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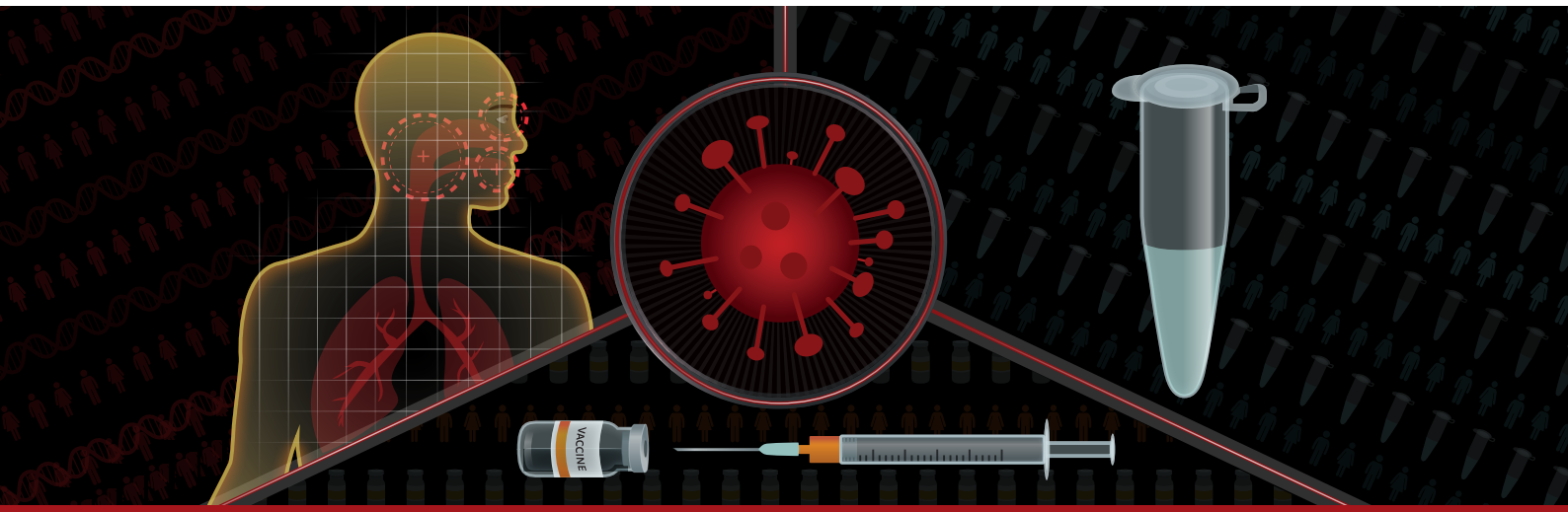
EMBO encounters



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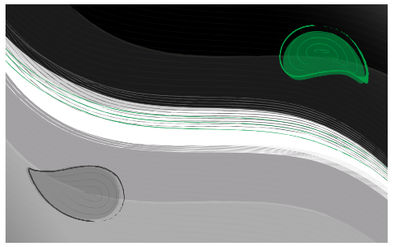
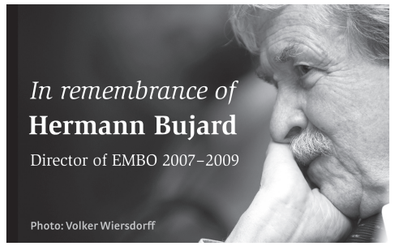
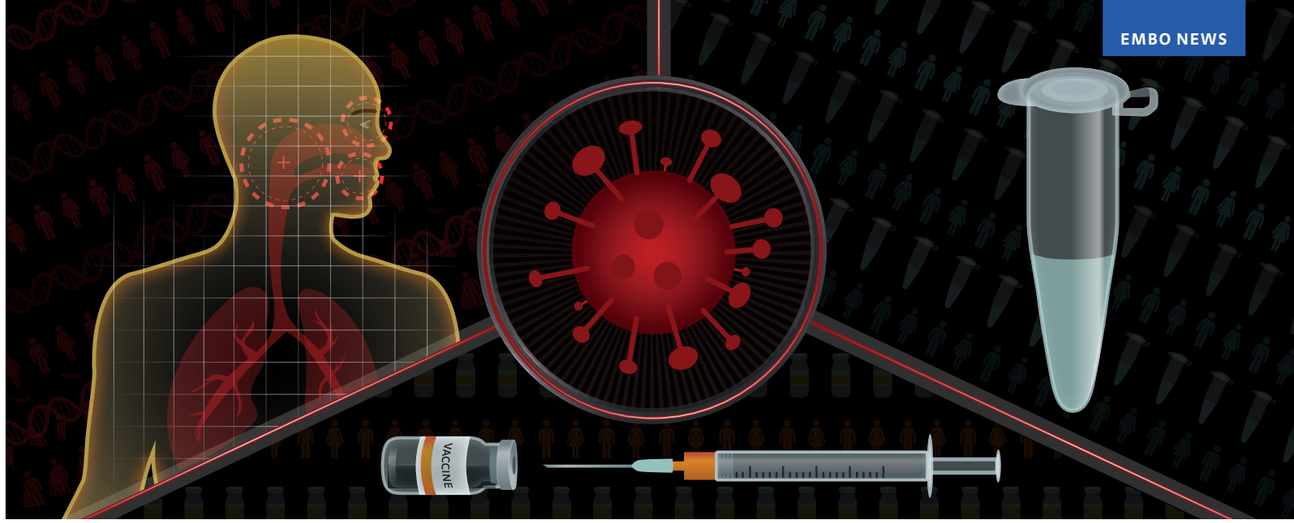






