



Akademie věd
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of Sciences

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THE CZECH ACADEMY OF SCIENCES

The Czech Academy of Sciences (the CAS) was established by Act No. 283/1992 Coll. It conducts research through its research institutions, which are established by the the CAS in the form of public research institutions employing over 8,000 workers, more than half of whom are researchers with university degrees.

The primary mission of the the CAS and its institutes is to conduct research in a broad range of the natural, technical and social sciences and the humanities. This research, whether highly specialised or interdisciplinary in nature, aims at advancing the development of knowledge at the international level while meeting the needs of Czech society and respecting Czech culture.

Research institutes of the the CAS participate in education, particularly in the education of young researchers in doctoral study programmes, and by the participation of its workers in pedagogical activities at universities and other higher education institutions.

The the CAS also fosters collaboration with applied research and industry. A wide range of joint international projects and exchange of scientists with partner institutions abroad reinforce the integration of Czech science into the international context.

A WORD FROM JIŘÍ DRAHOŠ, PRESIDENT OF THE CAS

The Academy of Sciences has introduced its new research strategy. Does Strategy AV21 bear any relation to the recent fundamental transformation of the institutes of the Academy of Sciences into public research institutions?

It is certainly not possible to relate the new strategy of the Academy of Sciences to the transformation of its institutions into public research institutions that took effect on 1 January 2007 with the primary aim to enhance the legal personality of the institutes. The point of the new strategy of the Academy of Sciences more properly lies in creating a system framework for what has already existed to some extent, that is, the interdisciplinary research. Moreover, the new strategy aims at boosting inter-institutional synergy not only inside the Academy but also in the cooperation with universities, other higher education institutions, business organizations and state administration.

In this connection, I would like to emphasize the fact that the system of the Academy of Sciences and its research institutes offers conceptual and effective work and at the same time it is flexible enough to allow the research teams to react to international development in their research area and to respond to social demand. I am convinced that one of the important future competitive advantages of the Czech Republic will be found in the flexibility of non-university research. The research institutes of the Academy of Sciences are closely interlinked with education; however, in comparison with universities or other higher education institutions, the research institutes have the necessary prerequisites and even the obligation to concentrate primarily on addressing highly specialized or extensive interdisciplinary projects requiring costly infrastructure and a long-term concentration of capacities. Such topics as energetic future of the Czech Republic, the health of the citizens or the quality of public matters represent complex areas of problems the solution of which requires widely based interdisciplinary research. It is this very type of research that will grow at the Academy of Sciences under the new strategy.

What stimulated Strategy AV21? Did you look for inspiration in the neighbouring countries where non-university research is on a high level?

Despite the fact that the Academy of Sciences is an institution of top-level basic research, we consider it important to emphasize that we want to pay more attention to public interest for the benefit of the society. That means to rise to important challenges of our times thus demonstrating that basic research is essential for the development of knowledge and at the same time in many areas of human activity it is a driving force for innovation. Strategy AV21 is a part of our new concept where basic research remains a primary and typical activity of the Academy of Sciences and yet strongly accents the strategic orientation of its results to economically and societally important areas be it industry or state administration. This is the meaning of the new strategy and its current fourteen interdisciplinary research programmes.

In the preparation of Strategy AV21 and in building research programmes, the experience of our colleagues in prominent non-university research institutions

abroad was useful inspiration for us. As an example, let me mention Max-Planck-Gesellschaft, Helmholtz-Gemeinschaft and Leibniz-Gemeinschaft in Germany, or CNRS in France. Just as a matter of interest, Leibniz Association designed 11 Leibniz Research Alliances analogous to our research programmes. We were also interested in the manner of financial flow allocation and methods of coordination – we were not interested in inventing something that has already been tested in some other places and found to function well.

Fourteen research programmes have been formulated so far. Is it the final number? And who can enter these programmes?

Programme framework for the Strategy in the form of fourteen research programmes was completed at the end of the year 2014 on the understanding that even further programmes can be proposed in the future. Above, I mentioned the number of Leibniz Association research programmes, and for further comparison, I can also refer to another German institution – Helmholtz Association, which has prepared 28 research programmes; and the Max Planck Society has recently introduced a new initiative called Research Perspectives 2014, which involves six areas of priority interest. The objective of all these programmes is to boost contributing to the solutions of current societal issues that are of global importance and are also significant for the Czech Republic.

We expect that through direct participation of our partners at universities and other higher education institutions, enterprises and government agencies in formulating and carrying out research programmes, Strategy AV21 will considerably help a more effective transfer of research results to educational and applied spheres including state administration. I believe that our existing cooperation will thus receive a new impulse, which will bolster concrete projects of the cooperation between academic and business spheres and lead to scientifically based analyses necessary for political decisions. I want to emphasize that we are ready for a discussion concerning new forms of cooperation that the Strategy offers.

The motto of the Strategy “Top research in the public interest” suggests the direction towards the research that reacts on the topical needs of society. What is the anticipated output and when do you expect the first results to come?

Typical categories of the output will be specialized publications, studies, surveys, analyses, expert opinions and industrially applicable results. The research programmes will also bring further partial results in the forms of scientific debates, specialized and popularized lectures, or public discussions. We assume that the research programmes of the Academy of Sciences will be regularly evaluated and, if necessary, subsequently rearranged. Moreover, it will also be possible to propose new programmes reflecting the state of knowledge. In general the coordinators of all the fourteen programmes are not bound by a strict time plan, but in about a year’s time we will examine how the particular programme works and what it can yield in the near future. The programmes that will not show relevant scientific quality and societally relevant results will after agreement with their coordinators be revised or terminated.

Let me also highlight the fact that in the period of its preparation the Strategy encountered a positive response from the representatives of business sphere and state administration, the same as from the officials of the parliamentary parties at the Chamber of Deputies and the Senate of the Parliament of the Czech Republic. This context clearly shows the potential of Strategy AV21 and its meaning for building relations with the academic and business spheres that will be based on mutual inspiration. Practical application of these inspiring stimuli will bring lasting benefit primarily for the Czech Republic and its citizens.

PROFILES OF RESEARCH AREAS

Mathematics, Physics and Earth Sciences

In *the Section of Mathematics, Physics and Computer Science* methods of mathematics and computer science are being developed, often for other research areas. The research in physics brings knowledge of fundamental laws of the micro and macro world, of the behaviour of physical systems in extreme conditions as well as of the possibilities of practical utilization of new discoveries and phenomena. The topics include the research into condensed matter systems with important physical properties (including nanoscale structured systems), exploration of properties, structure and interaction of matter on subatomic level, as well as the study of classical, particle, quantum and non-linear optics. Astrophysicists and astronomers investigate the nature and behaviour of matter and radiation from the upper layers of the Earth's atmosphere as far as the remotest parts of the universe. Their research is directed towards key issues of galaxies, star systems, stars, Sun, Earth-Sun relations interplanetary bodies and artificial satellites of the Earth.

The subject matter of *the Section of Applied Physics* is the research into the properties of ionized media and laser plasma, photonics, generation and diagnosing of high and low-temperature plasma, transmission phenomena in liquid systems and the hydrosphere, mechanics of ductile objects and biomechanics, dynamics of liquids, thermodynamics, research into the properties of high-voltage electromagnetic systems, new concepts of energy conversion, sensors, transmission and processing of signals, material research and exploration of the properties of advanced materials in the relation to their microstructure. Attention is also paid to the development of new physical methods, special technologies and instrumentation principles, the development of basic interdisciplinary research and applied research focused on fundamental knowledge crossing the disciplinary borders. Typical are the applications in bioengineering, medicine, ecology including protection of human health and safety, and preservation of natural and cultural heritage of humankind.

The institutes organized in *the Section of Earth Sciences* investigate the planet Earth with its immediate and distant vicinity. The priority is given to the study of inner structure of the Earth, exploration of the development of the lithosphere, biosphere and environment from the oldest geological eras to the present time including human-induced processes in the lithosphere. The study of geodynamic processes in the upper layer of the Earth's crust and examination of hydrological processes influencing the environment and ecologically responsible management of raw materials is particularly important for industrial applications.

Life and Chemical Sciences

The Section of Chemical Sciences includes research institutes which focus on the synthesis and on 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 the research of the relations between the structure, properties and reactivity of materials, associated with the elucidation of temporally and spatially distinguished mechanism of their reactions. This research gives a theoretical basis for applications. Substantial part of the research is also devoted to the study of the chemical principles for biological effects in biomedicine and ecology and to the development of new chemotherapeutics, biologically active substances and polymeric biomaterials for therapeutic applications. Advanced technologies are the objective of the research focused on the processes in multiphase reactive systems, molecular engineering, new methods for initiating chemical reactions and processes important for environmental decontamination and protection. Integral part of chemical research is the development of instrumental, analytical and bioanalytical methods.

The Section of Biological and Medical Sciences is formed by the research institutes exploring the processes in living systems at various levels of their organisation. Here, a special attention is paid to the development of genomics, proteomics and system biology as groundwork for the future biomedicine and biotechnologies. Biomedical research is focused on acquiring the knowledge of the biophysical properties of living systems, the mechanisms of functioning and malfunctioning of the nervous, immune, cardiovascular and reproductive systems including the external factors influencing them, on the study of gene expression and its signal path, on the genetic bases of diseases and human evolution, on the research of tumour and stem cells, on the development of new pharmaceuticals, on 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 utile in modern biotechnologies. The research in biology of animals includes physiology and the pathologic processes in animals. Other research focuses on the genetic basis of the development of plants, the interaction of the plant genome with the environment and on the biodegradation of xenobiotics in water and soil.

The Section of Biological-Ecological Sciences includes the institutes oriented on the mutual relations between organisms, on the relations between organisms and the environment, and on functional mechanisms in ecosystems with respect to the anthropogenic effects. The objective is to attain knowledge of the key processes for their possible application into medicinal, biotechnological, veterinary and agricultural practice as well as for their use as the basis for rational management of the landscape. The research is also focused on animal biodiversity, evolutionary ecology of the vertebrates and adaptations of their behaviour, on the investigation of the evolution, structure and ecological role of biodiversity of plants (from the genetic level through the level of organisms and communities to ecosystems) and on the study of the insect as a biological model and pest. Another important area of interest includes the interactions of parasitic and symbiotic organisms, communities of organisms in the soil ecosystems, functioning of the ecosystems of valley dams and lakes, the study of the global cycle of carbon, the flow of energy and substances 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, remote research of the Earth and mathematic modelling with an emphasis on a systemic approach.

Humanities and Social Sciences

The Section of Social-Economic Sciences includes research institutes which focus on the topical societal issues. The research in economics covers nearly all the main streams in modern economy not neglecting the applied research; besides other things, it studies the relations among bank, currency and debt crises. The central topic for the psychological research is the study of the conditions for the optimal development of man in a variety of real-life contexts. The researchers working in this area also study the history of instrumentation in psychological research. Sociological research advances the level of scientific knowledge of complex social processes, relations, connections and mechanisms and pushes forward the utilization of sociological exploration in practice. Among other things, it focuses on the development of public opinion related to the political system and its players. The research in the field of law concentrates on the general theory of law and philosophy of law, and on theory of legislation and its quantitative analysis. It also focuses on empirical methodology and cooperation in the development of data archives.

The Section of Historical Sciences comprises research institutes devoted to the investigation in the area of historical sciences, archaeology and archival science. Archaeological part of the research is based on the study of proper archaeological sources ranging from field finds, across the study of artefacts and ecofacts in the context of archaeological cultures, to generalizing models of the past Societies. Historical research reflects contemporary theoretical-methodological procedures and relevant historiographic discourses with the accent on the role of science in preserving national memory and forming national identity and culture in the widest multicultural sense. The research focuses on the analysis, reconstruction and interpretation of historical processes from prehistory to the twentieth century, with the aim of giving their comparative overview. There is consistent effort to put into European context history of fine arts and music, history of architecture, aesthetics, science and urbanism in the Czech lands. An integral part of methodology of these fields is formed by the interdisciplinary cooperation within international teams.

The research institutes belonging to *the Section of Humanities and Philology* study the issues of philosophy, ethnology, language and literature or specialize in oriental studies. In philosophy, they address the current questions of philosophical thinking and deal with philosophical aspects of the related areas of science, history of Czech and European philosophy, selected subjects in logics, theory of science and the related disciplines in humanities (namely classical and medieval studies). The institutes specialized in oriental studies investigate history, religious and philosophical systems, languages, literatures and cultures of the nations of Asia and Africa. The research in ethnology focuses on the issues of migration and discovering the ways of life and the culture of socio-ethnic groups at home and abroad. The core of the research in literary science lies in Bohemistic and Slavonic studies, research of the history of Czech literature from the remotest periods up to the contemporary times, and in the sphere of theory and sociology of literature. Also, the research of the development of the Czech language is performed investigating its standard and non-standard, written and spoken forms from the synchronic and diachronic perspectives; at the same time, methods of teaching and testing foreign languages in academic environment are covered.

SELECTED RESULTS

The following results have been published in a number of publications. If not given otherwise, they appeared in primary research articles, mostly in peer-reviewed international journals.

Reanalysis of the Benešov bolide and recovery of polymict breccia meteorites – old mystery solved after 20 years (Astronomical Institute)

A new analysis of the Benešov bolide of 7 May 1991 was performed using improved methods. The new analysis of the atmospheric trajectory of the Benešov bolide and specification of the impact line allowed to recover four Benešov meteorites exactly in the area predicted. This is the first time a meteorite has been found so long after the bolide observation. Even more interestingly, these four meteorites are of three different mineralogical types, which means that Benešov meteoroid and its parent asteroid were significantly heterogeneous.

Death on magnets (Institute of Physics)

The research demonstrated that a particular configuration of local magnetic field could elicit apoptosis of cancer cells. High static gradient of the magnetic field generated by micro magnets causes swelling in THP1 tumour cells, an increase in the level of reactive oxygen species (ROS) in the cell, slowdown in proliferation and subsequent cell death. These phenomena, explained in physical models, open a remarkable direction of magnetic therapy without the use of chemical agents.

Two-sided bounds for eigenvalues of differential operators (Institute of Mathematics)

This result enables to compute upper and lower bounds of optimal Friedrichs' constant with arbitrary precision and to guarantee the validity of Friedrichs' inequality with the computed constant. In contrast to current technically demanding methods, this approach is based on the standard finite element method. The bounds can be computed efficiently thanks to the adaptive algorithm with a natural error indicator. The method is general and can be applied to Poincaré inequality, trace theorems, etc.

A new approach to estimating the condition number in 2-norm based on the matrix inverse allows for remarkably precise estimates (Institute of Computer Science)

The condition number is a useful tool in matrix computations. It is used to measure sensitivity, precisions and convergence of numerical processes. While the exact calculation is demanding, the standard procedure in 2-norm uses matrix decomposition and gets the estimate incrementally via a sequence of smaller submatrices. The novel approach is based on matrix inverse and allows remarkably exact estimates of the condition number.

Elemental characterization of chemically prepared graphene by nuclear analytical methods (Institute of Nuclear Physics)

Graphene is a two-dimensional modification of carbon. Owing to many extraordinary chemical, electrical, mechanical and optical properties, it has a significant application potential. In some methods of preparation, graphene may be contaminated; on the other hand, adding elements may improve the properties of graphene. Nuclear analytical methods were used to study the content of elements in graphene prepared by various methods. This approach revealed that it is possible to prepare chemically interesting graphene with a higher content of thorium and uranium.

Restoration of retinal image with space-variant blur (Institute of Information Theory and Automation)

The researchers developed a system for the restoration of retinal images. In the image, a blur is considered both unknown and space variant. Retinal images are essential clinical resources for the diagnosis of retinopathy. The variability in the damage reduces the effectivity of the applied methods. The researchers model the blur by a linear operation interpreted as a convolution with a point-spread function (PSF) that changes with the position in the image. The PSF is robustly estimated using eye-domain knowledge. The results show an important enhancement leveraging clinical use of the images.

Functional metallic nanoparticles for ultrasensitive optical biosensors (Institute of Photonics and Electronic)

The research proved that functionalized metal nanoparticles could enhance the sensitivity of optical biosensors. A theoretical model was developed that allows predicting the enhancement of the response of a surface plasmon resonance (SPR) sensor to FNPs as well as selecting most suitable FNPs in size and composition of the particles. The model was validated in the detection experiments in which gold NPs were used for the biosensor-based detection of low levels of carcinoembryonic antigen – marker for colorectal carcinoma.

SiOC based materials and composites (Institute of Physics of Materials)

Glass fibre-reinforced composites with SiOC glass matrix were developed. They resist temperatures up to 1550°C under air atmosphere while maintaining sufficient mechanical strength. Initially, polymer matrix was reinforced by alumina-based or basalt fibres. The composite material was formed by pyrolysis of the organic component of modified polysiloxane resin forming glass inorganic matrix along the fibres. In addition, SiOC foam with porosity up to 80% was prepared and joined with the fibre reinforced composite into a laminate-type structure.

Study of near-SOL heat flux channel in the COMPASS tokamak (Institute of Plasma Physics)

The inner wall of ITER is in the direct contact with plasma, and therefore it must satisfy the difficult requirement of surviving the heat flux. Because plasma flows almost parallel to the surface, a suitable shape of the surface may avert melting (as was the case with the Temelin NPP in 2013). For this reason, hundreds of

experiments have been carried out on COMPASS for a variety of plasma parameters. Analysing the thermal camera images of the wall revealed the agreement of the optimum shape with the heuristic model, thus confirming its prediction for ITER as credible.

Modelling rheological characteristics of polymer materials (Institute of Hydrodynamics)

A simplification in evaluation of rheological characteristics of polymer materials in steady and transient shear and elongation flow was carried out using a proposed modification of the differential constitutive model. At the same time, a methodology was proposed for measuring uniaxial elongational viscosity of polymer melts determining applicability of the SER rheometer (at present a predominantly used technology worldwide) for a given type of material, including the tolerance limits.

