

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



2009



THE ACADEMY
OF SCIENCES
OF THE CZECH
REPUBLIC

ANNUAL REPORT 2009

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01

Introduction

INTRODUCTION

In 2009, the Academy of Sciences of the Czech Republic (hereinafter referred to as the 'ASCR'), as a democratically-organised national institution of non-university research and a system of scientific workplaces, continued in its implementation of the updated concept of the advancement of research and development. Building on Czech Government Resolution No. 729, On the National Policy of Research, Development and Innovation of the Czech Republic for 2009–2015 of 8 June 2009, it simultaneously prepared conceptual drafts for its own orientation according to socio-economic needs and the latest trends in world science for the period after 2009. The platform for preparations became not only discussions at various levels within the ASCR but also so-called round-tables organised under the auspices of the Prime Minister of the Government and the Chairman of the Council for Research, Development and Innovation J. Fišer, whose topic was the search for agreement on the current problems of science and research, the system of their structure, management and financing. Six round-table meetings were held during the year with representatives of universities, of basic and applied research.

The most important change to the **legal and economic environment** in which the ASCR operated in 2009 was the adoption of Act No. 110/2009 Coll., which amended Act No. 130/2002 Coll., On Research and Development Support from Public Funds as of 1 July 2009. This Act changes the position of the ASCR in the system of science and research such that the ASCR will gradually cease to be the provider of special-purpose public support in research and development, which will lead to its gradual ending of the activity of the Grant Agency of the ASCR and not announcing and administering research, development and innovation programmes in the future. However, one particularly negative impact came from the adoption and application of certain flawed provisions of this Act that the Council for Research, Development and Innovation tried to apply already during the preparation of the draft budget of expenditure on research, development and innovation for 2010. The introduction of centralised evaluation and comparison of the results of various fields and areas of science, research and innovation and the corresponding shoddy methodology of that assessment would lead to the destabilisation of the financing for this entire area, threaten mainly scientific workplaces dealing with the complex tasks of basic research and could soon mean the destruction of the whole system of the workplaces of the ASCR. The gravity of this



Extraordinary Session of the Academic Assembly of the ASCR on 30 June 2009
(Photo: S. Kyselová)

situation led to the first Extraordinary Session of the Academic Assembly of the ASCR in the history of the ASCR on 30 June 2009, where this process was denounced and rejected. A number of complicated negotiations followed, supported by the public protests of scientists, which thanks to the understanding of the Prime Minister of the Czech Republic and the members of his Cabinet brought at least a partial correction of the funding of the ASCR and its workplaces for 2010 and the promise of a more favourable solution also for the next period. The discussions on a new systemic solution for this issue, however, were not successfully concluded even by the end of 2009, mainly due to the unwillingness of the Council for Research, Development and Innovation to recognise the irregularities and the damages that would arise from them.

The involvement of the ASCR in the **Czech Republic's Presidency of the Council of the European Union** came to a climax in 2009. The ASCR ensured the organisation of two significant conferences on the topics of 'The Role of Basic Research in the Process of Structuring the European Research Area' and 'European Future Technologies: Science

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Beginning of the Role of Basic Research in the Process of Structuring the European Research Area conference – ERA 2009 (in Prague on 16–18 April 2009), organised by the ASCR within the CR’s Presidency of the Council of Europe (Photo: Archives of the Head Office)



At Prague Castle on 13 March 2009, President of the CR V. Klaus appointed J. Drahoš the new President of the ASCR. (Photo: S. Kyselová)

beyond Fiction’ including their accompanying events. The content priorities and agenda of the Presidency reflected to a considerable extent the positions of the ASCR, for example the regional location of major research infrastructures for research or greater involvement in the European Research Area.

Support for the involvement of the workplaces in the operational programmes financed from the **EU structural funds**, in particular the Operational Programme for Research and Development for Innovation, was chosen as a way of improving the performance of certain areas of science qualitatively. The ASCR issued a number of recommendations relating to the procedure of the Steering Committee of this Operational Programme in selecting so-called major projects (over € 50 million) for the sake of preserving the principle of partnership and ensuring the requisite transparency of the whole process. It also looked at the issue of research infrastructures, namely not merely in relation to the

operational programme in question but in connection with the preparation of a roadmap of the major Czech research infrastructures and amendment to Act No. 130/2002 Coll.

A significant event in the life of the ASCR was the **instalment of new ASCR steering bodies** for 2009–2013 (President, Academic Council, Scientific Council, new structure and composition of the advisory and auxiliary bodies of the Academic Council and the Scientific Council). Based on the election and after discussions within the Government of the Czech Republic, President of the Czech Republic Václav Klaus appointed prof. Ing. Jiří Drahoš, DrSc., dr. h. c., as President of the ASCR as of 25 March 2009. Elections to the Academic Council and the Scientific Council took place at the 34th Session of the Academic Assembly on 24 March 2009. The Academic Council subsequently elected prof. Ing. Miroslav Tůma, CSc., prof. Ing. Vladimír Mareček, DrSc., and prof. PhDr. Jaroslav Pánek, DrSc., dr. h. c., as the new Vice Presidents of the ASCR. Doc. RNDr. Karel Oliva Dr.

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Praesidium of the 36th Session of the Academic Assembly on 15 December 2009. From the left, Vice-President of the ASCR M. Tůma, Honorary President of the ASCR R. Zahradník, Vice-President of the ASCR V. Mareček, President of the Learned Society of the CR H. Illnerová, Vice-President of the ASCR J. Pánek.

(Photo: S. Kyselová)

was appointed Chairman of the Scientific Council of the ASCR following a by-election of the Scientific Council at the 35th Session of the Academic Assembly. Lists of the members of the Academic Council, the Scientific Council and the heads of auxiliary bodies are displayed at the ASCR website (http://www.avcr.cz/o_avcr/struktura/). There were no changes in 2009 in the development of the **system of the workplaces of the ASCR** (Appendix 13); the system of the workplaces of the AS still includes fifty-three scientific workplaces, the Centre of Administration and Operations of the ASCR, v. v. i., and the Head Office of the ASCR. There are a total of 7,771 employees, of whom 4,395 are researchers with university qualifications. The ASCR as the founding entity made use of its statutory authorisation and coordinated overall scientific and economic policies through elected bodies with the aim of maintaining the cohesiveness of workplaces of the ASCR. A government resolution on the changes in the state administration of research, development and innovation from 2009 resulted in a consid-



Director of the IOCB TTO M. Fusek lectures on the aims of the commercialisation of intellectual property rights at the Institute of Organic Chemistry and Biochemistry. A. Holý is watching.

(Photo: Archives of the Institute of Organic Chemistry and Biochemistry)

erable reduction in the number of employees at the Head Office of the ASCR, which fulfils the role of the state administration of research and provides administrative and organisational support to scientific workplaces. The number of employees at the Head Office was reduced by 13%. Given the rigid measures aimed at the savings on employment positions, which has been achieved by continuing rationalisation of the structure and the merger of certain sections at the Head Office, any further downsizing of the administrative apparatus at the ASCR required by government documents would cause considerable problems in carrying out the assignments that arise for the ASCR from the legal regulations.

In light of personnel connections between the Faculty of Law of the University of West Bohemia in Pilsen and the Institute of State and Law of the ASCR, the Academic Council asked the director of the Institute of State and Law of the ASCR to terminate the employment of doc. JUDr. M. Kindl,

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CSc. with immediate effect, accepted the resignation of doc. JUDr. J. Zachariáš, CSc. from the position of director of the institute and established a commission for inspection of the activities at this institute under the leadership of prof. J. Zima on 20 October 2009. Based on an assessment of the development, current status and prospects of this institute, this commission stated that the irregularities had occurred as a consequence of the personal failure of certain employees that were senior officials in both institutions at the same time. It also stated that there had been no violation of the fundamental principles of the operation of the workplace according to the valid legal regulations and that the activity at the institute ensured mainly by the younger generation of its researchers is in accordance with its founding deed.

The workplaces of the ASCR established new companies in order to simplify the technological transfer of research into practice and as part of intensifying the cooperation with applied research. For example, the *Institute of Organic Chemistry and Biochemistry* set up IOCB TTO, s. r. o., and entered the innovation cluster of MedChemBio, z. s. p. o. The *Institute of Biotechnology* and the *Institute of Molecular Genetics* entered the CzechBiO, z. s. p. o. association. This gradually creates also a formalised platform for communication and for building relations between entities in the commercial and the academic sectors.

Upon the conversion of the workplaces to public research institutions, the directors of the workplaces of the ASCR were appointed to a five-year term of office, 2007–2012. Based on selection procedures and nominations by the councils of the relevant workplaces of the ASCR, the following changes were made in the appointments to the positions of directors of the workplaces by the President of the ASCR following discussion in the Academic Council:

- given the resignation of doc. Ing. Lubomír Lízal, Ph.D., from the position of Director of the *Economics Institute*, the President of the ASCR appointed doc. Ing. Štěpán Jurajda, Ph.D., as director of the institute on the basis of the results of the selection procedure and the nomination of the council of the workplace as of 1 January 2009;
- as a result of the death of the Director of the *Institute of Mathematics* RNDr. Antonín Sochor, DrSc., RNDr. Pavel Krejčí, CSc. was appointed the new head of this department as of 1 May 2009;
- prof. RNDr. Jan Zima, DrSc., resigned from the position of Director of the *Institute of Vertebrate Biology* because of the incompatibility of the positions of head of a workplace of the ASCR and member of the Academic Council, and doc. Ing. Marcel Honza, Dr., was named the new head of this department as of 15 June 2009;
- Ing. Peter Šebo, CSc., was dismissed from the position of Director of the *Institute of Biotechnology* at the suggestion of the Council and the Board of Supervisors of the Workplace, with the leadership of the institution subsequently entrusted to doc. RNDr. Jana Pěkníková, CSc., who was named director of the institute as of 14 January 2010;
- after the resignation of the Director of the *Institute of State and Law* doc. JUDr. Jaroslav Zachariáš, CSc., leadership of the institute was entrusted to JUDr. Jan Bárta, CSc., as of 2 October 2009;
- on the recommendation of the Commission of the Czech Historical Institute in Rome and at the proposal of contracting parties, the Academic Council appointed prof. PhDr. Jaroslav Pánek, DrSc., as the Head of the Czech Historical Institute in Rome, a joint workplace with the Faculty of Philosophy and Arts of Charles University, for a term of office from 1 January 2009 to 31 December 2010;
- doc. RNDr. Karel Oliva, Dr., resigned from his position as Director of the *Institute of the Czech Language* on 18 December 2009 in connection with his appointment as Chairman of the Scientific Council of the ASCR.



The Athenaeum for the 21st Century initiative was founded in the summer of 2009.
(Source: www.vedazije.cz)

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↑ ↗ On 8 September 2009, the exhibition **Science for Life**, which presented the diverse research work of the scientific institutes of the ASCR, was opened in the building of the ASCR at Národní 3 in Prague. (Photo: S. Kyselová)

In 2009, the ASCR placed exceptional emphasis on building and deepening **public relations** given an awareness of its duty not only to inform the public of its activities and scientific successes but also to promote science and research systematically, bring in new talent and broaden the possibilities of cooperation with the sphere of application. An unforgettable fact was the public response – the creation of independent platforms for scientists – at the ‘Science Lives’ and ‘Athenaeum for the 21st Century’ fora. Media activities increased in importance, with their goal being to point out the threat posed to the very existence of the ASCR as a result of the planned year-on-year reduction of its budget by ca 20% and by more than 50% over three years. The concentrated efforts succeeded in achieving a state where this topic became a subject of public debate and where the ASCR is again seen by the general public as an institution with a justified place in the system of science and education in contemporary Czech society. What is particularly pleasant is the rising support from foreign scientific and higher education institutions and prominent

personalities as well as from leading personalities of domestic scientific, public and political life who are not indifferent to the future of science and education in the Czech Republic.

The main areas of work and specific activities of the ASCR in 2009 are described in more detail in the chapters below and are documented in their appendices.

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Scientific Activity

SCIENTIFIC ACTIVITY



↑ On 29 April 2009, President of the ASCR J. Drahoš presented the diplomas to the Doctors of Sciences. (Photo: Archives of the Head Office)

The proof of the overall forward advancement of the scientific performance of the Academy of Sciences of the Czech Republic (ASCR) is its publishing activity, an overview of which is included in Appendix 2. The trend analysis of quantitative performance shows that the number of works in the Thomson Reuters citation database is growing constantly. The ASCR continues to publish about a third of all of the papers within the Czech Republic and participates in approximately half of the citations of the published papers. The trend in the overall number of publications can also be seen in the following overview, but it should be anticipated that the final number of publications in 2009 will be higher (*).

The growing trend is also demonstrated by the number of Doctor of Science degrees granted by the ASCR. This prestigious scientific qualification was received by eighteen science personalities in 2009.

Table 1: Number of published papers

YEAR	2005	2006	2007	2008	2009*
Czech Republic	8,286	9,358	11,763	11,724	11,281
ASCR	2,653	2,900	2,988	3,056	2,897

1. Section of Mathematics, Physics and Computer Science

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

In mathematical disciplines, both mathematical and computer-science 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. Significant support is provided to 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.

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.

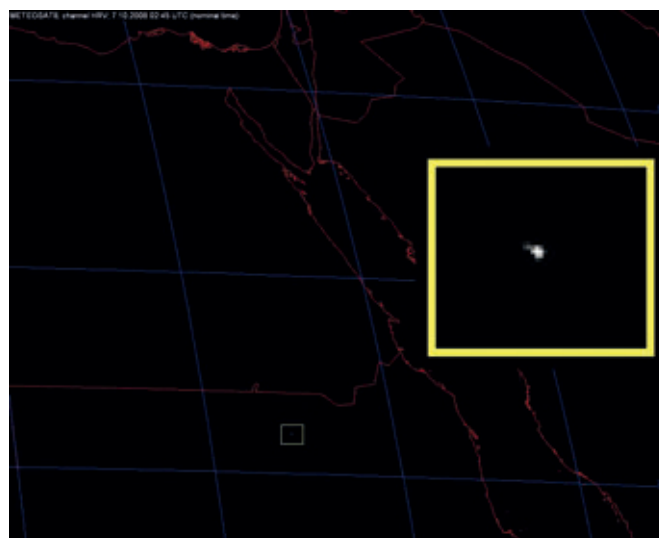
From the results from 2009, we present:

Analysis of the Collision of Asteroid 2008 TC3 with the Earth using Meteosat Satellite Data

(Astronomical Institute)

On 6 October 2008, a small asteroid rapidly approaching the Earth was discovered in the USA. The following day, the asteroid entered the terrestrial atmosphere over the territory of Sudan. As expected, it caused a distinct luminous phenomenon in the atmosphere (a bolide); nevertheless, it disintegrated during its transit through the atmosphere

and only small fragments (meteorites) landed on the surface, which did not cause any damage. Such phenomena occur several times a year, but this was the first and so far only case that an asteroid was discovered before atmospheric entry and the bolide was forecast. Because of quick succession of events, it was not, however, possible to prepare any special observations and there are, consequently, only a few data about the course of the asteroid's entry into the atmosphere. It is, therefore, very valuable that Z. Charvát from the CHMI (Czech Hydrometeorological Institute) discovered the bolide in the images from the Meteosat 8 meteorological satellite.



The bolide over Sudan. A part of the Meteosat 8 satellite image showing the bolide over Sudan after Asteroid 2008 TC3 entered the terrestrial atmosphere. The frame shows a detail of the bolide. (Photo: Czech Hydrometeorological Institute and EUMETSAT)

In cooperation with the CHMI, the scientific team analysed in detail all of the available data from the Meteosat 8 and 9 satellites, which contain not only data on the bolide itself but also data on the dust cloud that it left in the atmosphere. The altitudes of the asteroid's disintegration and the absolute bolide brightness at two altitudes were determined. Multi-channel observation made it possible to find the spectral distribution of the radiation. The bolide colour temperature was 3650 ± 100 K. The infrared spectrum of the fresh dust was dominated by the Si-O band at 10 microns, caused by recondensed silicates at temperatures exceeding 1000 K. The silicates soon became crystallised. The total mass of silicate smoke was estimated to 3100 ± 600 kg.

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More mass was probably contained in larger, micron-sized, dust particles originating from incomplete sublimation of asteroidal material. From the height of the asteroid's disintegration, we estimated that the bulk porosity of the asteroid was about 50%, i.e. more than the porosity of the Almahata Sitta meteorites recovered (which belong to a rare type, ureilites). Our bolide analysis along with the data on the asteroid itself and the meteorites therefore contributed greatly to the knowledge of the properties of one type of asteroid crossing the Earth's orbit.

Cooperating entity: CHMI

Borovička, J. – Charvát, Z.: Meteosat observation of the atmospheric entry of 2008 TC3 over Sudan and the associated dust cloud. Astronomy & Astrophysics. Vol. 507, 2 (2009), pp. 1015–1022.

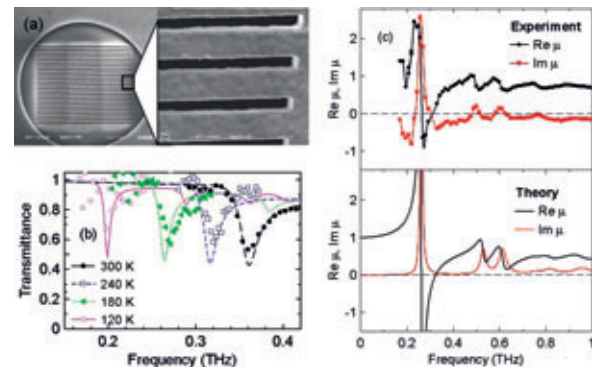
Creating Tuneable Metamaterials with Negative Permeability for Terahertz Spectral Range

(Institute of Physics)

Metamaterials are artificially created composite periodic structures with a unit cell much smaller than the wavelength of the radiation. These materials may represent environments with electromagnetic properties not found in nature. Using a suitable combination of composite constituents, it is possible to create e.g. an 'invisibility cloak' or plates with a negative refractive index, making it possible to overcome the diffractive gap in optical imaging. However, these properties can be used only in a narrow spectral band limited by the width of the very sharp magnetic resonances of permeability. For this reason, the scientific employees proposed and experimentally created a metamaterial with a tuneable range of negative permeability in the terahertz spectral range (0.2–0.36 THz). This structure consists of an array of nonmagnetic rods made of an incipient ferroelectric SrTiO₃, which shows a high tuneable permittivity. The magnetic responses and their tuning are achieved by a temperature control of the permittivity of SrTiO₃. With a suitable aspect ratio of the rods, a broadband magnetic response can be obtained.

Němec, H. – Kužel, P. – Kadlec, F. – Kadlec, C. – Yahiaoui, R. – Mounaix, P.: Tuneable terahertz metamaterials with negative permeability. Physical Review B. Vol. 79 (2009). Čl. 241108(R), pp. 1–4.

Yahiaoui, R. – Němec, H. – Kužel, P. – Kadlec, F. – Kadlec, C. – Mounaix, P.: Broadband dielectric terahertz metamaterials with negative permeability. Optics Letters. Vol. 34 (2009), pp. 3541–3543.



(a) The metamaterial structure measured by transmission electron microscopy (TEM). (b) Transmission spectra obtained at various temperatures; the sharp minimum corresponds to the lowest Mie resonance, which is connected with effective magnetic response. (c) Effective magnetic permeability ($\text{Re } \mu$ and $\text{Im } \mu$) at room temperature. (Photo: Institute of Physics)

Pták's Characterisation of Reflexivity in Tensor Products

(Institute of Mathematics)

The approximation property (AP) of a Banach space is a very fine property which was initially supposed to be fulfilled in each Banach space. More precisely, it was used without the mathematicians' realising that it constitutes a further assumption which did not have to arise from the definition of Banach space. It was not until 1955 that French mathematician A. Grothendieck precisely formulated this property (the AP) and posed the question whether this property holds for each Banach space. Since then, it has been necessary to state this property as an assumption in theorems where it was used. One of them is the following theorem (A): The space of all operators is reflexive if and only if every operator is also a compact operator. This was proved in 1971 by a number of authors under the assumption of the approximation property. They simultaneously formulated the problem of whether Theorem (A) can be proved even without the approximation property assumption. The problem remains unresolved. Only decades later has it been proved that the AP does not always

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apply. This further increased the pressure on the question of where Theorem (A) can be left out as an assumption of approximation.

The employees of the Institute in this work have proved that Theorem (A) holds quite generally, i.e. without the approximation property assumption. The proof uses a method developed by Czech mathematician V. Pták in 1959. His criterion for reflexivity was refined and adapted to the situation in Theorem (A). The reason this problem remained unresolved for so long is that there was no idea of how to proceed without the assumption of approximation.

The outcome of this work has a number of consequences, each solving a long-standing mathematical question. For example: G. Pisier constructed a space with a number of unexpected properties in 1983. He formulated a problem of whether his construction could be improved to obtain even greater reflexivity. Although he and a number of other important mathematicians strived to construct such a space, they did not succeed in answering the problem either positively or negatively. A relatively simple result of the consequence of Theorem (A) is a negative answer to Pisier's problem: There is no reflexive Pisier space.

John, K.: Pták's characterisation of reflexivity in tensor products. Czechoslovak Mathematical Journal, in print.

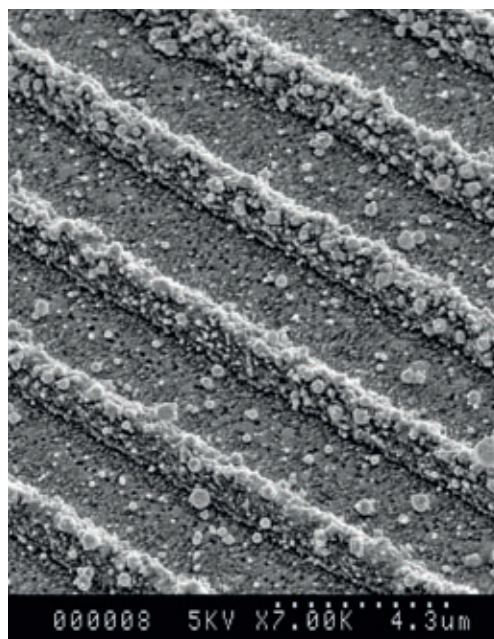
Study of Metal-Fullerene Hybrid Composites

(Nuclear Physics Institute)

Hybrid composites combining organic and inorganic (metallic) components are new types of materials often exhibiting unique properties suitable for special-purpose applications. One such set of materials comprises composites synthesised by the co-deposition of fullerene (C_{60}) molecules and atoms of transitional metals (Ni, Co, Ti, etc.) in vacuum. These composites have interesting structural and other properties (such as the proclivity to self-organisation, see the figure on the right) and a significant response to thermal annealing (or ion irradiation).

Using Magnetic Force Microscopy, the scientific employees observed the self-organisation of magnetic domains in a $Ni+C_{60}$ composite (prepared at room temperature of the substrate), proving a hidden separation of the Ni and

C_{60} phases. The periodic structure of the domain was disrupted during thermal annealing, which indicates the thermodynamic instability of the hybrid system. The structure of another composite, $Ti+C_{60}$, was further analysed, during which it was found that the structure is formed by nanoparticles of Ti encapsulated in a polymerised coating of fullerenes. This structure exhibited promising biocompatibility, showing that the $Ti+C_{60}$ composite can find application in tissue engineering. At room temperature of the substrate, another composite, $Co+C_{60}$, was prepared, which was formed by Co nanocrystals separated by a polymerised C_{60} matrix. Thermal annealing resulted in a relaxation of the structure and the conversion of the fullerenes into single-wall carbon nanotubes doped with Co atoms. A modification of the structure of a thin layer of fullerenes with C_{60}^+ cluster ions C_{60}^+ was further investigated. It was found that bombarding the fullerite with C_{60}^+ leads to the formation of nanodots, or also of periodic polymerised nanostructures comprised of 5–10 C_{60} molecules. The fullerene polymerisation as a result of bombardment with C_{60}^+ clusters evidences the crucial role that the surface shock waves play in the transformation of the fullerene structure.



Self-organisation of the layer induced by co-deposition of Ni and C_{60} on the $MgO(100)$ monocrystal at a temperature of 500 °C

(Photo: Archives of the Nuclear Physics Institute)

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Cooperating entities: Takasaki Advanced Radiation Research Institute, Japan Atomic Energy Agency; Japan Atomic Energy Agency Tokai; Veeco Darmstadt; Institute of Physiology; Institute of Physics; Institute of Chemical Process Fundamentals

Vacík, J. – Lavrentiev, V. – Hnatowicz, V. – Yamamoto, S. – Vorlíček, V. – Stadler, H.: *Spontaneous partitioning of the Ni + C₆₀ thin films grown at RT. Journal of Alloys and Compounds. Vol. 483 (2009), pp. 374–377.*

Vacík, J. – Lavrentiev, V. – Novotná, K. – Bačáková, L. – Lisá, V. – Vorlíček, V. – Rajtar, R.: *Diamond and Related Materials, in print, DOI:10.1016/j.diamond.2009.10.016.*

Lavrentiev, V. – Vacík, J. – Naramoto, H. – Sakai, S.: *Thermal effect on structure organizations in cobalt-fullerene nanocomposition. Journal of Nanoscience and Nanotechnology. Vol. 9 (2009), pp. 1–6.*

Core of Coalition Games on MV-Algebras:

Theory and Algorithms

(*Institute of Information Theory and Automation*)

The models of coalition games with many-valued coalitions rely on the assumption that players can participate in a coalition only with certain levels of membership. The emerging coalition structure can be naturally described by many-valued logics, which allows for a better understanding and modelling of the multiple levels of a player's membership in a coalition. The core of a game is a set of certain payoff distributions, which tends to be hard to characterise in a general situation. An iterative projection algorithm was therefore proposed and studied, which allows the discovery of at least one core element or possibly a decision on whether such a distributive vector exists.

Cooperating subject: Dan Butnariu, Dept. of Mathematics, University of Haifa

Butnariu, D. – Kroupa, T.: *Enlarged cores and bargaining schemes in games with fuzzy coalitions. Fuzzy Sets and Systems. Vol. 160, 5 (2009), pp. 635–643.*

Kroupa, T.: *Core of coalition games on MV-algebras. Journal of Logic and Computation. Oxford Journals, in print.*

Other notable results:

1. Response of optical hydrogen lines to beam heating: I. Electron beams (*Astronomical Institute, ASCR*)
2. False periods in complex chaotic systems (*Astronomical Institute, ASCR*)
3. Searching for broken pairs of asteroids (*Astronomical Institute, ASCR*)
4. Powdery disc around binary star Upsilon Sagittarii, an object with a low hydrogen content (*Astronomical Institute, ASCR*)
5. Magnetocaloric phenomena under high pressures (*Institute of Physics, ASCR*)
6. Spin-injection Hall effect in planar photovoltaic cell (*Institute of Physics, ASCR*)
7. Source of entangled, two-photon states, so-called KLM states (*Institute of Physics, ASCR*)
8. Inclusive effective cross-section of electron-proton scattering in the HERA synchrotron (*Institute of Physics, ASCR*)
9. Transparency of aluminium foil caused by X-ray laser radiation on free electrons (*Institute of Physics, ASCR*)
10. New Insights on Atomic-Resolution Frequency-Modulation Kelvin-Probe Force-Microscopy Imaging of Semiconductors (*Institute of Physics, ASCR*)
11. Magnetic anisotropies of isolated 3d spins of transition metals adsorbed on a CuN surface (*Institute of Physics, ASCR*)
12. A device for the treatment of the properties of NiTi shape memory alloy fibres by passing electric current (*Institute of Physics, ASCR*)
13. Upper limit on the cosmic-ray photon fraction at EeV energies in the Pierre Auger Observatory (*Institute of Physics, ASCR*)
14. Chemical generation of singlet oxygen for a chemical oxygen-iodine laser (COIL) using an originally designed centrifugal spray generator (*Institute of Physics, ASCR*)
15. Semilinear stochastic equations in a Hilbert space with a fractional Brownian movement (*Institute of Mathematics, ASCR*)
16. Amplifying Lower Bounds by Means of Self-Reducibility (*Institute of Mathematics, ASCR*)
17. The regularizing effect of the Golub-Kahan iterative bidiagonalization and revealing the noise level in the data (*Institute of Computer Science, ASCR*)

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18. On the universal computing power of amorphous computing systems
(Institute of Computer Science, ASCR)
19. Cyclic climate changes associated with solar and geomagnetic activity
(Institute of Computer Science, ASCR)
20. The first proton-proton collisions on LHC as observed with the ALICE detector: measurement of the charged-particle pseudorapidity density at an energy of $\sqrt{s} = 900$ GeV
(Nuclear Physics Institute, ASCR)
21. Determination of the excitation function of the reaction $\text{Pa-231}(d,3n)\text{U-230}$
(Nuclear Physics Institute, ASCR)
22. High-Resolution Spectroscopy of ^{16}N by Electroproduction
(Nuclear Physics Institute, ASCR)
23. Using noise inconsistencies for blind image forensics
(Institute of Information Theory and Automation, ASCR)
24. Hierarchical Multiple Markov Chain Model for Unsupervised Texture Segmentation
(Institute of Information Theory and Automation, ASCR)

2. 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 2009, we present:

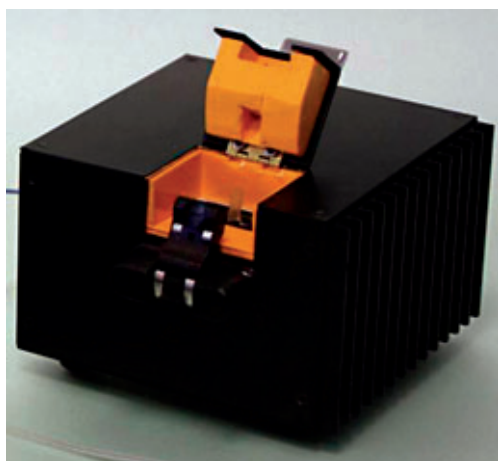
Surface Plasmon Resonance Biosensors for Food Safety and Medical Diagnostics

(Institute of Photonics and Electronics)

The need for the detection of chemical and biological substances where they appear in real time exists in numerous important sectors, including medical diagnostics, environmental monitoring, food safety and security. Current chemical and biochemical analyses are, however, primarily conducted in centralised laboratories; moreover, they are laborious, time-consuming and require expensive equipment. All over the world in the last few decades, great attention has therefore been devoted to the research and development of new bioanalytical tools, like biosensors, which would enable the detection of biological and chemical substances in the field. Researchers at the Institute of Photonics and Electronics, ASCR, v. v. i. (IPE) have developed new surface plasmon resonance (SPR) biosensors for rapid and sensitive detection of chemical and biological analyses at the place of their occurrence. These new biosensors combine novel and highly sensitive opti-

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cal sensor developed at the IPE with special molecular receptors (e.g. antibodies, peptides, nucleic acids) allowing the specific detection of selected substances. The biosensors developed at the IPE have detected potential cancer and Alzheimer disease biomarkers (ALCAM, transgelin, 17 β -HSD10), foodborne pathogens (*Escherichia coli*) and toxins (tetrodotoxin). For instance, the SPR biosensor for the detection of tetrodotoxin developed and tested in collaboration with the University of Washington, Seattle and the U.S. Food and Drug Administration is able to detect tetrodotoxin in the puffer fish matrix down to 1 ng/ml.



Laboratory prototype of the compact PATHOMILK SPR biosensor for detecting bacterial pathogens in milk
(Photo: Archives of the Institute of Photonics and Electronics)

Cooperating entities: University of Washington, Seattle (USA), U.S. Food and Drug Administration (USA)
Křištofiková, Z. – Bocková, M. – Hegnerová, K. – Bartoš, A. – Klaschka, J. – Řičný, J. – Řípová, D. – Homola, J.:
Enhanced levels of mitochondrial enzyme 17 β -hydroxysteroid dehydrogenase type 10 in patients with Alzheimer disease and multiple sclerosis. Molecular Biosystems. Vol. 5 (2009), pp. 1174–1179.
Hegnerová, K. – Bocková, M. – Vaisocherová, H. – Křištofiková, Z. – Řičný, J. – Řípová, D. – Homola, J.:
Surface plasmon resonance biosensors for detection of Alzheimer disease biomarkers. Sensor and Actuators B. Vol. 139, (2009), pp. 69–73.

Ladd, J. – Allen, T. – Piliarik, M. – Homola, J. – Jiang, S.:
Label-free detection of cancer biomarker candidates using surface plasmon resonance imaging. Analytical and Bioanalytical Chemistry. Vol. 393 (2009), pp. 1157–1163.

Formation of Supersonic Plasma Jets in Cylindrical and Conical Channels

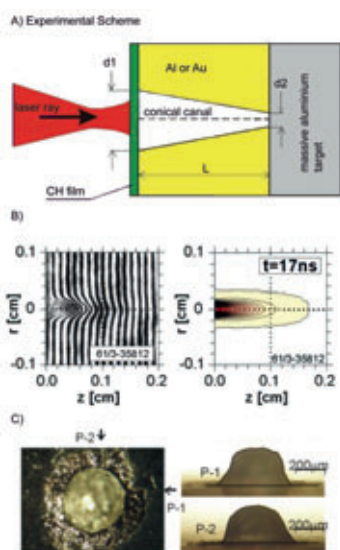
(Institute of Plasma Physics)

To find a way to transfer efficiently laser-beam energy to plasma, concentrate it and use it to heat a thermonuclear pellet is a key issue of laser thermonuclear fusion. All the schemes of acceleration and compression of the laser-produced plasmas suggested up to now are based on so-called ablative acceleration, which is in fact the 'rocket effect'. However, as its efficiency is small, a great amount of laser energy is needed (100 kJ – 1 MJ) for fusion ignition.

At the PALS TW-laser laboratory of the IPP, ASCR, a new method which might improve that unfavourable situation has been experimentally tested in cooperation with physicists of the IPPLM Institute, Warsaw. For plasma transport and compression, they employed a transport channel inside a hollow laser target. The focused laser beam generates plasma from a 10 μ m thick PET foil, which covers the entrance aperture of 0,3–0,5 mm in diameter (see the figure on the next page, part a). The plasma is accelerated and transported through a cylindrical or conical channel in a solid material (Al or Au) up to a distance of several mm. During transport in the conical channel, the plasma becomes compressed and its energy density increases. The volume of the crater produced in the massive part of the target is a measure of the energy transmitted through the channel (see the figure on the next page, part b). The plasma exits the channel in a form of a narrow supersonic jet, whose density can be measured by a laser interferometer after the removal of the back part of the target (see the figure on the next page, part c).

The advantage of the new method is a unique possibility to create supersonic plasma jets of light elements. The experiments conducted so far show that the efficiency of energy transfer to the target is up to 30 times higher than with the ablation acceleration alone.

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The formation of supersonic plasma jets in cylindrical canals
a) Scheme of the arrangement of the laser experiment with a conical transport canal
b) The crater created in the massive aluminium part of the target: microphotography of the original crater (on the left) and the crosscuts through its wax replica
c) A laser interferogram of the plasma jet protruding from the cylindrical canal (on the left) and the reconstructed longitudinal profile of its electron mass. The maximum mass on the axis of the jet is $2 \times 1,020 \text{ cm}^{-3}$
 (Photo: Archives of the Institute of Plasma Physics)

Cooperating entity: IPPLM Institute Warsaw

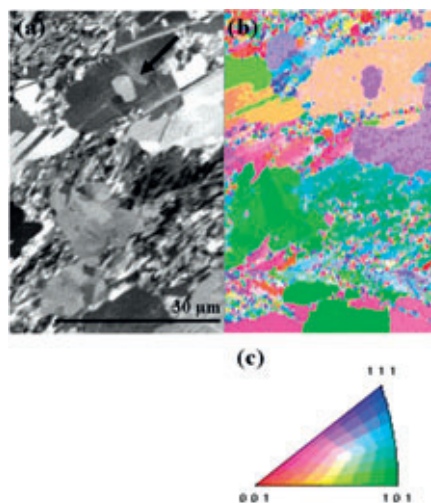
Borodziuk, S. – Kasperczuk, A. – Pisarczyk, T. – Badziak, J. – Chodukowski, T. – Ullschmied, J. – Krousky, E. – Masek, K. – Pfeifer, M. – Rohlena, K. – Skala, J. – Pisarczyk, P.: Cavity pressure acceleration: An efficient laser-based method of production of high-velocity macroparticles, *Applied Physics Letters* 95, 231501 (2009), DOI:10.1063/1.3271693.
 Badziak, J. – Pisarczyk, T. – Chodukowski, T. – Kasperczuk, A. – Parys, P. – Rosiński, M. – Wołowski, J. – Krouský, E. – Krása, J. – Mašek, K. – Pfeifer, M. – Skála, J. – Ullschmied, J. – Velyhan, A. – Dhareshwar, L. J. – Gupta, N. K. – Yong-Joo Rhee – Torrisi, L. – Pisarczyk, P.: Formation of a supersonic laser-driven plasma jet in a cylindrical channel, *Physics of Plasmas* 16 (2009), 114506(1)-114506(4).

Kasperczuk, A. – Pisarczyk, T. – Demchenko, N. N. – Gus'kov, S. Yu. – Kálal, M. – Ullschmied, J. – Krouský, E. – Mašek, K. – Pfeifer, M. – Rohlena, K. – Skála, J. – Pisarczyk, P.: Experimental and theoretical investigations

of mechanisms responsible for plasma jets formation at PALS. *Laser and Particle Beams* 27 (2009), 415–427, DOI:10.1017/S0263034609000548.

Diagnostics of Ultrafine-Grained Metals (Institute of Scientific Instruments)

The structure of crystalline grains in copper treated by equal-channel angular pressing has been successfully imaged and measured by means of an ultra-high-vacuum low-energy scanning electron microscope equipped with a cathode lens, namely in the very low energy electron reflectance mode. The maximum grain contrast was achieved at electron energies below about 30 eV, where also its sign alternated and exhibited dependence on electron energy specific for the grain orientation. The energy dependence of the electron reflectance has shown its capability of serving as a fingerprint enabling determination of the crystalline orientation. In the area of hundreds of eV, fine details of the microstructure are also observable including twins and low-angle grain boundaries. The reflectance of very low energy electrons is a promising alternative to the EBSD method owing to its high resolution and fast data acquisition.



A depiction of grains in ultrafine-grained polycrystalline metal. Ultrafine-grained copper: a) a picture from a scanning electron microscope with a cathode lens for very-low-energy electron microscopy, b) pseudo-colour picture gained by the EBSD (electron back-scatter diffraction) method c) along with a colour key of the crystal orientation.
 (Photo: Archives of the Institute of Scientific Instruments)

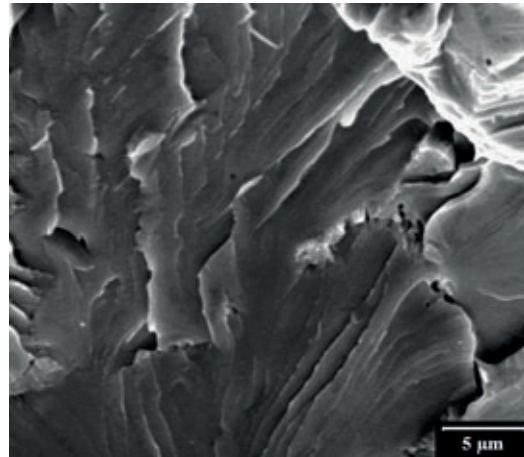
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Cooperating entity: Brno University of Technology,
Faculty of Mechanical Engineering
*Mikmeková, Š. – Hovorka, M. – Müllerová, I. – Man, O. –
Pantělejev, L. – Frank, L.: Grain contrast imaging in UHV
SLEEM. Materials Transactions. Vol. 51 (2010), in print.
Mikmeková, Š. – Hovorka, M. – Müllerová, I. – Frank, L.
– Man, O. – Pantělejev, L.: Microstructure of the ultra-fine
grained Cu by UHV SLEEM. MC 2009 – Microscopy
Conference: First Joint Meeting of Dreiländertagung and
Multinational Conference on Microscopy. Graz: Verlag der
Technischen Universität, 2009. Vol. 3, pp. 515–516.
Mikmeková, Š. – Hovorka, M. – Müllerová, I. – Frank, L.
– Man, O. – Pantělejev, L.: Study of the Microstructure of
the UFG Copper in UHV SLEEM. Proceedings of the 4th
Czech-Japan-China Cooperative Symposium on Nano-
structure of Advanced Materials and Nanotechnology
(CJCS'09). Brno: ISI ASCR, 2009 (Pokorná, Z.; Mika, F.),
p. 19.*

The Mechanism of Steel Damage by Hydrogen-Induced Stress Corrosion *(Institute of Theoretical and Applied Mechanics)*

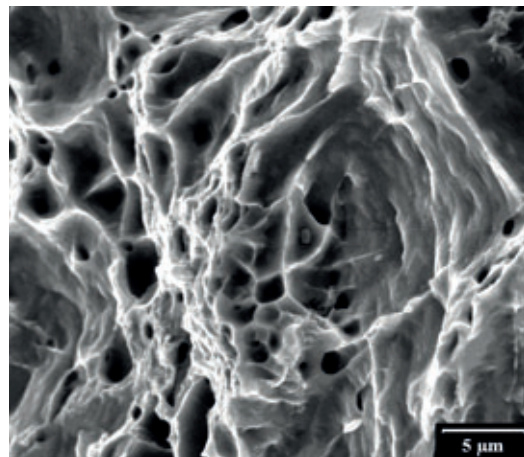
As shown by microfractographic analysis, under conditions of a chemical reaction with the evolution of hydrogen atoms, the process of corrosion cracking of steel takes place by the mechanism of a gradual cleavage fracture. The hydrogen atoms diffuse into the material ahead of the crack tip, where they adopt interstitial positions in the iron lattice and/or are captured on impurities, grain boundaries as well as on dislocations. It is these atoms captured on dislocations that prevent the dislocations from moving, which reduces the development of plastic deformation. This leads to a local embrittlement of material ahead of the crack tip and – upon the fracture process – to the rise of cleavage facets at the fracture surface. The scientific employees of the institute have found that the character of fracture – the occurrence of cleavage facets – is retained provided that the fracture process takes place in a time interval in the order of hours after the conditions of the evolution of hydrogen atoms ceased to exist. If, however, the fracture process takes place after a longer time, e.g. in the order of weeks, the fracture proceeds by the mechanism of a ductile damage with the formation of characteristic dimples. These findings are reflected in the level of the resistance of the material to fracture (fracture toughness). In the

former case, a considerable reduction of fracture toughness was found (up to one-fifth) and in the latter case the steel gained up to 80% of its original fracture-resistance properties as a result of the escape of atomic hydrogen or its recombination into molecules.



