



Perspectives from Vesna Boraska Perica

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EMBC Delegate

Please tell us about your professional journey up to this point.

I graduated in 2001 from the Faculty of Mathematics and Natural Sciences, Department of Biology, at the University of Zagreb. In 2002, I started working at the Medical School, Department of Medical Biology, at the University of Split. Concurrently, I pursued a PhD programme and obtained my PhD in genetics of diabetes mellitus in 2008. I progressed from scientific novice to an associate professor, to an assistant professor and finally a full professor. Currently, I am actively involved in teaching and research.

Throughout my career, I realized the importance of expanding my perspective on institutions abroad and global scientific advancements. To achieve this, I applied for various projects and scholarships. For instance, I have

been awarded a scholarship from the British Scholarship Trust that enabled me to undergo four months of training at the Wellcome Centre for Human Genetics in Oxford. There, I worked in the group led by Mark McCarthy, learning statistical analysis in genetics, and got introduced to the genome-wide association studies under the Wellcome Trust Case Control Consortium (WTCCC). Subsequently, I obtained scholarships from the National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia and Unity Through Knowledge that allowed me to perform postdoctoral research at the Wellcome Sanger Institute in Hinxton, Cambridge, in the group of Eleftheria Zeggini, who is a current EMBC Delegate for Greece. Under her guidance I became the lead analyst for the WTCCC phase three analysis of

anorexia nervosa. These experiences significantly contributed to my scientific and personal development.

Upon returning to Croatia and my primary institution, I secured funding from the Croatian Science Foundation for the project entitled Genome-wide association analysis of Hashimoto's thyroiditis. This has become the focus of my current scientific work, in which I investigate the genetic and environmental aspects of the development of this autoimmune disease and collaborate with physicians. We also examine the clinical features of patients with Hashimoto's thyroiditis.

You have also become a delegate of EMBC, the international funding body of EMBO. How do life scientists in Croatia benefit from the new schemes to increase participation in the EMBO Programmes?

I enthusiastically welcome the opportunities provided by the new and adapted schemes for life scientists in Croatia and other participating countries. My colleague, EMBC Delegate Lovorka Barać Lauc, and I are actively involved in raising awareness of these opportunities. We organized information days in Zagreb and Split. EMBO conducts a training course on professional soft skills and the selected organizers are in the process of arranging the course here in Croatia. I believe that Croatian scientists will greatly benefit from these opportunities.

Looking at the broader landscape of life sciences in Croatia, what noteworthy trends do you observe?

Croatian scientists are engaged in diverse fields of molecular biology, with a particular emphasis on life sciences. It is difficult to highlight a single group, as there are many throughout Croatian universities and scientific institutes that apply cutting edge technologies in scientific research. The main challenge for Croatian scientists

lies in funding. National funding calls are not yet available on a yearly basis, making it difficult to maintain continuity in research work, sustain knowledge within research groups and retain promising PhD students, who could progress to become postdoctoral researchers. Most Croatian scientists work at universities and are heavily involved in teaching and associated responsibilities, which limits their opportunities for long-term research or training abroad.

What advice would you give to scientists seeking to embark on a research career in Croatia?

My research journey began with applying to different training courses abroad. One anecdote from my personal early career that actually marked my life is based on a rejection letter from one specific course. As I was determined to attend a similar course, I successfully applied to one held in Colombia in South America and spent ten days there. It was during this course that I met my future supervisor from the UK, that opened doors for me. Therefore, my main message is that younger scientists should embrace the opportunities available to them, such as those provided by organizations like EMBO, and not be demoralized if not accepted immediately as there is always a second chance. One training course can open doors, expand knowledge and boost self-confidence. This is particularly vital for PhD students and postdoctoral researchers.