Passive localization system for monitoring the distribution of Egyptian fruit bats in the Mediterranean and in the Egyptian desert (Institute of Scientific Instruments)

Localization system for wireless monitoring the position of the Egyptian fruit bats is a unique tool for the community of zoologists who follow the development of the population of these unique mammals. The localization system uses a combination of advanced algorithms of digital signal processing and stochastic analysis of the recorded data for an accurate description of migration, nesting and reproduction of these small vertebrates. The system has now been deployed in the Mediterranean and the Egyptian desert.

Assessing the effect of hydrophobic linseed oil addition in lime and lime-metakaolin mortars for the purpose of historic conservation (Institute of Theoretical and Applied Mechanics)

The research conducted at Institute of Theoretical and Applied Mechanics demonstrated that linseed oil improves the resistance of lime and lime-metakaolin mortars to NaCl cycles. The mortars enriched with linseed oil thus have a significantly higher durability, which makes them useful in conservation of historical monuments.

Surface tension of supercooled water: a refuted anomaly (Institute of Thermomechanics)

Fascinating pictures of vegetation casted in ice and an electric traction outage in December 2014 were the consequences of an unusual rain of supercooled water (SW). SW is common in clouds. Its important property is the surface tension, for which some older experimental data and theoretical results indicated anomalous temperature dependence. Such an anomaly was reliably excluded by independent measurements at temperatures down to $-25\text{ }^{\circ}\text{C}$ performed at the Institute of Thermomechanics and at the University of West Bohemia.

Nonisotropic radiation of the 2013 North Korean nuclear explosion (Institute of Geophysics)

North Korea conducted a nuclear test in the northeastern part of the country (12 February 2013). The recorded seismic waves included SH and Love waves that are inconsistent with the model of a spherically symmetric source. The analysis showed that Love waves are generated due to the deviatoric stress in the rock near the test site. The retrieved moment tensor was characterized by the ISO component of only 57 %. The orientation of the principal axes of the tensor is consistent with that of regional tectonic stress axes in the Korean Peninsula.

Sandstone landforms shaped by negative feedback between stress and erosion (Institute of Geology)

The research based on physical and numerical modelling and field observations of locked sands and sandstones shows that an increase in stress within the landform reduces weathering and erosion. Planar discontinuities in sandstone together with negative feedback between stress and weathering/erosion processes are thus sufficient conditions to create landforms such as arches, alcoves and pillars.

Forecasting road surface temperature and condition in winter season (Institute of Atmospheric Physics)

The researchers developed the METRo-CZ model for forecasting road surface temperature and condition in winter. The model is based on the computation of surface heat and water balance of the road. It utilizes the current knowledge and the available data and is adapted to conditions in the Czech Republic. In collaboration with the Czech Hydrometeorological Institute, the researchers created a forecast line and started a pilot application that enables road maintenance controllers to make optimal decisions in winter conditions.

Solving flow problems in porous media: the development of numerical methods and analysis of sealing barriers for repository of highly radioactive nuclear waste (Institute of Geonics)

The development of numerical methods for simulation of fluid flow in porous media is important for the solution of many geotechnical and environmental problems. The obtained results concern the development of models to study the efficiency of sealing elements based on bentonite by means of new methods, such as utilization retention dependence on the saturation and degree of compaction of bentonite. Another series of results concerns new preconditioners; they were constructed and analysed for systems arising from the implementation of mixed finite element methods.

Large late pleistocene landslides from the marginal slope of the Flysch Carpathians (Institute of Rock Structure and Mechanics)

It is for the first time that the real extent of a vast deep-seated slope deformation has been objectively identified. The slope deformation was much larger than had been assessed using generally applied morphologically identified borders. The

studied landslide is one of the oldest-dated slope deformations in Europe (ca. 55 ka). The research applied innovative methods, including a construction of an extremely long geophysical survey profile, detailed documentation, material analyses and outcrop dating. The results have practical utilization in defining endangered areas.

Free liquid membranes and their applications in micro-electromembrane extractions (Institute of Analytical Chemistry)

A new method for electromembrane extractions across free liquid membranes (FLMs) was elaborated. FLMs are stable; their dimensions can be easily determined and manipulated as well as their shapes. FLMs enable selective micro-extractions of analytes from raw biological samples and preconcentration of analytes. The extraction process can be visualized in real time, thus FLMs might help to understand the fundamental principle of electromembrane extractions across liquid membranes.

Nanosheets of zinc oxide for new technologies of air and water purification (Institute of Inorganic Chemistry)

A novel method was developed for the preparation of ZnO nanosheets with thickness of 0.6 nm, which can be arranged into transparent nanometric films with exposed high-energy facets [1.2]. These films were proved far more effective photocatalysts for the degradation of organic pollutants under UV irradiation than ZnO nanoparticles prepared by common methods. The nanosheets are useful in the development of bactericidal surfaces and in new technologies for air and water purification.

High-energy chemistry of formamide: a unified mechanism of nucleobase formation (J. Heyrovský Institute of Physical Chemistry)

The Editorial Board of the high-prestige journal PNAS identified the publication as work of exceptional significance. The work addresses one of the central problems of the research of the origin of life: the scenario suggesting extraterrestrial impact as the source of biomolecules. Impact plasma has been simulated using the high power laser PALS. Formamide molecule was exposed to LIDB in the presence of a wide range of minerals. The findings show the very first one-pot synthesis of all the canonical nucleobases.

Microwave recycling of waste PET bottles (Institute of the Fundamentals of Chemical Processes)

A novel method for the chemical depolymerization of waste polyethylene terephthalate (PET) by application of microwave radiation was developed. The characteristic properties of the method are a low consumption of energy and a high purity of the product (terephthalic acid and ethylene glycol). The method has been patented both in the Czech Republic (CZ299908) and abroad (EP2176327). The patent is valid in four European countries (Germany, Italy, France, and Great Britain) and in China. Recently, the technology has been sold to a Polish company NRT Polska, which is now building an operating unit.

Polymer drug carriers avoiding multidrug resistance, enabling specific delivery of cancerostatics into solid tumours and exhibiting significant therapeutic effect proved *in vivo* in mice cancer models (Institute of Macromolecular Chemistry)

HPMA copolymers as polymer drug carriers enabling targeted delivery of broad spectrum of cancerostatics (taxols, pirarubicine, doxorubicin) to solid tumours were synthesized and designed to overcome multidrug resistance. It was proved that the polymer carriers enable significant enhancement of concentration of cancerostatics in solid tumours, decrease in their toxicity for healthy tissue and efficiency of treatment of tumours in mice (lymphoma EL4, tumour 4T1, sarcoma S-180, colorectal tumour).

How is a “wet” electron formed? (Institute of Organic Chemistry and Biochemistry)

How does an electron dissolve in water? Dissolution of electrons in water and subsequent reactions are important for understanding radiation therapy of cancer the same as chemical processes in intermediate storage facilities for nuclear waste. Calculations carried out at the Institute of Organic Chemistry and Biochemistry, together with ultrafast terahertz laser experiments performed at the University of Zurich, give answers to fundamental questions concerning formation of the hydrated electron.

Substitution-inert trinuclear platinum complexes efficiently condense/aggregate nucleic acids and inhibit enzymatic activity (Institute of Biophysics)

The trinuclear platinum complexes (Triplatin NC-A, and Triplatin NC) are biologically active agents that bind to DNA through noncovalent interactions. TriplatinNC condenses DNA with a much higher potency than conventional DNA condensing agents. Both complexes induce aggregation of small transfer RNA molecules. TriplatinNC completely inhibits DNA transcription at lower concentrations than naturally occurring spermine. The mechanisms for the biological activity of TriplatinNC-A and TriplatinNC may be associated with their ability to condense/aggregate nucleic acids with consequent inhibitory effects on crucial enzymatic activities.

Mitochondrial genome acquisition restores respiratory function and tumorigenic potential of cancer cells without mitochondrial DNA (Institute of Biotechnology)

Cancer cells devoid of mitochondrial DNA (mtDNA), upon grafting into mice, form tumours with a delay after acquiring mitochondrial genome and recovery of mitochondrial function exemplified by mitochondrial respiration. This documents another level of cancer cell plasticity and indicates a transfer of mtDNA from the host to cancer cells.

Modulation of synaptic transmission as an underlying mechanism of pain states (Institute of Physiology)

Chronic and pathological pain states lead to significant decrease of patient's quality of life, frequently without the possibility of adequate analgesic therapy. The results showed a significant role of spinal cord synaptic transmission modulation and especially TRPV1 receptors in the development of these states. These receptors participate in information transmission from pain stimuli, e.g. in neuropathic pain states. Further study of their function may bring new knowledge important for the development of novel approaches and drugs for pain therapy.

Clarification of regulation of genes controlling toxic pollutant phenol degradation in *Rhodococcus erythropolis* (Institute of Microbiology)

Bacteria of the *Rhodococcus* genus degrade various toxic contaminants of the environment, e.g. phenol. Analysing *Rhodococcus erythropolis*, the researchers at the Institute of Microbiology revealed how to regulate the function of its genes that control phenol degradation to harmless compounds. The researchers also determined the complete DNA sequence of the studied strain genome. The findings on mechanisms of gene regulation and the knowledge of the genetic makeup of this useful microorganism will allow purposefully constructed biodegraders of toxic compounds in the environment.

Genome sequence of bread wheat (Institute of Experimental Botany)

The research brought a draft sequence of the huge and complex genome of wheat. Sequencing isolated chromosome arms permitted characterization of repetitive elements, identification of 124,201 genes and determined their genome position. Chromosome-based analysis revealed genome changes accompanying the origin of wheat by interspecific hybridization and established the role of parental genes in wheat growth and development. The results will facilitate gene isolation and marker development for breeding with molecular tools.

Mesenchymal cells prolong the lifespan in a rat model of amyotrophic lateral sclerosis (ALS) (Institute of Experimental Medicine)

The researchers at the Institute of Experimental Medicine studied the influence of human mesenchymal cells (MSC) in the treatment on an experimental model of amyotrophic lateral sclerosis (ALS) in rats. The results show that the application of MSC improved motoric functions and the strength of muscle grip, and prolonged the life span in rats. At the same time, the application of MSC partly decreased motor neurons cell death and prevented the apoptosis. It is possible to conclude that transplantation of MSC is a safe method that can enhance the reconstruction and regeneration of CNS.

Radiotherapy-induced plasticity of prostate cancer mobilizes stem-like non-adherent, Erk signalling-dependent cells (Institute of Molecular Genetics)

Metastatic dissemination is the main cause of death of tumorous patients. One of the main reasons for the failure of radiotherapy in prostate cancer is radioresistance and further dissemination of surviving cancer cells. The results from the Institute of Molecular Genetics contribute to better understanding of radiation- or chemotherapy-induced stress response and heterogeneity of human metastatic prostate cancer cells, document treatment-induced plasticity and phenotypically distinct cell subsets, and suggest the way to exploit their differential sensitivity to radiosensitizing drugs in overcoming radioresistance.

A sentinel protein assay for simultaneously quantifying cellular processes (Institute of Animal Physiology and Genetics)

The publication describes a proteomic screening approach based on the concept of sentinel proteins, i.e. biological markers whose changes characterize the activation state of a given cellular process. The method employed is selected reaction monitoring (SRM). The described approach offers a reliable means for screening evaluation of cell biological processes under physiological and pathological conditions or during medication.

Transcriptome and proteome of the soft tick (Biology Centre)

Sequencing of tick mRNA combined with the methods of quantitative proteomics described the composition of tick (*Ixodes ricinus*) salivary molecules, an important vector for human pathogens. This new information brings a better understanding of important mechanisms, such as congenital immunity, cell death, genes and proteins regulation and metabolism. One of the important published results is the finding that expression dynamics of a gene and the amount of the respective protein vary in different tissues.

A unified classification of alien species based on the magnitude of their environmental impacts: on the journey to IUCN black list (Institute of Botany)

The impacts of biological invasions vary greatly in dependence on the species and the ecosystems into which they are introduced. There is therefore a critical need for a standardised method to evaluate, compare, and eventually predict the magnitudes of these different impacts. A straightforward system was proposed for classifying alien species according to the magnitude of their environmental impacts, based on the mechanisms of impact used to code species in the Global Invasive Species Database of the International Union for Conservation of Nature (IUCN). The classification can be utilized on various levels of ecological complexity and at different spatial and temporal scales.

Placing recent unprecedented fir growth in a European-wide and Holocene-long context (Global Change Research Centre)

Forest decline played a pivotal role in motivating Europe's political focus on sustainability around 35 years ago. Silver fir (*Abies alba*) exhibited a particularly severe dieback in the mid-1970s, but disentangling biotic from abiotic drivers was complicated because both spatial and temporal data were lacking. The study analyses 14,136 samples from living trees and historical timbers together with 356 pollen records to evaluate recent fir growth from a continent-wide and Holocene-long perspective.

Diversity and phylogeny of African rodents: hidden abundance and new views of the evolution of African mammal fauna (Institute of Vertebrate Biology)

Rodents belong among the least known African mammals despite their important connections with man (pest, disease carrier). The researchers utilized genetic data of the species from mountain forests of east Africa to identify the most important areas for the protection. They also proved that the genus *Muriculus* (rediscovered after 70 years) belongs among the oldest African lineages of the genus *Mus*. By the discovery of about 10 subgenera, they demonstrated that *Mus* makes the most abundant group of African mammals.

Influential Opinion Leaders (Economics Institute)

The research studied a two-level coordination game, in which experts with special interests endorsed candidates and endorsements were observed by the voters. It showed that the equilibrium election outcome is biased towards the experts' interests even though voters know the distribution of expert interests and account for it when evaluating endorsements. The results have been applied to the rise of social movements or to the penetration of the products with network externalities to the market.

Nationalism and modernism in the East Turkestan Republic (Oriental Institute)

This study explains the intellectual history and ideology of the Turkic insurgency and the East Turkestan Republic in Kashgar in 1933–34. It uses texts of that period and proves that the intertwining of East Turkestani national identity and interests with political self-government and modernization was an ideological concept that had a profound impact on all subsequent administrations in Xinjiang.

BOOKS

Psychological Machinery: Experimental Devices in Early Psychological Laboratories (Institute of Psychology)

The book covers the topic of experimental instrumentation at the turn of the 20th century. The authors introduce the role of instruments in the process of establishing

psychology as a scientific discipline. They concentrate on identifying historical devices and the issues connected with rediscovering their functionality. The book is a unique source of information in the area of specialized literature written in English.

Vobořil, D. – Květon, P. – Jelínek, M.: Psychological Machinery: Experimental Devices in Early Psychological Laboratories. Peter Lang, Frankfurt am Main 2014. 130 s.

25 Years of Czech Democracy through the Eyes of the Public (Institute of Sociology)

The volume discusses the evolution of public opinion in relation to the political system and its actors, both in the dimension of internal and foreign politics and policies. Its ambition is to map comprehensively the processes that have been characteristic for civic perception and evaluation of transformation after 1989.

Kunštát, D. – Červenka, J. – Ďurďovič, M. – Tabery, P. – Vinopal, J.: 25 let české demokracie očima veřejnosti. Academia, Praha 2014. 302 s.

New Approaches to the Aarhus Convention Implementation in the Czech Republic (Institute of Law)

The book reflects the shift in Czech legislation and interpretation in the field of the public participation in environmental decision-making in the Czech Republic. The authors comment primarily the upcoming conceptual change in the EIA Act and related legislation that has been prepared to respond to the critique of the shortages in the Aarhus Convention implementation noted by both the Aarhus Convention Compliance Committee and the European Commission.

Müllerová, H. – Humlíčková, P.: Nové přístupy k implementaci Aarhuské úmluvy v ČR. Praha, Ústav státu a práva AV ČR 2014. 98 s.

Academic Atlas of Czech History (Institute of History)

Academic Atlas of Czech History presents a collection of selected, hierarchically arranged accomplishments of modern, post-1989, Czech historiography on maps, cartographic models, illustrations, charts and cartograms. They concern Czech and Czechoslovak history with links to the European and, in particular, central-European area. By means of a modern historiographical approach – the cartographic method, the Atlas conjoins three main topics: the man (society), space (historical landscape) and time (historical development).

Semotanová, E. – Cajthaml, J. a kol.: Akademický atlas českých dějin. Praha, Academia 2014. 559 s.

Science goes to people! Czechoslovak Society for the Dissemination of Political and Scientific Knowledge and popularization of sciences in Czechoslovakia during the 20th Century (Institute for Contemporary History)

The book deals with the issue of popularization of science and its ideological role in the framework of totalitarian regimes. Czechoslovak society for the Dissemination of Political and Scientific Knowledge was de facto the most powerful part of the

communist propaganda in the country and the most influential organization dealing with the popularization of sciences in the then Czechoslovakia. The book analyses its functioning and the extent of its activities, including a possible impact on the collective memory of the Czech nation.

Olšáková, D.: Věda jde k lidu! Československá společnost pro šíření politických a vědeckých znalostí a popularizace věd v Československu ve 20. století. Praha, Academia 2014. 678 s.

Ancestors. Human Evolution (Institute of Archaeology, Brno)

The book assembles the knowledge of human evolution from the point of view of palaeoanthropology. Going from the first hominids to the anatomically modern man, the explanation expands beyond the anthropological scope by integrating additional disciplines namely evolutionary biology, Quaternary geology, paleoecology, and paleoethnology. The text is richly illustrated with original author drawings and photographs.

Svoboda, J. A.: Předkové. Evoluce člověka (s úvodními kapitolami M. Macholána). Praha, Academia 2014. 480 s.

Budeč – an important power centre of the first Přemyslids (Institute of Archaeology)

The monograph “Budeč – an important power centre of the first Přemyslids” presents new dating and interpretation of the origin, development and decline of an exceptional fortified seat, whose period importance is reflected in scarce literature of the 10th-11th centuries. The new evaluation of settlement-historical development of Budeč linked with the evidence from written sources helps to explain basic historical phases of this Přemyslids power centre, which in the 10th century significantly participated in Christianization of the country and held a noticeable position in the process of building early Czech state.

Bartošková, A.: Budeč. Významné mocenské centrum prvních Přemyslovců. Praha, Nakladatelství Lidové noviny 2014. 182 s.

