SLOVAK ACADEMY OF SCIENCES
ANNUAL REPORT
2023

PART 1

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In compliance with § 9 Section 5 c) thereof, the Scientific Council of Slovak Academy of Sciences endorsed the Annual Report
on 29. 5. 2024.
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Photos and images of the selected research results by SAS research institutes and the Department of Communication and Media of the Office of Slovak Academy of Sciences.

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FOREWORD BY THE SAS PRESIDENT

In 2023, the Slovak Academy of Sciences commemorated the 70th anniversary of its founding with a series of events celebrating the popularization of science and technology and science in general. SAS was born in difficult times. It was five years after the communists took power in Czechoslovakia and a few months after the death of the dictator Joseph Vissarionovich Stalin. The period of its establishment was tumultuous. The atmosphere of the times past also affected the composition and organizational structure of the SAS, which copied the structure and focus of the Academy of Sciences of the Soviet Union. Even today, we sometimes observe opinions that the SAS is just a relic of this time. However, it is a great paradox of history that even in the conditions and environment of ideological manipulation, beneficial institutions and significant scientific results in the entire spectrum of scientific disciplines were created on its premises. The SAS´ story shows that it was and remains a platform that, despite the external circumstances of its foundation and several political pressures at various stages of its 70-year development, enables and supports free scientific thinking.

I believe that ideological opinions and manipulation are a thing of the past for good, and I am convinced that, today, SAS is a modern scientific institution, actively contributing to the development of a quality European research area (ERA). SAS has research teams that can be ranked among the best in Europe. Direct evidence of this statement is also the recently completed evaluation of SAS institutes by an international panel of experts. The panel concluded that the Polymer Institute SAS belongs to the leaders within ERA as a whole, and

the other six SAS institutes are ranked among the top by many researches. These institutes include: Institute of Electrical Engineering SAS, Institute of Materials and Machine Mechanics SAS, Biomedical Research Center SAS, Institute of Zoology SAS, Institute for Research in Social Communication SAS and the Institute of Ethnology and Social Anthropology SAS. Multifaceted evaluations of SAS institutes by independent international panels are proving to be the right way to improve the quality of scientific outputs. The establishment of international independent advisory boards for consultations on the direction of individual institutes, the management of scientific policy, and the introduction of research topics that are at the frontier of knowledge is an extremely useful tool that helped/helps individual institutes establish themselves adequately within ERA.

SAS is not only a desirable place for university graduates from Slovakia, but it openly invites foreign scientists. SAS currently manages 2 projects giving opportunities to the international community of scientists to participate in research at SAS. These are the SASPRO 2 programmes (in cooperation with Comenius University and the Slovak University of Technology in Bratislava) and the IMPULZ programme. The goal of these programmes is to attract excellent scientists with experience from foreign top institutes to the SAS. More than 20% of foreign PhD students from the total number of PhD students are currently being trained at SAS. The internationalization of SAS research teams also creates healthy competition between individuals and teams, which leads to research excellence.

After seventy years, we can claim that SAS today has its respected place in the structure of relevant institutions of our society. The general public also appreciates the input of SAS experts on problematic topics. It was no different during the recent pandemic. However, for SAS employees, it is both a challenge and an obligation that SAS has for a long time been ranked as the most credible institution in the Slovak Republic.

Science has always sought and will seek (since it is in its genetic code) relevant answers to the burning questions of the time. The exceptional scientists are those of us who have the gift of non-standard thinking, perseverance, the ability to see things from other angles, and the gift of leaving a dead end. They work in adverse conditions, but they need a pleasant environment. I believe that the Slovak Academy of Sciences succeeds and will succeed in providing such an environment - with technical infrastructure, organizational background, but mainly with the scientifically inspiring internal atmosphere of its research teams, centres and institutes.

Prof. RNDr. Pavol Šajgalík, DrSc., Dr. h. c.
SAS President

1 SAS SCIENCE POLICY AND SUPPORT OF RESEARCH PROJECTS

1.1 Implementation of recommendations of the accreditation evaluation Metapanel and other measures to support excellent research

At the beginning of 2023, the regular evaluation of SAS institutes for the period 2016 – 2021, which took place during the year 2022, was completed. The SAS Annual Report 2022 informs about it in more detail. The international evaluation was performed by foreign panels and affected all aspects of science and research of the evaluated institutes in the categories of quality and productivity, social importance, strategy and development potential. The particular evaluation in these three areas, as well as the overall evaluation, included seven "categories" A, A/B, B, B/C, C, C/D, D. Category A meant international excellence, category B meant European level, category C meant research with solid foundations and results and category D meant scientific or technical deficiencies. Intermediate categories meant that part of the research belonged to a higher and part to a lower category. The evaluation included evaluation protocols, which verbally described the strengths and weaknesses of individual categories and categories in general. Institutes had the opportunity to appeal against the evaluation, whereas in this proceeding the panel's word was again decisive and the SAS did not in any way interfere with its autonomy. In 2023, the panels assessed 11 appeals, but there was a change in only a single partial evaluation category for a single institute and also several clarifications in the verbal evaluation of several institutes. The Presidium of SAS thus confirmed the decision of the panels. Polymer Institute SAS was the only institute to receive an overall A rating, A/B ratings were received by the Institute of Electrical Engineering SAS, Institute of Materials and Machine Mechanics SAS, Institute of Zoology SAS, Biomedical Research Center SAS, Institute for Research in Social Communication SAS and Institute of Ethnology and Social Anthropology SAS. 15 institutes were included in category B, 16 institutes in category B/C, 6 institutes in category C and one institute in category C/D. No SAS institute was included in category D. In 2023, institutes that achieved the best ranking in the international evaluation were subsidised by the wage fund.

The Presidium of SAS also approved the detailed Final Report of Regular Evaluation of SAS Research Institutes, prepared by the Metapanel composed of six foreign evaluators, the head evaluator, the chairs of the evaluation

panels for the three scientific sections of the SAS and two experts on the young scientific generation and scientific transfer. An important part of this report is the recommendations of the decision-making sphere, especially the Ministry of Education, for the entire ecosystem of science, research and innovation, as well as recommendations for SAS.

In 2023, part of the members of the panels and the meta-panel created the SAS International Advisory Board, composed of: Prof. Wim van der Doel, the Leiden-Delft-Erasmus Universities alliance, Prof. Marja Makarow, University of Helsinki, Prof. Valeria Nicolosi, Trinity College Dublin, Dr. Özen Nergis Dolcerocca, University of Bologna and Dr. Zdeněk Havlas, Vice-President of the Czech Academy of Sciences.

An important tool for evaluating the quality of scientific work at the individual level of individual authors is the valuing of top SAS publications. In the category Top journal works in scientific journals with the highest impact measured by the SJR index (Scimago Journal Ranking) falling into the first percentile of the SJR in the relevant scientific field, seven publications in journals such as Advanced Materials, Drug Resistance Updates, or Annals of Tourism Research was awarded. We also awarded six "highly cited" publications and five top scientific monographs published by renowned publishing houses. Seven works in journals registered in the Nature Index database and four publications in journals included in the Norwegian Register, category 2, were also selected for the award.

1.2 Support systems of SAS research projects

1.2.1 Projects and other activities of VEGA Scientific Grant Agency

The Scientific Grant Agency of the Ministry of Education, Research, Development and Youth of the Slovak Republic and the Slovak Academy of Sciences (hereinafter referred to as "VEGA") is a joint body of the Ministry of Education, Science, Research and Sport and the Slovak Academy of Sciences. VEGA represents a system of institutional support for basic research. SAS provides funds to its organizations for the solution of research projects from its own budget chapter through this grant scheme.

VEGA is the largest Slovak grant agency in many respects, such as the number of researchers, the number of young researchers under the age of 35, the number of funded projects and received grant applications, the number of publication outputs in the international scientific space recorded in the Web of Science and SCOPUS databases. Publications supported by VEGA make up almost 37% of all Slovak scientific publications by Slovak authors registered in the scientific bibliographic databases Web of Science and SCOPUS every year. With its setup, VEGA supports a wide diversity of projects in all fields of science and technology, and, at the same time, it creates space for the real possibility of ensuring irreplaceable continuity and the unique integration of the young generation of PhD students and postdoctoral students into the research process through supported projects.

VEGA's main activities in 2023:

- announcement of a new call for submitting applications for a financial contribution for scientific projects starting in 2024 and initial evaluation of projects;
- financing of ongoing and new VEGA projects;
- final evaluation of projects, the solution of which was completed in 2022.

Initial evaluation of applications for financial contribution for projects starting in 2024

The Presidium of SAS approved the wording of the VEGA call for applications for financial contributions to scientific projects on January 12, 2023. The call was announced on March 1, and applications for contributions could be submitted until April 28, 2023.

In 2023, a total of 940 applications were submitted, of which 172 applications were from SAS institutes. The evaluation process was carried out in two rounds. In the first round, the committee assessed the completeness of the application and the subject of the research with regard to the selected committee. In 2023, it was also possible to submit an interdisciplinary project as part of this call, i.e. a project in which a related scientific field is declared. At SAS, the greatest interest in presenting interdisciplinary projects comes from SAS institutes in the field of social sciences. The focus of these projects led to the linking of mainly biological and medical sciences with social sciences and humanities.

In the first round of evaluation, 60 applications were rejected due to failure to meet quality criteria. Thus, 880 applications advanced to the second round of selection. The initial evaluation separated the projects into individual categories A - C, which are the main indicators of project quality. At SAS, this categorization has a significant impact on the amount of financial resources allocated for solving projects in a given year. More than half of the projects submitted from SAS institutes in the evaluation were in category A. The long-term low share of projects in category C points to the high-quality level of submitted projects from SAS institutes.

Project quality category	Number of projects		Share [%]	
	VEGA in total	Of which SAS	VEGA in total	Of which SAS
A	332	96	35	56
B	325	53	35	31
C	202	19	21	11

The list of evaluated projects by VEGA commissions, ranked according to success, is available at http://www.vega.sav.sk/index.php?p=show&id=27, (SAS projects are marked with a grey background).

Financing of ongoing and new VEGA projects

For 2023, the Presidium of SAS allocated EUR 4,742,608 to finance VEGA projects. The principles of the breakdown of funds for VEGA projects at the SAS in 2023 were approved by the Presidium of the SAS on January 12, 2023. A total of 550 projects were financed from the SAS organizations and 66 joint projects (in which the project leader is a university employee, with SAS employees participating in the project solution), a total of 616 projects. For projects where the main recipient of funds was the SAS institute, the average annual contribution amounted to EUR 8,000.

Information on the VEGA project funds provided for 2023 to the SAS is available at the VEGA website: http://www.vega.sav.sk/index.php?p=show&id=16 .

Allocated funds for VEGA projects in 2022 according to the SAS Scientific Section

SAS Scientific Section	Number of projects	Financial contribution (in EUR)
1. Physical, Space, Earth, and Engineering Sciences	179	1,457,245
2. Life, Chemical, Medical, and Environmental Sciences	290	2,386,282
3. Social Sciences, Humanities, Arts, and Culture	147	899,081
Total	**616**	**4,742,608**

Final evaluation of research projects completed in 2022

The evaluation of the final project reports that ended the solution of the projects in 2022 was carried out in February 2023. A total of 496 projects were completed, of which 157 were from SAS. Part of the evaluation of the individual VEGA commissions was also the selection of projects that brought very significant results. The VEGA commissions selected a total of 73 projects that achieved very significant results, and 28 of these projects were from SAS institutes. The results of these projects are presented in the Report on the Most Significant Results Achieved in Solving VEGA Projects Completed in 2022. This report is published on the SAS VEGA webpage: http://www.vega.sav.sk/index.php?p=show&id=19.

SAS projects financed through the Slovak Research and Development Agency (APVV)

In 2023, the SAS institutes participated in the solution of 430 projects financed by the APVV grant agency, and the SAS institutes were the main recipient of APVV contribution in the case of 242 projects. In addition, in 188 projects financed by APVV, SAS institutes were co-recipients of APVV contribution based on a Cooperation Agreement.

The total volume of financial resources provided by APVV for the solution of SAS projects reached the amount of EUR 10,083,177 in 2023.

Within the framework of cooperation in the solution of APVV projects, SAS institutes received funds in the amount of EUR 2,356,322 for the solution of projects. The given data document a significant degree of cooperation of SAS institutes with universities, as well as with the business sector. Both of these sectors are the most important partners in the solution of joint SAS projects. The solution of joint projects is carried out at the level where the project solver is the SAS institute or where the solver is the organization, or organizations from other research and development sectors.

A total of 160 projects from SAS institutes were submitted to the calls for all APVV support schemes in 2023. Compared to 2022, the number of submitted applications increased by 20%. The SAS institutes with organizations from other sectors of research and development submitted 100 projects in the position of co-researcher.

Number of submitted proposals, research projects and funds drawn at the SAS in APVV calls in 2023 by Scientific Sections

SAS Scientific Section	Number of submitted proposals		Number of research projects		Funds provided from APVV (€)	
	A	B	A	B	A	B
Scientific Section 1	45	34	79	65	2,116,460	1,020,927
Scientific Section 2	85	58	124	96	4,483,609	1,184,603
Scientific Section 3	30	8	39	27	1,126,786	150,792
Total	160	100	242	188	7,726,855	2,356,322
Total A + B	260		430		10,083,177	

A - SAS organization is the project promoter
B - SAS organization is the contractual project solver

Mobility and reintegration programmes

An important part of the SAS science policy is the acquisition of talented researchers from abroad. Top foreign researchers will enrich the scientific teams and increase the involvement of SAS in international projects. Mobility and reintegration programmes make it possible to partially reverse, or at least mitigate, the phenomenon of "brain drain" from Slovakia by motivating people to return to Slovakia and offering Slovak scientists working abroad adequate conditions for work in their home country.

SASPRO 2 programme

In 2023, the third year of implementation of the SASPRO 2 mobility and reintegration programme https://saspro2.sav.sk/ continued, co-financed by the H2020 scheme Marie Skłodowska-Curie Actions - COFUND.
SASPRO 2 is a mobility programme of the SAS and partners of the Comenius University in Bratislava and the Slovak University of Technology in Bratislava, intended for experienced scientists from abroad interested in working in the host organizations of the programme's partners. The portfolio of host organizations includes up to 70 institutions. An important aspect of the project is to improve cooperation between the scientific and applied sectors and to support multidisciplinary approaches to project solutions. Applications were submitted within two mobile schemes: Incoming and Reintegration, and for both schemes, it is one of the conditions that the scientist does not work in Slovakia for some time before submitting the application. The programme allows the applicants to apply for a work stay of 12 to 36 months, and the field of science in which they can apply is not limited. The project is worth EUR 9,34 million and the SAS is its coordinator. The co-financing rate from the European Commission is around 50%.

Three calls were announced as part of the project, 174 applications were received, and 51 work stays were offered. All projects recommended for funding from both list A and reserve list B have been screened by the Ethics Commission. At the end of 2023, a total of 37 Marie Curie scholarship holders were active in all partner organizations (SAV 20, STU 8, UK 9). All projects must be completed by 30. 9. 2025.

In 2023, SASPRO 2 programme coordination team in cooperation with partners Comenius University in Bratislava and the Slovak University of Technology organized a Slovak language course for foreign scholarship holders, presentation skills training, "Soft Skills training" in Smolenice (management skills, time management, leadership, presentation and popularization of research results, ethics in research, protection of intellectual property and commercialization), spring (online) and autumn (hybrid) meetings of the evaluation Committee (ongoing evaluation of results, publication activity, participation in international events, degree of integration in workplaces, drawing of funds, the invited directors of institutes, deans of the faculties and scholarship holder tutors also answered the questions of the evaluation committee).
In 2023 based on the approval of the European Commission, the 1st call for extending the duration of successful projects whose approved duration did not exceed 24 months was announced due to the early termination of several projects. The applications were evaluated by the respective Evaluation Committees and approved by the partners and Presidium of SAS. In the 1st call, 5 scholarship holders applied for an extension. All projects were evaluated by the committees as successful and their extension was approved.
Scholarship holders of the SASPRO 2 programme are fully integrated at SAS, STU and UK organizations, publish in renowned scientific journals, create their own groups and teams, participate in popularization activities and actively present themselves at domestic and foreign conferences. The programme coordinator, together with the partners, continues to develop an effective mobility programme that brings benefits to the scholarship holders and host

organizations while strengthening and improving international scientific cooperation. The SASPRO 2 programme contributes to efforts to retain talented scientists in Slovakia and motivates foreign scientists to work at partner organizations.

MoRePro programme

In the course of 2023, three scholarship projects of the SAS mobility and reintegration programme under the name MoRePro were implemented. The programme aims to attract top domestic and foreign scientists to SAS institutes. SAS provides the three scientists who are implementing their projects with adequate and motivating conditions for their scientific work and, on the other hand, expects scholarship holders to improve the quality of the research environment and scientific outputs. Scholarship holders are future leaders who will develop research topics competitively in an international environment. The total duration of projects is a maximum of 4 years. In the interim evaluation of the scholarship holders' results in February 2023, the evaluation committee unanimously stated that the achieved results were in line with the anticipated plans and invited the scholarship holders to continue their work. Short profiles of scholarship holders are available at: https://www.sav.sk/?lang=sk&doc=educ-morepro

IMPULZ programme

At the beginning of 2023, the 2nd call of the IMPULZ programme announced in June 2022 was evaluated. Based on the recommendation of the Evaluation Committee, 3 projects from the fields of materials research, molecular biology and linguistics were approved for funding. The ratio of applications recommended for funding to the number of applications received (success ratio) in the second year was 15%. Successful projects will receive funding ranging from EUR 60,000 to EUR 160,000 per year over the next 5 years. The projects started to be implemented in the second half of 2023 (one project started implementation in September 2023 and two projects in November 2023). Successful applicants must be employed at individual SAS institutes, which will ensure the financing of the project's indirect costs.

In June 2023, the third call of the IMPULZ programme was announced, the goal of which is to improve SAS institutes through the recruitment of internationally recognized scientists, including talented young researchers. Their task is to create and manage their own research groups at the SAS. The IMPULZ programme is intended to help increase research excellence, its internationalization and competitiveness across various scientific fields in the SAS and the European Research Area, and last but not least, to gain success in obtaining prestigious European grants. As part of the third call, 25 applications were received for the IMPULZ programme (including 13 applications from Scientific Section 1, 9 from Scientific Section 2 and 3 from Scientific Section 3). Within the two-round evaluation process, the applications were evaluated by the IMPULZ programme Evaluation Committee composed of independent

foreign evaluators. 5 applications that did not meet the formal requirements were excluded from the evaluation process. In the first round of the evaluation process, 20 applications were assessed, of which 7 were not recommended by the evaluation committee to advance to the second round of evaluation by external evaluators. A total of 130 external foreign evaluators were approached to assess applications in the second round.

In the middle of the implementation of the projects, an interim evaluation will be carried out, based on which it will be evaluated whether the project will continue to be financed. The ongoing evaluation of the project will also take into account all the project's prospects for co-financing from other external sources - such as e.g. Horizon Europe (with special emphasis on the ERC grant scheme) or another prestigious foreign grant with comparable funding as the addressed IMPULZ project.

Detailed information about the Impulz programme and profiles of scholarship holders is available at: https://impulz.sav.sk/

Grant programmes for SAS PhD students

DoktoGrant

The Department of Science and Research of the Office of the SAS in cooperation with the member of the Presidium of SAS responsible for education and doctoral studies, prof. RNDr. Ľubica Lacinová, DrSc., ensured the implementation of the grant programme for SAS PhD students - DoktoGrant. In June 2023, the fifth call of the programme was announced to support scientific projects of students of full-time doctoral studies carried out within SAS institutes. The goal of this SAS activity is to financially support high-quality project proposals that form a coherent entity within the research projects solved during PhD studies and which can be implemented within one year. At the same time, students gain valuable experience in the preparation and implementation of projects, which are necessary for their future careers and the possibility of obtaining additional grants.

By the deadline for submitting applications in August 2023, 91 applications were received - the total number of evaluated applications within the fifth call of the SAS PhD Student Grants Programme was 88 (the number of received applications for Scientific Section 1: 22, for Scientific Section 2: 48, for Scientific Section 3: 18).

A total of 44 projects were supported in the amount of EUR 84,500 (the number of applications supported by the grant for Scientific Section 1: 11, for Scientific Section 2: 24, for Scientific Section 3: 9). All projects supported by a grant in the fifth call of the programme will be implemented by successful scholarship holders in SAS research institutes from 1. 1. 2024 to 31. 12. 2024. Programme website: https://www.doktogrant.sav.sk/

Štefan Schwarz Support Fund

The Department of Science and Research of the Office of the SAS in collaboration with a member of the Presidium of SAS responsible for PhD studies, prof. RNDr. Ľubica Lacinová, DrSc., and the Department of Physical, Space, Earth, and Engineering Sciences ensured the implementation of the Štefan Schwarz Support fund with a new call in 2023. The SAS PhD programme is intended for graduates of full-time studies from Slovakia and abroad, for whom no more than four years have passed since the defence of their dissertations. Successful applicants will receive a salary allowance for two years, with the option of extending the allowance for 1 more year.

The call for 2022 was open from 1. 9. 2022 to 30. 9. 2022. 40 applications were received by the application deadline. The number of applications evaluated for Scientific Section 1: 14, for Scientific Section 2: 17, for Scientific Section 3: 9. A total of 20 projects were supported (the number of applications supported for Scientific Section 1: 7, for Scientific Section 2: 7, for Scientific Section 3: 6). Successful scholarship holders will implement their projects within the SAS institutes for a period of 2 years.

Website of the Štefan Schwarz Support Fund: https://schwarz.sav.sk/Shell/Home/FrontPage

Euraxess Point_SAS

Since its creation (in 2020), Euraxess Point SAS has been providing consultations and support related to the arrival of foreign researchers and PhD students at SAS, or to the arrival of their family members in Slovakia for the purpose of family reunification.

Inquiries to Euraxess Point SAS come directly from foreign researchers and PhD students or from staff of SAS institutes who are involved in hiring employees and PhD students - coordinators, administrative staff, supervisors, etc.

There were 274 consultations provided for 2023. Consultations can be simple when the answer to a question is a short piece of information or a recommendation for information sources and represents an average of 2-3 e-mails, or telephone answers. However, in most cases, consultations are a complex service and require intensive (especially e-mail) communication and cooperation with other institutions, while some cases (consultations) last several months (3-9 months).

Most of the consultations (131) were, as in previous years, related to administrative processes related to the granting of visas and temporary stays. Other inquiries were of different focus, such as conditions of (health) insurance for foreigners according to the purpose of temporary stay; the procedure for registering foreigners to the social and health insurance company; employers' obligations towards the Central Office of Labour, Social Affairs and Family when hiring foreigners for research and development; the procedure for processing a permit for receiving foreigners from third countries for research and development; details of the hosting agreement; detailed instructions and document checks during family reunification (arrival of family members of a researcher/PhD student already working in Slovakia); information and

advice on what documents to supplement in case of interruption of administrative proceedings by the foreign police and others. Euraxess Point SAS provided personal assistance at OCP PZ BA 24 to applicants for temporary stay.

Specific topics or complicated cases need to be consulted with experts or specific offices/bodies. The Euraxess point SAS team continuously cooperated with the Migration Information Centre (MIC) Slovakia, SAIA, n. o., Bureau of Border and Foreign Police of the Presidium of the Police Force, with representative offices of the Slovak Republic abroad, health insurance companies and the Social Insurance Agency (SIA), Ministry of Foreign and European Affairs of the Slovak Republic, etc.

In the period from 11.9.2023 to 15.10.2023, the Foreign Police departments operated in a very limited mode (they were practically closed to the public and handled only specific situations) due to the tasks that the police had to fulfil in connection with the influx of illegal migrants into the Slovak Republic. This also affected the Euraxess Point SAS workplace, which received a lot of questions from foreign PhD students and researchers who had reserved dates for applying for temporary stays. Due to illegal migration and the workload of the police, the deadlines for submitting applications for temporary stays were cancelled and it was necessary to wait for the restoration of the full functioning of the Foreign Police departments.

The revocation of the crisis situation (declared in connection with COVID-19 on March 11, 2020) also had an impact on the Euraxess Point SAS agenda. The crisis situation related to COVID-19 was revoked on 15.09.2023, and many questions and consultations arose because several facts were linked to it (e.g. exceptions in the Act on Residence of Foreigners, which only applied during a crisis situation).

Euraxess Point SAS regularly communicates with SAS institutes, provides information and consultations in individual cases. It also informs all SAS institutes (coordinators and directors) about networking and integration events for foreign researchers and PhD students organized by SAIA, n.o. as the national coordinator of the Euraxess network in Slovakia (e.g. Spring Tours 2023, UniverCity Tours 2023).

On the bilingual website https://euraxesspoint.sav.sk/domov/, which is continuously updated, it is possible to find under the new section "Documents" various samples of documents, applications and instructions related to the admission of foreign students and researchers and links to information cards to individual types of temporary stays created by the Migration Information Center IOM (published with the permission of the MIC IOM).

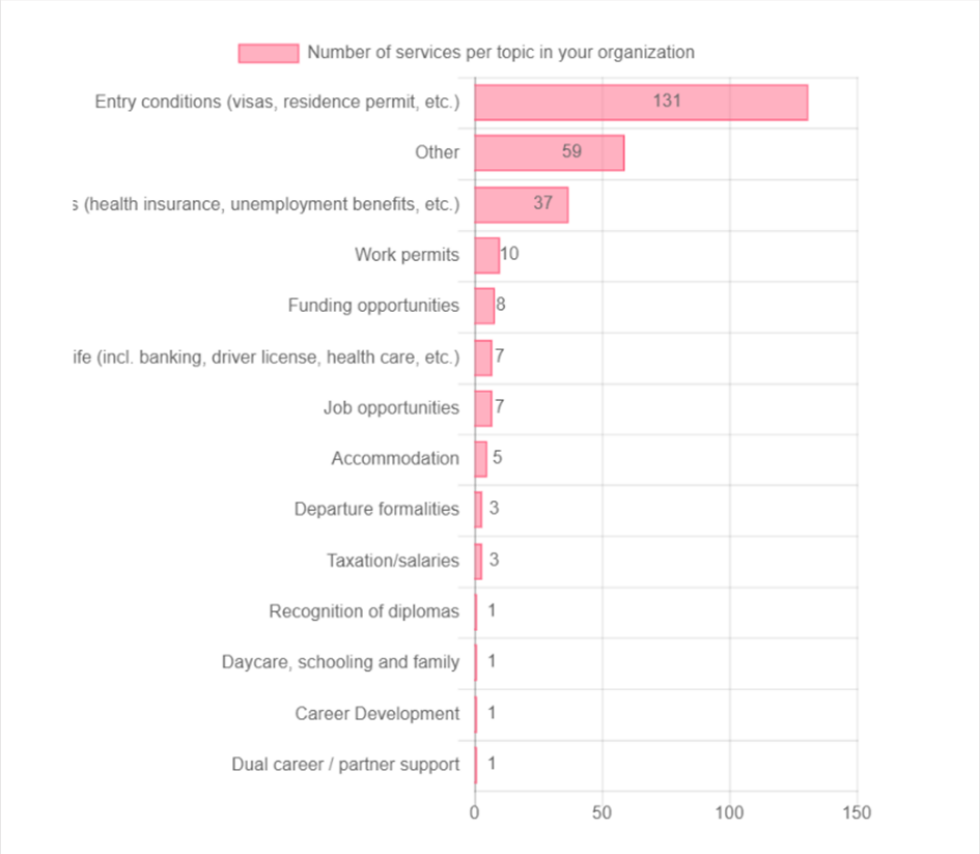
The trend continues that most consultations are provided to PhD students and researchers from India (51), Iran (26), Pakistan (16), Egypt (15), Ukraine (13).

Incoming inquiries to Euraxess Point come from PhD students and researchers working mainly in the fields of chemical sciences (48), physical sciences (30), technical sciences (17) and biological sciences (16).