Defying the virus

Across the world, scientists and clinicians have combined in extraordinary efforts to help fight the COVID-19 pandemic. Three members of the EMBO community tell how they and their colleagues have risen to this scientific challenge.

By Kathy Weston

In her role as co-founder of the Human Cell Atlas (HCA), EMBO Member and Gold Medallist Sarah Teichmann coordinates a network of hundreds of researchers around the world. As the first ominous hints that SARS-CoV-2 was no ordinary coronavirus appeared in early 2020, the HCA community mobilised. "If you have a pre-existing community," Teichmann says, "people know each other, and they are very willing to collaborate". From her laboratory at the Wellcome Sanger Institute in Cambridge, Teichmann asked her fellow researchers to use their published and unpublished data to generate a map delineating where in the body a panel of genes involved in viral uptake was expressed.

It soon became clear from the pooled data that one of the reasons for SARS-CoV-2's rapid transmissibility was the presence of the viral receptor ACE2 and its associated protease TMPRSS2 on cells in the nose, mouth, upper airways and eyes; this may explain why some respiratory viruses like SARS-CoV-2 and influenza, whose receptors are more highly expressed in the upper airways, are far easier to catch. Due to the public health implications, the results were fast-tracked into print in a much-cited paper in April 2020.

More recent data show there is good concordance between the consortium's predictions of where the virus would enter, and where it is actually found. "A good example is if you map the oral cavity from healthy donors and COVID-19 patients," says Teichmann. "There are cells in the salivary glands that have high expression of ACE2, and when we stain in tissue sections you can see the virus sitting there."

To accompany their ongoing COVID-19 work, the HCA community now maintains an open access data portal, containing reference data from many more healthy tissues, together with single cell mapping of patient sample data, and spatial mapping data from infected post-mortem tissue. The portal has become an invaluable resource, accessed tens of thousands of times. "It's really helped me get through this terrible year to know that we've been able to contribute something useful," Teichmann says.

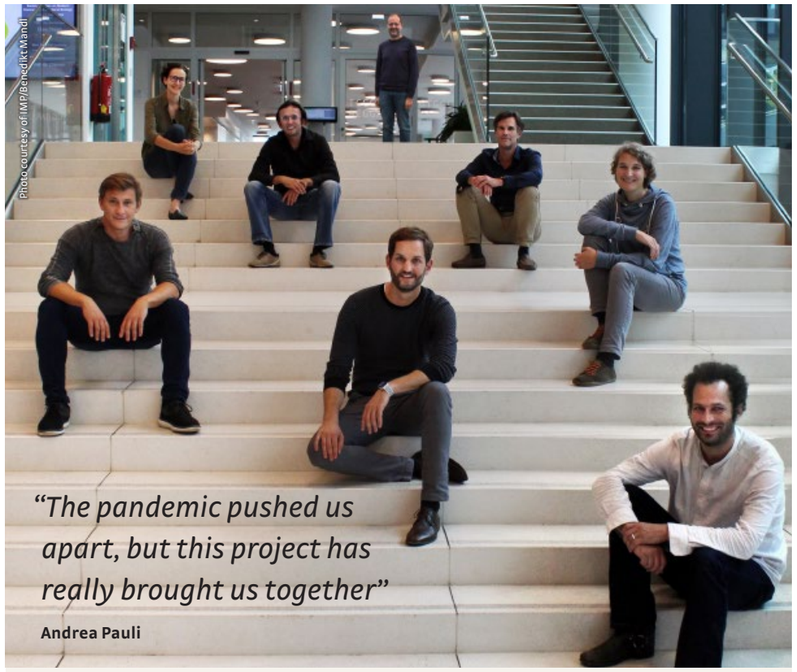
In contrast to the HCA, the group leaders responsible for setting up and running the Vienna Biocenter's impressively efficient SARS-CoV-2 testing programme had no prior experience in the field, but simply felt that they needed to help. "We had the instruments, we had extensive expertise in molecular biology, and we thought we should pool our brainpower and equipment," says one of them, Andrea Pauli.

