# Perspectives from Rita Sinka

**Associate professor and head of the Department of Genetics at the University of Szeged | former Installation Grantee**

Rita Sinka's research into fruit fly reproductive processes in the last 15 years has led to a new collaboration which may answer key questions about human infertility. "Drosophila melanogaster has a very big sperm – comparatively 32 times bigger than human sperm, but the basic structures are very, very similar," Sinka says. "I started to work on spermatogenesis because it's a great system to model basic cell biological questions, like organ changes during development, and tissue-specific gene regulation and tissue-specific cell organelle development."

Initially focused on the role of membrane transport during germ cell formation and spermatogenesis, her lab also undertook genetic screening and analysis of Drosophila testis. "We identified many gene products which are probably responsible for the late development of the spermatids, when there are huge changes – an approximately 10 micrometre develops to 1.8 millimetres in size," Sinka says.

Fortunately, her university in Szeged includes a Centre for Reproductive Medicine. "We started a collaboration to try to find the human orthologs of what we had identified in Drosophila. Actually, it was very like when I wrote my first grant!" she says. "I proposed in my EMBO Installation Grant that in the future we can understand better human sperm development. Hopefully based on our research we can move a little further and try to identify factors which could contribute to human infertility."

After completing her PhD at what is now the HUN-REN Biological Research Centre Szeged, Sinka moved to England for a postdoctoral position at the University of Cambridge studying cell cycle regulation. A further postdoc role followed at the MRC Laboratory of Molecular Biology in EMBO Member Sean Munro's group working on membrane transport. After six years away including starting a family, she was keen to return to Szeged.

"The research community here is very supportive, and I had very good connections at the BRC and the university as well. They offered me a position at the university, but unfortunately, they didn't have any start-up money to establish a research group," Sinka says. "The EMBO Installation Grant in 2009 basically offered me a very flexible opportunity to establish my own lab. Without that support, I probably would never have been able to establish my own lab. I bought equipment, and I managed to hire very good colleagues, a postdoc and a technician."

The move back to Szeged also gave Sinka the opportunity to change direction and start work on spermatogenesis – utilizing the different skills developed throughout her career. "I'm focusing on basic research. The infertility collaboration is very important for me, and hopefully, that can develop in the near future - basic research is the field where I'm more comfortable, but I definitely want to understand better the human relevance of our findings," she says.

The EMBO grant was also a 'gateway to other things' – including funding from the Hungarian National Research, Development and Innovation Office (NRDIO). Sinka says the environment for early career researchers in Hungary is now more positive than in the past, due to two national funding schemes designed to help young scientists establish their own lab, run by the NRDIO, and the Hungarian Academy of Scientists. "They are quite competitive, but it's a good start," Sinka says. "But definitely I think EMBO support is very important – not only for the young scientists here in Hungary, but also the more established scientists, as well as the connection you get with EMBO and with EMBO-related institutes."

# Meet scientists from the EMBO communities

## Gergely Rona
## Fresh approaches to understanding neurodegeneration

**Group leader at the HUN-REN Research Centre for Natural Sciences | EMBO Installation Grantee**

Gergely Rona has made a habit of approaching scientific puzzles from fresh angles. "As a student, I saw something in the literature that didn't make sense to me," says Rona. "I was invited to carry out some preliminary experiments and to my surprise they revealed unknown effects on the localization of an enzyme that plays a key role in genomic integrity and how cells function. When I saw the black and white results, I was so happy and rushed to tell my supervisor, who invited me to carry out follow-up studies for my PhD. The experience showed me that when you have an idea, dedication and support, you can make it work."

Rona's group studies how cells maintain their genomic integrity, and how this is linked to health and disease. "Errors in a cell's DNA repair processes are thought to contribute to neurological disorders such as Huntington's disease and amyotrophic lateral sclerosis," he says. "One area we are interested in is how non-dividing cells, such as neurons, repair and protect their genome against DNA damage, despite not being able to rely on the replication machinery."

Rona says his EMBO Installation Grant presents opportunities to build fruitful collaborations. "We will be able to initiate joint projects to help answer our research questions," he says. "My team will also be able to attend meetings, take part in training courses and benefit from mentorship initiatives that will support the growth of our lab."

## Imre Gaspar
## Exploring AI to simulate cancer

**Research scientist at Turbine.ai start-up in Budapest | former EMBO Fellow**

Imre Gaspar's EMBO Postdoctoral Fellowship helped create the contacts and develop the skills he has used throughout his subsequent career in academia and now in industry. "I learnt a lot, so many things that I used afterwards and even now that I've moved out of academia. That was a very important part of my life," he says.