The investigation of the mechanism of steel damage by stress-corrosion cracking.

A) The micromorphology corresponding to a cleavage fracture. The fracture process followed about ten minutes after the removal of the body from the stress-corrosion cracking generator.



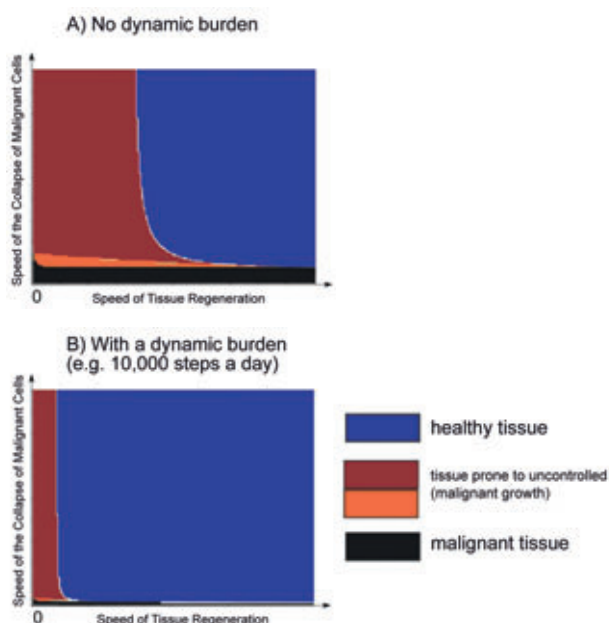
B) A micromorphology corresponding to the ductile dimple fracture. The fracture process followed two weeks after the removal of the body from the generator of the corrosive-stress crack.

(Photo: Archives of the Institute of Theoretical and Applied Mechanics)

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Gajdoš, L. – Šperl, M.: *Vliv koroze pod napětím na bezpečnost provozu plynovodu. Plyn. Vol. 89 (2009), Part 1: 7–8, pp. 161–165; Part 2: 9, pp. 195–199; Part 3: 10, pp. 220–223.*

Coupling Effect between Mechanical Loading and Chemical Reactions in Living Tissues (Institute of Thermomechanics)



The influence of the size of the dynamic stress (e.g. the number of steps per day) on the growth of healthy tissue (Photo: Archives of the Institute of Thermomechanics)

The research offers a theoretical explanation and comparison with clinical data of the coupling effects of mechanical loading on the course of chemical reactions by means of the principles of linear nonequilibrium thermodynamics. The long-discussed question of to what degree static or dynamic loading may influence biochemical processes has been addressed – the necessity of dynamic (time varying) loading as a stimulatory mechanism has been shown. Further, it has been suggested that chemical and mechanical processes not only facilitate or support one another but they may also play a triggering role for the other coupled process – some biochemical processes may need mechanical stimulation to run and *vice versa* – chemical reactions may provide energy for some mechanical processes. To

show the importance of the connections between the processes, a detailed analysis of a model for controlled autocatalytic reproduction was conducted, where the coupling effect, i.e. the influence of dynamic loading on reaction kinetics, is demonstrated (see the enclosed figure).

Cooperating entity: Department of Mathematics, FNSPE, Czech Technical University in Prague

Klika, V. – Maršík, F.: *Coupling effect between mechanical loading and chemical reactions. Journal of Physical Chemistry B. Vol. 113, 44 (2009), pp. 14689–14697.*

Other notable results:

1. Transition phenomena in fibre raman amplifiers with concentrated parameters and time-multiplexed pumping (Institute of Photonics and Electronics, ASCR)
2. Nonlinear effects in the time measurement device based on surface acoustic wave filter excitation (Institute of Photonics and Electronics, ASCR)
3. Long-term creep strength and rupture characteristics in creep of TiAl-base intermetallics (Institute of Physics of Materials, ASCR)
4. High-temperature fatigue property of Superalloy IN 713LC (Institute of Physics of Materials, ASCR)
5. The effect of structural degrees of freedom on bonding and strength characteristics of molybdenum disilicide (Institute of Physics of Materials, ASCR)
6. The Role of Surface Chemistry at Ceramic/Electrolyte Interfaces in the Generation of Pulsed Corona Discharges in Water Using Porous Ceramic-Coated Rod Electrodes (Institute of Plasma Physics, ASCR)
7. Research on the method of resonance magnetic disturbances for COMPASS, MAST and JET tokamaks (Institute of Plasma Physics, ASCR)
8. Anode processes in a non-transferred arc in plasma-tron and their effect on the structure of plasma flow (Institute of Plasma Physics, ASCR)
9. Nanocrystallisation of plasma sprayed coatings based on eutectic ceramic mixtures (Institute of Plasma Physics, ASCR)
10. Rheological modelling of polymeric melts (Institute of Hydrodynamics, ASCR)
11. Properties of identification methods for virus structures (Institute of Hydrodynamics)

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12. Simulation of coupled-spin systems for fast MR spectroscopic imaging
(Institute of Instrumental Technology, ASCR)
13. Calculation of aberration coefficients by ray tracing
(Institute of Scientific Instruments, ASCR)
14. Local probe microscopy with interferometric monitoring of the stage nanopositioning
(Institute of Scientific Instruments, ASCR)
15. Stability and post-critical processes in auto-parametric systems
(Institute of Theoretical and Applied Mechanics, ASCR)
16. Analysis of effects of wind on light, low-rise wooden structures
(Institute of Theoretical and Applied Mechanics, ASCR)
17. A proposed theoretical model of the lubrication of the human ankle joint
(Institute of Theoretical and Applied Mechanics, ASCR)
18. Risk assessment of air pollution and appraisal of damage from a worsened environment on historical materials and covering structures of buildings – economic losses and strategies for the control of measures to reduce the impacts on historical buildings and residences
(Institute of Theoretical and Applied Mechanics, ASCR)
19. Improvement of the material model of cyclic plasticity
(Institute of Thermomechanics, ASCR)

3. Section of Earth and Space Sciences

The section includes five workplaces 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 2009, we present:

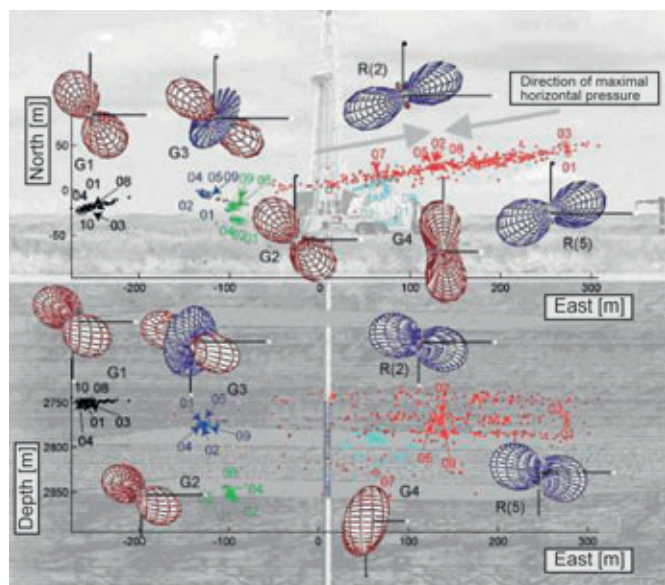
Oil and Gas Exploitation Induced Seismicity

(Institute of Geophysics)

The seismic monitoring of high-pressure fluid injections performed in oil, gas and some geothermal boreholes is an example of where seismology encounters the industrial routine. The fracturing of the rock mass by the injected fluid (hydrofracs) induces seismicity – weak 'earthquakes' which are many orders of magnitude below the energy of natural earthquakes. While the latter events are by far mostly shear phenomena, i.e. shear-slip along a pre-existing tectonic fault occurs in their foci, micro-tremors induced by hydraulic fracturing can exhibit a more general mechanism: the slip along the fault additionally possesses the normal component, which corresponds to the fault opening, or an entirely new – tensile – crack is created. It is obvious that the greater the extent of the normal slip in the foci, the greater the efficiency of the injection procedure – increasing the permeability of the reservoir. Such industrial seismicity induced by hydrofracs in the oil industry is routinely monitored by sensors placed in a single monitoring borehole near the production well to minimise costs. To determine the complete mechanism indicating both the type of fracturing and its orientation, however, requires at least two-well monitoring. Even then the task is difficult and it is vital to assess carefully all of the effects deteriorating the resolution, such as seismic noise on the recordings, the inexact location of the hypocentre and

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a lack of information on the parameters of the surrounding rock mass for constructing its response, which is called the Green function and is indispensable for addressing the inverted tasks of the seismic source. With the focus model described by the unconstrained moment tensor, the scientific employees reinterpreted the hydrofrac data from the injection into the borehole of the Cotton Valley, Texas, gas field and demonstrated that the mechanisms of the strong tremors accompanying the injection of liquid into the borehole, which was earlier considered to be purely shear slippage, had significantly non-shear components and correspond to a tensile fracturing of the rock mass of the gas field. This finding significantly modifies the existing concepts of the mechanics of the movement of injection fluids in these frequent and expensive technological operations in the oil and gas industry and can be used for their design and for the performance of hydrofracs aimed to enhance the efficiency in the exploitation of the reservoir.



Oil and gas exploitation induced seismicity. The mechanisms of selected micro-tremors induced by high-pressure injections into a gas well in Cotton Valley, Texas. Above there is a map while below a depth cut; G1–G4, R are individual groups of phenomena into which seismicity can be categorised by type. The mechanisms are illustrated as 3D 'wire models' emitting the characteristics of P-waves: the colour red corresponds to the extensive movement in the foci, the blue the compression movement. In the groups G1 and G2, extension dipole dominates, which is the equivalent of a tensile crack. (Photo: Archives of the Institute of Geophysics)

Šílený, J. – Eisner, L. – Hill, D. – Cornet, F., 2009. Non-double-couple mechanisms of microearthquakes induced by hydraulic fracturing. Journal of Geophysical Research, 114, DOI:10.1029/2008JB005987.

Carboniferous Tropical Forest (Institute of Geology)



A reconstruction of the Carboniferous tropical forest (J. Svoboda)
(Photo: Archives of the Institute of Geology)

Finds of 300-million-year-old specimens of Carboniferous plants have provided a great deal of background information for palaeoecological study and reconstructions of original Upper Palaeozoic tropical forest. The entire area of the tropical forest in the Czech Republic, which was then close to the equator, was at the time of its flowering buried by a thick layer of volcanic ash from the eruption of a big volcano near Dresden. The plants thus have been uniquely preserved to this day. The fossils include large fronds of ferns, branches and trunks of trees several meters long, especially stumps. Such finds are exceptional in the world. Another advantage of this form of preservation of the tropical rainforest is the fact that the plants are excavated di-

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rectly in positions of their original growth; it is therefore possible to reconstruct precisely not only the family and species composition of the tropical equatorial forest but e.g. also its density, i.e. the mutual distances between individual plants, which is impossible elsewhere on the planet. One of the global successes was the find of a rare Carboniferous spider and an earlier find of a dragonfly with a wingspan of as much as 60–70 centimetres.

Cooperating entities: Faculty of Natural Sciences of Charles University, Prague, Czech Geological Service, National Museum in Prague and West Bohemian Museum in Pilsen

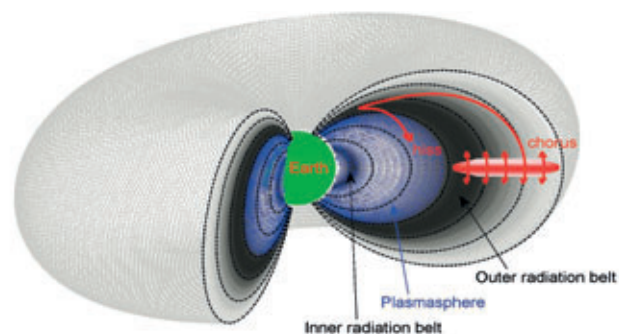
Opluštil, S. – Pšenička, J. – Libertín, M. – Bek, J. – Dašková, J. – Šimůnek, Z. – Drábková, J.: Composition and structure of an in situ Middle Pennsylvanian peat-forming plant assemblage buried in volcanic ash, Radnice Basin (Czech Republic). Palaios. Vol. 24 (2009), pp. 726–746.

The Source and Propagation of Chorus Emissions in the Earth's Magnetosphere

(Institute of Atmospheric Physics)

The effect of electromagnetic waves on the space environment around our planet has been studied since the early 1960s. The basic analysis of these waves at audible frequencies lay in listening to the recorded data through a speaker. Historically, the waves were therefore named according to what they sounded like from the speaker: whistlers, noise, hiss and chorus. In the study of chorus emissions, which play an important role in the dynamics of the radiation belts of the Earth, employees have specialised in the chorus propagating obliquely, which was until then devoted less attention, especially in theoretical studies. They focused on the case study of observations at lower magnetic widths, where either the individual mutually corresponding chorus elements or hiss lacking a more distinct spectral structure were observed at the same time in all four of the CLUSTER satellite. Through a detailed analysis of the multi-component measurement, they showed that in both cases the waves spread at large angles with respect to the terrestrial magnetic field. In the case of discrete chorus, it was a few degrees from the resonance cone. In the case of hiss, it was only a fraction of a degree from the resonance core. Chorus can then propagate into

the plasmasphere and contribute to the origin of plasmaspheric hiss.



Space surrounding the Earth with the Van Allen radiation belt (grey), plasmasphere (blue), source area for chorus-type emissions (red) and with an indication of their propagation towards the Earth.

(Photo: Archives of the Institute of Atmospheric Physics)

Cooperating entity: University of Iowa, USA, and Station de Radioastronomie de Nançay, France

Santolík, O. – Gurnett, D. A. – Pickett, J. S. – Chum, J. – Cornilleau-Wehrlin, N.: Oblique propagation of whistler mode waves in the chorus source region. Journal of Geophysical Research, 114 (2009), A00F03, DOI:10.1029/2009JA014586.

Santolík, O. – Chum, J.: The origin of plasmaspheric hiss. Science 324 (2009), 729–730, DOI: 10.1126/science.1172878.

Use of Wind Energy: Evaluation of Spatial Relations, Environmental Aspects and Social Context by Means of GIS Tools

(Institute of Geonics)

The monograph provides a relatively complex and synoptic evaluation of the frequently asked questions related to the development of wind energy in the Czech Republic. The evaluation is based on the analysis of spatial relations, environmental aspects and the social and economic context of the given issue, with the emphasis being placed on the interconnection of foreign experience with our own knowledge and conclusions of empirical research. An interdisciplinary approach forms the basis, involving and systematically evaluating a wide spectrum of interrelated aspects (physical-geographical, environmentally-ecological,

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human-geographical and sociological) but also aspects of a legislative and economic character and finally also issues connected with the impact on the health of the population, quality of life etc. It is the geography that has a coordinating function. Its main advantage in this regard is its broad thematic scope and primarily its ability to synthesise, which is essential for the correct objective assessment of the territorial potential, or the specification of the rate of suitability or acceptability of wind energy exploitation in a particular location. The collective of authors coming from several academic, university and specialised workplaces assumes that the publication could become a guideline for further scientific research and that it will help enhance the knowledge portfolios of public service employees and economic entities, that it will rectify some myths related to wind energy, and that last but not least it will contribute to expanding the group of informed laypeople able to evaluate the given issue objectively and constructively.

Cetkovský, S. – Frantál, B. – Štekl, J. et al.: Větrná energie v České republice, hodnocení prostorových vztahů, environmentálních aspektů a socioekonomických souvislostí. Studia geographica 101, in print.

Cetkovský, S. – Nováková, E.: Assessment of the impact of wind turbines on landscape character: implications for landscape planning. Moravian Geographical Reports, Vol. 17, 2, (2009), pp. 27–33.

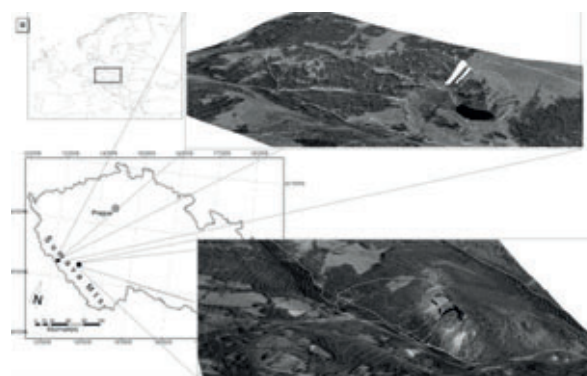
Frantál, B. – Kučera, P.: The impact of wind turbines operation as perceived by the residents of concerned areas. Moravian Geographical Reports, Vol. 17, No. 2, (2009), pp. 34–45.

Reconstruction of Slope Deformations at Two Sites in the Bohemian Forest Mountains

(Institute of Rock Structure and Mechanics)

The study describes two sites in the Bohemian Forest Mountains affected by slope deformations (landslides). Although the Bohemian Forest is generally considered to be a rather stable region geomorphologically, there are localities which bear unmistakable signs of a surprisingly high activity of recent or even contemporary relief development. Various methods have been employed to study these two sites, including direct monitoring of current movements (which showed that the rock blocks move downwards up to 1 mm per year), GPS mapping, borehole

and sediment studies, geodetic measurements and radiocarbon dating of the landslides. The research has brought several significant results. It has been possible to discover the regularity of the slope behaviour of two model localities and to formulate a likely scenario of the development of the localities according to which the slope movements repeat depending on the speed of the accumulation of the sliding material. Radiometric dating showed that the cycles span approximately 4000 years. The reason for the instability of the studied slopes in a generally stable area is the simultaneous activity of two factors that decrease slope stability: a favourable structural predisposition (the course of fissures and disturbance of the massif) and an increase in relief steepness through either glacier activity (in the period of glaciation) or flowing water. Finally, the research has contributed to the knowledge of the history of a cultural heritage site. At the site of Rýzmburk (Giant Castle), affected by rocksliding, there are remnants of Celtic fortifications. Archaeological finds on this site were negligible, and the research of the archaeologists ended with the conclusion that the fortifications had never been finished. The current survey contributed to complementing this knowledge by a possible cause of the site having been abandoned – it seems that overloading of the already unstable slope on the eastern side of the citadel by the fortification being built may have resulted in its collapse and a rockslide of the entire eastern slope.



The position and general situation at localities of interest: the glacial valley of Prášíly Lake (Prášilské jezero) (above on the right) and the slope under Rýzmburk (Giant Castle) (below on the right). The dashed white lines show the studied slopes, the full white line the slope deformations. (Photo: Archives of the Institute of Rock Structure and Mechanics)

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Hartvich, F. – Mentlik, P. (2009): Slope development reconstruction at two sites in the Bohemian Forest Mountains. *Earth surface processes and landforms*, Vol. 34 (2009), DOI: 10.1002/esp.1932.

Other notable results:

1. Discovery of the first Quaternary maar in the Bohemian Massif, Central Europe, based on combined geophysical and geological surveys (*Institute of Geophysics*)
2. Thermal instability of the fluid column in a borehole: application to the Yaxcopoil hole (Mexico) (*Institute of Geophysics*)
3. Thickness of lithosphere in Europe (*Institute of Geophysics*)
4. The transport of heavy metals from a heavily contaminated drainage basin of the river Litavka during flood events (*Institute of Geology*)
5. Integrated stratigraphy and geochemistry of the Jurassic/Cretaceous boundary strata in the Tethyan and Boreal Realms (*Institute of Geology*)
6. Development of methods for the improvement of short-term torrential summer rainfall forecasting using remote meteorological measurements (*Institute of Atmospheric Physics*)
7. Climate-Change Impact on Drought in the Czech Republic (*Institute of Atmospheric Physics*)
8. Acoustic-gravity waves observed at the origin of the tropical zone and ionosphere (*Institute of Atmospheric Physics*)
9. Diagonally expanding chorus waves of the lower band: elements observed by Cluster satellites between discrete time lags (*Institute of Atmospheric Physics*)
10. Modified clay minerals (*Institute of Geonics*)
11. Pre-Conditional Methods for Modelling Physical Processes and Particularly the Rock Environment (*Institute of Geonics*)
12. Project of a fill of an intervertebral spacer for spinal treatment based on particle composites (*Institute of Rock Structure and Mechanics*)
13. Suspended Magnetic Separator with Large Blocks from Permanent NdFeB Magnets, Suspended above the Conveyor Belt, and the Magnetic Circuit for This Separator (*Institute of Rock Structure and Mechanics*)

4. Section of Chemical Sciences

The section joined six workplaces whose research focuses on the targeted synthesis and the structural and functional characterisation of new inorganic and organic compounds with a special focus on crystalline, composite, glass and polymeric materials and supramolecular or nanostructured systems. Another priority is research of the relations between the structure, properties and reactivity of materials associated with the clarification of temporally and spatially distinguished mechanism of their reactions, yielding a theoretical basis for applications. A substantial part of the activities is also the study of the chemical principles of the biological phenomena in biomedicine and ecology and the development of new chemotherapeutics, biologically active substances and polymeric biomaterials for targeted therapeutic applications. The research that 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 bioanalytical methods.

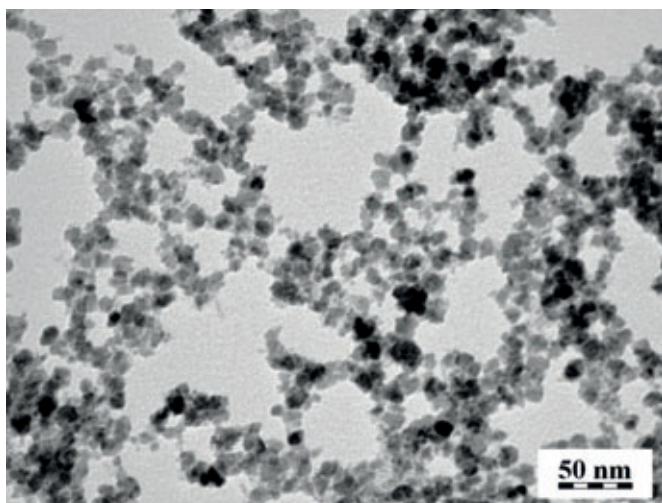
From the results from 2009, we present:

Superparamagnetic Nanoparticles for Cell Labelling (*Institute of Macromolecular Chemistry*)

Superparamagnetic iron oxide nanoparticles have been prepared by the precipitation of ferrous and ferric salts by ammonium hydroxide and subsequent oxidation, which was followed by their coating with biocompatible polymers – poly(N,N-dimethylacrylamide) and poly(L-lysine) using a new, original procedure (see the figure on the next page). These nanoparticles exhibited long-term colloidal stability. The study of the impact of a range of reaction parameters on the properties of the particles conducted in cooperation with the Institute of Macromolecular Chemistry and the Institute of Experimental Medicine resulted in the design of new contrast agents for cell labelling. The cells labelled in this way can be transplanted into the damaged (ill) tissue of the organism, with it being possible to monitor noninvasively and in the long term their direction, migration, proliferation, differentiation and overall fate using magnetic resonance imaging. The monitoring of the behaviour of transplanted

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cells is of key importance especially in regenerative medicine and tissue engineering. The effect of the newly developed agents for cell labelling is based on the significantly higher accumulation of nanoparticles in the cells as compared with commonly available agents thanks to their suitably modified surface. In practice, a much lower concentration of the agent is needed than before, which is less harmful to the organism of the patient. The biocompatibility, utility and a high efficiency of cell labelling by newly developed nanoparticles have been verified on human mesenchymal stem and spinal precursor cells as well as the islets of Langerhans (important for the treatment of diabetes).



A microphotograph from a transmission electron microscope of superparamagnetic nanoparticles for cell labelling. The ca 10 nm nanoparticles with a modified surface were prepared by the precipitation of ferrous and ferric salts in alkaline medium, oxidised and coated with poly(N,N-dimethylacrylamide).

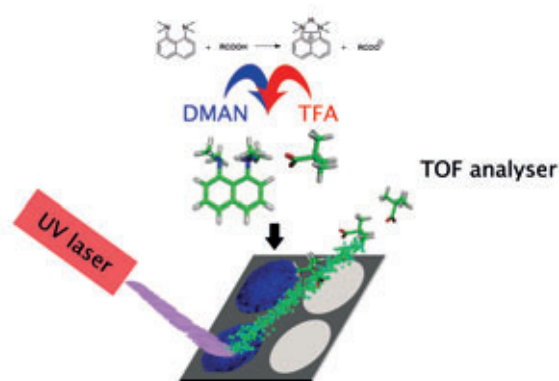
(Photo: Archives of the Institute of Macromolecular Chemistry)

Horák, D. – Babič, M. – Jendelová, P. – Herynek, V. – Trchová, M. – Likavčanová, K. – Kapcalová, M. – Hájek, M., – Syková, E.: The effect of different magnetic nanoparticle coatings on the efficiency of stem cell labeling. *Journal of Magnetism and Magnetic Materials*. Vol. 321, 10 (2009), pp. 1539–1547.

Babič, M. – Horák, D. – Jendelová, P. – Glogarová, K. – Herynek, V. – Trchová, M. – Likavčanová, K. – Hájek, M. – Syková, E.: Poly(N,N-dimethylacrylamide)-coated maghemite nanoparticles for stem cell labeling. *Bioconjugate Chemistry*. Vol. 20, 2 (2009), pp. 283–294.

MAILD (Matrix-Assisted Ionisation/Laser Desorption) – A New Method for Targeted Metabolomics

(Institute of Organic Chemistry and Biochemistry)



MAILD (Matrix-Assisted Ionisation/Laser Desorption) – a new method for targeted metabolomics. The mass spectra acquired by the MAILD method from diverse biological materials: (a) a leaf of thale cress (*Arabidopsis thaliana*), (b) male and female fruit flies (*Drosophila melanogaster*), (c) the wing of a pea aphid (*Acyrtosiphon pisum*), (d) a drop of human blood.

(Photo: Archives of the Institute of Organic Chemistry and Biochemistry)

The employees of the institute have developed a new technology called Matrix-Assisted Ionisation/Laser Desorption (MAILD), which is based on the already classic method of mass spectrometry (MALDI-TOF/MS). It makes it possible to distinguish between the great amount of metabolites in biological material, which opens doors for so-called targeted high-capacity metabolomics. The new MAILD method lies in finding the so-called ‘smart matrices’, which in and of themselves do not produce any undesirable ions disrupting the mass spectrum. It is precisely these disrupting ions that used to make the analysis of small molecules that play an essential role in the metabolism of various organisms impossible. The undesirable ions coming from the standard matrices can thus be compared to a haystack in which we attempt to find a few small but very important needles. Hence, instead of further improving the search for needles, i.e. metabolites (sugars, fatty acids, amino acids and other organic compounds), scientists have begun to devise matrices which would retain their function but also not allow the creation of ions disrupting the measurement of metabolites; in other words, they have endeavoured to remove the haystack and make the needles vis-

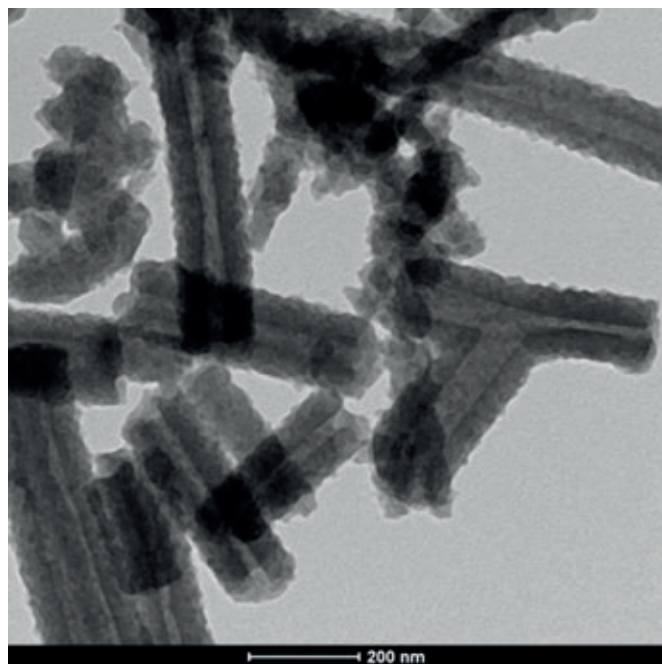
SCIENTIFIC ACTIVITY

ible. They have found assistance in the application and combination of the basic concepts of physical and organic chemistry, and the authors have succeeded in this effort of theirs.

Cooperating entity: MPI for Chemical Ecology, Jena, Germany

Shroff, R. – Rulišek, L. – Doubský, J. – Svatoš, A.: *Acid-base-driven matrix-assisted mass spectrometry for targeted metabolomics. Proc. Natl. Acad. Sci. U. S. A., Vol. 106, 25 (2009), pp. 10092–10096.*

New Materials Based on Conducting Polymers (Institute of Macromolecular Chemistry)



Polyaniline nanotubes. The scale shows a length of 200 nm.
(Photo: Archives of the Institute of Macromolecular Chemistry)

In 2009, the research of conducting polymers, in particular polyaniline, was oriented in two directions. Within the first, the preparation of materials with high electrical conductivity, the employees found that when the film of a conducting polymer, polyaniline, is placed in an acid solution, its conductivity increases by up to three orders of magnitude, thus approaching the conductivity of metals,

such as mercury. The increase in conductivity is explained by the mixed electron and proton conductivity of polyaniline; the latter type of conductivity becomes effective precisely in aqueous media. It was further found that the reaction between two non-conductive substances, aniline and silver nitrate, yields a composite composed of two conducting moieties, polyaniline and silver. The reaction normally requires several months; using the new procedure, it may be implemented in minutes or hours. The resulting materials have conductivity of 103 S cm^{-1} , three orders of magnitude higher than polyaniline alone. The second direction concerned the preparation of new nanostructures produced by conducting polymers. The reaction conditions leading to polyaniline nanotubes were optimised. These were subsequently carbonised to yield nitrogen-enriched carbon nanotubes. An entirely new material is produced, suitable for applications currently using multi-wall carbon nanotubes. The application potential of polyaniline-based materials includes heterogeneous organic catalysis, fuel-cell electrodes, metal corrosion protection, sensors, and highly conductive materials for electronics, etc.

Stejskal, J. – Bogomolova, O. E. – Blinova, N. V. – Trchová, M. – Šeděnkov, I. – Prokeš, J. – Sapurina, I.: *Mixed electron and proton conductivity of polyaniline films in aqueous solutions of acids: beyond 1000 S cm^{-1} limit. Polymer International. Vol. 58, 8 (2009), pp. 872–879.*

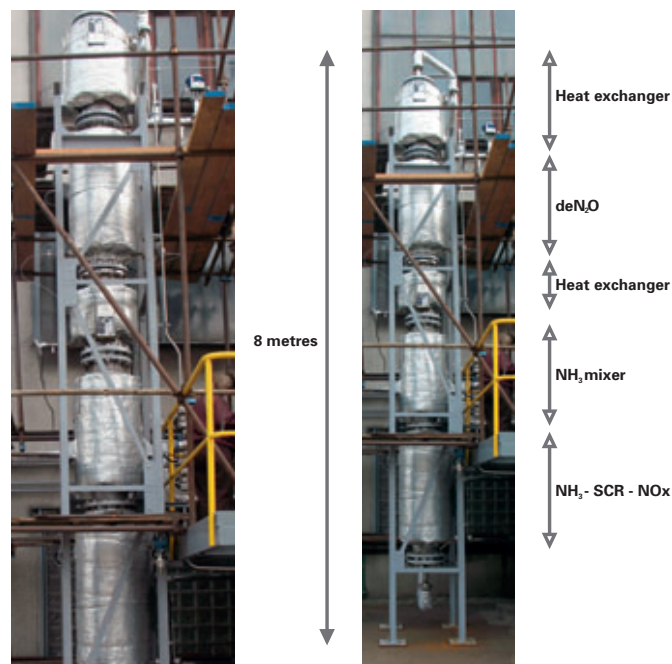
Trchová, M. – Konyushenko, E. N. – Stejskal, J. – Kovářová, J. – Čirić-Marjanović, G.: *The conversion of polyaniline nanotubes to nitrogen-containing carbon nanotubes and their comparison with multi-wall carbon nanotubes. Polymer Degradation and Stability. Vol. 94, 6 (2009), pp. 929–938.*

Blinova, N. V. – Stejskal, J. – Trchová, M. – Sapurina, I. – Čirić-Marjanović, G.: *The oxidation of aniline with silver nitrate to polyaniline-silver composite. Polymer. Vol. 50, (2009), pp. 50–56.*

Konyushenko, E. N. – Trchová, M. – Stejskal, J.: *The Role of Acidity Profile in the Nanotubular Growth of Polyanilin. Chem. Pap. Vol. 64, (2009), pp. 56–64.*

Catalysts for the Reduction of NO_x and N₂O in Process Gases

(J. Heyrovský Institute of Physical Chemistry)



Test-unit catalysts for the reduction of NO_x and N₂O in the process gases from the production of nitric acid (Photo: Archives of the Jaroslav Heyrovský Institute of Physical Chemistry)

The combination of multinuclear MAS NMR experiments with QM/MM calculations along with the UV-Vis spectra of transition metal ions allowed the authors to proceed from the identification of siting and distribution of Al atoms in the skeleton of zeolites to the development of original syntheses of zeolites with controlled distribution of the negative charge in the skeleton, which are a subject of a patent application. These approaches further led to the preparation of active cationic and oxocation complexes in zeolites that exhibit high selective activity in the reactions of the transformation of NO, NO₂ and N₂O to nitrogen. The results arising from the basic structural analyses of the well-defined crystalline solids were then the subject of an optimisation of a Cu-zeolite-based catalyst for the selective reduction of NO_x by ammonium, which comes from our own earlier patented preparation method. The combination of the NO_x catalyst and the Fe-zeolite-based catalyst

also prepared according the patent application of the institute and optimised for N₂O-decomposition reactions resulted in the design of a two-step system for simultaneous reduction of NO_x and N₂O. The high efficiency of both catalysts was verified in 2009 using a testing unit during NO_x and N₂O reduction in real output process gases from the production of nitric acid.

Cooperating entity: Euro Support Manufacturing Czechia, s.r.o. and the Research Institute of Inorganic Chemistry, Ltd.

Dědeček, J. – Sklenák, S. – Li, C. B. – Gao, F. – Brus, J. – Zhu, J. Q. – Tatsumi, T.: Effect of Al/Si Substitutions and Silanol Nests on the Local Geometry of Si and Al Framework Sites in Silicone-Rich Zeolites: A Combined High Resolution Al-27 and Si-29 NMR and Density Functional Theory/Molecular Mechanics Study. J. Phys. Chem. C. Vol. 113, (2009), pp. 14454–14466.

Dědeček, J. – Sklenák, S. – Li, C. B. – Wichterlová, B. – Gábová, V. – Brus, J. – Sierka, M. – Sauer, J.: Effect of Al-Si-Al and Al-Si-Si-Al Pairs in the ZSM-5 Zeolite Framework on the Al-27 NMR Spectra. A Combined High-Resolution Al-27 NMR and DFT/MM Study. J. Phys. Chem. C. Vol. 113, (2009), pp. 1447–1458.

Nováková, J. – Sobalík, Z.: N₂O Decomposition over Fe-Ferrierite: Primary and Secondary Reactions with Reducing Agents. Catalysis Letters. Vol. 127, (2009), pp. 95–100.

Sklenák, S. – Andrikopoulos, P. – Boekfa, B. – Jansang, B. – Nováková, J. – Benco, L. – Bucko, T. – Hafner, J. – Dědeček, J. – Sobalík, Z.: N₂O decomposition over Fe-zeolites: Structure of the active sites and the origin of the distinct reactivity of Fe-ferrierite, Fe-ZSM-5, and Fe-beta. A combined periodic DFT and multispectral study. J. Catal., in print.

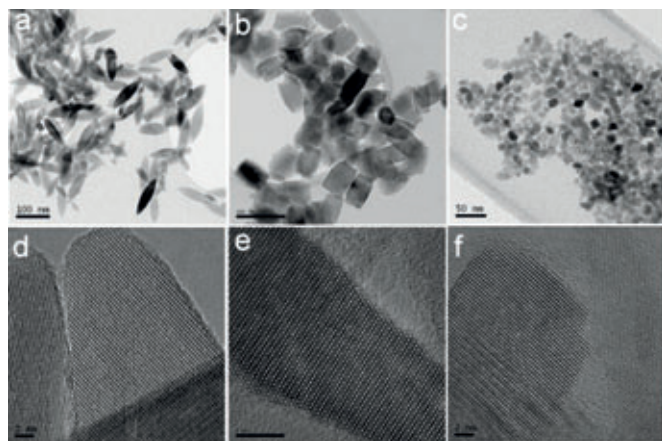
Sobalík, Z. et al.: Process for preparing a catalyst for selective catalytic reduction of nitrogen oxides based on Cu-zeolites. Patent CZ284749.

Sobalík, Z. et al.: Process for preparing a zeolite-based catalyst for removing nitrogen oxides from exhaust gases by reduction with hydrocarbons. Patent CZ293917.

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New Generation of Photocatalytically Active Pigments for Applications in the Ultraviolet and Visible Areas of Light

(Institute of Inorganic Chemistry)



The morphology of TiO₂ particles prepared from peroxocomplexes.

The pictures from the high-resolution transmission electron microscope show that the hydrolysis of titanium peroxocomplexes yields monodispersive titania (a, d). Doping changes the shape as well as the size of the particles (doping with neodymium – b, e; doping with tungsten – c, f). (Photo: Archives of the Institute of Inorganic Chemistry)

The photocatalytic activity of materials based on titania is well known and currently used in a number of applications. Doping with other elements both in the cation and anion sublattice is used to shift the activity from the ultraviolet into the visible area of light. The materials are modified with zirconium, iron, aluminium, neodymium and/or cerium oxides or with zinc, cadmium, indium and/or ruthenium sulphides. Using the hydrolysis of titanium peroxocomplexes, the authors succeeded in the preparation of monodispersive photocatalytic titania (see Figs a and d), materials doped with neodymium (see Figs b and e) and, for the first time, materials doped with tungsten (see Figs c and f), because the method of homogenous hydrolysis of TiOSO₄ in aqueous solutions in the presence of urea, used so far, is inappropriate for doping tungsten. As the analysis shows, the doping of metals in crystalline lattices changes the morphology of particles (see Figs a–c). A HRTEM (High-Resolution Transmission Electron Microscope) analysis showed that the crystal structure of particles is well developed with an interlayer distance of atoms of $d = 0.354\text{--}0.387$ nm (see Figs d, e and f), which is evi-

dence for the presence of dopants in the crystalline structure of the particles causing an expansion of the crystal lattice. A simple modification of the reaction method produces titania as a powder, or as a stable gel which can be used as the starting material for the preparation of highly-active transparent photocatalytic layers. The decomposition of peroxocomplexes as against other reaction methods has one great advantage, namely that it is a one-step procedure and the reaction residue is pure water. Another great advantage of this method is that it is easy to transfer to the production of low-cost photocatalytic pigment.

