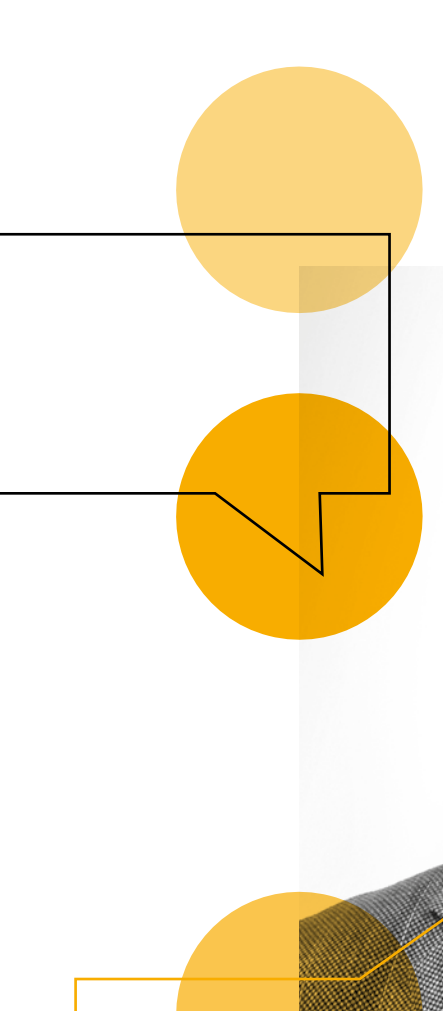




Perspectives from Toivo Maimets

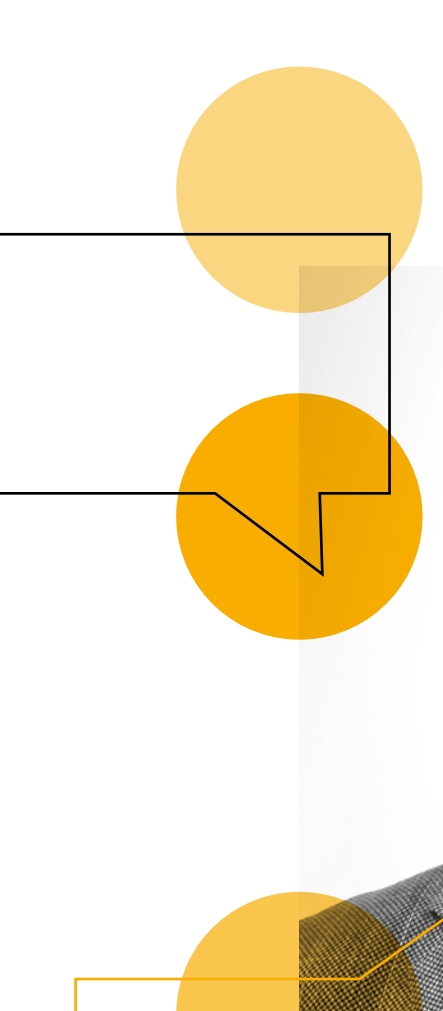
Professor and Chair of Cell Biology, Institute of Molecular and Cell Biology, University of Tartu
Former Estonian Minister for Education and Research and EMBC President



To start, could you talk about your research and career?

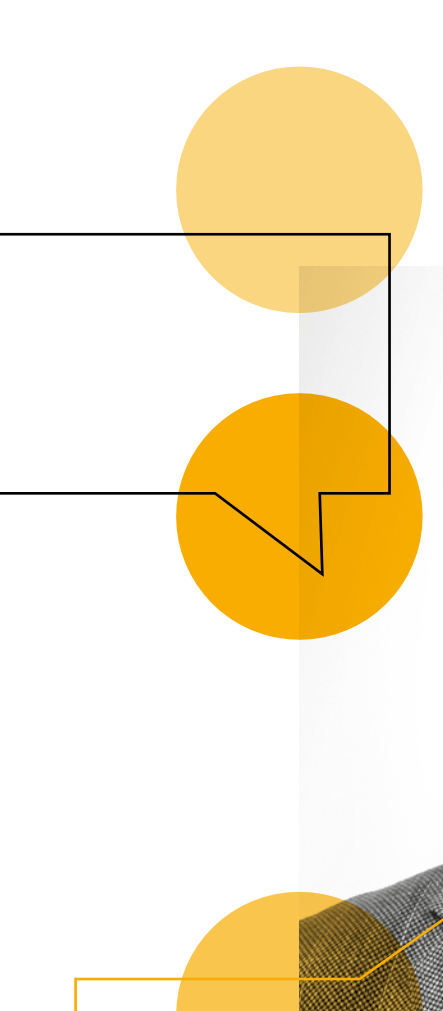
I studied molecular biology at the University of Tartu from 1975. In the 1970s microbiology here exploded. In 1984, I got my degree kandidat nauk degree in molecular biology from the University of Moscow, the best university accessible to me. I switched to cancer biology, and at the end of 1985, I went to the UK with a stipend from the British Council. I spent four years at the Marie Curie Cancer Research Institute working on the molecular biology of cancer. Then I came back to Estonia and built up my own lab with p53 research. When Estonia became independent, it wasn't clear whether the soviet degree would be converted

