

ANNUAL REPORT ON THE ACTIVITY OF THE ACADEMY OF SCIENCES OF THE CZECH REPUBLIC



2011



THE ACADEMY
OF SCIENCES
OF THE CZECH
REPUBLIC

ANNUAL REPORT 2011

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01

Introduction

06

INTRODUCTION



President of the ASCR Jiří Drahoš

An Interview with the President of the ASCR

How would you characterise 2011 from the perspective of the Academy of Sciences?

We have devoted the absolute majority of our time in the last year to the evaluation of the research activities of our institutes. If the Academy of Sciences is to defend its name and position in the Czech and international scientific communities, it cannot lower its requirements on high-quality scientific research. I am convinced that only in this way is it possible to deal with the current difficult period of stagnating financing and simultaneously create the necessary conditions for further generations of researchers to find a reliable institutional basis at the Academy of Sciences and at its institutes.

The Academy of Sciences underwent as the only institution a demanding evaluation, in which roughly 400 research teams were put to the test. Were you surprised by anything either in a negative or positive sense?

Precisely the completed evaluation showed that the Academy of Sciences is clearly the most effective scientific institution in the Czech Republic and has a number of teams

comparable with the world's best, which is not surprising for me personally. On the other hand, I would naturally be glad if there were even more of these global teams.

One of the aims of the evaluation was to reflect quality in the financing of the institutes. Was that successful?

I believe so, namely thanks to the fact that the evaluation this time took place all the way on the level of individual scientific teams and the results of the assessment were reflected in the budgets of the institutes. It means that the institutes with a higher number of excellent teams received more, naturally at the expense of those worse.

Science needs financial means. What does the stagnating institutional financing mean for the Academy of Sciences?

For a limited time, it is possible to face the unfavourable financial situation with cuts, improvisations and postponement of desirable investments. Further deepening of the investment debt particularly in instrument equipment of the institutes from the past years has already led to inhibition and limitation of a number of important research activities of the Academy of Sciences and to the serious endangerment of its competitiveness. The situation is complicated also by the necessity to finance the preparation of the projects of the operational programmes from the European Structural Funds.

Even in spite of it all, the people at the Academy of Sciences have managed to maintain a high level of research. What do you consider – also in connection with last year's International Year of Chemistry – as the best result?

In basic research, it is hard to foresee which result will have the greatest practical impact and when that will happen. There are a large number of peak research results at the Academy of Sciences – the current ones are on our website. If I had to choose not one specific result but some area of research, I would mention the very promising results in the treatment of tumours: from substances blocking the vascular supply of tumours, which can no longer metastasise without nutrients and die, through methods of the targeted transport of medicines to the tumours all the way to more effective and less detrimental methods of chemotherapy, where the patient would not suffer from the side effects as much.

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2012 will be an election year for the Academy of Sciences. What is its vision for the next years?

The Academy of Sciences wants to and must support primarily peak research. I have already mentioned that it is possible only with difficulty to foresee the later significance of the current results in basic research. On the other hand, it is clear that important results can be expected primarily from outstanding teams – it is therefore necessary to support them as a priority whether they are excellent physicists or a peak team of historians or linguists – therefore the Academic Council and I are currently working on the strategy of the further development of the Academy of Sciences which would support excellent research even more.

The Academy of Sciences of the CR under the Microscope

In 2011, the Academy of Sciences of the CR continued to function as a highly effective component of our science and research which implements its objectives on a good international level and with a number of valuable contributions for the entire society. One of the indispensable prerequisites of this successful scientific and research activity is its constant critical reflection conducted all the way to the level of the individual scientific teams and connected with effective support of high-quality research and with the identification and suppression of the weak points. Therefore, one of the most important and demanding tasks of the ASCR in 2011 was the completion of the evaluation of the research activities of its institutes for 2005–2009 and the application of its results in determining the institutional support of the institutes for 2012 and further years.

In the total of 395 scientific units, fifty-two research-orientated institutes of the ASCR were evaluated, of which 116 (29%) at workplaces of the 1st Scientific Area, 201 (51%) at workplaces of the 2nd Scientific Area and 78 (20%) at workplaces of the 3rd Scientific Area. The assessment took place also at two infrastructure-focused workplaces. From a comparison of the quality of the scientific outputs with the previous round of evaluation of the institutes of the ASCR, it is clear that at the workplaces of the ASCR in the period of 2005–2009 there was a substantial increase of the measurable quality and amount of scientific and professional outputs of the institutes. This conclusion arose from a bibliometric comparison, the conclusions of the evaluation commissions and the comments of the foreign evaluators. Despite the complexity and logistical difficulty of the evaluation of the institutes of the ASCR implemented, it is possible to state that it provided for the leadership of the ASCR and the leadership of the institutes important background materials for the further increasing of the quality of their work. On the other hand, the results of the evaluation showed the fact that the long-term underestimation of the amount of state institutional support of science and research is limiting for a comparison with the results of the workplaces of the peak global level.

Based on the results of the complex assessment of the research and professional activities of the workplaces of

INTRODUCTION

the ASCR, the Academic Council of the ASCR commenced work on the Strategy of the Development of the ASCR for the Period 2014–2020.

The basic system of fifty-three scientific institutes of the ASCR did not undergo any fundamental changes as a consequence of the conclusions of the evaluation of their research activities for 2005–2009 or for other reasons. As of 1 March 2011, there was only a change of the name of the Institute of Systems Biology and Ecology of the ASCR to the Global Change Research Centre of the ASCR, which more precisely expresses the basic research focus of the workplace. Nevertheless, the evaluation brought a number of significant corrections of the research foci and organisational and personnel changes at the individual institutes. In 2011, the workplaces of the ASCR capped the first five years of activities in the legal and economic regime of public research institutions. This five-year experience confirmed that the transformation of the workplaces of the ASCR to public research institutes proved itself, contributed to increasing the autonomy and initiative of the workplaces in increasing the quality and effectiveness of their work and opened new possibilities for establishing beneficial partnership ties of the institutes on the national and international levels.

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Scientific Activity

SCIENTIFIC ACTIVITY

2.1 THE SCIENTIFIC AREAS OF THE ASCR

I. Non-Life Sciences

The section includes six institutes of the ASCR with a very wide spectrum of both applied and theoretical research.

In mathematical disciplines, mathematical and informatics methods are being developed both within the branches themselves and with regard to the needs of physics and technical branches, further chemistry and biology and, last but not least, social sciences and the humanities.

Research in physics provides knowledge not only on the basic natural laws of the micro- and macro-worlds but also on the particular behaviour of various physical systems under extreme conditions and on the opportunities for a practical utilisation of the new discoveries and phenomena. The research of condensed systems with distinguished physical properties including systems structured on the nanoscale, the study of the properties, structure and interactions of matter at the subatomic level, and classical, particulate, quantum and nonlinear optics is significantly supported.

The subject of interest of astrophysics and astronomy is the study of the character and behaviour of matter and radiation in all of space from the upper atmosphere of Earth to the most distant parts of universe seen so far. The research is therefore focused on the astronomy and astrophysics of galaxies, stellar systems, stars, the Sun, Sun-Earth relations, interplanetary bodies and artificial satellites of the Earth.

The section of applied physics includes seven institutes, whose research focuses on the utilisation of applications of physical research in the technical sciences, the research of properties of ionised environments and laser plasma, further on photonics, the generation and diagnostics of high-temperature and low-temperature plasma, the transfer phenomena in liquid systems and the hydrosphere, the mechanics of ductile objects and biomechanics, the dynamics of liquids, thermodynamics, research of the properties of heavy-current electromechanical systems, new concepts of energy conversion, sensors, the transmission

and processing of signals, material research and research of properties of advanced materials with respect to their microstructure. The development of new physical methods, special technologies and instrumental principles, the development of interdisciplinary basic as well as applied research focusing on basic knowledge crossing the borders of field research with typical applications in bioengineering, medicine, ecology, including health protection and human safety and the preservation of the natural and cultural heritage of humankind are also supported.

The earth-science section includes five institutes whose subject of research is the Earth and its nearby as well as distant surroundings. The priorities include the study of the inner structure and physical properties of the Earth, research of the development of the lithosphere, biosphere and natural environment from the earliest geological past to the present, including research of the processes in the lithosphere induced by human activity. It also deals with the study of selected processes in the Earth's atmosphere and its cosmic surroundings. The applied sphere conducts focused research of the geodynamic processes in the upper layer of the Earth's crust and of the hydrological processes influencing the environment and ecological use of mineral resources.

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II. Life Sciences

The chemical-science section associates six workplaces whose research focuses on the targeted synthesis and the structural and functional characterisation of new inorganic and organic compounds with a special focus on crystalline, composite, glass and polymeric materials and supramolecular or nanostructured systems. Another priority is research of the relations between the structure, properties and reactivity of materials associated with the clarification of temporally and spatially distinguished mechanism of their reactions, yielding a theoretical basis for applications. A substantial part of the activities is also the study of the chemical principles of the biological phenomena in biomedicine and ecology and the development of new chemotherapeutics, biologically active substances and polymeric biomaterials for targeted therapeutic applications. Advanced technologies are sought in the research focused on the processes in multiphase reactive systems, molecular engineering, new methods for initiating chemical reactions and processes important for environmental decontamination and protection. An indispensable part of chemical research is also the development of instrumental, analytical and bioanalytic methods.

The section of biological and medical sciences associates eight workplaces whose research is focused on the processes in living systems at various levels of their organisation. Special attention is paid to the development of genomics, proteomics and system biology as bases for future biomedicine and biotechnologies. Biomedical research is particularly focused on the knowledge of the biophysical properties of living systems, the mechanisms of the function and disorders of the nervous, immune, cardiovascular and reproductive systems, their being influenced by external factors, on the study of gene expression and its signal path, the genetic bases of diseases and evolution, the research of tumour and stem cells, on the development of new pharmaceuticals, the influence of lifestyle factors on the health of the population and on the biology of microorganisms and microbe biotechnologies; the emphasis is placed on obtaining knowledge applicable in the prevention, diagnostics and therapy of serious diseases and in modern biotechnologies. Research in the biology of animals includes above all physiology and the pathological

processes in animals. Other research is focused on the genetic bases of the development of plants and the interaction of the plant genome with the environment and on the biodegradation of xenobiotics in water and soil.

The section of biological-ecological sciences associates four workplaces whose research is focused on the mutual relations between organisms, between organisms and the environment and on the functional mechanisms in ecosystems with respect to the anthropogenic effects. The objective is to understand the key processes with the possibility of using the results in medicinal, biotechnological, veterinary and agricultural practice as well as the bases for rational exploitation of the landscape. The research is also focused on animal biodiversity, vertebrate evolutionary ecology and adaptations of their behaviour, on the research of the evolution, structure and ecological role of plant biodiversity (from the genetic level through the level of organisms and communities to ecosystems) and on the study of the insect as a biological model as well as pest. Another area of interest includes the interactions of parasitic and symbiotic organisms, organism communities in the soil ecosystems, the functioning of the ecosystems of valley reservoirs and lakes, the study of the global cycle of carbon, energy and material flows through ecosystems, and the ecology of the landscape influenced by man. An important component of the research is the use of advanced methodologies in ecology, in particular the methods of molecular biology, of remote research of the Earth and of mathematic modelling with an emphasis on a systemic approach.

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III. The Humanities and Social Sciences

The section of social-economic sciences includes five workplaces, whose research activities focused on the topical research issues. Research in economics reflected the changing conditions of our society. It focused in particular on the economic aspects of the integration of post-transformation countries in the European Union and European Monetary Union and on the specifics of the Czech Republic's convergence to EU standards. Research in the field of law investigated the process of the institutional provision of the requirements of EC/EU law on the domestic (national) law of member states and the influence of this process on the legal systems of the member states under the conditions of an information society; all of this in terms of legal philosophy, theory and practice. Research in sociology was focused on the analysis of long-term social processes in Czech society and on the investigation of the conditions for the advancement of knowledge society, of human, social and cultural capital. The pivotal topic for the psychological research was the study of the conditions of the optimal development of humankind from a life-long perspective and in the context of the social changes of the unifying Europe.

The section of historical sciences includes six workplaces whose research activities concentrated on research topics in the areas of historical sciences and archaeology which in an important way contribute to forming the cultural, national and state identities. Historical research focused on the issues of Czech historical area from the Early Middle Ages to the present, including the period of both totalitarian regimes. The research took into consideration both the European context in terms of diversity, continuity and integration and the challenges and threats of the contemporary global world. The history of the fine arts and music in the Czech lands was thoroughly placed in the European context. Archaeological research emphasised the development of methodology, particularly in cooperation with the methods of the natural-science disciplines. Since the archaeological potential of the Czech lands is ever more intensively being perceived as a part of the national cultural heritage, the quality information science of the branch was being developed along with the legal protection of archaeological monuments. The development and implementation of an information infrastructure for science and

research, modern ways of processing and making the resource base accessible and a prospective strategy for work with electronic documents have become the priorities of the historical and archaeological workplaces.

The section of the humanities and philological sciences associates six workplaces whose research activities focused on numerous research themes. The humanities-focused workplaces dealt with philosophy, ethnology, language and literature. Within the research in the area of philosophy, also selected problems of related disciplines were resolved, in particular logic, theory of science, classical and mediaeval studies. Components of the resolution of these issues also included research of the resources and traditions of European thought. In the area of political and moral philosophy, the research endeavour concentrated specifically on the philosophical aspects of democracy and the plurality of cultures. In the field of ethnology and social anthropology, the research focused on the topics of the migrations of minorities and socially-excluded communities in the Czech Republic, on research of Czechs abroad and selectively also non-European ethnology. Czech Oriental Studies dealt with the research of the history, cultures, languages and religions of countries in Asia and Africa. Linguistics and literary science had its focus in Czech and Slavic research and its applications (e.g. research of the Czech lexis, research of Czech literature and other Slavic literatures including their positions in the European context). In addition, research of Czech book culture from the 16th century to the present continued. A substantial part of the activities in the fields of the humanities was the publication of scientific journals, critical editions, encyclopaedias, lexicographic and musical works focused on making the national cultural heritage accessible and also creating electronic data and information sources for the needs of the public.

2.2 TO THE BORDERS OF KNOWLEDGE

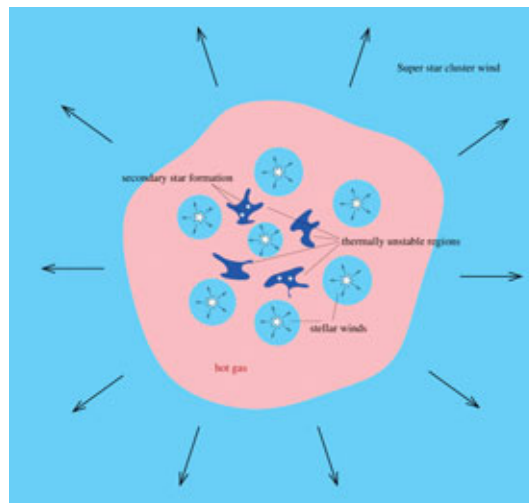
From the results from 2011, we present:

The Thermal Instability and Cooling Winds of Super Star Clusters
(Astronomical Institute)

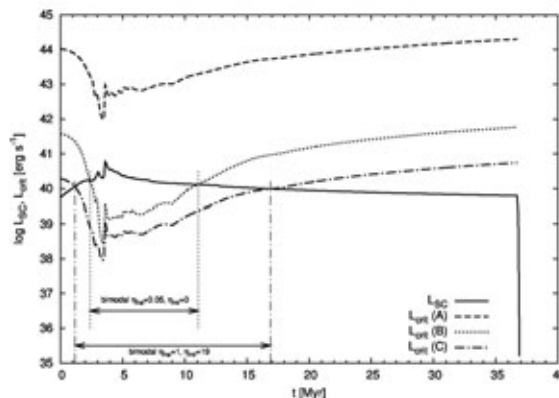


Antennae Galaxies.
In the colliding Antennae galaxies, thousands of super star clusters emerge visible as blue points surrounded by a red aurora.

Scientific employees of the Astronomical Institute have studied the evolution of winds of young stars in massive stellar clusters (super star clusters) observed for instance in such colliding galaxies as Antennae (NGC 4038/NGC 4039), because these young and massive stars' mass and energy leads to the formation of strong star cluster winds reaching substantial distances in galactic or intergalactic space. Under certain circumstances given by the mass and the radius of the super star cluster, however, the cooling of the wind in the central region of the cluster is very fast and causes so-called thermal instability. The presented work on cooling winds estimates the period and the extent of the thermal instability which may be the source of mass for the central black hole or for induced secondary star formation. The work builds on two previous papers and for the first time in the global literature quantitatively formulates the implications of the thermal instability for the evolution of super star clusters.



Schematic sketch of a super star cluster.
The winds of individual young massive stars transform in mutual collisions into a hot gas, from which the wind of a super star cluster emerges. In the hot gas, cool, thick clouds can also emerge by thermal instability.

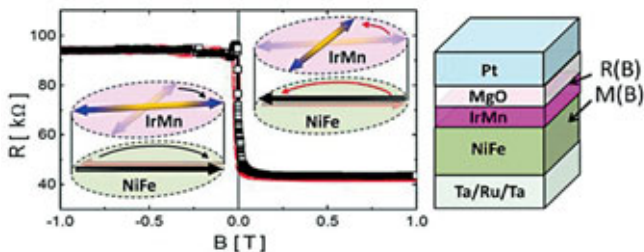


The Development of a super star cluster with a mass of 1 million solar masses.
The continuous line depicts the input of power given by the stars. If this value surpasses a critical boundary, shown for three different models with broken, dotted and dash-and-dot lines, the star cluster is in bimodal regime and forms cool, thick clouds.

Cooperating entity: Instituto Nacional de Astrofísica Óptica y Electrónica, Puebla, Mexico

SCIENTIFIC ACTIVITY

Spintronics Based on Antiferromagnets (Institute of Physics)



Spin-dependent magnetoresistance of an antiferromagnetic tunnelling structure.
The figure shows an antiferromagnetic tunnelling component (on the right) and its magnetoresistance signal.

In collaboration with researchers from the Faculty of Mathematics and Physics of Charles University in Prague and from Hitachi Laboratories in the UK and Japan, scientists from the Institute of Physics have demonstrated a new principle of operation of a spintronic device based on an antiferromagnet. All of the current spintronic devices used, e.g. in hard-drive read-heads or magnetic random access memories, are based on ferromagnets. In these materials, electron spins have the tendency to orientate in parallel and the materials then act as strong magnets. There is, however, a much larger family of materials in which electron spins in the vicinity of one group of atoms in the crystal grating are orientated in one direction, whereas spins at another group of atoms have the opposite orientation. These so-called antiferromagnets are attractive i.a. by demonstrating their magnetic behaviour only inside the crystal while appearing as non-magnetic for the outside world. Therefore, antiferromagnetic substances do not magnetically affect each other at a distance, which is a valuable property in particular with respect to the high density of components in current integrated circuits. It has been, however, unknown on what physical principle an antiferromagnet-based spintronic device could operate. The scientists have introduced not only the principle but also an experimental realisation of such a device [1,2]. They have shown that when rotating the spins in an antiferromagnet, a large change in the electric resistance is observed, comparable to conventional ferromagnetic spintronic components. Besides its potential application in spintronics, this quantum-relativistic phenomenon is remarkable also from the perspective of understanding the basic physical prop-

erties of condensed matter. For spintronics research and its possible applications in the area of sensors and computer microcomponents, an entirely new area of antiferromagnetic materials with metal or semiconductor properties has emerged [3], which is much broader and richer than metal ferromagnets used in spintronic devices to date.

Cooperating entities: Charles University, University of Nottingham, Great Britain, University of Cambridge, Great Britain, Hitachi Laboratory, Great Britain and Japan

Banach Space Theory. The Basis for Linear and Nonlinear Analysis (Institute of Mathematics)

Many problems of modern mathematical analysis are naturally of an infinite-dimensional nature. Banach space theory provides a power tool for the study of such areas and a unifying framework e.g. for linear and nonlinear functional analysis, operator theory, abstract mathematical analysis, geometry, probability and optimisation. The mentioned Banach spaces are named in honour of the Polish mathematician Stefan Banach, who is considered as the founder of functional analysis, hence the field of mathematics that studies the spaces of functions and the operators in these spaces. The result presented here is the publication of a new monograph of the field. The text introduces the reader to the essential principles and techniques forming the core of Banach space theory. The monograph includes and describes the basic results of Banach space theory, weak topologies, locally convex spaces, Schauder bases, compact operator theory, the Radon-Nikodým property, finite-dimensional spaces and local theories of tensor products. The book also contains sections on uniform homeomorphisms and nonlinear theory, Rosenthal l_1 theorem, fixed points, includes information on further topics and directions of research, and offers some open problems at the end of each chapter. It provides numerous practical exercises as well. The text is suitable both for graduate courses and for independent study, but also as a reliable reference source for specialists in the field. The first responses to the book are extremely positive; the monograph is strongly recommended as a study aid and compared to fundamental monographs in the field, used by generations of mathematicians.

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Cooperating entities: Faculty of Electrotechnics of the Czech Technical University in Prague, Universidad Politécnica de Valencia, Spain

Mathematical and Computational Methods in Biomechanics of Human Skeletal Systems

(Institute of Computer Science)

This book provides the orthopaedic, biomechanical and mathematical bases for the simulation of surgical techniques in orthopaedics. It focuses on the numerical modelling of total human joint replacements and simulations of their functions, along with the rigorous biomechanics of human joints and other skeletal parts. The theories presented are applied to specific problems of orthopaedics. Numerical results are presented and discussed from both biomechanical and orthopaedic points of view and treatment methods are also briefly addressed. This book might become a highly useful tool for designers, researchers and manufacturers of joint implants. The suggested experiments will contribute to improving existing shapes or will help to design better shapes. The book may also benefit graduate students in orthopaedics, biomechanics and applied mathematics.

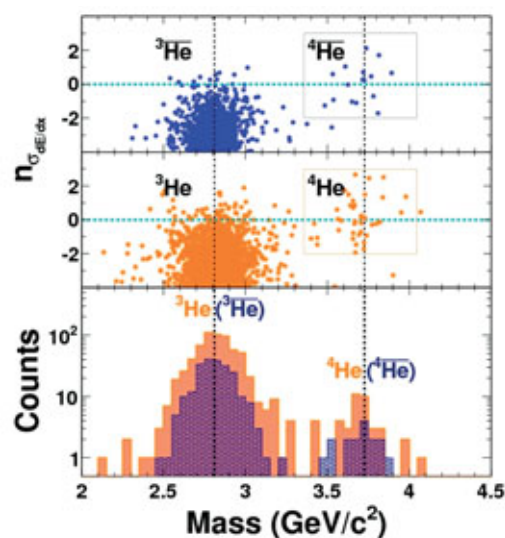
Cooperating entities: Institute of Mathematics of the ASCR, University of West Bohemia, Pilsen, České Budějovice Hospital, University Hospital Motol

Discovery of the Heaviest Known Anti-Nucleus

(Nuclear Physics Institute)

Antimatter is a type of matter comprised of anti-particles, hence particles the same in every perspective as their partner particles but with the opposite electrical charge or other opposite characteristics, such as the so-called baryon number. One of the greatest mysteries of the origin of the universe is the fact that after the supposed Big Bang antimatter disappeared, because antimatter comprises only an insignificant fraction in visible space. The existence of antimatter was predicted by Paul Dirac in 1928, but already soon after that it was observed in the collisions of cosmic radiation particles. Whereas stars, galaxies or other objects of antimatter have not yet been observed, it is possible to produce them here on Earth using particle accelerators. It was managed already earlier to create on these

devices the nuclei of antihydrogen, but heavier nuclei still resisted. The result of the latest experiments is the creation of the nucleus of antihelium-4, hence the heaviest known anti-nucleus. Specifically, it is a STAR experiment at the RHIC (Relativistic Heavy Ion Collider) accelerator at the Brookhaven National Laboratory in the USA, which has been participated in by a scientific team from the Nuclear Physics Institute of the ASCR for over ten years.



Identification of the isotopes of helium based on the measurement of the ionisation losses and masses determined using TPC and TOF detectors.

This first observation of the nucleus of antihelium-4 has been presented in a recent publication (Nature 473:353, 2011) as the result of the STAR experiment. Although the counterpart of this anti-nucleus – the nucleus of Helium-4 – was discovered already a hundred years ago by the physicist Ernest Rutherford and comprises roughly 10% of cosmic radiation, the existence of its anti-particle has only now been proved. The nuclei of antimatter are produced only very rarely on accelerators, but despite that it has been possible to show that the likelihood of their occurrence among collision products decreases roughly a thousand times with each other anti-nucleon creating the anti-nucleus created. Through an analysis of one billion collisions of the nuclei of gold acquired at the RHIC accelerator, a total of eighteen of these particles were found. The measured number of detected nuclei of antihelium-4 is in accord with the models which describe the synthesis. It is therefore

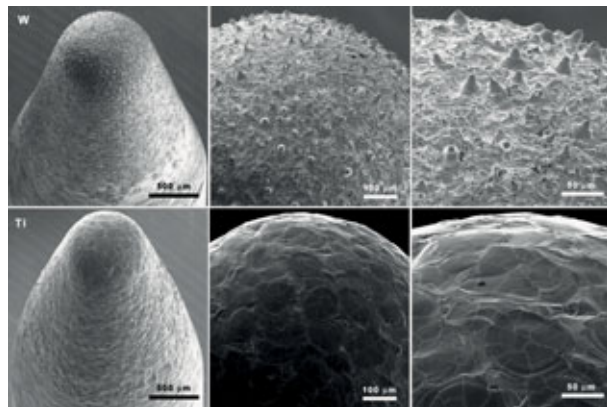
SCIENTIFIC ACTIVITY

possible to use this result not only for the estimation of the likelihood of the production of more, even heavier, anti-nuclei but also for a comparison with the future observations of anti α -particles in cosmic radiation. The further new results also include the discovery of another exotic form of antimatter made by scientists from STAR already a year earlier. In an article published in *Science* 328:58, 2010, the results of the analyses of seventy cases of the production of the antihypernucleus of tritium are listed.

The contribution of the Czech team in achieving the results includes i.a. operation of the STAR detector during the measurement of the nuclear collisions at the RHIC accelerator and calibration of the time-of-flight (TOF) measurement detector, which was in combination with the time-projection chamber (TPC) crucial for the identification of the nuclei of the antihelium.

The Catalytic Role of Tungsten Electrode Material in the Plasma-Chemical Activity of a Pulsed Corona Discharge in Water

(Institute of Plasma Physics)



SEM photographs of the surface of the high-voltage discharge electrodes (tungsten and titanium) eroded by the effect of pulsed electric discharge in water.

The shape and geometry of high-voltage discharge electrodes play an important role in the generation of electric discharge in liquids because of their significant effect on the physical conditions (mainly electrical field intensity) required for electrical breakdown of liquids (e.g. water). In addition, depending on the material used, discharge elec-

trodes also significantly affect plasmachemical processes induced by electrical discharges in liquids. The Pulse Plasma Systems laboratory of the IPP ASCR has experimentally determined the catalytic role of tungsten electrodes in the plasmachemical processes evoked by pulsed corona discharges in water generated in a reactor of needle-plane electrode geometry. These processes were studied in dependence on the discharge-electrode material (tungsten and titanium). In comparison with titanium electrodes, lower H_2O_2 productions and higher efficiency of the decomposition of the model organic compound dimethyl sulphoxide (DMSO) were determined when using tungsten electrodes. It was established that in the discharge plasma environment tungsten needle electrodes are eroded, as a consequence of which tungsten ions are released from the discharge electrodes into water. Tungsten ions were shown to cause a decomposition of H_2O_2 produced by discharge plasma in water while yielding highly oxidative peroxotungstates, which participate in tungsten-catalysed oxidation of DMSO by H_2O_2 . The results of this work significantly contribute to the better understanding of the processes occurring in the plasma environment generated in water and were published as invited paper in the journal *Plasma Sources. Sci. Technol.* in a special issue devoted to the topic of 'Plasma with Liquids'.

Cooperating entity: Institute of Chemical Technology, Prague

Adsorption of Cellular Peptides of *Microcystis Aeruginosa* and Two Herbicides onto Activated Carbon during Water Treatment

(Institute of Hydrodynamics)

This study investigated the influence of the competitive effect of small-molecular-weight peptide fractions produced by cyanobacterium *Microcystis aeruginosa*, which represented the hard-to-separate algae organic matter during chemical water treatment, on the adsorption of two herbicides, alachlor (ALA) and terbuthylazine (TBA), on granular activated carbon. Moreover, in dependence on the pH value and surface charge, also the main mechanisms of adsorption were investigated. It was proved that the adsorption capacity of both herbicides onto fresh activated carbon is influenced predominantly by their different chemical structures. A negative impact of the preloading

of the activated carbon by cellular low-molecular peptides on herbicide adsorption was proved, which was significantly greater for ALA than for TBA. It was further discovered that the adsorption of both herbicides was inhibited chiefly at low pH values ($\text{pH} < 6$), where on the other hand significant adsorption efficiency was exhibited by cellular peptides. The reason is the competitive adsorption of these peptides on the surface of activated coal, which hinders the migration of the herbicides in the pores and their subsequent adsorption. Electrostatic interactions and hydrogen bonding were identified as the most significant mechanisms of cellular-peptide adsorption. The low-molecular cellular peptides were adsorbed to a much greater extent than high-molecular peptides, with the pesticide adsorption inhibition being attributable to peptides with a molecular weight of 700–1700 Da.

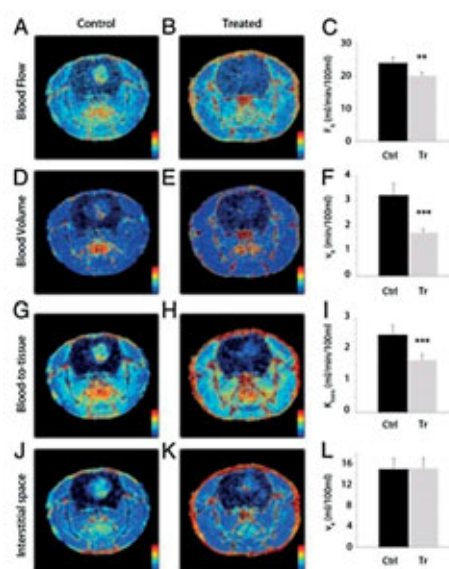
MR-based perfusion imaging for biomedical research and cancer diagnostics

(Institute of Scientific Instruments)

The monitoring of tissue perfusion parameters (blood flow, blood volume, capillary-wall permeability) is a physiological process significant for cancer diagnosis and therapy development, because these parameters vary depending on the state of the tissue, like in the abnormal angiogenesis accompanying the growth of tumours. For reliable determination of these parameters on the basis of MR images and their modelling, the measurement protocols and data-analysis methods have been developed by the institute and applied to specific biomedical research.

Bevacizumab, an antibody inhibiting the vascular endothelial growth factor (VEGF), is a promising but controversial substance for clinical therapy of glioblastoma, a brain tumour. Its effects on tumour burden, recurrence and vascular physiology are unclear. Preclinical dynamic perfusion MRI revealed reduction of the blood supply, as evidenced by a decrease in intratumoural blood flow and volume and, at the morphological level, by a strong reduction of medium- and large-sized blood vessels. These data suggest that vascular remodelling induced by anti-VEGF treatment leads to a more hypoxic tumour microenvironment, whose metabolic consequences may increase the tumour-cell invasivity. The ISI has processed data for a preclinical study carried out by the University of Bergen. The

perfusion parameters are determined very indirectly and their reproducibility is not always satisfactory. For method validation, for the identification of estimate error sources and for estimate improvement, an artificial flow phantom with known perfusion parameters was developed, a new DCATH (distributed capillary adiabatic tissue homogeneity) model enhanced by bolus delay was tested, and more reliable analytical methods (blind single-channel deconvolution), suppressing the effect of auxiliary quantity estimation errors, were applied. These methods were subsequently tested preclinically in Bergen and clinically at the Masaryk Memorial Cancer Institute in Brno.



Analysis of the treatment of glioblastomas with bevacizumab using the DCE-MRI method.

Maps of perfusion with the tumour in the sewer-rat model; a control sewer rat (left) and a sewer rat after the application of bevacizumab (right).

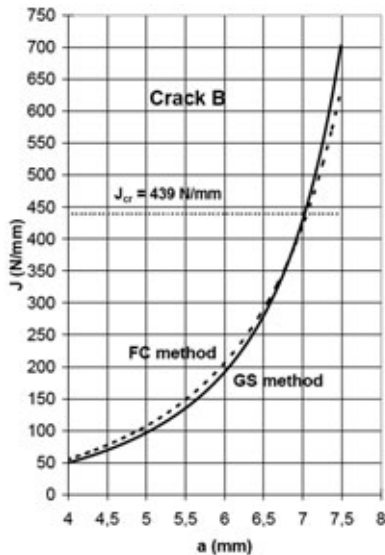
Bevacizumab led to a demonstrable reduction of blood flow (A–C), blood volume in the tissue (D–F) and the blood-tissue extraction constants

Cooperating entities: University of Bergen, Norway, Masaryk Memorial Cancer Institute, Brno, Faculty of Electrical Engineering and Communication, Brno University of Technology

SCIENTIFIC ACTIVITY

Evaluation of the Integrity of Thin-Walled Pressure Systems by Fracture Mechanics

(Institute of Theoretical and Applied Mechanics)



The prediction of the fracture depth of a crack of the surface length $2c = 230$ mm in a pipe of $\text{Ø}1018/12$ mm from X70 steel at a pressure of $p = 9.55$ MPa.

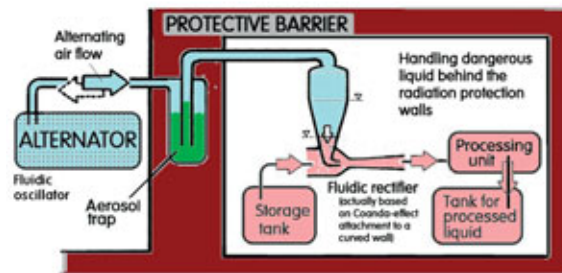
Determination of the critical depth of a part-through crack 230 mm long in a gas pipeline DN 1000 with the wall thickness of 12 mm made from steel X70 (the yield stress 490 MPa) at a pressure of 9.55 MPa. This depth is given by the x co-ordinate of the point of intersection of J-a curves with a horizontal straight line $J = J_{cr} = 439$ N/mm. J-a curves are determined by two different methods, namely GS method (developed at ITAM) and FC method (French Nuclear Code).

A new simple method has been developed for assessing axial part-through cracks in the wall of a thin-walled cylindrical shell subjected to internal overpressure of a medium. The method utilises approximate expressions for determining the fracture parameters K , J , employed to determine critical dimensions of a crack in the wall of a cylindrical shell on the basis of equality between the J integral and the J -based fracture toughness. In so doing, it is necessary to consider a considerable reduction of fracture toughness if the crack is of stress-corrosion origin formed by the hydrogen mechanism. The crack tip constraint is taken into account by the so-called plastic constraint factor on yielding, C , by which the uniaxial yield stress in the J integral equation is multiplied. This factor is given by the ratio of the stress needed to obtain plastic macrostrains

under constraint conditions to the yield stress at a homogeneous uniaxial state of stress. The results of prediction have been verified by burst tests of pipe sections of the dimensions DN 800 and DN 1000.

