

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



**2010**





THE ACADEMY  
OF SCIENCES  
OF THE CZECH  
REPUBLIC

**ANNUAL REPORT 2010**

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**ANNUAL REPORT OF THE ASCR 2010**



## ANNUAL REPORT OF THE ASCR 2010



Dear Readers,

You have before you the Annual Report of the Academy of Sciences of the Czech Republic, in which you will find specific information on our main activities in 2010. We are very pleased especially by the fact that despite the dramatic events of 2009 the Academy of Sciences is still perceived by the wider public and the political representation as an institution that has a justified position in the system of science and education of the contemporary Czech society.

The Year 2010 was exception for the Academy of Sciences in that all of its institutes underwent a demanding evaluative process, which should contribute to the further improvement of their research activities. I have to emphasise that the Academy of Sciences is the only institution in the Czech Republic that systematically conducts such an assessment, namely with significant participation of foreign reviewers.

The evaluation of the activities of the institutes of the Academy of Sciences has from the very beginning followed several objectives at the same time, by which it fundamentally differs from the simple mechanism of

the current evaluation methodology introduced by the former Research and Development Council (a so-called coffee mill that put everything in one pile regardless of the quality). One of the main objectives of the evaluation taking place at the Academy of Sciences is an effort for an objective mapping of the scientific quality of our institutes, namely all the way to the level of individual units. The assessment process will be capped by specific conceptual steps within which carefully planned measures of a financial and organisational character will result, so that we will be able to even more quickly and efficiently utilise research results in practice both on the national and international scale.

In the modern period, it is ever more evident that science, research and education are among the fundamental factors of the economic prosperity of society, which also significantly participate in the formation of its cultural and spiritual values. The leadership of the Academy of Sciences will therefore take thorough care to ensure that the balanced relation between the necessity to maintain a sufficiently wide base of scientific fields and the need to reinforce the priority directions of research will be preserved also in the future. I am convinced that precisely the system of the institutes of the Academy of Sciences, which is the most complex research institution in the Czech Republic, has the historic and contemporary most appropriate prerequisites for it and also bears high responsibility for it.

Jiří Drahoš  
President of the Academy of Sciences

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**01**

# Introduction

## INTRODUCTION

As compared to previous years, the scientific-research, educational and cultural activity of the Academy of Sciences of the Czech Republic (hereinafter referred to as the 'ASCR') took place in 2010 in impaired external, particularly economic, conditions. Predominantly, an international economic crisis was taking effect, whose result was a substantial slowing of the growth of the public support for research, development and innovation. Nevertheless, the ill-conceived reform of research, development and innovation from 2008–2009 and primarily the introduction of a completely mistaken methodology of the evaluation of the results achieved in this area, which threatened not only the institutes of the ASCR but the quality and position of Czech science and education as a whole, had an even greater negative impact on the activity of the ASCR. As a consequence of these steps, the budget of the ASCR for 2010 as the only institution in the area of science, research and development was reduced by more than half of a billion (CZK), while the original proposal of the Research and Development Council was even much more drastic and over the following years could have led to the complete liquidation of the ASCR. Although this Council, which bore the main responsibility for this irregularity, was recalled in the middle of 2010, its composition was modified and even the first results of an international audit clearly showed the faultiness and harmfulness of the existing approach, the situation was not essentially corrected and the budget of the ASCR also for 2011 was again reduced, albeit to a lesser extent.

This approach to ensuring the activities of the ASCR is in sharp discrepancy with the reality that the ASCR is through its results clearly the most efficient component of research and development in the Czech Republic: it associated only 15% of the employees in research and development and at the same time produces 37% of its internationally recognised results. Further to that, it is also necessary to state that the institutional financing of the ASCR from the state budget covers only 55 % of its total costs, whereas 45% of the other means were acquired by the institutes of the ASCR through competitions from the public and private domestic and foreign grants and from other sources of their own, which is in comparison with similar eminent foreign institutions an exceptionally favourable proportion.

Despite that, the ASCR has to intensively endeavour for a **qualified evaluation** and support not only of its own ac-

tivities but all of our science and research and gradual creation of the conditions which would allow the Czech Republic to assume a place among the advanced countries of Europe and the entire world in the area. In these endeavours, the ASCR continues to rely on the support of the preeminent personalities of our scientific, public and political life, of the Czech and foreign scientific and higher education institutions and of the wider public. Another round of evaluations of their scientific activity for 2005–2009 had special significance in the life of the institutes in 2010. The ASCR is the only research institution in the CR, which has regularly conducted such evaluations since its foundation. This evaluation was already the sixth since 1990 and of those the fourth that took place with the broad participation of foreign reviewers and according to the rules, customs and methodology applied in the scientifically advanced countries as dictated by the current legal regulation. Unlike previous rounds, it has focused on assessing a total of five areas of criteria, namely all the way to the level of the scientific units of the institute, of which there are a total of 406. For the bibliometric part of the evaluation, an analytical system was created by the *Library*, which allowed a detailed mapping of the results of the institutes on the level of the scientific units and the individual types of results.

The overall process of the current evaluation is spread into three connected stages. The first phase – the actual evaluation by the commissions and discussion of their final protocols – which took place predominantly in 2010, will be formally closed at the spring session of the Academic Assembly in 2011. The second phase – the interpretation of the results of the evaluation of the relevant gremia and bodies of the ASCR in cooperation with the management of the institutes – will commence immediately after the completion of the summative phase. The third phase – the projection of this interpretation into the proposal of the conceptual measures of an organisational and financial character – will be the subject of the proceedings of the Academic Assembly in the autumn of 2011.

The leadership of the Academy is convinced that the well-considered evaluation of the results of the evaluation by the relevant bodies of the ASCR and sufficient time for the discussion of possible conceptual and organisational measures with the management of the individual institutes of the ASCR will lead to the desired increase in the

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At the press conference for the ELI project on 26 April 2010, also the coordinator of the project for the CR Bedřich Rus, Director of the *Institute of Physics* J. Řídký and Vice-President of the ASCR M. Tůma appeared among others. (photo: L. Svoboda)

quality of the scientific activity of the institutes and also the strengthening of the position of the ASCR as a key component of the system of science and research in the Czech Republic. In 2010, it was a priority interest of the ASCR to be involved in the creation of the fundamentals for the **utilisation of the structural funds** in the new programme period of the cohesion policy of the EU in 2014–2020 and in the preparation of the 8th Framework Programme for Research and Technological Development of the European Union. The ASCR further became involved in the activities of the new counselling body of the MEYS – the European Research Area Committee (Czech abbreviation: VERA), which has devoted itself to coordinating the policies of the European research area and issuing recommendations for coordination with national policy and for the Council for Large Research, Development and Innovation Infrastructures. The implementation of the projects of the Operational Programme Research and Development for Innovation, financed from the structural funds of the European Union, will be an important and rare occasion for a substantial increase of the quality of some areas of



A model of the **Biotechnology and Biomedical Research Centre** of the ASCR and Charles University in Vestec – BIOCEV. (photo: Archives of the ÚMG)

our science and research. It is anticipated that nineteen institutes of the ASCR will be engaged in the resolution of the projects of this programme as applicants for financing from these funds.

Within the implementation of the so-called large projects of the Operational Programme Research and Development for Innovation, the ASCR achieved progress when the project of an excellent laser research infrastructure ELI (Extreme Light Infrastructure) and Biocev (Biotechnology and Biomedicine Centre of the ASCR and Charles University) exceeding CZK 9 billion in the total subsidy was sent to Brussels for evaluation and approval. Yet it a demanding task not only was to build this top scientific centre but also to ensure its high-quality operation with the broad participation of leading foreign scientists so as not to weaken the support of the other areas of research. It takes greater significance particularly because the growth of the means for the public support of research and development has so far been much slower recently than was anticipated at the time the project was prepared.

## INTRODUCTION



37th Session of the Academic Assembly on 14 December 2010 was attended also by Prime Minister of the Government of the CR P. Nečas.  
(photo: M. Hužvárová)



A large travelling exhibition of the ASCR Science on Our Side was begun in Brno on 20 September 2010.  
(photo: M. Hužvárová)

In terms of the internal **institutional life of the ASCR** in 2010, its most important events were the completion of the activities of its highest self-governmental body – the Academic Assembly of the ASCR – for the functional period of 2006–2010 and the establishment of the new composition of the Assembly for the functional period of 2010–2014. The newly formed Assembly, which began its activity with the 37th Session on 14 December 2010, is composed of a total of 239 members, of which, fifty-four are directors of institutes of the ASCR, 121 are elected representatives of the institutes, who are elected by assemblies of the research employees of the institutes, fifteen representatives of higher education institutions appointed by the Council of Higher Education Institutions of the CR, ten representatives of state bodies appointed by the Government of the Czech Republic, ten representatives of industry, business circles and banks, twenty-three important domestic and foreign scientists and six members of the Academic Council, who were not elected or appointed as members of the Academic Assembly in one of the categories mentioned above. In accordance with the Regulations of the

ASCR, the Assembly elected the Supervisory Commission for another four-year period in function, and in addition newly also the permanent Mandate Commission, which will constantly monitor the validity of the mandates of the members of the Assembly and the appropriate procedural conditions for its work. The full, up-to-date composition by name of the Assembly and both mentioned commissions has been published at the website of the ASCR.

There were no changes in the **structure of the scientific institutes of the ASCR** in 2010. Besides these fifty-three institutes, another fifty-four joint workplaces (without legal subjectivity) belong to it, created on the basis of contracts on cooperation between the ASCR and higher education institutions. In accordance with the relevant legal regulations, a regular annual check of the course of the resolution of the research plans of the institutes of the ASCR was conducted for 2009 and also the overall evaluation of the completed research programmes 'Information Society' and 'Support of Targeted Research Projects', where the ASCR was the provider, was adopted.

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There was also no more extensive changes in the occupancy of the functions of the directors of the institutes of the ASCR in 2010, because the five-year functional period of the function of the majority of the directors ends in 2012. In some individual cases, the President of the ASCR took decisions on the basis of selection processes, the proposals of the councils of the relevant institutes and after discussion in the Academic Council of the ASCR on the following changes:

- doc. RNDr. Jana Pěkníková, CSc. was appointed as the Director of the *Institute of Biotechnology* to a five-year functional period as of 13 January 2010;
- Ing. Petr Křenek, CSc. was appointed as the new Director of the *Institute of Plasma Physics* to a five-year functional period as of 1 February 2010;
- because of the resignation of prof. PhDr. Ivan Šedivý, CSc., from the post of the Director of the *Masaryk Institute and Archive* on 31 March 2010, the running of the institute was entrusted to Mgr. Lucie Kostrbová, Ph.D. as of 1 April 2010; as of 1 August 2010, PhDr. Luboš Velek, Ph.D. was appointed to a five-year functional period as Director of this institute;
- RNDr. Jaroslav Kuneš, DrSc., resigned from the post of the Directors of the *Institute of Physiology* as of 30 June 2010 and RNDr. Lucie Kubínová, CSc., was appointed to a five-year functional period as the new Director of this institute as of 1 July 2010;
- JUDr. Jan Bárta, CSc., entrusted with the operations of the *Institute of State and Law*, was appointed to a five-year functional period as the Director as of 11 June 2010;
- doc. PhDr. Pavel Janoušek, CSc., was released at his own request from the post of Director of the *Institute of Czech Literature* and Ing. Pavel Janáček, Ph.D. was appointed to a five-year functional period as the new Director of this institute as of 1 July 2010.

2010 was an exceptionally demanding year for the ASCR in terms of **communication with the public**. In the atmosphere of pressure to reduce the budget and more or less veiled attacks on the very existence of the ASCR, one of the priorities became seeking new effective forms of the communication of scientific activities. Other than the popularisation of science, cultivation of an awareness of the latest discoveries and last but not least an endeavour to

address the future scientists among the children of school age attractively and comprehensibly, it was necessary to strengthen the public's awareness of the importance of the ASCR for the future of the Czech state and its development. The concentrated work was reflected in an ever stronger public opinion that science and research are a necessary condition of the economic growth of the country and that the ASCR is an indispensable element and guarantor of the rising level of Czech science.

The specific activities and results of the work of the ASCR by the main segments of its activity are described in more detail in the following chapters of this report and its attachments.



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02

# Scientific Activity



## SCIENTIFIC ACTIVITY

The main orientation of research at the ASCR in 2010 was devoted predominantly to the resolution of research plans (Appendix 1).

The proof of the **scientific efficiency** of the institutes of the ASCR is the constant growth of works in the Thomson Reuters – Web of Science citation database. The ASCR has 26% share in the total number of works of published entities from the Czech Republic for the past five years. A full 32% of all of the articles in that period were published by scientists from the institutes of the ASCR. The citation rate of these articles in international journals is 42% of the total number for the entire Czech Republic.

A more detailed overview of the publication results of the ASCR by their categories for the entire ASCR and in the individual sections of the institutes of the ASCR is provided in Appendix 2.

The high scientific qualification in the form of the scientific degree of 'Doctor of Sciences' of the ASCR was granted to eleven scientific personalities in 2010.



**O. Semerák from the Faculty of Mathematics and Physics of Charles University is one of the new Doctors of Sciences, who received their diplomas on 26 May 2010. (photo: Z. Tichý)**

**Tab. 1: Publication Activity in Numbers.**

Year	2006	2007	2008	2009	2010*	2006–2010
Number of works at Web of Science						
Czech Republic	9,396	11,277	12,000	12,888	10,622	56,183
Academy of Sciences of the CR	2,907	3,013	3,109	3,064	2,714	14,807
Number of articles						
Czech Republic	5,186	6,067	6,829	7,313	7,488	32,883
Academy of Sciences of the CR	1,965	2,074	2,224	2,218	2,185	10,666
Number of citations for articles						
Czech Republic	49,794	41,606	32,559	16,543	3,897	144,399
Academy of Sciences of the CR	20,644	19,948	12,833	5,831	1,393	60,649

\* The data for 2010 are not complete. The citation rate can only be monitored in retrospect.

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### 1. The Section of Mathematics, Physics and Informatics

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

In mathematical disciplines, both 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 matter 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.

#### From the results from 2010, we present:

##### **Disentangling of Spectra – theory, practice, and results of the method**

(Astronomical Institute)

The author has developed an original method of spectral disentangling spectroscopically variable stellar systems. The new technique is based on a Fourier transformation in the wavelength domain and allows the separation of spectra into individual components and simultaneously a determination of the parameters of the system with an unprecedented accuracy exceeding the possibilities of other

approaches. The collection of papers provides an extensive and practical review as well as new improvements and applications of the method which has been spread by research collaborators and students and is now used worldwide.



Practical exercises at the Summer school of spectra disentangling, Ondřejov 2008, in which 25 astrophysicists from 10 countries participated.  
(photo: Archives of the Astronomical Institute)

Hadrava, P. – Šlechta, M. – Škoda, P.: Notes on disentangling of spectra. II. Intrinsic line-profile variability due to Cepheid pulsations, *Astronomy and Astrophysics*. Vol. 507 (2009), pp. 397–404.

Caballero-Nieves, S. M. – Gies, D. R. – Bolton, C. T. – Hadrava, P. – Herrero, A. – Hillwig, T. C. – Howell, S. B. – Huang, W. – Kaper, L. – Koubský, P. – McSwain, M. V.: The Ultraviolet spectrum and physical properties of the mass donor star in HD 226868 = Cygnus X-1, *The Astrophysical Journal*. Vol. 701 (2009), pp. 1895–1905.

Hadrava, P.: Disentangling of spectra, theory and practice, <http://arxiv.org/pdf/0909.0172> (2009), 88 pp.

Hadrava, P.: Notes on the disentangling of spectra. I. Enhancement in precision, *Astronomy and Astrophysics* (2009). Vol. 494, pp. 399–402.

Škoda, P. – Hadrava, P.: Fourier disentangling using the technology of virtual observatory, conference 'Binaries – Key to Comprehension of the Universe', eds. A. Prša and M. Zejda, *Astronomical Society of the Pacific Conference Series* (2010), Vol. 435, pp. 71–75.

## SCIENTIFIC ACTIVITY

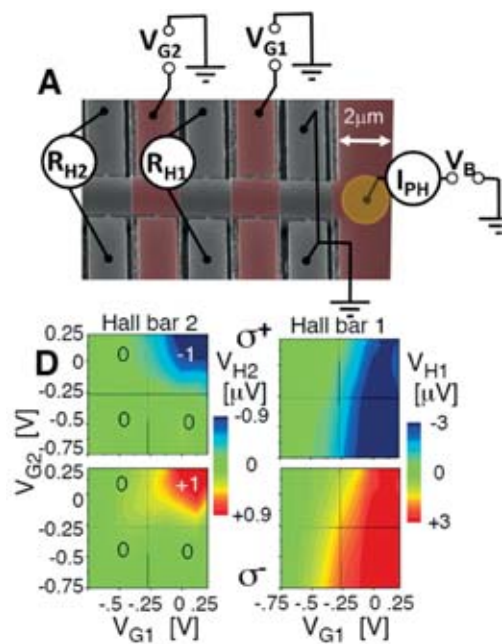
### Spin Hall effect transistor (Institute of Physics)

An international team of researchers has reported experimental demonstration of a transistor whose functionality is based on electron's spin. The technology has focused on down-scaling the device size which has brought transistor dimensions from the table-top size close to the interatomic-distance scale. One extensively studied possibility how continue the miniaturisation is utilizing the second basic attribute of electron which is its elementary magnetic moment, the so-called spin. The team engaged recently discovered quantum-relativistic phenomena for both spin manipulation and detection to realise the spin transistor and to demonstrate logic operation.

To observe the electrical manipulation and detection of spins the team utilised a specially designed planar photo-diode placed next to the transistor channel. By shining light on the diode, photo-excited electrons are injected into the transistor channel. In the present work, a circularly polarised light is used to generate spin-polarised electrons. The quantum relativistic effects are employed to control the precession of spins by input gate-electrode voltages. Quantum-relativity is also responsible for the onset of transverse electrical voltages which depend on the local orientation of precessing electron spins in the transistor channel and represent the output signal.

The new device can have a broad range of applications as an efficient tool for manipulating and detecting spins in semiconductors without disturbing the spin-polarised current and without using magnetic elements. The observed output electrical signals remain large at high temperatures and are linearly dependent on the degree of circular polarisation of the incident light. The device represents therefore a realisation of an electrically controllable solid-state polarimeter which directly converts polarisation of light into electric voltage signals. Medium term applications may exploit the device to detect the content of chiral molecules in solutions, for example to measure the blood sugar level of patients or the sugar content of wine. Whether spin-transistors will become a viable alternative of current transistors in information processing devices is yet to be discerned.

Cooperating entities: Charles University, Hitachi Cambridge Laboratory and the University of Nottingham, Great Britain, and Texas A&M University, USA  
*Wunderlich, J. – Park, B. G. – Irvine, A. C. – Zarbo, L. P. – Rozkotová, E. – Němec, P. – Novák, V. – Sinova, Jairo – Jungwirth, T.: Spin Hall effect transistor, Science 330 (2010), pp. 1801–1804.*



**Spin Hall Effect Transistor.** The SEM image of the micro-device along with the transistor circuitry. D – The measured data representing the logical function AND as realised by the means of electron spin.

### On the complexity of circuit satisfiability (Institute of Mathematics)

The aim of computational complexity theory is, for given problems, to determine the computational resources precisely, i.e. the time and memory they need. To find an upper boundary on complexity means designing an algorithm that uses little time or memory. To find a lower boundary is usually much more difficult and requires the use of nontrivial theory. That is why our ideas about the complexity of hard problems are currently mostly based only on conjectures. The key conjectures in complexity theory have only qualitative nature and do not determine

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specific values for given types of complexities. This article presents probably the first result that shows how a quantitative problem of a lower boundary can be reduced to a qualitative one.

Specifically, the research workers considered the problem whether a given circuit is satisfiable, i.e. can provide output 1 for some input vector. This problem plays a crucial role in complexity theory because it is one of the hardest problems in the class NP. It seems that this problem cannot be solved more efficiently than essentially by searching all input vectors. Such algorithms have exponential complexity. In this paper the researchers have, in some sense, confirmed this conjecture for a class of probabilistic algorithms. They showed that if the problem could only be solved a little more efficiently, then there would exist very efficient algorithms for it, which is considered to be very unlikely. This proves that if the problem of satisfiability of boolean circuits is hard, as it is generally assumed, then no probabilistic algorithm from the considered class can solve it in subexponential time.

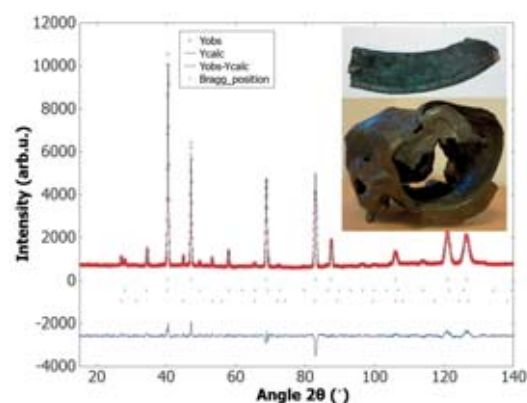
Cooperating entity: Ramamohan Paturi, University of California, USA

*Paturi, R. – Pudlák, P: On the complexity of circuit satisfiability. Proceedings of the 2010 ACM Symposium on Theory of Computing (2010), pp. 241–249.*

### **X-ray, synchrotron, and neutron diffraction analysis of a Roman cavalry parade helmet fragment** (Nuclear Physics Institute)

Non-destructive surface and in-depth analysis by x-rays or neutrons offers a wide range of applications in the study of rare archaeological artefacts. Thanks to the unique properties of neutrons, one can obtain information on the basic material hidden under a thick layer of corrosion products without having to remove it. Analysis of the corrosion products can obtain additional valuable information on the climate and soil composition of the place of discovery. Combining the results of X-ray and neutron diffraction analysis important conclusions were obtained about the discovery of a unique Roman cavalry parade helmet from the second century AD. The helmet was found during excavations of a Roman military camp Gerulata situated

near the village Rusovce (Slovak Republic). The analysis disproved the initial assumption that the helmet is made of bronze. The helmet was made of brass, with zinc content of about 18%. This zinc content respects the manufacturing process of cementing routinely used by the Romans and corresponds with similar findings of the Roman brass artefacts during the first century AD. Diffraction analysis of surface corrosion layer showed that its main components are cuprite ( $\text{Cu}_2\text{O}$ ) and nantokite ( $\text{CuCl}$ ). These minerals were also found as various components of the corrosion products of bronze artefacts from Byzantine coins to Swedish decorations and are the main products of corrosion of copper alloys.



**Neutron diffraction pattern of Roman cavalry parade helmet. Measured (red dots), calculated (black line) and difference (blue line) neutron diffraction pattern of Roman parade helmet. Lines below the patterns show the position of the peaks of the individual phases (from top brass, cuprite, nantokite). Right bottom – a global view of a Roman cavalry parade helmet found in the excavation of a military camp Gerulata near town Rusovce (Slovak Republic) from which the fragment was analyzed (right top).**

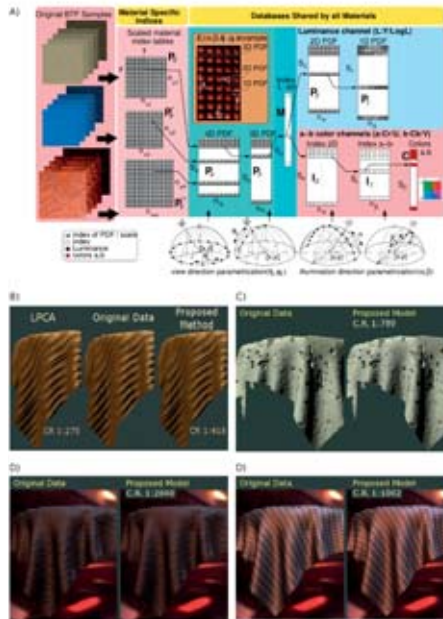
Cooperating entity: Institute of Inorganic Chemistry, Slovak Academy of Sciences

*Smrčok, L. – Petřík, I. – Langer, V. – Filinchuk, Y. – Beran, P: X-ray, synchrotron, and neutron diffraction analysis of Roman cavalry parade helmet fragment. Cryst. Res. Technol. 45, No. 10 (2010), pp. 1025–1031.*

## SCIENTIFIC ACTIVITY

### Bidirectional Texture Function Compression based on Multi-Level Vector Quantisation

(Institute of Information Theory and Automation)



Scheme of the BTF compression method principle with example results and achieved compression rates: (A) The BTF compression method and illumination and view direction parameterization principle. (B) Comparison of rendering from original BTF measurements (middle) with the results of the competing approach (left), and proposed method (right). (C) Rendering of the HDR BTF sample illuminated by a point-light. Measured data (left), compressed data (right). (D) Rendering of two BTF samples in environment illumination. Measured data (left), compressed data (right).

The Bidirectional Texture Function (BTF) is becoming widely used for accurate representation of real-world material appearance. In this result a novel BTF compression model is proposed. The model resamples input BTF data into a parametrisation, allowing decomposition of individual view and illumination dependent texels into a set of multi-dimensional conditional probability density functions. These functions are compressed in turn using a novel multi-level vector quantisation algorithm. The result of this algorithm is a set of index and scale code-books for individual dimensions. BTF reconstruction from the model is then based on fast chained indexing into the nested stored code-books. In the proposed model, luminance and

chromaticity are treated separately to achieve further compression. The proposed model achieves low distortion and compression ratios 1:233–1:2040, depending on BTF sample variability.

Cooperating entity: Ing. Vlastimil Havran, Ph.D., Faculty of Electrical Engineering Czech Technical University in Prague

Havran, V. – Filip, J. – Myzskowski, K.: Bidirectional texture function compression based on Multi-level vector quantization. *Computer Graphics Forum*. Vol. 29, No. 1 (2010), pp. 175–90.

#### Other important results:

1. Numerical modeling of Mercury's magnetosphere (*Astronomical Institute*)
2. The Earth Orientation Catalog 4: An optical reference frame for monitoring Earth orientation in the 20th Century (*Astronomical Institute*)
3. A multiferroic material to search for the permanent electric dipole moment of the electron (*Institute of Physics*)
4. Electron gas kinetics in a laser corona (*Institute of Physics*)
5. Original approach to the preparation of Si nanocrystals and their unique luminescence properties (*Institute of Physics*)
6. Experimental and theoretical determination of the nature of electronic structure in ferromagnetic (Ga, Mn)As (*Institute of Physics*)
7. Asymptotic behaviour of dynamical systems in fluid mechanics (*Institute of Mathematics*)
8. BDDC by a frontal solver and stress computation in a hip joint replacement (*Institute of Mathematics*)
9. A Posteriori Error Estimates Including Algebraic Error and Stopping Criteria for Iterative Solvers (*Institute of Computer Science*)
10. Functional connectivity in resting-state fMRI: Is linear correlation sufficient? (*Institute of Computer Science*)

## 2. The Section of Applied Physics

The section 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, 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 with typical applications in bioengineering, medicine, ecology, including health protection and human safety, and on the preservation of the natural and cultural heritage of humankind are also supported.

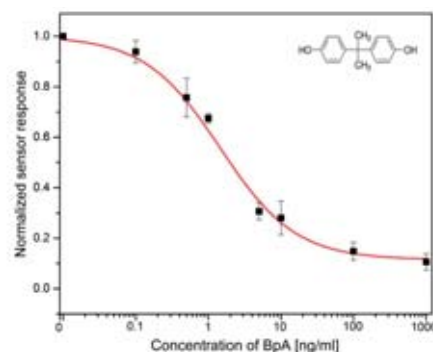
From the results from 2010, we present:

### Novel optical biosensors for environmental monitoring and medical diagnostics

(Institute of Photonics and Electronics)

The diffusion of the inorganic and biological worlds represents an important paradigm of modern science and technology. Optical biosensors combine human-made optical sensing devices with biological molecules to investigate interactions among molecules or detect target molecules of interest. Devices enabling rapid and sensitive detection of biological substances are urgently needed in many important areas, including medical diagnostics, environmental monitoring, and food safety. Researchers at the Institute of Photonics and Electronics, AS CR, v. v. i. (IPE) have developed novel biosensors based on optical excitation of surface plasmons. These biosensors incorporate original high-performance sensing platforms, microfluidic systems for sample collection and delivery to the sensor and specific biomolecular receptors (e.g. antibodies, nucleic acids) allowing highly-specific detection of selected analytes. The biosensors developed at the IPE have been applied to a wide

variety of bioanalytical tasks in environmental monitoring and medical diagnostics. Researchers at the IPE developed a sensitive sensor for detection of Bisphenol A (BpA) in waste water and drinking water. In collaboration with researchers at VIDIA spol. s r. o. they demonstrated that the sensor is much more sensitive than the presently used methods and that it is capable of detecting BpA at concentrations below 100 pg/ml. Biomarkers relevant to cancer diagnostics – human chorionic gonadotropin (hCG) and activated leukocyte cell adhesion molecule (ALCAM) – were detected by SPR biosensors developed at the IPE in blood plasma samples with limits of detection as low as 45 ng/mL (ALCAM) and 100 ng/mL (hCG). In collaboration with researchers at the Institute of Systems Biology (Seattle, USA), IPE scientists developed a biosensor enabling detection of microRNAs. The team has demonstrated detection of microRNA related to drug-induced liver injury at concentrations down to 2 pM with an absolute amount at high attomoles.



Response of the optical biosensor developed at the *Institute of Photonics and Electronics* to different concentrations of bisphenol A (BpA).

Cooperating entities: Institute of Systems Biology, Seattle, USA and VIDIA, spol. s r. o., Vestec u Prahy  
*Piliarik, M. – Bocková, M. – Homola, J.: Surface plasmon resonance biosensor for parallelised detection of protein biomarkers in blood plasma. Biosensors and Bioelectronics. Vol. 26 (2010), pp. 1656–1661.*

*Hegnerová, K. – Piliarik, M. – Šteinbachová, M. – Flegeľová, Z. – Černohorská, H. – Homola, J.: Detection of bisphenol A using a novel surface plasmon resonance biosensor. Analytical and Bioanalytical Chemistry. Vol. 398 (2010), pp. 1963–1966.*

*Hegnerová, K. – Homola, J.: Surface plasmon resonance sensor for detection of bisphenol A in drinking water. Sensors and Actuators B. Vol. 151 (2010), pp. 17–179.*

## SCIENTIFIC ACTIVITY

Šípová, H. – Zhang, S. – Dudley, A. M. – Galas, D. – Wang, K. – Homola, J.: Surface plasmon resonance biosensor for rapid label-free detection of microRNA at subfemtomole level. *Analytical Chemistry*. Vol. 82 (2010), pp. 10110–10115.

Špringer, T. – Piliarik, M. – Homola, J.: Surface plasmon resonance sensor with dispersionless microfluidics for direct detection of nucleic acids at the low femtomole level. *Sensors and Actuators B*. Vol. 145 (2010), pp. 588–591.

Vala, M. – Chadt, K. – Piliarik, M. – Homola, J.: High-performance compact SPR sensor for multi-analyte sensing. *Sensors and Actuators B*. Vol. 148 (2010), pp. 544–549.

### A reliable estimation of cracks behaviour in layered materials

(Institute of Physics of Materials)

In order to design modern engineering structures with the desired properties, it is necessary to use a combination of different materials. The ability to predict the fracture of such components is of fundamental importance for the assessment of the reliability of engineering structures. Common descriptions of the stress field around the crack tip based on the stress intensity factor are in such situations sometimes not satisfactory and accurate. The authors modelled the effect of the material interface or free surface using a general singular stress concentrator and formulated criteria describing crack behaviour in such cases. Based on this methodology, it is possible to estimate the realistic shape and path of the growing crack and critical value of the fracture parameters. As a practical application, the apparent fracture toughness of ceramic laminates was numerically estimated and a new material design of such composites was recommended, in the case of polymer materials crack penetration through the interface between the protective layer and main material. The results obtained contribute to a better understanding of the failure.

Hutař, P. – Náhlík, L. – Knésl, Z.: The effect of a free surface on fatigue crack behaviour. *International Journal of Fatigue*. No. 32 (2010), pp. 1265–1269.

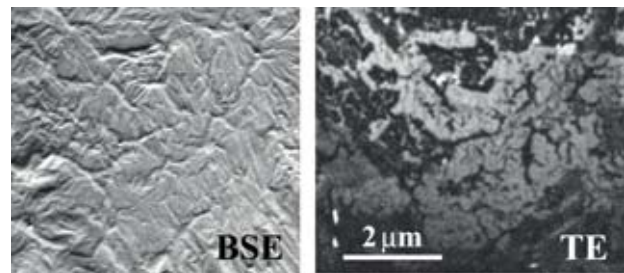
Hutař, P. – Náhlík, L. – Šestáková, L. – Ševčík, M. – Knésl, Z. – Nezbedová, E.: A fracture mechanics assessment of surface cracks existing in protective layers of multi-layer composite pipes. *Composite Structures*. No. 92 (2010), pp. 1120–1125.

Náhlík, L. – Šestáková, L. – Hutař, P. – Bermejo, R.: Prediction of crack propagation in layered ceramics with strong interfaces. *Engineering Fracture Mechanics*. No. 77 (2010), pp. 2192–2199.

Klusák, J. – Knésl, Z.: Reliability assessment of a bi-material notch: Strain energy density factor approach. *Theoretical and Applied Fracture Mechanics*. No. 53 (2010), pp. 89–93.

### Scanning transmission microscopy of free-standing thin films with very slow electrons

(Institute of Scientific Instruments)



Graphene imaged with very slow electrons. Micrographs of mutually overlaid graphene flakes, acquired in backscattered electrons (BSE) and in transmitted electrons (TE) at the landing energy of 20 eV, exhibiting very high contrast of individual atomic layers of carbon in the TE image. (photo: Archives of the Institute of Scientific Instruments)

In a scanning electron microscope equipped with a cathode lens, the penetration of electrons through free-standing thin films has been verified depending on the landing energy of electrons, which has led to the development of the transmission mode at extremely low energies. An incoherent signal contribution of secondary electrons emitted from the bottom surface of the film has been revealed and the detector configuration was corrected in order to suppress this signal. Using very slow electrons, the transmissivity and imaging of the graphene have been studied at high lateral resolution. The image contrast in the transmitted electrons of the individual graphene layers has proven itself incomparably higher than the contrast in reflected electrons available so far. The transmissivity of graphene has been found to reach its maximum at 5 eV. Research was made in cooperation with 2010 Nobel prize laureates A. Geim and K. Novoselov from the University of Manchester, who prepared the graphene samples.

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Cooperating entity: University of Manchester, Great Britain

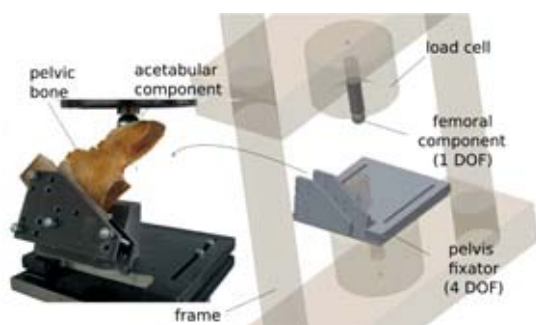
Müllerová, I. – Hovorka, M. – Hanzlíková, R. – Frank, L.: *Very low energy scanning electron microscopy of free-standing ultrathin films. Material Transactions. Yearbook 51, No. 2 (2010), pp. 265–270.*

Müllerová, I. – Hovorka, M. – Frank, L.: *Advances in low energy scanning electron microscopy. Proceedings of 17th International Microscopy Congress (IMC17), Rio de Janeiro (2010), pp. 256–257.*

Frank, L. – Hovorka, M. – Konvalina, I. – Mikmeková, Š. – Müllerová, I.: *Very low energy scanning electron microscopy. Nuclear Instruments and Methods in Phys. Res. A. (2011), in press.*

Müllerová, I. – Hovorka, M. – Frank, L.: *Scanning transmission low energy electron microscopy. Proceedings of 7th LEEM/PEEM International Workshop, New York 2010.*

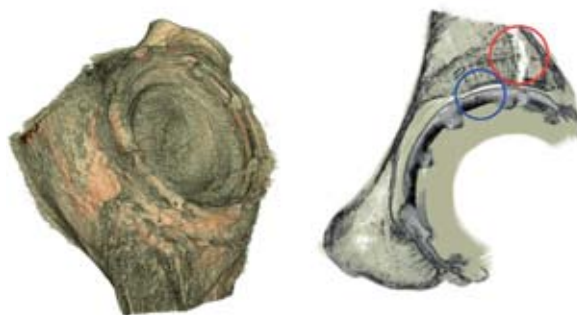
### Radiological investigation of cement mantle degradation and loosening of hip joint replacement under cyclic loading (Institute of Theoretical and Applied Mechanics)



**Hip joint simulator.** The hip joint simulator was developed for acetabular implant testing. The experimental setup was designed to allow cyclic loading of the sample of pelvic bone with implanted cemented acetabular component. The device was designed as an accessory for Instron 1343 and Instron 1603 loading machines. (photo: Archives of the *Institute of Theoretical and Applied Mechanics*)

Cement mantle degradation and bone-cement interface debonding of hip joint implant during physiological loading conditions have been investigated using a custom hip simulator and radiological measurement. The acetabular cup made from UHMWPE was implanted into a human pelvic bone and tested in a custom hip joint simulator under physiological loading conditions. The experimental setup was designed to allow the cyclic loading of the sample of

pelvic bone with implanted cemented acetabular component. The most unfavourable activity (downstairs walking) was simulated in the experiment. The process of damage accumulation in the fixation was monitored by repeated X-ray scanning using high resolution micro Computed Tomography. Use of micro-focus source and high-resolution flat panel detector of large physical dimensions allows investigation of structural changes and crack propagation both in the cement layer and the trabecular bone.



Visualisation of the pelvis with implanted acetabular component after mechanical testing. The significant damage and direction of crack propagation in inner structure is observable in the segment of the model of the loaded pelvis. Debonding of the cement mantle from the bone is visible easily distinguishable in the area labelled with the blue circle, the crack in the region of acetabular labrum is highlighted with red circle. (photo: Archives of the *Institute of Theoretical and Applied Mechanics*)

Cooperating entity: Institute of Experimental and Applied Physics, Department of Mechanics, Faculty of Civil Engineering, Czech Technical University in Prague  
Kytýř, D. – Jiroušek, O. – Dammer, J.: *Radiological investigation of bone cement layer behaviour under cyclic loading. In Experimental methods and numerical simulations in engineering science. Wuppertal: Institute static and dynamic of structures University of Wuppertal, (2010), pp. 64–65.*

Kytýř, D. – Doktor, T. – Jiroušek, O. – Zlámal, P. – Pokorný, D.: *Experimental and numerical study of cemented bone-implant interface behaviour. 9th Youth Symposium on Experimental Solid Mechanics. Trieste: Italian Group of Fracture (2010), pp. 151–154.*

Kytýř, D. – Jiroušek, O. – Dammer, J.: *High resolution X-ray imaging of bone-implant interface by large area flat-panel detector. Journal of Instrumentation (2010), in press.*

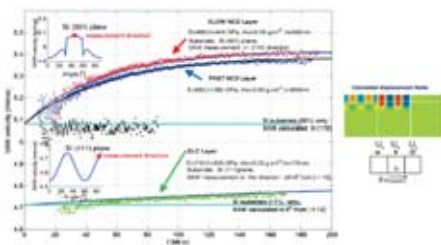


## SCIENTIFIC ACTIVITY

### Mechanical properties of surface layers

(Institute of Thermomechanics)

Thin coatings have become an increasingly popular topic of investigation in material science, electronics and biomedical applications. Standard methods of identification of their mechanical properties have limitations and shortcomings. A new ultrasonic method was proposed. The method is based on the changes of the resonant frequencies of specimens, which are caused by the presence of deposition layers on substrates. The scope of the modified resonant ultrasound spectroscopy (RUS) method was tested on diamond layers (DLC and NCD) of 100 nm – 1µm thickness and on the plasma sprayed coatings of alumina (100-200µm).



Elastic constants (Young's modulus and K- bulk modulus) of diamond surface layers deposited on various cuts of the Si substrate evaluated from the measurement of surface acoustic waves (SAW) dispersion curves (SAW velocity versus frequency). The figure shows the results for three examples of the coatings: 1) slow grown layer DLC – red points, 2) fast grown NCD layer – blue experimental points and 3) thin amorphous DLC layer – green points. The corresponding fitted curves by sought parameters are plotted by solid lines and resulting elastic quantities are shown. The results are strongly dependent on the orientation of the substrate crystal. We must know not only orientation of the substrate cut, but also the direction of SAW propagation with respect to the crystallographic axes. The theoretical displacement field in the layer on substrate is shown on the right side.

The proposed method is particularly suitable for the investigation of in-plane elastic properties of layers, and it may also be implemented to monitor the deposition process in situ. Furthermore, analysing the resonant frequency changes, it is possible to estimate the level of residual stresses in materials and to follow the propagation of surface acoustic waves (SAW) through anisotropic media. The method was successfully tested on specimens composed of carbon layers deposited on silicon substrates. The principal investigator conducted a set of experiments at ATF KU Leuven during his stay in Belgium. The unique SAW methodology in combination with the original RUS meth-

od showed much advantage over the standard arrangement when the two techniques were separately used.

Růžek, M. – Seiner, H. – Sedlák, P. – Kruisová, A. – Landa, M.: *Linearized forward and inverse problem of the resonant ultrasound spectroscopy for the evaluation of thin surface layers. Journal of the Acoustical Society of America, in print.*

Kocourek, T. – Růžek, M. – Landa, M. – Jelínek, M. – Mikšovský, J. – Kopeček, J.: *Evaluation of elastic properties of DLC layers using resonant ultrasound spectroscopy and AFM nanoindentation. Surface and Coating Technology, in print.*

### Other important results:

1. Fiber-optic pH detection of small volumes of bio-samples (Institute of Photonics and Electronics)
2. International cooperation of science and industry in development of the new prototype of an ultra-stable quartz oscillator (Institute of Photonics and Electronics)
3. Study of turbulence and electric fields of the edge plasma on ASDEX Upgrade using Ball-pen probe (Institute of Plasma Physics)
4. Microstructural aspects of non-linear deformation and crack propagation in thermal spray coatings (Institute of Plasma Physics)
5. Laser Induced Cavity Pressure Acceleration – new highly efficient method for plasma acceleration (Institute of Plasma Physics)
6. Monitoring and modeling of the water flow in the unsaturated zone of the soil profile, in the surface layer of atmosphere and in the stem of trees (Institute of Hydrodynamics)
7. Multi-walled carbon nanotube network/polymer composites and their mechanical, electrical, thermal and chemical vapor sensing properties (Institute of Hydrodynamics)
8. Self-organisation of microparticles caused by optical interaction between them (Institute of Scientific Instruments)
9. Cultural Heritage Protection against Flood (Institute of Theoretical and Applied Mechanics)
10. Mathematical and experimental modelling of fluid-structure interaction in human vocal folds (Institute of Thermomechanics)

### 3. The Section of Earth and Space Sciences

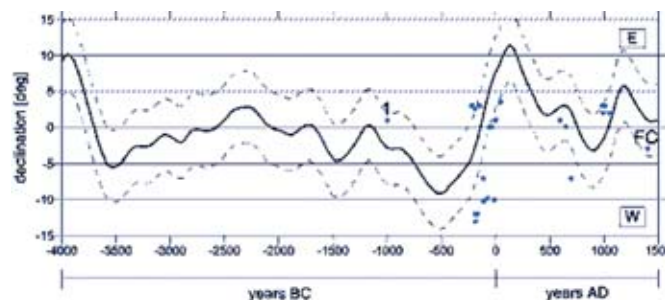
The section includes five institutes whose subject of research is the Earth and its nearby as well as distant surroundings. The priorities include the study of the inner structure and physical properties of the Earth, research of the development of the lithosphere, biosphere and natural environment from 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 the space around it. 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.

#### From the results from 2010, we present:

#### Chinese tombs oriented by a compass: Evidence from paleomagnetic changes versus the age of tombs (Institute of Geophysics)

The research workers have found agreement of the orientation of Chinese imperial tombs, 'pyramids', with a model paleo-declination curve from the main field model CALS7K.2 for Central China between 1000 BC to 1420 AD, spanning the period of the reign of the Zhou, Han, Tang, Song and Ming dynasties. The Chinese have used compasses from time immemorial for orienting objects and constructions in the north-south direction in accordance with their spiritual principle of feng shui. Contrary to nearly a rigid position of the Earth's rotation pole, the magnetic pole moves continuously, and significantly deviates from the pole of rotation, the deviation reaching up to 12°. Several Chinese pyramids have dimensions comparable to those of the greatest Egyptian pyramid, about 240m. The study shows that the individual pyramids were oriented into the direction of the current magnetic pole at the time their construction was started. The results of the study allow us to employ the north-south orientation of additional documented pyramids and further Chinese historical (architectural) objects, e.g. city walls, spiritual paths, streets, palaces, canals, etc., as a significant supplementary tool for evaluating the position of the magnetic pole in the past with increased precision. The approach is highly promis-

ing as rich data resources over considerable parts of Asia, including China, have not yet been available for this kind of investigations. This work is the first study on this topic worldwide, and even in China itself this sort of research has not been conducted. Results of the study have already found a significant response in the paleomagnetic and archaeological research communities.