The History of the Czech Academy of Sciences in Pictures (Masaryk Institute and Archive)

Based on period documents and photography, the book in English-Czech version maps the development of Czech non-university sciences from the 18th century. The main attention is focused on the Academy of Sciences of the Czech Republic and its most important precursors, the Czechoslovak Academy of Sciences, the Czech Academy of Sciences and Arts and the Royal Bohemian Society of Learning. Individual chapters are devoted also to other Czech and German institutions in the Czech lands. The entire process of the development of Czech non-university science is put in a wider social context.

Franc, M. – Mádllová, V.: Dějiny Akademie věd v obrazech. Praha, Academia 2014. 459 s.

Josef Führich (1800–1876). From Chrastava to Vienna. (Institute of Art History)

The publication offers a comprehensive view of life and work of Josef Führich and his status in the context of Czech art of the 19th century. In chronologically ordered chapters, the authors cover the relationship of the artist's early work to handcraft in his home region, then they describe his rise in the Prague's artistic world in the 1920', explain the importance of Führich's stay in Rome and also his situation after the return to Bohemia, and finally they deal with his departure to Vienna.

Machalíková, P. – Tomášek, P.: Josef Führich (1800–1876). Z Chrastavy do Vídně / Joseph Führich (1800–1876). Von Kratzau nach Wien. Praha, Liberec, Národní galerie, 2014. 366 s.

Inferentialism : why rules matter (*Institute of Philosophy*)

The book covers the results of the author's long-term research into the position of inferentialism – the conviction that meanings identify with inferential roles, which brings a radical departure from more traditional semantic approaches. The term was originally used by Robert Brandom as a label for his theory of language. Independently of this, the term is now cropping up in logic in connection with positions prioritizing proof-theory over model theory and approaching meaning in logical, especially proof-theoretical, terms. The book brings these two strands together: it reviews and critically assesses the foundations of Brandomian inferentialism, proposes upgrades and clarifies its relationship to inferentialism in logic.

Peregrin, J.: Inferentialism. Why rules matter. New York, Palgrave Macmillan 2014. 278 s.

New Emigration from the Czech Republic after 1989 and Return Policy (Institute of Ethnology)

The book covers modern Czech emigration from the country, social activities of Czechs abroad and their relationship to the Czech Republic and to older communities of emigrants. The novel view that the book offers is in the topic of return policy and reintegration of migrants of the Czech origin. The researchers and politicians address the same issues of the needs of the re-migrants and the possibilities of the state to help to meet them. This is a highly topical issue in the times of economic crisis, when the number of re-migrants is growing.

Brouček, S. – Grulich, T. (eds): Nová emigrace z České republiky po roce 1989 a návratová politika. Náhled na problematiku v kontextu vývoje světových migrací. Praha, Etnologický ústav AV ČR 2014. 238 s.

Greek-Old Church Slavonic Index (Institute of Slavonic Studies)

Dictionary entries of Greek-Old Church Slavonic Index present to the reader a comparison between Byzantine Greek and Old Slavonic languages. The source base is in Old Slavonic texts of Great Moravian origin translated from Greek sources. Each Old Slavonic equivalent is supplemented with data on its frequency in each text source, precise location of the lexeme and with Greek variant reading. The eight

Index of 548 Greek-Old Slavonic entries covering the letters alpha, beta and gamma, constitutes the final volume of the 1st part.

Bláhová, E. (red.): Řecko-staroslověnský index / Index verborum graeco-palaeoslovenicus. Tomus I, fasc. 8 (afé – góniaios). Praha, Slovanský ústav AV ČR/Euroslavica 2014. 68 s.

Dvůr Králové and Zelená Hora Manuscripts and Czech Science (Institute of Czech Literature)

The collection of studies with the annotated anthology of texts analyses Dvůr Králové and Zelená Hora manuscripts as writings of Czech literature that enjoyed the highest reception in the 19th century Europe. The publication addresses the following questions: How did the Manuscripts and their reflections of the original Czech society and culture form the modern Czech nation in the transnational framework of the years 1817–1885? What was the context of their explanations and disputes over their authenticity?

Dobiáš, D. – Fránek, M. – Hrdina, M. – Krejčová, I. – Piorecká, K.: Rukopisy královédvorský a zelenohorský a česká věda (1817–1885). Praha, Academia 2014. 936 s.

Academic Vade Mecum of the Czech language (Institute of the Czech language)

Academic Vade Mecum of the Czech Language is the first printed version of the reference section of the Internet Language Reference Book. The book offers general explanations about the Czech language, namely orthography, morphology and some syntactic issues. The explanations also comment on contradictory data published in other reference books and resolve differences between codification and literary language norm. The book is intended for both the lay public and professionals, especially teachers and students.

Pravdová, M. – Svobodová, I. (eds.). Akademická příručka českého jazyka. Praha, Academia 2014. 536 s.

SUPPORT OF RESEARCH, DEVELOPMENT AND INNOVATION

Funding from the State Budget of the CR

Funding of the CAS institutes has its basis in direct institutional support from the state budget expenditures on research, development and innovation, whose major part is the outlay on the development of research organizations and other items cover the common activities of the CAS and material or financial rewards for outstanding achievements.

Substantial part of the budgets of institutes of the CAS is made up by the means acquired for projects within public tenders of providers of targeted support funds, mainly the Czech Science Foundation (GACR), the Ministry of Education, Youth and Sports (MEYS), and the Technology Agency of the Czech Republic (TACR). In 2014, the CAS research institutes participated in 1,590 research projects funded from the state budget. The CAS institutes were recipients of the support in 1,221 projects, whereas in 369 projects they were participants (co-recipients) of the support.

The overview of the participation in the above-mentioned types of projects is given in Table 1.

Table 1: Participation of institutes of the CAS in R&D&I projects in 2014

| Provider | Number of projects | | |
|---|----------------------------------|------------------------------------|--------------|
| | The CAS institute as a recipient | The CAS institute as a participant | Total |
| Czech Science Foundation | 853 | 186 | 1,039 |
| Ministry of Culture | 28 | 4 | 32 |
| Ministry of Industry and Trade | 3 | 27 | 30 |
| Ministry of Education, Youth and Sports | 253 | 16 | 269 |
| Ministry of Interior | 8 | 2 | 10 |
| Ministry of Health | 13 | 32 | 45 |
| Ministry of Agriculture | 14 | 1 | 15 |
| Technology Agency | 49 | 101 | 150 |
| TOTAL | 1,221 | 369 | 1,590 |

Projects of the Operational Programmes of EU Structural Funds

In 2014, CAS research institutes participated in solving 126 projects of the operational programmes co-funded by the EU structural funds for the period 2007–2013. The institutes of the CAS were coordinators or recipients in 64 projects, 15 of which started in 2014, 27 projects continued during 2014, and 22 were finished in 2014. An overview of the participation of CAS institutes in the projects of individual operational programmes is given in Table 2. Projects launched in 2014 are listed in Appendix 6. Total amount of the approved subsidy for the whole period of the projects is CZK 310.2 million.

Table 2: Participation of the CAS institutes in projects of operational programmes in 2014.

| Operational programme | Projects launched | Running projects | Projects completed | TOTAL |
|--|--------------------------|-------------------------|---------------------------|--------------|
| OP Czech Republic – Austria | 0 | 0 | 1 | 1 |
| OP Human Resources and Employment | 0 | 2 | 0 | 2 |
| OP Transnational Cooperation | 0 | 0 | 1 | 1 |
| OP Enterprise and Innovation | 0 | 2 | 1 | 3 |
| OP Prague - Adaptability | 0 | 0 | 2 | 2 |
| OP Prague - Competitiveness | 8 | 0 | 0 | 8 |
| OP Research and Development for Innovation | 2 | 1 | 2 | 5 |
| OP Education for Competitiveness | 3 | 22 | 15 | 40 |
| OP Environment | 2 | 0 | 0 | 2 |
| TOTAL | 15 | 27 | 22 | 64 |

Among the important projects co-funded by the Operational Programme Research and Development for Innovation (OP RDI), which progressed in 2014, ranks ELI Beamlines (ELI - Extreme Light Infrastructure) project – a unique laser infrastructure for interdisciplinary applications, which is being built by the Institute of Physics in Dolní Břežany. The total amount of the subsidy for the preparation and construction of the world's most intense laser amounts to CZK 6.8 billion. The extent of the infrastructure and research ambitions make ELI Beamlines the most prominent project of its kind in the history of the Czech Republic. Its completion is planned for 2017.

Another important research centre funded by OP RDI is the Biotechnology and Biomedicine Center (BIOCEV) that is being constructed in Vestec near Prague by the Institute of Molecular Genetics (as the recipient of the project) in cooperation with five other institutes of the CAS and two faculties of Charles University in Prague. Its completion is planned for 2015.

In early 2014, the Institute of Physics started the work on *LABONIT*, a project under the 11th call of the Operational Programme Prague – Competitiveness (OP PC). The received support of EUR 46 million will facilitate the construction of high-tech laboratories for the preparation and characterization of nitride nano-heterostructures. The construction of the laboratories was also supported by approximately CZK four million from the budget of the Institute of Physics. Within its premises in Prague, *the Center of Functional Materials for Bio-applications (FUNBIO)* comes to existence. This project from the 11th call of OP PC significantly supplements the current project of *the Centre for Analysis of Functional Materials (SAFMAT)*. Whereas the objective of *SAFMAT* was to extend the possibilities of the analysis of modern semiconductive and thin-film materials, *FUNBIO* broadens the use of modern analytical methods to materials on the border between the organic and inorganic world. On 24 September 2014, a ceremony attended by many eminent guests and representatives of the media launched *High average power pulsed LASERs (HiLASE)* – a new research centre of the Institute of Physics.

The Institute of Physiology received a subsidy from OP PC for two projects called *BrainView: the Centre for the Study of neurodevelopmental and neurodegenerative diseases* and *the System for multifactorial analysis of cellular energy MitEnAI*. The aim of *BrainView* is to build a new research centre for the study of neurodevelopmental and neurodegenerative disorders such as autism, epilepsy, and Alzheimer's and Parkinson's diseases. In their effects, these disorders represent an increasingly significant burden on social and health care expenditures and reduce the quality of patients' lives. *BrainView* focuses on basic research in this area with the objective to understand the mechanisms of commencement of these diseases. This will open the way to looking for possible treatment. The major part of the project is to build a specialized research unit handling a number of most recent and developed brain imaging technologies used to study the brain of laboratory animals as indispensable models for understanding human diseases. Building new well-equipped and more comfortable facilities for laboratory animals is another part of the project. The project was launched on 1 January 2014; *BrainView* research centre is expected to start operating in July 2015.

Project *MitEnAI* focuses on the analysis of cellular energetics. To understand its functioning is important for the study of inherited metabolic diseases and for finding the mechanisms causing obesity or cardiovascular diseases. Such diseases, caused for example by insufficient energetic functioning of mitochondria, belong among the most serious hereditary disorders affecting children. All the mentioned research efforts will benefit from the purchase of the new system for multifactorial analysis of cellular energetics, which will enable the types of analyses so far unavailable at the Institute of Physiology. A European-level research centre will be established, including an integrated laboratory for the analyses covering all the aspects of mitochondrial metabolism – from the whole-body analysis, cellular and mitochondrial analysis to special phenomena at sub-mitochondrial level.

The Institute of Experimental Medicine presented two of their completed projects on 10 November 2014. The institute used the financial support from OP PC in the amount of almost CZK 30 million to buy the technology for the new *Research Center for Genomics and Proteomics*, where the researchers will use new methods of sequencing, chip analysis, protein analysis, and analysis of functional properties of cells to study the effects of pollutants (especially polluted air) on the changes in human DNA and in human organism as a complex. *Laboratory for Advanced Bioimaging of Living Tissues* will use the most advanced technology to deepen the

knowledge of incidence and progress of neurodegenerative diseases (Alzheimer's disease, Parkinson's disease, multiple sclerosis, and cerebrovascular accidents) as well as the complications associated with posttraumatic states such as brain and spinal cord injuries, posttraumatic edema, and epilepsy. The laboratory will be operated by a multidisciplinary team linking specialists from various departments of the Institute of Experimental Medicine and the Department of Neuroscience of the 2nd Medical Faculty, Charles University, Prague.

On 29 April 2014, an opening ceremony was held in Brno to launch the new research Centre of Excellence *CzechGlobe*, which is a part of the CAS. *CzechGlobe* is one of the eight successful projects of OP RDI supporting the construction of new research centres. The centre uses advanced infrastructure allowing comprehensive research on global changes. The work will concentrate on three basic segments influenced by global change – atmospheric processes and climate, ecosystems, and socio-economic systems.

The CAS as a provider of targeted support

Almost 25 year-long activity of the Grant Agency of the Czech Academy of Sciences (GA CAS), the oldest grant agency supporting basic research in the Czech Republic, was terminated in 2014 as a consequence of the Reform of the System of Research, Development and Innovation in the Czech Republic implemented since 2009.

The last 35 Standard Research Grant projects supported by GA CAS ended as of 31 December 2013. In 2014, the GA CAS Discipline Committees performed the final evaluation, rating 18 projects as “fulfilled with outstanding results” and 17 projects as “fulfilled”. Apart from the results typical for basic research, 3 patents and 15 applied outputs were achieved. On average, one project yielded 21 results.

In April 2014, the final session of the GA CAS Board was held and in May 2014 the Supervisory Board met for the last session, which praised GA CAS for its activities in the preceding year. The next step was to enter the process of termination of activities of its remaining bodies and ceasing the validity of related legal documents. The XLVth Meeting of the Academy Assembly of the CAS on 16 December 2014 approved the abrogation of the GA CAS statutes. On its session on 20 January 2015, the Academy Council of the CAS endorsed the abolition of Rules and Election Regulations of the GA CAS and the termination of operation the Presidium of the GA CAS, GA CAS Supervisory Board and the Secretariat of the GA CAS.

INTERNATIONAL COOPERATION

Organizational activities

In 2014, the CAS organized or co-organized more than 520 international scientific conferences. Among the most important belong the 11th European Conference on Nondestructive Testing (Institute of Thermomechanics), the 18th International Microscopy Congress (Institute of Molecular Genetics and Institute of Physiology) and Turning Points in 20th Century European History. Europe between War and Peace 1914–2004 (Institute of Contemporary History). A more detailed overview of selected significant scientific events can be found in Appendix 4.

the CAS continued its tradition of annual events, namely the meeting of the leaders of the CAS with the Diplomatic corps and leaders of universities and other higher education institutions “Academic Prague”. The issues of strategy in science and integration of European Research Area (ERA) were discussed at the meeting of the representatives of the Visegrad Group Academies and at the meeting of the CAS leaders with the representatives of the Slovak Academy of Sciences.

In the area of European integration in research, development and innovation (R&D&I), the CAS focused mainly on active observation and influence in the preparation of strategic, political and legislative documents on national and European levels for the programme period 2014–2020. The main attention was paid to the preparation of the National Reform Programme 2014, Partnership Agreement for 2014–2020 programme period, National Research and Innovation Strategy for smart specialisation of the Czech Republic (National RIS3 strategy) and new operational programmes financed from European Structural and Investment Funds (ESIF).

The CAS actively monitored the preparation of the Operational Programme Research, Development and Education (OP RDE), Operational Programme Prague – Growth Pole of the Czech Republic (OP PGP) and Operational Programme Enterprise and Innovations for Competitiveness (OP EIC). Because OP PGP and OP EIC are dominantly focused on the support of business sphere, the representatives of the CAS primarily concentrated on the preparation of the OP RDE. In the period of negotiating and commenting that exceeded one year, the CAS representatives promoted the interests of Czech scientific community and highlighted the key role of research organizations for the education of top specialists, the need for the development of human resources in newly built research centres, and the need for sufficient financial support for the Prague region.

Adequate funding of the needs in the area of R&D&I and education in Prague for the programme period 2014–2020 is regarded by the CAS as crucial. To point out the seriousness of the situation, the CAS organized the *Round Table: Prague in the Context of Science Policy* held on 28 March 2014. The round table – a result of the cooperation of the CAS, universities and other higher education institutions in Prague and the Senate of the Czech Republic – discussed the use of ESIF in R&D&I and education. The discussion with the key actors responsible for the preparation of the new programme period and setting of the conditions for drawing from ESIF was meant to help to find ways in which the deepening of the structural deficit in Prague

could be prevented. The participants of the Round Table agreed that the current division of finance for R&D&I between Prague and the other regions does not reflect the R&D&I capacity and efficiency nor the needs of the Czech Republic. They also shared the opinion that in the medium-term horizon the underfunded R&D&I in Prague is dangerous for the competitiveness of the whole country. Even though the Round Table received a favourable response, the OP RDE mirrors this urgent need only on a very general level.

Working in the Coordination Council RIS3 responsible for the preparation of the National RIS3 Strategy, the representatives of the CAS strived to contribute to a higher quality and consistence of the document. The objective of the National RIS3 Strategy is to define the potential of national, regional and local for launching the process of innovation leading to excellence and to accomplishing the conditions of the Strategy Europe 2020. National RIS3 Strategy is one of the fundamental conditions for the approval of new Operational Programmes for the period 2014–2020. the CAS repeatedly pointed out that the proposal reduces the role of research to the position of a servant for the application sphere and indicated that the document does not discuss cutting-edge research, support of research infrastructures, neither teams of excellence, nor social innovation.

The representatives of the CAS joined the renewed counselling body of Ministry of Education, Youth and Sports (MEYS) – the European Research Area and Innovation Committee (ERAC), the objective of which is to deliver opinions, strategies and plans for the involvement of the Czech Republic in ERA. the CAS deputies also participated in the work of another counselling body of MEYS – the Council for Large Infrastructures, mainly in the preparation of the new methodology for the evaluation of the research infrastructures in the CR. The results of the evaluation will be used to guide the MEYS in allocating grants for the projects of significant infrastructures in the period 2016–2020/22; the results will also be used for updating the National Roadmap of the CR for Research Infrastructures for R&D&I. The National Roadmap reflects the Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). Through the work of its delegate, the CAS has been involved in updating of the ESFRI map, which started in 2004.

