly under the Project Consortium programme. Also, about one-third of projects in the Support Programme for Targeted Research and Development and more than one-half of the economic contracts concerned technological innovations. The strength of collaboration is illustrated by the following selected projects and results:

TTC Telekomunikace took over production of the test series of special low-voltage power supply units developed at the **Institute of Physics** for reading electronics of stripping silicon detectors intended for the measurement of path lines of ionised particles in the ATLAS detector, CERN,

Design, creation, and testing of supervisory software for frequency transformers with IGBT, utilisable, *e.g.*, for pump drives • **Institute of Electrical Engineering — Polovodiče, Inc.,**

Development and verification of apparatus for perspective technology of extruding tests on small thin discs within the framework of the project, "Analysis of Heat Resistance of Welded Joints on Power Facilities with the Use of Extrusion Test Technology" • **Institute of Physics of Materials — Vítkovice, Výzkum a vývoj, Ltd., Ostrava,**

Verification of the stress state of the steel roof structure of the Sazka hall by experiment • **Institute of Theoretical and Applied Mechanics,**

Steel roof structure of the Sazka hall,
whose stress state was verified by experiment at
the Institute of Theoretical and Applied Mechanics

Development of new technological procedures for the production of boron compounds (decaborane and carborane) • **Institute of Inorganic Chemistry – Katchem, Ltd.,**

Application of new photo-catalytic agent types based on TiO2 for coating compositions of construction materials • **Institute of Inorganic Chemistry, Heyrovsky Institute of Physical Chemistry – ATG Praha, SYNPO Pardubice, Klokner Institute of the Czech Technical University, and RAKO Rakovník,**

Verification of the technological procedure for recycling waste PET materials into terephthalic acid and ethylene glycol based on the invention, "Method of Chemical Recycling of Waste Polyethylene Terephthalate (PET)" • **Institute of Chemical Process Fundamentals, Institute of Macromolecular Chemistry – JAMI Petrol, Ltd.,**

Development of the conversion process of ammonium aluminium sulphate to aluminium hydroxide and fertilizers • **Institute of Chemical Process Fundamentals – Diamo, Stráž pod Ralskem,**

Synthesis of a number of semi-sandwich titanium complexes for styrene polymerisation • **Heyrovsky Institute of Physical Chemistry – Research Institute of Inorganic Chemistry (VÚANCH), Ústí nad Labem,**

Development and elaboration of methods for the preparation of polymer drug carriers with hydrolytic-controlled release of cancerostatics; selection and preparation of polymer cancerostatics based on doxorubicine conjugates differing in the structure of the polymer carrier • **Institute of Macromolecular Chemistry, Institute of Microbiology – Zentiva, a.s.,**

Selection of a perspective binding substance based on polyvinylidene fluoride for heterogeneous ion exchange membranes used in hydrogenous and methanol fuel cells • **Institute of Macromolecular Chemistry – MEGA, Stráž pod Ralskem,**

Development of methods for NMR spectroscopy of a solid state resulting in almost complete recognition of the structure and active substances in pharmaceuticals, such methods being the only ones applicable in the case of difficult crystallizing substances • **Institute of Macromolecular Chemistry, Institute of Microbiology – IVAX, Ltd.,**

Development of a new type of hydrogel material for covering and healing wounds, containing a radical trap which is already being produced for veterinary purposes • **Institute of Macromolecular Chemistry – Wilens,**

Development of a new method for the determination of aminolaevulinic acid
• **Institute of Entomology — Zentiva, Inc.**,

Development of electrochemical biosensors for the detection of herbicides in water
• **Institute of Microbiology — BVT Technologies, Brno**,

Design of a unique solar bioreactor • **Institute of Microbiology — ENVI, Třeboň**,

Development of submerse technology for the preparation of specific antigens for veterinary application based on the full-cell vaccine • **Institute of Microbiology — Bioveta, Ltd., Ivanovice na Hané**,

Development of a Lyme disease vaccine to be used in veterinary practice
• **Institute of Vertebrate Biology — Bioveta, Ltd.**

Cooperation with hospitals and other health establishments

Broad collaboration exists with other — predominantly non-entrepreneurial — organizations, particularly in the sphere of national health, the environment, and agriculture sectors. ASCR institutes took part in 58 projects of the Ministry of Health, 14 projects of the Ministry of the Environment, 21 projects of the Ministry of Agriculture, and worked on a number of projects with outputs into these spheres, supported by the GACR.

Cooperation with **hospitals and other establishments in the health sphere** produced the following results:

Development of a method suitable for radio-labelling of selected monoclonal antibodies
• **Nuclear Physics Institute**,

Combination of a microchip with mass spectrometry for a highly effective population and selective screening of congenital metabolic derangements
• **Institute of Analytical Chemistry — University College Hospital in Brno**,

Proposal and synthesis of oligosaccharide mimetics of natural ligands of the activation lectin receptor of NK cells based on linear and branched oligosaccharides consisting of 2-amino-2-deoxysaccharides
• **Institute of Organic Chemistry and Biochemistry — Institute of Veterinary Medicine in Brno, and State Medical Institute in Praha**,

Preparation of monoclonal antibodies against TRAIL-receptors DR4 and DR5, with possible use in the treatment of tumours • **Institute of Molecular Genetics — Exbio, Praha, and Apronex, Praha**.

Cooperation in the environmental sphere

In the **environmental** sphere, partners and users of results are, besides state administration bodies and regional and local authorities, private business entities. The projects tackled include:

New flood protection technology based on the use of artificial fabric bags filled with concentrated aqueous suspensions by means of mobile pumps • **Institute of Hydrodynamics — KOEXPRO, Ostrava**,

Solving the serious problem of the stability of potential Skalka intermediate storage of spent nuclear fuel; with the use of a mathematical modelling method, stress fields induced by the designed storage were calculated, and the stability influenced by the designed structure of the system in question was assessed • **Institute of Geonics — PRO ENGINEERING, Ltd.**,

Preservation of selected endangered species in the tundra area of the Giant Mountains National Park (Krkonošský národní park) • **Institute of Botany — KRNAP administration**,

Development of fluorescent imaging technologies and fluorescent signal monitoring systems on the level of vegetation • **Institute of Landscape Ecology – PSI, Ltd.**,

Glasshouse in a forest – a unique lamellar cultivation sphere at an experimental field station of the institute of Landscape Ecology at Bílý Kříž in the Moravian-Silesian Beskyds (altitude 908 m). Trees are grown there under natural and double concentrations of CO_2, the latter being expected to occur about the year 2050.

Carbon balance for forest ecosystems: regional quantification of carbon deposits and modelling of its development in connection with the Kyoto Protocol obligations • **Institute of Landscape Ecology – IFER, Ltd.**,

Innovation of technological procedures for spoil-bank reclamation; monitoring of the occurrence of selected organisms in spoil banks after lignite coal mining in the Sokolov region
• **Institute of Soil Biology – ENKI, v.p.s., Třeboň**.

Cooperation in agricultural research

In the **agricultural research** sphere, the Academy's institutes worked, among others, in cooperation with applied research and development subjects on the following projects:

Proposal and realisation of a detecting chamber prototype for field-flow fractionation and proteomic identification of prolamines
• **Institute of Analytical Chemistry, Institute of Microbiology – Research Institute of the Food Industry, Sdružení celiaků ČR (Association of Celiacs), and Immunotech,Inc.**,

Preparation of a number of new brassinosteroids for testing in field conditions on various crops
• **Institute of Organic Chemistry and Biochemistry – AGRA**,

Derivation and hand-over of selected di-haploid lines of barley and wheat
• **Institute of Experimental Botany – ZVÚ Kroměříž, SELGEN, Ltd., ŠS Stupice**,

Improvement of *in-vitro* insemination methods using swine
• **Institute of Animal Physiology and Genetics – Research Institute of Animal Production (VÚŽV), Uhříněves and KlinLab, Ltd.**,

Development of a vaccine against rabbit coccidiosis
• **Institute of Parasitology – BIOPHARM, Inc., Research Institute of Bio-pharmacy and Veterinary Pharmaceutics**,

Development of methods for the assessment of the efficiency of genetically modified organism transgen products in the protection of plants, and the evaluation of risks in their introduction
• **Institute of Soil Biology – Research Institute of Plant Production, Prague**.

ASCR's assistance to units of the state administration, local authorities and EU institutions

Researchers at the Academy's institutes annually prepare hundreds of expert papers, opinions and analyses for the user sphere, including the **state administration, local authorities and EU administrative institutions.** Social sciences and humanities significantly participate in these activities. Archaeological Institutes in Prague and Brno produced more than two thousand technical expert papers that determined conditions of the protection of archaeological sites and cultural relics, and entered into 160 economic contracts for archaeological salvage research of sites affected by construction activities.

One programme of this kind that may be considered most important is the archaeological salvage research of the Slavonic skeleton necropolis in Čejč in the Hodonín region. In an area of about 2,500 m^2, 203 graves have been found, of which about 130 date back to Great Moravian Empire period.