Paleomagnetic declinations for the region of central China, according to the CALS7K.2 model, for the time interval from 4000 BC to 1500 AD. The deviation of the declinations from the North geographic pole is plotted in degrees, the positive values are to the East [E]. The accuracy of the model has been estimated by the authors to be about 50, and is indicated by dashed lines around the paleodeclination curve.



Pyramids from two epochs and dynasties, central China. (a) Pyramid of the dynasty Western Han, Kan(g)ling, 1 BC – 5 AD, eye altitude 1.1 km, size 225 x 235 m. (b) Pyramid of the dynasty Western Han, Wudiling, 140 – 87 BC, eye altitude 1.1 km, size 235 x 240 m. Ling in Chinese means imperial tomb. The pictures are oriented towards the present geographical North. Adopted from Google Earth. (photo: Archives of the *Institute of Geophysics*)

Charvátová, I. – Klokočník, J. – Kolmaš, J. – Kostelecký, J.: Chinese tombs oriented by a compass: Evidence from paleomagnetic changes versus the age of tombs. *Studia Geophys. Geod.* Vol. 55, No. 1 (2011), in print.

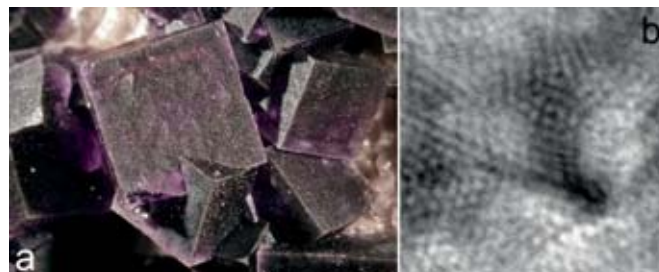
## SCIENTIFIC ACTIVITY

### Defects in the structure of fluorite owing to long-term natural irradiation: is fluorite really a suitable candidate for nuclear waste management?

(Institute of Geology)

Fluorite and substances with fluorite-based structures have been repeatedly expected to represent materials suitable for nuclear waste management based on studies on experimentally irradiated samples. These studies, though applying radiation doses of variable intensity, cannot account for the time factor. Therefore, samples of fluorite that underwent natural irradiation lasting millions of years have been selected for the investigation. The sample from Kletno (Poland) has been exposed to uraninite-emitted radiation while the material from Vlastějovice (Czech Republic) has been irradiated by coexisting allanite (cerium silicate). The former was expected to display the highest degree of irradiation damage, it is dark purple coloured and shows dim surface. The latter sample was assumed to undergo lower irradiation since the activity of allanite is several times lower as compared to uraninite. The reference materials were non-irradiated fluorite from the locality of Jílové u Děčína (Czech Republic) and a synthetic fluorite (Suprapur, Merck). All of the fluorite samples were studied by several analytical methods, including X-ray diffraction, positron annihilation spectroscopy, photoluminescence spectroscopy and transmission electron microscopy. X-ray powder diffraction indicates the presence of peak broadening. This broadening is dominated by micro-strain contribution whereas domain size induced broadening is negligible. The degree of peak broadening is proportional to the anticipated irradiation dose. Transmission electron microscopy (TEM), similar to X-ray diffraction, showed that the defect concentration depends on the radiation source activity. The reference material displays no defects observable by TEM whereas in the sample from Vlastějovice, experiencing low irradiation, dislocation loops occur and the Kletno sample contains such a high density of defects that it makes it almost impossible to distinguish the individual dislocations or dislocation loops. Besides the dislocations and dislocation loops, the calcium inclusions are present in the sample which underwent the most severe irradiation but not in low irradiated or standard samples. Spectroscopic methods and calculations helped to characterise the defects on an atomic scale. Irradiation is responsible for the formation of vacancies and their agglomeration. All the observations above

make the use of fluorite for the potential containment of radioactive waste rather questionable.



**Defects in the structure of fluorite owing to long-term natural irradiation: Is fluorite really a suitable candidate for nuclear waste management? Crystals of fluorite (a) and a HRTEM image of a highly strained irradiated fluorite sample along [111] zone axis (b) (b)**  
(photo: J. Sejkora)

Cooperating entities: Faculty of Science of Charles University, Prague; Bayerisches Geoinstitut, Universität Bayreuth, Bayreuth, Germany; Faculty of Mathematics and Physics of Charles University; Institute of Physics of the ASCR, Prague; Faculty of Nuclear Sciences and Physical Engineering of the Czech Technical University, Prague

*Viček, V. – Čížek, J. – Dražokoupil, J. – Valenta, J. – Miyajima, N. – Skála, R.: Defects in CaF<sub>2</sub> caused by long-time irradiation and their response to annealing. Philosophical Magazine. Yearbook 90, No. 20 (2010), pp. 2749–2769.*

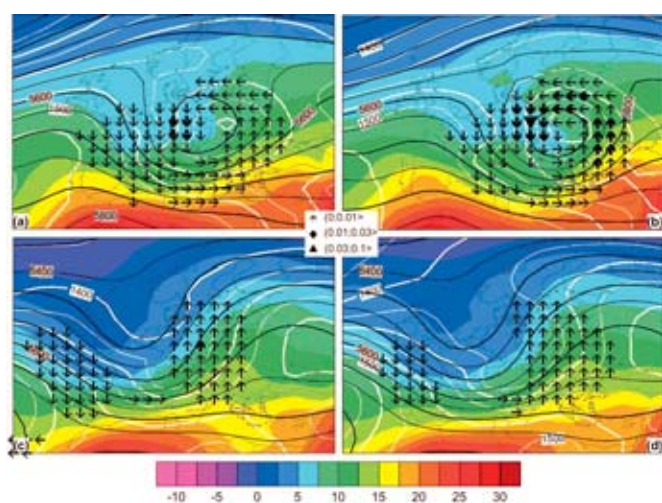
### Variants of causal conditions of heavy precipitation in the Czech Republic and Central Europe

(Institute of Atmospheric Physics)

The research employees have developed a method of the classification of circulation types which is based on the quantitative evaluation of the intensity of zonal and meridional moisture fluxes on a spatial scale of the order of 100 km. The method enables a comparison of the circulation causes of hydro-meteorologically extreme events in various regions. The research workers applied the method to heavy precipitation events which occurred in the Czech Republic (CR) and selected catchment areas of Central Europe in warmer half-years of 1958–2002. It was shown that the events were accompanied by very intensive moisture fluxes in the vicinity of the rainfall area. Using a technique of divisive fuzzy clustering of the events in the CR, the re-

## ANNUAL REPORT OF THE ASCR 2010

search employees distinguished four variants of causal circulation conditions which are characterised by recurring passages of frontal waves from the southwest and alternatively by passages of individual cyclones east or south of the CR. In Central Europe, the researchers proved a close relation between three-day areal precipitation amounts in a catchment and the increase of average daily flow. We detected four regions with various circulation types responsible for heavy precipitation and demonstrated the dependence of the dominant circulation type on the seasonal distribution of heavy precipitation in these regions.



Variants of the circulation conditions of heavy precipitation in the CR. Mean temperature field at 850 hPa level (color scale in °C) and mean geopotential fields at 850 hPa level (white contours in  $m^2s^{-2}$ ) and 500 hPa level (black contours in  $m^2s^{-2}$ ) combined with a mean measure of the intensity of zonal or meridional moisture flux (arrows) for a cyclonal (a, b) and a frontal (c, d) variant of heavy precipitation in the CR. The shape of the arrow represents the lowest mean probability of not exceeding of the magnitude of the moisture flux component which was reached at 850, 700, 500, and 300 hPa levels. The orientation of the arrow indicates the orientation of the moisture flux component. For both variants, the fields on a day of precipitation onset (a, c) and on the next day (b, d) are shown.

Kašpar, M. – Müller, M.: Variants of synoptic-scale patterns inducing heavy rains in the Czech Republic. *Physics and Chemistry of the Earth*. Vol. 35, (2010), pp. 477–483.

Müller, M. – Kašpar, M.: Quantitative aspect in circulation type classifications – An example based on evaluation of moisture flux anomalies. *Physics and Chemistry of the Earth*. Vol. 35 (2010), pp. 484–490.

### Acoustic generator of pressure pulsations (Institute of Geonics)

The Institute of Geonics has oriented the research in the area of intensification of effects of high-speed water jets into a solution of the problem of the generation of pulsating water jets. Both an analytical solution and numerical methods of flow simulation verified experimentally were used to study the fundamentals of the processes of excitation and the propagation of acoustic waves (and/or high-frequency pressure pulsations) in liquid in a high-pressure system and their effects on forming and properties of pulsating liquid jets. The proprietary method of the generation of pressure pulsations in high-pressure system to generate pulsating water jets using acoustic generator was designed and verified. The method proved a significant increase of the disintegration effects of pulsating water jets on various types of materials in comparison to continuous jets.



Pulsing fan water generated at 20MPa. The scale represents the stand-off distance of in mm.  
(photo: Archives of the *Institute of Geonics*)

Nowadays, the development and manufacturing of acoustic generator of pressure pulsations for an operating pressure up to 150 MPa and excitation frequency 20 and 40 kHz is being concluded. The internal profile of the generator was optimised with respect to the maximum amplification of pressure pulsations in the liquid upstream from the nozzle exit using the CFD and FEM methods. Also a new shape of the ultrasonic sonotrode flange was designed to reduce the undesirable transmission of ultrasonic vibrations into the generator body. Based on results obtained, an exclusive license agreement on the commercial application of

## SCIENTIFIC ACTIVITY

pulsating water jets was signed with renowned German manufacturer of high-pressure equipment.

*Foldyna, J. – Švehla, B.: Method of generation of pressure pulsations and apparatus for implementation of this method. Patent US 07740188.*

*Foldyna, J. – Švehla, B.: Method of generation of pressure pulsations and apparatus for implementation of this method. Patent EP 1863601.*

*Foldyna, J. – Sitek, L. – Ščučka, J. – Martinec, P. – Valíček, J. – Páleníková, K.: Effects of pulsating water jet impact on aluminium surface. Journal of material processing technology. Vol. 209, No. 20 (2009), pp. 6174–6180.*

### **A tectonic pressure pulse and increased geodynamic activity recorded from the long-term monitoring of faults in Europe**

*(Institute of Rock Structure and Mechanics)*



**The tectonic pressure pulse and increased geodynamic activity recorded from the long-term monitoring of faults. The displacement of various widely-distributed tectonic structures were evaluated. From the data obtained it is clear that a tectonic pressure pulse initiated a period of increased geodynamic activity across central and southern Europe during the course of our monitoring. Within the Bohemian Massif, the pressure pulse was first recorded in mid 2003 and the ensuing period of increased geodynamic activity lasted for nearly three years.**  
*(photo: Archives of the Institute of Rock Mechanics and Structure)*

The study recorded the displacement of various widely-distributed tectonic structures along the generally aseismic Sudeten Marginal Fault Zone within the Bohemian Massif (Czech Republic). The derived results were compared with data recorded over the same time period in the Upper

Rhine Graben (Germany), Central Apennines (Italy), and Gulf of Corinth (Greece). It is clear that a tectonic pressure pulse initiated a period of increased geodynamic activity across central and southern Europe during the course of our monitoring. Within the Bohemian Massif, the pressure pulse was first recorded in mid-2003 and the ensuing period of increased geodynamic activity lasted for nearly three years. This period is associated with compression along the Sudeten Marginal Fault Zone.

*Stemberk, J. – Košťák, B. – Cacoň, S.: A tectonic pressure pulse and increased geodynamic activity recorded from the long-term monitoring of faults in Europe. Tectonophysics. Yearbook 487, Nos. 1–4 (2010), pp. 1–12.*

### **Other important results:**

1. Monte Carlo analysis and inversion of electromagnetic induction data *(Institute of Geophysics)*
2. Non-Double-Couple Earthquake Mechanism as an Artifact of the Point-Source Approach Applied to a Finite-Extent Focus *(Institute of Geophysics)*
3. Application of petrophysical rock properties for precise correlation and stratigraphic purposes and evolution of sedimentary environment: an example of Basal Choteč event near the Lower-Middle Devonian boundary *(Institute of Geology)*
4. A symbol carved on a tree trunk from the Holocene Elbe sediments: the oldest so far known record *(Institute of Geology)*
5. Infrasonic signals excited in earthquake epicentre *(Institute of Atmospheric Physics)*
6. Influence of a mountain ridge on the nocturnal airflow and CO<sub>2</sub> fluxes in a forest canopy *(Institute of Atmospheric Physics)*
7. Qualitative and quantitative analysis of minerals in sedimentary rocks using FTIR spectroscopy and multivariate statistical methods *(Institute of Geonics)*
8. Analysis of geosynthetic tubes filled with several separate liquids of different densities *(Institute of Geonics)*
9. High-pressure sorption apparatus for the determination of carbon dioxide sorption on carbonaceous materials *(Institute of Rock Structure and Mechanics)*
10. Shear wave crustal velocity model of the Western Bohemian Massif from Love wave phase velocity dispersion *(Institute of Rock Structure and Mechanics)*

#### 4. The Section of Chemical Sciences

The section includes six institutes and their research is focused 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 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 biological phenomena in biomedicine and ecology and the development of new chemotherapeutics, biologically active substances and polymeric biomaterials for targeted therapeutic applications. The research, which is focused on the processes in multiphase reactive systems, molecular engineering, new methods for initiating chemical reactions and processes important for environmental decontamination and protection, is leading to advanced technologies. An indispensable part of chemical research is also the development of instrumental, analytical and bioanalytic methods.

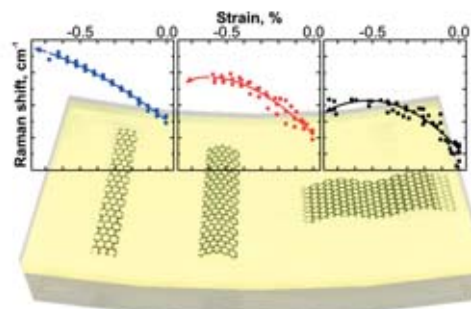
From the results from 2010, we present:

##### Mechanical and electrochemical properties of graphene and its application for photoelectrochemical solar energy conversion

(J. Heyrovský Institute of Physical Chemistry)

Pioneering studies of mechanical and electrochemical properties of graphene have been carried out. In cooperation with the 2010-Nobel Prize Laureates in physics, the behaviour of graphene under uniaxial strain was reported [1,2]. The single-layer graphene under compression was described by the Euler linear buckling regime. Such knowledge has so far been acquired solely by theoretical computations of layers with dimensions of tens to hundreds of nm. The changes in the electronic structure of graphene under tension with different excitation energies have been described. The presence of so-far neglected inner resonance processes has been proved both experimentally and theoretically for the first time [2]. The doping of graphene shifts the Fermi level and can be used to influence the transport and optical properties. The Raman spectra of graphene depend on the

electrochemical doping and laser excitation energy [3]. An anomalous increase of the G mode intensity occurs at highly positive electrode potentials depending on the excitation energy. These results are important for graphene metrology and for a fundamental understanding of its properties related to carbon nanotubes [4]. Graphene is promising for photoelectrochemical energy conversion in dye-sensitised solar cells [5]. Here, it can replace both platinum and transparent conducting oxide, particularly in devices with ionic liquids as electrolytes. Semitransparent (>85%) films of graphene nanoplatelets presented no barrier to drain photocurrents at full illumination by the Sun and the potentials from 0 to ca. 0.3 V, but an improvement of the cell characteristics near the open circuit potential requires an order of magnitude decrease of the charge-transfer resistance. The latter scaled linearly with the graphene film's absorbance, confirming proportionality between the concentration of active sites (edge defects and oxidic groups) and electrocatalytic activity of graphene as a cathode in solar cell.



**Raman 2D mode dependence on the applied compression. The non-linearity and the position of the maxima on the fitted polynomials, which correspond to the critical buckling strain, depend on the lateral dimensions of the compressed monolayer.**

Cooperating entities: University of Manchester, U.K., Institute of Chemical Engineering and High Temperature Chemical Processes, Foundation of Research and Technology-Hellas (FORTH/ICE-HT), Patras, Greece, Technische Universität Berlin, Germany, Massachusetts Institute of Technology, Cambridge, USA, Leibniz-Institut für Festkörper- und Werkstoffforschung Dresden, Germany, École Polytechnique Fédérale de Lausanne, Switzerland.

Frank, O. – Tsoukleri, G. – Parthenios, J. – Papagelis, K. – Riaz, I. – Jalil, R. – Novoselov, K. S. – Galiotis, C.: *Compression behavior of single-layer graphenes. ACS Nano. Yearbook 4, (2010), pp. 3131–3138.*

## SCIENTIFIC ACTIVITY

Frank, O. – Mohr, M. – Maultzsch, J. – Thomsen, C. – Riaz, I. – Jalil, R. – Novoselov, K. S. – Tsoukleri, G. – Parthenios, J. – Papagelis, K. – Kavan, L. – Galiotis, C.: *Raman 2D-band splitting in graphene: theory and experiment.* *ACS Nano*, Yearbook 5, No. 2 (2011), pp. 2231–2239.

Kalbáč, M. – Reina-Cecco, A. – Farhat, H. – Kong, J. – Kavan, L. – Dresselhaus, M. S.: *The influence of strong electron and hole doping on the Raman intensity of chemical vapor-deposition graphene.* *ACS Nano*, Yearbook 4, (2010), pp. 6055–6063.

Kavan, L. – Dunsch, L.: *Spectroelectrochemistry of carbon nanotubes,* *ChemPhysChem*. Yearbook 12 (2011), pp. 47–55.

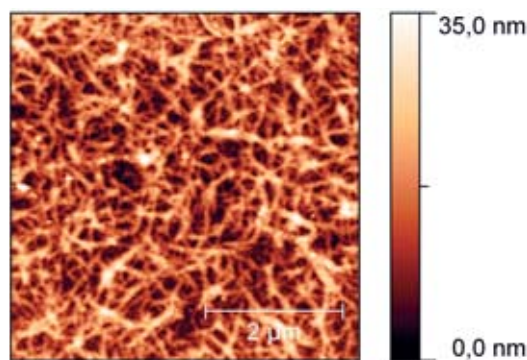
Kavan, L. – Yum, J. H. – Graetzel, M.: *Optically transparent cathode for dye-sensitized solar cells based on graphene nanoplatelets* *ACS Nano*. Yearbook 4 DOI (2010), 10.1021/nn102353h.

### Surface fibrin networks

(Institute of Macromolecular Chemistry)

Immediately after vascular injury, blood coagulation is activated, consisting of a cascade of enzymatic reactions resulting in thrombin formation. By cleaving four fibrinopeptides, thrombin converts fibrinogen circulating in the blood to fibrin that associates spontaneously with the fibres and fibrin network. The fibrin gel together with platelets stops bleeding and later it provides a scaffold for cells regenerating the damaged vessel. We have utilised proteins and mechanisms participating in blood coagulation for controlled formation of surface fibrin network on polymer scaffolds used for tissue engineering. For example, this approach has made it possible to grow a confluent layer of vascular endothelial cells on inner surfaces of synthetic prostheses currently used by surgery for the replacement of disabled blood vessels. Artificial fibrin network grows at the surface from ambient fibrinogen solution due to catalytic action of thrombin previously attached to the adsorbed fibrinogen layer. When studying initial stages of the fibrin network formation on model surfaces, our team in collaboration with a team from the Institute of Hematology and Blood Transfusion in Prague discovered that the cleaving of fibrinopeptides from the adsorbed fibrinogen depends on the fibrinogen concentration in the adsorption solution and that this process differs considerably from the currently accepted concept of that in blood coagulation, as it has

been derived from model experiments. The understanding of these processes might help to develop a better treatment of thrombotic conditions, based on affecting the formation of dangerous thrombi directly at the site of its initiation at the surfaces of damaged or diseased blood vessels.



The artificial fibrin network grows at the surface from ambient fibrinogen solution thanks to catalytic action of thrombin previously attached to the adsorbed fibrinogen layer (Atomic force microscopy).

Cooperating entity: Institute of Hematology and Blood Transfusion in Prague

Riedel, T. – Suttner, J. – Brynda, E. – Houska, M. – Medved, L. – Dyr, J. E.: *Fibrinopeptides A and B release in the process of surface fibrin formation.* *Blood*. Yearbook 117, No. 5. pp. 1700-1706. Filová, E. – Brynda, E. – Riedel, T. – Bačáková, L. – Chlupáč, J. – Lisá, V. – Houska, M. – Dyr, J. E.: *Vascular endothelial cells on two- and three-dimensional fibrin assemblies for biomaterial coatings.* *Journal of Biomedical Materials Research. Part A*. Yearbook 90, No. 1 (2009), pp. 55–69.

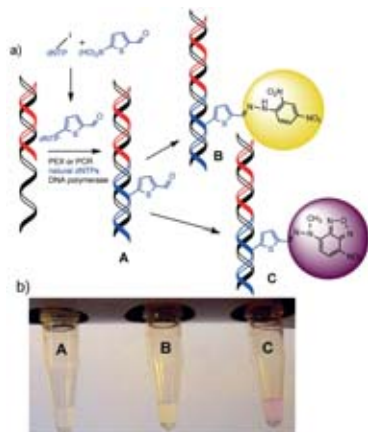
### DNA decorated by aldehydes for attachment of other molecules

(Institute of Organic Chemistry and Biochemistry)

A novel simple and efficient methodology for attachment of other molecules to DNA (bioconjugation) has been developed. It consists in synthesis of DNA bearing very reactive chemical functional groups that can be readily (in one step) linked to diverse other molecules e.g. for studying of molecular mechanism of important biological processes or for labeling of DNA by colour or electroactive markers. This methodology is much shorter, simpler and easier than existing methods of preparation of DNA conjugates and thus it

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has a promising potential for a broad range of applications in interdisciplinary area between chemistry and biology.



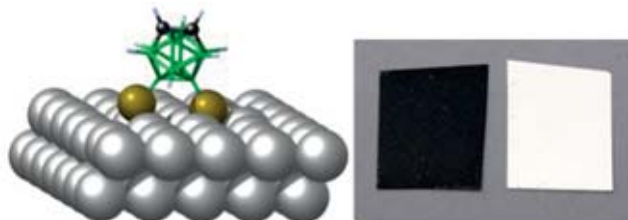
a) Polymerase construction of aldehyde-modified DNA and its further modification by hydrazone-formation. b) Color changes of DNA after modification.

The key intermediate is a DNA bearing very reactive chemical functional groups (aldehydes) as molecular “clips”. The methodology of its synthesis is very straightforward and consists of only two steps. The first step is chemical synthesis of modified nucleoside triphosphates and the second one is enzymatic polymerase catalyzed synthesis of DNA from these building blocks. In this way, one can prepare both short sequences containing one or several aldehyde “clips” and very long DNA containing hundreds of such groups. The aldehyde groups readily react with a number of reagents to attach virtually any other molecule. This principle was shown on the formation of coloured compounds (hydrazones) used for staining of DNA to yellow or pink (see Figure). Now other reactions of the modified DNA are studied in order to attach important biomolecules (peptides, proteins, etc.). This methodology may find a wide range of applications not only in preparation of diverse bioconjugates of DNA but also in material science or nanotechnology where the DNA could serve as an easily programmable and renewable scaffold for attachment of useful chemical molecules of functional groups.

*Raindlová, V. – Pohl, R. – Šanda, M. – Hocek, M.: Direct polymerase synthesis of reactive aldehyde-functionalized DNA and its conjugation and staining with hydrazines. Angewandte Chemie. International Edition. Yearbook 49, No. 6 (2010), pp. 1064–1066.*

## Protection of silver surfaces against corrosion by monomolecular layers of carborane clusters

(Institute of Inorganic Chemistry)



Ag-surface modified by a monolayer of carboranethiols. Thiolated carborane clusters easily bind to a silver surface and self-assemble into organized monomolecular layers. Such modified silver surfaces show a remarkable protection ability against the corrosion caused by atmospheric H<sub>2</sub>S. The picture shows a schematic representation of a molecule of 9,12-(HS)<sub>2</sub>-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub> on a flat silver surface (on the left), and a corroded unprotected silver film versus a film modified by 9,12-(HS)<sub>2</sub>-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub> derivative.

Thiolated carborane molecules easily bind to a silver surface and self-assemble into organised monomolecular layers. Two derivatives (1,2-(HS)<sub>2</sub>-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub> and 9,12-(HS)<sub>2</sub>-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>) with different bonds to the surface (C-S-Ag and B-S-Ag) have especially been investigated. We studied the monolayers of these species self-assembled on silver surfaces, and we have particularly focused on their ability to slow the corrosion process in an atmosphere containing H<sub>2</sub>S. Several supplementary analytical techniques have been used. The corrosion rate was followed by reflectance UV-Vis spectrometry, elemental composition of the surface was analyzed using X-ray photoelectron spectroscopy, topographical changes of the surface were studied using atomic force microscope, and sulphur concentration profiles were measured using Rutherford Back Scattering. We observed the ability of the monolayers to significantly slow the corrosion process, and made a comparison between carborane thiol derivatives and their organic counterparts, which have been previously used for silver protection. The results exhibit a higher stability of the monolayers composed of carborane thiols than of their organic counterparts of similar dimensions, and there seem to be several factors that influence the protection ability of the self-assembled monolayers. A particularly interesting observation is that B-S-Ag bond in 9,12-(HS)<sub>2</sub>-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub> seems to be stronger than the C-S-Ag bonds commonly found in organic thiol derivatives anchored to a silver surface. Additionally, we performed an independent verifi-



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cation of this experimental result using quantum computational methods. The preliminary results confirmed that the 9,12-(HS)2-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub> derivative indeed bind to the surface more strongly than 1,2-(HS)2-1,2-C<sub>2</sub>B<sub>10</sub>H<sub>10</sub>, which binds to the surface via a C-S-Ag link. One of the advantageous features of these monomolecular layers is their easy preparation based on chemical reaction between the surface and thiol derivatives either in the solution, or in a gas phase. We are currently focusing on a better understanding of the structure of the modified flat silver surface, and also on the applicability of these monolayers.

Cooperating entities: *J. Heyrovský Institute of Physical Chemistry and Nuclear Research Institute, Inc. Lübben, J. F. – Baše, T. – Rupper, P. – Künniger, T. – Macháček, J. – Guimond, S.: Tuning the surface potential of Ag surfaces by chemisorption of oppositely-oriented thiolated carborane dipoles. Journal of Colloid and Interface Sciences. (2010), ACS Nano, Yearbook 4 (doi: 10.1016/j.jcis.2010.10.052).*

*Baše, T. – Bastl, Z. – Havránek, V. – Lang, K. – Bould, J. – Londesborough, M. G. S. – Macháček, J. – Plešek, J.: Carborane-thiol-silver interactions. A comparative study of the molecular protection of silver surfaces. Surface and Coatings Technology. Yearbook 204, No. 16–17 (2010), pp. 2639–2646.*

*Macháček, J.: A computational study of dicarbododecaborane dithiols bound to gold surface. Book of Abstracts, 5th European Meeting on Boron Chemistry (EUROBORON 5), Heriot-Watt Univ., Edinburgh, UK, August 29th–September 2nd 2010, P47, p. 126.*

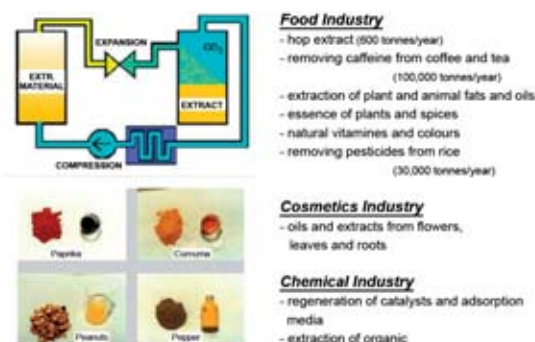
### Supercritical fluid extraction of biologically active substances

*(Institute of Chemical Process Fundamentals)*

Supercritical extraction with carbon dioxide is a modern, mild technique for obtaining medicinal and other biologically active natural substances for the pharmaceutical, food, and cosmetic industries. These substances dissolve in liquid CO<sub>2</sub> under the pressure of up several hundreds of atmospheres and at near ambient temperatures (important for thermally labile compounds) and easily separate from the solvent after pressure reduction. The extracts are free of any trace of organic solvents.

In the ICPF, the supercritical fluid extraction of plants has been studied on a laboratory scale both experimentally and developing mathematical models for optimisation and scale-up. The research is now focused e.g. on the extraction of botanical insecticides and phytosteroids. The demand for natural products is steadily increasing and therefore we are seeking and finding cooperation with industrial companies. The ICPF is the only institution in CR where the research is orientated towards industrial application of supercritical fluid extraction.

### The scheme for supercritical extraction and its application.



The authors focused on research of the supercritical extraction of plant biologically active materials, e.g. insecticides, which plants create to protect themselves from insect pests. Based on the measurement on a laboratory apparatus, they then formulated mathematical models with the aim of deepening the knowledge of the studied process and of allowing the preparation of extracts that could compete thanks to their quality despite the higher production costs with common products of the extraction of organic solvents (the demand for purely natural products is rising). With the objective of increasing the concentration of biologically active materials in the extract, they gradually concluded the development of simpler models of extraction, which do not distinguish between the different behaviours of the components of the extracted mixtures, and in 2010 they proposed and verified a model for the calculation of the composition of the extract depending on the extraction conditions (pressure, temperature, flow of the solvent as well as on the preparation of the plant material for extraction).

This model, arising from the phase balances and singularly in the specialised literature on supercritical extraction from plants, describes the experimental data well and will thus

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be used for the further optimisation of the extraction conditions and for the proposal of large-capacity (industrial) supercritical extraction.

Cooperating entity: Research Institute of Crop Production, Agra Group, *Institute of Experimental Botanics*, Institute of Chemical Technology, Prague, Institute of Chemical Engineering of the Bulgarian Academy of Science.

Sovová, H. – Galushko, A. A. – Stateva, R. P. – Rochová, K. – Sajfrtová, M. – Bártlová, M.: *Supercritical Fluid extraction of minor components of vegetable oils:  $\beta$ -sitosterol*. *J. Food Eng. Yearbook 101, No. 2 (2010)*, pp. 201–209.

Pavela, R. – Sajfrtová, M. – Sovová, H. – Bárnet, M. – Karban, J.: *The insecticidal activity of *tanacetum parthenium* (L.) Schultz bip. extractso* Obtained by supercritical fluid extraction and hydrodistillation. *Ind. Crop. Prod. Vol. 31, No. 3 (2010)*, pp. 449–454.

Sovová, H.: *Mathematical modelling of supercritical fluid extraction*. In: *Current Trends of the Supercritical Fluid Technology in the Pharmaceutical, Nutraceutical and Food Processing Industries*. (Duarte, A. R. C. – Duarte, C. M. M., Ed.). *Bentham eBooks 2009*. 15 pp.

Sajfrtová, M. – Ličková, I. – Wimmerová, M. – Sovová, H. – Wimmer, Z.:  *$\beta$ -sitosterol: supercritical carbon dioxide extraction from sea buckthorn (*Hippophae rhamnoides* L.) Seeds*. *Int. J. Mol. Sci. Yearbook 11, No. 4 (2010)*, pp. 1842–1850.

6. Photocatalysis on Titania-coated Electrode-less Discharge Lamps (*Institute of Chemical Process Fundamentals*)
7. Electromigration techniques – a fast and economical tool for differentiation of similar strains of microorganisms (*Institute of Analytical Chemistry*)
8. Effect of preparation temperature on the efficiency of silica-based monolithic capillary columns (*Institute of Analytical Chemistry*)
9. Selective electrocatalytic oxygen evolution (*J. Heyrovský Institute of Physical Chemistry*)
10. Structure motifs of Gag polyproteins important for assembly of retroviral particles (*Institute of Organic Chemistry and Biochemistry*)

### Other important results:

1. Modified insulins help to elucidate the mechanism of insulin action (*Institute of Organic Chemistry and Biochemistry*)
2. Ion-selective membranes for fuel cells (*Institute of Macromolecular Chemistry*)
3. Nanostructures produced by conducting polymers (*Institute of Macromolecular Chemistry*)
4. New method of recycling of polyurethane foams (*Institute of Macromolecular Chemistry*)
5. Electromembrane extraction of heavy metal cations followed by capillary electrophoresis with capacitively coupled contactless conductivity detection (*Institute of Analytical Chemistry*)

## SCIENTIFIC ACTIVITY

### 5. The Section of Biological and Medical Sciences

The section associates eight institutes 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 plant genomes with the environment and on the biodegradation of xenobiotics in water and soil.

#### From the results from 2010, we present:

##### The role of the protein complex exocyst in *Arabidopsis* cell division

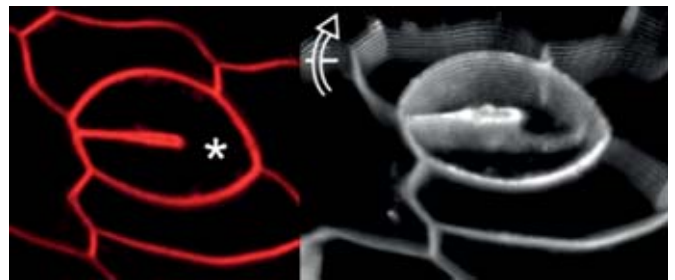
(Institute of Experimental Botany)

Cell division creates two daughter cells from one mother cell. First, genetic data and the inner cellular structure (organelles) is shared between them. The daughter cells are then physically separated. With plants, it occurs such that a new cell wall is built across the maternal cell. Its base is the so-called cell plate, which is created in the middle between the cell centres of the future daughter cells. At first, it has a circular shape and grows on the edges, until it joins with the wall of the mother cell.

From the onset of phragmoplast initiation to the maturation of the cell plate, the delivery of secretory vesicles is necessary to sustain successful daughter cell separation. The teth-

ering of secretory vesicles at the plasma membrane is mediated by the evolutionarily conserved exocyst complex. *Arabidopsis thaliana* mutants for EXO84b are severely dwarfed and have compromised leaf epidermal cell and guard cell division. During cytokinesis, green fluorescent protein-tagged exocyst subunits exhibit distinctive localisation maxima at cell plate initiation and cell plate maturation, stages with a high demand for vesicle fusion.

We conclude that the exocyst complex is involved in secretory processes during cytokinesis in *Arabidopsis* cells, notably in cell plate initiation, cell plate maturation, and formation of new primary cell wall. This result highlights a similarity in cell division of plant and animal cells; also in animal and fungal cells, the exocyst is necessary for successful daughter cell separation.



Cell division problems in an *Arabidopsis* guard cell. The guard cell of *Arabidopsis* in which the exocyst function was impaired. The single confocal section shown on the left, 3D reconstruction of confocal sections shown on the right. The unfinished cell wall is marked with an asterisk.

Cooperating entities: Faculty of Science of Charles University in Prague and Oregon State University, Corvallis (USA)

Fendrych, M. – Synek, L. – Pečenková, T. – Toupalová, H. – Cole, R. – Drdová, E. – Nebesářová, J. – Šedinová, M. – Hála, M. – Fowler, J. E. and Žárský, V.: *The arabidopsis exocyst complex is involved in cytokinesis and cell plate maturation. Plant Cell. Yearbook 22, (2010), pp. 3053–3065.*

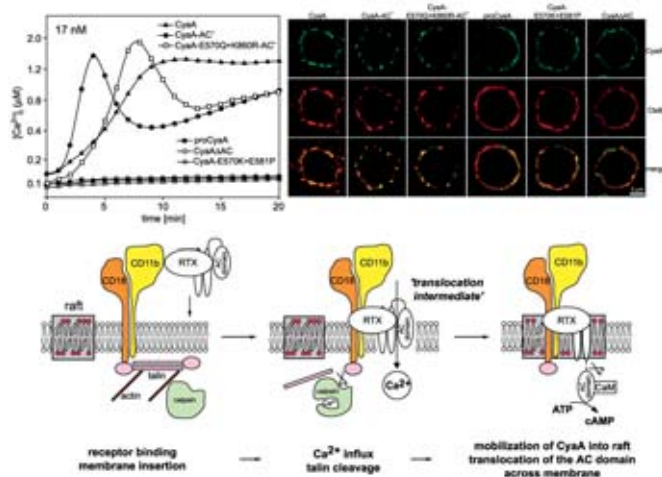
##### Target membrane penetration of adenylate cyclase toxin

(Institute of Microbiology)

The two-step mechanism of target membrane penetration of adenylate cyclase toxin has been elucidated. It is shown that upon binding to the  $\beta 2$  integrin receptor, CD11b/CD18,

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the toxin inserts directly into the plasma membrane of myeloid phagocytic cells and forms a translocation intermediate. This constitutes a novel type of transmembrane channel mediating entry of extracellular calcium ions into the submembrane compartment of phagocytes. There, the calcium ions activate the protease calpain, which cleaves the talin tether and liberates the toxin-receptor complex for lateral movement within membrane, thus promoting its relocation into cholesterol-rich membrane microdomains, called lipid rafts. Within rafts the toxin accomplishes the translocation of its adenylate cyclase enzyme (AC) domain across cell membrane into the cytosol of phagocytes. This finding is quite relevant for understanding of the pathophysiology of action of the toxin, as the cAMP-responsive protein kinase A subunits are accumulating beneath lipid rafts. Hence, through localised production of the signaling molecule cAMP from ATP by the AC enzyme translocating from lipid rafts, the toxin maximises the impact of its action on target cells.



**The mechanism of the membrane penetration of the adenylate cyclase toxin.**

Bumba, L. – Mašín, J. – Fišer, R. – Šebo, P.: *Bordetella* adenylate cyclase toxin mobilizes its  $\beta 2$  integrin receptor into lipid rafts to accomplish translocation across target cell membrane in two steps. *PLOS Pathogens* 6 (5),| e1000901 (14 May 2010) doi: 10.1371/journal.ppat.1000901

### **Myeloperoxidase regulates acute inflammatory response** (*Institute of Biophysics*)

Myeloperoxidase (MPO) is an abundant phagocyte-derived hemoprotein released during phagocyte activation. It was shown that MPO-deficient mice had significantly lower plasma levels of arachidonic- and linoleic acid-derived biologically active metabolites (epoxides, fatty acid diols, hydroxy intermediates) compared to wild-type mice during acute inflammation. Conversely, MPO-deficient mice had significantly higher plasma levels of cysteinyl-leukotrienes with well-known proinflammatory properties. This suggests that MPO modulates the balance of pro- and anti-inflammatory lipid mediators during acute inflammation and, in this way, may control acute inflammatory diseases. Next, we provide evidence for MPO facilitating leukocyte recruitment by its positive surface charge. In-vitro, MPO evoked highly directed leukocyte motility, which was solely dependent on electrostatic interactions with the leukocyte's surface. In-vivo, leukocyte recruitment demonstrated to be MPO-dependent in different inflammatory mouse models. Given MPO's affinity to both the endothelial and the leukocyte's surface, MPO evolves as a mediator of leukocyte recruitment because of its positive surface charge. This electrostatic effect of MPO not only indicates a so-far unrecognised, catalysis-independent function of the enzyme, but also highlights a principal mechanism, which yields leukocyte attraction driven by electrostatic charge of endothelium surface.

Cooperating entities: UC Davis, USA, University Medical Center Hamburg-Eppendorf, Germany

Kubala, L. – Schmelzer, K. R. – Klinke, A. – Kolářová, H. – Baldus, S. – Hammock, B. D. – Eiserich, J. P.: *Modulation of arachidonic and linoleic acid metabolites in myeloperoxidase-deficient mice during acute inflammation. Free Radical Biology & Medicine. Yearbook 48, No. 10 (2010), pp. 1311–1320.*

Klinke, A. – Nussbaum, C. – Kubala, L. – Friedrichs, K. – Rudolph, T. K. – Rudolph, V. – Paust, H. J. – Schröder, C. – Benten, D. – Lau, D. – Szocs, K. – Furtmüller, P. G. – Heeringa, P. – Sydow, K. – Duchstein, H. J. – Ehmke, H. – Schumacher, U. – Meinertz, T. – Sperandio, M. – Baldus, S.: *Myeloperoxidase attracts neutrophils by physical forces. Yearbook 117, No. 4 (2011), pp. 1350–1358.*

## SCIENTIFIC ACTIVITY

### Successful isolation, characterisation and cultivation of limbal stem cells and their use for regeneration of severely damaged ocular surface

(Institute of Molecular Genetics)

We succeeded for the first time in isolating a highly purified population of limbal stem cells from the enzymatically digested limbal tissue of the mouse. Consequently, the novel, as-yet unrevealed immunosuppressive and antiapoptotic properties of stem cells were described. The results indicate that these self-protective properties of limbal stem cells contribute to their survival in the environment of the anterior segment of the eye, where harmful inflammatory reactions often occur. The limbal stem cells were cultured in tissue cultures and using nanofiber scaffolds were transferred on the damaged ocular surface. It was proved that stem cells can migrate from the nanofibers onto the ocular surface, where they can contribute to the healing process. In addition, due to their potent immunosuppressive properties, these limbal stem cells also inhibit a local inflammatory reaction which occurs on the damaged part. These results which are based on a combination of nanotechnologies and stem cell research, suggest new possibilities for the treatment of limbal stem cell deficiencies and for the repair of severe ocular surface injuries.

Cooperating entity: *Institute of Macromolecular Chemistry, Institute of Experimental Medicine*, Elmarco, s.r.o., Liberec

Holáň, V. – Pokorná, K. – Procházková, J. – Krulová, M. – Zajícová, A.: *Immunoregulatory properties of mouse limbal stem cells. J. Immunol. Yearbook 184, No. 4 (2010), pp. 2124–2129.*

Zajícová, A. – Pokorná, K. – Lenčová, A. – Krulová, M. – Svobodová, E. – Kubínová, Š. – Syková, E. – Přádny, M. – Michálek, J. – Svobodová, J. – Munzarová, M. – Holáň, V.: *Treatment of ocular surface injuries by limbal and mesenchymal stem cells growing on nanofiber scaffolds. Cell Transplant. Yearbook 19, No. 10 (2010), pp. 1281–1290.*

### Mitochondrial peripheral neuropathy due to ATP synthase deficiency is caused by a mutation of the *ATP5E* gene

(Institute of Physiology)

ATP synthase is the key enzyme of cellular ATP production. Its dysfunction leads to severe metabolic disorders. A nov-

el mitochondrial disease manifesting itself in a dominant peripheral neuropathy has been found to be caused by an isolated deficiency of ATP synthase. This is due to a new type of genetic defect – a missense mutation in *ATP5E* gene leading to a replacement with cysteine of a highly conserved tyrosine 12. *ATP5E* encodes the smallest subunit of the catalytic part of the enzyme, the only subunit without a homolog in bacterial or chloroplast enzyme. The mutation does not affect a biochemical function of the ATP synthase but it brings about a strong inhibition of enzyme's biosynthesis. This is accompanied by a unique accumulation of subunit c, the main component of ATP synthase's proton channel. RNA interference of *ATP5E* in HEK293 cell line resulted in the same phenotype – ATP synthase deficiency and subunit c accumulation. This first-ever disclosure of a mutation in a nuclear-encoded ATP synthase subunit, and our knock-down experiments point to a novel, regulatory role in ATP synthase biogenesis of the epsilon subunit. *ATP5E* is thus yet another gene responsible for the isolated ATP synthase deficiency, in addition to *TMEM70* (described by our group in 2008) and *ATP12* genes. The results offer a prospect for a further improvement in the diagnosing and prevention of human mitochondrial diseases.