Fluidic Pumps for Extremely Dangerous Liquids

(Institute of Thermomechanics)



Simplified (single phase) flowchart of the arrangement of a pump for an extremely dangerous liquid.

The pump is propelled by an alternating air flow generated in the alternator; the rectification effect takes place in closed cavities without moveable components and does not require any maintenance. The practically 100% reliability and unlimited lifespan enables it to work in an inaccessible area inside a protective barrier.

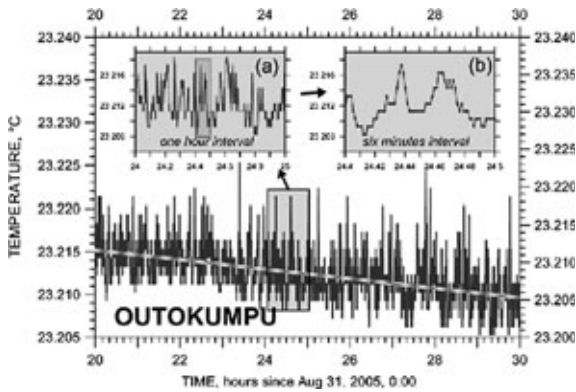
The real arrangement works with a two-phase alternating flow, in the rectification stages it uses the Coandă effect and is multi-stage with a 'peristaltic' transfer of the pumped liquid between the individual stages.

Scientific employees of the Institute of Thermomechanics have developed pumps based on the original principle of the fluidic rectification of alternating flow without moving parts. Different flow fields in the opposite flow directions are caused by the non-linear character of the equations governing fluid flows. The rectification effect takes place in closed cavities with solid fixed walls, which means that there is no need to seal the orifice through which the mechanical driving shaft enters classical pumps. The pump thus may be e.g. a welded block of resistant material, such as Monel metal or ceramics. As these pumps need no maintenance (like the replacement of the sealing glands, oiling the bearings etc.), they exhibit absolute reliability and practically unlimited life, which makes them suitable for use in nuclear industry or in other situations where an access to the pump is not desirable or is utterly impossible.

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Geothermal Research of the Deep Borehole Outokumpu, Finland

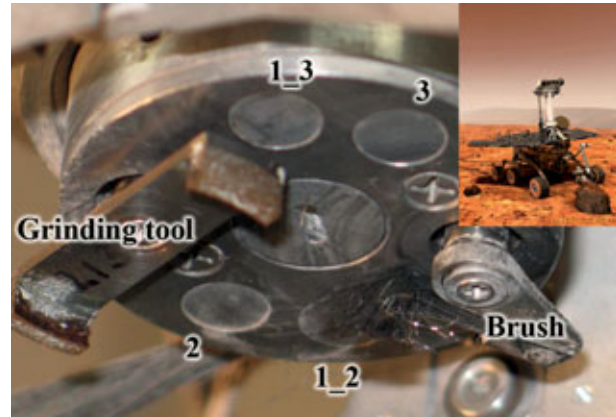
(Institute of Geophysics)



Geothermal research of the deep borehole Outokumpu
The time-temperature series recorded by a probe placed at a depth of 1390 m; measured every 5 s. The fine structure of temperature oscillations is clear in the insets capturing the hourly and six-minute intervals of measurement.

The main subject of the geothermal research is the measurement of temperature distribution of in various layers of the Earth's crust or other parts of the Earth. The temperature profiles acquired are then used for many diverse purposes like obtaining information on past climate changes, the flow of underground water but also for possible energy applications. A team from the Institute of Geophysics of the ASCR, v. v. i. participated in such research in Finland at the Outokumpu borehole dug in 2004–2005 to a depth of 2516m. In the borehole, five repeated underground geophysical surveys were conducted, the last of which after approximately three years from the conclusion of the drilling work. From the borehole, the core was taken and its measured thermal conductivity showed significant differences in various layers of the borehole. It is possible to explain this by the influence of the paleoclimate on the surface temperature over the last 100,000 years and on this basis to estimate the average temperature of this place in the Holocene and its deviations. The results are a significant contribution to the knowledge of the local climate in the past.

New Learning on the Geological Processes on Mars (Institute of Geology)



Magnetic experiment on Mars

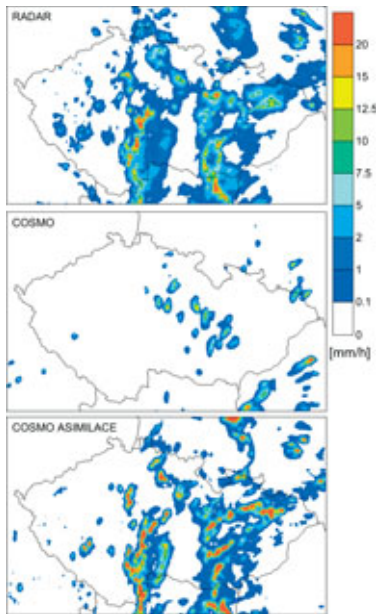
The grinding tool (left) is a component of the board of the robotic rovers on Mars (see the inset in the top right). In the right part, the brush for modifying the ground surface of the rock is depicted and the numbers mark the magnets intended for the collection of magnetic dust created by the abrasion

As against the Earth, Mars has approximately one-tenth of the mass, which is a phenomenon that has not yet been satisfactory explained. Also many others of its features draw attention and it is no wonder that in the last fifty years it has been investigated by around twenty automated probes. The latest research rovers Spirit and Opportunity, which move on the surface of Mars, are part of the Mars Exploration Rover mission, to which the experiment in which the institute cooperated is connected. Specifically, Spirit, which landed here in 2004, investigated the magnetism of the dust on the surface of Mars. One of the basic findings is that the absolute majority of the dust on Mars is magnetic. It seems to be a planet-wide phenomenon, because similar results have been announced also from the opposite side of the planet. Of the minerals that could share in this phenomenon, magnetite, maghemite and red hematite have been found. New experiments on the rocks containing hematite further show the likely presence of a magnetic mineral with greater magnetic attraction than the hematite in the outcrops of the rocks found in the Meridiani Planum area. If also all of the airborne dust is magnetic, it will be possible to use magnets as an anti-dust shield of the probes in further expeditions.

SCIENTIFIC ACTIVITY

Cooperating entities: Niels Bohr Institute, Denmark, Max Planck Institute, Germany, University of Utah, USA, Honeybee Robotics, New York, USA, and Technical University, Denmark

Nowcasting of Heavy Convective Storms in Summer (Institute of Atmospheric Physics)



A comparison of the forecast of strong convective storms from 29 June 2009.

The upper figure shows the hourly storms between 15 and 16 UTC computed based on the radar and precipitation measurements.

The centre and lower images show the forecast of hourly showers using the COSMO model without and with radar-reflectivity assimilation. The end of the assimilation is at 15 UTC.

Summer convective storms accompanied by flash floods cause significant economic damage every year. Although early warnings cannot completely remove the economic losses caused by the subsequent floods, they can significantly reduce them. The forecast of heavy convective precipitation is however very complicated, because these are quite local phenomena, both spatially and temporally. For the forecast of severe summer convective precipitation, a new technique focused on very short-term nowcasting below three hours has been developed with a high horizontal resolution of 2–3 km. This technique combines two

already used forecasting methods: (i) physical modelling of the state of the atmosphere by a numerical weather-prediction model and (ii) the extrapolation of the current measurements of precipitation intensity by meteorological radars. The method proposed by the scientific employees of the Institute of Atmospheric Physics combines these two techniques by using extrapolated rain rates derived from radar reflectivity to modify the course of the numerical model during the first hour of the nowcast. This data assimilation into the model modifies the initial conditions so that they would correspond better to the state of the atmosphere. The numerical model uses these conditions for the forecast for the second and third lead hours. The described technique was tested on the forecast of a series of events with heavy observed precipitation. The results confirmed that the forecast accuracy of the new method is much better than the individual forecasts of both methods used. The first tests of the application of the model with a follow-up hydrological model were conducted with a positive result.

Monitoring and complex analysis of digital geomechanical data (Institute of Geonics)

(Institute of Geonics)

Since 2001, an intensive research is carried out in the medieval Jeronym Mine in the Sokolov region, within which the Institute of Geonics of the ASCR developed a distributed monitoring system, allowing the acquisition of a long-term series of interrelated geomechanical digital data that are utilised among others for the assessment of stability and for the investigation of selected properties of the rock mass. One of the monitoring results is obtaining time series of measured changes in the height of the ceiling of the chamber K2 with a laser rangefinder. These data were processed using multifractal analysis, which showed significant signal segmentation, and it was proved that the data are not purely stochastic. A specific method that was also used in that monitoring is the measurement of stress tensor and its changes in the rock mass. This method is based on strain gauge measurements of the development of deformations on the conical bottom of a prepared borehole in response to changes of the stress field in the vicinity. The measurement is realised by a special probe developed at the Institute of Geonics in several developmental modifications, which enable both the long-term monitor-

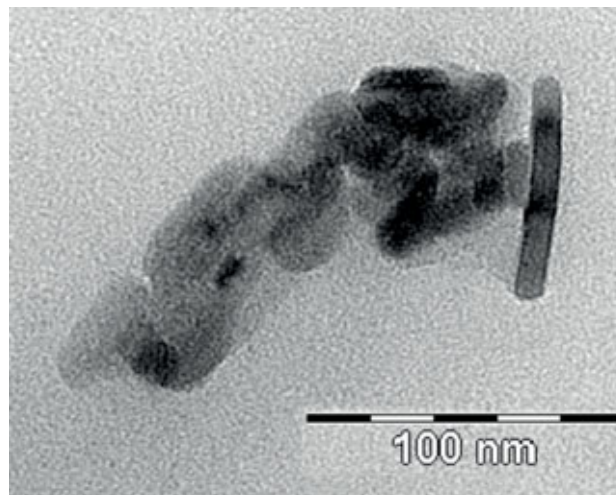
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ing of stress changes and the determination of the absolute stress magnitudes by using the borehole overcoring technique. The stress-measurement methodology in both variants is successfully applied and tested at many locations including the monitoring of stress changes induced by rock heating in connection with the TIMODAZ (Thermal Impact on the Damage Zone around a Radioactive Waste Disposal in Clay Host) international project. To assess the degree of weathering of and the impact on the rock massif, non-destructive test methods were used in addition to visual observations – especially the measurement of compressive strength by the Schmidt hammer and ultrasonic radiography. As a result, a methodology for the classification of the studied surfaces into 5 categories was developed. Based on the data obtained by monitoring at the Jeronym Mine, it can be competently said that the mine works as a whole create a stable system. Nevertheless, the results suggest that the measured values of some parameters are not entirely constant and their development requires increased attention. Owing to the large amount of measured data of different quantities from one measuring system, it is possible to perform data synchronization. This provides a unique data set that allows a further detailed analysis of processes in the rock massif.

Isolation of Bioapatite from the Chicken Femur Bone and Study of the Dispersion of Apatite Nanoparticles in Polymer Matrice

(Institute of Rock Structure and Mechanics)

Nano-bioapatite particles were successfully acquired from chicken femur bones via chemical treatment followed by calcination. The bioapatite powder was chemically and structurally characterised by elemental analysis, X-ray diffraction, transmission electron microscopy and Fourier transform infrared spectroscopy techniques. The use of these methods proved the nanostructured character of the acquired bioapatite, which along with its chemical composition makes it suitable for application as filler in biocomposite materials. Consequently, the problem of nanoapatite dispersion in polymer matrices was studied, because this is one of the key problems in biocomposite preparation. Possible approaches for the resolution of this problem have been described in one chapter of the study dealing with this problem.



Nanoparticles of bioapatite isolated from the chicken femur bone.
A picture from a transmission electron microscope capturing the nanoparticles of bioapatite isolated from the chicken femur bone. The nanoparticles have a needle-like shape and show the nanostructural character of bioapatite.

Cooperating entity: VŠB – Technical University of Ostrava

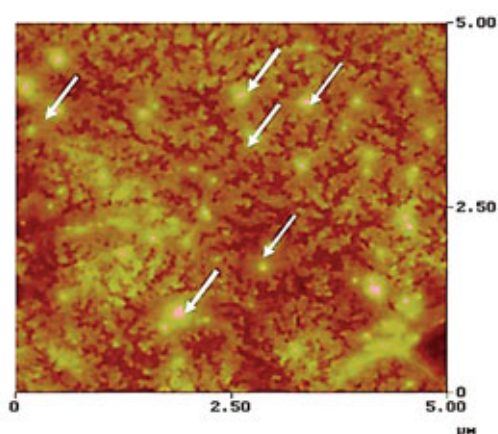
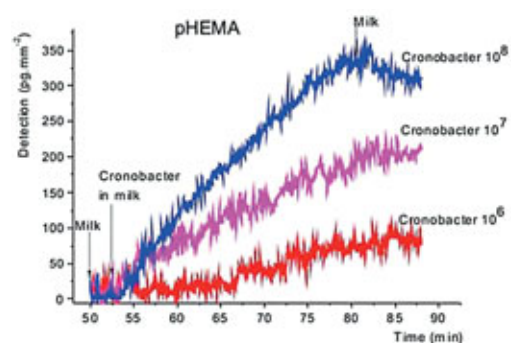
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2.3 ON THE WAY TO NEW PRODUCTS AND TECHNOLOGIES

From the results from 2011, we present:

Biomimetic Polymer Materials

(Institute of Macromolecular Chemistry)



The response of an SPR biosensor detecting the pathogenic bacterium *Cronobacter* in milk. The bacterium was captured by an antibody covalently bound to an SPR chip coated with a polymer brush from poly(hydroxyethyl metacrylate). The response was measured at a concentration of *Cronobacter* 10^8 , 10^7 , and 10^6 bacteria in 1 ml of milk.

In order to verify the possibility of the use of polymer materials for the construction of biosensors or selective cell carriers for regenerative medicine and tissue engineering, the scientific employees of the institute have developed several alternative methods of the preparation of surfaces resistant to nonspecific adsorption of proteins and adhe-

sion of cells from biological fluids. Specific properties of modified surfaces were obtained by binding hydrophilic polymer chains to the material surface in a manner leading to the formation of an organised layer of polymer chains in a polymer-brush conformation. To prepare surface films in the brush conformation, we investigated both grafting-to techniques and grafting-from techniques. In the research, the kinetics of grafting polymerisations, the chain density and thickness of polymer brushes as well as resulting surface physical properties of biomaterials coated with molecular layers were analysed. A specific chemical reaction was investigated, affording binding of specific biologically active molecules to the surface of polymer brushes, thus providing selectively interacting materials and surfaces.

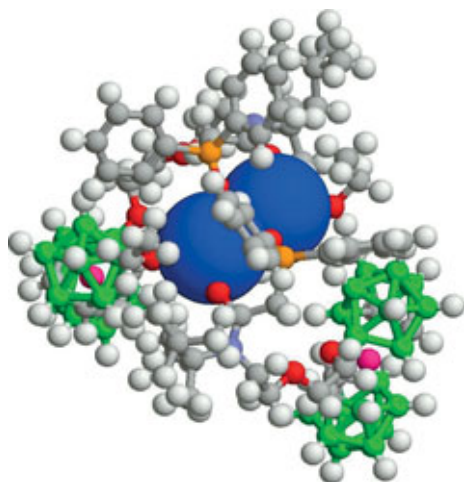
Chemistry of Extraction Agents for High-Level Nuclear Waste Treatment

(Institute of Inorganic Chemistry)

For the sustainable development of nuclear technologies, the successful solution of problems associated with the treatment of the spent nuclear fuel, and storage and handling of high-level nuclear waste (HLW), are just as important as the issue of reactor safety. Developed countries therefore consider the processing of the waste or reprocessing of nuclear fuel in a closed cycle that would lead to consistent elimination of the most radiotoxic elements (actinides) and possibly also Cs^+ and Sr^{2+} and thus to significant reduction of the time necessary for storage (up to 1000 times) and of the volume (about 60 times) of the waste before its final disposal in repositories. In 2011, the development of preparative approaches continued leading to new extraction agents, which are structurally based on amidic bonds of two chemically modified cobalt bis(dicarbollide) anions to a diglycolic-acid platform. The institute further dealt with the modifications leading to the improvement of the properties of ion agents with a complexing group on the CMPO (carbamoyl methyl phosphine oxide) basis. Both types of ionic substances make it possible to achieve a high extraction efficiency for the selective extraction of lanthanoid and actinoid groups from strongly acidic nuclear wastes, namely without the presence of synergic, special solvents or the presence of other auxiliary substances in the system. They exhibit good stability as well as relatively good solubility in less polar, ecologically acceptable

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solvents. Extraction tests were carried out on a microscale and on model fission mixtures and re-extraction. Within the EU ASCEPT project (7th F.P), the institute also participated in the analyses and expertise of hydrolytic and radiation stability of modified bis(triazinyl bipyridines) designed for the selective extraction of minority actinoids. In this year, in cooperation with a team from Chalmers Univ., Sweden, the radiation stability of these agents under very high doses of radiation and the influence of the interference of cations from a mixture of fission products on the extraction were studied in more detail. A contribution to understanding these events is an important factor in the development of the technological process.



Structure of the borane extraction agent.

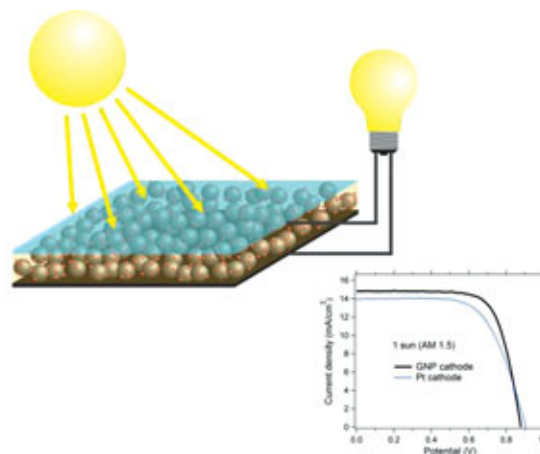
Crystallographically determined structure of the dimer of the sodium salt of cobalt bis(dicarbollide) derivative – $[(8\text{-CMPO}-(\text{CH}_2\text{-CH}_2\text{O})_2\text{-}1,2\text{-C}_2\text{B}_9\text{H}_{10})(1',2'\text{-C}_2\text{B}_9\text{H}_{11})\text{-}3,3'\text{-Co(III)}]^{2-}$ (CMPO = Ph- P(O)-(CH₂)_nC(O)N1t-C₈H₁₇). This ionic ligand enables selective liquid-liquid extraction of lanthanides and actinides, and for its optimal solubility and high extraction efficiency was chosen to be studied in detail. The research of extraction properties for lanthanides and actinides was carried out on a macroscale, the study of the effect of the interference of other ions present in fission mixtures and successful discovery of the conditions for the re-extraction of targeted radionuclides have been recently performed in close cooperation with a team from NRI, plc., Rež.

Cooperating entity: Chalmers University, Sweden, NRI, plc.

Electrocatalytic, Spectroelectrochemical and Mechanical Properties of Graphene

(J. Heyrovsky Institute of Physical Chemistry)

Graphene nanoplatelets in the form of optically transparent thin films exhibit excellent electrocatalytic properties with cobalt complexes of bipyridine. In this case, graphene is clearly outperforming platinum as a catalyst. This discovery has straightforward application in a new generation of dye-sensitised Co-mediated solar cells which have recently (November 2011) demonstrated record power conversion efficiency over 12%. The cell with a graphene cathode is superior to that with a platinum cathode particularly in fill factors and in the conversion efficiency at higher illumination intensities. The Raman spectroelectrochemical study of double-layer graphene was studied using isotope labelling of the carbon. This work provided an unexpected conclusion, namely that electrochemical doping of both layers proceeds similarly, contrasting the behaviour of an analogous system of double-layer carbon nanotubes. A related Raman study of mechanical stress in bilayer graphene with Bernal stacking pointed at a possibility of band-gap opening, which would enable the use of graphene as a semiconductor.



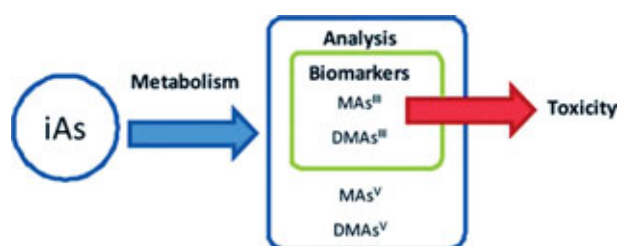
Current-voltage characteristics of dye-sensitised solar cell with platinum cathode (Pt) and cathode from graphene nanoplatelets (GNP) under 1 sun illumination

Cooperating entity: University in Manchester, Great Britain; University in Patras, Greece; Technical University

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in Berlin, Germany; Massachusetts Institute of Technology, USA; Leibniz Institute of Solid State and Materials Research, Dresden, Germany; Technical University in Lausanne, Switzerland

A method for Trace Speciation Analysis of Arsenic Directly in Samples of Slurries of Homogenised Tissues and Cells (Institute of Analytic Chemistry)



Speciation analysis of arsenic metabolites in biological samples. The most interesting metabolites of arsenic for toxicology are very unstable trivalent methylated arsenic species.

A current trend of trace element analysis is a shift from determining total element concentration to determining its individual forms – a speciation. Arsenic is a typical example of an element whose toxicity is strongly dependent on its chemical form. The most toxicologically interesting forms are the substances found in mammalian arsenic metabolism, i.e. arsenites and arsenates. A topical problem is determining methyl- and dimethyl arsenites, which are much more toxic than the corresponding arsenates. These species extremely easily oxidise. In cooperation with a toxicological team from the University of North Carolina, an analytical method was developed based on selective hydride generation, hydride collection and separation in a cryogenic unit and detection by methods of atomic spectrometry, allowing direct determination of all metabolites from a slurry of cells or homogenised tissues. For samples of liver tissue, we achieved very good agreement with the determination after mineralisation (which does not provide oxidation-state information). Excellent detection limits allow also analyses of samples corresponding to low arsenic exposure. Using this methodology, we found that trivalent species in liver tissue and cell-culture samples are stable up to 3 weeks when stored at -80°C . We proved that quantitative speciation of arsenic, including oxidation-state information, may be acquired from tissue and cell samples obtained in population studies and that a substantial portion

of arsenic in liver tissue is in the form of trivalent methylated species. In this respect, our method is unique and creates the prerequisites for significant progress in the field of arsenic toxicology, because alternative approaches, relying on methods of liquid chromatography, are unsuitable for direct tissue analysis.

Cooperating entity: University of North Carolina at Chapel Hill, Department of Nutrition, Chapel Hill, NC, USA.

Emission Factors of Selected Pollutants from Small Combustors (Institute of Chemical Process Fundamentals)



The effect of the domestic-waste combustion on emission factors of selected organic pollutants. Smokestacks in the countryside

Domestic heating appliances are among the most significant sources of air pollution both in terms of emissions of polyaromatic hydrocarbons (PAHs) and of dioxins (PCDD/F) and other persistent organic pollutants (POPs). Within a four-year research project resolved in cooperation with VŠB – Technical University of Ostrava and the Public Health Institute based in Ostrava (ZÚ Ostrava), a complex set of emission factors (EF) was acquired from five fuel types (lignite, bituminous coal and three types of biomass – spruce, beech and maize) burnt in six types of combustion appliances of various designs. These are the first complex and original data monitoring the effect of both the fuel and of the combustion device. The pollutants monitored included particulate matter (PM), carbon monoxide, polyaromatic hydrocarbons (PAH), hexachlorobenzene (HxCBz), poly-

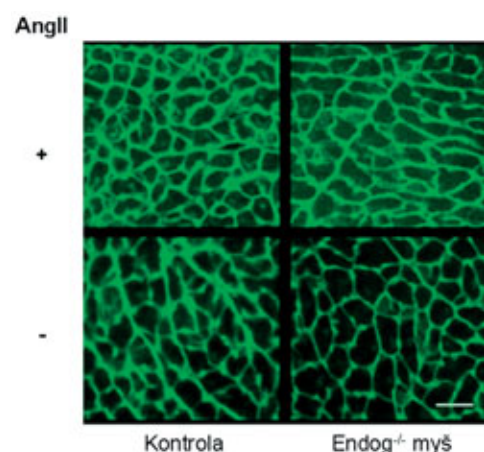
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chlorinated dibenzo-p-dioxins and furans (PCDD/F), etc. It was determined that what is crucial for the emission rate of non-chlorinated pollutants is the type of appliance; the type of fuel plays only a minor role. The decisive factor for the emissions of chlorinated pollutants is the fuel being combusted. Surprisingly enough, higher EFs of some pollutants were observed for modern-type boilers. On the basis of the mentioned data set, it is also possible to recommend unambiguously which heating appliances and fuels are suitable in terms of emission minimisation.

Cooperating entity: VŠB – Technical University of Ostrava, Public Health Institute based in Ostrava (ZÚ Ostrava)

Mutated Endonuclease G Causes Mitochondrial Dysfunction and Left Ventricular Hypertrophy

(Institute of Physiology)



EndoG^{-/-} mice have enlarged cardiomyocytes at baseline and following angiotensin II (AngII) stimulation
A representative picture of left ventricular sections from EndoG^{-/-} and wild-type (WT) mice at baseline (-) and following AngII-induced hypertrophic stimulation (+). Scale bar = 50 microns.

Left ventricular hypertrophy (LVH) represents a compensatory response to increased hemodynamic stress, for instance in systemic hypertension, with the predisposition to LVH being strongly genetically determined. Chronic hypertrophy is associated with increased risk of heart failure and premature death. The spontaneously hypertensive rat (SHR) is one of the most widely used animal model of human essential hypertension and accompanying LVH. To search for genes that are responsible for LVH, the

SHR was crossed with normotensive Brown Norway (BN) strain, which has normal blood pressure as well as ventricular mass. Using linkage analyses, it was ascertained that the gene responsible is EndoG, coding for endonuclease G, which is located in mitochondria. However, the possible involvement of EndoG in heart-mass regulation was unknown. In-vitro analysis of cardiomyocytes whose EndoG expression had been reduced clearly showed that the loss of the endoG function indicates their hypertrophic growth. In agreement with this find, it was established that the EndoG-deleted mouse heart depleted mitochondria, exhibited mitochondrial dysfunction and elevated levels of reactive oxygen species, which was associated with enlarged and steatotic cardiomyocytes. These findings further corroborated an important association between mitochondrial dysfunction, oxidative stress and heart disease and provided evidence for the important role of EndoG in maladaptive cardiac hypertrophy.

Cooperating entity: The work is the result of broad international cooperation. It builds on grant projects resolved in the 6th and 7th Framework Programmes of EU – EURATools and EURATRANS, in which also the laboratories of further co-authors of the article, predominantly from Imperial College in London, have participated.

Synthesis and Antiangiogenic Activity of Silybin Galloyl Esters

(Institute of Microbiology)

The basic principle of using antiangiogenic drugs in the tumour therapy consists in the blockage of the angiogenic network formation in tumours (tumour angiogenesis), which may stop tumour proliferation or destroy the tumour due to nutrient and oxygen limitation. To this end, so-called antiangiogenic substances on the basis silybin are used. The institute has developed a new group of substances based on the structural analogy with the already known antiangiogenic compound epigallocatechin gallate (EGCG) from green tea. This compound was grafted to the silybin molecule, a compound acquired from *Silybum marianum* (L.) Gaertner (milk thistle). The acquired series of derivatives with antiangiogenic activities was tested in antiangiogenic tests in the HUVEC (Human Umbilical Vein Endothelial Cells) cell lines. For these compounds, also a SAR (Struc-

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ture Activity Relationship) study was conducted. As the strongest antiangiogenic compound, 7-*O*-galloylsilybin B, having IC₅₀ 4.3 μM (MTT assay), was identified. The results of this research have strong potential for the application in the selective therapy of tumour diseases.

Cooperating entity: The work was created in cooperation with: Palacký University, Olomouc, and with Prof. M. A. Medina, University of Málaga, Spain.

Identification of Genes and Their Arrangement in the Genetic Information of Barley

(Institute of Experimental Botany)

One of the few possibilities to secure enough food for the increasing world population is to grow improved varieties of crops with increased yield, resistance to diseases and pests and adapted to changing climatic conditions. Efficient breeding of such varieties is however impossible without understanding the molecular mechanisms underlying important traits, which requires the knowledge of genetic information (genome) of the respective plant species. The genomes of rice and maize – two of the most important crops – have already been sequenced ('read'), but the genomes of wheat and barley, which are among the crops of no lesser importance, are yet to be sequenced. This delay is due to the enormous size of these two cereal genomes, which makes their sequencing ('reading') difficult and expensive. To simplify and accelerate the sequencing of complex genomes, we have developed a strategy which builds on the fact that genomes are made of smaller parts – chromosomes. We have shown that it is possible to isolate chromosomes by a so-called flow cytometric sorting and then sequence them using next-generation sequencers. Using this approach, we identified 27,581 genes in barley. A comparison with known genomes of related species enabled us to determine putative positions of 21,766 barley genes on its seven chromosomes.

These results are a great leap forward in analysing the hereditary information of barley and may only be surpassed by a complete sequencing of the entire genome. The gene sequences obtained are an exceptionally important source of information that can be employed in breeding. They will also substantially facilitate searches for important revealing the genome-structure changes which accompanied monocot evolution and barley domestication.



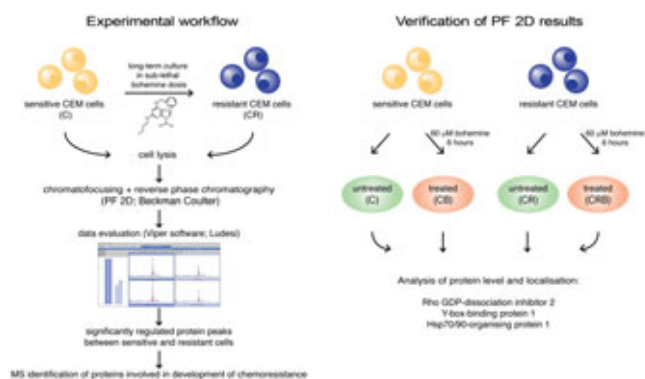
A comparative analysis of genome structure in barley and a model grass species *Brachypodium distachyon*. The figure provides a comparison of the positions of barley genes as determined in this study with genes of *B. distachyon*. The figure includes four sets of concentric circles: the innermost circle represents seven barley chromosomes (each in different colour). Moving outwards, the second circle represents barley chromosomes, but this time coloured based on their similarity with *B. distachyon* genome. Two outer (partially incomplete) circles represent *B. distachyon* chromosomes arranged according to their similarity with barley chromosomes. Conserved regions are highlighted coloured yellow to red. Putative similar genes of both species are connected with lines. Coloured lines in the center represent barley genes which emerged from one original gene as a consequence of a whole genome duplication.

Tumour Resistance with the Use of Specific Proteins in Clinical Applications

(Institute of Animal Physiology and Genetics)

In this study, the proteome alterations associated with the development of resistance to cyclin-dependent kinase inhibitor bohemine, a promising anti-cancer drug, were analysed with the primary aim of identifying potential resistance targets within the cell that could pave a way to selective elimination of specific resistant cell types. Our study has revealed that a critical role in resistance to cyclin-dependent kinase inhibitor is played by Rho GDP-dissociation inhibitor 2, Y-box binding protein 1 and the HSP70/90 organising protein. Furthermore, the testing of further cell lines proved the role of these proteins in the resistance to other types of anti-cancer drugs such as vincristine and daunorubicin.

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Tumour resistance and the use of proteins Rho GDP-dissociation inhibitor 2, Y-box binding protein 1 and HSP70/90 organising protein in clinical applications in proteomics.

Cooperating entity: Institute of Microbiology of the ASCR, v. v. i., Prague, CR; Laboratory of Experimental Medicine, Faculty of Medicine of Palacký University and University Hospital in Olomouc, Olomouc, CR; Ludesi, Malmö, Sweden

Interactions of Ah Receptor-Activating Toxicants with Signalling Pathways Regulating Cell Survival, Proliferation and Inflammation

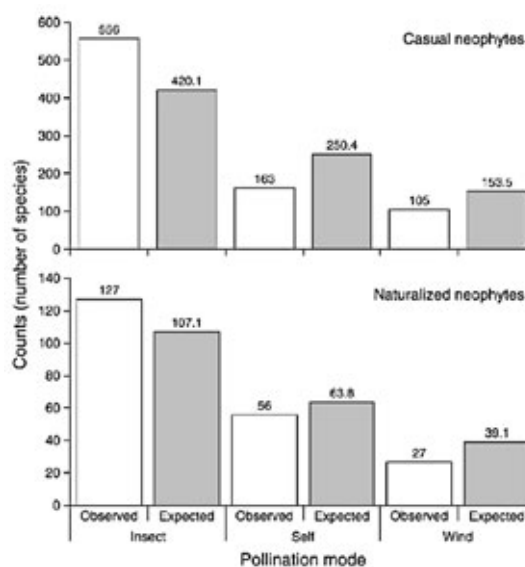
(Institute of Biophysics)

Organic pollutants and polycyclic aromatic hydrocarbons (PAHs) are important environmental toxicants. In many cases, one of the key factors in their toxicity is their ability to activate the aryl hydrocarbon receptor (AhR). Our studies have shown that by activating this protein, toxicants may disrupt some natural control mechanisms in cells that participate in regulating inflammatory response or in controlling the processes related to the development of organism and liver-tissue functions. They can thus significantly influence the formation of inflammatory mediators, such as anti-inflammatory cytokines and prostaglandins in lung cells... Furthermore, we have shown that the substances activating this receptor play an important role in liver regeneration as well as in the development of some chronic liver diseases. Our work contributes to revealing the mechanisms of the toxicity of aromatic compounds present e.g. in improperly prepared food or in polluted air.

Cooperating entity: Veterinary Research Institute, Brno; Institute of Experimental Medicine, ASCR, Prague

The Relationships between Alien Plants and Organisms of Other Trophic Levels Result from Centuries of Interaction

(Institute of Botany)



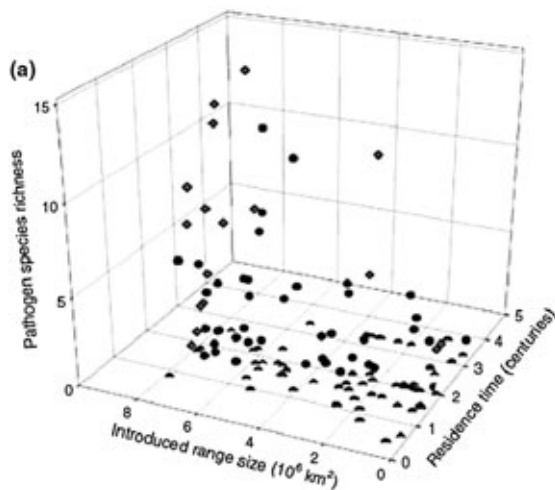
The relationships between alien plants and organisms of other trophic levels have changed in the course of thousands of years.