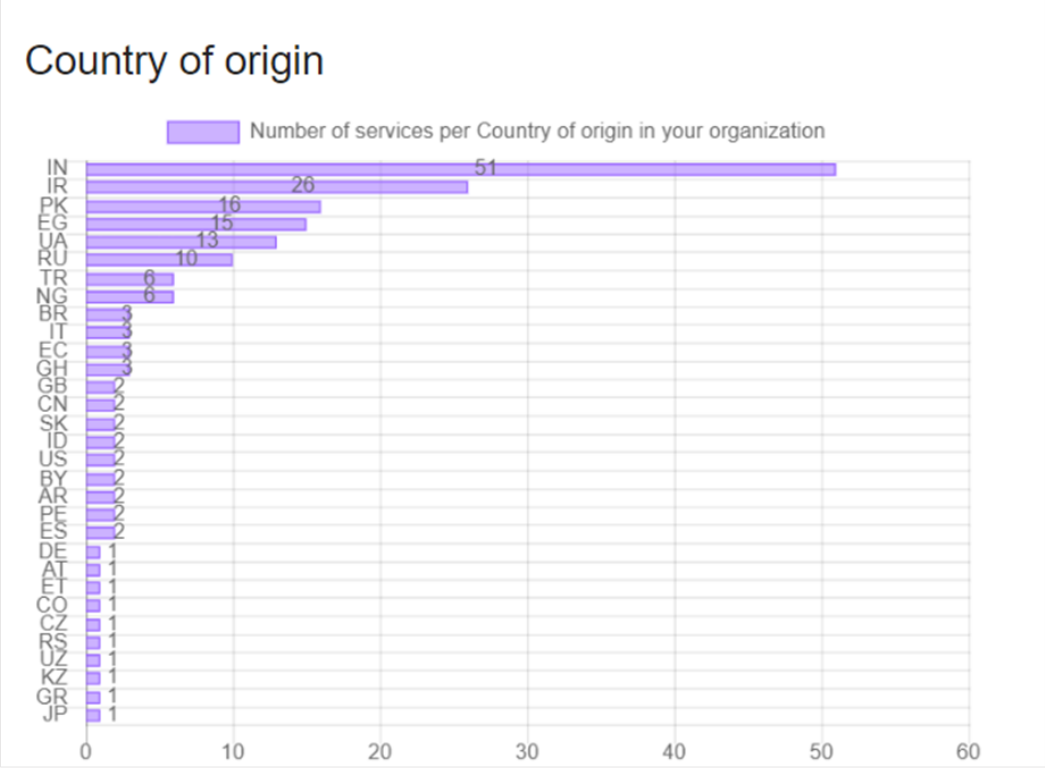
Most of the inquiries are from men (124), less (55) from women.

Statistical data on Euraxess Point SAS activities for January 2023 - December 2023 (compiled according to information reported to the European Euraxess portal) are presented in the graphs on the following pages.

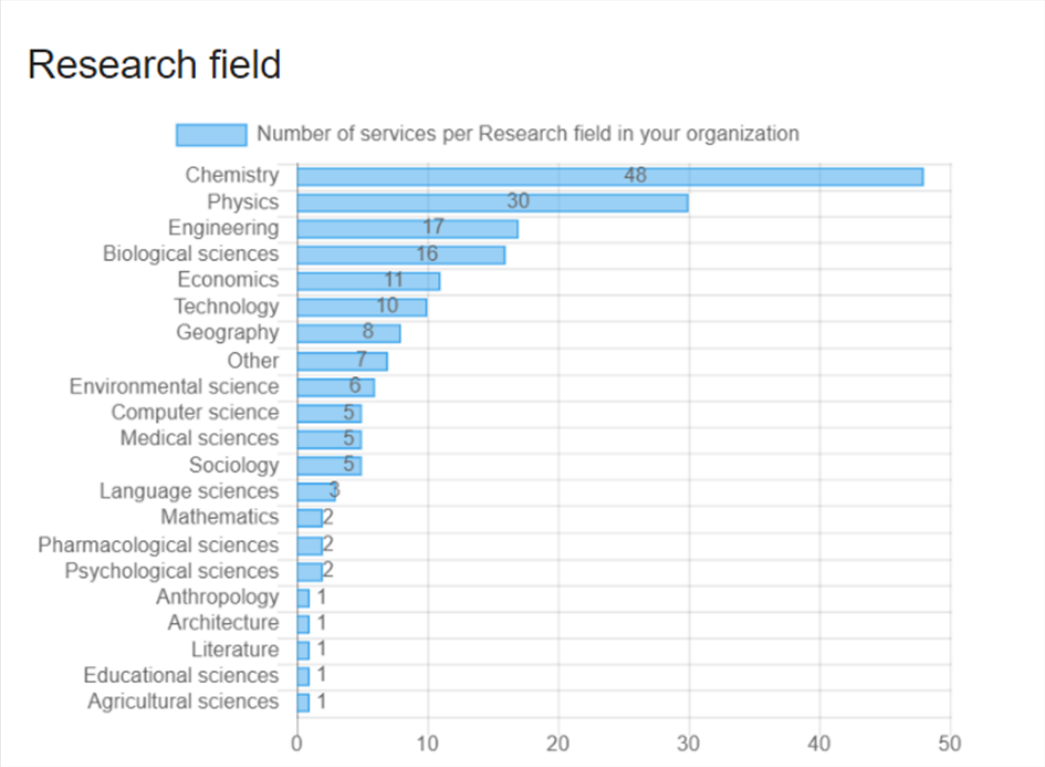
Overview of the number of consultations by individual topics (areas) in 2023



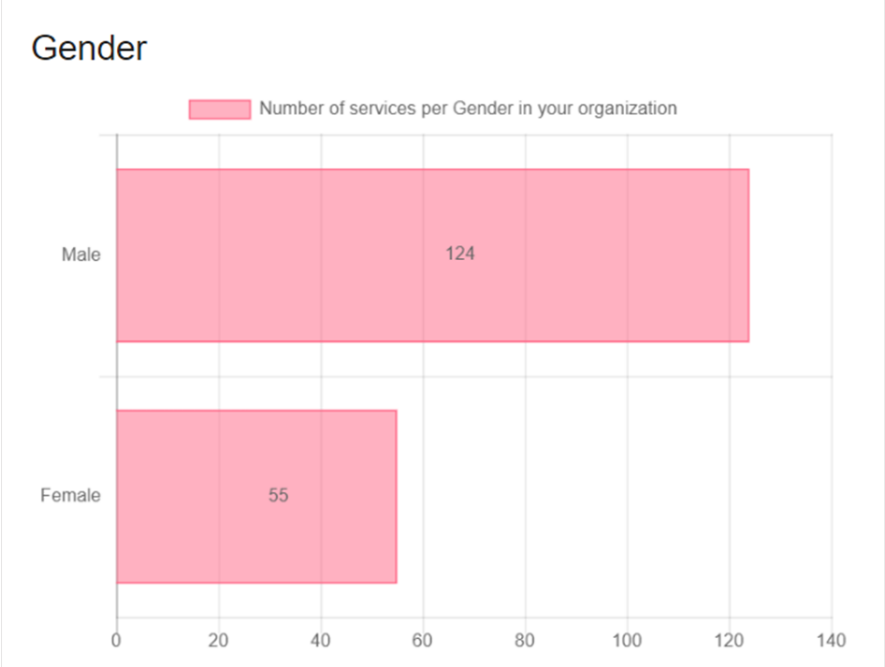
Overview of countries of origin of Euraxess point SAS clients in 2023



Statistics of Euraxess Point SAS clients by area of operation



Composition of Euraxess Point SAS clients by gender



Human resources strategy in research - HRS4R

In 2023, work continued on the ongoing fulfilment of the points of the Action Plan of the Human Resources Strategy in Research. The HRS4R project is in the second phase of the implementation of the HRS4R SAS Action Plan (2023 - 2025), after which this process will be evaluated by the European Commission after a personal visit (after 19 10. 2025).

At the end of 2023, 29 SAS institutes joined the HRS4R strategy. The HRS4R SAS Steering Committee and Working Group regularly monitors and evaluates the progress in implementing the strategy. Results and events are published on the project's bilingual website https://hrs4r.sav.sk/. The website regularly updates documents and events.

In April 2023, representatives of the Institute of Animal Physiology and Genetics of the Czech Academy of Sciences came to Bratislava. The institute has been awarded HRS4R since 2021. The meeting aimed to exchange experiences and good practices in implementing the HRS4R strategy.

In September 2023, the HRS4R breakfast meeting for representatives of SAS institutes was held. The aim of the informal meeting was to inform the coordinators about the state of implementation and planned activities for 2023-2025. The breakfast meeting allowed time not only for the necessary sharing of information and experience between institutes but also for a beneficial and inspiring discussion.

In November 2023, a meeting was held with the employees of the Faculty of Science of Masaryk University in Brno. The faculty has been a recipient of the award since 2018. During the meeting, the importance of the position of human resources in the academic sector was discussed, and there was an exchange of experiences and good practices in implementing the OTM-R methodology (open, transparent procedures for recruiting researchers).

In 2023, activities started in the private group called "SAS Parents" on the Facebook social network. The goal of the group is to unite parents working in the Slovak Academy of Sciences and thus create a communication platform for them. In the group, parents can exchange opinions and experiences regarding combining parental duties and scientific work or advise each other in various life situations.

In 2023, in accordance with the Gender Equality Plan, Procedures for Reporting and Resolving Cases of Sexual Harassment at the Slovak Academy of Sciences were published, and were also translated into English. The Slovak Academy of Sciences has at least 3 confidential counsellors. In accordance with the Gender Equality Plan, the SAS Return Project Scheme for Parents Returning to Work after Maternity or/and Parental Leave was created for applicants.

After receiving the award in 2020, SAS undertook to incorporate the principles of the Charter and the Code into the institutional policies and strategies of human resources management and, above all, to emphasize quality working conditions, transparent recruitment based on qualifications and experience, and the creation of a favourable environment for career development, including gender policy.

Technology Transfer Office SAS (KTT SAV)

The Technology Transfer Office SAS (KTT SAV) provided complex services for SAS institutes in 2023 in the field of transfer of research results into practice. The activities of KTT SAS employees can be divided into four basic areas. The first is legal support. The second is activities related to the protection of intellectual property. The third includes activities related to the commercialization of intellectual property and promotion and popularization activities (promotion of scientific research results of SAS researchers, as well as KTT SAV itself). The fourth is education (increasing awareness of the issue of technology transfer among researchers of SAS institutes in the form of professional seminars). KTT website: http://www.ktt.sav.sk/

Searches and evaluation reports of KTT SAV on reported objects of industrial property

In 2023, KTT SAV provided important technical and commercial evaluations of reported items of industrial property (PPV). As part of this service, KTT SAV employees (in cooperation with the founders) analyse, for example, whether the given case really is an invention, whether the conditions for patentability are (provisionally) met, and whether it will be possible to apply for the granting of industrial protection. The technical and commercial evaluation also includes the proposal of a strategy for obtaining legal protection, market analysis, as well as other evaluation criteria.

In 2023, most evaluations were done in close contact with the director and founders of the given organization. Informal evaluations were carried out for the Institute of Materials and Machine Mechanics SAS (1) and Institute of Electrical Engineering SAS (2).

A formal evaluation with an evaluation report was carried out for 1. PPV Working Title: Portable device for measuring the dynamic temperature during planetary grinding in a cylindrical grinding chamber (Institute of Geotechnics SAS).

For a high-quality assessment of the fulfilment of patentability conditions, for the creation of a high-quality patent application at a later stage of the intellectual property protection process or a trademark application for different territories, it is necessary to conduct a search for the state of the technology/trademark. Preparation of searches for the state of the technology/trademark based on the task created at KTT SAS was carried out by:

- PATLIB patent information centre based in the Slovak Centre of Scientific and Technical Information (3 patent searches on the state of the technology and 2 trademark searches),
- patent offices within the scope of services provided (2),
- in one case, to the trademark application directly to KTT SAV.

Cooperation of KTT SAV in the protection of intellectual property

As part of the activities connected with the protection of intellectual property, KTT SAV employees provided in 2023 cooperation in securing the services of patent attorneys,

preparing priority (national (SK) and regional (European)) applications for protection, as well as preparing responses to the assessments of the UPV SR.

In 2023, KTT SAV submitted:

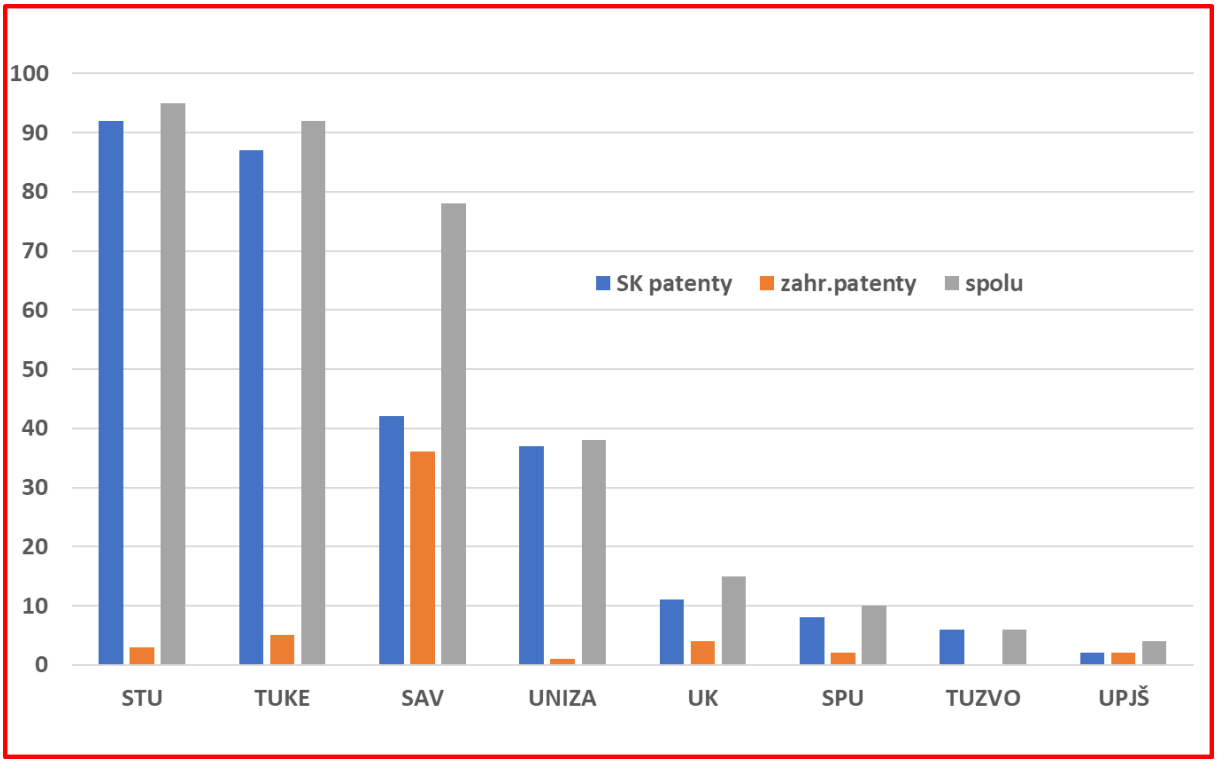
- two international patent applications under the PCT,
- one Slovak priority patent application,
- three utility model applications.

KTT SAV also prepared the complete filing of the European trademark at the EUIPO, which significantly reduced the costs of the patent office service (by 50%) for its filing. The filing by KTT SAV was hindered by the formal requirement of EUIPO to have representation if there is more than one applicant.

The number of monitored patents was 46 in connection with observance and 125 with maintenance.

In 2023, the KTT SAV, based on the decisions of the directors of the SAS institutes concerned, took over from the patent offices the monitoring of deadlines and the payment of administrative and maintenance fees for foreign applications pending in the following numbers:

- 6 European patent applications,
- 3 European patent applications from the PCT application,
- 5 international applications under the PCT.



Comparison of the number of granted patents in 2018-23 at Slovak universities and SAS (source CVTI)

2 SAS IN INTERNATIONAL CONTEXT

2.1 SAS in the European Research Area

SAS continuously ensures academic mobility in the field of international cooperation and cooperates not only with scientific and research institutes but also with central state administration bodies and representatives of diplomacy. International cooperation within the SAS is coordinated by the SAS Vice President for International Relations and her representatives. They manage the Department of International Cooperation of the SAS Office, which administratively ensures the participation of the SAS in various research programmes such as ERA-NET, European Partnerships, Joint Research Projects of the SAS, the bilateral Mobility programme, etc. In 2023, SAS supported excellent research and increased the possibility of SAS scientists to succeed in ERC challenges through the Seal of Excellence, SAS-UPJŠ ERC Visiting Fellowship Grants programmes as well as through the newly created Tandem CNRS – SAS programme.

In 2023, the SAS was also active in the traditional meetings of the Forum of Academies of the V4 countries and deepening intensive cooperation with the Czech Academy of Sciences. In addition to the continued support of existing bilateral and multilateral project schemes within the existing European partnerships, SAS managed to expand cooperation with new research institutes in Spain, France, Great Britain, Estonia, etc.

SAS pursued activities in the field of security in international research. In cooperation with representatives of ministries, state security services and foreign partners, it provided training and recommendations intended for SAS institutes and drew attention to the possible risks of international cooperation. Tomáš Hromádka is the authorized member of the Presidium of SAS in this area.

Cooperation with international scientific organizations, such as ALLEA (All European Academies), EASAC (European Academies Science Advisory Council) and ISC (International Science Council), is an important pillar of SAS activity. By cooperating with these institutions, SAS tries to promote the enlightenment of professional public opinion based on scientific knowledge. SAS also develops cooperation within UNESCO, CERN, ESA and other groups. In several of these organizations, SAS also represents other scientific institutions from Slovakia.

The SAS International Prize for 2023 was awarded by the SAS Scientific Council to Professor Rory Fitzgerald for outstanding work in the field of social sciences and humanities related to Slovakia.

ISC (International Science Council) brings together international scientific societies and member organizations at the level of national representation. As part of its activities in the

ISC, the SAS provided the activities of 15 national committees, associations of scientists from various scientific disciplines, which represent the Slovak Republic in the relevant international scientific unions. Zuzana Panczová is the SAS representative in the ISC. She participated in several ISC online meetings and the 2023 Mid-term Meeting of ISC Members "Capitalizing on Synergies in Science" in Paris and the 6th Annual Meeting of European ISC Members in Podgorica.

ALLEA (All European Academies) is a federation of all European academies. ALLEA members currently include 56 academies from 41 countries. Its goals and objectives include the development of science policy in an effort to improve the conditions for scientific work, increase excellence, and develop and adhere to high ethical standards of science in Europe. The SAS representative in ALLEA is a member of the Presidium of SAS Michal Kšiňan, who was replaced by Tomáš Hromádka during his absence in the period from May to December 2023.

EASAC (European Academies Science Advisory Council) is made up of the national academies of the EU Member States. The aim is to develop mutual cooperation between academies, to create a joint platform for commenting on urgent issues of the development of science and society, as well as to provide advice on the preparation of documents in accordance with EU legislation. EASAC provides highly expert opinions on current issues, assesses European legislation, organizes seminars for European regulators and issues opinions on topics discussed in the European Commission. The SAS representative in EASAC is vice president for Scientific Section 2 Karol Marhold who attended the 2023 EASAC Council meeting in Brussels and Madrid and the EASAC Environment Steering Panel meeting in Budapest.

ESA (European Space Agency) is an intergovernmental organization of 22 member states for space research founded in 1974. Research focuses on environmental monitoring, meteorology, aeronomy and geoinformatics, solar system research and navigation and safety systems. In 2010, an agreement was signed between the Slovak Republic and ESA on Slovakia's entry into the first of three stages of cooperation in research and the use of space for peaceful purposes. SAS actively participated in ESA activities mainly in the fields of space science (space biology and medicine), mapping the unused agricultural land and processing of materials, including the development of advanced alloys and material architectures suitable for use in space. In 2023, cooperation within the ESA project was financially supported by SAS funds.

Bilateral scientific cooperation

In 2023, SAS expanded bilateral cooperation with important foreign partners on the basis of cooperation agreements. A visit of the vice president for international relations of the Spanish National Research Council (Consejo Superior de Investigaciones Científicas – CSIC) Dr. Francisco Javier Moreno Fuentes took place in March 2023. SAS and CSIC concluded a new Cooperation Agreement, which enables the announcement of joint calls and the exchange of researchers between the two organizations. In 2023, SAS created a new mobility project subprogramme called Basic Mobility, the funding of which is provided in the form of a refund

(costs for travelling abroad are covered by the sending party, accommodation and meals during the stay are paid by the receiving party). As part of Basic Mobility, an agreement on scientific cooperation was signed with the Estonian Academy of Sciences in May 2023. In August 2023, the agreement between SAS and the Royal Society of Edinburgh (Scotland) was renewed. SAS currently has signed Cooperation Agreements with academies of sciences in the Czech Republic, Serbia, Bulgaria, Romania, Hungary, Poland, Italy, Spain, Slovenia, with DAAD in Germany, with the French Research Center in Humanities and Social Sciences (Centre français de recherche en sciences sociales – CEFRES) and with the Spanish National Research Council (CSIC). Other agreements - with the Chinese Academy of Sciences and the Lithuanian Academy of Sciences are in the preparation stage.

In 2023, 12 international calls were announced, within which 20 projects were submitted. Cooperation was also developed with other countries such as Taiwan, Great Britain, China, Japan, Turkey, the United Kingdom, Ukraine, France and the Vatican. In 2023, SAS presented a new excellent research programme in cooperation with the French Research Center in Humanities and Social Sciences (Centre national de la recherche scientifique - CNRS) Tandem CNRS - SAV for 2024 - 2026 for researchers with the financing of one Slovak-French tandem, which will result in the submission of an ERC project or a project within Horizon Europe.

Multilateral scientific cooperation

COST, Horizon 2020 and Horizon Europe projects

In 2023, the SAS institutes participated in the research of 40 projects within the Horizon 2020 programme and 28 projects within Horizon Europe programme. Teams from SAS participated in the preparation of 61 Horizon Europe project proposals, of which 12 proposals in the position of coordinator.

COST projects

The European Cooperation in Science and Technology (COST) programme is the oldest European transversal program for scientific and technological cooperation between EU Member States and EFTA countries. Cooperation takes place through the coordination of national research projects, with projects funded at the national level. In 2023, SAS teams participated in a total of 160 COST projects.

ERA-NET and European Partnership projects

The ERA-NET (Horizon 2020) and European Partnerships (Horizon Europe) are EU specific tools for coordinating national research programmes through national agencies. The ERA-NET and Co-funded European Partnerships programmes are carried out in the COFUND scheme, which

means that part of the funds that the agencies spend on research projects is paid from EU funds. The participation of SAS in coordination projects enables teams from SAS institutes to participate in the submission of research projects. During 2023, SAS was a member of 23 ERA-NET coordination projects and 3 in a Co-funded European Partnership project. In 2023, SAS teams participated in 26 research projects.

Other projects

Other programmes with the participation of SAS organizations include the International Visegrad Fund (IVF), within which 16 projects were solved at SAS, and UNESCO (5 projects). In cooperation with UNESCO, the SAS participated in the International Hydrological Program (IHP). SAS institutes were also represented in other important international programmes, such as IAEA, NATO, IEA, INES, CERN and EMPR.

2.2 Cooperation with economically and research developed countries outside EU

Taiwan

Cooperation with Taiwan continues within the Joint Research Projects (JRP) framework programme implemented based on an agreement on bilateral scientific cooperation between SAS and the National Science and Technology Council (NSTC). In 2023, 5 projects were carried out as part of this cooperation. In cooperation with the Taipei Economic and Cultural Office in Prague (TECO), SAS ensured the announcement and organization of the 15th joint call for project submissions for 2024-2026, which opened in February 2023 for all scientific disciplines without topic restriction. Funding was approved for 2 projects starting in January 2024, and 5 projects were submitted.

Turkey

SAS cooperates with Turkey based on an agreement with TÜBITAK (The Scientific and Technological Research Council of Turkey). The Joint Research Projects (JRP) programme is carried out within the agreement. In 2023, 3 joint bilateral projects were resolved, one completed in the given year. In November 2023, the 10th SAS-TÜBITAK joint scientific forum was held online with the support of the Consulate General of the Slovak Republic in Istanbul to continue cooperation within the 9th joint call for submission of research projects. This will be open in 2024.

Japan

Cooperation with Japan is carried out through two types of project programmes:

- V4-Japan. In 2023, cooperation between the V4 countries and Japan continued in the JRP (Joint Research Projects) format aimed at supporting joint research projects and intensifying scientific and technical cooperation in the field of materials research. Within this cooperation, 4 projects financed from SAS resources were carried out.
- EIG CONCERT Japan is a cooperation programme in science and technology between European partners and Japan within the European Interest Group (EIG) for Japan consortium. The consortium follows up on the successful ERA-Net CONCERT Japan project from 2011-2014. In 2023, 4 projects with the participation of the SAS were carried out.

In 2023, the 20th Annual Meeting of the Science and Technology in Society forum was held in Kyoto, Japan. SAS was represented by vice-president Martin Venhart.

Republic of Korea

The cooperation is based on a memorandum of understanding between the Republic of Korea represented by the Ministry of Science, ICT and Future Planning of the Republic of Korea, and institutions from the V4 countries (International Visegrad Fund, Ministry of Education, Youth and Sports of the Czech Republic, National Agency for Research, Hungary, the National Center for Research and Development, Poland, and the Slovak Academy of Sciences). The cooperation is based on joint research projects with the participation of teams from scientific institutes and universities in the Republic of Korea and the V4 countries. The V4-Korea JRP call on Clean Energy was opened in February 2023, within which 2 projects with the participation of SAS were supported.

2.3 Other activities in the development of international cooperation

Cooperation of V4 academies and cooperation with the Czech Academy of Sciences

The meeting of the representatives of the V4 academies of science took place on 18. – 19. 10. in Warsaw. The main topics of the meeting were presentations of the institutes' current activities and discussions about the status and roles of the scientific community in society and politics. In the end, the participants signed the Joint Declaration of the V4 Forum of Academies of Sciences on the terrorist attacks in Israel and the impending humanitarian disaster in the Gaza Strip.

A meeting of representatives of the SAS and the Czech Academy of Sciences took place in the Smolenice Castle Congress Centre on 3. – 4. 4. 2023. The representatives of the academies exchanged experiences in the field of international cooperation, knowledge transfer, issues of equal opportunities and security in the framework of establishing international cooperation. Among other things, the negotiations resulted in the realization of a joint research project focused on the policies and practice of reception, adaptation and integration of Ukrainian migrants in the Czech Republic and the Slovak Republic. In addition to meetings at the level of the Presidiums of both countries, a working meeting of the international cooperation departments of the SAS and the CAS was held to exchange experiences.

Participation of SAS delegations in meetings abroad:

SAS delegations participated in the following events in 2023:

- festive session of the European Academy of Sciences and Arts, 14. – 15. 4. 2023, Salzburg (Austria)
- ENRIO regular meeting, 17. – 18. 4. 2023, Brussels (Belgium)
- 14th biennial meeting of the International Human Rights Network of Academies and Scholarly Societies, 6. – 8. 6. 2023, Pretoria (South Africa)
- Science Fair connected with the presentation of selected SAS institutes, 8. – 10. 6. 2023, Prague (Czech Republic)
- 102nd meeting of IIASA Council 13. – 14. 6. 2023, Laxenburg (Austria)
- 20th Annual Meeting of the STS Forum and Future Leaders Program, 1. – 4. 10. 2023, Kyoto (Japan)
- Forum of V4 Academies, 18. – 19. 10. 2023, Warsaw (Poland)
- 12th Danube Academies Conference (DAC), 18. – 20. 10. 2023, Ljubljana (Slovenia)
- 1st Annual Meeting of Academy Communication Professionals, 17. – 18. 10. 2023, Warsaw (Poland)
- TechInnovation International Fair, 31. 10. – 3. 11. 2023, Singapore

Significant receptions at SAS

- **Visit of CEFRES Director Mateusz Chmurski** and Attaché for Scientific Cooperation of the French Embassy Yan Pautrat on 11. **1. 2023.**
- **Visit of the Regional Director of the Science Section for Central Europe of the Embassy of the United Kingdom of Great Britain and Northern Ireland, Martyn Cushing**, at the premises of the SAS on **16. 1. 2023.** The meeting aimed to assess the possibilities of resuming bilateral cooperation between the SAS and scientific research institutes in the United Kingdom, primarily by addressing SAS research institutes and centres that are actively involved in the programme of multilateral scientific cooperation.
- **Visit of the Ambassador of North Macedonia to the SR J.E. Evgenia Ilieva on 23. 2. 2023.** The diplomat's efforts are to raise the profile of North Macedonia, a candidate country for joining the EU. Evgenia Ilieva was interested in the establishment of bilateral cooperation between SAS and the Macedonian Academy of Sciences and Arts and the possibility of working for North Macedonian students and scientists at the SAS and other Slovak educational institutions.
- **On 6. 3. 2023**, **the vice president for international relations of the CSIC, Dr. Francisco Javier Moreno Fuentes** visited the SAS. SAS and CSIC concluded a new Cooperation Agreement, which enables the announcement of joint calls and the exchange of scientists between the two organizations. The signing ceremony was attended by Spanish Ambassador J. E. Lorea Arribalzaga Ceballos, Chargé d'affaires of the Spanish Embassy Laura Carratalá, and the State Secretary of the Ministry of Education, Science, Research and Sports of the Slovak Republic Michal Fedák.
- **Visit of the Ambassador of the United States of America J.E. Gautam A. Rana** to the premises of the SAS on **14. 4. 2023.** The topic of the meeting was the assessment of the possibilities of deepening and developing cooperation, especially in the field of material and chemical sciences, as well as biomedical research with the perspective of creating a similar model of cooperation as in the case of Taiwan or Turkey.
- **Visit of the President of the Slovenian Academy of Sciences and Arts, Professor Peter Štih, on 22. 6. 2023.** On the occasion of the celebration of the 70th anniversary of its foundation, SAS renewed bilateral cooperation with the Slovenian Academy of Sciences and Arts by signing a new Cooperation Agreement.
- **On 27. 7. 7.** 2023, President of the SAS, prof. Pavol Šajgalík received the **Romanian ambassador H.E. Călin Fabian** at the premises of the Academy. They discussed the possibilities of developing bilateral scientific cooperation.
- **Visit of H.E. Mons. Nicola Girasoli, Apostolic Nuncio of the Holy See in Slovakia, Doyen of the Diplomatic Corps in Slovakia on 2. 8. 2023** at the Office of the SAS. He was received by the President of the SAS, prof. RNDr. RNDr. Pavol Šajgalík, DrSc. The Nuncio was accompanied by the attaché of the Embassy of the Holy See, Ján Bittšanský.