Cooperating entity: Department of Pediatrics, Paracelsus University, Salzburg, Austria

Mayr, J. A. – Havlíčková, V. – Zimmermann, F. – Magler, I. – Kaplanová, V. – Ješina, P. – Pecinová, A. – Nůsková, H. – Koch, J. – Sperl, W. – Houšťek, J.: *Mitochondrial ATP synthase deficiency due to a mutation in the *ATP5E* gene for the F1 epsilon subunit. Human Molecular Genetics. Yearbook 19, No. 17 (2010), pp. 33430–33439.*

Havlíčková, V. – Kaplanová, V. – Nůsková, H. – Drahot, Z. – Houšťek, J.: *Knockdown of F1 epsilon subunit decreases mitochondrial content of ATP synthase and leads to accumulation of subunit c. Biochimica et Biophysica Acta (Bioenergetics). Yearbook 1797, (2010), pp. 1124–1129.*

### Other important results:

1. Chromosomal damage in peripheral blood lymphocytes of newly diagnosed cancer patients and healthy controls (*Institute of Experimental Medicine*)
2. Protein Structure-Sensitive Electrocatalysis at Dithiothreitol-Modified Electrodes (*Institute of Biophysics*)

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3. A remote arene-binding site on prostate specific membrane antigen revealed by antibody-recruiting small molecules (*Biotechnology Institute*)
4. Role of mitochondrial BKCa channels in cardioprotection induced by chronic hypoxia (*Institute of Physiology*)
5. Supramolecular immunoactivators (*Institute of Microbiology*)
6. Coordinated action of auxin influx and efflux transporters during the germination of *Arabidopsis thaliana* plants (*Institute of Experimental Botany*)
7. Noise exposure during early development impairs the processing of sound intensity in adult rats (*Institute of Experimental Medicine*)
8. Safe harbors for integration of retroviral vectors (*Institute of Molecular Genetics*)
9. Proteome mining of human follicular fluid reveals a crucial role of complement cascade and key biological pathways in women undergoing *in vitro* fertilisation (*Institute of Animal Physiology and Genetics*)
10. Nitrogen fixation in cyanobacterium *Trichodesmium* (*Institute of Microbiology*)

## 6. The Section of Biological-Ecological Sciences

The section includes four institutes 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.

### From the results from 2010, we present:

#### **A common red algal origin of the apicomplexan, dinoflagellate, and heterokont plastids**

(*Biology Centre*)

The discovery of a nonphotosynthetic plastid in malaria and other apicomplexan parasites has sparked a contentious debate about its evolutionary origin. Molecular data have led to conflicting conclusions supporting either its green algal origin or red algal origin, perhaps in common with the plastid of related dinoflagellates. This distinction is critical to our understanding of apicomplexan evolution and the evolutionary history of endosymbiosis and photosynthesis; however, the two plastids are nearly impossible to compare due to their non-overlapping information content. The Czech-Canadian team described the complete plastid genome sequences and plastid-associated data from two independent photosynthetic lineages represented by *Chromera velia* and

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an undescribed alga CCMP3155 that are closely related to apicomplexans. These plastids contain a suite of features retained in either apicomplexan (four plastid membranes, the ribosomal superoperon, conserved gene order) or dinoflagellate plastids (form II Rubisco acquired by horizontal transfer, transcript polyuridylation, thylakoids stacked in triplets) and encode a full collective complement of their reduced gene sets. Together with whole plastid genome phylogenies, these characteristics provide multiple lines of evidence that the extant plastids of apicomplexans and dinoflagellates were inherited by linear descent from a common red algal endosymbiont. Phylogenetic analyses also support their close relationship to plastids of heterokont algae, indicating they all derive from the same endosymbiosis. Altogether, these findings support a relatively simple path of linear descent for the evolution of photosynthesis in a large proportion of algae and emphasise plastid loss in several lineages (e.g., ciliates, *Cryptosporidium*, and *Phytophthora*).

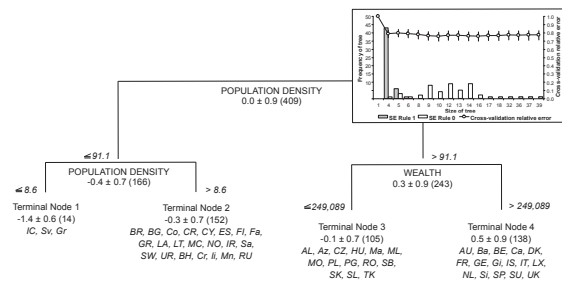
Cooperating entity: University of British Columbia, Department of Botany, Vancouver, Canada  
*Janouškovec, J. – Horák, A. – Oborník, M. – Lukeš, J. – Keeling, P. J. A common red algal origin of the apicomplexan, dinoflagellate, and heterokont plastids. Proceedings of the National Academy of Sciences of USA. Yearbook 10, (2010), pp. 10949–10954.*

### Economics of biological invasions: historical legacy yields invasion debt

(Institute of Botany)

For the first time on the continental level, two studies building on one another distinguished between the importance of the economic, geographical, and climatic factors for biological invasions (the seeding of plants and animals outside the area of their original appearance) in terrestrial and freshwater environments. The inclusion of the appearance of very different organisms in 55 European regions brought results valid across taxonomic groups. It has been shown that the demographic and economic factors play a much more important role in biological invasions than the local climatic situation or geographical conditions. The degree of the affliction of European regions by invasive species mostly depends on the human population density and economic prosperity of the country expressed as cumulative national wealth, which reflects the economic history of

the given region, and is therefore more suitable for capturing the trends in biological invasions that are themselves the result of long-term processes. The decisive influence of the economic factors reflects the intensity of international trade and the level of the disruption of the landscape by human activity. The majority of the invasive species causing problems today, however, were introduced into Europe many decades ago. The current diversity of invasive species in European countries today is therefore better explained by the economic parameters from the beginning of the twentieth century than by the contemporary efficiency of the economies. It creates an 'invasion debt', which means that the consequences of current economic activity will not be felt to their full extent until some time in the future. These findings are important for the policy of the approach to biological invasions in Europe and their future management. Europe needs to improve the monitoring of the introduction of invasive species, including the limitation or thorough controls of certain types of imported goods, because the researchers believe that individual economic activities are connected with the introduction of invasive organisms (e.g. trade with pets is connected with invasive vertebrates or the transport infrastructure with the introduced species of insect or plants).



**The Economy of Biological Invasion: In the Future We will Pay 'Invasion Debts'. Regression trees lend further support that wealth and demography had an overwhelming effect on the numbers of alien species. The best tree across all taxa explained 25.6% of variance, of which 18.0% was attributed to human population density, and 7.6% to wealth. High numbers of alien species are supported by a high human population density and great wealth, reaching the highest values in regions with more than 91.1 inhabitants/km<sup>2</sup> and wealth exceeding about US\$ 250,000 per capita. The regions falling into groups of defining terminal nodes are marked by codes of the English names. (Adopted from Pyšek et al., Proceedings of the National Academy of Sciences of the United States of America 107, (2010), pp. 12157–12162.)**

Cooperating entities: members of the international consortia of the DAISIE and ALARM projects

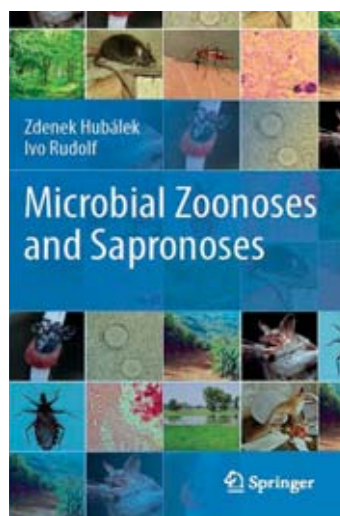
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(Environment Agency Austria, Vienna, Austria; UFZ Halle-Leipzig, Germany; Lincoln University, New Zealand)  
*Pyšek, P. – Jarošík, V. – Hulme, P. E. – Kühn, I. – Wild, J. – Arianoutsou, M. – Bacher, S. – Chiron, F. – Didžiulis, V. – Essl, F. – Genovesi, P. – Gherardi, F. – Hejda, M. – Kark, S. – Lambdon, P. W. – Desprez-Loustau, A. M. – Nentwig, W. – Pergl, J. – Pobljšaj, K. – Rabitsch, W. – Roques, A. – Roy, D. B. – Shirley, S. – Solarz, W. – Vilà, M. – Winter, M.: Disentangling the role of environmental and human pressures on biological invasions across Europe. Proceedings of the National Academy of Sciences of the United States of America. Yearbook 107 (2010), pp. 12157–12162.*  
*Essl, F. – Dullinger, S. – Rabitsch, W. – Hulme, P. E. – Hülber, K. – Jarošík, V. – Kleinbauer, I. – Krausmann, F. – Kühn, I. – Nentwig, W. – Vilà, M. – Genovesi, P. – Gherardi, F. – Desprez-Loustau, M.-L. – Roques, A. – Pyšek, P.: Socioeconomic legacy yields an invasion debt. Proceedings of the National Academy of Sciences of the United States of America Yearbook 108 (2011), pp. 203–207.*

### **Microbial zoonoses and sapronoses** (Institute of Vertebrate Biology)

This book presents the state-of-the-art in the field of microbial zoonoses and sapronoses. It could be used as a textbook or manual in microbiology and medical zoology for students of human and veterinary medicine, including Ph.D. students, and for biomedical scientists, medical practitioners and specialists as well. Surprisingly, severe zoonoses and sapronoses still appear; they are either entirely new (e.g., SARS, Hendra and Nipah viroses, hantavirus pulmonary syndrome), newly recognised (Lyme borreliosis, anaplasmosis), resurging (West Nile fever in Europe), increasing in incidence (salmonellosis after 1988, campylobacteriosis), geographically expanding (West Nile fever in the Americas), with a changing range of hosts and/or vectors, with modified clinical manifestations or caused by agents acquiring antibiotic resistance. The collective term for those diseases is (re)emerging infections, and as much as 75% of them represent zoonoses and sapronoses (the rest are anthroponoses). The number of known zoonotic and sapronotic pathogens of humans is continuously growing – over 800 today. In the introductory part, short characteristics are given of infectious and epidemic process, the role of environmental factors in the spread of zoonoses and sapronoses, possibilities of their epidemio-

logical surveillance, and control. Much emphasis is laid on ecological aspects of zoonoses and sapronoses (haematophagous vectors of the diseases and their life history; vertebrate hosts of zoonoses; habitats of the agents and their geographic distribution; natural focality of diseases). Individual zoonoses and sapronoses are then characterised in the following brief paragraphs: taxonomy and nomenclature of the agent; source of human infection; animal disease; transmission mode; human disease; epidemiology; diagnostics; therapy; geographic distribution).



The cover of the book *Mikrobiální zoonózy a sapronózy* [Microbial Zoonoses and Sapronoses], which is a recent overview of microbial zoonoses and sapronoses. (photo: Archives of the Institute of Vertebrate Biology)

*Hubálek, Z. – Rudolf, I.: Microbial Zoonoses and Sapronoses. Dordrecht, Heidelberg, London, New York: Springer (2011), p. 457.*

### **Symmetric allosteric mechanism of hexameric Escherichia coli arginine repressor exploits competition between L-arginine ligands and resident arginine residues** (Institute of Systems Biology and Ecology)

With the aid of molecular-dynamic simulations and calorimetry, the authors have examined and described the transcription of L-arginine on the arginine repressor ArgR. The results document the structural and thermodynamic behaviour of the symmetrical relaxed state of the predicted allosteric model of Monod, Wyman and Changeux.

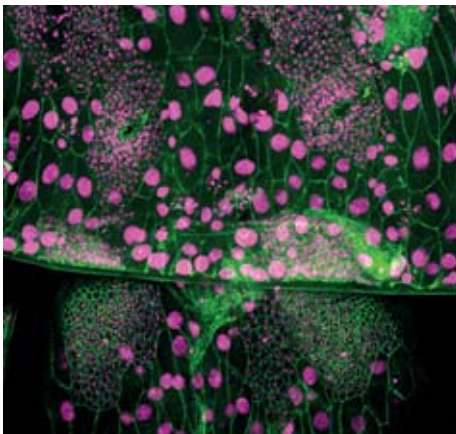


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This relaxed state is acquired by using the dynamics of the structure and the distributive character of its cohesive free energy. The model of ArgR shows that the symmetry can be created, even if the binding places are filled gradually, which was not predicted. The molecular mechanism described here neither specifies or requires a specific pathway of the allosteric signal through the protein, which can mean that the binding of free amino acids was an early 'discovery' in the evolution of allostery.

Cooperating entities: Princeton University, Chemistry Department, Princeton, NJ, USA, University of South Bohemia, Institute of Physical Biology, Nové Hrad, ČR, The College of New Jersey, Department of Biology, Ewing, NJ USA, Medical University Vienna, Department of Medicinal Chemistry, Vienna, Austria  
*Strawn, R. – Green, M. – Stockner, T. – Carey, J. – Etrich, R.: Symmetric allosteric mechanism of hexameric Escherichia coli arginine repressor exploits competition between L-arginine ligands and resident arginine residuem. PLOS Computational Biology. Yearbook 6 (2010): 6. e1000801 June.*

### Remodeling of epidermis during larva to adult fly transformation (Biology Centre)



Cell replacement of the larval epidermis (large cells) by new cells of the adult during the metamorphoses of the fly *Drosophila* requires the suppression of the activity of the gene *atf3*.  
(photo: Archives of the *Biology Centre – Institute of Entomology*)

Movements, fusions and closures of epithelial tissues are important for animal development, e.g. during embryogenesis but also for healing of wounds. The fruit fly, *Drosophila melanogaster*, offers several model examples of such epithelial movements and fusions. An interesting case is the formation of the adult fly abdomen. During metamorphosis of a maggot into fly, large larval epidermal cells (LEC) must leave the epithelium to free space for new cells (histoblasts), which rapidly proliferate and migrate to occupy the entire surface of the abdomen, then produce the adult cuticle. The regulation of this complex exchange of cell populations is as yet unclear. It has been known that the entire process, like metamorphosis of other tissues, is stimulated by the steroid hormone ecdysone, and that the extrusion of LEC requires cytoskeleton changes dependent on the Rho signaling pathway. The authors have implicated a transcription factor of the bZIP family in the abdominal morphogenesis *Atf3*. Activity of the *atf3* gene must be restricted during the exchange of the two cell populations, as deregulated *atf3* blocks removal of LEC from the epithelium by interfering with Rho signaling and increasing LEC adhesiveness. These obsolete larval cells consequently obstruct closure of the adult epithelium. To exert this effect, *Atf3* requires its binding partner, the oncoprotein *Jun*. Although interaction between these two regulatory proteins has been well documented by *in vitro* studies on mammalian cell lines, our results for the first time demonstrate a developmental function of the *Atf3-Jun* complex *in vivo*. We have published this study in collaboration with our former student, now group leader at the University of Cologne, M. Uhlířová, in the journal *Development* with a cover illustration.

Cooperating entity: Department of Biomedical Genetics, University of Rochester, Medical Center, Rochester, NY 14642, USA

*Sekyřová, P. – Bohmann, D. – Jindra, M. – Uhlířová, M.: Interaction between Drosophila bZIP proteins Atf3 and Jun prevents replacement of epithelial cells during metamorphosis. Development. Yearbook 137, (2010) pp. 141–150.*

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### Other important results:

1. Flora of the Czech Republic 8 (*Institute of Botany*)
2. Factors responsible for distribution and diversity of two major groups of *Betaproteobacteria* (*Biology Centre*)
3. Coevolution dynamics in the relationship between bitterling fish and freshwater mussels (*Institute of Vertebrate Biology*)
4. Homogenisation of European flora: impact of biological invasions and their management (*Institute of Botany*)
5. Dynamic changes of canopy-scale mesophyll conductance to CO<sub>2</sub> diffusion of sunflower as affected by CO<sub>2</sub> concentration and abscisic acid (*Biology Centre*)
6. Polyploidisation and interaction with herbivores (*Institute of Botany*)
7. Increasing incidence of fungal infection in bats in Central Europe (*Institute of Vertebrate Biology*)
8. Thermally-induced plasticity in ectothermic vertebrates (*Institute of Vertebrate Biology*)
9. Night-time airflow in a forest canopy near a mountain crest (*Institute of Systems Biology and Ecology*)
10. Genomic composition and evolution of the allohexaploid *Elymus repens* (*Poaceae, Triticeae*) (*Institute of Botany*)

### 7. The Section of Social-Economic Sciences

Five institutes whose research activities focused on the topical research issues have been included in this section. 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 the institutional, value and cultural relationships of the economic, social and political life, local and regional issues, governmental system, representation of interests, civil society, public opinion, gender identities and inequalities, national identity and attitudes towards immigration as well as other issues both in the national context and in international comparison. 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 in a unifying Europe.

#### From the results from 2010, we present:

##### Digitisation Registry CZ (Library)

The Digitisation Registry of the Czech Republic is a national project, which has been developed with the cooperation of National Library of the Czech Republic, the Library of the Academy of Sciences and the company Incad. The aim of the national registry of the digitised documents is to avoid undesirable duplicates, to enable the sharing of the digitisation results across the Czech Republic and not to waste time and money by scanning the same documents. The Digitisation Registry could also provide to the system's users with tools for digitisation workflow management to simplify the way of monitoring the digitisation process. The solution could also serve the end users as the central access point to digitised documents. Another very important fact is that it cooperates with library catalogue

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systems as well as with digital document repositories. At the end of 2010, there were 39,000 records in the Registry.



Web Access to the Digitisation Registry CZ.

Cooperating entities: National Library of the CR, INCAD, s. r. o.

*Kocourek, P. – Lhoták, M. – Ljubka, I.: Digitization registry CZ [online]. Registr digitalizace CZ, 2010, available from <http://www.registrdigitalizace.cz/>*

### Reconsidering the effect of market experience on the 'endowment effect'

*(Economics Institute)*

Simple exchange experiments have revealed that participants trade their endowment less frequently than standard demand theory would predict and that the most experienced dealers acting in a well-functioning market are not subject to this exchange asymmetry. We have designed an experiment which tests the market-experience effect on exchange asymmetry by means of trade uncertainty.

Cooperating entity: Paris School of Economics, CNRS, France

*Engelmann, D. – Hollard, G.: Reconsidering the effect of market experience on the "endowment effect". *Econometrica*, Yearbook 78, No. 6 (2010), pp. 2005–2019.*

### Neural structures of jealousy: Infants' experience of social exclusion with caregivers and peers

*(Institute of Psychology)*

This study theoretically explores possible neural models that express infant experience of different social exclusion

situations. Social exclusion occurs when infants' close relationships with caregivers are threatened by a rival. Infant reactions to these situations involve an odd combination of negative and approach behaviours, which is often interpreted as jealousy. At the neural level, the authors propose that these reactions are part of a homeostatic model, i.e. negative emotions and stress are counteracted by structures and hormones involved in emotion regulation, and are thus responsible for infant approach behaviours. However, situations of social exclusion may not occur only in the context of close relationships with caregivers but also with playmates. Therefore, in the second part of the chapter, the authors present results from their study showing that infants during the first year of life react to being excluded from peer groups. In that study, excluded infants displayed less enjoyment and social behaviours than included infants, while they sustained interest in the ongoing interactions of the group. The authors argue that at both the behavioural and neural level, infant experience of social exclusion among peers may involve a suppression of negative emotionality and stress owing to their insecurity with the novel social situation. Theoretical analyses in this chapter suggest that infants have the necessary neural substrate as well as the social skills that allow them to conceptualise different social exclusion situations and react appropriately. Further research must provide experimental evidence for the theoretical models proposed in this chapter.

Cooperating entity: Department of Psychology, York University, Toronto, Canada

*Markova, G. – Stieben, J. – Legerstee, M.: Neural Structures of Jealousy: Infants' experience of social exclusion with caregivers and peers. In: Hart, S. – Legerstee, M. (eds.). *Handbook of Jealousy: Theories, principles and multidisciplinary approaches*. Wiley-Blackwell, Malden 2010, s. 83–100.*

### What is Czech society like? Questions we often ask...

*(Institute of Sociology)*

This book sets out to inform the public in an accessible way about the results of the work of sociologists, demographers, economists, political scientists, and geographers working at the Institute of Sociology, ASCR. The intention of the authors is not to present a comprehensive report on Czech society but rather to provide answers to some of the

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questions that people frequently ask, and test the validity of various presumptions and ideas that Czechs have about themselves. Social scientists shed light on phenomena that society itself tends to overlook, but that experts regard as worthy of attention. The approach in most of the articles in the book is grounded in the long tradition of the institution at which the book was prepared. Most chapters in the book work with information obtained from sociological research. They inform readers about findings based on an empirical approach to and the systematic study, measurement and analysis of social phenomena. The contributing authors were given considerable freedom over the nature and scope of their topic and their approach to it, adopting the method they viewed as most appropriate. Unlike standard scholarly texts intended for the academic community, in this book the authors keep references to the relevant theories and descriptions of the analytical methods used to arrive at their findings to the essential minimum. There are no complicated statistical models or other difficult analytical instruments for readers to deal with. The authors try to demonstrate their findings using simple tools comprehensible to the wider public. The publication raises and discusses the following questions: What are we really like and how do we learn these things about ourselves? Are we European, worldly, or mainly just ourselves? Are public opinion polls trustworthy? Is it our habit to be social and/or economic pessimists? What and how are we affected by consumer society? What are the trends in and causes of corruption in the Czech Republic? Are Czechs really irreligious? What are our attitudes towards foreigners and ethnic minorities? Are Czechs politically active? What is the quality of democracy in the Czech Republic?



The cover of the book Maříková, H. – Kostelecký, T. – Lebeda, T. – Škodová, M.: *Jaká je naše společnost? Otázky, které si často klademe* [What is Czech society like? Questions we often ask...]. (photo: Archives of the *Institute of Sociology*)

*Maříková, H. – Kostelecký, T. – Lebeda, T. – Škodová, M.: Jaká je naše společnost? Otázky, které si často klademe... Sociologické nakladatelství (SLON), Praha 2010, 446 pp.*

### Immoral Law

*(Institute of State and Law)*

The contents of this relatively unique book are above all analytical philosophy of law and analytical moral philosophy (meta-ethics). The author systematically focuses on logical analysis of moral discourse, further to the notional relation between law and morality, as well as to the relation of free will and moral (as well as legal) responsibility. In so doing he also touches connected fields, e.g. moral psychology. In meta-ethics, Tomáš Sobek endorses so-called moral fictionalism, according to which moral discourse has noncognitive pragmatics and cognitive semantics. In the philosophy of law, he is a supporter of legal positivism, i.e. of the opinion that validity and contents of law are determined only by social facts. As to the issue of free will, he endorses so-called illusionism, therefore he believes that free will is only a socially useful illusion.

*Sobek, T.: Nemorální právo. Ústav státu a práva ASCR, Praha and Aleš Čeněk, Plzeň 2010, 423 pp.*

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### Other important results:

1. ASEP Analytics: Statistical and bibliographic outputs for institutes of ASCR, their departments and scientific researchers of the ASCR (*Library*)
2. Technological leadership and persistence of monopoly under endogenous entry: static versus dynamic analysis (*Economics Institute*)
3. Real exchange rates in emerging economies (*Economics Institute*)
4. How People See Others Is Different From How People See Themselves: A Replicable Pattern Across Cultures (*Institute of Psychology*)
5. Spirituality as a Basic Aspect of Personality: A Cross-Cultural Verification of Piedmont's Model (*Institute of Psychology*)
6. Academic Duets: on Professional and Private Life in Science (*Institute of Sociology*)
7. Changes in Family and Career Starts (*Institute of Sociology*)
8. Legal Informatics (*Institute of State and Law*)
9. The Control of the Separation of Powers Within the EU With regard To *Ultra Vires* Situations (*Institute of State and Law*)

### 8. The Section of Historical Sciences

The section associated six institutes whose research activities focused 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 bases accessible and a prospective strategy for work with electronic documents have become the priorities of the historical and archaeological workplaces.

#### From the results from 2010, we present:

#### **Human Remains from the Moravian Gravettian: Morphology and Taphonomy of Additional Elements from Dolní Věstonice II and Pavlov I**

(*Institute of Archaeology, Brno*)

A laboratory analysis of the Gravettian bone assemblages from Dolní Věstonice II and Pavlov I, southern Moravia, have yielded 11 additional remains from Dolní Věstonice II and 20 remains from Pavlov I (16 of which come from a pair of hands, Pavlov 31). These remains are those of early modern humans, albeit with a few generally archaic features. At least two of them represent very tall individuals, among the tallest known for the Upper Paleolithic. These remains also raise the question, previously posed, as to the nature of differential treatment of the dead among Middle Upper Paleolithic humans, given the presence of ritual burials, isolated bones, and (with Pavlov 31) selected associated anatomy.

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**Skeletal remains from the settlements of the mammoth hunters in Dolní Věstonice and Pavlov.**  
(photo: Archives of the *Institute of Archaeology, Brno*)

Cooperating entities: Department of Anthropology, Washington University St. Louis; Instytut Systematyki i Ewolucji Zwierząt PAN, Kraków

*Trinkaus, E. – Svoboda, J. A. – Wojtal, P. – Nývltová Fišáková, M. – Wilczyński, J.: Human remains from the moravian gravettian: Morphology and taphonomy of additional elements from Dolní Věstonice II and Pavlov I. International Journal of Osteoarchaeology, Yearbook 20 (2010), pp. 645–669.*

### **Spatial analysis of non-ceramic refuse at Neolithic sites** (*Institute of Archaeology, Prague*)

The article aims to provide an interpretation of the structure and spatial patterning of the non-ceramic refuse from the Neolithic site of Bylany. The spatial distribution and quantity of refuse are analysed with respect to space (in terms of proximity to Neolithic houses and the whole of the excavated settlement area) and time (the duration of settlement in six chronological stages). No deliberate pattern of refuse management was identified in the vicinity of the houses, but the refuse was found to have a tendency towards peripheral grouping within the settled area as a whole. Refuse quantity depends on the number of houses and settlement duration. The negative correlation between the mean density of non-ceramic artefacts per house and the number of houses in corresponding chronological stages may be explained by the interpretation that refuse was commonly deposited within abandoned houses, which would be consistent with ethnoarchaeological observations.

*Květina, P.: The spatial analysis of non-ceramic refuse from the Neolithic site at Bylany, Czech Republic. European Journal of Archaeology 2010, 13/3, pp. 1–31.*

### **Regesta Bohemiae et Moraviae aetatis Venceslai IV.** (*Institute of History*)

*Regesta Bohemiae et Moraviae aetatis Venceslai IV* (December 1378 – 16th August 1419) is a book series which publicises documentary and correspondence materials coming from Wenceslas IV's period archives. The newly published Volume VII covers resource materials stored in the Moravian Provincial Archives in Brno. As regards the structure of the resources, it mainly contains documents on the rule of Margrave Jobst and Wenceslas IV and the history of monasteries in Moravia. The book contains abstracts of 701 documents, a nominal index (personal and territorial) and a Czech and English introduction.

*Krafl, P. (ed.): Regesta Bohemiae et Moraviae aetatis Venceslai IV. (1378 dec. – 1419 aug. 16.). Tomus VII, Fontes Archivi terrae Moraviae Brunae. Historický ústav, Praha 2010, 496 pp.*

### **Sudeten German Catholicism at the Crossroads. Political Activities of Sudeten German Catholics in the First Czechoslovak Republic in the 1930s** (*Institute of History*)

It is the first monograph on Sudeten German political Catholicism in the politically and societally dynamic period of the 1930s in Czechoslovakia which reaches the German readers. The book elaborates on the structural and political development of the German Christian Social Party in this period. However, it views this issue through the prism of a development of regenerative ecclesiastic tendencies. These tendencies were gaining strength in the second decade of the Czechoslovak State's existence within both the Sudeten German and the Czech Catholic milieu. These ecclesiastical trends, however, did not only affect the spiritual section of the religious life; they also contributed to a new definition of the role of Church in public space which was accompanied with a significant affinity towards nationalist principles in the Sudeten German circles. These facts contributed to escalation of the Czech-German relationship in the second half of 1930s which brought about fatal consequences in 1938 when the crisis escalated after

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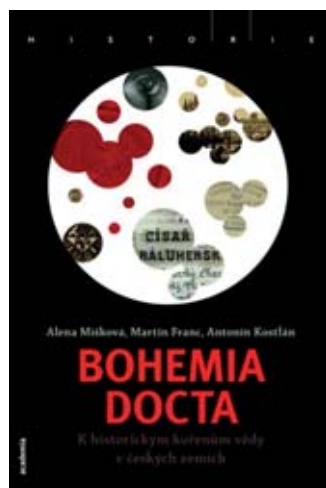
the fall of the First Republic's statehood after signing the Munich Treaty.

Šebek, J.: *Sudetendeutscher Katholizismus auf dem Kreuzweg. Politische Aktivitäten der sudetendeutschen Katholiken in der Ersten Tschechoslowakischen Republik in den 30er Jahren*. Berlin – Münster, Lit Verlag 2010, 268 pp.

### Bohemia docta. On the historical roots of science and scholarship in the Czech lands

(Masaryk Institute and Archives)

*Bohemia docta* traces the entire development of non-university science and scholarship from its beginnings in humanist learned societies to the transformation of the Czechoslovak Academy of Sciences into the Academy of Sciences of the Czech Republic. A team of renowned authors engagingly and eruditely present the history of such prominent research institutes as the Czech Royal Learned Society, the Czech Academy of Sciences and Arts, the Masaryk Academy of Labour and the landmark postwar Czechoslovak Academy of Sciences, without neglecting the research institutes run by Germans in the Czech lands. This lavishly illustrated publication also includes biographical profiles of the individuals who have had the most significant influence on Czech science and scholarship in the past.



The cover of the publication *Bohemia docta. K historickým kořenům vědy v českých zemích* [Bohemia docta: On the historical roots of science and scholarship in the Czech lands]. (photo: Archives of the Masaryk Institute and Archives)

Mišková, A. – Franc, M. – Kostlán, A. (eds.): *Bohemia docta. K historickým kořenům vědy v českých zemích*. Academia, Praha 2010, 529 pp.

### Solidarity across Borders. Opposition in Czechoslovakia and East Germany after 1968

(Institute of Contemporary History)

This book describes the development of Czechoslovak and East German opposition from 1968 until 1989. The book is focused on particular factors (family environment, group dynamic, historical events, social background and influence of the law of action and reaction) of the opposition. Furthermore, the book deals with the perception of opposition leaders and the social anchoring of the opposition. Part of the book is aimed at the activities of the political police (in the compared countries) regarding the actions of the so-called enemy within.

Vilímek, T.: *Solidarita napříč hranicemi. Opozice v ČSSR a NDR po roce 1968*. Vyšehrad, Praha 2010, 384 pp.



The cover of the publication *Solidarita napříč hranicemi. Opozice v ČSSR a NDR po roce 1968* [Solidarity across borders. Opposition in Czechoslovakia and East Germany after 1968]. (photo: Archives of the Institute of Contemporary History)

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### Other important results:

1. On the Early Hunnic Presence in the Danubian Provinces in the Light of Archaeological Finds (*Institute of Archaeology, Brno*)
2. Archaeological evidence of Nomad influence and impact within territory of Moravia in end of 9th and in 10th century (*Institute of Archaeology, Brno*)
3. Archaeological and architectural study of the Minorite monastery in Most (*Institute of Archaeology, Prague*)
4. The Emergence of the Bohemian State (*Institute of Archaeology, Prague*)
5. Petr Vok z Rožmberka. A Biography of a Renaissance Gentleman (*Institute of History*)
6. Birth of the Renaissance Cavalier: The Upbringing and Education of the Nobility from the Bohemian Lands at the Threshold of Modern Age (1500–1620) (*Institute of History*)
7. Relations between Czechs and the Nations and Countries of Southeastern Europe (*Institute of History*)
8. The Correspondence of T. G. Masaryk and the Old Czechs (*Masaryk Institute and Archives*)
9. Processing and Exhibiting the Visual Archive of Emil Filla (*Institute of Art History*)
10. Bohemia is Full of Churches. Boemia plena est ecclesiis (*Institute of Art History*)
11. Was it Only Rock'n'Roll? Music Alternative in Communist Czechoslovakia 1956–1989 (*Institute of Contemporary History*)
12. The Government and the President. Normalisation (September 1968 – October 1969) (*Institute of Contemporary History*)

### 9. The Section of Humanities and Philological Sciences

The section was comprised of six institutes whose research activities focused on issues of philosophy, ethnology, language and literature, along with 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 migrations, 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.



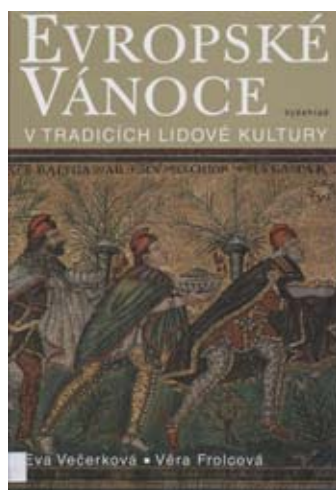
## SCIENTIFIC ACTIVITY

From the results from 2010, we present:

### **The European Christmas in the Traditions of Folk Culture** (*Institute of Ethnology*)

This monograph presents Christmas as a phenomenon of European culture. From the standpoint of ethnology, it evaluates the reflection of the cult of Christmas in the Christian West and East and the contribution of the tradition of folk culture to the Christmas celebrations.

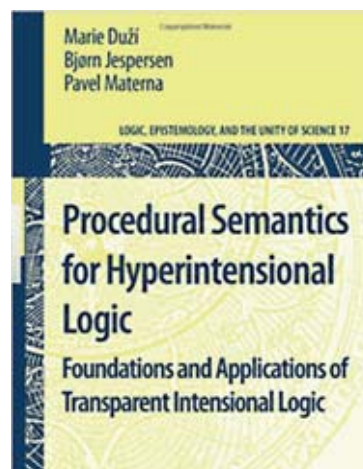
*Večerková, E. – Frolcová, V.: Evropské Vánoce v tradicích lidové kultury. Vyšehrad, Praha 2010, 520 pp.*



The cover of the book by Večerková, E. – Frolcová, V.: *Evropské Vánoce v tradicích lidové kultury* [The European Christmas in the Traditions of Folk Culture]. (photo: Archives of the *Institute of Ethnology*)

### **Procedural Semantics for Hyperintensional Logic** (*Institute of Philosophy*)

The first systematic exposition of transparent intensional logic, its foundations and many applications to a wide range of topics (formal semantics, philosophy of language, philosophical logic). The semantics is tailored to the hardest case, as constituted by hyperintensional contexts, and generalised from there to intensional and extensional contexts.



The cover of the book *Procedural Semantics for Hyperintensional Logic: Foundations and Applications of Transparent Intensional Logic*. (photo: Archives of the *Institute of Philosophy*)

Cooperating entity: VŠB-Technical University of Ostrava  
*Jespersen, B. – Duží, M. – Materna, P.: Procedural semantics for hyperintensional logic. Foundations and Applications of Transparent Intensional Logic. Springer, Berlin 2010, 550 pp.*

### **The Life and the Work of Jerome of Prague** (*Institute of Philosophy, Centre for Medieval Studies*)

The book is devoted to the life and the philosophical teaching of Jerome of Prague († 1416). His extensive travels, his wide erudition, his eloquence, his wit, made him a formidable thinker and critic of the church of his day, and it was for his criticisms rather than for heresy that his death was at the Council of Constance compassed.

*Šmahel, F.: Život a dílo mistra Jeronýma Pražského. Argo, Praha 2010, 390 pp.*

### **Bibliographical Vocabulary of Czech, Slovak and Foreign Authors of 16–18th Century** (*Institute of Philosophy, Centre for Classical Studies*)

In 2010, the Centre for Classical Studies of the Czech Academy of Sciences has published the “Knihopisný slovník českých, slovenských a cizích autorů 16.–18. století” by

## ANNUAL REPORT OF THE ASCR 2010

Václav Pumplra. This volume represents the work of the “Clavis Monumentorum Litterarum Regni Bohemiae” workgroup. It is based on the Czech retrospective bibliography (*Knihopis českých a slovenských tisků od doby nejstarší až do konce XVIII. století*) which has been digitised by the Institute during recent years. The present volume is a biographical encyclopedia of the writers/authors whose work is included in the Czech retrospective bibliography. Altogether it contains biographical data of cca. 2.000 authors. The entries are structured according to 16 aspects (date of birth/demise, place of birth/demise, career, religious affiliation, etc.). In addition to that, there is detailed account of interrelationships of the given author with other authors and personalities of the time. This may provide useful insight into the intellectual “web” of the past. Fully searchable database of the Czech authors portrayed on a CD-ROM is part of the publication. The on-line version of the database is likewise available from <http://database.aipberoun.cz/avaut/index.php>



The cover of the book *Knihopisný slovník českých, slovenských a cizích autorů 16.-18. století* [Bibliographical Vocabulary of Czech, Slovak and Foreign Authors of 16–18th Century]. (photo: Archives of the *Institute of Philosophy*)

Cooperating entity: AiP Beroun, s. r. o.

Pumplra, V.: *Knihopisný slovník českých, slovenských a cizích autorů 16.–18. století*. Kabinet pro klasická studia, Filosofický ústav AV ČR, v. v. i., Praha 2010, 1318 pp.

### **Words Written in Clay: Myths and Legends of Babylon** (*Oriental Institute*)

The book deals with the Akkadian (Babylonian and Assyrian) and bilingual (Sumerian and Akkadian) myths and legends handed down in the region of the ancient Near East during the period of 2nd and 1st millennia B.C. Their integral translations are accompanied by detailed introductions and supplemented by factual and bibliographical notes, list of quoted literary sources and secondary works as well as explanatory dictionary of proper names. This book is for its scope of translated and commented texts unique even in the context of global scholarly literature.

Prosecký, J.: *Slova do hlíny vepsaná. Mýty a legendy Babylónu*. Edice Orient, Vol. 9, Academia, Praha 2010, 440 pp.

### **Literary Life in the Shadow of Munich. 1938–1939** (*Institute of Czech Literature*)



The cover of the book *Literární život ve stínu Mnichova* [Literary Life in the Shadow of Munich]. (photo: Archives of the *Institute of Czech Literature*)

The book by the literary historian Jaroslav Med deals with the relations of the Czech writers and journalists towards the social and political reality following the acceptance of the Munich Agreement, in the period of the Second Republic (October 1938 – March 1939). At the basis of the detailed analysis of literary life then (i.e. not only of literary produc-

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tion, but especially of journalism) he reveals the roots of a number of problems, which at the time of the 'national catastrophe' came forth. Thus, Med shows the continuity between the Second Republic and the First Republic, vividly defines the basic areas, where idea streams clashed in the interwar period, like the relation to liberal democracy, capitalism, social issues, and to the problems of tradition and nationalism, the Spanish Civil War, Jews etc., as well as mapping out the key role the Czech writers and poets played in these polemics, culminating just during the period of the Second Republic. Last but not least, he argues that despite the tragical character of the period of the Second Republic in our modern history, thanks to the leading intellectual representatives, it was not the time of resignation and cooperation with the enemy.

*Med, J.: Literární život ve stínu Mnichova 1938–1939. Academia, Praha 2010, 340 pp.*

### **Etymological Dictionary of the Old Church Slavonic V, 15th Volume**

*(Institute for the Czech Language)*

The Etymological Dictionary of Old Church Slavonic is the only etymological dictionary of this oldest written Slavic language in the world. The dictionary analyzes Old Church Slavonic vocabulary within the context of all Slavic languages, in addition to nomenclature, the book also explains the material and cultural life and customs of the Old Slavs. It shows how Old Church Slavonic was enriched by receiving words from other cultural languages, mainly Greek but also Latin, Old Germanic languages, etc. The individual entries contain characteristics of grammar, derivatives of the entry word, suggested etymological and semantic development. The 15th volume treats the entries *srъdъce*–*сь*. It is highly valued both in Europe and around the world.

*Janyšková, I. a kol.: Etymologický slovník jazyka staroslověnského 15, hesla srъdъce –сь. Tribun EU, Brno 2010, 64 pp.*

### **Other important results:**

1. Songs from Kopanice from the records of Josef Černík (*Institute of Ethnology*)
2. Czech-Slovak relations and compatriots (*Institute of Ethnology*)
3. Domestic Estates: Ethical-Economic Themes in Medieval Narratives on the Household (*Institute of Philosophy*)
4. Can Concepts be Defined in Terms of Sets? (*Institute of Philosophy*)
5. Globalisation in Contemporary Social Contexts (*Institute of Philosophy, Centre of Global Studies*)
6. Saints and their Cults in the Middle Ages (*Institute of Philosophy, Centre for Medieval Studies*)
7. Jan Patočka and the Heritage of Phenomenology (*Institute of Philosophy, Centre for Theoretical Studies*)
8. A Small Encyclopaedia of Taoism (*Oriental Institute*)
9. Prague traces of Jakub Bart-Čišinski (*Institute of Slavonic Studies*)
10. Somewhere Here: The Czech Poet Karel Šiktanc (*Institute of Czech Literature*)
11. Text in Motion (*Institute of Czech Literature*)
12. Old Czech Bible of Dresden and Olomouc (*Institute for the Czech Language*)



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**03**

# Educational Activity

## EDUCATIONAL ACTIVITY

The ASCR ascribes great significance to the development and deepening of the quality of educational activities, which are among the essential elements of the fulfilment of its mission in society. Primary attention is naturally paid to tertiary education at higher education institutions, particularly in relation to the training of doctoral candidates implemented as part of the broadened accreditation of doctoral study programmes. However, more and more attention at the ASCR is now being focused on educating secondary-school pupils through direct instruction, increasing the expertise of teachers, by means of assistance in organising specialised competitions, olympics and specialised secondary-school activities or summer schools of various orientations. Many such educational activities make use of subsidies from suitably focused programmes of the European Social Funds. The educational activities are 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 institutes.

### Tertiary Education

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 area is coordinated by the **Council for Cooperation with Higher Education Institutions and the Preparation of Scientific Employees of the ASCR**. The Council discussed the contribution of the students in the outputs of scientific work (publications) with regard to the entry of data on the maternal workplace in the RIV database. There was a further discus-

sion of the question of introducing an accredited workplace at which a doctoral study programme was implemented, in a diploma in the sense of Act No. 111/1998 Coll., on Higher Education Institutions (a statement was issued on this problem and can be found at [www.cas.cz/sys/news.archive.jsp](http://www.cas.cz/sys/news.archive.jsp)).

Other than scientific cooperation with higher education institution workplaces, the ASCR to a significant degree **participates directly in lecturing at higher education institutions**. Scientists from the institutes of the ASCR ensured a total of 4,360 individual semestral cycles of lectures, training sessions or seminars in a **total extent of 77,326 hours** at various higher education institutions in 2010. The employees to a significant degree participate in the academic life of higher education institutions, (the proceedings of the scientific councils, the councils of the doctoral study programmes or the examination and appointment commissions). Several employees of the ASCR participated through membership in the Accreditation Commission in ensuring the quality of tertiary education.

The institutes of the ASCR in a considerable way **share the work in supervising students** in elaboration of their qualification theses. Their employees in 2010 supervised a total of **1,454 students in bachelor's and master's studies** and **2,153 students of doctoral studies** (of which 290 from abroad). In 2010, 249 postgraduate students trained at institutes of the ASCR successfully completed their studies. The ASCR concluded twenty-two framework contracts on cooperation in the area of doctoral study programmes with individual higher education institutions and the majority of the institutes of the ASCR have been granted joint accreditation for their implementation in a wide range of fields. The centres of cooperation with higher education institu-

**Tab. 2: Overview of the Most Important Data on Cooperation with Higher Education Institutions**

Year	2005	2006	2007	2008	2009	2010
PhD students supervised at ASCR institutes	2,079	2,072	2,154	2,162	2,157	2,153
MA/MS students supervised at ASCR institutes	1,143	1,238	1,366	1,419	1,540	1,454
Newly accepted PhD. students	391	366	431	411	412	338
Number of completed doctoral dissertations	220	259	256	266	279	249
Number of semestral cycles of lectures, seminars and exercises provided by employees of the ASCR at HEIs	2,666	2,824	3,195	3,571	3,487	4,360
Number of hours lectured	66,006	68,429	71,739	78,306	76,744	77,379

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tions 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 2, with more detailed statistics provided in Appendix 5.

The ASCR continues to organise regular **Basic Courses of Scientific Work**, which are one of the forms of support of the education of students in doctoral study programmes. Attendance is offered primarily to doctoral candidates working at accredited workplaces of the ASCR, but the courses are open also to other students of higher education institutions. They are run as a one-week, special-purpose block of lectures and practical exercises. They take place in Prague and in Brno and more than **400 students** went through them in 2010. The courses took place five times in Prague and were attended by 124 students. In Brno, they took place three times and 178 students were trained. Moreover, three one-day courses, which were attended by a total of 100 students, were organised in Zlín for Tomáš Baťa University. Since autumn 2009, the courses in Brno have been held as part of the Operational Programme Education for Competitiveness.

The ASCR supports the educational cycles entitled **utilisation of university students**. Activities leading to more substantial mutual cooperation between higher education institutions, scientific-research workplaces and the entrepreneurial sector are the main themes of the project **Transfer of Knowledge and Technology** in selected regions, which applies the **Technology Transfer Manager** European Educational Model. The project is taking place in České Budějovice and in Brno and within its framework the first courses of TTM-J (Junior) were begun in the form of distance education, i.e. via e-learning.