to a PhD, therefore I did my second PhD. From 2003 to 2005, I was Minister for Education and Research. Then I went back to science and was also the director of the institute here until the beginning of this year.

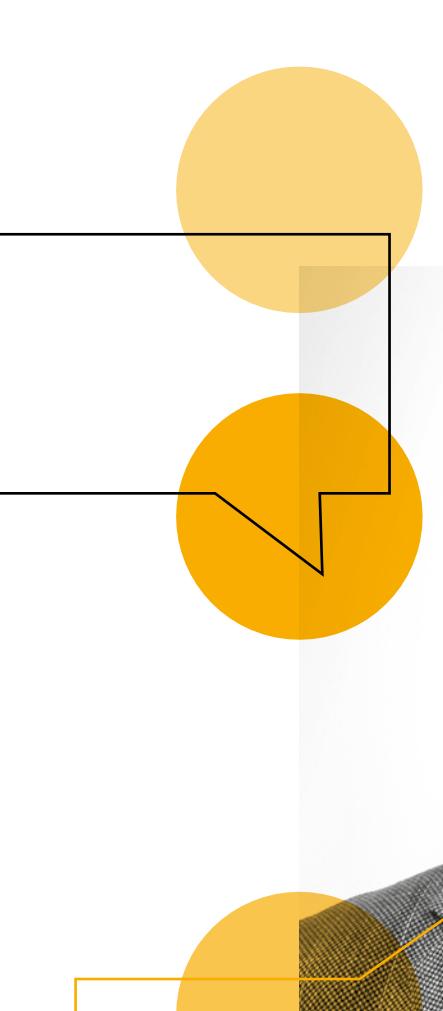


As a member state of the EMBC, Estonia, through EMBO, is supporting life scientists across Europe since 2006. Could you talk about this commitment and your involvement?

I was very much involved because I was a minister and molecular biologist. Before Estonia became an EMBC Member, I was already an observer at the EMBC Council. When it became a member, I was one of the two first Es-



tonian EMBC Delegates; the other was Toivo Rääim. In 2010 I was elected a President of the EMBC, where I served until 2015.



What are the current trends in the life sciences landscape of Estonia?

The fundamental molecular biology is still doing well. All other life sciences started to use the tools of molecular biology, e.g. ecology, agriculture and cancer biology. We now have more collaborations with medical doctors on cancer, we try to develop new diagnostics methods and design new drugs. A big thing, important politically and scientifically, is the Estonian Biobank. Over 20 years ago, Andres Metspalu decided that we would collect samples, like in Iceland. It is a huge database now.



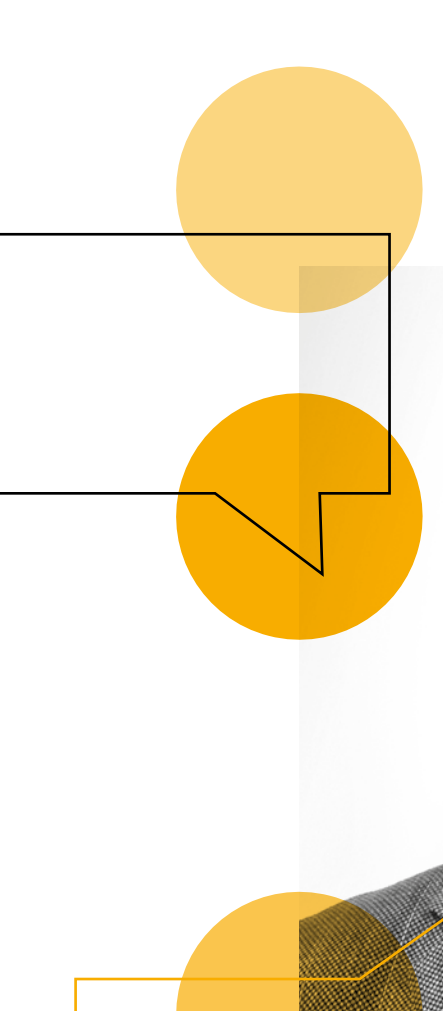
What opportunities are available for life scientists in Estonia?