3 SELECTED RESULTS OF SCIENTIFIC RESEARCH

Statistical and scientometric data on the results of scientific research in the SAS in 2023 can be found in Annex no. 6 of this Annual Report. The following selection of achieved results aims to characterize the content focus of the research of SAS institutes, with no claim to the integrity of such a view in the number of publications, applications or other outputs. The chapter is divided according to the general focus on the selection of results based on basic research, the application-type results and the results achieved within the framework of international research projects.

3.1 Results based on basic research

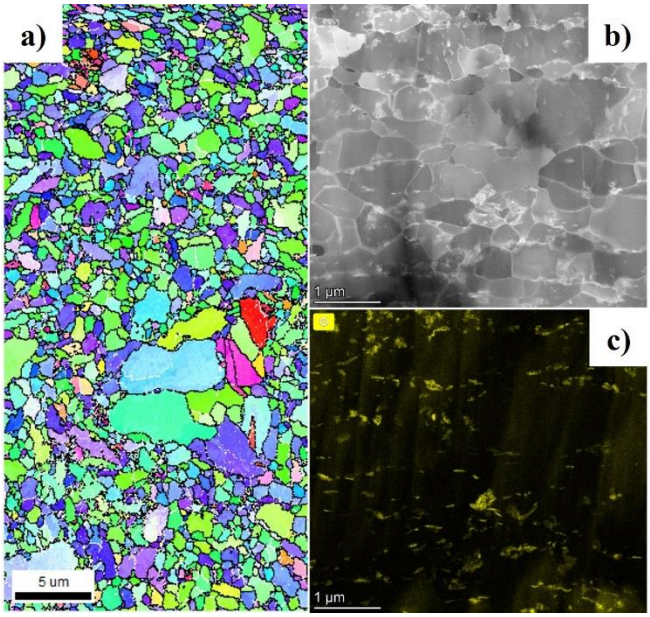
Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

Bioresorbable Zn+ZnO composite for implantology (DeZiCOM©)

Institute: Institute of Materials and Machine Mechanics SAS
Researchers: M. Balog, P. Krížik
Projects:

After the time required to support the recovering tissue, endovascular stents and orthopedic internal fixators become redundant, and their long-term retention in the human body becomes problematic and poses health risks. However, secondary surgery is stressful for the patient and represents a significant economic burden. This motivates research into fully bioabsorbable implants that provide the necessary temporary support for tissue healing and eventually dissolve completely and safely inside the body. Due to their unique properties, bioresorbable Zn materials have attracted considerable scientific attention in recent years. However, the microstructural instability and associated change in the mechanical properties of Zn-based metals limit their use in the biomedical field. As part of the cooperation of three SAS institutes (ÚMMS, BMC, CEMEA), we developed a new type of Zn composite prepared by powder metallurgy called DeZiCOM©. It relies on the unique concept of stabilizing the ultrafine-grained Zn microstructure using a small amount of nanometric ZnO dispersoids. Thus, for the first time, such an ultra-fine-grained microstructure of the Zn matrix was

achieved. Zn+ZnO composites showed significantly higher mechanical properties than those published so far for pure Zn materials, while these were unchanged even at elevated temperatures (above the recrystallization temperature of Zn, which is ~10 °C). The applied stabilization concept did not have a negative effect on corrosion behaviour and in-vitro biological response. On the contrary, it led to more homogeneous corrosion while maintaining the required degradation rate, a non-toxic effect and a bacteriostatic effect. The observed behaviour and properties predetermine the new type of bioresorbable Zn+ZnO material very potential for applications in implantology.



(a) EBSD and (b) TEM images of fine-grained Zn microstructure with (c) EDS O map representing ZnO dispersoids

Related publications and other outputs:

BALOG, Martin** – DE CASTRO, Moara Marques – ČAPEK, Jaroslav – ŠVEC, Peter Jr. – TAKÁČOVÁ, Martina – CSÁDEROVÁ, Lucia – SEDLÁČKOVÁ, Eva – ŠVASTOVÁ, Eliška – ŠKOLÁKOVÁ, Andrea – DVORSKÝ, Drahomír – PINC, Jan – HYBÁŠEK, Vojtěch – KUBÁSEK, Jiří – KRÍŽIK, Peter – SKIBA, Jacek – BAJANA, Otto – HASSAN IBRAHIM, Ahmed Mohamed. Suppression of mechanical instability in bioabsorbable ultrafine-grained Zn through in-situ stabilization by ZnO nanodispersoids. In Journal of Materials Research and Technology-JMR&T, 2023, vol. 25, pp. 4510-4527. (2022: 6.4 - IF, Q1 - JCR, 1.05 - SJR, Q1 - SJR). ISSN 2238-7854. Available at: https://doi.org/10.1016/j.jmrt.2023.06.252 ,

CASTRO, Moara Marques – BALOG, Martin - KRÍŽIK, Peter – ŠVEC, Peter Jr. – ŠVASTOVÁ, Eliška – TAKÁČOVÁ, Martina – KUBÁSEK, Jiří. Microstructure, Mechanical, and In Vitro Characterization of a Novel Biodegradable Zinc-Based Composite Fabricated at Room Temperature. In Key Engineering Materials, 2023, vol. 967, p. 165-170. (2022: 0.171 - SJR, Q4 - SJR). ISSN 1013-9826. Available at: https://doi.org/10.4028/p-Lk6RQ1

Patents:

The lead authors have received a positive response from the ISA on the PCT patent application, with the results being communicated to potential industry-interested parties: Balog M., Krizik P., A

biocompatible and bioabsorbable composite material for full absorption in vivo in contact with a human or animal tissue and method of manufacture of said composite material, PCT/SK2023/050007

Fe-Ni foams modified by metal phosphides as catalysts for hydrogen evolution

Institute: Institute of Materials Research SAS
Researchers: M. Strečková
Projects: VEGA 2/0027/23, APVV-20-0299

In 2023, an effective catalyst for hydrogen reduction based on metal foams, surface treated by phosphidation was successfully prepared. Three types of commonly used metal foams, Fe, FeNi and Ni, were investigated and subjected to phosphidation in a hydrogen atmosphere at precisely defined temperature cycles. The electrochemically active surface area corresponded very well with the total surface area determined by mercury porosimetry, clearly indicating which sample was the best candidate for hydrogen reduction. All three prepared foams were found to be active and stable on both sides of water decomposition. FeNiP and NiP samples were the most effective electrocatalysts of hydrogen and oxygen evolution, showing at a current density of 10 mA cm-2 overvoltages for HER – 165 mV for FeNiP and -141 mV for NiP, and for OER 313 mV for FeNiP and 261 mV for NiP. Both prepared materials were stable for 22 hours in 1M KOH.

Related publications and other outputs:

GUBÓOVÁ, Alexandra – ORIŇAKOVÁ, Renáta – STREČKOVÁ, Magdaléna – PARAČKOVÁ, M. – PETRUŠ, Ondrej – PLEŠINGEROVÁ, B. – MIČUŠÍK, Matej. Iron-nickel metal foams modified by phosphides as robust catalysts for a hydrogen evolution reaction. In Materials Today Chemistry, 2023, vol. 34, art. no. 101778. (2022: 7.3 - IF, Q1 - JCR, 1.229 - SJR, Q1 - SJR). ISSN 2468-5194.

Fossil biomarkers as indicators of environmental changes in the High Tatras

Institute: Earth Science Institute of the SAS
Researchers: ŽATKOVÁ, Lucia – MILOVSKÝ, Rastislav** – ŠURKA, Juraj et al.
Projects:

Fossil biomarkers preserved in the sediments of Tatra lakes (Trojrohé and Batizovské pleso) record environmental changes in the High Tatras after the retreat of the glaciers. Using an actualist approach, we interpreted the distribution of sedimentary lipids with the help of chemical traces of modern plant groups. The identified chemostratigraphic units roughly correspond to the Holocene climatic periods. Diplopten as a biomarker of bacterial activity points to the beginning of the soil-forming process at the end of the B/A interstadial, corresponding to the period of valley deglaciation. The absence of conifer biomarkers in the sediments of Batizovské pleso indicates that the upper limit of the continuous zone of pine *(Pinus mugo)* never reached an altitude of 1880 m above sea level. The retreat of sphagnum

indicates a dry climate during the Younger Dryas period. A sharp increase in the amount of ruthenium in 5000 BP suggests a flood episode.

Related publications and other outputs:

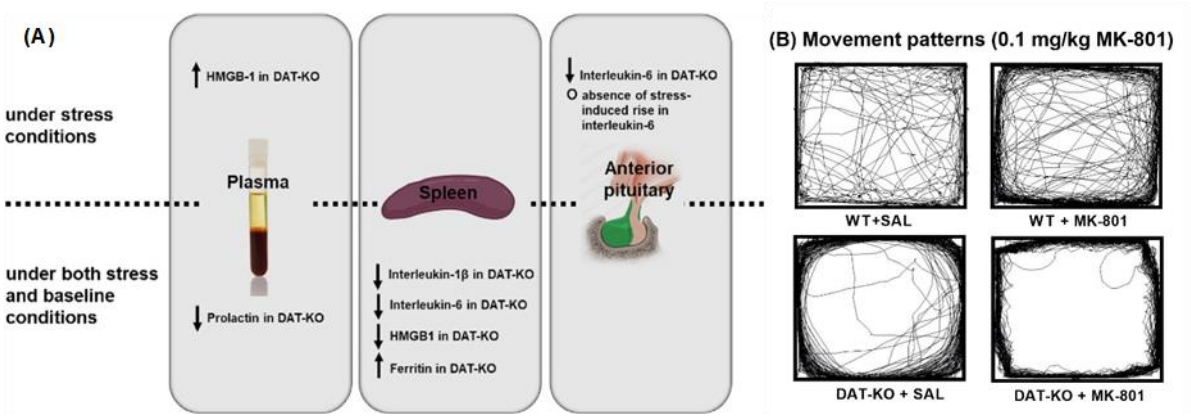
ŽATKOVÁ, Lucia – MILOVSKÝ, Rastislav** – BECHTEL, Achim – STAREK, Dušan – KYŠKA-PIPÍK, Radovan – ŠURKA, Juraj. n-Alkane and terpenoid fingerprints of modern biomass producers unveil floral changes recorded in postglacial alpine lake sediments, Tatra Mountains, Slovakia. In Organic geochemistry, 2023, vol. 184, art. no. 104672. (2022: 3 - IF, Q2 - JCR, 1.395 - SJR, Q1 - SJR). ISSN 0146-6380. Available at https://doi.org/10.1016/j.orggeochem.2023.104672

Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

Abnormal interaction between the immune and endocrine systems during stress in dopamine transporter knockout rats

Institute: Biomedical Research Center SAS, Institute of Experimental Endocrinology SAS
Researchers: Nataša Hlaváčová, Katarína Hrivíková, Lucia Karailievová, Peter Karailiev, Daniela Ježová
Projects: ERANET NEURON II/2018/569/UNMET

Chronic stress is a key factor in psychiatric and neurological diseases, which acts through endocrine activation of neurotransmission and also affects the immune system. The goal of our research was to identify the functional interaction of the endocrine and immune systems with monoamine and glutamatergic neurotransmission in the mechanisms leading to behavioural changes during stress. Experiments were performed on a special line of rats that have the dopamine transporter gene knocked out (DAT-KO rats). These rats show a hyperdopaminergic state associated with psychopathological changes similar to mania and schizophrenia. We observed differences between DAT-KO and WT rats during infection-induced stress induced by repeated administration of lipopolysaccharide. DAT-KO rats showed signs of chronic stress already during basal conditions, including increased plasma concentrations of the stress hormones corticosterone, aldosterone, and also prolactin concentrations. Expression of interleukin-6 in the adenohypophysis was increased during immune challenge stress in WT but not in DAT-KO rats. The most significant differences between genotypes were revealed in the spleen.



(A) Major differences in endocrine and immune system parameters between DAT-KO and WT rats during basal and stress conditions.

(B) Changes in locomotor activity in DAT-KO and WT rats after i.p. Injection of MK-801.

Gene expression of interleukin-1, interleukin-6, and HMGB1 in the spleen was lower, and ferritin expression was higher in DAT-KO compared with WT rats. We noted significant differences between genotypes in the effect of glutamatergic modulation through the administration of MK-801, which induced a different behavioural response. The obtained results show that behavioural changes and psychiatric disorders associated with dopamine dysfunction are a consequence of the functional interaction of the endocrine and immune systems with the transmission of nerve stimuli through monoamine and glutamate signalling.

Related publications and other outputs:

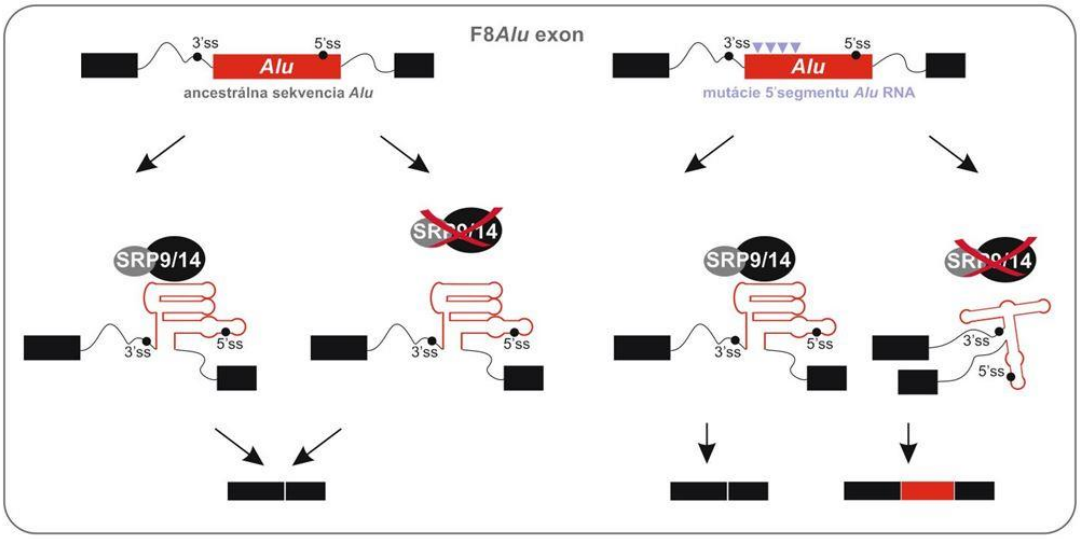
HLAVÁČOVÁ, Nataša - HRIVÍKOVÁ, Katarína - KARAILIEVOVÁ, Lucia - KARAILIEV, Peter - HOMBERG, Judith R. - JEŽOVÁ, Daniela**. Altered responsiveness to glutamatergic modulation by MK-801 and to repeated stress of immune challenge in female dopamine transporter knockout rats. In Progress in Neuro-Psychopharmacology and Biological Psychiatry, 2023, vol. 126, art. no. 110804. (2022: 5.6 - IF, Q1 - JCR, 1.543 - SJR, Q1 - SJR). ISSN 0278-5846. https://doi.org/10.1016/j.pnpbp.2023.110804

Conserved architectural Alu RNA elements condition the selection of Alu exons and point to a possible chaperone activity of SRP9/14 that represents a diversion from its traditional function in the regulation of the translation process

Institute: Centre of Biosciences SAS
Researchers: Ivana Borovská, Jana Královičová
Projects:

Alu elements are retrotransposon sequences derived from 7SL RNA, which is part of the signal recognition particle (SRP) important in the translation process. Alu sequences are present in the genome of all primates, contributing to the variability of the coding potential of mRNA, but can also lead to the production of a non-functional protein with pathological consequences. Alu elements can be part of mRNA due to their localization in intronic regions of genes, and the minimal number of nucleotide changes required for their exonization.

For a better understanding of the cellular mechanisms enabling Alu exonization, we used the F8Alu exon, included in the primary transcript of the human F8 gene as a result of a mutation associated with haemophilia, as a model. We found that the substitution-induced exonization of F8Alu could be better predicted based on changes in the conformation of Alu RNA than based on changes in the sequence of motifs regulating RNA splicing. At the same time, we proved that the splicing of exons derived from Alu is regulated by the protein heterodimer SRP9/14, which primarily forms part of SRP. This heterodimer affects the structure of Alu exons similarly to how it affects the complex structure of 7SL RNA.



The exonization potential of Alu RNA is modulated by RNA conformational changes induced by its primary sequence. The SRP9/14 heterodimer participates in the regulation of exonization and alternative splicing of Alu sequences.

Related publications and other outputs:

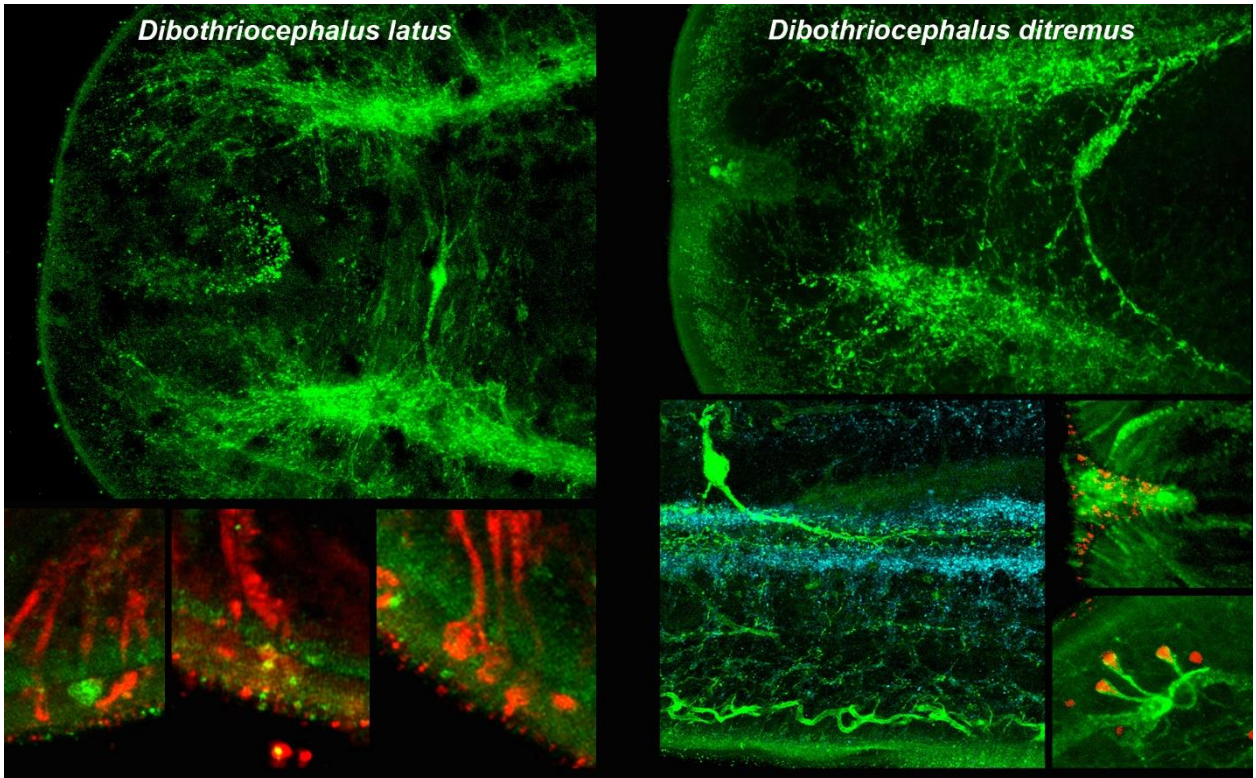
BOROVSKÁ, Ivana - VOŘECHOVSKÝ, Igor - KRÁLOVIČOVÁ, Jana**. Alu RNA fold links splicing with signal recognition particle proteins. In Nucleic Acids Research, 2023, vol. 51, no. 15, p. 8199-8216. (2022: 14.9 - IF, Q1 - JCR, 8.234 - SJR, Q1 - SJR). ISSN 0305-1048

Dynamics of the incidence of the human tapeworm *Dibothriocephalus latus* in the period 1900–2020 and the functional morphology of the infectious stages of *D. latus* and *D. ditremus*

Institute: Institute of Parasitology SAS
Researchers: Králová-Hromadová Ivica; Barčák Daniel; Čisovská-Bazsalovicsová Eva; Radačovská Alžbeta; Oros Mikuláš
Projects: APVV-15-0004; VEGA 2/0027/21; SAS-MOST JRP 2016/7

The tapeworm *Dibothriocephalus latus* is the most common cause of diphyllobothriasis, a parasitic human disease that occurs after the consumption of uncooked fish. *Dibothriocephalus latus* occurs in several natural foci in Eurasia, North and South America. An interesting fact about the distribution of this tapeworm is that as a result of intensive epidemiological measures that were put into practice in the 70s and 80s, there was a significant reduction in the prevalence of diphyllobothriasis in humans. We performed a comprehensive analysis of the dynamics of the incidence of this zoonosis over the last 120 years (1900–2020) in all European and Asian outbreaks. In 2021, data from Scandinavia, the Baltics, the Danube region, and the Alpine region were summarized. In 2023, we published comprehensive data on the distribution of *D. latus* in the European and Asian parts of Russia, as well as in other Asian countries. The most significant outbreaks were recorded in Karelia and the Volga basin in the European part of Russia, as well as in the Ob, Irtysh, Yenisei and Lena river basins and in the Lake Baikal region in the Asian part of Russia. While in the European part of Russia, a reduced incidence of this zoonosis has been recorded in recent decades, in some Asian parts of the country (Siberia), the zoonotic disease continues to persist. Human cases of infection in all other Asian countries were of introduced origin. The distribution of *D. latus* in the monitored period showed the same dynamics of incidence in all foci, reflecting important historical milestones (especially the period after the Second World War) and epidemiological situations (introduction of effective preventive measures).

Knowing the detailed microanatomy of the head part (scolex) of the infectious stages of *D. latus* and *D. ditremus* can help to understand the function of the organs that condition the survival of these parasites in the host's body. A specific immunofluorescence signal indicating the presence of a (neuro)peptide similar to FMRF amide made it possible to visualize the structure of the primitive brain, the course of the main neural pathways and their communication with the sensory organs on the surface of the body. Surprisingly, however, a specific signal was also captured in the channels of the excretory system and reservoirs of secretory cells concentrated in the apical part of the scolex. Peptide/s structurally similar to FMRF amide can thus be part of secretory-excretory products secreted into the host's body and/or form a building block of the respective tubular structures. In other parts of the nervous system, the neurotransmitter synapsin was detected, which ensures the function of synaptic connections in vertebrates.



Nervový, sekrečný a vylučovací systém plerocerkoidov označené protilátkami proti FMRF amidu, synapsínu, tubulínu.

Related publications and other outputs:

KUCHTA, Roman* - RADAČOVSKÁ, Alžbeta* - ČISOVSKÁ BAZSALOVICSOVÁ, Eva - KRÁLOVÁ-HROMADOVÁ, Ivica**. Ups and downs of infections with the broad fish tapeworm Dibothriocephalus latus in Europe (Part II) and Asia from 1900 to 2020. In Advances in Parasitology, 2023, vol. 122, p. 1-69. (2022: 3.125 - IF, 0.698 - SJR, Q2 - SJR). ISSN 0065-308X. Type: ABA

BARČÁK, Daniel** - ALEXOVIČ MATIAŠOVÁ, Anna - ČISOVSKÁ BAZSALOVICSOVÁ, Eva - SOLDÁNOVÁ, Miroslava - OROS, Mikuláš - KRÁLOVÁ-HROMADOVÁ, Ivica**. An examination of nervous system revealed unexpected immunoreactivity of both secretory apparatus and excretory canals in plerocercoids of two broad tapeworms (Cestoda: Diphyllobothriidea). In Parasitology, 2023, vol. 150, iss. 7, pp. 612-622. (2022: 2.4 - IF, Q2 - JCR, 0.683 - SJR, Q1 - SJR). ISSN 0031-1820. Type: ADCA

Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)

A History of Nihilism in the 19th Century - Confrontations with Nothingness

Institute: **Institute of Philosophy SAS**
Researchers: **Jon Stewart**
Projects: **APVV-20-0137 Philosophical Anthropology in the Context of Current Crises of Symbolical Structures.**

Nihilism – the belief that life is meaningless – is frequently associated with twentieth-century movements such as existentialism, postmodernism and Dadaism, and thought to result from the shocking experiences of the two World Wars and the Holocaust. In his new book, Jon Stewart shows that nihilism's beginnings in fact go back much further to the first half of the nineteenth century. He argues that the true origin of modern nihilism was the rapid development of Enlightenment science, which established a secular worldview. This radically diminished the importance of human beings so that, in the vastness of space and time, individuals now seemed completely insignificant within the universe. The author's panoramic exploration of how nihilism developed - not only in philosophy, but also in religion, poetry and literature - shows what an urgent topic it was for thinkers of all kinds, and how it has continued powerfully to shape intellectual debates ever since. The publication was developed within the project APVV-20-0137 Philosophical Anthropology in the Context of Current Crises of Symbolical Structures.

Related publications and other outputs:

STEWART, Jon. A History of Nihilism in the Nineteenth Century : Confrontations with Nothingness. 1. ed. Cambridge : Cambridge University Press, 2023. 322 p. Available at: https://doi.org/10.1017/9781009266734. ISBN 978-1-00-926670-3 (APVV-20-0137 : Filozofická antropológia v kontexte súčasných kríz symbolických štruktúr) Typ: AAA

A significant contribution to research on the reception of Goethe's popular novel in Europe and East Asia

Institute: Institute of World Literature SAS
Researchers: Johannes Daniel Kaminski
Projects: SASPRO 2 PROJECT World Government: Grand Narratives in Contemporary Science-Fiction / Svetovláda: veľké naratívy v súčasnej science-fiction

Goethe's epistolary novel The Sorrows of Young Werther, first published in 1774, has produced a global echo that rivals contemporary bestsellers. While in the German context, the book was always outshined by its famous author, patriotic writers in Italy and China saw their lives mirrored in Werther's struggle, inspiring them to rewrite Goethe's novel in revolutionary

terms. Meanwhile, French Romantics embraced Werther's expressive language to explore the dark corners of their souls. The same happened in Japan, where modernists invoked the text to show that there lies beauty in death. In his book Lives and Deaths of Werther, Johannes Kaminski investigates how interpretations, translations, and literary adaptations of Goethe's novel have manipulated the text in ways that left deep marks on world literature.

Related publications and other outputs:

KAMINSKI, Johannes Daniel. Lives and Deaths of Werther : Interpretation, Translation, and Adaptation in Europe and East Asia. Oxford : Oxford University Press, 2023. 251 s. British Academy Monographs. ISBN 978-0-19-726755-4

Ethnography in Slovakia in the service of the Third Reich

Institute: Institute of Ethnology and Social Anthropology SAS
Researchers: Zuzana Panczová, Gabriela Kiliánová, Tomáš Kubisa
Projects: VEGA 2/0107/19 : Folklore, folkloristics and ideology

The publication focuses on the topic of the influence of ideology on social science research, specifically on the efforts to use ethnography and related scientific disciplines by Nazi ideology in the 1940s. Using the example of the Institute for National Research in Kežmarok, which focuses on the German minority in Slovakia, it identifies the way of work and career fates of selected German researchers and their influence on ethnographic research in Slovakia. The book includes unique source collections from the Institute of Ethnology and Social Anthropology SAS and other institutes in Slovakia and abroad. The publication is an edited and supplemented edition of the electronic book Národopis na Slovensku v službách tretej ríše, which was published in 2021 in the Slovak language. This edition brings both new information obtained through further research and in connection with the response to Slovak publication and communicates this knowledge to a German-speaking professional audience.

