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OF SZEGED

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A commitment to excellence



“A grand cultural institute as a university does not just exerts its influence within its city limits; its impact radiates far beyond,” said Kunó Klebelsberg who has made an undisputable contribution to the advancement of higher education in Szeged.

The members of the university daily perform their duties in the field of education, research and medicine which helps the lives of those living in the immediate surroundings and in nearby regions. Continuous improvement and striving for excellence has always been core values of the university. This effort has been recognized by the “Committed to Excellence” prize awarded by the European Foundation for Quality Management (EFQM), an institute founded in Brussels over a quarter of a century ago. The University of Szeged is the first Hungarian higher education institute to win this prize. Albert Szent-Györgyi strived for the same excellence as a researcher, lecturer and rector of the university and was awarded the Nobel Prize in Physiology or Medicine in 1937, exactly 80 years ago. The press, as well as the majority of the public, felt that this honourable prize, beyond the undisputable individual feat of Szent-Györgyi, is a natural legacy of the higher education policy of Kunó Klebelsberg. The Nobel laureate himself was no exception and his first trip took him to Klebelsberg’s gravestone. “It is Klebelsberg to whom I owe a debt of gratitude,” Szent-Györgyi said, “for the fact that I am in Hungary; it is his guiding spirit that brought me back. [...] I have always tried to live up to his ideas.” This path of commitment to excellence is a common bond shared by past and present students and lecturers, some who will be introduced in this magazine.

Prof. Dr. Gábor Szabó

Member of the Hungarian Academy of Sciences, Rector
UNIVERSITY OF SZEGED



Revolutionizing the Storage of Solar Power

Researchers at the University of Szeged (SZTE) are developing intelligent materials that may be useful for special energy sources and also in the development of new methods for the storage of power, such as solar power.

SZTE research groups studying nano-materials have set a common goal to achieve new scientific results in the field of functional materials by developing nanostructured systems with a well-defined composition. Dr. Zoltán Kónya, Head of the Department of Applied and Environmental Chemistry of SZTE's Faculty of Science and Informatics explains that research groups have managed to create a special composition that may be suitable for the development of new energy storage methods and power sources. Storing solar power in chemical bonds has been studied for many years in Szeged. This project now aims to develop an intelligent material that carries out this task with optimal efficiency, stability and selectivity with each component responsible for a specific function. Csaba Janáky, Head of the Photoelectrochemical Research Group (supported by the Lendület [Momentum] Programme of the Hungarian Academy of Sciences and SZTE) states that these novel, intelligent materials may surpass current materials in terms of solar power storage efficiency.

GREEN UNIVERSITY

A paradigm shift of the university members coupled with environmentally friendly investments have both resulted in the University of Szeged being the greenest university in Hungary. The University of Szeged was the first higher education institute in Hungary to install a solar park. Geothermal heating is installed in the majority of the university buildings and the heating and cooling of SZTE's József Attila Study and Information Centre is partly carried out by heat pumps using the heat of the sewage pipes.





The Molecular Centre of Excellence

The Hungarian Centre of Excellence for Molecular Medicine (HCEMM) has been founded in Szeged.

The project, with over 15 billion HUF funding, focuses on biomedical research and diagnostics of non-communicable, widespread and common disease, including cardiovascular diseases, cancer and inflammatory diseases, which claim around 30 million victims each year worldwide. The scientific research will place a strong emphasis on the diagnostics of diseases that are widespread in Hungary, including immunological, metabolic and tumorous diseases, cardiovascular diseases, such as hypertension; rheumatism, eczema, psoriasis, diabetes and cancer. The future centre in Szeged will strongly promote the clinical application of the results of basic research and

the development of new therapy methods. Results from this research may provide breakthroughs in molecular diagnostics and also customized therapy. The HCEMM was established through cooperation of the University of Szeged, the Biological Research Centre, Hungarian Academy of Sciences, Szeged, the University of Debrecen, Semmelweis University and the European Molecular Biology Laboratory. The centre for excellence will enhance the research capacity of each institute and the formation of new scientific relations. Additional common goals include the joint development of infrastructure, joint doctoral training programmes and joint clinical research training programmes.