The educational cycle **Management of Science**, which focuses on the assistance of the managerial employees of the individual workplaces of the ASCR during activities in the complicated legislative and economic environment, has been implemented already for the third year. The graduates of the course acquire managerial skills and a deeper knowledge of the areas of managing human resources, financial management, legislation, the European financial mechanisms for the support of science and research and many others. The project is conceived as a ten-month cycle comprising eighteen all-day meetings on various topics on which renowned experts lec-



The participants of the Management of Science project which took place at the Conference Centre of the ASCR in Liblice. (photo. M. Hužvárová)

ture. The educational activities aimed at universities but also secondary schools take place at a number of workplaces of the ASCR through projects financed from EU structural funds within the Operational Programme Education for Competitiveness. The **EKOTECH** project resolved at the *Biology Centre* is focused on the multi-disciplinary education of specialists for the utilisation of biotechnology in ecological fields. The *Institute of Biophysics* is implementing the project **Modern Biophysical Methods**: advanced practical education in experimental biology, the *Institute of Macromolecular Chemistry* the **Innovation of Education in Chemistry** project, the *Institute of Physics* **Modern Technology in the Study of Applied Physics** project, the *Institute of Physics of Materials* the **Complex System for Acquiring, Educating and Permanently Engaging Talents in Research and Development Centres** project.

The individual workplaces of the ASCR organise and ensure other diverse events focused on the support of teaching at higher education institutions and its innovation. The *Institute of Geonics* for example runs an **Innovation in the teaching of Geographic Study Fields** project, the *Nuclear Physics*

## EDUCATIONAL ACTIVITY



Open House Days 2010 at the *J. Heyrovský Institute of Physical Chemistry* were visited by 400 students. (photo: Archives of the ÚFCHJH)



The national finale of the competition of scientific and technical projects by secondary-school students, which is announced by the Association for Youth, Science and Technology (ANMAVET), took place under the aegis of the ASCR on 6 and 7 May 2010 in the building of the ASCR. (photo: S. Kyselová)

*Institute* lectures at a **Summer School of Mathematics and Physics** organised by Jan Evangelista Purkyně University in Ústí nad Labem.

### Secondary Education

The institutes of the ASCR participate in education at secondary schools in **direct teaching** and diverse lecture activity. These activities are contributed to by fourteen institutes of the ASCR; their employees had lectures at secondary schools in a total of more than 3,000 hours. The share of the employees in the creation and publication of **secondary-school textbooks** is also significant. A good example in the last year became a new textbook of natural science for elementary schools and eight-year general secondary schools or the processing of e-learning pages for the students of secondary schools in the South Moravian region.

**Student scientific and specialised activity** is another area, where the institutes of the ASCR are considerably active.

They provide secondary schools and their students as well as teachers with a very wide offer of **internships and excursions**, which take place regularly at twenty institutes. Student stays here often serve for the elaboration of valuable work within **secondary-school specialised activities**; some of them were honoured at state-wide displays. A suitable specific example of these activities is the educational, popularisation project of the *J. Heyrovský Institute of Physical Chemistry* 'Three Instruments: Information – Internship – Presentation', which offers particularly lectures and excursion at the workplace. Not only the guiding of works but also membership in commissions and juries contributes to the organisation and course of the student specialised activity at the ASCR.

The institutes of the ASCR contribute in a significant way to the course and provision of **science competitions in the Czech Language, Mathematics, Chemistry and Biology** with specialised and informational assistance during the competitions, leading laboratory exercises, lectures and organising summer camps. The employees of the individual institutes of the ASCR further helped organise the In-

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J. Pačes from the *Institute of Molecular Biology* lecturing within the cycle *Do Not Fear Science* on the them of 'How To Read DNA'.

(photo: S. Kyselová)



A component of the summer school project *Open Science* in *Nové Hrady* was the lecture by doc. J. Černý from the Faculty of Science of Charles University on immunology.

(photo: S.Kyselová)

**International Tournament of Young Physicists**, ensures a biology camp within the **Arachne** events and engage in the project **České hlavičky [Little Czech Minds]**.

The project **Open Science II – We Are Seeking Young Scientists** was begun by the *Centre for Administration and Operations* already in 2009, which enables access to scientific and research workplaces and systematic support of the educational activities of especially students from outside of Prague, who often do not have as many opportunities for their own development. The project hence in the form of a two-year internship offers talented interested parties the possibility to engage in authentic scientific activities in the top research projects of the institutes of the ASCR and the research workplaces of the cooperating higher education institutions. Under the guidance of experienced scientists, gifted students discover scientific work in its everyday practice. They can hence try out work in the laboratory, various experiments but also field surveys. In total, 150 scientific employees participated in the project, who within the internships devote themselves individually to the selected students. In

2010, they thus supported the interest of 185 students in the fields of biology, chemistry, physics, mathematics, computer science, geology or geography. The ASCR within this project stimulates the mutual cooperation of secondary schools and scientific-research institutes in the area of the further education and work with talented young people. More information can be found at [www.otevrena-veda.cz](http://www.otevrena-veda.cz).

A similar project is running in cooperation with the Association of South Moravian Workplaces of the ASCR with the South Moravian Regional Centre for International Mobility in Brno as a component of the Operational Programme Education for Competitiveness. Also this project focuses on the educational and scientific activity of talented secondary-school youth.

Some of the educational events are intended not only for students but also for teachers. Throughout 2010, the traditional cycle of lectures **Don't Fear Science** took place for secondary-school students and their teachers from biology, chemistry, physics, medicine, mathematics, computer sci-



## EDUCATIONAL ACTIVITY



The participants of the summer school project **Open Science – Secondary-School Pedagogues**, which took place during August 2010 at the Academic and University Centre in Nové Hradý (photo: S. Kyselová)

ence and other fields. In regular monthly cycles always devoted to one field of natural sciences, leading Czech scientists present to the students not only interesting topics and the results of Czech research but enrich them also with their own experience. The presenters address the students with language and means that are close to the younger generation. More than 1,400 students expressed an interest in utilising this singular opportunity to discuss things with significant Czech scientists this year.

Inspiration and experience for secondary-school teachers of biology, physics and chemistry is offered by the **Open Science for Pedagogues** project implemented by the *Centre for Administration and Operations*, within whose framework three practical courses in these subjects were organised for secondary-school teachers. They took place like in previous years in the summer months in the Academic and University Centre in *Nové Hradý* and were successfully completed by almost 70 pedagogues from the entire CR. Components of the programme were lectures by interesting people from the institutes of the ASCR and universities, accompanied by practical



The **Circle of Chemistry and Physics** with the title **Science Is Not Boring** was implemented in cooperation with elementary schools from Prague 9. (photo: Archives of the *J. Heyrovský Institute of Physical Chemistry*)

blocks from the content of the individual courses. In these exercises, the presenters 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 have the opportunity to try out work with modern laboratory instruments. The practical courses have indicated a possible path to the further education of secondary-school pedagogues. The courses provide the teachers not only with new knowledge and ideas but enable the meeting of participants from various schools from all over the Czech Republic.

In June, the ASCR traditionally organised through the *Centre for Administration and Operations* the **Summer School of Contemporary History** for teachers of history from the entire Czech Republic. The Institute of Czech History of the Faculty of Arts of Charles University in Prague along with the employees from the *Institute for Contemporary History* participated in the preparation. Within the Summer School, six lectures took place on topics complemented by a visit to the Jewish Museum in Prague and the screening of a film. The event was attended by 40 pedagogues.

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The *Nuclear Physics Institute* participated in organising **Czech Teacher's Week in the Laboratories of CERN**, which encountered a substantial reaction from the attendees. Within similar events, also the lecture cycle for secondary-school youth **Dreams&Teams** organised by the British Council took place, with the *Institute of Inorganic Chemistry* cooperating in its provision. The *Biology Centre* in cooperation with the University of South Bohemia organised **Summer Academic Days**, which included advanced courses for secondary-school students. The institutes of the ASCR also participated in the organisation of the **7th Prague Conference of Secondary-School Students**.

The institutes of the ASCR and their employees also support education on the level of elementary school and share in the creation of teaching materials for their pupils. The *Astronomical Institute* participated in the **Lada's Region in the Transformations of Time** project and contributed to the elaboration of some of the background materials for the education of the pupils of the elementary schools of that region. Also the natural-science group **Science Is Not Boring**, which meets at the *J. Heyrovský Institute of Physical Chemistry*, is focused on elementary-school pupils.

Activities aimed at bringing science closer to secondary-school students have also been developed at the **international level**. The ASCR has participated in the preparatory work leading to the establishment of a complex programme for the education of youth in Europe, which will be provided by 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 its representative actively participated in the conference in York entitled Taking Inquiry-Based Education into Secondary Schools. At the conference, the European strategy for asserting science education at secondary as well as elementary schools was discussed. In this context, the ASCR established cooperation with the steering group of the **Support for Technical and Scientific Fields project** coordinated by the MEYS of the CR.

### Education for the General Public

The ASCR also developed multifaceted activities directed at educating the public, such as lectures, educational courses or specialised consultations. Many of these activities are



J. Syka from the *Institute of Experimental Medicine* lecturing within the **European Week of the Brain** which took place from 15 to 21 March 2010. (photo: S. Kyselová)

described in Chapter 7, which is dedicated to popularisation and promotional activity.

The ASCR ensured **specialised education**. Seven institutes of the ASCR actively participated in pedagogical work when implementing life-long learning at the **University of the Third Age** with an offer of a wide range of lectures. The institutes of the ASCR further provided various other professionally focused activities; e.g. the *Institute of Physiology* prepared **Specialised Courses for Physicians**, the *Institute of State and Law* with the Association of General Practitioners an educational cycle of **The Minimal Legal Standard for Physicians**. A cycle of lectures and practical exercises was offered by the **Autumnal School of the Basics of Electron Microscopy**, which was organised by the *Institute of Scientific Instruments*, and the traditional **European Week of the Brain** prepared by the *Institute of Experimental Medicine* was met with great interest and response. The educational events dedicated to the problems of the **impact of the environment on human health** were also significant. The *Institute of Experimental Medicine* in cooperation with other institutes organised several events with such a focus

## EDUCATIONAL ACTIVITY



The graduates of the School of Folklore Traditions.  
(photo: L. Tyllner)

for the people in the affected area of Ostrava. The *Institute of State and Law* provided for the Magistrate of the Town of Pilsen lectures on the theme of **administrative proceedings** and a seminar on **accounting reform** for the Institute of the Certification of Accountants. The *Economics Institute* organised **economic seminars** on an ongoing basis. For the Chamber of Interpreters of Sign Language, the *Institute of Psychology* organised a seminar on the **production and perception of texts**, co-organised a roundtable discussion devoted to the serious social phenomenon – **harrassment** and arranged a seminar on **sex education**.

The organisation of **lectures and seminars** was again in 2010 an inseparable part of the educational activity of the ASCR. The institutes of the ASCR participated in the state-wide event **European Night of Scientists**, which had a very favourable reception among the general public. A number of educational activities were aimed at contemporary society and its history. Great interest was aroused by the autumnal and spring cycles of lectures at the *Institute of Sociology* or the series of lectures **Psychology for Every Day**, prepared by the *Institute of Psychology* in coopera-



For the visitors of Earth Day Game, the employees of the *Institute of Geology* prepared a number of graphic examples in the Geopark.  
(photo: S. Kyselová)

tion with the Faculty of Arts of Charles University. For the Prague Information Service, the *Institute of History* and *Institute of Philosophy* contributed to the programme of a cycle of lectures **The Middle Ages a Bit Differently** and to the programme of the education of future town guides. Special seminars were prepared for the 600th anniversary of Prague's Orloj (Astronomical Clock). Under the auspices of the National Museum, the *Institute of Slavonic Studies* participated in a lecture cycle called **Byzantium, Heir of the Eastern Roman Empire in the Middle Ages**.

The ASCR participated in a significant way in the education of the public within **teaching and cultivating the Czech Language** through the *Institute for the Czech Language*. It for instance organised courses in the correction of documents in official style, a course of lecturer skills for teachers of Czech as a foreign language, courses of Czech for foreigners. Within the language-advisory activities, the employees of the institute in 2010 answered 9,400 written questions more than 50 of which were letters and almost 9,350 emails. They answered approximately 40 questions a day at the telephone line of the language consulting office. Already traditionally,

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The travelling exhibition **The Story of the Drop** dedicated to Jaroslav Heyrovský (Prague- Brno-Pardubice-Olomouc). (photo: Archives of the ÚFCHJH)

the institute shared all year round in the preparation of programmes and the creation of themes for Czech Television and Czech Radio (the television and radio cycle *Divnopis*, explaining the strange names of Czech villages or townlets, in the programme *Živočichopis nebo Vývoj českých zoologických názvů /The Development of Czech Zoological Names/* and so on).

Attention was also paid to the questions of **literature**. The *Institute of Czech Literature* in cooperation with the Faculty of Arts of Charles University organised the popular Summer School of Linguistics and Slavic Studies and prepared lectures on the theme of *Multilingualism in Czech Literature 2010–2011*. The *Oriental Institute* offers **language courses of Mongolian and Arabic** for the public.

The *Institute of Ethnology* in the **Summer School of Classical Dance** in Rataje nad Sázavou. This institute also ensures the **Schools of Folklore Traditions** and its employees are represented in the evaluation commissions of the international and national folklore festivals and national shows of folklore.

Within the Tenth Annual **Science and Technology Week** and the Days of Open Houses at the institutes of the ASCR, a total of 155 lectures and five seminars, seventeen exhibitions and twelve scientific cafés were held (see Chapter 7 for more details).

The year 2010 was declared the **International Year of Biodiversity** and thus offered the opportunity to evaluate the progress achieved in fulfilling the goals of the UN Convention on Biological Diversity. The ASCR is well aware of the insufficient participation and utilisation of scientific knowledge in the current practice of natural protection, and therefore supports research on biodiversity at its workplaces. In connection with this, the ASCR organised an accompanying discussion seminar **Saving Biodiversity – Saving Future of the Mankind** within the 14th **Forum 2000** conference, which took place under the title of *The World We Want to Live In*. The aim of the meeting was to emphasise the international importance of biological diversity for the future development of human societies and simultaneously present the wide palette of the research on biodiversity at the institutes of the ASCR. There was also similar event organised by the *Biology Centre* in cooperation with the Ministry of the Environment **Week for Biodiversity**.

On the occasion of the worldwide **Earth Day**, scientists from the ASCR along with experts specialised in earth sciences prepared a series of lectures. The four-day programme was complemented by a graphic interactive *Earth Day Game* with simulations of geophysical phenomena at the Geopark of the *Institute of Geophysics* in Prague in Spořilov.

The **exhibition** on the activities and results of scientific work at the Academy of Sciences called **Science on Your Side** took place in Prague, Brno, Olomouc, Ostrava and České Budějovice and was presented also in the Chamber of Deputies of the CR. The *J. Heyrovský Institute of Physical Chemistry* ensured the continuation of the travelling exhibition **The Story of the Drop**, connected with the lecture Jaroslav Heyrovský – The Story of the Nobel Prize Laureate. The *Institute of Geology* prepared an exhibition on geology and archaeology at the Chateau Valdštejn.

The ASCR is a member of the **European Science Event Association**, which associates European institutes organising scientific festivals. The coordination of educational activities intended for the wider public with this association con-

## EDUCATIONAL ACTIVITY



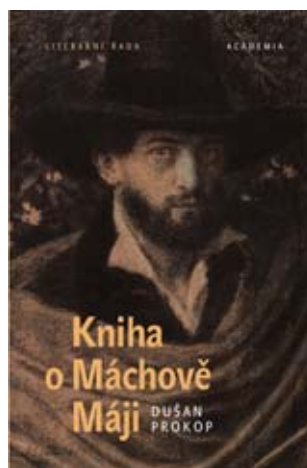
Ceremonial announcement of the Second Annual Academia Publishing House Award for 2009 took place on 24 February 2010. In the picture, President of the ASCR J. Drahoš and Jana Zoubková, awarded for her translation of the book by K. Liessmann *Theory of Uneducation*. (photo: S. Kyselová)

tributes to their international dimension and enables new contacts to be made.

### Editorial Activity of the ASCR

The ASCR subsidises the publications of selected science and popular-science publications and in 2010 financially supported the publication of fifty books, of which thirty-three were issued by **Academia Publishing House** by the *Centre for Administration and Operations* and fifteen other institutes of the ASCR. The total subsidy for the support of science and popular-science publications was CZK 11.1 million. During 2010, more volumes of the edition **Paměť** [Memory], which have been labelled as prestigious by a number of critics and historians, were issued by Academia Publishing House as well as further volumes of the editions of **Galileo**, **Novověk** [The Modern Period], **Historie** [History] or **Europa** [Europe], which are also editions highly praised by readers and critics. The list of titles issued by the institutes of the ASCR is in Appendix 9.

Some of the ASCR's editorial enterprises are considered to be exceptional, for instance the publication of the last two volumes of the edition of *Staročeské Bible drážďanské a olomoucké* [The Old-Czech Bible of Dresden and Olomouc], which was prepared by a group of employees of the *Institute for the Czech Language* under the guidance of PhDr. Jaroslava Pečirková, the publication of Martin Hilský's *Shakespeare a jeviště svět* [Shakespeare and the Stage of the World], the book *Teorie nevzdělanosti* [The Theory of Uneducation] by Austrian philosopher Konrad Paul Liessmann. On the occasion of the 200th anniversary of the birth of Karel Hynek Mácha, the Academia Publishing House of the *Centre for Administration and Operations* a monograph by doc. Dušan Prokop *Kniha o Máchově Máji* [A Book on Mácha's Máj], an anthology of Mácha's work by Růžena Grebeníčková *Máchovské studie* [Mácha's Studies] in a careful edition by doc. Michael Špirit and the anthology *Mácha redivivus* by the editors prof. Aleš Haman and Radim Kopáč. The *Centre for Administration and Operations* publishes the journal **Živa**. The books from the production of the Academia Publishing House acquired several significant awards in 2010 – the Magnesia Litera award, the Josef Hlávka Award, The Vize [Vision] 97 Award, and an award in the poll by Lidové noviny [People's Newspaper] *Kniha roku* [Book of the Year].



The cover of the *Kniha o Máchově Máji* [Book on Mácha's Máj]. (photo: Archives of the Academia Publishing House)

**Akademický bulletin** (Academic Bulletin), which provided information on the events in the ASCR and at its institutes, came out regularly in 2010.

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# Practical Activity

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## PRACTICAL ACTIVITY

The transfer of research results and their application in practice is one of the long-term priorities of the ASCR. The ASCR therefore systematically supports the transfer of the acquired knowledge to the application sphere and also focuses on strengthening of the current and creation of new contacts between its workplaces and entities of the user sphere. This is also facilitated by the Council for the Cooperation of the ASCR with the entrepreneurial and application spheres and synergy with the Technological Centre of the ASCR and *the Centre for Administration and Operations of the ASCR, v. v. i.*

The education of research employees in the area of the issue of innovative processes and the protection of intellectual or industrial property rights is provided by the Centre of Innovative Education in Liblice and the Information Centre of the Academy of Sciences of the CR for Innovation (ICASI). Both centres were put into operation within projects supported by the structural funds.

The main partners of the ASCR for cooperation with the user sphere are the Engineering Academy of the Czech Republic (in particular 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.

In 2010, the ASCR's institutes resolved a large number of **projects with an emphasis on the immediate application of the obtained knowledge** in direct cooperation with entities in the areas of entrepreneurial and application spheres. Twenty-eight such joint projects were resolved within the Targeted Research Projects, Information Society Technologies and Nanotechnology for the Society programmes and the Grant Agency of the ASCR, and forty-two projects within programmes provided by the Ministry of Education, Youth and Sports. In addition, fifteen projects of the Czech Science Foundation were also based on the active participation of partners from the user sphere. The direct cooperation of the ASCR's institutes in innovation activities with partners from industry was further implemented in the framework of the joint resolution of forty projects in programmes of the Ministry of Industry and Trade. In cooperation with partners from the application sphere, sixteen projects of the Ministry of the Environment were resolved,

four projects of the Ministry of Agriculture and another forty-one projects with various forms of support from public as well as private sources (of which eleven projects were international or financed from EU means).

The process of knowledge transfer from research to practice was considerably assisted by **cooperation based on agreements and economic contracts** between institutes of the ASCR and entities of the user sphere. In 2010, the institutes of the ASCR concluded more than 240 economic contracts with such partners. The *Institutes of Archaeology* in Prague and Brno themselves concluded another 660 contracts for conducting rescue archaeological surveys.

Based on the results of the activities of the *Institute of Experimental Medicine*, four **new 'spin-off' companies**, which implement the rapid transfer of the results of research into practice were created in the area of applied research in 2010: SinBio, s. r. o. (for the area of bio-nanotechnology), CellMaGel, s. r. o. (for the development and production of complex biomaterials based on polymer hydrogels, serving for the planting of stem cells), ArtiCell, s. r. o. (for the introduction of research results in the field of mesenchymal cells into medicinal practice – the treatment of injury and damage to the human movement apparatus) and EponaCell, s. r. o. (for the introduction of research results in the field of mesenchymal cells into veterinary practice – the treatment of injury and damage to the movement apparatus of animals, particularly with horses and dogs).

The following selected examples of cooperation implemented within joint projects or on the basis of economic contracts document the activities, which led in 2010 to the application of the research results achieved by the institutes of the ASCR in industrial, service and consulting companies, agriculture, health care and in the protection of the environment and cultural values:

- Robotisation of the spectographs of a 2-m telescope to increase the effectivity of the spectroscopic observation, *Astronomical Institute* and ProjectSoft HK, a. s., Hradec Králové
- Development of new methods and equipment for the modification and/or control of the functional mechanical features (particularly the transformational deformation and/or fixity) of the metal threads from materials with shape memory, *Institute of Physics* and ITV

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- Denkendorf (Germany), DITF Denkendorf (Germany) and ELLA-CS, s. r. o., Hradec Králové
- Development of 2D scintillation imaging with high resolution using an Lu<sub>3</sub>Al<sub>5</sub>O<sub>12</sub>:Ce scintillator, *Institute of Physics* and CRYTUR, s. r. o.
  - Development of special technologies for the production of monochromators for synchrotron radiation, *Institute of Physics* and Polovodiče, a. s. (ABB)
  - Development of the radiation and physical testing of thermoelectric modules, *Institute of Physics* and Škoda Mladá Boleslav, a. s.
  - Development of optical and transport methods for the characterisation of semi-insulating GaN:Fe (substrate material for integrated optoelectronics and microwave electronics), *Institute of Physics* and Kyma Technologies Inc., Raleigh (USA)
  - Development of models for the forecast of the production of electricity from the photovoltaic farms and from windfarms, *Institute of Computer Science*, ČEZ Distribuce, a. s., and ČEPS, a. s.
  - Development of modified models for the estimate of the loss in the supply of natural gas, *Institute of Computer Science* and RWE GasNet, s. r. o.
  - Introduction of the method of determining <sup>89</sup>Sr, <sup>90</sup>Sr and <sup>90</sup>Y using liquid scintillation spectrometry in the Dukovany nuclear electric plant, *Nuclear Physics Institute* and ČEZ-EDU
  - Development of a system for searching in image databases, *Institute of Information Theory and Automation* and Profimedia.CZ, s. r. o., Pardubice
  - Development and software implementation of mathematical models of production lines for the prediction and optimisation of the dynamics of production, *Institute of Information Theory and Automation* and dataPartner s.r.o., Č. Budějovice
  - Development of a program for noise reduction of the EKG signal from the three electrodes using blind separation, *Institute of Information Theory and Automation* and Medical Technologies CZ, s. r. o.
  - Development of an approach to the quantitative analysis of oxygen in Zr alloys using the SIMS method for the nuclear industry, *Institute of Photonics and Electronics* and UJP Prague, a. s.
  - Development of a methodology for testing very brittle ceramic (glass) materials in terms of the resistance to breakage under dynamic stress, *Institute of Physics of Materials* and VOP Šternberk, s. p., – VTUO division in Brno
  - Development of technologies on the basis of water-stabilised plasmatron (WSP), *Institute of Plasma Physics*, VUK Panenské Břežany, a. s., and ITC-VUK, a. s.
  - Preparation of special plasma-sprayed ceramic tubes, *Institute of Plasma Physics* and JSP, s. r. o.
  - Development of a special optic system, *Institute of Plasma Physics* and Elya Solutions s. r. o., Prague
  - Development of a method of acoustic emission and nonlinear ultrasound spectroscopy for the detection of damaged airplane alloys, *Institute of Thermomechanics*, Honeywell CZ, s. r. o., Aircraft Industries, a. s., Kunovice and the Institute of Aerospace Engineering, Faculty of Mechanical Engineering, Brno Technical University
  - Production of medicinal and radioactive waters in connection with seismic phenomenon, *Institute of Rock Structure and Mechanics* and Léčebné Lázně Jáchymov, a. s.
  - Development of a methodology for the research of xylites focused on the anatomical features of the tissue of coalified wood and the composition of the biomarkers with the aim of distinguishing between gymnosperm and angiosperm plants and determining the taxa of the original vegetation, *Institute of Rock Structure and Mechanics* and Severočeské doly, a. s.
  - Development and installation of a suspended magnetic separator for capturing undesired ferromagnetic impurities from ceramic raw materials on a moving belt, *Institute of Rock Structure and Mechanics* and LasselsbergeR, s. r. o.
  - Preparation of new materials based on composites of TiO<sub>2</sub> – CdS – ZnS with the deposition of Pt, Pd and Au for photocatalytic water splitting, *Institute of Inorganic Chemistry* and Rokospol, a. s., Prague
  - Preparation of new materials based on mixed oxides of TiO<sub>2</sub>-GeO<sub>2</sub>, TiO<sub>2</sub>-MnO<sub>2</sub> and Mn doped with iron oxides indicating a 95–99% conversion of vombat materials per hour, *Institute of Inorganic Chemistry* and Rokospol, a. s., and VTUO, Brno
  - Preparation of stable water salts Ti, Al, Zn, Zr and sandwiched multilayer TiO<sub>2</sub>/SiO<sub>2</sub> to create the effect of the Bragg reflector on Ni substrates and on the commercial product OVDots®, *Institute of Inorganic Chemistry* and OPTAGLIO, s. r. o., Řež



## PRACTICAL ACTIVITY

- Resolution of the approach to the conversion of TiO<sub>2</sub> nanothreads into TiO<sub>x</sub>N<sub>y</sub> (within the project of the Bioactive biocompatible surfaces and new nanostructured composites for application in medicine and pharmaceuticals), *J. Heyrovský Institute of Physical Chemistry* and Zentiva, a. s., Elmarco, s. r. o., Liberec, Generi Biotech, s. r. o., Hradec Králové, the Faculty of Science, CU, Prague, ICT Prague, University of Pardubice, the University of South Bohemia in České Budějovice and 3rd Faculty of Medicine, CU, Prague
- Development of a preparative laboratory electrolyzer of suitable construction for the electrolysis of solutions of polymers under an inert atmosphere, *J. Heyrovský Institute of Physical Chemistry* and CPN, s. r. o., Dolní Dobrouč
- Development of reactive chemical barriers for the decontamination of heavily polluted subsurface waters, *Institute of Chemical Process Fundamentals* and Dekonta, a. s., Prague
- Development of microapparatuses for the processing of products of consumer chemistry, *Institute of Chemical Process Fundamentals* and Procter & Gamble – Rakona, s. r. o., Rakovník
- Development of new methods of the characterisation of the remaining extract, which will enable the identification and evaluation of the composition of the dextrines typical for Czech beer, *Institute of Analytical Chemistry* and the Research Institute for Brewing and Malting, Plc., Prague
- Development of a new networking system for the epoxide cement Fluepox, *Institute of Macromolecular Chemistry* and Walter Aircraft Engines (Division of GE Aviation), Prague
- Development of a technology to clean and regenerate the electrolysing membrane from the desalination of the sweet serums, *Institute of Macromolecular Chemistry* and MemBrain, s. r. o., Stráž pod Ralskem
- Development of a polymer antitumour pharmaceutical with a dual mechanism of the effect on the cancer cells, based on the polymer carrier formed by a HPMA copolymer and combining the effect of enzymatically and hydrolytically bound doxorubicine on the carrier, *Institute of Macromolecular Chemistry* and Zentiva, k. s., Prague
- Development of biocompatible nanothread constructs forming new medicinal forms for the application of biologically and pharmacologically active materials, *Institute of Macromolecular Chemistry*, Elmarco, s. r. o., Liberec, *Institute of Experimental Medicine* and *Institute of Molecular Genetics*
- Development and testing of pilot units for the membrane separation of methane and carbon dioxide from biogas, *Institute of Macromolecular Chemistry* and MemBrain, s. r. o., Stráž pod Ralskem
- Development of the pharmaceutical Tenofovir disoproxoyl fumarate, *Institute of Organic Chemistry and Biochemistry* and Zentiva, k. s., Praha
- Development of the nanostructured layers of TiO<sub>2</sub> in the form of a pineapple and amorphous diamond-like carbon enriched with titanium (for bone implants), *Institute of Physiology* and HVM Plasma, s. r. o., Prague, Beznoska s. r. o., Kladno, Prospan s. r. o., Kladno and the Faculty of Mathematics and Physics of CU, Prague
- Development of new medicinal forms of liposomal gel containing a hydrophobic phthalocyanine photosensitizer for the photodynamic therapies of malignant tumours, *Institute of Physiology* and Wake, s. r. o., Prague
- Development of a new type of bioreaktor for the cultivation of algae and blue-green algae under defined concentrations of CO<sub>2</sub>, *Institute of Microbiology* and Photon Systems Instruments, s. r. o., Brno
- Production of the apple-tree species pf GOLDSTAR, RED TOPAZ, ROZELA, SOLARIS *Institute of Experimental Botany* and Holland Alma Ltd., Pírcse (Hungary)
- Development of transgenic technology with fowl and the modification of retroviral vectors for transgeneses (within the Retroviral Vectors Derived from ASLV



RED TOPAZ species of the apple tree.  
(photo: Archives of the *Institute of Experimental Botany*)

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project), *Institute of Molecular Genetics* and *Biopharm*, a. s.

- Development of thirty EST–SSR molecular markers for the genotyping of hop (*Humulus lupulus* L.) suitable for the reliable characterisation of eleven cultivars of hop, *Biology Centre* and *Chmelařský institut Žatec*, s. r. o.
- Development and verification of a method for utilising cryo-FESEM for the assessment of the formulation of Cyclosporin CPS, *Biology Centre* and *Teva Czech Industries*, s. r. o., *Opava-Komárov*
- Development of a technology for the cultivation of quickly growing evergreen tree species for the production of biomass in the contaminated soils of the Přeboram region, *Institute of Botany*, *Czech University of Agriculture in Prague* and *Bioforsk* (Norway)
- Development of an aeration technology for the reduction of the resting stages of cyanobacteria and bioaccessible nutrients in the sediments of tanks, *Institute of Botany* and *Biology Centre*
- Prediction of the reference interest rates and currency exchange rates in Belarus, Cambodia, Guatemala and Rwanda, *Economics Institute*, *OGResearch*, s. r. o., and *TCX Management Company*

Based on Act No. 20/1987 Coll., on State Monument Care, as later amended, the cooperation between the ASCR and the Ministry of Culture continued. The ASCR expressed five requests for a permit to conduct archaeological surveys, concluded two agreements on the extent and conditions of the performance of archaeological surveys (with *Pueblo* – archaeological company, o. p. s. /civic society organisation/, and *ArcheoBohemia*, o. p. s.) and submitted eight proposals for the declaration of archaeological finds as cultural monuments; the institutes of archaeology of the ASCR, territorial workplace of the National Monument Institute and other entities participated in their preparation.

In the areas of the social sciences and humanities, the institutes of the ASCR cooperated mainly with:

- state bodies and organisations – MEYS, MLSA, MRD, MC, Chamber of Deputies and Senate of the Parliament of the CR, Institute for Information in Education, the State Health Institute, National Monument Institute, Czech Statistical Office, Administration of Radioactive

Waste Depositories (SÚRAO) and the Agency for Social Inclusion in Roma Localities at the Office of the Government of the CR,

- non-governmental and other organisation: *Aperio*, *Gender Studies*, the *Letní dům* civic association and the *ISEA*.

Research teams (or individual employees) of the institutes of the ASCR prepared a total of 170 **specialised expertises** for state bodies, institutions and entrepreneurial entities and implemented the 55 more significant outputs in cooperation with the state and public administration. They further prepared a number of **methodologies and test and diagnostic methods**, treated the background information for a great number of **technical norms and guidelines** and conducted hundreds of measurements, analyses, characterisation of materials, laboratory tests and judgements. Another practical activity was the development and localisation of software and participation in various monitoring systems and other activities. The institutes of the ASCR are at the same time partners in twenty-seven **national** and ten **international monitoring networks**.

The state in the area of the protection of the intellectual property right of the ASCR as of the end of 2010 is summarised in the following table. The most active in this direction in the long term are the *Institute of Macromolecular Chemistry*, *Institute of Experimental Botany*, *Institute of Organic Chemistry and Biochemistry* and *Institute of Chemical Process Fundamentals*.

## PRACTICAL ACTIVITY

Tab. 3: Summary of the situation in the area of intellectual property right protection of the ASCR as of the end of 2010

	until 2009	in 2010
1. Patents granted in the CR	191	65
1.a Patents granted abroad	155	56
2. Utility models registered	51	31
2.a Utility model applications submitted	19	17
3. Invention applications	220	36
4. Valid licence agreements	30	40
5. Protected trademarks	1	0

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# International Scientific Cooperation

## INTERNATIONAL SCIENTIFIC COOPERATION

### Cooperation within EU Structures

In June 2010, the European Council adopted **Europe 2020**, a strategic document for economic and social development. Its flagship initiative is the so-called **Innovation Union** aimed at aspects important for building the European Research Area.

The ASCR has been actively engaged in all of the essential activities, which the European Research Area developed in order to enable more efficient international cooperation for its institutes. From this perspective, the commencement of the preparations of the 8th Framework Programme for Research and Technological Development and the new cohesion policy of the EU for 2014–2020 were considered key issues in 2010.

The ASCR became engaged in the activities of the new advisory body of the MEYS – the **Committee of the European Research Area (VERA)**, which focuses on the preparation of the national positions on European research policies, issues recommendations on their preparation and harmonisation with the national RDI policy. In September 2010, the document Position of the Czech Republic on the Simplification of the Framework Programmes for Research, prepared and commented on by a number of experts from the institutes of the ASCR as well as other research institutions, was sent to the European Commission.

Researchers in the departments of the ASCR are also actively involved in another advisory body of the MEYS – the **Council on Large Infrastructures for Research, Development and Innovation**. The Council was engaged in the update of the Roadmap for Large RDI Infrastructures; within this update, also ASCR experts participated within the thematic working groups. In March 2010, the Government of the CR approved the provision of targeted support to projects with the participation of the institutes of the ASCR connected to the ESFRI – Roadmap of the European Strategic Forum for Research Infrastructures (SHARE, CESSDA, ESS-survey, LINDAT/CLARIN, THALES, CzeCOS/ICOS, ESS, CzechGEO/EPOS). The provision of continuity in the financing of the existing large infrastructures supported so far according to the concluding schemes of financing (CESNET, PALS) was also approved.



Since 2001, the Czech Social-Science Data Archives have been a part of the CESSDA network (Council of European Social Science Data Archives – <http://www.CESSDA.org>).

The implementation of former Czech Centre for Mobility project, now **EURAXESS** Czech Republic at the *Centre for Administration and Operations*, which currently has eight regional contact points and two service centres in Prague and Brno, successfully continued. In the preceding period, the Centre provided individual assistance to 210 research employees from third countries including their family members and reacted to nearly 700 requests. The EURAXESS Centre ([www.euraxess.cz](http://www.euraxess.cz)) continued in the organisation of integration events for the international community of foreign scientists and their family members and provided legal services concerning the conditions of their residence in the CR, conditions for obtaining work permits, health and pension insurance and tax obligations, etc.

An indispensable part of the integration of the ASCR in the European Research Area is active participation in a number of consultations – e.g. Interim evaluation of the Seventh Framework Programme.

In 2010, an overall participation of ASCR institutes in the **Framework Programmes for Research and Technological Development** of the European Union (FPs) achieved 173 projects. In connection with the conclusion/finalization of the 6th FP, the overall number of projects handled at the ASCR decreased compared to 2009, despite that, it was possible to maintain the level of contracted funding for 2010. That confirms the long-term trend of engagement in excellent projects of research cooperation and prestigious grants from the European Research Council (ERC). The ASCR has also maintained the highest number of project coordinators (17) within Czech research institutions. The

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overall amount of contractually agreed financial means from the Framework Programmes for 2010 reached ca EUR 7.5 million. The highest number of resolved projects in the area of the non-life sciences was achieved by the *Institute of Physics* (12), in life sciences and chemical sciences by the *Institute of Macromolecular Chemistry* (13), *Institute of Microbiology* (11) and *J. Heyrovský Institute of Physical Chemistry* (11), in the area of social sciences and the humanities by the *Economics Institute* (9).

The ASCR institutes have also become actively involved in other European programmes funding activities in the area of research and development. The activities included the community programmes of Culture 2007, Lifelong Learning and the Research Fund for Coal and Steel as well as other programmes of European cooperation, such as COST, the European Science Foundation or the Norway Financial Mechanism.

The ASCR devotes a great deal of attention to **structural funds**, which currently represent an important and relatively stable contribution for the financing of science and research. Tab. 5 provides an overview of the projects of the institutes of the ASCR in the Operational Programme Research and Development for Innovation (OP R&DI), Education for Competitiveness (OP EC), Prague – Competitiveness (OP PC), Environment (OP E), Central Bohemia (ROP) and Cross-Border Cooperation, and these were accepted in 2010 for financing. There are large projects (over EUR 50 million) in negotiations, for instance ELI (Extreme Light Infrastructure) submitted by the *Institute of Physics* with a requested subsidy of CZK 6.8 billion, and Biocev (the Bio-

technical and Biomedical Centre of the ASCR and Charles University) submitted by the *Institute of Molecular Genetics* with a requested subsidy of CZK 2.3 billion, sent to the European Commission in 2010 for approval.

Of the seventeen projects, four fall into the OP R&DI, six in the OP PC, four into the OP Crossborder Cooperation and one each in the OP EC, Environment and Regional Programme for Central Bohemia. The total requested financial support is CZK 1,643 million (of which CZK 1.194 million is in the OP R&DI). The institutes of the ASCR are also partners in at least another ten accepted projects of the structural funds, which were in most cases submitted by higher education institutions.

Based on the experience with the on-going operational programmes, the ASCR has actively engaged in the preparation of the framework position of the CR on the Cohesion Policy of the EU in 2014–2020, which is being prepared by the Ministry for Regional Development.

On 23–24 September 2010, the annual (15th) **Visegrad Four Forum** (the Academies of Sciences of the V4 countries) took place at the chateau in Třešť. The representatives of European non-university research (the Presidents of the Austrian and Bulgarian Academies of Sciences, the German Max Planck Society, the President and Managing Director of the Federation of National Academies of Sciences ALLEA, the General Secretary of the European Association of Research and Technological Organisations EARTO) were invited to participate in the session with the intent to gradually form a platform of non-university research

**Tab. 4: Participation of the institutes of the ASCR in the main instruments of the framework programmes in 2010.**

Type of instrument	Total number of projects
CP (Collaborative research projects)	81
MCA (Marie Curie Actions – support for training and career development for researchers)	41
CSA (Coordination and support actions)	16
CSA (Coordination actions of the preparatory stage of ESFRI projects)	13
NoE (Networks of Excellence)	10
Other instruments (SME, Joint Technological Initiatives, integration activities etc.)	8
ERC (grants of the European Research Council)	4

## INTERNATIONAL SCIENTIFIC COOPERATION



Participants in the Forum of the Academies of Sciences of the V-4 2010.  
(photo: Archives of the Division of International Cooperation)

performing organisations. The top representatives of the academies of sciences of the V4 countries issued a joint declaration on the contributions of the Academies of Sciences of the V4 countries in strengthening the ERA. Within the cooperation between the academies of sciences of the V4 countries, the ASCR publishes the English abstracts of the scientific papers from the areas of the humanities and social sciences on the CEJSH (The Central European Journal of Social Sciences and Humanities) shared internet portal included in the YADDA platform.

### The ASCR's Cooperation with Other International Governmental Organisations

**Conseil Européen pour la Recherche Nucléaire** (CERN, European Centre for Particle Physics) – 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 Large Hadron Collider pro-



The Laureates of the awards given to young scientists in the area of Material Science: O. Podrazký (ÚFE), Miklós Szilágyi (MAV), B. Dyniewicz (PAV), P. Vršanský (SAV), Forum of the Academies of Sciences of the V-4 2010.  
(photo: Archives of the Division of International Cooperation)

gramme (LHC) within the ALICE, ATLAS and TOTEM experiments. In 2010, the most interesting result was acquired in the ATLAS experiment in the examination of the collision of lead atoms. The data are unique, which testifies to the characteristics of nuclear matter under conditions of extreme humidity and heat, which simulate the conditions of the early stage of the development of the universe.

The working contacts also continued between institutes of the ASCR, in particular the *Nuclear Physics Institute*, the *Institute of Macromolecular Chemistry*, the *Institute of Geophysics* and the *Institute of Physics*, and the laboratories of the **Joint Institute for Nuclear Research in Dubna** in Russia, predominantly in the field of experimental, theoretical and mathematical physics, ion and transuranium physics, radiobiology, medical physics and geophysics, in research into polymers and in a number of other fields.

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 in-

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ternational cooperation in the area of space research for the implementation of the scientific plans of Czech workplaces. The *Astronomical Institute* conducted astronomical and astrophysical observation from on-board artificial satellites and probes with the ESA programmes. Its employees are the main investigators of five projects of the PECS programme (a programme for cooperating states)

and participate in another two. The Institute is engaged in the preparation of two programmes of the ESA – the Solar Orbiter and PROBA-3 and in five projects in its framework. The scientific employees of the *Astronomical Institute* also share organisational duties of ESA membership. The ASCR is represented in the SPC, PRODEX and Task Force Committees. At the end of September and the beginning of Oc-

**Tab. 5: Approved projects of institutes of the ASCR in the area of structural funds in 2010.**

OP	Applicant	Name of the Project	Amount of Approved Support in Millions of CZK
R&DI – European Centres of Excellence	<i>Institute of Theoretical and Applied Mechanics</i>	Centre of Excellence, Telč	238.3
R&DI – European Centres of Excellence	<i>Institute of Systems Biology and Ecology</i>	CzechGlobe	647.9
R&DI – Regional R&D Centres	<i>Institute of Plasma Physics</i>	Regional Centre of Special Optics and Optoelectronic Systems	175.0
R&DI	<i>Institute of Microbiology</i>	Project of Algae Biotechnologies, Třeboň (Algatech)	133.2
OP EC	<i>Institute of Geonics</i>	Energy in the Region: Innovation, Dynamisation and Internationalisation of Research	14.0
OPPC	<i>Institute of Molecular Genetics</i>	CZ-OPENSREEN: National Infrastructure for Chemical Biology	109.2
OPPC	<i>Institute of Physiology</i>	Biomodels – centre for the production and functional analysis of biomodels of lifestyle diseases	43.4
OPPC	<i>Institute of Organic Chemistry and Biochemistry</i>	Centre of Molecular Interactions in Biomedicine	60.5
OPPC	<i>Institute of Experimental Medicine</i>	Research Centre of Cell Therapy and Tissue Replacement	54.0
OPPC	<i>Institute of Microbiology</i>	Prague Infrastructure for Structural Biology and Metabolomics	88.3
OPPC	<i>Institute of Experimental Botany</i>	Modernisation of the Equipment for the Research of Plants as Sources of Health-Utilisable Materials	35.2
OP E	<i>Institute of Vertebrate Biology</i>	Monitoring of Large Carnivores in the European Important Locality Beskydy	13.8
ROP – Central Bohemia	<i>Institute of Botany</i>	Unified Information System in the Průhonice Park	3.2
Cross-Border Cooperation – Poland	<i>Institute of Microbiology</i>	Probiotics: Joint Research, Education and Enlightenment	14.0
Cross-Border Cooperation – Saxony	<i>Biology Centre (Institute of Soil Biology)</i>	Research of the Possibilities of the Minimisation of the Contents of Organic Pollutants in Drinking Water Sources in the Ore Mountains	4.5
Cross-Border Cooperation – Slovakia	<i>Institute of Vertebrate Biology</i>	Migration and Spatial Activity of Deer and Roe-Deer in the Protected Regional Area of the Beskydy and Protected Regional Area Kysuce	4.8
Cross-Border Cooperation – Slovakia	<i>Institute of Vertebrate Biology</i>	Support of the Population of Western Capercaillie (Tetrao urogallus) in the Czech-Slovak Border Area	3.8



## INTERNATIONAL SCIENTIFIC COOPERATION

tober, the 61st International Astronautical Congress (IAC) took place in Prague with the participation of more than 2,000 scientists. The motto of the conference was *Space for Human Benefit and Exploration*.