Pollination mode frequencies for neophytes in the Czech flora. The casual (observed values, upper panel) and naturalised species (observed values, bottom panel) differ in this respect from the most successful group, invasive species (expected values). The invasive species do not differ in the pollination mode from the native (from Pyšek et al., *Ecological Monographs*, 2011).

When studying the determinants of the invasiveness of plant species, it needs to be taken into account that the relationships between invasive plants and organisms at other trophic levels, no matter if they influenced the invading species positively or negatively, result from millenia of mutual interactions. The most important mutualistic relationships include pollination mode. Our study shows that alien flora introduced to Central Europe have a higher proportion of insect-pollinated species and host a greater diversity of pollinators than the native species. However, the frequency of pollination modes in the introduced alien flora gradually change during the process of naturalisation (Fig. 1) and the most successful invasive species do not

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differ in the pollination mode from native species. The results further corroborate the importance of self-pollination for the invasion; the species using this mode are the most widespread. Pathogenic fungi and viruses have the opposite effect. Plants introduced from Europe to America 400 years ago hosted six times more pathogens than those introduced 40 years ago. In the native area, more pathogen species were hosted by the plants occurring in more habitat types, with a history of agricultural use and adapted to greater resource supplies. In the hosts' invaded area, the pathogen species diversity has been correlated with the size of the invaded region, agricultural use, and time since introduction, but not with biological traits (Fig. 2). Introduced species have accumulated pathogens more slowly than is usual with most ecological processes, and the rate of this accumulation is determined by geographic and historic circumstances.



The relationships between alien plants and organisms of other trophic levels have changed in the course of thousands of years.

Pathogen species richness determined on European plants introduced to North America depends on historic and geographic factors. Pathogen richness was greater on European plants that had a larger introduced geographic range size in North America, a longer residence time in the introduced range (they were introduced earlier) and had a history of agricultural use (from Mitchell et al. 2010).

Cooperating entity: Faculty of Science, Masaryk University in Brno; University of North Carolina at Chapel Hill, USA; USDA-ARS, Fort Collins, USA; Helmholtz Centre for Environmental Research-UFZ, Germany

Tetrapyrrole Synthesis Is an Indicator of Plastid Evolution (Biology Centre)

The synthesis of tetrapyrroles (heme and chlorophyll) is one of the fundamental pathways in living systems on Earth. Heme is a necessary cofactor of a number of vital enzymes and participates in the creation of electron-transport chains both in a mitochondria and plastid. Chlorophyll is a vital photosynthetic pigment that is synthesised via the same pathway as heme, with the exception of the last step, when the magnesium (in the case of chlorophyll) instead of iron (in the case of heme) is incorporated into the tetrapyrrole ring. It appears that the tetrapyrrole synthesis path is mosaic, i.e. composed of enzymes of various origins, and that its composition reflects the evolutionary history of an organism. Our results obtained on two complex algae, *Euglena gracilis* (Excavata: Euglenozoa) and *Chromera velia* (Chromalveolata: Chromerida) suggest that there is a specific stage in the endosymbiosis process leading to the evolution of plastids in which algae synthesise tetrapyrroles in two separate and independent paths, one for the plastid and one for the mitochondrion. Exactly such an arrangement has been found in green complex alga *E. gracilis*, which has obviously passed through secondary endosymbiosis with green alga. We assume that it is the loss of the mitochondrially cytosolic tetrapyrrole pathway for tetrapyrrole synthesis and the preservation of the only path for the synthesis of these necessary components in a plastid that generally lead to the essentiality of the plastid and the inability of the organism to live without this organelle unless the alga finds another tetrapyrrole source. We have also demonstrated that *C. velia* uses a non-canonical pathway to synthesise the tetrapyrroles, which is homologous to that found in apicomplexan parasites (Chromalveolata: Apicomplexa). The alga synthesizes δ -aminolevulinic acid (ALA) in the mitochondrion through the C4 pathway presented in the eukaryotic heterotrophs, although it is a full photoautotroph. Therefore, *C. velia* appears to be the only known phototroph on the Earth synthesising chlorophyll from glycine and succinyl-CoA. The presence of a non-canonical pathway for tetrapyrrole synthesis in *C. velia* also represents strong non-phylogenetic evidence for common evolutionary history of Chromerida and Apicomplexa isolated from Australian corals.

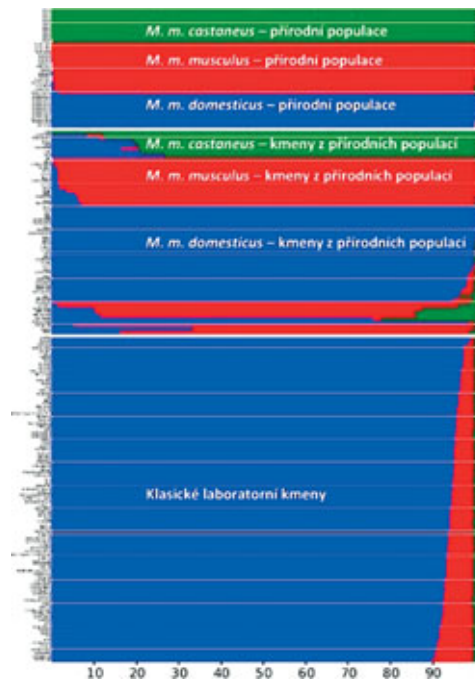
Selection Mechanisms in the House Mouse Hybrid Zone
(Institute of Vertebrate Biology)



Picture of two domestic mouse subspecies living in Europe. The West-European form, *Mus musculus domesticus*, is on the left side, the East-European form, *M. m. musculus*, on the right. (Photo: M. Macholán)

An important aid in the study of species diversity, i.e. the genesis of new species (speciation), is the study of the genetically different forms that are at the beginning of this process. Such species on a territory inhabited by hybrid individuals, which are in comparison with the parent populations in some way disadvantaged by natural selection, include two subspecies of the domestic mouse in Europe: *Mus musculus musculus* with the range in eastern and northern and *M. m. domesticus* in western and southern part of the continent. This hybrid zone (HZ) forms an ideal ‘natural laboratory’ for the study of speciation. By introducing innovative technological, randomisation and mathematical-analytical techniques, we hopefully contributed to a breakthrough in HZ studies. For whole-genome based mapping of chromosomal regions that are under selection in HZ, the scientists have constructed a panel consisting of 1401 diagnostic molecular markers distributed evenly across the mouse genome with the mean distance 2 Mb between the neighbour markers and scored their genotypes in 1400 mice trapped in West Bohemia and South-East Bavaria and in 440 mice from the south-Bavarian portion of the house mouse zone. A comparison of the same set of markers located on the X chromosome in the two areas revealed that the sampling design focusing on trapping individuals at localities from the central parts of the HZ is the

prerequisite for unbiased inference on selection. Through an analysis of a targeted selection of 24 X-linked markers, we further showed that even markers in tight linkage can recombine away from their parental genome and introgress in different way across the HZ. In some cases, it was possible to refute generally expected concepts. An example can be the genes that share in the adaptive immunity response of the organism against pathogens. Originally, it was supposed that with hybrid individuals there was a disturbance of the finely tuned complex of these genes and thus their reduced ability to defend themselves against parasites, but our research determined the opposite trend, i.e. a lowered level of parasitisation with hybrids in comparison with the parent populations. Moreover, despite the established opinion, not even from the theoretical perspective are the genes responsible for the immunity suitable candidates for the initiator of reproductive isolation among species.



Proportion of diagnostic markers in the genome of three subspecies of the house mouse in wild populations (the top of the panel), in wild-derived strains (the central part of the panel) and classical laboratory strains (the bottom of the panel). Green is characteristic for *M. m. castaneus*, red for *M. m. musculus* and blue for *M. m. domesticus*.

Cooperating entity: Centro de Investigação em Biodiversidade e Recursos Genéticos, Campus Agrário de Vairão, Vairão, Portugal (S. Baird); University of Michigan, Ann

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Arbor, USA (P. Tucker); College of Medicine, University of Arizona, USA (B. Karn, C. Laukaitis)

Two-Photon Polarisation Microscopy Reveals Protein Structure and Function

(Global Change Research Centre)

A new kind of optical microscope will allow visualising many processes inside living cells that have, until now, been impossible to observe. The new technology builds on an advanced type of an optical microscope called a two-photon microscope, in which the biological sample is illuminated by a powerful infrared laser in a way that allows three-dimensional spatial localisation of fluorescent molecules. Fluorescent molecules are often used in biology for the visualisation of otherwise colourless biological molecules. The described improvement lies in modifying the properties of the laser beam used such that its light waves alternately oscillate in various, precisely defined directions (polarisations). This modification allows using a two-photon microscope not only to visualize where the fluorescent molecules are but also how they are oriented. It has been shown that information on the orientation of fluorescent labels attached to a particular protein can be used to deduce information on the structure of these proteins directly in living cells and tissues. Since the structure of protein molecules often changes during biological processes, the new kind of microscope makes it possible to detect whether a particular molecular process is taking place in the cells.

Cooperating entity: Columbia University, Czech Technical University Prague

Phylogenetic Trends of Microscopic Lignicolous Fungi (Pezizomycotina)

(Institute of Botany)

The uncertainties in the determination of ligniperdous fungi which have complicated the study of their biology and ecology in the long term have been resolved based on our research of the evolutionary relationships of lignicolous microscopic fungi. A group of organisms from the order *Glomerellales* were successfully identified; they mimic fungi of another, evolutionarily distant group, the order



A study of phylogenetic trends of microscopic lignicolous fungi (Pezizomycotina).

A phylogram based on three genes (of small and large ribosomal RNA subunits and the second largest RNA polymerase subunit) clearly shows current systematic classification within the Sordariomycetes and the positions of the Glomerellales, Microascales and Chaetosphaeriales.

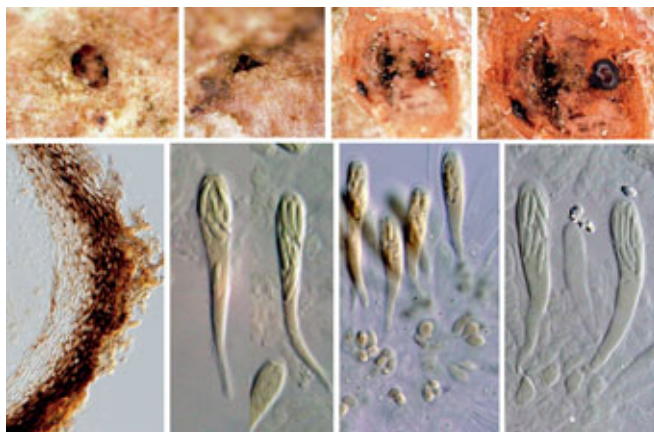


A study of phylogenetic trends of microscopic lignicolous fungi (Pezizomycotina).

Representatives of three asexually reproducing genera of the Helotiales order (class Leotiomycetes) *Infundichalara*, *Exochalara* and *Brachyalara*, distinguished from morphologically similar taxa in the order Glomerellales and Chaetosphaeriales.

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Chaetosphaeriales. Our study defined three monophyletic families within the order *Glomerellales*, two of which were described as new for science. We also successfully resolved the relationship of the members of the order *Microascales*, whose conidial states were in the past incorrectly interpreted and linked with *Chaetosphaeriales*. The integrating methods of light and electron microscopy, cultivation experiments, phylogeny of protein- and RNA-coding genes, bioinformatics methods including the prediction of secondary structures made it possible to clarify also the taxonomic structure of the *Glomerellales*. This enabled the study of evolutionary trends in the fungal class *Sordariomycetes* and description of the relations between morphologically similar but evolutionarily distant fungal groups (Fig. 4). Through a study of evolutionary relationships of the conidial states of fungi traditionally referred to the *Glomerellales*, three monophyletic genera (Fig. 5) were also identified, which are correctly placed not only in a different order and but also in a different fungal class. When studying microscopic fungi of the genus *Ceratostomella*-complex, we discovered new organisms and new evolutionary relationships. A new sexual stage was discovered in the lifecycle of the microscopic fungus *Sterigmatobotrys macrocarpa*, which morphologically imitates another, evolutionarily different genus. Based on the discovered information, a monograph of the genus *Jattaea* (Fig. 6) of the order *Calosphaeriales* was published.



A study of phylogenetic trends of microscopic lignicolous fungi (Pezizomycotina). *Jattaea discreta*, a typical representative of the genus *Jattaea* (Calosphaeriales).

Cooperating entity: Institute of Microbiology of the ASCR, v. v. i.

Science and Society

From the results of 2011, we present:

Financial Development and Corporate Growth in the EU Single Market

(Economics Institute)

A quantification of the influence of the growing banking sector, capital market or accounting standards of a given country on its economic growth is a fundamental but difficult to resolve question (the anticipated future economic growth influences today's development of the financial sector). In this article, the question is answered using an analysis of the establishment of the EU-15 single market, which led to a synchronisation of the growth shocks for the individual branches of production but which at the same time did not lead to a unification of the level of the development of the national financial markets. Deviations of company growth from the Europe-wide branch averages for similar firms active in countries with variously developed financial systems are compared in terms of the amount of financial activity and quality of the institutions (measured in 1993 – at the establishment of the single market). The hypothetical transfer of a given company from the least to the most developed financial market should according to these regressive results (based on more synchronised branches) lead to an increase of the annual growth of the added value of a given firm by as much as three percentage points. It has also been shown that this growth gap caused, by the difference of the financial markets in 1993, was entirely eliminated by 2003.

Cooperating entity: University of British Columbia, Sauder School of Business, Vancouver, Canada
Bena, J. – Jurajda, Š.: Financial Development and Corporate growth in the EU Single Market. *Economica*, Vol. 78, No. 311 (2011), pp. 401–428.

The Republic of Sociologists: the Golden Age of Czech Sociology in the Interwar and Early Post-War Periods

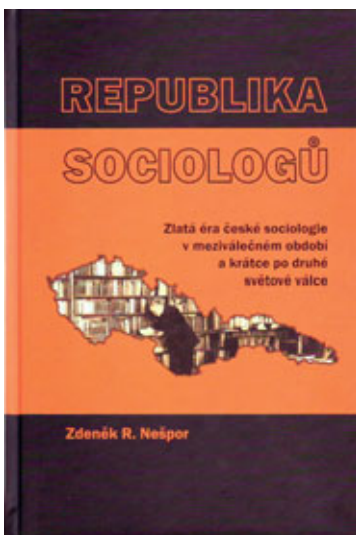
(Institute of Sociology)

The Republic of Sociologists offers a comprehensive and detailed analysis of the development of Czech sociology based not only on a content analysis of the work of the

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authors but also on the wider contexts. Few academic disciplines can boast of such a colourful past as Czech sociology. Its history is testimony to the turbulent development, illustrious rises and absolute falls, nepotism or conversely the condemnation and destruction of the social sciences by the various political regimes that ruled in the Czech lands from the end of the nineteenth century to the present day. Sociologists and their field were often just passive witnesses, impacted by the course of history but unable to influence it; nonetheless, it does not mean that the sociological community would not have made strenuous albeit usually futile efforts for self-realisation in the form of steering social operations. If we leave aside the current development of the field in a free society, the two periods of the greatest social advancement of Czech sociology, which were also the 'golden ages' of its history, occurred in the interwar period and shortly after the Second World War, before the rise of the communist regime, and in the 1960s in connection with attempts to reform socialist society.

Nešpor, Z. R.: *Republika sociologů. Zlatý věk české sociologie v meziválečném období a krátce po druhé světové válce* [The Republic of Sociologists: The Golden Age of Czech Sociology in the Interwar and Early Post-War Periods]. Scriptorium, Praha 2011, 308 p.



Book cover of Nešpor, Z. R.: *Republika sociologů. Zlatý věk české sociologie v meziválečném období a krátce po druhé světové válce* [The Republic of Sociologists: the Golden Age of Czech Sociology in the Interwar and Early Post-War Periods]

Legal Reasoning

(Institute of State and Law)

This book explores the complex relations between the legal validity, legal methodology and the existence of pervasive and persistent reasonable disagreement in the issues morality and justice. The author argues that the moral pluralism as a social fact is a good reason for the acceptance of legal positivism. The book will be of value not only to legal theorists but also to practical lawyers.

Sobek, T.: *Právní myšlení* [Legal Reasoning]. Ústav státu a práva AV ČR, Praha – Aleš Čeněk, Plzeň 2011, 608 p.

The Origins of Art

(Institute of Archaeology, Brno)



A drawing of a deer in the Las Chimeneas cave, Cantabria, Spain. This impressive sketch of a deer is one of the finest examples of Palaeolithic art (roughly 15,000 B.C.).

Thirty-five thousand years ago, prehistoric man began to create art. This book asks how to approach this phenomenon today. It builds on archaeological findings but on a comparison with similar phenomena in recent and contemporary human cultures, makes use of evolutionistic theories and discusses a wide range of hypotheses expressed with respect to this topic over the last 150 years. It has been shown that we understand ancient art better when we attempt to put it into its original context of time, space and of the artist himself – man. Prehistoric art is not uniform. Over thousands of years, it underwent a process of inner development while making use of a wide range of

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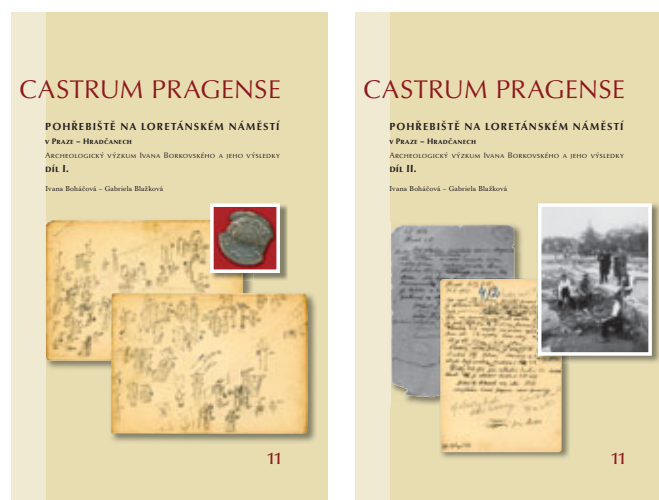
materials and techniques. It took individual species from the animal kingdom, evidently according to a certain key, depicted man himself and reduced some shapes down to standardised symbols. The book also explores how pictures come to be grouped into a themed whole – a story – and appraises them from the viewpoint of the interpretative models that can be considered – magic, shamanism, games, ritual and myth. The book concludes with a detailed list of the principal archaeological find sites.

Svoboda, J. A.: *Počátky umění [The Origins of Art]*. Academia, Praha 2011, 335 p.

The Burial Site at Loreta Square in Prague *(Institute of Archaeology, Prague)*

The publication describes one of the earliest large-scale archaeological interventions (1934–1936) in the complex stratigraphic environment of the stratigraphies of pre-urban and urban organisms in Bohemia. It is a critical edition of the primary and secondary documentation of the sources connected with an extensive burial complex which was used over the long term during various developmental phases of the Early and High Middle Ages and in the Early Modern period and their basic assessment. The burial site is unique also due to the fact that its function was not continuous but settlement activities would return repeatedly to its area or some parts of it.

Today, these sources represent one of the basic pillars of Prague archaeology despite their limited and in particular varied testimonial value resulting from the amount of time that has passed between the completion of the fieldwork and their current presentation. The assessment of the sources led to a number of findings, which testify to general historical phenomena: the establishment of the row burial ground at the latest around the middle of the eleventh century in a settlement complex, the transformation of this cemetery into a multi-layered burial ground, the clear integration of children (including the youngest category) in the area of the cemetery from its earliest phase etc. It at the same time brought a number of distinctive indications for the existence of a sacral building in the place of the most intensive burial. The graves of beheaded persons, concentrated in an isolated part of the burial complex are an important source of the Early Modern Period.



Cover of the first and second volumes of the book *Pohřebiště na Loretařském náměstí [The Burial Site at Loreta Square in Prague]* in Prague-Hradčany

Boháčová, I. – Blažková, G.: *Pohřebiště na Loretařském náměstí v Praze–Hradčanech. Archeologický výzkum Ivana Borkovského a jeho výsledky. [The Burial Site at Loreta Square in Prague-Hradčany: The Archaeological Survey by Ivan Borkovský and Its Results] ARÚP (Castrum Pragense 11/I–II)*, Praha 2011, First Volume 320 p. + 12 maps in the appendix, Second Volume 312 p.

Memory of Places, Events and Persons: History as an Identity and Manipulation *(Institute of History)*

Until recently, only philosophers, psychologists and perhaps sociologists were concerned with the memory within the humanities and social sciences. Currently, however, it is being tackled by historians, journalists and politicians. This fact proves that research into individual human memory and forgetting in Freudian psychoanalysis has transformed into an analysis of collective memory and its impact on the creation and preservation of the collective memory and identity. The transformation of this approach has also implied that the phenomenon of 'memory' has ceased to be a mere academic research 'whim' and has become an utterly political issue that is able eruptively to determine a relationship with the past and even affect a political mental conduct of entire social groups or even state institutions. This methodological concept is pondered on

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and specifically elaborated in this monograph by thirty-five Czech, Slovak and French historians.

Cooperating entity: The Commission of Czech, Slovak and French Historians

Hlavačka M., – Marès A., – Pokorná, M.: Pamět míst, událostí a osobností: historie jako identita a manipulace [Memory of Places, Events and Persons: History as an Identity and Manipulation]. Nakladatelství HŮ, Praha 2011, 686 p.

The Viennese Weekly Die Zeit (1894–1904) as an Intermediary between Czech and Viennese Modernism
(Masaryk Institute and Archives)



Book cover of 'Die Wiener Wochenschrift Die Zeit (1894–1904) als Mittler zwischen der Tschechischen und Wiener Moderne'

This publication presents the first synthetic treatment of contacts between the leading representatives of Czech political and literary modernism (e.g. T. G. Masaryk, J. S. Machar, F. V. Krejčí, V. Mrštík, K. Kramář and J. Kaizl) and one of the most important organs of Central European modernism, the Viennese weekly Die Zeit, founded in 1894 by H. Bahr, H. Kanner and I. Singer. The first part of the book describes the concept of intermediation (Vermittlung), and the studies interpret the mutual relations in terms of political science, Czech studies and German studies. The second part brings a commented edition of the sources: a se-

lection of the most important articles from the review and a selection of the correspondence of the co-workers of this weekly etc. A component of the book is a bibliography of *Bohemica* in Die Zeit, short bibliographies of its contributors, an overview of the primary and secondary sources as well as an index.

Cooperating entity: Österreichisches Theatrumuseum, Wien.

Kostrbová, L. – Ifkovits, K. – Doubek, V.: Die Wiener Wochenschrift Die Zeit (1894–1904) als Mittler zwischen der Tschechischen und Wiener Moderne. Masarykův ústav a Archiv AV ČR a Österreichisches Theatrumuseum, Praha-Wien 2011, 502 p.

Alchemy and Rudolph II. The Search of the Secret of Nature in Central Europe in the 16th and 17th Centuries
(Institute of Art History)



Book cover of Purš, I. – Karpenko, V. (eds.): Alchymie a Rudolf II. Hledání tajemství přírody ve střední Evropě v 16. a 17. století. [Alchemy and Rudolph II. The Search of the Secret of Nature in Central Europe in the 16th and 17th Centuries]

It is difficult to think of another theme in Bohemian and Central European history in the Early Modern Period that would be so popular and at the same time still today so little understood as the alchemy associated with the reign of Emperor Rudolph II (1552–1612). The situation did not begin to change until in the 1970s, when in connection with

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the renewed interest in Mannerism and Rudolphine art the view of historians focused also on other areas of Rudolphine culture and hence also on alchemy, which formed a significant part of it. This interest was naturally related also to the change of the view of alchemy itself. Alchemy had stopped being in the eyes of historians a precursor of modern chemistry, hence a subject limited to a specialised history of science. It began to be studied as a complex and important cultural-historical and social phenomenon, which is tied to other disciplines, techniques and areas of social life, e.g. not only medicine, mining and metallurgy but also religion, the fine arts and aristocratic representation. The publication deals with both the activities directly supported by Emperor Rudolph II and those developed in the wider social circle connected with the imperial court. That did not affect only the Czech lands but also Austria and a number of areas of the Holy Roman Empire.

Purš, I. – Karpenko, V. (eds.): *Alchymie a Rudolf II. Hledání tajemství přírody ve střední Evropě v 16. a 17. století* [Alchemy and Rudolph II. The Search of the Secret of Nature in Central Europe in the 16th and 17th Centuries]. ARTEFACTUM, Praha 2011, 840 p.

Divided by the Past. Formation of Political Identities in the Czech Republic after 1989

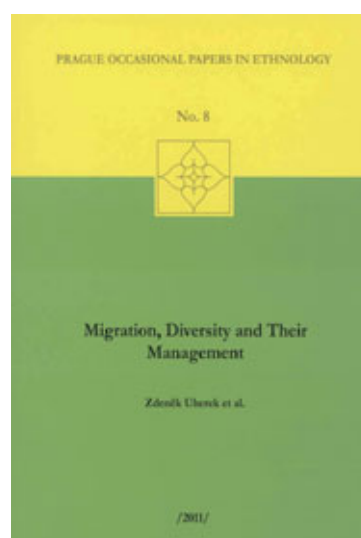
(Institute for Contemporary History)

The collective monograph by the employees of the Department of the History of Democratic Transformation after 1989 of the Institute for Contemporary History analyses the formation of Czech political culture and political and cultural identities after 1989. The book shows that cleavages of the post-1989 Czech politics are not primarily formed by ideological differences only but by the past, i.e. that the political culture of Czech democracy is to a significant extent influenced by the ways in which the latest history is handled and interpreted. The seeking and formation of political traditions and hence also the images of the past was not arbitrary or accidental in the post-revolutionary period. It sometimes lay deep in the previous development of a given political group, sometimes in who sat with whom in an office or in jail, other times it has arisen from the pragmatics of political battle. The past has formed solid bonds, on which all of the important actors of contemporary Czech politics have built their identity.

Gjuričová, A. – Kopeček, M. – Roubal, P. – Suk, J. – Zahradníček, T.: *Rozdělení minulostí. Vytváření politických identit v České republice po roce 1989* [Divided by the Past. Formation of Political Identities in the Czech Republic after 1989]. Knihovna Václava Havla, Praha 2011, 415 p.

Migration, Diversity and Their Management

(Institute of Ethnology)



Book cover of Uherek, Z. et al.: Migration, Diversity and Their Management

The collective monograph is the result of international cooperation within the project Centres of Excellence of the 6th Framework Programme of the EU Sustainable Development in the Diverse World and a research plan of the IE of the ASCR, v. v. i. Scientists from the Czech Republic, Slovakia and Sweden participated in the treatment of the individual chapters. The main themes of the work are immigrants, their integration into the new milieu and transnationalism. Besides migration to Sweden, the texts concern the transnational milieu in Brussels and other Belgian destinations, the issues of the adaptation of Polish and Vietnamese migrations to the Czech Republic and migrations from the territory of the former Soviet Union. An important topic which is opened in the work is the issue of the families of migrants. By adapting to a new milieu, a person changes the relations also towards his/her closest, and

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if these people are with him/her in the host country, they jointly choose specific collective adaptation strategies. The book is complemented by articles by Czech musicologists, who present in a historical perspective selected musicians from the Czech lands as specific migrants with transnational features.

Cooperating entity: European Commission
(6th Framework Programme of the EU)
Uherek, Z. et al.: Migration, Diversity and Their Management. Etnologický ústav AV ČR, v. v. i., Praha 2011, 298 p.

From the Evolutionary Point of View. The Concept of Evolution in Contemporary Philosophy (*Institute of Philosophy*)

This collective monograph is the first Czech publication to map systematically the influence of modern evolutionary theory on key areas in philosophy: the philosophy of science and mind, ethics and epistemology. More generally, the book is in the realm of modern philosophical naturalism even though the authors do not always assume the same attitude towards naturalism.

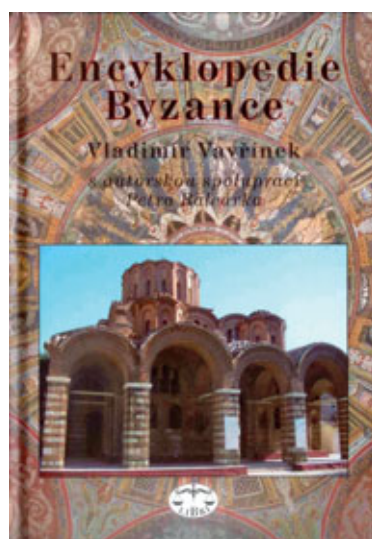
Havlík, V. – Hříbek, T. (et al.): Z evolučního hlediska. Pojem evoluce v současné filosofii [From the Evolutionary Point of View. The Concept of Evolution in Contemporary Philosophy]. Filosofia, Praha 2011, 336 p.

From Misrecognition to Justice (*Institute of Philosophy – Global Studies Centre*)

The book analyses political, social and cultural misrecognition, and explains attempts to seek justice from local levels to the global one. The author explains the limits of the existing theories of justice and systematically formulates the bases of his alternative theory of justice which would be able to articulate justice in the framework of contemporary transnational and global interactions and conflicts. His theoretical conception solves both global disputes on social and political justice and relations between individual cultures (extraterritorial recognition, intercultural dialogue, etc.). After a longer period of time in the Czech context, it is an original contribution to the revitalisation of a systematically conceived theory of society and politics.

Hrubec, M.: Od zneuznání ke spravedlnosti. Kritická teorie globální společnosti a politiky [From Misrecognition to Justice: A Critical Theory of Global Society and Politics]. Filosofia, Praha 2011, 562 p.

Encyclopaedia of Byzantium (*Slavonic Institute*)



Book cover of the Encyclopaedia of Byzantium

The encyclopaedic dictionary of a length of ca 1,900 entries endeavours to capture in the widest possible spectrum the political, social, economic, ecclesiastical and cultural history of Byzantium. The more extensive entries provide a basic overview of Byzantine civilisation and its influence on the surrounding nations; the subentries contain profiles of significant figures, important historical events, data on the state administration, spiritual and religious movements, on the mentality of the society, further entries from the history of Byzantine art, architecture, characteristics of the literary works and their authors. The dictionary is complemented by a selected bibliography.

Vavřínek, V. (with the authorial collaboration of P. Balcárek): Encyklopedie Byzance [Encyclopaedia of Byzantium]. Slovanský ústav AV ČR / Libri, Praha 2011, 550 p.

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Czech Poetry in the Postmodern Situation (*Institute of Czech Literature*)

This book deals with the poetic production of young debutants who began their literary career in the 1990s and whose work emerged from the intricate context of the post-totalitarian cultural situation, where highly varied traditions came together. This publication follows three distinctive lines within young poetry at this time – spiritual, material and imaginative. It shows how this poetry accepts the traditional lyrical models but gradually removes from them all programmatic and ideological accents – in the postmodern situation these models cease to be parts of large narratives. They are not developed in their original form but selectively and with respect to the current state of culture and thought.

Piorecký, K: *Česká poezie v postmoderní situaci* [Czech Poetry in the Postmodern Situation]. Academia, Praha 2011, 299 p.

An Anthology of Older Czech Literature (*Institute for the Czech Language*)

In 2011, the Department of Language Development became the first centre in the Czech Republic ever to put together the original Czech e-book, *An Anthology of Older Czech Literature*. The department makes electronic as well as book editions of Old and Middle Czech literary treasures, so that the creation of electronic editions and presenting them on the internet becomes a highly perspective form of providing access to older as well as later Czech literature. The department has formulated principles for the production of electronic editions and has created tools that make it possible to present the editions on the internet while maintaining the characteristics of a critical edition. The electronic editions are also included in a text bank of Old Czech (<http://vokabular.ujc.cas.cz/banka.aspx>), which can be searched using the corpus manager. The electronic editions are also available in a coherent form in the so-called edition module of the Vocabulary website (<http://vokabular.ujc.cas.cz/moduly/edicni.aspx>). The final editions are a rich material base for the philological research of historical Czech.

Výbor ze starší české literatury [An Anthology of Older Czech Literature] – an e-book created within the edition of the literary monuments from the period of the Middle Ages and Early Modern Period <http://vokabular.ujc.cas.cz>; <http://eknihy.ujc.avcr.cz/index.html>, available at <http://eknihy.academia.cz/vybor-ze-starsi-ceske-literatury.html>)



The title page of the e-book *An Anthology of Older Czech Literature* created within the edition of literary monuments from the period of the Middle Ages and Early Modern Period



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03

Educational Activity

EDUCATIONAL ACTIVITY

Contribution to the development and improvement of the quality of educational activities is one of the essential elements fulfilling the mission of the Academy of Sciences of the CR in society; therefore, we ascribe exceptional high importance to this area. Primary attention is naturally paid to education at higher education institutions (HEIs), particularly in relation to the training of doctoral candidates implemented as part of the broadened accreditation of doctoral study programmes. Nevertheless, we also want to devote ourselves thoroughly to participation in the education and training of secondary-school youth through direct instruction, by increasing the expertise of teachers, by assisting in organising specialised competitions, thematic olympics and specialised secondary-school activities or summer schools of various orientations. These educational activities make use of subsidies from suitably focused programmes of the European Social Funds. The educational events and activities are also aimed at the wider public in the form of specialised lectures, training courses and exhibitions or professional consultancy. An important component of this service to the public is extensive editorial activity, which we have developed at our own publishing house as well as at individual workplaces.

Education at Higher Education Institutions

For the Academy of Sciences, cooperation with higher education institutions is a fundamental pillar of the synergy with other institutions of research and development at a national level. This cooperation is coordinated by the **Council for Cooperation with Higher Education Institutions and the Preparation of Scientific Employees of the ASCR**. In the last year, two sessions of the Council took

place, at which particularly the topical questions of the preparation of a bill of the new act on higher education institutions were discussed. The representative of the Academy of Sciences was a member of the working group consulting the preparation of this bill.

Share in Instruction

Other than scientific cooperation with university workplaces, whose results are summarised elsewhere, the ASCR to a significant degree participates directly in **higher education instruction**. At various higher education institutions in 2011, employees of the institutes of the Academy of Sciences ensured a total of 3,853 individual semestral cycles of lectures, exercises or seminars in a total amount of 80,600 hours. The employees of the ASCR to a significant degree participate in the academic life of higher education institutions also through their participation in the sessions of their scientific councils, the councils of the doctoral study programmes or the examination and appointment commissions. The ASCR contributes to ensuring the quality of tertiary education through the membership of several of its employees in the Accreditation Commission. Representatives of the ASCR are regular guests at sessions of the Council of Higher Education Institutions.