ASCR institutes undertook three research projects of the Ministry of Foreign Affairs, four projects of the Ministry of Labour and Social Affairs, nine projects of the Ministry of Culture, one project of the Ministry of the Interior, and a number of other tasks for the needs of the state administration and local authorities. Some of the issues carried out:

The Oriental Institute took part in working out a theoretical basis for the state policy of integration of foreigners in the Czech territory; a study entitled China, the Chinese and the Czech Republic was developed from a regional point of view.

The Institute of Sociology carried out public opinion research for the Ministry of Labour and Social Affairs regarding the position of women in the labour market, and prepared a study on support of the use of parental leave by men.

Besides the tangible results and projects mentioned, ASCR employees participated in the preparation of a number of technical standards, methodologies, analyses, measurements, laboratory tests and diagnostic methods, several dozen extensive expert papers and hundreds of professional opinions on documents and projects, and reports from the applied research and development sphere, preparation of documents for legislation and presentation of the National Research Programme and its parts and phases aimed at collaboration between basic and applied research.

Quantitative data concerning protection of intellectual property and licence agreements are presented in the table.

Applications for patents, utility designs, patents, licence agreements in ASCR in 2003

Institute	Patents granted in the CR	Patents granted abroad	Registered utility designs	Applications for invention	Applications for utility designs	Valid licence agreements total	Valid licence agreements of which in 2003
FZÚ				3		5	
ÚFP	4			2			
ÚE		1					
GFÚ		1					
ÚSMH			1		1		
ÚACH	2			2		1	
ÚFCH JH		2		1			
ÚCHP	1			7		2	
ÚMCH	4	4		5		14	1
ÚOCHB	2			1	1	2	
BFÚ		1					
ENTÚ				1			
MBÚ	2		1	2			
ÚEB			3			84	6
ÚMG			3				
AV total	15	9	8	24	2	108	7

FZÚ = Institute of Physics
ÚFP = Institute of Plasma Physics
ÚE = Institute of Electrical Engineering
GFÚ = Geophysical Institute
ÚSMH = Institute of Rock Structure and Mechanics
ÚACH = Institute of Inorganic Chemistry
ÚFCH JH = J. Heyrovský Institute of Physical Chemistry
ÚCHP = Institute of Chemical Process Fundamentals
ÚMCH = Institute of Macromolecular Chemistry
ÚOCHB = Institute of Organic Chemistry and Biochemistry
BFÚ = Institute of Biophysics
ENTÚ = Institute of Entomology
MBÚ = Institute of Microbiology
ÚEB = Institute of Experimental Botany
ÚMG = Institute of Molecular Genetics

5 International Cooperation

Cooperation of the ASCR with its foreign partners takes a number of forms at various levels. Statistical information about the principal activities of ASCR institutes in this area is summarised in the concluding table. In particular, the involvement of ASCR institutes in selected international programmes and projects is presented, as are significant international conferences and symposia organised by the institutes of the ASCR in 2003.

Cooperation within EU and NATO structures

The pending accession of the Czech Republic to the **European Union** has already activated all areas of our society, including that of research and development. The ASCR is fully aware of the historical significance of this step and has made intensive efforts to reinforce and improve the quality of its cooperation with EU member states and with European science institutions. This cooperation has been put into practice by Czech research teams participating in international projects, primarily in European Union framework programmes (hereinafter referred to as "EUFP"). The agenda mentioned was also supported staff-wise in the past year at the ASCR Office. A list of selected European projects in which ASCR institutes participated is given at the end of this subsection.

The ASCR also participated in a number of important events which were co-organised by the European Commission, among others the Budapest Science Forum and the issue of "Knowledge and Society", a conference on infrastructures in research in Trieste, Italy, and a number of methodological, procedural and coordination meetings on major topics of the Lisbon Process, "Science and Governance", "Technology Foresight", "Technology Transfer and Innovation", and "Benchmarking in Research, Development and Innovation".

The Technology Centre of the ASCR succeeded in fulfilling its role as National Contact Organisation for the 6th EUFP and as of October 1, 2003 has had the status of National Information Centre for European Research (NICER). Aside from stabilising and improving further spectra of informative and support activities regarding the 6th EUFP, the Technological Centre also prepared a draft system for the financial support of projects that are to be launched in the first half of 2004.

By agreement between the Ministry of Education, Youth, and Sports of the Czech Republic and the ASCR, the Academy became part of the European Network of Mobility Centres. Its purpose is to create conditions for facilitating closer contacts between scientists from the 15 original EU states and their counterparts from the new member countries, and to assist individual scientists during their long-term research visits.

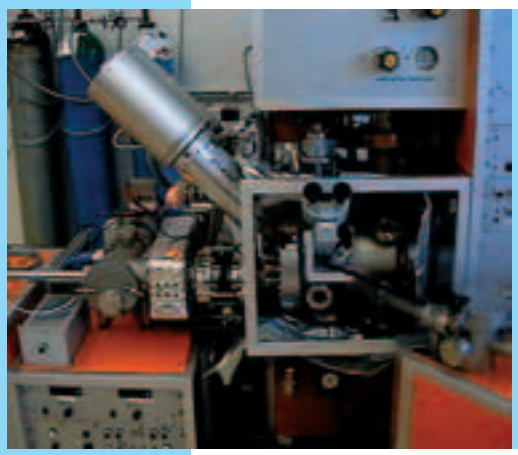
A staff member of the ASCR also represents the Czech Republic on the **NATO** Science Committee (a NATO Council advisory body) which is responsible for the NATO science programme. Twenty seven ASCR institutes were involved in this programme and participated in 32 projects.

Selected COST projects

Power Generation into the 21st Century: Steam Turbine Working Group • Institute of Physics of Materials, Vítkovice, Research and Development, SVÚM Prague, Škoda Research, Pilsen and 56 temporary positions from 16 countries in Western and Central Europe

Telecommunication, Information Science and Technology (COST 266) • Institute of Radio Engineering and Electronics as coordinator, partners from research laboratories in 15 European states

Impact of Wind and Storm on City Life and Man-made Environment (COST 14) • coordinator: Università di Firenze, Italy; other partners from the Institute of Theoretical and Applied Mechanics and groups from 13 European countries



SIMS (Secondary Ion Mass Spectrometry) ATOMIKA ADIDA 3000 analyser for analysing the chemical composition and surface structure of solids. The laboratory equipment of the Department of Physics, Pedagogical Faculty, J. E. Purkyně University in Ústí nad Labem is used in joint experiments with the Nuclear Physics Institute, ASCR under the COST project 527, Plasma Polymers and Related Materials.

Meteorology Applied to Urban Air Pollution Problems (COST 715) • Institute of Thermomechanics, Faculty of Mathematics and Physics, Charles University, Universität Hamburg, Instituto de Meteorologia Lisboa, Università di Roma, and others.

Channel Modelling and Propagation Impairment Mitigation for Millimetre Wave Radio Systems (COST 280) • Institute of Atmospheric Physics, Testcom, Prague and the Faculty of Electronics, ČVUT (Czech Technical University); and teams from 14 other European countries.

3-D Monitoring of Active Tectonic Structures (COST 625) • coordinator for 2003: Institute of Rock Structure and Mechanics; in cooperation with 13 partners in as many countries.

Development of Microarrays-Based Biomarkers for Detection of Fruit Viruses (COST 853) • Institute of Plant Molecular Biology together with research laboratories in 20 other European countries, *e.g.*, Italy, Switzerland, Poland, Germany, Austria, and the Netherlands

Selected projects of the 5th EU Framework Programme

IDEALIST (Information Dissemination and European Awareness Launch for the IST) • Institute of Information Theory and Automation together with partners in 29 European countries, plus Israel and Turkey

EVANET – HYDRA (Evaluation and Network of EC-Decision Support Systems in the Fields of Hydrological Dispersion Models and Aquatic Radiological Research) • Institute of Information Theory and Automation cooperating with 18 European universities and research institutes

SMARTWELD – Intelligent Welding of Power Generation Components • Institute of Physics of Materials, Škoda Pilsen, and partners from Great Britain, Ireland, the Netherlands, Slovenia, and Slovakia

PALS Research Centre • Institute of Physics and Institute of Plasma Physics in cooperation with the Faculty of Nuclear Science and Physical Engineering and the Faculty of Electrotechnics of the ČVUT (Czech Technical University) in Prague; plus partners in Italy, Poland, and Germany

Members of the Italian team during an experiment with laser-induced shock waves, made at the Prague Laser Plasma Research Centre under the Transnational Access to Major Research Infrastructures programme (Fifth Framework Programme of the EU)

NAIS – Photonic Next Generation Active Integrated Optic Subsystems • Institute of Radio Engineering and Electronics and partners from universities and industrial research laboratories in the Netherlands, France, Switzerland, Germany, Great Britain, and Italy

Quality and Trust in the Industrial Application of CFD • Institute of Thermomechanics in cooperation with scientists in 44 nations

MEREDIAN-2 – Mediterranean-European Rapid Earthquake Data Information and Archiving Network • project coordination: KNMI, the Netherlands, in cooperation with the Geophysical Institute and along with 7 others in 5 Central European countries, Estonia, and Malta

CANDIDOZ (Chemical and Dynamical Influences on Decadal Ozone Change) • Institute of Atmospheric Physics and the Czech Hydrometeorologic Institute together with a number of research institutes in Finland, Switzerland, Great Britain, France, Denmark, Norway, and Germany