Černý, Z. – Štengl, V.: *Způsob výroby fotokatalyticky aktivního monodispersního oxidu titaničitého*, Granted Patent No. 301 006 (2009).

Murafa, N. – Štengl, V. – Houšková, V.: *Monodispersed spindle-like particles of titania*. *Microscopy and Microanalysis*. Vol. 15, (2009), pp. 1036–1037.

Other notable results:

1. Fast and selective separation and sensitive detection of microbial strains and biopolymers by zone electrophoresis and isoelectric focusing (*Institute of Analytical Chemistry*)
2. Solubilities of organic nonelectrolyte solids in pressurized hot water (*Institute of Analytical Chemistry*)
3. System effects in sample self-stacking CZE: Single analyte peak splitting in salt-containing samples (*Institute of Analytical Chemistry*)
4. Divergent flow isoelectric focusing: A fast and efficient method for protein sample preparation of mass spectrometry (*Institute of Analytical Chemistry*)
5. Chemical vapour generation of metals with atomic absorption spectrometry detection: radiotracer efficiency study and characterization of volatile species (*Institute of Analytical Chemistry*)
6. Investigation of the thermal denaturation of barley nonspecific lipid transfer protein 1 (ns-LTP1b) by nuclear magnetic resonance and differential scanning calorimetry (*Institute of Analytical Chemistry*)
7. Light-controlled synthetic carriers of gaseous molecules based on borane clusters (*Institute of Inorganic Chemistry*)

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8. A new method of chemostratographical correlation of lake and fine river sediments
(*Institute of Inorganic Chemistry*)
9. Doping of single-wall carbon nanotubes
(*J. Heyrovský Institute of Physical Chemistry*)
10. Nanosecond Time-Dependent Stokes Shift at the Tunnel Mouth of Haloalkane-Dehalogenase Enzymes
(*J. Heyrovský Institute of Physical Chemistry*)
11. Electrochemical alkoxylation
(*Institute of Chemical Process Fundamentals*)
12. Advanced materials for applications in the environment
(*Institute of Chemical Process Fundamentals*)
13. A new method of helicene synthesis by cycloisomerisation
(*Institute of Chemical Process Fundamentals*)
14. New types of polymeric nanocomposites with excellent mechanical properties
(*Institute of Macromolecular Chemistry*)
15. 6-Hetaryl-7-deazapurine ribonucleosides – a novel type of nanomolar cytostatics
(*Institute of Organic Chemistry and Biochemistry*)
16. Synthesis and properties of long helical aromatics
(*Institute of Organic Chemistry and Biochemistry*)

5. Section of Biological and Medicinal Sciences

The section associated eight workplaces whose research is focused on the processes in living systems at various levels of their organisation. Special attention is paid to the development of genomics, proteomics and system biology as bases for future biomedicine and biotechnologies. Biomedical research is particularly focused on the knowledge of the biophysical properties of living systems, the mechanisms of the function and disorders of the nervous, immune, cardiovascular and reproductive systems, their being influenced by external factors, 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 2009, we present:

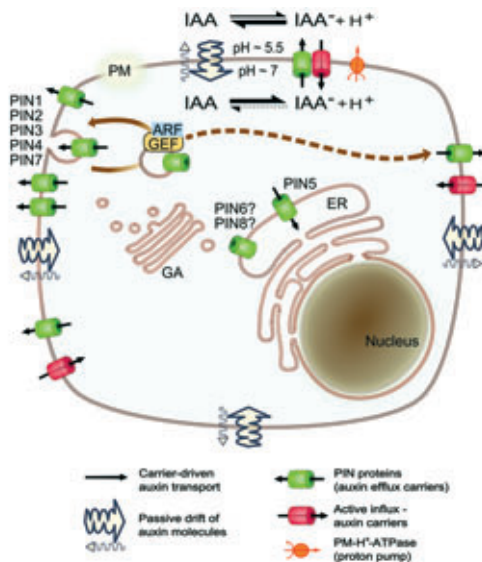
A New Mechanism of the Regulation of the Level of the Key Phytohormone Auxin in Plant Cells (*Institute of Experimental Botany*)

The right level of the phytohormone auxin in each part of the plant is necessary for its proper development. Therefore, a plant precisely regulates the concentrations of auxin in tissues and cells. What is controlled is not only biosynthesis and decomposition of this hormone in individual cells but also its transport between cells.

PIN proteins play a decisive role in auxin's flow through a plant. In the model plant *Arabidopsis thaliana*, the PIN transporter protein family has eight members, whose structure determines two subgroups in this family. PIN proteins from the larger of the two subgroups are part of the plasma membrane on the cell surface and catalyse the export of auxin molecules from the cell; their function

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has been known for a few years already. Two PIN proteins (PIN5 and PIN8), however, differ significantly in their structure from the other members of the family and their function has not been elucidated up to now. The authors have found that these two proteins are localised inside of cells and transport auxin molecules between the cytoplasm and endoplasmic reticulum. In the endoplasmic reticulum, the auxin molecules are converted into compounds without hormonal effects. This has clarified a so-far-unknown mechanism of how plants can regulate the level of auxin in cells, and hence also their subsequent development. This finding has the potential for being implemented also in practice – e.g. in controlling the growth of agriculturally important crops and in their targeted breeding.



Scheme of the polar flow of auxin through a plant cell. Scheme of a plant cell with marked PIN-type carriers with the indicated function.
(Photo: Archives of the Institute of Experimental Botany)

Cooperating entity: Flanders Institute for Biotechnology and the University of Ghent (VIB), Belgium

Petrášek, J. – Friml, J.: Auxin transport routes in plant development. Development. Vol. 136, 16 (2009), pp. 2675–2688.

Křeček, P. – Skůpa, P. – Libus, J. – Naramoto, S. – Tejos, R. – Friml, J. – Zažímalová, E.: The PIN-FORMED (PIN) protein family of auxin transporters. Genome Biology.

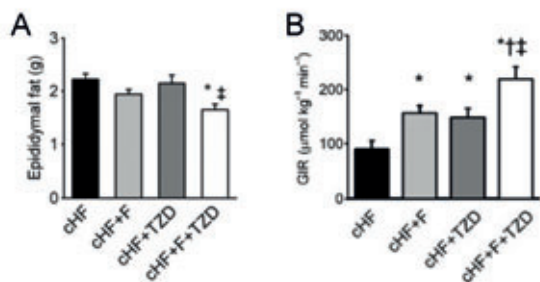
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Mravec, J. – Skůpa, P. – Bailly, A. – Hoyerová, K. – Křeček, P. – Bielach, A. – Petrášek, J. – Zhang, J. – Gaykova, V. – Stierhof, Y. D. – Dobrev, P. – Schwarzerová, K. – Rolčík, J. – Seifertová, D. – Luschnig, Ch. – Benková, E. – Zažímalová, E. – Geisler, M. – Friml, J.: Subcellular homeostasis of phytohormone auxin is mediated by the ER-localized PIN5 transporter. Nature. Vol. 459, 7250 (2009), pp. 1136–1140.

Novel Possibilities of the Use of Saltwater Fish Lipids for the Prevention and Treatment of Obesity and Associated Disorders

(Institute of Physiology)

The mechanisms by which omega-3 polyunsaturated fatty acids (omega-3 acids) from saltwater fish hinder the emergence of the health problems associated with obesity are systematically studied at the Department of Adipose Tissue Biology of the Institute of Physiology of the ASCR. In experiments on mice, the authors demonstrated that dietary intake of omega-3 acids: 1) partially prevents obesity induced by a high-fat diet; 2) stimulates the creation of mitochondria and burning of lipids specifically in adipose tissue and the small intestine, which limits the negative effects of the deposition of lipids in other tissues; 3) induces the release of insulin-sensitising hormone adiponectin from adipose tissue. In cooperation with the Norwegian company, PronovaBiopharma, chemical derivatives of omega-3 acids with strong antidiabetic effects were developed and patented. In spite of the fact that omega-3 acids do not affect insulin resistance in diabetic patients, it was discovered in tests on mice that omega-3 acids augment the efficacy of thiazolidinediones (TZD), insulin-sensitising drugs. Only the combined administration of omega-3 acids and TZD rosiglitazone reduced the accumulation of body fat. The improvement in insulin sensitivity was the result of the synergistic action of omega-3 acids and rosiglitazone on the muscles. The combined application of n-3 PUFA and TZD may reduce the TZD dosage in patients with diabetes and limit the undesirable side-effects as well as the cost of the therapy. The new treatment is now being tested at the Centre of Diabetology at the Institute for Clinical and Experimental Medicine in Prague.



Omega-3 unsaturated fatty acids improve the sensitivity to insulin.

The influence of the long-term application of omega-3 PUFA (CHF+F), rosiglitazone (CHF+TZD) or their combination (CHF+F+TZD), in comparison with the control group of mice fed a high-fat diet (CHF), on the mass of epididymal fat body in the abdomen (A) and the body-wide sensitivity to insulin (B) of the evaluated amount of the glucose infusion rate in the course of the euglycemic hyperinsulinemic clamp. (Photo: Archives of the Institute of Physiology)

Cooperating entities: PronovaBiopharma AS, Lysaker; and EPAX AS, Aalesund, Norway.

Van Schothorst, E. M. – Vlacha, P. – Franssen-van Hal, N. L. – Kuda, O. – Bunschoten, A. – Molthoff, J. – Vink, C. – Hooiveld, G. J. – Kopecký, J. – Keijer, J.: Induction of lipid oxidation by polyunsaturated fatty acids of marine origin in small intestine of mice fed a high-fat diet. *BMC Genomics*. Vol. 10, (2009), p. 110, doi:10.1186/1471-2164-10-110.

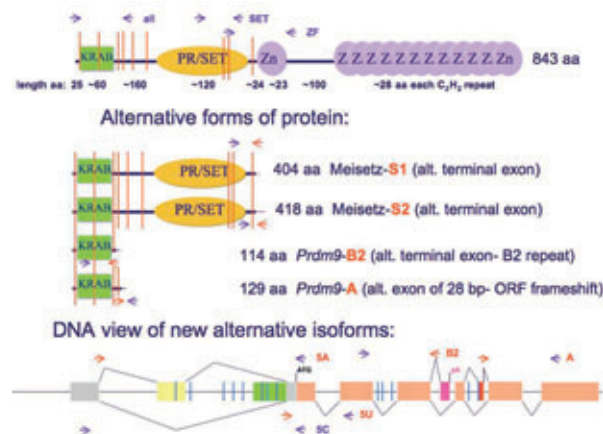
Rossmesl, M. – Jeleník, T. – Jilková, Z. – Slámová, K. – Kůs, V. – Hensler, M. – Medníková, D. – Povýšil, C. – Flachs, P. – Mohamed-Ali, V. – Bryhn, M. – Berge, K. – Holmeide, A. K. – Kopecký, J.: Prevention and reversal of obesity and glucose intolerance in mice by DHA-derivatives. *Obesity*. Vol. 17, 5 (2009), pp. 1023–1031. Bryhn, M. – Holmeide, A. K. – Kopecký, J.: New DHA derivatives and their use as medicaments. Patent in the USA (US 7,550,613 B2), 2009.

Kopecký, J. – Rossmesl, M. – Flachs, P. – Kuda, O. – Jilková, Z. – Staňková, B. – Tvrzická, E. – Bryhn, M.: n-3 polyunsaturated fatty acids: bioavailability and modulation of adipose tissue function. *Proceedings of the Nutritional Society*. Vol. 68, 4 (2009), pp. 361–369. Kuda, O. – Jeleník, T. – Jilková, Z. – Flachs, P. – Rossmesl, M. – Hensler, M. – Kazdová, L. – Obstoř, N. – Baranowski, M. – Gorski, J. – Janovská, P. – Kůs, V. – Polák, J. – Mohamed-Ali, V. – Burcelin, R. – Cinti, S. – Bryhn, M. – Kopecký, J.: n-3 fatty acids and rosiglitazone improve insulin sensitivity through additive stimulatory effects on muscle glycogen synthesis in mice fed a high-fat diet.

Diabetologia. Vol. 52, 5 (2009), pp. 941–951.

Identification of the First Vertebrate Hybrid Sterility Gene (Institute of Molecular Genetics)

A prerequisite for the origin of new animal or plant species is the establishment of an interspecific reproductive barrier between the incipient species and related taxa. Already a hundred and fifty years ago, the existence of such a barrier was anticipated by Darwin, who knew about infertility of hybrids originating, for example, from crosses between the donkey and horse, but he could not explain it by his theory of the origin of species. Thirty-five years ago, the authors of the presented work genetically mapped the first gene that is responsible for such reproductive isolation in hybrids between related subspecies of house mouse (*Mus musculus*). After many years of work, the gene was finally identified as *Prdm9*, gene coding lysine 4 H3 histone trimethyltransferase enzyme. Besides the biochemical and cytological evidence, a functional proof was obtained. The authors removed male sterility by transferring the ‘fertile’ form of the *Prdm9* gene by means of artificial bacterial chromosomes into the genome of the interspecific hybrid, which subsequently began to produce functional sperm.



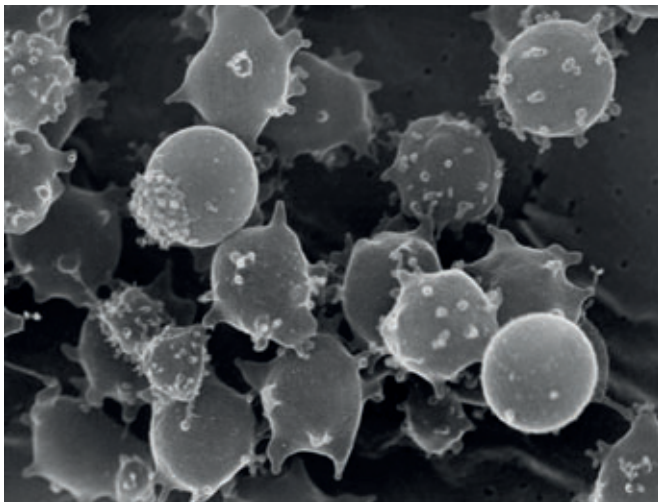
The predicted alternative forms of the *Prdm9*(hybrid sterility gene)-coded protein. KRAB, PR/SET and Zn are protein domains. Sterile and fertile allelic forms of protein differ in the number of zinc fingers (Zn). This part of the molecule shows strong positive selection in the course of evolution. (Photo: Archives of the Institute of Molecular Genetics)

SCIENTIFIC ACTIVITY

Mihola, O. – Trachtulec, Z. – Vlcek, C. – Schimenti, J. C. – Forejt, J.: *A mouse speciation gene encodes a meiotic histone H3 methyltransferase. Science. Vol. 323, 5912 (2009), pp. 373–375.*

Oligomers of Bacterial Toxins are Involved in Pore Formation in Cell Membrane (Institute of Microbiology)

The first direct physical evidence was provided that the bacterial toxin from the RTX protein family forms oligomers in the cell membrane. It was shown that oligomerisation is a condition for adenylate cyclase (AC) toxin pore formation in the cell membrane. The translocation of the enzymatic AC domain of the toxin through target cell membrane is then ensured by toxin monomers, which do not enter the oligomers. The mechanism of the activity of the toxin at the cell membrane thus involves two parallel and mutually independent activities, the formation of pores and the translocation of the AC enzyme through cell membrane. This priority result is important for the construction of new types of tools for the delivery of vaccine antigens into immune-system cells, for the induction of protective immunity to infections and for the development of novel methods of tumour immunotherapy.



The creation of membrane protuberances on erythrocytes elicited by the activity of the membrane pores formed by the adenylate cyclase toxin. A picture from a scanning electron microscope (enlarged 10,000x).
(Photo: Archives of the Institute of Microbiology)

Cooperating entities: doc. J. Cerny, Faculty of Natural Sciences, and Prof. R. Benz, University of Würzburg, Germany

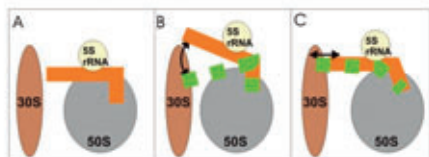
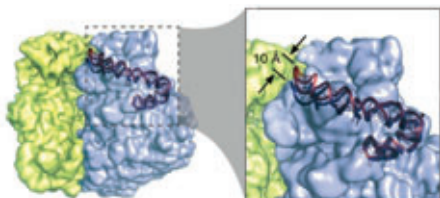
Vojtova-Vodolanova, J. – Basler, M. – Osicka, R. – Knapp, O. – Maier, E. – Cerny, J. – Benada, O. – Benz, R. – Sebo, P.: *Oligomerization is involved in pore formation by Bordetella adenylate cyclase toxin. FASEB J. Vol. 23, (2009), pp. 2831–2843.*

Dynamics of the Base of Ribosomal A-site Finger Revealed by Molecular Dynamics Simulations and Cryo-EM (Institute of Biophysics)

A-site finger (Helix 38) of the large ribosomal subunit is an important functional and dynamic segment of the ribosome which is involved in the regulation of ribosomal translocation and signal transfer between both ribosomal subunits. The authors conducted molecular dynamics simulations on the A-site finger elbow segments from the large subunit of the archaeal ribosome and three large bacterial ribosomal subunits. The study showed that although the studied ribosomal segments have unconserved secondary structures, they adopt an almost identical spatial arrangement and exhibit similar stochastic fluctuations. A comparison of the geometries of the segments from the simulations with structures obtained via cryo-electron microscopy in cooperation with our partners showed that the experimental structures and the structures from the simulations exhibited the same direction of fluctuations. Based on the results obtained, the authors suggested that the dynamics of the elbow segments are coupled with the functional movement of the A-site finger in the course of protein synthesis. The results gained thus proved that although the respective ribosomal segments at first sight do not exhibit any conservation on the level of sequences and secondary structures, their topology and elasticity are clearly conserved and are crucial in terms of function. During our studies of flexible ribosomal segments, a frequent occurrence of direct intermolecular hydrogen bonds between RNA phosphate groups and the bases was observed. In cooperation with our foreign partners, a detailed analysis of these interactions in the entire ribosome has been carried out, which led to a significant extension of the classification of the basic molecular interactions in RNA. In the broader context, this research thus convincingly demonstrated that modern theoretical meth-

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odologies can supply the required physical-chemistry information on the RNA structural dynamics, which cannot be determined using the standard methods of structural biology and bioinformatics.



The structure and dynamics of the Helix 38 base of the large bacterial ribosomal subunit (A-site finger). Above: a cryo-electron map of the ribosome with a marked A-site finger (represented by a ribbon), which leads from the large subunit (depicted in blue) to the small subunit (depicted in yellow). The picture shows the movement of the end of the A-site finger in the range of 10 Å during the translational cycle. Centre: a detail of two structures from cryo-EM (depicted in light and dark pink) and the crystal structure (depicted in green). The folding of the structures across one shoulder shows a significant movement in the other shoulder. Below: the movement mechanism of the A-site finger proposed based on simulations.

(A) Schematic depiction of the A-site finger (depicted in orange) with respect to the 5S rRNA and the small (30S) and large subunits (50S). The other two pictures (B and C) show the possible movements of the A-site finger in the ribosome. B shows the movement up and down, whereas C shows the movement forward and backward.

(Photo: Archives of the Institute of Biophysics)

Réblová, K. – Rázga, F. – Li, W. – Gao, H. – Frank, J. – Šponer, J.: Dynamics of the base of ribosomal a-site finger revealed by molecular dynamics simulations and cryo-EM. *Nucleic Acids Research*, Vol. 38, 4, pp. 1325–1340.

Zirbel, C. L. – Šponer, J. E. – Šponer, J. – Stombaugh, J. – Leontis, N. B.: Classification and energetics of the base-phosphate interactions in RNA. *Nucleic Acids Research*. Vol. 37, 15 (2009), pp. 4898–4918.

Ditzler, M. A. – Otyepka, M. – Šponer, J. – Walter, N. G.: Molecular dynamics and quantum mechanics of RNA: Conformational and chemical change we can believe. *Accounts Chemistry Research*, Vol. 43, 1 (2010), pp. 40–47.

Other notable results:

1. Arrangement of human telomeric DNA quadruplexes in physiologically-relevant potassium solutions (*Institute of Biophysics*)
2. Epigenetic regulation of chromatin and the significance of SUV39h histone methyltransferases (*Institute of Biophysics*)
3. The suppression of tumour growth *in vivo* by the mitocan α -tocopheryl succinate requires respiratory complex II (*Institute of Biotechnology*)
4. Compiling and implementing guidelines for the optimisation of RT-qPCR assays and processing their results (*Institute of Biotechnology*)
5. Loss of dispersion energy changes the stability and folding/unfolding equilibrium of the Trp-Cage protein (*Institute of Biotechnology*)
6. Expression and localisation of seminal plasma acrosin inhibitor in the boar reproductive tract (*Institute of Biotechnology*)
7. Gestational Diabetes Mellitus influences the transcription programmes in the developing embryo (*Institute of Biotechnology*)
8. Detection and molecular characterisation of a new type of unconventional memory B-lymphocytes in humans (*Institute of Biotechnology*)
9. Role of inhibiting G-proteins in hypertension: coupling of noradrenergic hyperactivity and increased calcium influx (*Institute of Physiology*)
10. Signalling by purinergic P2X receptors and their role in hypophysis (*Institute of Physiology*)
11. Yeast stress granules (*Institute of Microbiology*)
12. The antiradical activity of flavonoid silybine (*Institute of Microbiology*)
13. Biodegradation of endocrine-disruptive compounds and suppression of estrogenic activity by ligninolytic fungi (*Institute of Microbiology*)

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14. In Vivo Expansion of Activated Naive CD8+ T Cells and NK Cells Driven by Complexes of IL-2 and anti-IL-2 Monoclonal Antibody As a Novel Approach of Cancer Immunotherapy (*Institute of Microbiology*)
15. Sulphur and nitrogen partly replace phosphor in phytoplankton phospholipids (*Institute of Microbiology*)
16. New microscopic technique using confocal electron microscopy (*Institute of Microbiology*)
17. The Influence of the Nod2 gene mutation on the pathogenesis of Crohn's disease (*Institute of Microbiology*)
18. Mutasynthesis of Lincomycin Derivatives with Activity against Drug-Resistant Staphylococci (*Institute of Microbiology*)
19. Preparation and immunological testing of dimer disaccharides connected with cross-links of a defined length (*Institute of Microbiology*)
20. Clinical experience with anthracycline antibiotics-HPMA copolymer-human immunoglobulin conjugates (*Institute of Microbiology*)
21. Phytopathogenic fungi causing disease in walnut trees (*Institute of Microbiology*)
22. Hormonal control in plant development (*Institute of Experimental Botany*)
23. Particles in pollen grains serve for RNA storage and protein production (*Institute of Experimental Botany*)
24. Urinary 8-oxodeoxyguanosine levels in children exposed to air pollutants are a sensitive biomarker for measuring of the exposure of children to polluted air (*Institute of Experimental Medicine*)
25. Biomarkers of exposure to tobacco smoke and environmental pollutants in mothers and their transfer to the foetus (DNA adducts, oxidative damage) (*Institute of Experimental Medicine*)
26. The Postischemic Environment Differentially Impacts Teratoma or Tumor Formation After Transplantation of Human Embryonic Stem Cell-Derived Neural Progenitors (*Institute of Experimental Medicine*)
27. Industasis, a Promotion of Tumor Formation by Nontumorigenic Stray Cells (*Institute of Molecular Genetics*)
28. A mutation linked to retinitis pigmentosa in HPRP31 causes protein instability and impairs its interactions with spliceosomal snRNPs (*Institute of Molecular Genetics*)
29. The issue of cancer research and the possibilities of the study of tumour biomarkers (*Institute of Animal Physiology and Genetics*)
30. The effect of reduced glutathione, surfactants and ion strength on the detection of metallothioneins as determined by Brdlička's reaction (*Institute of Animal Physiology and Genetics*)
31. British Celtic Lem: New knowledge of the small mammal phylogeography (*Institute of Animal Physiology and Genetics*)
32. *Bifidobacterium bombi* sp. nov., from the bumblebee digestive tract (*Institute of Animal Physiology and Genetics*)

6. Section of Biological and Ecological Sciences

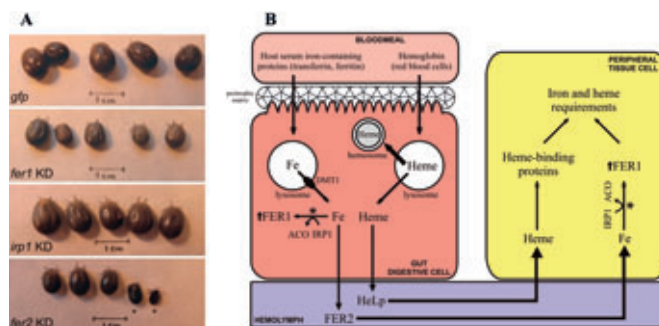
The section associated four workplaces whose research is focused on the mutual relations between organisms, between organisms and the environment and on the functional mechanisms in ecosystems with respect to the anthropogenic effects. The objective is to understand the key processes with the possibility of using the results in medicinal, biotechnological, veterinary and agricultural practice as well as 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 2009, we present:

Discovery of a Tick Ferritin 2, a Novel Iron-Transporting Protein as a Candidate for Anti-Tick Vaccine (Biology Centre)

During research on the hard tick (*Ixodes ricinus*), the vector of tick-borne encephalitis and Lyme borreliosis, and the ways it manages the surplus of iron originating from the host's blood, the authors discovered a so-far unknown protein designated as ferritin 2. Unlike the already earlier described ferritin 1, serving for intracellular iron storage, the newly-discovered ferritin 2 is secreted into the body fluid (hemolymph) of the tick. The functions of ferritin 1, ferritin 2 and the iron-regulatory protein (IRP) were studied using a method of RNA interference, which makes it possible specifically to block their production. Surprisingly, it was demonstrated for the newly discovered ferritin 2 that

its main role is in iron transport from the tick's digestive tract to other organs, mainly the salivary glands or ovaries. Impairment of the iron metabolism had a negative impact on reproduction and further development of the ticks. The most important result was the discovery that the suppression of the production of ferritin 2 led to a limitation of the ticks' ability to feed on the host, with more than half of the ticks dying during blood feeding on the host. A similar effect was achieved also during experimental vaccination of rabbits with recombinant ferritin 2, where the antibodies imbibed with the host blood efficiently blocked ferritin 2 in the tick's gut. This fact, together with a remarkable molecular difference from the ferritins of mammalian hosts, makes the tick ferritin 2 a promising candidate for an efficient 'anti-tick' vaccine limiting the ability of the ticks to feed and thanks to their weakening also the risk of the transmission of the pathogenic progenitors of infectious diseases. The potential veterinary use of ferritin 2 is protected by a Czech* as well as an international** patent claim. The pilot tests of this vaccine on cattle have already been performed within foreign cooperation and the results achieved greatly support further development towards commercialisation of this vaccine and its broad application, especially in the countries where economical losses caused by tick feeding in the livestock production are enormous.

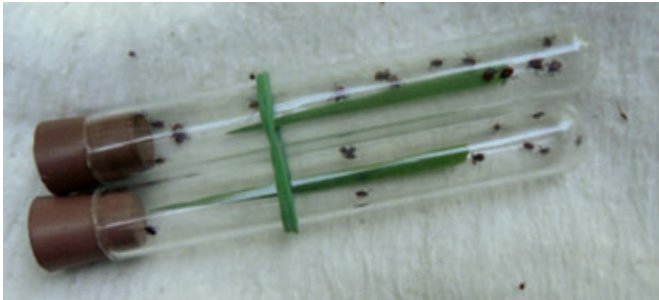


Tick ferritin 2: a novel iron-transporting protein and candidate anti-tick vaccine.

Panel A: The influence of RNA interference on the ticks' ability to feed on the host. GFP – the group injected with the control (GFP) two-fibre RNA; Irf1 KD – the influence of the suppression of the intracellular ferritin 1; Irp1 KD – the influence of the suppression of the iron-regulatory protein (IRP); Irf2 KD – the influence of the suppression of the secreted ferritin 2.

Panel B: Model scheme of the metabolism of iron in ticks.

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The phases of the research at which males and females are studied separately.
(Photo: Archives of the Institute of Parasitology of the Biology Centre)

Hajdušek, O. – Sojka, D. – Kopáček, P. – Burešová, V. – Franta, Z. – Šauman, I. – Winzerling, J. – Grubhoffer, L.: *Knockdown of proteins involved in iron metabolism limits tick reproduction and development. Proceedings of the National Academy of Sciences of the United States of America. Vol. 106, (2009), pp. 1033–1038.*

* Czech patent application: Kopáček, P. – Hajdušek, O.: 'Ferritin 2 pro imunizaci organismu proti klíšťatům.' Industrial Property Office of the Czech Republic, PV 2008-402 (25 June 2008).

** International Patent Application: Kopáček, P. – Hajdušek, O.: 'Ferritin 2 for the host immunization against ticks.' Industrial Property Office of the Czech Republic, PCT/CZ2009/000085 (18 June 2009).



The collection of ticks in the field
(Photo: Archives of the Institute of Parasitology of the Biology Centre)

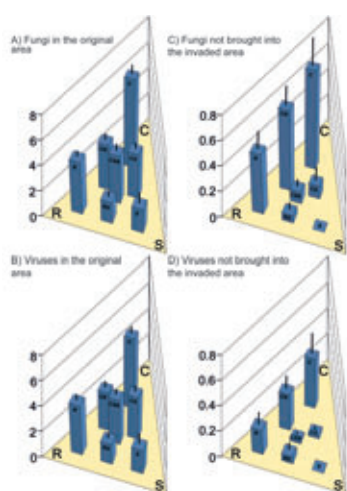
Based on the results attained and the work of the laboratory of Pedro L. Oliveira (Rio de Janeiro), the authors anticipate two different paths of heme (blood pigment) metabolism and non-heme iron from the host's blood. The elimination of ferritin 2 leads to a disruption of the transmission of non-heme iron, which is important for instance for the function of enzymes in the respiratory chain. Moreover, it leads to the accumulation of toxic iron in the tick's gut. This significantly disrupts the ability of the tick to blood feed and further develop.

Synergy in Plant Invasions: Fast-Growing Species Experience Greater Enemy Release (Institute of Botany)

It is known that plant species do not bring with them into a new region most of their enemies which regulate in a natural way the size of their populations in the area of their original spread and thus keep them from dominating the other plants. The idea that this mechanism is one of the important causes of invasions is generally accepted. The study conducted is the first to show that the amount of the enemy release depends on the type of plant. The analysis of the fungal and viral diseases of 243 plant species of European origin which are invasive in the United States revealed that two mechanisms generally considered as the main causes of the invasions of non-indigenous plants, hence the high level of resources and escape from enemies, work in synergy. Fast-growing plants, adapted from the areas of their original spread to damp and nitrogen-nutrient-rich sites, hence a habitat with high levels of resources, are more predisposed to fungal and viral diseases (see the figure on the next page). In the invasion of a new area, however, these species lose many more of these pathogens than plants from resource-poor sites, which helps their spread. This result contributes to the explanation of why plant invasions are the most frequent in an environment rich in nutrients and other resources which is usually created by human activities. Invasive, fast-growing species thus actually gain a double advantage – an increased amount of resources allows them to dislodge from the communities slow-growing plants but also fast-growing indigenous

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species, because they are regulated in their natural habitat by the activity of their natural enemies. This discovery helps us understand better the dramatic invasions of some plant species and indicates that the current global changes like the disruption of the landscape by mankind and its enrichment with nutrients will continue to be accompanied by massive invasions of plant species in various parts of the world. The results of this study, moreover, confirm that the distinction between species based on their geographical origin (a principle that is sometimes questioned) is justified by the differences in the behaviour and characteristics of the indigenous and non-indigenous species.



Synergism in plant invasions: fast-growing plants experience greater enemy release. The average number of species of fungal and viral pathogens discovered in plants with various types of life strategies in the original area in Europe (A, B) and the number of these pathogenic species which plants escaped from after importation into North America (C, D). The competitive (C) and ruderal (R) strategies are typical for fast-growing species; the species able to tolerate stress (S) grow more slowly.

(Adopted from Blumenthal et al., Proc. Natl. Acad. Sci. USA 106: 7899–7904, 2009)

Cooperation took place with partners within the Research Coordination Network on Integrating the Ecology and Evolution of Invasions (NSF, USA).

Blumenthal, D. – Mitchell, C. E. – Pyšek, P. – Jarošík, V.: Synergy between pathogen release and resource availability in plant invasion. *Proceedings of the National Academy of Sciences of the United States of America*. Vol. 106, (2009), pp. 7899–7904.

Pyšek, P. – Hulme, P. E.: Invasion biology is a discipline that's too young to die. *Nature*. Vol. 460, (2009), p. 324.

Sexual Selection in the Bitterling Fish

(Institute of Vertebrate Biology)



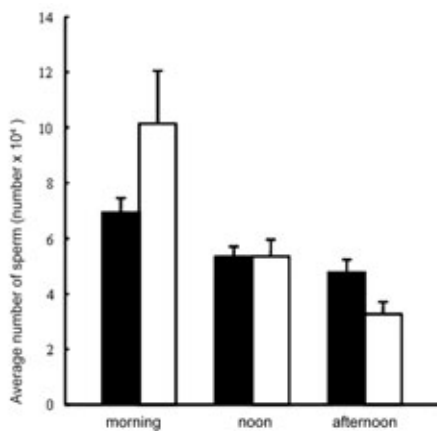
The spawning of the bitterling fish. A male (on the right) and a female bitterling near a mussel into whose gill chambers the fish lay their eggs.

(Photo: Archives of the Institute of Vertebrate Biology)

Sexual selection explains the mechanisms and processes influencing the unequal reproductive success among individuals within a population. Its study can explain a wide range of apparently disadvantageous behavioural patterns or morphological adaptations but can also offer important background information for ideal pairing in livestock breeding, which will increase production (growth rate) and minimise offspring mortality. In the research, the authors focused on four aspects of sexual selection and found the following: (1) the viability, growth rate and survival of offspring were significantly higher when females were allowed to select a mate. The most likely mechanism was olfactory choice based on a complex of immune genes. (2) The reproductive success of males differed according to type of environment. In a highly competitive environment, males who invested in colouration signalling aggression and the higher production of sperm were successful. However, those males also impeded the females' ability to choose their mate. On the contrary, females had more opportunities to express their choice of a suitable partner in an environment with a lower level of competi-

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tion. (3) Male–male competition for fertilisation of the fish eggs may lead to sperm depletion in the short and long terms (hours and weeks) and hence considerably increase the number of unfertilised eggs. (4) The successfulness of natural reproduction in the bitterling fish is primarily influenced by the flow-rate regime and ambient temperature. The higher water temperatures in European rivers recorded in the last few years along with the strong anthropogenic influence on the character of rivers (weirs, dykes) are likely responsible for the population increase and invasion of the bitterling in most of Europe.



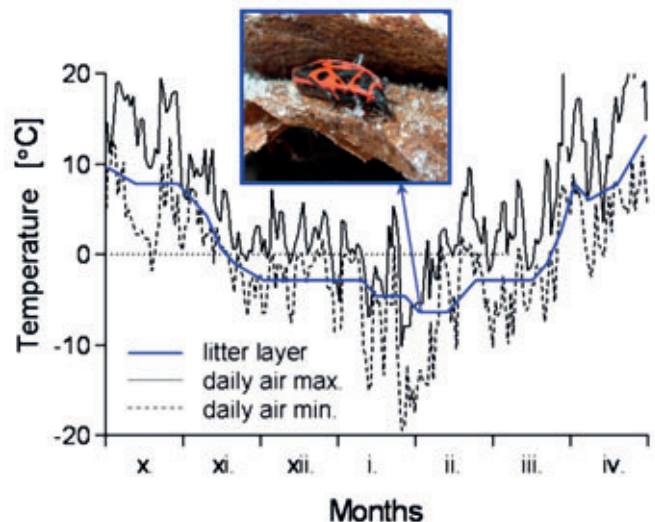
The volume of sperm in the ejaculate changes depending on the sperm competition. The daily fluctuation of the average amount of sperm in the ejaculate of the males of the bitterlings exposed to sperm competition (white column) and the control group without sperm competition (black column). Morning (9–10 a.m.), Noon (12–1 p.m.), Afternoon (3–5 p.m.). (Photo: Archives of the Institute of Vertebrate Biology)

Cooperating entities: University of St Andrews (GB), University of Leicester (GB), University of Lodz (PL)
 Reichard, M. – Ondračková, M. – Bryjová, A. – Bryja, J. – Smith, C.: *Breeding resource distribution affects selection gradients on male phenotypic traits via sexual selection: experimental study on lifetime reproductive success in the bitterling fish (*Rhodeus amarus*)*. *Evolution*. Vol. 63, 2 (2009), pp. 377–390.
 Konečná, M. – Jurajda, P. – Reichard, M.: *River discharge drives recruitment success of the European bitterling (*Rhodeus amarus*) in a regulated river in Central Europe*. *Journal of Fish Biology*. Vol. 74, 7 (2009), pp. 1642–1650.
 Smith, C. – Pateman-Jones, C. – Zieba, G. – Przybylski, M.

– Reichard, M.: *Sperm depletion as a consequence of increased sperm competition risk in the European bitterling (*Rhodeus amarus*)*. *Animal Behaviour*. Vol. 77, 5 (2009), pp. 1227–1233.

Casalini, M. – Agbali, M. – Reichard, M. – Konečná, M. – Bryjová, A. – Smith, C.: *Male dominance, female mate choice and intersexual conflict in the rose bitterling (*Rhodeus ocellatus*)*. *Evolution*. Vol. 63, 2 (2009), pp. 366–376.

Heat-Shock Protein Expression as a Part of the Complex Adaptation for Cold Tolerance in the Insect, *Pyrrhocoris apterus* (Biology Centre)



Overwintering *Pyrrhocoris apterus*. The body temperature of the diapausing heteroptera, *Pyrrhocoris apterus*, drops in the long term to temperatures below zero during their overwintering in a layer of leaf litter. (Photo: Archives of the Institute of Entomology of the Biology Centre)

Body temperature of the overwintering temperate-latitude insect individuals drops below 0°C often and for long periods (see the figure above). Numerous insect species survive temperature extremes at which no vertebrate organism could survive. The key for survival success lies in the seasonal transition into the diapause state and the activation of a complex of adaptations, which result in increased

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cold and frost tolerance. The employees of this institute have studied this complex on the model heteroptera species, *Pyrrhocoris apterus*. Entering diapause is a case of deep phenotypic change, which is based on an alteration of gene transcription. Among others, also the transcription of genes coding the heat shock proteins from the Hsp70 kDa family is changed. The authors investigated the ability of the heteroptera to react to the exposure of both high and low temperatures by accelerating the transcription of the genes coding these proteins. They cloned and sequenced the fragments of the genes for the inducible and cognate forms of Hsp70 kDa heat shock protein. The abundance of mRNA transcripts was then monitored using quantitative real-time PCR and the abundance of the protein products using the Western blot analysis. The abundance of transcripts as well as the protein of the inducible form were significantly up-regulated in response to both heat and cold shocks. The authors prepared a (95 bp-long) dsRNA for the inducible form. The injection of the dsRNA into the heteroptera prior to their exposure to the temperature shock RNAi method caused an elimination of the heat- and cold-shock-induced transcriptional response. The RNAi predictably entirely prevented repair of damage caused by high temperatures. It was newly determined that the elimination of the Hsp70 kDa transcription also significantly lowers the ability of the heteroptera to repair damage caused by cold shock. The results attained have thus proved that the transcriptive activation of the Hsp70 kDa heat shock protein is an important component of the adaptive complex of cold tolerance in the insect, *P. apterus*.