Meet scientists from the EMBO communities



Marko Šestan A holistic approach

Assistant professor at the University of Rijeka and former EMBO Postdoctoral Fellow

After his PhD research on the role of viral infection on the development of type 2 diabetes at the University of Rijeka in Croatia, Marko Šestan went to Portugal, where he studied interactions between the nervous and immune systems, and the effects on endocrine function funded by an EMBO Postdoctoral Fellowship. His work revealed details of how, during fasting, cells migrating from the gut to the pancreas trigger hormone production to maintain glucose levels. "I am thankful to EMBO for such an excellent opportunity. I was able to meet many interesting people and learn a lot of important techniques," he says.

Šestan is now back at the University of Rijeka, where he has a teaching position at the faculty of medicine. He is also working on securing funding for his own research group. "Disease and homeostasis pathways work across multiple organs and systems in the body. I want to combine my knowledge and make my own niche looking at how viral infections affect the immune system and endocrine function," Šestan explains.

He admits the funding situation within Croatia is difficult: "Government investment in science is still relatively

low, which means we are still not very competitive on the European stage." The problem is acknowledged, says Šestan, and the situation improving. The Croatian government has plans to increase investment and to attract more international scientists, and EU funding bodies such as the ERC are planning funding calls specifically for Eastern Europe. "We are hopeful!" says Šestan. Of his home country Šestan says it is a beautiful place, and also that people are open for new experiences and encounters: "You should definitely visit Croatia!"



Iva Tolić A love for life

EMBO Member and professor at the Ruđer Bošković Institute, Zagreb

"I am fascinated by how life works!" says Iva Tolić, professor of cell biophysics at the Ruđer Bošković Institute (RBI) in Zagreb, Croatia. The fascination has taken her from studying molecular biology in Zagreb, to a PhD in biomathematics integrating a quantitative approach into her research, via Copenhagen and Florence gaining experience in biophysical methods, and to the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, where she spent ten years as a group leader in cell biology.

Now in Zagreb, her research focuses on the structure of the mitotic spindle

and its role in cell division. "We want to understand how the spindle works, what happens when it doesn't and what relevance this has for cancer," she says. Specializing in high-resolution microscopy and cell biology approaches, she collaborates closely with theoretical physicists to build quantitative models of the spindle complex. "We use our models to make predictions about the spindle's behaviour and design specific lab experiments to test these predictions," she explains.

Funding from the ERC helped establish her group at the RBI, Tolić says, enabling her to buy microscopes and extend her collaborative network. "The ERC grants changed my life! I have the same resources as elsewhere and I can be here in my home city". She appreciates the intellectual atmosphere in Croatia. "Croatia has a very vibrant scientific community and people are very motivated. I really enjoy this," says Tolić. She can often be found in the many cafés between her house and the institute. "I do most of my reading and writing in cafés with a cappuccino. It's a great way of life."



Kristian Vlahovicek Building international collaborations

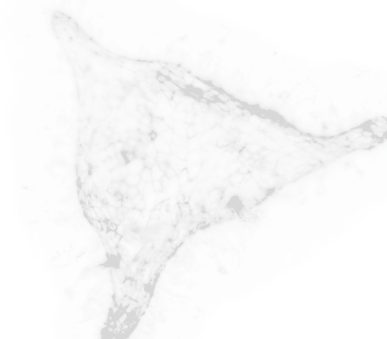
Professor at the University of Zagreb and former EMBO Installation Grantee

In 2006, after ten years in Italy, Kristian Vlahovicek, a professor of bioinformatics, returned to Croatia to set up his computational biology group at the University of Zagreb. Vlahovicek, who says his first scientific love was crys-