RE URBAN MOBIL • Institute of Geonics and 13 other institutes in Germany, Great Britain, Poland, Spain, and Slovenia

ITSAPT — Intelligent Textile Structures — Application, Production and Testing (Centre of Excellence) • Technical University in Liberec; collaborates with the Institute of Rock Structure and Mechanics, Institute of Physics, Baťova Univerzita Zlín, INOTEX Dvůr Králové, and others in 14 countries

Behaviour of Multiphase Systems under Super-ambient Conditions • Institute of Chemical Process Fundamentals cooperates with its counterparts in France, Spain, Greece, Slovenia, and Slovakia

Polymer-Virus Hybrid Vectors for Safe and Efficient Treatment of Prostate Cancer • Institute of Macromolecular Chemistry in cooperation with universities in Great Britain and Spain

European Network on Children's Susceptibility and Exposure to Environmental Genotoxicants • Institute of Experimental Medicine and research institutes in Denmark, Finland, Belgium, the Netherlands, Hungary, Great Britain, Norway, Sweden, Spain, Italy, Poland, and Greece

Genes and Genetic Engineering for Arbuscular Mycorrhiza Technology and Applications in Sustainable Agriculture • Institute of Botany cooperates with institutes in France, Italy, Great Britain, Germany, Spain, and Poland

CONTINENT — High Resolution Continental Palaeoclimate Record from Lake Baikal • Institute of Hydrobiology works with fellow researchers from Germany, Switzerland, Russia, and other countries

Greenhouse Gas Mitigation of Organic and Conventional Dairy MIDAIR Production • Institute of Soil Biology is involved along with institutions from Germany, Great Britain, France, the Netherlands, Italy, Austria, Sweden, Finland, Denmark, and Greece

Technology Assessment in Europe: Between Method and Impact • Institute of Philosophy cooperates with 10 research institutions throughout Europe

Selected projects of the 6th EU Framework Programme

Controlled Thermonuclear Fusion (EURATOM project) • Institute of Plasma Physics coordinates the collaboration of 5 research establisments in the Czech Republic

THERAVAC — Optimised Delivery Systems for Vaccines Targeted to Dendritic Cells (STREP project) • Institute of Microbiology cooperates with research and industrial partners from France, Belgium, Great Britain, Italy, and Spain

CARBOEUROPE — An Investigation on Carbon and Energy Exchange of Terrestrial Ecosystems in Europe — (integrated project; coordination: Max-Planck-Institut, Jena, Germany) • Institute of Landscape Ecology and 66 other partners in 17 European countries

Central European Centre for Women and Youth in Science • Institute of Sociology is the coordinator of cooperation of Hungary, Slovakia, Slovenia, Czech Republic, France, Italy, and Romania

ASCR cooperation with international governmental scientific organisations

The year 2003 was a successful one in terms of Czech cooperation with **CERN** (Conseil Européen pour la Recherche Nucléaire). Three hundred researchers and students from 13 ASCR institutes participated in 9 experiments and extensive theoretical issues of sub-nuclear and nuclear physics. A number of significant and in some cases unique results were achieved. Among these are, for example, the most accurate verification of the standard model forecast to date, the first manifestations of quark-gulon plasma and confirmation of three new five-quark systems, and preparation and study of antihydrogen atoms.

Furthermore, participation was successful in the development of nine new research and development technological and application programmes. The most important from the perspective of application was cooperation on the new DataGRID communication system, cooperation in the development of radiation-resistant detectors, and cooperation in the new diagnostics and treatment of tumours.

The underground hall of the ATLAS experiment located in the depth of 100 m, in which is being installed a giant cylindrical detector ATLAS (weight 7 000 t, height 25 m, and length 46 m!) In its centre two proton beams, accelerated in the LHC each up to energy of 7 TeV, will collide 980 million times per second. Analysis of products of collisions will allow to find some answers to fundamental questions concerning the smallest building blocks of matter and characteristics of forces acting between them, as well as explanation of processes at the beginning and later evolution of the universe. Among 1800 research workers participating in the ATLAS experiment are scientists from the Institute of Physics, ASCR, from the Faculty of Mathematics and Physics of Charles University, and from the Czech Technical University in Prague. They are responsible for construction of the inner detector, the so-called calorimeter, whose eight modules (each weighing 21 t) are just being lowered through the installation shaft.

The working contacts of 60 researchers from 6 ASCR institutes were maintained with the **Joint Institute for Nuclear Research** in Dubna in 21 projects in relation to mathematical physics, ion physics and the chemistry of trans-uranium elements, radiobiology and medical physics, in the application of methods of neutron physics, in the physics of solid state, in geophysics, and in research into polymers. Cooperation in the development and improvement of detectors and other experimental equipment was also realised.

The Academy of Sciences of the Czech Republic actively cooperates with the **Czech Commission for UNESCO**, in which it has been represented by five employees since 2003. Three ASCR institutes participate in the organisation of UNESCO postgraduate courses: the Institute of Microbiology continues a long-term course on the modern problems facing biology and microbiological technology, the Institute of Macromolecular Chemistry organises a course on research into polymers, and the Institute of Botany organises, in association with the Austrian Academy of Sciences, an International Postgraduate Course in Limnology.

Very active is the Czech National Committee of the UNESCO programme **Man and the Biosphere (MAB)**, sponsored by the ASCR.

The chairman of this committee represents Central and Eastern Europe as well as the former Soviet countries in the MAB International Coordination Council (ICC MAB). Representatives of the committee attended a conference of the MAB Bureau in Paris in July 2003. Incorporation of 15 new areas in the World Biosphere Reserve Network was approved at that session. The network includes 440 reserves that span 97 countries, six of them are in the Czech Republic.

The work of research institutes and teams with the **ESA** (European Space Agency) is coordinated by the Czech Council for Cosmic Activity at the Ministry of Education, Youth and Sports. The ASCR has four representatives from two institutes in this council and these institutes are involved in projects in cosmic astronomy (Astronomical Institute) and astrophysics (Institute of Atmospheric Physics). They also sponsored a lecture on the activities of the ESA and a press forum with high-ranking representatives of the ESA about the INTEGRAL (International Gamma Ray Laboratory) project in May 2003.

ASCR cooperation with international non-governmental scientific organisations

The ASCR is a member of the All European Academies (**ALLEA**), which proposed and assisted in the creation and activity of the European Research Council, the operation of the European Parliament in the field of science, and so on. The ASCR also has representatives in ALLEA working groups that deal with, for example, cooperation in research or relations between science and the media. The ASCR is also represented in the **ICSU** (International Council for Science), a top-ranking scientific organisation that encompasses the activities of international science unions for all natural and social sciences. The relevant national committees are partners in these unions. The ASCR paid the membership contributions of 35 national committees to their international partner organisations in 2003, and contributed to the participation of the representatives of these committees at international conferences and general meetings.

A representative of the ASCR attended the General Meeting of the **IAP** (InterAcademy Panel) in December 2003. The IAP is a worldwide organisation which brings together national academies of sciences principally dedicated to the problems of developing countries. Discussions centred on “Science for Society”. The ASCR was also one of the signatories of an IAP declaration in support of cloning for therapeutic purposes and added its signature to IAP declarations related to the following spheres of interest: “Mother and Child Health”, “Scientific Capacity Building”, “Science Education”, “Science and the Media”, and “Access to Scientific Information”. Eight ASCR institutes participated in six projects carried out by the UAI (Union Académique Internationale), an organisation which encompasses 51 member countries and coordinates and financially supports cooperation in prominent humanitarian projects. The ASCR is participating in the following projects: *Moravia Magna, Clavis Monumentorum Litterarum Bohemiae, Lexicon Iconographicum Mythologiae Classicae, Corpus Vasorum Antiquorum (Thesaurus Cultus Rituumque Antiquorum), Latinitatis Medii Aevi Lexicon Bohemorum, and Aristoteles Latinus*.

The **Czech Historical Institute in Rome**, a unique joint association shared by the ASCR and the Faculty of Philosophy, Charles University in Prague, were engaged in three research assignments: promoting the continuing publication of Vatican sources for medieval Czech history, to issue reports of the papal legates at the imperial court, and to systematically investigate the *Bohemica* manuscripts in the Vatican and other libraries. An edition of *Monumenta Vaticana res gestas Bohemicas illustrantia* (years 1305—1342) was published in 2003 and another volume covering the years 1431—1447 is in progress.

The ASCR is a member of the **European Science Foundation** (ESF) together with the Czech Science Foundation and has representatives in the ESF management, as well as on expert bodies and committees. ASCR staff members were involved in 23 of the 46 ESF programmes in biological, chemical, physical, and social sciences, and the humanities. Six programmes were completed and the coordination commission of the ASCR and Czech Science Foundation authorized participation in eight other programmes. A number of meetings and workshops took place in the Czech Republic as part of ESF activities, the most prominent of which was the first European Conference on Functional Genomics, which was organised and hosted by the Institute of Molecular Genetics, ASCR and in which six hundred scientists participated. ASCR employees also received grants as part of the new EUROCORES programme, *e.g.*, Institute of Macromolecular Chemistry in the SONS (Self Organized Nano Structures) sub-programme and are participating in bids for grants as part of the EuroDYNA (Dynamic Nuclear Architecture and Chromatin Function), EuroCLIMATE, EuroSCOPE (Science of Protein Production for Functional and Structural Analysis), and Biodiversity sub-programmes.