Related publications and other outputs:

PANCZOVÁ, Zuzana [50 %] - KILIÁNOVÁ, Gabriela [20 %] - KUBISA, Tomáš [30 %]. Volkskunde in den Diensten des Dritten Reiches : Deutsche Forscher und Forscherinnen in der Slowakei. 1. Edition. Münster : Lit Verlag, 2023. 190 p. Kultur: Forschung und Wissenschaft, Band 26. ISBN 978-3-643-25076-6

3.2 Results based on applied research

Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

AC losses in superconducting motors for hydrogen-electric aircraft

Institute: Institute of Electrical Engineering SAS
Researchers: E. Pardo, J. Kováč
Projects: AIRBUS UpNext research contract (France)

Commercial aviation is a growing source of greenhouse gas emissions (CO2, NOx and water vapour at high altitudes). Hydrogen-electric aircraft are characterized by zero CO2 emissions, and, in the case that the electricity on board is produced by fuel cells, they do not produce nitrogen oxides and emit small amounts of water vapour. For this reason, the European Commission's ACARE fly-the-green-deal document sets several targets related to hydrogen aircraft, including a certified hydrogen-powered aircraft by 2035 and the construction of at least 100 hydrogen hubs at European airports. For this reason, Airbus aims to develop the first hydrogen-powered aircraft by 2035, while the use of superconductors in electrical wiring and propulsion units is an intensively studied alternative. Superconducting motors are indeed very promising for future hydrogen-electric aircraft due to their expected high specific power, which could reach the aerospace industry's target of 25 kW/kg. Our institute received a contract from Airbus [1] for modelling AC losses in a superconducting electric motor and for measuring AC losses in high-temperature superconductor tapes. The project was successfully completed and brought interesting results.

Solvophobicity-driven mesoscale structures in liquid mixtures and their potential for use in the application sphere, a patented method for screening hydrophobic contaminants and a prototype device for the application of this method

Institute: Institute of Experimental Physics SAS
Researchers: D. Rak, M. Sedlák
Projects: VEGA 2/0115/20, VEGA 2/0071/23

The best result in this category consists of a monothematic set of three outputs, namely a patent granted by the European Patent Office [1], a publication that scientifically discusses the physico-chemical phenomena behind the patented method [2] and a device prototype that was built based on the patented method [3] . The granted patent relates to a method for

measuring the content of hydrophobic substances (contaminants) in water-miscible organic liquids [1]. Compared to existing solutions, the method is characterized by its simplicity, speed, ease of use in terms of finances and service personnel, and the possibility of application in the field. It is based on original scientific knowledge about the behaviour of mixtures with solvophobic components, where under certain conditions phase separation takes place not macroscopically but mesoscopically, where the separated components form well-defined nanodispersions with interesting properties without the need for stabilizers (so-called "green chemistry"). In addition to the method patented by us, other possibilities for their application use are emerging.

Related publications and other outputs:

[1] M. SEDLÁK, D. RAK: A Method for Determination of Content of Hydrophobic Compounds in Water-Miscible Organic Liquids.
European Patent Office, patent number EP3092487, 12. 4. 2023

[2] D. RAK, M. SEDLÁK: Solvophobicity-Driven Mesoscale Structures: Stabilizer-Free Nanodispersions. In Langmuir 39 (2023) 1515–1528, IF = 4.0, Q1P

[3] D. RAK, M. SEDLÁK: prototyp zariadenia na meranie obsahu hydrofóbnych látok (kontaminantov) vo vodou miešateľných organických kvapalinách na báze patentovanej metódy [1]

Application EWA - Early Warning of Alzheimer

Institute: Institute of Informatics SAS
Researchers: Milan Rusko, Marian Trnka, Sakhia Darjaa, Róbert Sabo
Projects: EU Structural Funds Project, Code: 313022V631,

Operational Programme: Operational Programme Integrated Infrastructure

Applicant: AXON PRO, s.r.o.

An application was created for the diagnosis of neurodegenerative diseases from voice and speech. The mobile application is available for the Android and iOS operating systems and is designed for the Slovak language. For the purposes of the application, the Institute of Informatics SAS developed a patient speech recognizer that names and describes the images displayed on the mobile phone. An extractor of linguistic and acoustic features that serve as input for machine learning systems was created. The institute was significantly involved in the creation of the speech database EWA DB and the creation of the entire application. The Institute of Informatics SAS made the EWA DB database available for scientific purposes free of charge through the ELRA agency (https://catalog.elra.info/en-us/repository/browse/ELRA-

S0489/). Using the application, Slovaks can be screened for the presence of Alzheimer's and Parkinson's diseases or other mild cognitive impairments.

Related publications and other outputs:

As part of the creation of the application, the System for the Automatic Creation of Speech Databases was registered in the register utility model no. 9855. The application won the IT Product of the Year 2023 award.

Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

Association of Nonconcussive Repetitive Head Impacts and Intense Physical Activity With Levels of Phosphorylated Tau181 and Total Tau in Plasma of Young Elite Soccer Players

Institute: Institute of Neuroimmunology SAS

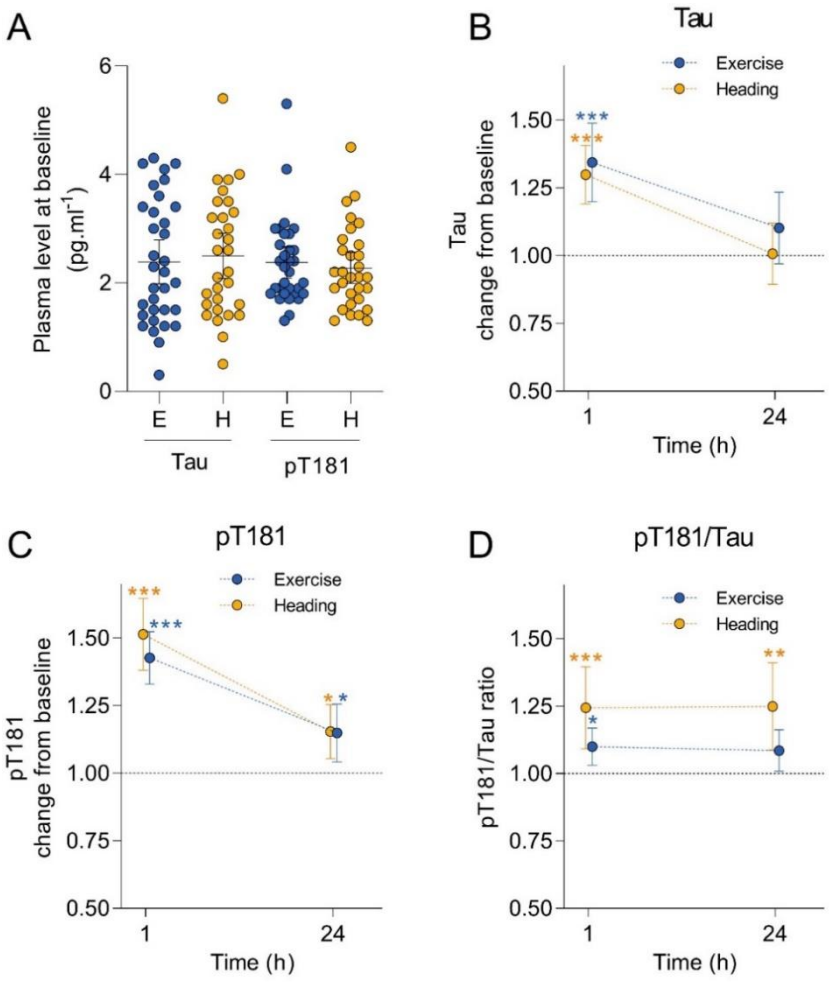
Researchers: CENTE, M - HANES, J - PORUBSKA, S - JURISICA, I - FILIPCIK, P.

Projects:

Head impacts represent a significant risk factor for the development of neurodegenerative diseases such as Alzheimer's and Parkinson's disease. However, the pathophysiological mechanism inducing the processes leading to neurodegeneration is currently not sufficiently elucidated.

The team led by Doc. RNDr. Peter Filipčík, PhD. with colleagues from the Institute of Neuroimmunology SAS and collaborators from the Faculty of Physical Education and Sports of Comenius University and the University of Trnava investigated the connection between repeated blows to the head and the level of peripheral markers of neurodegeneration.

An analysis of a group of professional youth soccer players revealed that physical training and heading the ball increase blood levels of Tau proteins, with the ratio of phosphorylated to total Tau protein being specifically increased after repeated head impacts after heading. In addition, the conclusions of the study revealed impaired neuropsychological parameters of the players, such as attention deficit and reduced cognitive flexibility in football players after intensive training without heading as well as after heading. These findings suggest that even low-intensity repeated blows to the head, such as heading in football, are associated with an acute imbalance of neuronal proteins, which usually implies the emergence of pathological processes in the early presymptomatic phase of the neurodegenerative disease. In the long term, this may pose an increased risk of neurological sequelae in people exposed to repeated head impacts.



Tau and $_pT_{181}$ Tau levels after physical exercise and heading in soccer players.

One hour after both exercise and heading, we observed a significant change in the level of total and phosphorylated Tau protein in the plasma. Elevated levels normalized to basal within 24 h, but the pT181/Tau ratio remained significantly higher at 24 h, specifically in players who did the heading (Physical exercise = blue, heading = orange, horizontal black lines indicate the average and 95% CI).

Related publications and other outputs:

CENTE, M - PERACKOVA, J - PERACEK, P - MAJDAN, M - TOTH, I - MIKULIC, M - HANES, J - PORUBSKA, S - SPAJDEL, M - KAZICKOVA, B - JURISICA, I - FILIPCIK, P. Association of Nonconcussive Repetitive Head Impacts and Intense Physical Activity With Levels of Phosphorylated Tau181 and Total Tau in Plasma of Young Elite Soccer Players. JAMA Netw Open. 2023 Mar 1;6(3):e236101. doi: 10.1001/jamanetworkopen.2023.6101. PMID: 36995709; PMCID: PMC10064253. IF: 13.8 (CENTE et al. 2023; https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2802890)

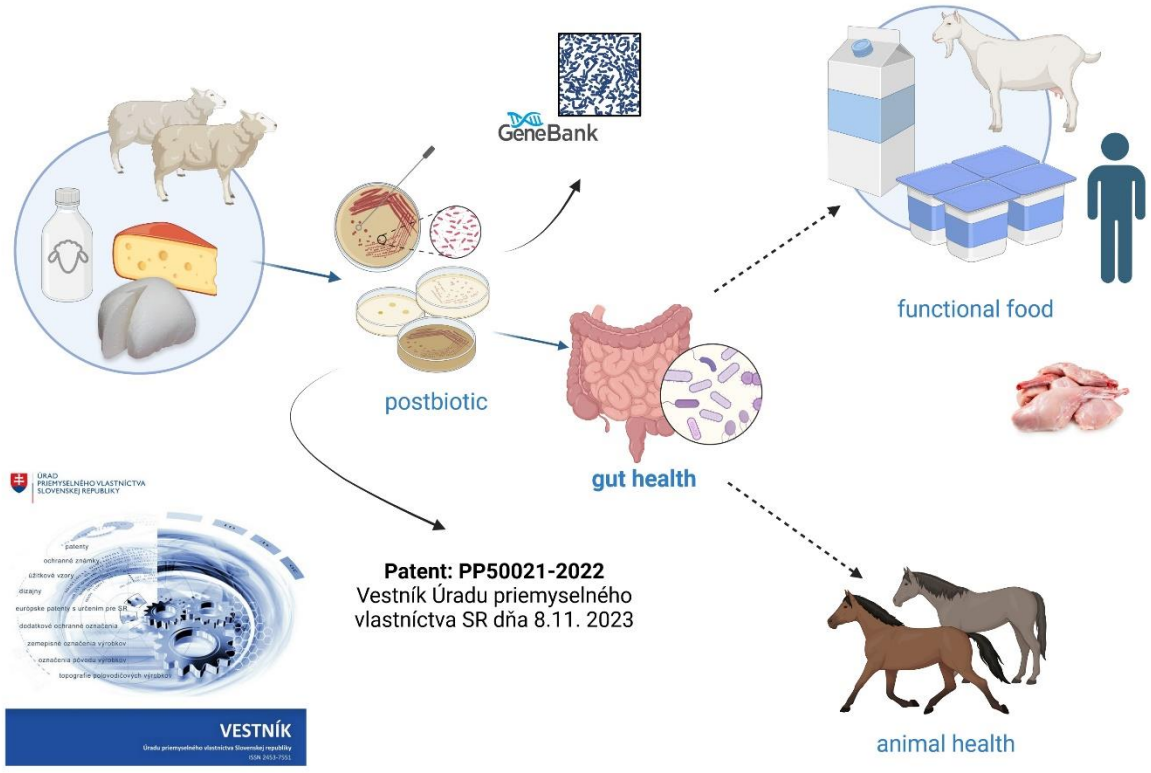
Use of beneficial microbiota for health

Institute: Centre of Biosciences SAS

Researchers: Andrea Lauková, Monika Pogány Simonová, Valentína Focková, Eva Bino

Projects:

We come across the term functional foods more and more often. By consuming them, it is possible to positively influence our health. Functional foods can be e.g. a source of beneficial (probiotic) bacteria and the bioactive substances produced by them. Several bacterial strains with beneficial properties, dominated by antimicrobial (postbiotic) activity, were selected and characterized from sheep and goat milk and their products. The selected strains produce bacteriocins, natural protein substances with an antimicrobial effect, i.e. postbiotics with use in human and animal nutrition. The strain isolated from sheep lump cheese *Lactiplantibacillus plantarum* LP17L/1 is not only postbiotically active (produces plantaricin), but also produces the β-galactosidase enzyme important for the preparation of products for lactose-intolerant people. Together with another strain isolated from goat's milk, *Lactococcus lactis* MK1/3, which shows technologically advantageous properties, they were used in the biotechnological process of producing a dairy drink based on goat's milk with favourable sensory properties. Strains LP 17L/1 and MK1/3 are part of the patent application and have the potential to establish themselves in the functional food market.



Related publications and other outputs:

Patent: PP50021-2022 Strains of lactic acid bacteria Lactococcus lactis subsp. lactis MK1/3, Lactiplantibacillus plantarum LP17L/1, use of said strains, method of producing fermented goat's milk, product produced by this method.
A patent application published in the Journal of the Industrial Property Office of the Slovak Republic on 8.11- 2023

Benefits and pitfalls of growing foreign maples

Institute: Institute of Forest Ecology SAS

Researchers: Ferus P., Oravec A., Košútová D., Konôpková J.

Projects: VEGA 2/0058/18

Maples (Acer sp.) are among the most attractive ornamental trees, but not all are suited to the harsh urban environment. Several studies assess their tolerance to drought as one of the main limiting factors in urban environments, but none on such a large collection of species, which are also at a juvenile age when they are commonly planted. Our study brought unique data including the relationships of the physiological and morphological response to summer drought to the growth specificities of 8 species, which define the degree of their drought tolerance.

Several hypotheses related to the characteristics of species/populations are associated with the transition of plants to invasive behaviour. Our work evaluates the application of those hypotheses related to the growth, reproductive, physiological and defence capabilities of the most widespread foreign species of maples and confronts it with the history of plantings and the frequency of escapes from culture. This is an unconventional and very complex approach in this field of study.

In addition to theoretical knowledge, both works provide practical information for those who grow ornamental trees - on the one hand, they name drought-resistant species in big cities and on the other hand, they describe the risk of their transition to invasive behaviour.

Related publications and other outputs:

FERUS, Peter**. Mechanisms involved in alien maples (Acer sp.) invasion process in the Central Europe. Testing hypotheses associated with species fitness. In Urban Ecosystems, 2023, vol. 26, no. 5, p. 1455-1467. (2022: 2.9 - IF, Q2 - JCR, 0.811 - SJR, Q1 - SJR). ISSN 1083-8155.
Available at: https://doi.org/10.1007/s11252-023-01390-4 Type: ADCA

ORAVEC, Adrián - FERUS, Peter** - KOŠÚTOVÁ, Dominika - KONÔPKOVÁ, Jana. Screening for drought resistance among ornamental maples (Acer sp.). A field experiment in juvenile plants. In

Dendrobiology, 2023, vol. 89, pp. 35-45. (2022: 0.9 - IF, Q3 - JCR, 0.277 - SJR, Q2 - SJR). ISSN 1641-1307. Available at: https://doi.org/10.12657/denbio.089.004 Type: ADMA

Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)

Online hate: Perception of hate speech by the public and experts: Insight into predictors of the perceived hate speech towards migrants

Institute: Centre of social and psychological sciences SAS

Researchers: Jana PAPCUNOVÁ - Marcel MARTONČIK - Denisa FEDÁKOVÁ - Michal KENTOŠ - BOZOGÁŇOVÁ, Miroslava - ADAMKOVIČ, Matúš a kol.

Projects: Extraordinary grant: Social Psychology Ambassadorship (The European Association of Social Psychology); APVV-20-0319; PRIMUS/20/HUM/009 (Univerzita Karlova Praha)

The study aims to find out how the general population and a group of experts (for the given issue) differ in the sensitivity of the perception of hate speech. We also wanted to examine the demographic and psychological correlates of the perception of hate speech, such as gender, age, human values, impulsivity, attitudes towards social networks, trust in institutions and attitudes towards migrants. The most important findings are that the general population is significantly less sensitive to the perception of hate speech and more often agrees with anti-migrant comments. Of the psychological variables, subjectively perceived social closeness and value orientation towards universalism, traditions and security were significant predictors.

Related publications and other outputs:

PAPCUNOVÁ, Jana - MARTONČIK, Marcel - FEDÁKOVÁ, Denisa - KENTOŠ, Michal - BOZOGÁŇOVÁ, Miroslava - SRBA, Ivan - MORO, Robert - PIKULIAK, Matúš - ŠIMKO, Marián - ADAMKOVIČ, Matúš. Hate speech operationalization: a preliminary examination of hate speech indicators and their structure. In Complex & Intelligent Systems, 2023, vol. 9, no. 3, p. 2827-2842. (2022: 5.8 - IF, Q2 - JCR, 1.138 - SJR, Q1 - SJR). ISSN 2199-4536.
Available at: https://doi.org/10.1007/s40747-021-00561-0

Anthropological documentary film A Happy Man - life and family relations of a transgender person

Institute: Institute of Ethnology and Social Anthropology SAS

Researchers: Soňa G. Lutherová

Projects: Project name

The world premiere of the anthropological documentary film A Happy Man, whose screenplay author and director is the employee of the Institute of Ethnology and Social Anthropology SAS, Soňa G. Lutherová, took place in May 2023. The documentary captures the life and family relations of a transgender man Marvin, his Slovak husband and children based in Sweden in a time-lapse storytelling. Sensitively and ethically, the film encourages the audience to think about the essence of individual identity, the functioning of the family and parenting as classic anthropological topics, which Luther has been dealing with for a long time also in her scientific activities. Institute of Ethnology and Social Anthropology SAS was the official partner of the film of a Czech-Slovak co-production (Azyl production, HBO MAX, Company F) and is distributed internationally by HBO MAX in various European countries. Currently, it will be released in distribution on the American market. The film received great media coverage at home and abroad (more than 130 media releases). As part of the release of the film in Slovakia, the human rights campaign A Happy Man (www.somstastnyclovek.sk) was created, with the participation of the personalities of Slovak social and cultural life. The world premiere of the film took place at the Hotdocs International Film Festival, the largest documentary film festival on the North American continent, in Toronto, Canada. The film was also presented at the festivals IFF Jeden svět (Czech Republic), IFF Cinematik, IFF Jeden svet, IFF Inakosti (all in Slovakia), IFF Queerfilm fest Bremen (Germany). The Slovak premiere at the Cinematik IFF was attended by the Minister of Culture Silvia Hroncová and the President of the Slovak Republic Zuzana Čaputová at the film launch ceremony in Bratislava. At the Cinematik IFF, the film won the main award in the documentary film category cinematik.doc. The film was mentioned in articles in various international culture periodicals, including the prestigious culture magazine Variety, the Canadian documentary magazine POV, and featured articles in other international online culture periodicals (e.g. Business Doc Europe). Foreign reviews (Cineuropa, Joy of movies and In the seats) and domestic reviews were published for the film: in mainstream media (Pravda, Rádio Devín); in professional magazines (film.sk) and cultural websites (Kinema.sk, Film podcast SME "Vertigo") and others. Soňa G. Lutherová completed more than a dozen interviews in the domestic and foreign press and spoke at public events, attended several public screenings with discussions in various cities in the Czech Republic and Slovakia. The media's interest in the film reflected the social urgency of the topic. In media appearances, Soňa G. Lutherová used knowledge from her numerous research on the topic of identity and family relations and thus actively presented the results of scientific activities at the Institute of Ethnology and Social Anthropology SAS. The film won the main award for the documentary film category cinematik.doc at the Cinematik International Film Festival. Soňa G. Lutherová was among the nominees for the 2023 Tatra Banka Foundation Award for Art.

Related publications and other outputs:

A Happy Man
Documentary film SK-CZ, 81 min.
Director and screenplay. Soňa G. Lutherová.
(www.somstastnyclovek.sk)

Investigating possibilities of using data from job advertisements in the prediction of basic socioeconomic indicators of the labour market

Institute: Institute of Economic Research SAS

Researchers: Miroslav Štefánik, Štefan Lyócsa, Matúš Bilka

Projects: VEGA č. 2/0150/21: Micro macro modelling in Slovak conditions. APVV-17-0329: Creation of scientific information to support labour market policies. 2018-1-DE02-KA202-005215: Discovering job Knowledge through Web Analytics towards facilitated mobility of European Professionals and Refugees Career Integration (DISKOW))

As part of the international DISKOW project and the national APVV project, we investigated the possibility of using data from job advertisements to predict basic socioeconomic indicators of the labour market, specifically the development of employment, unemployment, or vacancy statistics. Aggregated quarterly data on the number of published job advertisements proved to be a suitable predictor of the development of these indicators in a time series with quarterly periodicity. Our research pointed to new possibilities of using data from online job advertisements. The article was published in a prestigious journal focused on topics at the intersection of social and computational sciences.

Related publications and other outputs:

ŠTEFÁNIK, Miroslav** - LYÓCSA, Štefan - BILKA, Matúš. Using online job postings to predict key labour market indicators. In Social Science Computer Review, 2023, vol. 41, iss. 5, pp. 1630-1649. (2022: 4.1 - IF, Q1 - JCR, 1.662 - SJR, Q1 - SJR). ISSN 0894-4393.
Available at: https://doi.org/10.1177/08944393221085705

3.3 Results based on international cooperation

Scientific Section 1 (Physical, Space, Earth, and Engineering Sciences)

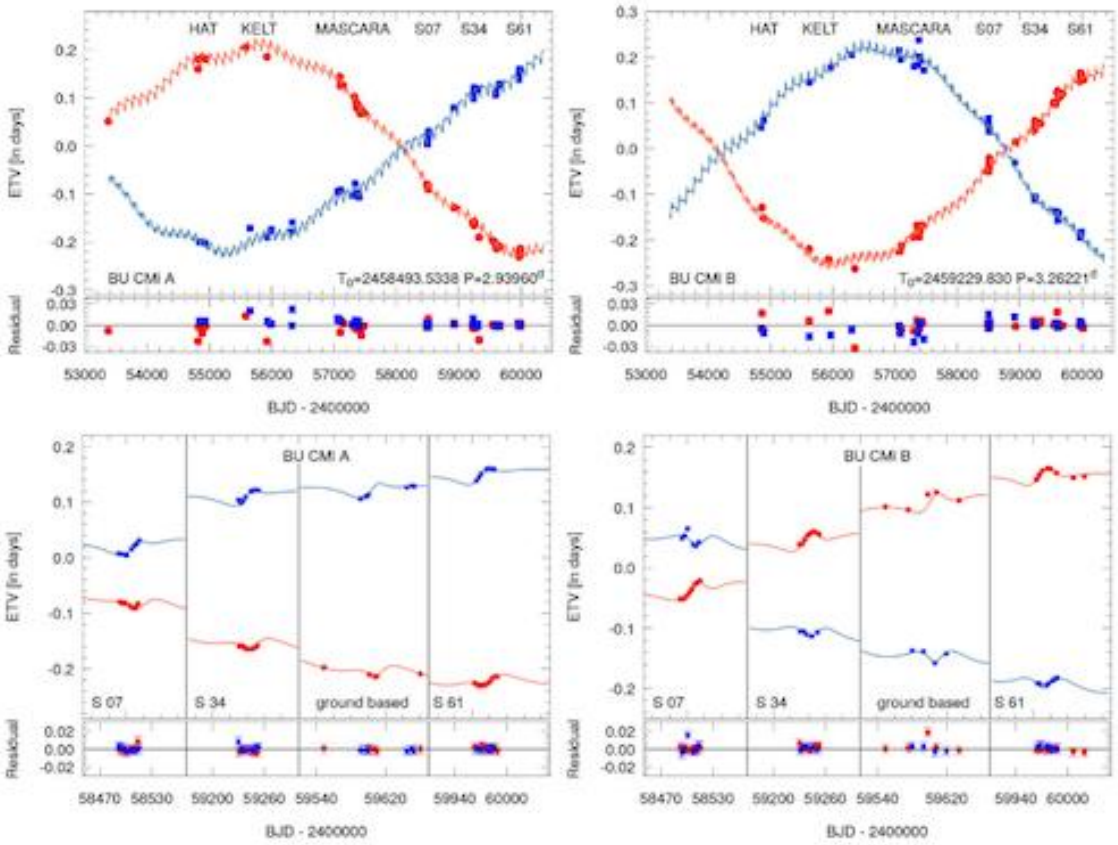
BU Canis Minoris - the Most Compact Known Flat Doubly Eclipsing Quadruple System

Institute: Astronomical Institute SAS

Researchers: Theodor Pribulla, Richard Komžík

Projects: APVV-20-0148, VEGA 2/0031/22

We have found that the 2+2 quadruple star system BU CMi is currently the most compact quadruple system known, with an extremely short outer period of only 121 days. The previous record holder was TIC 219006972 (Kostov et al. 2023), with a period of 168 days. The quadruple nature of BU CMi was established by Volkov et al., but they misidentified the outer period as 6.6 years. BU CMi contains two eclipsing binaries (EBs), each with a period near 3 days, and a substantial eccentricity of about 0.22. All four stars are within about 0.1 solar mass of 2.4 solar masses. Both binaries exhibit dynamically driven apsidal motion with fairly short apsidal periods of about 30 years, thanks to the short outer orbital period. he outer period of 121 days is found both from the dynamical perturbations, with this period imprinted on the eclipse timing variations (ETV) curve of each EB by the other binary, and by modelling the complex line profiles in a collection of spectra. We find that the three orbital planes are all mutually aligned to within 1 degree, but the overall system has an inclination angle near 83.5 degrees. We utilize a complex spectro-photodynamical analysis to compute and tabulate all the interesting stellar and orbital parameters of the system. Finally, we also find an unexpected dynamical perturbation on a timescale of several years whose origin we explore. This latter effect was misinterpreted by Volkov et al. (2021) and led them to conclude that the outer period was 6.6 years rather than the 121 days that we establish here.



Deviations from the mean orbital period for the primary (red) and secondary components (blue) of binaries A (left) and B (right). Larger symbols correspond to observations and continuous curves to the photodynamic model obtained by numerical integration. The lower two panels show the time periods of three sectors of observations from the TESS satellite and one interval of ground observations.

Related publications and other outputs:

PRIBULLA, Theodor - BORKOVITS, Tamás - JAYARAMAN, Rahul - RAPPAPORT, Saul A. - MITNYAN, Tibor - ZASCHE, Petr - KOMŽÍK, Richard - ANDRÁS, Pál - UHLÁŘ, Robert - MAŠEK, Martin - HENZL, Zbyněk - BARNA BIRÓ, Imre - CSÁNYI, István - STUIK, Remko - KRISTIANSEN, Martti H. - SCHWENGELER, Hans M. - GAGLIANO, Robert - JACOBS, Thomas L. - OMOHUNDRO, Mark - KOSTOV, Veselin B. - POWELL, Brian P. - TERENTEV, Ivan A. - VANDERBURG, Andrew - LACOURSE, Daryll M. - RODRIGUEZ, Joseph E. - BAKOS, Gáspár - CSUBRY, Zoltán - HARTMAN, Joel. BU Canis Minoris - the most compact known flat doubly eclipsing quadruple system. In Monthly Notices of the Royal Astronomical Society, 2023, vol. 524, no. 3, p. 4220-4238.