Education of Students

The workplaces of the ASCR in a considerable way are involved in **supervising students** in the elaboration of their qualification theses. In 2011, the employees of the ASCR thus supervised 1,342 students of the baccalaureate and

Tab. 1: An Overview of the Most Important Data on Cooperation with Higher Education Institutions

	2006	2007	2008	2009	2010	2011
PhD students supervised at ASCR workplaces	2,072	2,154	2,162	2,157	2,153	2,182
MA/MS students supervised at ASCR workplaces	1,238	1,366	1,419	1,540	1,454	1,342
Newly accepted PhD students	366	431	411	412	338	381
The number of completed doctoral dissertations	259	256	266	279	249	254
The number of semestral cycles of lectures, seminars and exercises provided by the employees of the ASCR at HEIs	2,824	3,195	3,571	3,487	4,360	3,853
The number of hours lectured	68,429	71,739	78,306	76,744	77,379	80,600

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magisterial studies and 2,182 students of doctoral studies. Last year, studies were successfully completed by 254 post-graduate students of doctoral study programmes trained at the workplaces of the Academy of Sciences. The ASCR concluded twenty-two framework contracts on cooperation in the implementation of doctoral study programmes with individual higher education institutions and the majority of the institutes of the ASCR in a wide spectrum of fields have joint accreditation granted for their implementation. The centres of cooperation with higher education institutions in the area of research and education are joint workplaces, of which there are now a total of 54. The data on the participation of the ASCR in tertiary education and the recent development of certain indicators are presented in Table 1, with more detailed statistics provided in Appendix 6.

Basic Courses of Scientific Work

One of the important activities of the Academy of Sciences in relation to the students of doctoral study programmes is organising the Basic Course of Scientific Work, which has taken place already since 2004. Among the students, there is constant interest in this unique type of educational activity. In 2011, the week-long course took place in five sessions in Prague, for which a total of 187 students had registered. For interest on the part of the students, the seminar of English, which is divided into a theoretical and practical part, was given more time. Based on the initiative of the students, a course focused on fields of the humanities took place in September 2011 and was received positively. The courses take place in parallel in Brno, namely within the OP Education for Competitiveness project. In 2011, four courses took place, for which a total of 257 students had registered. Two courses were organised independently for the Janáček Academy of Music and Performing Arts with fifty-one students attending; the courses were attended also by students from higher education institutions from Ostrava, Zlín and Olomouc. The activities connected with the Course of the Basics of Scientific Work are regularly discussed by the Council for Cooperation with Higher Education Institutions and the Preparation of Scientific Employees of the ASCR.

The individual workplaces of the Academy of Sciences of the CR organise and ensure also other events to support instruction at higher education institutions and its innovation.



Scientific internships at workplaces of the ASCR within the Open Science II project

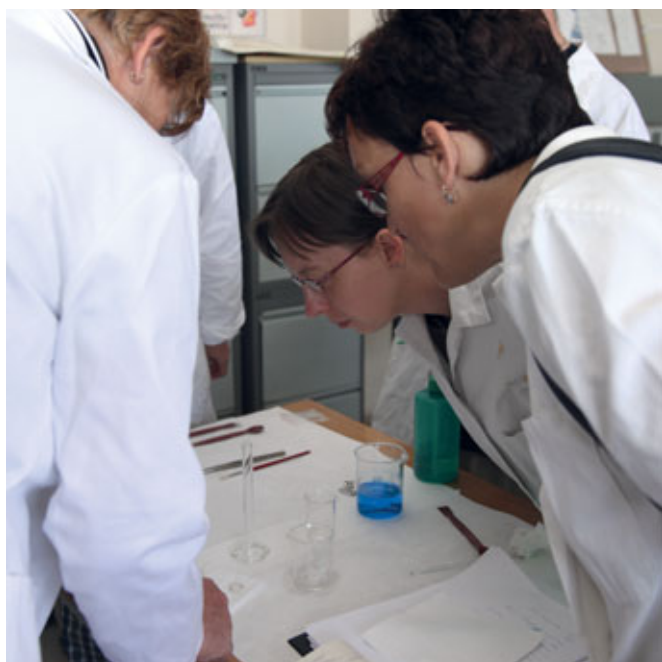
Education at Secondary and Primary Schools

Employees of the Academy of Sciences of the CR participate in education at secondary and primary schools through direct instruction and diverse lecture activities. These activities are contributed to by various institutes of the ASCR; the share of the employees of the Academy of Sciences of the CR in the creation and publication of secondary-school textbooks or e-learning courses is also significant.

Open Science II – A Project for Students and Teachers

Within the Open Science II project, scientific internships in the fields of chemistry, biology, physics, mathematics, computer science, geology or geography continued at the workplaces of the ASCR and universities, offering talented students of secondary schools outside of Prague the unique opportunity to engage in real scientific activities or in top research projects of scientific teams directly at the institutes of the Academy of Sciences of the CR and at specialised workplaces of higher education institutions. Last

EDUCATIONAL ACTIVITY



Educational Courses of Open Science for Teachers

year, 170 students were engaged in the project. Under the guidance of experienced scientists, gifted students could discover scientific work in its everyday practice. They tried out work in the laboratory, various experiments but also field surveys. In the course of the year, the best then placed in the foremost position of domestic and foreign competitions. Open Science II was presented also to specialists abroad. The implementers and most successful interns attended the May annual conference of EUSCEA (European Science Events Association) in Göteborg, Sweden.

The Open Science II project was built on by Open Science for Teachers through practical courses for secondary-school teachers. The three-weeks of courses were in the spirit of the professional and practical education of teachers in the fields of biology, chemistry and physics. The purpose of the weekly educational courses accredited by the Ministry of Education, Youth and Sports was to acquaint teachers with novelties in the field, allow them to meet interesting researchers and show them practical exercises or laboratory experiments that can acquaint the students with the subject more graphically. The sixth year was attended



Don't Fear Science – public lectures for secondary-school students and their teachers

by a total of seventy-four teachers from all over the CR. Components of the programmes were lectures by interesting personalities from the workplaces of the Academy of Sciences and universities as well as the practical blocks of the individual courses. In these exercises, the lecturers attempted to demonstrate to the participants how to enliven the teaching hours and acquaint the students with 'science' more graphically and attractively. At the same time, teachers had the opportunity to try out work with modern laboratory instruments or visit research workplaces.

We Educate Students and Teachers

Under the title Don't Fear Science, public lectures in biology, chemistry, physics, medical science, mathematics, information science and other natural-science fields for secondary-school students and their teachers continued in regular monthly cycles at the ASCR. Preeminent Czech scientists presented the students not only with interesting topics and results of Czech science but enriched them with their experience. For instance, in October Jan Konvalinka from the In-

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Session of an ALLEA working group at Villa Lanna in Prague.

stitute of Organic Chemistry and Biochemistry of the ASCR lectured on the topical issue of AIDS: Chemist against the Virus and Virus against the Chemist. More than 1,100 students expressed interest in taking advantage of the unique opportunity to discuss with significant Czech scientists.

Student Scientific and Specialised Activity

The institutes of the Academy of Sciences of the CR provide secondary schools and their students as well as teachers with a very wide range of internships and excursions. These student stays at the institutes often serve for the treatment of valuable papers within secondary-school specialised activities and some of them were recognised at country-wide shows last year. An apt specific example of these activities is the educational-popularisation project of the Jaroslav Heyrovský Institute of Physical Chemistry: 'Three Instruments: Information – Internship – Presentation'.

We also contribute in a significant way to the operation and provision of the Mathematical, Chemical, Biological and Ecological competitions with specialised and organi-

sational assistance during the competitions, guidance of the laboratory exercises, lectures and organisation of summer camps.

Several institutes have devoted themselves to acquainting the public with experiments and research projects conducted in the laboratories of CERN and the Czech Teacher's Week again took place at that institution.

International Cooperation

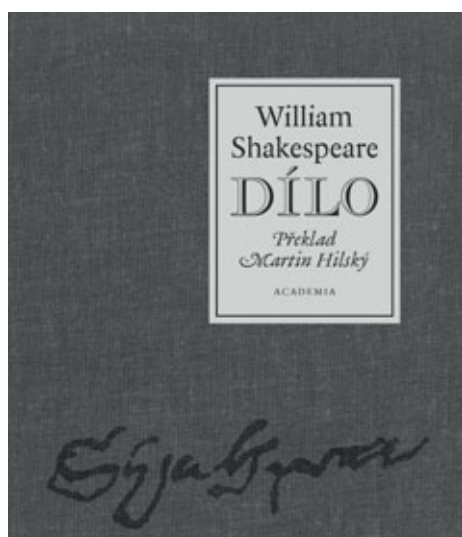
The Academy of Sciences has participated in the preparation of a complex programme for the education of youth in Europe, which will be implemented under the auspices of the academies of sciences of the individual countries associated in the ALLEA (All European Academies) organisation. The ASCR is represented in the ALLEA Working Group for Science Education, and a representative of the ASCR actively participated in the meeting in Brussels at which the expert position for the European Union was prepared.

Editorial Activity of the ASCR

The Academy of Sciences of the CR subsidises the issuance of selected scientific and science-popularisation publications and in 2011 financially supported the issuance of fifty-one books, of which thirty-six were published by Academia Publishing House of the Centre for Administration and Operations of the ASCR and fifteen by other workplaces of the ASCR. The overall subsidy for the support of scientific and science-popularisation literature was almost CZK 13 million. Many high-quality titles could hence be issued at the Academia Publishing House in the already established twenty-four editorial series.

A significant and singular authorial, editorial and publishing act is the publication of the collected works of W. Shakespeare in the Czech translation by M. Hilský, which has attained nominations for several prestigious domestic and foreign awards and for which Professor Hilský received the State Prize for Translation from the hands of the Minister of Culture and subsequently also the Medal for Service from the hands of the President of the Republic.

EDUCATIONAL ACTIVITY

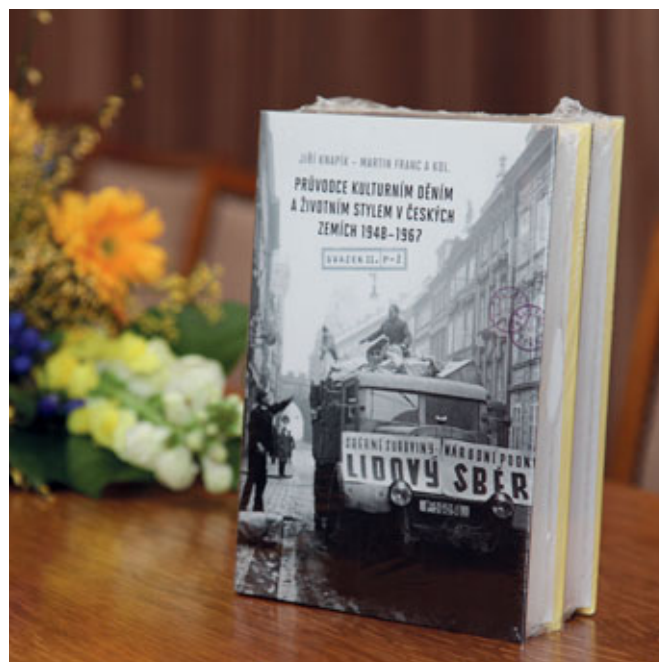


Book cover of the collected works of William Shakespeare in the Czech translation by Martin Hilský

Of the other editorial acts, it is worth mentioning the publication of the book *One Hundred Czech Scientists in Exile* or the book by the historians Jiří Knapík and Martin Franc, *Guide to the Cultural Events and Lifestyle in the Czech Lands 1948–1967*. In 2011, publications from the production of Academia Publishing House received several significant awards – the Magnesia Litera Prize, Josef Hlávka Award, Ferdinand Peroutka Prize, Annual Prize of the Czech Literary Fund Foundation, F. X. Šalda Prize, the award in the survey of the newspaper *Lidové noviny* Book of the Year and several awards in the competition Dictionary of the Year.

Academia Publishing House further issued the journal *Živa*, which is considered to be the highest-quality natural-science popularisation magazine in the CR.

In 2011 within the Policy of Open Access, the ASCR introduced a new program of support for publication in the form of Open Access, subsidised by CZK 1 million annually. This program, intended to ease access to scientific outputs and accelerate the exchange of scientific information, encountered clear positive interest at the workplaces of the ASCR. In 2011, *Akademický bulletin* (Academic Bulletin) came out regularly, providing information on the events at the ASCR and its workplaces.



Recognition for successful books and publications



Title page of the publication by Soňa Štrbářová and Antonín Kostlán *100 Czech Scientists in Exile*

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04

The Academy of Sciences of the CR and the Public

THE ACADEMY OF SCIENCES OF THE CR AND THE PUBLIC

The year 2011 was demanding for the ASCR also in terms of communication with the public. In an atmosphere of pressure to reduce the budget, seeking new effective forms of communication of the results of scientific activities became one of the priorities. In this regard, the establishment of the Department of Media Communication of the Head Office of the ASCR as of 1 January 2011 can be evaluated positively. This step significantly improved and professionalised particularly the media communication of the ASCR. The concentrated work has been reflected in an ever stronger public opinion that science and research are an indispensable condition for the economic growth of the country and that the ASCR is an essential guarantor of the rising level of Czech science. The interest of the public service media in systematic cooperation with the ASCR increased, which is proved also by a memorandum on mutual support and cooperation concluded this year with Czech Television.

Within its activities, the Academy of Sciences of the CR supports the popularisation of scientific fields and the results of research in them. It therefore also in 2011 built on its rich experience with the popularisation of the results achieved in past years and in accord with the declared support of the level of education of the entire society continuously acquainted the wider public with them. It used diverse forms and means of popularisation to arouse to the maximum possible amount the interest in various age groups and to motivate them to understand the meaning and mission of science in the life of every one of us.

That the representatives of the ASCR reacted throughout the year to the topical issues on all levels, be they of international, nationwide or local importance, informed on the results achieved, expressed themselves on domestic and global discoveries, commented on events in world and foreign economics and politics, organised lectures, seminars for all age groups, cooperated with state and local institutions and provided expert analyses and opinions is shown by an extensive monitoring of the news. In 2011, (nearly 12,000 reports), with the keyword Academy of Sciences and its forms, i.e. about 1,000 articles a month, more than thirty a day (including Saturdays and Sundays), were published in selected printed, internet and other media. It is the highest number since statistics have been recorded, i.e. since 1998.



Chemical fair in Prague

The media outputs prove that the employees of the ASCR published on the pages of the main as well as regional dailies and appeared in television and radio programmes. One of them was the cycle of Czech Radio 2, *Jak to vidí?* [How Do They See It?], in which the questions of the moderator were answered by former President of the ASCR Prof. V. Pačes, a television 13-part serial of the programme *Magické hory* [Magic Mountains], where the viewers were guided by Director of the Institute of Geology V. Cílek and the actress K. Fialová, a regular television cycle of *historie.cs* [History of Czechoslovakia], in which the ASCR was represented by employees of the Institute for Contemporary History and the Institute of History). The Astronomical Institute provided Czech radio Leonardo with twenty interviews for the programme *Nebeský cestopis* [Celestial Travelogue]; the Institute of Physics presented the ASCR in more than fifty appearances (Czech TV PRIZMA [Prism], Czech TV, TV Noe, Slovak TV, Czech Radio, Czech Radio Leonardo etc.). The Institute of Ethnology prepared a regular Sunday radio cycle of programmes *Duchovní hudba* [Religious Music] on Czech Radio 3-Vltava, whereas the Institute of Philosophy prepared for the same channel a serial *Století rozumu* [A Century of Reason]. We cannot forget

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Michal Babič and his performance at the FameLab competition (photo: Marian Vacek)



The most successful popularisers of science are recognised at the ceremonial announcement of the results of the SCIAP 2011 competition

to mention the already established programme of Czech TV PORT Michalovy experimenty [Michael's Experiments] from the area of science and technology, whose author and moderator was the employee of the Institute of Inorganic Chemistry Michael Londesborough. The Institute for the Czech Language already traditionally participated in the preparation of programmes, the creation of topics and scripts for the television serial O češtině [On Czech], for the programme which clarified the interpretations of less common Czech place names Divnopsis (ČT), prepared language corners and language columns for magazine sections, radio programmes etc.

At the beginning of 2011, the ASCR like every year joined in a popularisation event of an international character, namely the International Year of Chemistry. The Institute of the Chemical Process Fundamentals ensured the January press conference and the subsequent first activity – Breakfast with Female Scientists, a morning debate not only on chemistry, which was attended by five important specialists from various fields of chemistry. There followed a press conference of the ASCR, The Influence of Carbon

Dioxide on Climate Changes, participation of the Institute of the Chemical Process Fundamentals at the Chemical Fair in Příbram and later in Prague, Night in the Library and an interactive popularisation exposition by the Institute of the Chemical Process Fundamentals at the National Technical Library in Prague within Prague Museum Night.

In March 2011, the ASCR traditionally joined another significant event, the 13th Annual European Brain Awareness Week, which was organised by the Institute of Experimental Medicine and during which interested parties could listen to eight lectures.

At that time also in a cooperation of the ASCR with the British Council, there were two presentations by an employee of the Institute of Inorganic Chemistry of the ASCR for secondary-school students entitled The Secret of Energy – A Show by Dr. Londesborough, namely at the Municipal Library in Prague and at Masaryk University in Brno. They had an unprecedented success with the audience at both places. In April 2011, the ASCR again joined in International Earth Day; in the Geopark of the Institute of Geophys-

THE ACADEMY OF SCIENCES OF THE CR AND THE PUBLIC

ics and in the institute itself, the Centre for Administration and Operations, v. v. i. (SSČ) organised Earth Day as Play, where visitors had the opportunity to see simulations of various geophysical phenomena. At the same time, there was a seminar at the institute for twenty teachers on the topic of Earth's interior, earthquakes, the Bohemian massive or climate changes. Lectures devoted to earth sciences took place throughout April at the building of the Academy of Sciences; they were visited by almost 400 students; the event at the Geopark and the exhibition of photographs Colourful World of Rocks under the Microscope were seen by further hundreds of visitors.

In May, the ASCR captured the attention of the media thanks to the victory of Michal Babič from the Institute of Macromolecular Chemistry in the popularisation competition FameLab, organised by the British Council in Prague. Michal Babič subsequently participated in the international finale of the competition in Cheltenham, where he won the Audience Prize.

At the end of the school year in June, the ASCR in cooperation with the employees of the Institute of Czech History of the Faculty of Arts and with the Institute for Contemporary History of the ASCR again organised the already well-established Summer School of Contemporary History. The seminars and lectures on various topics (Literature and Censorship in Post-War Czechoslovakia, The Roma in Modern Czech History, The Transformation of Czech Society at the Turn of the 1990s, The Kosovo Question in the Modern Period, The Possibilities and Limits of Oral History, Reflections of the Germans in Czech Post-War Film) were complemented by a didactic seminar History or Memory? or the commented screening of the film by Karel Kachyňa, Kočár do Vídně (Carriage to Vienna). The ASCR presented an entirely new activity in autumn 2011, when it announced in October a competition popularisation show SCIAP 2011 intended for scientific centres, institutes, higher education institutions, civic associations and individuals with their own projects. It aroused unprecedented interest; a total of 56 entries were registered by 35 competitors, of whom twelve were from the ASCR. The aim of the SCIAP competition show was the evaluation of the most successful popularisation activities of science for the period of one year implemented in the CR or in the Czech language in the categories EXPOSITION, PERIODICAL PRESS, AUDIO/VIDEOPROGRAMME, INTERNET, OTHERS. The ceremoni-



The unique exhibition Treasures of the Mikulčice Treasury contributed to the high visitation rate of the Science and Technology Week festival

al announcement of the results took place at Villa Lanna on 1 December 2011. Exceptional recognition was attained by Michael Londesborough from the Institute of Inorganic Chemistry of the ASCR, who acquired undoubted renown by his engagement in the field of the popularisation of science.

Science and Technology Week (STW) is the largest scientific festival in the Czech Republic, which is regularly organised each year by the ASCR and SSČ along with its partner organisations and which is a part of its systematic work in science popularisation. Last year's, eleventh annual festival was symbolically expanded to eleven days and therefore lasted from 1 to 11 November 2011. For the first time in its existence, the programme offered a total of more than 300 events in all of the regions of the Czech Republic. Three press releases were issued on the beginning of STW and instead of the usual press conference the representatives of the media were invited to the ceremonial opening.

The open house days, lectures, seminars, exhibitions, scientific cafés and documentary films in which the scientific

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Practical exercises during the course Communication of Science through the Media



Cities and Science Communication international project

ic employees of the ASCR presented their work, research projects, the latest scientific equipment and the latest trends in the area of science were visited by 42,506 people, which is an increase from the last year of 27%. The website of STW 2011 was seen by 40,000 people in one month. The support of sponsors made it possible to create promotional materials and strengthen the external campaign of STW in Prague, Brno, Ostrava and České Budějovice. Not only the numerous media partnerships (e.g. with the daily MF DNES /Youth Front Today/, the magazine 21. století /21st Century/, the magazine Týden /Week/) but also the prestige of the festival were responsible for a record number of articles and other media outputs on STW – more than 150 of them were published.

There was interest in the most important scientific festival not only among the visitors themselves but also among institutions; all of the institutes of the ASCR and almost fifty cooperating organisations, of which six were from abroad, participated in the 11th annual festival. Within STW, the ceremonial awarding of the Vojtěch Náprstek Honorary Medal for Merit in Science Popularisation also took place. The

most attractive exhibitions included the exposition of the unique gems of the culture of Great Moravia prepared by the Institute of Archaeology of the ASCR in Brno.

From each day of the festival, short reportages were created and Minutes of the Festival was operated at the website of the ASCR for the entire period of the events. The lectures of foreign guests from Great Britain and Germany aroused great interest among the visitors. Science and Technology Week concluded its 11th year with a victory in the competition show of popularisation activities, SCIAP. Just like in previous years, the Academy of Sciences organised popular discussion evenings, informal meetings of scientific employees with the public – Academic Cafés. The Council for the Popularisation of Science also jointly organised three seminars for scientific employees 'How to Achieve Something with Words' on the topic of the preparation of popularisation lectures.

The ASCR considers the popularisation of scientific fields and the results of research to be one of its priorities. A specific act in this direction was *inter alia* the practical course

THE ACADEMY OF SCIENCES OF THE CR AND THE PUBLIC

Communication of Science through the Media. Its aim was to acquaint the scientific community with the means of the communication of science, to improve the connection of science and the media by strengthening the knowledge of the representatives of the individual workplaces in the area of the effective popularisation and communication of science and research. Through the course, it was possible to establish closer ties between the scientific employees and the journalists representing the individual media. The practical exercises in front of the camera, writing press releases, and the presentation of good examples of the popularisation of individual areas of science were beneficial.

Another year of the successful educational cycle Management of Science was organised for the directors of the institutes of the ASCR. It aided them in orientation in the legislative and economic milieu and in deepening their knowledge from the areas of human resource management, financial management, legislation, European financial mechanisms for the support of science and research and many other managerial skills. The fourth year was attended by eighteen directors of the workplaces of the ASCR. In five two-day seminars in the Chateau Hotel Třešť, they dealt with topics like intellectual property rights and their protection, science marketing, multiculturalism at the workplaces, leading difficult managerial conversations and media appearance training.

The representatives of the ASCR attended *inter alia* the international project Cities and Science Communication (CASC). The aim of CASC was to increase the interest of the wider public in the area of science and research and act upon it to join actively in the debates on the questions of the development of science, describe the best approaches to reaching this goal and create a European network allowing the exchange of experience in this area. In October 2011, the meeting of the actors of this project took place at the building of the ASCR.

05

Practical Activity

PRACTICAL ACTIVITY

For the ASCR, one of the constantly supported priorities is the transfer of the results of research and their use in practice. Not only for this reason does the ASCR systematically support the transfer of the knowledge attained into the application sphere while focusing on strengthening the current and establishing new contacts between its institutes and the entities of the user sphere. That is facilitated also by the Council for Cooperation of the ASCR with the Industrial and Application Sphere and the synergy with the Technological Centre of the ASCR and with the Centre for Administration and Operations of the ASCR.

The strategic partners of the ASCR for cooperation with the user sphere are the Engineering Academy of the CR (primarily its Czech Knowledge Transfer Office), the Association of Research Organisations, the Association of Innovative Entrepreneurship, the Union of Industry and Transport of the Czech Republic and CzechInvest, then on the regional level the regions themselves and the regional innovation centres.

Extensive direct cooperation of the institutes of the ASCR with entities from the areas of entrepreneurial and application spheres lay mainly in the joint projects with an emphasis on the immediate use of the knowledge gained.

The institutes of the ASCR worked on sixteen such joint projects within the Nanotechnologies for the Society programme and the Grant Agency of the ASCR. In cooperation with enterprises, they also worked on four projects of the Czech Science Foundation. The direct cooperation of the ASCR's institutes in innovation activities with partners from the private sector was further implemented in the framework of the joint work on twelve projects from the programmes of the support of research of the Ministry of Education, Youth and Sports, eight projects of the Ministry of the Environment and six projects of the Ministry of Agriculture. Seven projects in whose framework the institutes of the ASCR cooperated with private enterprises were supported by the Ministry of Labour and Social Affairs, Ministry of Industry and Trade, Ministry of Health and Ministry of Foreign Affairs. The workplaces of the ASCR also cooperated in many projects supported from other public (e.g. from the European Union) and private sources. The process of knowledge transfer from research to practice was considerably assisted by cooperation based on agree-

ments and economic contracts between institutes of the ASCR and entities of the user sphere. In 2011, the workplaces of the ASCR concluded more than 550 economic contracts with such partners.

The research institutes of the ASCR prepared a total of 3,850 specialised expert opinions for state bodies, institutions and business entities and actively participated in 55 monitoring networks.

They further elaborated a number of methodologies and testing and diagnostic methods, prepared the background materials for a great number of technical norms and guidelines and conducted hundreds of measurements, analyses, material characterisations, laboratory tests and judgments. The situation in the area of the protection of the intellectual property rights of the ASCR as of the end of 2011 is summarised in the following table. The most active in this direction in the long term are the Institute of Macromolecular Chemistry, Institute of Organic Chemistry and Biochemistry, Institute of Physics, Institute of Microbiology, Institute of Experimental Medicine and Institute of Chemical Process Fundamentals.

Selected examples of cooperation implemented within the joint projects or on the basis of economic contracts form the contents of Appendix 3.

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Tab. 2: A Summary of the Situation in the Area of the Protection of Intellectual Property Rights of the ASCR as of the end of 2011

	A	B	
	2011	all documents valid so far or in process, except for documents from 2011 (ad A)	
	number of licences	number	licences
Invention applications submitted in the CR	42	150	
Patents granted in the CR	27	168	11
Utility models submitted in the CR	25	25	
Utility models registered in the CR	30	55	
Protected trademarks submitted in the CR	5		
Protected trademarks registered in the CR		15	
Invention applications submitted abroad			
International application – ‘PCT’	12	46	
National or regional phase of ‘PCT’	12	144	
National or regional route	2	3	
Patents granted abroad			
Regional (at EPO, EAPO, OAPI, ARIPO)	12	35	
Of which national patents	38	107	56
National	3	64	9
SPCs which have taken effect abroad		14	
Application for granting protected rights to new varieties of plants in the CR	6		
Breeder’s certificates in the CR		14	69

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06

International Cooperation

INTERNATIONAL COOPERATION

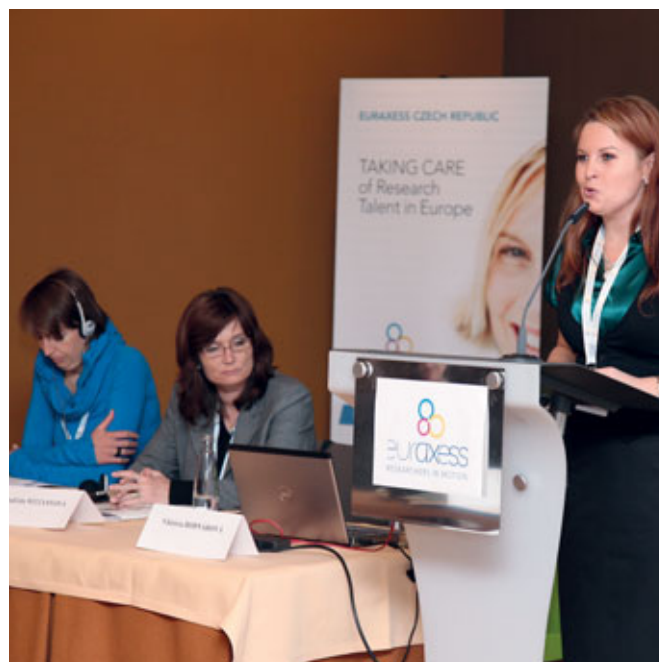
The Contribution of the ASCR in Forming the European Research Area

In 2011, preparation for the financial period 2014–2020 continued in the European Union. The proposal for the new Framework Programme of the EU for Research and Innovation called Horizon 2020 was published (the total expenditures for this programme are proposed to be EUR 88 billion). The fundamental document for the preparation of the new cycle of the cohesion policy of the EU for 2014–2020 is the 'Fifth Report of the European Commission on Economic, Social and Territorial Cohesion'.

The Academic Council of the ASCR expressed its objections to the documents of the European Commission most often within the European Research Area Committee at the Ministry of Education, Youth and Sports (primarily regarding Horizon 2020), the Working Group of the Steering and Coordination Committee for the Future of Cohesion Policy established at the Ministry for Regional Development of the CR and Round Tables for the National Reform Programme, convened by the Office of the Government of the CR. The positions of the ASCR were prepared in cooperation with the Council for the support of the participation of the ASCR in European research and development integration. The consultations and coordinations of the national positions on the policy of European research took place also within the annual discussion of the Forum of the Academies of Sciences of the Visegrad Four.

The Academy of Sciences of the CR in its objections to the Horizon 2020 document put emphasis primarily on the financing of research based on excellence and simplification of the administrative processes. It proposed increasing the support for the European Research Council (ERC), the mobility of scientific employees and the development of research infrastructures. It also emphasised the necessity for the synergy of the cohesion policy and programmes for the support of research, development and innovation.

In connection with European activities, several national strategic documents were discussed with the participation of the ASCR and approved by the government. The most important of them include the National Innovation Strategy of the Czech Republic, the National Reform Programme of the Czech Republic and the Overall Proposal of the Direction of the Future Cohesion Policy of the EU after



The conference Science without Borders within the activities of the EURAXESS centre (foto: Stanislava Kyselová)

2013 under the Conditions of the CR, referring to another key document of the EU, the Europe 2020 Strategy. In the parts of the documents focused on the cohesion policy, the ASCR proposed using the structural funds for the support of the operation of a newly built research capacity, the development of human resources in science and research and for the change of the experimental research basis in the CR, particularly then also in the capital city of Prague.

European cooperation is supported by EURAXESS, a centre working at the Centre for Administration and Operations of the ASCR assisting foreign scientists, their family members and employers in overcoming the administrative hurdles connected with their stay in the CR.

Participation of the Workplaces of the ASCR in Framework Programmes

In 2011, the total amount of the financial means contractually agreed by the workplaces of the ASCR from the framework programmes reached EUR 7.7 million. The greatest

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Tab. 3: Participation of the Institutes of the ASCR in the main Instruments of the Framework Programmes in 2011

Type of Instrument	Total Projects
CP (Collaborative Research Projects)	71
MCA (Marie Curie Actions – support for training and career development for researchers)	37
CSA (Coordination and Support Actions)	17
CP-CSA-INFRA (Combination of Collaborative Projects and Coordination and Support Actions for Integrating Activities)	21
ERC (Support for Frontier Research)	4
Other instruments (e.g. NoE /Networks of Excellence/, JTIs /Joint Technology Initiatives/)	3

number of projects in the area of Mathematics, Physics and Earth Sciences were resolved by the Institute of Physics (15), in the Life and Chemical Sciences it was the Institute of Microbiology (11), and in the Humanities and Social Sciences it was the Institute of Economics (4). Of the total of seven grants of the European Research Council (ERC) awarded to scientists from the Czech Republic, four were resolved at workplaces of the Academy of Sciences.

Infrastructure Projects of European Importance Financed from the Structural Funds

In 2011, two so-called large projects of the Operational Programme for Research and Development for Innovations (Czech acronym: OP VaVpl), whose recipients are institutes of the ASCR, were approved by the European Commission.

ELI



The project of the Extreme Light Infrastructures, a research facility of the EU

The Czech part of the Extreme Light Infrastructures (ELI), an EU research facility, will be implemented by the Institute of Physics of the ASCR in Dolní Břežany within the ELI Beamlines project with a total subsidy of CZK 6.8 billion. The project is on the roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). The other two parts of ELI will be located in Hungary and Romania. An important supporting project of ELI is the High-Average Power Pulsed Lasers (HiLASE) project. The aim of this project, also supervised by the Institute of Physics, is the development of the next generation of lasers.

BIOCEV



The project of the Biotechnological and Biomedical Centre (BIOCEV)

Also a joint project of six institutes of the ASCR and Charles University in Prague – Biotechnological and Biomedical Centre (BIOCEV) in Vestec was approved with a total subsidy of CZK 2.3 billion.

INTERNATIONAL COOPERATION

The Czech part of the INFRAFRONTIER international infrastructure project and the Eurobioimaging project will be established within the BIOCEV project.

Cooperation with International Government Organisations

The ASCR continued its cooperation with European and global organisations. Membership of the Czech Republic in these organisations forms the prerequisites for deepening and expanding the cooperation of scientific employees in important international projects. It makes it possible to present in the long term and systematically scientific work at highly prestigious scientific forums and provides access to unique research facilities, experience and results.

Conseil Européen pour la Recherche Nucléaire (CERN, European Centre for Nuclear Research) – The CR has been a member since 1993. Czech scientists and technicians from the *Institute of Physics, Nuclear Physics Institute* and higher education institutions (FMP of CU, FNPE of CTU in Prague) cooperate in the LHC (Large Hadron Collider) programme, which in 2011 produced a huge amount of unique experimental data. Their analysis brought significantly closer an answer to the question of the existence of the so-called Higgs boson, a theoretically predicted particle which plays a key role in today's ideas of the origin of the mass of elementary particles.



CERN – European Centre for Nuclear Research
(photo: Archive CERN)

The cooperation of the workplaces of the ASCR, the Nuclear Physics Institute, Institute of Macromolecular Chemistry,

Institute of Geophysics and the Institute of Physics and to a more limited degree also the Institute of Biophysics and the Institute of Scientific Instruments, with the laboratories of the Joint Institute for Nuclear Research in Dubna (JINR) continued mainly in the areas of experimental, theoretical and mathematical physics, the physics of ions, chemistry of transurans, radiobiology and medical physics.

The European Space Agency (ESA) – The Czech Republic has been a full member of the ESA since 2008. Accession to the ESA considerably broadened the possibilities of international cooperation in the area of space research for the implementation of the scientific plans of Czech workplaces. Employees of the Astronomical Institute were the main investigators of four projects of the PECS programme (a programme for cooperating states) and participated in the preparation of two ESA projects – the Solar Orbiter and PROBA-3. The projects of the PECS programme are also resolved at the Institute of Atmospheric Physics, the Institute of Geophysics and the Institute of Plasma Physics.

The European Southern Observatory (ESO) is focused on astronomical research of the Southern Hemisphere. Currently, fifteen European states are members of the ESO. Czech scientists participated in a number of projects in Chile, i.a. at La Silla Paranal Observatory, which has a group of large telescopes, the so-called Very Large Telescope; the Astronomical Institute became one of the ALMA Regional Centres for ALMA interferometer data processing.

The ASCR is actively engaged in the activities of the Czech Commission for Cooperation with UNESCO. Since 2007, this advisory commission has been headed by Prof. H. Illnerová, and another six representatives of workplaces of the ASCR are members of the commission. Each year, the Institute of Molecular Chemistry organises postgraduate courses of the UNESCO intended for scientists from developing countries.