The centre EURAXESS at the Centre of Administration and Operations was a significant contributor boosting the involvement of young researchers and engagement of the outstanding foreign research workers in the work of research infrastructures and the institutes of the CAS in 2014. The Centre helped to augment multinational character of research teams, thus strengthening the excellency of the research in the CR.

Cooperation with international scientific organizations

In the year 2014, the CAS continued its cooperation with world organizations in order to support the integration of Czech scientists into significant international projects thus facilitating their long-term access to unique research infrastructures, technologies, platforms, databases and scientific data. Czech researchers were highly involved in the projects within the framework of large research infrastructures, namely CERN and EMBL. A more detailed overview of the participation of the institutes of the CAS in selected international projects is given in Appendix 3.2. Another manner of cooperation was implemented by means of expert workers from

the CAS institutes who were appointed into leading positions in international scientific organizations.

Cooperation with international non-governmental organisations

The CAS contributed to the formation of the European Research Area and the Global Scientific Strategy by delegating their deputies to European and international organizations – *the European Academies Science Advisory Council, EASAC, All European Academies, ALLEA, International Council for Science, ICSU, and InterAcademy Panel, IAP*. Among the most significant examples of the active share of the CAS in establishing European scientific strategy is organizing the meeting of EASAC-JRC Working Group on Marine Sustainability, which concentrated on formulating a common view of the protection and sustainable use of oceans and seas. Another contribution can be seen in the cooperation of the CAS experts in the preparation of the EASAC expertize.

Cooperation within international bilateral agreements

Bilateral international cooperation was developed with partners from more than 40 countries in the form of joint projects, thematic cooperation and study stays. Both sides of the exchange were generally balanced. The institutes of the CAS received nearly 400 foreign researchers for about 3,250 days; similarly, 350 researchers from the institutes of the CAS were sent abroad for about 3,350 days. Other bilateral cooperation between the CAS institutes and foreign organizations was based on the agreements made on the inter-institutional level.

Two seminars and round tables held in Prague and in Brno in September belong among important events for Czech-Norwegian cooperation. The seminars called “Seminars on Research and Innovation in the Kingdom of Norway” were attended by more than 130 representatives of Czech experts in R&D&I. Norwegian experts introduced the system of managing, functioning and financing R&D&I applied in Norway, with a special attention paid to the transfer of technologies. The round table called “Round Table Meeting on Transfer of Research Results to Industry and Evaluation of Research Activities” hosted key actors in the area of R&D&I in the CR and experts from Norway, who through sharing and exchange of experience mapped the current situation and identified the needs of scientific communities and institutions in the area of scientific strategy.

“The Vltava Meeting Bioscience” was one of the series of colloquia called “the Vltava Meeting”. It brought together the workers involved in the research into biomedicine. The objective of this meeting was to develop further Czech-French cooperation establishing new working contacts in the fields of genetics, biology, microbiology and physiology and to prepare the incorporation of both countries into the programme Horizon 2020.

The Internal Aid for International Cooperation programme continued fostering the research programmes up to three years long resolved by researchers at the CAS in cooperation with prominent international research institutions. The total sum of financial means spend for 83 research projects in the year 2014 was CZK 29.6 million.

Participation of the CAS in the EU Framework Programmes

In 2014, the CAS participated in 122 projects of the Seventh Framework Programme (7th FP) and in four projects of the programme Horizon 2020 (H2020). The total amount of financial means in agreements made by the institutions of the CAS reached EUR 8.68 million (from the 7th FP) and EUR 0.75 million (from H2020). The highest number of projects (12) was resolved by the Institute of Physics, also participating in the resolution of the ERC Synergy Grant called “Spin-charge conversion and spin caloritronics at hybrid organic-inorganic interfaces”.

An overview of the participation in the main tools of the 7th FP and H2020 in the year 2014 is given in Table 3.

Table 3: Participation of the CAS in the main tools of the 7th FP and H2020 in the year 2014

| Tool type | Total number of projects 7 th FP/H2020 |
|--|---|
| CP (Collaborative Projects) and RIA (Research and Innovation Actions) | 42/1 |
| MCA, MSCA (Marie (Skłodowska) Curie Actions – support for training courses and career development or researchers | 30/1 |
| CSA (Coordination and Support Actions) | 14/1 |
| CP-CSA-INFRA (Combination of Collaborative Projects and Coordination and Support Actions – support for research infrastructures) | 19/0 |
| ERC (European Research Council) grants | 9/0 |
| JTI (Joint Technology Initiatives) | 8/0 |
| Euratom | 0/1 |

the CAS ERC grants hosted by institutes of the CAS

- *Spintronics based on relativistic phenomena in systems with zero magnetic moment*, AdG, Tomáš Jungwirth, Institute of Physics, 2010–2016
- *Mathematical Thermodynamics of Fluids*, AdG, Eduard Feireisl, Institute of Mathematics, 2013–2018

- *Feasibility, logic and randomness in computational complexity*, AdG, Pavel Pudlák, Institute of Mathematics, 2014–2018
 - *Regular Arrays of Artificial Surface-Mounted Dipolar Molecular Rotors*, AdG, Josef Michl, Institute of Organic Chemistry and Biochemistry, 2009–2014
- Long-term woodland dynamics in Central Europe: from estimations to a realistic model*, StG, Péter Szabó, Institute of Botany, 2012–2016

ERC grants with institutes of the CAS as beneficiaries

- *Bioinorganic Chemistry for the Design of New Medicines*, AdG, Viktor Brabec, Institute of Biophysics, host institution: Warwick University, 2010–2015
- *Spin-charge conversion and spin caloritronics at hybrid organic-inorganic interfaces*, SyG, Jörg Wunderlich, Institute of Physics, host institution: University of Cambridge, 2014–2020
- *Regime and Society in Eastern Europe (1956–1989). From extended Reproduction to Social and Political Change*, AdG, Oldřich Tůma, Institute of Contemporary History, host institution: Sophia University St. Kliment Ohridski, 2011–2016
- *Origins of the Vernacular Mode. Regional Identities and European Networks in Late Medieval Europe*, StG, Lucie Doležalová, Institute of Philosophy, host institution: Die Österreichische Akademie der Wissenschaften, 2011–2016

Other selected projects of EU Framework Programmes are given in Appendix 3.2

REGIONAL COOPERATION

The institutes of the CAS participated in 22 projects of the programme Regional Cooperation. In the framework of this programme, they addressed together with their regional partners the issues that contribute to the improvement of social, economic, ecologic, natural and cultural standards of the regions. Beside the regions of the Czech Republic and their institutions and municipalities among the partner organizations are also universities, other higher education institutions and companies.

Among economically most important examples of such cooperation ranks the project “Impacts of droughts in South Moravia”, carried out in cooperation of the Centre for Global change and the Region of South Bohemia. The cooperation in the research in sociology and ecology brings about a significant effect for the society. The importance of expert contacts and collaboration with museums is indisputable, for example the exhibition of Medieval and Early Renaissance sculptures in Hradec Králové or the research into wood conservation in Jihlava.

The results of the cooperation are discussed and presented at the annual working meetings of the representatives of the CAS and the Regions of the CR. In 2014, such meeting was attended by the researchers of seven projects, President of the CAS Prof. Jiri Drahos, members of the Academic Council, directors of the participating institutes as well as representatives of the Regions – Central Bohemia, South Moravia, Vysočina, and of the Association of the Municipality of Orlicko.

EDUCATIONAL ACTIVITY

The CAS considers its participation in the development and improvement of the quality of education as one of the fundamental elements of its mission. Therefore, the CAS gives the prime importance to the education on the individual levels of the school system and also to the education aimed at the general public.

Educational activities of the CAS concentrate mainly on the cooperation with universities or other higher education institutions and on the education of doctoral students carried out under the accreditation of doctoral study programmes at individual institutes of the CAS. Moreover, the research institutes of the CAS are involved in the education of secondary school students by direct teaching, specialized lectures, broadening the knowledge of secondary school teachers or by participating in the organization of specialized competitions, olympiads and special secondary school training.

Cooperation with universities and other higher education institutions

Collaboration with universities and other higher education institutions represents a basic element of the cooperation of the CAS with other educational, research and innovative institutions on the national level in research as well as in education. Diverse forms of this cooperation are coordinated by the Council for Cooperation with Universities and for Graduate Study Programmes, which is one of the advisory bodies of the CAS. In 2014 primary attention of the Council sessions was paid to the preparation of the amendment to the Act No. 111/1998 Coll., on Higher Education Institutions and at the consequences of this legislation regulation for the participation of institutes of the CAS in realization of doctoral study programmes.

Through its representatives in the Accreditation Commission and in the Council of Higher Education Institutions of the Czech Republic, the CAS contributes to guaranteeing the quality of university education. Important opportunity for the collaboration with universities and other higher education institutions in research and education is provided by joint research units; currently there are 55 such units.

Teaching

The institutes of the CAS participate substantially in the supervision of students at public and private universities. 4,017 semestral courses of lectures, seminars or practical exercises were arranged by researchers of the CAS in the total amount of nearly 75,000 hours. In addition to the regular courses, the CAS researchers prepared a number of specialized seminars and series of lectures. Moreover, the workers of the CAS are members of scientific councils, doctoral study programme councils, examination commissions and commissions for habilitation and for appointment of professors.

Education of students

The supervision of students qualification theses that are performed at the laboratories and institutes of the CAS represents important contribution to university education

Employees of the CAS supervised more than 1,100 students in baccalaureate and master degree study programmes and more than 2,000 students in doctoral study programmes. 268 students in doctoral study programmes supervised at the institutes of the CAS successfully completed the study.

The CAS concluded 22 framework agreements with universities on the cooperation in the implementation of doctoral study programmes. The institutes of the CAS are therefore co-bearers of joint accreditation in a wide range of doctoral study programmes. The data on the involvement of the CAS in higher education are given in Table 4; more detailed statistic can be found in Table 5.

Table 4: examples of the collaboration with universities and other higher education institutions

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|-------------|-------------|-------------|-------------|-------------|-------------|
| Doctoral students supervised at the CAS institutes | 2,157 | 2,153 | 2,182 | 2,064 | 2,063 | 2,030 |
| MA/MS students supervised at the CAS institutes | 1,540 | 1,454 | 1,342 | 1,356 | 1,362 | 1,104 |
| Newly accepted doctoral students | 412 | 338 | 381 | 386 | 397 | 315 |
| Number of completed doctoral dissertations | 279 | 249 | 254 | 258 | 224 | 268 |
| Number of semestral cycles of lectures, seminars and exercises led by the employees of the CAS | 3,487 | 4,360 | 3,853 | 3,722 | 4,034 | 4,017 |
| Number of hours lectured | 76,744 | 77,379 | 80,600 | 76,939 | 74,198 | 74,747 |

The institutes of the CAS organized various specialized events focused on the education of students in higher education, like, for example: *Summer Training Course on Experimental Plasma Physics (SUMTRAIC)* organized by the Institute of Plasma Physics introduced diagnostic methods at tokamak COMPASS.

- *Summer course on elasticity and strength* organized by the Institute of Physics of Materials to widen the knowledge of the students of Bc study programmes at higher education technical schools and to introduce practical solutions to problems using the knowledge of basic courses in statics.

- *Application of micromorphological techniques in natural and archaeological context* organized by the Institute of Geology acquainted the students with the microscopic technique useful in the study of archaeology, sedimentology or pedology.
- *International postgraduate course in polymer science UNESCO/IUPAC* was organized by the Institute of Macromolecular Chemistry with the aim to help the students from economically disadvantaged countries to receive education in polymer science and use the latest technology and methods unavailable in their countries.
- *A course in paleoecology* organized by the Institute of Botany mainly dealt with the interaction between the world of nature and man in the postglacial period.
- *A seminar in etology* organized by the Institute of Vertebrate Biology was an intercollegiate meeting including also a workshop on the research into behaviour.
- *An international workshop on Gathering Remotely Sensed Data for the Assessment of the Properties of Vegetation* was organized under the project HYDAP by Global Change Research Centre. Doctoral students from the Czech Republic and from abroad learned about processing and assessing the data from remote exploration of the Earth.
- A course called *Physiology and molecular biology of plants* offered by the Institute of Experimental Botany introduced the Bc students into basic approaches to molecular biology of plants and showed them several research laboratories where they could practically try how to use various apparatuses.
- The course called *Tissue engineering of bone, joint and cartilage substitutes* was just one of many events of the kind prepared by the Institute of Physiology.
- *Human Resources for Neuroscientific Research* is the title of the summer school organized by Institute of Experimental Medicine in Královéhradecký and Ústecký Region.
- The 38th season of the annual lecture series called *Advances in Molecular Biology and Genetics 2014* was organized by Institute of Molecular Genetics. It offered its audiences information on scientific advances in the interdisciplinary field of molecular biology, genetics and biomedicine with some biotechnology views.
- *Archaeology in Practice* was a hands-on field course prepared by Institute of Archaeology in Brno for students specializing in various fields of history.
- *Sociology as a Contemporary Scientific Discipline* was a course organized by the Institute of Sociology. The aim of the course was to improve and broaden the students' knowledge of the strategies and conditions of basic research in social sciences.
- The Institute of the Czech Language prepared a range of specialized courses focused on professional writing in general as well as the specific features of scientific writing in Czech and in English.

Course on the fundamentals of research work

In the long term the CAS contributes to the general training of students in doctoral study programmes by organizing the successful and sought-after *Course in the Fundamentals of Research Work*. In 2014, the course was held in four runs in Prague, where it was attended by 110 students, and there were five runs in Brno attended by 222 students. The intent to focus the course to the selected specializations was successfully implemented by a specialised lecture course for students of biomedicine. It was held at the Institute of Molecular Genetics and offered lectures by experts from European Molecular Biology Organization (EMBO).

Educational activities at secondary and primary schools

The contribution of the CAS to the education at primary and secondary schools consists in the participation in teaching and lecturing on a variety of topics. It also contributes substantially to creating and publishing secondary school textbooks or e-learning courses. Financial means received from the projects in the area of education subsidized by the EU allow the institutes of the CAS to cooperate with secondary or primary focussing on particular interest groups. Special attention is paid to further education of teachers.

From a large number of events we mention just a few examples. The projects *Open Science III* and *Open Science IV*, coordinated by the Centre for Administration and Operations, are realized with financial support from Operational Programme Education for Competitiveness, and from the State Budget of the Czech Republic. The objective of the projects – the popularization of natural and technical branches of study, offers students of secondary schools unique chance to become involved in real scientific activities by means of scientific internships at the institutes of the CAS and at specialized laboratories of universities and thus motivate them to pick science as their future career. Within the above-mentioned projects, study stays abroad and participation in international conferences are also provided.

Another important area is the education of teachers. The objective of educational courses for teachers, accredited by the MEYS, was to make the teachers familiar with the current experimental approaches in biology, chemistry and physics that can be used in laboratory exercises at schools. Each participant of the course received a set of teaching aids and printed overview material. The teachers learned about the recent technology for laboratory exercises that is available in the leading research institutes.

Other events for further education of teachers include for example *Summer Scientific Camp for Teachers* organized by the CAS together with the Faculty of Science, Charles University in Prague and devoted to the topic Science and Earth. Other courses concentrated on Humanities and Social sciences, like the fourth year of the workshop *School of the Czech Language and Literature* meant for active teachers of the Czech language and literature at primary and secondary schools.

Don't fear science is a long-established series of lectures for the students of secondary schools and their teachers interested in animate and inanimate nature. Lectures in the series *Ecce homo!* on the other hand focus on humanities. The event *Spring Excursions to the World of Science* is held in spring months at selected institutes of the CAS as an independent part of the festival *Week of Science and Technology*. The programme wants to attract secondary school students in particular.

An attractive choice of educational events was offered by the individual research institutes of the CAS. The Institute of Computer Science continued the cooperation with other institutions in the successful project *100 Scientists to Secondary Schools*. The Institute of Theoretical and Applied Mechanics together with the cooperating secondary schools introduced the students' scientific programme *Patrimonio*, which allows for the participation of students in research and in preservation of cultural heritage, helps them to try scientific work and to find interesting facts and connections in their close or wider neighbourhood. Popularizing lectures were the contribution of J. Heyrovský Institute of Physical Chemistry in the project for the Vysočina Region called *Natural and Technical Disciplines – a Challenge for the Future*. The same institute also arranged the chemical workshop *Chemistry is not a bore* for secondary school students and prepared practical classes and excursions *Meet science or A Day with a Scientist*. The Institute of Archaeology in Brno organized an excursion for students to the archaeological display in Dolní Věstonice accompanied by popularizing commentary about Palaeolithic monuments of South Moravia. The Institute of Sociology cooperated in implementing a mentoring programme for the female secondary students in the third year of study who showed interest in applying for a technical university.

The institutes of the CAS significantly contributed to a high level of mathematical, chemical, biological olympiads. They offered expert and information support during the contests, ensured supervision in laboratory exercises, gave lectures and organized summer camps. Apart of all that, the institutes of the CAS ensured expert assistance in the events held in the framework of Secondary School Scientific Activity.

TOWARDS SOCIETY

Publishing

The CAS supports publishing of selected research and science-popularizing publications written by their employees and by other authors. In 2014, the subsidy from the CAS amounted to approximately CZK 14 million. This sum helped to publish 62 titles, 40% of which were prepared by the authors from the research institutions other than the CAS.

A total of 44 subsidies were directed to the Publishing House Academia and 18 subsidies went to institutes of the CAS. Under the Policy of Open Access, the CAS subsidized by 1 million Czech crown scientific publications of 44 authors.

Popularization of Science

For the CAS popularization of science and research by means of all forms of communication tools represents an integral part of its activity. . The aim is to bring science closer to non-specialists, draw their attention to the results of the research in individual research areas, to introduce outstanding researchers and research units and to awaken the interest in scientific work in students, pupils, and even in young children.

Web pages *VEDAPROZIVOT.CZ* popularize science and bring both basic and applied research closer to the lay public informing them about the latest research activities in the institutes of the CAS as well as in their partner institutions.