Operando Spatial and Temporal Tracking of Axial Stresses and Interfaces in Solid-state Batteries

Institute: Centre for Advanced Materials Application SAS
Researchers: Simon Mičky, Erik Šimon, Karol Végsö, Peter Krížik, Eva Majková, Peter Šiffalovič
Projects:

Solid state batteries (SSBs) are expected to be the future driving force of electromobility. Apparently, they will overcome the shortcomings of conventional lithium-ion batteries, namely their sensitivity to high temperatures combined with the safety risks of liquid electrolytes. Solid-state batteries (SSB) have the potential to improve energy density while increasing safety by replacing flammable liquid electrolytes with solid-state electrolytes (SSE). Volumetric changes caused by lithiation/delithiation in SSBs that lead to mechanical stress and subsequent cracking and loss of ion/electron conductivity should be investigated in detail, as only then can targeted strategies to mitigate these effects be developed. So far, only the average chemo-mechanical stresses in the entire battery volume have been investigated. To probe real-time voltage distributions at the micro- or even nanoscale, scanning high-energy X-ray diffraction (HEXRD) has proven to be a suitable technique for studying the phenomena of changing voltage fields in SSBs. In this paper, we present the application of synchrotron scanning HEXRD to monitor the spatiotemporal evolution of voltage fields in SSB. In our study, we used an archetypal SSB system based on a pressed sulfide SSE located between a layered LiNi0.8Co0.15Al0.05O2 (NCA) cathode and a Li metal anode. Since a high production pressure is used to densify the cathode and SSE layers, followed by a relatively lower operating pressure required for optimal battery operation, it is highly desirable to examine the breakdown voltage distribution during SSB operation in detail. Our study revealed that the total stress field consists of residual stresses resulting from the high production pressure during compaction of the SSE and cathode powders, which overlap with the stress field induced by the battery stack pressure. This field can be conveniently measured using external strain gauges, while residual stresses induced by cold pressing are not available with conventional external techniques. Non-monotonic residual stress fields, which are usually a combination of tensile and compressive stresses, are naturally present in cold-pressed solids. The X-ray mapped stress fields showed a non-monotonic behaviour, which is due to the cold pressing manufacturing process. The time evolution during the electrochemical cycle showed the formation of a tensile stress region in the Li-SSE interface region. This effect can have several causes related to the formation of Li dendrites. Furthermore, the magnitude of the voltages decreased with increasing cycling time, as the lithium transported between the anode and cathode leads to their relaxation. In addition, monitoring the diffraction intensity of SSE allowed us to track the degradation of the Li-SSE interface. Finally, we monitored the volume changes in the unit cell of the cathode material to complete the study and obtain a complete picture of the lithiation/delithiation of the cathode material. To our knowledge, this is fundamental research on the development of spatially resolved voltages during SSB

operation. The mentioned work was created based on scientific cooperation with the University of Leoben (Austria) and the Massachusetts Institute of Technology (USA).

Related publications and other outputs:

Mičky, S., Šimon, E., Todt, J., Végsö, K., Nádaždy, P., Krížik, P., Majková, E., Keckes, J., Li, J., Siffalovic, P., Mičky, S., Šimon, E., Végsö, K., Krížik, P., Majková, E., Siffalovic, P., Nádaždy, P., Todt, J., Keckes, J., & Li, J. (2023). Operando Spatial and Temporal Tracking of Axial Stresses and Interfaces in Solid-state Batteries. Small, 2307837.
https://doi.org/10.1002/SMLL.202307837

The outlook of studying quantum effects in 2D material systems

Institute: Institute of Experimental Physics SAS

Researchers: M. Gmitra, J. Kačmarčík, Z. Pribulová

Projects: APVV-SK-CZ-RD-21-0114, FLAG ERA JTC 2021 2DSOTECH, EU H2020 European Microkelvin Platform No. 824109, IMPULZ IM-2021-42, APVV-20-0425, VEGA 2/0058/20, VEGA 1/0105/20

In the paper [1], we present the first systematic study of quantum oscillations of specific heat using high-quality natural graphite. We found out that the intersection of the Landau level with the Fermi energy gives rise to a two-peak structure in the specific heat, rather than the usual single peak observed using other methods. The paper [2] deals with the study of Ge1-xMnxTe multiferroic materials. The study revealed that the material has ferrimagnetic ordering characteristics that offer greater flexibility in controlling the orientation of magnetization as one of the essential characteristics in the design of modern technologies. We dealt with the study of the electronic structure and electron-spin resonance of graphite in work [3]. We proved that spins injected by polarization perpendicular to the planes of graphene have extremely long lifetimes, 100 ns at room temperature, and the extreme spin diffusion length of 70 µm across the planes of graphite suggests that graphite thin films can be excellent platforms for spintronic applications. Proximally induced spin-orbit interaction in graphene deposited on a TaS2 monolayer was studied theoretically in work [4]. The calculations showed that the charge wave in TaS2 has a significant effect on the radial component of the spins of the Dirac electrons, which can be used in the design of spintronic devices using the collinear Rashbov-Edelstein effect in charge-to-spin conversion. Structural defects in TaS2 were studied using scanning tunnelling microscopy and spectroscopy in [5]. We identified several types of defects that we modelled theoretically and described their characteristic manifestations in the measured local density of states. The study revealed a cross-correlation between the charge modulation due to S-defects and the shift of the Hubbard bands.

Related publications and other outputs:

[1] Z. Yang, B. Fauqué, T. Nomura, T. Shitaokoshi, S. Kim, D. Chowdhury, Z. Pribulová, J. Kačmarčík, A. Pourret, G. Knebel, D. Aoki, T. Klein, D. K. Maude, Ch. Marcenat, Y. Kohama: Unveiling the double-peak structure of quantum oscillations in the specific heat.
Nature Communications 14 (2023) 7006, IF = 16.6, Nature Index

[2] J. Krempaský, G. Springholz, S.W. D'Souza, O. Caha, M. Gmitra, A. Ney, C.A.F. Vaz, C. Piamonteze, M. Fanciulli, D. Kriegner, J.A. Krieger, T. Prokscha, Z. Salman, J. Minár, J.H. Dil: Efficient magnetic switching in a correlated spin glass.
Nature Communications 14 (2023) 6127, IF = 16.6, Nature Index

[3] B.G. Márkus, M. Gmitra, B. Dóra, G. Csősz, T. Fehér, P. Szirmai, B. Náfrádi, V. Zólyomi, L. Forró, J. Fabian, F. Simon: Ultralong 100 ns spin relaxation time in graphite at room temperature.
Nature Communications 14 (2023) 2831, IF = 16.6, Nature Index

[4] K. Szałowski, M. Milivojević, D. Kochan, M. Gmitra: Spin–orbit and exchange proximity couplings in graphene/1T-TaS2 heterostructure triggered by a charge density wave
2D Materials 10 (2023) 025013, IF = 5.5, Q1

[5] I. Lutsyk, K. Szalowski, P. Krukowski, P. Dabrowski, M. Rogala, W. Kozlowski, M. Le Ster, M. Piskorski, D. A. Kowalczyk, W. Rys, R. Dunal, A. Nadolska, K. Toczek, P. Przybysz, E. Lacinska, J. Binder, A. Wysmolek, N. Olszowska, J.J. Kolodziej, M. Gmitra, T. Hattori, Y. Kuwahara, G. Bian, T. Chiang, P. J. Kowalczyk: Influence of structural defects on charge density waves in 1T-TaS2.
Nano Research 16 (2023) 11528–11539, IF = 9.9, Q1

Scientific Section 2 (Life, Chemical, Medical, and Environmental Sciences)

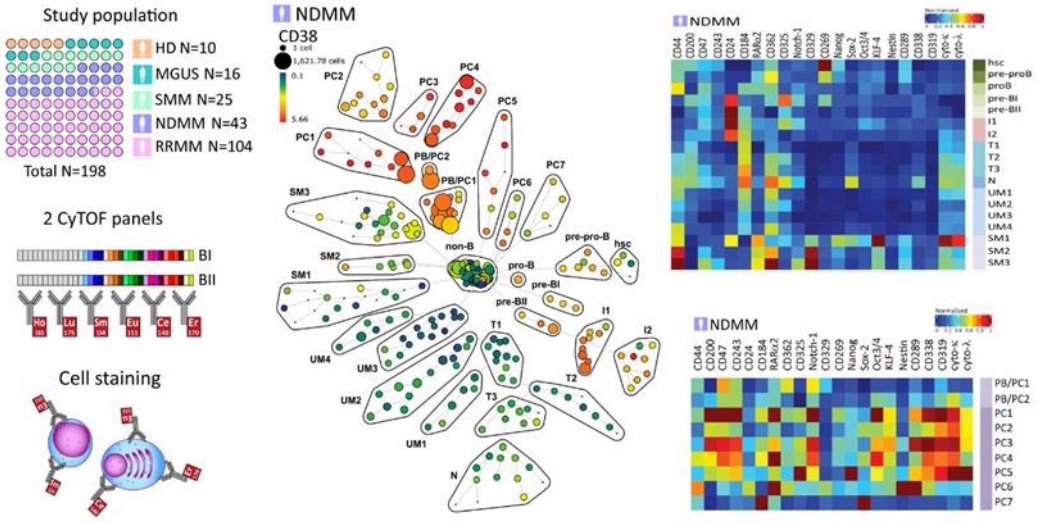
Characterization of the molecular and cellular profile of multiple myeloma and Waldenström macroglobulinemia patients using advanced mass cytometry technology to elucidate mechanisms of disease progression and enable personalized treatment

Institute: Biomedical Research Center SAS, Cancer Research Institute
Researchers: Jana Jakubíková, Dana Cholujová
Projects: APVV-16-048, APVV-19-0212, APVV-20-0183, MZ SR 2019/14-BMCSAV-9, VEGA 2/0144/20, VEGA 2/0147/20

Multiple myeloma (MM) is a bone cancer that causes the formation of abnormal specific white blood cells called plasma cells from B cells. Despite progress in elucidating the biology of MM, it is still an incurable disease. It is believed that genetic and molecular errors that occur during the development of hematopoiesis in the bone marrow contribute to the formation of tumour cells. In individual MM patients, tumours are composed of different cells (the so-called subclones) with different molecular and biological properties, clinical aggressiveness and different growth rates. As a result of therapy, the composition of subclones changes, with aggressively resistant subclones surviving and contributing to disease relapse.

Using mass cytometry, we analyzed cellular and signalling profiles of tumour subclones of plasma cells as well as total B cell hematopoiesis in bone marrow samples of patients from premalignant to active stages of MM to elucidate the intraclonal heterogeneity of MM. Our results showed that the prognosis of the disease is associated with changes in the levels of regulators of B cell signalling and differentiation, surface and stem features as well as the tumour microenvironment.

The study points to the importance of accurate molecular profiling of patients using mass cytometry to determine disease heterogeneity and prognosis, which is a prerequisite for new effective therapies directed against all coexisting tumour subclones for complete tumour eradication in individual patients at a personalized level.



Output from the analysis of molecular and cellular profiling of patients using mass spectrometry

Related publications and other outputs:

JAKUBÍKOVÁ, Jana** - CHOLUJOVÁ, Dana - BEKE, Gábor - HIDESHIMA, Teru - KĽUČÁR, Ľuboš - LEIBA, Merav - JAMROZIAK, Krzysztof - RICHARDSON, Paul G. - KASTRITIS, Efstathios - DORFMAN, David - ANDERSON, Kenneth C. Heterogeneity of B cell lymphopoiesis in patients with premalignant and active myeloma. In JCI Insight, 2023, vol. 8, no. 3, art. no. e159924. (2022: 8 - IF, Q1 - JCR, 3.277 - SJR, Q1 - SJR).

CHOLUJOVÁ, Dana - BEKE, Gábor - HUNTER, Zachary R. - HIDESHIMA, Teru - FLORES, Ludmila - ZELEZNIKOVA, Tatiana - HARRACHOVA, Denisa - KĽUČÁR, Ľuboš - LEIBA, Merav - DRGOŇA, Ľuboš - TREON, Steven P. - KASTRITIS, Efstathios - DORFMAN, David M. - ANDERSON, Kenneth C. - JAKUBÍKOVÁ, Jana**. Dysfunctions of innate and adaptive immune tumor microenvironment in Waldenström macroglobulinemia. In International Journal of Cancer, 2023, vol. 152, no. 9, p. 1947-1963. (2022: 6.4 - IF, Q1 - JCR, 2.259 - SJR, Q1 - SJR). ISSN 0020-7136.

Atom Transfer Radical Polymerization of 2-Isopropenyl-2-Oxazoline in Solution and from the Surface of Carbonyl Iron Particles toward Fabrication of a Cytocompatible Magneto-Responsive Hybrid Filler

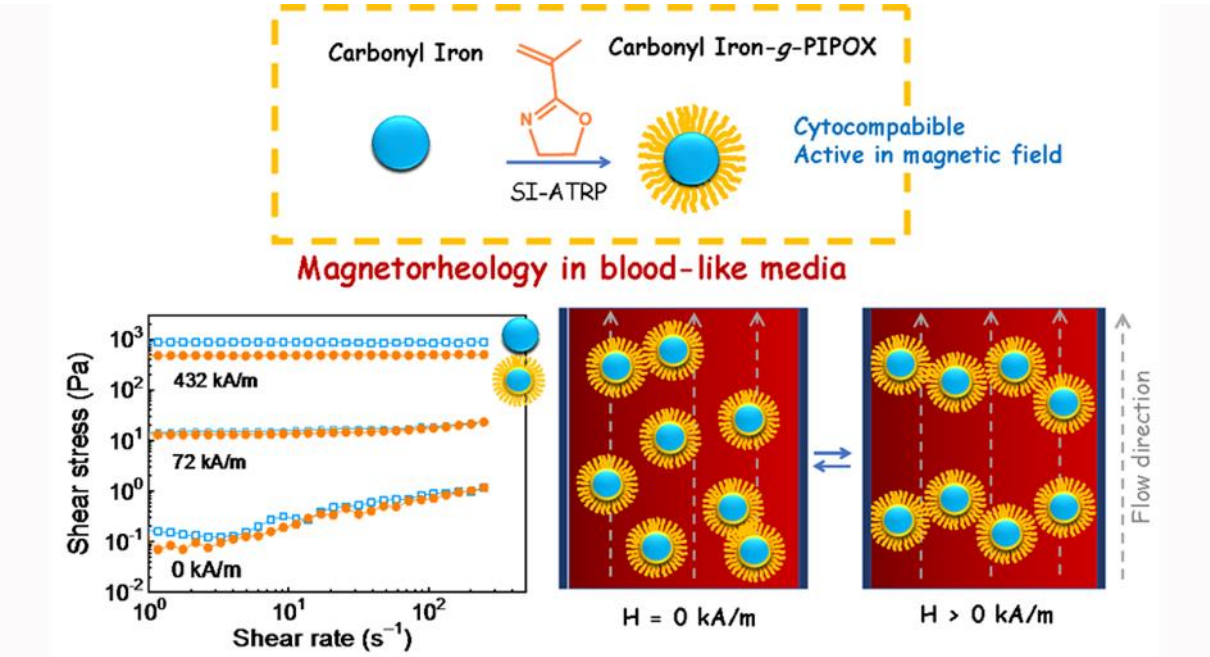
Institute: Polymer Institute SAS

Researchers: M. Ilčíková, D. Bondarev, Z. Kroneková, J. Kronek, J. Mosnáček

Projects: VEGA 2/0161/20, VEGA 2/0172/21, APVV-19-0338

Modern polymerization techniques, such as atom transfer radical polymerization (ATRP), allow control over the molecular characteristics, architecture, and functional groups of

polymer chains and thus the synthesis of polymers with properties tailored to a specific application. The ATRP of 2-isopropenyl-2-oxazoline was optimized in terms of the type of initiator, ligand, copper catalyst and solvent in order to obtain polymers with well-defined molecular weight and low dispersion. Poly(2-isopropenyl-2-oxazoline) (PIPOx) was prepared with controlled molar weights up to 20,000 g/mol and dispersion in the range of 1.2–1.5, while high conversions could be achieved. Polymerization conditions using halogen exchange leading to well-defined PIPOx were also developed and used for surface-initiated ATRP applied to the synthesis of magnetic CI-PIPOx particles. As proof of the applicability of such hybrid particles, the particles were dispersed in phosphate-buffered saline and glycerol to obtain a magnetorheological fluid with blood-like properties. Magnetorheological studies demonstrated that the non-cytotoxic CI-PIPOx particles provided sufficient yield strength values to act as an embolization agent. These materials have potential use in the need to quickly stop bleeding or in the targeted blocking of blood vessels, while the process can be reversibly controlled by switching the magnetic field on and off.



Related publications and other outputs:

ILČÍKOVÁ, Markéta** - MRLÍK, Miroslav - CVEK, Martin - BONDAREV, Dmitrij - KRONEKOVÁ, Zuzana - KRONEK, Juraj - KASÁK, Peter - MOSNÁČEK, Jaroslav**. Atom transfer radical polymerization of 2-isopropenyl-2-oxazoline in solution and from the surface of carbonyl iron particles toward fabrication of a cytocompatible magneto-responsive hybrid filler. In Macromolecules, 2023, vol. 56, p. 3904-3912. (2022: 5.5 - IF, Q1 - JCR, 1.461 - SJR, Q1 - SJR). ISSN 0024-9297.

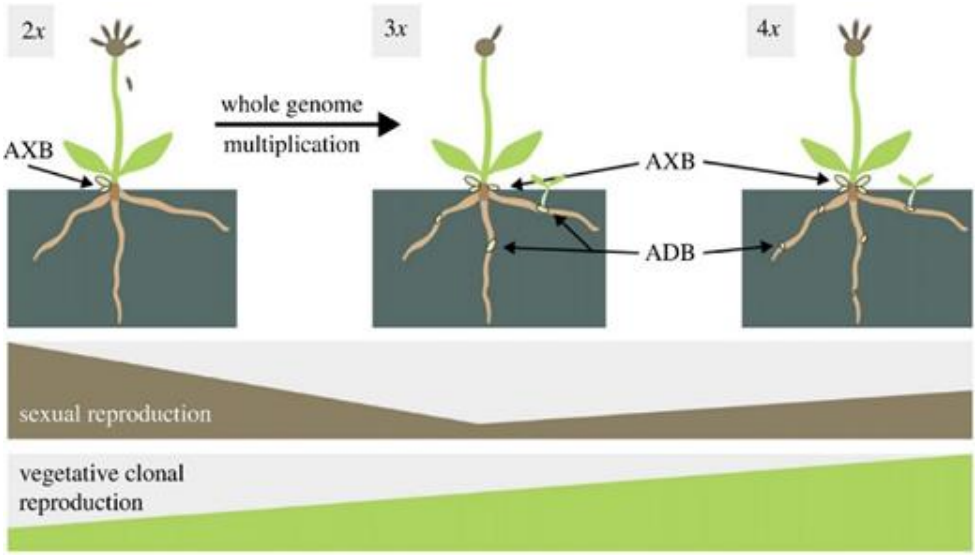
The novel expression of clonality following whole-genome multiplication compensates for reduced fertility in natural autopolyploids

Institute: Plant Science and Biodiversity Centre SAS, Institute of Botany

Researchers: Barbora Šingliarová

Projects:

The result was based on the author's long-term cooperation with Dr. P. Mráz from Charles University in Prague and Prof. H. Mueller-Schaerer, who led the research group at the University of Fribourg, Switzerland. In the past, Dr. Šingliarová completed a research stay in the mentioned group supported by the Swiss-Slovak scholarship fund. Considering the widespread polyploids (multiplication of chromosome sets) and their fundamental importance in the evolution of vascular plants, it is paradoxical how little we still know about which evolutionary mechanisms allow newly formed autopolyploids to successfully establish themselves in nature. Our study provides empirical evidence for the impacts of whole-genome multiplication on sexual and vegetative reproduction in the model species Pilosella rhodopea (Asteraceae) with repeated formation of neo-autopolyploids in mixed populations. Although whole-genome multiplication greatly reduces the fecundity of autopolyploids, this negative effect is compensated by increased vegetative growth through increased production of axillary rosettes and adventitious rosette production from roots—a feature never observed in parental diploids. Although quantitative differences between cytotypes have already been reported, our study is the first to demonstrate the expression of a novel vegetative clonal trait in autopolyploids. This qualitative and quantitative shift to increased clonality literally changes the evolutionary "game" by giving autopolyploids a chance to take hold, survive and spread in originally diploid populations. Our study shows how whole-genome multiplication can immediately and substantially change the plant phenotype and provides a perspective for further in-depth investigation of the underlying (epi)genetic and physiological mechanisms of this fascinating phenotypic change.



Graphical summary of the qualitative and quantitative consequences of whole-genome multiplication on sexual and vegetative reproduction in the natural autopolyploids Pilosella rhodopea. AXB - axillary buds that form on the stems and in the axils of rosette leaves, and from which axillary rosettes are formed. ADB - adventitious buds on the roots, which form adventitious rosettes (root buds)

Related publications and other outputs:

ŠINGLIAROVÁ, Barbora - HOJSGAARD, Diego - MÜLLER-SCHÄRER, Heinz - MRÁZ, Patrik. The novel expression of clonality following whole-genome multiplication compensates for reduced fertility in natural autopolyploids. In Proceedings of the Royal Society: B : Biological Sciences, 2023, vol. 290, no. 2001, art. no. 20230389. (2022: 4.7 - IF, Q1 - JCR, 1.898 - SJR, Q1 - SJR). ISSN 0962-8452. Available at:
https://royalsocietypublishing.org/doi/10.1098/rspb.2023.0389
https://www.nature.com/nature-index/article/10.1098/rspb.2023.0389

Scientific Section 3 (Social Sciences, Humanities, Arts, and Culture)

Modern perspectives on political thinkers and the Slovak political system

Institute: Institute of Political Science SAS

Researchers: Dirk Dalberg, Astrid Lorenz, et al.

Projects:

German political scientist Dirk Mathias Dalberg established cooperation with the Institute of Political Science SAS within the SASPRO programme. In 2023, he published an extensive monograph on Czech and Slovak political thinkers from 1968-1989 and compiled a modern collective work on the political system of Slovakia.
Monograph [1] deals with the least researched questions of the history of political thought of the left-oriented representatives of the Czechoslovak dissent from Charter 77 and its close collaborators. The subject of the author's research is the works of Czech dissidents - philosopher, novelist and poet Egon Bondy (1930-2007), publicist and human rights activist Petr Uhl (1941-2021), Slovak philosopher Miroslav Kusý (1931-2019) and Czech philosopher Milan Šimečka (1930- 1990), who worked in Slovakia. They criticized the political practice of normalizing Czechoslovakia from Marxist positions and, at the same time, tried to formulate a positive programme. While Uhl and Bondy stuck to Marxist principles, Kusý and Šimečka identified with the values of liberal democracy. Dalberg's work contributes to the theory of democracy and the history of ideas, while also focusing on the transfer of ideas between individual parts of Europe.

The collective publication [2] is the result of the cooperation of the Institute of Political Science SAS and the University of Leipzig and offers in-depth analysis and up-to-date information on the trends in the development of the political system in Slovakia. It documents the growing strategic importance of Slovakia's membership in the EU and NATO. Individual chapters are devoted to historical, international, economic, socio-political, legal and cultural aspects affecting the shape of the political system of the Slovak Republic after the fall of the communist regime in 1989.

Dalberg (as chief editor) and J. Marušiak participated in the preparation of the publication from the Institute of Political Science SAS, and A. Lorenz (author and co-editor) from Leipzig. From other SAS institutes, it was S. Mihálíková and M. Mrva (Institute for Sociology SAS) and K. Frank (Institute of Economic Research SAS). The international nature of the collective of authors is underlined by the participation of authors from Slovakia, Germany, the Czech Republic and Poland.

The innovative contribution of the mentioned publication is that in the German-speaking environment, but also abroad, it is the first comprehensive work on the investigated issue

after more than two decades since the publication of the work of the German political scientist Rüdiger Kipke "Die Politischen Systeme Tschechiens und der Slowakei. Eine Einführung" (Wiesbaden: VS Verlag für Sozialwissenschaften 2002), which, however, had more of a textbook character. Unlike it, the publication edited by D. Dalberg and A. Lorenz offers an interdisciplinary perspective, as its authors are not only political scientists but also specialists in the fields of sociology, law, international relations, security studies and economics.

Link to the book: https://link.springer.com/book/10.1007/978-3-658-42633-0#about-this-book

Related publications and other outputs:

[1] DALBERG, Dirk Mathias : Politisches Denken im tschechoslowakischen Dissens : Egon Bondy, Miroslav Kusý, Milan Šimečka und Petr Uhl (1968-1989). Stuttgart : Ibidem - Verlag, 2023. 542 s. Soviet and Post-Soviet Politics and Society, 264. ISBN 978-3-8382-1318-7

[2] DALBERG, Dirk Mathias – LORENZ, Astrid (eds.): Das politische System der Slowakei. Konstante Kurswechsel in der Mitte Europas. Wiesbaden: Springer VS. ISBN: 978-3-658-42632-3; eBook ISBN: 978-3-658-42633-0, 296 s. DOI: https://doi.org/10.1007/978-3-658-42633-0

New perspectives on the childhood phenomenon in the Bohemian lands and Slovakia in the 19th and 20th centuries

Institute: Institute of History SAS

Researchers: Gabriela Dudeková Kováčová, Ingrid Kušniráková

Projects: Collaboration project Collegium Carlinum Munich – Institute of History SAS

Long-term international cooperation between the Institute of History SAS and the Munich institute Collegium Carolinum with the participation of experts from other institutes abroad resulted in a publication in the prestigious foreign publishing house Vandenhoeck & Ruprecht. The employees of the Institute of History SAS (Gabriela Dudeková Kováčová and Ingrid Kušniráková) joined as authors and editors. The publication Variations and Transformations of Childhood in the Bohemian Lands and Slovakia (Edited by Frank Henschel, Jan Randák, Martina Winkler, Gabriela Dudeková Kováčová), 2023, brings several new perspectives on the phenomenon of childhood in the Bohemian lands and Slovakia in the 19th and 20th centuries. At the same time, it opens up the possibility of developing the history of childhood as a new direction of research, which – unlike the historiographies of other European countries – is not yet established in Slovakia. The publication follows the international conference on the history of childhood, which was conceptually prepared by its editors under the title Kindheiten in den böhmischen Länder und der Slowakei: Jahrestagung des Collegium Carolinum, and which the Collegium Carolinum institute organized in November 2019 in cooperation with the Institute of History SAS, the Faculty of Arts of the Charles University in Prague and the Christian Albrecht Universität in Kiel, in which several employees of the Institute of History SAS actively

participated (Gabriela Dudeková Kováčová, Ingrid Kušniráková, Marína Zavacka and Peter Macho).

Related publications and other outputs:

Variations and Transformations of Childhood in the Bohemian Lands and Slovakia : Proceedings of the Annual Conference of Collegium Carolinum Fischbachau, 7-10 November 2019. Edited by Frank Henschel, Jan Randák, Martina Winkler, Gabriela Dudeková Kováčová. 1st edition. Göttingen : Vandenhoeck & Ruprecht, 2023. 230 p. Bad Wiesser Tagungen des Collegium Carolinum, Band 42. ISBN 978-3-525-37318-7. ISSN 2190-1376 (Kindheiten in den böhmischen Ländern und der Slowakei : Jahrestagung des Collegium Carolinum)
https://www.collegium-carolinum.de/en/events/annual-conferences/translate-to-englisch-einzelansicht/jahrestagung-2019.

Multidisciplinary and transnational research on the late medieval culture of the Luxembourg court

Institute: Art Research Centre of SAS

Researchers: Ingrid Ciulisová, et al.

Project: Soe/2017/72.C/MOCAHIC : Seal of Excellence programme

The Luxembourg family (1308 - 1437) is known today mainly thanks to its leading royal and imperial representatives, Henry VII, John of Bohemia, Charles IV. and Charles' two sons, Wenceslas and Sigismund - monarchs who, for better or for worse, shaped the political fate of a large part of Europe in the 14th and early 15th centuries. Although some of the cultural legacy of the Luxembourg family can still be directly experienced today in and around Prague and southern Germany, and through the literary and musical works of Machaut, Froissart and Wolkenstein, in addition to the dynasty's home countries in today's Luxembourg, Belgium and France, they affected a much wider European area: from England to today's Romania and from the Baltic Sea to the Italian peninsula. However, this culture has not always attracted the scientific attention it deserves. The project output is an extensive collection of English essays dedicated to the cultural achievements and politics of one of the most important ruling families of late medieval Europe. The collection examines the pan-European influence and activity of the Luxembourg family in various fields: the history of art and architecture, material culture, Czech, French, German and Latin text production, gender and intellectual history, and music. The published essays offer new perspectives on the late medieval cultures of the Luxembourg court from a multidisciplinary and transnational perspective; e.g. the creation of the "Wenceslas Bible"; Machaut at the court of John of Luxembourg; and the patronage of Charles IV. over multilingual literature.