Cooperation with International Non-Governmental Scientific Organisations

Representatives of the ASCR significantly participated in the activities of the European scientific organisations the European Science Foundation (ESF), All European Academies (ALLEA), European Academies Science Advisory

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Council (EASAC) and through them they shared in the creation of a European scientific strategy. The membership and activities in the international organisations the International Council for Science (ICSU), Inter Academy Panel (IAP), Inter Academy Medical Panel (IAMP) and Union Académique International (UAI) were similarly important.

The European Science Foundation (ESF) is an association of 72 European national organisations from 30 countries responsible for the support of scientific research. The ESF to a significant extent contributes to the deepening and expansion of scientific cooperation in key areas. In 2011, the ASCR participated in the resolution of 21 Research Networking Programmes and 4 Expert Boards. In the area of scientific strategy, the ASCR participated in the activities of the Member-Organisation Forum on Research Infrastructures (MOFRI), MO Forum on Evaluation of Publicly Funded Research and MO Forum on Science Foresight for Joint Strategy Development.

In the course of 2011, it was not possible to clarify the relation of the ESF to the newly established Science Europe organisation, whose mission is similar.

The International Council for Science (ICSU) associates 121 national scientific organisations and 30 international scientific unions. Experts from the ASCR share to a significant extent here in the creation of key strategic documents.

Cooperation within International Bilateral Agreements

Bilateral cooperation of the ASCR takes place with partners from 47 countries within 66 inter-academic agreements. Of those, a new Agreement on Scientific Cooperation between the ASCR and the French Centre National de la Recherche Scientifique and an Agreement on Scientific Cooperation between the ASCR and the National Council for Science and Technology of the United Mexican States (CONACYT) were signed in 2011. The validity of the Memorandum on Cooperation between the ASCR and the Japan Society for the Promotion of Science was extended. Within inter-academic agreements, means are allotted for projects supporting mobility. In 2011, the resolution of 156 ongoing and 107 new projects continued.



The signing of the Agreement on Scientific Cooperation between the Academy of Sciences of the CR and the French Centre National de la Recherche Scientifique

In 2011, the implementation of the Programme of Internal Support of the Projects of International Cooperation of the ASCR continued, aimed at the support of long-term stays of research employees from the workplaces of the ASCR at renowned workplaces abroad and top experts at workplaces of the ASCR. Total support of CZK 50,921,000 was allotted for 66 projects in 2011.

Other Significant Activities within International Relations

The Czech Historical Institute in Rome (ČHÚŘ) is a component of an international network of workplaces associated in the Unione Internazionale degli Istituti di Archeologia, Storia e Storia dell'Arte in Rome. Its activity focused mainly on systematic source research of the *Bohemica* in Roman, Vatican but also other Italian archives and libraries. In 2011, 17 travel grants were awarded.

INTERNATIONAL COOPERATION

Also in 2011, the ASCR engaged in the activities of the International Network for Human Rights of Academies and Scholarly Societies. It joined the petition of the international scientific community addressed to the UNESCO, drawing attention to the violations of the General Declaration of Human Rights and other international treaties in Syria. It also sent a written intervention to the king of Bahrain for the release of two arrested scientists. In Cuba, three scientists were released against whose many years of internment the ASCR had protested in previous years.

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07

Research, Development and Innovation Projects

RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS

As a result of the implementation of the Reform of the Research, Development and Innovation System, the Academy of Sciences of the CR lost its status as a provider of targeted support in 2008. In 2011, it therefore provided targeted support only for continuing grant projects through its open Grant Agency of the ASCR (hereinafter only GAAS) and programme projects within its Nanotechnologies for Society programme. With ever-deepening European integration, the workplaces of the ASCR are placing greater emphasis on acquiring financial support from the operational programmes of the structural funds. Within the programme period of 2007–2013, they are involved especially in the Operational Programme: Education for Competitiveness, Operational Programme: Prague Competitiveness and Operational Programme: Research and Development for Innovation.

Grant Projects

As a result of the implementation of the Reform of the Research, Development and Innovation System in the CR, the GAAS in 2011 financially supported only continuing grant projects started before 2010. From the budget of the ASCR, a total of CZK 230.7 million was used for these purposes.

Targeted financial means were provided for the resolution of 239 standard research grant projects (of which 15 interdisciplinary) and 67 junior research grant projects. One standard research project from the area of the medical and molecular biological sciences was further financed from the means provided for this purpose by PRO.MED. CS Praha a.s. The amount of this support in 2011 was CZK 1,550,000.

Detailed data on the numbers of projects resolved within the individual fields and the amounts of financial support allotted are shown in Table 1.

At their sessions in January–March 2011, the field councils of the GAAS conducted final evaluations of the level of resolution and quality of the results of the grant projects completed as of 31 December 2010. The background materials for the assessments were the final reports on the resolution and results of the projects, complemented with copies of the already published results or offprints of the most significant works created in their resolution. There were 116 completed standard research grant projects with a resolution period of two to five years and 79 junior research grant projects resolved for one to three years evaluated. In the category of standard research projects, 42 projects were assessed as fulfilled with outstanding results, 72 as fulfilled and two projects were evaluated as unfulfilled,

Tab. 1: Standard Research Grant Projects Resolved in 2011

Field	Number of supported projects total	Of which completed in 2011	Subsidy provided in thousands of CZK
1 Mathematical and Physical Sciences, Information Science	31	20	21,498
2 Technical Sciences and Cybernetics	13	7	10,722
3 Earth and Space Sciences	25	17	17,482
4 Chemical Sciences	45	25	42,925
5 Medical and Molecular Biological Sciences*	37	21	38,997
6 Ecological-Biological Sciences	36	15	35,839
7 Social and Economic Sciences	8	6	3,163
8 Historical Sciences	17	13	5,101
9 Humanities and Philological Sciences	13	10	5,196
10 Interdisciplinary projects	15	6	23,406
Total	240	140	204,329

*The data shown include also a grant project financed from the means of PRO.MED.CS Praha a.s.

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particularly for the reason of insufficient publication activities. For the entire time of the resolution of the successfully completed standard research projects, an average of thirteen publications was issued per project, primarily in prestigious peer-reviewed foreign periodicals. In the category of junior research grant projects, 25 projects were evaluated as fulfilled with outstanding results, 52 as fulfilled and two projects were assessed as unfulfilled, because the results of the resolution had not been published. On average, five results per project were implemented with the junior research projects. This number is lower in comparison with the results of standard research projects, but it is necessary to take into consideration the shorter period of resolution and the smaller size and less experience of the investigating junior teams. Although the topics of the grant projects by their character fall into the area of basic research, also 30 applied outputs were achieved in their resolution, of which 12 with the junior projects. One fundamental result of a standard research project was patented.

Programme Projects

The ASCR's programme entitled Nanotechnologies for Society, which sets its aim at achieving significant progress in the development of publication and practical use of nanotechnologies and nanomaterials in Czech society, continued in the resolution of 23 projects begun in 2007 and 2008. A targeted subsidy of a total amount of CZK 177.8

million was allotted for their support in 2011. In February 2011, the Council of the Nanotechnologies for Society Programme evaluated the fulfilment of the aims and quality of the results achieved with the eleven projects completed as of 31 December 2010. All of the projects were assessed as fulfilled, seven of them were evaluated as fulfilled with outstanding results based on the high number of very high-quality results. Contracts on the utilisation of the results of research and development were concluded with the recipient of the completed programme projects; their fulfilment will be monitored each year for a period of three years after the end of the resolution.

Projects of the Operational Programmes of the Structural Funds

In 2011, the Head Office of the ASCR introduced an internal electronic information system, 'Registration of the Participation of the Workplaces of the ASCR in the Operational Programmes of the CR'. This registry provides detailed information on the projects in preparation, ongoing and completed projects within the operational programmes and thus comprises an important background material for the decision making of the ASCR on engagement in the operational programmes, financed from the structural funds.

At the workplaces of the ASCR, eleven new projects of the operational funds began to be resolved in 2011, 18 con-

Tab. 2: Junior Research Grant Projects Resolved in 2011

Field	Number of supported projects total	Of which completed in 2011	Subsidy provided in thousands of CZK
1 Mathematical and Physical Sciences, Information Science	9	8	2,860
2 Technical Sciences and Cybernetics	7	7	2,359
3 Earth and Space Sciences	6	6	2,885
4 Chemical Sciences	5	5	2,350
5 Medical and Molecular Biological Sciences	8	8	3,984
6 Ecological-Biological Sciences	16	15	9,155
7 Social and Economic Sciences	4	3	1,452
8 Historical Sciences	6	6	1,469
9 Humanities and Philological Sciences	6	6	1,397
Total	67	64	27,911

RESEARCH, DEVELOPMENT AND INNOVATION PROJECTS

tinued in resolution for the entire year and five projects were concluded. Thus, a total of 34 projects were resolved. An overview of the participation of the workplaces of the ASCR in the resolution of projects of the operational programmes divided into the individual operational pro-

grammes is listed in Table 3. More detailed data on the projects begun in 2011 are shown in Table 4 with the overall amount of authorised support for their resolution being CZK 8.02 billion.

Tab. 3: Participation of the Workplaces of the ASCR in the Resolution of Projects of the Operational Programmes in 2011

Operational programme	Projects begun	Projects ongoing	Projects completed	TOTAL
OP Czech Republic – Poland	0	1	0	1
OP Czech Republic – Austria	0	1	0	1
OP Supranational Cooperation	1	0	0	1
OP Entrepreneurship and Innovations	0	1	0	1
OP Prague Competitiveness	3	3	3	9
OP Research and Development for Innovation	2	6	0	8
OP Education for Competitiveness	5	5	1	11
OP Environment	0	1	0	1
ROP NUTS II Central Bohemia	0	0	1	1
TOTAL	11	18	5	34

Tab. 4: Projects of the Operational Programmes Begun in 2011

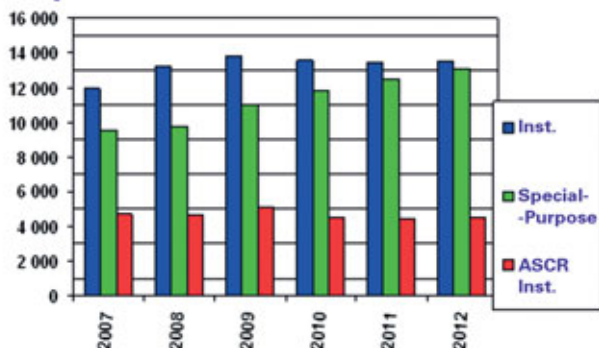
Recipient coordinator	Name of the project	Total amount of support approved for the project in thousands of CZK
OP Research and Development for Innovation		
FZÚ	ELI: Extreme Light Infrastructure	6,800,576
FZÚ	HiLASE: New ILsers for Industry and Research	799,955
OP Prague Competitiveness		
ÚMG	CZ-OPENSREEN: National Infrastructure for Chemical Biology	109,252
MBÚ	Prague Infrastructure for Structural Biology and Metabolomics	87,669
ÚEM	Research Centre for Cell Therapy and Tissue Replacement	53,720
OP Education for Competitiveness		
ÚMG	Creation of an Expert Team of the Centre for Phenogenomics	38,769
FZÚ	Research and Development of Femtosecond Laser Systems and Advanced Optic Technologies	37,332
FZÚ	Research and Development of New Ways of Generating Radiation and Charged Particles Using Ultraintensive Laser Fields	36,289
ÚGN	Energy Landscapes: Innovation, Dynamisation and Internationalisation of Research –ENGELA	12,633
Na ÚBO	PROVAZ: Connection of Education and New Methods of Zoological-Ecological Research – from Theory to Practice	9,733

08

Overview of the Economic Management of Financial Means

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

Expenditures on R&D in the CR



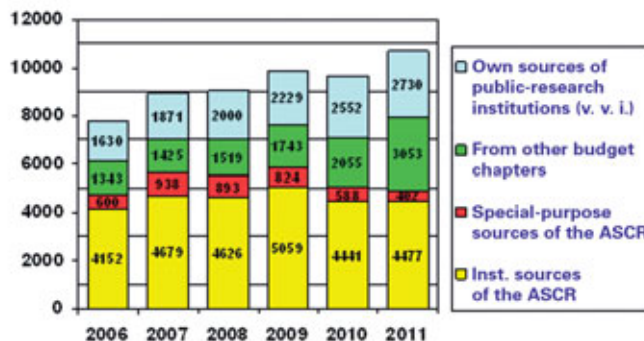
In 2011, the ASCR managed a total of CZK 10,663.3 million, of which CZK 4,879.7 million came from its own budget chapter.

The institutional means provided for the support of research plans, institutional support of research organisations according to the results achieved by them and for ensuring the research infrastructure were 91.5% of the total amount of the budgetary means. The amount of targeted means intended for the resolution of the grant and programme projects which are provided from the chapter of the Academy of Sciences of the CR based on the results of public tenders was reduced by 29% as against 2010. From other budget chapters pursuant to Act No. 130/2002 Coll., CZK 3,053.3 million was transferred directly without budget measures to workplaces of the ASCR. Transferred financial means of CZK 2,023.5 million came from providers from other ministries; a total of CZK 1,029.8 million, i.e. almost 39% of all the targeted means distributed by the Czech Science Foundation, was transferred from the CSF.

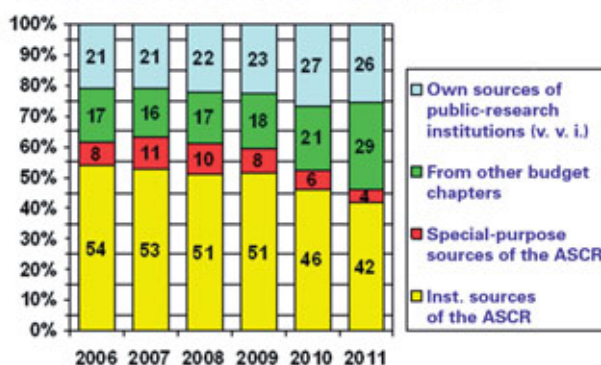
The non-investment sources of the ASCR in 2010 were comprised by 44.7% of the means of its own chapter of the state budget, by 24.6% of transfers from the other chapters of the state budget and 30.7% from its own revenue and extrabudgetary means. The percentage of non-investment sources acquired by transfer from the other chapters of the state budget increased as against the year before by 16.1%.

For investment sources, the ASCR had 51.2% from the means from its own chapter of the state budget and 48.8% from transfers from the other chapters of the state budget.

Financial Sources of the ASCR



Financial Sources – Structure



The joint expenditures intended particularly for foreign contacts, computer networks, membership contributions to international scientific organisations and the subsidies to 75 scientific societies associated at the Council of Scientific Societies of the CR were covered from the budget of the Head Office of the ASCR, through which also all of the targeted means intended for extra-academic entities for the resolution of the grant projects of the Grant Agency of the ASCR and programme projects within the programme of Research, Development and Innovation of the ASCR Nanotechnology for Society also went.

From their total revenues of CZK 8,622.4 million, the workplaces of the ASCR (public research institutions) used CZK 7,736.5 million to cover their own costs. Improved economic results totalling CZK 885.9 million will in addition to covering any losses incurred in previous years primarily be used for the supplementation and renewal of instruments and equipment essential for the actual scientific activities of the workplaces.

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The structure of the costs of the workplaces of the ASCR (public research institutions) has been relatively stable for a number of years. As against 2010, their total expenditures increased only by 4.4%. The expenditures decreased for travel (4.5%) and for the purchase of energy, water and fuel (0.8 %); the expenditures slightly increased for the purchase of services (3 %), other costs (1.1%) and expenditures for the purchase of material (0.3 %).

Expenditures for repairs and maintenance (14.5%) and personnel costs (6.1%) rose more distinctly. The creation of a fund of targeted means increased as against last year by 6%.

From the means spent on the purchase of services, CZK 933 million was used for the item 'other services'. The expenditures on other services are specific for every workplaces of the ASCR. They are contribution abroad within international cooperation, scientific measurements and analyses for projects, publication costs, training, seminars, payments for the professional preparation of grant requests, legal and tax consultation, payments for electronic access to the databases of foreign journals etc.

The analysis listed does not include the accounting depreciation of property taken from subsidies of the total amount of

The Structure of the Financial Sources of the ASCR's Workplaces (in millions of CZK):

	Non-investment means	Investment means
Approved budget of the chapter	4,130.8	735.0
Transfer of non-investment means into investment	-173.4	173.4
Transfer outside the chapter of the ASCR	-0.4	
Subsidies from other budget chapters	2.8	
Amended budget of the chapter of the ASCR	3,959.8	908.4
of which subsidies to public research institutions	3,694.2	908.1
to the Head Office of the ASCR	265.6	0.3
Use of claims from unused expenses	12.3	0.0
of which grants from the Grant Agency of the ASCR	7.3	0.0
Financial Mechanisms of EEA/Norway	4.8	0.0
projects of the European Union	0.0	0.0
material costs of the OSS (Operational Support System)	0.2	0.0
Resources of the reserve fund of ASCR chapter	2.0	
Transfer to files of claims from unused expenses	-2.8	-0.0
Total resources from the ASCR budget chapter	3,971.3	908.4
Subsidies from other budget chapters (pursuant to Act No. 130/2002 Coll.)	2,187.2	866.1
of which Czech Science Foundation grants	1,014.5	15.3
projects of other ministries	1,172.7	850.8
Own R&D&I resources	2,730.3	
of which main activity orders	182.7	
sales of publications	111.6	
sales of goods and services	150.3	
licences	1,476.3	
conference fees	15.8	
foreign grants and donations	246.3	
rent	87.6	
interest, exchange-rate profits	84.9	
own fund resources	181.6	
other	193.2	
Total resources	8,888.8	1,774.5

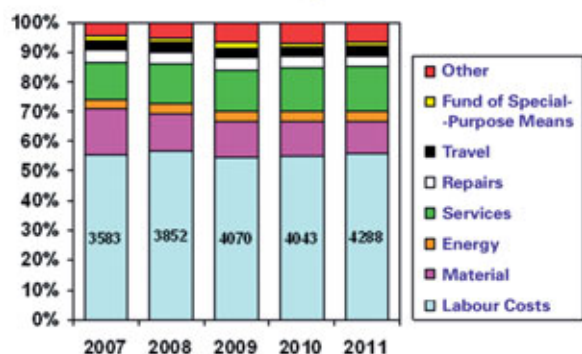
OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

The Structure of the Expenses of the ASCR's Workplaces (in millions of CZK):

Personnel costs (labour costs, mandatory insurance paid by the employer, health-insurance benefit compensation)	55.42 %	4,287.7
Purchase of material	10.91 %	843.9
of which books, journals		65.4
small material property		168.2
use of material, protective aids		546.2
other material costs		11.1
work of a production character (press)		53.0
Purchase of energy, water and fuels	3.38 %	261.7
of which electrical energy		152.4
water, steam, gas		91.7
fuels, fuel substances		17.6
Purchase of services	14.55 %	1,125.5
of which services of the post, telecommunication and radiocommunication		43.0
purchase of small non-material property		18.8
rent		32.4
computer technology performances		28.7
costs for representation		9.9
preliminary budget		7.5
conference fees		43.8
sewage fees		8.4
other services		933.0
Repairs and maintenance	3.82 %	295.2
of which repair and maintenance of property		226.0
repair and maintenance of moveable assets		69.2
Total travel	2.91 %	225.2
of which foreign travel expenditures		208.7
domestic travel expenditures	16.5	
Depreciation of fixed assets	0.99 %	76.6
Creation of a fund of targeted means	1.33 %	103.0
of which targeted means from the chapter of the ASCR		1.5
institutional means		66.5
targeted means from other providers		35.0
Total other costs	6.69 %	517.7
of which transfers to the Social Fund and other social costs		129.2
taxes and fees		200.4
exchange-rate losses		43.4
injury insurance, fines, penalties, shortfalls, damages		144.7
Total expenses	100.00 %	7,736.5

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Non-Investment Expenditures – Structure



CZK 860,408,000, which are an expenditure item only from an accounting perspective; pursuant to Decree No. 504/2002 Coll., as later amended, however, they do not comprise a source of the fund for the reproduction of property and do not influence the economic result.

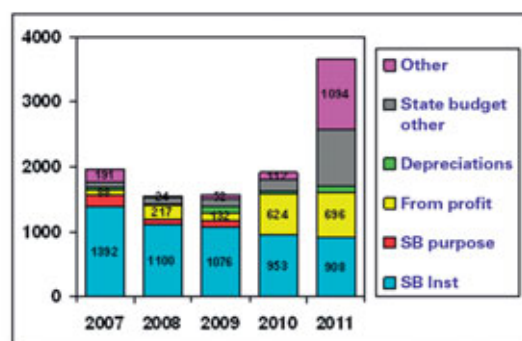
Considering that the workplaces of the ASCR are managed economically as public research institutions in the system of non-state organisations, they do not conclude their accounting until 30 June of the following year and the final account must be verified by an auditor. It is hence necessary to take the following analysis as preliminary.

Of the events continuing from last year, thus of the unfinished buildings, attention is deserved *inter alia* by particularly two items. They are the completion of the building of the optics department of the Institute of Physics (FZÚ) and the completion of the entry, multifunctional building of the Institute of Geophysics (GFÚ) in the complex in Prague – Spořilov. We will not mention a number of other financially smaller events here.

In 2011, the long-planned reconstruction of the building of the Institute of Theoretical and Applied Mechanics in the Prosek complex, where also the Institute of History is headquartered, had to be stopped, because the renter and owner of the neighbouring property started a court dispute, which has still not been concluded.

Also in 2011, despite the significantly limited possibilities, the Academy of Sciences of the CR endeavoured to ensure the renewal of instrumental equipment. The amount of CZK 193 million was set aside for this purpose. Of this amount,

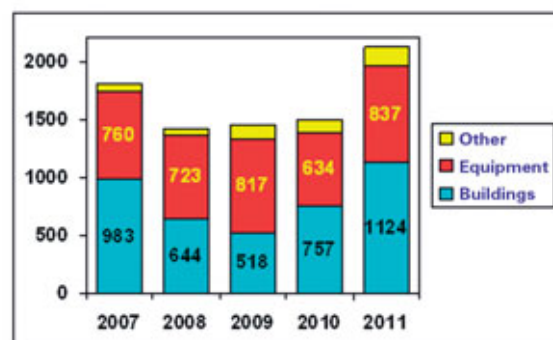
Investment Resources



CZK 57 million was allotted for instrumental equipment at a cost above CZK 5 million and the rest for distribution through a system of internal competitions for apparatuses up to CZK 5 million. For completeness, it is possible to mention here that another source of investment was the subsidy for the reproduction of property (CZK 260 million) and the amount of CZK 22 million allocated for the instrumental equipment of the laureates of Praemium Academiae. The institutes further significantly contributed to all of these subsidies from their own resources.

Another significant component of investment sources is the allocation of subsidies for the reproduction of property (Czech acronym: DRM); in 2011 it was CZK 260 million. The aim of this measure introduced in connection with the change of the legal form of the institutes was to cover the loss of non-investment subsidies for depreciation, which were allotted to the workplaces as state contributory organisations until 2006.

Investment Expenditures



OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

The creation of investment resources and their usage

The resources of investment means are mainly comprised of institutional and targeted subsidies from the state budget and means from depreciation. The data for the entire Academy of Sciences of the CR may be summarised as follows:

Total Investment Resources (in millions of CZK)	3,718.9
of which depreciation	101.4
transfer from improved outcome from operations	696.3
recipients; joint recipients (pursuant to Act No. 130/2002 Coll.)	866.1
foreign grants and donations	1,093.8
revenues from sales of fixed assets	47.4
combining funds for the acquisition of fixed assets	5.8
subsidies from the state budget	908.1
institutional	908.1
targeted	0.0
These resources were used to fund	
building financing	1,124.4
acquisition of instruments and equipment	836.7
maintenance and repairs	15.4
other	166.3
Total used on the acquisition of fixed assets	2,142.8
Acquisition of the Property Reproduction Fund	1,576.1
Returned to the state budget	0.0

In 2011, the amount of investment means for building projects was significantly lowered in connection with the anticipated stagnation of institutional support year on year (by 21 %). The more important of those provided with investment subsidies in 2011 were (in thousands of CZK):

Completion of the Astronomical Pavilion in Prague – Spořilov	4,500
Reconstruction of the complex Koleč of the Institute of Molecular Genetics	12,000
Research Base Mikulčice – Trapíkov of the Institute of Archaeology, Brno	9,360
Construction of Building 2 of the Institute of Experimental Botany in Prague – Lysolaje	32,000
Completion of the complex Na Sádkách – 2 nd Stage – laboratories	
Biological Centre České Budějovice	9,000
Annex of the laboratories and computer centre within the OP R&D for I	
Centre for Global Change Research	11,900
Building modifications of the 1 st underground floor of the main building – CEITEC facilities and the ICRC at the Institute of Biophysics	5,000
Multiple-area clean laboratory of the Institute of Analytical Chemistry, Brno	5,740

ANNUAL REPORT OF THE ASCR 2011

Analysis of Employment and the Drawing on Wage Resources

In 2011, the total number of employees of the ASCR increased from 7,526 to 7,709, of whom 2,103 employees (which is 27.28% as against 22.27% in 2010) are paid from targeted and extrabudgetary means. The number of university-educated employees of research units who passed the demanding certification following the Career Rules for University Educated Employees of the Academy of Sciences of the CR and were put in the relevant qualification grade rose from 4,291 to 4,456. The growth in the number of university-educated employees paid from targeted and extrabudgetary means is caused primarily by the new rules announced by some of the providers in public tenders, when for participation in the grant an employment contract must be concluded exclusively for the resolution of the project.

In total, the Academy of Sciences spent CZK 3,137,065,000 on wages and salaries and CZK 108,848,000 on other payments for work performed. The total average monthly earnings at the ASCR were CZK 33,913 with a year-on-year increase as against 2010 of 3.52%.

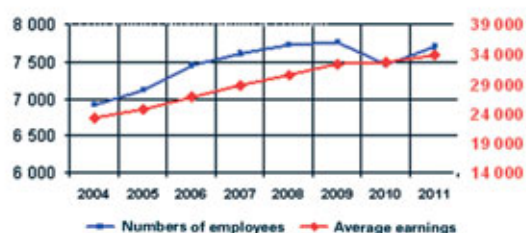
At the Head Office of the ASCR in 2011, 64 employees were paid for on average an adjusted amount for salaries of CZK 36,969,000. The other payments for work performed were drawn in the amount of CZK 1,802,000. The total average monthly earnings of the employees of the Head Office of the ASCR without elected functionaries of the ASCR in 2011 were CZK 37,423. If we include among the employees of the Head Office of the ASCR also the elected functionaries of the ASCR, we come to average earnings of CZK 48,189.

Categories

Categories	Average adjusted number of employees	Average monthly earnings in CZK
Research employees	2,825	46,254
Other university-educated employees of research units	1,631	28,791
Specialised employees with university education	417	29,984
Specialised employees with secondary school or college	860	22,728
Specialised R&D employees with secondary school or college	136	25,558
Technical-economic employees	935	32,868
Labourers	505	17,806
Operational employees	336	16,236
Total	7,645	33,794

Employees and Wages

ASCR Institutes	2007	2008	2009	2010	2011
Numbers of employees	7 615	7 730	7 771	7 526	7 709
Research employees	2 541	2 610	2 725	2 723	2 825
Average earnings	28 823	30 592	32 471	32 715	33 913



This increase of the average earnings as against the previous year is caused by the current reward system. Unlike the other chapters of the state budget, the elected representatives of the Academy of Sciences (President, Vice Presidents and members of the Academic Council) are rewarded according to Government Decree No. 564/2006 Coll.,

On the Salaries of Employees in Public Services and Administration. Hence (again unlike the other chapters of the state budget), they are included in the binding indicators – the limit of the means for salaries and the limit of the number of employees of the Head Office of the ASCR. This leads to a distorted (upwards) display of the average earnings.

At all of the institutes of the Academy of the Sciences – public research institutions, CZK 3,100,096,000 on wages and CZK 107,046,000 on other payments for work performed were spent on 7,645 employees in average adjusted number in 2011. The total average monthly earning was CZK 33,794 with a year-on-year increase as against 2010 of 3.30%.

OVERVIEW OF THE ECONOMIC MANAGEMENT OF FINANCIAL MEANS

A more detailed overview of the average monthly earnings in the public research institutes (including all sources – institutional, targeted and extrabudgetary) divided by categories of employees is provided in the following table:

An analysis of the wage means shows that public research institutions in 2011 covered 64.4% of wage costs from institutional means. targeted means of the budget chapter of the ASCR (GAAS, the programmes of research and development) had a 2.7% share in the wage means, extrabudgetary targeted means (grants of the CSF, TA CR and projects listed by the ministries) 26.3%, other activities 1.2% and other extrabudgetary resources 5.4%.

The numbers of employees, paid wage means divided by resources and average gross monthly earnings for the individual workplaces of the ASCR and further the number of workplaces and employees by section are listed in Appendix 6.

For the support of the young scientific employees – laureates of the Otto Wichterle Award, the workplaces of the ASCR were transferred the amount of CZK 7,801,000.

Audit Activity

Audit activity within the ASCR is ensured by an independent audit department, which is directly subject to the President of the ASCR, takes place pursuant to the Act on Financial Control in Public Administration and its aim is:

- guarantee the observance of the legal regulations and adopted internal measures in the financial management of public means in the performance of activities in the area of research and development,
- ensure the protection of public means from risks, discrepancies or other insufficiencies caused particularly by legal regulations, wasteful, purposeless and ineffective management of public means, or criminal activity,
- prompt and reliable informing of the steering bodies of the Academy of Sciences on the management of public means, on the operations performed, on their conclusive accounting processing for the purpose of the effective directing of the activity of the Academy of Sciences in accord with the set tasks in the area of research and development.

Public-administration audits were conducted based on the approved annual plan. They were thematically focused mainly on the effectiveness of the internal control system, the correctness and conclusiveness of the accounting, the correctness of the use, registration and manifestation of the targeted and public means, administration and economic management with property.

In 2011, six planned audits of academic workplaces were conducted of the seven originally approved. Based on the request of the Director of the Global Change Research Centre of the ASCR, v. v. i., the President of the Academy of Sciences approved the postponement of this planned audit to 2012. Audits of the subsidies provided to nine projects in five scientific societies were conducted. The amount of these subsidies was CZK 735,000 of the total provided of CZK 5,500,000. Eleven of 67 resolved research plans were verified in a total audited amount of CZK 508,543,000, 22 of 309 resolved grant projects in a total audited amount of CZK 35,147,000 and two of 23 resolved programme projects in a total audited amount of CZK 75,710,000. The financial controls in the course of 2011 verified the drawing of the targeted supports provided for the period of the duration of selected grant or programme projects, or until 31 December 2010.

At the workplaces of the Academy, seven subsequent audits fulfilling the measures to remove insufficiencies discovered by audits of the economic management in 2010 or 2009 were conducted.

Based on the approval by the competent body of the EU, the audit department of the *Head Office of the ASCR* conducts internal audits of the accounting of projects of the 6th and the 7th Framework Programmes of the EU. This service is taken advantage of by twenty-three workplaces of the ASCR. In 2011, the volume of verified financial means was CZK 101,689,000 and eleven audit certificates were issued.

On the part of the leadership of the Academy of Sciences, greater attention was devoted to the activity of the internal control system. The individual protocols on resulting audits were submitted and discussed at sessions of the Academic Council.