Koštál, V. – Tollarová-Borovanská, M.: *The 70 kDa heat shock protein assists during the reparation of chilling injury in the insect, Pyrrhocoris apterus. PLoS ONE. Vol. 4 (2009), e4546, pp. 1–9.*

Tollarová-Borovanská, M. – Lalouette, L. – Košťál, V.: *Insect cold tolerance and repair of chill-injury at fluctuating thermal regimes: role of 70 kDa heat shock protein expression. Cryo-Letters. Vol. 30 (2009), pp. 312–319.*

Other notable results:

1. Identification of a single peridinine sensing Chl-a excitation in reconstituted PCP complex by crystallography and spectroscopy (*Biology Centre*)
2. Polyphasic characterisation and taxonomic revision of planktonic cyanobacteria of *Anabaena* spp. (Nostocaceae) (*Biology Centre*)
3. Effect of overwintering cattle on the structure and activity of soil microbial community, which ensures nitrogen transformation in soils through the denitrification process, with regard to N₂O emissions (*Biology Centre*)
4. Biological invasions: Europe on a crossroad? (*Institute of Botany*)
5. The ecological, taxonomic and evolutionary consequences of genome duplication (*Institute of Botany*)
6. Timing of flowering is a non-trivial result of selection pressure from pollinators and herbivores (*Institute of Botany*)
7. Survival strategies of plants in disturbed environments (*Institute of Botany*)
8. Carotenoid ornaments, sexual selection and immunogenetics in passeriformes (*Institute of Vertebrate Biology*)
9. Low-frequency electromagnetic fields generated by power lines disturb magnetic orientation of ungulates (*Institute of Vertebrate Biology*)
10. Thermal acclimation of the swimming capability of newt larvae: the effect of daily temperature fluctuations during embryogenesis (*Institute of Vertebrate Biology*)
11. Effect of summer flood on carbon deposition of CO₂ in wetlands (*Institute of Systems Biology and Ecology*)
12. Photosynthesis in silico. Understanding complex behaviour from molecules to ecosystems (*Institute of Systems Biology and Ecology*)
13. Magnetically modified microbial cells as intelligent whole-cell biocatalysts (*Institute of Systems Biology and Ecology*)
14. Surface temperature change of spruce forest as a result of bark beetle attack: remote sensing and GIS approach (*Institute of Systems Biology and Ecology*)
15. Structure of the motor subunit of type I restriction-modification complex EcoR124I (*Institute of Systems Biology and Ecology*)

SCIENTIFIC ACTIVITY

7. Section of Social and Economic Sciences

This section associated five workplaces whose research activities focused on the topical research issues. Research in economics reflected the changing conditions of our society. It focused in particular on the economic aspects of the integration of post-transformation countries in the European Union and European Monetary Union and on the specifics of the Czech Republic's convergence to EU standards. Research in the field of law investigated the process of the institutional provision of the requirements of EC/EU law on the domestic (national) law of member states and the influence of this process on the legal systems of the member states under the conditions of an information society; all of this in terms of legal philosophy, theory and practice. Research in sociology was focused on the analysis of 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 Man from a lifelong perspective and in the context of the social changes in a unifying Europe.

From the results from 2009, we present:

The Effects of Privatisation and Ownership in Transition Economies

(Economics Institute)

The study evaluates the impact of privatisation on the basis of the experience of the past twenty years. In Central Europe, this effect is positive for domestic owners, mainly in the later phase of the economic transformation. In the countries of the former Soviet Union, the impact is less distinctive and positive only for foreign owners. In China, on the other hand, non-state ownership has a positive influence.

Cooperating entity: London School of Economics and Political Science, Great Britain

Estrin, S. – Hanousek, J. – Kočenda, E. – Švejnar, J.: The effects of privatization and ownership in transition economies. Journal of Economic Literature. Vol. 47, 3, (2009), pp. 699–728.

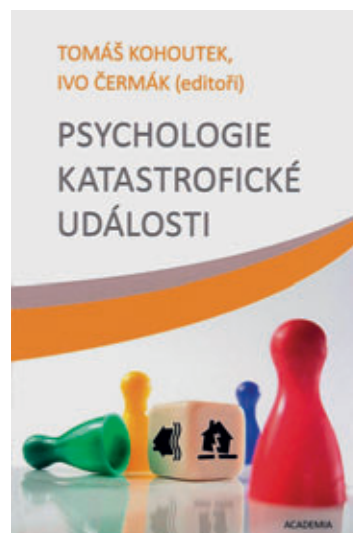
The Psychology of Disastrous Events

(Institute of Psychology)

The Psychology of Disastrous Events describes, from different perspectives, one of the most devastating natural events in the last decade, namely the floods that struck a large part of the Czech Republic and of the entire Central European region in 2002. The core of the publication is formed by the original research study conceived and coordinated in the years after the floods by the Institute of Psychology of the Academy of Sciences of the Czech Republic. A component of the research is a summary of the latest findings about experiencing extremely stressful and traumatic events. The extensive studies are devoted to the experience of the flood victims from all of the regions of the Czech Republic with the entire course of the flood including the renewal phase, to their experiences and needs as well as to their opinions on the assistance provided. The publication captures also the wider context of the experience shared – historical and geographic. The research also had practical impact in the form of a formulation of the principles and models of psycho-social care.

Cooperating entity: Caritas Czech Republic

Kohoutek, T. – Čermák, I. (eds.): Psychologie katastrofické události. Academia, Praha 2009. 364 pp.



The cover of the book by Kohoutek, T. – Čermák, I. (eds.): **The Psychology of Disastrous Events** (Photo: Archives of the Institute of Psychology)

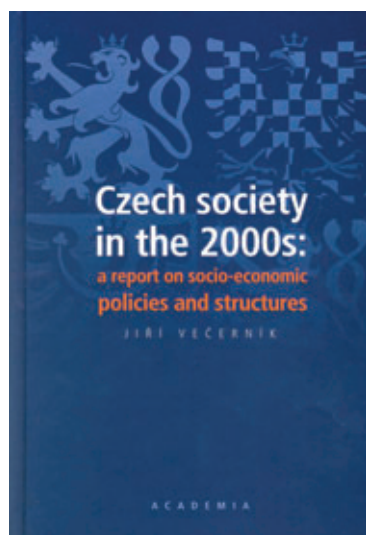
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Czech Society in the 2000s: A Report on Socio-Economic Policies and Structures

(Institute of Sociology)

The book provides information on the development of Czech society over the past nearly two decades in the areas of employment, social policies, wage and income inequalities, further in the social structures with a focus on the situation of the middle class, pensioners and the poor, and subsequently in the area of values specifically regarding work and consumption. The aim is to provide a documented picture of the development using statistical and sociological surveys and other sources while also observing the systemic changes behind quantitative shifts.

Večerník, J.: Czech society in the 2000s: a report on socio-economic policies and structures. Academia, Praha 2009. 286 pp.



The cover of the book by Večerník, J.:
**Czech Society in the 2000s:
A Report on Socio-Economic Policies and Structures**
(Photo: Archives of the Institute of Sociology)

Other important results:

1. Digital Library of the ASCR (*Library of the ASCR*)
2. Kramerius System V 3.3.0 (*Library of the ASCR*)
3. Kramerius System V 4 (*Library of the ASCR*)
4. Attitudes and Action: Public Opinion and the Occurrence of International Terrorism (*Economics Institute*)
5. Czech Female Managers and Their Wages (*Economics Institute*)
6. Variations on the Theme of Gender. Poststructuralism, discourse analysis and gender identity (*Institute of Psychology*)
7. How does personality develop over the life-course (sic): Results of the Brno Longitudinal Study on Life-span Development (*Institute of Psychology*)
8. Problem Neighbourhoods in Cities and the Regeneration Policies that Target Them – A Case Study of Prague (*Institute of Sociology*)
9. Women and Social Citizenship in Czech Society: Continuity and Change (*Institute of Sociology*)
10. The Czech Republic in the European Union (2004–2009): The Institutional and Legal Aspects of Membership (*Institute of State and Law*)
11. Democracy and Issues of Legal Policy in Fighting Terrorism: a Comparison (*Institute of State and Law*)
12. The Czech (sic) Confederation of 1619 (*Institute of State and Law*)

SCIENTIFIC ACTIVITY

8. Section of Historical Sciences

The section associated six workplaces 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 2009, we present:

Pavlov VI: An Upper Paleolithic Living Unit (*Institute of Archaeology, Brno*)

A new settlement, labelled as Pavlov VI, was discovered in 2007. It is a part of the residential complex of the Upper Paleolithic Period mammoth hunters in the Dolní Věstonice – Pavlov area. The site included a central pit (perhaps the remains of a dwelling) surrounded by a semicircle of smaller pits, the skeletal remains of two mammoths, stone and bone tools and decorative objects. The survey enabled closer insight into the feeding methods of mammoth hunters. What is particularly important are the ceramic shards, some of which have been intentionally modelled as figures of animals while others bear the imprints of human fingers, textiles and animal fur. The first publication from the journal *Antiquity* 2009 was adopted by the foreign media and thus had a relatively broad international reception.



**The head of a feline, apparently a lion, burnt clay,
a new find from the locality of Pavlov VI**
(Photo: Archives of the Institute of Archaeology, Brno)

*Svoboda, J. – Králík, M. – Čulíková, M. – Hladilová, Š.
– Novák, M. – Nývltová Fišáková, M. – Nývlt, D.
– Zelinková, M.: Pavlov VI: An Upper Palaeolithic
living unit. Antiquity. Vol. 83 (2009), pp. 282–295.*

ANNUAL REPORT OF THE ASCR 2009

Early Mediaeval Fortified Settlements in Bohemia

(Institute of Archaeology, Prague)

Assessments of the fundamental earlier surveys of early mediaeval fortified settlements led to one monograph and three studies in the main Czech journal and a prestigious German journal. The works provide, for example, a historical interpretation of the development phases of the Budeč fortified settlement, a new dating of the establishment of the fortified settlement in Libušín, a model of the economic base of the centre in Libice nad Cidlinou and information on construction techniques at early mediaeval Prague Castle. The works repay in a significant way Czech archaeology's debt to the country's most important archaeological monuments and to the surveys from recent decades; they have also produced new views of the historical period of the emergence of the Czech state.



Plan of the archaeological surveys in the complex of the early mediaeval fortified settlement of Budeč with the names of the survey leaders
(Photo: Archives of the Institute of Archaeology, Prague)

Cooperating entity: National Museum, Prague

Bartošková, A.: Budeč – ein bedeutendes Machtzentrum des frühen tschechischen Staates. Zeitschrift für Archäologie des Mittelalters (Köln) (in print).

Boháčová, I.: Dřevo v raně středověkých konstrukcích opevněné centrální lokality. Příklad Pražského hradu. Památky archeologické, Vol. CI (in print)

Mařík, J.: Libická sídelní aglomerace a její zázemí v raném středověku. Dissertationes Archaeologicae Brunenses/Pragensesque 7, Praha 2009. 283 pp.

Varadzin, L.: Libušínské hradiště. Revizní zpracování výzkumů. Památky archeologické, Vol. CII (in print).

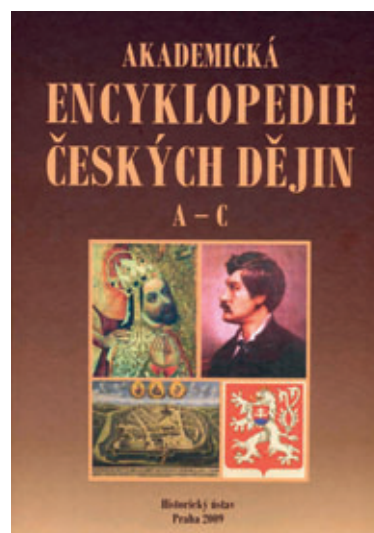
Academic Encyclopaedia of Czech History, Vols. A–C

(Institute of History)

The Academic Encyclopaedia of Czech History is a broadly conceived multi-volume work which provides a synopsis of the knowledge on Czech history from the Middle Ages to the present. The first volume contains an extensive corpus of synthetic treatises, characteristics and overviews, of which many had not been treated in this synoptic form before while others have had to rely on newly conducted research. The individual entries focus on the events, institutions and processes that shaped the life of the society in the Czech lands. They explain the general terms, organisational structures, ideological streams and cultural tendencies. The content of the entries captures the state of the art in historical knowledge at the beginning of the 21st century and presents topical results of research on themes hitherto neglected or not covered systematically.

Cooperating entities: external co-authors from various institutions including the ASCR and higher education institutions

Pánek, J. et al.: Akademická encyklopedie českých zemí, Vols A–C. Institute of History, Praha 2009. 384 pp.



The cover of the book by Pánek, J. et al.: Academic Encyclopaedia of Czech History, Vols A–C
(Photo: Archives of the Institute of History)

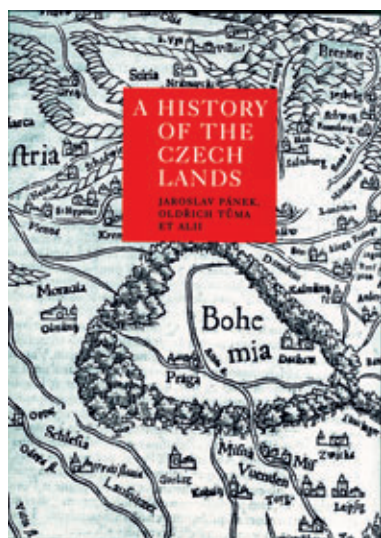
SCIENTIFIC ACTIVITY

A History of the Czech Lands

(Institute of History)

The book presents a synoptic explanation of the history of the Czech lands from prehistory until the birth of the Czech Republic in 1993. The English version (it was published in Czech by the Karolinum publishing house in 2008 under the title *Dějiny českých zemí*) is the first work which mediates the history of the Czech lands to foreign readers in such an extent and quality. The history of the Czech lands is presented with an emphasis on the progress of the Czech society, national minorities, culture, religion, economy and the landscape in the context of the political transformations. The synthetic work provides an orientation in the history of Central Europe, represents contemporary Czech historiography and reflects Czech history and culture in an international context.

Cooperating entity: *Institute for Contemporary History*
Pánek, J. – Tůma, O. – Boubín, J. – Cibulka, P. – Gebhart, J. – Ondo-Grečenková, M. – Hájek, J. – Harna, J. – Hlavačka, M. – Kocian, J. – Kučera, M. – Mikulec, J. – Pernes, J. – Polívka, M. – Semotanová, E. – Suk, J. – Třeštík, D. – Žemlička, J. – Šmahel, F.: *A History of the Czech Lands*. Karolinum, Praha 2009. 639 pp.



The cover of the book *A History of the Czech Lands*
(Photo: Archives of the Institute of Archaeology, Brno)

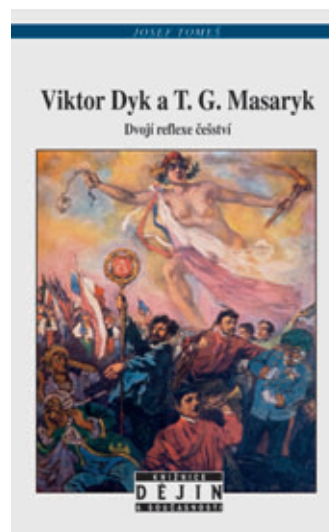
Viktor Dyk and T. G. Masaryk.

Two Reflections of Czechness

(Masaryk Institute and Archives)

This monograph summarises in a synthetic way for the first time the history of the relations between Viktor Dyk and T. G. Masaryk throughout the period transformations of Czech national fates in the first third of the twentieth century. It compares the various intellectual and political positions of both men and their different conceptions of Czechness, Czech and ultimately Czechoslovak statehood. The appendix reprints several reactions to these disputes in Viktor Dyk's literary work and key letters which both protagonists exchanged as their confrontation came to a head in 1929.

Cooperating entity: Lidové noviny publishing house
Tomeš, J.: *Viktor Dyk a T. G. Masaryk. Dvojí reflexe češství*. Nakladatelství Lidové noviny, Praha 2009. 204 pp.



The cover of the book entitled *Viktor Dyk and T. G. Masaryk: Two Reflections of Czechness*
(Photo: Archives of the Masaryk Institute and Archives)

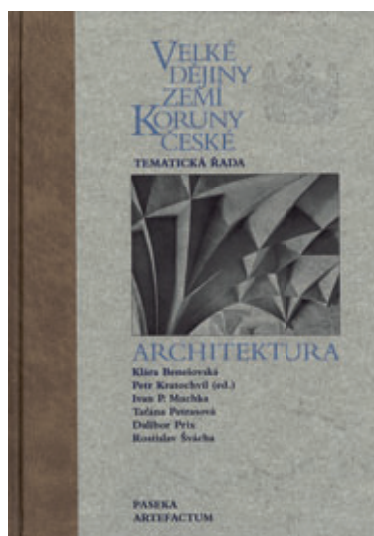
ANNUAL REPORT OF THE ASCR 2009

The Comprehensive History of the Lands of the Bohemian Crown – Architecture

(Institute of Art History)

The book builds upon the extensive project, The Comprehensive History of the Lands of the Bohemian Crown, which the new thematic series is to complement by a one-volume synoptic history of individual fields. The volume devoted to architecture covers the entire period beginning with the buildings of the Great Moravian Empire to the present. Focusing on key works and architects, it interprets them in the context of the wider cultural development of the Czech lands. This is the first time since 1961 that such a complete survey of the history of Czech architecture has been published here.

Kratochvíl, P. – Muchka, I. P. – Petrasová, T. – Prix, D. – Švácha, R.: *Velké dějiny země Koruny české – tematická řada: Architektura*. Paseka, Praha 2009. 808 pp.



The cover of the book *The Comprehensive History of the Lands of the Bohemian Crown – Architecture* (Photo: Archives of the Institute of Art History)



Josip Plečnik, *The Church of the Most Sacred Heart of Our Lord, Prague-Vinohrady, 1928–32* (Photo: Archives of the Institute of Art History)

SCIENTIFIC ACTIVITY

Common People...?! Insight into the Life of the So-Called Silent Majority. Biographical Stories Told by Members of Labouring Professions and the Intelligentsia *(Institute of Contemporary History)*

Based on the analysis and interpretation of more than a hundred of interviews with members of the labouring professions as well as professions of the so-called working intelligentsia, the publication deals with the key question of how 'common people' living in Czechoslovakia then experienced and perceived the era before 1989. The interdisciplinary research team consisting of representatives of several generations deals from various perspectives with among others the questions of the history of representations, the study of the lives of particular professional groups or social structures, everyday problems and everyday life, regional history or topics of the contemporary historical semiotics. Twelve interpretation studies are complemented with a set of four dozen edited interviews.

Vaněk, M. (ed.): Obyčejní lidé...?! Pohled do života tzv. mlčící většiny. Životopisná vyprávění příslušníků dělnických profesí a inteligence. *Academia, Praha 2009. 1835 pp.*



The cover of the book **Common People...?! Insight into the Life of the So-Called Silent Majority**
(Photo: Archives of the Institute of Contemporary History)

Other important results:

1. The development of fortification techniques in Moravia and Czech Silesia in the Early Middle Ages (*Institute of Archaeology, Brno*)
2. Lithic Chipped Industry of the Bell Beaker Culture in Moravia and its East-Central European Context (*Institute of Archaeology, Brno*)
3. 2000th anniversary of the Roman military campaign against Maroboduus (*Institute of Archaeology, Prague*)
4. Migration of Chadic speaking pastoralists within Africa based on population structure of Chad Basin and phylogeography of mitochondrial L3f haplogroup (*Institute of Archaeology, Prague*)
5. Josef Němec: The Extraordinary Husband of an Extraordinary Woman (*Institute of History*)
6. An Imperial and Royal Civil Servant in Golden Age of Security (*Institute of History*)
7. Meeting Minutes of the Czechoslovak Government in London I (1940–1941) (*Masaryk Institute and Archives*)
8. The Institutional Framework for the Humanities and Social Sciences in the Czech Lands 1848–1952 (*Masaryk Institute and Archives*)
9. A Depiction of a Sovereign in the Sacred Paintings of the Counter-Reformation and Baroque Period. An Iconological Study to the Sovereign Representation of Emperor Ferdinand II in Bohemia (*Institute of Art History*)
10. Karel Teige and Typography: Asymmetrical Harmony (*Institute of Art History*)
11. Dropping, Maintaining and Breaking the Iron Curtain: The Cold War and East-Central Europe Twenty Years Later (*Institute for Contemporary History*)
12. Lives for Ransom. Exports and Forced Donations of Works of Art during the Emigration of Jews from Bohemia and Moravia 1938–1942 (*Institute for Contemporary History*)

ANNUAL REPORT OF THE ASCR 2009

9. Section of Humanities and Philology Sciences

The section was comprised of six workplaces whose research activities focused on numerous research topics. The Humanities-oriented workplaces dealt with the issues of philosophy, ethnology, language and literature. Within the research in the area of philosophy, also selected issues 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 their 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 sixteenth century to the present continued. A substantial part of the activities of 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.

From the results from 2009, we present:

Homeland (sic) Attitudes to Czechs Living Abroad in Modern History (1918–2008)

(*Institute of Ethnology*)

The book provides a synoptic recapitulation of the domestic attitudes towards emigration and towards Czechs living abroad. It builds on a detailed analysis of the emigration policy of interwar Czechoslovakia, identifies the political simplification in 1948–1989 and offers an overview of the domestic endeavours to bring the domestic and compatriot worlds together after November 1989.

Brouček, S. – Grulich, T.: Domáci postoje k zahraničním Čechům. Public History in cooperation with the Institute of Ethnology of the ASCR, v. v. i., Praha 2009. 231 pp.



The cover of the book by Brouček, S. – Grulich, T.: Homeland Attitudes to Czechs Living Abroad (Photo: Archives of the Institute of Ethnology)

SCIENTIFIC ACTIVITY

From Language to Logic (*Institute of Philosophy*)

The book endeavours to answer the question of what the nature of logic is. It strives to find the roots of logic in natural language and in real human argumentation. It shows that the path leading from common language and argumentation to logical symbolism and to artificial languages employed by modern logic is far from straightforward. The examination of how the artificial languages of modern logic and the logical calculi derived from them function undoubtedly paves the ways to more sophisticated expression and especially a better understanding of our argumentational practices, but these languages definitely cannot be seen as a kind of higher stage of natural language. In the book, the foundations of so-called classical logic as well as the main versions of its non-classical alternatives are systematically examined. Attention is paid also to problems of the logical modelling of the meanings of natural language expressions, to logical paradoxes or to the question of where the limits for the application of the methods of logical modelling are.

Svoboda, V. – Peregrin, J.: Od jazyka k logice. Filozofický úvod do moderní logiky. Academia, Praha 2009. 428 pp.



The cover of the book *From Language to Logic*
Photo: Archives of the Institute of Philosophy)

The Přemyslids: Building the Bohemian State. A Historical Synthesis

(*Institute of Philosophy – Centre for Medieval Studies*)

The collective monograph, which was created under the methodological guidance of the foremost experts, gathers texts by thirty-five authors which complement each other. It focuses on the emergence of the early mediaeval Czech state and its culture, the Christianisation of society and its cultural and political contacts within Central Europe. This main theme is approached from the perspectives of a broad spectrum of mediaevalist disciplines, particularly history, archaeology, art history, ethnology, iconology and linguistics.

Cooperating entity: *Institute of Archaeology, Prague.*
Sommer, P. – Třeščík, D. – Žemlička J. et al.: Přemyslovci, budování českého státu. Nakladatelství Lidové noviny, Praha 2009. 497 pp.



The cover of the book *The Přemyslids: Building the Bohemian State*
(Photo: Archives of the Institute of Philosophy)

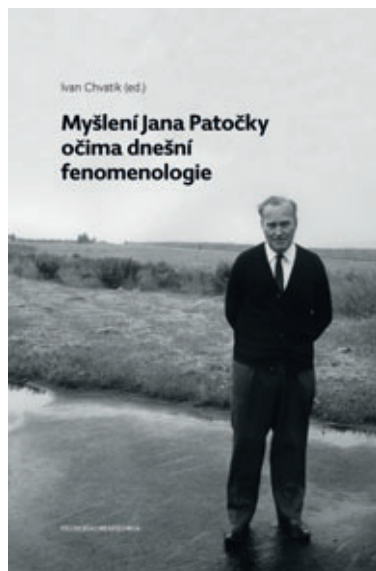
ANNUAL REPORT OF THE ASCR 2009

The Thinking of Jan Patočka in the Eyes of Today's Phenomenology

(Institute of Philosophy – Centre for Theoretical Studies)

The collective monograph comprising the articles of the world's leading experts on Jan Patočka presents a synoptic overview of his philosophy and can serve as a compendium for everyone who seriously wants to study his contribution to phenomenology.

Chvatík, I. (ed): Myšlení Jana Patočky očima dnešní fenomenologie. Filosofía, Oikúmené, Praha 2009. 560 pp.



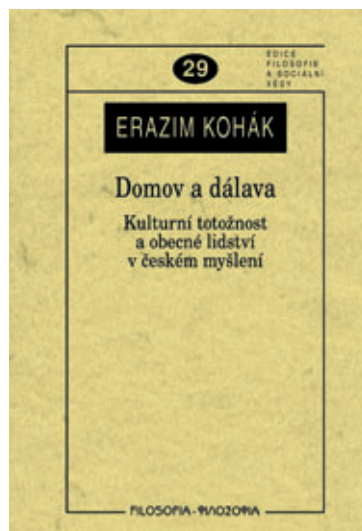
The cover of the book The Thinking of Jan Patočka in the Eyes of Today's Phenomenology
(Photo: Archives of the Institute of Philosophy)

Hearth and Horizon. Cultural Identity and Global Humanity in Czech Philosophy

(Institute of Philosophy – Centre for Global Studies)

The book summarises the author's lifelong consideration on the Czech cultural identity. It formulates two basic questions: What does it mean to be Czech? and What is the meaning of this question? The book follows the development of the Czech thought from the national revival in the nineteenth century until today on the background of Czech history with a particular focus on T. G. Masaryk, Emanuel Rádl, Jan Patočka and Karel Kosík.

Kohák, E.: Domov a dálava: Kulturní totožnost a obecné lidství v českém myšlení. Filosofía, Praha 2009. 370 pp.



The cover of the book Hearth and Horizon. Cultural Identity and Global Humanity in Czech Philosophy
(Photo: Archives of the Institute of Philosophy)

SCIENTIFIC ACTIVITY

The 'East-West' Issues in European Cultures and Literatures

(Institute of Slavonic Studies)

The collective thirty-chapter monograph, the work of authors from the Czech Republic as well as other European countries (Germany, Austria, Hungary, Russia, Ukraine, Poland and Slovakia), treats from the topical literary-cultural Slavonic-studies discourse the transformations of the concept of 'East-West' on the model of mutual Slavic/non-Slavic (primarily Russian-German) literary and cultural relations. The book is divided into individual sections in which the 'East-West' issue is treated from the standpoints of theoretical methodology, the history of culture, from comparative and receptive perspectives as well as in terms of philosophical reflections within literary works.

Cooperating entities: Neisse Verlag Dresden, Detlef Krell *Ulbrecht, S. – Ulbrechtová, H. (Hrsg.): Die Ost-West-Problematik in den europäischen Kulturen und Literaturen. Ausgewählte Aspekte. Problematika Východ – Západ v evropských kulturách a literaturách. Vybrané aspekty. Slavonic Institute of the ASCR / Neisse Verlag, Praha / Dresden 2009. 800 pp.*



The cover of the book *Die Ost-West-Problematik in den europäischen Kulturen und Literaturen* [The 'East-West' Issues in European Cultures and Literatures]

(Photo: Archives of the Institute of Slavonic Studies)

The Machinists of Human Souls.

People's Libraries and their Censorship in the Early 1950s

(Institute of Czech Literature)

The book maps the attempt to control, transform radically and utilise for political power purposes the public libraries which occurred in Czechoslovakia under Stalinism. The introductory explanation captures the main form of the subsequent censorship in Communist Czechoslovakia: it describes the censorship of the people's libraries, deals with what kinds of literature were removed from libraries and seeks the reasons of this ban. The next section then follows the attempts of the librarians to influence or control the contemporary readership and thus educate a new reader. The title paraphrase of Stalin's statement on writers, the engineers of human souls, wants to define based on the period metaphor of cultural work as industrial production the sense of the censorship activities and of the entire reform of libraries and librarianship. With the help of the tools selected – the books produced by the engineers-writers, the librarians were to process the human material and mould it to the form of the new socialist man of the future.

Šámal, P.: Soustružníci lidských duší: Lidové knihovny a jejich cenzura na počátku padesátých let 20. století. Academia, Praha 2009. 613 pp.



The cover of the book *The Machinists of Human Souls. People's Libraries and their Censorship in the Early 1950s*

(Photo: Archives of the Institute for Czech Literature)

ANNUAL REPORT OF THE ASCR 2009

Creation of a Lexical Database of the Czech Language of the Beginning of the 21st Century

(Institute of the Czech Language)

The building of the lexical database Pralex according to the types of processed units, namely with one-word units – nouns (12,000 lemmas) are being treated, basic treatment of pronouns (160), numerals (662) and interjections (1,551) has been completed; with multi-word units – phrasemes (9,000 lemmas entered and interlinked) and similes (1,300 lemmas entered, 380 lemmas treated) are being treated. The processing of abbreviations/symbols (470) continues; the Pralex lexicon is gradually being supplemented (ca 120,000 data entries). The continuous programme development of the Praled lexicographical work station is being performed. The web application Lexiko was made available for the wider public (<http://lexiko.ujc.cas.cz>).

Other important results:

1. Leoš Janáček. Folkloric Studies (1886–1927)
(Institute of Ethnology)
2. Searching for Authenticity: Dvořák's Moravian Duets and the History of their Publication
(Institute of Ethnology)
3. The Concept of General Theory of Action after Parsons
(Institute of Philosophy – Centre for Science, Technology, and Society Studies)
4. On Egypt, Arabia, Palestine and Galilee
(Institute of Philosophy – Institute for Classical Studies)
5. Universalism in Ethics as a Problem
(Institute of Philosophy – Centre of Global Studies)
6. Prophets, their words and their world
(Institute of Philosophy – Institute for Classical Studies)
7. Innovative Cultures: The Challenge and Strategy of Learning
(Institute of Philosophy – Centre for Science, Technology, and Society Studies)
8. Transformations of the Historiography of Science
(Institute of Philosophy)
9. Concise Encyclopaedia of Islam and Muslim Society
(Oriental Institute)
10. Bhutan: A Brief History of the States
(Oriental Institute)
11. Greek–Old-Church-Slavonic Index
(Institute of Slavonic Studies)
12. Russian poetry in the second half of the twentieth century
(Institute of Slavonic Studies)
13. Czech Historiography in Dialogue with Europe (1890–1914)
(Institute of Czech Literature)
14. Dictionary of Czech Literature after 1945 Online
(Institute of Czech Literature)
15. Electronic Dictionary of Old Czech
(Institute of the Czech Language)
16. Internet Language Handbook and Language Consultancy
(Institute of the Czech Language)

SCIENTIFIC ACTIVITY

ANNUAL REPORT OF THE ASCR 2009

03

Educational Activity

EDUCATIONAL ACTIVITY

Educational activities are among the important elements through which the ASCR fulfils 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, by means of assistance in organising specialised competitions and on 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 general public in the form of lectures, training courses and programmes or professional consultancy. An important component of this service to the public is extensive editorial activity, which we have developed at our own publishing house as well as at individual workplaces.

A) Tertiary Education

(higher education instruction, the accreditation of study programmes, training of doctoral students)

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. Other than scientific collaboration with university workplaces, the ASCR participates to a considerable degree directly in higher-education instruction. In 2009, the employees of the workplaces of the ASCR provided a total of 3,487 individual semestral cycles of lectures, training sessions or seminars at various higher education institutions comprising a total of 76,744 hours. Practically all of the workplaces of the ASCR were involved in tertiary education, including the *Library*. The employees at the ASCR participate to a significant extent in the academic life at higher education institutions by attending the meetings of their scientific councils, the field councils of doctoral study programmes and in test and appointment commissions. The percentage of ASCR employees involved in

offering guidance to students preparing their qualification dissertations is particularly significant. The employees at the ASCR guided 1,540 students in undergraduate or master's studies and 2,157 doctoral students (319 from abroad) in 2009. Of this number, 832 undergraduate and master's students and 279 postgraduates successfully completed their studies in 2009.

The ASCR concluded twenty-two framework contracts on cooperation within doctoral study programmes with individual higher education institutions, and the majority of the institutes of the ASCR have joint accreditation to implement these programmes in a wide range of fields. The centres of cooperation with higher education institutions in the area of research and education are joint workplaces, of which there are now a total of fifty-three. The Academy of Sciences has participated in ensuring the quality of tertiary education through the membership of a number of its employees in the Accreditation Commission and also through its consultative role in the external evaluation of the Accreditation Commission by experts from the European Association for Quality Assurance in Higher Education (ENQA). 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.

A significant component of the support of education in doctoral study programmes is the organisation of the Course of the Fundamentals of Scientific Work. This course provides its students with a set of knowledge of the system of scientific work and is implemented as a comprehensive block of lectures and practical exercises. All of the topics are presented by experienced professionals from the ASCR's institutes, higher education institutes, other research workplaces as well as the private sector. In 2009, the course was arranged five times in Prague and four times in Brno and was attended by a total of 363 students, 215 of whom in Brno. Since autumn 2009, the courses in Brno have been held as part of the Operational Programme Education for Competitiveness.

ANNUAL REPORT OF THE ASCR 2009

Table 2: An overview of the most important activities that concern cooperation with higher education institutions (HEIs)

	2004	2005	2006	2007	2008	2009
Doctoral candidates training at workplaces	1,939	2,079	2,072	2,154	2,162	2,157
Students preparing dissertations training at workplaces	1,097	1,143	1,238	1,366	1,419	1,540
Newly-accepted students of doctoral study programmes	421	391	366	431	411	412
Number of semestral cycles of lectures, seminars, training sessions led by employees from the ASCR at HEIs	2,292	2,666	2,824	3,195	3,571	3,487
Number of hours of lectures given by employees of the ASCR at HEIs	60,329	66,006	68,429	71,739	78,306	76,744

The educational and training activities leading to more substantial mutual cooperation between higher education institutions, scientific-research workplaces and the entrepreneurial sector are the main content of the new project Transfer of Knowledge and Technology in Selected Regions – the Application of the ‘Technology Transfer Manager’ European Educational Model. The project is a part of the Operational Programme Education for Competitiveness and is co-financed by the European Social Fund.



‘Sociologický webzine SOCIOWEB’ is an electronic periodical serving as a platform for the communication of the academic sociological community with the public, especially with the media and students.

(Photo: Archives of the Institute of Sociology)

B) Secondary Education

As part of an education programme for secondary schools, the *Centre for Administration and Operations* launched the Open Science II project on 1 September 2009, which builds on a similar previous project that offered secondary-

-school students in Prague an internship at one of the scientific workplaces of the ASCR. The follow-on project will facilitate a path to the scientific and research workplaces particularly for the pupils from outside Prague, who do not have so many opportunities for personal development or systematic support for educational activities. The project offers talented young people who are interested a two-year internship at a scientific workplace of the ASCR and at the research workplaces of cooperating higher education institutions. A total of 150 research employees will be involved in the project and will devote their time to the selected students as part of their internship. The best results of these scientific internships will be published at student scientific conferences to be held in April 2011 and April 2012, which will simulate real scientific congresses. The **Open Science to Regions** programme, implemented as Open Science Nové Hradky in 2009, is an extension of this project and was again implemented by the *Centre for Administration and Operations*. Three practical courses in biology, chemistry and physics for secondary-school teachers were organised in Nové Hradky as part of this project, which indicated a possible path for further education to secondary-school teachers. Their aim was to contribute to the improvement of the quality of the teaching of natural-science subjects. A total of seventy-nine teachers were trained in the summer months.

A similar project has been running in cooperation with the South Moravian Regional Centre for International Mobility in Brno as part of the Operational Programme Education for Competitiveness. This programme also focuses on the education and scientific activity of talented secondary-school pupils.

Activities aimed at bringing secondary-school pupils closer to science were also developed at an international level,

EDUCATIONAL ACTIVITY



Secondary-school students from Prague and the immediate vicinity at one of the lectures in the *Don't Be Afraid of Science* cycle which took place in the building of the ASCR in Národní Avenue in Prague.
(Photo: S. Kyselová)

with the ASCR taking part in preparatory work directed at the establishment of a comprehensive programme for educating young people in Europe that will be ensured by the academies of sciences of the individual countries associated in the ALLEA organisation.

The employees of the ASCR gave more than 2,000 hours of lectures at secondary schools. Almost a hundred competitions for secondary-school pupils were organised to help motivate them to take an interest in science. The now traditional *Don't be Afraid of Science* cycle of lectures was held throughout the year with the average attendance being higher than 100 students. Within the cycle, the Day with Astronomy event was especially successful. The ASCR prepared the ceremonial evaluation of the Eustory history competition for secondary-school students in cooperation with the *Institute of Contemporary History*.

The organisation of **summer schools** is also significant. *The Institute of Psychology* organised the Summer School of Linguistics, a cycle of lectures and seminars on current



The Week of Science and Technology 2009 brought listeners also to the Institute of Philosophy (Centre for Theoretical Studies) for a lecture on biology and mathematics called *What Our World Is Like*.
(Photo: S. Kyselová)

linguistic and psycholinguistic research in the world (with foreign participation), and another cycle of lectures and seminars entitled the Winter School of Cognitive Psychology. *The Institute of the Czech Language* traditionally participated in the preparation of lectures for foreign students of Czech called the Summer School of Slavonic Studies. *The Institute of Philosophy* organised the 17th Annual Summer School of Classical Studies for teachers of Latin. The 2nd Annual Summer School of Contemporary History, which the ASCR prepared together with the Institute of Czech History of the Faculty of Philosophy and Arts at Charles University in Prague, was held in June 2009. The first, initial year of this event evoked such a response from secondary-school history teachers and future teachers – students that the ASCR decided to continue in this activity. This summer school, which familiarised the participants with the very latest trends and interpretation approaches in the teaching of contemporary history, was attended by approximately thirty-five teachers.

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C) Education for the General Public

(lectures, educational courses and programmes, specialised consultation)

The ASCR develops multifaceted activities directed at educating the public. Many of these activities are described in Chapter 7, which is dedicated to popularisation and promotional activity.



The honourable mention from the Director General's Collegium at Czech Television for the publication activity in issuing the free edition series for the television cycle *About the Czech Language* (Photo: Archives of the Institute of the Czech Language)

A total of 117 lectures, 12 exhibitions, 6 scientific cafés, 7 presentations, 4 seminars and 2 conferences were implemented as part of the 9th Annual Science and Technology Week and of the Open Houses at workplaces of the Academy of Sciences of the Czech Republic.

The year-round cycle of lectures for the public known as Academic Prague, organised in association with Charles University in Prague, was implemented along with the cycle of lectures for secondary-school pupils.

The ASCR is through the *Centre for Administration and Operations* a member of the European Science Event Association, which associates European institutions organising science festivals. The coordination of educational events intended for the general public with this association contributes to their international dimension and offers the building of new contacts.



The ceremonial presentation of the book by Petr Pithart: *Devětaosmdesátý ('89)*, which had won in the public opinion poll of *Lidové noviny* Book of the Year, took place in the areas of the Senate of the Parliament of the CR. (Photo: Archives of the Centre for Administration and Operations)

For the second year now, the *Centre for Administration and Operations* has organised the education cycle known as 'The Management of Science', which concentrates on helping senior employees of individual ASCR workplaces in activities in a complex legislative and economic environment. The first year of the event was attended and successfully completed by fifty-five participants. Currently, eighteen of them are attending a follow-on course, which offers the opportunity to deepen the skills acquired as well as to learn about new topics. A new cycle for forty-two managers from the ASCR was also launched.

EDUCATIONAL ACTIVITY

Editorial Activity of the ASCR

The ASCR subsidises the publications of selected science and popular-science publications; it provided financial assistance to the publication of forty-four books, of which twenty-nine were published by Academia publishing house (*Centre for Administration and Operations*) and fifteen by scientific workplaces of the ASCR. The total subsidies for the support of scientific and popular-science literature were 9.4 million CZK.