Related publications and other outputs:

Luxembourg Court Cultures in the Long Fourteenth Century : Performing Empire, Celebrating Kingship. Edited by Karl Kügle, Ingrid Ciulisová and Václav Žůrek. Woodbridge : The Boydell Press, 2023. 508 s.

the Creative Commons license CC BY-NC-ND. Available on the Internet:
https://library.oapen.org/handle/20.500.12657/86008. ISBN 978-1-80543-218-0

CIULISOVÁ, Ingrid. Charles of Luxembourg and his Reliquary Cross : The Significance of Precious Stones. In Luxembourg Court Cultures in the Long Fourteenth Century : Performing Empire, Celebrating Kingship. - Woodbridge : The Boydell Press, 2023, s. 137-173. ISBN 978-1-80543-218-0. Available on the Internet: https://library.oapen.org/handle/20.500.12657/86008

CIULISOVÁ, Ingrid - ŽŮREK, Václav. Introduction : The ‘Long Luxembourg Century' (1308–1437): Courtly Networks, Cultural Politics, Dynastic Legacy. In Luxembourg Court Cultures in the Long Fourteenth Century : Performing Empire, Celebrating Kingship. - Woodbridge : The Boydell Press, 2023, s. 1-17. ISBN 978-1-80543-218-0.
Available on the Internet: https://library.oapen.org/handle/20.500.12657/86008

4 EDUCATIONAL ACTIVITIES AND SUPPORT OF PHD STUDENTS

SAS INSTITUTES actively participate in third-level higher education (doctoral studies) as external educational institutions based on framework agreements concluded with individual universities and their faculties. After the entry into force of the amendment to Act No. 131/2002 Coll. on Higher Education and Act No. 269/2018 Coll. on Quality Assurance in Higher Education, the SAS has created a separate internal quality assurance system for doctoral studies. It focuses on the quality of the institutional environment, the quality of potential supervisors and, finally, the quality of the outputs of the doctoral students themselves.

The SAS institutes continue in the process of concluding "Framework agreements on cooperation with an external educational institution by participating in the implementation of doctoral study programmes" with the relevant universities. Currently, SAS institutes have concluded 114 agreements on doctoral studies with the faculties of universities in the Slovak Republic. The most important partners of SAS institutes in doctoral studies are the Comenius University (53 agreements), the Slovak University of Technology (16 agreements), and Pavol Jozef Šafárik University in Košice (13 agreements). These universities are ranked best in international rankings. An overview of the number of agreements with universities and their faculties is presented in Table no. X.

Development of the number of researchers and PhD students.

The number of SAS researchers decreased slightly last year, but globally, it is slightly increasing. The number of PhD students has stabilized in the last five years (Fig. 4.1).

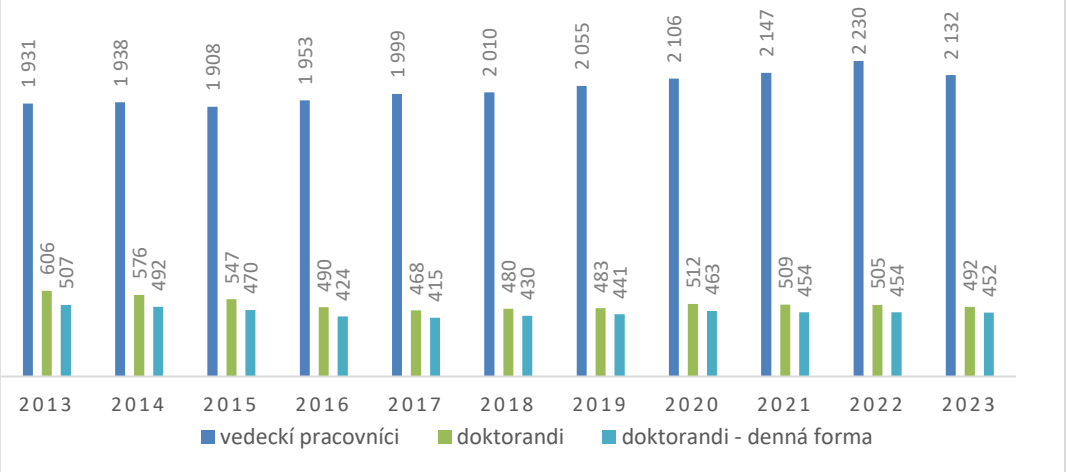


Fig. 4.1: *Development of the number of researchers and PhD students in 2013-2023*

Table 4.1: *The number of framework agreements with an external educational institution for participation in the implementation of PhD study programmes concluded on 31.12. 2023*

University	**Faculty**	No. of agreements
Comenius University in Bratislava	Faculty of Mathematics, Physics and Informatics	7
	Faculty of Natural Sciences	16
	Faculty of Medicine	3
	Jessenius Faculty of Medicine	1
	Faculty of Physical Education and Sport	1
	Faculty of Pharmacy	1
	Faculty of Arts	17
	Faculty of Law	1
	Faculty of Social and Economic Sciences	6
Slovak University of Technology in Bratislava	Faculty of Electrical Engineering and Information Technology	4
	Faculty of Informatics and Information Technologies	1
	Faculty of Civil Engineering	2
	Faculty of Mechanical Engineering	2
	Faculty of Materials Science and Technology in Trnava	1
	Faculty of Chemical and Food Technology	6
University of Economics in Bratislava	Faculty of Economics and Finance	3
Slovak University of Agriculture in Nitra	Faculty of Biotechnology and Food Sciences	1
	Faculty of Horticulture and Landscape Engineering	2
Constantine the Philosopher University in Nitra	Faculty of Natural Sciences and Informatics	1
	Faculty of Arts	3
University of Trnava	Faculty of Arts	3
Technical university in Zvolen	Faculty of Ecology and Environmental Sciences	1
	Faculty of Forestry	1
Matej Bel University in Banská Bystrica	Faculty of Arts	2
Pavol Jozef Šafárik University in Košice	Faculty of Science	10
	Faculty of Arts	3
Technical University of Košice	Faculty of Materials, Metallurgy and Recycling	4
	Faculty of Mechanical Engineering	1
	Faculty of Metallurgy	1
	Faculty of Electrical Engineering and Information Technology	2
University of Veterinary Medicine and Pharmacy in Košice		5
University of Žilina	Faculty of Civil Engineering	1

Alexander Dubček University of Trenčín		1

In 2023, SAS institutes trained a total of 492 PhD students (203 males (m) and 289 females (f)). 452 PhD students (166 m and 246 f) were enrolled full-time and 40 part-time (14 m and 26 f). There were 121 newly admitted PhD students for full-time doctoral studies with a topic assigned by SAS (50 m and 71 f). The number of foreign PhD students slightly increased. Their share in the total number of students is 29% (Fig. 4.2). The main obstacle to the faster internationalization of doctoral studies is the lengthy and complicated processing of the necessary documents by third-world applicants. Last year, several accepted PhD students from third countries did not enrol after all, because they did not get an entry visa even after several months. To facilitate the immigration process, a Euraxess point was established at the SAS in 2020. Its employees assist foreign students in preparing the necessary documents.

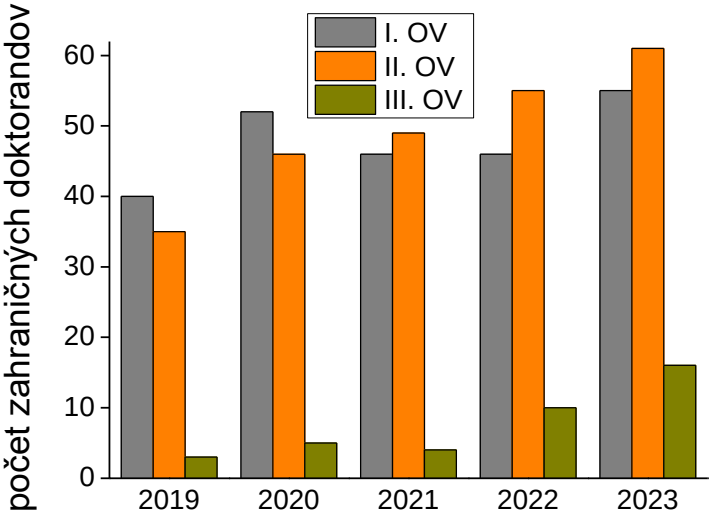


Fig. 4.2 *Development of the number of foreign PhD students by science sections (OV) in 2019-2023*

101 PhD students (40 m and 61 f) completed their doctoral studies with a successful thesis defence. 52 of them were employed in research (SAS, University, abroad), 23 outside research within their field, and 3 outside their field. In 23 cases, SAS institutes do not have information about the practical application of their PhD graduates.

After stagnation in 2014-2016, the net monthly income of PhD students began to grow and in 2023, reached € 915.50 before and € 1,066 after the dissertation exam. From 1.9. 2023, the

scholarships were revised and reached the amount of € 1,025.50 before and € 1,194 after the dissertation exam. (Fig. 4.3). This scholarship amount was guaranteed to all students from central sources. Individual institutes can increase scholarships for specific PhD students, e.g. based on good performance. In 2022, the Presidium of SAS approved the Criteria for motivational fellowship for PhD students. Students who will achieve exceptional results during their doctoral studies will be awarded a motivational scholarship from 2023, which will be paid together with the standard scholarship in December. For the year 2023, this scholarship in total amount of € 153,000 was awarded to 153 PhD students.

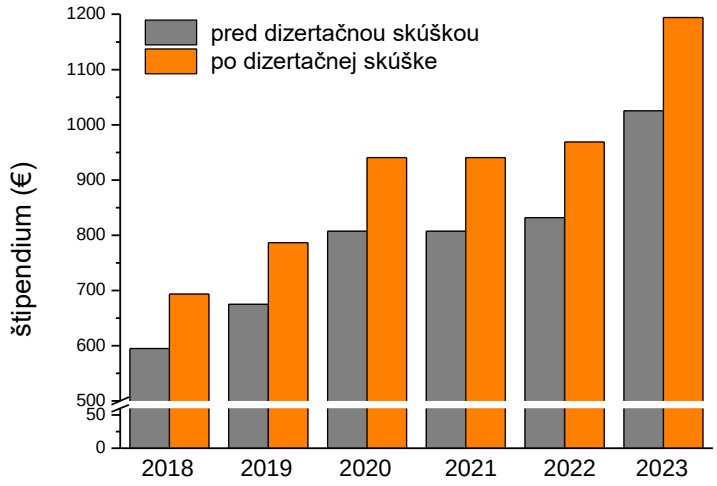


Fig. 4.3: *Development of the net monthly income of PhD students before and after the completion of the dissertation exam in 2018-2023*

After starting a job at SAS, the fresh PhD graduates will have their net monthly table income reduced compared to the scholarship. Under the regulation of the Government of the Slovak Republic establishing increased scales of salaries for employees performing work in the public interest with effect from 1. 9. 2023, the basic starting net salary was € 1,029 (in salary class T8 of the salary scale and salary level 3 according to Annex No. 3 to the Decree of the Government of the Slovak Republic No. 296/2022 Coll.). To continue to motivate and support young scientists, the SAS provided the opportunity to receive a competitive compensation allowance of € 150/month in 2023. SAS Presidium increased the institutes´ wage fund by € 75 and € 75 was provided by the institute from its own funds. In 2023, 14 graduates received a compensation allowance.

SAS also supports young scientists through the Štefan Schwarz Support Fund.

Institutes employing successful applicants will receive from central sources a wage fund in the

amount of 100% of the tariff salary in salary class T8 of the salary scale and salary level 4, including levies, and the scholarship holders will receive an additional payment from the institute for two years (with the possibility of extension by one year) to the salary of at least € 300 per month. In 2023, 20 PhD students (9 m and 11 f) from 16 institutes received a grant. The SAS Presidium approved the extension of the scholarship from the Štefan Schwarz Support Fund for 5 applicants (m).

PhD students studying at SAS have the opportunity to complete the so-called soft skill training every year and develop skills necessary for an academic and/or non-academic career. In 2023, courses were offered on communication and presentation skills, ethics and integrity of scientific work, writing grant proposals, time management, basics of business skills, transfer of knowledge to practice and copyright protection, and recognition of predatory journals and conferences. Courses are offered in Slovak and English. In 2023, a lecture and discussion called "The power of decency. Good manners and nobility in a changing world" was organized for the Academy's PhD students.

An important part of preparing for an academic career is the Doktogrant programme, whose successful applicants can receive € 2,000 for a one-year scientific project related to the topic of their dissertation. By participating in the project, students practically learn to write a grant application, manage the grant budget and write a final report for the project. In 2022, 44 out of a total of 88 applicants received this grant.

In 2022, an all-academic PhD seminar was established, and in 2023, selected representatives from each scientific section presented and discussed the results of their work. These meetings on a three-month basis are an opportunity for the PhD students to get to know each other and, thanks to their work, gain an overview of what their young colleagues are doing within the individual institutes.

PhD students and young researchers under the age of 35 compete annually in intra-academic competitions for the best publication or set of publications. SAS brings standard high quality, which is reflected by success in national competition

The Student Personality of Slovakia is a national competition of young talented people, students of the first, and second level of university studies or third level - PhD students. PhD students of the SAS were also awarded for the academic year 2022/2023. Mgr. Fridrich Egyenes, PhD. from the Institute of Electrical Engineering SAS became the student personality of the year in the category of Electrical engineering and industrial technologies. Mgr. Aneta Ševčíková from the Biomedical Research Center SAS was awarded

in the category of Medical Sciences and Mgr. Vladimír Held, PhD, from the Institute of Physics SAS in the Informatics and Mathematical-Physical Sciences category.

Within the ESET Science Award, the international jury headed by the Nobel laureate Michel Mayor selected Matej Baláž, who works at the Institute of Geotechnics SAS, in the category

Exceptional Young Scientist in Slovakia under the Age of 35, based on a complex evaluation process. He is also the first Slovak to be a member of the prestigious Young Academy of Europe.

They founded the "Danubius Awards" in 2011 to recognize individuals who, through their exceptional academic work, deal with the Danube region. In the "Danubius Young Scientist Awards" category, which highlights the scientific work and talent of young researchers and supports their involvement in the research of the Danube and the Danube region, Dominika Oravkinová from the Institute of Archaeology SAS was awarded.

In November 2023, a regular meeting of PhD students at SAS was held with the member of the SAS Presidium for scientific education and training, Prof. RNDr. Ľubica Lacinová, DrSc. The event was preceded by a meeting of directors of SAS institutes and centres and SAS PhD degree guarantors. These regular meetings aim to evaluate the past academic year, information on the number of PhD students, scholarships, news awaiting PhD students in the new academic year, or what remains unchanged in the organization of PhD studies. SAS PhD students were informed about the possibilities of participating in competitions with the possibility of financial rewards, grants and obtaining scholarships.

Within the framework of cooperation with colleges and universities, SAS employees participated the most in the lecturing activities of universities - 311 employees lectured 9,679 hours at home and 41 employees lectured 1,202 hours abroad. 216 employees led exercises and seminars at home (10,494 hours) and 20 employees (913 hours) abroad.

An important part of the pedagogical activity is the supervision of diploma and bachelor's theses: 427 SAS employees supervised 906 diploma and bachelor's theses, 203 employees opposed 296 dissertation and habilitation theses. 349 supervisors acted as the main supervisors of PhD students. They supervised a total of 535 PhD students (also for other institutes). SAS employees worked as members of committees for PhD defences. (234), committees for the defence of doctoral theses (18), as members of committees, or opponents in inaugural or habilitation proceedings at universities (65).

5 APPLIED RESEARCH AND SAS PROFESSIONAL ACTIVITIES FOR SOCIETY

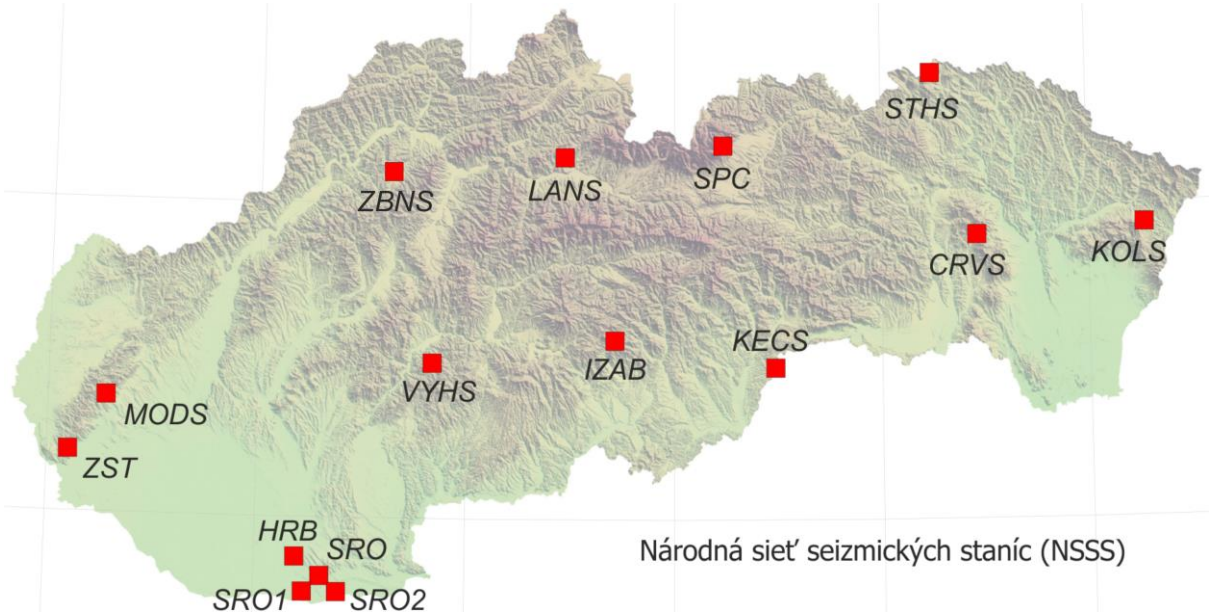
5.1 SAS activities for technical and economic development

Under Act no. 133/2002 Coll. and Act no. 243/2017 Coll., as it stands, SAS as a self-governing, scientific institution of the Slovak Republic carries out activities to develop science, education, culture and the economy. In addition to its main mission focused on basic research, it also strives to apply the results in the form of applications to benefit the technical and economic development of the state and society. It should be emphasized that it is a complex of activities and infrastructure that serve not only scientific purposes but also contribute to the development of the country and its population in the economic, social and cultural spheres.

These include particularly the following activities in the field of natural and technical sciences (sorted by institute):

- **Earth Science Institute SAS** is the only Slovak institute that analyses the seismic risk in the entire territory of Slovakia and prepares seismic assessments at nationally important localities. It monitors the seismic activity in Slovak´s territory using the National Network of Seismic Stations, 15 of which are currently spread out throughout Slovakia. The institute performs continuous measurements of the geomagnetic reference field and the world magnetic WMM model for the needs of navigation and transport (air traffic, sea, land) for the Ministry of Defence of the Slovak Republic, and the Geomagnetic Observatory in Hurbanovo has been performing measurements since 1900, since 1998 in the global world network. Within contractual cooperation, the institute carries out expert work for linear constructions (railways, highways, tunnels) and investment construction and cooperates with mining companies on research of raw materials and energy resources. The institute examines the reserves of critical mineral resources in Slovakia and analyses the possibilities of their effective use. It also contributes to proposals for solving the current energy crisis by analysing realistic options for the use of geothermal energy, or by searching for suitable storage facilities for storing energy reserves in gaseous fuels.
- **Institute of Geotechnics SAS** has been cooperating for a long time on the remediation of the environmental burden of Bratislava Vrakuňa – Vrakuňská cesta-dump site CHZJD with the Environcentrum, s.r.o. company. It is actively involved in wastewater treatment projects using advanced electrochemical oxidation processes and foam separation. In 2023, the institute contributed to solving the crisis on the river Slaná while sampling and analysing mine waters and sediments from the point of discharge into the Slaná river and proposing options for their effective cleaning. An innovative mine water treatment

procedure with the possibility of selective extraction of individual metals (Fe, Mn, Ni, Co, Mg) in the water purification process was successfully tested.



- **Institute of Measurement Science SAS** provides calibration, service and maintenance of the tilt measurement system of the nuclear reactor objects of the Mochovce and Jaslovské Bohunice atomic power plants. In 2023, a measuring system for automated measurement of the tilt of the reactor vessel was put into test operation at the fourth block of the Mochovce nuclear power plant. This measurement system uses optoelectronic sensing with a high resolution of 1 micrometre. The measurement system has been in test operation since November 15, 2023, and will contribute to increasing the safety standards of the nuclear power plant in Mochovce after the weighing of nuclear fuel and the start of operation of the 4th unit.
- **Institute of Geography SAS** prepared and analysed the situation with the availability and quality of housing in the Bratislava satellite areas, which have experienced massive development in the recent past. The cross-border suburbs of Bratislava also recorded a significant increase in the number of inhabitants. After 2008, housing in the EU became more affordable mainly due to rising incomes and falling interest rates. The research showed that residents who moved to the Austrian suburb of Bratislava were more satisfied with living in the municipality, as well as the overall cost of housing.
- **Astronomical Institute SAS** performed expert activity in assessing the findings of "meteorites", special phenomena and bodies in the atmosphere. It also provides the calculation of sunrise and sunset times for Slovak airports and the level of cosmic radiation affecting air traffic. The participation of the institute in the European Solar Telescope

project (European Solar 4m Telescope) ensures the possibility of direct access to the world's top technology for solar research, of which the institute is already an integral part.

- **Institute of Informatics SAS** is strategically focused on research activities related to the use of high-performance computing and a comprehensive solution to security and improving the quality of life of the population. It significantly contributed to the development of the European cloud for open science by expanding the capacity of computing, storage and data resources in accordance with the FAIR principles for scientific data (findability, accessibility, interoperability and reusability) and the integration of national research data repositories. In 2023, an application was created to diagnose neurodegenerative diseases from voice and speech. The mobile app is available for the Android and iOS operating systems and is designed for the Slovak language. Using it, Slovaks can be screened for the presence of Alzheimer's, Parkinson's diseases or Mild Cognitive Impairment. The application won the 2023 IT Product of the Year award (https://catalog.elra.info/en-us/repository/browse/ELRA-S0489/)
- The Slovak Infrastructure for High-Performance Computing (SIVVP) now includes the "Devana" supercomputer, which was put into full operation in 2023. It is accessible for free to all scientists and researchers from Slovak universities and SAS institutes, who can apply for computing capacity allocated in a peer-reviewed grant competition. In cooperation with the SAS Computing Center, the Centre of Joint Activities provides the National Competence Center for HPC with the opportunity to implement free pilot and proof-of-concept projects with experts´ help. Users can apply for computing time via the registration portal.

  In 2023, after a long decision-making process, the Centre of Joint Activities was finally awarded the project of the new powerful **supercomputer "Perun"** based on the best proposal, which will be financed from the Recovery and Resilience Plan, and its construction must be completed by the summer of 2026.

- **Institute of Materials and Machine Mechanics SAS** completed research on special composite materials for containers for permanent storage of spent nuclear fuel in dry storage in 2023. In cooperation with HydroExtrusion a.s. and VÚJE a.s., the first test containers of real size were prepared, which are currently being measured. Their regular serial production is expected next year and the institute will prepare the necessary composite semi-finished products. Within the solution of the project: "Research on the possibilities of using waste heat from industry for heating in the public and commercial sector in Slovakia", an original interactive map of waste (residual) heat from industrial processes and electricity production was developed, which is currently not used in any way. At the same time, the need for household heating in Slovakia was identified based on data from the 2022 census. It was found that approximately 100 TWh of waste heat is available in Slovakia, while approximately 20 TWh of heat is needed to heat all households, which is additionally produced mainly by burning natural gas. Around 5 TWh of heat is still

produced by burning solid fuel, which in many cases significantly pollutes the environment with emissions. If 5% of the waste heat could be captured and used for heating where solid fuel is used, this problem could be completely eliminated. The project proposed a concrete solution to achieve this.

5.2 SAS activities to improve the living conditions of human beings and nature protection

Slovak Academy of Sciences is an organization that significantly contributes not only to the level of education and culture but also to ensuring better living conditions for the population, environmental protection and the overall general development of the state, for the benefit of society, with regard to the country. It does so not only with its professional approach, competencies, and knowledge, but also with professional services for the public, educational, scientific and popularization activities and, last but not least, the application of the results of its own and other research.

SAS scientific and professional employees were and are members of advisory boards and active working commissions of state and public administration bodies and organizations. They have been involved for a long time in solving current problems in society and challenges in public life. As an example, the direct involvement of SAS in solving the current problem of liquidation and neutralization of mine waters in the vicinity of Nižná Slaná and river Slaná can be mentioned. They also act as experts in international organizations whose decisions help determine the situation in Slovakia.

SAS is aware that it transfers the results of its research into practice and that it contributes to improving the administration of public affairs, health care, the safety of residents, and the protection of the environment. SAS employees explain the climate change, global challenges and current social, political or security issues.

From the wide spectrum of applied research and activities of SAS institutes from Scientific Section 2, we can highlight:

- Through its detached workplace Centrum Memory n.o., the **Institute of Neuroimmunology SAS** helps people with memory disorders and patients suffering from Alzheimer's disease. It investigates neurodegenerative and neurodevelopmental diseases of the brain, regularly monitors the latest results and gradually introduces them into everyday life. Centrum Memory also provides services for those interested in maintaining good memory and vitality at any age, family members or loved ones who live with patients in the household or care for them on a daily basis, and health and social workers professionally involved in solving problems related to dementia.
- **Institute of Molecular Biology SAS** deals with the issue of biodegradation of objects of cultural heritage. It also investigates the effectiveness of biological degradation of pharmaceuticals in wastewater. In cooperation with the State Veterinary and Food Institute in Bratislava, it runs a Honey Laboratory, which tests the antibacterial activity of

honey for the needs of beekeepers, honey producers and consumers using an accredited method.

- **Institute of Parasitology SAS** systematically deals with the diagnosis of human parasitic diseases, the verification and confirmation of the diagnosis in humans using classical examination methods as well as methods that are not provided by other diagnostic laboratories in Slovakia for these diseases. It diagnoses diseases transmitted by parasites for veterinary clinics and clinics from all over Slovakia. In cooperation with the Research Station and the TANAP Museum, research continued on the parasite fauna of Tatra endemics - the High Tatra marmot and the High Tatra chamois.
- **Institute of Forest Ecology SAS** has long-term expertise in the evaluation of the stability of trees and the root system using the method of acoustic tomography. It builds and operates a unique research botanical garden in the Mlyňany Arboretum. The area is undoubtedly one of the most original in Europe in terms of the arrangement of tree collections and geomorphology. Currently, the tree gene pool consists of 1,933 taxa with a 125-year history.

- **Plant Science and Biodiversity Centre SAS** provides consulting activities on the issue of the occurrence and identification of invasive plants, as well as the application of chemical substances in their removal. It also monitors structural changes in the environment affected by the operation of the Gabčíkovo waterworks. In addition, the centre manages collections/databases documenting the diversity of plants (herbarium) and fauna in Central Europe as part of the Slovak Republic's activities within the framework of fulfilling the obligations arising from the Convention on Biological Diversity (as a signatory of the

CBD).

- In its implementation department, the **Institute of Chemistry SAS** produces a wide range of rare carbohydrates based on continuously achieved results of basic research. It delivers these results to the foreign market, some as the only producer in the world. It also manages the Culture Collection of Yeasts (CCY), which is the only authorized general yeast collection in Slovakia with the status of an international depository for legally protected yeast strains. It stores approximately 3,600 strains of yeast and yeast-like organisms, which makes it one of the largest collections of this type.
- **Biomedical Research Center SAS** carries out some unique examinations of biological samples for the presence of infectious pathogens or antibodies induced by them based on requests from medical practitioners. A very beneficial activity for the public is the analysis of ticks, which determines the causative agents of Lyme disease and other tick-borne pathogens, such as tick-borne encephalitis virus. Based on the results of research into the health effects of physical activity, practical physical exercises for seniors and other volunteers are carried out in the institute´s Centre of Physical Activity. The institute operates the Centre for Obesity Management, which, through a scientific team, investigates the causes and consequences of obesity. It studies the possibilities of intervention and provides comprehensive care to patients with obesity. In 2023, the centre was the first in Slovakia to receive accreditation from the European Association for the Study of Obesity (EASO).

SAS's approach to living/working conditions and nature protection was also reflected in the international urban planning competition for a new vision of the SAS complex at Patrónka in Bratislava. The tender was announced in 2023 by the Slovak Academy of Sciences, in accordance with the territorial development plan of the capital city Bratislava and in cooperation with the Slovak Chamber of Architects

"From relatively austere socialist urbanism, the area should become a modern and, at the same time, green top-level scientific workplace. In order to fulfil this objective, it must meet the most demanding criteria for creative work, relaxation and interdisciplinary communication. It should also create a simple communication space for brainstorming from various fields of science," the President of the SAS, Pavol Šajgalík, explained the main idea of the SAS vision. He also expects that the complex will become a new recreation zone for the inhabitants of the capital, where the public will come into contact with cutting-edge science in a non-intrusive way.

The jury appreciated the clear concept of the winning proposal, which supports mutual interaction and establishes new possibilities for connecting science, the environment for everyday life and the public. This gives a clear signal to both employees and visitors to the campus that the environment is changing. The jury also highlighted that the proposal responds to the climate crisis. The authors included rain gardens, polders and a wetland ecosystem in the area subsidized by rainwater flowing from the paved spaces.