Our research has traditionally been good, as well as our path for education. Also, last year, the Estonian government committed to put 1% of GDP into research. This was a great decision, and I hope very much that they will be able to keep it.



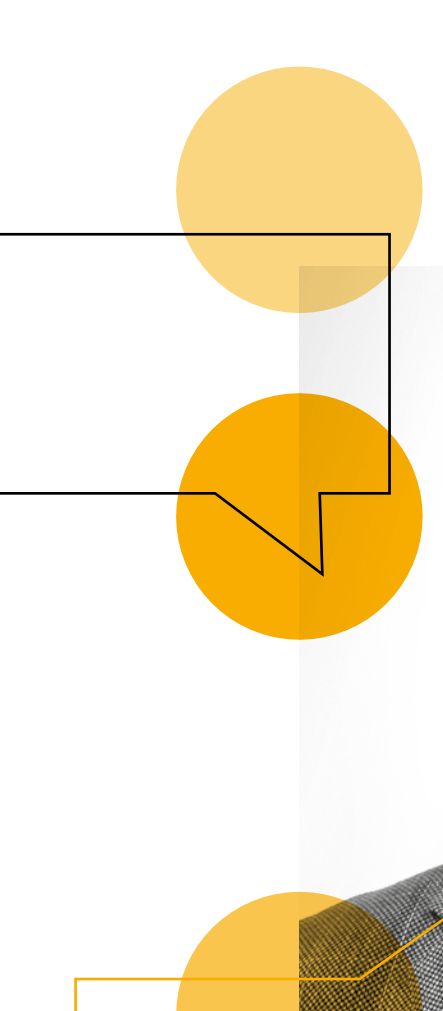
Are there challenges?

The goal has been to invest at least 3% of GDP into research and innovation, 1% from public and 2% from private funding. We do not have many businesses that require highly educated people with doctorate degrees and invest. This is like a Catch-22: if you don't have enough educated people in the private sector, it will never grow to the point where it needs more of them. Also, the number of students has gone down, which means that the number of academic staff cannot go up, rather it is decreasing. We train young people, they go abroad and want to come back, but do not have career possibilities in Estonia.



What role does EMBO have in supporting researchers in the country?

I was on the board of the EMBO Installation Grants for years. Estonia became a member of EMBC in 2006, so we joined the scheme immediately. This has been a real success. I look back at the first grantees and several have become professors already. I would like to see this funding going away and our scientists successfully competing for the same EMBO grants as scientists from all other EMBC Member States. I always say to politicians that I work with widening instruments only with one aim – to get rid of them.



What advice would you give to an early-career scientist considering a career in Estonia?

My recommendation for young scientists is to work as hard as you can, to study as well as you can and to put everything that you have into your career. We have a rule at the University of Tartu that if you want to become a professor, you have to spend periods of postdoctoral research abroad, to polish your education and then come back.

Meet scientists from the EMBO communities



Peep Palumaa Innovative research at TalTech and beyond

Professor of Proteomics, Tallinn University of Technology, and EMBO Member

Peep Palumaa is interested in metalloproteins. “We study the structural and functional aspects of proteins which associate with copper and zinc ions, to understand how they obtain and transport metals,” he explains. “Metal metabolites in the cell, and the disturbances associated with them, are known factors in degenerative diseases such as Alzheimer’s and Wilson’s disease,” he adds. “A better understanding of how metalloproteins transport ions and interact with enzymes could lead to new therapies for these devastating diseases.”

Palumaa is Professor of Proteomics at the Tallinn University of Technology, or “TalTech” for short. “With the exception of medicine and the humanities, the majority of specialities is represented here – engineering, sciences, business – but with a strong technological focus,” Palumaa says. Interdisciplinary work is encouraged to spark innovation, a mindset found across the Estonian society and research

community. “Estonians are innovative and like to find digital or e-solutions,” says Palumaa. “Fields like bioinformatics are doing well in Estonia. For this type of research, you don’t need much large-scale infrastructure – the data facilities don’t have to be in the same place, or even in the country. Expertise and intellectual contribution are what is important”.