Representatives of the ASCR have for several years participated in the activities of the **International Human Rights Network of Academies and Scholarly Societies** — a network of academies which protest against the injustices which are perpetrated against specific scientists in some countries. A meeting of participating academies was held in 2003 in Ascona, Switzerland. The primary focus of this gathering was on the defence against terrorism and on how to encourage and reinforce cooperation between the Israeli and Palestinian Academies of Sciences through joint research projects.

The ASCR also became engaged in the "GOLEM" project in cooperation with Charles University, the Czech Technical University, and other interested institutions. This project was initiated by the Argentinean Embassy in the Czech Republic, the impulse being a reflection of the magic of Prague and the figure of Golem in a Prague Jewish legend and in the poem "El Golem" by the Argentinean poet and writer J. L. Borges. Part of the project included a conference in Buenos Aires about computers and their use in replacing certain human activities. Topics embraced computers and artificial intelligence, computers and art, and so on. The project is an effort to bring together science, art, and the public and is set to continue into 2005 in connection with the World Mathematics Congress.

Examples of other ASCR Institutes' international projects

ESA INTEGRAL (international satellite for high energy astrophysics) • Astronomical Institute in association with the Faculty of Nuclear Science and Physical Engineering, Charles University, Faculty of Electrotechnics, ČVUT (Czech Technical University) in Prague and the Mathematical Institute in Brno; and partners in other countries

CLUSTER,
a system of satellites collaborating under the ESA project

BARRANDE (French-Czech cooperation) • Institute of Mathematics, Faculty of Nuclear Science and Physical Engineering, ČVUT (Czech Technical University), Faculty of Engineering, ČVUT, Faculty of Mathematics and Physics, Charles University, and 5 French universities

STAR (RHIC BNL, USA) • Nuclear Physics Institute and 49 establishments in 12 countries

U. S. — Czech Engineering Research on Circuit Design and Control of Variable Speed Drives for Low Cost High Volume Applications (NSF project) • Institute of Electrical Engineering and the University of Wisconsin, Madison, USA

RETREAT: 2002—2007 • a comprehensive Italian-American project (coordinators: Yale University, USA, INGV Roma, Italy) with the participation of the Geophysical Institute and 3 institutes in France and Switzerland

Life and chemical sciences

Li-Ion Rechargeable Microbatteries Integratible on Low Power ICs (NATO project, SfP) • Institute of Inorganic Chemistry and Institute of Physics together with establishments in Greece, Hungary, and Italy

DNA Interactions of Platinum Anticancer Drugs. Relation to the Development of New Cytostatics (The Wellcome Trust, UK) • Institute of Biophysics and the University of Edinburgh, Department of Chemistry

Natural and Recombinant Protease Inhibitors (NATO-Poland Collaborative Linkage Grant LST.CLG.979223) • Institute of Entomology and Institute of Biochemistry and Biophysics of the Polish Academy of Sciences

Behavioural evaluation of memory failures in the transgenic model of Alzheimer disease in mice (Alzheimer Disease Research Scios, Inc.) • Institute of Physiology together with research and university institutes in the USA and Finland

Important Pathogenic Parasites of Fish: Biology and Control Measures (KONTAKT, ME 424) • Institute of Parasitology, and Institute of Hydrobiology of the Chinese Academy of Sciences

Humanities and social sciences

GDN Research Competition III (Global Development Network programme) • coordinator: Economics Institute, 37 active participants from 11 countries; 10 of these from the Czech Republic

Occupation in Europe. The Impact of National Socialist and Fascist Rule, 1938—1945 (a project under the patronage of the ESF Standing Committee for the Humanities) • Institute of History, and Faculty of Philosophy, Charles University, a total of 74 participants from almost all European countries

Christianization and State Formation in Northern and Central Europe c. 900 — c. 1200 (University of Cambridge project) • Institute of Philosophy, Institute of Archaeology, Institute of History, and establishments in eight other countries in Northern and Central Europe

A Europe of Dictatorships — Reforms in the Countries of Central Europe during the 1950s and 1960s (Max-Planck-Institut für Europäische Rechtsgeschichte project) • Institute for Contemporary History, Faculty of Social Sciences and Faculty of Philosophy, Charles University, Berliner Brandenburgische Akademie, Università Federico II, Napoli, Université de Montpellier, and others.

Money Lending to Socially Vulnerable Members of Roma Communities (Office of the High Commissioner of the United Nations Organisation for Refugees) • Institute of Ethnology, Citizens' Advice Bureau

Misión arqueologica española en Turquia (salvage research into endangered areas of southeast Turkey) • Oriental Institute, University of Alicante, Spain, Sanliurfa Museum, Turkey, Widener University, USA

Moravia Magna, Greek-Ancient Slavonic Index (Lexicon linguae palaeoslovenicae) (Union Académique Internationale project) • Institute of Slavonic Studies

European Language Atlas (UNESCO program) • The Czech Language Institute together with institutes in 51 European countries

Cooperation with other countries under bilateral agreements

The ASCR currently has concluded 59 bilateral agreements with partners in 45 countries throughout the world. Cooperation further expanded in 2003 to include partners from other countries or new partners from countries of long-standing cooperation. New agreements on scientific cooperation were entered into with an Argentinean partner CONICET, with the National University in Singapore, and with the Korean Academy of Science and Technology. Agreements with partners in Saudi Arabia and Iran are scheduled to be signed in the first quarter of 2004. Agreements were updated with, for example, the Slovak Academy of Sciences and the Hungarian Academy of Sciences, with both academies in Poland, two partners in India, the Belarussian Academy of Sciences, and with others. Cooperation undertaken as part of the agreements is principally focused on two or three-year joint projects, 74 of which are now being implemented. Five hundred twenty nine researchers were sent abroad for a total of 6042 days under the Academy's bilateral agreements and 426 scientists were received at the institutes and universities for 4442 days.

Twenty-two two-year projects chosen in 2003

In 2003, 22 two-year projects were launched as part of a new cooperation established on a joint programme with the German partner DAAD (Deutscher Akademischer Austauschdienst). This programme focuses on supporting cooperation between teams in which young research workers, graduate students, and students are significantly involved. The Canadian National Research Council (NRC) is also a new partner and it was with this organisation that specific conditions for cooperation were agreed in two selected joint projects. The project entitled “Nano and Amorphous Materials”, in which the Institute of Plasma Physics is participating, is being undertaken as is the “Protein-Carbohydrate Interaction Area” project, involving the Institute of Parasitology. Two-year projects with the French partners CNRS and INSERM and the Spanish partner CSIC have been implemented as of 2003. This was the last year of projects engaged in with the Italian partner CNR, with a new selective procedure initiated for a further three-year period.

In countries where the ASCR does not have its own contractual partners or where the contracts are not sufficient to cover requirements due to major interest, the institutes of ASCR utilise international programmes and projects through inter-governmental cultural agreements concluded by the Czech Ministry of Foreign Affairs (*e.g.*, with Denmark, Norway, Greece, and Germany) and inter-governmental agreements on cooperation in research and development under the aegis of the Ministry of Education, Youth and Sports of the Czech Republic. These agreements focus on applied research and enable basic research teams to link up with important partners in the field of technology and industry. Examples include the inter-governmental agreements on cooperation in research and technology entered into with, for example, Japan, Slovenia, Hungary, and Germany, the Barrande programme in cooperation with France, the AKTION programme in cooperation with Austria, and the KONTAKT programme with the National Science Foundation (USA), in which 9 new projects involving institutes of the ASCR were approved in 2003. ASCR specialists regularly appraise proposals for new projects and their eventual selection.

Other forms of international cooperation

Two meetings of the **V4 Academy Forum**, an open grouping of Academies of Sciences from the countries of the Visegrád Four, took place in Cracow and in Prague. Their professional task was to take part in a discussion on creating a European Research Council (the participants at the meetings supported the setting up of this key body, mainly as a path to further realising the programmes set out by the EU), on strengthening the position of science academies in the V4 countries, on the medium-term perspective of research and technology in the V4 countries, and on setting up an electronic database entitled The Central European Journal of Social Sciences and Humanities.

Research workers at the ASCR lecture at universities in other countries and at international congresses, guide foreign students, are members of the editorial teams of a number of foreign science magazines, and publish abroad. Institutes enter into their own direct agreements on cooperation with partners in other countries. These activities are shown in the table.

In addition to the scientific meetings organised by ASCR institutes (see below), there were also meetings organised by the Academy itself. The 5th "Science, or Else?" colloquium was held on the topic of "Expertise by Public Demand" and was attended by 25 guests from the Czech Republic, Switzerland, Germany, and the Netherlands. Also, the General Secretary of the Humboldt Trust, M. Olsen, gave a lecture at a meeting of Czech graduates of the Humboldt Scholarship.