"The area is planned as an open landscape seamlessly connected to two strong natural units in the form of forested outcrops of the Lesser Carpathian massif," states the jury. The inhabitants of Bratislava could one day walk, for example, from the ZOO through the green SAS campus to the Železná studnička.

More information about the SAS's intentions in connection with the Patrónka is found at the end of this report in chapter 10.

5.3 SAS activities in social, cultural and managing area

At the beginning of the 20th century, Ján Lajčiak wrote a timeless statement: Science is one of the most important factors of cultural life. And by culture, he meant the overall civilisation level of society. Slovak Academy of Sciences is aware of the potential that the professional, language knowledge, equipment, expert competencies and general educational level of its employees represent for our country, and its direction towards a good life in all aspects for everyone. Scientists and professional staff of SAS participate in a significant way in setting the social agenda, they are involved in solving current societal problems and challenges of public life. They provide answers to qualitatively new phenomena such as the pandemic, the Russian invasion of Ukraine, industry 4.0., artificial intelligence... and they offer paradigmatic new approaches for traditional topics, e.g. "nature protection". In addition to working directly on research grounds, they are members of advisory boards and working commissions of state administration bodies and organizations, they act as experts in international organizations whose decisions also determine the situation in the Slovak Republic.

By producing research results that determine the identification and management of societal issues and putting them into practice, SAS contributes to better management of public affairs, raising the educational and cultural standard of the population, resistance to extremism and openness to differences, as well as the preservation and evaluation of cultural heritage, better care for physical and mental health, safety of residents and protection of the environment, etc.

Institute of Archaeology SAS carries out archaeological research on domestic and foreign sites. It engages in maintaining monuments, making accessible and using historical architecture and objects to popularize our history and cultural tourism. The institute also provides several professional activities in the planning and preparation of constructions of national importance and prepares assessments and expertise on archaeological objects. Employees act as forensic experts in the field of cultural heritage. In 2023, rescue archaeological research was carried out on the territory of the future industrial park Valaliky near Košice (and other 89 rescue activities) and systematic field research for scientific and documentation purposes continued in Bojná I-Valy, Dolné Vestenice, Vráble - Veľké Lehemby, Podhájska, Iža near Komárno, near Liptovská Mara - Havránok Castle, in Zvolen's Pustý hrad, Hrušov Castle, Lietava Castle, Šášov Castle, Viniansky Castle, Revište Castle, etc. After the end of the fifteen-year conservation of

the princely tomb from Poprad, the parts of this 1,600-year-old wooden architecture, which were decided not to be part of the permanent exhibition of the tomb in Poprad, are deposited in a newly built air-conditioned depository at the site in Nitra, where they are under constant control and, at the same time, available for further research. The institute has been cooperating for a long time in the creation of permanent archaeological exhibitions, e.g. the Museum of Great Moravia in Bojná, the collection in Nitra on Martinský vrch, the Museum of Liptov in Ružomberok, the Nitra Castle, the City Museum in Sereď, etc. (the institute is also a sought-after partner in the international exhibition space).

Institute of History SAS is a strategic partner of the Ministry of Foreign and European Affairs of the Slovak Republic and embassies of the Slovak Republic in informing about Slovak history abroad and promoting it. The institute´s expert team provides advice on the evaluation of architectural works as potential cultural monuments and generally provides consultations and expert opinions in the field of protection and restoration of architectural monuments, especially of the 20th century. The institute participates in the preparation of various exhibitions at home and abroad. It also prepares assessments when changing the names of streets and squares and thus participates in determining the nature of public space.

Centre of Social and Psychological Sciences SAS solves methodological and conceptual problems of forecasting the development of Slovak society in a national and global context. In cooperation with the city of Košice, an educational laboratory was opened at Luník IX to strengthen the position of members of the Roma community to bridge the existing gap between Roma and non-Roma residents of the region in the sphere of information, digital and functional literacy. An energy-emissions model was developed at the institute, which the European Commission recommends be used in the new INEKP (Integrated National Energy and Climate Plan) setting. In 2023, the institute provided expertise in the field of psychodiagnostic methods (as part of the implementation of the Recovery and Resilience Plan), preschool education of Roma children, employment and employability of people from marginalized Roma communities, the creation of a support system for social innovations, etc. The centre representative works in the interdisciplinary working group focused on solving energy poverty. The centre is a partner of the Slovak Center for Digital Innovations, where it provides expertise in the field of the impact of digital transformation on the workforce and mirrors the possibilities of adapting the workforce to the transformation.

Institute for Sociology SAS ensures the operation of the Slovak Archive of Social Data (SASD, http://sasd.sav.sk) and continuously provides data files and documentation for research archived in SASD via the archive's website. SASD is a service provider in Slovakia within the CESSDA ERIC distributed infrastructure. In 2023 continued the cooperation with the Institute for Research in Social Communication SAS, the institute participated in the research of society during the pandemic "How are you, Slovakia?" After the pandemic and the war in Ukraine, the research reflected the topics related to early parliamentary elections in September 2023. As a rule, press releases issued by the institute were taken over by the press agencies TASR and

SITA, as well as several opinion-forming media. The institute profiles itself as a centre for social science expertise monitoring current moods in society.

Institute for Research in Social Communication SAS examines the effects of the new educational curriculum for pre-primary education, which it helped prepare, compared to the original one (narrative skills, metacognition...). It helps employees in marginalized communities in the field of sexual and reproductive health promotion. It identifies cases of ill-treatment by public authorities towards the Roma and develops the basis for effective policies against their discrimination. For a long time, it has provided consultancy in the implementation of gender equality plans. Together with the Metropolitan Institute of Bratislava, it defines challenges in the sphere of inclusiveness of public space. It conducted a survey "How are you, Slovakia?", together with the Institute for Sociology SAS, and maps people's attitudes to important social topics in connection with current events. This year, the focus shifted primarily to topics related to the war in Ukraine, attitudes towards LGBTI+ people, but also the elections and the future of Slovakia.

Ludovit Stur Institute of Linguistics SAS operates the Dictionary Portal and provides the wide professional and lay public with the opportunity to obtain information about the use of language from older as well as from the latest explanatory dictionaries and manuals. It offers language consulting services to the public by phone and correspondence, as well as personal consultations, and a website with a database of answered questions has been created. The Slovak Terminology Database project of the Slovak National Corpus Department was recently enriched with a terminological collection of law, epidemiology and immunology.

Institute of Philosophy SAS - the research results of the Department of Environmental Philosophy can be used as a basis for the societal debate on climate change and the necessary strategic and legislative steps. The Department of Human Rights and Normativity deals with the topic of social human rights with an overlap into concrete practice. The Department of Analytic Philosophy engages in reflection on AI, e.g. on the grounds of the Committee on Ethics and Regulation of Artificial Intelligence.

Institute of Ethnology and Social Anthropology SAS devotes part of its scientific capacity to the issue of transgender people, human rights and the family, which extends into its own documentary filmmaking. Another project focuses on the role of living heritage for war-displaced communities in Ukraine and its preservation. The ambition of the project is to enable a safe space for the practice and transmission of various forms of living heritage, including intergenerational transmission, and indirectly to support social cohesion between refugees and the receiving society. Scientific teams are being created at the institute, dealing with individual aspects of the life of marginalized Roma communities (health and environmental justice, access to employment opportunities). The employees of the institute are recognized authorities in the field of reflection on conspiracy theories. The institute develops the discipline of digital humanities and digital curation, or support of research infrastructure in the fields of ethnology and social anthropology. The institute operates an Information Portal as a tool to improve labour migration - the Danube Compass for new residents of Slovakia or the

countries of the Danube region (http://sk.danubecompass.org/), where it concentrates information on residence, education, entrepreneurship, job search or learning of the official language of the new country for 8 countries (SR, CZ, DE, AT, HR, SRB, SLO, HU).

Institute of Slovak Literature SAS cooperates for a long time in the continuous education of pedagogical staff in the field of Slovak literature. It cooperates with the Slovak Literary Centre in Bratislava and the civic association ars_litera, which organizes the literary prize Anasoft litera, and the civic association Platform for Literature and Research, which is the publisher of the professional internet periodical plav.sk. It guarantees professional events and performs at foreign events presenting Slovak literature in cooperation with the Hungarian Literary and Art Association in Slovakia (Bázis).

Institute of World Literature SAS Researchers from the institute are not only specialists in the field of individual national literature but thanks to their knowledge of individual cultures in Slovakia, as "cultural ambassadors" they play an important role in intercultural dialogue, mediating cultural contents and values in the current era, which is the bearer of numerous crises, e.g. the less discussed crisis of education. One of the forms embodying mediation is professional and artistic translation.

Institute of State and Law SAS has been providing consultancy and expertise in solving legal problems for a long time. Commentaries on individual laws published by the institute become the interpretive authority for their application. The research results are applied to the decisions of the Slovak courts, including the Supreme Court of the Slovak Republic. The employees of the institute, as members of the Legislative Council of the Government of the Slovak Republic, directly and substantially influenced several drafts of generally binding legal regulations with their comments and proposals before their advancement to the next phase of the legislative process. Two members of the Judicial Council of the Slovak Republic are institute employees.

Institute of Economic Research SAS provides macroeconomic forecasts as well as expert opinions in the field of international economic policy and the topic of an efficient labour market in the Slovak Republic. In 2023, the institute prepared expertise for several state and public administration bodies, including a microsimulation model for the forecast of students at the pre-primary, primary and secondary levels of education and the forecast of the demand for teachers at individual levels of education in a regional breakdown, including the Concept for the Development of Water Transport in the Slovak Republic by 2030 with a view to 2050. The Possibilities of Setting up the Methodology for Investigating the Quality of the Employment Environment in Slovakia and the Analysis of Current changes in the Labour market, especially in the context of the consequences of the pandemic, the armed conflict in Ukraine and the energy crisis in the administration, economy and management sector, were developed. In cooperation with Profesia a.s., the institute analyzed whether it is possible to use machine learning methods to increase the attractiveness of published job offers. The results can help operators of specialized portals publishing online job advertisements, as well as employers, improve their offers and attract more job seekers.

6 SAS PERSONNEL STRUCTURE AND SCIENTIFIC QUALIFICATION OF EMPLOYEES

2,147 researchers, 212 of which were doctors of science (163 males (m) and 49 females (f)) and 1,935 CSc. and PhD. (992 m and 943 f) have been employed at SAS institutes as of 31.12.2023. Compared to last year, the number of researchers with a scientific-pedagogical degree decreased. The reason may be the retirement of researchers over the age of 70. There are 120 professors (91 m and 29 f) and 174 assistant professors (128 m and 172 f) working at the SAS. According to the qualification structure, 228 principal investigators (179 m and 49 f) and 1,185 independent researchers (632 m and 553 f) worked at the SAS. In 2023, 2 SAS employees (m) received DrSc. degree and 11 SAS employees (6 m and 5 f) received scientific and pedagogical degrees.

On 1. 1. 2022, Act No. 347/2021 Coll., amending Act No. 133/2002 Coll. on the Slovak Academy of Sciences, as amended, entered into force, which substantially changed the issue of awarding scientific qualification degrees of levels I and IIa to SAS researchers, universities and other institutions. By law, the Commission for the Assessment of Scientific Qualifications was established. The Scientific Council of Slovak Academy of Sciences approved the new content requirements of the proposal, including new requirements (criteria) for creative ability and the minimum level of research, development or artistic activity necessary for awarding the relevant scientific qualification degree. The aforementioned regulation was further repealed by Act No. 39/1977 Coll. on the education of new research workers and the further improvement of qualifications of research workers, as amended, and implementing decree of the Czechoslovak Academy of Sciences no. 55/1977 Coll. On further

improvement of qualifications and evaluation of the creative capabilities of research workers.

In 2023, 203 proposals for awarding scientific qualification degrees were submitted to the Commission for the Assessment of Scientific Qualifications of Employees, of which 112 were from the Slovak Academy of Sciences and 90 from the Ministry of Education, Science, Research and Sport of the Slovak Republic and other departments of the Slovak Republic. The commission discussed 5 proposals for granting scientific qualification level I and 198 proposals for granting scientific qualification level IIa. It granted a total of 200 scientific qualification degrees and rejected 3 proposals. The average registered number of employees recalculated for the year 2023 represented 2,964.4 persons in public research institutes. The average salary was EUR 1,836, EUR 1,607 came from the state budget (source 111 – IFP +APVV). (data source report Práca 2-04, FIN 1-12)

Achieved level of average earnings of researchers for 2023 in euros (DrSc., PhD., CSc. 1,646 persons)– SAS institutes

SAS institutes	**2023 [€]**
Source 111 ŠR - IFP	1,785.0
Source 111 ŠR - APVV	124.0
Other sources total	233.5
Average earnings total	2,142.5

Average earnings according to the remuneration tables (Act No.553/2003 Coll.) for the year 2023 (data source report Práca 2-04).

Salary table	**Average Salary [€]**	**Number of persons**
University teachers and research and development employees - Annex 5	2,092	1,976.5
Basic table - Annex 3	1,324	987.5
SAS total	1,836	2,964.4

7 FINANCIAL RESOURCES AND SAS ECONOMIC ACTIVITY

As of 31.12. 2023, the Slovak Academy of Sciences consisted of 1 budget organization (chapter manager) and 47 public research institutions.

According to the Act on Public Research Institutions, as amended, all public research institutions can carry out business activities. In 2023, 4 public research institutions carried out business activities.

When drawing funds, valid legislation, principles within the framework of individual programmes, functional and economic classification, and binding expediency of their use, were observed. All organizations were involved in the budget information system of the State Treasury.

The approved revenue budget for 2023 was EUR 10,500,000. The revenue budget also included the budget for the sale of the building. Due to the fact that the sale did not take place in 2023, the income was not fulfilled and the budget for current expenses was not used in the same amount. In fact, the SAS budget organization transferred non-tax revenues of EUR 262,175 to the income account of the state budget.

These were payments from the sale of services of EUR 213,376, income from the rental of buildings and premises of EUR 14,857, other non-tax income of EUR 20,079 (mainly income from credit notes, overpayments from advance billing for gas, electricity, heat, from the annual settlement of payments to health insurance companies and income from violations of regulations of EUR 13,863).

Structure of budget revenue (in euros)

Main category / category	Approved budget	Revised budget	Actual	% to revised budget
200 – Non-tax revenues	10,500,000	10,500,000	262,175	2.50
210 – Revenue from business and property ownership	125,000	14,857	14,857	100.00
220 – Administrative fees and other fees and charges	375,000	213,364	228,535	107.11
230 – Capital revenue	10,000,000	10,000,000	150.00	0.00
290 – Other non-tax revenues	0	271,779	18,633	6.86

In the approved budget for 2023, the chapter had a budget of total expenditure of EUR 113,744,470. During the year, the budget of total expenditure was adjusted based on the

budgetary measures to EUR 125,686,066. An increase of EUR 11,941,596 was involved in the adjustment of the expenditure budget.

The increase in expenditure was influenced by budgetary measures, which mainly dealt with:

- untying KTG 700 - funds tied up in 2022 under § 8 of Act No. 523/2004 Coll., in a total amount of EUR 1,247,628,
- increasing the budget of expenditure for research projects financed from EU structural funds, including co-financing from the state budget intended for the project "Building a Centre for Advanced Materials Application SAS" of EUR 7,115,759,
- increasing the budget of expenditure ensured by binding expenditures in the Ministry of Education, Science, Research and Sport of the Slovak Republic chapter of EUR 788,663,
- increasing the budget of expenditure ensured by binding expenditures in the General Treasury Management chapter of EUR 2,789,546 intended for the support and appreciation of elite SAS institutes based on the results of international accreditation and the valorization of PhD student scholarships.

In the course of the year, budget measures were also implemented, which were of an internal nature and dealt with the reclassification of budget funds within the SAS chapter.

All expenditures of the SAS budget chapter were allocated in programmes structured into subprogrammes and elements.

Structure of budget expenditures (in euros)

Main category / category	Approved budget	Revised budget	Actual	% to revised budget
Total expenditure	**113,744,470**	**125,686,066**	**115,434,323**	**91.84**
600 – Current expenditure	103,104,837	105,822,281	103,989,856	98.27
700 – Capital expenditure	10,639,633	19,863,785	11,444,467	57.61

As of 31.12.2023, the SAS budget organization drew funds of EUR 115,434,323 through expenditure accounts in the State Treasury. The structure of total expenditure according to sources was as follows:

- expenditure from the state budget of EUR 108,318,564;
- expenditure for joint programmes of the Slovak Republic and the EU financed from EU structural funds, including co-financing from the state budget, adopted based on budgetary measures of EUR 7,115,759.

Of the total budget expenditure, current expenditure amounted to EUR **103,989,856** (of which the institutional financial contribution of the founder to the SAS public research institutions of

EUR 95,628,632, a contribution to the CEMEA project of EUR 819,953, reimbursement of costs of EUR 16,034) and capital expenditures EUR **11,444,467** (of which an institutional financial contribution to SAS public research institutions of EUR 3,916,543 and a contribution to the CEMEA project of EUR 9,600). The sum of EUR 312,380 represents the return of the unaccounted part of the advance payment for capital expenditures by transfer to the account of the Ministry of Education, Science, Research and Sport of the Slovak Republic.

The average registered number of employees recalculated for 2023 was 120.0 persons in the Office of the SAS budgetary organization. The average salary level for 2023 was EUR 2 ,451, of which EUR 2,450 came from the state budget (source 111). (data source report Práca2-04, FIN 1-12).

SAS public research institutions achieved a total income of EUR 153,947,332. From the total income of public research institutions, it represented an institutional financial contribution of EUR 99,545,175 (including: current of EUR 95,628,632 and capital of EUR 3,916,543).

Own resources, which mainly consisted of income from the sale of products, goods and services, income from the rental of buildings, premises and objects amounted to EUR 8,073,660, and grants from domestic entities outside the public administration amounted to EUR 878,322. Other income of public research institutions consisted of contributions for research projects, especially contributions from the state budget provided by the Slovak Research and Development Agency and foreign grants, especially funds for international cooperation research projects (Horizon 2020, multilateral projects within the EU, other multilateral projects, bilateral projects and projects within the framework of intergovernmental agreements on scientific and technical cooperation).

The total expenditure of public research institutions was EUR 151,568,185, of which the current expenditure of EUR 139,091,168 and capital expenditure of EUR 12,477,017.

8 ACTIVITIES OF SAS SELF-GOVERNING AND SCIENTIFIC BODIES

8.1 Assembly of Slovak Academy of Sciences

In 2023, four regular meetings of the SAS Assembly and thirteen committee meetings of the Assembly were held. During this period, the Assembly exercised the standard powers given by the Act on the Slovak Academy of Sciences and the Statute of the Slovak Academy of Sciences. At its plenary meeting in April 2023, the Assembly discussed and approved Amendment no. 1 of Principle of the proposal and distribution of the SAS budget for 2023, and by-elections were held for an external member of the SAS Scientific Council, for which doc. P. Vrábel from RONA, a.s. in Lednické Rovne was elected.

At the meeting in September 2023, the Assembly focused on deducting the activity of individual members of the Presidium of SAS in the middle of their term of office.

At the meeting in October 2023, the Assembly discussed and approved the proposal for the procedure for the breakdown of public research institutions' salaries for 2024, the Principles for the proposal and distribution of the SAS budget for 2024, amendments to the Rules of the selection procedure for filling the position of director of public research institution and Rules of the selection procedure for filling the position of the head of the organizational unit of public research institutions founded by the Slovak Academy of Sciences.

At the December meeting, another by-election for an external member of the SAS Scientific Council was held and prof. P. Mésároš, rector of the Technical University of Košice, was elected. Elections were also held for the president and vice-president of the SAS Assembly for the third third of the term of office from 2021 to 2025. Ľuboš Klúčár was elected Speaker of the Assembly with his mandate beginning on December 20, 2023. Radoslav Passia and Katarína Gmucová became the vice-presidents of the Assembly. The Assembly also approved the Principles of Performance Funding of SAS Scientific Institutions and resolved that the Methodology for Annual Evaluation and Performance Funding of SAS Scientific Institutions will not change in 2024.

According to the current need, members of the Presidium of SAS were invited to the meetings of the Assembly committee, with whom the committee consulted on current problems of the academy and prepared materials submitted to the plenary meetings of the Assembly and comments on them. By virtue of their position, the members of the Assembly committee continued to be members of the committees and advisory bodies of the SAS Presidium. In 2023, the representatives of the committee participated in all regular meetings of the SAS Presidium, the President of the Assembly was also invited to meetings of the SAS Scientific Council. They also participated in other official events of the SAS or events dedicated to the

70th anniversary of the founding of the SAS. At the end of 2023, the Speaker of the Assembly, R. Passia, initiated the preparation of remuneration principles for the members of the SAS Presidium in accordance with the Act on SAS.

The composition of the Assembly of Slovak Academy of Sciences in 2023:

Mgr. Radoslav Passia, Ph.D.
President of the SAS Assembly (until 20. 12. 2023)
Vice-President of the SAS Assembly (from 20. 12. 2023)
President of the 3rd chamber of SAS Assembly
Institute of Slovak Literature SAS

Mgr. Ľuboš Kľučár, PhD.
Vice-President of the SAS Assembly (until 20. 12. 2023)
President of the SAS Assembly (from 20. 12. 2023)
President of the 2nd chamber of SAS Assembly
Institute of Molecular Biology SAS

RNDr. Katarína Gmucová, CSc.
Vice-President of the SAS Assembly
President of the 1st chamber of SAS Assembly
Institute of Physics SAS

MVDr. Daniela Antolová, DrSc.
Institute of Parasitology SAS

RNDr. Ján Gálik, CSc.
Institute of Neurobiology of the Biomedical Research Center SAS

Ing. Veronika Hvozdíková, PhD.
Institute of Economic Research SAS

Ing. Michal Kadúc
Centre of Operations SAS - Computing Center SAS

Ing. Anna Kalistová, PhD.
Institute of Social Sciences of the Centre of social and psychological sciences SAS

doc. RNDr. Karol Nemoga, CSc.
Mathematical Institute SAS

8.2 Presidium of SAS

The jurisdiction of the SAS Presidium, as a self-governing body of the academy, is determined by § 10 (5) of the Act on SAS and, for the given term, is specified in the Programme Statement of the SAS Presidium and in the SAS Presidium Action Plan, which was updated at the SAS Presidium meeting on 12. 10. 2023.

The Presidium of SAS, as a collective body, takes decisions at its meetings in the form of resolutions. The form and manner of SAS Presidium negotiations are regulated by the Rules of Procedure of SAS Presidium. Meetings of the SAS Presidium are convened and directed by the president of the academy or the vice-president of the academy authorized by him. They usually take place once a month, usually on the second Thursday of the month.

In 2023:

11 regular meetings of the SAS Presidium took place, of which the meeting on 8, 6. 2023 was held in Košice, 3 special meetings of the SAS Presidium (31. 1., 6. 9. and 20. 9.),6 negotiations per rollam.

The agenda of the meeting is drawn up according to the approved structure and contains the following basic points of discussion:

1. Information about negotiations, events, travel reports
2. Follow-up of the implementation of resolutions and tasks of the SAS Presidium ("C" resolutions - in writing, others that do not need to be recorded in the minutes - orally)
3. Minutes and programmes of meetings of the academy's bodies
4. Concepts, analyses, activity reports
5. Economic and budgetary issues
6. Legislative and legal issues (internal regulations of the academy, principles, comment procedures, founding documents, lawsuits, etc.)
7. Domestic projects (VEGA, APVV, SASPRO, IMPULZ and others)
8. MVTS (projects including RP EU, NATO and others, agreements, opinions)
9. International relations (proposal letters, invitations)
10. PhD studies, education, cooperation with universities, SRK
11. Awards and honours (SAS, other bodies)
12. Personnel issues (selection procedures, appointments, nominations to bodies)
13. Accreditations, evaluations
14. Application of results (cooperation, patents)
15. Popularization of results (conferences, seminars, exhibitions, TK, DOD, media and others)
16. Information system (SAS publishing activity, magazines, databases, SANET, web)
17. Dislocation measures
18. Control and audit activity

19. SAS Assembly, SAS Scientific Council, the Learned Society of Slovakia, trade unions operating on the SAS premises, central body of state administration
20. Miscellaneous

At its meeting on 23. 5. 2023, the SAS Presidium approved Amendment no. 1 to the Rules of Procedure of the SAS Presidium, which modified the provisions of art. II of Meetings of the SAS Presidium, Art. IV of Meeting and resolution of the SAS Presidium, Annex I. of Instructions for the preparation and submission of written materials for the SAS Presidium meeting and the announcement of its resolutions and Annex I/A – Structure of the meeting programme.

As part of the discussion of proposals for legislative and legal issues, the SAS approved in 2023:

- Directive on processing notifications on anti-social activity,
- SAS Directive on the protection of personal data,
- Addendum no. 2 to the Rules for Remuneration of the Director of a Public Research Institution established by SAS, which entered into force on 1. 7. 2018,
- Procedures for reporting and solving cases of sexual harassment at SAS,
- Amendment no. 2 to the SAS Code of Ethics,
- Amendment no. 1 of the Statute of the SAS Commission for Equal Opportunities,
- Addendum no. 1 to the Statute of the SAS Return Project Scheme,
- Remuneration Rules for the director of a public research institution established by the SAS,
- Remuneration Rules for the head of the civic association of the public research institution founded by SAS,
- Addendum no. 2 to the System measure taking into account the acquisition of the scientific degree of DrSc. from 12. 1. 2017,
- Statute of the Štefan Schwarz Support Fund for the creation of PhD positions at SAS,
- Methodology for the annual evaluation and performance financing of scientific organizations of the SAS in 2024,
- Addendum no. 1 and no. 2 to the Methodological Guideline of the SAS Presidium for the preparation and approval of the lease agreement and the contract for the loan of real estate owned by public research institutions within the founding scope of the SAS in accordance with Act no. 243/2017 Coll.,
- Addendum no. 2 to the Rules for remuneration of members of the supervisory board of a public research institution,
- Addendum no. 1 to the Statute of the Štefan Schwarz Support Fund for the creation of PhD positions at SAS,
- Criteria for providing motivational scholarships to PhD students of full-time doctoral studies financed from central sources in the academic year 2023/2024,
- Financial rules for awarding SAS grants for international research projects,
- Financial rules for awarding grants for projects within the Mobility programme,
- Directive on increasing the institutional resilience of SAS,

- Addendum no. 2 to the Statute of the SAS Ethics Commission,
- Principles for the allocation of SAS funds to support international scientific cooperation projects for 2024.

The SAS Presidium submitted to the SAS Assembly for discussion:

- Draft rules of the selection procedure for filling the position of the director of a public research institution established by SAS,
- Draft rules of the selection procedure for filling the position of head of civic association of a public research institution founded by SAS,
- Amendment to the Principles of performance funding of scientific organizations of the SAS,
- Draft procedure for the breakdown of wage resources of public research institutions for 2024,
- Draft policy for the proposal and distribution of the Academy's budget for 2024.

At the special meeting on 31. 1. 2023, the SAS Presidium discussed the results of the regular assessment of SAS institutes after appeals.

SAS Presidium dealt with measures to reduce the energy requirements of the operation of SAS institutes at several meetings and regularly familiarized itself with the course of the architectural competition "Vision of the SAS Complex".

Within point 5 of the meeting programme of the SAS Presidium - economic and budgetary issues - the SAS Presidium regularly discussed proposals for adjusting the budget of the SAS and SAS institutes. At the meeting on 13. 4. 2023, it approved the Proposal for the final account of the SAS chapter for 2022, as well as the recommended outline of the Annual report on activity and management of public research institutions for 2023.

Based on an initiative from the SAS institutes, the SAS Presidium approved amendments to the articles of incorporation.

SAS Presidium further approved:

- the results of the competition for young scientists under the age of 35,
- the results of the competition for PhD students,
- award proposal for top publications,
- the proposal for the awarding of the SAS Presidium Greeting Letter at the "Prominent SAS Personalities in 2023" seminar,
- the outline and timetable for the preparation of the Annual Report on the activities and management of the SAS institutes for 2023,
- draft outline of the SAS Annual Report for 2023.

At the April meeting (13. 4. 2023), the SAS Presidium approved the draft of the final account of the SAS chapter for 2022, as well as the recommended outline of the Annual Report on the activities and management of the SAS institutes for 2022. At the same time, it approved the text of the opinion on the petition, in which the signatories call on the SAS to publicly distance themselves from the workbook "Partnership and Sexual Education. Workbook for secondary schools and gymnasiums."

Per rollam, it approved the results of the competition for young scientists under the age of 35.

On 23. 5. 2023, the SAS Presidium approved the results of the competition for PhD students and the proposal for awarding top publications.

In June, a meeting of the SAS Presidium was held in Košice (8. 6. 2023), at which the SAS Presidium awarded the SAS Award for the Popularization of Science and Social Applications of Science for 2022, approved the proposal to award the SAS Presidium Greeting Letter at the seminar "Prominent SAS Personalities in 2023" and took into consideration the reports on the activities of the supervisory boards of public research institutions in 2022.