**European Southern Observatory (ESO)** – the CR has been a full-fledged member of the ESO, a European intergovernmental organisation for astronomical research in the Southern Hemisphere since 2007. Currently, fourteen European states are ESO members. The *Astronomical Institute* has become one of the ARC (ALMA Regional Center) regional centres for observation and data processing.

The ASCR further actively participates in the work at the **Czech Commission for Cooperation with UNESCO**. Prof. H. Illnerová has been at the head of this advisory body since 2007 and members of the commission include another six representatives of institutes of the ASCR. In 2010, the updated Statutes of the Commission were adopted. The *Institute of Macromolecular Chemistry* organises postgraduate UNECSO courses intended for scientists coming from developing countries each year. The **ISSC** (International Social Science Council) also works under the auspices of UNESCO. The main mission of the Council is to support and apply the results of the social and behavioural sciences and to ensure their representation on a global scale.

In 2010, the Czech National Committee for the **UNESCO MAB** programme (Man and Biosphere) *inter alia* initiated discussions with the representative of the Ministry of Environment on the concept of the MAB programme in the CR and on the financial support of its international activities; it accepted a supportive Position on the Declaration of a Protected Regional Area “Soutok” (“Confluence”). The Czech Biospheric Reserves (BR) are part of the Czech network of sites involved in long-term ecological research (the CZ-ILTER Network).

### **The ASCR's Cooperation with International Non-Governmental Scientific Institutions**

In the area of **multi-lateral scientific cooperation**, the representatives of the ASCR actively participated in the discussions of the international scientific organisations ESF, EUROHORCS, ALLEA, EASAC and so participated in the search for a new arrangement of the Europe-wide scien-

tific institutions and the definition of their roles in the European Research Area.

**European Science Foundation (ESF)** – a European organisation which financially supports Europe-wide scientific programmes and projects. The CR is represented in all standing committees, nominated alternatively by the ASCR and the Czech Science Foundation. ESF discussion on the merger of ESF and EuroHORCS (European Heads of Research Councils) took place on all levels all year long. The eighteen academies of sciences associated in ALLEA in the interest of expressing its opinion on the merger process whose result was to be a successor organisation with the working title of European Research Organisation (ERO), signed a declaration on this development in April 2010 and presented it at the Spring Session of the ESF Governing Council. The final decision concerning the merger will most likely come in 2011. The standing committees of the ESF, besides their normal agendas, discussed the merger of the ESF and EuroHORCS and a way of increasing the roles of the standing committees in the future organisation. Scientific teams from the ASCR are working in two expert committees, namely NuPPECC (Nuclear Physics European Collaboration Committee) and CRAF (Committee on Radio Astronomy Frequencies). Scientists at the ASCR have registered in the programmes of EUROCORES (European Collaborative Research). In 2010, Czech teams participated in twenty-three programmes (Research Networking Programmes), of which twenty-one will continue also in 2011. The most important newly established scientific forum of the ESF is the Member Organisation Forum on Scientific Foresight for Joint Strategy Development (September 2010, Darmstadt).

**All European Academies** (ALLEA – the Federation of National Academies of Sciences) associates fifty-three academies of sciences from forty European countries. ALLEA advocates new forms of activity (ALLEA Strategic and Implementation Plan for 2010–2015, plan for the establishment of a Task Force for Science Policy). ALLEA also engages with critical position in the process of the planned merger of ESF and EUROHORCS.

**European Academies Science Advisory Council (EASAC)** – is a twenty-five member scientific consultative body, comprises of delegates of the national academies of sciences of twenty-three member states of the EU, ALLEA and

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Academia Europaea. The main mission of the council is the dialogue of scientists and academies of sciences with political actors and bodies on the European and national levels. The conclusions of the joint research projects have been published in a declaration of expert councils on various contemporary problems, e.g. climate changes.

Membership of the ASCR in the **International Council for Science (ICSU)** creates the conditions for the integration of Czech researchers in scientific policy, deepening international cooperation and contacts in the individual scientific fields. The ASCR is also an umbrella organisation of national scientific committees (38 of them active in the CR). In 2010, a project of the institutionalisation of the European groups of the ICSU was implemented; preparations of the second ICSU strategic plan for 2012–2017 began, augmented by new programmes and foresight.

The **Inter-Academy Panel (IAP)** and **Inter-Academy Medical Panel (IAMP)** are international organisations which associate academies of sciences from countries all over the world (including the ASCR). Both panels are administratively linked.

The **Union Académique Internationale (UAI)** associates sixty-one national academies from all over the world, coordinates and in some cases provides financial support for cooperation on exceptionally significant projects from the areas of the humanities surpassing the framework of a single country. The institutes of the ASCR in the social sciences and humanities participate in the historically-orientated projects: *Moravia Magna*, *Clavis monumentorum litterarum Bohemiae*, *Dictionnaire du Latin médiéval – Latinitatis Medii Aevi lexicon Bohemorum*, *Corpus philosophorum Medii Aevi – Aristoteles Latinus* and the *Greek–Old-Church-Slavonic Lexicon–Index*. In 2010, the 84th General Assembly of the UAI rated the *Clavis monumentorum litterarum Bohemiae* project of the *Institute of Philosophy* at the highest level.

The **Czech Historical Institute in Rome (ČHÚ)** is a joint workplace of the *Institute of History* and the Faculty of Arts of Charles University in Prague. The institute participated (with the Ministry of Foreign Affairs of the CR and the Prague Archbishopric) in the organisation of a scientific-popularisation session devoted to the 610th death anniversary of Jan Jenštejn, Archbishop of Prague.

### Cooperation with Foreign Institutions within International Bilateral Agreements

International bilateral cooperation continues to play an important role in the foreign relations of the ASCR. The legal framework of these official contacts are bilateral agreements between the ASCR and foreign scientific institutions. In 2010, the ASCR utilised sixty-seven agreements with partners from fifty countries. The new documents include especially the Agreement on Cooperation between the ASCR and the Academy of Sciences of the Republic of Tatarstan, the update of the Agreement on Scientific Cooperation between the ASCR and the Vietnamese Academy of Sciences and Technologies (VAST), the Framework Agreement and Implementation Plan of Scientific Cooperation between ASCR and French Higher School of the Social Sciences – EHESS, the Protocol on Scientific Cooperation between the ASCR and the Scientific and Technological Research Council of Turkey (TÜBİTAK). On 2nd September 2010, discussions took place between the President of the ASCR and a delegation of the National Science Council of Taiwan, led by Minister prof. Lou Chuang Lee. During discussions with President of the Council of Foreign Relations in October 2010, the representatives of the National Taiwan University presented the activity of their institution and possibilities for international scientific cooperation.

The change of content and form of bilateral cooperation within interacademic agreements is even more common in the process of updating the existing contracts; cooperation in the form of joint projects and also establishment of scientific topics priority lists is preferred. In this way, reciprocal quota are thus preferentially utilised in the foreign journeys with the contract partners in Argentina, Bulgaria, Egypt, Hungary, Russia, Poland, Ukraine and Portugal. The agreements were also utilised for participation at international scientific conferences, symposia and workshops organised by partner organisations abroad.

Through bilateral cooperation, 472 people were sent abroad in 2010 for a total of 4,995 days in residence. From abroad, 538 foreign scientists were received for 4,432 days in residence. The development of bilateral contacts for the past fourteen years is shown in Table 6. It is clear from this overview that there has been a slight decrease of scientific exchanges in absolute numbers. In some territories,

## INTERNATIONAL SCIENTIFIC COOPERATION

cooperation was marked by the complicated financial situation into which partner academies have come as a result of the drastic cuts in their budgets, especially the limitation or non-provision of financial means for international cooperation.

The implementation of the **Programme of Internal Aid for International Cooperation Projects at the ASCR** continues, focusing on ensuring long-term internships for researchers from the institutes of the ASCR at renowned workplaces abroad, long-term internships of top experts at the institutes of the ASCR and research projects of up to three years for the researchers or research teams of the ASCR in cooperation with prominent international institutions. In 2010, the resolution of 70 research projects continued, three long-term stays at institutes of the ASCR continued and five long-term stays at foreign workplaces, which had begun already in the previous year. After additional evaluation of the postponed requests, the resolution of one research project was begun in the course of 2010 and one long-term stay implemented at an institute of the ASCR. In

accord with the rules for the provision of financial means within this programme, three requests for extensions of long-term stays were approved. The total support allotted for 2010 was CZK 58,067,000.

The ASCR deepens its relations with partners from neighbouring countries, particularly then with the Slovak Academy of Sciences (SAS). Regular bilateral discussion of the leadership of the ASCR and the SAS took place at the Congress Centre of the SAS at Smolenice in 2010.

Other than the centrally-concluded bilateral agreements, scientific employees also develop international cooperation based on direct contacts of the ASCR institute (inter-institute agreements, involvement in international programmes and projects – the number of projects is listed in the statistical Table 7), attendance at international scientific gatherings or through direct contacts between partners at home and abroad (see Attachments 3 and 4).

**Tab. 6: Synoptic statistical data on bilateral scientific cooperation as part of inter-academy agreements.**

Year	Number of countries	Number of agreements	People arriving	Days stayed	People sent	Days stayed
1997	38	58	370	4,831	450	5,400
1998	42	59	448	6,386	445	5,295
1999	43	61	425	4,252	371	4,181
2000	42	60	413	4,853	455	5,917
2001	42	57	421	4,441	447	5,825
2002	42	56	499	4,682	550	6,796
2003	45	59	426	4,442	529	6,042
2004	45	60	533	5,397	658	8,053
2005	45	60	631	5,334	730	8,964
2006	45	59	571	5,151	711	7,898
2007	46	63	549	5,075	614	6,515
2008	49	66	563	4,798	659	6,427
2009	49	67	598	5,017	619	6,474
<b>2010</b>	<b>50</b>	<b>67</b>	<b>538</b>	<b>4,432</b>	<b>472</b>	<b>4,995</b>

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The working seminar *Scientists in Exile* organised by the *Institute of Contemporary History*. In the picture, from the left S. Vepřek (Technische Universität, München), Z. V. David (Secretary of the Society for Sciences and Arts), K. Raška (President of the Society for Sciences and Arts) and J. Michl (University of Colorado, Boulder).  
(photo: Archives of the *Institute of Contemporary History*)

### Other Activities within International Relations

The ASCR again in 2010 was intensively involved in the activity of the International Human Rights Network of Academy and Scholarly Societies. In 2010, the first international symposium *Human Rights and Science* was organised by this organisation in Berlin; also a closed session of the representatives of academies and scientific societies (including the ASCR). The gratifying fact arose from the lectures on the activities of the organisation so far that the ASCR is the 10th most active in the world in the protection of the human rights of scientists.

## INTERNATIONAL SCIENTIFIC COOPERATION

**Tab. 7: An overview of international scientific cooperation activities of institutes of the ASCR**

1. Number of conferences attended by scientists from other countries (organised or jointly organised by an institute)
2. Number of journeys abroad by scientific employees of an institute
  - 2a. of which outside of bilateral agreements
3. Number of occasions of active participation by employees of the institute at international conferences
  - 3a. Number of lectures given at these conferences
  - 3b. of which invited papers
  - 3c. Number of posters
4. Number of ASCR employees lecturing at higher education institutions abroad
5. Number of ASCR employees serving on editorial boards of international journals
6. Number of memberships in the bodies of international governmental and non-governmental scientific organisations (societies, committees)
7. Number of lectures given 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
<b>I. Non-Life Sciences</b>													
Section 1	44	2,349	2,283	1,260	886	303	478	27	157	150	195	46	33
Section 2	33	887	866	685	517	78	227	15	53	123	67	37	33
Section 3	19	641	586	461	295	40	230	7	61	64	38	27	12
<b>TOTAL</b>	<b>96</b>	<b>3,877</b>	<b>3,735</b>	<b>2,406</b>	<b>1,698</b>	<b>421</b>	<b>935</b>	<b>49</b>	<b>271</b>	<b>337</b>	<b>300</b>	<b>110</b>	<b>78</b>
<b>II. Life Sciences and the Chemical Sciences</b>													
Section 4	33	1,353	1,300	1,132	483	96	716	25	86	95	105	56	41
Section 5	45	1,627	724	1,325	491	229	899	29	213	102	169	80	61
Section 6	26	626	524	585	383	81	290	37	136	72	40	46	28
<b>TOTAL</b>	<b>104</b>	<b>3,606</b>	<b>2,548</b>	<b>3,042</b>	<b>1,357</b>	<b>406</b>	<b>1,905</b>	<b>91</b>	<b>435</b>	<b>269</b>	<b>314</b>	<b>182</b>	<b>130</b>
<b>III. The Humanities and the Social Sciences</b>													
Section 7	30	318	310	345	289	97	24	19	30	49	52	24	16
Section 8	31	382	315	279	277	190	19	10	62	85	44	24	6
Section 9	52	354	271	383	375	162	1	18	135	93	179	11	3
<b>TOTAL</b>	<b>113</b>	<b>1,054</b>	<b>896</b>	<b>1,007</b>	<b>941</b>	<b>449</b>	<b>44</b>	<b>47</b>	<b>227</b>	<b>227</b>	<b>275</b>	<b>59</b>	<b>25</b>
<b>AS TOTAL</b>	<b>313</b>	<b>8,537</b>	<b>7,179</b>	<b>6,455</b>	<b>3,996</b>	<b>1,276</b>	<b>2,884</b>	<b>187</b>	<b>933</b>	<b>833</b>	<b>889</b>	<b>351</b>	<b>233</b>



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06

# Special-Purpose Support of Research and Development Projects

## SPECIAL-PURPOSE SUPPORT OF RESEARCH AND DEVELOPMENT PROJECTS

Like in the previous year, no 'public tender' call for new proposals in research and development was announced in the course of 2010, where the provider of special-purpose financial means would have been the ASCR. The reason was the validity of the principles established by the Reform of the System of Research, Development and Innovation in the Czech Republic included in the amendment of Act No. 130/2002 Coll. (the Act on the Support of Research, Experimental Development and Innovation) and according to which the ASCR is no longer a provider of special-purpose means. The financial means intended for the support of the programme and grant projects in the competence of the ASCR were used exclusively for projects begun no later than in 2009.

### Programme Projects

In the period 2005–2009, the ASCR was the provider of special-purpose financial means for the resolution of projects falling in the programmes of **Information Society** (thematic programme) and **Support for Targeted Research Projects** (a component programme of an interdisciplinary programme of 'Integrated Research'), included in the National Research Programme I (NRP I). Both of the mentioned programmes were in accord with their announcements completed on 31 December 2009. In February 2010, the councils of the programmes evaluated the results achieved in the fifteen projects of the **Information Society** programme and 32 projects of **Support for Targeted Research Projects**, whose resolution still continued in 2009, and further proposed the conception for the preparation of the summary reports on the evaluation of the relevant programmes for the entire period of their duration. The summary reports on the two programmes were approved by the Academic Council at its 19th Session in July and simultaneously completed the activity of the corresponding Councils of the programmes. Adapted versions of the summary reports were already provided in March 2010 at the request of the Ministry of Education, Youth and Sports, which as the responsible party prepares the summary report for the entire NRP I. On 18 October 2010, a presentation of seven successful projects realised within the Information Society and Support for Targeted Research Projects programmes was organised for the professional as well as lay public.

The departmental programme of the ASCR **Nanotechnologies for Society** continued in 2010 with the resolution

of 34 projects begun in 2006–2008. The financial support for their resolution in this year was a total of CZK 246 million. The Council of the programme at its session in February 2010 evaluated the final reports of the two projects concluded as of 31 December 2009. Both were evaluated as fulfilled.

Contracts on the use of the research and development results were signed with the beneficiaries of all of the completed programme projects, whose fulfilment will be monitored every year for three years after its completion.

### Grant Projects of the Grant Agency of the ASCR

Like with the programme projects, the GA AS in 2010 supported only projects continuing from the previous years, i.e. those that successfully went through public competitions organised in 2006–2008. From the budget of the ASCR, a total of CZK 330.5 million of special-purpose means was allotted for the GA AS to support projects resolved in 2010. Financial means were provided for the resolution of two types of grant research projects, namely junior and standard. Interdisciplinary projects comprised an independent category within the standard projects. One projects falling into the 5th departmental council, focused on medical sciences, was financed from means provided for this purpose by PRO.MED.CS Praha, a. s. (financial support in 2010 was CZK 1,650,000).

More detailed data on the number of projects resolved within the individual fields and on the amount of financial means allotted are summarised in Tables 8 and 9.

### Assessment of Continuing and Completed Grant Projects

At their meeting in the first quarter of 2010, the Departmental Councils of the GA AS dealt with the assessment of the level of the resolution and quality of the results achieved of the grant projects continuing in 2010 as well as completed as of 31 December 2009. The evaluation was based on background reports provided by the investigators of these projects, which were principally in the case of completed projects supplemented with offprints of the most significant work created during their implementation. The department councils evaluated a total of

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**Tab. 8: Standard research grant projects resolved in 2010**

Field	Total number of projects	Number completed as of 31 December 2010	Number continuing in 2011	Grants in thousands of CZK
<b>1</b> Mathematical, Physical and Computer Sciences	46	15	31	30,350
<b>2</b> Technical Sciences and Cybernetics	28	15	13	19,267
<b>3</b> Earth and Space Sciences	44	19	25	27,858
<b>4</b> Chemical Sciences	58	13	45	52,871
<b>5</b> Medical Sciences and Molecular Biology	51	14	37	50,505*
<b>6</b> Biological and Ecological Sciences	53	17	36	49,517
<b>7</b> Social Sciences and Economics	12	4	8	5,221
<b>8</b> Historical Sciences	25	8	17	7,515
<b>9</b> Humanities and Philology	23	10	13	8,778
<b>Total</b>	<b>340</b>	<b>115</b>	<b>225</b>	<b>251,882</b>
<b>X</b> Interdisciplinary projects	16	1	15	24,332

\* The amount shown includes also the means provided to the GA AS by PRO.MED.CS. Praha, a. s.

**Tab. 9: Junior research grant projects resolved in 2010**

Field	Total number of proposals	Number completed as of 31 December 2010	Number continuing in 2011	Grants in thousands of CZK
<b>1</b> Mathematical, Physical and Computer Sciences	18	9	9	4,573
<b>2</b> Technical Sciences and Cybernetics	16	9	7	5,225
<b>3</b> Earth and Space Sciences	15	9	6	6,038
<b>4</b> Chemical Sciences	13	7	6	6,211
<b>5</b> Medical Sciences and Molecular Biology	17	9	8	7,390
<b>6</b> Biological and Ecological Sciences	31	16	15	17,046
<b>7</b> Social Sciences and Economics	9	5	4	2,900
<b>8</b> Historical Sciences	14	8	6	3,518
<b>9</b> Humanities and Philology	13	8	6	3,251
<b>Total</b>	<b>146</b>	<b>79</b>	<b>67</b>	<b>56,152</b>



## **SPECIAL-PURPOSE SUPPORT OF RESEARCH AND DEVELOPMENT PROJECTS**

112 completed standard research projects with the duration of the resolution between two and five years. Of this number, 44 projects were evaluated as fulfilled with excellent results, 65 as fulfilled and three projects were evaluated as unfulfilled, particularly for an insufficient number of implemented results. In the course of the resolution of the completed standard projects, an average of 7.3 publications were issued per project, namely in prestigious, peer-reviewed foreign periodicals. Of the junior research grant projects, resolved for one to three years, 98 were completed, of which 29 were completed with excellent results, 67 fulfilled and two projects were evaluated as unfulfilled, because there were no results published with them. On average, 3.3 results per project were implemented with the junior research projects. This figure is lower than for standard grant projects, but it is important to take into consideration the shorter length of resolution and the lower age composition as well as the size of the investigating teams. It is certainly worth mentioning the fact that despite the character of the grant projects that all fall into the area of basic research, also 146 applied outcomes (of which 37 within the junior projects) were achieved in their resolution and five outcomes (of which one within the junior projects) were patented.

07

# Popularisation and Promotional Activity

## POPULARISATION AND PROMOTIONAL ACTIVITY

Like in the previous years, the ASCR continued in the thorough popularisation of research activities as well as the other activities of both the work teams and the individuals and in the systematic presentation of the results among the general lay and professional publics and students of all types and levels of schools, including elementary. Like every year, the employees of the ASCR cooperated with all of the Czech statewide and regional media. They provided interviews to television as well as radio stations, dailies and the other periodicals. They shared in the preparation of selected programmes (the television cycles *Vizita /Visit/*, *Věda a vědci /Science and Scientists/*, *Historie.cs /History.cs/*, *Kapitolky o havěti /Chapters on Vermin/*, the programmes *PORT*, *PRIZMA*, the radio programme *Nebeský cestopis /Heavenly Travelogue/*, *Kritický klub /Critical Club/*, *Dvory a residence středověku /Courts and Residences of the Middle Ages/* and many others). They continuously expressed themselves on domestic and worldwide discoveries; they commented on events in domestic and foreign politics. They cooperated with organisations of the public administration and local institutions, organised lectures and seminars for schools of all levels, the lay and specialised public, and provided professional declarations and judgements.

In 2010, the ASCR sent out ca **131 press releases**, i.e. more than ten press releases per month. One of the main themes to which the media devoted attention continued to be the financing of basic research, the budget of the ASCR and the methodology of the evaluation of research and development results. It, however, also took up topics of a specialised nature of specific persons with exceptional results. The information on the continuing internships for secondary-school students outside of Prague Open Science II, the report on the granting of the Academic Premium, on the European Digital Mathematics Library and others met with a very good media response. The often published items included for instance the information on the creation of the CzechGlobe Centre, which is run by the *Institute of Systems Biology and Ecology*, the elucidation of the cause of death of Danish astronomer Tycho de Brahe, in which scientists from the *Nuclear Physics Institute* participated, on the conference by the *Institute of Experimental Medicine* entitled *The Safety of Nanotechnologies* etc.

Through the *Centre for Administration and Operations*, the ASCR ensured the dispatch of **invitations** to **26 events** or-

ganised by the individual institutes of the ASCR, i.a. to the seminar 'Results of the successful projects realised within the Information Society and Support for Targeted Research Projects programmes', to the meeting of President of the ASCR prof. J. Drahoš with successful scientists etc. Within the popularisation activities and the results of the employees of the ASCR, there were **17 press conferences** organised; for example, the conference on the already tradition European Week of the Brain was among the most successful.



At the press conference that took place in October 2010 with the participation of the President of the ASCR J. Drahoš, scientists from the *Biology Centre*, *Institute of Vertebrate Biology* and from the *Institute of Botany* spoke about the protection of biological diversity. (photo: S. Kyselová)

In 2010, a total of **8,675** press releases with the symbol ASCR and its form, i.e. on average **723 press releases a month**, were published in the monitored media (including electronic). The questions followed by the media in the main daily newspapers, in television and radio broadcasts but also in the regional media included both specialised topics and society-wide current events such as the reform of science and research, the financing of the ASCR, the position and financing of basic and applied research in the CR, the activity of the R&D&I Council, on which the foremost personalities of the ASCR expressed themselves, first of all President of the ASCR prof. J. Drahoš, prof. V. Hořejší, Ing. K. Aim, doc. P. Jungwirth and others. The attention of the media regularly concentrated on the projects endeavouring for the financial support of the European Funds, in the case of the ASCR primarily the construction of the ELI

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The discussions of the 14th Annual Forum Conference, a part of which took place in the building of the ASCR, were also participated in by V. Čílek from the *Institute of Geology*. (photo: S. Kyselová)

superlaser and the Biocev biotechnology centre, at the end of the year mainly the CzechGlobe project.

The media also paid attention to the prestigious **FORUM 2000** event, whose selected activities took place directly in the building of the ASCR.

Also the participation of the ASCR in another annual international event, which is regularly organised by the EU in September, **European Night of Scientists**, when the public had the repeated opportunity to become acquainted with specific scientists at specialised workplaces right during their activities, e.g. at the *Astronomical Institute*, met with a response in the media. At the *Institute of Sociology*, people could attend discussions on the theme of the privatisation of public space and the possibilities for a civil society.

The ASCR presented its results also to the public **abroad**, for instance by merit of the participation of the *Institute of Archaeology* in Prague in a serial by German **public television ZDF Die Deutschen**. A report on Deutsche-Welle Spectrum informed on the newly built Nanocentre at the *J. Hey-*

*rovský Institute of Physical Chemistry*. Even further away, in Costa Rica, a documentary, which was broadcast as a serial by **Costa Rican Television NR6**, presented the work of Czech scientists – a team from the *Institute of Vertebrate Biology* and the University of Veterinary and Pharmaceutical Sciences Brno. Czech Television broadcast a continuation of the programme 'Seventy-Two Names of Czech History', a serial by the *Institute of Archaeology in Prague* on the people whose names appear on the façade of the National Museum in Prague. Czech Radio prepared a multimedia project with the *Institute of Archaeology in Prague* on the Celts. Popularisation was also devoted time by the *Institute of Experimental Botany*, whether it was the popular-science magazine of Czech Television 2 PORT, PRIZMA on Czech TV 24, diverse programmes of the radio stations or other activities.

Also events held by the ASCR in the **regions** enjoyed the attention of the media, for instance the announcement of the so-called Jizerka *Dark Sky Area* on the Czech and Polish sides of the Jizerské Mountains, which was initiated and prepared on the Czech side by the employees of the *Astronomical Institute*, earned an unprecedented and long-term media response. It also was presented at the Regiontour Travel Industry Trade Fair in March. In Kouřim, the representatives of the ASCR attended the ceremonial unveiling of the symbol of an astronomically significant place marked as the astronomical centre of Europe – the crossing of 15th meridian east and 50th parallel north. The *Institute of Archaeology in Brno* presented *inter alia* at the Week for Mikulčice event. It included an Open House Day, lectures, an exhibition, walking tours round the Mikulčice fortified settlement with an explanation by an archaeologist but also European Night of Scientists in Mikulčice or Archaeology + Astronomy. At the Festival of Sciences in Brno the *Institute of Archaeology in Brno* presented Reflection of the Religious World of the Paleolithic and Early Historical Periods in Moravia.

The ASCR achieved a significant response through the **Commission for the Environment**, whose President, MUDr. R. Šrám, an employee of the *Institute of Experimental Medicine*, with a team of collaborators devoted themselves to environmental research in Ostrava and its area. The results of the study **Programme Ostrava**, which proved critical values of the atmosphere there and pointed out their consequences on the health, particularly small children and sen-

## POPULARISATION AND PROMOTIONAL ACTIVITY



M. Hilský signs his book devoted to W. Shakespeare within the programme *Forms of Sonnets – Forms of Love* organised during the Science and Technology Week. (photo: S. Kyselová)

ior citizens, aroused not only a significant media response but also political consequences in the form of a petition of the representatives of the city against the state.

The ASCR attends also to the popularisation of serious **information from history and contemporary history**. Employees of the *Institute for Contemporary History* and the *Institute of History* are sought-after commentators of the individual social and political events, partners and participants in discussions in radio and television programmes, in whose creation they actively participate, such as e.g. the programme on Czech TV *Historie.cs* or the unique radio cycle *Courts and Residences in the Middle Ages*. In 2010, the *Institute of Contemporary History* i.a. ensured the professional accompaniment of a number of proceedings reminding the public of the battles of the First and Second World Wars and the events of 1945–1948.

The meetings under the name **Akademická kavárna** (Academic Café) also continued last year, which enjoyed considerable interest from the public, such as the December meeting on the topic of 'Entertaining Mathematics ... and

a Sad End, If We Do Not Understand It' or the presentation of a book by Vladimír Vondřejš *Otazníky kolem genového inženýrství* [Questions Round Genetic Engineering].

During the 10th Annual **Science and Technology Week of the ASCR**, there were lectures, scientific cafés, exhibitions, panel discussions by experts or the screening of documentary films in many places of the ASCR and outside of it. **Fifty-five institutes** of the ASCR and **thirteen partner organisations** participated in this year's programme of the festival in the competence of the *Centre for Administration and Operations*. The Science and Technology Week was attended by 33,555 visitors. There were 155 lectures, 12 scientific cafés, 5 seminars, 17 exhibitions, 8 external excursions organised and more than 15 scientific programmes screened.



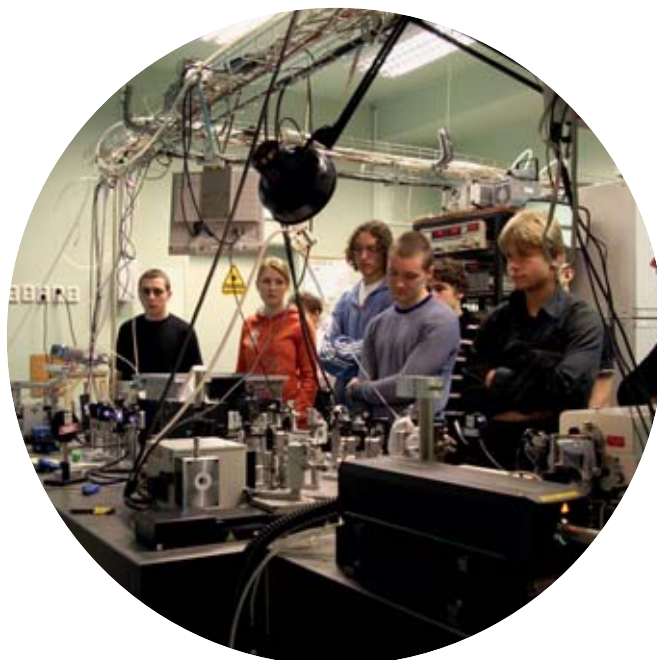
Flyer for the Science and Technology Week.

**Open House Days** took place at 49 institutes of the ASCR and 26 workplaces of cooperating partners. Already traditionally, the institutes of the ASCR prepared interesting exhibitions for the attendees of Science and Technology Week. Right in the building of the ASCR, unique finds of the *Institute of Archaeology, Brno* from the area of South Moravia were for example presented for one day. The exposition of the exhibition *Science as a Calling and Hobby* was extensive. In Ostrava, an exhibition *New Dimensions* was arranged for the 30th anniversary of the *Johan Palisa Observatory and Planetarium*. In *České Budějovice*, visitors

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Open House Days at the *Institute of Macromolecular Chemistry*.  
(photo: archives of the IMCH ASCR)



Open House Days at the *Institute of Physics*  
(photo: archives of the IF ASCR)

were offered a view into the microworld at the exhibition of Czech scientific photography *Microworld II*.



Antiviruses from the workshop of A. Holý from the *Institute of Organic Chemistry and Biochemistry* presented at the EXPO world exhibition in Shanghai.  
(photo: Archives of the *Institute of Organic Chemistry and Biochemistry*)

At an exhibition in the building of the ASCR during Science and Technology Week, the *Centre for Administra-*

*tion and Operations* presented its activities concerning the popularisation of science, popularisational and educational projects within the **Cities and Science Communication** project, Open Science II, Do Not Fear Science, the Summer School of Contemporary History as well as Science and Technology Week.

Of the **exhibitions** organised by the travelling exhibition **Science on Our Side**, which the *Centre for Administration and Operations* prepared and took place gradually from October to November 2010 at significant and frequented places of several towns of the Czech Republic – in Brno, Olomouc, České Budějovice, Ostrava and in Prague – definitely deserves mentioning. It can consequently be supposed that the aims – to draw attention to the importance of science and acquaint as many people as possible with the results of those involved in it – were achieved. The exhibition *Molecules for Life* (anti-HIV medicines) by the *Institute of Organic Chemistry and Biochemistry*, represented the ASCR at **EXPO 2010** in Shanghai. In the Czech Republic, the ASCR organised a total of 15 cycles

## POPULARISATION AND PROMOTIONAL ACTIVITY



**The Opening of the Works by Painter and Graphic Artist V. Komárek called Altars of Solace which took place on 29 November 2010.**  
(photo: S. Kyselová)



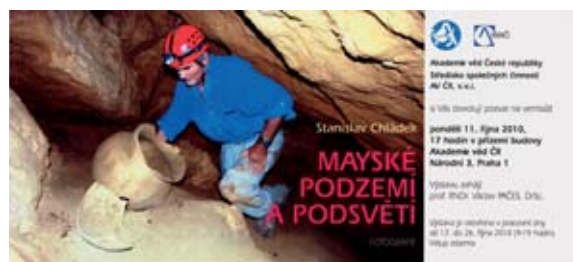
**The Eyes of a Scientist Sees the Invisible, The Brain of a Scientist Understands the Incomprehensible, The Discoveries that He/She Brings Are Priceless – those of the mottoes of the exterior of the exhibition Science on Our Side which started in Brno in September.**  
(photo: L. Svoboda)

of lectures in 2010; of which one in the Chamber of Deputies of the Parliament of the CR. The interest of the public was noticed also by the exposition of pictures by Vladimír Komárek and others.

The *Centre for Administration and Operations'* television studio created nearly 40 of its own reports on interesting events in the life not only of the ASCR but Czech science and culture generally, fifteen small medallions devoted to the activities of the scientists and students in the ASCR, another five small medallions on the publication of books of the Academia Publishing House and their authors. At the end of 2010, the production of this studio appeared also in a programme broadcast from one of the satellite television stations.

**Earth Day with the Academy of Sciences** was organised in close cooperation with the *Institute of Geophysics* and was one of the activities of the international project for the popularisation of science, *Cities and Science Communication*. The rich programme was accompanied by an exhibi-

tion of photography, *The World in the Eyes of Our Geologists*, in the building of the ASCR.



**The invitation to the opening of the exhibition.**

The consistency with which the ASCR devotes itself to the popularisation of scientific activities among the public of all age categories is proved for instance by the activities of the *Nuclear Physics Institute*, which i.a. organised Children's Day at New Town Hall in Prague. The attention of children was focused on itself also by the Not Only for Anna artistic competition, in which the *Institute of Experimental Botany* also participated.

08

Summary of the Use  
of Financial Means

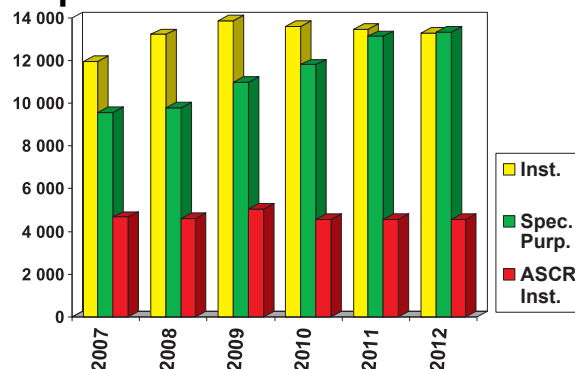


## SUMMARY OF THE USE OF FINANCIAL MEANS

In order to understand all of the connections of the financing of the ASCR in the difficult year of 2010, it is not possible to exclude some facts from the previous years. 2009 was relatively favourable in terms of financing for the ASCR. The total expenditures of the budget chapters of the ASCR (including institutional means) slightly rose as against the year before, whereas special-purpose means slightly decreased for the reasons of the gradual completion of some of the research programmes and the relative limitation of the resources of the Grant Agency of the ASCR.

It was entirely different in 2010. The government-approved expenses on research, development and innovation from the state budget for 2010 without the expenditures of hidden incomes from foreign programmes were CZK 25,389 billion, which is approximately a 2% year-on-year increase. The original draft budget for the expenses for the ASCR for 2010 was, however, arranged based on the expenditure frameworks of the approved Government Resolutions No. 715 of 8 June 2009 and corresponded to the fourth version of the proposal of the expenses of the state budget submitted to the government by the former Council for Research, Development and Innovation (CRDI), by which the institutional expenses of the ASCR had been reduced by as much as CZK 721 million as against 2009. The last version of the draft budget for the ASCR (i.e. a reduction of the institutional expenditures of the ASCR actually by CZK 1,030 million and a reduction of the chapter of the ASCR by a total of CZK 1,271 million as against 2009) was approved by Government Resolution No. 838 of 29 June 2009. After the faultiness of the methodology of the preparation of this draft was proved, the government decided to lessen the impact of the proposed changes by a correction of the budget of the ASCR by an increase of the proposed expenditures by CZK 563 million. The total expenditure of the state budget for research, development and innovation in 2010 was also increased by this amount.

### Expenditures for R&D in the CR



2010 was already the fourth year of the management of the institutes of the ASCR in the form of public research institutions. The results of the previous years as well as 2010 have shown that the institutes have managed to utilise and harmonise this economic regime very well with the fulfilment of their tasks and implementation of the outputs on a high level. A more pliant system of public research institute management brought the institutes in a number of cases not only a simplification of acceleration of the implementation of management tasks but also an increased feeling of responsibility for thought-out or effective decision making. The management of the institutes along with the councils of the workplaces and supervisory bodies also put more emphasis on the effective use of institutional means for material and personnel costs. This approach was beneficial not only in the area of management but was also reflected positively both in the increase of professional results and in the acquisition of further financial means. It also allowed them to cope better with the difficult financial situation that occurred.

The ASCR is according to all of the available official data the highest performing and most effective research organisation in the CR. The competitiveness of the ASCR in com-

Tab. 10: The basic parameters of the budget 2009–2011

(millions of CZK)	2009	2010	2011	Index 11/10
institutional	5,058.6	4,574.9	4,464.2	0.98
investment	981.8	786.0	735.0	0.94
non-investment	4,076.0	3,788.9	3,729.2	0.98
special-purpose	823.8	583.1	401.6	0.69

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parison with abroad is confirmed i.a. also by the international evaluation of scientific institutions.

In 2010, the MEYS commissioned and financed 'International Audit of the System of Research, Development and Innovation in the CR and the Implementation of its Results in Strategic Documents' conducted by a group of renowned professional, foreign companies under the guidance of British Technopolis and the first results of the audit confirm the peak performance of the ASCR and its institutes. One of the principles that the employees of Technopolis repeatedly stress in their first, preliminary report is the necessity of not implementing hasty and rash changes. The area of research and development requires solid instruments of evaluation tested in the international context and based on a thorough analysis of the actual qualities and relevance of the results, potential and professional direction of the research teams and organisation with an awareness of all the consequences, which the possibly adopted measures will bring. It is an area whose functioning well is built for many years, but can be very quickly destroyed by imprudent interventions.

If we look back, it is possible to state that after the further reduction of expenditures by the binding 2.5 % of means (CZK 129 million), there was a drop of the overall expenditures of the chapter of the ASCR by 14.6 % and a decrease of the institutional support of the ASCR by 12.3 % as against 2009.

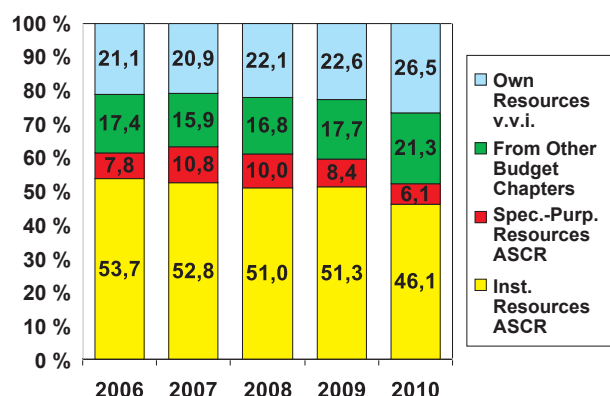
Nevertheless, the structure of the main elements of the financial resources of the ASCR even in this complicated period did not differ very much from the previous years, i.e. about 52 % of the resources came from subsidies from its own budget chapter, not quite one quarter of the means from other budget chapters and the rest from foreign resources and from the revenue of the institutes themselves.

In the second half of 2010, it was necessary to implement a proposal of austerity measures of the government by binding expenditures of institutional support in the sense of Government Resolution No. 552 of 28 July 2010. In the case of the ASCR, it was a reduction of the institutional expenditures by CZK 128,761,000. This decline in means forces decisions of the Academic Council of the ASCR to suspend one planned construction event (CZK 24.4 million), significantly reduce one event of an expensive construction maintenance (CZK 15 million), limit shared (so-called mandatory) costs (CZK 13 million) and cut institutional means allocated in the budget for 2010 to the individual institutes by 2.5 % (CZK 76.4 million).

In 2010, the ASCR managed with a total of CZK 9,633 million, of which CZK 5,026.5 million came from its own budget chapter.

The **institutional** means provided for research plans, institutional support of research organisations according to the results achieved by them and in ensuring the research infrastructure was 88.3 % of the total amount of the budget means. The amount of the special-purpose means intended for the resolution of grant and programme projects, which are provided from the chapter of the ASCR based on the results of public competitions, was reduced as against 2009 by 31.4%. From other budget chapters, the institutes of the ASCR were transferred a total of CZK 2,054.7 million directly without budgetary measures according to Act No. 130/2002 Coll.. Transferred financial means in the amount of CZK 1,298.7 million came from providers of other sections; from the Czech Science Foundation, a total of CZK 756 million was transferred, i.e. over 38% of all of the special-purpose means that the CSF distributed.

### Financial Resources of the ASCR – Structure



## SUMMARY OF THE USE OF FINANCIAL MEANS

### The structure of the financial resources (in millions of CZK):

	Non-investment funds	Investment funds
<b>Approved budget chapter</b>	<b>4,646.7</b>	<b>511.2</b>
Transfer of non-investment means into investment	-519.4	519.4
Transfer outside the chapter of the ASCR	-0.4	
<b>Amended budget chapter of the ASCR</b>	<b>4,126.9</b>	<b>1,030.6</b>
of which subsidies to public research institutions	3,815.3	1,030.3
to the <i>Head Office of the ASCR</i>	311.6	0.3
<b>Subsidies from other budget chapters</b>	<b>2.6</b>	
of which projects of the MEYS	2.6	
<b>Use of claims from unused expenses</b>	<b>6.8</b>	<b>0.4</b>
of which Financial Mechanisms of EEA/Norway	6.8	0.4
<b>Resources of reserve fund of ASCR chapter</b>	<b>2.0</b>	
<b>Transfer to files of claims</b>		
<b>from unused expenses</b>	<b>-14.0</b>	<b>-0.0</b>
<b>Binding SB expenses per Govt. Res. No. 552</b>	<b>-51.2</b>	<b>-77.6</b>
<b>Total resources from the ASCR budget chapter</b>	<b>4,073.1</b>	<b>953.4</b>
<b>Subsidies from other budget chapters</b>		
<b>(pursuant to Act No. 130/2002 Coll.)</b>	<b>1,884.3</b>	<b>170.4</b>
of which Czech Science Foundation grants	737,5	18.5
projects of other ministries	1,146.8	151.9
<b>Own R&amp;D&amp;I resources</b>	<b>2,551.8</b>	
of which main activity orders	156.8	
sales of publications	120.2	
sales of goods and services	121.2	
licences	1,344.7	
conference fees	24.7	
foreign grants and donations	250.3	
rent	81.0	
interest, exchange rate profits	106.4	
own fund resources	147.1	
other	199.4	
<b>Total resources</b>	<b>8,509.2</b>	<b>1,123.8</b>

The institutes of the ASCR (public research institutions) from their total revenues used CZK 8,196.9 million to cover their own costs 7,407.4 mil. Kč. Improved economic results totalling CZK 789.5 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 scientific activities of the institutes.