While funding in Estonia is still modest, Palumaa is optimistic for the future of Estonian science. “Remember, we are still quite a young country and have had to build a scientific system almost from scratch. Estonia has no natural resources, so it is understood that the only way to grow our economy is through scientific innovations. The funding situation for research and higher education is now improving and that is a good feeling.”

With only around 5,000 researchers, the scientific community in Estonia is small. “Everyone almost knows everyone else!” Palumaa says. “But it means that collaborations can easily be set up.” Estonian researchers are also actively looking beyond the borders to build international collaborations and apply for funding from sources such as the EU and EMBO. Palumaa himself has been an EMBO Member since 2011 and is keen to disseminate information about EMBO funding opportunities to his fellow Estonian scientists. “EMBO offers several very valuable fellowships and grants,” he says. “For example, many scientists want to return to Estonia after having been abroad to raise their families here. The EMBO Installation Grants can be a real help to get them started. I try to make sure that people are aware of these options,” he explains.



Elin Org Big data, big connections

Associate Professor of genomics and microbiomics, University of Tartu, and EMBO Installation Grantee

Elin Org studies the interaction between the human microbiome and health. Based at the Estonian Genome Centre at the University of Tartu, she uses the Estonian Biobank, that comprises genetic information from over 200,000 individuals, together with national health records, and microbiome data from 2,500 individuals, for her research. This wealth of data is proving to be very valuable. “We can track the effects of, for example, regular medication intake on the microbiome, and investigate correlations of microbiome changes with diseases. Such a large and rich data set is hard to find elsewhere,” she explains.

“International researchers also see the opportunity we have here,” says Org, who collaborates with colleagues from across Europe. An EMBO Installation Grant helped her to start her group in 2017 and forge collaborations. “I’m discovering that being a group leader is not only about doing outstanding science, but also about working with people,” she says. “The EMBO Lab Leadership Courses were very valuable.” When asked what she loves about Estonia, she doesn’t hesitate. “The natural beauty!” she says. “Every summer Estonians long to swap the city for the nature reserves!”



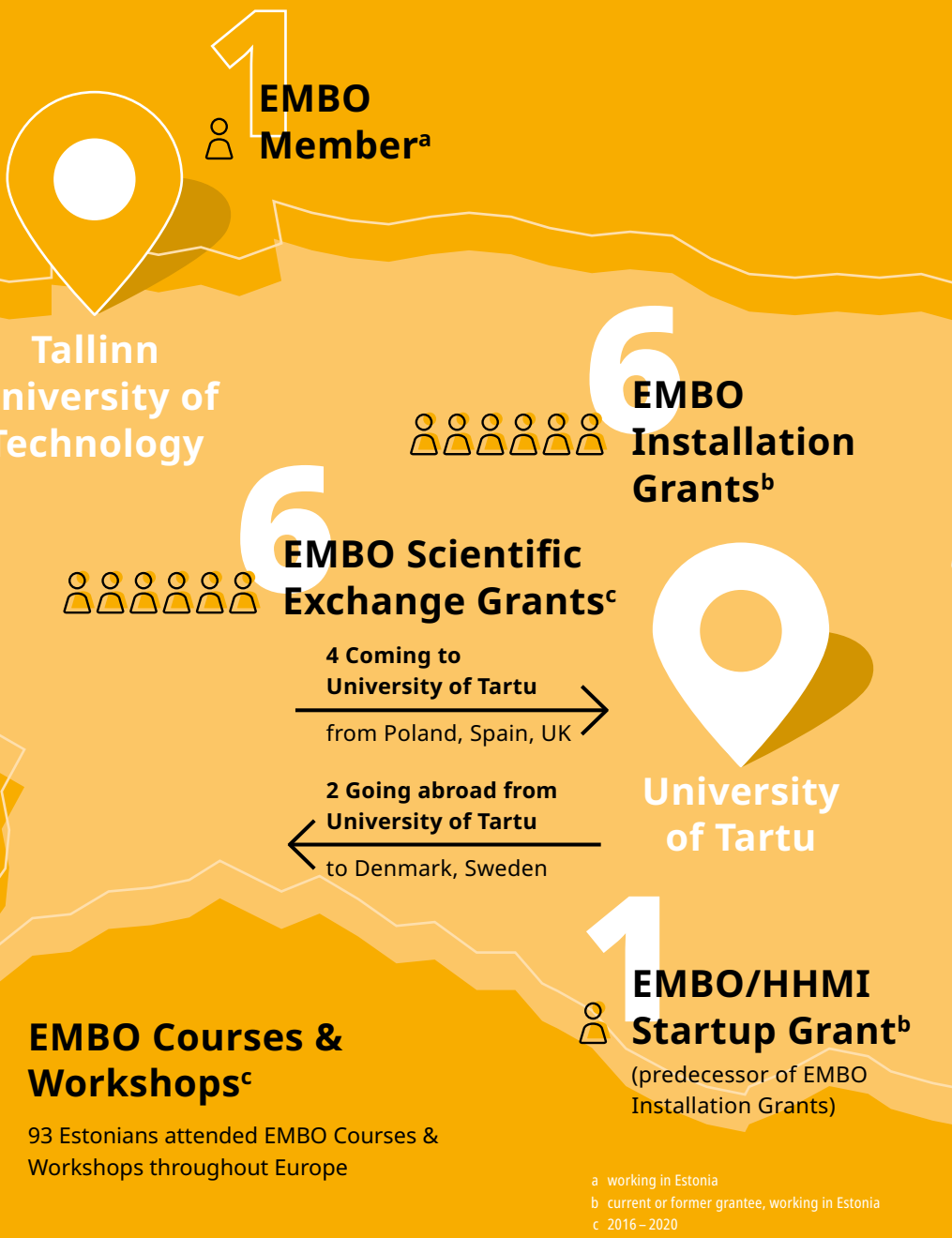
Dominika Chmowska From short term visit to long term collaboration