During 2009, further volumes of the prestigious publication *Paměť* [Memory] and new volumes of *Galileo*, *Novověk* [Modern Period], *Stíny* [Shadows], *Historie* [History] and *Europa* [Europe] were issued by Academia publishing house, as were further publications in the *Psychologie* [Psychology] and *Literární řady* [Literary Series] series. The editorial enterprises considered significant include for example the publication of the monumental monograph by Professor Milan Kuna Václav Talich, the three-volume work entitled *Obyčejní lidé* [Ordinary People], the translation of the Old-Tibetan text *Gurbum* and last but not least the publication of the extensive monograph *Cesta života* [Path of Life], which is devoted to the life and times of Rabbi Loew. Another major event was the publication of Dante's *Divine Comedy* in a new and complete translation. The *Centre for Administration and Operations* publishes the *Živa* journal. The books published by Academia publishing house won a number of significant awards in 2009: book prizes (Magnesia Litera, Litera for Translated Book, Litera for Contribution to Czech Literature), the Josef Hlávka Prize for Best Publication in the Social Science Literature, Dictionary of the Year, and *Lidové Noviny's* Book of the Year. A synoptic overview of the books published is presented in Appendix 9.

Akademický bulletin (Academic Bulletin) was regularly published in 2009, which in the first half of the year offered a topical section on the Czech Republic's Presidency of the Council of the EU and devoted significant attention to the issue of the financing of science.

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04

Practical Activity

PRACTICAL ACTIVITY

The transfer of research results and their application in practice are among the ASCR's priorities. The ASCR therefore always supports the transfer of the acquired knowledge to the application sphere and also focuses on the reinforcement of 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, which was reconstrued in 2009, and synergy with the Technological Centre of the ASCR and the *Centre for Administration and Operations*.

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 Organizations, the Association of Innovative Entrepreneurship, the Union of Industry and Transport of the Czech Republic and CzechInvest. In the framework of regional activities in the area of research, development and innovation, the ASCR cooperated in particular with the Vysočina region (projects of the Science and Technical Park Jihlava I and II) and with the South-Moravian Innovation Centre. Successful cooperation with the Pardubice region and the Orlice Union of Towns also continued.

In 2009, the ASCR's workplaces 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-seven such common 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. More than twenty projects of the Czech Science Foundation were also based on the active participation of partners from areas of the industrial sphere. The direct cooperation of the ASCR's workplaces with partners from the user sphere in innovative activities

was also implemented in the framework of the joint resolution of projects in programmes of the Ministry of Industry and Trade (43 projects), Ministry of the (sic) Environment (9 projects), Ministry of Agriculture (11 projects), Ministry of Health (4 projects) or with the support of the Ministry of Transport, Ministry of Regional Development, Ministry of Labour and Social Affairs and Ministry of Foreign Affairs. In cooperation with partners in the application sector, an additional 40 projects with various forms of support from both public and private sources (8 of which being international) were being resolved.

The process of knowledge transfer from research to practice was considerably assisted by cooperation based on agreements and economic contracts between workplaces of the ASCR and entities of the user sphere. In 2009, workplaces of the ASCR concluded more than 330 economic contracts with such partners. The *Institutes of Archaeology* in Prague and Brno concluded another 310 contracts for conducting rescue archaeological surveys.

A significant enterprise in 2009 was the establishment of three 'spin-off' companies focused on facilitating knowledge transfer and commercialising the results of scientific work. The *Institute of Organic Chemistry and Biochemistry* established the company IOCB-TTO, s. r. o., headquartered in Prague, which concentrates on searching for suitable projects, assisting in the protection of intellectual property rights, managing the procedure between the national and international patent applications, seeking partners and investors, on licence negotiations, contracts with partners etc., and the international company Mendel Therapeutic, s.r.o., based in Brno, which focuses on the transfer of results achieved in the field of research of non-pyrogenic glycopeptide immunotherapeutics into clinical practice. The *Institute of Experimental Medicine* founded the company BiotechInvest, s.r.o., based in Prague, to accelerate the transfer of biotechnologies in the area of biomedicine.

The breadth of the forms of cooperation accomplished within the joint projects or on the basis of economic contracts, which in 2009 led 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, is documented by the following selected examples:

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- The development of x-ray crystal monochromators for synchrotron radiation based on silicon up to the prototype phase, *Institute of Physics* and Polovodiče, a. s., Prague
- The development of the stent graft for biomedical applications (endoprostheses and treatment of dysfunctions of convex parts of human body) made of nickel-titanium nanowires, *Institute of Physics* and ITV Denkendorf (Germany), DITF Denkendorf (Germany) and ELLA-CS, s. r. o., Hradec Králové
- The development of a thermoelectric generator using combustion-engine-produced waste heat, *Institute of Physics* and Škoda Mladá Boleslav, a. s.
- The cultivation and characterisation of BaWO₄ single crystals and phosphate glasses for use in laser technologies, *Institute of Physics* and CRYTUR, s. r. o., Turnov
- The development of a device checking the detection of the colour labelling of the coil springs used in cars in the real time of production-line manufacturing, *Institute of Physics* and Mubea, s. r. o., Prostějov
- The development of mathematical models for the consumption of natural gas by low- and medium-volume consumers, *Institute of Informatics* and RWE Energie, a. s.
- Monitoring and modelling the concentration of greenhouse gases within the GOSAT project, *Institute of Informatics* and Japan Aerospace Exploration Agency, National Institute for Environmental Studies (Japan) and Ministry of the Environment (Japan)
- Neutron diffraction mapping of internal pressure around welds of the INCONEL alloy and around stainless steel welds (construction materials of nuclear energy) to increase the safety of nuclear power stations, *Institute of Nuclear Physics*, EPRI (USA), VGB Power Tech, Essen (Germany) and Nuclear Research Institute Řež, a. s.
- The design of the algorithms for a system of the detection of identical digital images in very extensive databases, *Institute of Information Theory and Automation* and Profimedia.CZ, s. r. o., Pardubice
- The development of a professional DVB-T2 signal receiver, *Institute of Information Theory and Automation* and Screen Service Broadcasting Technologies S.p.A., Brescia (Italy)
- Constructing a model for monitoring the actual position of a car in car testing, *Institute of Information Theory and Automation* and Škoda Auto, a. s.
- The implementation of a compact, high-resolution surface-plasma sensor prototype, *Institute of Photonics and Electronics* and Phenogenomics, Inc., Seattle (USA)
- The generation and distribution of reference signals for the primary source of reference frequency, *Institute of Photonics and Electronics* and Telefónica O2 Czech Republic, a. s.
- The development of an arc ignition system in plasma-tron for the fuel combustion control in the Prunéřov Power Station, *Institute of Plasma Physics*, the University of West Bohemia in Pilsen and Orgrez, a. s., Brno
- The development of the technology of recording using an electron beam with a variable aperture of 66–2100 nm, *Institute of Instrumentation* and Optaglio, s. r. o., Řež
- The innovation of a contactless vibrodiagnostic system for operational monitoring of the blade vibrations in the TG25 turbogenerator in the Prunéřov II power station (the usage of a system complemented with circuits for the automatic saving of data during a change of the limit regimes in the turbine and software for remote data transfer will also lead to an increase in the safety of the operation of the Temelín Power Station), *Institute of Thermomechanics* and ŠKODA POWER, a. s., Pilsen
- The processing of a photo-visualisation of wind-power stations using GIS and GPS tools in the suburban zone of Břidličná, *Institute of Geonics* a Ventoreal, s. r. o., Brno
- The development of a device for dielectric analysis and elaboration of methodology for the evaluation of data on measuring the course of the hardening of epoxide systems using this device, *Institute of Rock Structure and Mechanics* and 5M, s. r. o., Kunovice, Rigaku, s. r. o., Prague and ECOSOFT, s. r. o., Prague
- The elaboration of a pyrolysis procedure up to 1100°C of surface nano-structures based on silicon dioxide and polyacrylonitrile, *Institute of Rock Structure and Mechanics* and Elmarco, s. r. o., Liberec

PRACTICAL ACTIVITY

- The development of special procedures for the treatment of samples and determination of granulometric composition of various powder metal materials containing precious metals using laser granulometry, *Institute of Rock Structure and Mechanics* and SAFINA, a. s.
- The development of the production method for synthetic combined inorganic pigments based on selected natural substrates whose surface is treated with metal oxides or sulphides, *Institute of Inorganic Chemistry*, Institute of Chemical Technology, Prague, and České lupkové závody, a. s (ČLUZ)
- The preparation and successful testing of new materials based on TiO₂-CdS and TiO₂-ZnS composites with Pt, Pd and Au deposition for photocatalytic water decomposition by sunlight used for hydrogen production, *Institute of Inorganic Chemistry*, Rokospol, a. s., Prague and Asteing, s. r. o., Rostoky
- The preparation of thermostabile pigments based on kaolinite particles covered in a thin layer of nanooxides of transition metals for application in high-temperature ceramics, *Institute of Inorganic Chemistry*, ČLUZ, a. s., and Asteing s. r. o., Rostoky
- The preparation of nanocomposite polymeric materials with a hydrotalcite component with increased mechanical strength, *Institute of Inorganic Chemistry*, *Institute of Macromolecular Chemistry* and Hexion Specialty Chemicals, a. s., Sokolov
- The preparation of Ag and Cu nanoparticles stabilised on natural carriers – materials suitable for the elimination of algae in the water circuits of a thermal power plant, *Institute of Inorganic Chemistry* and LUMET, s. r. o., Pardubice
- The development of a preparation method for transparent photocatalytic coatings designed for surface decontamination, *Institute of Inorganic Chemistry* and Rokospol, a. s., Prague
- The construction and testing of a reactor for cultivating the algae coming from waste gases within research on the possibilities of increasing the ecological and economic potential of biogas stations, *Institute of Chemical Process Fundamentals* and the ČEZ Prodej, s. r. o.
- The development of methodology for using thermodesorption and catalytic combustion in waste decontamination, *Institute of Chemical Process Fundamentals* and Dekonta, a. s., Prague
- The design of a pilot production line for waste PET material depolymeration using microwave irradiation, *Institute of Chemical Process Fundamentals* and NOEN Recycling & Technologies, s. r. o., Prague
- The development of a polyurethane recycling technology that uses renewable resources, *Institute of Macromolecular Chemistry* and SYNPO, a. s., Pardubice
- The development of a preparation procedure for composites with a matrix of polypropylene recyclate from used plastic car parts hardened with a cellulose filler based on a recyclate of newsprint, *Institute of Macromolecular Chemistry* and NOEN Recycling & Technologies, s. r. o., Prague
- The preparation and characterisation of stable nanofibrous scaffolds for cell transfer in the regeneration of tissues based on the optimised polyamide PA6/12; the selection and testing of new nanofibrous carriers for stem cell transfers, *Institute of Macromolecular Chemistry*, *Institute of Molecular Genetics*, *Institute of experimental Medicine* and Elmarco, s. r. o., Liberec
- The development of polymer diagnostic agents based on hydroxypropylmetacrylate copolymers conjugated to antibodies and horseradish peroxidase, *Institute of Macromolecular Chemistry* and EXBIO Prague, a. s.
- The development of two prototypes of organic coatings (XS 4020, XS 5090) based on nanocomposite latexes containing organically-modified montmorillonites and the characterisation of inorganic filler distribution in a polymer matrix, *Institute of Macromolecular Chemistry* and Hexion Specialty Chemicals, a. s., Sokolov
- The implementation of a new technology of the preparation of heterogeneous ion-exchange membranes in the form of granular mixtures, *Institute of Macromolecular Chemistry* and Mega, a. s., Stráž pod Ralskem
- The development of industrially-applicable synthetic process for the preparation of the antiviral drug (R)-PMPDAP, *Institute of Organic Chemistry and Biochemistry* and Okapi Sciences NV, Heverlee (Belgium)

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- The preparation of vectors and the genetic modification of technological crops with an increased expression of the bacterial degradation genes responsible for PCB cleavage (for the biological cleaning of contaminated soils), *Institute of Organic Chemistry and Biochemistry* and AGRITEC Šumperk, s. r. o.
- The development of composite carriers for bone cells based on synthetic polymers (polyamide, siloxane) and hydroxyapatite (HA) or tricalcium phosphate (TCP), *Institute of Physiology, Institute of Rock Structure and Mechanics* and Elmarco, s. r. o., Liberec
- The development of a new medicinal form of a gel with liposomes fused with hydrophobic microparticles of phthalocyanine for the photodynamic treatment of tumours, *Institute of Physiology* and RCD, s. r. o., Dobřichovice
- The development of a technology for the production of the rabies virus on the industrial scale via the submersion cultivation of the BHK-21 cell culture, *Institute of Microbiology* and Bioveta, a. s., Ivanovice na Hané
- The development of a drug with anti-tumour activity based on a combination of doxorubicine with amide and hydrazone bonds on N-(2-hydroxypropyl) methacrylamide (HPMA) copolymers/oncopolymers, *Institute of Microbiology* and Zentiva, k. s., Prague
- The development of new quantitative PCR reagents (XL-qPCR 2x SYBR Master Mix; XL-qPCR 2x SYBR+DMSO Master Mix), *Institute of Molecular Genetics* and Top-Bio, s. r. o., Prague
- The identification of pathogens (tick-borne encephalitis virus, *Borrelia burgdorferi*) in ticks in the South Bohemian Region, *Biology Centre* and Envisan-GEM, s. r. o., České Budějovice
- The production of new Czech cultivars of *Begonia* TBH with a possibility of patent protection for these new varieties using newly generated DNA markers, *Biology Centre* and Sempra Flora, s. r. o., Holice in Bohemia
- The development of diagnostic sets for ELISA: 4 plant viruses, *Biology Centre* and Bioreba AG, Reinach (Switzerland)

Table 3: Overview of the situation in the area of the ASCR's intellectual property right protection

Invention applications submitted in the CR in 2009	15
Patents granted in the CR in 2009	15
Utility models submitted in 2009	3
Utility models registered in 2009	1
Invention applications submitted abroad in 2009	
– international application – PCT	16
– national phase	6
– national way	1
Patents granted abroad in 2009	1
Invention applications submitted in the CR by 2008 (pending)	54
Patents granted in the CR by 2008 (monitored + maintained in effect)	27
Invention applications submitted abroad by 2008 (pending)	12
Patents granted abroad by 2008 (monitored + maintained in effect)	39

PRACTICAL ACTIVITY

- The design and evaluation of biomanipulation management of the Hamry water-supply reservoir, *Institute of Vertebrate Biology* and Povodí Labe, s. p., Hradec Králové
- The revision of evaluation methodology of investment incentive impact, transaction multipliers and employment multipliers in regions of the CR in 1998–2008, and the development of a methodology for multiplier updating, *Economical Institute* and Deloitte Advisory, s. r. o.
- The location of relicts of walls and underground spaces via geophysical survey in the Dominican Monastery in Prague, *Institute of Archaeology Prague*, Geonika, s. r. o., Prague and Cortuum, s. r. o., Prague
- The development and updating of software 'Czech Grammar Corrector' for Microsoft Office 2010, *Institute of the Czech Language* and Microsoft, s. r. o., Prague

In addition to the above-mentioned forms of cooperation and knowledge transfer, the research teams (or individual employees) of the institutes of the ASCR prepared 180 expert opinions for state agencies, institutions and entrepreneurial entities (moreover, the *Institutes of Archaeology* in Prague and Brno processed about 7,800 expert opinions) as well as a number of methodologies and trial and pilot and diagnostic methods, processed the background data for a large number of technical standards and directives and conducted dozens of measurements, analyses, material characterisations and laboratory tests. Other practical activities included the development and localisation of software and participation in various monitoring systems and activities. The workplaces of the ASCR are partners in twenty-nine national or international monitoring networks.

The situation in the area of the protection of the intellectual property rights of the ASCR as of the end of 2009 is summarised in Table 3 below. The greatest activity in this respect has been developed in the long term by the *Institute of Experimental Botany*, *Institute of Experimental Medicine*, *Institute of Chemical Process Fundamentals*, *Institute of Macromolecular Chemistry*, *Institute of Molecular Genetics* and *Institute of Organic Chemistry and Biochemistry*.

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05

International Scientific Cooperation

INTERNATIONAL SCIENTIFIC COOPERATION

Cooperation within EU Structures

In 2009, the involvement of the ASCR in several years of preparatory work and the actual organisation of the **Czech Republic's Presidency of the Council of the EU** culminated. Its programme in the area of research and development contained a number of up-to-date topics for the ASCR, including the regional distribution of major research infrastructures, development of human resources in research, evaluation of the impacts of EU framework programmes and further development of the European Research Area (ERA).

The ASCR organised or directly participated in the implementation of several events of the Czech Presidency. As one of the first, the Role of Basic Research in the Process of Structuring the European Research Area conference facilitated an exchange of opinions of the representatives of the leading international research and development institutions on the Vision 2020 strategic agenda and on questions of the further direction of the ERA. The prospects of frontier research in information technologies were presented by one of the largest events of the Presidency – European Future Technologies: Science beyond Fiction (FET09) – accompanied by an exhibition, a poster section and a common session of the European Technologies Platform in Information and Communication Technologies (ICT), the Information Society Technologies Advisory Group (ISTAG) and the ICT national representatives under the title of Research and Innovation: Raising the Game, devoted to new information from the European Commission concerning ICT. The session of the Steering Platform on Research for the Western Balkan Countries discussed the current state of cooperation in research and development between the states of the Western Balkans and the EU. The conference Researchers in Europe without Barriers was devoted to the development of human resources in research. The workplaces of the ASCR contributed organisationally to the success of two other events of the main calendar of the Presidency – Changing Research Landscapes to Make the Most of Human Potential. 10 Years of EU Activities in 'Women and Science' (*Institute of Sociology*) and World Biodiversity: Aspects of European Responsibility (*Institute of Botany*).

The ASCR also sponsored a number of accompanying events of the Presidency, namely CHEP 2009 – the conference on Computing in High Energy and Nuclear Physics (*Institute of Physics, Institute of Nuclear Physics*), the



The European Future Technologies: FET09 – Science beyond Fiction conference organised by the ASCR, Czech Technical University in Prague and the European Commission on 21–23 April 2009 in Prague as a part of the Czech Republic's Presidency of the Council of the EU (Photo: S. Kyselová)

COMPASS Programmatic Conference (*Institute of Plasma Physics*), the 10th Central European Workshop on Soil Zoology (*Biology Centre*), PERMEA 2009 (*Institute of Macromolecular Chemistry*) and ENHR2009 – Changing Housing Markets: Integration and Segmentation (*Institute of Sociology*).

The conclusions and recommendations of the conferences in terms of specific aspects of the ERA in the areas of basic (i.e. frontier) research, human resources, ICT, regional cooperation, gender equality or biodiversity were either directly assigned to the relevant divisions of the Council of the EU or passed on the expert level to the European Commission or to its working groups for further treatment. The results of these conferences were also incorporated in the Vision 2020 strategy and passed to the subsequent Swedish Presidency of the Council of the EU.

The Presidency provided the ASCR with considerable experience with the process of formulating EU policy in the area of research and development, which it will be able to use

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in its further participation in the formation of the **European Research Area** (ERA). In its activities during the Presidency, the ASCR took into consideration the Union's strategies relating to the ERA, such as the Ljubljana Process or Vision 2020, including their priority concentration on the development of research infrastructures on a global level, the free movement of research employees, knowledge and technologies, the joint creation of programmes, the sharing of knowledge, international cooperation and other areas.

The *Centre for Administration and Operations* continued in its implementation of the international **Czech Centre for Mobility** project. This project helps foreign scientists, the members of their families and their employers overcome all of the administrative obstacles associated with their residency in the Czech Republic and thus supports the international mobility of scientists in a significant way.

In 2009, the ASCR achieved progress in the implementation of **major research infrastructure** projects from the so-called Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). The Extreme Light Infrastructure (ELI) excellent laser research infrastructure project will be the only of these roadmap implemented in the new member states and with its likely headquarters in the Czech Republic. Significant shift was also achieved in implementing other projects from this roadmap with the participation of the workplaces of the ASCR. This mainly involved distributed infrastructures for research (SHARE, CESSDA, European Social Survey, LINDAT/CLARIN) or projects with their headquarters in another member state (JHR, ILL20/20 (ThALES)). Other projects are currently in the preparatory stage (ESRF, UPGRADE, CzechCOS/ICOS, INFRAFRONTIER, HiPER). The ASCR also participated in the creation of a national Roadmap of Major Infrastructures for Research, Development and Innovation. Its leading experts were active in thematic working groups of the Roadmap at the Ministry of Education, Youth and Sports.

The ASCR is currently the only research institution in the Czech Republic to have declared its support of the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers and has worked the principles of these into its own fundamental documents. It joined in the project to raise awareness of the principles of the Charter and the Code in the individual states and institutions. After this ended, it became involved at the request

of the European Commission together with another forty institutions from the EU in the creation of A Human Resources Strategy for Researchers Incorporating the Charter and Code.

In 2009, the ASCR participated at the expert level in a number of EU public consultations associated with research and development – on the preparation of the new EU 2020 strategy to replace the existing Lisbon Strategy, on the financial rules of programmes covered by the EU budget and on the simplification of the rules of the 7th Framework Programme.

European programmes in support of research and development continued to be at the fore of the ASCR's interest. The workplaces of the ASCR took ever greater advantage of the community programmes 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 Norwegian Financial Mechanism. It also newly engaged based on Article 187 of the Treaty of Lisbon in cooperation in the Artemis Joint Undertaking, which focuses on built-in computer systems.

The ASCR devoted a great deal of attention to the participation of its workplaces in **Framework Programmes for Research and Technological Development** of the European Union (FPs) also in 2009. By the end of the year, it had surpassed (the level of) 220 projects from both programme periods, which meant a repeated rise in the level of participation. The number of new projects from the 7th FP rose to eighty-two as of the same date, with the total contracted amount for the year in question reaching around € 2.4 million. In 2009, the overall volume of the contractually negotiated funds from the framework programmes reached ca € 7.4 million. The volume of the funds from the EUROATOM nuclear research programme totalled € 0.9 million for the eleven projects at the ASCR. Within the ASCR, the highest number of projects being resolved in the area of non-life sciences were traditionally implemented by the *Institute of Physics* (21) and the *Institute of Plasma Physics* (17), whereas in the life sciences and chemical sciences the *Institute of Microbiology* (16) and the *Institute of Experimental Medicine* (14) were most active and in the humanities and social sciences the *Economics Institute* (9) and the *Institute of Sociology* (4).

INTERNATIONAL SCIENTIFIC COOPERATION



The international conference EuroNanoForum 2009 took place in the Congress Centre in Prague as part of the Czech Republic's Presidency of the Council of the EU on 2–5 June 2009. Also President of the ASCR J. Drahoš appeared at the event.

(Photo: S. Kyselová)



Within the accompanying programme of the EuroNanoForum 2009 conference, NanoTruck came to Prague in June 2009. It is a mobile laboratory whose aim is to inform the public on the advantages and potential dangers of nanotechnologies in the near future and show their prospects.

(Photo: S. Kyselová)

Table 4: Participation of the workplaces of the ASCR in the main instruments of the 7th FP in 2009 and 2008

Type of instrument	Total number of projects	
	2009	2008
CP (research cooperation projects)	35	30
MC (Marie Curie events – support for training and career development for researchers)	18	8
CSA (coordination and support actions)	13	8
CSA (coordination actions within the preparatory stage of ESFRI projects)	11	8
NoE (networks of excellence)	1	1
BSG-SME (research for the Benefit of Special Groups – in particular small- and medium-sized enterprises)	2	1
ERC Advanced Grants (frontier research projects)	2	2

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Like in previous years, the ASCR paid considerable attention to **structural funds**, in particular the Operational Programme (OP): **Research and Development for Innovations**. The Application and Development Laboratories of Advanced Microtechnologies and Nanotechnologies project (*Institute of Scientific Instruments*) and the HILASE project – New Lasers for Industry and Research (*Institute of Physics*) – were both adopted as part of priority axis 2 of the OP: Research and Development for Innovations – Regional Research and Development Centres.

Several workplaces of the ASCR became involved also in the operational programme of **Education for Competitiveness**, in the support area 2.3 – Human Resources in Research and Development.

The Open Science II project, implemented by the *Centre for Administration and Operations*, is particularly significant from the perspective of the ASCR. It offers talented pupils at secondary schools outside of Prague the opportunity to take part in 150 scientific internships at individual workplaces of the ASCR and HEIs all over the Czech Republic. The Knowledge and Technology Transfer in Selected Regions project – the Application of the Technology Transfer Manager European educational model – which

had been submitted by the *Biology Centre*, found success within the support area 2.4, Partnership and Networks, of the OP: Education for Competitiveness.

The ASCR also became involved in programmes announced by the Prague City Hall. The following projects were approved as part of the second round of invitations for applications for the OP: **Prague – Competitiveness**, the support area 3.1 – The Development of the Innovation Environment and Partnership between the Basis of Research and Development and Practice:

The BIOPHARM project, submitted by the *Institute of Microbiology*, was approved in 2009 as part of the OP: **Czech Republic–Austria Cross-Border Cooperation**, as was the Spatially-Bound Historical Information as the Basis for Planning Care for and the Development of the Close-to-Nature forests in Saxon–Bohemian Switzerland project, submitted by the *Institute of Botany* as part of the OP: **Czech Republic–Saxony Cross-Border Cooperation**.

In 2009, thirteen projects financed by structural funds submitted by institutes of the ASCR were thus approved, of which two within the OP: Research and Development for Innovations, six within the OP: Education for Competitiveness, three within the OP: Prague – Competitiveness

Table 5: Approved projects of the workplaces of the ASCR in the support area 2.3 of OP: Education for Competitiveness

Applicant	Name of the Project
<i>Institute of Biophysics</i>	Modern biophysical methods: advanced practical education in experimental biology
<i>Biology Centre</i>	Multidisciplinary education of experts for the use of biotechnology in environmental fields
<i>Institute of Geonics</i>	The development of the professional abilities and skills of geographers
<i>Academy of Sciences of the Czech Republic</i>	Courses in the fundamentals of scientific work intended for the students of doctoral study programmes
<i>Centre for Administration and Operations</i>	Open Science II – the systematic involvement of talented secondary-school pupils in scientific and research work

Table 6: Approved projects of the workplaces of the ASCR in the support area 3.1 of the OP: Prague – Competitiveness

Applicant	Project
<i>Institute of Physics</i>	SAFMAT – Centre for Analysis of Functional Materials
<i>Institute of Macromolecular Chemistry</i>	Otto Wichterle Centre of Polymer Materials and Technologies
<i>Institute of Physiology</i>	NeuroImage – Centre for the study of the nerve tissue morphology

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and two within the OPs: Cross-Border Cooperation. The total funding requested is 1,655,000,000 CZK (of which 1,423,000,000 CZK within the OP: Research and Development for Innovations). Moreover, the workplaces of the ASCR took part not only as applicants but also as partners in other structural fund projects primarily submitted by higher education institutions, which contributed greatly to raising the level of mutual cooperation.

The management of the ASCR continued to provide support to the involvement of the workplaces of the ASCR, principally in the OP: Research and Development for Innovations. Besides general regulations, for example the internal procedure for assessing the applications of the workplaces of the ASCR for funding for the preparation of projects, it had to deal with a number of unresolved property, legal and personnel issues in connection to individual so-called major projects among others.

The representatives of the ASCR in the monitoring committees of the operational programmes of structural funds jointly participated in promoting efficiency and quality in the implementation of the individual operational programmes.

The Visegrad Four Forum (the academies of sciences in the countries of the V4), a regular meeting of the representatives of the academies of sciences of the V4 countries, took place in 2009 at the conference centre of the Polish AS in Jablonna near Warsaw. The main topics of discussion included questions concerning the impact of the financial and economic crisis on science and research in the individual countries of the V4, the Czech Republic's Presidency of the Council of the EU as well as the present and future of the ERC. 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. Up-to-date information on activities within the Forum of Academies of Sciences of the V4 Countries can be found on the shared website of the V4 Academies of Sciences at <http://v4.avcr.cz/>.

The ASCR's Cooperation with Other International Governmental Organisations

Within the **Conseil Européen pour la Recherche Nucléaire** (CERN), the repair and related modifications of a unique piece of scientific equipment, the Large Hadron Collider, were successfully completed. Its launch at the close of 2009 was a major event. The functions of the detectors for all of the experiments prepared (ALICE, ATLAS, CMS, LHCb, LHCf and TOTEM) were tested. Another significant event at the CERN was a science symposium entitled 'From PS to LHC – 50 years of Nobel Memories in High Energy Physics', which was attended by, among others, thirteen laureates of the Nobel Prize for Physics. More than 400 scientific employees and students from fifteen workplaces of the ASCR and higher educational institutions took part in the Czech cooperation with the CERN in 2009. The Czech Republic participated among other things in the development and application of eight of the thirty-four pieces of cutting-edge technologies at the CERN that have prominent application even entirely outside of elementary particle and high energy physics, in particular in the diagnostics and treatment of tumour illnesses and in the creation of the GRID computer and information network, which allows access to practically all of the information sources in the world. The CERN budget was more than CHF 1,000,000,000 in 2009. The contribution of the Czech Republic to this is around 1%. The Czech Republic is able to achieve a return of almost half of this contribution through public contracts for industrial supplies from CERN member states, for service and industrial services, spare parts etc.

In 2009, working contacts also continued between certain workplaces of the ASCR (in particular the *Institute of Nuclear Physics*, 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, particularly 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 became a full member of the ESA in 2008. This step considerably broadened the possibilities of international cooperation in the area of space research for the imple-

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mentation of the scientific plans of Czech workplaces. Astronomical and astrophysical observation from onboard artificial satellites and probes is essential for this and the *Astronomical Institute*, which was a pioneer in space-observation methods in Czechoslovakia from the end of the 1960s, has maintained its position to this day. It became involved in the PECS programme (a programme for cooperating states), as part of which it is working on five scientific projects. The employees of the *Astronomical Institute* are their principal investigators and participate in another two. The Czech Republic is involved in the preparation of two ambitious projects of the ESA – the Solar Orbiter and PROBA-3, for which Czech research workplaces are to develop and produce part of the flight hardware. Apart from this, the scientific employees of the *Astronomical Institute* also share the organisational duties of our membership of the ESA: we also have our own representatives in the 'Task Force' Committee and the Science Programme Committee (SPC) of the ESA.

European Southern Observatory (ESO) – 2009 was already the second year in which the Czech Republic was a full-fledged member state of the European Southern Observatory. The following representatives worked in individual committees on behalf of the Czech Republic: in the ESO Council prof. Jan Palouš (*Astronomical Institute*); in the Observing Programme Committee dr. Pavel Koubský (*Astronomical Institute*), who was replaced during the year by Marek Wolf (Faculty of Mathematics and Physics at Charles University in Prague); in the Scientific Technical Committee Michael Prouza (*Institute of Physics*) and in the Users' Committee dr. Jiří Grygar (*Institute of Physics*). Scientists from the Czech Republic had observation time during Period 83 and applied for observation time during Period 84. The ESO is building an ALMA interferometer, and the Czech Republic is a subcontractor for some of its parts (e.g. Frentech Aerospace in Brno). The *Astronomical Institute* became an ARC regional centre (ALMA Regional Center) for observation and for processing the data from this apparatus.

European Science Foundation (ESF) – A European organisation which financially supports Europe-wide scientific programmes and projects. The ASCR and the Grant Agency of the ASCR are its members for the Czech Republic. The ASCR has two representatives in ESF committees: in the Standing Committee for Life, Earth and Environmen-

tal Sciences (LESC) and in the Standing Committee for Social Sciences (SCSS). Prof. J. Syka became the latest representative of the Czech Republic in the Council for European Medical Research. The main body of the ESF, the Assembly, convened in Strasbourg in November 2009. The ASCR was represented there by Ing. V. Nekvasil. One announcement made public at the meeting was that the ESF and EUROHORCs (European Heads of Research Councils) are to merge. The reasons for this move were an effort for the scientific community to act and speak uniformly within the ERA, further a certain overlapping of the agendas, as well as financial reasons. However, a component of this reorganisation should also be independence for COST (European Cooperation in Science and Technology) and the exclusion of learned societies and academies of sciences (including the ASCR). The attending representatives of the ALLEA and the academies of sciences protested against this decision. An entire range of specialised scientific conferences and workshops were held within the ESF in 2009, as were the Forum on Scientific Integrity, the Peer Review Forum, the Science Career Forum and the Forum on Medium-Sized Research Infrastructures, which were attended by representatives of the ASCR. Czech research teams were involved in twenty-four research network programmes in 2009, six of which were completed in 2009 and eighteen continue. Scientists from the workplaces of the ASCR are involved in eleven programmes. Scientific teams from the ASCR are taking part in work on two expert committees: NuPECC (Nuclear Physics European Collaboration Committee) and CRAF (Committee on Radio Astronomy Frequencies). A new expert committee, the Material Science and Engineering Expert Committee, was established at the Committee for Physical and Technical Sciences, with a representative of the ASCR involved as an observer. Scientists from the ASCR also enrolled in EUROCORES (European Collaborative Research) programmes.

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, with other employees of the ASCR also acting as members of the commission. Every year, the *Institute of Molecular Chemistry*, the *Institute of Botany* and the *Institute of Systems Biology and Ecology* organise post-graduate UNESCO courses intended for scientists from developing countries. The **ISSC** (International Social Science Council) also exists under the auspices of UNESCO.

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The main mission of this Council is to support and apply in practice the social and behavioural sciences and to ensure their representation on a global scale. The ISSC organised the World Social Science Forum in Bergen in May 2009, among whose more than 700 delegates the ASCR had two representatives. The Czech National Committee for the **UNESCO MAB** (Man and Biosphere) programme also remains active. Representatives of MAB attended the 21st Session of the International Coordination Council of Man and Biosphere (ICC MAB) in South Korea in May 2009 as observers. Twenty-two new biosphere reserves were adopted at the ICC meeting, thus there are currently 553 of them in 107 countries. Czech biosphere reserves are part of the Czech network of sites involved in long-term ecological research (the CZ-ILTER Network). The Czech National Committee for MAB organised an international course on wetlands entitled *Ecohydrological Approaches to Wise Use, Restoration, Management and Conservation of Wetlands* with the financial assistance of the ASCR and the Czech Commission for UNESCO, whose evaluation by its participants from fifteen European countries was very positive. The Czech National Committee for MAB also jointly organised the *Using Biosphere Reserves in the Czech Republic as Learning Laboratories for Sustainable Development* conference in October 2009, the outcomes of which are the proceedings and a CD.

The ASCR's Cooperation with International Non-Governmental Science Institutions

All European Academies (ALLEA) associates fifty-three academies of sciences from forty European countries. ALLEA cooperates very closely with other European and global organisations and participates in the organisation of prominent global events. In March 2009, for example, a session of the ALLEA committee for science and ethics, in which the ASCR has a representative, was held in Berlin. An ASCR representative also took part in the ALLEA Towards a European Code of Conduct conference in Amsterdam in September.

The **European Academies Science Advisory Council** (EASAC) consists of twenty-five representatives delegated by the national academies of science of the twenty-three member states of the EU, further ALLEA and Academia Europaea. The academies of Norway and Switzerland as

well as the Federation of Medical Academies also send their observers to the EASAC. The primary mission of the council is to prepare expert studies and provide objective information from various scientific fields that are currently being resolved by the European and national political representations and institutions (for example the European Parliament). The ASCR has an official representative in the EASAC while scientific employees from the academy are members of the expert groups for the environment and vaccination against infectious diseases. The participation of the Czech Republic in the energy working group is currently marginal. In October 2009, the EASAC issued a memorandum for incoming Members of the European Parliament, whose aim was to point to the activity of the Advisory Council and to help politicians in their decision-making on matters which are on the borders of science. In 2009, the two regular sessions of the EASAC were held in Madrid in June and in Brussels in December. The current projects in whose preparation scientific employees from the ASCR participated concern ecosystems and biodiversity in Europe, the questions of the protection of animals used for medical research and the following expert-opinion theme: *Infections Associated with Health Care*.

The **International Council for Science** (ICSU) is a non-governmental organisation associating 111 countries and international unions. The Czech Republic is represented by the ASCR, which is the umbrella organisation of the national science committees (of which there are thirty-seven active here). The ASCR is in continuous contact with the national committees, resolves the situations which in their very nature are beyond the competence of the committees and contributes to their activities. An important event of the year was the International Year of Astronomy 2009, which the UN announced at the bequest of the International Astronomical Union on the occasion of the 400th anniversary of the first observation using a telescope, which was made by Galileo Galilei. The Czech National Committee for Astronomy established a working group which organised numerous popularisation events throughout the year. These events mainly involved an outside exhibition, lectures, observations of the night sky and others. A Czech National Committee for Long-term Ecological Research (CZ-LTER, a member of ILTER) was established at the initiative of the representatives of the Czech National Committee for MAB.

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The **InterAcademy Panel (IAP)** and **InterAcademy Medical Panel (IAMP)** are international organisations which unite academies of sciences from countries all over the world. Both panels are administratively linked and their secretariats regularly contact their members in the periods between General Assemblies with requests for expert statements and opinions on the challenges which these organisations address to the global scientific public. Under the auspices of the IAP and ALLEA, discussions took place on creating a European Regional Programme on Science Education in Paris in June 2009, which was attended also by a representative of the ASCR.

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 that surpass the framework of a single country. The workplaces of the ASCR are involved in the following projects: Moravia Magna, *Clavis monumentorum literarum Bohemiae*, *Lexicon iconographicum mythologiae classicae/Thesaurus cultus et rituum antiquorum*, *Corpus vasorum antiquorum*, *Dictionary of Mediaeval Latin and Aristoteles Latinus*. The Moravia Magna and Greek–Old-Church-Slavonic *Lexicon-Index* projects have a special status. The Moravia Magna project is a joint project of the *Institute of Archaeology in Brno*, the Institute of Archaeology of the Slovak Academy of Sciences and the Polish Academy of Art and Sciences in Krakow. The *Institute of Archaeology in Brno* is the pivotal workplace for the project, is the most active, and its publications, in particular a comparative monograph on early mediaeval fortifications, have been highly rated. The investigator for the other project is the *Institute of Slavonic Studies*. This project won the very highest evaluation (félicitations) in 2009.

The **Czech Historical Institute in Rome** is a joint workplace of the *Institute of History* and the Faculty of Arts and Philosophy at Charles University in Prague. The organisation was run by prof. J. Pánek in 2009. The Czech Historical Institute in Rome focuses on the systematic source research of the *Bohemica* in Roman, Vatican but also the other Italian archives and libraries. Its results are published mainly in the editorial series *Monumenta Vaticana res gestas Bohemicas illustrantia* and *Epistulae et acta nuntiorum apostolicorum apud imperatorem*. A catalogue of manuscript *Bohemica* in the collections of the Vatican Library is also

being created. Sixteen scholarship stays were implemented at the Czech Historical Institute in Rome in 2009. The institute regularly publishes the results of its work in the periodical *Bolletino dell 'Istituto Storico Ceco di Roma* and in an international yearbook issued by the International Union of Archaeological, Historical and Art Historical Institutions (Unione Internazionale degli Istituti di Archeologia, Storia e Storia dell'Arte), which is based in Rome. Along with the Austrian Historical Institute in Rome and the Pontifical College of Nepomucenum, the Czech Historical Institute in Rome organised an international conference on the topic of Czech Clerical Cultural Formation in a Context with Compromises towards Nationalists and Coexistence in the 19th and 20th Centuries in September 2009, which was attended by experts from the Czech Republic, Italy, Germany, Austria, the Slovak Republic and the Vatican. The proceedings of this conference will be published in a publication being prepared by Palacký University in Olomouc.

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 2009, the ASCR utilised sixty-seven agreements with partners from forty-eight countries. New cooperation agreements were signed e.g. with partners in Belarus and Taiwan, while an agreement with Turkey is waiting to be signed. The agreements signed in previous years were continuously updated, with an emphasis being placed on new trends in international cooperation, i.e. for these documents to allow new contacts to be developed, to allow participation at international science meetings but primarily to allow the implementation of mutual cooperation in the form of bilateral two- and three-year projects. Foreign scientists from partner scientific institutions are reciprocally received at workplaces of the ASCR and attend congresses and conferences organised by ASCR departments. Through this bilateral cooperation, 619 people were sent abroad for a total of 6,474 days in 2009. Meanwhile, 598 foreign scientists were received from abroad for a total of 5,017 days. The development of bilateral contacts over the past thirteen years is shown in Table 6. From this perspective, it is clear that in spite of certain restrictions which our

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foreign partners have been forced to proceed to as a consequence of the impact of the financial crisis, we have still been able to maintain mutual relations at roughly the same level.