Investigating Rare Diseases

A research programme for the development of novel diagnostic and therapy procedures for rare diseases has been launched at the University of Szeged. The programme focuses on rare metabolic diseases, genetically determined heart diseases and skin diseases.

Rare diseases affect less than 1 in 2000 people and it is estimated that around eight to nine hundred thousand people in Hungary are affected by some kind of rare disease. There are several thousand rare diseases, the majority are genetically determined, but the number of diseases related to various infections or the immune system is also significant says Márta Széll, head of the project.

At the Department of Pediatrics of the University of Szeged, infants are screened for 26 different metabolic diseases where an early diagnosis is crucial. Researchers are developing methods for the precise determination of the genetic background of these diseases, opening the door for personalized therapy.

A Hungarian clinical databank will also be established and expanded in the scientific framework of the project. This databank is essential for customized diagnostics and therapy and for the planning of up-to-date basic and pharmaceutical research based on genetic findings. The genome-level database will radically improve therapeutic safety in daily medical care and family planning and it will also help decrease the incidence of severe genetic diseases.

The outcomes of this programme will provide an unparalleled opportunity, to understand the pathogenesis of rare diseases, to develop novel diagnostic and therapy procedures, and for the long-term integration of all these processes into clinical practice.

Tricking bacteria

Antibiotic resistance – pathogenic bacteria becoming increasingly resistant to antibiotics – is a major threat to public health. This problem is exacerbated by multidrug resistance where bacteria are often resistant to multiple antibiotics and antibiotic resistance may become the leading cause of death by 2050.

This potential timebomb highlights the importance of the joint research programme of the University of Szeged and the Biological Research Centre which will look into the causes as well as the processes leading to resistance.

The participating research groups, led by Csaba Pál, Balázs Papp and Éva Kondorosi, will create bacterial strains that are resistant to antibiotics then assess the effect of antibiotic combinations on the antibiotic resistance of these strains. These findings will be used by the research groups of Tamás Martinek, Ferenc Fülöp and Imre Földesi to produce new antibiotic compounds that attempt to trick bacterial defence systems and counteract the resistance.

The researchers will apply a new strategy that puts the mechanisms responsible for the control over the development and elimination of resistance as the focus of pharmaceutical research. This new research strategy will be applied by the researchers at the University of Szeged using systems biology; synthetic chemistry and biology to create a new methodology for the qualitative development of new active pharmaceutical ingredients. This research will allow researchers to develop combination therapies based on co-administration of molecules and will also help to restore the efficiency of current antibiotics.





Investigating Endemic Diseases

A new research programme investigating the possibilities for treating neurological, inflammatory and degenerative muscle diseases has been launched. The programme will involve researchers from the University of Szeged and from the Biological Research Centre, Hungarian Academy of Science, Szeged.

At the moment, the most common public health issues include neurodegenerative diseases, inflammatory diseases of the digestive tract and cardiovascular diseases. The processes leading to these problems are still not completely known; therapy options are scarce and the available medication usually just alleviate the symptoms of these diseases.

Prof. Dr. László Vécsei, lead investigator of the project says that "The processes involved in the degeneration of the nervous system may differ with each disease but there might be common underlying mechanisms.

The goal of this four-year project is to investigate the role of kynurenines in the function of the nervous system, the immune system and the muscular system. Kynurenines are compounds found in the human body, produced during the degradation of an essential amino acid, tryptophan. Kynurenines take part in the functioning of the immune system and also have an important role in neurodegenerative disorders. Long-term research plans include the development of molecules that allows the manipulation of these systems through kynurenines, and thus opening new therapeutic possibilities.

Prof. Vécsei emphasized that the programme aims to train and equip the next generation of future researchers as well as seeking patent-eligible scientific results and publishing scientific publications. The programme will help keep talented young researchers in Hungary by providing an opportunity to carry out valuable research and to earn a doctoral degree.



The Fight Against Oral Cancer

Scientists at the University of Szeged are looking for ways to detect the early signs of periodontitis and oral cancer. They are also looking into the causes of these conditions, which are widespread in Hungary, as well as studying the possibilities to improve prevention and the factors influencing treatment.