Three parallel initiatives were set up: an RT-qPCR pipeline for in-house testing and monitoring, led by Johannes Zuber, and also involving Stefan Ameres; next generation sequencing, led by Ulrich Elling, Luisa Cochella and Alex Stark; and RT-LAMP, led by Julius Brennecke and Pauli. Interestingly, all seven are either EMBL alumni, present or past EMBO Young Investigators, or EMBO Members. They were joined by many other volunteers from the Vienna Biocenter research community.

Neither Pauli nor Brennecke had worked on anything related to LAMP (loop-mediated isothermal amplification) technology before. "I'm a zebrafish embryologist and Julius works on RNA biology in flies, and to be honest, I didn't even know what LAMP was in March!" Pauli laughs. However, LAMP proved to be the best solution to developing a cheap and robust assay that could also be used in lower- and middle-income countries, where uncertain supply chains and limited equipment make testing for SARS-CoV-2 especially challenging.

The assay costs less than 1€ per reaction, and only requires simple reagents and a waterbath set at 63°C. An open-access version with home-made enzymes is available, and Pauli hopes it will be adopted not only in Austria, where diagnostics labs and hospitals are now recommended to use it for testing, but worldwide.

Of the testing programme in general, Pauli emphasizes that it was a team effort: "The whole campus has come together, from the directors, particularly Harald Isemann (managing director of the IMP), to the students and technicians running the assays. To some extent, the pandemic pushed us apart, but this project has really brought us together."



From left to right: Ulrich Elling, Luisa Cochella, Johannes Zuber, Stefan Ameres, Alexander Stark (at rear), Harald Isemann, Andrea Pauli, and Julius Brennecke.

Five years ago, EMBO Member Eric Vivier co-founded Marseille Immunopôle, a federation dedicated to the research and development of immunotherapy antibodies and cell therapies. Vivier believes its members have been crucial for the rapid development of a potential anti-COVID-19 drug, now in phase 2 clinical trials. "Even though we were not working in inflammation or virology, we knew that being experts in immunology could help to describe the impact of the disease on the immune system", he says. "Then we went one step further by trying to repurpose drugs."

Alerted in March to the worsening situation in Marseille's intensive care units, Vivier hit upon the idea of an immunomonitoring programme for seriously ill patients that specifically looked at 40 molecules for which drugs had already been developed in other contexts. "It turned out that one of these molecules was not just interesting, it was phenomenal", says Vivier. The Explore COVID-19 group, recruited from Immunopôle members, rapidly analysed 82 patient samples provided by local hospitals, and showed that levels of soluble complement factor C5a were exactly commensurate with the severity of the disease. C5a and its receptor C5aR1 have a key role in initiation and maintenance of several inflammatory responses, and the high levels of both suggested a role in the acute respiratory distress syndrome suffered by COVID-19 patients. The paper describing these results, submitted less than a month after the first sample was collected, was published in Nature in July.

In addition to his academic research, Vivier is also Chief Scientific Officer of Innate Pharma, which had acquired Avdoralimab, an anti-C5a drug which had already passed phase 1 trials, some years previously. Aided by a French government grant, Innate has provided the drug gratis to be tested against placebo in an ongoing double-blind randomised trial. Results are yet to be published, but Vivier is cautiously optimistic. "This is a potential path," he says. "I'm not saying that it's definitely going to work—it may not—but we may provide some treatments for patients who need them. And that would be extraordinary."