Academic Bulletin (Akademický bulletin) as the official monthly of the CAS is a source of information for expert and wider professional public on the activities of the Academic Council of the CAS, and its academic, research and educational institutions. Along with the print version, there are also web pages informing about the current events, giving useful references or links and documenting the information with picture galleries. Apart from the standard 11 issues, the Bulletin Editorial Board decided to publish, in cooperation with the Institute of Philosophy, a specialized monograph called "*Villa Lanna in Prague*". The monograph was published in English for foreign visitors to the CAS .

To provide technical background and documentation of significant events in the main building in Národní Street, the CAS used services of the Centre of Administration and Operations, namely its Department of Audio-Visual Technologies (OAT), which produced audiovisual documents on the activities of the CAS. For the web pages, of the CAS prepared media coverages, spots and ensured and took charge of archiving the news published on the web. Besides other interesting materials, the OAT created more than 40 scientific coverages from the institutes and laboratories of the CAS and six video clips presenting the new strategy of the CAS.

Individual research institutes of the CAS organized a wide range of popularization events, like, for instance: : climbing Milešovka Mountain (Institute of Atmospheric Physics), Children's Day at the Brno Airport (Global Change Research Centre), lecture on the occasion of the premiere of the film *Cyril and Methodius – Apostles to the Slavs* (Institute of Slavonic Studies).

The largest scientific festival *Week of Science and Technology of the CAS*, held on 1–15 November, offered over 500 events all over the Czech Republic attended by about 160,000 visitors. The festival focuses on the general public allowing people to visit specialized scientific rooms and laboratories and to learn more about the world of science at excursions, lectures, Science Cafés, exhibitions, seminars, documentary film screenings and other events.

In 2014 the festival was enriched with a new activity – the photographic contest of employees of the CAS called *Photogenic Science* supplemented with a follow-up exhibition of the best photographs. Thirteen of them are presented in the official calendar of the CAS for the year 2015

Other popularizing events of interest

The regular series of lectures for secondary schools *Don't fear science* and *Ecce Homo!* were continued, this time directly at the participating secondary schools.

In March the Institute of Experimental Medicine in cooperation with the Czech Society for Neuroscience organized the 16th *Brain Awareness Week*. On the occasion of *World Meteorological Day* the Institute of Atmospheric Physics organized an *Open House Day* and Astronomical Institute opened its observatory for excursions and observation of the sky.

The CAS organized international conference *Science education & Science communication* as well as student scientific conference called "*I am a young scientist!*". The best participants of the conference represented the Czech Republic at the *International Environment & Sustainability Project Olympiad INESPO 2014* in Hague. Five Czech contestants won five awards – one Gold Medal, one Silver Medal, one Bronze Medal and two fourth places.

As in previous years the spring excursions to the World of Science were organized for the secondary school students. This time, eight research institutes of the CAS participated, attracting 3,610 visitors from among the secondary school students and the general public.

The annual series of educational workshops called *School of the Czech Language and Literature* was organized by the Institute of the Czech language and the Institute of Czech literature with the help of the Centre of Administration and Operations. The workshops were attended by 40 teachers of the Czech language and literature.

The CAS systematically encourages popularization of science and research and endorses research-oriented education. One of the tools is the project *Open Science*, which offers study stays at the institutes of the CAS. In this way, the students of secondary schools and universities from various regions of the CR can participate in research. *Open Science III* offered 172 study stays for secondary students and 29 study stays for the students of higher education institutions, in *Open Science IV* it was 61 and 12 study stays respectively. *Open Science Prague* provided the students of secondary school in Prague with 33 study stays at the institutions of the CAS .

Moreover, the second *Summer Science Camp*, this time subtitled *Science and the Earth*, was held for 30 secondary school teachers of biology, physics and chemistry from the schools outside Prague.

Selected institutes represented the CAS on the occasion of the *European Researchers' Night* and participated in *Science Fair* held under the patronage of the previous president of the CAS Václav Pačes. One of the events was the interactive game called *Geosites of the Region* created by the Institute of Geonics.

the CAS supported the international contest of science popularisers *FameLab 2014*, and participated in the scholarship programme for young female researchers *L'Oréal for Women in Science*, organized jointly by the L'Oréal CR, Czech Commission for UNESCO and the CAS .

Exhibitions

60 years of CERN

The CAS organized 19 exhibitions in its building at Národní Street. The biggest attention attracted the exhibition celebrating the 60th anniversary of CERN, which had to be prolonged.

The Story of the Mercury Drop

The exhibitions took place throughout the Czech Republic. “*The Story of the Mercury Drop*” introducing the personality of Jaroslav Heyrovský has been travelling around the country since the year 2009. Altogether 15 such exhibitions attended by 10,900 visitors have been arranged so far.

The Benedictines in the heart of Europe 800–1300

The Institute of Philosophy took part in the preparation of an important exhibition called “*Open the Gates of Paradise. The Benedictines in the heart of Europe 800–1300*” at the Wallenstein Riding School in Prague.

Great Moravia and the beginnings of Christianity

The Institute of Archaeology in Brno and the Institute of Philosophy participated in the preparation of international exhibition “*Great Moravia and the Beginnings of Christianity*”. The exhibition displays more than 1,200 exhibits, mostly priceless archaeological finds discovered in Czech, Moravia, Slovakia, Austria and Poland.

SCIENCE FOR PRACTICE

To widespread exploitation of scientific knowledge in practice represents integral part of the mission of the CAS. This necessitates establishing direct contacts between institutes of the CAS and partner organizations from the industrial sphere. The contacts may come in the forms of contract research or joint projects supported by Czech or foreign agencies. Partner organizations of the CAS in the cooperation with the user sphere include the Technology Agency CR, the Engineering Academy CR, the Association of Research Organizations, the Association of Innovative Entrepreneurship CR, Confederation of Industry CR, and CzechInvest. On the regional level, the partners are regions themselves and regional innovation centres.

The research at the CAS is characterised by long-term conceptual work on selected research topics and is accompanied by the augmentation of knowledge, experience and technologies. In this way, good conditions are created for cooperation, for the formation of joint projects and for the transfer of technologies to the user sphere. Such approach often brings long-term relations between research teams and partner companies or organizations.

Support and coordination of activities in the sphere of practical application is provided by the *Council for Cooperation of the CAS with Business and Application Sphere*. The Council consists of persons responsible in the institutes of the CAS for technology transfer and researchers skilled in cooperation with industry and other areas where the results of research are applied.

The Council continues the constructive dialogue and effective cooperation with the Technology Agency of the Czech Republic (TACR), who is the main provider of the targeted funds for the applied research. In a similar way, the Council has established dialog with the Department of Industrial Research and Technological Development of Ministry of Industry and Trade. Within these contacts, consultations have been carried out concerning the upcoming calls of Operational Programme Enterprise and Innovation for Competitiveness (OP PIK) funded from the EU Structural Funds.

Besides the cooperation with the partners from the industrial sphere, application-oriented activities of the CAS include the cooperation with the Chamber of Deputies and the Senate of the Parliament CR, state administration and its bodies (Radioactive Waste Repository Authority, Land fund of the Czech Republic, Czech Statistical Office), local administration offices (municipalities, town districts, towns, regions), other subjects and non-governmental organizations.

As the result of participation of institutes of the CAS in the projects of the Operational Programme Research and Development for Innovation, particularly in the area of the support for regional R&D centres, , centres for the transfer of technologies are being gradually formed. the. In 2014 the Council for Cooperation of the CAS with Business and Application Sphere established contacts with the Technology Centre of the CAS and with the South Moravian Innovation Centre . The Regional centres involved in the transfer of technologies have great potential to mediate between their contacts in application sphere and institutes of the CAS.

Relevant examples of cooperation with the partners in the industrial sphere:

Reinstallation of vibrodiagnostic system for monitoring of blade vibrations of the blade row in the 1,000-MW Steam Turbine at the power plant Temelín. Magnetic characteristics were measured and 1,000-MW Steam Turbine blades were demagnetized. Vibrodiagnostic system VDS-UT, developed at the Institute of Thermomechanics for long-term monitoring of 1,000-MW turbine blades vibrations at JET, was innovated and reinstalled. In this way, a higher level of reliability and safety of turbine operation was accomplished.

A study on the impact of the new nuclear source at the power station in Dukovany (NNS NPPDu) on the local climate. The study focuses on the influence of the cooling towers of NNS NPPDu (NJZ EDU) and their plumes on the neighbouring climate, i.e. on the changes in temperature, humidity and shading in the surroundings of the NNS. The study is based on the model CT-PLUME/EDU and consists in simulating the development of plumes for the given configuration of the towers between 1. 1.–31. 12. 2012 at the test period of one hour.

Co-combustion of coal and rubber granulate in a fluidized bed. The research was carried out at the heating plant in Zlín by the Institute of Chemical Processes and Alpiq Generation (CZ), s.r.o. Its main aim was to test the co-combustion of coal and the granules of rubber in a fluidized bed of the ash K31, provided that the blended fuel mixture contains up to 15% by weight of the rubber granules.

Research results that are important for practical applications deserve legal protection, usually in the form of patents. The following overview summarizes the results with legal protection.

Table 5: Overview of property rights granted to the institutes of the CAS in 2014

| Invention applications submitted in the CR | Number | Licence |
|---|---------------|----------------|
| Patent applications filed in the CR | 60 | |
| Patents granted in the CR | 44 | 5 |
| Utility models filed in the CR | 31 | |
| Utility models registered in the CR | 32 | |
| Trade marks filed in the CR | 3 | |
| Trade marks registered in the CR | 1 | |
| Registered designs filed in the CR | 3 | |
| Registered designs granted in the CR | 3 | |
| Invention applications submitted abroad | Number | Licence |
| International application form (PCT) | 14 | |

| | | |
|--|---------------|----------------|
| National or Regional stage of the PCT | 11 | |
| National or Regional mode | 14 | |
| Patents granted abroad | Number | Licence |
| Regional (at EPO, EAPO, OAPI, ARIPO) | 10 | 1 |
| Of which national patents | 7 | |
| National | 9 | 1 |
| Applications for Community plant variety right filed in the CR | 1 | |
| Applications for Community plant variety right filed abroad | 2 | |
| Cultivation certificates in the CR | 3 | |
| Cultivation certificates abroad | 4 | 1 |

Annotation:

PCT – Patent Cooperation Treaty

EPO – European Patent Office

EAPO – Eurasian Patent Office

OAPI – Organisation Africaine de la Propriété Intellectuelle (African Intellectual Property Organization)

ARIPO – African Regional Industrial Property Organization (African Regional Intellectual Property Organization)

Gaining legal protection granted to a scientific result by a patent is a significant success. Examples of this demanding process:

Institute of Thermomechanics. Patent was granted for the invention of a *unit generating small air bubbles in liquids* by periodic oscillations acting on the air streaming out from an aerator. Wastewater processing is done by bacteria. The bubbles provide the bacteria with vitally necessary oxygen. Generating bubbles is also important for the production of unicellular algae, which are a significant part of food chain and also as producers of renewable algal petrol.

Institute of Biotechnology. The patent name: “*Analogues of tamoxifen efficient in particular against Her2-high tumours*”. Tamoxifen is a common anti-cancer drug, especially for women with breast cancer. However, the drug is not successful in patients with heightened expression oncoprotein HER2. This occurs in about 30% of patients. A derivative of tamoxifen, which is antagonist of the estrogen receptor and direct inhibitor of mitochondrial complex I, with positively charged phenyl phosphonium added, targets the molecules to mitochondria substantially increasing their anti-tumour activity. Moreover, the new substance was found to be much more efficient in killing breast carcinoma cells with a high HER in comparison to the cells with a low HER2, i.e. opposite to the initial tamoxifen. These substances will be used for the treatment of tumour diseases. They will be especially suitable for the treatment of tumours with high levels of oncoprotein HER2. Taking into account that 30% of patients with breast carcinoma meet the given condition, it is this group of patients that is suitable for testing of the new substances.

Institute of Organic Chemistry and Biochemistry. The patent name: *“Pregnane anionic compounds, process for preparing thereof and their use.”* The patent concerns Pregnane anionic compounds of the general formula I, their production and their use in the preparation of pharmaceutical compositions intended for treating neurologic and psychiatric diseases and conditions associated with excessive activation of NMDA receptors such as neuroprotection agents against excitotoxic damage of the Central Neural System (CNS), conditions associated with excessive activation of NMDA subtype of glutamate receptors or where this receptor type participates in the rise or course of some insanities or neurological diseases, that is particularly traumatic and hypoxic damage of neural tissue in diseases of central neural system such as Alzheimer, Huntington and Parkinson diseases, and in cognitive disorders arising in old-age. The invention can be used industrially to produce compounds that can be applied in the treatment of a range of the CNS disorders.

AWARDS AND RECOGNITION

The relevance of the work of researchers of the the CAS for the society is manifested by awards and prizes bestowed on them by Czech and foreign institutions and state bodies. In 2014 the following awards and prizes were bestowed:

The National Prize of the Government of the Czech Republic “Česká hlava” (Czech Head)

Emil Paleček (Institute of Biophysics) – for lifelong research work

Pavel Izák (Institute of Chemical Process Fundamentals) – Kapsch Award in technical sciences

Pavla Eliášová (J. Heyrovsky Institute of Physical Chemistry) – ČEZ Award (Czech Head in the category “Doctorandus”)

The Silver Commemorative Medal of the Senate of the Parliament of the Czech Republic

Emil Paleček (Institute of Biophysics) – for lifelong research work

František Vyskočil (Institute of Physiology) – for lifelong research work

Jean-Marie Lehn Award (bestowed by the French Embassy in the CR)

Vítězslav Jarý (Institute of Physics) – for exploring novel luminescent materials and their application

The Prize of the Minister of Education, Youth and Sports for outstanding results in research, experimental development and innovation

Jaroslav Doležel (Institute of Experimental Botany) – for the research into hereditary information in plants

Jiří Homola (Institute of Photonics and Electronics) – for the research into optical sensors

Silver medal of the Capital City of Prague (bestowed by the Mayor of Prague)

Helena Illnerová (Institute of Physiology) – for contributing to science and spreading the international fame of the Capital City of Prague

Award of the City of Prague (bestowed by the Prague City Hall)

Blanka Říhová (Institute of Microbiology) – for lifelong contributing in science

Order of Laurel, Platinum (bestowed by the Czech Chamber of Commerce)

Blanka Říhová (Institute of Microbiology) – for lifelong contributing in the field of immunology

Honorary Medal of Charles University (bestowed by the Rector of Charles University)

Eva Syková (Institute of Experimental Medicine) – for lifelong contributing in the field of biomedicine

The Josef Hlávka Medal (bestowed by the Foundation of Josef, Marie and Zdeňka Hlávka)

Vladimír Hnatowicz – for the research contributing in Czech nuclear physics

The Award of the Chairman of GACR for outstanding research results in basic research grant projects

Jiří Čejka (J. Heyrovsky Institute of Physical Chemistry)

Michal Fárník (J. Heyrovsky Institute of Physical Chemistry)

Vojtěch Novotný (Biology Centre)

TACR Award for the Best Project in Applied Research

Jan Wild (Institute of Botany) – in the category “Usefulness of the Solution”

Werner von Siemens Excellence Award (bestowed by Siemens s.r.o. Česká republika)

Research team lead by Pavel Zemánek (Institute of Scientific Instruments) – for preeminent result in basic research

The Gold Medal of Masaryk University for Outstanding Contributions to the Development of Science and Masaryk University (bestowed by the Scientific Council of Masaryk University)

Jindřich Hladil (Institute of Geology)

The State Prize for Translation (bestowed by the Ministry of Culture)

Jiří Pechar (Institute of Philosophy)

Commemorative Medal of Charles University

Štěpán Jurajda (Economics Institute) – for outstanding contributions to the development of CERGE UK

Awards granted by the CAS

Praemium Academiae

Praemium Academiae is intended for outstanding scientists who excel in their fields in the international context and contribute to the prestige of the CAS. It is awarded with the aim to endorse excellence in science financially and morally.

Doc. RNDr. Ondřej Santolík, Dr.

Doc. RNDr. Ondřej Santolík, Dr. (born in 1967) specializes in satellite plasma measurements and the research of plasma waves, wave dynamics and plasma instabilities. Ondřej Santolík received his doctoral degree in physics at University of Orléans (Université d'Orléans) and at Charles University in Prague (plasma physics and ionized media). He is a member of research teams for international satellite projects and a regular contributor in international journals. He has participated in a number of research stays in the USA (University of Iowa) and France (LPCE/CNRS Orléans) and his research results receive international recognition and credit. Since 2007, Ondřej Santolík has been working at the Institute of Atmospheric Physics of the CAS, where he holds the position of Head of the Department of Space Physics and Chairman of the institute Board.

In his research work, Ondřej Santolík concentrates on the plasma physics with a special focus on exploratory satellite measurements of space plasma, and does research into plasma waves of the magnetosphere of the Earth and the planets of the Solar System and their interactions with energetic particles. He is engaged in the analyses of satellite data (e.g. from the satellites Intershock, APEX, Interball, Magion, Freja, Polar, DEMETER, and Cassini) and in the preparation of measurements of the space plasma in the future satellite missions. Ondřej Santolík leads research teams of the upcoming satellite projects as a Lead Co-Investigator for the IME-HF instrument for the satellite TARANIS, as a Co-Principal Investigator for the RPWI instrument for the space probe JUICE to Jupiter's moons, as a Principal Investigator for the apparatuses ELMAVAN and LEMRA-L in the satellites Resonance and Luna-Glob. Of high importance is his cooperation in the upcoming satellite project of solar probe Solar Orbiter, where he is a Co-investigator of the RPW instrument.

He is author or co-author of more than 170 papers in internationally reviewed journals. At the same time, he significantly contributes to the education of the students in Baccalaureate, Magister and Doctoral study programmes.

The fact that the results of his work are internationally respected is reflected in a number of invited papers at international conferences, invited lectures at international institutions and numerous international awards (Bernard Bolzano

Medal for Physics, J. William Fulbright Scholarship, etc.). In the year 2008, Ondřej Santolík was elected vice-chairman of the international scientific organization URSI (Union Radio-Scinetifique Internationale). Since the year 2010, he has been a Vice-Chair of the Panel on Capacity Building of the COSPAR (Committee on Space Research) and a member of scientific advisory committee of European Cosmic Agency.