One of the new instruments is the **Programme of Internal Aid for International Cooperation Projects** at the ASCR, which supports long-term internships for researchers from the workplaces of the ASCR at renowned workplaces abroad, long-term internships of top experts at the workplaces of the ASCR and research projects of up to three years for the researchers or research teams of the ASCR with prominent international institutions. The aim of the programme is to strengthen the current international cooperation by involving especially young research employees in excellent work teams, with the expectation of producing quality results in research and development at the workplaces of the ASCR. A total of 150 applications were received in 2009 as part of the first call, of which 110 sought aid for research projects, fourteen aid for long-term internships at workplaces of the ASCR and twenty-six aid for long-term internships at foreign workplaces. Financial support totalling 49,955,000 CZK was approved for 2009

for seventy research projects, four long-term internships at workplaces of the ASCR and fifteen long-term internships at foreign workplaces. The relations between the ASCR and partners from neighbouring countries, in particular the Slovak Academy of Sciences, are traditionally outstanding. A regular bilateral meeting of the representatives of both academies took place in the Czech Republic in 2009 at the château in Lužany, which is associated with the life of prominent patron of science J. Hlávka. This time it was the meeting of new representatives of both academies, because elections to academy managements and presidential elections had been held at both the ASCR and the Slovak Academy of Sciences.

Independent of the centrally-concluded bilateral agreements, scientific employees themselves also develop international cooperation based on the direct contacts of the workplaces of the ASCR, be this in the form of inter-institute agreements, involvement in international programmes and projects by attending international scientific meetings or via direct contacts between partners at home and abroad (see Table 8).

Table 7: Synoptic statistical data on bilateral scientific cooperation as part of inter-academy agreements

Year	Number of countries	Number of agreements	Arriving people	Days of stay	Sent people	Days of stay
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

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Other Activities within International Relations

The ASCR was intensively involved in the activity of the International Human Rights Network of Academy and Scholarly Societies, where the Academy is represented by President of the ASCR prof. J. Drahoš. Its principal mission is to seek out the cases of injustice committed against people of science thoroughly and to protest against these. The ASCR intervened in a number of serious cases also in 2009. For example, the President of the ASCR intervened in the case of Indian paediatrician Dr. Binyak Sen, who had been imprisoned from 2007 for contact with Indian Maoists (Naxalites), by sending a letter to the Prime Minister of India in February 2009. A turnaround in this case came in May 2009, and Dr. Sen was released. Professor J. Drahoš also joined the protests of the global science community against the criminal prosecution of a group of Iranian scientists who were involved in the leadership of the Bahá'í community and are intensely persecuted in Iran. They stand accused of blasphemy, espionage, profanation and subversion of the state apparatus and face the death penalty. The initiatives of members of the International Network for Human Rights of Academies and Scholarly Societies also bring success in their activities. Professor of Political Science Matruk al-Faleh was released from prison in January 2009, over whose arrest then President of the ASCR prof. V. Pačes expressed his dissatisfaction in a letter to the King of Saudi Arabia in 2008. A meeting of representatives of the network was held in 2009 at the headquarters of the Academy of the Kingdom of Morocco, with the ASCR represented at the meeting by prof. J. Palouš.

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Table 8: An overview of international scientific cooperation activities of workplaces of the ASCR

- 1 Number of conferences attended by scientists from other countries (organised or jointly organised by a workplace)
- 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
I. Non-Life Sciences													
Section 1	55	2,782	2,482	1,126	823	282	435	27	175	149	224	64	39
Section 2	35	770	733	572	435	65	189	12	56	94	67	38	31
Section 3	21	657	587	432	280	39	201	7	58	61	26	25	13
Total	111	4,209	3,802	2,130	1,538	386	825	46	289	304	317	127	83
II. Life Sciences and the Chemical Sciences													
Section 4	30	1,405	1,197	1,024	427	107	702	28	86	97	142	63	43
Section 5	34	1,568	1,138	1,283	473	183	845	66	184	108	191	80	62
Section 6	28	694	591	489	275	76	333	26	113	88	68	61	30
Total	92	3,667	2,926	2,796	1,175	366	1,880	120	383	293	401	204	135
III. The Humanities and the Social Sciences													
Section 7	25	360	354	309	288	67	19	29	21	42	98	26	17
Section 8	44	418	344	351	339	227	25	5	44	79	69	26	6
Section 9	36	327	253	299	276	149	1	20	124	69	153	6	3
Total	105	1,105	951	959	903	443	45	54	189	190	320	58	26
Total other	7	0	138	0	0	0	0	0	0	10	0	1	0
AS Total	315	8,981	7,817	5,885	3,616	1,195	2,750	220	861	797	1,038	390	244

06

**Public Tenders
in Research
and Development**

PUBLIC TENDERS IN RESEARCH AND DEVELOPMENT

As a result of the implementation of the Reform of the System of Research, Development and Innovation in the Czech Republic, no public tender was announced in 2009 in research and development to support programme projects under the sponsorship of the Academy of Sciences of the Czech Republic or any grant projects supported by the Grant Agency of the ASCR. However, new three-to-five-year grant projects selected on the basis of public tenders announced in 2008 did begin (usually as of 1 January 2009) and the support for programme and grant projects begun in previous years continued.

Programme Projects

2009 was the final year of the resolution of research projects under the **Information Society** and **Support for Targeted Research Projects** programmes, which have been classified under National Research Programme I (hereinafter referred to as NRP I). The final fifteen projects were supported within the Information Society programme (an NRP I thematic programme), for whose resolution 37.2 million CZK was provided in 2009. Special-purpose subsidy in the Support for Targeted Research Projects programme (a sub-programme of NRP I Integrated Research) was provided to thirty-two projects amounting to 47.6 million CZK.

Work on thirty-five projects in the Information Society programme commenced in 2004 and 2005 and on fifteen projects in the Support for Targeted Research Projects programme begun in 2005 was concluded as of 31 December 2008. Both programme councils assessed the completed projects according to the quantity and quality of the results achieved and in particular that of the applied outputs. Twenty projects in the Information Society programme were considered to be 'completed with outstanding results' and fifteen as 'completed'. Seven projects in the Support for Targeted Research Projects programme were considered to be 'completed with outstanding results', seven 'completed' and one 'not completed' for objective reasons.

Thirty-six projects commenced between 2006 and 2008 continued within the **Nanotechnology for Society** programme of the ASCR. A total of 315.5 million CZK was invested in this work in 2009. The resolution of the first two

projects was completed as of 31 December 2008, with the programme council considering one project to have been 'completed with outstanding results' and one 'completed'.

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 AS

In 2009, a total of 448.8 million CZK in special-purpose funding from the ASCR budget was used for the GA AS. This money went to support projects continuing from previous years (304.5 million CZK) and to resolve projects which were successful in the two public tenders announced in 2008 (144.3 million CZK). One newly-launched project aimed at medical sciences is financed by funds provided for this purpose by PRO.MED.CS Praha a.s. (financial aid in 2009 of 1,365,000 CZK).

Funding for Newly-Initiated Grant Projects

The resolution of 119 standard research grant projects began on 1 January 2009 based on the results of public tenders, with these projects being allotted 108.1 million CZK. A separate subcategory of 'interdisciplinary projects' was included within the standard research grant projects, as it had been the previous two years. Such projects are mainly intended to deepen the cooperation between the workplaces of the ASCR and higher education institutions. The six interdisciplinary projects aided were provided financial support of 11.6 million CZK. The sum of 37.5 million CZK was provided to eighty junior research grant projects that were initiated at the same time. More detailed information on the success rate of individual fields and on the funds allocated is summarised in Tables 9 and 10.

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Table 9: Standard research grant projects initiated as of 1 January 2009

Field	Number of proposals	Number of projects financed	Percentage of projects funded	Special-purpose grants in thousands of CZK
1 Mathematical, Physical and Computer Sciences	82	18	22.0	12,108
2 Technical Sciences and Cybernetics	49	8	16.3	7,119
3 Earth and Space Sciences	66	11	16.7	8,587
4 Chemical Sciences	107	16	15.0	19,577
5 Medical Sciences and Molecular Biology	101	16	15.8	17,970
6 Biological and Ecological Sciences	141	16	11.3	21,856
7 Social Sciences and Economics	52	6	11.5	2,920
8 Historical Sciences	40	13	32.5	3,163
9 Humanities and Philology	52	9	17.3	3,194
Total	690	113	16.4	96,494
X Interdisciplinary projects	25	6	24.0	11,646

Table 10: Junior research grant projects initiated as of 1 January 2009

Field	Number of proposals	Number of projects financed	Percentage of projects funded	Special-purpose grants in thousands of CZK
1 Mathematical, Physical and Computer Sciences	32	9	28.1	2,906
2 Technical Sciences and Cybernetics	33	9	27.3	3,356
3 Earth and Space Sciences	40	8	20.0	4,048
4 Chemical Sciences	57	8	14.0	4,944
5 Medical Sciences and Molecular Biology	46	9	19.6	4,653
6 Biological and Ecological Sciences	116	17	14.7	11,985
7 Social Sciences and Economics	53	5	9.4	2,085
8 Historical Sciences	45	7	15.6	1,827
9 Humanities and Philology	37	8	21.6	1,719
Total	459	80	17.4	37,523

PUBLIC TENDERS IN RESEARCH AND DEVELOPMENT

Assessment of Completed and Continuing Grant Projects

At their meetings held between February and April 2009, the Departmental Councils of the GA AS assessed the standard of the resolution and the quality of the results of grant projects completed by 31 December 2008 and the standard of the work on continuing grant projects. 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 off-prints of the most significant work created during their implementation. One hundred and nine completed standard research grant projects lasting from two to five years were evaluated. Of this number, fifty-three projects were considered as 'completed with outstanding results', fifty-three 'completed' and three 'not completed' because of a lack of publication activity. An average of 6.8 publications per project were issued in the course of resolving the project works now completed, most of them in prestigious, peer-reviewed foreign periodicals. A total of seventy-one junior research grant projects of between one and three years in length were completed, of which thirty were 'completed with outstanding results', thirty-five 'completed' and six 'not completed'. No publication output was documented for five of the projects not completed while one project was terminated prematurely at the request of the investigator. An average of 2.9 results were applied per project. 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.

The Departmental Councils of the GA AS also assessed the progress of the resolution of 352 standard and 166 junior research grant projects on the basis of regular reports and in all of the cases recommended that work continue also in 2009.

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07

Popularisation and Promotional Activity

POPULARISATION AND PROMOTIONAL ACTIVITY



The International Year of Astronomy was begun in the presence of Euro-commissioner for Science and Research J. Potočník on 7 January 2009 on Old Town Square in Prague. In the picture, he is accompanied by President of the ASCR V. Pačes.
(Photo: S. Kyselová)

The ASCR began its **popularisation activity** at the very beginning of the year, when on 7 January 2009 it took part in the ceremonial launch of the International Year of Astronomy on Old Town Square in Prague in the presence of leading personalities from abroad. It continued to participate in it through a number of diverse events throughout the year. For example, it organised observation of the sky for schools and the public through the Institute of Astronomy as part of the worldwide '100 Hours of Astronomy' project.

That the ASCR's popularisation activities reach beyond the borders of the Czech Republic is proved by the membership of the *Institute of Geology* in the Preparatory Group for the Activities of the International Year of Planet Earth and also by the fact that one of the many lectures given by the *Institute of Archaeology in Prague* was enjoyed by interested listeners in Dresden. The English-speaking public found out about the results of the latest surveys on the locations of mammoth hunters in South Moravia conducted by the *Institute of Archaeology in Brno* through the BBC



Astronaut A. Feustel, who participated as a crew member of space shuttle Atlantis in May 2009 in the last service mission to the Hubble Space Telescope, visited the Czech Republic at the invitation of the *Astronomical Institute*. He appeared at a press conference in the building of the ASCR on 3 August 2009.
(Photo: S. Kyselová)

serial *The Human Journey*, and surveys at the Pavlov VI settlement were shown on Discovery News, PM – Welt des Wissens and in other foreign media. On the other hand, the *Institute of Ethnology* represented the ASCR at the international festival, Days of Ethnographic Film, in Ljubljana etc.

Also in 2009, the ASCR consistently supported the growing interest among the lay and expert public of all age groups in the activity of researchers and their results, and through the media but also through the various activities carried out by individuals and working parties, it regularly acquainted the public with the successes achieved both at home and abroad.

The statistics of reports published mentioning the 'ASCR' and its various forms in 2009 show that around 8,000 reports mentioning the 'ASCR' and its forms were published in the media monitored, i.e. almost 700 reports a month (an average of more than twenty-two reports a day including Saturdays and Sundays). The ASCR appreciates the in-

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The press conference for the beginning of the International Year of Astronomy on 5 January 2009 was one of the most successful. In the picture, J. Palouš from the *Astronomical Institute* is speaking. (Photo: S. Kyselová)

terest shown by the public and is as accommodating as possible to it. **Through the popularisation activities of the individual workplaces, it address all age categories.**

The ASCR organised a total of **twenty press conferences** in 2009, among the most successful of which were the conferences for the aforementioned International Year of Astronomy, for European Brain Week and for Science and Technology Week, and a press conference with American astronaut Andrew Feustel. It presented i.a. the *Concise Encyclopaedia of Islam* by the *Oriental Institute*, ensured the ceremonial assessment of the Eustory History Competition for secondary-school pupils etc.

The ninth year of the **Science and Technology Week** and the **Open Houses** at the ASCR's workplaces took place on 2–8 November 2009 in Prague, Brno, Ostrava, České Budějovice, Pilsen, Olomouc and for the first time also in Hradec Králové. In total, these events comprised 117 lectures, twelve exhibitions, six scientific cafés, seven presentations, four seminars and two conferences. The **Open**



M. Londesborough from the *Institute of Inorganic Chemistry* during a lecture *Mysteries of Energy* on 2 November 2009 reveals the mystique of alternative energies through attractive experiments. (Photo: S. Kyselová)

House events were held in seventeen places in Brno, six in České Budějovice, one each in Ostrava and Olomouc and fifty-five in Prague and surroundings. The total number of people interested in these activities continues to rise every year: whereas in 2008 there were 25,600 participants, 31,550 people attended them in 2009.

In response to the considerable interest shown by the public, the ASCR organised the 2nd Annual Plant with a Story photo competition for the scientific community and the lay public. The main organiser was again the *Institute of Experimental Botany* and like the year before the event climaxed with a subsequent exhibition of the best entries at the building of the ASCR during Science and Technology Week.

The ASCR issued some 105 **press releases** with information from various areas of activity at its workplaces; the media success is witnessed by the growing number of articles published in the media, in particular after the extraordinary meeting of the Academic Congress dedicated to the

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Astronaut A. Feustel and his wife I. Feustel, who is of Czech descent, at a forum with children.
(Photo: Archives of the Astronomical Institute)



The photographic exhibition of the second year of the competition *Plants with a Story*, organised within the Week of Science and Technology
(Photo: S. Kyselová)

transfer of expenses from the area of basic research to research into applied development and innovations.

The ASCR tries to provide information about science as universally as possible but also to gain the support of **prospective and promising novices for science already from an early age** and to involve them systematically in various activities. For this reason, the *Institute of Astronomy* involved not only the public and schools but also the children at nursery schools in an astronomical programme in Litomyšl, organised an art competition to mark the International Year of Astronomy in association with the Primary School of Arts in Říčany and so on. The ASCR presented itself through the *Institute of Astronomy* to visitors at the Child in Dlouhá (Dítě v Dlouhé) **theatre festival in Prague**, the eleventh year of which was inspired by the International Year of Astronomy and a part of which was a children's theatre festival with an astronomical programme.

Other successful popularisation activities of the ASCR include **internships for students and secondary-school**

teachers, specialised seminars, courses, lectures and blocks of lectures. Information about the so-called summer schools organised by individual workplaces of the ASCR is provided in Chapter 3. The *Institute of Physics* again organised a week-long study residence with excursions for secondary schools and their teachers from Prostějov and the surrounding area, as well as all-day seminars for physics teachers at secondary schools. It organised another visit of the CERN for secondary-school teachers. The *Institute of Computer Science* and the Ministry of Education, Youth and Sports prepared a day of lectures and a workshop as part of a camp for students preparing for international competitions. The *Institute of Microbiology* and the *Institute of Experimental Botany* regularly arranged excursions for pupils from secondary schools throughout the school year. The *Institute of Sociology* organised i.a. two cycles of expert seminars and discussions open to the public, which were very well received and had high attendance. The *Library* organised a seminar on the cataloguing of early printed books for students at the Faculty of Arts and Philosophy at Charles University in Prague.

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President of the ASCR J. Drahoš at a press conference for the beginning of the Ninth Annual Week of Science and Technology
(Photo: S. Kyselová)



The press conference to begin the Ninth Annual Week of Science and Technology
(Photo: S. Kyselová)

Popularising lectures and excursions for university students and teachers were organised last year by the *Institute of Plasma Physics* and the *Institute of Chemical Process Fundamentals* (Why Study Aerosols – for doctoral students), whereas also the *Institute of Biotechnology* organised specialised one-off as well as regular seminars. The *Institute of Analytical Chemistry* ensured the organisation of a coveted competition of dissertations and published papers by young authors under the age of thirty-five for the best paper in the field of spectroscopy. A one-day block of lectures for the public presenting the current results of Czech laboratories in the field of evolutionary biology and palaeontology was jointly prepared by the *Institute of Experimental Botany* and the *Institute of Geology*, whereas scientists at the *Biology Centre* organised the Environmental Olympics for Secondary Schools.

The *Economics Institute* organised joint seminars of the Czech National Bank/Czech Economic Society/CERGE-EI for the professional public where the guests presented the

results of their research. It also as usual organised student recruitment through a presentation of the joint doctorate programme of CERGE UK and the *Economics Institute of the ASCR* and the joint workplace of CERGE-EI at universities in the Czech Republic and abroad.

For **secondary-school students** from Prague and its immediate surroundings, the ASCR again organised through the *Centre for Administration and Operations* regular lectures in the **Don't be Afraid of Science** cycle throughout the year at its building at Národní 3 in Prague. Each of these lectures was attended by an average of more than one-hundred students. The Day with Astronomy was especially successful within this cycle. The *Centre for Administration and Operations* launched the **Open Science II** project in September 2009, which offered talented students from outside of Prague two-year internships at the scientific workplaces of the ASCR and at the research workplaces of cooperating higher education institutions. This project was built on by Open Science to Regions, which in 2009

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The winners of the competition *New Face (Nová tvář)*, which was organised by the *Academia* bookshop of the *Centre for Administration and Operations* (Photo: S. Kyselová)



The *Jaroslav Heyrovský Institute of Physical Chemistry* organised a travelling exhibition *The Story of the Drop*, which presented through photographs, films, written documents and other exhibits (e.g. the development series of a number of polarographs) the story of J. Heyrovský, winner of the Nobel Prize for Chemistry (Photo: Archives of the Jaroslav Heyrovský Institute of Physical Chemistry)

continued under the name of **Open Science Nové Hrad** and was again organised by the *Centre for Administration and Operations*. Three practical courses in biology, chemistry and physics for secondary-school teachers were conducted as part of this project, with the aim of contributing to the improvement of the quality of natural-science teaching. These practical courses indicated a possible path for the further education of secondary-school teachers; a total of seventy-nine teachers were trained.

One entirely new popularisation activity was a competition announced by the Centre for Administration and Operations entitled *Academia Bookshop – A New Face*. Its aim was to address pupils at schools of decorative-art, graphic-design schools and design schools and motivate them to create designs for a uniform visual style for *Academia* sales outlets. Selected competition proposals were then presented to the public in an exhibition in the foyer of the ASCR.

Another level of popularisation activity of the ASCR consists of **lectures and exhibitions** to familiarise the lay and expert public with scientific activities at the workplaces of the ASCR or important events in public and scientific life. For this reason, the ASCR continued in its organisation of the successful cycle of lectures **Academic Prague** in cooperation with Charles University in Prague. The *Institute of Atmospheric Physics* commemorated thirty years of *MAGION* satellites through exhibitions, lectures, television reports and articles in periodicals. It built a model of the *MAGION 2* satellite for the permanent exhibits at the National Technical Museum in Prague. The *J. Heyrovský Institute of Physical Chemistry* prepared a travelling exhibition on the *Story of the Drop* on Nobel Prize winner J. Heyrovský and on the occasion of the 50th anniversary of the Nobel Prize for Chemistry, which was visited by 4,700 people in Czech towns. The research of scientists from the ASCR in the Antarctic and the construction of the Czech station on James Ross Island was presented in Telč by the *Institute of Botany*. The *Library* organised an exhibition on the 'History of

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Cieszyn Silesia in the book collections of Bibliotheca Tessinensis (Książnica Cieszyńska)' accompanied by lectures.

The ASCR used a series of events on the 55th anniversary of the beginning of archaeological research in Mikulčice and a cycle of lectures on the 90th anniversary of the foundation of the *Institute of Archaeology in Prague* to remind the public of the significant successes that the ASCR achieved in archaeology. Several dozen expert-popularisation lectures were prepared by the *Institute of History* as a part of its popularisation activity and at the invitation of various cultural, scholastic, educational, civil and ecclesiastical institutions. The ASCR was represented before the public also by the *Institute of Art History* with abundant lecture activity throughout the year, while the *Institute of Czech Literature* prepared the Literary Science Forum and Art Yesterday and Today cycles, the latter in association with the Academy of Arts, Architecture and Design in Prague.

The ASCR is a respected and coveted partner for various media outlets and through selected workplaces provides **expert consultation and helps in the creation of scripts for specific programmes**. Last year, for example, the *Institute of Geology* collaborated with Czech Television on the Bohemia Subterranea II television series while M. Londesborough from the *Institute of Inorganic Chemistry* cooperated with Czech Television on the weekly PORT programme on news and items of interest from various areas of science, new technologies and social disciplines. Figures of Czech science, for example prof. V. Pačes, appeared as guests of Doc. J. Konvalinka from the *Institute of Organic Chemistry and Biochemistry* on the Rendez-vous programme on ČT24 (the 24-hour news channel of Czech TV). A serial by the *Institute of Archaeology in Prague* entitled Seventy-Two Names of Czech History on the people whose names are shown in the façade of the National Museum in Prague continued on Czech Television, while Czech Radio Leonardo broadcast a popular cycle of programmes on mediaeval castles by prof. T. Durdík from the *Institute of Art History*. The *Institute of History* also regularly participated in the preparation of several dozen television programmes and film scripts in 2009. The employees of the *Masaryk Institute and Archives* also represented the ASCR in television and radio programmes throughout the year, for example in the History.cs and History.eu cycles on Czech Television, and regularly published in the daily press. The *Insti-*

tute of Art History contributed to the presentation of the ASCR through a series of radio programmes European Cathedrals, and the *Institute of Contemporary History* was involved in regular editorial and authorial cooperation with Czech Television on the previously mentioned History.cs and on 20 Years of Freedom, in radio broadcasts on the events in Prague during the fall of the Communist regime and so on. The *Institute of Philosophy* ensured the treatment of sixty-two entries in the *Encyclopaedia Comeniana*. The *Institute of Czech Literature* also contributed to the presentation of the ASCR in the media, for instance through its preparation of the Critic's Club programme on book novelties for Czech Radio – Vltava and radio programmes on Czech poetry. A significant partner of Czech Television was again The *Institute of the Czech Language*, helping with the popular programmes such as O češtině (About Czech) and the show Divnopsis (explaining the strange names of Czech villages or townlets). It also continued its cooperation with Czech Radio Pilsen on the Jazykové koutky (Language Corners) programme.

The employees from the ASCR are regularly invited to make statements in the media on various events at home and abroad. They are quoted in commentaries, mainly in regional daily dailies and other periodicals, and appear in television and radio debates and discussions. The representatives and personalities from the ASCR, for example the current and former presidents of the ASCR, regularly offer their opinions on current political and social topics. Last year, like in previous years, employees of the *Institute of Geophysics* commented on seismic events, experts from the *Institute of Sociology* commented on the political situation, economists from the *Economics Institute* stated their opinions on the economic crisis, housing policy etc. The ASCR was involved in the catastrophic situation concerning the polluted air in the Ostrava district and in research into the impact of the poor environment on the health of the people there through the *Institute of Experimental Medicine* and its Committee on the Environment. Employees of the *Oriental Institute*, on the other hand, were contacted by the media for comments on current topics (Sri Lanka, Tibet, China etc.). The ASCR made a clear statement in defence of genetically-modified organisms through its presentation of the White Paper by the scientists from the *Biology Centre*. The *Institute of State and Law* along with medical societies devoted themselves to the popularisation of health law.

POPULARISATION AND PROMOTIONAL ACTIVITY



A photographic exhibition Meet UNESCO World Heritage, organised in cooperation with the UNESCO Commission, was begun on 9 November 2009 by President of the Czech Commission for UNESCO H. Illnerová.
(Photo: S. Kyselová)

The numerous activities in 2009 prove that the ASCR has become a coveted cooperating institution for state and regional organisations. For example, it cooperated with state administrative bodies involved in the protection of the environment (Krkonoše National Park Administration, Administration of the Šumava National Park and Reserve) in utilising scientific knowledge in the area of nature protection. The *Institute for Hydrodynamics* organised the Orlicko – Kłodzko 2009 conference, which presented the results of research activities carried out by the institute and all of the participating workplaces of the ASCR, which in a number of fields took place across borders. The *Institute of Information Theory and Automation* participated in the Fantazie Festival on statistical recognition in Chotěboř, and the *Institute of Scientific Instruments* presented a laser show with demonstrations of experiments using laser light and gave lectures at the Festival of Science in Brno, in whose organisation it cooperated with other institutions in Brno. The *Institute of Thermomechanics* became involved in the Robotour 2009 mobile robot competition in Brno. The *Institute of Philosophy* represented the ASCR at the

now traditional European Festival of Philosophy in Velké Meziříčí and organised in conjunction with the Municipal Authority in Chorušice lectures on the history of the local deanery and guided tours. It also organised a talk on the subject of How to Approach Representations for the PEN Club. Through the editorial activity of M. Nodl, it also continued its cooperation in the publication of historical literature with ARGO publishing house. The *Institute of Theoretical and Applied Mechanics* and the Arte-fakt association for the protection of monuments participated in the Restoration and Protection of Works of Art – Surveys of Monuments conference. Employees of the *Masaryk Institute and Archives* gave twenty-five lectures organised by schools, museums, clubs, generally beneficial company, municipal authorities and so on. The *Institute of the Czech Language* provided lectures on the Czech language (including historical Czech and dialects) at the request of certain institutions (Ministry of the Interior of the Czech Republic, Ministry of Defence of the Czech Republic, Writers' Community, Chamber of Court Appointed Interpreters and Translators of the Czech Republic). As part of its traditional language consultancy, it answered around forty phone calls a day and dealt with around 9,000 written questions in 2009.

The fifteen independent exhibitions organised by the *Centre for Administration and Operations* in 2009 testify to the fact that the ASCR is continuing in the tradition of its predecessor in the area of art. A great response was evoked from the visitors to the 'End of Czechoslovakia on 14th–16th March 1939' exhibition by the *Institute of History*, the 'Bolides and Meteorite Fall' exhibition by the *Astronomical Institute* and most of all by the 'Science for Life' exhibition, which presented the results of the work of the ASCR's institutes in response to the efforts of the Government of the Czech Republic and the Council for Research, Development and Innovation to reduce the financial contributions to the activities of the ASCR.

Visitors were shown unique photographs taken by Jan Andryška in the Galapagos, photographs taken by scientists from the *Institute of Archaeology* on the first science expedition to Gilf al-Kebir and from research in Egypt's Western Desert, a photo-reportage presentation by television cameraman Milan Mošna from the visit of President of the US Barack Obama at Prague and an exhibition organised in cooperation with the UNESCO commission entitled Meet UNESCO World Heritage.

08

Summary of the Use of Financial Means

SUMMARY OF THE USE OF FINANCIAL MEANS

At the beginning, 2009 was rather above average in terms of the financing of Czech science and the ASCR. The climate favourable for fulfilling demanding tasks, quiet at work, and development prospects, however, were undermined by dramatic events in the preparation of the 2010 budget. The tense situation caused by the unprofessional approach and flawed budget proposals of the Research and Development Council led to the convocation of an Extraordinary Session of the Academic Assembly in midyear. The threat of a liquidating reduction in funding was partially compensated through the intervention of the Government of the Czech Republic.

The total expenditures of the ASCR's budget chapter rose by about 6% as against 2008, while the total amount of institutional fund volume increased by 7%. The total amount of special-purpose funds has been gradually falling since 2007 in line with the fact that in 2009 the programs *Information Society* and *Support of Targeted Research Projects* ended and no further tender rounds have been announced in the *Nanotechnologies for Society* program.

Structure of financial resources (in millions of CZK):

		Non-investment funds	Investment funds
Approved budget chapter		4,820.0	1,067.1
Amended budget chapter of the ASCR		4,750.1	1,156.1
of which	subsidies to public research institutions	4,353.1	1,121.2
	subsidies to the ASCR's Head Office	397.0	34.9
Subsidies from other budget chapters		2.6	
Use of claims from unused expenses		2.7	7.9
Sources of reserve fund of the ASCR's chapter		1.9	
Transfer to files of claims from unused expenses		-7.6	-0.1
Total resources from the budget chapter of the ASCR		4,749.7	1,163.9
Subsidies from other budget chapters (pursuant to Act No. 130/2002 Coll.)		1,612.4	130.5
of which	Czech Science Foundation grants	610.5	25.1
	other ministries' projects	1,001.9	105.4
Own R&D&I resources		2,228.5	
of which	main activity orders	175.0	
	sales of publications	125.9	
	sales of goods and services	174.5	
	licences	1,131.9	
	conference fees	24.4	
	foreign grants and donations	231.3	
	rent	72.8	
	interest, exchange rate profits	83.6	
	own fund resources	88.4	
	other	120.7	
Total resources		8,590.6	1,294.4

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The ASCR operated with a total of 9,885,000,000 CZK in 2009, of which 5,913,600,000 CZK came from the organisation's own budget chapter.

The institutional funds provided for research plans and to ensure the research infrastructure amounted to 85.6% of the total volume of budget resources from its own budget chapter. The total volume of specific resources intended for grants and projects provided from the ASCR's chapter on the basis of the results of public tenders fell by 9.4% as against 2008.

The non-investment funds of the ASCR in 2009 were from 55.3% comprised of resources from its own chapter of the state budget, from 18.8% of transfers from other state budget chapters and from 25.9% of own revenues and extrabudgetary funds. The share of non-investment funds obtained by transfers from other state budget chapters rose slightly.

The investment funds of the ASCR were covered from 89.9% from resources from its own chapter of the state budget and from 10.1% from transfers from other chapters of the state budget.

Of total revenues amounting to 8,188,300,000 CZK, the workplaces of the ASCR (public research institutions) used 7,455,000,000 CZK to cover their own costs. In addition to covering any losses incurred in previous years, improved economic results totalling 733,300,000 CZK will primarily be used for the supplementation and renewal of instruments and equipment essential for the scientific activities of the workplaces.

Structure of the expenses of the ASCR's workplaces (in millions of CZK):

Personnel costs (labour costs, mandatory insurance paid by the employer, sick-leave compensation)	54.60%	4,070.5
The purchase of material	11.92%	888.8
The purchase of energy, water and fuels	3.47%	258.3
The purchase of services	13.55%	1,010.3
Repairs and maintenance	4.11%	305.9
Total travel expenses	3.20%	238.8
Depreciation of fixed assets	0.55%	41.1
The creation of special-purpose funds	2.21%	164.9
Total other expenditures	6.39%	476.4
Used by the workplaces of the ASCR in total	100.00%	7,455.0

SUMMARY OF THE USE OF FINANCIAL MEANS

The structure of the expenditures of the ASCR's workplaces (public research institutions) has been rather stable for a number of years.

The Creation of Investment Resources and Their Use

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:

Total investment resources (in millions of CZK)		1,567.7
of which	Depreciation	89.8
	Transfer from improved outcome from operations	132.3
	Recipients; joint recipients (pursuant to Act No. 130/2002 Coll.)	130.5
	Foreign grants and donations	42.0
	Revenues from sale of fixed assets	5.6
	Combining funds for the acquisition of fixed assets	3.9
	Subsidies from the state budget	
	institutional	1,075.8
	specific-purpose	87.8
These resources were used to fund:		
	Buildings	518.3
	Acquisition of instruments and equipment	816.5
	Maintenance and repairs	21.2
	Other	93.8
Total used on the acquisition of fixed assets		1,449.8
Use of the Property Reproduction Fund		118.2
Sum returned to the state budget		-0.3

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Analysis of Employment and the Drawing on Wage Resources

There was a considerable year-on-year reduction in the volume of investment funds for construction activities in 2009 in relation to the expected stagnation of institutional support.

The overall average monthly earnings in the ASCR were 32,471 CZK, which represents a year-on-year growth of 6.14% as against 2008.

The average monthly earnings by category of employees in public research institutions (workplaces) of the ASCR are shown in the following table:

Category	Average adjusted number of employees	Average monthly earnings in CZK
Research workers	2,725	45,105
Other university-educated workers of research workplaces	1,670	28,454
Specialist workers with university education	375	28,856
Specialist workers with secondary education and technical college	906	22,108
Specialist R&D workers with secondary education and technical college	151	23,567
Technical and financial employees	929	30,865
Manual labourers	552	17,181
Operations employees	375	15,011
Total	7,683	32,361

SUMMARY OF THE USE OF FINANCIAL MEANS

An analysis of the wage resources shows that 70.7% of all payroll costs in 2009 were paid from the institutional resources of the ASCR, public research institution.

Audit Activity

The aim of audit activity is to ensure that the legal regulations and the internal measures adopted are being observed in the management of public funds and to ensure the protection of public funds.

The audit department of the ASCR's Head Office conducts internal audits of the accounting of projects from the 6th EU Framework Programme based on approval by the competent body of the EU. A total of 101,352,000 CZK of funding was audited in 2009. Thirty audited certificates were issued.

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Appendices

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR

Appendix 1

List of Research Plans Resolved by Workplaces of the ASCR – Status as of 31 December 2009

Recipient	Identification code	Name
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
Mathematical Institute	AV0Z10190503	Research and development of general mathematical knowledge and its application to other branches of science and practice
Institute of Informatics	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 Informatics Theory and Automation	AV0Z10750506	Advanced mathematical methods in retrieval, processing and applications of knowledge and information in complex and non-deterministic systems
Institute of Material Physics	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

Recipient	Identification code	Name
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
Institute of Biotechnology	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 the organismal, cellular and molecular level
Biology Centre	AV0Z60660521	Relationships between the structure and function of decomposer food web in soil

LIST OF RESEARCH PLANS RESOLVED BY WORKPLACES OF THE ASCR

Recipient	Identification code	Name
Institute of System Biology and Ecology	AV0Z60870520	Spatial and functional dynamics of biological, ecological and socio-economic systems interacting with global climatic change
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 life-span 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 the Czech lands to 1800
Economic 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
Archaeological Institute, Brno	AV0Z80010507	Prehistoric and early historical development in Central Europe in the view of the latest results of archaeological research in Moravia and Silesia
Archaeological Institute, 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 Arts History	AV0Z80330511	Research into the history of Czech visual arts in terms of joining the EU
Institute of Contemporary History	AV0Z80630520	Analysis of Czechoslovak/Czech Contemporary History and History of Science
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 mediaeval 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 of the Czech Language	AV0Z90610518	Integrated research of the Czech language and its variants
Institute of 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	Publication results			
	Year of issue 2008		Year of issue 2009*)	
	Czech	Foreign language	Czech	Foreign language
Books	245	63	175	47
Treatises in books	605	362	374	253
Articles in scientific journals	1,112	3,802	789	3,200
Conference proceedings	28	42	15	24
Papers in proceedings	610	1,565	371	1,126
Translations	38		19	
Reviews	344		275	
Specialised articles in the daily press	302		194	
Research reports	268		220	

*) The data for 2009 are incomplete, because publications with 2009 as the 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.

PUBLICATION RESULTS

Appendix 2.2

Publication Results by Area of Science

Type of publication	Sections 1–3				Sections 4–6				Sections 7–9			
	2008		2009*)		2008		2009*)		2008		2009*)	
Language	Czech	Foreign	Czech	Foreign	Czech	Foreign	Czech	Foreign	Czech	Foreign	Czech	Foreign
Books	24	12	22	7	15	11	2	12	211	39	155	28
Treatises in books	42	69	39	41	57	94	4	62	511	194	332	152
Articles in scientific journals	169	1,587	160	1,313	165	2,018	89	1,772	784	212	543	176
Conference proceedings	10	26	5	17	8	10	4	5	10	6	6	2
Papers in proceedings	261	1,050	153	783	126	432	97	280	232	104	122	80
Translations	0		1		1		0		37		18	
Reviews	2		0		1		2		341		272	
Specialised articles in the daily press	83		49		54		43		165		104	
Research reports	126		72		13		6		129		142	

*) The data for 2009 are incomplete, because publications with 2009 as the year of publication are also published the following year.