ANNUAL REPORT OF THE ASCR 2011

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Appendices

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR IN 2011

Appendix 01

List of Research Plans Resolved by Workplaces of the ASCR in 2011

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z00950701	Středisko společných činností AV ČR, v. v. i.	Centre of Administration and Operations, ASCR, v. v. i.	Implementace infrastruktury výzkumu a vývoje v AV ČR, nezbytný předpoklad kvalitativního rozvoje vědních oborů AV ČR	Implementation of Research and Development Infrastructure in the ASCR, A Prerequisite for the Qualitative Progress of the ASCR's Disciplines
AV0Z10030501	Astronomický ústav AV ČR, v. v. i.	Astronomical Institute, ASCR, v. v. i.	Astronomie a astrofyzika	Astronomy and Astrophysics
AV0Z10100502	Fyzikální ústav AV ČR, v. v. i.	Institute of Physics, ASCR, v. v. i.	Jevy fyziky elementárních částic přesahující standardní model	Particle Physics beyond the Standard Model
AV0Z10100520	Fyzikální ústav AV ČR, v. v. i.	Institute of Physics, ASCR, v. v. i.	Specifické jevy v kondenzovaných systémech se sníženou prostorovou dimenzí a narušenou symetrií	Specific Effects in Condensed Systems with Reduced Dimension and Broken Symmetry
AV0Z10100521	Fyzikální ústav AV ČR, v. v. i.	Institute of Physics, ASCR, v. v. i.	Fyzikální vlastnosti a příprava nanostruktur, povrchů a tenkých vrstev	Physics and Technology of Nanostructures, Surfaces and Thin Films
AV0Z10100522	Fyzikální ústav AV ČR, v. v. i.	Institute of Physics, ASCR, v. v. i.	Vlnové a částicové šíření světla, optické materiály a technologie	Wave and Corpuscular Light Propagation, Optical Materials and Technology
AV0Z10100523	Fyzikální ústav AV ČR, v. v. i.	Institute of Physics, ASCR, v. v. i.	Intenzivní zdroje záření a interakce záření s hmotou	Intense Radiation Sources and Radiation-Matter Interaction
AV0Z10190503	Matematický ústav AV ČR, v. v. i.	Institute of Mathematics, ASCR, v. v. i.	Rozvoj a prohloubení obecných matematických poznatků a jejich užití v dalších vědních oborech a v praxi	Research and Development of General Mathematical Knowledge and Its Application to Other Branches of Science and Practice
AV0Z10300504	Ústav informatiky AV ČR, v. v. i.	Institute of Computer Science, ASCR, v. v. i.	Informatika pro informační společnost: modely, algoritmy, aplikace	Computer Science for the Information Society: Models, Algorithms, Applications
AV0Z10480505	Ústav jaderné fyziky AV ČR, v. v. i.	Nuclear Physics Institute, ASCR, v. v. i.	Jaderná fyzika a příbuzné obory v základním, aplikovaném a interdisciplinárním výzkumu	Nuclear Physics and Related Fields in the Basic, Applied and Interdisciplinary Research
AV0Z10750506	Ústav teorie informace a automatizace AV ČR, v. v. i.	Institute of Information Theory and Automation, ASCR, v. v. i.	Pokročilé matematické metody získávání, zpracování a využití informací a znalostí ve složitých a nedeterministických systémech	Advanced Mathematical Methods in Retrieval, Processing and Applications of Knowledge and Information in Complex and Non-Deterministic Systems
AV0Z20410507	Ústav fyziky materiálů AV ČR, v. v. i.	Institute of Physics of Materials, ASCR, v. v. i.	Fyzikální vlastnosti pokročilých materiálů ve vztahu k jejich mikrostruktuře a způsobu přípravy	Physical Properties of Advanced Materials in Relation to Their Microstructure and Processing

APPENDIX 01

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z20430508	Ústav fyziky plazmatu AV ČR, v. v. i.	Institute of Plasma Physics, ASCR, v. v. i.	Fyzikální a chemické procesy v plazmatu a jejich aplikace	Physical and Chemical Processes in Plasmas and Their Applications
AV0Z20570509	Ústav termomechaniky AV ČR, v. v. i.	Institute of Thermomechanics, ASCR, v. v. i.	Interakce elektromagnetických polí a dynamika řízených energetických přeměn v silnoproudé elektrotechnice	Interaction of Electromagnetic Fields and Dynamics of Controlled Energy Conversions in Electrical Engineering
AV0Z20600510	Ústav pro hydrodynamiku AV ČR, v. v. i.	Institute of Hydrodynamics, ASCR, v. v. i.	Dynamika tekutých soustav a transformační procesy v hydrosféře	Dynamics of Fluid Systems and Transformation Processes in the Hydrosphere
AV0Z20650511	Ústav přístrojové techniky AV ČR, v. v. i.	Institute of Scientific Instruments, ASCR, v. v. i.	Rozvoj experimentálních metod studia fyzikálních vlastností hmoty a jejich aplikací v pokročilých technologiích	Research into Experimental Methods for the Examination of the Physical Properties of Matter and Their Application in Advanced Technologies
AV0Z20670512	Ústav fotoniky a elektroniky AV ČR, v. v. i.	Institute of Photonics and Electronics, ASCR, v. v. i.	Materiály, struktury, systémy a signály v elektronice, optoelektronice a fotonice	Materials, Structures, Systems and Signals for Electronics, Optoelectronics and Photonics
AV0Z20710524	Ústav teoretické a aplikované mechaniky AV ČR, v. v. i.	Institute of Theoretical and Applied Mechanics, A SCR, v. v. i.	Studium časově závislé odezvy materiálů, systémů a prostředí na působení přírodního i lidského činitele	Time-Dependent Response of Materials, Systems and Environments on Natural and Human Actions
AV0Z20760514	Ústav termomechaniky AV ČR, v. v. i.	Institute of Thermomechanics, ASCR, v. v. i.	Komplexní dynamické systémy v termodynamice, mechanice tekutin a těles	Complex Dynamical Systems in Thermodynamics, Fluid and Solid Mechanics
AV0Z30120515	Geofyzikální ústav AV ČR, v. v. i.	Institute of Geophysics, ASCR, v. v. i.	Studium vnitřní stavby a fyzikálních vlastností Země a jejího okolí geofyzikálními metodami	Study of the Internal Structure and Dynamics of the Earth
AV0Z30130516	Geologický ústav AV ČR, v. v. i.	Institute of Geology, ASCR, v. v. i.	Zemský systém v průsečíku geologických procesů, vývoje života, klimatických a antropogenních vlivů	Earth System at the Intersection of Geological Processes, Evolution of Life, Climatic and Anthropogenic Impacts
AV0Z30420517	Ústav fyziky atmosféry AV ČR, v. v. i.	Institute of Atmospheric Physics, ASCR, v. v. i.	Studium atmosférického obalu Země v interakci s pozemskými a kosmickými vlivy	Investigation of the Earth's Atmosphere and Its Interaction with Surface and Cosmic Forcing
AV0Z30460519	Ústav struktury a mechaniky hornin AV ČR, v. v. i.	Institute of Rock Structure and Mechanics, ASCR, v. v. i.	Výzkum vlastností geomateriálů, vývoj metod jejich ekologického využívání a interpretace geodynamických procesů	Research into the Properties of Geomaterials, Development of Methods of Their Ecological Exploitation and Interpretation of Geodynamic Processes
AV0Z30860518	Ústav geoniky AV ČR, v. v. i.	Institute of Geonics, ASCR, v. v. i.	Fyzikální a environmentální projevy v litosféře indukované antropogenní činností	Physical and Environmental Processes in the Lithosphere Induced by Anthropogenic Activities

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR IN 2011

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z40310501	Ústav analytické chemie AV ČR, v. v. i.	Institute of Analytical Chemistry, ASCR, v. v. i.	Moderní analytické techniky pro bioanalýzu, ekologii a nanotechnologie	Advanced Analytical Techniques for Bioanalysis, Environmental Analysis and Nanotechnology
AV0Z40320502	Ústav anorganické chemie AV ČR, v. v. i.	Institute of Inorganic Chemistry, ASCR, v. v. i.	Design, syntéza a charakterizace klastrů, kompozitů, komplexů a dalších sloučenin na bázi anorganických látek; mechanismy a kinetika jejich interakcí	Design, Synthesis and Characterisation of Clusters, Composites, Complexes and Other Compounds Based on Inorganic Substances; Mechanisms and Kinetics of Their Interactions
AV0Z40400503	Ústav fyzikální chemie J. Heyrovského AV ČR, v. v. i.	J. Heyrovsky Institute of Physical Chemistry, ASCR, v. v. i.	Struktura, reaktivita a dynamika molekulárních a biomolekulárních systémů: teorie, experiment, aplikace	Structure, Reactivity and Dynamics of Molecular and Biomolecular Systems: Theory, Experiment, Application
AV0Z40500505	Ústav makromolekulární chemie AV ČR, v. v. i.	Institute of Macromolecular Chemistry, ASCR, v. v. i.	Progresivní makromolekulární materiály a supramolekulární systémy: syntéza a studium vlastností, jevů a možností využití pro speciální aplikace a moderní technologie	Advanced Polymer Materials and Supramolecular Systems: Synthesis and Research on Properties, Phenomena and Implementation in Special Applications and Innovative Technologies
AV0Z40550506	Ústav organické chemie a biochemie AV ČR, v. v. i.	Institute of Organic Chemistry and Biochemistry, ASCR, v. v. i.	Regulace biologických procesů: Chemické modulatory vybraných systémů významných pro medicínu a zemědělství	Regulation of Life Processes: Chemical Modulators of Selected Biological Systems Relevant to Medicine and Agriculture
AV0Z40720504	Ústav chemických procesů AV ČR, v. v. i.	Institute of Chemical Process Fundamentals, ASCR, v. v. i.	Výzkum vícefázových reagujících systémů pro návrh procesů v oblastech syntézy a přípravy nových materiálů, energetiky a ochrany životního prostředí	Investigation of Multiphase Reacting Systems for the Design of Processes Important in Synthesis and Preparation of Novel Materials, in Energy Production and in Environmental Protection
AV0Z50040507	Biofyzikální ústav AV ČR, v. v. i.	Institute of Biophysics, ASCR, v. v. i.	Biofyzika dynamických struktur a funkcí biologických systémů	Biophysics of Dynamic Structures and Functions of Biological Systems
AV0Z50040702	Biofyzikální ústav AV ČR, v. v. i.	Institute of Biophysics, ASCR, v. v. i.	Genom a epigenom: 1D a 3D struktura, dynamika, interakce s proteiny a funkce	Genome and Epigenome: 1D and 3D Structure, Dynamics, Interactions with Proteins and Functions
AV0Z50070508	Biologické centrum AV ČR, v. v. i.	Biology Centre, ASCR, v. v. i.	Studium regulace vývoje hmyzího organismu, dynamiky hmyzích populací a funkce hmyzu v ekosystémech	Study of the Regulation of Insect Organism, Dynamics of Insect Populations and Function of Insects in Ecosystems

APPENDIX 01

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z50110509	Fyziologický ústav AV ČR, v. v. i.	Institute of Physiology, ASCR, v. v. i.	Výzkum molekulárních a buněčných základů fyziologických a patofyziologických procesů s cílem objasnit mechanismy vzniku závažných onemocnění člověka	Investigation of the Molecular and Cellular Basis of Physiological and Pathophysiological Processes in Order to Clarify the Pathogenesis of Important Human Diseases
AV0Z50200510	Mikrobiologický ústav AV ČR, v. v. i.	Institute of Microbiology, ASCR, v. v. i.	Mikroorganismy ve výzkumu a biotechnologiích	Microorganisms in Research and Biotechnology
AV0Z50380511	Ústav experimentální botaniky AV ČR, v. v. i.	Institute of Experimental Botany, ASCR, v. v. i.	Mechanismy regulace růstu a vývoje rostlin na úrovni buněk, orgánů a celých organismů: fyziologické, genetické a molekulárně biologické základy	Mechanisms of the Regulation of Plant Growth and Development on the Level of Cells, Organs and Whole Organisms: Physiological, Genetic and Molecular Bases
AV0Z50390512	Ústav experimentální medicíny AV ČR, v. v. i.	Institute of Experimental Medicine, ASCR, v. v. i.	Molekulární, buněčné a systémové mechanismy závažných onemocnění lidského organismu, jejich diagnostika, terapie a farmakoterapie	Molecular, Cellular and Systemic Mechanisms of Major Diseases of the Human Organism, Their Diagnosis, Therapy and Pharmacotherapy
AV0Z50390703	Ústav experimentální medicíny AV ČR, v. v. i.	Institute of Experimental Medicine, ASCR, v. v. i.	Nové biotechnologie, nanomateriály a kmenové buňky pro užití v regenerativní medicíně	New Biotechnologies, Nanomaterials and Stem Cells for Use in Regenerative Medicine
AV0Z50450515	Ústav živočišné fyziologie a genetiky AV ČR, v. v. i.	Institute of Animal Physiology and Genetics, ASCR, v. v. i.	Genetický, funkční a vývojový potenciál živočišných buněk, tkání a organismů: jejich využití v medicíně, ekologii a zemědělství	Genetic, Functional and Developmental Potential of Animal Cells, Tissues and Organisms: Their Use in Medicine, Ecology and Agriculture
AV0Z50510513	Biologické centrum AV ČR, v. v. i.	Biology Centre, ASCR, v. v. i.	Výzkum struktury genetické informace rostlin a jejich patogenů na molekulární úrovni, indukce a analýza cílených změn genomu a plastomu a studium fotosyntetických procesů a projevů dědičnosti v interakci s prostředím a patogeny	Research on the Molecular Organisation of Plants and Their Pathogens, Induction and Analysis of Targeted Changes in Genome and Plastome and Study of Photosynthesis Processes and Heritability in Interaction with the Environment and Pathogens
AV0Z50520514	Ústav molekulární genetiky AV ČR, v. v. i.	Institute of Molecular Genetics, ASCR, v. v. i.	Molekulárně genetické a buněčné základy klíčových biologických procesů: genová exprese, onkogeneze, replikace virů, imunita a vývoj organismů	Molecular Genetics and Cellular Bases of Key Biological Processes: Gene Expression, Oncogenesis, Virus Replication, Immunity and Development of the Organism

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR IN 2011

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z50520701	Biotechnologický ústav AV ČR, v. v. i.	Institute of Biotechnology, ASCR, v. v. i.	Vybudování Biotechnologického ústavu AV ČR	Establishment of the Biotechnology Institute ASCR
AV0Z60050516	Botanický ústav AV ČR, v. v. i.	Institute of Botany, ASCR, v. v. i.	Struktura, funkce a evoluce biodiversity fotoautotrofních organismů a hub: původ a příčiny jejich proměnlivosti, dynamika populací, společenstev a ekosystémů; využití vybraných výsledků k rozvoji Průhonického parku	Structure, Function and Evolution of the Biodiversity of Photoautotrophic Organisms and Fungi: The Origin and Causes of Their Variation, Population, Community and Ecosystem Dynamics; Application of Selected Results in the Průhonice Park
AV0Z60170517	Biologické centrum AV ČR, v. v. i.	Biology Centre, ASCR, v. v. i.	Struktura, funkce a vývoj vodních ekosystémů	Structure, Functioning and Development of Aquatic Ecosystems
AV0Z60220518	Biologické centrum AV ČR, v. v. i.	Biology Centre, ASCR, v. v. i.	Parazitismus a parazito- -hostitelské vztahy na organismální, buněčné a molekulové úrovni	Parasitism and Host- -Parasite Relationships at the Organismal, Cellular and Molecular Levels
AV0Z60660521	Biologické centrum AV ČR, v. v. i.	Biology Centre, ASCR, v. v. i.	Vztahy mezi strukturou a funkcí dekompozičního potravního řetězce v půdě	Relationships between the Structure and Function of Decomposer Food Web in Soil
AV0Z60870520	Centrum výzkumu globální změny AV ČR, v. v. i.	Global Change Research Centre, ASCR, v. v. i.	Prostorová a funkční dynamika biologických, ekologických a sociálně- -ekonomických systémů v interakci s Globální změnou klimatu	Spatial and Functional Dynamics of Biological, Ecological and Socio- -Economic Systems Interacting with Global Climatic Change
AV0Z60930519	Ústav biologie obratlovců AV ČR, v. v. i.	Institute of Vertebrate Biology, ASCR, v. v. i.	Biodiverzita a ekologie obratlovců: Strategie ochrany a využívání přírodních populací	Biodiversity and Ecology of Vertebrates: Implications in the Conservation and Sustainable Management of Natural Populations
AV0Z70250504	Psychologický ústav AV ČR, v. v. i.	Institute of Psychology, ASCR, v. v. i.	Člověk v kontextech celoživotního vývoje	The Human Being in the Contexts of Life-Span Development
AV0Z70280505	Sociologický ústav AV ČR, v. v. i.	Institute of Sociology, ASCR, v. v. i.	Sociologická analýza dlouhodobých sociálních procesů v české společnosti v kontextu evropských integračních politik, rozvoje znalostní společnosti, lidského, sociálního a kulturního kapitálu	Sociological Analysis of Long-Term Social Processes in Czech Society in the Context of European Integrational Policies, Development of the Knowledge-Based Society and of Human, Social and Cultural Capital
AV0Z70680506	Ústav státu a práva AV ČR, v. v. i.	Institute of State and Law, ASCR, v. v. i.	Proces harmonizace práva v rámci Evropské unie a jeho vliv na právní řády členských států v podmínkách informační společnosti	Harmonisation of Law in the European Union and Its Impact on the System of Law of the Member states in the Context of the Information Society

APPENDIX 01

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z70830501	Knihovna AV ČR, v. v. i.	Library of the ASCR, v. v. i.	Vývoj a implementace informační infrastruktury pro vědu a výzkum; dějiny knihy a knihoven v českých zemích do roku 1800	Development of the Infrastructure for Science and Research; Historical Bibliography of Retrospective: History of Books and Libraries in the Czech Lands to 1800
AV0Z70850503	Národohospodářský ústav AV ČR, v. v. i.	Economics Institute, ASCR, v. v. i.	Ekonomické aspekty vstupu do Evropské unie a Evropské měnové unie	Economic Aspects of the EU and EMU Entry
AV0Z70900502	Masarykův ústav a Archiv AV ČR, v. v. i.	Masaryks Institute and Archives, ASCR, v. v. i.	Hledání identity: myšlenkové a politické koncepce moderní české společnosti 1848–1948	The Search for Identity: Intellectual and Political Conceptions of Modern Czech Society 1848–1948
AV0Z80010507	Archeologický ústav AV ČR, Brno, v. v. i.	Institute of Archaeology, ASCR (Brno), v. v. i.	Pravěký a časně dějinný vývoj ve střední Evropě z pohledu nejnovějších výsledků archeologického bádání na Moravě a ve Slezsku	Prehistoric and Early Historical Development in Central Europe in the Light of the Latest Results of Archaeological Research in Moravia and Silesia
AV0Z80020508	Archeologický ústav AV ČR, Praha, v. v. i.	Institute of Archaeology, ASCR (Prague), v. v. i.	Archeologický potenciál Čech: teoretický výzkum, metodologie a informatika, péče o národní kulturní dědictví	The Archaeological Potential of Bohemia: Theoretical Research, Methodology and Information Systems, Care for the National Cultural Heritage
AV0Z80150510	Historický ústav AV ČR, v. v. i.	Institute of History, ASCR, v. v. i.	Český dějinný prostor v evropském kontextu. Diverzita, kontinuita, integrace.	Czech historical Space within a European Context. Diversity, Continuity, Integration.
AV0Z80330511	Ústav dějin umění AV ČR, v. v. i.	Institute of Art History, ASCR, v. v. i.	Výzkum dějin českého výtvarného umění v podmínkách vstupu do EU	Research into the History of Czech Visual Arts in Terms of Joining the European Community
AV0Z80630520	Ústav pro soudobé dějiny AV ČR, v. v. i.	Institute of Contemporary History, ASCR, v. v. i.	Vědecký výzkum československých dějin v období dvou totalitních režimů 1938–1989 a po zhroutilí komunismu 1989	Analysis of Czechoslovak/ Czech Contemporary History and History of Science
AV0Z80770509	Masarykův ústav a Archiv AV ČR, v. v. i.	Masaryks Institute and Archives, ASCR, v. v. i.	Výzkum a ochrana pramenné základny k dějinám vědy a kultury v českých zemích, moderní způsoby zpracování a zpřístupňování jejich informační hodnoty, výhledová strategie práce s elektronickými dokumenty	Research into and Protection of the Source Base on the History of Science and Culture in the Czech Lands, Modern Methods of Processing and Providing Access to Their Information Value and a Prospective Strategy for Working with Electronic Documents

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR IN 2011

Ident. code	Recipient	Recipient in English	Title	Title in English
AV0Z90090514	Filosofický ústav AV ČR, v. v. i.	Institute of Philosophy, ASCR, v. v. i.	Transdisciplinární výzkum vybraných klíčových problémů filozofie a příbuzných humanitních oborů, zejména logiky, klasických a medievistických studií a teorie vědy. Ediční a publikační zpracování odpovídajících textových a elektronickýchází.	Transdisciplinary Research into Selected Key Areas of Philosophy and Related Disciplines, in Particular Logic, Classical and Medieval Studies, and the Theory of Science. Editions and Publications of Corresponding Texts and Electronic Databases.
AV0Z90210515	Orientální ústav AV ČR, v. v. i.	Oriental Institute, ASCR, v. v. i.	Výzkum náboženských systémů, historie, jazyků, literatur a kultur zemí Asie a Afriky	Research on the Religions, History, Languages, Literatures, Cultures and Civilisations of the Countries of Asia and Africa
AV0Z90560517	Ústav pro českou literaturu AV ČR, v. v. i.	Institute of Czech Literature, ASCR, v. v. i.	Výzkum české literatury od nejstarších dob do přítomnosti, a to v jejích aspektech historických, teoretických, interpretačních a dokumentačních	Research into Czech Literature from Earliest Times to the Present, Reflecting Its Historical, Theoretical, Interpretational and Documentary Aspects
AV0Z90580513	Etnologický ústav AV ČR, v. v. i.	Institute of Ethnology, ASCR, v. v. i.	Kulturní identita a kulturní regionalismus v procesu formování etnického obrazu Evropy	Cultural Identity and Cultural Regionalism in the Process of Forming the Ethnic Picture of Europe
AV0Z90610518	Ústav pro jazyk český AV ČR, v. v. i.	Institute of the Czech Language, ASCR, v. v. i.	Integrovaný výzkum českého jazyka a jeho variet	Integrated Research of the Czech Language and Its Variants
AV0Z90610521	Ústav pro jazyk český AV ČR, v. v. i.	Institute of the Czech Language, ASCR, v. v. i.	Vytvoření databáze lexikální zásoby českého jazyka počátku 21. století	Creation of a Lexical Database of the Czech Language of the Beginning of the 21 st Century
AV0Z90920516	Slovanský ústav AV ČR, v. v. i.	Institute of Slavonic Studies, ASCR, v. v. i.	Vědecký výzkum a ediční počiny v oblasti komparativní slovanské jazykovědy, paleoslovenistiky a byzantologie, srovnávacích dějin slovanských literatur a dějin slavistiky v českých zemích	Scientific Research and Editorial Outputs in the Field of Comparative Slavonic Linguistics, Palaeoslavonic and Byzantine Studies, Comparative History of Slavonic Literatures and History of Slavonic Studies in the Czech Lands

APPENDIX 02

Appendix 02.1

Overall Publication Results at the ASCR

(the specific data including their division by section will not be handed out until at the session of the Academic Assembly of the ASCR)

Type of Publication	Publication Results			
	Year of the issue: 2010		Year of the issue: 2011*)	
	Czech	Foreign language	Czech	Foreign language
Books	225	58	197	62
Treatises in books	681	347	486	397
Articles in scientific journals	1,052	4,062	835	3,704
Conference proceedings	26	33	21	26
Papers in anthologies	471	1,290	267	1,041
Translations		27		30
Reviews		357		282
Specialised articles in the daily press		206		195
Research reports		270		301

*) The data for 2011 are incomplete, because publications with that year of issue are also published the following year.

N.B.: The aggregate data for the ASCR are not a sum of the data by area of science given the fact that staff from more than one institute can participate in a single item. Such work is included for each institute and in the total only once.

Appendix 02.2

Publication Results by Area of Science

Type of publication	Sections 1–3				Sections 4–6				Sections 7–9			
	Year of the issue: 2010		Year of the issue: 2011*)		Year of the issue: 2010		Year of the issue: 2011*)		Year of the issue: 2010		Year of the issue: 2011*)	
	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language
Books	28	14	22	18	10	11	14	8	189	34	162	35
Treatises in books	12	61	24	103	64	94	12	97	608	192	450	199
Articles in scientific journals	143	1,743	123	1,567	124	2,131	117	1,985	791	213	597	195
Conference proceedings	7	24	12	13	6	4	3	9	13	7	6	4
Papers in anthologies	180	875	104	682	89	346	77	306	209	92	90	63
Translations	0		1		0		0		27		29	
Reviews	3		1		3		2		351		279	
Specialised articles in the daily press	51		53		36		30		120		112	
Research reports	128		93		12		9		123		171	

*) The data for 2011 are incomplete, because publications with that year of issue are also published the following year.

SELECTED EXAMPLES OF COOPERATION WITHIN JOINT PROJECTS OR ECONOMIC CONTRACTS

Appendix 03

Selected Examples of Cooperation Implemented within Joint Projects or Based on Economic Contracts

- Solar Orbiter — ESA, *Astronomical Institute*, CSRC Brno, TOPTEC Turnov
- Semi-Isolating GaN: Fe, *Institute of Physics*, Kyma Technologies, Inc., Raleigh, North Carolina, USA
- New Material Concepts for Fast Scintillators, *Institute of Physics*, Tohoku University and Furukawa Co. (Japan)
- Nanocomposite, Ceramic and Thin-Layer Scintillators, *Institute of Physics*, CRYTUR s.r.o.
- Rn Concentration in Soil Air, *Nuclear Physics Institute*, PreCura-Institut für Präventive Medizin e. V., Berlin
- The Use of Neutron Scattering in Industry, *Nuclear Physics Institute*, ÚJV Řež, a. s.
- Research Centre Data-Algorithms-Decision-Making, *Institute of Information Theory and Automation*, Empo Praha, s. r. o.
- Scalable LOW Power Embedded platformS, *Institute of Information Theory and Automation*, NXP, Thales Communication, CEA France, ASICentrum
- Apple-CORE — Apple-CORE – Architecture Paradigms and Programming Languages for Efficient Programming of Multiple [Processor] CORES, *Institute of Information Theory and Automation*, Universiteit van Amsterdam (Holland), University of Hertfordshire (Great Britain), University of Ioannina (Greece), ACE Associated Compiler Experts bv (Holland), Aeroflex Gaisler AB (Sweden)
- SMECY – Smart Multicore Embedded SYstems, *Institute of Information Theory and Automation*, CEA: Commissariat a l’Energie Atomique (France), Technical University Brno, ČIP plus s. r. o., ACE Associated Compiler Experts bv (Holland), Aristotle University of Thessaloniki (Greece), Danmarks Tekniske Universitet (Denmark), Free2Move AB (Sweden), Thomson Grass Valley France SA (France), Hellenic Aerospace Industry S. A. (Greece), Hogskolan Halmstad (Sweden), HPC Project (France), Nethawk Oyj (Finland), Politecnico di Milano Dipartimento di Elettronica e Informazione (Italy), Politecnico di Torino (Italy), Realtime Embedded AB (Sweden), SELEX SISTEMI INTEGRATI (Italy), SKYLAB Industries (France), Saab Microwave Systems (Sweden), STMicroelectronics S. r. l. (Italy), STMicroelectronics (Grenoble 2) SAS (France), Tellabs Oy (Finland), Thales Research & Technology France (France), Thales Research & Technology UK (Great Britain), Technische Universiteit Delft (Holland), Université Joseph Fourier Grenoble 1 (France), Alma Mater Studiorum – Università di Bologna (Italy), University of Ioannina (Greece), Valtion teknillinen tutkimuskeskus (Finland)
- The development of aids for the blind, which aim at the realisation of a utility model of a device like a Personal Digital Assistant with a Braille keypad and synthetic voice output, *Institute of Information Theory and Automation*, Czech Blind and Partially-Sighted Union
- Optimisation of the economy of driving based on the currently measured data and the DAR Research Centre, *Institute of Information Theory and Automation*, Škoda Auto, a. s.
- Probabilistic Bayesian soft sensor – a tool for on-line estimation of the key process variable in cold rolling mills, *Institute of Information Theory and Automation*, Compureg Plzeň, s. r. o.
- New methods for urban traffic control in congested areas (NOMŘÍZ), *Institute of Information Theory and Automation*, ELTODO Traffic Systems, s. r. o.
- Application of advanced statistical methods for assimilation of model predictions with observations from field observations in the form of modern program aids for emergency-management support, *Institute of Information Theory and Automation*, ÚJV Řež, a. s.
- Utilisation of the new satellite navigation-system generation for time-scale comparison, *Institute of Photonics and Electronics*, Dicom, spol. s r. o.
- Usage of DWDM optical network for time and frequency transfer, *Institute of Photonics and Electronics*, CESNET, z. s. p. o.
- Meteorology Development Programme, *Institute of Photonics and Electronics*, Czech Meteorological Institute
- Research and development of new technologies of precise casting of nickel-based superalloys for rotor parts of turbochargers and aircraft turbines, *Institute of the Physics of Materials*, První brněnská strojírna Velká Bíteš, a. s., UJP PRAGUE, a. s.
- Research of material and technological innovations for power and chemical plants, *Institute of the Physics of Materials*, UJP PRAGUE, a. s.
- Plasma torch with hybrid stabilisation of arc for plasma spraying and waste pyrolysis, *Institute of Plasma Physics*, Projektsoft, a. s.
- Flame spray technology Innovation, *Institute of Plasma Physics*, Research and Testing Institute, Pilsen, s. r. o.

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- Optimisation of the creation and homogenisation of highly viscous materials in food industry, *Institute of Hydrodynamics*, Hydrosystem project, a. s.
- Evaluation of the influence of climate changes on the hydrological balance and proposal of practical measures to limit its impacts, *Institute of Hydrodynamics*, Czech Geological Service
- Optimisation of electron-beam lithography, *Institute of Scientific Instruments*, Optaglio, s. r. o.
- Investigation of dynamics of the laser welding process and its control, *Institute of Scientific Instruments*, Dendera, a. s.
- Completion of the national standard for nanometrology, *Institute of Scientific Instruments*, Czech Meteorological Institute
- Components for nano-diagnostic of length fluctuations, deviation of shapes and surface faults, *Institute of Scientific Instruments*, MESING, spol. s r. o.
- Development of the methods for the diagnostics of gauge blocks for precise engineering, *Institute of Scientific Instruments*, MESING, spol. s r. o.
- Development of instrumentation and methodology for the selection of photoautotrophic microorganisms for production of higher-generation biofuels, *Institute of Scientific Instruments*, PSI, spol. s r. o.
- New generation of electrochemical sensors and biosensors using thin modified DLC layers, *Institute of Scientific Instruments*, BVT Technologies, a. s.
- Industrial drive with induction motor (IM) fed from high-voltage (hv) inverter, *Institute of Thermomechanics*, ČKD elektrotechnika, a. s.
- Evaluation of NDT methods and their integration into SHM/VHM aircraft system, *Institute of Thermomechanics*, Honeywell CZ, s. r. o., Aircraft Industries a. s., Kunovice, LÚ FSI VUT Brno
- Automated diagnostics of extremely loaded civil structures, *Institute of Thermomechanics*, UNICA Technologies, a. s., Faculty of Mechanical Engineering of the Czech Technical University
- Nanocomposite layers and nanoparticles created in low-pressure plasma for surface modifications, *Institute of Geophysics*, HVM Plasma, s. r. o., Beznoska, s. r. o., Prospan s. r. o., Faculty of Mathematics and Physics of Charles University
- Visualisation of the formation of collagen by osteogenic cells in cultures on the surfaces of nanocrystalline diamond, *Institute of Geophysics*, *Institute of Physics*, Beznoska, s. r. o., Lasak, s. r. o.
- Mining and processing of industrial minerals on Jamaica and in selected CARICOM countries, *Institute of Geology*, GET, s.r.o., Prague
- The preparation of a catalogue of tertiary and quaternary localities in the Křivoklát Protected Landscape Area and the first overall treatment of the geomorphological development of this area in the tertiary and quaternary periods, *Institute of Geology*, Administration of the Křivoklát Protected Landscape Area
- Evaluation of the chemical composition of the deposition on the territory of the national park, *Institute of Geology*, Administration of the National Park Bohemian Switzerland
- The influence of the operation of the Bilina quarry on the PM10 concentration, *Institute of Atmospheric Physics*, Severočeské doly, a. s.
- Thermal analysis of the reference proposal of a repository for spent nuclear fuel, *Institute of Geonics*, Radioactive Waste Repository Authority (SÚRAO), Technical University of Liberec
- Geobiocenoses of the upper forest limits and the influence of mountain pines (*Pinus mugo*) on the mountain relief of the Hrubý Jeseník, *Institute of Geonics*, Lesy ČR, Mendel Faculty of Forestry and Wood Technology, Brno
- Composite materials with low content of volatile components and radiological resistance for astrophysics and applications in space, *Institute of Rock Structure and Mechanics*, 5M, s. r. o., TTS, s. r. o.
- Utilisation of ashes from biomass combustion as an easily applicable considerate fertiliser: a complex solution of benefits and risks, *Institute of Rock Structure and Mechanics*, Czech University of Life Sciences, Czech Development Agency, o. p. s., CZ Biom – The Czech Biomass Association, o. s., REAL ECO TECHNIK, s. r. o.
- Paleoseismological survey of the fault structures in the vicinity of Temelín Nuclear Power Plant, *Institute of Rock Structure and Mechanics*, Masaryk University in Brno, Energoprůzkum Praha, s. r. o.
- Investigation of the impact of granite porosity on the safety of deep repositories in geological formations, the development of methodology and measurement apparatus, *Institute of Rock Structure and Mechanics*, Stavební geologie, s. r. o.

SELECTED EXAMPLES OF COOPERATION WITHIN JOINT PROJECTS OR ECONOMIC CONTRACTS

- Investigation of thermal processes in dumps created during mining of coal deposits, development of methods and devices for the utilisation of their thermal potential, *Institute of Rock Structure and Mechanics*, Stavební geologie, s. r. o.
- Seismic analysis of the events in the vicinity of the Preese Hall well, *Institute of Rock Structure and Mechanics*, Cuadrilla Resources (Great Britain)
- Fast detection and identification of pathogenic microorganisms and viruses by electromigrational methods and mass spectrometry, *Institute of Analytic Chemistry*, State Phytosanitary Administration, Diagnostic Department, Olomouc
- New glass and ceramic materials and advanced methods of their preparations and production, *Institute of Inorganic Chemistry*, České lupkové závody, a. s., Institute of Chemical Technology Prague
- Amorphous oxide nanolayers coated from aqueous solutions usable for industrial application, *Institute of Inorganic Chemistry*, OPTAGLIO, s. r. o.
- Research of the preparation of the nanoforms of layered piezoelectrics for the implementation of the high-temperature ultrasonic transducers, *Institute of Inorganic Chemistry*, STARMANS electronics, s. r. o., Piezoceram, s. r. o.
- New Glasses and Their Technologies, *Institute of Inorganic Chemistry*, GlassService, a. s.
- Research Centre for Nanosurface Engineering, *J. Heyrovsky Institute of Physical Chemistry*, *Institute of Inorganic Chemistry*, ATG, s. r. o., Institute of Chemical Technology Prague, Technical University of Liberec
- Hierarchy nanosystems for microelectronics, *Institute of Chemical Process Fundamentals*, Research Institute of Organic Syntheses, a. s. (VÚOS)
- Reactive chemical barriers for the decontamination of heavily contaminated groundwater, *Institute of Chemical Process Fundamentals*, Dekonta, a. s.
- Utilisation of combined thermal desorption and catalytic oxidation methods for solid waste decontamination, *Institute of Chemical Process Fundamentals*, Dekonta, a. s.
- Research and development of systems for the detection of explosives, *J. Heyrovsky Institute of Physical Chemistry*, Explosia a. s.
- Nanostructural materials for catalytic, electrocatalytic and sorption applications, *J. Heyrovsky Institute of Physical Chemistry*, *Institute of Inorganic Chemistry*, Faculty of Mathematics and Physics, Charles University, Nuclear Physics Institute, Řež, Euro Support Manufacturing, s. r. o.
- Modification of recycled PET, optimisation of mechanical and rheological parameters, *Institute of Macromolecular Chemistry*, Plastic Technologies & Products, s. r. o.
- Biomass upgrading by membrane separation processes, *Institute of Macromolecular Chemistry*, MemBrain, s. r. o.
- Study of gaseous samples resulting from the radiolysis of cable materials, *Institute of Macromolecular Chemistry*, ÚJV Řež, a. s.
- Development of Tenofovir diisopropoxyl fumarate, *Institute of Organic Chemistry and Biochemistry*, Zentiva, a. s.
- Centre for new antivirals and neoplastics, *Institute of Organic Chemistry and Biochemistry*, Vidia, s. r. o.
- Nanocomposite layers and nanoparticles created in low-pressure plasma for surface modifications, *Institute of Physiology*, HVM Plasma s. r. o., Beznoska s. r. o., Prospan s. r. o., Faculty of Mathematics and Physics, Charles University
- Visualisation of collagen production in osteogenic cells cultivated on nanocrystalline diamond films, *Institute of Physiology*, *Institute of Physics*, Beznoska s. r. o., Lasak, s. r. o.
- Bio-inspired Nanocomposite Structures for Bone Tissue Regeneration, *Institute of Physiology*, *Institute of Rock Structure and Mechanics*, Elmarco s. r. o.
- Complex research of endoprostheses with better utility properties based on beta-titanium alloys, *Institute of Physiology*, Beznoska, s. r. o., Faculty of Mathematics and Physics, Charles University
- Immobilized yeasts in biotechnology: development of new applications for manufacturing, *Institute of Physiology*, *Institute of Organic Chemistry and Biochemistry*, *Institute of Microbiology*, LentiKats, a. s., Faculty of Science, Charles University
- New DHA derivatives and their use as medicaments, *Institute of Physiology*, EPAX AS (Norway)
- Industrial microfluidisation of liposomal and hydrophobic drug formulations, *Institute of Physiology*, Wake, spol. s. r. o.
- Investigation of novel formulations of gels containing liposomes fused with hydrophobic microparticles of phtalocyanine for photodynamic therapy of tumours, *Institute of Physiology*, RCD Dobřichovice, s. r. o.