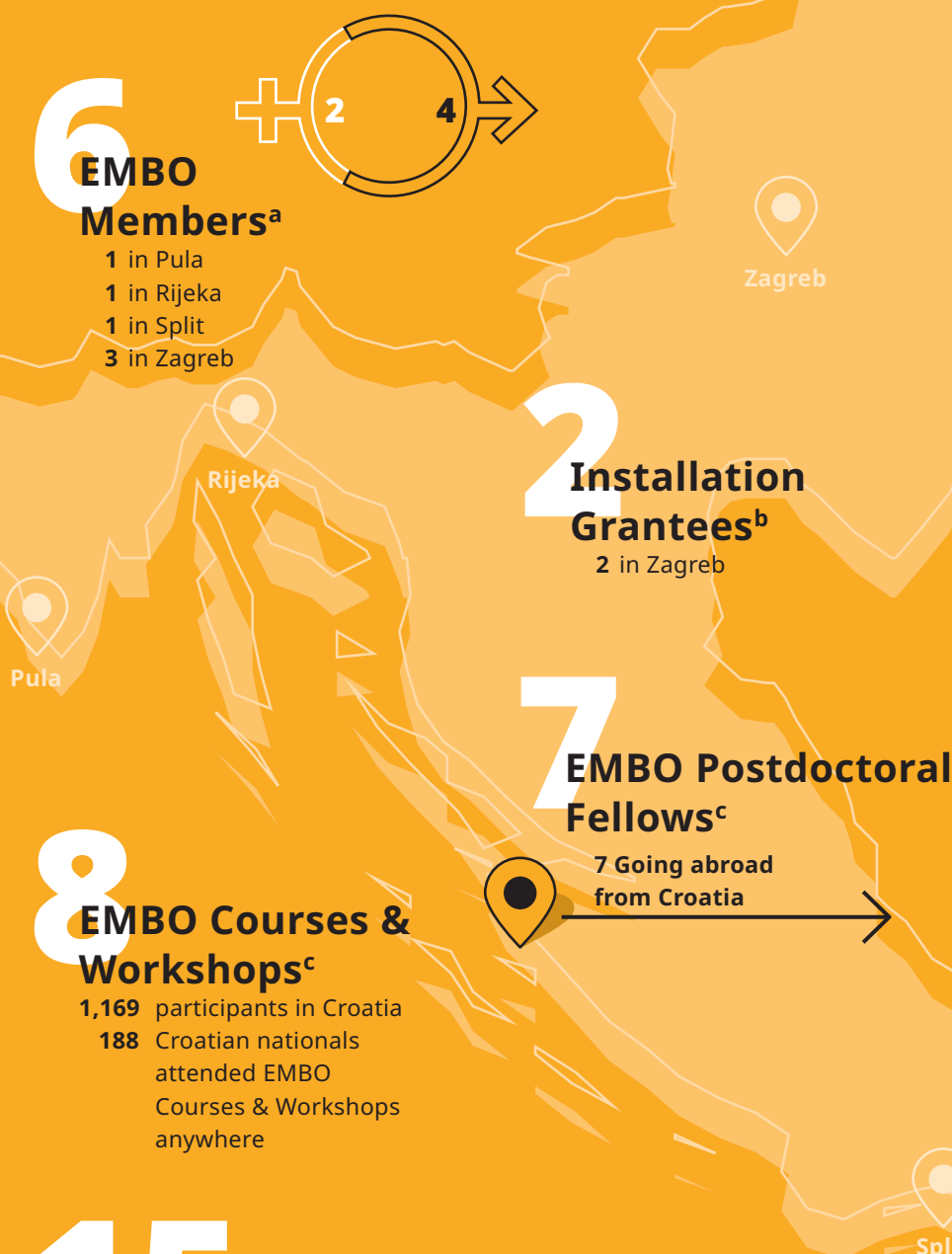
tallography, realized the importance of bioinformatics for the life sciences during his undergraduate studies and quickly moved to focus his research on computational biology methods. Now, in collaboration with experimental biologists, his work focuses on analysing genome datasets.

Instrumental to getting established in Zagreb, Vlahovicek says, was an EMBO Installation Grant. "I cannot emphasize enough the importance EMBO has had for my career," he says. Crucially, the grant enabled him to connect with scientists at a similar career stage, working at the forefront of international and European science, and opened opportunities for collaboration. "International collaborations are the cornerstone of my research," he says, noting that some of his most productive and closest collaborations started from this time.