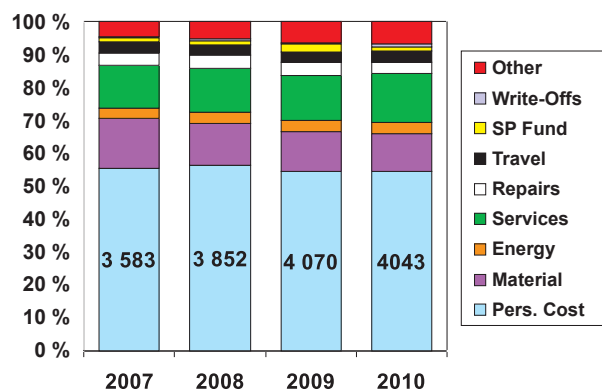
## ANNUAL REPORT OF THE ASCR 2010

The structure of the expenses of the ASCR's institutes (in millions of CZK):

<b>Personnel costs</b> (labour costs, mandatory insurance paid by the employer, sick leave compensation)	<b>54.58 %</b>	<b>4,042.9</b>
<b>The purchase of material</b>	<b>11.36 %</b>	<b>841.4</b>
of which books, journals		71,9
small material property		164,1
use of material, protective means		536,1
other material costs		15,4
works of a production character (printing)		53,9
<b>The purchase of energy, water and fuels</b>	<b>3.56 %</b>	<b>263.9</b>
of which electricity		136.8
water, steam, gas		96.3
fuel, propellant		30.8
<b>The purchase of services</b>	<b>14.76 %</b>	<b>1,093.0</b>
of which postal services, telecommunication and radiocommunication		44.2
purchase of small non-material property		15.4
rent		34.7
computer technology services		30.6
costs for representation		8.7
preliminary budget		7.9
conference fees		44.4
sewage fees		7.7
other services		899.4
<b>Repairs and maintenance</b>	<b>3.48 %</b>	<b>257.8</b>
of which repairs and maintenance of property		187.2
repairs and maintenance of chattels		70.6
<b>Total travel expenses</b>	<b>3.18 %</b>	<b>235.8</b>
of which foreign travel expenses		221.0
domestic travel expenses		14.8
<b>Depreciation of fixed assets</b>	<b>0.86 %</b>	<b>63.4</b>
<b>The creation of special-purpose funds</b>	<b>1.31 %</b>	<b>97.2</b>
of which special-purpose means from the ASCR chapter		3.3
institutional means		57.4
special-purpose means from other providers		36.5
<b>Total other expenditures</b>	<b>6.91 %</b>	<b>511.8</b>
of which transfers to the SF and other social costs		126.0
taxes and fees		194.9
exchange rate losses		49.2
injury insurance, fines, penalties, shortages, damages		141.7
<b>Used by the institutes of the ASCR in total</b>	<b>100.00 %</b>	<b>7,407.4</b>

## SUMMARY OF THE USE OF FINANCIAL MEANS

### Non-Investment Expenditures – Structure



The structure of the expenditures of the ASCR's institutes (public research institutions) has been rather stable for a number of years. As against 2009, their total costs dropped by not quite 1 %. Expenditures on the purchase of energy, water and fuels grew slightly (2.2 %); costs for the purchase of services (8.2 %) and other costs (7.4 %) rose more significantly. In contrast, the costs for repairs and maintenance (15.7 %) and expenditures for the purchase of material (5.3 %) dropped significantly; personnel costs (0.7 %) and travel expenses (1.3 %) decreased slightly. The fund of special-purpose intended means was formed as compared to the year before at a level of 58.9 %, i.e. a significant drop of 41.1 %.

In the mentioned analysis, the accounting depreciations of property purchased from subsidies in the total amount of CZK 871,415,000, which are a cost only in terms of accounting, have not been included; pursuant to Decree No. 504/2002 Coll., as later amended, the fund for the reproduction of property does not form a resource and does not influence the economic result.

Considering that the institutes of the ASCR are manager as public research institutions in the regime of non-state organisations, they close their accounting as of 30 June of the following year and the accounting closure must have

### The Creation of Investment Resources and Their Use

The sources of investment funds are primarily created through institutional and specific-purpose subsidies from the state budget and funds from depreciation. The data for the Academy of Sciences as a whole can be summarised as follows:

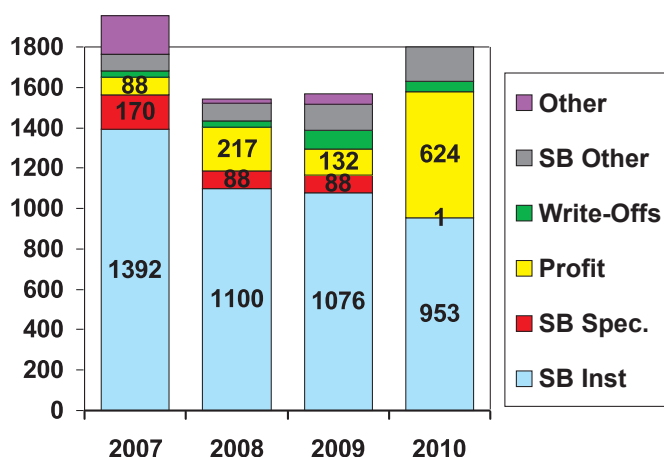
<b>Total Investment Resources (in millions of CZK)</b>	<b>1,912.6</b>
of which Depreciation	52.9
Transfer from improved outcome from operations	623.5
Recipients; joint recipients	
(pursuant to Act No. 130/2002 Coll.)	170.4
Foreign grants and donations	75.2
Revenues from sale of fixed assets	37.0
Combining funds for the acquisition of fixed assets	0.2
Subsidies from the state budget institutional	952.9
specific-purpose	0.5
<b>These resources were used to fund:</b>	
Buildings	757.0
Acquisition of instruments and equipment	633.7
Maintenance and repairs	20.6
Other	76.9
<b>Total used on the acquisition of fixed assets</b>	<b>1,488.2</b>
<b>Acquisition of the Property Reproduction Fund</b>	<b>424.4</b>
<b>Sum returned to the state budget</b>	<b>0.0</b>

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an accredited auditor. It is thus necessary to take the following analysis of their management as preliminary.

Of the events continuing from the last year, hence from the buildings under construction, attention is deserved *inter alia* by particularly several (albeit more modest than in recent years) items. They are the completion of the building of the Section of Optics of the Institute of Physics, the completion of the entry multi-purpose building of the Institute of Geophysics in the complex in Prague-Spořilov and the successful completion of a second, final stage of the reconstruction of the halls of residence of the researchers Mazanka (Prague), through which the lodging capacity, size and necessary level of services was expanded. The reconstruction of the building of the Institute of Vertebrate Biology in Brno was also completed.

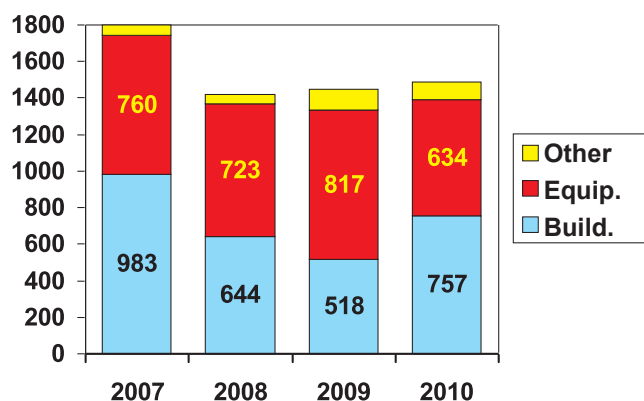
### Investment Resources



There was a considerable year-on-year reduction in the volume of investment funds for construction activities in 2010 in relation to the expected stagnation of institutional support. The more important of these that were provided with an investment subsidy in 2010 are (in thousands of CZK):

Continuation of construction of the <i>Astronomical Pavilion</i> in Prague-Spořilov	20,500
Reconstruction of the building of Electron Microscopy of the <i>Institute of Inorganic Chemistry</i>	12,000
Annex of the building of the biology laboratories of the <i>Institute of Physiology</i>	16,137
Construction of Building 2, <i>Institute of Experimental Botany</i> in Prague-Lysolaje	34,000
Completion and heat cladding of Building La, <i>Institute of Experimental Medicine</i>	19,208
Reconstruction of experimental animal farm, <i>Institute of Molecular Genetics</i>	12,000

### Investment Expenditures



On the other hand, a long-planned reconstruction of the building of the Institute of Theoretical and Applied Mechanics in Prague (complex Prosek), in which also the Institute of History is headquartered, had to be suspended in 2010.

Also in 2010, despite the significantly limited opportunities, the ASCR placed great emphasis on the renewal of apparatus equipment. For this purpose, the amount of CZK 180 million was allocated, which was divided among the institutes by a well-tested system of internal competitions. Amounts for apparatus equipment in prices over CZK 5 million were not allotted in 2010 for money-saving reasons. Another source of investments was the amount of CZK 15 million for the apparatus equipment of the laureates of the *Praemium Academiae*. The workplaces fur-

## SUMMARY OF THE USE OF FINANCIAL MEANS

ther significantly contributed to these subsidies from their own resources.

Another significant component of the investment resources are the allotment of specified subsidies for property reproduction (SPR). The aim of this measure introduced in connection with the change of the legal form of the institutes was to replace the loss of non-investment subsidies for depreciation, which until 2006 had been allocated to the workplaces as state semi-budgetary organisation.

In 2010, the **non-investment** resources of the ASCR were made up from 47.9 % of the means of its own chapter of the state budget, 22.1 % transfers from other chapters of the state budget and 30 % of its own revenues and extra-budgetary means. The percentage of non-investment resources acquired by transfer from the other chapters of the state budget rose by 16.9% as against last year.

In the **investment** resources of the ASCR, 84.8 % were means from its own chapter of the state budget and 15.2 % transfers from other chapters of the state budget. The share of investment resources acquired by transfer from other chapters of the state budget rose by 30.6% as compared to the year before.

The joint expenditures intended particularly for foreign contacts, computer networks, membership contributions of international scientific organisations and the subsidies of 74 scientific societies associated in the Council of Scientific Societies of the CR were covered through the budget of the *Head Office of the ASCR*, through which all

of the special-purpose 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.

### **Analysis of Employment and the Drawing on Wage Resources**

The overall number of employees of the ASCR in 2010 was reduced from 7,771 to 7,526, of which 1,676 employees (which is 22.27 % as against 20.34 % in 2009) are paid from special-purpose and extrabudgetary means. The number of university-educated employees of the research units, who have undergone demanding attestations according to the Career Regulations of University-Educated Employees of the ASCR and have been categorised in the relevant qualification levels, dropped from 4,395 to 4,291. The decline of the number of employees was caused by the reduction of the ASCR's budget as against 2009 and the necessity of reducing the institutional salary means.

The ASCR in total expended CZK 2,958,514,000 on salaries and wages and on 'OON' (other payments for work performed) CZK 103,120,000. The overall average month earning in the ASCR were CZK 32,760 with a year-on-year increase as against 2009 of 0.89 %.

In the Head Office of the ASCR, the average adjusted amount for wages of the 60 employees in 2010 was CZK 27,673. The other payments for work performed were drawn in the amount of CZK 3,066,000, from which the le-

**Tab. 11: Overview of the earnings at ASCR institutes – public research institutions**

Category	Average adjusted number of employees	Average monthly earning in CZK
research employees	2,723	45,104
other university-educated employees of research units	1,568	28,539
specialised employees with university education	388	28,624
specialised employees with secondary school and college	870	22,016
special. R&D employees w/ secondary school and college	135	24,296
technical-economic employees	921	31,299
labourers	519	17,265
operations employees	372	15,594
<b>Total</b>	<b>7,466</b>	<b>32,715</b>

## ANNUAL REPORT OF THE ASCR 2010

gally required severance pay for reducing the number of employees according to Government Resolution No. 1305 of 20 October 2008 and Government Resolution No. 838 of 29 June 2009 was paid in the amount of CZK 1,017,000. The total average monthly earnings in the Head Office of the ASCR reached CZK 38,435, which is a year-on-year decrease of 8.53 %.

At all of the institutes of the ASCR – public research institutions, there was CZK 2,930,840,000 spent on wages in 2010 for 7,466 employees in average adjusted number, for 'OON' CZK 100,055,000. The total average monthly earnings were CZK 32,715 with a year-on-year growth against 2009 of 1.09 %.

A more detailed overview of the average monthly earning at the public research institutions (including all resources – institutional, special-purpose and extrabudgetary) divided by the categories of employees is provided in Table 11:

An analysis of the wage means shows that public research institutions in 2010 covered 68.7 % of wage costs from institutional means. Special-purpose means of the budget chapter of the ASCR (GA AS, the programmes of research, development and innovation) had a 3.9 % share in the wage means, extrabudgetary special-purpose means (grant projects of the CSF and projects listed by the ministries) 20.6 %, other activity 1.3 % and other extrabudgetary resources 5.5 %.

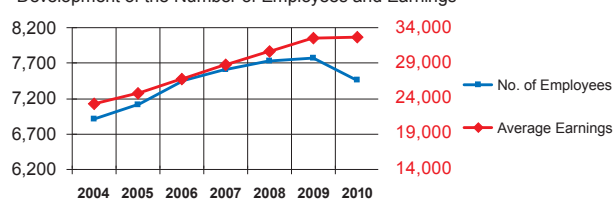
The numbers of employees, paid wage means divided by resources and average gross monthly earning for the individual institutes of the ASCR and further the number of workplaces and employees by section are listed in Appendix 6.

For the support of young scientific employees – laureates of the Otto Wichterle Award, the amount of CZK 7,926,000 was transferred to the institutes of the ASCR.

### Employees and Wages

ASCR Institutes	2007	2008	2009	2010
No. of Employees	<b>7,615</b>	<b>7,730</b>	<b>7,771</b>	<b>7,526</b>
Research employees	<b>2,541</b>	<b>2,610</b>	<b>2,725</b>	<b>2,723</b>
Average earnings	<b>28,823</b>	<b>30,592</b>	<b>32,471</b>	<b>32,760</b>

Development of the Number of Employees and Earnings



### Audit Activity

Audit activity in the ASCR is ensured by an independent audit department, which is directly subject to the President of the ASCR. The activity of this organisational unit is governed by the act on financial auditing in public administration and the aim is to ensure that the legal regulations and the internal measures adopted are being observed in the management of public funds in the performance of activities in the area of research, development and innovation and to ensure the protection of public funds from risk.

In 2010, six planned and one exceptional audit of the institutes of the ASCR were conducted. Audits of the provided subsidies of thirteen projects in five scientific societies were conducted. Eight of 67 resolved research plans, 31 of 505 resolved grant projects and two of 34 resolved programme projects were verified.

At institutes of the ASCR, fourteen follow-up checks were conducted of the fulfilment of the measures to remove the insufficiencies discovered by a previous audit of the management.

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 workplac-



## **SUMMARY OF THE USE OF FINANCIAL MEANS**

es of the ASCR. In 2010, the volume of verified financial means was almost CZK 144 million and eighteen audit certificates were issued.

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Appendices

## LIST OF RESEARCH PLANS RESOLVED BY INSTITUTES OF THE ASCR

### Appendix 1:

#### List of Research Plans Resolved by institutes of the ASCR – Status as of 31 December 2010

Recipient	Identification Code	Title
Centre for Administration and Operations	AV0Z00950701	Implementation of research and development infrastructure in the ASCR, a prerequisite of qualitative progress of the ASCR disciplines
Astronomical Institute	AV0Z10030501	Astronomy and Astrophysics
Institute of Physics	AV0Z10100502	Particle physics beyond the standard model
Institute of Physics	AV0Z10100520	Specific effects in condensed systems with a reduced dimension and broken symmetry
Institute of Physics	AV0Z10100521	Physics and technology of nanostructures, surfaces and thin layers
Institute of Physics	AV0Z10100522	Wave and corpuscular light propagation, optical materials and technology
Institute of Physics	AV0Z10100523	Intense radiation sources and radiation-mass interaction
Institute of Mathematics	AV0Z10190503	Research and development of general mathematical knowledge and its application to other branches of science and practice
Institute of Computer Science	AV0Z10300504	Computer Science for the information society: models, algorithms, applications
Nuclear Physics Institute	AV0Z10480505	Nuclear physics and related fields in basic, applied and interdisciplinary research
Institute of Information Theory and Automation	AV0Z10750506	Advanced mathematical methods in retrieval, processing and applications of knowledge and information in complex and non-deterministic systems
Institute of Physics of Materials	AV0Z20410507	Physical properties of advanced materials in relation to their microstructure and processing
Institute of Plasma Physics	AV0Z20430508	Physical and chemical processes in plasmas and their applications
Institute of Thermomechanics	AV0Z20570509	Interaction of electromagnetic fields and dynamics of controlled energy conversions in electrical engineering
Institute of Hydrodynamics	AV0Z20600510	Dynamics of fluid systems and transformation processes in the hydrosphere
Institute of Scientific Instruments	AV0Z20650511	Research into experimental methods for the examination of the physical properties of matter and their application in advanced technologies
Institute of Photonics and Electronics	AV0Z20670512	Materials, structures, systems and signals for electronics, optoelectronics and photonics
Institute of Theoretical and Applied Mechanics	AV0Z20710524	Time-dependent response of materials, systems and environments on natural and human actions
Institute of Thermomechanics	AV0Z20760514	Complex dynamic systems in thermodynamics, fluid and solid mechanics
Institute of Geophysics	AV0Z30120515	Study of internal structure and dynamics of the Earth
Institute of Geology	AV0Z30130516	Earth system at the intersection of geological processes, evolution of life, climatic and anthropogenic impacts
Institute of Atmospheric Physics	AV0Z30420517	Investigation of Earth's atmosphere and its interaction with surface and cosmic forcing
Institute of Rock Structure and Mechanics	AV0Z30460519	Research into the properties of geomaterials, development of methods of their ecological exploitation and interpretation of geodynamic processes
Institute of Geonics	AV0Z30860518	Physical and environmental processes in lithosphere induced by anthropogenic activities
Institute of Analytical Chemistry	AV0Z40310501	Advanced analytical techniques for bioanalysis, environmental analysis and nanotechnologies

## APPENDIX 01

<b>Recipient</b>	<b>Identification Code</b>	<b>Title</b>
Institute of Inorganic Chemistry	AV0Z40320502	Design, synthesis and characterisation of clusters, composites, complexes and other compounds based on inorganic substances; mechanisms and kinetics of interactions
J. Heyrovský Institute of Physical Chemistry	AV0Z40400503	Structure, reactivity and dynamics of molecular and biomolecular systems: theory, experiment, application
Institute of Macromolecular Chemistry	AV0Z40500505	Advanced polymer materials and supramolecular systems: synthesis and research on properties, phenomena and implementation in special applications and innovative technologies
Institute of Organic Chemistry and Biochemistry	AV0Z40550506	Regulation of life processes: chemical modulators of selected biological systems relevant to medicine and agriculture
Institute of Chemical Process Fundamentals	AV0Z40720504	Investigation of multiphase reacting systems for the design of processes important in synthesis and preparation of novel materials, in energy production and environmental protection
Institute of Biophysics	AV0Z50040507	Biophysics of dynamic structures and functions of biological systems
Institute of Biophysics	AV0Z50040702	Genome and epigenome: 1D and 3D structure, dynamics, interactions with proteins and functions
Biology Centre	AV0Z50070508	Study of the regulation of insect organism, dynamics of insect populations and function of insects in ecosystems
Institute of Physiology	AV0Z50110509	Investigation of molecular and cellular basis of physiological and pathophysiological processes in order to clarify the pathogenesis of important human diseases
Institute of Microbiology	AV0Z50200510	Microorganisms in research and biotechnology
Institute of Experimental Botany	AV0Z50380511	Mechanisms of regulation of plant growth and development on the level of cells, organs and whole organisms: physiological, genetic and molecular bases
Institute of Experimental Medicine	AV0Z50390512	Molecular, cellular and systemic mechanisms of major diseases of the human organism, their diagnosis, therapy and pharmacotherapy
Institute of Experimental Medicine	AV0Z50390703	New biotechnologies, nanomaterials and stem cells for use in regenerative medicine
Institute of Animal Physiology and Genetics	AV0Z50450515	Genetic, functional and developmental potential of animal cells, tissues and organisms: their use in medicine, ecology and agriculture
Biology Centre	AV0Z50510513	Research on 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 environment and pathogens
Institute of Molecular Genetics	AV0Z50520514	Molecular Genetics and Cellular Bases of Key Biological Processes: Gene Expression, Oncogenesis, Virus Replication, Immunity and Development of the Organism
Biotechnology Institute	AV0Z50520701	The building of the Institute of Biotechnology of the ASCR
Institute of Botany	AV0Z60050516	Structure, function and evolution of biodiversity of photoautotrophic organisms and fungi: origin and causes of their variation, population, community and ecosystem dynamics; application of selected results in the Průhonice Park
Biology Centre	AV0Z60170517	Structure, functioning and development of aquatic ecosystems
Biology Centre	AV0Z60220518	Parasitism and host-parasite relations at organismal, cellular and molecular level
Biology Centre	AV0Z60660521	Relationships between the structure and function of decomposer food web in soil
Institute of Systems Biology and Ecology	AV0Z60870520	Spatial and functional dynamics of biological, ecological and socio-economic systems interacting with global climatic change

## LIST OF RESEARCH PLANS RESOLVED BY INSTITUTES OF THE ASCR

<b>Recipient</b>	<b>Identification Code</b>	<b>Title</b>
Institute of Vertebrate Biology	AV0Z60930519	Biodiversity and ecology of vertebrates: implications in the conservation and sustainable management of natural populations
Institute of Psychology	AV0Z70250504	The human being in the contexts of lifespan development
Institute of Sociology	AV0Z70280505	Sociological analysis of long-term social processes in Czech society in the context of European integrational politics, development of knowledge-based society and of human, social and cultural capital
Institute of State and Law	AV0Z70680506	Harmonization of law in the European Union and its impact on system of law of the member states in the context of the information society
Library of the ASCR	AV0Z70830501	Development of infrastructure for science and research; history of books and libraries in Czech Lands to 1800
Economics Institute	AV0Z70850503	Economic aspects of European Union and European Monetary Union Entry
Masaryk Institute and Archives	AV0Z70900502	The search for identity: intellectual and political conceptions of modern Czech society 1848–1948
Institute of Archaeology, Brno	AV0Z80010507	Prehistoric and early historical development in Central Europe in the view of the latest results of archaeological research in Moravia and Silesia
Institute of Archaeology, Prague	AV0Z80020508	The archaeological potential of Bohemia: theoretical research, methodology and information systems, care for the national cultural heritage
Institute of History	AV0Z80150510	Czech historical space within a European context: Diversity, continuity, integration
Institute of Art History	AV0Z80330511	Research into the history of Czech visual arts in terms of joining the EU
Institute of Contemporary History	AV0Z80630520	Research in Czechoslovak History in the Period of the Two Totalitarian Regimes (1938–1989) and after the Collapse of Communism 1989
Masaryk Institute and Archives	AV0Z80770509	Research 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
Institute of Philosophy	AV0Z90090514	Transdisciplinary research into selected key issues of philosophy and related disciplines, in particular logic, classical and medieval studies and the theory of science. Editions and publications of the corresponding texts and electronic databases
Oriental Institute	AV0Z90210515	Research on the religions, history, languages, cultures and civilisations of the countries of Asia and Africa
Institute of Czech Literature	AV0Z90560517	Research into Czech literature from the earliest times to the present, reflecting its historical, theoretical, interpretational and documentary aspects
Institute of Ethnology	AV0Z90580513	Cultural identity and cultural regionalism in the process of forming the ethnic image of Europe
Institute for the Czech Language	AV0Z90610518	Integrated research of the Czech language and its variants
Institute for the Czech Language	AV0Z90610521	Creation of a lexical database of the Czech language of the beginning of the 21st century
Institute of Slavonic Studies	AV0Z90920516	Scientific research and editorial outputs in the field of comparative Slavonic linguistics, Paleoslavonic and Byzantine studies, comparative history of Slavonic literatures and history of Slavonic studies in the Czech Lands

## APPENDIX 02

### Appendix 2.1: Overall Publication Results at the ASCR

Type of publication	Year issued 2009		Year issued 2010*)	
	Czech	Foreign Language	Czech	Foreign Language
Books	244	60	169	50
Treatises in books	647	374	433	276
Articles in scientific journals	1,200	3,872	819	3,567
Conference proceedings	21	32	16	22
Papers in anthologies	507	1,488	372	1,119
Translations	27		20	
Reviews	392		289	
Specialised articles in the daily press	243		165	
Research reports	253		238	

\*) The data for 2010 are incomplete, because publications with that year of publication 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 2.2: Publication Results by Area of Science

Type of publication	Sections 1–3				Sections 4–6				Sections 7–9			
	Year issued 2009		Year issued 2010*)		Year issued 2009		Year issued 2010*)		Year issued 2009		Year issued 2010*)	
	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language	Czech	Foreign language
Books	25	8	23	9	7	11	6	10	217	38	141	31
Treatises in books	43	75	5	52	13	80	11	79	592	220	419	145
Articles in scientific journals	203	1635	129	1512	158	2051	98	1929	849	227	594	157
Conference proceedings	6	23	6	18	6	5	4	3	9	4	6	2
Papers in anthologies	184	1011	163	763	128	381	74	314	197	109	141	61
Translations		1		0		0		0		26		20
Reviews		0		3		3		3		388		283
Specialised articles in the daily press		64		46		51		26		130		94
Research reports		88		104		13		4		146		114

\*) data for 2010 are incomplete, because publications with that year of publication are also published the following year.

## OVERVIEW OF THE INTERNATIONAL PROJECTS RESOLVED BY THE INSTITUTES OF THE ASCR

### Appendix 3: Overview of the International Projects Resolved by the Institutes of the ASCR

#### COST

##### **IntelliCIS Intelligent monitoring, control and security of critical infrastructure systems**

- coordinator: *Institute of Computer Science*

##### **Plasmonic components and devices**

- coordinator: Chalmers University of Technology, Sweden
- co-investigators: *Institute of Photonics and Electronics* and another 42 partners from 18 European countries and Israel

##### **Advanced Solder Materials for High Temperature Applications**

- coordinator: *Institute of Physics of Materials*
- co-investigators: 48 research institutions from 20 states of the EU

##### **Developing Space Weather Products and Services in Europe**

- coordinator: National Observatory of Athens, Greece
- co-investigators: *Institute of Atmospheric Physics* and other institutions from 26 states

##### **OC-COST. Relocation of production factors between countries and impact on employment, wages, and development**

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

##### **Remaking eastern borders in Europe: a network exploring the social, moral and material relocations of Europe's eastern peripheries**

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

##### **Properties and dynamics of electronic states of transition metal complexes, COST D35 – 1P05 OC 09043**

- coordinator: *J. Heyrovský Institute of Physical Chemistry*
- co-investigators: 21 partners from 21 countries

#### EEA/Norway

##### **Monitoring of chlorine in the forest ecosystem – its cycling and effects**

- coordinator: *Institute of Experimental Botany*
- co-investigators: Forestry and Game Management Research Institute, Norwegian Forest and Landscape Institute

##### **Comparison of seismic swarms in West Bohemia and South Iceland**

- coordinator: *Institute of Rock Structure and Mechanics*
- co-investigators: *Institute of Geophysics, Iceland*

##### **Resurrected treasure (Instrumentarium for the historical photography fund Processing)**

- umbrella organisation: Financial mechanism of the EEA and Norway
- coordinator and investigator: *Institute of Art History* along with another five workplaces from European countries

#### ESA –PECS program: Plan for European Cooperating States

##### **Czech participation in the GAIA project**

- coordinator: European Space Agency
- co-investigators: *Astronomical Institute* and other European countries

##### **Data processing and simulation facility, numerical modeling and interpretation of wave and particle observations**

- coordinator: *Institute of Atmospheric Physics*
- co-investigators: European Space Agency

##### **ESO – ALMA programme: Atacama, Large Millimeter/ submillimeter Array – ALMA Regional Centre in Ondřejov**

- coordinator: ESO-ALMA Garching, Germany
- co-investigators: *Astronomical Institute* and other countries around the world

## APPENDIX 05

### EU Framework Programmes

#### **ELI – Extreme Light Infrastructure** (preparatory phase)

- coordinator: Centre national de la recherche scientifique, France
- co-investigators: *Institute of Physics* and other European countries

#### **HiPER – European High Power Laser Energy Research Facility** (preparatory phase)

- coordinator: Science and Technology Facilities Council, Great Britain
- co-investigators: *Institute of Physics* and another seven research institutions from France, Spain, Italy, Greece, Germany and Great Britain

#### **LASERLAB-EUROPE – European Laser Research Infrastructures II**

- coordinator: Forschungsverbund Berlin e.V., Germany
- co-investigators: 26 laser research infrastructures from 16 EU state including the *Institute of Physics*

#### **BrainSync – Large Scale Interactions in Brain Networks and Their Breakdown in Brain Diseases**

- coordinator: Università G. d’Annunzio – Chieti e Pescara, Italy
- co-investigators: *Institute of Computer Science* and other institutions from European countries

#### **SMECY – Smart Multicore Embedded Systems, ARTEMIS** – joint technological initiative

- coordinator: Commissariat à l’Energie Atomique, France
- co-investigators: *Institute of Information Theory and Automation* and another 29 research institutions from European countries

#### **FAST – Advanced Signal-processing for Ultra-Fast Magnetic Resonance Spectroscopic Imaging, and Training**

- coordinator: Université Claude Bernard, Lyon, France
- co-investigators: *Institute of Scientific Instruments* and other institutions from European countries

#### **EXPERTISSUES – Novel therapeutic strategies for tissue engineering of bone and cartilage using second generation biomimetic scaffolds**

- coordinator: University of Minho, Portugal
- co-investigators: *Institute of Macromolecular Chemistry* and other partners from nine countries

#### **SPIDIA – Standardisation and improvement of generic pre-analytical tools and procedures for In vitro DIAGnostics**

- coordinator: QIAGEN GmbH, Hilden, Germany
- cooperation: *Biotechnology Institute* and other institutions from eight countries

#### **PROductivity TOOLs – Automated tools to measure primary productivity in European seas**

- coordinator: Netherlands Institute of Ecology – Royal Netherlands Society of Arts and Sciences
- co-investigators: *Institute of Microbiology* and another seven partners

#### **AXREGEN – Axonal regeneration, plasticity and stem cells**

- coordinator: University of Cambridge, UK
- co-investigators: *Institute of Experimental Medicine* and another 11 partners from 10 countries

#### **MOBITAG – Building up modern biotechnologies for agriculture**

- coordinator: *Biology Centre*

#### **EU-PEARLS – EU-based production and exploitation of alternative rubber and latex sources**

- coordinator: Agrotechnology and Food Innovations B.V., Wageningen, Netherlands
- co-investigator: *Institute of Botany*

#### **EDEN – Emerging diseases in a changing European environment**

- coordinator: CIRAD Montpellier, France
- co-investigator: Institute of Vertebrate Biology

#### **SUS.DIV – Sustainable development in a diverse world**

- coordinator: **Fondazione Eni Enrico Mattei (FEEM)**
- investigators: *Institute of Ethnology of the ASCR* and another 31 partners from 15 European countries



## OVERVIEW OF THE INTERNATIONAL PROJECTS RESOLVED BY THE INSTITUTES OF THE ASCR

### **RFCS – Research Fund for Coal and Steel Improvement of coal carbonization through the optimization of fuel in coking coal blends**

- coordinator: Uniwersytet Śląski, Poland
- co-investigators: *Institute of Geonics* and other research institutions from Germany and Spain

### **Hydrogen Oriented Underground Coal Gasification for Europe (HUGE), EU, Research Fund for Coal and Steel program**

- coordinator: Central Mining Institute, Poland
- co-investigators: *Institute of Chemical Process Fundamentals* and another 10 institutions from the Netherlands, Germany, Belgium, Poland, Great Britain and Ukraine

### **ESF**

#### **Lipid-protein interactions in membrane organisation**

- coordinator: MPI-CBG Dresden
- co-investigators: *Institute of Molecular Genetics* and other partners from Germany, Austria and Finland

#### **ARCANE: Associated regional chronologies of the ancient Near East**

- umbrella organisation a coordinator: ESF
- investigators: *Institute of Archaeology, Prague* and a number of other workplaces from the EU, USA and Turkey

#### **PALATIUM: Court residences as places of exchange in late medieval and early modern Europe (1400–1700)**

- umbrella organisation: ESF
- coordinator: *Institute of Art History*
- investigators: *Institute of History, Institute of Art History* and other workplaces from 10 European countries

#### **National histories in Europe; Overlapping national histories: Confrontations and (re)conciliations**

- umbrella organisation: ESF
- coordinator: University of Oxford
- investigators: *Institute of History* and other workplaces from seven European countries

### **Logical modelling of the reasoning with vague information**

- umbrella organisation: ESF – EUROCORES – LogiCCC
- coordinator: Technische Universität Wien
- investigators: *Institute of Philosophy* and another three partners from EU member states

### **EUREKA**

#### **Contrast and Detection in Scanning Electron Microscopy**

- coordinator: FEI Electron Optics B.V., The Netherlands
- co-investigators: *Institute of Scientific Instruments* and another five research institutions from the Netherlands, Belgium and Great Britain

### **EUROATOM**

Materials for Vision Reactors Programme

#### **Nano-Structured ODS Ferritic Steels Development**

- coordinator: Commissariat à l’Energie Atomique Saclay, France
- co-investigators: *Institute of Physics of Materials* and France

### **MEYS – INGO**

#### **Collaboration of the Czech Republic with CERN**

- coordinator and investigator: Institute of Physics
- co-investigators: CERN

#### **ATLAS-CERN International Experiment ATLAS-CERN**

- coordinator and investigator: Institute of Physics
- co-investigators: CERN

#### **Pierre Auger Cosmic Ray Observatory**

- coordinator: *Institute of Physics*
- co-investigators: AUGER Observatory, a total of 17 countries

#### **Thermonuclear Fusion Research on the joint European tokamak JET in Culham**

- coordinator: *Institute of Plasma Physics*
- co-investigator: United Kingdom Atomic Energy Authority, Great Britain

## APPENDIX 05

### **International collaboration in the research of the properties of water and aqueous mixtures in the framework of IAPWS**

- coordinator: *Institute of Thermomechanics*
- co-investigators: 15 other states

### **ERCIM – European Research Consortium for Informatics and Mathematics**

- coordinator: *Institute of Information Theory and Automation*
- co-investigators: another 19 states

### **Data sources, research on data quality, standards and methods of data harmonisation for the purposes of international comparative social research and integration into the CESSDA network**

- coordinator: Council of European Social Science Data Archives
- investigators: *Institute of Sociology* and other partners from European countries

### **MEYS – KONTAKT**

#### **Unilateral contact problems for thin structures**

- coordinator: *Institute of Mathematics*
- co-investigator: Slovak University of Technology in Bratislava, Slovakia

#### **Proteomics of spinal cord injury and cell grafting**

- coordinator: *Institute of Animal Physiology and Genetics*, in cooperation with the USA

### **MEYS – Barrande**

#### **Biological and chemical decontamination of water by electrical discharge**

- coordinator: *Institute of Plasma Physics*
- co-investigator: Comenius University in Bratislava, Slovakia

### **UNESCO and IUGS**

#### **International Geoscience Programme (IGCP)**

##### **Project 580: Application of magnetic susceptibility as a paleoclimatic proxy on Paleozoic sedimentary rocks and characterization of the magnetic signal**

- coordinator: International Administration
- co-investigators: *Institute of Geology* and other research institutions from other countries

##### **IGCP – Project 510: A-type granites and related rocks through time**

- coordinator: Brazil, Finland, South Africa
- co-investigators: *Institute of Rock Structure and Mechanics*, *Institute of Geology* and other institutions from 41 states

#### **Linguistic atlas of Europe**

- umbrella organisation: UNESCO
- coordinator: The Romanian Academy, “Iorgu Iordan – Al. Rosetti” Institute of Linguistics, Bucharest
- investigators: *Institute for the Czech Language* and another c. 40 national commissions from c. 40 countries

### **Others**

#### **Neutrino Experiment in Karlsruhe, KATRIN – Karlsruhe Tritium Neutrino Experiment**

- coordinator: Karlsruhe Institute of Technology, Germany
- co-investigators: *Nuclear Physics Institute* and research institutions from Germany, Russia, the USA and Great Britain

#### **Characterisation of Low-Defect-Density Native Gallium Nitride Materials**

- umbrella organisation: Missile Defence Agency, USA
- coordinator: *Institute of Physics*
- co-investigators: *Institute of Photonics and Electronics* and another partner from the USA

#### **Interpolation approach to embeddings of spaces of Besov and Sobolev type, Agreement between the ASCR and FCT (Fundação para a Ciência e a Tecnologia, Portugal)**

- coordinator: *Institute of Mathematics*
- co-investigator: Universidade de Coimbra, Portugal

## OVERVIEW OF THE INTERNATIONAL PROJECTS RESOLVED BY THE INSTITUTES OF THE ASCR

### **Multidisciplinary Study of AMS generation and relation to progressive strain: an experimental approach,**

Agreement between the ASCR and FCT (Fundação para a Ciência e a Tecnologia, Portugal)

- coordinator: *Institute of Geophysics*
- co-investigators: eight research institutions from Portugal, Switzerland, France and Germany

### **Establishing causes of sea-level change and oceanic anoxia in the Late Cretaceous: regional versus global patterns,** NERC UK

- coordinator: Durham University, Great Britain
- co-investigators: *Institute of Geophysics* and another four research institution from Great Britain, Canada and Poland

### **DECOVALEX – Development of codes and their validation against experiments,** SKB SURAO

- coordinator: Stockholms Kooperativa Bostadsförening, Sweden
- co-investigators: *Institute of Geonics* and other institutions from other states

### **STAR: Sollenoidal tracker at RHIC,** BNL US

- coordinator: Brookhaven National Laboratory, USA
- co-investigators: *Nuclear Physics Institute* and other institutions from 11 states

### **Advanced Singlet Oxygen Generator for a COIL,** programme of the US AF EOARD

- coordinator: *Institute of Physics*
- co-investigators: USA

### **Analytical laboratory for development of biomarkers of environmental exposures to arsenic, UNC School of Public Health, programme of Gillings Innovation Labs**

- coordinator: University of North Carolina at Chapel Hill, US
- co-investigator: *Institute of Analytical Chemistry*

### **Network of high temperature facilities devoted to the nuclear reactor severe accident R&D (ECONET)**

- coordinator: French Commission for Atomic Energy
- co-investigator: *Institute of Inorganic Chemistry* and another four partners from France, Germany, Russia and Kazakhstan

### **Near zero emission advanced fluidised bed gasification (FLEXGAS),** NRC programme

- coordinator: National Research Council of Italy
- co-investigators: *Institute of Chemical Process Fundamentals* and another 7 institutions from Italy, Portugal, Spain, Austria and England

### **Probing the mechanism of the cleavage reaction in catalytic RNAs,** Human Frontier Science Program

- coordinator: Tanaka Japan
- co-investigators: *Institute of Organic Chemistry and Biochemistry* and further partners from Japan and the USA

### **Platinum and ruthenium compounds. From DNA damage to cancer chemotherapy,** programme of HHMI Biomedical Research Grants for International Scientists, USA

- investigator: *Institute of Biophysics*

### **Improvement of metabolic flexibility by combination treatment with n-3 fatty acids and thiazolidinedione in mice,** Programme of the European Federation for Studies on Diabetes

- coordinator: *Institute of Physiology*
- co-investigator: Dutch partner

### **C57/BL/6 -and PWD-derived consomic strains**

- coordinator: *Institute of Molecular Genetics*
- co-investigator: partner from the USA

### **Enhancements of Pest Risk Analysis Techniques,** acronym: PRATIQUE

- coordinator: Dept. For Environment, Food and Rural Affairs, London, Great Britain
- co-investigator: *Institute of Botany*

### **Psychological effects of the economic recession: implications for stress and coping**

- coordinator: University of York
- investigators: *Institute of Psychology* and dozens of universities and research workplaces all over the world

## APPENDIX 05

### **MARS 500: Dynamics of resilience and its resources in crewmembers during extended spaceflight simulation**

- umbrella institution: Russian Federal Space Agency
- coordinator: Institute for Biomedical Problems, Moscow, Russian Federation
- investigators: *Institute of Psychology* and a number of research institutions from Europe, the USA and Canada

### **Eastern Europeans at the Beginning of the Middle Ages: from Tribe to State**

- umbrella organisation: CNRS
- coordinator: *Institute of Archaeology, Brno*
- investigators: *Institute of Archaeology, Brno* and another five European workplaces

### **Amber Route**

- coordinator: Austrian Archaeological Institute, Vienna
- investigators: *Institute of Archaeology, Brno* and another 15 workplaces from five European countries

### **Prehistoric Art**

- umbrella organisation: Mellon Foundation
- coordinator: Maison des Sciences humaines, Paris
- investigators: *Institute of Archaeology, Brno* and other European workplaces

### **Acculturation Phenomenon on Both Sides of the Alps in Antiquity and the Early Middle Ages**

- umbrella organisation: Austrian Academy of Sciences
- coordinator and investigator: *Institute of Archaeology, Brno* and another five workplaces from five European countries

### **Corpus of Roman findings on the territory of Moravia**

- umbrella organisation and coordinator: Roman-German Commission Frankfurt a. M.
- investigators: *Institute of Archaeology, Brno* and other workplaces from the majority of the European countries

### **Celts in Europe**

- umbrella organisation: CNRS
- coordinator: CNRS, France
- investigators: *Institute of Archaeology, Brno* and another eight workplaces from five European countries

### **Historical Towns Atlas of the Czech Republic**

- umbrella organisation and coordinator: Commission Internationale pour l'histoire des villes
- investigators: *Institute of History* and other workplaces from 14 European countries

### **Educational Reform, Philosophy and Irenicism: Intellectual Networks in Central and Western Europe, 1560–1670**

- umbrella organisation and coordinator: University of Oxford
- investigators: *Institute of History* and other workplaces from four European countries

### **Corpus der Quellen zur mittelalterlichen Geschichte der Juden im Reichsgebiet**

- umbrella organisation and coordinator: Universität Trier
- investigators: *Institute of History, Institute of Philosophy* and other workplaces from three European countries

### **Transferts artistiques dans l'Europe gothique des XIIe à XVIe siècles**

- umbrella organisation: INHA
- coordinator: Université de Liège
- investigator: *Institute of Art History* along with another 19 workplaces from 10 European countries

### **Comparison of structural system transformations in the Central European countries after 1945, focusing on collective farms**

- umbrella organisation: Visegrad Fund
- coordinator and investigator: *Institute of Contemporary History* and other partners from the CR and Slovakia

### **Around 68: Activism, Networks, Trajectories**

- umbrella organisation and coordinator: University of Oxford
- investigators: *Institute of Contemporary History* and another 15 partners from nine European countries

### **International Communist Studies and Archives Portal**

- umbrella organisation and coordinator: ZZF
- investigators: *Institute of Contemporary History* and another eight partners from six European countries

## OVERVIEW OF THE INTERNATIONAL PROJECTS RESOLVED BY THE INSTITUTES OF THE ASCR

### **Victims of human experiments under national socialism**

- umbrella organisation: Arts & Humanities Research Council, UK
- coordinator: Oxford Brookes University
- investigators: *Institute of Contemporary History* and another four partners from four European countries

### **Socio-Spatial Consequences of Demographic Change for East Central European Cities**

- umbrella organisation: UFZ Leipzig Volkswagenstiftung
- coordinator: UFZ Leipzig
- investigators: *Institute of Ethnology* and other partners from four European countries

### **The new Dvořák edition**

- coordinator and investigator: *Institute of Ethnology* and other partners from three European countries and the USA

### **Cultures of Knowledge: An intellectual geography of the seventeenth-century republic of feters**

- umbrella institution: Andrew W. Mellon Foundation
- coordinator: Humanities Division, University of Oxford
- investigators: *Institute of Philosophy* and another five partners from four EU member states

### **Latinitatis medii aevi Lexicon Bohemorum**

- umbrella organisation: Union Académique Internationale
- coordinator: *Institute of Philosophy*
- investigators: Centre for Classical Studies at the *Institute of Philosophy* and other partners from 12 countries

### **Corpus vasorum antiquorum**

- umbrella organisation and coordinator: Union Académique Internationale
- investigators: Centre for Classical Studies at the *Institute of Philosophy* and other partners from 23 countries

### **Clavis monumentorum litterarum**

- umbrella organisation and coordinator: Union Académique Internationale
- coordinator: *Institute of Philosophy*
- investigators: Centre for Classical Studies at the *Institute of Philosophy* and other partners from European countries

### **Ček-Hindí šabdkoš (Czech-Hindi Dictionary)**

- umbrella organisation and coordinator: Central Hindi Directorate
- investigators: *Oriental Institute* and other institutions from the CR and India

### **Greek–Old-Church-Slavonic Lexicon-Index**

- umbrella organisation: Union Académique Internationale
- coordinator: *Institute of Slavonic Studies*
- investigators: *Institute of Slavonic Studies* and another five partners from three European countries

### **Slavic Linguistic Atlas**

- umbrella organisation: International Congress of Slavists
- coordinator: International Commission for a Slavic Linguistic Atlas
- investigators: *Institute for the Czech Language* and another 13 national commissions from 13 countries

### **Danube Limes – World Heritage Site, OP Transnational cooperation Central Europe**

- coordinator: Institute of Austrian History Research, University of Vienna
- investigators: *Institute of Archaeology, Brno* and another five European workplaces

### **Cradles of European Culture, program CULTURE**

- umbrella institution: France Media Association
- coordinator: Ename Centre, Belgium
- investigators: *Institute of Archaeology, Brno* and another 16 workplaces from nine European countries

### **Ex oriente, program CULTURE**

- coordinator: Europäisches Burgeninstitut, Braubach am Rhein, Germany
- investigators: *Institute of Archaeology, Prague* and another nine partners from five EU member states

### **Monitoring policy and research activities on science in society in Europe (MASIS), DG Research– EC**

- coordinator: COWI, A/S and the Danish Institute for Science Policy
- investigators: *Institute of Philosophy* and another 35 partners from EU member and associate countries

## APPENDIX 04

### Appendix 4: Overview of the International Conferences Organised by the Institutes of the ASCR

Active participation at international scientific meetings abroad and the organisation of international scientific congresses and conferences in the Czech Republic create space for making new scientific contacts, the exchange of opinions and the presentation of new results of scientific research. The overview below provides examples of significant international conferences organised by the institutes of the ASCR or in whose organisation they participated in 2010.