Postdoctoral researcher at the Polish Academy of Sciences and the University of Wrocław, Poland, and EMBO Scientific Exchange Grantee at the University of Tartu

Ecologist Dominika Chmowska was studying how the translocation of meadows affects their soil ecosystems, when she heard leading Estonian ecologist Leho Tedersoo from the University of Tartu speak at a conference. “I liked his novel methodology, so I asked if I could visit his lab to learn about it,” she says. He agreed, and an EMBO Scientific Exchange Grant turned out to be the solution to fund the visit. After spending a month in Estonia sequencing the soil metagenome, she was able to establish a permanent collaboration through a national bilateral scheme.

Now Chmowska visits the group once a year to prepare samples and they regularly discuss data analysis. She has also visited other European labs on short-term fellowships, and believes they can be very beneficial for a career. “One month in Estonia was like a year in Poland!” she says. “I saw so much progress in myself and my work in such a short time. Especially if you can’t be away from home for long, it can be well worth it.” Of Estonia itself she says it is a mix of cultural experiences. “From historical buildings, to the very modern. Estonia has a mixture of everything!”

Estonia and EMBO in numbers



EMBC Delegates

Maia Kivisaar
Chair of Genetics, Institute of Molecular and Cell Biology, University of Tartu

Toivo Rääm
Adviser, Research Policy Department, Ministry of Education and Research

The EMBO Programmes are funded by the European Molecular Biology Conference (EMBC), an inter-governmental organization that comprises 30 Member States. Estonia has been an EMBC Member State since 2006.

EMBO opportunities in Estonia

EMBO Postdoctoral Fellowships

fund scientists to carry out research for a period of up to two years. International mobility is a key requirement.

New: An interview by an EMBO Member or Young Investigator is now guaranteed to researchers applying to work in Estonia, provided their application passes initial screening for overall quality. These will thereby enter the final shortlist.

EMBO Scientific Exchange Grants

support new, international collaborations, enabling the transfer of expertise unavailable in the applicant's laboratory. They fund research visits of up to three months. 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. Application deadline: 1 June 2021.

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 of the programme. Application deadline: 1 April.

EMBO Advanced Collaboration Grants

are a new scheme for group leaders in participating countries such as

Estonia who wish to visit scientists in other EMBC Member States to develop or carry out collaborative projects, or to prepare joint grant proposals. This scheme will start accepting applications by December 2021.

EMBO Practical Courses

provide training in new techniques for researchers as well as core facility staff. Application deadlines: 1 March and 1 August.

EMBO Workshops

bring together scientists to present and discuss their latest discoveries. Application deadlines: 1 March and 1 August.

EMBO Lecture Courses

provide funding for lecture courses to train PhD students and postdoctoral researchers in participating countries such as Estonia. Application deadline: 1 March 2022.