In the near future his research group plans to focus primarily on the experimental research into the origin, propagation and behaviour of waves and instabilities in space plasma, thus extending the existing results of their research. The following are the main directions planned for the future research: a) linear and nonlinear electromagnetic emissions from instabilities in space plasma and their interactions with charged particles, b) electromagnetic phenomena in the wide range of frequencies emitted by lightning discharges and other sources in the atmosphere, and c) preparation of new scientific apparatuses for satellites and probes and for terrestrial measurements.

Prof. RNDr. Jiří Šponer, DrSc.

Jiří Šponer (born in 1964) investigates the structure, dynamics, functions and evolution of nucleic acid molecules (DNA and RNA) by means of the most advanced computational methods.

The world of nucleic acids is immensely complicated and the available experimental methods are not able to cover all the key aspects. Here is the space for computer and theoretical methods to bridge the gaps in our knowledge and augment experimental data including their interpretation. The Department of Structure and Dynamics of Nucleic Acids headed by Jiří Šponer is respected as one of the world's best laboratories. The main emphasis is placed on the following approaches: explicit solvent molecular dynamics computer simulations, quantum-chemical calculations, hybrid quantum-classical calculations and bioinformatics – methods that have seen dramatic qualitative changes in recent three years. The laboratory was able to embark the changes. A reasonable utilization of financial funds from EU sources helped them to buy the necessary hardware and invite postdocs from abroad. All the mentioned factors are positively reflected in the growth of publishing activities in 2013–2014. In the field of quantum-chemical calculations, the laboratory was the very first research place to publish a quantum-chemical description of a complex functional 8-nucleotide fragment of DNA.

The laboratory of Jiří Šponer cooperates with a number of top research institutions abroad, such as laboratory of Allain F. H. T. in Zurich, world's top specialist in structural biology. They have started a joint project in theoretical-experimental study of protein-RNA complexes. The simulations in this project will be performed in direct cooperation with biochemical and MNR experiments carried out simultaneously at Allain's laboratory and with further support from the experimental studies in bioinformatics at the laboratory of Quaide Morrise in Canada (University of Toronto, Department of Molecular Genetics).

Jiří Šponer is an author or co-author of 250 original scientific papers and books.

Award of the CAS for outstanding results of great scientific significance

- Frantisek Slanina, Institute of Physics, for the monograph “Essentials of Econophysics Modelling” (Oxford University Press)
- Jiří Hejnar, Magda Matoušková, Filip Šenigl, Kateřina Trejbalová, Jiří Plachý, Dalibor Miklík, Institute of Molecular Genetics, for the result “Transcriptional regulation of retroviruses, retroviral vectors and retrotransposons”
- Karel Novotný, Institute of Philosophy, for the result “La genèse d’une hérésie. Monde, corps et histoire dans la pensée de Jan Patočka” (The Genesis of a Heresy. World, Body and History in the Thought of Jan Patočka). Bibliothèque de l’histoire de la philosophie. Nouvelle série. Librairie Philosophique J. Vrin, Paris 2012, 184 s. ISBN 978-2-7116-2464-5, and other.

Awards of the CAS to young scientists for outstanding results in science

- Michal Švanda, 1980* (Astronomical Institute) for the result “Contributions to the development of helioseismic methods”
- Jan Vondrák, 1979* (Institute of Botany) for the result “Phylogenetic approach to taxonomy of critical groups of lichenized fungi”
- Eva Chodějovská, 1981* (Institute of History) for the result “Historical Atlas of Towns in the Czech Republic – volume 24: Prague-Smíchov”. Praha, Historický ústav, 2013, 98 s. ISBN 978-80-7286-200-9.

Award of the President of the CAS for the promotion or popularization of research, experimental development and innovation

- Aleš Špičák (Institute of Geophysics)
- Michael Londesborough (Institute of Inorganic Chemistry)
- Jiří Prosecký (Oriental Institute)

The Otto Wichterle Premium to young scientists

I. Mathematics, Physics and Earth Sciences

- Oto Brzobohatý (Institute of Scientific Instruments)
- Jan Hrabina (Institute of Scientific Instruments)
- Leona Chadimová (Institute of Geology)
- Martin Kempa (Institute of Physics)
- Ladislav Křišťoufek (Institute of Information Theory and Automation)

- Jakub Plášil (Institute of Physics)
- Jiří Svoboda (Astronomical Institute)
- Martin Švec (Institute of Physics)
- Jana Vejpravová (Institute of Physics)
- Prokop Závada (Institute of Physics)

II. Life Sciences and Chemical Sciences

- Jakub Kaminský (Institute of Organic Chemistry and Biochemistry)
- Milan Kožíšek (Institute of Organic Chemistry and Biochemistry)
- Ondřej Kuda (Institute of Physiology)
- Petr Pecina (Institute of Physiology)
- Michaela Pekarová (Biology Centre of)
- Matěj Polačik (Institute of Vertebrate Biology)
- Marie Prchalová (Biology Centre of)
- Petra Procházková (Institute of Microbiology)
- Jan Řezáč (Institute of Organic Chemistry and Biochemistry)
- Jan Štefka (Biology Centre of)

III. Humanities and Social Sciences

- Aleš Bičan (Institute of the Czech Language)
- Patrick Gaulé (Economics Institute)
- Jana Klímová Chaloupková (Institute of Sociology)
- Petr Kitzler (Institute of Philosophy)
- Alice Koubová (Institute of Philosophy)
- Kateřina Zábrowská (Institute of Psychology)

Medals awarded by the CAS to Czech and foreign researchers

The Honorary Medal of the CAS “De Scientia et Humanitate Optime Meritis”

Noam Chomsky (Massachusetts Institute of Technology (MIT), Cambridge, Massachusetts, USA)

The Bernard Bolzano Honorary Medal for Merit in the Mathematical Sciences

Pavel Krejčí (Institute of Mathematics)

The Ernst Mach Honorary Medal for Merit in the Physical Sciences

Jan Palouš (Astronomical Institute)

Jan Stöckel (Institute of Plasma Physics)

Vladislav Šimák (Institute of Physics)

The František Pošepný Honorary Medal for Merit in Geological Sciences

Jaromír Ulrych (Institute of Geology)

The Jaroslav Heyrovský Honorary Medal for Merit in Chemical Sciences

Karel Ulbrich (Institute of Macromolecular Chemistry)

The Gregor Johann Mendel Honorary Medal for Merit in Biological Sciences

Vlasta Jankovská (Institute of Botany)

Maxim D. Frank-Kamenetsky (Russian Academy of Natural Sciences, Boston University, Boston, MA, USA)

Bohdan Slavík (Institute of Experimental Botany)

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

Christopher A. Sims (Princeton University, Princeton, USA)

Václav Pavlíček (Institute of State and Law)

The František Palacký Honorary Medal for Merit in Historical Sciences

Robert Luft (Collegium Carolinum, München, Germany)

Petr Sommer (Institute of Philosophy)

Zénon S. Kaluza (Laboratoire d'études sur les Monothéismes, Centre national de la recherche scientifique, Paris)

The Jan Patočka Memorial Medal

František Šmahel (Institute of Philosophy)

Adolf Filáček (Institute of Philosophy)

The Vojtěch Náprstek Honorary Medal for Merit in Science Popularisation

Marek Janáč (Czech Radio, Prague)

Markéta Pravdová (Institute of the Czech Language)

Jitka Staňková (Institute of Ethnology)

The Honorary Medal for Merit in the Academy of Sciences of the Czech Republic

Drahoslava Vaníčková (Head Office of the CAS)

The J. E. Purkyně Fellowship for outstanding and promising researchers

Petr Kabáth, nominated by the Astronomical Institute, for the research into the atmospheres of exoplanets, for the period of five years

Alexander Vikman, nominated by the Institute of Physics, for the research into inflationary models of early universe, for the period of five years

Juraj Fedor, nominated by the J. Heyrovsky Institute of Physical Chemistry, for the research into the ultrafast processes in ionized hydrogen-bonded molecule systems, for the period of five years

Valentina Fava, nominated by the Institute of Contemporary History, for the research into transfers of technologies between the East and West based on the survey data from automotive industry, for the period of five years

Matyáš Havrda, nominated by the Institute of Philosophy, for the research into the reception of Aristotle's theory of proof in late antique natural philosophy, for the period of five years

A Letter of Thanks

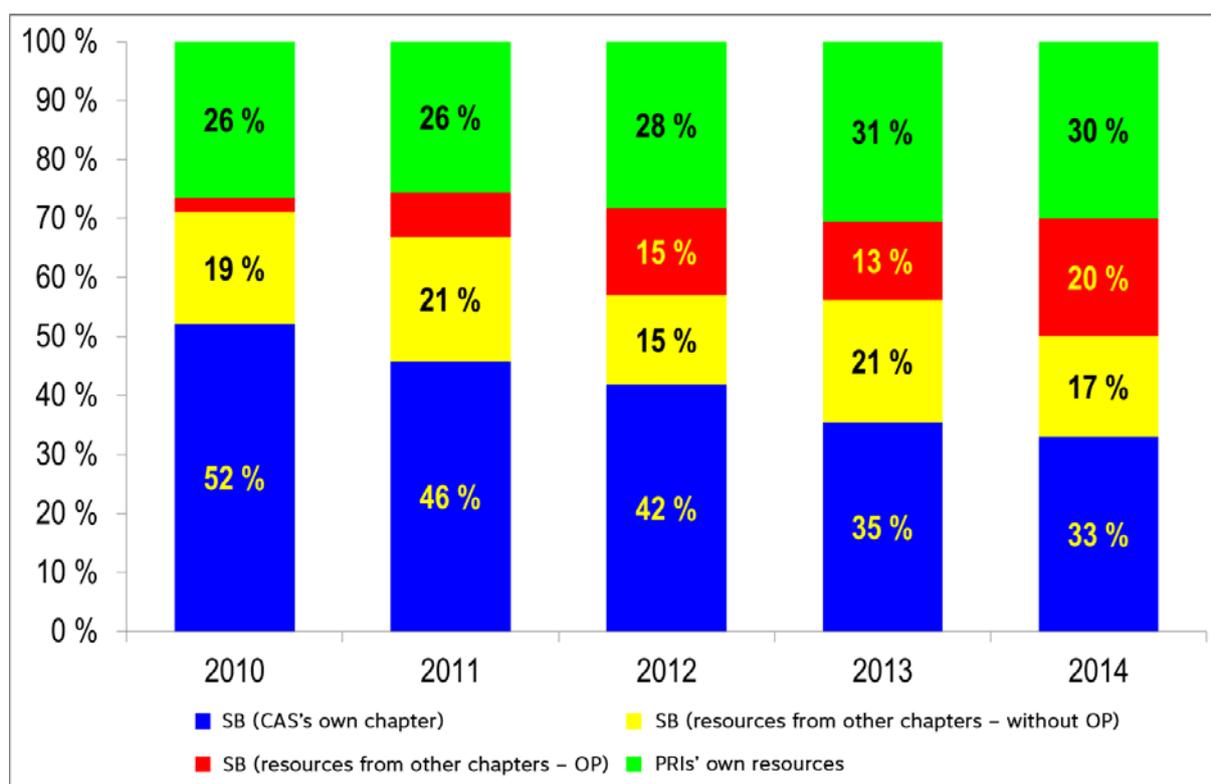
34 workers from 14 institutes of the CAS received Letters of Thanks from President of the CAS Jiří Drahoš for their long-lasting work for the CAS.

FINANCIAL MANAGEMENT

In 2014, the CAS managed a total of CZK 13,460.2 million of which CZK 4,452.6 million came from its chapter of the state budget (SB). From 2010, there was a gradual growth of the total financial means of the CAS by CZK 3.8 billion, despite the decrease of direct support through SB chapter of the CAS by approximately CZK 0.6 billion. This development was made possible by an increase in the funds coming on competitive basis from other SB chapters by CZK 3 billion in total (of which the major part were the means from operational programmes) and by an increase in the financial means raised by the CAS institutes themselves by CZK 1.4 billion (predominantly revenues from the licenses of the Institute of Organic Chemistry and Biochemistry).

The share of means from SB chapter of the CAS in the total financial sources of the CAS dropped from 52% in 2010 to 33% in 2014.

Graph 1: Structure of CAS Financial Resources



Financial resources (for the entire CAS including all institutes established by the CAS) coming from SB chapter of the CAS, from subsidies from other SB chapters, and from extra-budgetary sources are summarised in the following detailed overview:

The structure of CAS financial resources (in millions of CZK):

| | Non- investment | Investment | Total |
|--|----------------------------|-------------------|----------------|
| Approved SB chapter of the CAS | 3,757.3 | 695.0 | 4,452.3 |
| Transfer of non-investment funds into investment | -138.8 | 138.8 | 0.0 |
| Subsidies from other SB chapters | 40.3 | 60.0 | 100.3 |
| Amended SB chapter of the CAS | 3,658.8 | 893.8 | 4,552.6 |
| of which Subsidies to PRIs of the CAS | 3,581.4 | 892.1 | |
| Head Office of the CAS | 77.4 | 1.7 | |
| Use of claims from unused expenses | 0.2 | 0.0 | 0.2 |
| of which Material costs of the Organisational body of the state | 0.2 | 0.0 | |
| Resources of the reserve fund of the CAS chapter | 0.3 | | 0.3 |
| Transfer to files of claims from unused expenses | -40.5 | -60.0 | -100.5 |
| Total resources from SB chapter of the CAS | 3,618.8 | 833.8 | 4,452.6 |
| Subsidies from other SB chapters (pursuant to Act No. 130/2002 Coll.) | 3,292.4 | 1,751.0 | 5,043.4 |
| of which GACR grants | 1,533.9 | 35.2 | |
| TACR projects | 210.4 | 0.0 | |
| Projects of other providers incl. OP | 1,548.1 | 1,715.8 | |
| Own resources of PRIs of the CAS | 3,964.2 | | 3,964.2 |
| of which Main activity orders | 190.9 | | |
| Sales of publications | 109.8 | | |
| Rent | 87.1 | | |
| Licences | 2,410.5 | | |
| Sales of goods and services | 139.8 | | |
| Conference fees | 19.4 | | |
| Interest, exchange-rate profits | 124.0 | | |
| Sales of material, securities | 175.5 | | |
| Foreign grants and donations | 352.0 | | |

| | | | |
|------------------------|-----------------|----------------|-----------------|
| Own fund resources | 171.0 | | |
| Other | 184.2 | | |
| Total resources | 10,875.4 | 2,584.8 | 13,460.2 |

As it is seen from the above data, in 2014 the CAS managed in total CZK 13,460.2 million of which CZK 4,452.6 million, representing 33% of total resources, came **from the SB chapter of the CAS.**

Pursuant to Act No. 130/2002 Coll., a total of CZK 5, 043.4 million was transferred directly to the institutes of the CAS **from other SB chapters**; this was by 17.4% more than in 2013. The sum includes the targeted support for projects in the amounts of CZK 1,569.1 million from GACR, CZK 210.4 million from TACR, and CZK 3,263.9 million from other providers (esp. MEYS, MIT, MH, MC). The total sum of the resources thus received represented 37.5% of the total CAS resources.

The total sum of CZK 3,964.2 million (year-on-year increase of 2.7%) raised by institutes of the CAS as their **own resources** consisted of CZK 3,762.2 million for CAS the research institutes and CZK 202 million for the Centre for Administration and Operations of the CAS (CAO). These financial means represented 29.5% of the overall resources of the CAS.

Of the total **non-investment resources** of the CAS 33.3% were the direct support from SB chapter of the CAS, 30.3% were transfers from other SB chapters, and 36.4% were the revenues and other extra-budgetary means. Compared to 2013, the percentage of non-investment resources acquired by transfers from other SB chapters increased by 10.7%. Of the total **investment resources** of the CAS 32.3% were the direct support from SB chapter of the CAS and 67.7% were transfers from other SB chapters.

Common expenditures of the CAS, intended particularly for international cooperation, membership fees to international scientific organisations, and for the subsidies to scientific societies associated in the Council of Scientific Societies of the Czech Republic were covered from the budget of the Head Office of the CAS.

From their total revenues, the research institutes of the CAS used CZK 10,798,321 thousand to cover their expenses of CZK 9,335,762 thousand and as to 31 December 2014 their total profit was CZK 1,462,559 thousand.

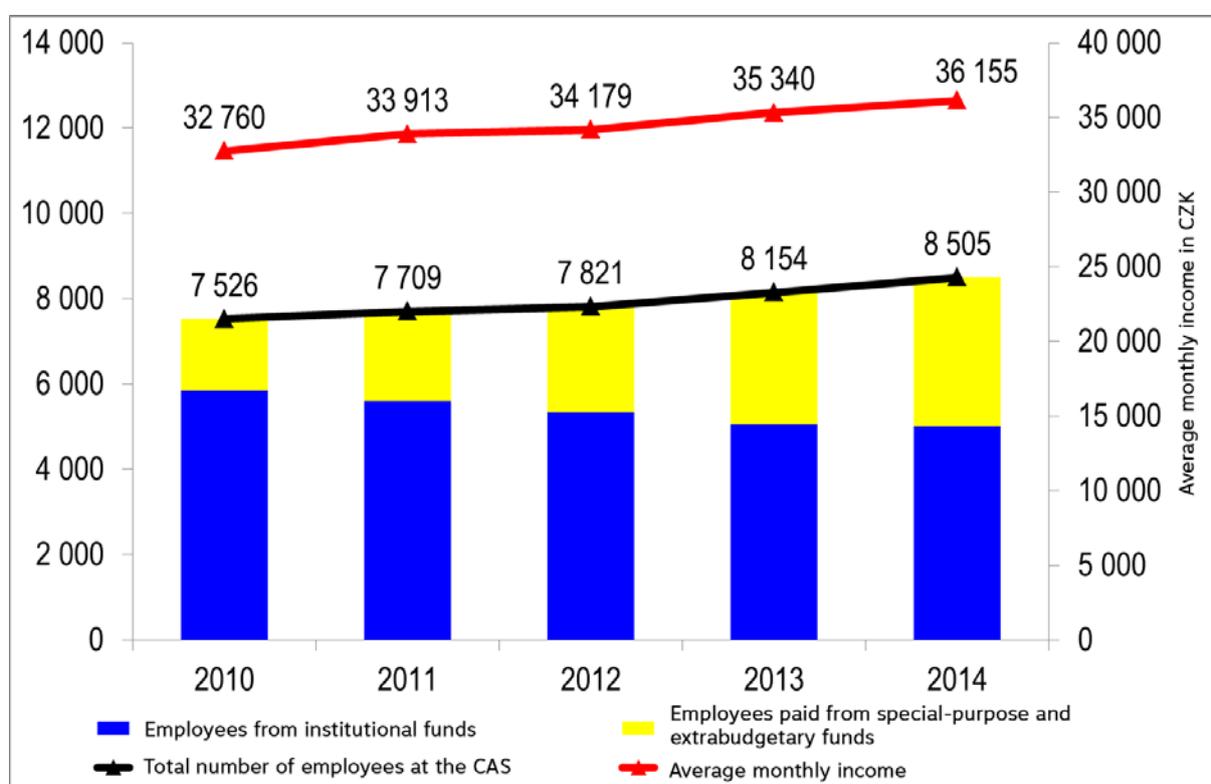
Compared to 2013, the total expenditures of CAS institutes increased by 2.3%. Year-on-year rise appeared in the expenditures for the purchase of material (by 2.3%), purchase of services (by 15.6%), travel costs (by 8.2%), and personnel costs (by 7.3%). Year-on-year decrease appeared in other costs (by 2.1%), in the purchase of energy, water and fuel (by 9.9%), and in repairs and maintenance (by 2.1%). The formation of the fund of targeted support decreased by 5.5% compared to the previous year.