APPENDIX 05

- Development of a vaccine for rabies, *Institute of Microbiology*, Bioveta, a. s.
- Environment as the source of bioactive compounds for human health, *Institute of Microbiology*, Zentiva, a. s.
- The Centre of Molecular Methods for Monitoring the Diffuse Pollution of the Environment, *Institute of Biotechnology*, *Institute of Microbiology*, CU (Faculty of Science, Charles University, Faculty of Medicine, Charles U.), VIDIA spol. s. r. o., ENVISAN-GEM, a. s., rEcoli spol. s. r. o., Aecom CZ spol. s. r. o.
- Biodegradable polymers in waste management, *Institute of Experimental Botany*, EKO-KOM, a. s.
- The system of biotechnological waste-water cleaning in agriculture and reuse, *Institute of Experimental Botany*, Dekonta, a. s., Farma Chrámce
- Auxinic herbicides: Design of herbicides with modified effectiveness and/or selectivity, *Institute of Experimental Botany*, Agra Group, a. s.
- ENVIRONGENOM – The effects of genome variability on the interaction between the human organism and the environment, *Institute of Experimental Medicine*, NIH Bethesda, MD (USA), US EPA, Research Triangle Park, NC (USA), Teplice Hospital, Prachatice Hospital
- AIRGEN – The study of the health consequences of polluted air in the Ostrava region with the use of genomics, *Institute of Experimental Medicine*, ALS Czech Republic, s. r. o., Czech Hydrometeorological Institute Prague, Czech Hydrometeorological Institute Ostrava, 9 paediatricians in Ostrava, Municipal Police Prague 1 and Prague 5
- Biocompatible nanothread constructs forming new medicinal forms for the application of biologically and pharmacologically active compounds, *Institute of Molecular Genetics*, *Institute of Experimental Medicine*, *Institute of Macromolecular Chemistry*, Elmarco, s. r. o.
- Nano-PCR, ultrasensitive test for the detection of specific proteins in body fluids, *Institute of Molecular Genetics*, 3rd Faculty of Medicine of Charles University, Psychiatric Centre Prague, VIDIA spol. s. r. o., Top-Bio, s. r. o.
- New nanoparticles for ultrastructural diagnostics, *Institute of Molecular Genetics*, Central European Biosystems, s. r. o.
- Centre of Molecular and Cell Immunology 1M0506, *Institute of Molecular Genetics*, Apronex, s. r. o.
- Biomedical models on minipigs for the testing of new pharmacs for spinal-cord injury and neurodegenerative diseases, *Institute of Animal Physiology and Genetics*, BioTest, s. r. o.
- New nanoparticles for ultrastructural diagnostics, *Biology Centre*, *Institute of Molecular Genetics*, *Institute of Macromolecular Chemistry*, Sevapharma, a. s., Central European Biosystem, s. r. o.
- The role of deep subsurface microflora on the development of microbial activities of Miocene claystones after excavation, *Biology Centre*, Czech Geological Service, Sokolovská uhelná, a. s.
- Wastewaters reclamation in an integrated biotechnological system, *Institute of Botany*, *Institute of Experimental Botany*, DEKONTA, a. s., University of Technology Brno
- Development of new methods of rearing selected promising species for aquaculture using non-traditional technologies, *Institute of Vertebrate Biology*, Mendel University in Brno, Rybníkářství Pohořelice, a. s.
- Internet portal and macroeconomic models for prognoses and currency policy analysis in developing countries, *Institute of Economics*, TCX Management Company,
- Improvement of Public Procurement Systems in the Czech and Slovak Republics, *Institute of Economics*, Siemens AG, Oživení, o. s.
- Foreigners' Incomes, Expenditures and Remittances, *Institute of Sociology*, Czech Statistical Office
- Gender Perspective in the National Reform Programme for Employment, *Institute of Sociology*, European Commission, Unit G1 'Equality between Women and Men'
- **Famous Buildings in Prague 2**, *Institute of Art History*, MO Prague 2
- Exhibition of the Architectural Group Sial, *Institute of Art History*, **Regional Art Gallery in Liberec**, **Gallery of Fine Arts in Cheb**
- Guide to Olomouc: Art Monuments of Olomouc, *Institute of Art History*, Statutory City of Olomouc
- **Exhibition 'Czech Functionalism and Its Contemporary Echoes' (JOYAS DE LA ARQUITECTURA FUNCIONALISTA: Tradición y echos contemporáneos) Madrid, 3 November 2011 — 3 December 2011**, *Institute of Art History*, The Jaroslav Fagner Gallery, Czech Centre Madrid

OVERVIEW OF THE INTERNATIONAL SCIENTIFIC COOPERATION OF THE WORKPLACES OF THE ASCR

Appendix 04.1

Overview of the International Scientific Cooperation of the Workplaces of the ASCR

1.	Number of conferences with the participation of foreign scientists (workplace as organiser or co-organiser)												
2.	Number of foreign trips by scientific employees of the institute												
2a.	of which outside of bilateral agreements												
3.	Number of active participations of employees of the institute at international conferences												
3a.	Number of lectures given at these conferences												
3b.	of which invited lectures												
3c.	Number of posters												
4.	Number of those lecturing at foreign universities												
5.	Number of memberships in editorial boards of international journals												
6.	Number of memberships in bodies of international scientific governmental and non-governmental organisations (societies, committees)												
7.	Number of lectures by foreign guests at the institute												
8.	Number of grants and projects financed from abroad												
8a.	of which from EU programmes												
	1	2	2a	3	3a	3b	3c	4	5	6	7	8	8a
I. Area of Non-Life Sciences													
Section 1	63	2774	2,712	1,212	840	290	509	22	156	136	269	52	43
Section 2	21	856	842	538	399	78	200	10	59	116	63	35	28
Section 3	21	716	598	488	327	52	244	4	63	66	42	27	16
TOTAL	105	4,346	4,152	2,238	1,566	420	953	36	278	318	374	114	87
II. Area of Life and Chemical Sciences													
Section 4	36	1,374	1,329	1,144	564	97	683	34	87	73	94	51	31
Section 5	26	1,608	1,119	1,209	454	207	943	32	210	141	180	70	51
Section 6	14	693	638	429	249	73	255	23	134	50	59	50	28
TOTAL	76	3,675	3,086	2,782	1,267	377	1,881	89	431	264	333	171	110
III. Area of the Humanities and Social Sciences													
Section 7	39	357	349	279	239	76	33	18	47	57	66	15	11
Section 8	104	333	282	311	272	153	20	13	59	69	30	25	6
Section 9	53	373	288	378	353	148	23	19	159	72	138	13	7
TOTAL	196	1,063	919	968	864	377	76	50	265	198	234	53	24
AS TOTAL	377	9,084	8,157	5,988	3,697	1,174	2,910	175	974	780	941	338	221

APPENDIX 04

Appendix 04.2

Overview of the Important International Projects Resolved by Workplaces of the ASCR

Artemis JU

SCALOPES – SCALable LOW Power Embedded platforms

- coordinator: NXP Semiconductors
- co-investigators: *Institute of Information Theory and Automation* and another 35 institutes from ten European countries

SMECY – Smart Multicore Embedded Systems

- coordinator: Commissariat à l'Énergie Atomique
- co-investigators: *Institute of Information Theory and Automation* and another 29 institutions from nine European countries

ASCR – Programme of Internal Support of the Projects of International Cooperation of the ASCR

Conjugates of Steroid Compounds with Biologically Active Substances as Supramolecular Systems and the Study of Their Physical-Chemical Characteristics

- coordinator: *Institute of Experimental Botany*
- co-investigator: *Universita Jyväskylä*

Intelligent and Bio-Responsive Polymer Biomaterials

- coordinator: *Institute of Macromolecular Chemistry*
- co-investigator: *Technion*

Wax Rollers from the Collections of the Institute of Ethnology

- investigators: *Institute of Ethnology* and other institutions from Slovakia and Austria

The Hillfort of Vladař

- coordinator and investigator: *Institute of Archaeology Prague* and another five investigators from institutions of the CR and Switzerland

Language, Reality, Fiction: Philosophy and Literary Theory on the Sources and Determinants of Meaning

- coordinator and investigator: *Institute of Philosophy* and another 18 co-investigators from the CR, USA, Sweden, Italy, Spain, Great Britain, Slovakia

Transition from Imitation to Innovation as Social and Cultural Process

- coordinator and investigator: *Institute of Philosophy*

Reform and Compactata. New Configurations of Secular and Ecclesiastical Powers in the Time of the Council of Basel

- coordinator and co-investigator: *Institute of Philosophy*
- co-investigator: *Universität Wien*

Language, Reality, Fiction: Philosophy and Literary Theory on the Sources and Determinants of Meaning,

Programme of Internal Support of the Projects of International Cooperation of the ASCR

- coordinator: *Institute of Philosophy*
- co-investigators: *Institute of Philosophy, Institute of Czech Literature*, and other partners from five European countries

CERN

ALICE – A Large Ion Collider Experiment

- coordinator: CERN
- co-investigators: *Nuclear Physics Institute* and another 93 institutions from 28 European countries

International ATLAS Experiment

- coordinator: CERN
- co-investigators: *Institute of Physics* and another 177 institutions from the whole world

COST

Intelligent Weather for Renewable Energy Resources

- coordinator: *Institute of Computer Science*
- co-investigators: 25 research teams from Europe

Suddenly released dispersing clouds in built-up environment

- coordinator: *Institute of Thermomechanics*
- co-investigators: *Meteorological Institute of University of Hamburg* and another 18 research institutions

OVERVIEW OF THE IMPORTANT INTERNATIONAL PROJECTS RESOLVED BY WORKPLACES OF THE ASCR

Advanced Solder Materials for High-Temperature Application

- coordinator: *Institute of the Physics of Materials*
- co-investigators: around 60 research teams from all of Europe

Diagnostic and Characterisation of Nonlinear Properties of Semiconductor Lasers and Novel Crystals Based on Salts of Inorganic Anions and Organic Cations

- coordinator: Poland
- co-investigator: *J. Heyrovsky Institute of Physical Chemistry* and 26 co-investigators

European Systems Genetics Network for the Study of Complex Genetic Human Diseases Using Mouse Genetic Reference Populations (SYSGENET)

- coordinator: Helmholtz Centre for Infection Research, Germany
- co-investigator: *Institute of Molecular Genetics* and 19 other co-investigators from nine European states

Biotechnical Functionalisation of Renewable Polymeric Materials

- coordinator: Graz University of Technology, Austria
- co-investigators: *Global Change Research Centre* and other institutions from 26 countries

Relocation of Production Factors between Countries and Impact on Employment, Wages and Development

- coordinator: Central European University
- investigators: *Institute of Economics* and another 35 research workplaces and universities from 20 European countries

Dynamic Markets and Firm Performance

- coordinator: Central European University
- investigators: *Institute of Economics* and another 35 co-investigators

Remaking Eastern Borders in Europe: A Network Exploring Social, Moral and Material Relocations of Europe's Eastern Peripheries

- coordinator: University of Manchester
- investigators: *Institute of Ethnology* and *Institute for Contemporary History* and another 17 partners from EU countries

ESA

PRODEX programme

Solar Orbiter Probe – the STIX instrument

- coordinator: ETH Zürich
- co-investigators: *Astronomical Institute* and other partner institutions

APPENDIX 05

Appendix 05

Overview of the Significant Conferences with International Participation Organised by Workplaces of the ASCR

Active participation of the employees of the institutes of the Academy of Sciences of the CR at international scientific meetings abroad and the organisation of international scientific congresses and conferences in the CR manifestly assist in increasing the prestige of Czech science on an international scale. This contributes to a significant extent to the deepening and expanding of specific scientific cooperation and forms the space for the establishment of new scientific contacts, exchange of opinions, presentation of the new results of scientific research and the engagement of Czech research community in the European Research Area. The overview shown below contains examples of significant scientific events with international participation which the workplaces of the ASCR organised or in whose organisation they took part in 2011.

I. Area of Non-Life Sciences

The Frontiers of Quantum and Mesoscopic Thermodynamics

■ organiser: *Institute of Physics*; 245 participants, of whom 232 foreign

International Summer School 'Physics at Nanoscale'

■ co-organiser: *Institute of Physics*; 166 participants, of whom 50 foreign

ICFSI-13 (International Conference on the Formation of Semiconductor Interfaces)

■ organiser: *Institute of Physics*; 230 participants, of whom 211 foreign

2nd ELI-Beamlines Scientific Challenges Workshop

■ organiser: *Institute of Physics*; 113 participants, of whom 53 foreign

11th Prague Topological Symposium

■ co-organiser: *Institute of Mathematics*; 138 participants, of whom 117 foreign

International Symposium on Forecasting 2011

■ co-organiser: *Institute of Computer Science*; 350 participants, of whom 300 foreign

5th European Conference on Neutron Scattering (ECNS 2011)

■ co-organiser: *Nuclear Physics Institute*; 700 participants, of whom 650 foreign

2011 IEEE International Conference on Acoustics, Speech and Signal Processing

■ co-organiser: *Institute of Information Theory and Automation*; 2,100 participants, of whom 2,080 foreign

9th International Fröhlich's Symposium: Electrodynamical Activity of Living Cells

■ organiser: *Institute of Photonics and Electronics*; 110 participants, of whom 70 foreign

Applied Mechanics 2011

■ organiser: *Institute of the Physics of Materials*; 70 participants, of whom ten foreign

19th International Symposium 'Physics of Switching Arc'

■ co-organiser: *Institute of Plasma Physics*; 105 participants, of whom 60 foreign

24th International Conference 'Mathematical Methods in Techniques and Technologies'

■ co-organiser: *Institute of Hydrodynamics*; 1221 participants, of whom 138 foreign

Hydrology of a Small Basin 2011

■ organiser: *Institute of Hydrodynamics*; 120 participants, of whom 20 foreign

Engineering Mechanics 2011

■ organiser: *Institute of Thermomechanics*; 172 participants, of whom 25 foreign

9th International Eclogite Conference

■ co-organiser: *Institute of Geology*; 161 participants, of whom 139 foreign

OVERVIEW OF THE SIGNIFICANT CONFERENCES WITH INTERNATIONAL PARTICIPATION

IAGA/ICMA/CAWSES-II Seminar 'Vertical Coupling in the Atmosphere-Ionosphere System'

■ organiser: *Institute of Atmospheric Physics*; 70 participants, of whom 60 foreign

Nano Ostrava 2011

■ co-organiser: *Institute of Geonics*; 120 participants, of whom 35 foreign

II. Area of Life and Chemical Sciences

16th International Symposium on Intercalation Compounds

■ organiser: *Institute of Macromolecular Chemistry*; 210 participants, of whom 187 foreign

European Materials Research Society: Advanced Hybrid Materials II – Design and Applications, 2012

■ co-organiser: *Institute of Inorganic Chemistry*; 200 participants, of whom 200 foreign

XVth Symposium on Chemistry of Nucleic Acids Components

■ organiser: *Institute of Organic Chemistry and Biochemistry*; 160 participants, of whom 120 foreign

International Conference 'Ecology of Soil Microorganisms'

■ organiser: *Institute of Microbiology and Biology Centre*; 400 participants, of whom 350 foreign

qPCR Symposium (Developments in real-time PCR. From preanalytics to molecular diagnostics)

■ co-organiser: *Institute of Biotechnology*; 182 participants, of whom 148 foreign

5th Central and Eastern European Proteomic Conference

■ organiser: *Institute of Animal Physiology and Genetics*; 120 participants, of whom 60 foreign

10th European Meeting on Glial Cells in Health and Disease

■ organiser: *Institute of Experimental Medicine*; 800 participants, of whom 750 foreign

Biosystematics

■ co-organiser: *Institute of Botany*; 400 participants, of whom 400 foreign

Zoological Days

■ organiser: *Institute of Vertebrate Biology*; 512 participants, of whom 61 foreign

III. Area of the Humanities and Social Sciences

INFORUM

■ co-organiser: *Library of the ASCR*; 600 participants, of whom 100 foreign

Forum 2000 Conference

■ co-organiser: *Institute of Economics*; 123 delegates, of whom 83 foreign

Social Processes and Personality

■ organiser: *Institute of Psychology*; 70 participants, of whom 30 foreign

Changing Modes of Parliamentary Representation

■ organiser: *Institute of Sociology*; 35 participants, of whom 28 foreign

Conference of Environmental Archaeology – CEA

■ organiser *Institute of Archaeology Brno*; 112 participants, 15 foreign

Castrum Bene 12

■ organiser: *Institute of Archaeology Prague*; 92 participants, of whom 87 foreign

Theory and Practice of Welfare State in 20th Century Europe

■ organiser: *Institute of History*; 100 participants, of whom 40 foreign

Omaggio a la Rosa – Conference dedicated to the 400 Anniversary of the dying out of the Rožmberks)

■ organiser: *Institute of History*; 200 participants, of whom 190 foreign

APPENDIX 05

Heroes and Villains of the Visegrád Countries' National History in the Historiographical Reflections of Neighbours

■ organiser: *Institute for Contemporary History*; 158 participants, of whom 107 foreign

Migration and Czech Society

■ co-organiser: *Institute of Ethnology*; 100 participants, of whom 60 foreign

Conference: Philosophy and Social Science

■ organiser: *Institute of Philosophy*; 130 participants, of whom 72 foreign

LOGICA 2011

■ organiser: *Institute of Philosophy*; 61 participants, of whom 30 foreign

Company Towns of the Baťa Concern

■ organiser: *Institute of Philosophy*; 105 participants, of whom 70 foreign

Václav Hanka 1791–1861–2011

■ organiser: *Slavonic Institute*; 30 participants, of whom seven foreign

Jan Mukařovský Today: Tradition and Perspective of Czech Structuralism

■ organiser: *Institute of Czech Literature*; 27 participants, of whom four foreign

Czech in the Synchronic and the Diachronic Views – The 10th Anniversary of the Institute for the Czech Language

■ organiser: *Institute for the Czech Language*; 150 participants, of whom 40 foreign

AN OVERVIEW OF THE MOST IMPORTANT ACTIVITIES WITH HIGHER EDUCATION INSTITUTIONS

Appendix 06

An Overview of the Most Important Activities of the Cooperation of the ASCR with Higher Education Institutions

1.	Number of PhD. graduates supervised at the workplaces
2.	Newly accepted PhD. students
3.	MS/MA students supervised at the workplaces
4.	Not-yet graduated students at workplaces sharing in scientific activities
5.	Number of hours lectured by employees of the ASCR at HEIs, 5a – Spring Semester, 5b – Fall Semester
6.	Number of cycles of semester lectures, seminars and exercises led by employees of the ASCR at HEIs, 6a – Spring Semester, 6b – Fall Semester

Workplaces ASCR	1	2	3	4	5a	5b	6a	6b
I. SA								
1 ASÚ	2	7	14	10	315	103	12	6
1 FZÚ	15	25	25	28	1,310	1,929	89	67
1 MÚ	1	5	10	4	929	956	31	33
1 ÚI	5	4	29	7	902	1,140	69	87
1 ÚJF	8	5	13	9	605	655	17	22
1 ÚTIA	9	10	33	16	1,185	1,449	65	63
	40	56	124	74	5,246	6,232	283	278
2 ÚFE	1	0	7	8	312	182	6	4
2 ÚFM	0	3	11	8	268	105	15	7
2 ÚFP	2	7	15	10	496	384	31	22
2 ÚH	0	2	0	0	137	38	7	2
2 ÚPT	1	4	12	11	344	345	11	19
2 ÚT	8	8	9	8	1,150	1,150	42	41
2 ÚTAM	3	2	6	5	316	246	16	16
	15	26	60	50	3,023	2,450	128	111
3 GFÚ	2	4	3	3	60	124	2	11
3 GLÚ	0	4	10	0	341	452	20	31
3 ÚFA	1	6	10	12	322	367	13	16
3 ÚGN	6	4	23	2	208	454	23	23
3 ÚSMH	2	0	1	0	100	132	7	7
	11	18	47	17	1,031	1,529	65	88

APPENDIX 06

Workplaces ASCR	1	2	3	4	5a	5b	6a	6b
II. SA								
4 ÚACH	4	6	8	11	166	276	8	13
4 ÚFCH J.H.	4	12	13	19	333	651	16	30
4 ÚCHP	4	5	4	17	409	558	49	85
4 ÚIACH	7	4	13	9	25	36	5	4
4 ÚMCH	4	9	1	5	293	248	8	7
4 ÚOCHB	11	29	55	29	504	434	19	30
	34	65	94	90	1,730	2,203	105	169
5 BFÚ	10	10	27	16	558	836	27	45
5 BTÚ	1	3	5	5	68	61	3	4
5 FGÚ	12	12	67	20	1,188	1,071	28	32
5 MBÚ	4	19	88	90	933	567	22	34
5 ÚEB	23	18	27	30	838	1,066	38	28
5 ÚEM	5	6	19	13	227	486	44	14
5 ÚMG	9	13	32	0	309	282	20	21
5 ÚŽFG	8	12	33	21	322	279	22	16
	72	93	298	195	4,443	4,648	204	194
6 BC	10	31	161	126	2,103	2,214	80	89
6 BÚ	5	9	60	18	502	121	16	6
6 CVGZ	6	5	14	11	600	1,000	3	5
6 ÚBO	7	6	59	42	562	486	30	38
	28	51	294	197	3,767	3,821	129	138
III. SA								
7 KNAV	0	0	1	1	38	0	3	0
7 NHÚ	6	29	8	11	1,539	2,124	31	57
7 PSÚ	5	8	52	2	614	733	29	40
7 SOÚ	2	4	78	40	1,059	1,374	39	51
7 ÚSP	1	1	0	0	1,315	1,502	183	228
	14	42	139	54	4,565	5,733	285	376
8 ARÚB	0	1	6	8	392	430	18	18
8 ARÚ	7	0	0	0	1,188	1,083	48	40
8 HÚ	0	0	47	0	1,360	1,443	84	96
8 MÚA	8	0	41	2	1,403	1,508	51	56
8 ÚDU	4	1	3	3	94	142	16	22
8 ÚSD	2	1	76	10	1,272	1,265	41	45
	21	3	173	23	5,709	5,871	258	277

AN OVERVIEW OF THE MOST IMPORTANT ACTIVITIES WITH HIGHER EDUCATION INSTITUTIONS

Workplaces ASCR	1	2	3	4	5a	5b	6a	6b
9 EÚ	4	3	11	19	766	921	14	14
9 FLÚ	5	9	30	3	4,477	5,698	211	231
9 OÚ	0	0	5	0	307	246	12	14
9 SLÚ	0	0	3	2	396	348	33	29
9 ÚČL	5	10	29	0	1,092	1,259	37	36
9 ÚJČ	5	5	35	36	1,488	1,601	65	69
	19	27	113	60	8,526	10,073	372	393
S 1	40	56	124	74	5,246	6,232	283	333
S 2	15	26	60	50	3,023	2,450	128	111
S 3	11	18	47	17	1,031	1,529	65	88
S 4	34	65	94	90	1,730	2,203	105	169
S 5	72	93	298	195	4,443	4,648	204	194
S 6	28	51	294	197	3,767	3,821	129	138
S 7	14	42	139	54	4,565	5,733	285	376
S 8	21	3	173	23	5,709	5,871	258	277
S 9	19	27	113	60	8,526	10,073	372	393
	254	381	1,342	760	38,040	42,560	1,829	2,024
SA total	254	381	1,342	760	38,040	42,560	1,829	2,024

APPENDIX 07

Appendix 07.1 Number of Employees, Salary Means and Earnings in 2011

Section/ Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning In CZK
		total	of which		total	of which		
			institut.	targeted and extra- budgetary		institut.	targeted and extra- budgetary	
1 ASÚ	126.04	55,586	41,440	14,146	923	385	538	36,753
1 FZÚ	665.50	298,726	186,510	112,216	3,367	853	2,513	37,406
1 MÚ	71.65	32,812	26,131	6,681	994	315	679	38,162
1 ÚI	104.73	48,897	29,093	19,807	2,883	104	2,778	38,907
1 ÚJF	198.57	84,996	46,067	33,289	1,930	556	463	35,670
1 ÚTIA	155.33	79,355	46,067	33,289	1,930	575	1,355	42,573
2 ÚFM	122.75	51,950	32,771	19,179	847	193	654	35,268
2 ÚFP	145.94	62,049	36,268	25,780	1,796	1,107	689	35,431
2 ÚH	48.81	21,232	17,067	4,165	1,028	429	599	36,249
2 ÚPT	130.87	50,446	28,204	22,243	2,252	423	1,829	32,122
2 ÚFE	103.34	47,513	38,790	8,722	859	218	641	38,314
2 ÚTAM	65.23	30,067	16,959	13,108	540	129	411	38,412
2 ÚT	183.13	72,288	55,046	17,242	1,488	114	1,374	32,895
3 GFÚ	96.35	39,621	31,008	8,613	536	143	392	34,269
3 GLÚ	72.67	27,226	23,980	3,246	1,429	848	581	31,221
3 ÚFA	78.48	36,037	25,588	10,449	728	58	670	38,226
3 ÚGN	98.47	37,912	24,341	13,571	1,265	212	1,053	32,084
3 ÚSMH	100.22	36,940	29,755	7,185	1,122	377	745	30,716
4 ÚIACH	62.82	26,664	17,656	9,008	642	104	539	35,371
4 ÚACH	69.33	31,284	22,447	8,837	1,399	470	929	37,603
4 ÚFCH JH	171.02	80,982	46,102	34,880	2,260	159	2,101	39,460
4 ÚCHP	153.49	69,577	40,984	28,592	949	286	663	37,775
4 ÚMCH	239.73	113,579	84,167	29,412	916	398	517	39,482
4 ÚOCHB	444.59	194,285	128,685	65,600	3,884	1,590	2,295	36,417

NUMBER OF EMPLOYEES, SALARY MEANS AND EARNINGS IN 2011

Section/ Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning In CZK
		total	of which		total	of which		
			institut.	targeted and extra- budgetary		institut.	targeted and extra- budgetary	
5 BFÚ	141.85	64,255	42,236	22,019	1,219	134	1,085	37,748
5 BTÚ	56.17	24,397	15,562	8,834	276	32	244	36,195
5 FGÚ	305.350	117,147	71,619	45,529	2,168	619	1,549	31,955
5 MBÚ	417.78	157,009	83,760	73,249	3,468	1,004	2,463	31,318
5 ÚEB	207.47	79,362	40,375	38,987	1,336	134	1,202	31,877
5 ÚEM	141.72	57,864	32,554	25,310	1,336	134	1,202	31,877
5 ÚMG	292.01	125,841	60,230	65,611	1,120	323	797	35,912
5 ÚŽFG	120.53	43,552	26,073	17,479	720	69	651	30,112
6 BÚ	254.53	85,032	53,078	31,954	2,132	512	1,620	27,840
6 BC	404.76	145,550	99,569	45,981	5,361	696	4,665	29,966
6 ÚSBE	148.84	50,893	18,235	32,657	3,577	1,048	2,529	28,494
6 ÚBO	71.99	23,938	14,436	9,502	1,060	118	942	27,709
7 KNAV	75.97	23,525	23,228	297	1,959	1,151	808	25,805
7 NHÚ	75.69	29,183	16,854	12,330	4,082	673	3,409	32,130
7 PSÚ	32.55	13,795	10,266	3,529	948	273	675	35,318
7 SOÚ	78.59	33,531	21,173	12,358	4,384	2,018	2,365	35,555
7 ÚSP	33.78	12,269	11,517	752	497	397	100	30,268
8 ARÚB	57.51	15,646	12,787	2,859	1,786	378	1,408	22,671
8 ARÚ	98.90	33,440	28,164	5,276	3,898	834	3,064	28,176
8 MÚA	37.63	14,500	12,453	2,047	1,344	714	630	32,110
8 HÚ	65.99	25,425	24,321	1,105	2,592	1,176	1,416	32,107
8 ÚDU	45.58	15,515	13,893	1,622	945	473	472	28,367
8 ÚSD	57.69	25,035	15,455	9,579	3,505	1,129	2,376	36,163

APPENDIX 07

Appendix 07.1 Number of Employees, Salary Means and Earnings in 2011

Section/ Workplace	Adjusted number of employees total	Means for wages and salaries in thous. of CZK			Other personnel costs in thous. of CZK			Average monthly earning In CZK
		total	of which		total	of which		
			institut.	targeted and extra- budgetary		institut.	targeted and extra- budgetary	
9 FLÚ	156.36	53,002	44,183	8,819	2,304	1,453	851	28,248
9 OÚ	22.38	9,234	9,234	0	499	499	0	34,382
9 ÚČL	73.76	23,798	19,332	4,465	1,348	570	778	26,886
9 EÚ	50.43	16,454	13,946	2,508	1,176	635	541	27,189
9 ÚJČ	111.95	40,037	30,077	9,960	3,545	1,668	1,877	29,802
9 SLÚ	25.13	8,914	7,765	1,149	932	690	242	29,560
0 SSČ	272.59	101,927	69,575	32,352	12,802	3,995	8,807	31,160
KAV	63.93	36,969	36,696	273	1,802	1,444	358	48,189
R&D&I total	7,644.69	3,100,096	2,032,207	1,067,889	107,046	33,795	73,251	33,794
ASCR total	7,708.62	3,137,065	2,068,903	1,068,162	108,848	35,240	73,608	33,913

NUMBER OF WORKPLACES AND EMPLOYEES OF THE ASCR BY SECTION

Appendix 07.2

Number of Workplaces and Employees of the ASCR by Section

	Number of workplaces in 2011	Average adjusted number of employees in 2010				Average adjusted number of employees in 2011			
		Total		of whom university educated employees of research units		Total		of whom university educated employees of research units	
		number	%	number	%	number	%	number	%
1. Section of Mathematics, Physics and Information Science	6	1,269.6	16.9	777.3	18.1	1,321.8	17.2	800.7	18.0
2. Section of Applied Physics	7	789.6	10.5	436.8	10.2	800.1	10.4	453.5	10.2
3. Section of Earth Sciences	5	435.5	5.8	270.2	6.3	446.2	5.8	281.7	6.3
4. Section of Chemical Sciences	6	1,112.6	14.8	727.7	17.0	1,141.0	14.8	765.8	17.2
5. Section of Biological and Medical Sciences	8	1,654.0	22.0	1,017.3	23.7	1,683.0	21.8	1,051.5	23.6
6. Section of Biological-Ecological Sciences	4	826.7	11.0	415.1	9.7	880.1	11.4	455.9	10.2
7. Section of Social-Economic Sciences	5	301.7	4.0	141.3	3.3	296.6	3.8	134.2	3.0
8. Section of Historical Sciences	6	371.8	4.9	207.0	4.8	363.3	4.7	204.3	4.6
9. Section of Humanities and Philology	6	428.4	5.7	298.3	6.9	440.0	5.7	308.4	6.9
Service workplaces (including Head Office)	2	335.7	4.4	0.0	0.0	336.5	4.4	0.0	0.0
ASCR Total	55	7,525.6	100.0	4,291.0	100.0	7,708.6	100.0	4,456.0	100.0

APPENDIX 08

Appendix 08.1

Economic Management of the Public Research Institutions of the ASCR in 2011

								thous. CZK
Workplace	Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)	
		transfers from SB	own resources		person. costs	material costs		
a	1	2	3	4	5	6	7	
1 ASÚ	127,658	94,956	32,702	126,121	77,065	49,056	1,537	
1 FZÚ	691,525	567,871	123,654	684,497	418,514	265,983	7,028	
1 MÚ	66,609	61,159	5,450	66,609	45,910	20,699	0	
1 ÚI	97,144	81,232	15,912	95,487	71,852	23,635	1,657	
1 ÚJF	250,433	179,186	71,247	244,301	119,819	124,483	6,132	
1 ÚTIA	146,640	126,301	20,340	144,437	113,018	31,419	2,204	
<hr/>								
2 ÚFM	122,424	87,913	34,511	121,409	72,204	49,205	1,015	
2 ÚFP	177,895	122,357	55,538	172,308	88,653	83,655	5,587	
2 ÚH	44,504	38,776	8,728	46,752	30,376	16,376	752	
2 ÚPT	123,540	93,928	29,612	123,540	72,414	51,126	0	
2 ÚFE	114,662	85,531	29,091	112,516	67,275	45,214	2,106	
2 ÚTAM	68,963	52,860	16,103	68,322	42,707	25,615	640	
2 ÚT	156,894	118,751	38,143	156,541	102,191	54,351	352	
<hr/>								
3 GFÚ	90,299	72,445	17,853	90,276	55,040	35,236	23	
3 GLÚ	75,689	49,482	26,207	74,998	39,240	35,758	691	
3 ÚFA	87,943	64,376	23,567	86,818	51,837	34,981	1,125	
3 ÚGN	79,199	64,413	14,786	78,838	54,004	24,834	361	
3 ÚSMH	99,615	76,771	22,844	99,406	52,512	46,894	209	
<hr/>								
4 ÚIACH	64,338	53,281	11,057	64,333	38,164	26,169	6	
4 ÚACH	95,655	76,499	19,155	94,231	45,586	48,645	1,424	
4 ÚFCH JH	227,653	167,290	60,363	224,796	115,301	109,495	2,857	
4 ÚCHP	192,863	156,542	36,320	192,538	97,319	95,220	324	
4 ÚMCH	254,967	198,795	56,173	249,963	156,761	93,201	5,005	
4 ÚOCHB	1,904,898	262,667	1,642,231	1,094,049	276,437	817,613	810,849	

ECONOMIC MANAGEMENT OF THE PUBLIC RESEARCH INSTITUTIONS OF THE ASCR IN 2011

								thous. CZK
Workplace	Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)	
		transfers from SB	own resources		person. costs	material costs		
a	1	2	3	4	5	6	7	
5	BFÚ	164,889	136,396	28,494	163,925	90,256	73,669	964
5	BTÚ	57,889	44,840	13,049	57,797	34,317	23,480	93
5	FGÚ	347,317	255,509	91,807	340,179	163,584	176,595	7,138
5	MBÚ	461,134	332,294	128,840	451,993	218,181	233,811	9,141
5	ÚEB	228,000	150,197	77,802	224,037	111,592	112,445	3,963
5	ÚEM	177,998	136,997	41,001	177,617	80,725	96,892	381
5	ÚMG	441,411	314,591	126,820	441,407	176,746	264,661	4
5	ÚŽFG	123,843	93,747	30,096	123,444	61,827	61,617	399
<hr/>								
6	BÚ	205,214	169,156	36,058	204,220	120,683	83,537	994
6	BC	373,821	274,340	99,480	373,503	204,275	169,228	318
6	ÚSBE	133,096	110,187	22,909	133,096	74,415	58,618	0
6	ÚBO	61,299	48,036	13,263	60,909	34,942	25,967	390
<hr/>								
7	KNAV	104,564	54,633	49,931	104,563	35,284	69,278	1
7	NHÚ	76,917	47,319	29,598	76,559	44,353	32,206	358
7	PSÚ	27,720	25,259	2,461	27,719	20,330	7,389	1
7	SOÚ	75,704	64,313	11,389	75,702	51,421	24,281	0
7	ÚSP	25,914	19,766	6,148	24,735	18,263	6,472	1,179
<hr/>								
8	ARÚB	36,350	25,368	10,982	35,155	23,613	11,542	1,195
8	ARÚ	98,959	57,091	41,868	97,621	50,135	47,486	1,338
8	MÚA	34,508	28,337	6,171	34,024	21,613	12,411	484
8	HÚ	57,253	50,642	6,611	56,216	38,301	17,915	1,038
8	ÚDU	35,343	30,817	4,526	35,342	22,930	12,412	2
8	ÚSD	52,583	47,024	5,559	52,580	38,985	13,595	3