Life science researchers' efforts to fight COVID-19

In April 2020, EMBO invited its 1800 Members and 150 Young Investigators to report on any efforts they or their institutions are making to help fight the ongoing COVID-19 pandemic. We received responses from close to 400 scientists, of which 328 reported SARS-CoV-2-related activities of their own research groups, of their institutions, or their own personal efforts. EMBO Members and Associate Members (282), Young Investigators (33), Installation Grantees (eight), and others (three) shared examples of work directed towards the pandemic. The majority are in Europe (289), but we have also had responses from Canada, Israel, Singapore, and the United States.

While some scientific groups have intensified their work on or pivoted their research to COVID-19, others who may not be able to conduct research because of lack of expertise or access to their laboratories found novel ways to support the scientific enterprise. Some reported switching from researcher to clinician mode, while others decided to work on devising personal protective equipment or volunteer for testing patients. Others are disseminating information via lectures, articles, blogs, interviews, and social media to policymakers, students, and the public. A few scientists, including some who stepped out of their retirement, are providing advice, mentorship, or a historical perspective.

This summary captures many but not all of the programmes, projects, and initiatives undertaken, and the number of people involved in these efforts. This is an impressive record. The accompanying article is dedicated to examples of three such efforts.

www.embo.org/news/articles/2020/life-science-researchers-efforts-to-fight-covid-19.html

Papers, preprints, and free lunches

Biologist Bernd Pulverer, Head of Scientific Publication at EMBO, discusses papers, preprints, academic presses, and the curse of the journal impact factor

Interview conducted by Thiago Carvalho


Bernd Pulverer

Let's jump right in. Why isn't *The EMBO Journal* a fully open access journal?

That's a very good question, because we have three open access journals, and one does wonder why they are not all open access. The reason is that our journals are quite expensive because they are highly selective and because the selection is based on in-depth editorial- and peer-review. It costs about 10,000 euros to produce a single published article. In the traditional open access model, the author pays directly from whatever source they can find, and often this would unfortunately be their research budgets. This increasingly is flipping to a model where institutions or funders pay. In the institutional subscription model that *The EMBO Journal* and *EMBO Reports* have, this cost is distributed to many more readers.

Why do open access fees vary between different EMBO Press publications?

We're trying to price our open access journals at an equitable level, and we are cross-financing these journals from our subscription journals. That's why we've kept two journals hybrid, and these are the two big journals. We're about to move OA charges to the same level, because it is ultimately strange to have a price gradient that does not reflect a gradient in quality or selectivity. We're worried that people will jump to the conclusion that one journal is better than the other because of the price difference.

Do we still need journals in the age of preprints?

I think that highly selective journals optimally contribute to the scientific process with the support of preprint servers. The four EMBO Press journals end up publishing just over 10% of submitted manuscripts. Journal selection for quality, depth and interest is important, but we are rejecting many papers that are perfectly reasonable science, which should be shared. The advent of preprint servers allowed the research community to share this information without long delays. We feel that there shouldn't be a flip to a much cheaper purely preprint based system, because there's a huge hidden cost, which is the cost of finding information, analyzing it, and processing it. If you expect readers to do the work of editors and referees, you'll immediately see that, given the millions of papers that are being published, this would be vastly less efficient. Post-publication commenting certainly has not addressed this and, in my view, will not.

***"Do not use journal-based metrics, such as journal impact factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions".* The San Francisco Declaration on Research Assessment (DORA) urged the scientific community to commit to this principle in 2013. What has changed?**

EMBO was one of the first organisations to ban the use of the journal impact factor (JIF) in applications and nominations. The ERC very actively polices that the JIF is not the first thing people jump on in their selection panels. Wellcome and Howard Hughes Medical Instituteare also trying to move beyond JIF based evaluation. The crux with all of these is that all the core assessment is done by researchers themselves. If you grow up in a certain system yourself, and you succeed within that system, it is very hard for you to wean yourself off that system. In my view, there has to be an element of a top-down process where you remind the researchers during the evaluation, and you police it. The EMBO Gold Medal is a nice example. EMBO Council selects a short list of candidates, nominated by EMBO Members, and the final selection process contains a step where editors give a 5-minute presentation on each candidate's science, without any mention of journals upon which the EMBO Council Members then base their discussion and ultimate decision. People often ask what DORA has achieved in its seven years - I think we easily forget how hard it is to change an engrained, complex process.

Is there a unique role for non-profit and academic presses in scientific publishing?

Our primary mandate is to support the research community at large. There is a fundamental difference in the mandate of someone, for example, at Springer Nature, where at the end of the day whatever project you do has to have a profit-compatible business plan. Three examples of projects that don't have a business model are preprints, set up by Cold Spring Harbor as a nonprofit activity; the Review Commons project run by EMBO and ASAPbio; and our own SourceData project. It takes time for a project like SourceData to become a standard, at which point it will hopefully flip into something that is useful to the community, but not based on a financial motive.