EMPLOYMENT AND WAGES

The total number of employees of the CAS ¹ increased in 2014 from 8,154 to 8,505, of which 3,496 employees (which is 41.10% against 37.92% in 2013) were paid from extrabudgetary means. The number of university-educated employees of the research units who passed the attestation in accordance with the Career Rules increased from 4,679 to 4,935.

In total, the CAS spent CZK 3,690,115.003 thousand on salaries and wages, and CZK 157,286 thousand on other payments for work performed (OON). The total average monthly income at the CAS was CZK 36,155 with a year-on-year increase of 2.3% compared to 2013.

Graph 4: Number of employees and average earnings at the CAS in 2010–2014



A more detailed overview of the total number of employees of the CAS is given in Table 8.

Table 8: Number of employees of the CAS in 2010–2014

| YEAR | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------------------------------|-------|-------|-------|-------|-------|
| At the research institutes of the CAS | 7,466 | 7,645 | 7,752 | 8,080 | 8,432 |
| At the Head Office of the CAS | 60 | 64 | 70 | 74 | 73 |
| In total at the CAS | 7,526 | 7,709 | 7,821 | 8,154 | 8,505 |

¹ Given as an average number of employees expressed in Full Time Equivalent – FTE.

CONTROLS AND AUDITS

Controlling and auditing oversight of the CAS and its institutes is carried out by independent Audit Department, directly subordinate to the president of the CAS. The system of controls at the CAS reflected the requirements of executive bodies of the CAS as well as the the rules of public controls.

The Audit Department verifies whether the objectives of the CAS and its research institutes are executed in compliance with legal regulations, the Statutes of the CAS and other inner directives. It also controls whether the decisions of the bodies of the CAS concerning economic and property management are carried out.

The controlling activity is further specified by the Act on Financial Control and other regulations of public control; it ensures and carries out the duty to control the management of the financial means from the state budget that the CAS distributes as the administrator of the budget chapter for science and research.

Public controls are carried out according to the approved r plan. In the previous period, they focused first on the efficiency of the internal controlling system, on the correctness and evidential force of accounting, on examining the utilization of budgetary means and their filing and reporting, on property administration and management and on the observation of the Labour Code.

In 2014, nine planned audits of of the institutes of the CAS were carried out. The management of the CAS paid close attention to the efficiency of the internal controlling system. Individual protocols on the results of public administration control of state-budget funds management were submitted and debated at the sessions of the Academic Council. Moreover, four unscheduled audits were carried out, focussing on the implementation of the corrective measures adopted because of the conclusions of the investments control carried out by the Supreme Audit Office in 2013. The Academic Council discussed the results of the unscheduled audits and took note of the fact that the institutes carried out measures to remove the deficiencies and to create conditions to avert errors reported by the SAO; at the same time, the Academic Council acknowledged a gradual improvement.

Seven follow-up controls were carried out at the institutes of the CAS. Their objective was to verify the elimination of the shortcomings found by the control in 2013. No repeated flaws were found.

Other controls were carried out in seven research Societies to examine drawing on subsidies granted to ten projects.

The Audit Department also audits the accounts of EU framework programmes. The volume of the financial means controlled in the year 2014 was CZK 89,416 thousand.

APPENDICES

1.1 Summary of publications

1.2 Summary of publications by research areas

3.2 Selected international projects

8.2 Number of institutes and employees of the CAS by sections

9. Annual report of the learned society of the Czech Republic for 2014

10. Activities of the Council of scientific societies of the CR and the associated scientific societies

12. List of acronyms

APPENDIX 1.1: Aggregate summary of publications

| Publication type | Publication results | | | |
|--|---------------------|-----------------|----------------------|-----------------|
| | Year of issue 2013 | | Year of issue 2014*) | |
| | Czech | Other languages | Czech | Other languages |
| Books | 189 | 79 | 195 | 60 |
| Chapters in books | 416 | 391 | 412 | 311 |
| Articles in scientific journals | 1,001 | 4,296 | 876 | 4,284 |
| Conference proceedings | 18 | 25 | 15 | 23 |
| Papers in anthologies | 318 | 1,260 | 262 | 1,218 |
| Translations | 30 | | 25 | |
| Reviews | 319 | | 272 | |
| Specialised articles in the daily press | 170 | | 175 | |
| Research reports | 494 | | 394 | |

*) The data for 2014 are incomplete, because the publications with the year of issue are also published during the following year.

Note: The aggregate data for the CAS are not sums of the data by research areas because researchers from more than one research area can participate in a single publication .

APPENDIX 1.2: PUBLICATION RESULTS BY RESEARCH AREAS

| Publication type | 1st–3rd Section | | | | 4th–6th Section | | | | 7th–9th Section | | | |
|--------------------------------|--------------------|-------------|----------------------|--------------|--------------------|-------------|----------------------|-------------|--------------------|-------------|----------------------|-------------|
| | Year of issue 2013 | | Year of issue 2014*) | | Year of issue 2013 | | Year of issue 2014*) | | Year of issue 2013 | | Year of issue 2014*) | |
| | Czech | Other lang. | Czech | Other lang.. | Czech | Other lang. | Czech | Other lang. | Czech | Other lang. | Czech | Other lang. |
| Books | 19 | 18 | 16 | 7 | 16 | 16 | 7 | 10 | 155 | 44 | 171 | 42 |
| Chapters in books | 7 | 68 | 10 | 52 | 22 | 110 | 8 | 93 | 387 | 212 | 395 | 169 |
| Articles in scientific | 139 | 1 779 | 88 | 1 791 | 140 | 2 310 | 175 | 2 262 | 729 | 248 | 614 | 270 |
| Conference proceedings | 6 | 13 | 3 | 12 | 2 | 8 | 4 | 6 | 10 | 4 | 8 | 5 |
| Papers in anthologies | 103 | 880 | 94 | 811 | 87 | 296 | 59 | 343 | 129 | 92 | 110 | 81 |
| Translations | 0 | | 1 | | 0 | | 1 | | 30 | | 24 | |
| Reviews | 1 | | 0 | | 4 | | 1 | | 314 | | 271 | |
| Specialised articles in | 40 | | 39 | | 53 | | 46 | | 77 | | 90 | |
| Research reports | 159 | | 121 | | 55 | | 64 | | 235 | | 172 | |

*) The data for 2014 are incomplete, because the publications with the year of issue are also published during the following year.

APPENDIX 3.2: SELECTED INTERNATIONAL PROJECTS

The researchers of the CAS institutes were actively involved in international projects. . They participated in the projects of EU Framework Programmes as well as in projects of other programmes of international cooperation. The participation in international projects significantly contributed to the exchange of knowledge, experience and expertise, and was important for the intensification of relations between the CAS and the leading research institutions abroad.

PROJECTS OF THE 7th FRAMEWORK PROGRAMME OF THE EU

Projects of Research Cooperative Programme (CP)

- **Probing Strong Gravity by Black Holes Across the Range of Masses**

Coordinator: *Astronomical Institute*

Participants: six institutions from six European countries

- **Accelerated development and prototyping of nano-technology-based high-efficiency thin-film silicon solar modules**

Coordinator: Forschungszentrum Jülich, SRN

Participants: *Institute of Physics* and other 23 institutions from seven European countries

- **Novel Biocatalysts for the Production of Glycosides**

Coordinator: Ghent University, Belgium

Participants: *Institute of Microbiology* and other four institutions from four European countries

- **Anti-tick Vaccines to Prevent Tick-borne Diseases in Europe**

Coordinator: University of Amsterdam, Netherlands

Participants: *Biology Centre* and other five institutions from five European countries

- **Systems biology of Mycobacterium tuberculosis**

Coordinator: The Centre for Genomic Regulation, Spain

Participants: *Institute of Organic Chemistry and Biochemistry* and other 12 institutions from nine European countries

- **Responsible Research and Innovation in a Distributed Anticipatory Governance Frame. A Constructive Socio-normative Approach**

Coordinator: Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung, Germany

Participants: *Institute of Philosophy* and other seven institutions from six European countries

- **Socio-economics Meets Security**

Coordinator: Università degli Studi di Trento, Italy

Participants: *Institute of Sociology* and other 10 institutions from six European countries

Marie Curie Actions – support for training courses and career development (MCA)

- **Glass and Ceramic Composites for High Technology Applications**

Coordinator: Politecnico di Torino, Italy

Participants: Institute of Physics of Materials and other seven institutions from four European countries

Coordinating and supporting activities (CSA)

- **Monitoring Public Opinion on Nanotechnology in Europe**

Coordinator: ZSI Wien, Austria

Participants: *Institute of Philosophy* and other 17 institutions from 11 European countries

Supporting research infrastructures (CP-CSA-INFRA)

- **Development of mouse mutant resources for functional analyses of human diseases – Enhancing the translation of research into innovation**

Coordinator: Helmholtz Zentrum München Deutsches Forschungszentrum für Gesundheit und Umwelt, Germany

Participants: *Institute of Molecular Genetics* and other 24 institutions from 13 European countries

- **ARIADNE – Advanced Research Infrastructure for Archaeological Dataset Networking in Europe**

Coordinator: University of Florence, Italy

Participants: *Institute of Archaeology, Prague* and other 22 institutions from 15 European countries

PROJECTS UNDER HORIZON 2020 FRAMEWORK PROGRAMME

Euratom

- **Implementation of activities described in the Roadmap to Fusion during Horizon 2020 through a Joint programme of the members of the EUROfusion consortium**

Coordinator: Max-Planck-Institut für Plasmaphysik, Germany

Participants: *Institute of Plasma Physics* and other 29 institutions from 27 European countries

NETWORK COOPERATION UNDER COST (COOPERATION IN SCIENCE AND TECHNOLOGY)

- **Weather intelligence for renewable energies**

Coordinator: Meteotest, Switzerland

Participants: *Institute of Information Theory and Automation, Institute of Atmospheric Physics* and other 45 institutions from 26 European countries

- **Assessment, Reinforcement and Monitoring of Timber Structures**

Coordinator: University College London, Great Britain

Participants: *Institute of Theoretical and Applied Mechanics*, and other 40 institutions from 23 European countries

- **Individuals, Societies, Cultures and Health (ISCH) – New Communities of Interpretation: Contexts, Strategies and Processes of Religious Transformation in Late Medieval and Early Modern Europe**

Coordinator: University of Groningen, Netherlands

Participants: *Institute of Philosophy*, and other 22 institutions from 22 European countries

- **Medieval Europe – Medieval Culture and Technological Resources – The Dictionary of Medieval Latin in Czech Lands – Latinitatis medii aevi lexicon Bohemorum**

Coordinator: International Society for the Study of the Latin Middle Ages, Italy

Participants: *Institute of Philosophy*, and other 38 institutions from 23 European countries

- **Reassembling the Republic of Letters, 1500–1800. A digital framework for multi-lateral collaboration on Europe's intellectual history**

Coordinator: University of Oxford, Great Britain

Participants: *Library of the CAS*, *Institute of Philosophy* and other 48 institutions from 28 European countries

- **Evolution of Reading in the Age of Digitisation**

Coordinator: University of Stavanger, Norway

Participants: *Institute of Czech Literature* and other 54 institutions from 31 European countries

PROGRAMMES OF INTERNATIONAL COOPERATION OF MEYS

- **Czech participation at the Pierre Auger Observatory**

Programme: INGO II
Coordinator: *Institute of Physics*

- **Fibre Optic Gas Sensing**

Programme: EUREKA CZ
Coordinator: SQS VláknoVá optika, a.s
Participants: *Institute of Photonics and Electronics*, Forschungsinstitut für Mikrosensorik und Photovoltaik (Germany) a Gooch & Housego (Great Britain)

- **Optical control of micro-droplets by shaped laser beams**

Programme: COST CZ
Coordinator: *Institute of Scientific Instruments*

- **The electrochemical gating of individual and bundled Single Walled Carbon Nanotubes**

Programme: KONTAKT
Coordinator: *J. Heyrovsky Institute of Physical Chemistry*
Participants: Massachusetts Institute of Technology, USA

- **Ultra low-fouling polymers for biomedical applications synthesized by living radical polymerization**

Programme: KONTAKT II
Coordinator: *Institute of Macromolecular Chemistry*
Participants: University of Pennsylvania, USA

- **Evolution of sexual ornaments and their information content: a comparative study in isolated populations with divergent signal traits and preferences**

Programme: KONTAKT II
Coordinator: *Institute of Vertebrate Biology*
Participants: University of Colorado, USA

- **Study of immediate changes after epileptic seizures elicited at different stages of postnatal development**

Programme: KONTAKT II
Coordinator: *Institute of Physiology*
Participants: University of California, Los Angeles, USA

- **Collaboration with Bioversity International on global analysis and conservation of genetic diversity of bananas**

Programme: INGO II
Coordinator: *Institute of Experimental Botany*

- **Permeation of condensable gases through asymmetric membranes**

Programme: MOBILITY
Coordinator: *Institute of Chemical Process Fundamentals*
Participants: Technische Universität Wien, Austria

- **Structure and function of proteins for biotechnologies and drug design**

Programme: INGO II
Coordinator: *Institute of Biotechnology*

OTHER SELECTED PROJECTS OF COOPERATION

- **Solar Orbiter – instrument STIX**

Umbrella organisation: European Space Agency (ESA)
Programme: PRODEX
Coordinator: *Astronomical Institute*
Participants: seven institutions from seven countries in the world

- **Biomaterials and stem cells in the treatment of stroke and spinal cord injury**

Programme: Czech-Norwegian Research Programme
Coordinator: *Institute of Experimental Medicine*
Participants: Norwegian University of Science and Technology, Norway

- **Comparative study of Huntington's disease using biochemical, immunocytochemical and molecular genetic methods on the mouse, minipig and human tissues and cells**

Programme: Czech-Norwegian Research Programme
Coordinator: *Institute of Animal Physiology and Genetics*

Participants: Oslo University Hospital, Norway and Charles University in Prague

- **Pilot Network for the Identification of Travelling Ionospheric Disturbances**

Umbrella organization: NATO

Programme: Science for Peace and Security Programme

Coordinator: The National Observatory of Athens, Greece

Participants: *Institute of Inorganic Chemistry* and other seven institutions from nine countries in the world

- **Chromatin structure modification and DNA repair pathways inhibition as tools to therapeutically increase or decrease cell survival upon the action of ionizing radiation of different quality**

Grant of the Government Plenipotentiary of the CR

Participants: *Institute of Biophysics* and JINDR Dubna, Russia

- **Corpus of Roman findings in Barbaricum - Corpus of Roman findings on the territory of Moravia**

Umbrella organization: Roman-Germanic Commission Frankfurt am. M., Germany

Coordinator: Roman-Germanic Commission Frankfurt am. M., Germany

Participants: *Institute of Archaeology, Brno* and other 20 institutions from 16 countries in Europe

- **RILM – International Repertory of Music Literature**

Umbrella organization: RILM – The International Center, USA

Coordinator: RILM – The International Center, USA

Participants: *Institute of Ethnology* and other institutions from 48 countries in the world

- **PALATIUM – Court Residences as Places of Exchange in Late Medieval and Early Modern Europe (1400–1700)**

Umbrella organization: ESF

Participants: *Institute of Art History* and other 13 institutions from 11 countries in Europe

- **Survey of Health, Ageing and Retirement in Europe**

Distributed research infrastructure of European Strategy Forum for Research Infrastructures

Participants: *Economics Institute* and other 19 institutions from 17 countries in the world

- **ADAPT2DC – Adaptation to Demographic Change**

Financed from Operational Programme National Cooperation – Central Europe
Coordinator: Thuringian Ministry of Building, Regional Development and Infrastructure, Germany

Participants: *Institute of Sociology* and other eight institutions from six countries in Europe

- **Europeana Awareness**

Financed from the Competitiveness and Innovation Framework Programme (CIP)

Coordinator: Stichting Europeana, Netherlands

Participants: *Institute of Contemporary History* and other 46 institutions from 30 countries in Europe

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

Coordinator: *Institute of Slavonic Studies*

Participants: five institutions from four countries in Europe

- **Linguistic Atlas of Europe**

Umbrella organization: UNESCO

Coordinator: Romanian Academy of Sciences

Participants: *Institute of the Czech Language* and other 60 institutions from 40 countries in Europe