Hungary is ranked in the top 3 countries in the world with the highest number of oral cavity cancer cases and in Hungary, most people die from this type of cancer. Gum inflammation is also an endemic condition in Hungary affecting every third person.

Scientists at the University of Szeged are investigating oral cancer and periodontitis in order to understand the factors leading to these diseases and to assess which of these factors could be harnessed for a successful treatment. The microbe communities which playing a role in oral cavity diseases can be identified from genetic sequencing.

In order to fight periodontal inflammations, the researchers are trying to identify the changes in the

composition of these microbial communities that may contribute to the disease as these changes can then be targeted by antibiotic therapy. Researchers are also investigating whether the surface modifications of titanium implants, used in dental prosthetics, influence the attachment of the body's cells and whether this in turn may inhibit the growth of bacteria on titanium surfaces leading to inflammation. In the case of oral cancer, researchers are attempting to identify biomarkers that may enable the recognition of a malignant tumour at an early stage. Currently, patient survival rates are very low with only half of all patients living longer than five years following diagnosis.

Rescuing Species in the Botanical Garden



Adonis vernalis (pheasant's eye), *Ajuga laxmannii* (bugleweed), *Anchusa barrelieri* (Barrelier's bugloss), *Ranunculus illyricus*, *Silene bupleuroides* (catchfly), *Viola ambigua* (violet), *Vinca herbacea* (herbaceous periwinkle) and many other rare flowering plants, totalling 82 are included in a plant rescue programme currently underway at the Botanical Garden of the University of Szeged.

"We are participating in a programme to protect natural stands of rare loess steppe plant species in a 160-hectare area of the Körös-Maros National Park. This nature conservation programme was launched in March 2017 and involves 82 plant species, including 16 protected and 52 regionally endangered species" reports Anikó Németh, director of the Botanical Garden of the University of Szeged.

The Pannon loess steppe is one of the most complex and species-rich plant community in Hungary. This community is endangered due to the rich and fertile chernozem soil found in the National Park has largely been ploughed for cultivation. Leaving only small patches of these plants on the slopes of kurgans or between alkali grasslands.

Planting areas have been marked and seeds have been collected from the designated plant species within 30 kilometres of the planting areas. The seeds are currently being purified and stored till sowed. There is virtually no knowledge about the reproduction and development of 50 of the 82 plant species to be re-planted. To rescue these plants, sowing experiments have been established to find the optimal conditions and time period for germination adds Anikó Németh describing a crucial step in the nature conservation programme.

Seedlings will be planted in multiple phases, with the characteristic natural spatial distribution and growth characteristics of plants taken into consideration. This project will result in the Botanical Garden of the University of Szeged helping plant diversity of Pannon loess steppes in the Southern Trans-Tisza Region by planting 25 thousand seedlings and sowing 255 thousand seeds by the end of 2021.



Marketable Knowledge

Shared Service Centres (SSCs) represent one of Hungary's fastest-growing sectors and offer a variety of positions in a number of major Hungarian cities – including Szeged – for young graduates, with or without experience, who speak foreign languages.

Every year, thousands of new positions open in the SSC sector for professionals with a degree in economics and a good command of foreign languages. Many SZTE graduates – especially those from the Faculty of Economics and Business Administration and the Faculty of Arts – choose shared services centres as a first workplace. This is why the Faculty Council of the Faculty of Economics and Business Administration has fully supported the SSC Basics course launched jointly with BDO – the fifth largest international network of public accounting, tax and advisory firms with representation in 154 countries. Since 2016, the Faculty of Economics and Business Administration of the University of Szeged (SZTE) has been jointly

training professionals, with BDO and throughout this programme, leading professionals share their experience, insight and knowledge in topics that are not covered in higher education in Hungary. This unique course aims to better prepare students for future SSC positions by offering sector-specific information in topics, like the processes or the multicultural environment of service centres. "The professional contribution of the cooperating partner, BDO, makes this course especially valuable" says Dr. Márton Vilmányi, dean of SZTE's Faculty of Economics and Business Administration. "BDO is an outstanding educational institute for the domestic SSC sector with exceptional knowledge of this field.