The cost of publishing

Few publishers and journals have disclosed their costs and charges and what they consist of, making it near impossible to assess the true cost of publishing a paper. An open discussion of what it costs to run and maintain high quality, selective journals, and who should pay, is only possible on the basis of real data.

EMBO and EMBO Press therefore made their journals' finances public to provide transparency and clarity.

EMBO Press publishes *The EMBO Journal*, *EMBO Reports*, *Molecular Systems Biology* and *EMBO Molecular Medicine*. *EMBO Molecular Medicine* and *Molecular Systems Biology* are fully open access (OA), *The EMBO Journal* and *EMBO Reports* are subscription-based, with an OA option for authors.

www.embo.org/news/articles/2019/the-publishing-costs-at-embo.html

Promoting best practice in European science

Members of the EMBO community and research integrity experts reflect on ways to tackle scientific misconduct in Europe

Research integrity, which includes core principles such as honesty, accountability, and fairness, is widely regarded as key to developing an environment conducive to excellent science and tackling issues such as fraud, conflicts of interests, and selective reporting. EMBO has developed a range of activities to promote research integrity, including international workshops, mandatory training courses, and contributions to conferences and expert groups. One recent initiative brought together experts to explore options for a coordinated approach to governing research integrity in Europe, with findings published in a report written by Sandra Bendiscioli and Michele Garfinkel of EMBO Research and Policy Affairs in June 2020.

The report is available at: www.embo.org/documents/science_policy/governance_of_ri.pdf

Drive consistency

One of the most striking findings of our report was that many participants thought research institutions are not doing enough to foster integrity. There was a strong feeling that the establishment of a body to support institutions in addressing research integrity and misconduct issues would be positive and drive consistency in approaches across Europe. We looked at the different responsibilities that a pan-European body could have – such as advisory, investigatory or oversight roles –, identifying advantages and disadvantages, as well as examining possible structure and funding. It will be necessary to confront issues such as institutional sovereignty and national laws, but the benefits of joining up approaches, supporting investigations, and developing cross-border policies are compelling. We now want to explore the needs and thoughts of the community with a view to developing some of these ideas. While it requires resources, fostering research integrity – in practical science, but also in how researchers interact, publish papers, and a range of other issues – improves quality and builds trust in science.

Sandra Bendiscioli, Senior Policy Officer, EMBO

Build support

Science in Europe is very diverse: different countries have different laws, regulations, and codes of conduct. It is not easy, then, to build a common approach to investigating scientific misconduct, but the benefits of doing so are clear. Research integrity places emphasis on quality over quantity – some institutions might see this as a hindrance, but it makes science better and more sustainable and is clearly good for European research. Today, many in the scientific community increasingly want to find solutions that improve the system and culture. Here, it is important to connect with people's heads and hearts: to establish common guidelines, but also garner support. It would be great to see more bottom-up initiatives, such as research integrity champions at institutions and training as well as mentoring initiatives. If people believe in research integrity, then you will be able to get them onboard. The EMBO workshop brought together participants with very different insights and provided a great platform to discuss these challenges.

Nicole Föger, Head of Office, Austrian Agency for Research Integrity, participant in an EMBO research integrity workshop

Take responsibility

Integrity can be seen as an attitude in life – something that researchers need to believe in and continuously pursue. It involves a colourful array of aspects such as: taking pride in experiments rather than chasing awards; giving credit where it is due; reducing pressure on young researchers; and prioritising truth. Clear and consistent cross-border rules for misconduct would help reduce the risk of fraud and conflicts. Some situations do not commandeer specific guidelines and oftentimes issues are highly nuanced, especially when it comes to conflicts of interest or authorship. It is crucial that we embed research integrity themes in PhD training as a basis for discussion about what it involves and its practical implications, so that researchers know their responsibilities, can live up to them, and can learn how to resolve issues. The EMBO initiatives in research integrity are extremely useful in developing these discussions.