It was during his EMBO Fellowship at the European Molecular Biology Laboratory in 2009 that he recognized the value of bioinformatics to the life sciences: "The amount of data that you collected all of a sudden just exceeded the capacities that you could normally comprehend without bioinformatics tools."

Now working for Turbine.ai – a cancer start-up in Budapest – Gaspar says bioinformatics have become an essential basic skill for life scientists. "It's like being able to read. It's at that level," he says, adding that the ability to use AI is becoming a similar core skill.

His current work uses AI tools to simulate cancer behaviour. "We use AI models, and we are working to understand why our AI models made that prediction," he says. "Can we relate that to real life biology?" Gaspar says it is essential to be able to understand how the AI models work, so that predictions can be treated as reliable hypothesis able to be tested in the lab and eventually in a clinic – work he sees as having potentially huge societal benefits.

## Ferenc Nagy
## EMBO and the life sciences in Hungary

**EMBC Delegate | HUN-REN Biological Research Centre Szeged | EMBO Member**

Nagy served twice on EMBO Council and is confident of the benefits to Hungary of its membership of EMBC, the international funding body of EMBO. He is particularly positive about the importance to his country of the initiative increasing participation in the EMBO Programmes thoughout Europe.

"There's solid evidence that EMBO cares about the smaller countries. This changed the attitude and the mood dramatically." Nagy is using the new EMBO opportunities to further internationalize the life sciences at his own institute and more widely across Hungary.

"Internationalization is absolutely important," he says. "Having these bilateral exchanges and helping people to go out to collaborate -- this is important for many reasons."

The initiative started in 2022, and Nagy acknowledges it is not possible to fully measure the impact after only two years.

"It is not long enough to see the overall impact but already we are engaged in nearly all the activities. We have Young Investigators, but not too many, and these are the people forming the first nuclei which then will grow and then you will get a network," he says.

Nagy says the life sciences in Hungary are gaining momentum because the national government understands the critical importance of science to the country's future.

But Nagy also believes researchers should do more to translate their knowledge into innovation: "We have to do good science - not 'applied' or 'basic' science but good science - and turn our breakthroughs into market value and commercial value. This is a very strong emphasis," he says.

# Hungary and EMBO in numbers

**13** **EMBO Members**[a]

- 3 Budapest
- 1 Gödöllő
- 8 Szeged
- 1 Tihany

**4** **EMBO Installation Grants**[d]

- 2 Budapest
- 2 Szeged

Gödöllő

Budapest

**1** **EMBO Young Investigator**[b]

Tihany

**26** **EMBO Scientific Exchange Grants**[d]

3 Coming to Hungary

23 Going abroad

Szeged

**3** **EMBO Courses & Workshops**

**231** Hungarian nationals attended EMBO Courses & Workshops throughout Europe[c]

a Working in Hungary
b Former programme member working in Hungary
c 2019 to 2024
d 1992 to February 2024

# EMBO opportunities

### EMBO Postdoctoral Fellowships

fund internationally mobile researchers for a period of up to two years. Five additional fellowships are reserved for those applying to work in participating countries*. Applications open all year around.

### EMBO Scientific Exchange Grants

fund research exchanges of up to three months. The grants facilitate collaborations with research groups with expertise, techniques, or infrastructure that is unavailable in the applicant's laboratory. Applications open all year around.

### EMBO Advanced Collaboration Grants*

fund exchange visits of group leaders with scientists from EMBC Member States to develop or carry out collaborative projects, or to prepare joint grant proposals. Applications accepted until 31 August 2024.

### EMBO New Venture Fellowships

help early career scientists to explore topics outside their current area and enter a new research direction. They fund research visits of up to three months. Applications open all year around.

### EMBO Core Facility Fellowships

support training for staff of core facilities that provide services to research institutions or universities. They fund international exchanges of up to one month. Applications open all year around.

### The EMBO Young Investigator Programme

supports group leaders in the early stages of setting up their independent laboratories for a period of four years. Networking is a key aspect. Application deadline: 1 April.

### EMBO Installation Grants*

support group leaders establishing their laboratories in Hungary and becoming part of an international young investigator network. Application deadline: 15 April.

### EMBO Courses & Workshops

stimulate exchanges of the latest scientific knowledge and provide training in experimental techniques. Application deadlines: 1 March and 1 August.