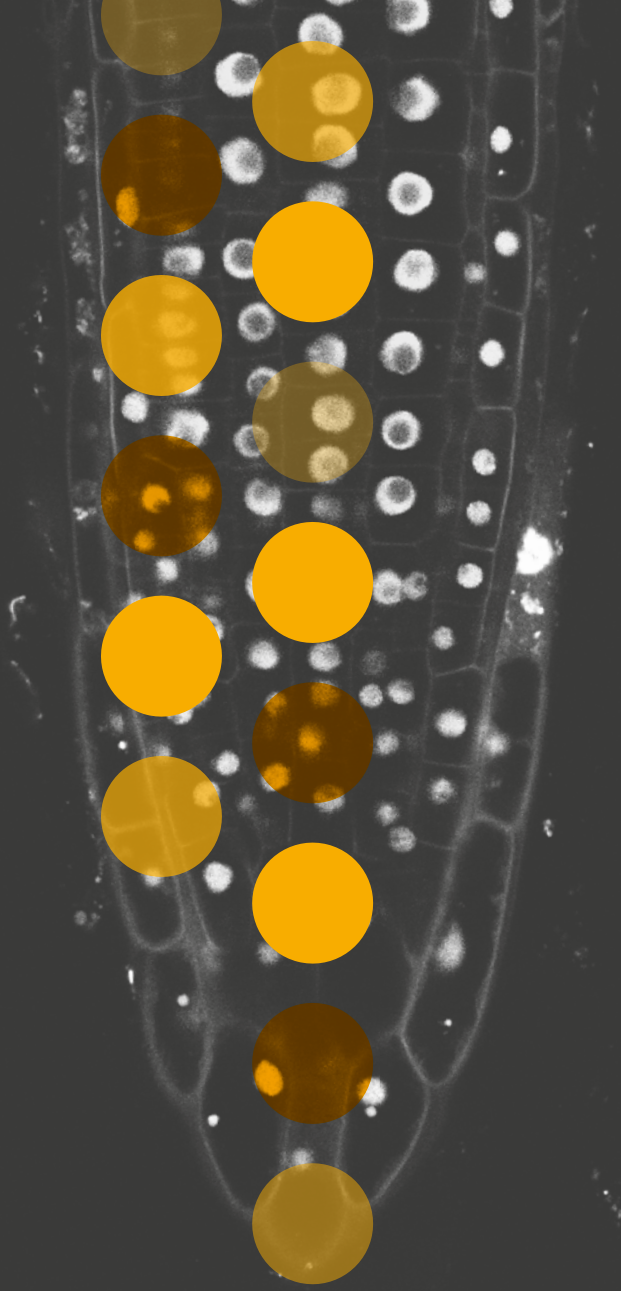
EMBO Lecture Series

provide funding to invite EMBO Members and Young Investigators to give lecture series in institutions in participating countries such as Estonia. 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*, published together with Rockefeller University Press and Cold Spring Harbor Laboratory Press.

embo.org
Information as of 10 August 2021
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Focus on Estonia



Facts and figures

Estonia has a strong educational system with a high level of secondary and higher education attainment¹. There are fees for bachelor and master degree studies, with scholarships available for international students². Doctorate studies are tuition free at public universities; private institutions often offer fee waivers². 11% of researchers and 29% of PhD students are international³, a threefold increase since 2008⁴.

The University of Tartu is the largest university in Estonia, and one of the oldest universities in Northern Europe². Tallinn University of Technology is Estonia's only university of technology. The Estonian University of Life Sciences in Tartu is renowned for agriculture and forestry².

Estonia is a digital society, reflected also in R&D with a focus on smart specialization and automatization⁴, and the use of big data to create solutions for real life situations, such as climate change and personalized medicine⁵.

R&D expenditure was 1.6% of GDP in 2019, an increase of 14.3% on 2018⁵. Expenditure on R&D was around 453 million euros in 2019, an increase of almost 24%⁵. Researchers in Estonia are also successful in securing funding from international sources, e.g. through Horizon 2020 projects⁴. Investment, and participation in the European Strategy Forum on Research Infrastructures (ESFRI), are central parts of the Estonian Research Infrastructure Roadmap 2019 which includes the European Life-sciences Infrastructure for Biological information (ELIXIR)⁶.

Key figures
Population: 1.3 million ⁷
R&D spending: 1.6% of GDP ⁵
Patents: 57 ⁸
Researchers: ~ 5,000 ⁹
Foreign researchers: ~ 11% ³
International PhD students: 29% ³
Universities: 6 under public law and 1 privately owned ²
Professional higher education institutions: 7 state and 4 private ²
Horizon 2020 funding: 482 projects, totalling 155.6 million euros ⁴
8 ERC principal investigators ¹⁰

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