Representatives of the ASCR welcomed a number of prominent foreign guests and delegations during 2003, for example, a delegation from the National University in Singapore, the Chinese Academy of Social Sciences headed by Vice-President Jiang Lansheng, a delegation from INSERM in France led by General Director C. Bréchot, members of the Swedish Parliament, representatives of the European Space Agency, the rector of the University of Montreal R. Lanix, and representatives of the Slovak Academy of Science at the traditional meeting of both academies.

The cooperation of the Academy with its counterparts in other countries is made easier thanks to the good contacts of its president and members of the Academy Council with diplomats in the Czech Republic.

International conferences organised by the ASCR

The following major conferences were organised by the institutes of the ASCR:

22nd European Conference on Surface Science (ECOSS) • organiser: Institute of Physics; 538 participants, 502 of these from abroad

11th European Conference on Integrated Optics (ECIO'03) • organiser: Institute of Radio Engineering and Electronics together with the Faculty of Nuclear Science and Physical Engineering and Faculty of Electrotechnics, ČVUT (Czech Technical University); 189 participants from 25 countries in Europe, Asia, USA and Australia.

Sixth IBRO World Congress of Neurosciences • organiser: Institute of Experimental Medicine; 3000 participants from 65 countries

4th European Congress of Mammalogy • organiser: Institute of Vertebrate Biology; 400 participants from 38 countries

Josef Dobrovský – Fundator studiorum slavicorum (a conference to mark the 250th anniversary of the birth of J. Dobrovský) • organisers: Institute of Slavonic Studies, the Czech Language Institute, Institute of Czech Literature, the Faculty of Arts, Charles University, and the National Museum; 67 participants, 38 of these from 13 other European countries and the USA

17th International Congress of Linguists • organisers: Faculty of Mathematics and Physics, Charles University and The Czech Language Institute; 500 participants from 50 countries

Other noteworthy conferences with international participation include the following:

ATLAS Overview Week • organiser: Institute of Physics; 250 participants

Vacuum Heat Treatment and Heat Treatment of Tools • organisers: Association for the Thermal Processing of Metals and the Institute of Physics of Materials; 120 participants

11th International Workshop on Optical Waveguide Theory and Numerical Modelling OWTNM'03 • organisers: Institute of Radio Engineering and Electronics together with Faculty of Nuclear Science and Physical Engineering of the ČVUT (Czech Technical University); 87 participants from 21 nations in Europe, Asia, USA and Australia

Magnetospheric Response to Solar Activity • organisers: Institute of Atmospheric Physics with the Faculty of Mathematics and Physics, Charles University; 140 participants

1st European Conference on Functional Genomics – "Functional Genomics and Disease" • organiser: Institute of Molecular Genetics; 600 participants

8th Conference on Methods and Applications of Fluorescence: Spectroscopy, Imaging and Probes • organiser: J. Heyrovský Institute of Physical Chemistry; 305 participants

XI. International Congress of Plant Embryology: From Mendel to Molecular Biology • co-organiser: Institute of Biophysics; 120 participants

20th Conference on Isoprenoids • organiser: Institute of Organic Chemistry and Biochemistry; 109 participants, 69 coming from 23 countries

Integration in Psychotherapy Today • organisers: Institute of Psychology, Teachers' Training College, Masaryk University; 95 participants

16. Internationales Symposium „Grundprobleme der frühgeschichtlichen Entwicklung im mittleren Donauraum" – Gentes und das Imperium an der Donau und Rhein (Archäologische Zeugnisse – historische Interpretation) • organisers: Institute of Archaeology in Brno together with the Institute of Archaeology, Slovak Academy of Sciences in Nitra and foreign partners; 60 participants

Svatý Prokop, Čechy a Evropa (Saint Procopius, Bohemia, and Europe) • organisers: Institute of Philosophy, Institute of Archaeology in Prague, District Archives in Benešov, Museum at Vlašim, and municipal assemblies; a total of 56 participants from the Czech Republic, Slovakia, Germany, Poland, and Austria

Local Strategies. International Ambitions. Modern Art in Central Europe 1918–1968 • organisers: New York University in Prague and the Institute of Art History; 35 active participants

Women Scholars and Institutions • organisers: Institute for Contemporary History and Institute of Sociology, ASCR, and other partners

The Diffusion of Food Culture: Cookery and Food Education in Europe (Eighth Symposium of the International Commission for Research into European Food)


6

Public Tenders in Research and Development

6

The ASCR's specific financial means were used for targeted support of progressive disciplines and scientific research grant projects. Support in 2003 for extensive departmental projects was provided through the Programme to Continuously Modernize Instruments in Institute Laboratories. In accordance with the conditions stipulated in new legislation on research and development, these programmes have recently been suppressed so as to focus on targeted support of key lines of research and extensive projects requiring costly scientific instruments through an incremental increase of funding.

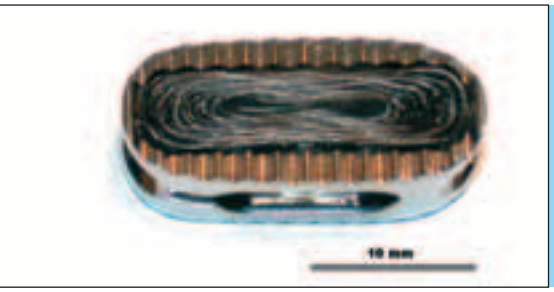
Based on a public tender in research and development (hereinafter the "public tenders"), the ASCR supports the Grant Agency of the ASCR (hereinafter the GAAS) and projects within the framework of the "Programme for Support of Targeted Research and Development", which is aimed at adjustment and transfer of basic research into practical use in particular applications. In 2003, GAAS organized the XIVth round of public tenders for research grant projects.

Programmes Announced by the ASCR

As in preceding years, a significant part of specific non-investment means that the ASCR had at its disposal in 2003 was given to support projects underway within the framework of the **"Programme for Support of Basic Research in Key Scientific Spheres".** In 2003, 19 projects which were begun in 2001 were supported under this programme. The quality of results achieved in the second year of work was given a positive rating (based on reports from researchers) by the Academy's Council for Sciences. **A total sum of 187.11 mill CZK** was spent on continuation of work on the projects.

Within the framework of the **"Programme for Support of Progressive Disciplines"**, work on two projects which started on 1 Jan 2001 was completed at the end of 2003. These were "Dynamics of Processes in Living and Nonliving Matter" and "Analysis of Complex System Behaviour". **Investment means totalling 2.96 mill. CZK** were earmarked for support of this work.

Based on results of public tenders, 38 projects of the **"Programme for Support of Specific Research and Development"** were started in 2003, of which 21 projects were started as of 1 Jan 2003 and 17 projects as of 1 Apr 2003. Support for newly launched projects amounted to **28.21 mill CZK. 68.52 mill CZK** was provided for work on 81 ongoing projects from the years 2000 to 2002. In 2003, the Programme Council evaluated 12 completed projects of this programme; 8 projects were evaluated as completed successfully, 4 projects as completed with outstanding results.



An intervertebral cage for spine therapy, based on a titanium alloy with a carbon-carbon composite core substituting the medulla.
Model 2003-13869
Authors: Sochor, M. (Czech Technical University)
and Balík, K. (Institute of Rock Structure and Mechanics)

Grant Agency of the ASCR

For GAAS, a **total sum of 190.9 mill CZK** was earmarked from the ASCR budget in 2003 (of which 5.10 mill CZK was projected for investments) and divided between works on newly launched and ongoing projects.

For data on numbers of newly launched and ongoing projects, distribution of support between particular sections, and evaluation of completed projects, see the attached tables.

Standard research projects (basic and junior categories) supported by the GA of the ASCR*

		Newly launched projects in 2003**					Ongoing projects in 1999–2002	
					Provided financial means in thousands of CZK			Provided non-investment financial means in thousands of CZK
	Section	Number of proposed projects	Number of supported projects	Percentage of supported projects	non-investment	investment	Number of projects	
1	Mathematics, Physics, Computer Science	49	25	51.0	9 512	1 523	44	19 603
2	Technical Sciences and Cybernetics	20	11	55.0	3 985	339	31	13 046
3	Earth and Space Sciences	31	10	32.3	5 677	525	34	11 509
4	Chemical Sciences	39	18	46.2	9 787	76	45	21 474
5	Medical and Molecular Biology Sciences	30	11	36.7	6 555	1 001	29	17 937
6	Bio-Ecological Sciences	33	14	42.4	6 908	178	31	13 610
7	Social and Economic Sciences	9	6	66.7	1 307	65	18	4 382
8	Historical Sciences	18	10	55.6	2 082	91	22	4 696
9	Humanities and Philology	16	6	37.5	1 736	170	15	2 778
	Total	**245**	**111**	**45.3**	**47 549**	**3 968**	**269**	**109 035**

*based on public tenders in research and development in 2003
**based on results of round XIII of public tenders

Junior research projects and complementary publication projects supported by the GA of the ASCR in 2003*