APPENDIX 05

Appendix 3

Selection of Prominent International Projects Resolved at Workplaces of the ASCR

CERN

ATLAS CERN Experiment

- coordinator and investigator: *Institute of Physics*
- co-investigators: *Institute of Computer Science* and other institutions from EU states, Switzerland and Russia

COST

Advanced Materials for Lead-Free Soldering at Higher Temperatures

- coordinator: *Institute of Physics of Materials*
- co-investigators: another forty-eight institutes from twenty EU states

Physical Modelling of Transport Processes in Micro-Meteorological Flows

- coordinator: *Institute of Thermomechanics*
- co-investigators: research institutes from twenty-two EU states

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

- coordinator: Helmholtz Centre for Infection Research, Germany
- co-investigators: *Institute of Molecular Genetics* and nineteen other partners from nine countries

OC-COST. Comparative Analysis of Enterprise Data: Industry Dynamics, Firm Performance, and Worker Outcomes

- coordinator: ESF and Central European University
- investigators: *Economics Institute* of the ASCR and another twenty European research workplaces and universities

Remaking Eastern Borders in Europe

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

ESA

Czech participation in the GAIA project

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

EU Framework Programmes

AIM – Advanced Microseismic Monitoring for Industry – An exchange of experts between academic and industrial institutions in different countries (7th)

- the following participated in the project: *Institute of Rock Structure and Mechanics* and eight other institutions from five countries

MOBITAG – Building up Modern Biotechnologies for Agriculture (7th)

- coordinator: *Biology Centre*

ALARM – Assessing Large-scale Environmental Risks with Tested Methods (6th)

- coordinator: UFZ-Leipzig, Germany
- co-investigator: *Institute of Botany*

CONGRESS – Conservation Genetic Resources for Effective Species Survival (7th)

- investigators: *Institute of Vertebrate Biology* and another twelve organisations from ten countries

IBD: Proteases Offer New Targets for Drug Discovery (7th)

- coordinator: The University of Sheffield, UK
- co-investigator: *Institute of Microbiology* and another ten co-investigators from the UK, Italy, Germany, the Netherlands, Ireland and New Zealand

Triticeae Genome – Genomics for Triticeae Improvement (7th)

- coordinator: INRA, France
- co-investigator: *Institute of Experimental Botany*

SPIDIA – Standardisation and Improvement of Generic Pre-analytical Tools and Procedures for In Vitro Diagnostics (7th)

- coordinator: QIAGEN GmbH, Germany
- co-investigator: *Institute of Biotechnology*

PROMINENT INTERNATIONAL PROJECTS

DeSANNS – Advanced Separation and Storage of Carbon Dioxide: Design, Synthesis and Applications of Novel Nanoporous Sorbents (6th)

- coordinator: CNRS (Marseille), France
- co-investigator: *J. Heyrovský Institute of Physical Chemistry* and another eight foreign workplaces from four countries

IMPULSE – Integrated Multiscale Process Units with Locally Structured Elements (6th)

- coordinator: INPL, Nancy, France
- co-investigator *Institute of Chemical Process Fundamentals* and another twenty partners from six countries

Danube Limes – World Heritage Site

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

SUS.DIV – Sustainable Development in a Diverse World

- coordinator: Fondazione Eni Enrico Mattei (FEEM)
- investigators: *Institute of Ethnology* and another thirty-one partners from fifteen European countries

Ex Oriente

- umbrella organisation: EU Culture Programme
- coordinator: Europäisches Burgeninstitut, Braubach am Rhein, Germany
- investigators: *Institute of Archaeology* and another four partners from EU member countries and one associate country

Nazi Euthanasia in the Reich District Sudetenland and the Protectorate of Bohemia and Moravia

- umbrella organisation: European Commission, Action 4 (Europe for Citizens)
- coordinator: Gedenkstätte Pirna-Sonnenstein
- investigators: *Institute for Contemporary History* and other partners from Germany and Austria

EUREKA

Contrast and Detection in Scanning Electron Microscopy

- coordinator: FEI Electron Optics B. V., Netherlands
- co-investigators: *Institute of Scientific Instruments* and another three European countries

ESF

Instruments of Modelling, Design and Controlling Adaptive Structures Using Elements of Alloys with Form Retention: Algorithms, Finite-Element Methods, experiments

- coordinator: K. U. Leuven, Belgium
- co-investigators *Institute of Physics* and another ten institutes from Belgium, France and Finland

The New Boundaries of Infinity: Mathematical, Philosophical and Computational

- coordinator: University of Barcelona, Spain
- co-investigator: *Institute of Mathematics* and another ten institutes from four European countries

Gene Interaction Networks and Models of Cation Homeostasis in *Saccharomyces Cerevisiae*

- coordinator: University of Barcelona, Spain
- co-investigator: *Institute of Physiology*

EARTH – Early Agriculture Remnants and Technical Heritage

- coordinator: ESF
- investigators: *Institute of Archaeology* and another twenty-two workplaces from Europe and the Near East

ARCANE – Associated Regional Chronologies of the Ancient Near East

- coordinator: ESF
- investigators: *Institute of Archaeology* and other workplaces from European countries, the USA and Turkey

National Histories in Europe; Overlapping National Histories: Confrontations and (Re-)Conciliations

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

Logical Modelling of Reasoning with Vague Information

- coordinator: Technische Universität Wien
- investigators: *Institute of Philosophy* and another three partners from three EU member states

APPENDIX 05

KONTAKT

The Theory and Application of Infinite Systems of Interacting Particles and of their Limit Theorem

■ coordinator: *Institute of Information Theory and Automation* in cooperation with France

CDC25 Phosphatases – Key Regulators of Oocyte Meiotic Maturation and Early Embryonal Development

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

UNESCO and IUGS

The application of magnetic susceptibility as a paleoclimatic instrument on Paleozoic sedimentary rock and a description of magnetic signal

■ coordinator: International management
■ co-investigators: *Institute of Geology* and another fifty institutes from thirty-two countries

A-type granites and related rock of Earth's history

■ coordinators: Brazil, USA, Finland, South Africa
■ co-investigators: *Institute of Rock Structure and Mechanics* and forty other institutes from forty countries

Others

The environmental history of Egypt's Western Desert: case study into the rise and fall of a civilisation struck by climatic changes

■ coordinator: *Institute of Geology*
■ co-investigators: scientific institutes from Egypt and Sudan

EPOS

■ building European research infrastructures with Czech participation from the *Institute of Geophysics* and another nineteen partners

High Acceptance Di-Electron Spectrometer

■ coordinator: GSI Darmstadt
■ co-investigators: *Institute of Nuclear Physics* and another seventeen institutes from another eight countries

CAWSES-II – Climate and Weather of the Sun-Earth System (SCOSTEP)

■ a global programme managed from the USA
■ Czech representation: *Institute of Atmospheric Physics*

Coordinated Research Project for Research on Small Tokamaks (IAEA)

■ coordinator: *Institute of Plasma Physics*
■ co-investigators: UKAEA from Great Britain and 6 countries from around the world

Devonian Land-Sea Interaction: Evolution of Ecosystems and Climate in Devon (IGCP)

■ coordinator: *Institute of Geology* and other research institutes in Germany, Lithuania and Turkey
■ co-investigators: research institutes from twenty-five to thirty countries

Development of Coupled Models and their Validation against Experiments

■ coordinator: SKB Stockholm, Sweden
■ co-investigators: *Institute of Geonics* and another seven institutes from countries from all over the world

Solenoidal Tracker at RHIC

■ coordinator: Brookhaven National Laboratory, USA
■ co-investigators: *Institute of Nuclear Physics* and another fifty-two institutes from eleven countries

Dipolar Rotor Array (ERC-2008-AdG in the IDEAS schedule)

■ investigator: *Institute of Organic Chemistry and Biochemistry*
■ co-investigators: Department of Physics in Boulder, USA

HORIZONS – New horizons in Mass Spectrometry (Advanced Grant ERC)

■ project investigators: *Institute of Organic Chemistry and Biochemistry* and other partners from nine countries

RESCUE – From Stem Cell Technology to Functional Restoration after Spinal Cord Injury, EU, STREP

■ coordinator: Institute of Neuroscience, Montpellier, France
■ co-investigator: *Institute of Experimental Medicine*

GIANT – Gene Therapy: An Integrated Approach to Neoplastic Treatment

■ coordinator: University of York, Great Britain
■ co-investigator: *Institute of Macromolecular Chemistry* and other partners from six countries

PROMINENT INTERNATIONAL PROJECTS

Analytical Laboratory for Development of Biomarkers of Environmental Exposures to Arsenic

- Gillings Innovation Laboratory programme
- coordinator: University of North Carolina, USA
- co-investigator: *Institute of Analytical Chemistry*

Immigration and Social Security Reform

- umbrella organisation: The World Bank
- investigator: *Economics Institute*

Data Sources, Research on Data Duality, 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 of the ASCR* and another nineteen partners from European countries

The Role of the V4 Countries in the European Neighbourhood Policy

- umbrella organisation: International Visegrad Fund
- coordinator: Eszterházy Karoly College, Eger, Hungary
- investigators: *Institute of State and Law of the ASCR* and another three partners from the Visegrad Four

Eastern Europeans at the Beginning of the Middle Ages: From Tribe to State

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

Prehistoric Art

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

Celts in Europe

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

Corpus of Roman Findings on the Territory of Moravia

- umbrella organisation and coordinator: Roman-Germanic Commission (RGK) Frankfurt a.M.
- investigators: *Institute of Archaeology in Brno* and other workplaces from most European countries

Historical Town Atlas of the Czech Republic

- umbrella organisation and coordinator: Commission internationale pour l'histoire des villes
- investigators: *Institute of History of the ASCR* and other workplaces from fourteen European countries

Cultures of Knowledge: An Intellectual Geography in Seventeenth-Century Republic of Letters

- umbrella organisation and coordinator: University of Oxford
- investigators: *Institute of Philosophy* 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

Resurrected Treasure (Instrumentarium for the Historical Photography Fund Processing)

- umbrella organisation: EEA and Norwegian Financial Mechanisms
- coordinator and investigator: *Institute of Art History* and another five workplaces from European countries

The Other Europe – From the Sixties to the Eighties. Dis-sent in Politics and Society, Alternatives in Culture

- umbrella organisation: Universität Bremen
- coordinator: Forschungsstelle Osteuropa Bremen
- investigators: *Institute for Contemporary History* and other partners from five European countries

Socialism as Mental World. Representation of Societal Order and Political Rule in East Central Europe

- umbrella organisation and coordinator: Zentrum für Zeithistorische Forschung, Volkswagen Stiftung
- investigators: *Institute for Contemporary History* and other partners from five European countries

The (Re-)construction of National History and State-Building after Communism. Belarus, Czechia, Poland, Slovakia, and Ukraine in Comparative Perspective

- umbrella organisation: International Visegrad Fund
- coordinator and investigator: *Institute for Contemporary History* and other partners from five European countries

APPENDIX 05

Ostpolitik and the CSCE

- umbrella organisation and coordinator: Universität Mannheim
- investigators: *Institute for Contemporary History* and other partners from six European countries, Russia and the USA

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

Städtische Musikinstitutionen in Mittel- und Osteuropa am Beispiel von Konzert- und Oratorienvereinen im 19. und 20. Jahrhundert. Modelle und Anwendung informationstechnologischer Erschließung ihres Wirkens

- umbrella organisation and coordinator: Universität Leipzig
- investigators: *Institute of Ethnology* and fourteen other partners from twelve European countries, Russia and Ukraine

Latinitatis medii aevi lexicon Bohemorum

- umbrella organisation: Union Académique Internationale
- coordinator and investigator: *Institute of Philosophy* and other partners from twelve countries

Corpus vasorum antiquorum

- umbrella organisation and coordinator: Union Académique Internationale
- investigators: *Institute of Philosophy* and other partners from twenty-three countries

Clavis monumentorum litterarum

- umbrella organisation and coordinator: Union Académique Internationale
- coordinator and investigator: *Institute of Philosophy* and other partners from three European countries

Ček-Hindí šabdkoš (Česko-hindský slovník) [Czech-Hindi Dictionary (shabdkosh)]

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

Greek–Old-Church-Slavonic Lexicon-Index

- umbrella organisation: Union Académique Internationale
- coordinator and investigator: *Institute of Slavonic Studies* and four other partners from three European countries

Praha/Prag 1900–1945: Literaturstadt zweier Sprachen, vieler Mittler

- umbrella organisation and coordinator: Adalbert Stifter Verein München
- investigators: *Institute of Czech Literature* and other partners from the Czech Republic and Germany

Österreichisches biographisches Lexikon

- umbrella organisation and coordinator: Österreichisches biographisches Lexikon und biographische Dokumentation Österreichische Akademie der Wissenschaften
- investigators: *Institute of Czech Literature* and other partners from the Czech Republic and Austria

Precursor of Scientific Slavic Studies: Johann Wenzel Pohl

- umbrella organisation and coordinator: Slavisches Seminar der Universität Tübingen
- investigators: *Institute of Czech Literature* and other partners from Germany

Precursor of Scientific Slavic Studies: M. W. Schimek

- umbrella organisation and coordinator: Institut für Slawistik, Universität Wien
- investigators: *Institute of Czech Literature* and other partners from Austria

Linguistic Atlas of Europe

- umbrella organisation: UNESCO
- coordinator: The Romanian Academy, 'Iorgu Iordan – Al. Rosetti' Institute of Linguistics, Bucharest
- investigators: *Institute of the Czech Language* and another roughly forty national commissions from around forty countries

Slavic Linguistic Atlas

- umbrella organisation: International Committee of Slavists
- coordinator: International Commission for a Slav Language Atlas
- investigators: *Institute of the Czech Language* and another thirteen national commissions from thirteen countries

OVERVIEW OF THE PROMINENT CONFERENCES WITH INTERNATIONAL COOPERATION

Appendix 4

Overview of the Prominent Conferences with International Cooperation Organised by Workplaces of the ASCR

Active participation at international scientific meetings abroad and the organisation of international scientific congresses and conferences in the Czech Republic are important forms of active international cooperation. They create the scope for building new scientific contacts, presenting new results and exchanging opinions. The overview below provides examples of significant international conferences organised by the workplaces of the ASCR in the past year.

Bolides and Meteorite Falls: International Conference

■ organiser: *Astronomical Institute*; 62 participants, of which 45 from abroad

CHEP 2009 – Computations in High Energy and Nuclear Physics

■ organiser: *Institute of Physics*; 616 participants, of which 560 from abroad

The 8th European Conference on Martensitic Transformations

■ organiser: *Institute of Physics*; 290 participants, of which 280 from abroad

Equadiff 12

■ co-organiser: *Institute of Mathematics*; 235 participants, of which 167 from abroad

Towards eEnvironment

■ co-organiser: *Institute of Computer Science*; 350 participants, of which 300 from abroad

The 16th International Congress on Mathematical Physics

■ co-organiser: *Nuclear Physics Institute*; 618 participants, of which 539 from abroad

FET '09 Conference – Science beyond Fiction and exhibition

■ co-organiser: *Institute of Information Theory and Automation*; 850 participants, of which 820 from abroad

CALPHAD XXXVIII International Conference

■ co-organiser: *Institute of Physics of Materials*; 145 participants, of which 110 from abroad



In the Clarion Hotel in Prague, the 16th International Congress of Mathematical Physics (ICMP09) was launched on 3 August 2009. (Photo: S. Kyselová)

Biohydrology 2009 – A Changing Climate for Biology and Soil Hydrology Interactions

■ co-organiser: *Institute of Hydrodynamics*; 135 participants, of which 124 from abroad

Conference on Natural Dynamos

■ co-organiser: *Institute of Geophysics*; 84 participants, of which 75 from abroad

International Conference on the State of Geomorphological Research in 2009

■ co-organiser: *Institute of Rock Structure and Mechanics*; 77 participants, of which 41 from abroad

10th International Seminar on Furnace Design – Operation and Process Simulation

■ co-organiser: *Institute of Inorganic Chemistry*; 130 participants, of which 60 from abroad

The 18th International Conference on Nucleation and Atmospheric Aerosols

■ co-organiser *Institute of Chemical Process Fundamentals*; 250 participants, of which 230 from abroad

APPENDIX 04

The 73rd Prague Meeting on Macromolecules: New Frontiers of Macromolecular Science: From the Macromolecular Concepts of Living Matter to Polymers for Better Quality of Life

■ organiser: *Institute of Macromolecular Chemistry*; 180 participants, of which 95 from abroad

The 16th European Symposium on Organic Chemistry

■ organiser: *Institute of Organic Chemistry and Biochemistry*; 791 participants, of which 720 from abroad

XXXIX Annual Meeting of the European Society for New Methods in Agricultural Research

■ co-organiser *Institute of Biophysics*; 150 participants, of which 100 from abroad

Mitochondria, Apoptosis and Cancer 2009

■ main organisers: *Institute of Biotechnology*, *Institute of Molecular Genetics* and *Institute of Biophysics*; 160 participants, of which 122 from abroad

Second Central European Congress on Obesity

■ co-organiser: *Institute of Physiology*; 320 participants, of which 312 from abroad

Auxins and Cytokinins in Plant Development

■ co-organiser: *Institute of Experimental Botany*; 250 participants, of which 190 from abroad

7th International Stem Cell School in Regenerative Medicine

■ main organiser: *Institute of Experimental Medicine*; 80 participants, of which 70 from abroad

12th Heart of Europe Bio-Crystallography Meeting HEC 12

■ co-organiser: *Institute of Molecular Genetics*; 106 participants, of which 95 from abroad

37th Annual Meeting of the European Radiation Research Society

■ co-organiser: *Institute of Molecular Genetics*; 150 participants, of which 100 from abroad

14th International EAFP Conference on Diseases of Fish and Shellfish

■ co-organiser: *Biology Centre*; 407 participants, of which 397 from abroad

2nd European Congress of Conservation Biology

■ co-organiser: *Institute of Botany*; 1,200 participants, of which 800 from abroad

Zoological Days 2009

■ co-organiser: *Institute of Vertebrate Biology*; 441 participants, of which 86 from abroad

INFORUM

■ co-organiser: The *Library*; 600 participants, of which 100 from abroad

GDN/CERGE-EI Regional Research Competition Conference

■ organiser: Global Development Network (GDN), *Economics Institute (CERGE-EI)*; 57 participants, of which 49 from abroad

Discussion Panel 'Unemployment and Economic Outlook for the Czech Republic and Europe'

■ organiser: *Economics Institute*; 72 participants, of which 21 from abroad

Bullying as an Ethical, Psychological and Educational Problem

■ organiser: *Institute of Psychology*; 126 participants, of which 12 from abroad

Social Processes and Personality 2009

■ organiser: *Institute of Psychology*; 90 participants, of which 40 from abroad

ENHR 09 PRAGUE – Changing Housing Markets: Integration and Segmentation

■ organiser: *Institute of Sociology*; 358 participants, of which 336 from abroad

Workshop on 'The Role of the V4 Countries in the European Neighbourhood Policy'

■ co-organiser: *Institute of State and Law*; 30 participants, of which 28 from abroad

Labour Law 2009

■ co-organiser: *Institute of State and Law*; 50 participants, of which 10 from abroad

Colloquium: Early Medieval Churches as a Historical and Archaeological Source. Mikulčice, 3–5 June 2009

■ organiser: *Institute of Archaeology in Prague*; 50 participants, of which 22 from abroad

11th Castrum Bene Conference: Terminology and Typology in Castle Studies. Gyöngyös – Mátrafüred, September 2009

■ organiser: *Institute of Archaeology in Prague*; 72 participants, of which 68 from abroad

OVERVIEW OF THE PROMINENT CONFERENCES WITH INTERNATIONAL COOPERATION



The participants at the conference on Ivan Málek and the Czechoslovak Academy of Sciences
(Photo: Archives of the Masaryk Institute and Archives)

Rudolf's Letter of Majesty – a Milestone in European History?, 24–26 September 2009, Prague

■ organiser: *Institute of History*; 40 participants, of which 8 from abroad

Czech Clerical Cultural Formation in a Context with Compromises towards Nationalists and Coexistence (La cultura ceca e la formazione presbiteriale in un contesto di sconti nazionalisti e di coesistenza), 29 September – 1 October 2009, Rome

■ organiser: *Institute of History*; 48 participants, of which 39 from abroad

Ivan Málek and the Czechoslovak Academy of Sciences: Conference on the 100th anniversary of the birth of Ivan Málek (1909–1994)

■ organiser: *Masaryk Institute and Archives*; 80 participants, of which 4 from abroad

Munich – Prague around 1600 / München – Prag um 1600 (Support from the Czech-German Fund for the Future)

■ co-organiser: *Institute of Art History*; 14 participants, of which 10 from abroad

Dropping, Maintaining and Breaking the Iron Curtain: The Cold War and East-Central Europe Twenty Years Later

■ organiser: *Institute of Contemporary History*; 34 participants, of which 28 from abroad

The Army as a Factor in Czechoslovak Relations

■ organiser: *Czech-Slovak Commission of Historians*; 60 participants, of which 40 from abroad

Annual Meeting of the International Editorial Board of the New Collected Issue of the Works of Antonín Dvořák (NDE)

■ organiser: *Institute of Ethnology*; 12 participants, of which 6 from abroad

Philosophy and Social Sciences

■ organiser: *Institute of Philosophy*; 81 participants, of which 59 from abroad

Educational Reform, Philosophy and Irenicism: Intellectual Networks in Central and Western Europe, 1550–1670

■ organiser: *Institute of Philosophy*; 25 participants, of which 13 from abroad

Logica 2009

■ organiser: *Institute of Philosophy*; 55 participants, of which 35 from abroad

The Grounds of Sense: the Philosophy of P. F. Strawson

■ organiser: *Institute of Philosophy*; 28 participants, of which 20 from abroad

International Conference Devoted to Editorial Activity in Orientalism

■ organiser: *Oriental Institute*; 19 participants, of which 9 from abroad

Literature and Culture between East and West

■ organiser: *Institute of Slavonic Studies*; 40 participants, of which 20 from abroad

Milan Kundera or What Can Literature Do? (Work and Reaction)

■ one of the main organisers: *Institute of Czech Literature*; 34 participants, of which 22 from abroad

Using and Experiencing Language

■ organiser: *Institute of the Czech Language*; 120 participants, of which 20 from abroad

APPENDIX 05

Appendix 5

Overview of the Volume of Education Activities at ASCR Workplaces

Section/WP	1	2	3	4a	4b	5
I. OV						
1 ASÚ	2	2	9	236	141	12
1 FZÚ	18	25	34	1,219	1,330	105
1 MÚ	4	9	17	1,038	1,183	97
1 ÚI	3	11	42	936	963	87
1 ÚJF	5	4	14	538	443	49
1 ÚTIA	4	12	39	1,677	1,534	103
Section 1	36	63	155	5,644	5,594	453
2 ÚFE	2	2	7	160	166	13
2 ÚFM	5	4	4	415	255	29
2 ÚFP	3	5	11	396	363	35
2 ÚPT	6	5	13	19	78	20
2 ÚH	0	1	4	141	20	9
2 ÚTAM	1	3	12	844	809	73
2 ÚT	6	6	16	812	1,484	82
Section 2	23	26	67	2,787	3,175	260
3 GFÚ	1	2	7	224	227	24
3 GLÚ	4	1	18	204	388	24
3 ÚFA	1	4	8	192	350	21
3 ÚGN	4	5	42	722	885	72
3 ÚSMH	2	2	5	100	90	8
Section 3	12	14	80	1,442	1,940	149
II. OV						
4 ÚACH	5	3	9	292	299	23
4 ÚIACH	2	2	10	27	24	8
4 ÚCHP	9	14	9	317	493	50
4 ÚFCH JH	6	6	9	355	409	46
4 ÚMCH	9	9	4	318	381	28
4 ÚOCHB	16	36	70	858	567	69
Section 4	47	70	111	2,167	2,173	224
5 BFÚ	15	17	24	504	508	80
5 BTÚ	1	5	7	24	174	10
5 FGÚ	10	22	31	1,042	1,111	72
5 MBÚ	20	25	65	563	527	64

OVERVIEW OF THE VOLUME OF EDUCATION ACTIVITIES AT ASCR WORKPLACES

Section/WP	1	2	3	4a	4b	5
5 ÚEB	9	7	45	564	987	66
5 ÚEM	6	4	20	270	303	77
5 ÚMG	2	25	36	374	350	211
5 ÚŽFG	3	7	7	248	220	33
Section 5	66	112	235	3,589	4,180	613
6 BC	21	19	166	1,900	2,528	184
6 BÚ	5	4	67	512	192	27
6 ÚBO	5	13	85	798	677	108
6 ÚSBE	4	16	43	361	740	20
Section 6	35	52	361	3,571	4,137	339
III. OV						
7 KNAV	0	3	0	0	32	1
7 NHÚ	12	22	7	1,516	1,440	311
7 PSÚ	9	13	75	879	701	127
7 SOÚ	3	4	71	874	1,128	78
7 ÚSP	1	0	0	578	575	69
Section 7	25	42	153	3,847	3,876	586
8 ARÚB	2	4	1	407	252	30
8 ARÚP	0	1	8	864	1,179	64
8 HÚ	3	4	44	1,360	1,430	179
8 MÚA	5	3	41	1,136	1,052	114
8 ÚDU	3	0	45	585	610	47
8 ÚSD	1	0	43	1,191	1,200	118
Section 8	14	12	182	5,543	5,723	552
9 EÚ	1	1	15	610	675	62
9 FLÚ	9	7	78	4,412	4,744	457
9 OÚ	0	0	12	344	420	33
9 SLÚ	2	0	8	396	348	62
9 ÚČL	7	4	54	1,192	1,332	89
9 ÚJČ	2	9	29	1,622	1,261	125
Section 9	21	21	196	8,576	8,780	828
ASCR total	279	412	1,540	37,166	39,578	4,004

Key:

1. Number of DSP graduates being trained at workplaces
2. Number of newly-accepted DSP students
3. Number of students preparing their dissertations at workplaces
4. Number of lecture hours provided by ASCR employees at HEIs

4a – Spring Term, 4b – Fall Term

5. Number of term cycles of lectures, tutorials and seminars lead by ASCR employees at HEIs in bachelor, master and doctoral study programmes during the Spring and Fall semesters

APPENDIX 06

Appendix 6.1

Number of Employees, Salary Means and Earnings

Section/Workplace	Adjusted Number of employees total	Means for wages and salaries in thous. CZK				Other personnel costs in thous. CZK			Average monthly earning in CZK
		Total	of which		Total	of which			
			Institut.	Special- -purpose & extrabudgetary		Institut.	Special- -purpose & extrabudgetary		
1 ASÚ	131.34	57,080	44,428	12,652	1,132	256	875	36,216	
1 FZÚ	620.37	262,346	198,829	63,517	2,159	725	1,434	35,241	
1 MÚ	83.81	36,221	29,847	6,374	956	149	806	36,015	
1 ÚI	113.81	49,361	30,049	19,312	1,947	278	1,670	36,143	
1 ÚJF	203.66	84,766	60,898	23,869	927	384	544	34,684	
1 ÚTIA	152.53	78,643	53,023	25,620	1,724	661	1,062	42,966	
2 ÚFM	129.83	51,223	37,386	13,837	855	166	689	32,878	
2 ÚFP	130.60	49,563	34,406	15,157	1,248	648	600	31,625	
2 ÚH	56.64	23,237	18,742	4,495	675	155	520	34,189	
2 ÚPT	126.19	47,064	31,469	15,595	1,157	704	453	31,080	
2 ÚFE	110.88	44,640	36,306	8,334	1,068	473	595	33,549	
2 ÚTAM	63.39	26,513	20,213	6,301	735	179	556	34,855	
2 ÚT	199.63	74,570	57,758	16,812	954	42	912	31,129	
3 GFÚ	98.84	37,746	33,993	3,753	264	63	201	31,824	
3 GLÚ	76.98	27,776	24,483	3,293	886	593	293	30,068	
3 ÚFA	80.22	33,928	25,506	8,422	498	31	467	35,245	
3 ÚGN	95.77	35,693	26,368	9,325	704	206	498	31,058	
3 ÚSMH	110.48	36,240	31,690	4,550	1,064	404	660	27,336	
4 ÚIACH	66.82	28,580	21,473	7,107	316	166	150	35,643	
4 ÚACH	75.87	35,228	25,118	10,110	1,677	943	734	38,693	
4 ÚFCH JH	154.56	75,073	49,447	25,626	2,100	147	1,953	40,477	
4 ÚCHP	163.19	66,448	44,444	22,003	1,142	296	846	33,932	
4 ÚMCH	244.75	106,093	80,893	25,200	848	353	495	36,123	
4 ÚOCHB	407.93	174,724	122,437	52,286	3,337	1,437	1,900	35,693	

NUMBER OF EMPLOYEES, SALARY MEANS AND EARNINGS

Section/Workplace		Adjusted Number of employees total	Means for wages and salaries in thous. CZK			Other personnel costs in thous. CZK			Average monthly earning in CZK
			Total	of which		Total	of which		
				Institut.	Special- -purpose & extrabudgetary		Institut.	Special- -purpose & extrabudgetary	
5	BFÚ	149.51	65,443	44,451	20,992	1,423	270	1,153	36,477
5	BTÚ	49.70	20,407	13,268	7,139	485	152	334	34,217
5	FGÚ	306.69	116,244	75,749	40,495	1,712	138	1,574	31,586
5	MBÚ	410.34	156,859	94,305	62,554	2,813	839	1,974	31,856
5	ÚEB	200.90	72,587	43,431	29,156	1,872	708	1,164	30,109
5	ÚEM	160.60	64,863	38,786	26,077	2,097	300	1,797	33,657
5	ÚMG	288.78	123,440	70,180	53,260	1,179	254	925	35,621
5	ÚŽFG	121.54	39,966	26,817	13,149	711	228	483	27,403
6	BÚ	256.05	80,614	53,538	27,076	2,187	484	1,703	26,236
6	BC	394.14	139,828	104,456	35,373	4,214	840	3,375	29,564
6	ÚSBE	103.23	32,151	18,290	13,861	1,307	530	777	25,954
6	ÚBO	77.93	24,918	16,686	8,232	860	94	766	26,646
7	KNAV	74.46	24,729	24,438	291	1,275	980	295	27,676
7	NHÚ	89.35	30,216	19,300	10,917	1,668	425	1,243	28,182
7	PSÚ	31.49	13,275	11,022	2,254	707	259	448	35,131
7	SOÚ	88.06	34,918	22,137	12,781	4,883	2,817	2,066	33,044
7	ÚSP	38.00	13,916	12,230	1,686	553	317	236	30,517
8	ARÚB	57.85	16,280	13,750	2,530	2,853	568	2,286	23,452
8	ARÚ	104.57	34,913	27,338	7,575	4,137	1,048	3,089	27,823
8	MÚA	43.61	15,395	13,964	1,431	1,094	412	682	29,418
8	HÚ	76.90	26,266	25,024	1,242	1,778	1,179	598	28,463
8	ÚDU	46.63	16,285	15,720	565	1,209	562	647	29,103
8	ÚSD	64.51	24,308	16,794	7,514	3,675	1,083	2,592	31,401
9	FLÚ	159.04	54,294	48,205	6,089	2,050	1,362	688	28,449
9	OÚ	24.05	9,567	9,567	0	572	546	26	33,150
9	ÚČL	72.67	26,791	22,573	4,218	1,469	793	676	30,722
9	EÚ	51.78	16,876	15,591	1,285	1,333	538	795	27,160
9	ÚJČ	114.32	38,721	32,755	5,966	3,455	2,426	1,029	28,226
9	SLÚ	27.71	9,818	8,284	1,534	740	232	508	29,525

APPENDIX 06

Section/Workplace	Adjusted Number of employees total	Means for wages and salaries in thous. CZK				Other personnel costs in thous. CZK			
		Total	of which		Total	of which		Average monthly earning in CZK	
			Institut.	Special- -purpose & extrabudgetary		Institut.	Special- -purpose & extrabudgetary		
SSČ	300.26	96,812	62,105	34,707	5,701	3,637	2,064	26,869	
KAV	88.49	44,620	44,318	302	4,174	2,999	1,175	42,020	
Public research institutions total	7,682.76	2,983,459	2,139,962	843,497	88,384	33,479	54,905	32,361	
AS total	7,771.25	3,028,079	2,184,280	843,799	92,558	36,478	56,080	32,471	

Appendix 6.2

Number of Workplaces and Employees of the ASCR by Section

	Number of workplaces in 2009	Average adjusted number of employees in 2008				Average adjusted number of employees in 2009			
		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	1,331.8	17.2	811.0	18.7	1,305.5	16.8	798.7	18.2
2. Section of Applied Physics	7	810.2	10.5	448.9	10.3	817.2	10.5	455.2	10.4
3. Section of Earth and Space Sciences	5	464.5	6.0	284.3	6.5	462.3	6.0	283.0	6.4
4. Section of Chemical Sciences	6	1,113.8	14.4	723.6	16.6	1,113.1	14.3	730.2	16.6
5. Section of Medical Sciences and Molecular Biology	8	1,643.0	21.3	978.3	22.5	1,688.1	21.7	1,023.8	23.3
6. Section of Biological and Ecological Sciences	4	822.2	10.6	420.2	9.7	831.3	10.7	419.7	9.6
7. Section of Social Sciences and Economics	5	315.9	4.1	140.6	3.2	321.4	4.1	151.6	3.4
8. Section of Historical Sciences	6	388.0	5.0	219.1	5.0	394.1	5.1	220.1	5.0
9. Section of Humanities and Philology	6	452.6	5.9	324.2	7.5	449.6	5.8	312.8	7.1
Service departments (including the Head Office of the ASCR)	2	388.5	5.0	0.0	0.0	388.7	5.0	0.0	0.0
AS total	55	7,730.4	100.0	4,350.1	100.0	7,771.3	100.0	4,395.1	100.0

ECONOMIC MANAGEMENT OF PUBLIC RESEARCH INSTITUTIONS OF THE ASCR

Appendix 7.1

Economic Management of Public Research Institutions of the ASCR

Workplace		Total revenues	of which		Total expenses	of which		Thous. CZK Income from oper. (profit +) (loss -)
			Transfers from SB	Own resources		Person. costs	Material costs	
1	ASÚ	133,849	103,788	30,061	132,733	78,553	54,180	1,117
1	FZÚ	649,429	564,205	85,224	642,433	365,054	277,379	6,996
1	MÚ	69,896	65,874	4,022	69,036	49,908	19,127	861
1	ÚI	99,068	85,931	13,137	98,949	70,825	28,124	118
1	ÚJF	237,394	166,157	71,237	229,486	119,018	110,468	7,908
1	ÚTIA	155,699	127,724	27,975	155,489	110,276	45,213	210
2	ÚFM	123,136	95,000	28,135	121,406	72,242	49,164	1,730
2	ÚFP	143,733	100,491	43,241	141,007	69,867	71,140	2,726
2	ÚH	53,006	45,083	7,923	52,600	32,444	20,156	406
2	ÚPT	113,647	84,519	29,128	113,647	65,820	47,827	0
2	ÚFE	111,720	87,340	24,379	102,867	62,929	39,938	8,853
2	ÚTAM	61,264	45,344	15,921	60,124	37,584	22,540	1,141
2	ÚT	163,745	128,326	35,419	163,101	104,448	58,654	644
3	GFÚ	90,589	70,181	20,408	90,177	51,776	38,401	412
3	GLÚ	66,690	59,480	7,209	66,266	39,085	27,182	423
3	ÚFA	84,180	59,157	25,023	83,582	47,101	36,481	598
3	ÚGN	73,469	60,141	13,328	72,220	49,711	22,508	1,249
3	ÚSMH	90,720	81,814	8,906	90,409	51,014	39,395	311
4	ÚIACH	67,483	57,283	10,200	67,295	40,040	27,255	188
4	ÚACH	99,298	86,023	13,275	98,137	50,763	47,375	1,161
4	ÚFCH JH	236,345	157,557	78,788	234,833	106,722	128,111	1,512
4	ÚCHP	193,053	142,520	50,533	192,724	92,648	100,075	329
4	ÚMCH	253,606	209,815	43,791	246,597	145,664	100,932	7,009
4	ÚOCHB	1,589,119	295,635	1,293,484	923,073	244,758	678,315	666,046

APPENDIX 07

Workplace		Total revenues	of which		Total expenses	of which		Thous. CZK Income from oper. (profit +) (loss -)
			Transfers from SB	Own resources		Person. costs	Material costs	
5	BFÚ	173,043	144,612	28,432	172,297	90,511	81,786	747
5	BTÚ	55,026	47,505	7,521	54,987	28,682	26,305	39
5	FGÚ	362,076	269,811	92,264	362,126	160,688	201,438	-50
5	MBÚ	421,377	330,103	91,275	419,617	214,443	205,174	1,760
5	ÚEB	221,283	147,898	73,385	221,283	101,954	119,330	0
5	ÚEM	197,234	144,753	52,482	196,790	90,142	106,648	445
5	ÚMG	423,567	312,867	110,700	423,563	171,303	252,260	3
6	BÚ	201,897	162,459	39,438	201,462	113,325	88,137	435
6	BC	389,526	279,326	110,200	389,526	192,891	196,635	0
6	ÚSBE	95,018	70,490	24,529	94,909	45,341	49,568	109
6	ÚBO	66,991	55,963	11,028	66,445	35,491	30,954	546
7	KNAV	85,907	56,707	29,200	75,069	35,681	39,389	10,838
7	NHÚ	68,456	45,782	22,674	67,246	42,638	24,608	1,210
7	PSÚ	26,484	23,408	3,076	26,479	19,311	7,168	5
7	SOÚ	84,029	69,510	14,519	84,028	53,563	30,465	1
7	ÚSP	28,367	23,406	4,961	28,276	19,960	8,316	91
8	ARÚB	43,621	29,090	14,531	42,202	25,363	16,839	1,419
8	ARÚ	122,084	60,853	61,231	121,603	52,908	68,695	481
8	MÚA	34,063	30,707	3,356	34,053	22,406	11,647	11
8	HÚ	56,448	52,633	3,815	56,245	38,015	18,231	203
8	ÚDU	38,092	33,047	5,045	38,090	24,189	13,901	2
8	ÚSD	59,176	47,896	11,280	59,175	37,808	21,367	2
9	FLÚ	111,093	99,799	11,294	111,093	76,391	34,703	0
9	OÚ	17,982	17,032	950	17,950	14,217	3,734	32
9	ÚČL	50,295	46,013	4,282	50,010	38,412	11,598	285
9	EÚ	40,524	35,508	5,017	39,803	24,933	14,870	722
9	ÚJČ	73,260	69,233	4,028	72,820	56,955	15,865	441
9	SLÚ	20,704	19,646	1,058	20,184	14,233	5,951	520

ECONOMIC MANAGEMENT OF PUBLIC RESEARCH INSTITUTIONS OF THE ASCR

		Total revenues	of which		Total expenses	of which		Thous. CZK
Workplace			Transfers from SB	Own resources		Person. costs	Material costs	Income from oper. (profit +) (loss -)
O	SSČ	414,170	161,794	252,376	413,938	140,777	273,162	232
	VO1	2,521,233	2,030,556	490,677	2,485,532	1,477,654	1,007,878	35,700
	VO2	5,166,438	3,007,270	2,159,168	4,485,282	1,980,907	2,504,376	681,156
	VO3	960,587	760,269	200,317	944,326	596,981	347,345	16,261
	Other workplaces	414,170	161,794	252,376	413,938	140,777	273,162	232
AS total		9,062,427	5,959,889	3,102,539	8,329,079	4,196,318	4,132,761	733,349
Book depreciation of PRI*)		-874,065		-874,065	-874,065			
AS total		8,188,362	5,959,889	2,228,474	7,455,014	4,196,318	4,132,761	733,349

*) 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

Workplace		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 2010)
1	ASÚ	35,436	16,232	6,500	9,732	0	0	19,204
1	FZÚ	199,289	158,523	46,987	110,737	0	800	40,765
1	MÚ	10,831	9,357	9,357	0	0	0	1,475
1	ÚI	12,818	2,156	52	1,341	0	763	10,662
1	ÚJF	45,520	26,346	4,050	20,403	1,000	893	19,174
1	ÚTIA	10,580	9,066	360	2,898	4,945	863	1,514
2	ÚFM	14,783	14,639	2,340	10,593	1,500	206	144
2	ÚFP	158,738	84,735	1,807	82,866	0	62	74,003
2	ÚH	18,453	8,599	0	8,599	0	0	9,854
2	ÚPT	74,363	31,778	20,532	11,245	0	0	42,585
2	ÚFE	32,876	13,257	2,894	9,713	650	0	19,620
2	ÚTAM	19,580	8,228	0	0	0	8,228	11,352
2	ÚT	51,386	20,583	6,032	14,551	0	0	30,803
3	GFÚ	43,658	30,521	25,722	4,208	0	591	13,136
3	GLÚ	126,919	121,673	102,080	19,593	0	0	5,246
3	ÚFA	10,263	7,501	0	6,143	0	1,358	2,762
3	ÚGN	10,008	6,665	2,009	4,136	0	521	3,342
3	ÚSMH	14,087	13,616	668	12,948	0	0	471
4	ÚIACH	19,744	18,205	6,775	11,430	0	0	1,539
4	ÚACH	18,834	15,812	738	14,118	0	956	3,022
4	ÚFCH JH	51,218	41,086	0	41,086	0	0	10,132
4	ÚCHP	13,424	12,851	375	12,476	0	0	573
4	ÚMCH	64,104	31,578	7,229	24,349	0	0	32,526
4	ÚOCHB	341,077	87,143	27,510	49,022	0	10,611	253,934

INVESTMENT RESOURCES AND THEIR USE

Workplace	Investment resources total	Use of investment resources total	of which				Other	Thous. CZK FRM at the end of the period (source by 2010)
			Buildings	Instruments	Mntn & repairs			
5	BFÚ	59,459	51,765	16,000	35,765	0	0	7,694
5	BTÚ	7,248	7,248	0	7,248	0	0	
5	FGÚ	63,999	41,589	6,236	33,631	0	1,722	22,410
5	MBÚ	90,095	71,417	22,192	39,903	8,873	450	18,678
5	ÚEB	53,101	47,578	4,600	40,737	0	2,241	5,523
5	ÚEM	29,485	27,229	0	16,580	0	10,649	2,256
5	ÚMG	48,469	47,934	19,800	28,134	0	0	535
5	ÚŽFG	23,081	19,940	5,074	14,416	0	450	3,142
6	BÚ	29,771	28,069	16,193	11,876	0	0	1,702
6	BC	85,520	61,150	17,929	42,624	0	596	24,370
6	ÚSBE	11,048	5,714	500	5,214	0	0	5,334
6	ÚBO	13,192	10,007	7,071	2,936	0	0	3,185
7	KNAV	28,100	26,357	7,051	18,515	0	791	1,743
7	NHÚ	14,443	3,257	0	321	2,748	188	11,185
7	PSÚ	4,566	533	0	533	0	0	4,032
7	SOÚ	17,886	7,334	4,108	2,801	256	170	10,552
7	ÚSP	1,438	434	0	434	0	0	1,004
8	ARÚB	8,575	7,957	1,434	0	0	6,523	618
8	ARÚ	16,434	5,523	1,185	4,338	0	0	10,911
8	MÚA	2,529	1,666	707	159	0	800	864
8	HÚ	2,031	1,180	0	1,060	120	0	851
8	ÚDU	9,822	7,522	3,940	1,626	0	1,956	2,300
8	ÚSD	3,451	0	0	0	0	0	3,451
9	FLÚ	21,224	8,510	5,676	1,585	0	1,249	12,714
9	OÚ	950	301	0	301	0	0	649
9	ÚČL	16,124	6,032	0	4,966	1,065	0	10,092
9	EÚ	6,289	3,850	1,159	977	0	1,714	2,439
9	ÚJČ	12,650	1,550	0	4	0	1,546	11,100
9	SLÚ	1,860	1,064	446	399	0	219	796

APPENDIX 07

Workplace		Investment resources total	Use of investment resources total	of which			Other	Thous. CZK FRM at the end of the period (source by 2010)
				Buildings	Instruments	Mntn & repairs		
O	SSČ	153,802	122,189	102,979	17,193	0	2,017	31,614
	VO1	889,588	583,475	231,390	329,705	8,095	14,285	306,113
	VO2	1,022,869	626,314	158,221	431,546	8,873	27,675	396,554
	VO3	168,371	83,070	25,706	38,019	4,189	15,156	85,301
	Other workplaces	153,802	122,189	102,979	17,193	0	2,017	31,614
AS total		2,234,630	1,415,048	518,295	816,463	21,157	59,133	819,582

SIGNIFICANT AWARDS FOR RESEARCHERS



Prime Minister J. Fischer at the international scientific conference *Dropping, Maintaining and Breaking the Iron Curtain* awards the Karel Kramář Commemorative Medal for significant contribution to the knowledge of modern Czech (Czechoslovak) history on the international scene. V. Prečan is third from the left.