### EMBO Press*

publishes five journals that serve the global life science community: The EMBO Journal, EMBO Reports, EMBO Molecular Medicine, Molecular Systems Biology, and Life Science Alliance, which is published in partnership with Rockefeller University Press and Cold Spring Harbor Laboratory Press. EMBO is waiving the Article Processing Charge (APC) for Open Access publication in the EMBO Press journals for scientists working in Hungary provided they are not covered by a Springer Nature Open Access Agreement and do not have scientific publishing support or alternative funding available.

Find more EMBO schemes at *embo.org/funding*

* Hungary is one of the participating countries in the increasing participation schemes. The aim of the schemes is to increase participation in the EMBO Programmes throughout Europe.

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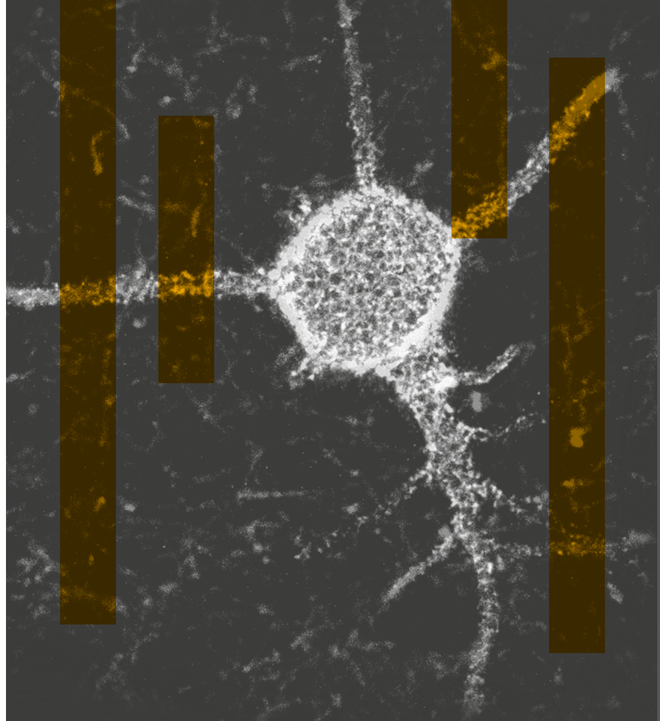

# Focus on Hungary

## Facts and figures

The first university in Hungary was established in 1367 in Pécs, and the oldest continuously operating higher education institution is the University of Debrecen dating from 1538[1]. There are now 64 higher education institutions in the country. The capital Budapest attracts half of Hungary's 289,000 enrolled students and is home to the Eötvös Loránd University – the country's largest.[2]

Around 32% of young adults in Hungary attain a tertiary education.[3] In 2021, more than 61,000 people in Hungary were employed in R&D work.[4]

Hungary has a network of National Laboratories[5] as well as the Hungarian Research Network.[6] The national Research, Development and Innovation Strategy (2021-2030)[7] sets three overarching objectives for domestic innovation policy including better use of research from public research and higher education institutions.

The European Patent Office granted 102 patents with first patentees residing in Hungary in 2022[8], and the Hungarian Intellectual Property Office granted 1,184 patents for inventions in the country in 2022.[9]

Research and development in Hungary has benefited from a significant increase in investment over the past decade. Gross expenditure on research and development (GERD) increased by more than 20% from 2015 to 2021, to 1.64%.[10] The main sectors financing GERD were business enterprise providing 50.6%, and the national government (35%).[11] Total R&D spending rose 150% between 2012 and 2021 to reach 907 billion Forint.[12]

Life scientists in Hungary have access to a variety of funding calls through the National Research, Development and Innovation Office[13], the HUN-REN Welcome Home and Foreign Researcher Recruitment Programme[14] and the Hungarian Academy of Sciences.[15] They also receive funding through Horizon Europe projects, European Research Council grants, and Marie Skłodowska-Curie Actions[16] as well as EMBO[17].

### Key figures

**Population: 9,599,744**[18]

**R&D spending: 1.64% of GDP**[16]

**People employed in R&D: 61,000**

**Foreign researchers: 11.0%**[19]

**Patents (European Patent Office): 102**

**Higher education Institutions: 64**

**Higher education enrolment: 289,000 students enrolled**

**Horizon 2020 funding**[20]**: 1,570 organizations including 437 SMEs involved in H2020 projects; 33 ERC principal investigators; 181 Marie Skłodowska-Curie Actions funded researchers**

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