		Junior research projects					Complementary publication projects		
					Provided financial means in thousands of CZK				Provided non-investment financial means in thousands of CZK
	Section	Number of project proposals	Number of supported projects	Percentage of supported projects	non-investment	investment	Number of project proposals	Number of supported projects	
1	Mathematics, Physics, Computer Science	7	6	85.7	1 862	0	0	0	0
2	Technical Sciences and Cybernetics	10	7	70.0	1 571	180	1	0	0
3	Earth and Space Sciences	12	7	58.3	2 640	120	1	0	0
4	Chemical Sciences	19	11	57.9	4 245	273	0	0	0
5	Medical and Molecular Biology Sciences	14	11	78.6	4 811	182	0	0	0
6	Bio-Ecological Sciences	34	23	67.6	8 057	374	0	0	0
7	Social and Economic Sciences	11	7	63.6	2 137	0	1	1	73
8	Historical Sciences	8	5	62.5	889	0	7	6	768
9	Humanities and Philology	8	5	62.5	1 499	0	7	6	811
	Total	123	82	66.7	27 711	1 129	17	13	1 652

*newly launched projects based on public tenders in research and development announced in 2002

Results of evaluation of standard projects finished in 2002

			Evaluation			
	Section	Number of finished projects	Completed with outstanding results	Completed	Failed	Number of publications per project*	Average support throughout the time of work in TCZK
1	Mathematics, Physics, Computer Science	22	10	12	0	16.8	1 551
2	Technical Sciences and Cybernetics	11	5	6	0	6.0	1 435
3	Earth and Space Sciences	15	5	9	1	8.1	1 214
4	Chemical Sciences	18	9	9	0	8.9	1 421
5	Medical and Molecular Biology Sciences	16	9	7	0	6.6	2 022
6	Bio-Ecological Sciences	7	2	5	0	3.0	1 443
7	Social and Economic Sciences	2	2	0	0	7.0	181
8	Historical Sciences	10	5	3	2	1.4	890
9	Humanities and Philology	5	4	1	0	2.0	699
	Total	106	51	52	3	8.5	1 417

*Average number of articles on projects published in reviewed journals

Public Relations

7

Throughout 2003, the ASCR further expanded its methods of publicising scientific activities and societal phenomena involving Czech science and research (in particular in relation to accession to the European Union). It attempted to reinforce the prestige of research and development in society and also focused on youth, with the object to strengthen the general public's awareness of the significance of science for the quality of societal development, and arouse its active interest in research

One of the most prominent attempts to interest the public in science was **Science and Technology Week 2003**, which was organised in cooperation with the British Council, the French Embassy, and the American Science and Information Centre. It was held during the Europe-wide Science Week, *i.e.*, from November 3—9. The programme included 8 lectures, two international round-table meetings, and six interactive programmes prepared by the British Council. Approximately 2000 visitors attended these events. Science and Technology Week 2003 also included **Open Door Days at ASCR institutes**, visited by a total of 7397 people.

Another successful event was **European Mind Week**, organised by the Institute of Experimental Medicine. Eight lectures attracted nearly a thousand visitors.

The Grant Agency of the ASCR presented projects it had supported, and the Czech Science Foundation presented the results of its work.

Efforts to make science interesting to the general public met with success. Scientists at most of the Academy's institutes were subjects of interviews in the press and electronic media, including Czech Television and Radio. At institutes, literary, publishing and translation projects continued.

The usefulness of appearing at fairs to communicate the results of basic and applied research to the public was confirmed by their attendance at **specialised fairs**, *i.e.*, the Salon of Innovation and Investment as part of the 14th International Building Fair ForArch 2003 (Institute of Hydrodynamics, Institute of Thermomechanics, Institute of Theoretical and Applied Mechanics, Institute of Landscape Ecology, and the Technological Centre) and the 9th EcoCity Praha Environment Fair (Institute of Physics of Materials).

Several institutes set up **exhibitions** for the general public. The *Historic Depiction of Earthquakes* exhibition by the Institute of Geophysics at the Carolinum was particularly successful. The Institute of Archaeology in Prague participated in the preparation of

a permanent exhibition entitled The History of Prague Castle, and the Institute of Slavonic Studies commemorated the 250th anniversary of the birth of Josef Dobrovský with an hour-long programme for Czech Radio Prague and a gathering in the Pantheon of the National Museum. This anniversary is on the UNESCO list of cultural anniversaries.

The **Academic Bulletin** published easily comprehensible reports of research results.

As part of its "Accessibility of the Results of Research and Development to the Czech Public" programme, the Ministry of Education, Youth and Sports produced three **popularisation videos** presenting several outstanding personalities, establishments, and results of research. Employees of the ASCR took part in the making of **medium-length films** *Astronomy in Bohemia*, which won first prize at the Techfilm 2003 competition, *The Polymers Around Us*, *The Centre for Molecular and Gene Biotechnology*, and *Czech Science in the Context of European Cooperation*.

The ASCR also became involved in a two-year international project known as *Ethnic*, which is financed by the EU and designed to heighten the awareness of science and technology among ethnic minorities.

8 Use of Financial Resources

After a dramatic decline in 2002, a certain improvement was experienced in 2003, when the level of total support for research and development from the state budget totalled 0.58% of the gross national product and again approached the 2001 level. In nominal values, this means an interim increase of 11.4%.

Mere comparison of total expenses and revenues of the budget chapter of the Academy of Sciences in 2002 and 2003 indicates an apparently highly favourable increase on balance totalling 16.9%. However, expenses in 2003 included a special item of expenditure for the removal of the results of flood damage and a mandatory increase in staff costs as a result of an overall 7% increase in tariff salaries. As a consequence, therefore, the virtual interim increase in direct material expenses for science was about 8%. This was significantly lower than the increase in total expenditure on research and development from the state budget. The situation might have been far worse were it not for the fact that the Committee for Science, Education, Culture and Sport, and the Budget Committee of the Chamber of Deputies of the Parliament of the CR supported our earnest appeal for an increase in expenditures of the budget chapter of 92 mill CZK to cover the prescribed increase in salaries. The original preliminary estimate did not specify this need.

The scientific activities and management of 14 institutes was influenced by the effort to remove destructive consequences caused by the floods of August 2002. It is a great achievement that the greater part of damage was removed during the year and the institutes could fully renew their research activities.

In 2003, the Academy of Sciences had at its disposal a total of 5,422.3 mill CZK, of which 3,659.0 mill CZK came from its own budget chapter.

Institutional means made available for research projects amounted almost to 86.6% of the total volume of budget means. The total volume of specific means raised in public tenders for research and development increased by 7.5% when compared with 2002. For the most part, this came as usual from the Czech Science Foundation, which, in 2003, totalled 411.8 mill CZK, *i.e.*, 36% more than of all specific means of the Science Foundation. Other support providers remitted 410.1 mill CZK.

Non-investment sources of the Academy of Sciences in 2003 consisted of means from its own state budget chapter, transfer from other state budget chapters, and its own revenues and off-budget means of 64.7%, 15.9%, and 19.4% respectively. These ratios have not changed over recent years and reflect the fact that research is financed predominantly from public sources in developed countries.

State support of research and development in the CR (in % GDP)

1993 0.43	**1999** 0.51
1994 0.39	**2000** 0.59
1995 0.36	**2001** 0.62
1996 0.41	**2002** 0.54
1997 0.47	**2003** 0.58
1998 0.49	

Eighty-nine per cent of capital resources of the Academy of Sciences in 2003 came from its own state budget chapter, while 11% was in the form of transfers from other state budget chapters.

Common expenditures determined principally for international contacts, computer networks, membership fees for international scientific organizations and allocations to 58 scientific companies associated in the Scientific Companies Council were paid from the budget of the Head Office of the ASCR, through which flowed all specific means intended for out-of-academy entities for work on grant projects supported by the Grant Agency of the ASCR and projects within the research and development programs of the ASCR.

The structure of the Academy's financial resources in 2003

in mill CZK		Non-investment resources	Investment resources
Approved chapter budget		3 207.5	443.6
Amended budget of the ASCR chapter		3 103.9	554.1
of which subsidies	to scientific and service departments	2 982.6	552.9
	to the Head Office of the ASCR	97.7	1.2
	fixed resources	23.6	
Off-budget resources of the ASCR chapter		1.0	
Grants from other state budget chapters		766.1	68.0
of which	GACR grants	395.9	15.9
	Projects of other departments	358.7	51.4
Own resources of research and service departments		929.2	
of which	Main activity projects	89.4	
	Sales of publications	143.7	
	Sales of goods and services	100.4	
	Licences	239.0	
	Conference fees	17.6	
	Foreign contributions and donations	199.0	
	Rent	40.4	
	Own fund resources	19.8	
	Others	79.9	
Total resources		**4 800.2**	**622.1**

From revenues totalling 4,677.6 mill CZK, the ASCR institutes and service departments used 4,586.4 mill CZK to cover their own expenditures. Improved profit from operations totalling 91.2 mill CZK will be used, besides covering losses from previous years, if any, for the completion of instrumentation necessary for its scientific activity.

The structure of costs of research and service departments

in mill CZK	%	in mill CZK
Employees' salaries and other payments for work done	37.65	1 727.0
Mandatory health insurance paid by the employer	12.67	581.1
Material purchases	15.73	721.4
Energies, water, fuels	3.15	144.6
Services purchased	10.50	481.4
Repairs and maintenance of assets	6.45	295.9
Total travel expenses	3.47	159.1
Depreciation of fixed assets	6.87	315.2
Total other costs	3.51	160.7
Institutes and service departments of the ASCR used in total	**100.00**	**4 586.4**

Comparing the size of costs of the ASCR institutes over the course of several years, it is obvious that the share of most of the items in the total volume of resources spent has barely changed. With the exception of a short-term decline in 2000, this applies to the relative amount of personnel expenses, too.