"I fear we haven't made the best of the possibilities offered by EU funds, making us less productive," Vlahovicek notes. He is, however, seeing change and a concerted effort of the government to become more agile. As an EMBO grantee he has been involved in discussions on best practices. Especially since Croatia is a member of the Erasmus exchange programme, more international students are also coming to the country, but Vlahovicek would love to see more. "Come for the food, the climate and the people!" he says.



Croatia and EMBO in numbers



EMBC Delegates

Lovorka Barać Lauc
 Croatian Science Foundation

Vesna Boraska Perica
 Split University Medical School

The EMBO Programmes are funded by the European Molecular Biology Conference (EMBC), an inter-governmental organization that comprises 30 Member States. Croatia has been an EMBC Member State since 1998.

EMBO opportunities in Croatia

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 open all year around.

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 participating countries* 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 Early Career Lecture Courses*

are designed to provide training for PhD students and postdoctoral researchers. Funding is available for courses in Croatia. Application deadlines: 1 February, 1 June and 1 October.

The EMBO Lecture Series*

scheme provides funding to invite EMBO Members, Associate Members and Young Investigators to give lecture series in institutions in Croatia. Applications open all year around.

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 Press offers Open Access publication at no cost for corresponding authors based in Croatia and who are not entitled to be covered by a publish-and-read agreement.*

Find more EMBO schemes at embo.org/funding.

embo.org
 Information as of July 2023
 Contact: communications@embo.org
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* Croatia is one of the participating countries. The aim of the schemes is to increase participation in the EMBO Programmes throughout Europe.

Facts and figures

There is a long and rich tradition of learning and education in Croatia. The country hosts a total of 133 higher education institutions including eight public universities⁸. The first university was founded in 1396 in Zadar⁸; the largest, and oldest currently active university, with over 70,000 students, is the University of Zagreb, founded in 1669⁹. The largest scientific and research institution, the Ruder Bošković Institute (RBI) in Zagreb, was founded in 1950⁸.

Many higher education institutions offer degree and postgraduate programmes in English⁸. Tuition fees vary depending on length of study, type of programme and institution, but waivers and scholarships, for example via exchange programmes such as Erasmus+, are available for international students¹⁰.

Although steadily increasing, at 0.72% of GDP (2021), investment in research and development in Croatia is relatively low². This combined with gaps in innovation and technology adoption, and weaknesses in managerial and organizational practices puts constraints on competitiveness¹¹. The situation is recognized by both the Croatian government and stakeholders abroad, and several initiatives have been established to help the Croatian government reform the research system. For example, the Croatian ministries and the World Bank collaborate to ensure more effective use of EU funding and better management of opportunities¹². In 2023, the World Bank invested 106 million euros in digital, innovative and green technology¹³. The Croatian government is implementing new policies as part of its 2018 – 2030 National Development Strategy and 2021 – 2029 Smart Specialisation Strategy to remedy previous gaps in funding opportunities¹⁴. The Croatian Science Foundation, which in 2021 distributed 228.8 million HRK, its highest level of funding yet¹⁵, is also expected to take on a significant role in helping to reform the country's research system¹⁵.

Croatia enjoys the second highest average of sunshine hours in Europe¹⁶. The country is characterized by its areas of natural beauty and extensive coastline. It has eight national parks with a total area of more than 87,000 km², as well as 1,800 km coastline and more than 1,200 islands¹⁴.

Key figures

Population: 3.9 million¹

R&D spending: 0.72% of GDP²

Patents: 32 applications filed in 2022 with the European Patent Office³, 130 patent applications submitted in 2022 to the State Intellectual Property Office⁴

Researchers: 16,879⁵

Universities: eight public universities, one private⁶

Horizon 2020 funding:

538 projects totalling 137.8 million euros⁷

Six ERC-funded investigators⁷

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Focus on Croatia



a Working in Croatia
 b Former and current
 c 2018–2022