Gerrit van Meer, Professor and Dean Emeritus at the Faculty of Science, University of Utrecht and EMBO Member

Be proactive

Research integrity has become a very important theme: high-profile cases have cast a spotlight on problems that need to be addressed. This presents an opportunity: young scientists are now more aware that misconduct happens and open to addressing it. Research institutions need to be proactive in training students and postdocs in issues of research integrity – if they are given the tools to tackle them, we will be able to prevent many cases of misconduct. There is a need for research integrity specialists in institutions that can advise students and researchers on a regular basis. There is also a need for guidelines, policies, and common standards between countries in Europe, not only in what is acceptable or unacceptable, but also in dealing with cases of misconduct. EMBO is playing a crucial role in promoting discussion, guiding researchers, and training on these issues.

Claudio Sunkel, Director of the Institute of Molecular and Cell Biology in Porto, Portugal and Director of the Institute for Research and Innovation in Health (i3S) and EMBO Member

Sarah-Maria Fendt and Markus Ralser awarded EMBO Gold Medal 2020

EMBO awards the Gold Medal to younger researchers in Europe in recognition of outstanding achievements in the life sciences. The award consists of a gold medal and a cash prize of 10,000 euros. This year's EMBO Gold Medal is going to two researchers who study cell metabolism: Sarah-Maria Fendt and Markus Ralser.

Sarah-Maria Fendt, a biochemist at the VIB Center for Cancer Biology and KU Leuven, Belgium, was awarded the Gold Medal for her contributions to the molecular understanding of metabolic changes that occur during cancer proliferation and metastasis formation, in particular for her discoveries on how the cellular environment influences the metabolism of tumours. Fendt's recent work has uncovered a new lipid metabolism pathway in cancer cells that can make the cells resistant to anticancer drugs. She has also discovered how the metabolism of metastasizing cancer cells regulates extracellular matrix remodelling of the metastatic niche. Because this metabolic regulation can be targeted to reduce metastasis formation, the finding could help to develop more effective cancer therapies. As a contributor to an EU-funded programme for female researchers, Fendt also acts as a mentor for women in science, supporting their career development.

"Sarah's research line is seminal, novel and paradigm-shifting in our understanding of cancer progression," says EMBO Member Peter Carmeliet at KU Leuven. In addition to opening new avenues for cancer metabolism research, Fendt's work "provides truly novel concepts that have the potential to increase long-term patient survival," says EMBO Member Karen Vousden at the Francis Crick Institute in London, United Kingdom.

Markus Ralser, a researcher in systems metabolism at the Charité Universitätsmedizin Berlin, Germany, and the Francis Crick Institute, London, is recognized for conceptual and technological advances in the understanding of the origins, evolution, and functionality of metabolism. Ralser has uncovered how the metabolic network of eukaryotic cells can quickly self-adapt to protect cells from toxic substances or changes in the environment. His work has also shown that a very central metabolic pathway, known as glycolysis, can function in the absence of enzymes. The finding was the first experimental evidence for a 'metabolism first' hypothesis about the origin of life, according to which some of the primordial reactions did not arise from Darwinian selection but were catalysed by simple inorganic molecules. In recent years, Ralser's group has developed new technologies that facilitate the quantification of enzymes and other proteins in thousands of samples. Using machine-learning algorithms, the team has also succeeded in capturing interactions between genes and metabolic pathways at the level of the entire cellular system.

"Markus Ralser is an impressive young molecular biologist who is performing cutting-edge research in metabolic systems biology, excelling in all domains of the subject: 'omic' analyses, mathematical modelling, and molecular genetics," says EMBO Member Stephen Oliver at the University of Cambridge, UK. Ralser, he adds, "combines a willingness to develop and perfect new technologies with the courage to probe beneath what 'everybody knows.'"

Sarah-Maria Fendt and Markus Ralser will be presenting their award lectures in occasion of Cell Bio 2020 Virtual, 9 December, held jointly by the American Society for Cell Biology (ASCB) and EMBO.

“The award highlights that our research on metabolism and metastasis formation is important”

Sarah-Maria Fendt, one of two recipients of the EMBO Gold Medal 2020, talked to EMBO about her work on the metabolic changes that occur during cancer proliferation and metastasis formation, her role as a mentor for young female researchers, and how she manages her lab during the COVID-19 pandemic.

Interview conducted by Giorgia Guglielmi

Sarah-Maria Fendt

© Ine Dehandschutter

During your postdoc, you started to study metabolism in the context of disease. What motivated you to focus on cancer metabolism?

Throughout my career, I had an interest in the medical field, so I wanted to apply metabolism on something that could have a medical application. Cancer made a lot of sense to me, because when I started my postdoc, the field of cancer metabolism was rising. And I think everybody knows somebody who died of cancer: for me, it was my grandmother. We still need to understand more about cancer to be able to progress further, but hopefully, at some point, it will be a manageable disease.