(Photo: Archives of the Institute of Contemporary History)



The Medal of the Ministry of Education, Youth and Sports, First Class for improving the conditions for the teaching of the mother tongue at all types of schools was received from the Minister of Education O. Liška by the collective of authors of the Internet Language Handbook from the *Institute of the Czech Language* K. Pala, P. Šmerk, K. Oliva, M. Pravdová, I. Svobodová and L. Uhlířová.

(Photo: G. Adamková)

Appendix 8

Significant Awards for Researchers

A number of researchers from the ASCR's workplaces received **significant accolades and awards at national and international level** for their work. For example, the President of the Czech Republic presented RNDr. Zdeněk **Ceplecha**, DrSc., a member of the *Astronomical Institute*, 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.

RNDr. Jiří **Grygar**, CSc., from the *Institute of Physics* became the laureate of the 'Česká hlava 2009' (Czech Mind) award of the Council for Research, Development and Innovation in the sphere of promoting and popularising research and development. However, he did not accept the award with his explanation being that the Government Council for Research, Development and Innovation

had tarnished the good name and existence of the ASCR. Doc. Ing. Jiří **Homola**, CSc., DSc., from the *Institute of Photonics and Electronics* was presented with the 'Česká hlava' Award in the Invention category, while MUDr. Jiří **Šedivý** from the *Institute of Experimental Medicine* won the 'Česká hlava' award in the Doctorandus (doctoral candidate) category.

The Minister of the Environment of the Czech Republic's Award was presented to PhDr. Dagmar **Dreslerová** and Mgr. Petr **Pokorný**, Ph.D., from the *Institute of Archaeology in Prague*, the Minister of Education, Youth and Sports of the Czech Republic Award to prof. MUDr. Jiří **Forejt**, DrSc., from the *Institute of Molecular Genetics* and PhDr. Lucie **Storchová** from the *Institute of Philosophy*, and the Ministry of Culture of the Czech Republic Award to doc. Mgr. Daniela **Stavělová**, CSc., from the *Institute of Ethnology*.

APPENDIX 08



In January 2009, the UNESCO-L'OREAL fellowships For Women in Science were awarded in the area of the *Library* to the winners of the third year of the prestigious competition for women in scientific research (up to age thirty-five) from the fields of Life or Material Science. One of the three laureates was also V. Poterya from the *J. Heyrovský Institute of Physical Chemistry* (first from the left). (Photo: Archives of the Jaroslav Heyrovský Institute of Physical Chemistry)



The Laureate of a UNESCO-L'OREAL fellowship For Women in Science V. Poterya works in the Department of Spectroscopy at the *J. Heyrovský Institute of Physical Chemistry* (Photo: Archives of the Jaroslav Heyrovský Institute of Physical Chemistry)

The Prime Minister of the Czech Republic awarded doc. PhDr. Vilém **Prečan**, CSc., from the *Institute of Contemporary History* the Karel Kramář Commemorative Medal, whereas the Minister of Defence of the Czech Republic awarded PhDr. Stanislav **Kokošek** from the *Institute of Contemporary History* the Commemorative Medal on the Establishment of the Czech Republic and prom. hist. Ivan **Štoviček**, CSc., from the *Masaryk Institute and Archives* a Meritorious Cross, Third Class. A collective of authors from the *Institute of the Czech Language* was awarded a Medal of the Ministry of Education, Youth and Sports, First Class. The Minister of Education, Youth and Sport of the Czech Republic awarded doc. Ing. Petr **Klán**, CSc. from the *Institute of Computer Science* a Commemorative Certificate.

The J. Hlávka Prize was presented to doc. PhDr. Pavel **Janoušek**, CSc. along with a team from the *Institute of Czech Literature*, further to PhDr. Lucie **Storchová** from

the *Institute of Philosophy*, Mgr. Jan **Sýkora**, PhD., from the *J. Heyrovský Institute of Physical Chemistry of the ASCR*, Mgr. Ing. Pavel **Trávníček** from the *Biology Centre*, Ing. Martin **Vejmelka**, Ph.D., from the *Institute of Computer Science*, and the J. Hlávka Medals were awarded to prof. RNDr. Petr **Hájek**, DrSc., from the *Institute of Computer Science*, prof. PhDr. Jaroslav **Pánek**, DrSc., and prof. PhDr. Svatava **Raková**, CSc., from the *Institute of History* while RNDr. Václav **Cílek**, CSc., from the *Institute of Geology* was awarded the Dagmar and Václav Havel Foundation VIZE 97 Prize.

The Prime Minister of the Government of the Republic of France awarded PhDr. Martin **Nejedlý**, Dr., from the *Institute of Philosophy* the title of Knight of the Order of Academic Palms, whereas the Minister of Education and Sport of Slovenia awarded The European Label for Innovative Projects in Language Teaching and Learning to a team from

SIGNIFICANT AWARDS FOR RESEARCHERS



J. Lukeš from the *Biology Centre* accepts from the hand of President of the ASCR J. Drahoš the Praemium Academiae 2009 award
(Photo: S. Kyselová)



The Laureate of Praemium Academiae 2009 J. Lukeš, President of the ASCR J. Drahoš and Director of the *Biology Centre* F. Sehnal signing the contract on the granting of Praemium Academiae on 23 June 2009
(Photo: S. Kyselová)

the *Institute of the Czech Language* consisting of Albena **Rangelová**, CSc., PhDr. Zdeňka **Tichá**, doc. RNDr. Karel **Oliva**, Dr., and Mgr. Martina **Habrová**. An honourable mention from the Minister of Culture of the Republic of Bulgaria went to PhDr. Marcel **Černý**, Ph.D., from the *Institute for Slavonic Studies*. The Minister of the Environment of Poland awarded Ing. Blahoslav **Košťák**, CSc., from the *Institute of Rock Structure and Mechanics* a Medal of Merit for the Protection of the Environment and Water Management.

The European Educational Publishers Group presented PhDr. Hana **Třísková** and PhDr. Jaroslav **Strnad**, Ph.D., from the *Oriental Institute* a bronze Best European Schoolbooks plaque for their history textbook for primary schools and six- or eight-year grammar schools grammar schools. Dr. Lukáš **Palatinus** from the *Institute of Physics* was awarded the Bertaut Prize from the European Crystallographic Association and the European Neutron Scattering Associa-

tion for contributions to the development of crystallography. Prof. RNDr. Jana **Zvárová**, DrSc., from the *Institute of Computer Science* and her team received an IT Networking Awards medal from the conference committee for the application of knowledge in medical practice. The Croatian Association of Inventors presented Ing. Ivan **Wichterle**, DrSc., from the *Institute of Chemical Process Fundamentals* a bronze INNOVA 2009 medal for modelling the physical/chemical properties of petroleum. Ing. Jiří **Šrogl**, Ph.D., from the *Institute of Organic Chemistry and Biochemistry* received the Graduate Faculty Award from North Carolina State University in Raleigh (USA), whereas Ing. Miroslava **Dušková**, Dr., from the *Institute of Macromolecular Chemistry* received the DuPont Young Faculty Award 2009 from the American DuPont Center for Collaborative Research and Education. Prof. RNDr. Vladislav **Šimák**, DrSc., from the *Institute of Physics* received a gold medal from the Slovak Academy of Sciences.

APPENDIX 08



The Awards of the ASCR for 2009 were received in Villa Lanna on 30 September 2009 by (from the left) E. Feireisl, J. Forejt, Z. Trachtulec, S. Gregorová, P. Jansa, D. Homolka. (Photo: S. Kyselová)



On 7 September 2009, President of the Academy of Sciences of the CR J. Drahoš awarded the Ernst Mach Honorary Medal for Merit in the Physical Sciences to P. Bruno from the European Synchrotron Radioactivity Facility. (Photo: S. Kyselová)

Also worthy of note is third place in the Award of the General Director at Žďas, a.s., won by scientists at the *Institute of Theoretical and Applied Mechanics*, the award for scientific activity handed over by the Mayor of the City of České Budějovice to four scientists at the *Biology Centre*, and the prize of the *Economia*, a.s. publishing house for Manager of the Year 2009 presented to prof. RNDr. Václav **Pačes**, DrSc., from the *Institute of Molecular Genetics*. PhDr. Jiřina **Kosíková** from the *Institute of Ethnology* won an award at the 'Můj druhý domov' (My Second Home) International Internet Festival of Documentary Film, Television and Radio Programme for the film 'Češko Selo'. The authors of the television series 'O češtině' (About Czech) from the *Institute of the Czech Language* received an honourable mention from the Director General's Collegium at Czech Television.

The rising number of awards presented to young scientists at international scientific conferences is also gratifying

(28 in 2009). For example, Mgr. Viktoriya **Poterya**, Ph.D., from the *J. Heyrovský Institute of Physical Chemistry* won the UNESCO-L'OREAL fellowship For Women in Science. Six papers written at workplaces of the ASCR in completing university and doctoral studies were also rewarded.

MUDr. Jiří **Šedý** from the *Institute of Experimental Medicine* received the Visegrad Group Academies Young Research Award 2009. A team from the *Institute of Theoretical and Applied Mechanics* consisting of prof. Ing. Miloš **Drdácký**, DrSc., Ing. Stanislav **Pospíšil**, Ph.D., Ing. Zuzana **Slížková**, Ph.D., Ing. **Jiří Bláha**, Ph.D., and prof. Dr. Ing. Ivo **Herle** received an EU Prize for Cultural Heritage / Europa Nostra Awards from the European Commission and Europa Nostra Grand Prix. IChemE (the Institute of Chemical Engineers in Great Britain) awarded prof. Ing. Václav **Tesař**, CSc., from the *Institute of Thermomechanics* the Moulton Medal for the best article in the field of chemical engineering.

SIGNIFICANT AWARDS FOR RESEARCHERS

Prof. Ing. Václav **Sklenička**, DrSc., from the *Institute of Physics of Materials*, became a member of the European Academy of Sciences, whereas prof. RNDr. Karel **Lemr**, Ph.D., from the *Institute of Microbiology*, was named a member of the European Academy of Sciences and Arts.

The ASCR itself handed out the following awards:

Praemium Academiae 2009 was presented to Prof. RNDr. Julius **Lukeš**, CSc., from the *Biology Centre*.

Awards of the ASCR for outstanding results of major scientific importance were received by:

■ a team of authors consisting of: doc. RNDr. Eduard Feireisl, DrSc. (*Institute of Mathematics*) and prof. RNDr. Antonín Novotný, CSc. (Université du Sud Toulon Var, France) for the scientific outcome: **Singular Limits in Thermodynamics of Viscous Fluids**

■ a team of authors consisting of: prof. MUDr. Jiří Forejt, DrSc., Ing. Zdeněk Trachtulec, Dr., RNDr. Soňa Gregorová, Ing. Petr Jansa, CSc., Mgr. David Homolka and Mgr. Ondřej Mihola (*Institute of Molecular Genetics*) for the scientific outcome: **Collection of papers on functional genetics and genomics of the house mouse (*Mus musculus*) as a mammalian model system**

Awards of the ASCR for young scientific employees for outstanding results of science work were presented to:

■ RNDr. Jan Kyselý, Ph.D. (*Institute of Atmospheric Physics*) for the scientific outcome: **Collection of papers on Climate extremes and their modelling**

■ doc. Mgr. Michal Hájek, Ph.D. (*Institute of Botany*) for the scientific outcome: **Collection of works on the ecology of moors**



The **Vojtěch Náprstek Honorary Medal for Merit in the Popularisation of Science** was received on 13 October 2009 by long-term editor of the Academy's Bulletin issued by the *Centre for Administration and Operations* S. Daničková, author and moderator of the Meteor programme on Czech Radio J. Jarošová and M. Londesborough from the *Institute of Inorganic Chemistry*.
(Photo: S. Kyselová)

Awards of the ASCR for particularly successful resolution of programme and grant projects were awarded to:

■ a team of authors consisting of: RNDr. Jiří Čermák, DSc., Ing. Lubomír Král, Ph.D., Ing. Bohumil David, Ph.D., Mgr. Ivo Stloukal, Dr. (*Institute of Physics of Materials*) for the scientific outcome: **Hydrogen Storage in Selected Mg-Ni-based Alloys**

■ a team of authors consisting of: doc. RNDr. Ondřej Prášil, Ph.D., Mgr. Michal Koblížek, Ph.D., Mgr. Radek Kaňa and Mgr. Michal Mašín, Ph.D. (*Institute of Microbiology*) for the scientific outcome: **New optical methods of studying phytoplankton**

■ Mgr. Ivo Purš (*Institute of Art History*) for the scientific outcome: **Study of the Library of Ferdinand of Tyrol – cultural-historical and art-historical aspects**

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Already the eighth awarding of the Otto Wichterle Premium for Young Scientists up to age thirty-five took place in the areas of the Villa Lanna on 21 May 2009. The diplomas were awarded by President of the ASCR J. Drahoš in the presence of the Vice-Presidents of the ASCR V. Mareček, M. Tůma and J. Pánek and with the participation of L. Wichterlová. T. Ostapchuk from the *Institute of Physics*, one of the twenty-four winners, accepts the premium from the hand of President of the ASCR J. Drahoš.
(Photo: S. Kyselová)

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

Honorary medal of the ASCR 'De scientia et humanitate optime meritis':

to Prof. Terence G. **Langdon**, Ph.D., DSc., Dr. h. c. (University of Southern California, USA)
prof. PhDr. František **Šmahel**, DrSc., Dr. h. c. mult. (*Institute of Philosophy*)
prof. RNDr. Emil **Paleček**, DrSc. (*Institute of Biophysics*)
RNDr. Zdeněk **Ceplecha**, DrSc. (*Astronomical Institute*)
doc. RNDr. Luboš **Perek**, DrSc. (*Astronomical Institute*)
prof. Erazim **Kohák**, Ph.D. (*Institute of Philosophy*)

The Ernst Mach Honorary Medal for Merit in the Physical Sciences:

prof. Patrick **Bruno**, PhD. (European Synchrotron Radiation Facility, France)
Ing. Vratislav **Kafka**, DrSc. (*Institute of Theoretical and Applied Mechanics*)

The František Křižík Honorary Medal for Merit in the Technical Sciences and for the Implementation of Results of Scientific Research:

prof. Otto S. **Wolfbeis**, PhD. (University of Regensburg, Germany)
prof. Ing. Ondřej **Fischer**, DrSc. (*Institute of Theoretical and Applied Mechanics*)
prof. Ing. Ladislav **Frýba**, DrSc., Dr. h. c. (*Institute of Theoretical and Applied Mechanics*)

The Jaroslav Heyrovský Honorary Medal for Merit in the Chemical Sciences:

Ing. Blanka **Wichterlová**, DrSc. (J. Heyrovský Institute of Physical Chemistry)

The Gregor Johann Mendel Honorary Medal for Merit in the Biological Sciences:

Prof. James H. **McKerrow** (University of California, San Francisco, USA)
prof. David L. **Baltimore**, Ph.D. (California Institute of Technology, Pasadena, USA)

The Jan Evangelista Purkyně Honorary Medal for Merit in the Biomedical Sciences:

Prof. Asla **Pitkänen**, MD, Ph.D., DSc. (University of Kuopio, Finland)
prof. MUDr. Josef **Syka**, DrSc. (*Institute of Experimental Medicine*)

The František Palacký Honorary Medal for Merit in the Historical Sciences:

prof. Dr. Zdeněk V. **David** (Woodrow Wilson International Center for Scholars, Washington DC, USA)
prof. Dr. Anne **Hudson**, FBA (University of Oxford, Lady Margaret Hall, Great Britain)

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The Vojtěch Náprstek Honorary Medal for Merit in the Popularisation of Science:

Sylva **Daničková**, graduate historian (*Centre for Administration and Operations*)

PhDr. Jindra **Jarošová** (Czech Radio, Prague)

Michael **Londesborough**, Dr. (*Institute of Inorganic Chemistry*)

RNDr. František **Kotlaba**, CSc. (*Institute of Botany*)

The Honorary Medal of Merit of the Academy of Sciences of the Czech Republic:

Karel **Melichar** (*Institute of Physics*)

Prof. Ing. Jiří **Niederle**, DrSc. (*Institute of Physics*)

Miroslav **Hudeček** (*Institute of Physics*) – in memoriam

Božena **Šléglová** (*Head Office*)

The aid of the **J. E. Purkyně Fellowship** for distinguished and prospective scientific employees was granted to:

Dr. rer. nat. Lukáš **Palatinus** (*Institute of Physics*)

Michail **Kotsyfakis**, Ph.D. (*Biology Centre*)

Leo **Eisneri**, Ph.D. (*Institute of Rock Structure and Mechanics*)

Marek **Cebecauer**, Ph.D. (*J. Heyrovský Institute of Physical Chemistry*)

RNDr. Cyril **Bařinka**, Ph.D. (*Institute of Biotechnology*)

The **Otto Wichterle Premium** for Young Scientists of the ASCR was awarded in 2009 to twenty-four young scientists of the forty-two proposed. The premium was awarded to:
in the non-life sciences:

Mgr. Daniela **Korčáková**, Ph.D. (*Astronomical Institute*), Mgr. Tetyana **Ostapchuk**, Ph.D. (*Institute of Physics*),

RNDr. Michael **Prouza**, Ph.D. (*Institute of Physics*),

Mgr. Michal **Koucký**, Ph.D. (*Institute of Mathematics*),

RNDr. Radomír **Pánek**, Ph.D. (*Institute of Plasma Physics*),

RNDr. Zuzana **Haniková**, Ph.D. (*Institute of Computer Science*),

Mgr. David **Krejčířík**, Ph.D. (*Nuclear Physics Institute*),

Ing. **Tomáš Kroupa**, Ph.D. (*Institute of Information Theory and Automation*)

in the life sciences and the chemical sciences:

RNDr. Martin **Falk**, Ph.D. (*Institute of Biophysics*), Ing. Petr

Novák, Ph.D. (*Biology Centre*), Ing. Jan **Pergl**, Ph.D. (*In-*

stitute of Botany), RNDr. Pavel **Flachs**, Ph.D. (*Institute of*

Physiology), RNDr. Petr **Man**, Ph.D. (*Institute of Microbi-*

ology), Michael **Volný**, Ph.D. (*Institute of Microbiology*),

Mgr. Markéta **Ondračková**, Ph.D. (*Institute of Vertebrate*

Biology), Mgr. Jan **Bartoš**, Ph.D. (*Institute of Experimental*

Botany), Mgr. Jiří **Pinkas**, Ph.D. (*J. Heyrovský Institute of*

Physical Chemistry), Mgr. Viktoriya **Poterya**, Ph.D. (*J. Hey-*

rovský Institute of Physical Chemistry)

in the humanities and social sciences:

Mgr. Josef **Fulka**, Ph.D. (*Institute of Philosophy*), PhDr. Mar-

tin **Holý**, Ph.D. (*Institute of History*), PhDr. Alena **Křížková**,

Ph.D. (*Institute of Sociology*), PhDr. Markéta **Pravdová**,

Ph.D. (*Institute of the Czech Language*), PhDr. Michal

Kopeček, Ph.D. (*Institute of Contemporary History*),

JUDr. **Ján Matejka**, Ph.D. (*Institute of State and Law*)

APPENDIX 09

Appendix 9

Editorial Work in the ASCR

A) Overview of the Titles Issued by the Centre for Administration and Operations – ACADEMIA Publishing House Division

Publications marked * were issued with the financial aid of the ASCR

Physics, Climatology, Astronomy

Fergusonová, K.: Tycho a Kepler. 424 pp. ISBN 978-80-200-1713-0

Häckel, H.: Atlas oblaků. 190 pp. ISBN 978-80-200-1687-4, reprint

Kerner, Ch.: Lise Meitnerová. Životní příběh atomové fyziky. 132 pp. ISBN 978-80-200-1694-2

Lovelock, J.: Gaia vrací úder. 196 pp. ISBN 978-80-200-1687-4

Informatics

Lukáš, L.: Pravděpodobnostní modely manažerských úloh. 135 pp. (co-published by the University of West Bohemia in Pilsen) ISBN 978-80-200-1704-8

Neumann, F.: Dějiny informatiky. 424 pp. ISBN 978-80-200-1730-7

Mathematics

Aczel, A.: Umělec a matematik. 192 pp. ISBN 978-80-1683-6 *

Bican, L.: Lineární algebra a geometrie. 304 pp. ISBN 978-80-200-1707-9

Křížek, M. – Sommer, L. – Šolcová, A.: Kouzlo čísel. 376 pp. ISBN 978-80-200-1610-2 *

Kuřina, F. et al.: Matematika a porozumění světu. 336 pp. (co-published by the University of Hradec Králové) ISBN 978-80-200-1610-2 200-1743-7 *

O'Shea, M.: Poincarého domněnka. 308 pp. ISBN 978-80-200-1658-4 *

Spicciová, J.: Až za hranice. Sen Sofie Kovalevské. 536 pp. ISBN 978-80-200-1623-2

Technical Sciences

Capra, F.: Věda mistra Leonarda. 360 pp. ISBN 978-80-200-1714-7

Jones, J.: Říše světla. 440 pp. ISBN 978-80-200-1664-5 *

Biology, Medicine, Ecology

Ball, P.: Ďáblův doktor. 488 pp. ISBN 978-80-200-1676-8

Bauman, H.: Orchideje Evropy a přilehlých oblastí. 360 pp. ISBN 978-80-200-1692-8

Dawkins, R.: Boží blud. 480 pp. ISBN 978-80-200-1698-0

Dunbar, R.: Příběh rodu Homo. 224 pp. ISBN 978-80-200-1715-4

Flegr, J.: Evoluční biologie, revised edition 572 pp. ISBN 978-80-200-1767-3

Gaisler, J. – Zima, J.: Zoologie obratlovců. 696 pp. ISBN 978-80-200-1484-9, reprint

Hroudová, V. – Sýkora, V.: Tajemství rostlin. 240 pp. ISBN 978-80-200-1770-3

Janoška, M.: Nejkrásnější vodopády. 283 pp. ISBN 978-80-200-1779-6, reprint

Jerie, P.: Pro koho je medicína. 444 pp. ISBN 978-80-200-1767-3

Klaus, R.: Atlas stop zvířat. 189 pp. ISBN 978-80-200-1784-0, reprint

Koutecký, J.: Život mezi beznadějí a úspěchem. 504 pp. ISBN 978-80-200-1672-0

Lippa, R. A.: Pohlaví – příroda a výchova. 432 pp. ISBN 978-80-200-1719-2

Macek, J.: Motýli a housenky střední Evropy. Noční motýli II. – můrovití. 490 pp. ISBN 978-80-200-1667-6

Mayr, E.: Co je evoluce. 360 pp. ISBN 978-80-200-1754-3

Moravec, J.: Procházka amazonským pralesem. 410 pp. ISBN 978-80-200-1651-5

Prostor, R. N.: Rasová hygiena. 432 pp. ISBN 978-80-200-1763-5

Mikšík, M. – Šutara, J. – Janda, V.: Hřibovité houby. 296 pp. ISBN 978-80-200-1717-8 *

Sengoopta, Ch.: Otto Weininger – Sexualita a věda v císařské Vídni. 324 pp. ISBN 978-80-200-1753-6

Smrčka, V.: Atlas chorob na kostních preparátech. 616 pp. ISBN 978-80-200-1765-9 *

Studnička, M.: Kapradiny. Atlas domácích a exotických druhů. 456 pp. ISBN 978-80-200-1716-1 *

Šilhánová, V.: Mikrobiologie pro potravináře a biotechnologů. 364 pp. ISBN 978-80-200-1703-1

Economics, Political Science, Public Administration, Law

Bauer, J.: Úvahy o holocaustu. 350 pp. ISBN 978-80-200-1739-0

Herzl, T.: Židovský stát. 140 pp. ISBN 978-80-200-1712-3

Hobsbawm, E.: Globalizace, demokracie a terorismus. 136 pp. ISBN 978-80-200-1725-3

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Ibánes, de la Corte L.: Logika terorismu. 322 pp. ISBN 978-80-200-1724-6

Liessmann, K. P.: Teorie nevzdělanosti. 127 pp. ISBN 978-80-200-1677-5

Liessmann, K. P.: Teorie nevzdělanosti. 127 pp. ISBN 978-80-200-1677-5, reprint

Pithart, P.: Devětaosmdesátý. 288 pp. ISBN 978-80-200-1774-1

Pithart, P.: Devětaosmdesátý. 288 pp. ISBN 978-80-200-1817-5, reprint

Service, R.: Soudruzi. 508 pp. (co-issued by Argo publishing house, supported by CCEBP grant) ISBN 978-80-200-1726-0

Slouka, Z.: Jdi po skryté stopě. 803 pp. ISBN 978-80-200-1799-4

Philosophy, Sociology

Adorno, T.: Minima moralia. 252 pp. ISBN 978-80-200-1759-8

Bauman, Z.: Tekuté časy. 112 pp. ISBN 978-80-200-1656-0, reprint

Habib, C.: Francouzská galantnost. 344 pp. (issue supported by the French Institute in the F. X. Šalda programme) ISBN 978-80-200-1782-6

Jaspers, K.: Otázka viny. 144 pp. ISBN 978-80-200-1455-9, reprint

Kratochvíl, Z.: Filosofie mezi mýtem a vědou. 472 pp. ISBN 978-80-200-1789-5

Vochala, J.: Konfucius v zrcadle Sebraných výroků. 536 pp. ISBN 978-80-200-1695-9

Večerník, J.: Czech Society in the 2000s. 286 pp. (co-published by *Institute of Sociology*) ISBN 978-80-200-1455-9

Zábrodská, K.: Variace na gender. 200 pp. ISBN 978-80-200-1752-9 *

History, Archaeology

Babka, L. (ed.): Jen jeden osud. 652 pp. ISBN 978-80-200-1701-7 *

Dratvová, A.: Vědecký deník Albíny Dratvové. 478 pp. ISBN 978-80-200-1696-6

Ferguson, N.: Válka světa. 776 pp. ISBN 978-80-200-1650-8

Hojda, Z. – Ottlová, M. – Prahl, R.: Vetché stáří neb zralý věk moudrosti? 488 pp. ISBN 978-80-200-1691-1 *

Kučera, M.: Pražský Maigret. 496 pp. ISBN 978-80-200-1711-6

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ACTIVITY OF THE LEARNED SOCIETY OF THE CZECH REPUBLIC

Appendix 10

Activity of the Learned Society of the Czech Republic

The Learned Society of the Czech Republic c.a. (hereinafter referred to as the 'Society') associates prominent scientists of all scientific fields. It celebrated its 15th anniversary of its founding in 2009. It was led by the eight-member Council comprising: Prof. RNDr. Helena Illnerová, DSc. (President), Prof. RNDr. Václav Pačes, DSc. (Vice-President), RNDr. Jiří Grygar, CSc. (Vice-President), RNDr. Zdeněk Jirák, CSc. (Scientific Secretary), Prof. RNDr. Aleš Pultr, DSc. (Chair of the Mathematical-Physical Science Section), Prof. MSc. Vladimír Mareček, DSc. (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). At the General Assembly held in Liblice, eight new regular members and one honorary member were elected. At the end of the year, the Society had one-hundred-and-one regular members and thirty-eight honorary members.

The Society has developed lecture activities concerning current issues of science and education, including specialised lectures and profiles at plenary sessions, further public lectures presenting topical issues, the lectures at the 15th General Assembly and discussion sessions, of which there were fourteen in total. The Society held eight working meetings. In September 2009, the Society organised a panel discussion devoted to the issues of Czech science inviting its members, representatives of important political parties, guests and journalists. A group of scientists of Czech universities and the ASCR formulated material called 'A Dozen Pre-Election Questions on the Conception of Science and Research Development in the Czech Republic' to address representatives of the political parties in the CR. The politicians answered these questions.

In May, the Society held its 16th General Assembly in the Karolinum in Prague, where i.a. the prestigious Society awards and medals for 2009 were presented. 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 DSc. The awards were presented to:

In the category Scientific Employee:

■ Prof. RNDr. Luděk **Zajíček**, DSc. (Faculty of Mathematics and Physics, Charles University in Prague) for notable discoveries in convex analysis and the theory of differentiable functions in Banach spaces

In the category Junior Scientific Employee:

■ RNDr. Pavel **Kocán**, PhD. (Faculty of Mathematics and Physics, Charles University in Prague) for beneficial works in the field of the study of atomic processes on solid material surfaces

■ RNDr. Jitka **Žlůvová**, PhD. (*Institute of Biophysics*) for groundbreaking works in the field of the evolution of sex chromosomes and the determination of gender in plants
Ten awards were presented in the category 'Secondary-School Student'.

In the year of its 15th anniversary, the Society introduced another award – a prize for teachers. This award is given as an acknowledgement of teaching professionals for supporting the interest in science and research in secondary schools, creating the conditions for individual scientific learning and student activities and for the excellent results of those students in competitions. The award was won by:

■ Prof. Ing. Bohumil **Vybíral**, CSc. (Department of Physics and Informatics, Faculty of Education, University Hradec Králové)

■ RNDr. Vladimír **Vít** (Grammar School Ostrov in Ostrov)
The medal for distinguished service in the development of science was awarded by the Society to two prominent personalities – a member of the Society Doc. RNDr. Luboš **Perek**, DSc., from the *Institute of Astronomy* and a non-member Doc. PhDr. Vilém **Herold**, CSc., from the *Institute of Philosophy*.

The Society successfully developed cooperation with the Czech Radio (in particular with the Praha, Vltava and Leonardo stations) and also with Radio Classic. The Society publishes and introduces itself to the wider public also on its website <http://www.learned.cz>, which is an important source of information on both their activities and the Society's members. Among other things, lectures, or even their

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presentations, are published there. The Society has also had recorded, in the form of interviews, a narrated history of science in the memories of its selected members.

The Society was represented in meetings with representatives of foreign learned societies and scientific institutes by RNDr. Jan Květ, CSc. (4th Annual Meeting of the European Chapter of the Society of Wetland Scientists in Erkner on the outskirts of Berlin), Prof. PhDr. Ivan Hlaváček, CSc. (Session of Berlin-Brandenburg Academy of Sciences and Humanities /Berlin-Brandenburgische Akademie der Wissenschaften/ in Berlin).

THE ACTIVITY OF THE COUNCIL OF SCIENTIFIC SOCIETIES OF THE CZECH REPUBLIC

Appendix 11

Activity of the Council of Scientific Societies of the Czech Republic and Its Associated Scientific Societies

The Council of Scientific Societies of the Czech Republic is an independent, not-for-profit, voluntary association of scientific societies active in the Czech Republic. It works in connection with the ASCR and associates seventy-four scientific societies with more than 25,000 members. A new scientific society was accepted last year. The Council of Scientific Societies of the Czech Republic and the scientific societies therein complement and spread the activities of the ASCR in a number of directions. In 2009, the Council of Scientific Societies of the Czech Republic and its scientific societies concentrated on reinforcing the support for science in the Czech Republic in areas in which there are no public or even private scientific and research institutions. It contributed to the interest in the education about and development of science and technology, which is not always sufficiently implemented in areas where commercial influences, industry, financial investment, political influences and social pressures predominate.

The range of activities implemented in 2009 was very broad. The societies themselves or with the support or direct cooperation of the Council of Scientific Societies of the Czech Republic organised and jointly organised a total of 484 international and national congresses, conferences and seminars, eighty-three of which were joint Czech-Slovak ventures. The societies actively supported education at primary schools, secondary schools and higher education institutions through a total of 654 events such as competitions in mathematics, natural sciences and astronomy, field-study courses for secondary-school and university students, doctoral seminars and various competitions. A total of twenty-eight awards were presented to distinguished personalities in the world of science or to promising young researchers as recognition of their outstanding work. The scientific societies associated in the Council of Scientific Societies of the Czech Republic also provided significant representation for Czech science on the international stage. The societies themselves as well as their members are involved in the activities of 144 international organisations, which is primarily enabled by the financial support of the ASCR.

A no less important component of the activity at most societies is their publication activity. Scientific societies have often issued a number of very prominent journals and magazines for decades now, as well as other, non-periodical publications. In 2009, they issued or participated in the publication of twenty-five international journals and seventy-two nationally significant journals and newsletters. Two hundred and thirteen conference proceedings, books and other non-periodical publications were also issued.



**An international scientific periodical published by the Czech Geological Society
(Photo: Archives of the Council of Scientific Societies)**

The core activity at most societies lies in their lecture, popularisation and other society, often interdisciplinary activities. The societies organised some 1,065 lectures, excursions or seminars in 2009 and dozens of media appearances and broadcasts which stimulate the interest of the public and primary students in science. The activities of the societies addressed around 430,000 participants from among both the specialised and lay public.

In 2009, the Council of Scientific Societies of the Czech Republic evaluated and approved in opponent proceedings a total of 107 applications for the provision of subsidies from the ASCR for projects of scientific societies. The subsidies from the ASCR allow societies to broaden their publication and lecturing activity significantly. The consultation activity of the Council of Scientific Societies of the

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Czech Republic for scientific societies in the sphere of submitting applications and implementing projects was also important. The Council of Scientific Societies of the Czech Republic intensively participated last year in the nationwide public debate on the support for the financing of science and the restructuring of the Research and Development Council.

On the basis of the overview of the activities for 2009 presented, we can say that through its activities the Council of Scientific Societies of the Czech Republic and the scientific societies associated therein have fulfilled their significant role in Czech society. They have significantly raised not only the level of interest in science but have also helped in actual research, education and the achievement of excellence. They also support very important areas of scientific, societal, technical and industrial applications, without which scientific institutions would have great difficulty in attaining sufficient and clear support for their activities.

THE ANNUAL REPORT OF THE ASCR

Appendix 12

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 2009

a) Number of Requests for Information Filed	13
Number of Decisions Issued to Dismiss the Request	0
b) Number of Appeals Submitted against the Decision to Dismiss the Request	0
c) Number of Court Judgments on the Review of the Legality of the Request Dismissal	0
d) Number of Exclusive Licences Granted	0
e) Number of Complaints Submitted according to Section 16a of the Act	0

APPENDIX 15

Appendix 13

Structure of the Academy of Sciences of the CR 2009

after the Election of the Academic Council and the Scientific Council of the ASCR in April 2009



THE STRUCTURE OF THE ACADEMY OF SCIENCES OF THE CR 2009



REGIONAL DISTRIBUTION OF THE WORKPLACES OF THE ASCR

Regional Distribution of the Workplaces of the ASCR

Section 1

Astronomic Institute – Ondřejov

Astronomic Institute of the ASCR – Workplace Prague

Institute of Computer Science, Prague

Institute of Information Theory and Automation, Prague

Institute of Mathematics, Prague

Branch Office in Brno

Institute of Physics

Joint Laboratories of Magnetic Studies and Low Temperatures

Joint Laboratory of Optics of Palacký University and the Institute of Physics of the ASCR

Nuclear Physics Institute, Řež near Prague

Department of Radiation Dosimetry of the NPI

Microtronic Laboratory, Department of Accelerators of the NPI

Section 2

Institute for Hydrodynamics, Prague

Detached Workplace Nový Dvůr

Institute of Photonics and Electronics, Prague

Department of Optical Fibers Technology of the IPE

Institute of Physics of Materials, Brno

Institute of Plasma Physics, Prague

Workplace Turnov

Institute of Scientific Instruments, Brno

Institute of Theoretical and Applied Mechanics, Prague

ARCHISS (Centre for Historical Constructions and Residences) Telč

Institute of Thermomechanics, Prague

Centre of Material Diagnostics, Branch Office Pilsen

Centre of Mechatronics, Branch Office Brno, Joint Workplace

Centre of Power Engineering, Branch Office Prague 6, Joint Workplace

Centre of Smart Systems and Structures, Branch Office Ostrava

Section 3

Institute of Geophysics, Prague

Geomagnetic Observatory Budkov

Gravity and Tidal Observatories Příbram

Seismic Observatory Kašperské Hory

Institute of Geology, Prague

Laboratory of Paleomagnetism

Laboratory of Physical Properties of Rocks

Institute of Atmospheric Physics, Prague

Branch Office Hradec Králové

Observatory Dlouhá Louka

Observatory Kopisty

Observatory Milešovka

Observatory Panská Ves

Observatory Průhonice

Institute of Geonics, Ostrava-Poruba

Department of Environmental Geography

Institute of Rock Structure and Mechanics, Prague

Section 4

Institute of Analytic Chemistry, Brno

Institute of Inorganic Chemistry, Řež near Prague

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

Institute of Macromolecular Chemistry, Prague

Department of Polymer Materials

Department of Solid State Chemistry, Pardubice

Institute of Organic Chemistry and Biochemistry, Prague

Animal Farm

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Section 5

Institute of Animal Physiology and Genetics, Liběchov

Laboratory of Animal Embryology, Brno

Laboratory of Mammalian Evolutionary Genetics, Brno

Institute of Biophysics, Brno

Institute of Biotechnology, Prague

Laboratory of Structural Biology

Institute of Experimental Botany, Prague

Institute of Experimental Medicine, Prague

Department of Molecular Embryology, Brno-Bohunice

Institute of Molecular Genetics, Prague

Animal Farm Koleč

Laboratory of Structural Biology

Institute of Physiology, Prague

Department of Cell Biology

Institute of Microbiology, Prague

Department of Autotrophic Microorganisms, Třeboň

Laboratory of Physiology, Immunity and Ontogenesis of Gnotobionts, Nový Hrádek

Section 6

The New Guinea Binatang Research Center,
Papua New Guinea

Institute of Botany, Průhonice – Castle

Department of Experimental Phycology
and Ecotoxicology, Brno

Department of Vegetation Ecology, Brno

Scientific-Research Section II, Třeboň

Institute of Systems Biology and Ecology, České Budějovice

Branch Office Brno

Branch Office České Budějovice

Branch Office Nové Hradky

Institute of Vertebrate Biology, Brno

Department of Medical Zoology, Valtice

Department of Population Biology, Koněšín

Section 7

Library, Prague

Branch Office of KNAV (The Library) Brno

Digitalisation Centre Jenštejn

Depository of the Library of the ASCR Jenštejn

Economics Institute, Prague

Institute of Psychology, Brno

Branch Office Prague

Section 8

Institute of Archaeology, Brno

Centre for Paleolithic and Paleoetnological Research

Centre for Research of the Great Moravian Period, Mikulčice

Centre for Research of the Roman Period
and Migration Period

Institute of Archaeology, Prague

Workplace Kutná Hora

Workplace Prague Castle

Workplace Vyšehrad

Workplace Žatec

Institute of History, Prague

Branch Office Brno

Centre of Early Modern Studies, České Budějovice

Czech Historical Institute in Rome

Institute of Art History, Prague

Institute for Contemporary History, Prague

Branch Office Brno

Cabinet of the History of Science

Documentation Centre of the Property Transfers
of the Cultural Assets of Victims of WWII

The History of Democratic Transformation after 1989 Section

REGIONAL DISTRIBUTION OF THE WORKPLACES OF THE ASCR

Section 9

Institute of Ethnology, Prague

Cabinet of Music History

Detached Workplace Brno

Institute of Philosophy, Prague

Cabinet for Classical Studies

Institute of the Czech Language, Prague

Cabinet of Languages Studies

Detached Workplace

Centre of Administration and Operations, Prague

Wiehl House – Publication Division

Academia Bookshop, Prague

Academia Bookshop, Brno

Academia Bookshop, Ostrava

Warehouse of Academia Publishing House, Prague

Hotel Mazanka – lodging facility of the ASCR, Prague

Vila Lanna – lodging facility of the ASCR, Prague

Penzion Sedlec – lodging facility of the ASCR

Penzion Marna – lodging facility of the ASCR, Prague

Conference Centre of the ASCR, Liblice

Conference Centre of the ASCR, Třešť

Section of Information Systems, Web
and Technology Administration

Administration of Property, Flats
and Lodging Facilities of the ASCR

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