#### International Conference Probing Strong Gravity Near Black Holes

■ organiser: *Astronomical Institute*; 145 participants, of whom 120 foreign.

#### Czech-Polish seminar on Ferroelectricity

■ organiser: *Institute of Physics*; 125 participants, of whom 83 foreign.

#### International Symposium on Ferroic Domains ISFD 10

■ organiser: *Institute of Physics*; 135 participants, of whom 101 foreign.

#### Workshop on Spintronics 2010

■ organiser: *Institute of Physics*; 50 participants, of whom 25 foreign.

#### Nonlinear Analysis, Spatial Functions and Applications 9

■ organiser: *Institute of Mathematics*; 54 participants, of whom 34 foreign.

#### Beauty of Logic II

■ organiser: *Institute of Computer Science*; 40 participants, of whom 12 foreign.

#### 22nd Summer School of Nuclear Many-Body Problems

■ organiser: *Nuclear Physics Institute*; 56 participants, of whom 42 foreign.

#### Prague Stochastics 2010

■ co-organiser: *Institute of Information Theory and Automation*; 170 participants, of whom 125 foreign.



In March 2010, the EUROPT(R)ODE X conference, organised by the *Institute of Photonics and Electronics*, took place in Prague. In the photo, Director of the institute V. Matějec. (photo: S. Kyselová).

#### 10th European Conference on Optical Chemical Sensors and Biosensors – EUROPT(R)ODE X

■ organiser: *Institute of Photonics and Electronics*; 250 participants, of whom 200 foreign.

#### FATIGUE 2010 – 10th International Fatigue Congress

■ organiser: *Institute of Physics of Materials*; 450 participants, of whom 400 foreign.

#### 21st International Colloquium on Fatigue Mechanisms

■ organiser: *Institute of Physics of Materials*; 50 participants, of whom 40 foreign.

#### PALS 2010 – Workshop

■ co-organiser: *Institute of Plasma Physics*; 74 participants, of whom 33 foreign.

#### Multi-field Conference LASER 50

■ organiser: *Institute of Scientific Instruments*; 85 participants, of whom five foreign.

## OVERVIEW OF THE INTERNATIONAL CONFERENCES ORGANISED BY THE INSTITUTES OF THE ASCR

### 2nd Historic Mortars Conference

■ organiser: *Institute of Theoretical and Applied Mechanics*; 220 participants, of whom 200 foreign.

### Topical Problems of Fluid Mechanics 2010

■ organiser: *Institute of Thermomechanics*; 54 participants, of whom 12 foreign.

### 12th Meeting on Paleo, Rock and Environmental Magnetism

■ organiser: *Institute of Geophysics*; 69 participants, of whom 55 foreign.

### Workshop on Micromorphology in an archaeological context

■ organiser: *Czech Geological Society*; 40 participants, of whom 38 foreign.

### VERSIM 2010

■ organiser: *Institute of Atmospheric Physics*; 40 participants, of whom 30 foreign.

### OVA'10 Conference: New Knowledge and Measurement in Seismology, Engineering Geology and Geotechnics

■ co-organiser: *Institute of Geonics*; 70 participants, of whom 15 foreign.

### 11th Czech-Polish Workshop 'Recent Geodynamics of the Sudeten and Adjacent Areas'

■ organiser: *Institute of Rock Structure and Mechanics*; 60 participants, of whom 32 foreign.

### 25th Symposium on Bioanalysis 2010

■ main organiser: *Institute of Analytical Chemistry*; 500 participants, of whom 300 foreign.

### Solid State Chemistry 2010

■ main organiser: *Institute of Inorganic Chemistry*; 203 participants, of whom 161 foreign.

### 6th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications (SPEA6)

■ co-organiser: *J. Heyrovský Institute of Physical Chemistry*; 230 participants, of whom 200 foreign.

### CHISA Conference

■ co-organiser: *Institute of Chemical Process Fundamentals*; 1,147 participants, of whom 1,060 foreign.

### ECIS 2010 Congress – European Colloid and Interface Society

■ co-organiser: *Institute of Macromolecular Chemistry*; 600 participants, of whom 500 foreign.

### Prague Protein Spring 2010

■ main organiser: *Institute of Organic Chemistry and Biochemistry*; 54 participants, of whom 29 foreign.

### XXIVth Genetics Days 2010

■ co-organiser: *Institute of Biophysics*; 150 participants, of whom 100 foreign.

### XVIIIth International Working Meeting on Genetic Systems of Sewer Rats

■ co-organiser: *Institute of Physiology*; 150 participants, of whom 145 foreign.

### 25th Congress of the Czechoslovak Society of Microbiological Microorganisms and the Quality of Life

■ co-organiser: *Institute of Microbiology*; 300 participants, of whom 140 foreign.

### Anniversary Conference SEB Prague 2010

■ co-organiser: *Institute of Experimental Botany*; 800 participants, of whom 700 foreign.

### Conference on the Biology of the Inner Ear

■ main organiser: *Institute of Experimental Medicine*; 160 participants, of whom 150 foreign.

### Conference on the 100th Anniversary of the Discovery of Retroviruses

■ main organiser: *Institute of Molecular Genetics*; 248 participants, of whom 201 foreign.

### 12th Conference on Experimental Plant Biology

■ co-organiser: *Biology Centre and Institute of Botany*; 268 participants, of whom 55 foreign.

### Zoological Days Prague 2010

■ co-organiser: *Institute of Vertebrate Biology*; 456 participants, of whom 77 foreign.

## APPENDIX 04

### NFORUM

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

### The Eleventh Annual Global Development Conference: Regional and Global Integration: Quo Vadis?

■ co-organiser: *Economics Institute (CERGE- EI)*; 500 foreign participants.

### 15th European Conference on Personality Psychology

■ co-organiser: *Institute of Psychology*; 400 participants, of whom 390 foreign.



Programme and Proceedings of the Abstracts of the 15th European Conference on the Personality Psychology. (photo: Archives of the *Institute of Psychology*)

### Symposium on Positive Psychology with M. Seligman

■ co-organiser: *Institute of Psychology*; participants 200, of whom 20 foreign.

### 2nd International Conference on Migrations: Knowledge Production/Polymaking

■ co-organiser: *Institute of Sociology*; 39 participants, of whom 21 foreign.

### Metamorphoses of Law in the Central Europe II. Twenty Years After

■ organiser: *Institute of State and Law*; 70 participants, of whom 21 foreign.

### 6th Protohistorical Conference Archaeology of Barbarians 2010, Graves and cemeteries of Germans on the territory between the Elbe and Danube, Hradec Králové, 6–10 September 2010

■ co-organiser: *Institute of Archaeology, Brno*; 65 participants, of whom 18 foreign.

### Conference of Proprietary Churches, Curtes and Manors and the Development of the Early Medieval Elite in Central Europe (Konferenz Eigenkirchen, Höfe und Sitze und die Entwicklung von frühmittelalterlichen Eliten in Ostmitteleuropa)

■ main organiser: *Institute of Archaeology, Prague*; 80 participants, of whom nine foreign.

### 11th International Conference Celts (2010)

■ main organiser: *Institute of Archaeology, Prague*; 48 participants, of whom 14 foreign.

### Conference: Birth of New Europe. Versailles, St. Germain, Trianon and Forming the Post-War Peace System. 8–9 June 2010, Prague

■ organiser: *Institute of History*; 40 participants, of whom 10 foreign.

### Kulturelles Handschriftenerbe in Ostmitteleuropa (Cultural Heritage of Manuscripts in Eastern Europe)

■ co-organiser: *Masaryk Institute and Archives*; 40 participants, of whom 30 foreign.

### Conference with international participation Hans von Aachen and new research in the transfer of artistic ideas into Central Europe

■ co-organiser: *Institute of Art History*; 35 participants, of whom 18 foreign.

### 16th International Oral History Association Conference

■ main organiser: *Institute of Contemporary History*; 503 participants, of whom 480 foreign.

### National Minorities and Identity

■ organiser: *Institute of Contemporary History*; 88 participants, of whom 12 foreign.

### Czech-Slovak Relations and Compatriots

■ co-organiser: *Institute of Ethnology*; 99 participants, of whom 60 foreign.



## OVERVIEW OF THE INTERNATIONAL CONFERENCES ORGANISED BY THE INSTITUTES OF THE ASCR

### Philosophy and Social Science Conference

■ organiser: *Centre for Global Studies of the Institute of Philosophy*; 98 participants, of whom 95 foreign.

### Controversies in Contexts

■ main organiser: *Cabinet for the Study of Science, Technology and Society of the Institute of Philosophy*; 53 participants, of whom 51 foreign.

### Logica 2010

■ organiser: *Institute of Philosophy*; 57 participants, of whom 30 foreign.

### Universal Reformation: Intellectual Networks in Central and Western Europe, 1560–1670

■ co-organiser: *Institute of Philosophy*; 41 participants, of whom 34 foreign.

### International Scientific Conference: **On the Borders of Two Cultures: Russian Émigrés in Interwar Czechoslovakia**

■ co-organiser: *Institute of Slavonic Studies*; 20 participants, of whom 14 foreign.

### Fourth Congress of World Czech Literary Studies: **The other Czech Literature (?)**

■ organiser: *Institute of Czech Literature*; 157 participants, of whom 86 foreign.

### Students' Literary Studies Conference: **Forms and Functions of the Story – towards an Interdisciplinary and Intermedia Debate**

■ organiser: *Institute of Czech Literature*; 62 participants, of whom 20 foreign.

### The Czech and Slovak Monolingual Lexicography at the Beginning of the 21st Century

■ co-organiser: *Institute for the Czech Language*; 21 participants, of whom eight foreign.



Ceremonial Opening of the 4th Congress of World Czech Literary Studies.  
(photo: Archives of the Institute of Czech Literature)

## APPENDIX 05

### Appendix 5: An Overview of the Cooperation of the ASCR with Higher Education Institutions

Section/Institute	1	2	3	4	5a	5b	6a	6b
<b>Scientific Area I</b>								
1 ASÚ	2	5	14	11	346	278	12	7
1 FZÚ	16	5	32	30	1,309	1,482	55	60
1 MÚ	4	6	12	1	845	1,202	38	50
1 ÚI	5	17	39	12	607	666	34	37
1 ÚJF	4	5	16	5	490	388	18	16
1 ÚTIA	3	12	1	1	1,534	1,625	66	66
<b>Section 1</b>	<b>34</b>	<b>50</b>	<b>114</b>	<b>60</b>	<b>5,131</b>	<b>5,641</b>	<b>223</b>	<b>236</b>
2 ÚFE	4	3	7	9	292	204	6	5
2 ÚFM	1	3	11	12	468	456	14	14
2 ÚFP	4	4	10	0	363	293	17	17
2 ÚPT	4	5	11	10	119	165	6	15
2 ÚH	0	2	4	3	88	28	36	1
2 ÚTAM	1	1	13	7	685	495	35	27
2 ÚT	7	8	19	12	868	1,652	31	59
<b>Section 2</b>	<b>21</b>	<b>26</b>	<b>75</b>	<b>53</b>	<b>2,883</b>	<b>3,293</b>	<b>145</b>	<b>138</b>
3 GFÚ	1	1	7	5	111	247	4	12
3 GLÚ	2	3	15	2	577	581	23	26
3 ÚFA	3	3	10	19	325	465	12	17
3 ÚGN	2	4	45	2	250	326	20	23
3 ÚSMH	4	1	7	6	70	14	3	2
<b>Section 3</b>	<b>12</b>	<b>12</b>	<b>84</b>	<b>34</b>	<b>1,333</b>	<b>1,633</b>	<b>62</b>	<b>80</b>
<b>Scientific Area II</b>								
4 ÚACH	3	4	4	5	76	153	4	6
4 ÚIACH	5	2	6	3	24	12	2	4
4 ÚCHP	2	7	8	22	474	647	84	139
4 ÚFCH J. H.	8	15	20	11	341	562	25	29
4 ÚMCH	6	10	4	0	240	276	6	6
4 ÚOCHB	16	22	60	28	697	436	46	21
<b>Section 4</b>	<b>40</b>	<b>60</b>	<b>102</b>	<b>69</b>	<b>1,852</b>	<b>2,086</b>	<b>167</b>	<b>205</b>
5 BFÚ	13	12	25	27	675	822	40	38
5 BTÚ	1	6	6	10	81	79	4	2
5 FGÚ	9	13	64	38	942	859	23	26
5 MBÚ	9	15	98	100	532	604	29	29
5 ÚEB	15	17	50	44	790	992	49	38

## AN OVERVIEW OF THE COOPERATION OF THE ASCR WITH HIGHER EDUCATION INSTITUTIONS

Section/Institute	1	2	3	4	5a	5b	6a	6b
5 ÚEM	2	7	21	24	234	258	43	21
5 ÚMG	7	9	31	0	255	198	8	10
5 ÚŽFG	6	11	17	12	205	163	26	26
<b>Section 5</b>	<b>62</b>	<b>90</b>	<b>312</b>	<b>255</b>	<b>3,714</b>	<b>3,975</b>	<b>222</b>	<b>190</b>
6 BC	8	11	162	130	1,911	1925	85	84
6 BÚ	4	3	44	19	309	176	10	8
6 ÚBO	4	14	81	60	417	561	34	42
6 ÚSBE	7	2	25	8	144	376	61	44
<b>Section 6</b>	<b>23</b>	<b>30</b>	<b>312</b>	<b>217</b>	<b>2,781</b>	<b>3,038</b>	<b>190</b>	<b>178</b>
<b>Scientific Area III</b>								
7 KNAV	0	1	0	0	53	0	2	0
7 NHÚ	10	21	7	4	1,166	2,252	149	209
7 PSÚ	3	7	62	3	1,243	848	46	46
7 SOÚ	3	1	63	36	1,095	1,364	42	49
7 ÚSP	1	0	0	0	463	526	97	133
<b>Section 7</b>	<b>17</b>	<b>30</b>	<b>132</b>	<b>43</b>	<b>4,020</b>	<b>4,990</b>	<b>336</b>	<b>437</b>
8 ARÚB	1	2	5	4	447	191	23	18
8 ARÚ	4	1	7	4	948	846	43	36
8 HÚ	2	3	42	0	1,360	1,430	84	95
8 MÚA	7	8	24	58	1,092	1,299	65	79
8 ÚDU	0	0	38	4	527	545	34	35
8 ÚSD	3	0	63	10	1,080	954	50	44
<b>Section 8</b>	<b>17</b>	<b>14</b>	<b>179</b>	<b>80</b>	<b>5,454</b>	<b>5,265</b>	<b>299</b>	<b>307</b>
9 EÚ	7	1	6	9	748	930	31	42
9 FLÚ	4	8	67	4	6,066	6,219	254	243
9 OÚ	0	0	9	0	306	340	13	14
9 SLÚ	4	3	4	5	396	348	33	29
9 ÚČL	4	11	45	1	1,171	1,136	37	51
9 ÚJČ	4	3	13	37	1,305	1,325	100	98
<b>Section 9</b>	<b>23</b>	<b>26</b>	<b>144</b>	<b>56</b>	<b>9,992</b>	<b>10,298</b>	<b>468</b>	<b>477</b>
<b>SA Total</b>	<b>249</b>	<b>338</b>	<b>1,454</b>	<b>867</b>	<b>37,160</b>	<b>40,219</b>	<b>2,112</b>	<b>2,248</b>

**Legend:**

1. Number of PhD. graduates supervised at the institutes
2. Newly accepted PhD. students
3. MS/MA students supervised at the institutes
4. Not-yet graduated students at institutes 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

## APPENDIX 06

Appendix 6.1:  
Number of Employees, Salary Means and Earnings in 2010

Section/Institute		Adjusted number of employees total	Means for wages and salaries in thous. CZK			Other personnel costs in thous. CZK			Average monthly earnings in CZK
			total	of which		total	of which		
				institut.	special-purpose and extra-budgetary		institut.	special-purpose and extra-budgetary	
1	ASÚ	123.65	55,194	42,263	12,931	1,208	274	933	37,198
1	FZÚ	620.93	256,768	194,687	62,080	2,224	984	1,240	34,460
1	MÚ	77.21	34,822	28,056	6,767	908	351	557	37,584
1	ÚI	104.44	46,042	27,326	18,716	2,192	45	2,147	36,738
1	ÚJF	194.66	80,667	59,079	21,587	1,015	324	691	34,533
1	ÚTIA	148.70	75,583	47,009	28,573	1,787	633	1,153	42,357
2	ÚFM	125.21	48,602	34,648	13,954	694	88	606	32,347
2	ÚFP	132.50	52,592	37,140	15,452	945	480	465	33,077
2	ÚH	50.93	21,381	17,882	3,499	610	103	507	34,985
2	ÚPT	131.93	49,295	28,830	20,464	1,475	408	1,067	31,137
2	ÚFE	104.04	42,819	35,194	7,626	877	279	597	34,297
2	ÚTAM	58.90	25,137	18,959	6,178	539	198	341	35,565
2	ÚT	186.12	70,165	53,031	17,134	1,386	226	1,160	31,416
3	GFÚ	92.81	38,725	32,133	6,592	851	136	715	34,771
3	GLÚ	68.43	26,269	23,261	3,009	1,269	983	287	31,990
3	ÚFA	76.48	32,935	25,010	7,925	734	220	514	35,887
3	ÚGN	94.60	33,103	27,180	5,924	988	117	871	29,161
3	ÚSMH	103.14	38,500	30,629	7,871	1,106	342	764	31,107
4	ÚIACH	59.94	26,681	19,779	6,903	401	75	326	37,095
4	ÚACH	69.88	32,886	23,438	9,448	1,170	586	583	39,217
4	ÚFCH JH	167.08	78,836	47,694	31,142	1,924	226	1,699	39,320
4	ÚCHP	154.43	66,222	42,765	23,458	1,042	261	781	35,735
4	ÚMCH	240.85	106,201	79,682	26,519	1,027	455	572	36,745
4	ÚOCHB	420.39	184,187	124,665	59,522	3,235	1,134	2,102	36,511
5	BFÚ	141.15	61,839	40,854	20,986	1,349	210	1,138	36,509
5	BTÚ	52.72	23,503	13,937	9,566	386	45	341	37,151

## NUMBER OF EMPLOYEES, SALARY MEANS AND EARNINGS IN 2010

		Adjusted number of employees total	Means for wages and salaries in thous. CZK			Other personnel costs in thous. CZK			Average monthly earnings in CZK
Section/Institute			total	of which		total	of which		
				institut.	special-purpose and extra-budgetary		institut.	special-purpose and extra-budgetary	
5	FGÚ	309.34	115,721	75,509	40,213	1,758	167	1,591	31,174
5	MBÚ	407.30	150,922	86,428	64,494	2,262	907	1,355	30,879
5	ÚEB	200.17	72,261	40,589	31,671	1,147	207	940	30,083
5	ÚEM	147.68	60,131	34,366	25,765	1,838	404	1,434	33,931
5	ÚMG	278.03	120,588	63,019	57,568	1,562	578	984	36,144
5	ÚŽFG	117.60	40,312	26,625	13,687	545	60	485	28,565
6	BÚ	258.93	83,635	52,606	31,030	2,240	374	1,866	26,917
6	BC	398.34	142,945	99,685	43,260	5,051	781	4,269	29,904
6	ÚSBE	98.22	31,298	17,422	13,876	1,656	349	1,307	26,555
6	ÚBO	71.20	22,862	15,011	7,851	995	40	956	26,758
7	KNAV	73.49	24,132	23,982	150	1,637	1,437	200	27,365
7	NHÚ	79.59	30,901	18,951	11,950	1,999	432	1,567	32,354
7	PSÚ	31.05	13,344	10,598	2,746	612	234	378	35,813
7	SOÚ	81.23	34,993	21,789	13,203	6,190	2,284	3,906	35,899
7	ÚSP	36.35	12,180	11,241	940	527	368	159	27,923
8	ARÚB	59.63	15,635	13,049	2,586	1,359	469	891	21,851
8	ARÚ	102.15	34,193	26,847	7,346	3,474	854	2,620	27,894
8	MÚA	40.57	14,711	12,286	2,425	1,193	210	983	30,217
8	HÚ	68.83	24,135	23,032	1,103	1,666	1,067	599	29,221
8	ÚDU	45.47	15,195	14,338	857	1,742	390	1,352	27,847
8	ÚSD	55.20	21,922	15,458	6,465	2,726	1,068	1,657	33,095
9	FLÚ	153.43	49,634	42,336	7,298	2,403	1,703	700	26,958
9	OÚ	23.51	9,328	9,328	0	520	520	0	33,063
9	ÚČL	71.26	23,501	20,430	3,072	1,421	786	635	27,483
9	EÚ	46.07	15,564	14,648	917	1,196	679	516	28,153
9	ÚJČ	107.74	36,625	28,735	7,891	3,333	2,005	1,328	28,329
9	SLÚ	26.44	9,243	7,974	1,269	736	425	311	29,133

## APPENDIX 06

		Adjusted number of employees total	Means for wages and salaries in thous. CZK			Other personnel costs in thous. CZK			Average monthly earnings in CZK
Section/Institute		total	of which			of which			
			total	institut.	special-purpose and extra-budgetary	total	institut.	special-purpose and extra-budgetary	
O	Centre for Administration and Operations	275.71	95,970	63,189	32,782	16,926	10,492	6,434	29,007
	Head Office	60.00	27,673	27,416	257	3,066	2,412	653	38,435
RDI total		7,465.65	2,930,840	2,044,603	886,237	100,055	38,471	61,584	32,715
<b>AS Total</b>		<b>7,525.65</b>	<b>2,958,514</b>	<b>2,072,019</b>	<b>886,495</b>	<b>103,120</b>	<b>40,883</b>	<b>62,237</b>	<b>32,760</b>

### Appendix 6.2:

#### Number of Institutes and Employees of the ASCR by Section

	Number of Institutes in 2010	Average adjusted number of employees in 2009				Average adjusted number of employees in 2010			
		total		of which research section employees with a university education		total		of which research section employees with a university education	
		number	%	number	%	number	%	number	%
1. Section of Mathematical, Physical and Computer Sciences	6	1,305.5	16.8	798.7	18.2	1,269.6	16.9	777.3	18.1
2. Section of Applied Physics	7	817.2	10.5	455.2	10.4	789.6	10.5	436.8	10.2
3. Section of Earth and Space Sciences	5	462.3	6.0	283.0	6.4	435.5	5.8	270.2	6.3
4. Section of Chemical Sciences	6	1,113.1	14.3	730.2	16.6	1,112.6	14.8	727.7	17.0
5. Section of Medical Sciences and Molecular Biology	8	1,688.1	21.7	1,023.8	23.3	1,654.0	22.0	1,017.3	23.7
6. Section of Biological and Ecological Sciences	4	831.3	10.7	419.7	9.6	826.7	11.0	415.1	9.7
7. Section of Social Sciences and Economics	5	321.4	4.1	151.6	3.4	301.7	4.0	141.3	3.3
8. Section of Historical Sciences	6	394.1	5.1	220.1	5.0	371.8	4.9	207.0	4.8
9. Section of Humanities and Philology	6	449.6	5.8	312.8	7.1	428.4	5.7	298.3	6.9
Service departments (including the Head Office of the ASCR)	2	388.7	5.0	0.0	0.0	335.7	4.4	0.0	0.0
<b>AS total</b>	<b>55</b>	<b>7,771.3</b>	<b>100.0</b>	<b>4,395.1</b>	<b>100.0</b>	<b>7,525.6</b>	<b>100.0</b>	<b>4,291.0</b>	<b>100.0</b>

## THE ECONOMIC MANAGEMENT OF PUBLIC RESEARCH INSTITUTIONS OF THE ASCR IN 2010

**Appendix 7.1:**  
**The Economic Management of Public Research Institutions of the ASCR in 2010**

Institute		Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)
			transfers from SB	own resources		person. costs	material costs	
1	ASÚ	128,369	95,700	32,669	126,869	76,624	50,245	1,500
1	FZÚ	631,557	544,058	87,499	623,009	359,335	263,674	8,548
1	MÚ	67,656	60,232	7,423	67,548	48,453	19,095	108
1	ÚI	91,721	77,217	14,504	90,654	67,249	23,404	1,068
1	ÚJF	239,978	167,053	72,925	232,560	113,829	118,731	7,418
1	ÚTIA	138,853	116,181	22,672	138,189	106,994	31,195	664
2	ÚFM	124,890	84,145	40,745	123,848	68,833	55,015	1,042
2	ÚFP	145,664	96,474	49,190	145,394	73,636	71,758	270
2	ÚH	47,603	38,293	9,310	47,049	30,140	16,909	554
2	ÚPT	124,209	95,128	29,081	123,948	69,768	54,180	262
2	ÚFE	105,193	81,163	24,029	102,168	60,811	41,356	3,025
2	ÚTAM	57,117	40,783	16,334	56,196	35,839	20,358	921
2	ÚT	157,693	118,647	39,046	157,332	99,792	57,541	361
3	GFÚ	93,826	71,582	22,244	93,823	54,203	39,620	2
3	GLÚ	62,965	52,364	10,601	60,883	37,707	23,176	2,082
3	ÚFA	83,692	57,668	26,024	83,035	48,345	34,690	657
3	ÚGN	67,019	54,380	12,639	67,018	47,033	19,985	1
3	ÚSMH	92,444	75,598	16,846	92,200	54,362	37,838	244
4	ÚIACH	67,365	52,965	14,400	66,008	37,381	28,626	1,357
4	ÚACH	85,398	71,360	14,038	84,342	47,552	36,790	1,056
4	ÚFCH JH	223,686	149,859	73,827	223,686	112,076	111,610	0
4	ÚCHP	187,403	137,780	49,623	187,048	92,803	94,246	354
4	ÚMCH	234,857	182,652	52,205	233,192	146,685	86,507	1,666
4	ÚOCHB	1,766,013	234,733	1,531,279	1,027,994	260,159	767,835	738,018
5	BFÚ	164,893	138,888	26,005	164,301	87,002	77,298	592
5	BTÚ	60,246	50,258	9,988	60,140	33,172	26,968	106
5	FGÚ	345,424	251,663	93,761	345,125	161,446	183,679	299

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Institute	Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)	
		transfers from SB	own resources		person. costs	material costs		
5	MBÚ	444,965	331,839	113,126	441,899	207,804	234,095	3,066
5	ÚEB	220,843	143,527	77,316	220,802	101,656	119,146	41
5	ÚEM	183,740	135,493	48,247	183,429	84,717	98,712	312
5	ÚMG	426,331	318,663	107,668	426,259	169,356	256,903	72
5	ÚŽFG	122,331	87,648	34,683	120,358	56,969	63,389	1,973
6	BÚ	203,573	167,528	36,044	203,126	118,753	84,373	446
6	BC	396,160	273,145	123,015	396,160	200,069	196,091	0
6	ÚSBE	107,047	83,424	23,623	107,049	45,397	61,652	-3
6	ÚBO	58,464	46,131	12,333	56,323	33,236	23,087	2,141
7	KNAV	103,304	55,449	47,855	98,636	35,545	63,092	4,667
7	NHÚ	76,381	47,460	28,921	76,234	44,634	31,600	147
7	PSÚ	26,876	23,185	3,692	26,860	19,387	7,473	16
7	SOÚ	84,183	73,887	10,296	84,183	55,071	29,111	0
7	ÚSP	26,498	20,385	6,113	26,306	17,754	8,552	192
8	ARÚB	34,526	25,352	9,174	34,404	23,112	11,292	123
8	ARÚ	106,754	58,125	48,629	106,648	48,834	57,815	105
8	MÚA	33,120	30,449	2,671	32,718	21,677	11,042	402
8	HÚ	51,228	46,909	4,319	50,076	35,260	14,817	1,152
8	ÚDU	39,369	32,634	6,735	39,367	23,481	15,886	1
8	ÚSD	47,910	40,553	7,357	47,910	33,797	14,113	0
9	FLÚ	103,253	91,780	11,473	103,253	70,831	32,422	0
9	OÚ	15,969	14,953	1,016	15,953	13,800	2,153	16
9	ÚČL	45,619	39,355	6,264	45,619	34,001	11,618	0
9	EÚ	35,842	29,136	6,706	35,397	22,774	12,623	445
9	ÚJČ	72,142	66,342	5,800	70,674	54,316	16,358	1,468
9	SLÚ	17,277	15,898	1,379	17,276	13,652	3,624	1



## THE ECONOMIC MANAGEMENT OF PUBLIC RESEARCH INSTITUTIONS OF THE ASCR IN 2010

Institute	Total revenues	of which		Total expenses	of which		Income from oper. (profit +) (loss -)
		transfers from SB	own resources		person. costs	material costs	
O Centre for Administration and Operations	388,835	148,989	239,846	388,297	151,837	236,460	538
SA1 SA1	2,460,448	1,926,666	533,782	2,431,722	1,452,952	978,770	28,726
SA2 SA2	5,298,738	2,857,556	2,441,182	4,547,240	1,996,233	2,551,007	751,498
SA3 SA3	920,251	711,852	208,399	911,516	567,926	343,590	8,735
O Other institutes	388,835	148,989	239,846	388,297	151,837	236,460	538
<b>AS total</b>	<b>9,068,273</b>	<b>5,645,063</b>	<b>3,423,210</b>	<b>8,278,775</b>	<b>4,168,948</b>	<b>4,109,827</b>	<b>789,498</b>
Book depreciation of PRI *)	-871,415		-871,415	-871,415		-871,415	
<b>AS total</b>	<b>8,196,858</b>	<b>5,645,063</b>	<b>2,551,795</b>	<b>7,407,360</b>	<b>4,168,948</b>	<b>3,238,412</b>	<b>789,498</b>

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

## APPENDIX 07

### Appendix 7.2: Investment Resources and Their Use in 2010

Institute	Investment resources total	Use of investment resources total	of which				FRM at the end of the period (source by 2011)	thous. CZK
			buildings	instruments	mntn & repairs	other		
1 ASÚ	43,786	24,277	20,500	3,777	0	0	19,509	
1 FZÚ	198,495	159,049	86,125	72,002	0	921	39,447	
1 MÚ	3,149	477	21	0	0	456	2,673	
1 ÚI	12,530	1,851	0	1,678	0	173	10,679	
1 ÚJF	73,341	52,708	5,270	13,832	0	33,606	20,633	
1 ÚTIA	5,796	4,057	0	4,057	0	0	1,739	
2 ÚFM	12,299	12,155	1,500	5,353	4,038	1,264	144	
2 ÚFP	99,063	64,340	1,470	62,791	0	79	34,723	
2 ÚH	11,525	1,670	0	1,670	0	0	9,855	
2 ÚPT	146,545	31,286	9,101	21,701	0	485	115,259	
2 ÚFE	36,500	13,402	0	10,167	3,235	0	23,098	
2 ÚTAM	16,651	5,299	0	4,496	0	803	11,352	
2 ÚT	45,654	15,707	5,421	10,285	0	0	29,948	
3 GFÚ	35,661	27,725	9,889	17,836	0	0	7,936	
3 GLÚ	21,291	14,065	4,416	9,649	0	0	7,226	
3 ÚFA	28,855	13,781	5,422	8,359	0	0	15,074	
3 ÚGN	8,785	4,836	0	3,900	0	936	3,949	
3 ÚSMH	11,065	10,972	886	10,086	0	0	93	
4 ÚIACH	16,356	14,766	5,217	9,067	0	482	1,590	
4 ÚACH	24,010	20,463	12,022	8,440	0	0	3,547	
4 ÚFCH JH	45,378	29,969	613	28,328	0	1,028	15,409	
4 ÚCHP	16,783	15,555	0	15,555	0	0	1,228	
4 ÚMCH	74,018	46,503	33,921	12,582	0	0	27,516	
4 ÚOCHB	964,067	349,486	254,111	86,818	0	8,557	614,582	

## INVESTMENT RESOURCES AND THEIR USE IN 2010

Institute		Investment resources total	Use of investment resources total	of which				thous. CZK
				buildings	instruments	mntn & repairs	other	FRM at the end of the period (source by 2011)
5	BFÚ	28,168	20,443	8,060	12,383	0	0	7,725
5	BTÚ	4,562	4,562	0	4,562	0	0	0
5	FGÚ	55,681	31,825	13,301	17,382	2	1,140	23,856
5	MBÚ	70,008	50,830	27,079	23,493	0	258	19,178
5	ÚEB	54,366	47,176	17,882	28,498	0	796	7,190
5	ÚEM	37,829	35,374	23,951	9,363	0	2,060	2,456
5	ÚMG	116,332	112,470	86,981	25,489	0	0	3,862
5	ÚŽFG	18,989	13,212	3,433	9,011	0	768	5,777
6	BÚ	20,978	19,448	6,993	12,065	0	389	1,530
6	BC	59,383	38,026	9,391	27,476	0	1,159	21,357
6	ÚSBE	38,537	28,576	5,138	12,909	9,516	1,013	9,961
6	ÚBO	10,243	6,449	3,164	3,285	0	0	3,794
7	KNAV	16,960	4,558	1,866	2,658	34	0	12,402
7	NHÚ	9,575	5,655	2,405	305	2,945	0	3,920
7	PSÚ	4,999	967	0	967	0	0	4,033
7	SOÚ	13,856	4,663	1,949	1,700	576	438	9,193
7	ÚSP	1,417	413	0	413	0	0	1,004
8	ARÚB	8,242	7,624	4,846	1,622	0	1,156	618
8	ARÚ	15,564	4,369	887	3,482	0	0	11,195
8	MÚA	866	151	0	81	0	70	715
8	HÚ	1,305	273	0	273	0	0	1,033
8	ÚDU	5,908	3,252	1,949	1,303	0	0	2,656
8	ÚSD	3,553	107	0	107	0	0	3,446

## APPENDIX 07

Institute		Investment resources total	Use of investment resources total	of which				thous. CZK
				buildings	instruments	mntn & repairs	other	FRM at the end of the period (source by 2011)
9	FLÚ	16,379	2,990	1,949	873	0	169	13,389
9	OÚ	700	88	0	88	0	0	612
9	ÚČL	10,881	1,480	461	810	208	0	9,401
9	EÚ	5,219	2,727	1,826	119	0	782	2,492
9	ÚJČ	11,916	332	0	191	0	141	11,584
9	SLÚ	4,999	4,266	3,836	271	0	160	733
O	SSČ	137,129	101,259	73,756	10,115	0	17,388	35,870
SA1	SA1	810,990	457,656	150,021	261,639	7,273	38,723	353,334
SA2	SA2	1,655,688	885,132	511,257	346,707	9,518	17,651	770 556
SA3	SA3	132,339	43,914	21,972	15,262	3,764	2,915	88,425
O	Other inst.	137,129	101,259	73,756	10,115	0	17,388	35870
<b>AS total</b>		<b>2,736,147</b>	<b>1,487,962</b>	<b>757,006</b>	<b>633,723</b>	<b>20,555</b>	<b>76,677</b>	<b>1,248,185</b>

## SIGNIFICANT AWARDS FOR RESEARCHERS



The national prize Česká hlava [Czech Mind] was received at the ceremonial dinner on 14 November 2010 by J. Svoboda from the *Institute of Molecular Genetics*. (photo: Archives of Česká hlava)

### Appendix 8: Significant Awards for Researchers

A number of researchers from the ASCR's institutes received **significant accolades and awards at national and international level** for their work. The President of the CR awarded an employee of the *Jaroslav Heyrovský Institute of Physical Chemistry* Ing. Blanka **Wichterlová**, DrSc., with a Medal of Merit, Second Class, for meritorious service to the state in the area of science on the occasion of the public holiday on 28 October 2009.

The National Prize of the Government of the CR 'Česká hlava' (Czech Mind) was awarded to prof. RNDr. Jan **Svoboda**, DrSc., from the *Institute of Molecular Genetics*, Mgr. Jaromír **Chalupský** from the *Institute of Physics* won the 'Česká hlava' award in the Doctorandus (doctoral candidate) category, and a special award of the jury of the competition 'Česká hlavička' (Little Czech Mind) was presented for the contribution to the popularisation of science among students to Ing. Květa **Stejskalová**, CSc., from the *Jaroslav Heyrovský Institute of Physical Chemistry*.



The laureate of the Prize of the Ministry of Education, Youth and Sports E. Kohák at the ceremonial awarding of the prizes at the MEYS. (photo: S. Kyselová)

The Minister of Education, Youth and Sports of the Czech Republic Award for research, experimental development and innovation was presented to prof. Mgr. Erazim **Kohák**, Ph.D., from the *Institute of Philosophy*, the Minister of Education, Youth and Sports of the Czech Republic Award for outstanding students went to Ing. Ondřej **Uhlík**, Ph.D. PhDr. Helena **Krejčová** from the *Institute of Organic Chemistry and Biochemistry* and Mario **Viček** from the *Institute for Contemporary History* took second place in Gloria Musaealis from the Ministry of Culture. The Minister of Education, Youth and Sports presented doc. Ing. Mgr. Petr **Klán**, CSc., from the *Institute of Computer Science* with a Commemorative Certificate of the minister. PhDr. Zlatica **Zudová-Lešková**, CSc., from the *Institute of History* received thanks from the Premier of the Government of the CR Jan Fischer for the results in her research of anti-Nazi and anti-Fascist resistance in the years of the Second World War.

The J. Hlávka Prize was received in the category of scientific literature by prof. RNDr. Michal **Křížek**, DrSc., from the *Institute of Mathematics*, in the category of young scientific employee Ing. Martina **Voláková**, Ph.D., from

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the *Jaroslav Heyrovský Institute of Physical Chemistry*, Ing. Jan **Souček**, Ph.D., from the *Institute of Atmospheric Physics* and PhDr. Ondřej **Ševeček**, Ph.D., from the *Institute of Philosophy* and in the category students and graduate Ing. Petr **Pisařík** from the *Institute of Physics*, Ing. Josef **Vlk** from the *Jaroslav Heyrovský Institute of Physical Chemistry*, Mgr. Martina **Huranová**, Ph.D., from the *Institute of Molecular Genetics* and Mgr. Petr **Vít** from the *Institute of Botany*. The J. Hlávka Medals were awarded to prof. Ing. Cyril **Höschl**, DrSc., from the *Institute of Thermodynamics*, Ing. Pavel **Tříška**, CSc., a Ing. Ludmila **Tříšková**, CSc., from the *Institute of Atmospheric Physics*.

The Prize of the President of the Grant Agency of the ASCR was presented to Ing. Vít **Novák**, CSc., from the *Institute of Physics* and RNDr. Aleš **Stuchlík**, Ph.D., from the *Institute of Physiology*, the Prize of the Learned Society in the category of young scientific employee went to MUDr. Jiří **Šedý**, Ph.D., from the *Institute of Experimental Medicine*.

The President of the Republic of Hungary awarded PhDr. Eva **Irmanová**, CSc., from the *Institute of History* the Officer's Cross Order of Merit of the Republic of Hungary.

RNDr. Pavel **Kalenda**, CSc., from the *Institute of Rock Structure and Mechanics* received the Diploma of Global Network for Forecasting of Earthquakes from the International Academy of Sciences H&E. The French Embassy awarded the Rhodia SA Prize for Chemistry to Ing. Eva **Káfuňková** from the *Institute of Inorganic Chemistry*. The Romanian Academy awarded Dr. Calin **Ambrozie** from the *Institute of Mathematics* with the Simion Stoilow Prize for excellent results in functional analysis. The Young Research Award in the field of Material Sciences was given by the Forum of the Academy of Science of the V-4 to Ing. Ondřej **Podrazký**, Ph.D., from the *Institute of Photonics and Electronics*.

The recognition for Best Paper IEEE GEO was received from IEEE Computer Society by prof. Ing. Jaroslav **Klokočník**, DrSc., from the *Astronomical Institute*, Best Poster Paper Award was received from the Organisational Committee of the 11th International Symposium on Spermatology in Okinawa (Japan) by the employees of the *Institute of Biotechnology* doc. RNDr. Věra **Jonáková**, DrSc., Mgr. Pavla **Postlerová**, Ph.D. and Mgr. Nina **Davidová**, Best Poster Presentation Award was received from the Italian Group of Fracture by Ing. Daniel **Kytýř**, Bc. Tomáš **Doktor**, doc. Ing. Ondřej

**Jiroušek**, Ph.D. and Ing. Petr **Zlámal** from the *Institute of Theoretical and Applied Mechanics*. The prize for the best poster was won at the Gordon Research Conference on Microbial Toxins and Pathogenesis in Waterville (USA) by Mgr. Ladislav **Bumba**, Ph.D., from the *Institute of Microbiology*, a similar award was received at the Annual Meeting of the Austrian Society for Allergology and Immunology by Mgr. Martin **Schwarzer** from the *Institute of Microbiology*. First Place for the Best Poster was given by EMBO Young Scientists to Mgr. Dáša **Doležalová** from the *Institute of Experimental Medicine*. Václav **Šicha** from the *Institute of Inorganic Chemistry* gained recognition for the best poster at the EUROBORON 5 Conference in Edinburgh (Great Britain). The Elsevier Publishing House presented the publication SCOPUS 1000 Award to RNDr. Barbara **Zitová** and prof. Ing. Jan **Flusser**, DrSc., from the *Institute of Computer Science* and RNDr. Ondřej **Milhol**, Ph.D., from the *Institute of Experimental Medicine*, The Theoretical Population Biology Top Cited Article 2008–2010 went to doc. RNDr. Vlastimil **Křivan**, CSc., from the *Biology Centre* and Thermal Biology Top Cited Article 2008–2010 to Mgr. Lumír **Gvoždík**, Ph.D., from the *Institute of Vertebrate Biology*. The Chemical Geology Top Cited Article 2008–2010 went to Mgr. Jiří **Sláma**, Ph.D., from the *Institute of Geology* and the Atmospheric and Solar-Terrestrial Physics Top Cited Articles 2005–2010 was received by RNDr. Jan **Laštovička**, DrSc., from the *Institute of Atmospheric Physics*.

The Croatian Association of Inventors awarded Ing. Ivan **Wichterle**, DrSc., from the *Institute of Chemical Processes* the Golden Medal for the database of the physical-chemical characteristics of bojary polymer mixtures based on styrene. An Honourable Medal from the Society for Science and the Public in Washington was received by doc. Ing. Mgr. Petr **Klán**, CSc., from the *Institute of Computer Science*.

The Czech Association of Energy Sector Employers granted a medal of V. List for service in the development of the Czech energy industry to prof. Ing. Čestmír **Šimáně**, DrSc. A unit for the contract-free calibration of end gauges, which Ing. Ondřej **Číp**, Ph.D. developed at the *Institute of Scientific Instruments*, was nominated by the commission for the Gold Medal of the International Mechanical Engineering Trade Fair. The Endowment Fund for Human Biomechanics awarded its Prize in the field of Biomechanics to Ing. Tomáš **Suchý**, Ph.D., from the *Institute of Rock Struc-*

## SIGNIFICANT AWARDS FOR RESEARCHERS



The laureates of the L'ORÉAL stipends for 2010 included also **J. Humpolíčková** from the *J. Heyrovský Institute of Physical Chemistry*, first from the right. (photo: S. Kyselová)

ture and Mechanics. Prof. Ing. Lubomír **Němec**, DrSc., from the *Institute of Inorganic Chemistry* received the Award of the Euroregion of the White Carpathian Mountains (Bílé/Biele Karpaty) for the support and development of the glass industry, the production, science, research and education in the area of glass.

A total of 56 young researchers working at institutes of the ASCR achieved recognition for their results, of which 12 at international conferences. The Award of the 21. STOLETÍ (21st Century) magazine was awarded to RNDr. Marek **Kovář**, Ph.D., from the *Institute of Microbiology*. The Florence School of Regulation granted the Loyola de Palacio Best PhD Award to Mgr. PhDr. Silvester van **Koten**, M.A., Ph.D., from the *Economics Institute*, Mgr. Jana **Humpolíčková**, Ph.D., from the *J. Heyrovský Institute of Physical Chemistry* won a stipendium from L'ORÉAL for Women in Science, Mgr. PhDr. Ing. Elena **Konyushenko**, Ph.D., from the *Institute of Macromolecular Chemistry* received Honourable Mention from the jury of L'ORÉAL for Women in Science. Recognition was also given to seven theses elaborated at institutes of the ASCR.