APPENDIX 08

Appendix 08.1

Economic Management of the Public Research Institutions of the ASCR in 2011

Workplace		Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)
			transfers from SB	own resources		person. costs	material costs	
a		1	2	3	4	5	6	7
9	FLÚ	100,347	89,369	10,978	100,347	75,557	24,790	0
9	OÚ	16,743	15,130	1,613	16,574	13,761	2,813	169
9	ÚČL	46,643	42,325	4,318	46,643	34,451	12,192	0
9	EÚ	38,053	32,867	5,186	37,787	24,424	13,363	267
9	ÚJČ	79,579	73,980	6,599	76,260	59,073	17,186	3,319
9	SLÚ	18,116	16,044	2,072	17,812	13,388	4,424	303
O	SSČ	416,626	153,126	263,500	416,079	155,258	260,821	547
SA1	SA1	2,624,596	2,038,311	586,285	2,593,178	1,574,631	1,018,547	31,418
SA2	SA2	5,516,285	2,981,365	2,534,920	4,672,035	2,101,111	2,570,954	844,250
SA3	SA3	925,295	719,285	206,010	915,639	585,884	329,755	9,656
O	Other workplaces	416,626	153,126	263,500	416,079	155,258	260,821	547
AS total		9,482,802	5,892,087	3,590,715	8,596,932	4,416,885	4,180,047	885,870
Book depreciation of PRI *)		-860,408		-860,408	-860,408		-860,408	
AS total		8,622,394	5,893,087	2,730,307	7,736,534	4,416,885	3,319,639	885,870

*) Book depreciation of assets acquired from grants which do not comprise a resource of the asset reproduction fund

INVESTMENT RESOURCES AND THEIR USE IN 2011

Appendix 08.2 Investment Resources and Their Use in 2011

Workplace		Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2012)
				buildings	instruments	mntn and repairs	other	
a		1	2	3	4	5	6	7
1	ASÚ	35,028	24,872	13,894	7,484	0	3,494	10,155
1	FZÚ	417,468	372,458	100,645	163,408	0	108,405	45,009
1	MÚ	4,138	1,215	903	312	0	0	2,923
1	ÚI	13,126	5,317	2,982	1,560	0	775	7,809
1	ÚJF	44,308	22,190	4,779	16,663	0	748	22,119
1	ÚTIA	4,113	2,148	0	2,148	0	0	1,964
2	ÚFM	12,688	12,544	1,500	8,258	2,214	571	144
2	ÚFP	192,849	56,646	12,350	42,804	0	1,492	136,203
2	ÚH	12,047	2,192	0	2,192	0	0	9,855
2	ÚPT	239,085	96,499	77,795	17,388	107	1,209	142,586
2	ÚFE	41,721	15,542	1,813	13,729	0	0	26,179
2	ÚTAM	82,921	81,703	79,170	2,533	0	0	1,218
2	ÚT	42,725	12,686	4,608	8,078	0	0	30,039
3	GFÚ	19,702	12,136	6,247	5,888	0	0	7,566
3	GLÚ	14,211	8,402	0	8,402	0	0	5,809
3	ÚFA	10,502	6,000	529	3,973	0	1,499	4,502
3	ÚGN	74,351	69,552	5,878	61,486	0	2,187	4,799
3	ÚSMH	8,014	6,854	700	6,154	0	0	1,160
4	ÚIACH	14,716	13,075	8,261	4,455	0	360	1,640
4	ÚACH	9,203	5,678	0	5,599	0	79	3,525
4	ÚFCH JH	70,866	59,248	0	59,248	0	0	11,618
4	ÚCHP	14,437	14,140	2,928	11,212	0	0	298
4	ÚMCH	78,456	50,449	9,143	37,288	0	4,019	28,007
4	ÚOCHB	2,348,551	540,166	423,879	90,844	0	25,443	1,808,385

APPENDIX 08

Appendix 08.2 Investment Resources and Their Use in 2011

Workplace		Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2012)
				buildings	instruments	mntn and repairs	other	
a		1	2	3	4	5	6	7
5	BFÚ	28,570	20,813	6,700	14,113	0	0	7,757
5	BTÚ	6,312	6,312	0	6,312	0	0	0
5	FGÚ	52,836	35,409	17,776	15,986	870	777	17,427
5	MBÚ	52,793	33,320	15,209	16,729	0	1,382	19,472
5	ÚEB	138,672	138,672	107,773	30,538	0	362	0
5	ÚEM	35,651	34,964	22,721	12,240	0	3	687
5	ÚMG	119,701	119,190	55,331	63,859	0	0	511
5	ÚŽFG	28,158	22,624	3,360	19,102	0	163	5,534
6	BÚ	18,245	16,164	5,823	7,474	0	2,866	2,081
6	BC	82,057	60,510	28,993	31,306	0	211	21,546
6	ÚSBE	322,381	15,030	9,067	2,311	0	3,652	307,350
6	ÚBO	15,274	9,701	2,415	7,286	0	0	5,573
7	KNAV	20,202	4,496	1,389	2,873	84	150	15,706
7	NHÚ	7,393	6,058	5,647	411	0	0	1,335
7	PSÚ	4,851	818	0	818	0	0	4,033
7	SOÚ	13,359	6,155	2,779	2,075	350	950	7,204
8	ARÚ	15,049	3,223	1,394	1,829	0	0	11,826
8	MÚA	1,887	1,172	0	1,172	0	0	715
8	HÚ	1,044	40	0	40	0	0	1,004
8	ÚDU	7,563	4,604	2,790	1,814	0	0	2,959
8	ÚSD	3,575	138	0	138	0	0	3,437

INVESTMENT RESOURCES AND THEIR USE IN 2011

Workplace		Investment resources total	Use of investment resources total	of which				thous. CZK
				buildings	instruments	mntn and repairs	other	FRM at the end of the period (source by 2012)
a		1	2	3	4	5	6	7
9	FLÚ	17,154	3,695	2,790	667	237	0	13,460
9	OÚ	620	0	0	0	0	0	620
9	ÚČL	11,030	1,815	0	1,815	0	0	9,215
9	EÚ	3,175	652	120	306	0	226	2,523
9	ÚJČ	13,777	1,321	0	1,320	0	1	12,456
9	SLÚ	5,098	4,267	4,157	110	0	0	831
O	SSČ	68,107	56,371	29,126	10,426	11,500	5,319	11,736
SA1	VO1	1,268,996	808,956	313,793	372,461	2,322	120,381	460,040
SA2	VO2	3,436,878	1,195,466	719,378	435,902	870	39,316	2,241,412
SA3	VO3	170,988	82,019	62,150	17,870	672	1,327	88,969
O	Other workplaces	68,107	56,371	29,126	10,426	11,500	5,319	11,736
ASCR Total		4,944,968	2,142,812	1,124,447	836,659	15,363	166,343	2,802,156

APPENDIX 09

Appendix 09

Significant Awards for Researchers

The ASCR presented the following awards:

Praemium Academiae 2011 was received by: Prof. Martin Hof, Dr. rer. nat., DSc., from the *J. Heyrovský Institute of Physical Chemistry* and doc. Ing. Jiří Homola, CSc., DSc., from the *Institute of Photonics and Electronics*.

The research work of the group of prof. Martin Hof is based on the continuous improvement of peak fluorescent techniques. 'Although we assemble most instruments ourselves, it is necessary to invest in the purchase of the individual components, for instance lasers, parts of the detectors, optic components or parts of the microscope, so we plan to use more than a third of the whole Praemium for equipping our laboratories. Other finances will be used to expand the team, hence for the salaries of two to three young scientists. The last part of the finances will cover the so-called material items necessary for our experimental research.'

Doc. Jiří Homola deals with the research of biosensors, particularly optic, based on excitation of the surface plasmons. 'The financial support connected with Praemium Academiae will be used for research of photonic nanostructures with surface plasmons for a new generation of optic biosensors. These allow the rapid and extremely sensitive detection of biological substances, which significantly aids medical diagnostics and the inspection of the quality of foodstuffs.'

The awards of the ASCR for achieving outstanding results of great scientific significance were received by:

- a team of authors composed of: RNDr. Antonín Šimůnek, CSc., RNDr. Jiří Vackář, CSc. (*Institute of Physics*) for the scientific result: **Hardness of Materials with Ion and Covalent Bond;**
- a team of authors consisting of: prof. Ing. Michal Haindl, DrSc., Ing. Jiří Filip, Ph.D., Ing. Jiří Grim, CSc., RNDr. Vojtěch Havlíček, Ph.D., Ing. Martin Hatka (*Institute of Information Theory and Automation*) for the scientific result: **Mathematical Modelling of the Visual Properties of Surface Materials;**
- a team of authors consisting of: MUDr. Zdeněk Hodný, CSc., Mgr. Lenka Rossmeislová, Ph.D., Mgr. Hana Hanzlíková, Ph.D., Mgr. Kateřina Krejčíková, Mgr. Markéta



The laureates of the Praemium Academiae for 2011 Doc. Jiří Homola (left) and Prof. Martin Hof with President of the ASCR Prof. Jiří Drahoš at the festive ceremony 30 June 2011 at the headquarters of the ASCR in Prague

- Vančurová (*Institute of Molecular Genetics*) for the scientific result: **The Role of PML in Cellular Ageing;**
- a team of authors consisting of: prof. RNDr. Blanka Říhová, DrSc., RNDr. Miroslav Flieger, CSc. (*Institute of Microbiology*), prof. RNDr. Viktor Brabec, DrSc. (*Institute of Biophysics*), doc. Ing. Emil Pollert, DrSc. (*Institute of Physics*), prof. Ing. Karel Ulbrich, DrSc. (*Institute of Macromolecular Chemistry*), RNDr. Jarmila Králová, Ph.D. (*Institute of Molecular Genetics*), RNDr. Ladislav Kohout, DrSc. (*Institute of Organic Chemistry and Biochemistry*), prof. MUDr. Pavel Martásek, DrSc. (*1st Faculty of Medicine, Charles University*), prof. RNDr. Martin Kotora, Ph.D. (*Faculty of Science, Charles University*), prof. RNDr. Pavel Anzenbacher, DrSc. (*Faculty of Medicine, Palacký University in Olomouc*), prof. RNDr. Vladimír Král, DrSc. (*Institute of Chemical Technology, Prague*) for the scientific result: **Nanoparticle and Supramolecular Systems for the Targeted Transport of Medicines;**
 - a team of authors consisting of: prof. PhDr. Pavel Materna, CSc., Bjørn Thoring Flagstad Jespersen, Ph.D. (*Institute of Philosophy*), doc. RNDr. Marie Duží, CSc. (*Technical University of Ostrava*) for the scientific result: **Procedural Semantics for Hyperintensional Logic;**
 - PhDr. Ivan Pavlů, DrSc. (*Institute of Archaeology*) for the scientific result: **Artefacts in Neolithic Society: Their Status and Role.**

SIGNIFICANT AWARDS FOR RESEARCHERS



Presentation of the Awards of the ASCR for achieving outstanding results of great scientific importance on 22 September 2011 in Villa Lanna in Prague, from the left: Antonín Šimůnek, Jiří Vackář, the wife of Michal Haindl, Jiří Filip and Jiří Grim

The awards of the Academy of Sciences of the CR for young scientific employees up to 35 years of age for outstanding results of scientific work were received by:

- Dr. Adéla Kawka, Ph.D. (*Astronomical Institute*) for the scientific result: **White Dwarves in our Galaxy**;
- RNDr. Linda Nedbalová, Ph.D. (*Institute of Botany*) for the scientific result **Snow-Seaweed: Singular Microorganisms from Extreme Places of Our Planet and the Hope for Biotechnology**.

ASCR medals were awarded to the following Czech and foreign scientists:

'De scientia et humanitate optime meritis' Honorary Medal

- prof. RNDr. Vojtěch Růdl, CSc. (*Emory University, Atlanta, USA*)
- Ivo Vrkoč, DrSc., (*Institute of Mathematics*)
- Andrew J. Feustel, PhD (*American astronaut, NASA, USA*);

Ernst Mach Honorary Medal for Merit in the Physical Sciences

- Ing. Karel Jungwirth, DrSc. (*PALS Research Centre – A joint Workplace of the Institute of Plasma Physics and the Institute of Physics*)



The press conference for the visit of American astronaut A. Feustel on 1 August 2011 at the headquarters of the ASCR in Prague, from the left: Petr Heinzl, Indira Feustelová, Andrew Feustel, Prof. Jiří Drahoš

- prof. Dr. Dieter Vollhardt (*Institut für Physik, Universität Augsburg, Germany*);

Jan Evangelista Purkyně Honorary Medal for Merit in the Biomedical Sciences

- prof. RNDr. František Vyskočil, DrSc., dr.h.c. (*Institute of Physiology*);

Karel Engliš Honorary Medal for Merit in the Social and Economic Sciences

- prof. PhDr. Pavel Říčan, CSc. (*Institute of Psychology*);

František Palacký Honorary Medal for Merit in the Historical Sciences

- prof. Dr. Joachim Bahlcke (*Historisches Institut, Universität Stuttgart, SRN*)
- prof. dr. hab. Wojciech Iwańczak (*Uniwersytet w Kielcach, Poland*);

Jan Patočka Commemorative Medal

- prof. PhDr. Stanislav Sousedík, CSc. (*Institute of Philosophy*)

APPENDIX 10

Vojtěch Náprstek Honorary Medal for Merit in Science Popularisation

- PhDr. Veronika **Kratochvílová** (*Press Department of the ASCR*)
- Ing. Dana **Sephtonová** (*British Council, Czech Republic*)
- Ing. Květa **Stejskalová**, CSc. (*J. Heyrovsky Institute of Physical Chemistry*);

Honorary Medal for Merit to the Academy of Sciences of the Czech Republic

- Ing. Jaroslav **Bulička**, CSc. (*Head Office of the Academy of Sciences*)
- RNDr. Václav **Novák**, CSc. *[in memoriam]* (*Institute of Physics*)
- PhDr. Jarmila **Burgetová** (*Library of the ASCR*)
- RNDr. Dana **Wagnerová**, DrSc. (*retired – Institute of Inorganic Chemistry*)

Otto Wichterle Award for young scientific employees of the ASCR was received in 2011 by a total of 23 young scientific employees proposed from 21 workplaces.

It went to:

in the non-life sciences:

- RNDr. Jan **Borovička**, Ph.D. (*Institute of Geology and Nuclear Physics Institute*)
RNDr. Stanislav **Gunár**, Ph.D. (*Astronomical Institute*)
RNDr. Tomáš **Masopust**, Ph.D. (*Institute of Mathematics*)
RNDr. Patřicia **Martinková**, Ph.D. (*Institute of Computer Science*)
Mgr. Martin **Čada**, Ph.D. (*Institute of Physics*)
Mgr. Hynek **Němec**, Ph.D. (*Institute of Physics*)
Mgr. Jindřich **Kolorenč**, Ph.D. (*Institute of Physics*)
in the life sciences and chemical sciences:
Mgr. Otakar **Frank**, Ph.D. (*J. Heyrovský Institute of Physical Chemistry*)
Mgr. Jan **Sýkora**, Ph.D. (*J. Heyrovský Institute of Physical Chemistry*)
RNDr. Dušan **Koval**, Ph.D. (*Institute of Organic Chemistry and Biochemistry*)
MUDr. Libor **Macůrek**, Ph.D. (*Institute of Molecular Genetics*)
RNDr. Petr **Procházka**, Ph.D. (*Institute of Vertebrate Biology*)
Mgr. Natálie **Martínková**, Ph.D. (*Institute of Vertebrate Biology*)



Otto Wichterle Award for Young Scientific Employees, the award is accepted by Jan Borovička, 1 June 2011 at Villa Lanna

- Mgr. Jana **Křenková**, Ph.D. (*Institute of Analytic Chemistry*)
RNDr. Lydie **Plecitá-Hlavatá**, Ph.D. (*Institute of Physiology*)
Mgr. **Martin Horák**, Ph.D. (*Institute of Physiology*)
in the humanities and social sciences:
PhDr. Michal **Bauer**, Ph.D. (*Institute of Economics*)
PhDr. Tomáš **Vilímek**, Ph.D. (*Institute for Contemporary History*)
Mgr. Bc. Vít **Boček**, Ph.D. (*Institute of the Czech Language*)
Mgr. Gabriela **Marková**, Ph.D. (*Institute of Psychology*)
PhDr. Lukáš **Linek**, Ph.D. (*Institute of Sociology*)
František **Šístek**, M. A., Ph.D. (*Institute of History*)

The support of the **J. E. Purkyně Fellowship** for distinguished and prospective scientific employees was obtained by:

- Mgr. Jan **Jansa**, Ph.D. (*Institute of Microbiology*)
Mag. Dr. phil. Alexander **Kratochvíl** (*Institute of Czech Literature*)
prof. RNDr. Ladislav **Kvasz**, Dr. (*Institute of Philosophy*)
Mgr. Jakub **Steiner**, M.A., Ph.D. (*Institute of Economics*)
Jan **Honolka**, Ph.D. (*Institute of Physics*)

A Letter of Appreciation for long-term work in the ASCR was received from the hand of President of the ASCR prof. J. Drahoš by 12 employees from five workplaces of the ASCR.

ANNUAL REPORT OF THE LEARNED SOCIETY OF THE CZECH REPUBLIC FOR 2011

Appendix 10

Annual Report of the Learned Society of the Czech Republic for 2011

The Learned Society of the Czech Republic (hereinafter referred to as the 'Society') associates prominent scientists of all scientific fields. Membership is possible in two ways in it: regular and honorary. The prerequisite for membership is a distinctive and creative contribution to science and moral integrity. Regular members of the Society are elected significant domestic scientific figures from the higher education institutions, ASCR as well as ministry workplaces. The Society associates outstanding researchers from the areas of natural sciences and the humanities working in various organisations. The other category are the honorary members, elected from among the significant foreign researchers, who have exceptional ties to the Czech scientific community. The Society is tightly selective. The aim of the Society is to stimulate the free cultivation of science in all of its manifestations, to encourage the desire for knowledge and enjoyment from it, to spread scientific knowledge in society, to support the increasing of the level of education and a creative, rational and humanly responsible social environment in the Czech Republic.

In 2011, the Society was led by an eight-member Council comprising: prof. RNDr. Václav Pačes, DrSc. (President), prof. ThDr. Petr Pokorný, DrSc. (1st Vice President), prof. RNDr. Helena Illnerová, DrSc. (2nd Vice President), RNDr. Zdeněk Jirák, CSc. (Scientific Secretary), prof. RNDr. Aleš Pultr, DrSc. (President of the Section of Mathematical-Physical Sciences), doc. Mgr. Pavel Jungwirth, DSc. (President of the Section of Chemical Sciences), doc. RNDr. Jan Konvalinka, CSc. (President of the Section of Biological-Medical Sciences), prof. PhDr. Ivan Hlaváček, CSc. (President of the Section of Social Sciences and the Humanities). At the end of the year, the Society had 107 regular and 41 honorary members.

The Society has developed lecture activities on current questions of science, education etc., including specialised lectures and profiles at plenary sessions, further public lectures on topical issues, the lectures at the 17th General Assembly and discussion sessions. It held eight working meetings. It organised public debates entitled 'Secondary School – Quo vadis?' and 'Where is Czech Higher Educa-



Ceremonial part of the 17th General Assembly of the Learned Society of the CR on 16 May 2011 in the Karolinum in Prague

tion Going?'. It organised in cooperation with the Embassy of Germany in Prague and the Humboldt Club of the CR a podium discussion on the topic of '*Excellence in Science and Education*'. It sent an open letter to Minister of Education Mgr. Josef Dobeš on the Bátorá case. The Society further had the narrative history of science in the memories of its selected members recorded in the form of interviews. An important source of information both on the activities of the Society and on its members is the website <http://www.learned.cz>, publishing (*inter alia*) lectures, or their presentations. Members represented the Society at meetings with the representatives of foreign learned societies and scientific institutions. Cooperation of the Learned Society and the Heidelberg Academy of Sciences (HAW) was developed; the invitation of the Learned Society of the CR was accepted by President of the HAW prof. Dr. Ing. Hermann Hahn. The subject of discussions were the problems of contemporary society, which neither politicians nor financial capital can (should) resolve without consultations with competent scientists. It included for instance the power industry, climate changes or medical ethics in the area of natural sciences and the definition of Europe, the European legacy and the relationship of Czechs and Germans in the 20th century in the area of the humanities. In order to develop cooperation with foreign institutions, the Learned Society had promotional materials and also business cards produced for its members.

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In May, the Society organised the 17th General Assembly in the Karolinum in Prague, at which a panel discussion took place on the topic of 'Global Climate Change', with contributions from our distinguished scientists. During the working part of the general assembly, nine new regular members and one honorary member were elected.

The prestigious Society awards and medals for 2011 were further presented ceremonially. The financial aspect of the awards is taken care of by the Endowment Fund for the Support of Science associated with the Learned Society of the Czech Republic, led until 17 May 2011 by the Chairman of the Board of Directors Prof. Vladimír Mareček DSc., then after elections of the new Board of Directors by Prof. RNDr. Jiří Krajiček, DrSc. The awards were received by:

Category of Scientific Employee

Prof. RNDr. Miloslav Druckmüller, CSc.

Institute of Mathematics, Brno University of Technology for the contemporary significant results in the mathematical treatment of the pictures of the solar corona made during a complete eclipse of the Sun

Doc. RNDr. Jan Tachezy, Ph.D.

Faculty of Science, Charles University in Prague for fundamental discoveries clarifying the evolution of organelles in protozoans

Category of Young Scientific Employee

RNDr. Milan Orlita, Ph.D.

Faculty of Mathematics-Physics of Charles University in Prague for work in the field of theoptical spectroscopy of graphene materials

MUDr. Mgr. Dana Pokorná, Ph.D.

Institute of Haematology and Blood Transfusion in Prague for outstanding work in the area of the immunology of tumours evoked by viruses

Award for Pedagogues

RNDr. Karel Lichtenberg, CSc.

General Secondary School Jírovčova, České Budějovice

RNDr. Jiří Herman, Ph.D.

General Secondary School Kpt. Jaroše, Brno

In the category of 'secondary-school student', a total of ten awards were issued.

Medals were awarded to **prof. PhDr. Růžena Dostálová, CSc.**, from the Faculty of Arts of Charles University in Prague for research in the area of Hellenistic Greek Culture and Byzantine Studies and **prof. RNDr. Martin Černošský, CSc.**, from the Faculty of Sciences of Masaryk University in Brno for merit in the development of the physical sciences and physical education and for a significant share in the formation and activity of academic institutions and specialised societies.

THE ACTIVITY OF THE COUNCIL OF SCIENTIFIC SOCIETIES OF THE CR AND THE SOCIETIES IN IT

Appendix 11

The Activity of the Council of Scientific Societies of the CR and the Scientific Societies Associated within It

The Council of Scientific Societies of the Czech Republic (CSSCR) is an independent, not-for-profit, voluntary association of scientific societies active in the Czech Republic, constituted for the formulation, implementation and advocacy of the interests of its scientific societies as well as science as a whole, for the support of their activities and mutual cooperation. It works in connection with and with the support of the ASCR. In 2011, it associated altogether 74 scientific societies with more than 25,000 members – experts, students as well as people interested in science. The orientations move from basic research all the way to application and technical directions. Through their activities, the CSSCR and the scientific societies associated in it fulfil an irreplaceable role in the support of science and its applications and hence complement and broaden the activity of the ASCR in a number of directions, particularly in its popularisation activities.

In 2011, the CSSCR with its scientific societies focused on strengthening the support of science in the CR also in areas where neither public nor non-public scientific and research institutes are active. It advanced the interest in knowledge and development of science and technology, which is not always sufficiently applied in areas where commercial interests, industry, financial investment, political influences and social pressures dominate. Information on the activities of the CSSCR and the societies associated in it are published at the websites <http://www.cas.cz/rvs> and <http://rvs.paleontologie.cz>.

The spectrum of the activities implemented in 2011 was very broad. The societies themselves or with the support or direct participation of the CSSCR organised and co-organised a total of 367 international and national congresses, conferences and seminars, of which 76 were joint Czech-Slovak events.

The societies actively supported instruction at elementary, secondary and tertiary schools through a total of 1,302 events of the type of mathematical, chemical, natural-science or astronomical students' olympic contests, field courses for secondary-school and university students, doctoral-candidate seminars, preparatory courses

for doctoral study and other competitions. They participated in the creation of teaching materials, textbooks as well as legal norms. They presented a total of 31 awards to significant personalities of scientific fields or talented young researchers as recognition of their outstanding work. The scientific societies associated in the CSSCR also significantly represented Czech science at the international level. The societies themselves as well as through their members are involved in the activities of 107 international organisations, which is allowed particularly by the financial support of the ASCR. A number of the representatives of our societies are at the same time members of the steering bodies of these associations.

A no less important element of the activities of the majority of the societies is their publication activity. For dozens of years, scientific societies have often issued not only a number of very important journals but also non-periodical publications. In 2011, they issued or participated in the publication of 24 internationally distinguished journals and 77 national journals and bulletins, of which four are high-impact and 20 are included in the RIV (Register of Research Plans) database. In 2011, also thanks to the support of the CSSCR, the *Journal of Geosciences* acquired the IF 1.026. In the absolute majority, the journals issued fulfil an irreplaceable role in mediating the current research results to the wider specialised public, in providing information on the activities of the societies and on interesting domestic and foreign events, seminars, congresses etc. There were also 174 conference proceedings, books or other non-periodical publications issued.

The centre of the activity of the majority of the societies, however, lies in their lecture, popularisation and other societal, often interdisciplinary activities. In 2011, the societies organised 957 lectures, excursions or seminars and dozens of media inputs and broadcasts, which stimulate the interest of the public and particularly students in scientific work and support also the application of new information.

A significant activity of the societies of the CSSCR is also the creation and accessibility of their internet pages. The absolute majority of the societies administer their own websites, which contain a great deal of important information not only for those interested in scientific research but also for the media. We can mention for instance the server

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www.astro.cz with its average visitation rate of 3,000–4,000 unique IP addresses daily.

In 2011, the CSSCR evaluated and in opponent proceedings approved a total of 111 applications for the provision of a subsidy from the ASCR for projects of scientific societies. Subsidies from the ASCR allow the societies to expand their publication as well as lecture activities considerably. Within Science and Technology Week 2011, the CSSCR organised a lecture day for secondary-school students.

Based on the overview of the activities provided for 2011, it is possible to state that the CSSCR and the scientific societies associated in it through their activities fulfil their important role for Czech society. They thus distinctly improve not only the interest in science but assist also research itself, knowledge and the attainment of excellence.

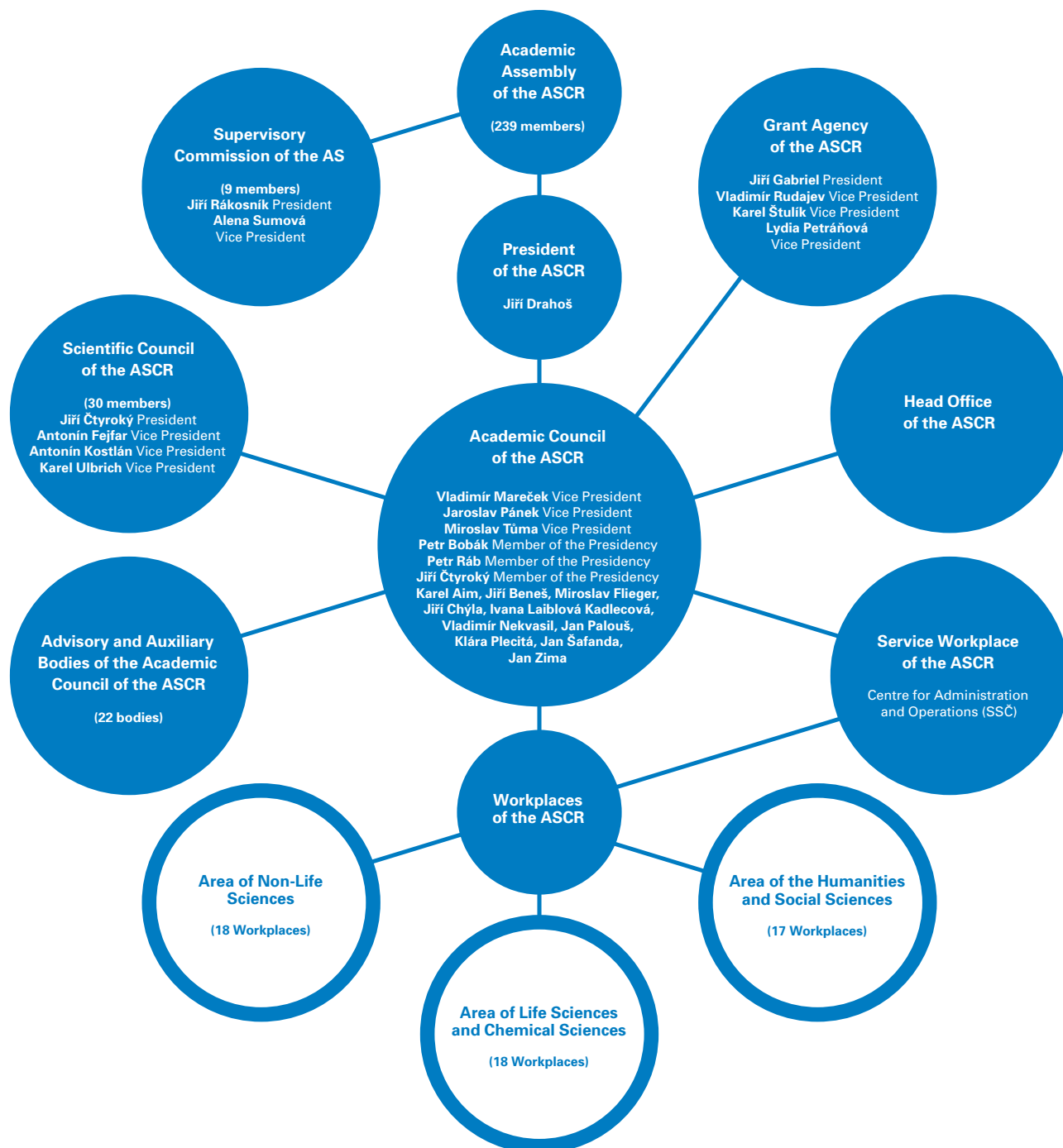
Appendix 12

Provision of Information According to Act No. 106/1999 Coll., On Free Access to Information, as Subsequently Amended, for the Period from 1 January to 31 December 2011

a) Number of requests for information filed	20
Number of decisions issued to dismiss the request	0
b) Number of appeals submitted against the decision to dismiss the request	0
c) Number of court judgments on the review of the legality of the request dismissal	0
d) Number of exclusive licences granted	0
e) Number of complaints submitted according to Section 16a of the Act	0

APPENDIX 15

Appendix 13: The Structure of the ASCR 2011

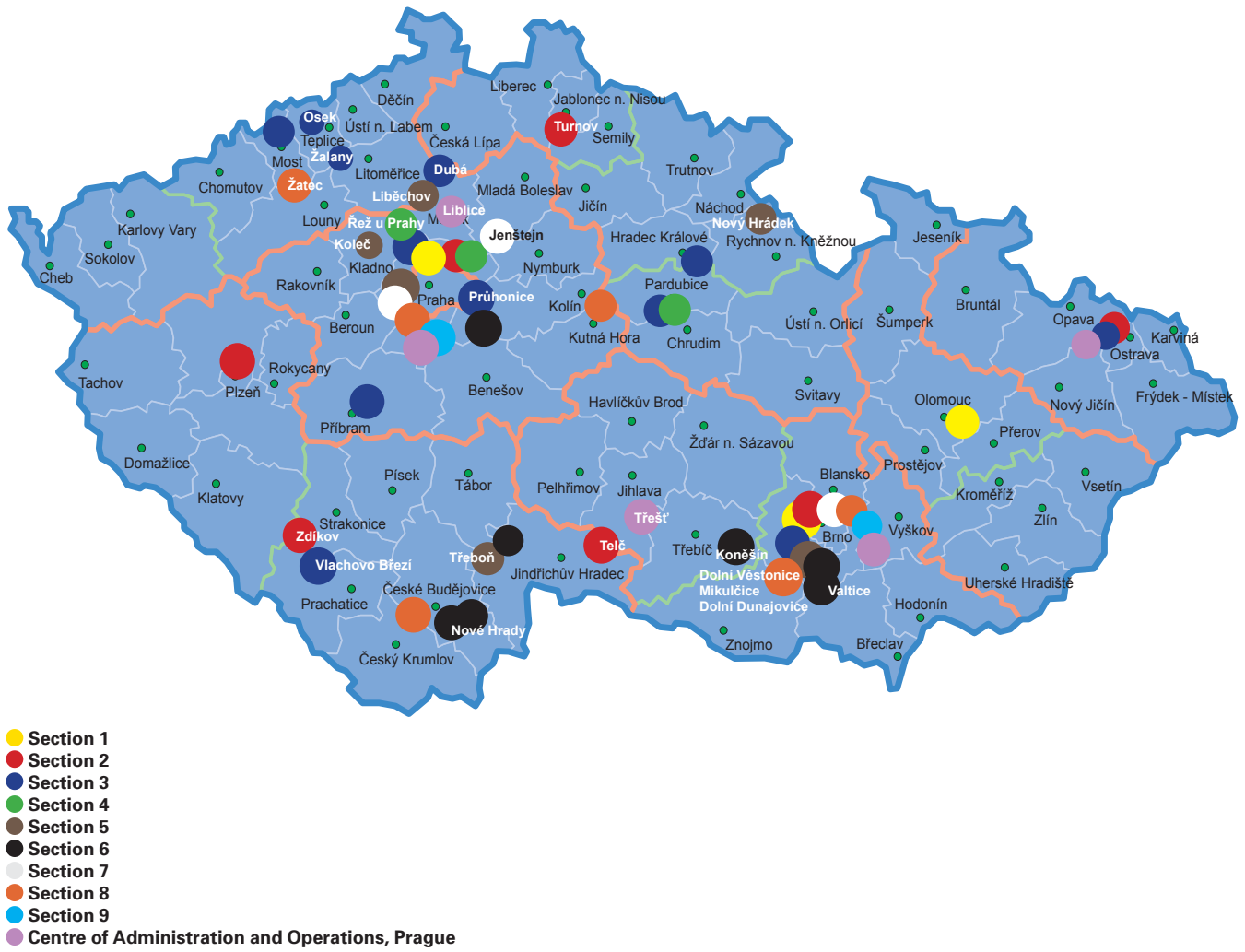


THE STRUCTURE OF THE ASCR 2011



APPENDIX 14

Appendix 14 Regional Distribution of the Workplaces of the ASCR



Issued by the Academy of Sciences of the CR, 2012

Design [Side2], 2012

**The photographs were provided by the Akademický Bulletin
of the Academy of Sciences of the CR
and the scientific institutes and workplaces
of the Academy of Sciences of the CR.**