You have made some important discoveries about the role of metabolism in cancer proliferation. What were the key findings of your studies?

In cancer, fat metabolism is often upregulated, because when cancer cells proliferate, they need fatty acids to make new cell membranes. So, we looked at a specific class of drugs that inhibits the processing of fatty acids, and we found that some cancer cells can evade those drugs: the cancer cells activate a different metabolic pathway of the fatty acids, which allows them to proliferate even in the presence of the drug. It’s important to understand that such a mechanism exists: if this alternative pathway is active in some cancer patients, it might not be a good idea to use a certain inhibitor of fatty acid processing, because the cancer could just bypass it.

You have also looked at the relationship between metabolism and metastasis formation. What insights did your work reveal?

We looked at one nutrient, called pyruvate, and we found that cancer cells that reach organs such as the lungs use pyruvate to make their metastatic niche more permissive so that they can proliferate. Scientists thought that the interaction between cancer cells and the tumour microenvironment was regulated only by transcription factors, activated for example by hypoxia. We showed that for the remodelling of the metastatic niche and thus the metastatic process to happen, cancer cells also need certain nutrients that drive their ability to nest into a new organ. This discovery allows us to better understand the interaction between metastases and their environment. At some point, we hope to be able to prevent metastases. This is years away, but it could really make a difference for patients.

Some of your findings could help to increase the survival of people with cancer. How important is that your research has the potential of being translated?

It is very important. But if we only focus on translational research, within five to 10 years there will be nothing left to translate. Take the researchers that got the Nobel Prize for the discovery of cancer immunotherapy in 2018: they got a basic understanding of how immune cells are regulated, which, decades later, led to the development of cancer immunotherapy. We need basic-science discoveries, and if you’re in the lucky situation that your discovery helps to develop new drugs or improve the chance of cancer patients to survive, that is amazing.

What is your lab focussing on now?

We would like to understand better how nutrients and diet influence metastasis formation, and whether they can be used to prevent metastases. Cancer patients often ask their physicians whether certain diets or supplements would support treatment. Despite the fact that certain dietary conditions such as obesity are known to influence the risk and severity of certain cancers, we lack molecular understanding and thus it is hard to give dietary advice to patients. With our research, we would like to help overcome this limitation.

You have established several collaborations with researchers worldwide. How important is collaborative research for you?

It is essential. I like the inspiration that comes from talking to people with different backgrounds. As a scientist, the most exciting thing is to discuss with somebody who has a totally different perspective on a problem. I try to tell my team members that they should collaborate with other people, because when you bridge your own expertise with that of somebody else, you get a synergistic effect.

What advice do you pass on to students in your lab?

One of the things that I tell my team members is that, when they ask a research question, they should design experiments that are conclusive to answer that question. And I tell them that it can happen that their hypothesis is totally wrong—that's not a drama, it's part of science and will reveal new insights.

As a member of the LIBRA Career Development Compass, you act as a mentor for young female researchers. What advice do you pass on to women in science?

In many research institutes, we often have more than 50% female PhD students and postdocs. But when you look at the PI level, the proportion of women drops dramatically. I’d like to make junior female researchers aware that it is possible to become a PI. I tell women in my lab that they should believe in themselves, that their research is good and they can proudly present it. It's so important that we support junior researchers, regardless of their gender, religion and ethnic background. Diversity is very important for any innovative process, because it generates new ways of thinking.

How did the COVID-19 pandemic affect your research?

The biggest challenge was to shut down the lab for about six weeks. My greatest worry was about my team members, because lots of them live alone, far from their families. The most important thing was to make sure that they were doing okay, so I increased the frequency of our group meetings and made sure we could discuss about science, but also about more personal things. Now, we are working in two shifts to reduce the number of team members that are in the lab at one moment, and social gatherings are no longer possible. So, we organize things such as walks outside or picnics where we keep a safe distance from each other. And because we are not traveling, scientific interactions are limited. Virtual conferences are better than nothing, but they are no replacement for in-person conferences or meetings, so we ask other PIs to give talks in our group meetings—these are informal session where people can show and discuss preliminary data. We are trying to make the best out of this crisis.

What does receiving the EMBO Gold Medal mean to you?

A: It's a big honour, and it highlights that our research on metabolism and metastasis formation is important. It also allows me to be a role model for women in science: I hope that junior female researchers will look at this award and say, ‘this is what I can achieve.’