Creation of investment resources and their use

Resources of investment means were created mainly from institutional and specific subsidies from the state budget and budget means from depreciation. Data for the whole ASCR may be summarized as follows (in mill CZK):

Investment resources in total				959.5
of which	depreciation		315.2	
	Transfer of improved profit from operations		5.1	
	Recipients; co-recipients (acc. to Act no. 130/2002 Coll.)		67.3	
	Foreign contributions and donations		17.1	
	Subsidies from state budget:	institutional	541.4	
		specific	13.4	
These resources were used for the funding of				
Buildings			287.3	
Instruments and equipment			584.8	
Maintenance and repairs			13.5	
Others			25.2	
Acquisition of fixed assets in total				910.8
Fixed assets renewal funds increased by				48.6
Sum returned to the state budget				0.1

Investment resources in total

The generally low expenditures for research and development from the state budget shown in the size of expenses of the ASCR budget chapter permit only a slow increase in investment means in its budget, and enable it to catch up for the arrears from the past decade in the maintenance and renewal of scientific instruments, modernization of laboratories, and renovation of buildings in use. Subsidies for depreciation remain a significant supplement to the investment resources.

To name some of the inevitable renovations and investment projects that continued or were started in 2003: Construction of a building having 30 accommodation units for young research workers in the Lysolaje premises and construction of a similar building in Krč was completed. A superstructure on the pavilion for the Institute of Landscape Ecology and the Institute of Botany, and a two-storey superstructure on the Institute of Analytical Chemistry were completed in Brno to make up for lack of space of three institutes of the 3rd division of sciences. In the Institute of Scientific Instruments, the former joinery workshop was converted into electron microscopy laboratories; at the Institute of Biophysics, greenhouses were converted into laboratories, and at the Institute of Experimental Botany, modification of greenhouses for the GMO regime was continued. Project preparation was started for an extensive construction of the Molecular Genetics Centre in Krč, which is to become the most significant ASCR investment project for the next three years.

Removal of flood consequences of 2002

Throughout 2003, intensive work on the removal of vast flood damage caused in 2002 proceeded, aiming at renewal of full operation of institutes, laboratories and libraries as soon as possible. Several dozen non-investment and investment actions that took place at 14 institutes focused on repairs and renovation of buildings, library and archive premises, repairing damaged instruments and replacing destroyed instruments. Thanks to the technical preparation and high commitment and dedication of employees of ASCR's affected institutes we succeeded in using subsidies from the state budget, the EU Solidarity Fund, and our own resources effectively. With the exception of four large construction works to be completed in 2004 (construction of replacement premises for the ASCR Archives, construction of a library depository in Jenštejn, reconstruction of a library at the Institute of Philosophy, reconstruction of a former building of the Archives), practically every piece of irredeemable damage was removed. Prompt installation of drying and disinfecting lines facilitated completing the drying of frozen soaked books before the end of the year, thereby saving considerable costs for storage in freezing chambers.

During 2003, a total amount of 175,805,000 CZK was spent on the removal of flood damage in the ASCR; the following breakdown is shown in thousands of CZK:

The cost of removing flood damage

Total non-investment means		117 837
of which	from the ASCR budget	99 381
	the chapter of the Ministry of Culture	621
	resources of ASCR institutes	17 835
Total investment subsidies		58 613
of which	from the ASCR budget	58 578
	from resources of ASCR institutes	35

From means allocated from the state budget totalling 158,621,000 CZK, 41,000 CZK remained as non-expended in investment accounts kept by the Czech National Bank.

From the EU Solidarity Fund, a total sum of 36,695,000 CZK was received. Of this sum, 30,553,000 CZK was transferred to the institutes, and 6,142,000 CZK will be used in 2004.

Analysis of employment and drawing of labour funds

The total number of ASCR employees increased from 6,819 in 2002 to 6,886 in 2003; this increase was due to increased employment of graduate research and development staff (from 3,706 to 3,791) and at the same time, a reduction in other labour categories. The mandatory budget index determined the number of skeleton staff at 6,405. The actual total number of employees was higher because this mandatory index did not include employees of the Academia publishing house and of the Optical Development Workshop, who were remunerated based on the Wages Act, and researchers engaged in work on grants and projects and paid from specific resources only.

The average gross monthly pay in the whole ASCR (*i.e.*, one twelfth of all means paid in the course of the year for salaries and wages, including merit pay, bonuses, and other emoluments from all, *i.e.*, institutional, specific, and off-budget resources) was 20,426 CZK. An interim increase, as compared

with the year 2002, totalling 9.7% was caused predominantly by the increase in salary tariffs of 8.2% on average as of 1 January 2003.

Numbers of employees and average gross monthly earnings in particular staff categories of these institutes are shown in the following table:

Average gross monthly earnings

Category	Average converted number of employees	Average monthly salary in CZK
Graduate research worker (with certificate)	2 237	28 534
Graduate R&D specialist	1 551	18 265
R&D specialist with secondary education	1 168	15 302
Technical & financial worker	845	20 720
Worker	754	12 096
Operator	232	10 563
Total ASCR	**6 787**	**20 496**

Entitlement salaries of skeleton employees paid from institutional resources amounted to 72.9% of all labour expenses, and annually used up almost all means intended for salaries. The source of floating portions of the salaries was almost exclusively the specific and off-budget means. Specific means of our budget chapter (GAAS grants and projects of programs for which ASCR is responsible) amounted to 10.3% of labour funds; other specific budget resources (GACR grants, grants and projects of other departments, etc.) totalled 10%, and off-budget resources including other (economic) activities amounted to 6.8%. The desired differentiation in remuneration shall apparently not be achieved despite the 16-category wage system, unless enough funds are allocated to this system.

9 Awards to ASCR Researchers for Outstanding Results

The following employees of the ASCR were presented with international, national and other awards:

René Descartes Prize, the highest international distinction for research and development in the European Union, was awarded to an international consortium including the research group of Ing. J. VONDRÁK, DSc. from the Academy's Astronomical Institute

The **state Medal for Merit** to RNDr. IVAN ŠETLÍK, CSc. of the Institute of Microbiology

Award of the Minister of Education, Youth and Sports to Prof. RNDr. VÁCLAV HOŘEJŠÍ, CSc. of the Institute of Molecular Genetics

Award of the Minister of Health to Doc. RNDr. JAN KONVALINKA, CSc. of the Institute of Organic Chemistry and Biochemistry

Award of the Grant Agency of the Czech Republic to Prof. RNDr. FRANTIŠEK MAREC, CSc. of the Institute of Entomology and MUDr. JAN BUREŠ, DSc. of the Institute of Physics

Award of the Learned Society of the Czech Republic to Ing. JAROSLAV KŘÍŽ, DSc. of the Institute of Macromolecular Chemistry and RNDr. PAVEL SPURNÝ, CSc. of the Astronomical Institute

"Česká hlava" (Czech Intellect) **award** to Prof. RNDr. ZDENĚK HERMAN, DSc. of the J. Heyrovský Institute of Physical Chemistry.

ASCR Awards for Outstanding Scientific Results of major Significance

A creative team consisting of Ing. MARTIN NIKL, CSc., coordinator (Institute of Physics), prom. fyz. PAVEL BOHÁČEK (Institute of Physics), Ing. KAREL NITSCH, CSc. (Institute of Physics), RNDr. EVA MIHÓKOVÁ, CSc. (Institute of Physics), Ing. JAN ROSA, CSc. (Institute of Physics), and RNDr. JOSEF NOVÁK, CSc. (Institute of Physics) for **$PbWO_4$ monocrystals – scintillation material for the physics of high energy. Physical description and optimisation of material**;

Professor Ing. PAVEL HOBZA, DSc. (J. Heyrovský Institute of Physical Chemistry) for **Non-covalent interaction and its application in bio-disciplines, primarily in the determination of the structure and dynamics of the DNA-base pairs and DNA oligomers**;

A working group comprising: Doc. PhDr. PETR SOMMER, CSc. (Institute of Philosophy — Centre of Medieval Studies, ASCR and Charles University), PhDr. DUŠAN TŘEŠTÍK, CSc. (Institute of Philosophy — Centre of Medieval Studies, ASCR and Charles University), Prof. PhDr. JOSEF ŽEMLIČKA, DSc. (Institute of Philosophy — Centre of Medieval Studies, ASCR and Charles University), Mgr. PAVEL SOUKUP (Institute for Contemporary History — Research Centre for the History of Science), Mgr. ROBERT NOVOTNÝ (Institute of Philosophy — Centre of Medieval Studies, ASCR and Charles University), Mgr. FRANTIŠEK GRUNT (Animare Porteus civic group), PhDr. MILENA BRAVERMANOVÁ (Prague Castle Administration), and Mgr. JIŘÍ MILITKÝ (National Museum, Prague) for **The Centre of Europe around the year 1000 — International Exhibition and Science Catalogue.**

ASCR awards for young research workers for outstanding achievements

RNDr. VOJTĚCH ŠIMON, PhD. (Astronomical Institute) for **The parameters of selected astrophysical sources of high-energy particles**;

Ing. RADIM OSIČEK, Ph.D. (Institute of Microbiology) for **The relationship of the RTX structure and function of proteins of pathogenic gram-negative bacteria**;

Mgr. JAROSLAV CUHRA (Institute for Contemporary History) for **The Czechoslovak-Vatican Dealings of 1968—1989**.