PŘÍLOHA 8.2: NUMBER OF INSTITUTES AND EMPLOYEES OF BY SECTIONS

| | Number of institutes in 2014 | Average FTE of employees in 2013 | | | | Average FTE of employees in 2014 | | | |
|--|------------------------------|----------------------------------|----------|---|------|----------------------------------|----------|---|------|
| | | Total | | of whom university educated employees of research units | | Total | | of whom university educated employees of research units | |
| | | Number | % | Number | % | Number | % | Number | % |
| 1. Section of Mathematics, Physics and Information Science | 6 | 1 433.5 | 17.6 | 807.1 | 17.2 | 1 544.5 | 18. 2 | 871.2 | 17.7 |
| 2. Section of Applied Physics | 7 | 862. 9 | 10. 6 | 499.5 | 10.7 | 892.6 | 10. 5 | 527.5 | 10.7 |
| 3. Section of Earth Sciences | 5 | 443. 8 | 5.4 | 283.5 | 6.1 | 443.8 | 5.2 | 287.6 | 5.8 |
| 4. Section of Chemical Sciences | 6 | 1 146.6 | 14.1 | 775.7 | 16.6 | 1 190.2 | 14. 0 | 819.2 | 16.6 |
| 5. Section of Biological and Medical Sciences | 8 | 1 808.4 | 22. 2 | 1 146.6 | 24.5 | 1 904.4 | 22. 4 | 1 211.4 | 24.5 |
| 6. Section of Biological- Ecological Sciences | 4 | 969. 5 | 11.9 | 511.2 | 10.9 | 1 020.2 | 12. 0 | 548.2 | 11.1 |
| 7. Section of Social-Economic | 5 | 307, 6 | 3.8 | 130.2 | 2.8 | 308.6 | 3.6 | 131.4 | 2.7 |

| | | | | | | | | | |
|---|-----------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| Sciences | | | | | | | | | |
| 8. Section of Historical Sciences | 6 | 378. 7 | 4.6 | 204.2 | 4.4 | 384.3 | 4.5 | 208.2 | 4.2 |
| 9. Section of the Humanities and Philological Sciences | 6 | 450. 2 | 5.5 | 320.6 | 6.8 | 460.7 | 5.4 | 330.5 | 6.7 |
| CAO | 1 | 279. 6 | 3.4 | 0.0 | 0.0 | 282.5 | 3.3 | 0.0 | 0.0 |
| Head Office | 1 | 73.6 | 0.9 | 0.0 | 0.0 | 73.4 | 0.9 | 0.0 | 0.0 |
| Total | 55 | 8 54.4 | 10 0.0 | 4 678.6 | 100. 0 | 8 505.2 | 10 0.0 | 4 935.2 | 100. 0 |

APPENDIX 9: ANNUAL REPORT OF THE LEARNED SOCIETY OF THE CZECH REPUBLIC FOR 2014

The Learned Society of the Czech Republic (hereafter ‘Society’) associates eminent scientists of all research areas. Membership in the Society is possible in two ways: regular and honorary. Membership is bestowed upon individuals of a high moral integrity in recognition for their significant and creative contribution to science. Prominent domestic scientific figures from universities and other higher education institutions, the CAS or departmental institutions may be elected regular members of the Society. Honorary members are elected from among the eminent foreign researchers who have exceptional ties to Czech scientific community. The aim of the Society is to stimulate the free and unimpeded cultivation of science in all of its forms, to encourage the desire for and enjoyment from knowledge, to spread scientific knowledge in society, to motivate the advancement in education and to endorse creative, rational and humanly responsible social environment in the Czech Republic

From the beginning of the year 2014 until 20 May 2014, the Society was governed by an eight-member Council comprising Petr Pokorný (President), Jiří Bičák (1st Vice-president), Václav Pačes (2nd Vice-president), Zdeněk Havlas (Scientific Secretary), Tomáš Jungwirth (Chairman of the Section of Mathematical-Physical Sciences), Pavel Jungwirth (Chairman of the Section of Chemical Sciences), Helena Tlaskalová (Chairman of the Section of Biological-Medical Sciences), Jan Bouzek (Chairman of the Section of Social Sciences and the Humanities). During the working session of the XXth General Assembly on 20 May 2014, election was held to the Council. The contemporary Council comprises Jiří Bičák (President), Zdeněk Havlas (1st Vice-president), Petr Pokorný (2nd Vice-president), Zdeněk Jiráček (Scientific Secretary), Jaroslav Smítal (Chairman of the Section of Mathematical-Physical Sciences), Karel Procházka (Chairman of the Section of Chemical Sciences), Helena Tlaskalová (Chairman of the Section of Biological-Medical Sciences), Jaroslav Pánek (Chairman of the Section of Social Sciences and the Humanities).

At the end of the year 2014, the Society had 103 regular and 41 honorary members.

The Society returned to its original seat damaged by a gas explosion in 2013 and now repaired. The Society performed lectures on current issues of science, education, etc., including specialised lectures and profiles at plenary sessions, public lectures on topical issues, and the lectures at the XXth General Assembly and discussion sessions. The Society held eight working meetings and organised a three-day excursion for its members to the region of Broumov. The Society had its narrative history recorded and preserved in the form of interviews and memoirs narrated by some of the members of the Society. An important source of information both on the activities of the Society and on its members is the Society’s website (<http://www.learned.cz>). Among other information, lectures or lecture presentations can be found there. In May, the Society organised the XXth General Assembly at the Karolinum in Prague, with a lecture by Ján Vilček and a series of lectures by the members of the Society called “Great-power status – the activator and the risk for historical development” (Velmocenské postavení jako hybatel a jako riziko dějinného vývoje). Prestigious awards and medals bestowed by the Society are financially managed by the

Endowment Fund for the Support of Science chaired by Jiří Krajíček. In 2014, the Certificate of merit for outstanding work in popularization of science was bestowed for the first time; the recipient was the radio programme Meteor.

prizes, medals and certificates of merit

In the category of “Young Researcher under the age of 40”

Vojtěch Hladký

Faculty of Science, Charles University, Prague

For the monograph Gemistos Plethón and other publications

Jana Roithová

Faculty of Science, Charles University, Prague

For innovative study of chemical reactions by means of mass spectrometry

In the category of ‘Secondary school student’

Prizes were awarded to 18 students

Award for Pedagogues was received by

Jiří Růžička

Gymnázium Jana Keplera, Prague

Medals were awarded to members of the Learned Society **Robert Kvaček** (Faculty of Arts, Charles University in Prague) and **Jan Svoboda** (Institute of Molecular Genetics).

Certificates of merit for outstanding work in popularization of science in the radio programme Meteor were given to:

Jindřiška Jarošová

Josef Kleibl

Oldřich Unger

Marek Janáč

Ivo Budil in memoriam

Bohumil Kolář in memoriam

Prague, 5 February 2015

Prof. RNDr. Jiří Bičák, DrSc.

President of the Learned Society of the Czech Republic

APPENDIX 10: ACTIVITIES OF THE COUNCIL OF SCIENTIFIC SOCIETIES OF THE CR IN 2014

The Council of Scientific Societies of the Czech Republic (CSS CR) is an independent, not-for-profit, voluntary association of scientific societies active in the Czech Republic. The CSS CR was constituted with the aim to advocate the interests of its member societies, to evaluate their projects and to support them financially. In the year 2014, the CSS CR included 75 scientific societies comprising over 25,000 members. At the plenary session in autumn 2014, two new societies received membership: *Church Law Society* and *Czech Society of Criminology*.

Most of the societies included in the CSS CR (hereinafter Societies) have a wide professional background in their members including the interested non-professionals (this is especially true for the Societies of natural sciences) and a wide range of activities from research to popularizing. The CSS CR, however, does not close off even strictly selective societies associating narrowly specialized experts. Even such societies often direct their activities to education and popularization. Generally spoken, the societies associated in the CSS CR constantly fulfil the function of unifying platforms for the individual fields of science. In most of the branches, the Societies connect the specialists from universities and other institutions of higher education, the Academy of Sciences, line research institutes and students at all levels of education. The Council of Scientific Societies CR is interdisciplinary in its character and some of the branches of science of the comprised Societies are not even represented in academic or other scientific institutions. A number of the Societies appear to be the only connecting line between the experts and international scientific organizations. Some of the Societies publish international impacted journals.

The activity of scientific societies can be divided into the following categories:

Publishing probably has the longest-lasting effect. Numerous Societies have been publishing national and international journals for decades with a wide impact on the scholarly community. Practically all Societies publish expert and information bulletins for their members. In 2014, there were 31 internationally significant journals and 79 national journals and newsletters published by the societies. The following examples name the most important periodicals:

- **International impacted periodicals.** The Societies issue five international impacted periodicals: *Preslia* (Czech Botanical Society, IF 2,82; *Fottea* (Czech Society of Allergology, 1,6); *Journal of Geosciences* (Czech Geological Society, 0,8); *Geografie* (Czech Geographical Society, 0,4); *Chemické listy* (Czech Chemical Society, 0,15). These journals are symbols of the Societies as well as the CSS CR and provide publishing platform for researchers of the CAS and other institutions.
- **Periodicals published in English without the IF.** *Czech Mycology* (Czech Scientific Society for Mycology.), *Acta Societatis Zoologicae Bohemicae* (Czech Zoological Society), *Materials Structure* (Czech and Slovak Crystallographic Association),
- **Czech national periodicals.** Almost half of the Societies across all fields publish national specialized periodicals. Among others we can name *Pedagogická orientace* (Czech Pedagogical Society), *Česká antropologie* (Czech Anthropological Society), *Klapalekiana* (Czech Entomological Society), *Sylvia* (Czech Society for

Ornithology), Časopis Matice moravské (Moravian Foundation), Pokroky matematiky, fyziky a astronomie (Union of Czech Mathematicians and Physicists).

- **Books and almanachs.** They create another significant platform for publication. There were 83 such publications issued last year. As an example, we want to mention the publication called “120 let české geografie from the branch of historical geography” (120 Years of Czech Geography)

Scientific and organizational activities. These activities include the organization of symposia, conferences and other meetings. Last year saw 100 international conferences where a scientific Society acted as the main organizer, 35 conferences where a scientific society acted as a co-organizer. There were also 75 Czech & Slovak, and 125 national expert and scientific meetings.

- International conferences and congresses are mostly held in English. Among larger events organized by a society and attended by several hundred to a thousand of participants belong *the 11th International conference on “Indoor Air Quality in Heritage and Historic Environments”* (Czech Aerosol Society); *4th Central European Mineralogical Conference 2014* (Czech Geological Society); *16th Biennial Meeting of the European Society for Immunodeficiencies* (Czech Immunological Society); *14th Annual Conference of European Society of Criminology* (Czech Society of Criminology); *EMS & ECAC 2014: Creating climate services through partnerships* (Czech Meteorological Society); *17th Radiochemical Conference* (Česká chemická společnost); *International Microscopy Congress 2014 Prague* (Czechoslovak Microscopy Society).
- International conferences, which are often organized for European and world institutions, are mostly distinguished and unique events, therefore, to be an organizer is a task of honour for the society. Czech and Czechoslovak conferences usually have the annual character. They may be thematic, but they have a closer connection to scientific practice. Among others, we can name the following conferences: *The Mendel and Bioclimatology International Conference* (Czech Bioclimatological Society); *Pedagogický výzkum: Spojnice mezi teorií a praxí (Educational Research: a connection between theory and practice)*, Czech Association of Pedagogical Research); *XXIVth Biochemistry Symposium* (Czech Society for Biochemistry and Molecular Biology); *Metodologické problémy identifikace a interpretace sociálních deviací (Methodological problems of identification and interpretation of social deviation)*, Czech Sociological Association).

Events for school of all types

Societies actively endorsed education at basic and secondary schools as well as at universities and other institutions of higher education. The Societies were involved in 290 events such as olympiads in mathematics, chemistry, biology or astronomy, in specialized field courses for the students at secondary schools or other schools of higher education, workshops for doctoral students, courses under doctoral study programmes and also in various competitions. Moreover, Societies participated in creating textbooks, teaching materials and even rules of law. The limited space of this chapter does not allow examples of these extensive activities. For their extraordinary

activeness, however, we want to name Czech Astronomical Society and the Union of Czech Mathematicians and Physicists.

Lecturing, exhibitions and popularization

Lecturing, popularizing and other, often interdisciplinary, activities play a pivotal role in the lives of all the Societies. In the year 2014, in addition to the above-mentioned events, the Societies organized 626 lectures, excursions or seminars, and over 100 media coverages broadcasts stimulating the interest of the general public, particularly students, in scientific work and promoting the application of new findings. Some of the events, often non-periodic ones, may seem minor, but they have the power of raising the Societies' profile among the educated general public outside expert community. This proves the irreplaceable role of the societies of the CSS CR in popularization of science.

Other activities

- The societies within the CSS CR bestowed 50 awards to distinguished scientists of various research branches and to promising young researchers for their excellent work.
- The Societies and their members participate in the activities of 129 international organizations. Thirty-three Societies are financially supported by the CAS . A number of representatives of the Societies are at the same time members of the management of the associations. In this way, they represent scientific community in the CR at the highest level.
- An important part of the work of the Societies is the maintenance of their web pages. The majority of the Societies ensure the administration of their webs thus making important information available to the visitors interested in the research and to the media.
- In 2014, the CSS CR considered and in the opposition procedure approved in total 90 applications for a subsidy from the CAS for the projects of the scientific Societies.

Secretariat is an integral part of the CSS CR. The office is placed in the main building of the CAS . The Secretariat administers the database of the CSS including annual reports (see <http://rvs.paleontologie.cz>), and the database of CEDR projects. The Secretariat also prepares basic documents for the meetings of the Council and plenary sessions of the CSS CR. The Secretariat cooperates in organizing annual conferences and lectures of some of the Societies. In 2014, the Secretariat organized a specialized workshop for scientific Societies focused on the new Civil Code.

The plenary session of the CSS CR held on 24 November 2014 elected the new Executive Council and the Chairman of the CSS CR for the period 2015–2018 in the following membership: Lubomír Hrouda – president, Jiří Buriánek – vice president for humanities, Jaroslav Spížek – vice president for Life Sciences, Ivan Bičík – vice president for Mathematics, Physics and Earth Sciences, Jana Albrechtová, Jan Farkač, Petr Budil, Jiří Dolejší, Ivo Pospíšil, Jana Procházková.

The rich activity of the CSS CR is possible by the active attitudes of thousands of its Societies' members but also by the responsive and helpful attitude of the CAS CR, whose budget chapter is used to finance the Council. The details concerning the activities of the CSS CR are available at <http://rvs.paleontologie.cz>.

Doc. RNDr. Lubomír Hrouda, CSc.

President of the CSS CR

LIST OF ACRONYMS

Acronym Name of the Institute (or Section for S1–S9)

S1 Section of Mathematics, Physics and Information Science

| | |
|------|---|
| ASÚ | Astronomical Institute of |
| FZÚ | Institute of Physics of |
| MÚ | Institute of Mathematics of |
| ÚI | Institute of Computer Science of |
| ÚJF | Nuclear Physics Institute of |
| ÚTIA | Institute of Information Theory and Automation of |

S2 Section of Applied Physics

| | |
|------|--|
| ÚFE | Institute of Photonics and Electronics |
| ÚFM | Institute of Physics of Materials |
| ÚFP | Institute of Plasma Physics |
| ÚH | Institute of Hydrodynamics |
| ÚPT | Institute of Scientific Instruments |
| ÚTAM | Institute of Theoretical and Applied Mechanics |
| ÚT | Institute of Thermomechanics CA |

S3 Section of Earth Sciences

| | |
|------|---|
| GFÚ | Institute of Geophysics CA |
| GLÚ | Institute of Geology |
| ÚFA | Institute of Atmospheric Physics |
| ÚGN | Institute of Geonics |
| ÚSMH | Institute of Rock Science and Mechanics |

S4 Section of Chemical Science

| | |
|---------|---|
| ÚIACH | Institute of Analytic Chemistry |
| ÚACH | Institute of Inorganic Chemistry |
| ÚFCH JH | J. Heyrovský Institute of Physical Chemistry |
| ÚCHP | Institute of the Fundamentals of Chemical Processes |
| ÚMCH | Institute of Macromolecular Chemistry |
| ÚOCHB | Institute of Organic Chemistry and Biochemistry |

S5 Section of Biological and Medical Sciences

| | |
|-----|----------------------------------|
| BFÚ | Institute of Biophysics |
| BTÚ | Institute of Biotechnology |
| FGÚ | Institute of Physiology |
| MBÚ | Institute of Microbiology. |
| ÚEB | Institute of Experimental Botany |

ÚEM Institute of Experimental Medicine
ÚMG Institute of Molecular Genetics
ÚŽFG Institute of Animal Physiology and Genetics

S6 Section of Biological-Ecological Sciences

BC Biology Centre
BÚ Institute of Botany
CVGZ Global Change Research Centre
ÚBO Institute of Vertebrate Biology

S7 Section of Social-Economic Science

KNAV Library
NHÚ Economics Institute
PSÚ Institute of Psychology
SOÚ Institute of Sociology
ÚSP Institute of State and Law

S8 Section of Historical Science

ARÚB Institute of Archaeology
ARÚ Institute of Archaeology
HÚ Institute of History
MÚA Masaryk Institute and Archive
ÚDU Institute of Art History
ÚSD Institute for Contemporary History

S9 Section of the Humanities and Philological Sciences

EÚ Institute of Ethnology
FLÚ Institute of Philosophy
OÚ Oriental Institute
SLÚ Institute of Slavonic Studies
ÚČL Institute for Czech Literature
ÚJČ Institute of the Czech Language

Other institutions

SSČ CAO, Centre for Administration and Operations
CTU Czech Technical University in Prague
EU European Union
GACR Grant Agency
KAV Head Office of the ASC
MC Ministry of Culture
MEYS Ministry of Education, Youth and Sports
MIT Ministry of Industry and Trade CR
MH Ministry of Health CR
SAO Supreme Audit Office
OP Operational programme

| | |
|----------|--|
| TACR | Technology Agency of the Czech Republic |
| R&D | Research and development |
| R&DfI | Research and development for innovations |
| UK | Charles University in Prague |
| v. v. i. | PRI (Public Research Institution) |