Laureates of the Academic Premium for 2010. (photo: Z. Tichý)

The president of the Chinese Academy of Sciences granted prof. RNDr. Zbyněk **Roček**, DrSc., from the *Institute of Geology* the status of Senior Visiting Professor at the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences. Technische Universität München granted RNDr. Pavel Krejčí, CSc., from the *Institute of Mathematics* the John-von-Neumann-Preis/gastprofessur. Prof. RNDr. Karel Šimek, CSc., was awarded the degree of *Docteur honoris causa* by Blaise Pascal University, Clermont-Ferrand (France). Prof. PhDr. Milan **Hlavačka**, CSc., from the *Institute of History* became a regular member of the Austrian Academy of Sciences, Mgr. Milada **Jonášová**, Ph.D., from the *Institute of Ethnology* was elected member of the Akademie für Mozart-Forschung. Prof. RNDr. František **Kolář**, CSc., from the *Institute of Physiology* was awarded a Commemorative Plaque of the Slovak Academy of Sciences for cooperation in the area of experimental cardiology by the presidium of the Slovak Academy of Sciences.

## APPENDIX 08



The Prizes of the ASCR were awarded on 13 October 2010  
(photo: S. Kyselová)



The Medal of the ASCR was received by M.C. Maurel on  
15 November 2010.  
(photo: Z. Tichý)

### The ASCR itself granted the following recognitions: **Praemium Academiae 2010** was received by:

doc. Mgr. Pavel **Jungwirth**, CSc., DSc., from the *Institute of Organic Chemistry and Biochemistry* and  
prof. RNDr. Petr **Pyšek**, CSc., from the *Institute of Botany*.

### Awards of the ASCR for outstanding results of major scientific importance were received by:

- a team of authors consisting of: RNDr. Jaroslava Plomerová, DrSc., RNDr. Vladislav Babuška, DrSc., RNDr. Luděk Vecsey, Ph.D. (*Institute of Geophysics*) for the scientific outcome: **Continental lithospheric mantle – mozaic of micro-plates with fossil 3D anisotropic structure**;
- a team of authors consisting of: prof. RNDr. Pavel Pudlák, DrSc., Mgr. Emil Jeřábek, Ph.D., prof. RNDr. Jan Krajíček, DrSc., doc. RNDr. Jiří Sgall, DrSc. (*Institute of Mathematics*) for the scientific outcome: **Theories, Proofs and Computational Complexity**;
- a team of authors consisting of: RNDr. Libor Matějka, CSc., DSc., Ing. Adam Strachota, Ph.D., Ing. Josef Pleštil, CSc., Ing. Jiří Brus, Dr., RNDr. Miroslav Šlouf, Ph.D., Ing. Milena Špírková, CSc. (*Institute of Macromolecular Chemistry*) for the scientific outcome: **Nanostructured Organic-Inorganic Polymer Systems**;

■ prof. RNDr. Jiří Šponer, DrSc. (*Institute of Biophysics*) for the scientific outcome: **The Role of Molecular Interactions in Structure, Dynamics, Function and Evolution of Nucleic Acids**;

■ a team of authors consisting of: prof. PhDr. Petr Sommer, CSc., DSc., prof. PhDr. Josef Žemlička, DrSc., Mgr. Pavlína Mašková, Mgr. Robert Novotný, Ph.D. (*Institute of Philosophy*) for the scientific outcome:

**The Přemyslids: Building the Bohemian State**;

■ a team of authors consisting of: PhDr. Jaroslava Pečirková, CSc., PhDr. Milada Homolková, Ph.D., Mgr. Markéta Pytlíková, Mgr. Hana Sobalíková-Kreisingerová (*Institute for the Czech Language*) for the scientific outcome: **Old-Czech Bible of Dresden and Olomouc**.

### Awards of the ASCR for young scientific employees for outstanding results of science work were presented to:

■ Mgr. Richard Wünsch, Ph.D., born in 1977 (*Astronomical Institute*) for the scientific outcome: **Modelling of Star Formation**;

■ Mgr. Eva Machová, Ph.D., born in 1977 (*Institute of Physiology*) for the scientific outcome: **Evidence of the early impairment of central cholinergic neurotransmission in mouse model of Alzheimer's disease and its contribution to the progression of the disease**;



## SIGNIFICANT AWARDS FOR RESEARCHERS



↑ ↗ The Otto Wichterle Premium was received by young scientists in Villa Lanna in June 2010 from the President and Vice-Presidents of the ASCR. (photo: S. Kyselová, Z. Tichý)

■ doc. PhDr. Zdeněk R. Nešpor, Ph.D., born in 1976 (*Institute of Sociology*) for the scientific outcome: **Czech Sociology of Religion in International and Interdisciplinary Contexts**.

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

**Honorary medal 'De scientia et humanitate optime meritis'**

prof. RNDr. Jiří Čížek, DrSc., F.R.S.C. (*University of Waterloo, Ontario, Canada*),  
doc. PhDr. Lydia Petrářová, CSc. (*Institute of Ethnology*);

**The Bernard Bolzan Honorary Medal for Merit in the Mathematical Sciences**

RNDr. Věra Kůrková, DrSc. (*Institute of Computer Science*),  
Ing. Igor Vajda, DrSc. /in memoriam/ (*Institute of Information Theory and Automation*);

**The Jaroslav Heyrovský Honorary Medal for Merit in the Chemical Sciences**

Prof. Barry Z. Karger, Ph.D. (*Barnett Institute, Northeastern University Boston, USA*);



**The Gregor Johann Mendel Honorary Medal for Merit in the Biological Sciences**

prof. Takeo Kishimoto, Ph.D. (*Tokyo Institute of Technology, Yokohama, Japan*);

**The František Palacký Honorary Medal for Merit in the Historical Sciences**

prof. Dr. Marie-Claude Maurel (*Centre français de recherche en science, Prague – CEFRES*);

**The Josef Dobrovský Honorary Medal for Merit in the Philological and Philosophical Sciences**

PhDr. Jan Balhar, CSc. (*Institute for the Czech Language*);

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

prof. Joseph E. Stiglitz, Ph.D. (*Columbia University, Broadway, New York, USA*);

**The Vojtěch Náprstek Honorary Medal for Merit in Science Popularisation**

Mgr. Vladimír Kunz (*HERAFILM – director of documentary and popular-science films*),  
Mgr. Vladimír Kučera (*Czech Television – editor and journalist, co-author, anchorperson and dramaturgist of the Historie.cs show*);

## APPENDIX 08

### The Jan Patočka Memorial Medal

doc. PhDr. Vilém **Herold**, CSc. (*Institute of Philosophy*).

The **Otto Wichterle Award** for Young Scientists of the ASCR was awarded in 2010 to a total of 22 young researchers nominated from 24 institutes. The premium was presented to:

in the non-life sciences:

Ing. Iva **Ambrožová**, Ph.D. (*Nuclear Physics Institute*)

Ing. Jiří **Filip**, Ph.D. (*Institute of Information Theory and Automation*)

Ing. Roman **Gröger**, Ph.D. (*Institute of Physics of Materials*)

Mgr. Emil **Jeřábek**, Ph.D. (*Institute of Mathematics*)

Ing. Jan **Souček**, Ph.D. (*Institute of Atmospheric Physics*)

doc. Ing. Jiří **Šremr**, Ph.D. (*Institute of Mathematics*)

Mgr. Viktor **Votruba**, Ph.D. (*Astronomical Institute*)

in the life sciences and the chemical sciences:

Mgr. Jiří **Doležal**, Ph.D. (*Institute of Botany*)

RNDr. Marek **Kovář**, Ph.D. (*Institute of Microbiology*)

Dr. Céline **Levron**, Ph.D. (*Biology Centre*)

RNDr. Veronika **Ostatná**, Ph.D. (*Institute of Biophysics*)

Mgr. Kamila **Rébllová**, Ph.D. (*Institute of Biophysics*)

Ing. Petr **Sazama**, Ph.D. (*Jaroslav Heyrovský Institute of Physical Chemistry*)

Mgr. Martin **Sládek**, Ph.D. (*Institute of Physiology*)

RNDr. Alena **Zíková**, Ph.D. (*Biology Centre*)

in the humanities and social sciences:

Mgr. Tomáš **Dvořák**, Ph.D. (*Institute of Philosophy*)

PhDr. Hana **Hašková**, Ph.D. (*Institute of Sociology*)

JUDr. Jan **Malíř**, Ph.D. (*Institute of State and Law*)

PhDr. Filip **Smolík**, Ph.D. (*Institute of Psychology*)

Mgr. Michal **Šimůnek**, Ph.D. (*Institute of Contemporary History*)

PhDr. Štěpán **Vácha**, Ph.D. (*Institute of Art History*)

PhDr. Jiří **Woitsch**, Ph.D. (*Institute of Ethnology*)

The aid of the **J. E. Purkyně Fellowship** for distinguished and prospective scientific employees was granted to:

Ing. Kvido **Stříšovský**, Ph.D. (*Institute of Organic Chemistry and Biochemistry*)

Dr. Jörg **Wunderlich** (*Institute of Physics*)



A Certificate of Appreciation was received also by the long-term employee of the Masaryk Institute and Archives N. Kmochová.  
(photo: Z. Tichý)

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 twelve employees from six institutes of the ASCR.

## EDITORIAL WORK AT THE ASCR

### Appendix 9: Editorial Work at the ASCR

#### A) Overview of the Titles issued by the *Centre for Administration and Operations – Division ACADEMIA Publishing House*

Publications marked \* were issued with the financial aid of the ASCR

#### Physics, Climatology, Astronomy

*Ackroyd, P.*: Newton. 140 pp. ISBN 978-80-200-1843-4

#### Informatics

*Sekanina, L.*: Evoluční hardware. 328 pp. (publication was supported by the Brno University of Technology). ISBN 978-80-200-1729-1\*

#### Mathematics

*Lukáš, L.*: Pravděpodobnostní modely v managementu. 136 pp. (publication was supported by the Czech Foundation for the Advancement of Technical Literature). ISBN 978-80-200-1704-8

#### Technical Sciences

*Pelant, I.*: Luminiscenční spektroskopie II. 348 pp. (publication was supported by the *Institute of Physics*). ISBN 978-80-200-1846-5

#### Biology, Medicine, Ecology

*Adamovič, J. a kol.*: Atlas pískovcových skalních měst ČR a SR. 460 pp. ISBN 978-80-200-1773-4

*Carroll, S. B.*: Nekonečné, nesmírně obdivuhodné a překrásné. 368 pp. ISBN 978-80-200-1800-7\*

*Dvořáček, P.*: Skanzeny České republiky a Slovenské republiky. 184 pp. ISBN 978-80-200-1760-4, hardback edition

*Dvořáček, P.*: Skanzeny České republiky a Slovenské republiky. 184 pp. ISBN 978-80-200-1883-0, paperback edition

*Friedman, T. L.*: Horký, zploštělý a přelidněný. 476 pp. (publication was supported by the Ministry of the Environment of the CR). ISBN 978-80-200-1881-6

*Hanzelka, P.*: Botanické zahrady a arboreta České republiky. 408 pp. (published in cooperation with the

Union of Botanical Gardens of the CR). ISBN 978-80-200-1771-0, hardback edition

*Hanzelka, P.*: Botanické zahrady a arboreta České republiky. 408 pp. (published in cooperation with the Union of Botanical Gardens of the CR). ISBN 978-80-200-1837-3, brochure issued by *Chytrý, M.*: Vegetace ČR I. 528 pp. (published with the support of Masaryk University in Brno). ISBN 978-80-200-1896-0, reprint

*Chytrý, M.*: Vegetace ČR II. 524 pp. (published with the support of Masaryk University in Brno). ISBN 978-80-200-1769-7

*Ježek, Z.*: Ve znamení neštovic. 688 pp. ISBN 978-80-200-1805-2

*Macek, J.*: Blanokřídílí České republiky I. Žahadloví. 524 pp. ISBN 978-80-200-1772-7\*

*Mikuláš, R.*: Ledové Čechy. 296 pp. ISBN 978-80-200-1877-9, hardback edition

*Mikuláš, R.*: Ledové Čechy. 296 pp. ISBN 978-80-200-1878-6, paperback edition

*Purkyně, J. E. – Hermann, T. – Cílek, V. (eds.)*: Útržky ze zápisníku zemřelého přírodovědce. 332 pp. ISBN 978-80-200-1794-9\*

*Slavíček, B.*: Klíč ke květeně ČR. 928 pp. ISBN 978-80-200-0836-7, reprint\*

*Štěpánková, R. (ed.)*: Květena ČR 5. 580 pp. ISBN 978-80-200-0590-8, reprint\*

*Štěpánková, R. (ed.)*: Květena ČR 8. 712 pp. ISBN 978-80-200-1824-3\*

*Vařilová, Z. – Belisová, N. (eds.)*: Pravčická brána. Velká kniha o velké bráně. 240 pp. (published in cooperation with the Administration of the Bohemian Switzerland National Park). ISBN 978-80-200-1863-2

*Vondřejš, V.*: Otazníky kolem genového inženýrství. 136 pp. ISBN 978-80-200-1892-2\*

*Vymazalová, H. – Vachala, B. – Strouhal, E.*: Lékařství starých Egyptanů. 240 pp. (vydáno ve spolupráci s Univerzitou Karlovou). ISBN 978-80-200-1865-6

*Zajíček, P.*: Jeskyně ČR. 280 pp. ISBN 978-80-200-1803-8, hardback edition

*Zajíček, P.*: Jeskyně ČR. 280 pp. ISBN 978-80-200-1840-3, paperback edition

#### Economics, Political Science, Public Administration, Law

*Blažek, P.*: „Vraťte nám vlasy!“ 592 pp. ISBN 978-80-200-1873-1

*Buruma, I.*: Vražda v Amsterdamu. 204 pp. ISBN 978-80-200-1875-5

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*Kratochvíl, Z.*: Filosofie mezi mýtem a vědou. 472 pp. ISBN 978-80-200-1789-5, reprint

*Lukacs, J.*: Na konci věku. 152 pp. ISBN 978-80-200-1781-9

*Lyčka, M.*: Filosofie náboženství Josefa Solovějčika. 212 pp. (publication was supported by the Czech Science Foundation). ISBN 978-80-200-1859-5

*Prudký, L.*: Inventura hodnot. 344 pp. (publication was supported by Charles University in Prague). ISBN 978-80-200-1751-2

*Rukriglová, D.*: Maimonides. Výběr z korespondence. 392 pp. (publication was supported by the Czech Science Foundation). ISBN 978-80-200-1848-9

*Stirner, M.*: Jediný a jeho vlastnictví. 368 pp. (publication was supported by the Goethe Institut). ISBN 978-80-200-1790-1

### History, Archaeology

*Babka, L. – Bzonková R. (eds.)*: Jen jeden osud. 652 pp. ISBN 978-80-200-1701-7, reprint\*

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*Czapska, M.*: Evropa v rodině. 496 pp. (publication was supported by the Instytut Książki). ISBN 978-80-200-1887-8

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*Loy, R.*: Moji židovští sousedé. 184 pp. (publication was supported by the Foundation for Holocaust Victims). ISBN 978-80-200-1855-7

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*Hilský, M.*: Shakespeare a jeviště svět. 912 pp. (publication was supported by The Kellner Family Foundation, British Council, Daniel Bartek and Evžen Hart). ISBN 978-80-200-1857-1

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*Kolektiv autorů:* Slovník spisovné češtiny. 648 pp.

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(publication was supported by the Ministry of Culture of the CR). ISBN 978-80-200-1872-4

*Kubíček, T.:* Felix Vodička – názor a metoda k dějinám

českého strukturalismu. 304 pp. (publication was supported by the Czech Science Foundation). ISBN 978-80-200-1868-7

*Malura, J.:* Písně pobělohorských exulantů. 472 pp.

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*Matonoha, J. – Jankovič, M. – Kubínová, M. (eds.):* Dílo v pohybu. Text v pohybu četby. Psaní vně logocentrismu. 616 pp. ISBN 978-80-200-1749-9\*

*Med, J.:* Literární život ve stínu Mnichova (1938–1939).

344 pp. ISBN 978-80-200-1823-6\*

*Papoušek, V.:* Dějiny nové moderny. 632 pp. ISBN 978-80-

200-1792-5\*

*Pečírková, D.:* Staročeská Bible drážďanská a olomoucká V/1, 2. 822 pp. (issued in cooperation with the Institute for the Czech Language, ASCR, v. v. i.). ISBN 978-80-200-

1822-9

*Prokop, D.:* Kniha o Máchově Máji. 360 pp. (publication

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ISBN 978-80-200-1880-9

### Cultural Anthropology

*Padevět, J.:* Cesty s Karlem Hynkem Máchou. 372 pp.

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*Padevět, J.:* Cesty s Karlem Hynkem Máchou. 372 pp.

(publication was supported by the Ministry of Culture of the CR). ISBN 978-80-200-1850-2, paperback edition

*Petrasová, T.:* Tělo a tělesnost. 380 pp. ISBN 978-80-200-

1833-5\*

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*Plháčková, A.:* Učebnice obecné psychologie. 472 pp.

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1697-3, reprint

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1854-0

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*Gao, X.:* Hora duše. 512 pp. (publication was supported

by the French Institute in Prague). ISBN 978-80-200-

1844-1

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*Kraus, I.:* Kdybys nebyla, vymyslím si tě. 216 pp.

ISBN 978-80-200-1690-4, reprint

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*Kaláb, Z. – Knejzlik, J. – Lednická, M. – Doležalová, H. – Hrubešová, E.:* Studium seizmických účinků v okolí seizmické stanice v závislosti na místních podmínkách. (Documenta Geonica 2010/2). 126 pp. ISBN 978-80-7225-339-5

*Koníček, P. – Souček, K. (eds.):* 3. Tradiční mezinárodní geomechanické a geofyzikální kolokvium. (Documenta Geonica 2010/1). 309 pp. ISBN 978-80-86407-93-7

*Cetkovský, S. – Frantál, B. – Štekl, J. a kol.:* Větrná energie v České republice, hodnocení prostorových vztahů, environmentálních aspektů a socioekonomických souvislostí. (Studia Geographica 101). 208 pp. ISSN 0587-1247

*Vaishar, A. a kol.:* Orlicko – region v pohraničí. (Studia Geographica 102). 116 s., ISSN 0587-1247

*Andráško, I. – Ira, V. – Kallabová, E. (eds.):* Změny regionálních struktur České republiky a Slovenské republiky. 64 pp. (co-publisher: Institute of Geology, Slovak Academy of Sciences). ISBN 978-80-970076-6-9

*Kallabová, E. – Andráško, I.:* Časoprostorové změny regionálních a krajinných struktur. 140 pp. ISBN 978-80-86407-13-5

### Institute of Macromolecular Chemistry

74th PMM – Contemporary ways of tailor made polymers. 88 pp. ISBN 978-80-85009-63-7

Polymery 2010 – VI. česko-slovenská konference. 146 pp. ISBN 978-80-85009-64-4

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### Institute of Hydrodynamics

*Chára, Z. – Klaboč, L. (eds.):* 24th Symposium on anemometry, Holany-Litice (Czech Rep.), 1-2 June 2010. 134 pp. ISBN 978-80-87117-07-1

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*Bláhová, K. – Sládek, O. (eds.):* Ústav pro českou literaturu AV ČR, v. v. i. 292 pp. ISBN 978-80-85778-70-0

*Mukařovský, J.:* Estetické přednášky I. Estetické studie z moderní české lyriky, Sociologie básnictví. 135 pp. ISBN: 978-80-85778-77-9

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*Fořt, B. – Jedličková, A. – Koten, J. – Sládek, O.:* Four studies of narrative. 70 pp. ISBN 978-80-85778-78-6  
*Fedrová, S. (ed.):* Česká literatura v intermedialní perspektivě. IV. kongres světové literárněvědné bohemistiky: Jiná česká literatura (?). 515 pp. (co-publisher: Akropolis). ISBN 978-80-85778-73-1, ISBN 978-80-87481-02-8

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*Sládek, O. (ed.):* Performance/performativita. 140 pp. ISBN 978-80-85778-76-2

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*Fedrová, S. – Jedličková, A. – Malínek, V. (eds.):* Literární historie, sémiotika, fikce – inspirace dílem Vladimíra Macury (1945–1999). Studentská literárněvědná konference 2009. 146 pp. ISBN 978-80-85778-75-5

### Institute of the Czech Language

*Hošnová, E. – Bozděchová, I. – Mareš, P. – Svobodová, I.:* Český jazyk 9 pro základní školy. 175 pp. (co-publisher: SPN Praha). ISBN 978-80-7235-481-8

*Čechová, M. – Kraus, J. – Styblík, V. – Svobodová, I.:* Český jazyk pro 2. ročník středních škol. 2., Edited edition. 206 pp. (co-publisher: SPN Prague). ISBN 978-80-7235-501-3

*Hošnová, E. – Bozděchová, I. – Mareš, P. – Svobodová, I.:* Český jazyk 7 pro základní školy, metodická příručka. 149 pp. (co-publisher: SPN Prague). ISBN 978-80-7235-445-0

### Institute for Contemporary History

*Čornejová, A. – Devátá, M. – Franc, M. – Pokorný, J. – Schindler-Wisten, P. – Tůma, O.:* Volný čas v komunistickém Československu. 65 pp. ISBN 978-80-86239-20-0  
*Devátá, M. – Olšáková, D. – Sommer, V. – Dinuš, P. – Kostlán, A. (ed.):* Vědní koncepce KSČ a její institucionalizace po roce 1948. Práce z dějin vědy 23. 288 pp. ISBN 978-80-7285-123-2

*Felcman, O. – Vondrová, J.:* Vláda a prezident. Normalizace (září 1968 – říjen 1969). Prameny k dějinám československé krize v letech 1967–1970: díl 8, svazek 2. 512 pp. ISBN 978-80-7285-128-7, ISBN 978-80-7239-247-6

(Supplement)

*Kocián, J. – Otáhal, M. – Vaněk, M. (eds.):* Historie prožité minulosti. K šedesátinám Oldřicha Tůmy. 422 pp. (co-publisher: Institute of International Studies, Faculty of Social Sciences, Charles University). ISBN 978-80-7285-134-2, ISBN 978-80-87404-04-1

*Nosková, H. – Bednařík, P. (eds.):* Národnostní menšiny, multikulturalita, vzdělávání. 240 pp. ISBN 978-80-7285-129-9  
*Nosková, H. – Tošovská, E.:* Kapitoly o proměnách pohraničí se zřetelem na Králicko. 254 pp. ISBN 978-80-7285-121-8

### Institute of Scientific Instruments

*Mika, F. (ed.):* Recent trends in charged particle optics and surfacephysics instrumentation, 12th Seminar, Brno. 70 pp. ISBN 978-80-254-6842-5

*Zemánek, P. – Sobotka, O. – Růžička, B. (ed.):* ALISI – Průvodce aplikačními možnostmi Ústavu přístrojové techniky AV ČR, v. v. i. 47 pp. ISBN 978-80-254-7051-0

*Zemánek, P. – Sobotka, O. – Růžička, B. – Oprchalová, L. (ed.):* ALISI – Průvodce aplikačními možnostmi Ústavu přístrojové techniky AV ČR, v. v. i., 2., expanded edition. 68 pp. ISBN 978-80-87441-02-2

*Zemánek, P. – Sobotka, O. – Růžička, B. (ed.):* ALISI – Handbook of application capacities of the Institute of Scientific Instruments of the ASCR, v. v. i. 68 pp. ISBN 978-80-87441-00-8

*Růžička, B. (ed.):* Sborník příspěvků multioborové konference LASER50. 81 pp. ISBN 978-80-87441-01-5

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*Belling, V. – Malíř, J. – Pítrová, L.:* Kontrola dělby pravomocí v EU se zřetelem ke kompetenčním excesům. 200 pp. (co-publisher: Aleš Čeněk Pilsen). ISBN 978-80-87439-01-2 \*

*Masopust, Z. – Jermanová, H. (eds.):* Dvacet let poté: Právo ve víru metamorfóz. 404 pp. (spoluvydavatel Aleš Čeněk, Plzeň). ISBN 978-80-7380-299-8

*Cvrček, F.:* Právní informatika. 371 pp. (co-publisher: Aleš Čeněk Pilsen). ISBN 978-80-87439-00-5

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*Louda, T. – Grospič, J. a kol.:* Partnerství veřejného a soukromého sektoru. Právní a ekonomické aspekty. 460 pp. (co-publisher: Aleš Čeněk Pilsen). ISBN 978-80-904024-8-5

*Sobek, T.:* Nemorální právo. 432 pp. (co-publisher: Aleš Čeněk Pilsen). ISBN 978-80-904024-7-8

### **Institute of Systems Biology and Ecology, České Budějovice**

*Marková, I. – Pavelka, M. – Tomášková, I. – Janouš, D.:* Ročenka meteorologických měření 2008. Experimentální ekologické pracoviště Bílý Kříž (Moravskoslezské Beskydy). 970 pp. ISBN 978-80-904351-2-4, ISSN 1803-8484

### **Institute of Information Theory and Automation**

*Heřmánek, A.:* Next generation equalisation algorithms. 132 pp. ISBN 978-3-8433-6457-7

*Fajfrová, L. – Hlubinka, D. (ed.):* Prague stochasticity 2010 – Book of abstracts. 171 pp. ISBN 978-80-903834-4-9

*Guy, T. V. – Kárný, M. – Wolpert, D.:* Decision making with multiple imperfect decision makers: Proceedings of Workshop of 24th NIPS Conference, Whistler, Canada. 86 pp. ISBN 978-80-903834-5-6

### **Institute of Thermomechanics**

*Pešek, L. (ed.):* Dynamics of machines 2010. National colloquium with international participation. Prague. 108 s., ISBN 978-80-87012-24-6

*Příhoda, J. – Kozel, K. (eds.):* Topical problems of fluid mechanics 2010. Conference proceedings. Prague. 128 pp. ISBN 978-80-87012-25-3

*Jonáš, P. – Uruba, V. (eds.):* Fluid dynamics 2010. Colloquium. Prague. 44 pp. ISBN 978-80-87012-27-7

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*Zolotarev, I. (ed.):* Engineering Mechanics 2010, International conference. 175 pp. ISBN 978-80-87012-26-0

*Hortel, M. – Škuderová, A. – Půst, L. – Kratochvíl, C. – Švéda, P. – Houfek, M.:* Analýza nelineárních, časově heteronomních pohonových soustav s chaotickými jevy. Monografie. 138 pp. ISBN 978-80-87012-28-4

## THE ANNUAL REPORT OF THE LEARNED SOCIETY OF THE CZECH REPUBLIC FOR 2010

### Appendix 10: The Annual Report of the Learned Society of the Czech Republic for 2010

The Learned Society of the Czech Republic (hereinafter referred to as the 'Society') associates prominent scientists of all scientific fields. Membership in it is possible in two ways 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 institutes. The Society associates outstanding researchers from the areas of natural sciences and the humanities from various organisations. The other category is the honorary member 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 spreading 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. The ASCR supports the Society based on Act No. 283/1992 Coll.

From the beginning of the year until 18 May 2010, it was led by the eight-member Council comprising: prof. RNDr. Helena Illnerová, DrSc. (President), prof. RNDr. Václav Pačes, DrSc. (1st Vice-President), RNDr. Jiří Grygar, CSc. (2nd Vice-President), RNDr. Zdeněk Jirák, CSc. (Scientific Secretary), prof. RNDr. Aleš Pultr, DrSc. (Chair of the Mathematical-Physical Science Section), prof. Ing. Vladimír Mareček, DrSc. (Chair of the Chemical Science Section), doc. RNDr. Jan Konvalinka, CSc. (Chair of the Biomedical Science Section), prof. PhDr. Ivan Hlaváček, CSc. (Chair of the Social Sciences and Humanities Section). On 18 May 2010, elections to the Council took place at the working part of the 16th General Assembly. The current Council now works in the composition: 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. (Chair of the Mathematical-Physical Science Section), doc. Mgr. Pavel Jungwirth, DSc. (Chair of the Chemical Science Section), doc. RNDr. Jan Konvalinka, CSc. (Chair of the Biomedical Science Sec-



The ceremonial part of the 16th General Assembly of the Learned Society of the CR on 17 May 2010. (photo: Z. Tichý)

tion), prof. PhDr. Ivan Hlaváček, CSc. (Chair of the Social Sciences and Humanities Section). At the end of the year, the Society had 98 regular and 38 honorary members.

The Society has ensured lectures concerning current issues of science and education, etc., specialised lectures and profiles at plenary sessions, further public lectures, the lectures at the 16th General Assembly and discussion sessions, of which there were sixteen in total. It held eight working meetings. Discussion sessions with the title 'How to Maintain Biodiversity in Bohemia' had a great response in the specialised public. The Society further for instance had recorded in the form of interviews the oral history of science in the memories of its selected members. A new website (<http://www.learned.cz>) was created, which is an important source of information both on the activities of the Society and on its members. There are (*inter alia*) also published lectures, or their presentations. The Society accepted the patronage over the publications of its honorary member Jiří Janata and further Arnošt Reiser (both publications were issued by the Institute of Chemical Technology in Prague). Members represented the Society at meetings with the representatives of foreign learned societies and scientific institutions.

In May, the Society held its 16th General Assembly in the Karolinum in Prague. On this occasion, it issued printed in-

## APPENDIX 10

formation material (in Czech and English versions) for all of the participants. At the ceremonial part of the Assembly, foreign guests appeared with their papers – General Secretary of the Swedish Royal Academy of Sciences Prof. Erling Norrby (Stockholm) and Prof. Donald Gillies (London). The prestigious Society awards and medals for 2009 were further presented ceremonially for 2010. 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, currently led by the Chairman of the Board of Directors Prof. Vladimír Mareček, Dr.Sc. The awards were presented to:

*In the category Scientific Employee*

■ **prof. MUDr. Jan Evangelista Jirásek, DrSc.**,  
Institute for the Care of Mother and Child in Prague,  
for breakthrough work in the area of the development of humans;

■ **prof. PhDr. Oldřich Král, CSc.**,  
Faculty of Arts, Charles University in Prague,  
for the development of Czech Sinology and multifaceted intercultural mediation of Chinese science and culture to the Czech specialised and general public, especially in the area of literature, aesthetics and philosophy;

*In the category Junior Scientific Employee*

■ **Dr. Jan Dušek**,  
Centre of Biblical Studies – a joint workplace of the ASCR and Charles University in Prague,  
for exceptional research and translation work in the area of Western Semitic philology, palaeography and the ancient history of Palestine;

■ **MUDr. et. MD Jiří Šedý, Ph. D.**,  
*Institute of Experimental Medicine*,  
for an important contribution to the elucidation of the pathophysiological mechanisms and therapeutic possibilities of injuries of the spinal cord.

*Awards for Pedagogues:*

■ **Mgr. Jarmila Ichová**,  
General Secondary School Jírovцова, České Budějovice;

■ **RNDr. Helena Kommová**,  
General Secondary School J. Kepler in Prague.

Eleven awards were presented in the category ‘*Secondary-School Student*’.

Medals for merit in the development of sciences were granted by the Society to two significant personalities – member of the Society prof. PhDr. **Ivan Hlaváček, CSc.**, from the Faculty of Arts at CU and prof. Ing. **Karel Štulík, DrSc.**, from the Faculty of Science of CU.

## THE ACTIVITIES OF THE COUNCIL OF SCIENTIFIC SOCIETIES OF THE CZECH REPUBLIC

### Appendix 11: The Activities of the Council of Scientific Societies of the Czech Republic

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 interest 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 the ASCR and in 2010, when another society was accepted as a member, associated altogether 75 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 sciences and their applications and hence complement and broaden the activity of the ASCR in a number of directions, particularly in its popularisation activities.

The activities of the CSSCR are coordinated by its Executive Committee and directed by the elected CSSCR President. The Executive Committee comprises representatives of the Three Main Scientific Areas (Technical Sciences, Live Sciences and Social Sciences). The President of the CSSCR is Prof. Ivo Hána, CSc., the Vice-Presidents are Dr. Petr Budil, Assoc. Prof. Jiří Buriánek, PhD, and Assoc. Prof. Luboš Hrouda, PhD.

In 2010, the CSSCR and its scientific societies focused on reinforcing the support of science in the CR as well as in area where public or private scientific and research institutions are not 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 website [http:// www.cas.cz/rvs](http://www.cas.cz/rvs) and at <http://rvs.paleontologie.cz>.

The spectrum of the activities implemented in 2010 was very broad. The societies themselves or with the support or direct participation of the CSSCR organised and co-ar-

ranged a total of 485 international and national congresses, conferences and seminars, of which 82 were joint Czech-Slovak events.

Through more than a thousand events, the societies supported instruction at elementary schools, secondary schools as well as higher education institutions in the form of mathematical, chemical, natural-science or astronomical students' olympic contests and other competitions. They organised field courses for secondary-school and university students, doctoral-candidate seminars and preparatory courses for doctoral study. They participated in the creation of teaching materials, textbooks as well as legal norms. They presented a total of 37 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 143 international organisations, which particularly the financial support of the ASCR allows. A number of the representatives of our society 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 2010, they issued or participated in the publication of 27 internationally distinguished journals and 76 national journals and bulletins; in the absolute majority, these fulfil an irreplaceable role in mediating the current results of research to the wider specialised public, in providing information on the activities of the societies and about interesting domestic and foreign events, seminars, congresses etc. There were also 202 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 2010, the societies organised 1,329 lectures, excursions or seminars and dozens of media inputs and broadcasts, which stimulate the interest of the public and particularly students in scientific work.

## APPENDIX 11

In 2010, the CSSCR evaluated and in opponent proceedings approved a total of 112 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. Also the consultation activity of the CSSCR was important for the scientific societies in the area of submitting applications and implementing projects. The CSSCR also engaged intensively last year in the public republic-wide discussions on the support of the financing of science and restructuring of the Research and Development Council. Within the Science and Technology Week 2010, the CSSCR organised an exhibition in the building of the ASCR on the occasion of the twentieth anniversary of its activities. The exhibition with abundant textual, pictorial and instrumental documentation enjoyed the marked interest of the public.

Based on the overview of the activities provided for 2010, it is possible to state that the CSSCR and the scientific societies associated in it through their constantly increasing activities fulfil their important role for Czech society. They distinctly improve in this way not only the depth of interest in science but assist also research itself, knowledge and the attainment of excellence. At the same time, they support also very important areas of scientific, social, technical and industrial applications without which scientific institutions would only with difficulty acquire sufficient and clear support for their activity.



The basic poster exhibition of Science as a Calling and a Hobby. (photo: Archives of the CSSCR)



## THE ANNUAL REPORT OF THE ASCR ON THE PROVISION OF INFORMATION

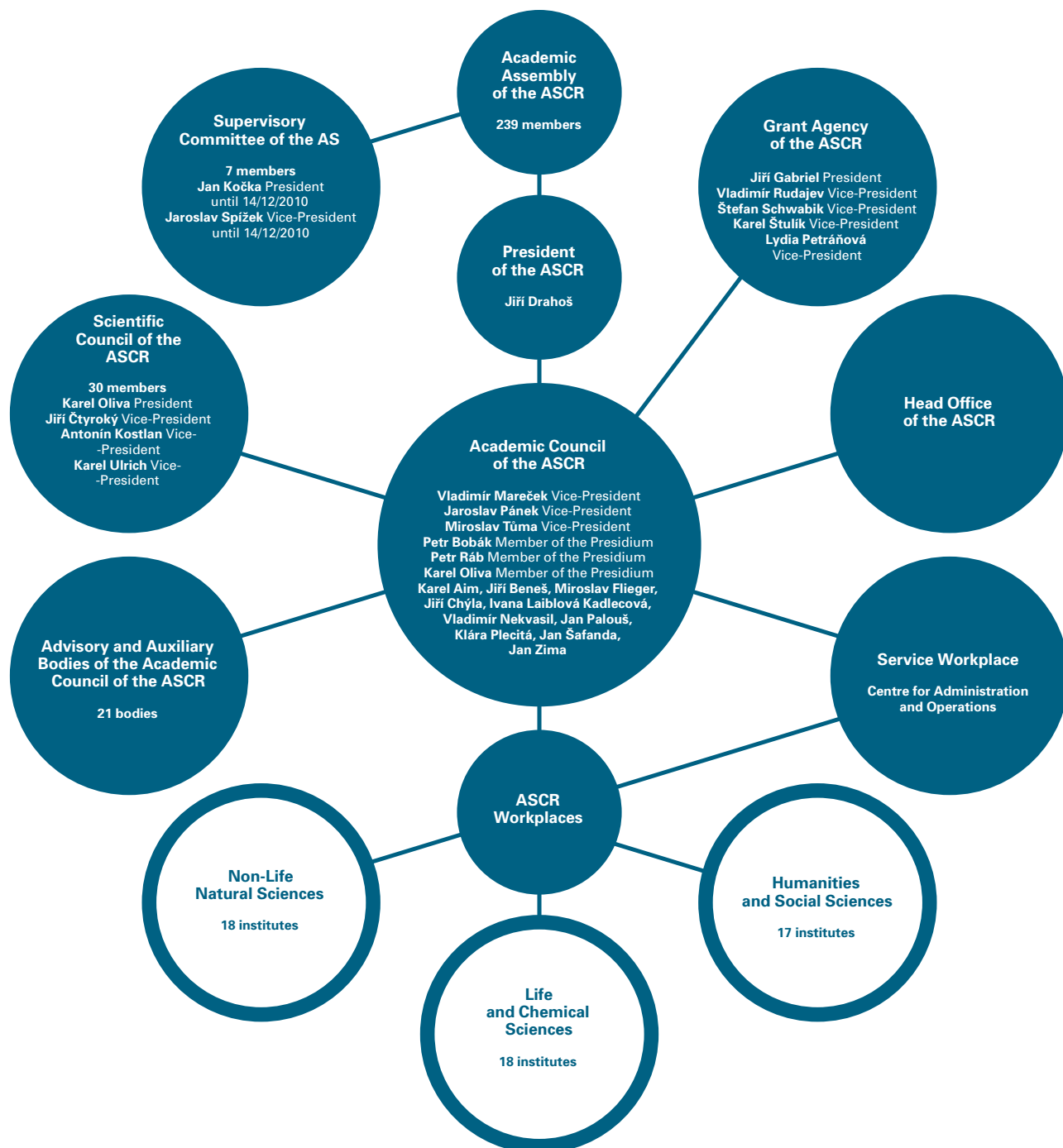
### Appendix 12:

**The Annual Report of the ASCR on the 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 2010**

a) Number of Requests for Information Filed	9
Number of Decisions Issued to Dismiss the Request	1
b) Number of Appeals Submitted against the Decision to Dismiss the Request	1
c) Number of Court Judgments on the Review of the Legality of the Request Dismissal	0
d) Number of Exclusive Licenses Granted	0
e) Number of Complaints Submitted according to Section 16a of the Act	0

## APPENDIX 15

Appendix 13:  
The Structure of the Academy of Sciences in 2010



## THE STRUCTURE OF THE ACADEMY OF SCIENCES IN 2010



## APPENDIX 14

### Appendix 14: Regional Distribution of the Institutes of the ASCR

Name of the Institute	Units
<b>Section 1</b>	
<i>Astronomical Institute, Ondřejov</i>	Detached Workplace Prague
<i>Institute of Physics, Prague</i>	Joint Laboratory of Optics of Palacký University and the Institute of Physics of the ASCR, Olomouc
<i>Institute of Mathematics, Prague</i>	Branch Office in Brno
<i>Institute of Computer Science, Prague</i>	
<i>Nuclear Physics Institute, Prague</i>	
<i>Institute of Information Theory and Automation, Prague</i>	
<b>Section 2</b>	
<i>Institute of Photonics and Electronics, Prague</i>	
<i>Institute of Physics of Materials, Brno</i>	
<i>Institute of Plasma Physics, Prague</i>	Workplace Turnov
<i>Institute for Hydrodynamics, Prague</i>	Detached Workplace Nový Dvůr (Zdíkov)
<i>Institute of Scientific Instruments, Brno</i>	
<i>Institute of Theoretical and Applied Mechanics, Prague</i>	ARCHISS (Centre for Historical Constructions and Residences), Telč
<i>Institute of Thermomechanics, Prague</i>	Centre of Material Diagnostics, Pilsen Centre of Mechatronics, Joint Workplace with the Faculty of Mechanical Engineering, Brno U of Technology, Brno Centre of Smart Systems and Structures, Ostrava
<b>Section 3</b>	
<i>Institute of Geophysics</i>	Gravity and Tidal Observatory Příbram Geomagnetic Observatory Budkov Seismic Observatory Kašperské Hory
<i>Institute of Geology</i>	Laboratory of Paleomagnetism, Průhonice
<i>Institute of Atmospheric Physics, Prague</i>	Observatory Panská Ves Observatory Milešovka Observatory Kopisty Observatory Dlouhá Louka Observatory Průhonice Branch Office Hradec Králové
<i>Institute of Geonics, Ostrava-Poruba</i>	Department of Environmental Geography, Brno
<i>Institute of Rock Structure and Mechanics, Prague</i>	

## REGIONAL DISTRIBUTION OF THE INSTITUTES OF THE ASCR

Name of the Institute	Units
<b>Section 4</b>	
<i>Institute of Analytical Chemistry, Brno</i>	Detached Workplace Prague
<i>Institute of Inorganic Chemistry, Řež near Prague</i>	Laboratory of Inorganic Materials, Joint Workplace of the Institute of Inorganic Chemistry and the Institute of Chemical Technology in Prague Laboratory of Low Temperatures, Joint Workplace of the Faculty of Mathematics and Physics and the Faculty of Science of Charles University and the Institute of Inorganic Chemistry and the Institute of Physics
<i>J. Heyrovský Institute of Physical Chemistry, Prague</i>	
<i>Institute of Chemical Processes</i>	
<i>Institute of Macromolecular Chemistry, Prague</i>	Department of Solid State Chemistry, Pardubice
<i>Institute of Organic Chemistry and Biochemistry, Prague</i>	
<b>Section 5</b>	
<i>Institute of Biophysics, Brno</i>	
<i>Institute of Biotechnology, Prague</i>	
<i>Institute of Physiology, Prague</i>	
<i>Institute of Microbiology, Prague</i>	Department of Autotrophic Microorganisms, Třeboň Laboratory of Physiology, Immunity and Ontogenesis of Gnotobionts, Nový Hrádek, Doly
<i>Institute of Experimental Botany, Prague</i>	
<i>Institute of Experimental Medicine, Prague</i>	Laboratory of Animal Embryology, Brno
<i>Institute of Molecular Genetics, Prague</i>	Animal Farm, Koleč
<i>Institute of Animal Physiology and Genetics, Liběchov</i>	Laboratory of Animal Embryology, Brno Section of the Biological Basis of Food Quality and Safety, Prague
<b>Section 6</b>	
<i>Biology Centre, České Budějovice</i>	The New Guinea Binatang Research Center,
Papua New Guinea	
<i>Institute of Botany, Průhonice – Castle</i>	Scientific-Research Section II, Třeboň Workplace Brno
<i>Institute of Vertebrate Biology, Brno</i>	Department of Medical Zoology, Valtice Department of Population Biology, Koněšín
<i>Institute of Systems Biology and Ecology, České Budějovice</i>	
Branch Office Nové Hradky Branch Office Brno	

## APPENDIX 14

Name of the Institute	Units
<b>Section 7</b>	
<i>Library, Prague</i>	Branch Office Brno Digitisation Centre and Depository, Jenštejn
<i>Economics Institute, Prague</i>	
<i>Institute of Psychology, Brno</i>	Branch Office Prague
<i>Institute of Sociology, Prague</i>	
<i>Institute of State and Law, Prague</i>	
<b>Section 8</b>	
<i>Institute of Archaeology, Brno</i>	Centre for Paleolithic and Paleoetnological Research, Věstonice Centre for Research of the Roman Military Intervention, Dolní Dunajovice Centre for Research of the Great Moravian Period of Mikulčice, Mikulčice Joint Workplace with the Silesian Museum, Opava
<i>Institute of Archaeology, Prague</i>	Workplace Kutná Hora Laboratory for Research of the Paleolithic, Depository, Třebíz Depositories Závist, Lhota u Dolních Břežan
<i>Institute of History, Prague</i>	Branch Office Brno Centre of Early Modern Studies, České Budějovice Czech Historical Institute in Rome, Rome
<i>Masaryk Institute and Archives, Prague</i>	
<i>Institute of Art History, Prague</i>	
<i>Institute for Contemporary History, Prague</i>	Branch Office Brno
<b>Section 9</b>	
<i>Institute of Ethnology, Prague</i>	Detached Workplace Brno
<i>Institute of Philosophy, Prague</i>	
<i>Oriental Institute, Prague</i>	
<i>Institute of Slavonic Studies, Prague</i>	
<i>Institute of Czech Literature, Prague</i>	Detached Workplace Brno
<i>Institute of the Czech Language, Prague</i>	Detached Workplace Brno
<i>Centre for Administration and Operations, Prague</i>	Academia Bookshop, Brno Academia Bookshop, Ostrava Conference Centre of the ASCR, Liblice Conference Centre of the ASCR, Třešť



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