At the meeting on 12. 10. 2023, the SAS Presidium approved the outline and timetable for the preparation of the Annual Report on the activities and management of the SAS institutes for 2023, the draft outline of the SAS Annual Report for 2023 and the addendum to the Action Plan to the SAS Presidium Program Statement for 2021-2025. At the same time, it was decided to hand out the Award for building infrastructure for science to prof. Ing. Dušan Galuska, DrSc., for building a unique international research centre for glass and ceramics research.

On 16. 11. 2023, it took note of the results of the evaluation of the quality of PhD studies in the academic year 2022/2023.

The composition of the SAS Presidium in 2023:

Prof. RNDr. Pavol Šajgalík, DrSc., President of the SAS
Prof. RNDr. Peter Samuely, DrSc., Vice President for Science, Research and Innovations
Prof. MVDr. Juraj Koppel, DrSc., Vice President for Budget and Legislation
Mgr. Zuzana Panczová, PhD., Vice President of the SAS for International Relations
Mgr. Martin Venhart, PhD., Vice President for Scientific Section 1
Prof. RNDr. Karol Marhold, DrSc., Vice President for Scientific Section 2
RNDr. Miroslav Morovics, Csc., Vice President for Scientific Section 3
Ing. Ivana Budinská, PhD.
RNDr. Pavol Siman, PhD.
Dr. Ing. František Simančík
MUDr. Mgr. Tomáš Hromádka, PhD.
Prof. RNDr. Ľubica Lacinová, DrSc.
Mgr. Róbert Karul, PhD.

Mgr. Michal Kšiňan, PhD.
(from 1. 5. 2023 until the end of 2023, he took paternity leave)
Ing. Marek Radvanský, PhD.

8.3 Scientific Council of Slovak Academy of Sciences

Three meetings of the SAS Scientific Council were held in 2023: 8. 3., 24. 5. and 22. 11.

In two cases, the Scientific Council deliberated per rollam: 26. 9. - 2. 10. and 1. 12 - 8. 12. 2023.

At the meeting on 8. 3. 2023, the Scientific Council of Slovak Academy of Sciences

awarded

- the scientific degree of Doctor of Chemical Sciences to doc. Ing. Ivan Šalitroš, PhD., senior researcher at the Institute of Inorganic Chemistry, Technology and Materials of Chemical and Food Technology STU in Bratislava, based on the successful defence of his doctoral thesis "Coordination compounds of iron and cobalt with magnetic bistability" in the field of science: inorganic chemistry - 010402,
- SAS medal for the support of science to RNDr. Miroslav Barančík, DrSc.,

accepted

- the request to review the decision of the Commission for the Assessment of Scientific Qualifications on the non-recognition of the scientific qualification level IIa of doc. Ing. Daniel Valúch, PhD., and changed the commission's decision to recognize doc. Ing. Daniel Valúch, PhD., scientific qualification level IIa,

approved

- addendum no. 3 to the Statute of the Learned Society of Slovakia.

The President of the SAS informed those present that Š. Rosina resigned as a member of the Scientific Council of the SAS in December 2022 due to workload.

At the meeting on May 24, 2023, the SAS Scientific Council

awarded

- the SAS Award for the results of scientific and research work to

  MVDr. Daniel Kupka, PhD. and a collective consisting of: Ing. Mirolava Václavíková, PhD., Ing. Lucia Ivaničová, PhD., Mgr. Lenka Hagarová, PhD. and Mgr. Zuzana Bártová, PhD., from the Institute of Geotechnics SAS for the preparation and development of the methodology and technology for cleaning underground and mine waters at the locations Bratislava - Vrakuňa and Nižná Slaná;

  Ing. Mária Omastová, DrSc. and research collective consisting of: Ing. Matej Mičušík, PhD., RNDr. Michal Procházdka, PhD., Ing. Nikola Bugárová, PhD., MSc. Anastasiia Stepura and MSc. Yaryna Soyka, from the Polymer Institute SAS, for results achieved in

interdisciplinary research of nanomaterials and polymer composites and nanocomposites;

- Dr. Oľga Malkinová, DrSc., from the Institute of Inorganic Chemistry SAS, for publishing the work "How to distinguish between bonding and non-bonding paths of spin-spin interaction: General approaches applied to complex J_{PP} and J_{PSe} scalar paths",
- doc. RNDr. Branislav Šprocha, Ph.D., from the Centre of social and psychological sciences SAS, for a set of works focused on the transformation process of the family and reproductive behaviour of the population of Slovakia after 1989 in a temporal and spatial perspective.
- The SAS Award ceremony took place on 4. 9. 2023 at the SAS Congress Centre in Smolenice.
- The SAS international award
  for outstanding work in the field of social and cultural sciences was awarded to a scientist from the United Kingdom, prof. Rory Fitzgerald.
- The SAS International Award ceremony took place on 26. 9. 2023 at Primate's Palace in Bratislava.
- SAS medal for the support of science:
  PhDr. Bohumila Ferenčuhová, DrSc., Ing. Zdena Sulová, DrSc. .

approved

- the Annual Report on the activities of the Slovak Academy of Sciences for 2022,

recommended

to carefully consider publishing in journals of by MDPI publishing house, as the quality of their peer review is gradually decreasing,

and, at the same time, turned to the scientific councils of institutes to deal with issues of evaluation of publications in journals and monographs in their fields, especially for those publishing houses that, in the open access approach, prioritize the quantity and speed of publication over quality and independent peer review.

At this meeting, the SAS President specially welcomed the new member of the SAS Scientific Council, doc. Dr. Ing. Peter Vrábel, to whom he and the President of the SAS Assembly handed over the appointment decree.

The SAS President drew attention to the parliament's proposal to amend the Act on the SAS which proposes the deletion of the provisions on the Learned Society of Slovakia from the Act

on the SAS and the establishment of a learned society outside SAS without consultation with the academy itself. The joint opinion of the SAS Presidium and the SAS Assembly was interpreted to the Committee of the National Council for Education, Science, Research and Sport.

At its meeting on 22.11.2023, the SAS Scientific Council

approved

- proposal for awarding the honorary scientific title of Doctor of Sciences in the field of materials engineering (DrSc. h.c.) to prof. Yury Gogotsi,

awarded

- scientific title of Doctor of Biological Sciences RNDr. to Mikuláš Oros, PhD., independent researcher of the Institute of Parasitology SAS in Košice, based on the successful defence of the doctoral thesis "Revision of monozoic tapeworms (Cestoda: Caryophyllidea): diversity, taxonomy and phylogenetic relationships" in the scientific field: 010620 – parasitology.

At the per rollam meeting on 26. 9. - 2. 10. 2023, the SAS Scientific Council

took note

- of the proposal of the Principles for the proposal and distribution of the academy's budget for 2024,

observed

- that it has no fundamental comments on the Principles of the proposal and distribution of the academy's budget for 2024,

imposed

- prof. MVDr. Juraj Koppel, DrSc., to submit the statement of the SAS Scientific Council on the Principles of the proposal and distribution of the academy's budget for 2024 to the SAS Assembly.

At the per rollam meeting on 1. 12. - 8. 12. 2023, the SAS Scientific Council

approved

- Criteria for scientific qualification level IIa and I.

In 2023, the SAS Scientific Council consisted of:

President:

prof. RNDr. Pavol Šajgalík, DrSc., President of the SAS

Vice President:

prof. JUDr. Marek Števček, PhD., rector of the Comenius University in Bratislava

Ex-offo members:
(members of the SAS Presidium according to § 9 (3) of Act No. 133/2002 Coll. on the Slovak Academy of Sciences, as amended):

Prof. RNDr. Peter Samuely, DrSc., Vice President for Science, Research and Innovations
Prof. MVDr. Juraj Koppel, DrSc., Vice President for Budget and Legislation
Mgr. Zuzana Panczová, PhD., Vice President of the SAS for International Relations
Mgr. Martin Venhart, PhD., Vice President for Scientific Section 1
Prof. RNDr. Karol Marhold, DrSc., Vice President for Scientific Section 2
RNDr. Miroslav Morovics, Csc., Vice President for Scientific Section 3
Ing. Ivana Budinská, PhD.
RNDr. Pavol Siman, PhD.
Dr. Ing. František Simančík
MUDr. Mgr. Tomáš Hromádka, PhD.
Prof. RNDr. Ľubica Lacinová, DrSc.
Mgr. Róbert Karul, PhD.
Mgr. Michal Kšiňan, PhD.
(from 1. 5. 2023 until the end of 2023, he took paternity leave)
Ing. Marek Radvanský, PhD.

External members of the SAS Scientific Council:

Dr. h. c., prof. h. c., prof. Ing. Stanislav Kmeť, DrSc., rector of the Technical University of Košice (until 17. 8. 2023
Prof. Ing. Peter Mésároš, PhD., rector of the Technical University of Košice (from December 2023)
Dr. h. c. prof. h. c. Dr. Ing. Oliver Moravčík, rector of the Slovak University of Technology in Bratislava
Prof. RNDr. Pavol Sovák, Csc., Pavol Jozef Šafárik University in Košice (until December 2023)
doc. Dr. Ing. Peter Vrábel, technical director, RONA, a.s., Lednické Rovne (from 24. 5. 2023
Prof. RNDr. Eva Zažímalová, Csc., President of the Czech Academy of Sciences
Prof. MUDr. Tomáš Zima, DrSc., MBA, Charles University in Prague, Czech Republic

8.4 The Learned Society of Slovakia

In 2023, the Learned Society of Slovakia (UčSS) fulfilled its mission to support science, research and education in Slovakia. The Council of UčSS composed of J. Noga (President), D. Ježová (Vice-President), F. Gömöry (Secretary), M. Fikar, E. Kowalská, Ľ. Lacinová, Ľ. Tomáška deliberated remotely 7 times on 31.1., 20.2., 28.3., 19.4., 20.9., 9.10., 27.10. 2023. Two General Assemblies were held remotely on 6.11. and in person on 6.12. 2023.

Awards to members of the Learned Society

On the occasion of the 30th anniversary of the establishment of the Slovak Republic, the President of the Slovak Republic awarded 28 personalities. 2nd Class Ľudovít Štúr Order for extraordinary merits for the development of the Slovak Republic in the field of science was awarded to academicians of the Learned Society, Daniela Ježová and Jana Madejová.

On the Constitution Day of Slovakia on 1. 9. 2023, the Chairman of the National Council presented the Jozef Miloslav Hurban State Award to 15 personalities. Academician of the Learned Society, Fedor Gömöry, was also awarded. He said in his speech that he sees this as a sign of respect for science and free scientific research.

Mária Omastová, an academician of the Learned Society, received the SAS award for the results of scientific research for 2022.

Media activity of the Learned Society

In 2023, cooperation with the Aktuality.sk portal continued on the regular column "Science, research - our chance", initiated in 2021 by academician Peter Moczo who engages in it with great energy. In 2023, 45 papers covering a wide range of scientific disciplines were published at weekly intervals. They are accessible online at https://www.aktuality.sk/tema/veda-vyskum-nasa-sanca/.

The Learned Society was a co-organizer of the discussion forum that took place on 30.3.2023 on the topic "Artificial intelligence and university education: Current challenges and future prospects".

UčSS academicians P. Moczo and V. Bužek significantly contributed to the successful course of the talent competition for researchers called "Falling Walls Lab Slovakia 2023 (FWLS 2023)".

The impact of the "VER" evaluation on Slovak science

The activity of the Ministry of Education, Science, Research and Sport which included a joint evaluation of the level of scientific research at university workplaces and SAS institutes, sparked a lively discussion in the academic community. After analysing the results, the Council of the UčSS requested a meeting with M. Kanovský, director of the Department of Strategies and Concepts of Science, Research and Universities. This took place on 1.2.2023. In the introduction, M. Kanovský stated that they are aware of some distortions, which were

primarily caused by lack of time. For the next period, they plan to introduce two more criteria: Social Impact and Research Environment. Councils of evaluators will be more numerous.

The members of the Council pointed out the need to improve the evaluation procedure in order to achieve a better overlap of the evaluated works with the evaluated workplace (not formal affiliation, but the actual share of the workplace in the output creation).

Modification of the UčSS statute

After approval by the UčSS General Assembly at the end of 2022, the proposed amendments to some articles of the UčSS Statute were adopted by the SAS Scientific Council such as Addendum No. 3: the changes concern the unification of membership categories, the admission of new members by a three-fifths majority, and the obligation of regular members to participate in the General Assembly proceedings, as well as the possibility to submit proposals for membership on the part of the SAS Scientific Council.

Parliamentary proposal for the establishment of a new learned society

In the first half of 2023, the UčSS took a stance on the parliamentary draft law, according to which the Ministry of Education, Science, Research and Sport of the Slovak Republic would establish the Learned Society of the Slovak Republic, and simultaneously, §3 on the establishment of a learned society would be deleted from the Act on SAS. The Council of the UčSS considered it an unreasonable destructive intervention in the current state when after several years of efforts, the latest amendments to the Act on SAS managed to achieve the state that the Act on SAS is perceived as an honourable body covering the scientists of the entire Slovak Republic. In this sense, the President of the UčSS informed the members of parliament - members of the Committee for Education, Science, Youth and Sport - as well as the Minister of Education, Science, Research and Sports, M. Horecký. The representatives of the Ministry of Education, Science, Research and Sports of the Slovak Republic expressed their willingness to strengthen the position of the UčSS through a possible amendment of the Act on SAS, which would ensure the allocation of special purpose funding intended for the activities of the UčSS. In the next legislative process, the parliamentary proposal did not receive sufficient support and possible scenarios of amendments became irrelevant.

Award for extraordinary interdisciplinary scientific output

In the 1st year of the competition, there were three proposals for awarding. After studying it, the Council requested additional information. In the final vote, none of the proposals received sufficient support, so it was decided not to award in 2023.

Election of new members

At the General Assembly on 6. 11. 2023, the following were elected as members of the Learned Society of Slovakia in a secret ballot:

prof. PhDr. Roman Holec, DrSc.
doc. RNDr. Pavol Hvizdoš, DrSc.
Prof. Dr. Ing. arch. Henrieta Moravčíková
prof. JUDr. Ján Svák, DrSc.
prof. RNDr. Jozef Širáň, DrSc.
prof. JUDr. Marek Števček, DrSc.
prof. Ing. Štefan Vilček, DrSc.
RNDr. Marcel Zámocký, DrSc.

The president of the UčSS presented diplomas to the newly elected academicians at the General Assembly on 6. 12. 2023, which took place in the Comenius University Science Park. In the second part, a lecture was given by the laureate of the ESET Award for 2023, academician Igor Lacík. After the end of the meeting, the UčSS Annual Dinner was held.

As of 1. 1. 2024, UčSS had 56 regular members, 64 emeritus members and 9 foreign members. The activities of the Learned Society of Slovakia are documented by news and official documents on the website of the Learned Society of Slovakia www.learned.sk.

9 COMMUNICATION WITH THE PUBLIC AND PROMOTION OF SAS RESULTS

2023 was extremely rich from the point of view of the media and popularization presentation of SAS, and its central theme was the 70th anniversary of the founding of the SAS.

SAS news - basic information source

In 2023, news on the SAS website was an important source of diverse information for the public and SAS employees. Throughout the year, information related to the 70th anniversary of the SAS or the anniversaries of individual SAS institutes resonated, but also the latest research results, projects and challenges, surveys, invitations to events, as well as interviews and reports on events at SAS. The number of news published in the News section was the same as last year - 550. According to the statistics, the number of views of all news for the selected period was 367,717.

9.1 SAS popularization events and activities

Celebrations of the 70th anniversary of the founding of the SAS

On 23. 6. 2023, a matinee for the 70th anniversary of the SAS was held in the Slovak National Theatre in Bratislava. Several guests, political representatives and the President of the Slovak Republic, Zuzana Čaputová, participated in the event. The 70th anniversary of SAS was also celebrated in Košice on 14.11.2023.
On the occasion of this anniversary, SAS created a specialized subpage for the Academy´s anniversary https://www.sav.sk/?lang=sk&doc=anniversary-70

Weekend with SAS

SAS organized the Weekend with SAS event for the third time in 2023, this time on M.R. Štefánik Square in front of the Eurovea shopping centre. It was the culmination of the celebration of the 70th anniversary of the founding of the Slovak Academy of Sciences. At the two-day event, more than 50 stands of SAS institutes and centres from all over Slovakia were presented with the participation of more than 200 scientists. Three Czech Academy of Sciences institutes supported the event by exhibitions and practical demonstrations,

The event, which connected the scientific community with the lay public, also included a series of lectures by 12 lecturers representing all three SAS Scientific Sections over the course of two

days. According to attendance statistics (*source Eurovea shopping centre*), around 11,000 people participated in the event. The event also featured a public recording of the Experiment TV show, as well as a Korben Dallas concert.

Vivat Scientia! Long live science!

In 2023, on the occasion of the 70th anniversary of its founding, the Slovak Academy of Sciences carried out a pilot popularization project called Vivat Scientia! Long live science! Its goal was to introduce and make the Academy visible in the regions where universities and SAS institutes are located. The first such place was the city of Lučenec, where the Academy´s scientific personalities gave a series of 10 popularization lectures during the year. An article, a photo gallery and a video were created from each event and can be found on the SAS website and are also available in audio format.

SAvinci café

The SAVinci science cafes were renewed on the premises of the Eurovea shopping centre, a successful partner in the Weekend with SAS project. The Academy organized four science cafes on these premises, each of which was recorded and the video was published on the SAS website and YouTube channel. However, the intention to attract an audience was not successful, therefore SAS ended its cooperation with the Eurovea shopping centre on this project.

9. Communication with the Public and Promotion of SAS Results

2-minute science

In 2023 continued the cooperation between SAS and Fun Radio. 2-minute science section is part of the *Morning Show with Junior and Marcel.* It includes the SAS scientists who answer the listeners' practical and sometimes unconventional questions. It can be listened to live every Tuesday and Thursday at 7:50 a.m. on Fun radio. The recordings can be also found on the radio´s website: https://www.funradio.sk/clanok/47128-moze-sa-clovek-najest-z-vyparov-pri-vareni/

Academy Journal/SAS News

In 2023, the SAS published 6 issues of the Academy Journal (SAV News) by the editor-in-chief, S. Longauerová. On the occasion of the 70th anniversary of the founding of the SAS, the journal underwent a significant graphic change. The number of pages has been increased, the graphic page break has been changed with an emphasis on supplementing visual content and dividing lines. The journal continued to systematically present the work of SAS institutes, their collectives and projects. It presented outstanding personalities from various science departments and their scientific work, bringing profiles of award-winning scientists of different age categories with special emphasis on the upcoming generation. Academy/SAS News also paid attention to the popularization actions of institutes and individuals from the SAS. The change in graphic design brought new regular columns (e.g. the presentation of the last episodes of the SAS Science Podcast) or the promotion of upcoming events in the form of banners or posters. The journal continues to provide current and archived issues to the public via the website https://akademia.sav.sk/

SAS Science Podcast The popular popularization format SAS Science Podcast continues to be one of the important formats for popularizing science from the SAS environment. In 2023, the hosts consisted of: Soňa G. Lutherová from the Institute of Ethnology and Social Anthropology SAS, Peter Boháč from the Institute of Inorganic Chemistry SAS and Klara Kohoutová from the Institute of Social Sciences of Centre of Social and Psychological Sciences SAS who conducted interviews with scientists working at institutes in central and eastern Slovakia. The SAS Science Podcast is available on all important podcast platforms, streaming services and apps (PodBean, Spotify, Apple Podcasts, Google Podcasts), on the SAS YouTube channel, and is also a regular part of the podcast family on the podcasty.sme.sk website.

20 episodes were released in a two-week interval in 2023 and reached an audience of 37.5 thousand listeners. Since the start of the podcast, the podcast has been listened to almost **117 thousand times** (data updated as of 28.2.2024, platforms summary: Spotify, Apple Podcast, Google Podcast and PodBean). The average audience for one episode in 2023 reached the value of 1875 listeners.

9. Communication with the Public and Promotion of SAS Results

Agrokomplex

SAS is one of the regular exhibitors at the international agricultural and food exhibition Agrokomplex Nitra. In 2023, it presented several research topics, e.g. how the Slovak countryside is changing in connection with the consequences of globalization on the agricultural landscape and what are the possibilities of their prevention and elimination, or the importance of plant cell walls for their physiology and development, and their need for humanity as a source of sustainable energy and new materials.

Science Fair

SAS attended the 2023 Science Fair in Prague, which is the largest popularization-educational event in the Czech Republic. SAS presented itself here for the second time as the only foreign exhibitor. Similar to last year, several SAS institutes were presented in the exhibition area and attracted the attention of the lay and professional public. Scientists from the Polymer Institute SAS presented to the visitors the processing of polymers into the form of fibres using centrifugal force. Using the example of spinning sugar syrup into cotton candy, they demonstrated the production of non-woven fabrics suitable for applications such as filtration or drug delivery systems. The visitors were surprised by the structure of the produced sugar fibres, which they could observe using a light microscope.

Young Hope of Slovak Science

The SAS organized a student conference "Young Hope of Slovak Science". The participants were the successful project researchers of high school competitions from the AMAVET Festival of Science and Technology and the Secondary School Vocational Activity (SOČ), nominated by the Academy in cooperation with the civic association AMAVET and ŠIOV (State Institute of Vocational Education) which fully reimbursed their participation. The three-day event with a rich programme was held in Smolenice. The conference aimed to motivate students to work in scientific fields, exchange contacts with experts from the Academy and create a space for discussion.

9.2 Open Academy

On the occasion of the 70th anniversary of the founding of the SAS and the 30th anniversary of the establishment of the Slovak and Czech Republics, an event called Thirty Years of Independence of the Slovak and Czech Republics (1993 – 2023) was held on 23.-24.10.2023 in the Mirror Hall of Primate's Palace in Bratislava. A series of moderated discussions with several important personalities from abroad and Slovakia was open to a wide professional and lay public and fans of the modern history of Slovakia and the Czech Republic. Co-organizers were the French Embassy in Slovakia, the French Institute in Slovakia, Center français de recherche en sciences sociales, the Czech Academy of Sciences and the Czech Center in Bratislava.

The Open Academy issued two brochures. The first one about the history of SAS was published on the occasion of the 70th anniversary of SAS and was also translated into English. It was followed by a second part of the thematic series Climate Change 2. A promotional video was created for each brochure and was presented through several media activities. Video about the History of the SAS shown during the annual event at the Slovak National Theatre.

https://otvorenaakademia.sav.sk/vysvetlujeme/brozury/dejiny-sav/
https://otvorenaakademia.sav.sk/vysvetlujeme/brozury/dejiny-sav-english/
https://otvorenaakademia.sav.sk/vysvetlujeme/brozury/zmena-klimy-2-diel/

SAS institutes and centres again participated in the national (Science and Technology Week) and international events (European Researchers' Night). SAS continued to produce promotional videos about individual SAS institutes.

9.3 SAS on Social Networks

Facebook SAS (https://www.facebook.com/SlovenskaAkademiaVied)

The number of followers of the SAS Facebook profile has increased to 15,000 accounts over the past year. In 2023, more than 400 posts highlighting the achievements of the Slovak Academy of Sciences and its scientists were added to the SAS fan page.

The most successful posts on the SAS Facebook page with the highest reach were those regarding the awarding of scientists as well as the sharing of important statements of the Slovak Academy of Sciences, the achievements and discoveries of Slovak scientists, the sharing of videos about SAS institutes, as well as the funny pictures of the "Funny Tuesday" column. In 2023, the post on the SAS Facebook about the SAS scientist being awarded by the European Space Agency appealed the most to Slovaks. The post had 491 interactions and reached 33,186

people. Similarly, the ESET Science Award post had 458 interactions and reached 32,419 people.

Instagram SAS @akademiavied

The number of followers of the SAS Instagram account has increased to 3895. The greatest success and impact were recorded by posts in the form of short videos edited from events that SAS participated in or organized. The Academy also uses the so-called Instagram TV - post format where you can publish videos of max. 10 minutes and the format of the so-called: stories - animated or static images that can be seen by clicking on the profile picture within 24 hours of their publication. This format usually has the greatest impact.

Twitter SAS @akademiavied

The number of fans following the SAS Twitter page has increased to 1,500. The results of the SAS scientific research and the achievements of Slovak scientists resonated the most. SAS communicates on Twitter in English.

LinkedIn SAS

The latest communication channel between SAS social networks is the LinkedIn profile. The number of SAS fans has increased over the past year from almost 1000 to 1800 followers. The composition of the fan base corresponds to what it is intended for. The profile is mainly followed by people working in the research and education spheres. Followers can find there information about job opportunities in the Slovak Academy of Sciences, professional courses and grant calls.

SAS YouTube Channel

The number of YouTube fans of the SAS account increased by more than 200 users from 1109 to 1347. In addition to short videos about the institutes and events of the Slovak Academy of Sciences, recordings of various scientific lectures by domestic and foreign personalities have been added to the profile. Also, recordings of the lectures of the Košice Science Café, the SAVinci Café and Vivat Scientia, or the SAS Science Podcast were regularly recorded and posted.

Over the past year, the videos of the series "SAS Educates Pupils" have attracted an audience. The most successful video from the series was the introduction to organic chemistry. In 2023, it reached 1,927 views.

The recording of the 70th anniversary of the SAS event in the Slovak National Theatre and the recordings of the lectures of Košice Science Cafes also achieved a high number of views.

10 VISIONS OF THE NEW LOOK OF THE SAS COMPLEX AT PATRÓNKA

SAS is interested in modernizing its campus at Patrónka and transforming it into a modern science campus that meets current research needs. In addition to creating better conditions for scientific work, one of the main goals is to make the environment more attractive for young promising scientists who come to work in the SAS and not choose the alternative of working abroad. The plan is to open the SAS complex to the public and transform it into a valuable space both for relaxation and popularization of measures aimed at the sustainability of a healthy environment, biodiversity, and energy needs.

The SAS complex lacks shared infrastructure, which essentially creates the basic prerequisites for meeting and broader mutual contacts in the scientific community. Therefore, SAS needs to create shared laboratories, conference and seminar spaces, common study rooms, but also opportunities for informal meetings, sports, accommodation and relaxation areas, because in the world of science, work is also done while relaxing, and one also relaxes while working. SAS intends to change the complex environment in such a way that it provides inspiring conditions for pleasant and creative work, and for scientists to look forward to work. Some temporary objects that have no added value for scientific work and it makes no sense to reconstruct them are planned to be removed. Traffic should be excluded from a substantial part of the area to make park improvements with rest zones accessible to the general public as a space in which science and popularization activities could be carried out. Today, the SAS complex partly resembles a park with its greenery and lower level of built-up area, and SAS wants to further strengthen this function. More pedestrian and rest zones should be built in the complex with examples of how natural sustainable life can be preserved in an environment of ongoing climate change and mass consumption.

In the future, the SAS wants to open the complex to the public and enable its wider use than it has been so far, and also to promote science in this way. The quality of the complex should help attract and develop talented scientists, provide them with a place for comfortable workspace and the public a space for active relaxation in a pleasant environment with a scientific popularization function.

The gradual implementation of the project is divided into several sub-tasks:

- creation of new work spaces according to the required scope (staff, laboratories, storage spaces, archive) - construction of at least one new pavilion is expected
- creation of a seminar/conference centre
- creation of a central area of first contact between SAS and the public (basic info, exhibitions, presentations, etc.)

- change in traffic situation, balance of individual links, pedestrians, cyclists, individual car traffic, supply, parking (areas for supply, parking for couriers, new entrances to the complex, use of circular roads
- creation of a pedestrian/cycling zone in the central axis of the complex with a park arrangement, zones for relaxing, educational sites open to the public, highlighting aspects of climate sustainability (water retention measures, energy efficiency, preservation of biodiversity)
- creation of a network cycling/pedestrian connection of the area to Mlynská dolina, Karlova Ves, Železná studnička
- synergistic connection of the area to the development project BSK at Patrónka, Zoo and ESET (adding functions)
- modern solution of dining areas, kindergarten, additional services
- supplementing the possibilities of sports and relaxation use of the area
- creation of shared laboratories, public study rooms, library,
- creation of a resident zone for mobility (accommodation, infrastructure, necessary services and relaxation zones)

It should be noted that the goal of the SAS is not massive new construction, but mainly the revitalization of existing buildings and space in order to create the necessary functionalities common in a modern science complex. Preliminary investment costs for this purpose are estimated at the level of EUR 40-100 million (according to the growing need for new buildings), which SAS has not yet secured. In 2023, an international urban planning competition was held for the future complex design, in which 14 applicants participated. The international jury selected the winner, who, while respecting the vision of the winning proposal, is currently working on a detailed urban and landscape solution. Based on it, the complex will gradually be finished in the target form according to the financial resources that will be available and the project readiness of individual construction solutions.