ASCR awards for particularly successful programmes and grant projects

RNDr. PETR HEINZEL, DSc. (Astronomical Institute) for **Analysis of the spectral data of the hydrogen of the solar atmosphere obtained by the SOHO satellite**;

Doc. Ing. VLADIMÍR KŘEN, DSc. (Institute of Microbiology) for **Enzymic synthesis and the bio-transformation of glycosides and natural substances**;

PhDr. JINDŘICH DEJMEK, PhD. (Institute of History) for **Czechoslovakia, its neighbours, and the great powers of the 20th century**.

Significant contributions made by individual Czech and foreign scientists in the fields of science, promotion of humanitarian ideas, and international scientific cooperation were rewarded with **honorary ASCR medals**.

The highest distinction — the **DE SCIENTIA ET HUMANITATE OPTIME MERITIS honorary medal** — was awarded to the following people:

Prof. PhDr. IVAN HLAVÁČEK, DSc. — Faculty of Arts, Charles University
Doc. JUDr. JIŘÍ KEJŘ, DSc. — retired
Prof. RNDr. JAROSLAV KOUTECKÝ, DSc. — Freie Universität Berlin, Germany
Prof. Dr. JAN TAUC, DSc. — Brown University, Providence, USA

Honorary medals for merit in individual branches of science were awarded to the following:

The B. BOLZANO honorary medal for merit in the mathematical sciences:

Prof. RNDr. JOZEF GRUSKA, DSc. — Masaryk University in Brno
Prof. RUDOLF HAŇKA, Ph.D. — University of Cambridge,
Prof. JOSEF KITTLER, Ph.D. — University of Surrey, United Kingdom

The E. MACH honorary medal for merit in the physical sciences:

RNDr. VLADIMÍR DVOŘÁK, DSc. – Institute of Physics, ASCR
RNDr. VLADIMÍR FIALA, CSc. – Institute of Atmospheric Physics, ASCR
prof. Dr. rer. nat. habil. SIEGFRIED HOFMANN – Max-Planck-Institut für Metallforschung, Germany
Ing. VĚNCESLAV F. KROUPA, DSc. – Institute of Radio Engineering and Electronics, ASCR
Prof. Ing. MILOŠ PICK, DSc. – Institute of Geophysics, ASCR
Ing. AXEL PLEŠINGER, DSc. – Institute of Geophysics, ASCR
Ing. JAN VONDRÁK, DSc. – Astronomical Institute, ASCR

The J. HEYROVSKÝ honorary medal for merit in the chemical sciences:

Prof. WYN BROWN – University of Uppsala, Sweden
Prof. Ing. JAROMÍR HORÁK, DSc. – Joint laboratory for the Chemistry of Solids, University of Pardubice and the Institute of Macromolecular Chemistry, ASCR
Prof. Ing. JINDŘICH KOPEČEK, DSc. – University of Utah, USA
Prof. RENÉ LAFONT, Dr. – Université Pierre et Marie Curie, France

The G. J. MENDEL honorary medal for merit in the biological sciences:

Prof. MUDr. JIŘÍ BARTEK, DSc. – Institute of Cancer Biology, Denmark
Dr. Gareth WYN GRIFFITHS – European Molecular Biology Laboratory, Germany
Prof. Dr. JOSEF JIŘIČNÝ – University of Zürich, Switzerland
Ing. MIROSLAV KAMÍNEK, CSc. – Institute of Experimental Botany, ASCR
Prof. Dr. HARTMUT K. LICHTENTHALER, Dr.h.c. – Universität Karlsruhe, Germany
MVDr. JIŘÍ LUKÁŠ, CSc. – Institute of Cancer Biology, Denmark
Prof. THOMAS A. MILLER – University of California, USA
Prof. RNDr. MILENA RYCHNOVSKÁ, DSc. – Palacký University in Olomouc

The J. E. PURKYNĚ honorary medal for merit in the biological sciences:

Prof. ALBERT AGUAYO, M.D., Ph.D. – Montreal General Hospital, Canada
Prof. ZACH W. HALL, Ph.D. – University of Southern California, USA
Prof. RAINER KLINKE, Dr. med. – Physiologisches Institut, Germany
Ing. JOSEF MATOUŠEK, DSc. – Institute of Animal Physiology and Genetics, ASCR
Prof. MICHAEL M. MERZENICH, Ph.D. – University of California, USA
Prof. OLE PETERSEN, M.D., FRS – University of Liverpool, United Kingdom
Prof. MUDr. EVA SYKOVÁ, DSc. – Institute of Experimental Medicine, ASCR
Prof. WILLIAM DARRELL WILLIS, Jr., M.D., PhD. – University of Texas, USA

The K. ENGLIŠ honorary medal for merit in the social and economic sciences:

Prof. JUDr. PhDr. VIKTOR KNAPP, DSc. – in memoriam

The J. DOBROVSKÝ honorary medal for merit in the social sciences:

Prof. PhDr. JAN BLAHOSLAV ČAPEK – in memoriam
Doc. ZOE HAUPTOVÁ, CSc. – Institute of Slavonic Studies, ASCR
Prof. ThDr. PETR POKORNÝ, DSc. – Charles University in Prague

The F. PALACKÝ honorary medal for merit in the social sciences:

Prof. MARCELI KOSMAN — Uniwersytet Adama Mickiewicza, Poland
Prof. Dr. DETLEF BRANDES — Heinrich-Heine-Universität, Germany
PhDr. JOSEF KRÁSA, CSc. — in memoriam
Prof. GEORGES MINK, PhD — Centre français de recherche en sciences sociales, Prague
Prof. JERZY TOMASZEWSKI — Uniwersytet Warszawski, Poland
Prof. PhDr. PAVEL SPUNAR, CSc. — Institute for Classical Studies, ASCR
Prof. Dr. KARL VOCELKA — Universität Wien, Austria
Prof. STANLEY B. WINTERS — New Jersey Institute of Technology, USA

The Jan PATOČKA memorial medal:

Prof. RNDr. PAVEL BLAŽKA, CSc. — University of South Bohemia in České Budějovice

The newly introduced **VOJTĚCH NÁPRSTEK honorary medal for merit in the popularisation of science** was awarded for the first time in 2003, to the following:

Prom. biol. ŠÁRKA ORLÍKOVÁ — "Živa" Magazine
Doc. Ing. JAROSLAV PETR, DSc. — Research Institute for Animal Nutrition in Prague
Mgr. VĚRA TŮMOVÁ — Český rozhlas 2 (Czech Radio 2), Prague
Prof. RNDr. ZDENĚK VESELOVSKÝ, DrSc. — University of South Bohemia in České Budějovice
Doc. RNDr. JAN ŽĎÁREK, DSc. — Institute of Organic Chemistry and Biochemistry, ASCR

Section of Mathematics, Physics and Informatics 1

Astronomical Institute
Institute of Computer Science
Institute of Information Theory and Automation
Institute of Physics
Mathematical Institute
Nuclear Physics Institute

Section of Applied Physics 2

Institute of Physics of Materials
Institute of Plasma Physics
Institute of Electrical Engineering
Institute of Hydrodynamics
Institute of Scientific Instruments
Institute of Radio Engineering and Electronics
Institute of Theoretical and Applied Mechanics
Institute of Thermomechanics

Section of Earth Sciences 3

Geophysical Institute
Institute of Atmospheric Physics
Institute of Geology
Institute of Geonics
Institute of Rock Structure and Mechanics

Section of Chemical Sciences 4

Institute of Analytical Chemistry
Institute of Chemical Process Fundamentals
Institute of Inorganic Chemistry
Institute of Macromolecular Chemistry
Institute of Organic Chemistry and Biochemistry
J. Heyrovsky Institute of Physical Chemistry

Section of Biological and Medical Sciences 5

Institute of Animal Physiology and Genetics
Institute of Biophysics
Institute of Entomology
Institute of Experimental Botany
Institute od Experimental Medicine
Institute of Microbiology
Institute of Molecular Genetics
Institute of Physiology
Institute of Plant Molecular Biology

Section of Bio-Ecological Sciences 6

Institute of Botany
Institute of Hydrobiology
Institute of Landscape Ecology
Institute of Parasitology
Institute of Soil Biology
Institute of Vertebrate Biology

Section of Social and Economic Sciences 7

Economics Institute
Institute of Psychology
Institute of Sociology
Institute of State and Law
Masaryk Institute

Section of Historical Sciences 8

Archives of the ASCR
Institute of Archeology (Brno)
Institute of Archeology (Praha)
Institute of Contemporary History
Institute of History
Institute of the History of Art

Section of Humanities and Philology 9

The Czech Language Institute
Institute of Czech Literature
Institute of Ethnology
Institute of Philosophy
Institute of Slavonic Studies
Oriental Institute
Institute for Classical Studies