This interview has been edited for length and clarity.

“It feels great that metabolism is back in focus”

Markus Ralser, one of two recipients of the EMBO Gold Medal 2020, talked to EMBO about his work on the origins, evolution, and functionality of the metabolism, his fascination with biology, and the challenges he faced during his career.

Interview conducted by Giorgia Guglielmi

Markus Ralser

© Jahie Airey

When did you first become fascinated by biology?

I grew up on a farm in northern Italy, so I was surrounded by biology from my early childhood. Genetics, biology, chemistry have always been my favourite school subjects. After high school, I was supposed to take over my parents’ farm in the Alps, but then I said, ‘maybe I try something else,’ and I enrolled in an undergraduate programme in genetics. I never planned to be a scientist—perhaps I didn’t know at that age what being a scientist really means—but the closer I got to it, the more exiting it became, so I ended up doing a PhD.

During your PhD, you focused on neurodegenerative disorders, then you transitioned to study metabolism. What motivated you to pursue metabolism as a research interest?

Neuroscience is exciting, but I always had the feeling that we are far away from understanding neurodegenerative diseases. When it came to metabolism, it was exciting to be able to use simple systems and have problems that are so precise that they were much easier to address.

You have made some important discoveries about the origins and evolution of metabolism. What were the key findings of your studies?

We observed that metabolic pathways are much more flexible and dynamic than one would have anticipated from the textbook, and that the core structure of metabolic reactions doesn’t depend on the evolution of enzymes. We observed—more or less by accident—that a reaction sequence that looks very much like glycolysis, one of the most central metabolic pathways, spontaneously assembles in the presence of Fe(II), which is a very abundant metal ion in Archaean sediment. So, the basic structure of metabolism may not have originated over time by evolution, which was the dominating view, but it is the consequence of the reaction properties of the metabolites that constitute metabolism. For the first time, we had experimental evidence that the origin of metabolism is likely an environmental-chemical one.

This discovery revived a long-discarded idea about how metabolism could have evolved in early life forms. How did the scientific community meet your findings?

Some colleagues really loved it, but other people called me an idiot. Now, getting the EMBO Gold Medal means that people start to trust our findings, but at the beginning not everyone would say, ‘well done,’ and pat me on the back—no way. That’s part of science: if you find something that everyone already knows intuitively, then everyone agrees from the start. But if you come up with something that is not obvious, or something that has been categorically excluded by some leaders in the field, then people get sceptical, and that's exactly how science needs to be.

You have also contributed to our understanding of how metabolism functions. What insights did your work reveal?

We observed that if you stress cells—by exposing them to something toxic or to heat—metabolic pathways regulate themselves within seconds. This helps the cell to establish a protective metabolism. This system does not always require changes in gene expression or signalling—it’s a self-regulation of metabolism, and it can work really fast. More recently, we found that cells take up some metabolites not only for growth, but also to become more robust and stress-tolerant—we call this ‘metabolic harvesting’. So, another key take from our work is the self-regulatory capacity of metabolism, and its role in stress protection.

What is your lab focussing on now?

We're after the basic principles of metabolism. The more we understand the rules that govern metabolism, the closer we get to understand what defines a cell and the basic properties that make biological systems work. At the same time, our lab works a lot on technologies that help us to study metabolism.

You made some fundamental discoveries by building your own tools to address specific questions. How important is interdisciplinary research for you?

It is key. However, you cannot be at the same time a top-tier biologist, top-tier physicist, top-tier mathematician. If you do multidisciplinary science, you need to work with colleagues and learn from them—that's the only way to generate something new and make an impact. We need to break down the walls that exist between the different disciplines. This, of course, requires a lot of patience and tolerance from the ‘experts’, and also some self-confidence when someone calls you ‘naïve’.

You started your own lab when you were only 27 years old. What did you learn and what’s your advice to young group leaders?

The challenge of becoming group leader at a young age is that you are less experienced than somebody who has done a lengthy postdoc. And the nice thing is that you are less experienced, and although you do some mistakes, there is some tolerance among senior scientists about that. I started my own lab before I had kids, which means I had to learn that when people have families, things are different. My advice to young group leaders is to appreciate that people are different from you: you can create a very nice atmosphere in the lab if you accept that everyone tries to work hard towards the goal in different ways.

At the moment, you have one lab in London and one in Berlin. How do manage to coordinate research in two different countries?

It works because I have brilliant, smart, self-confident lab members, who make my life as a supervisor very easy.

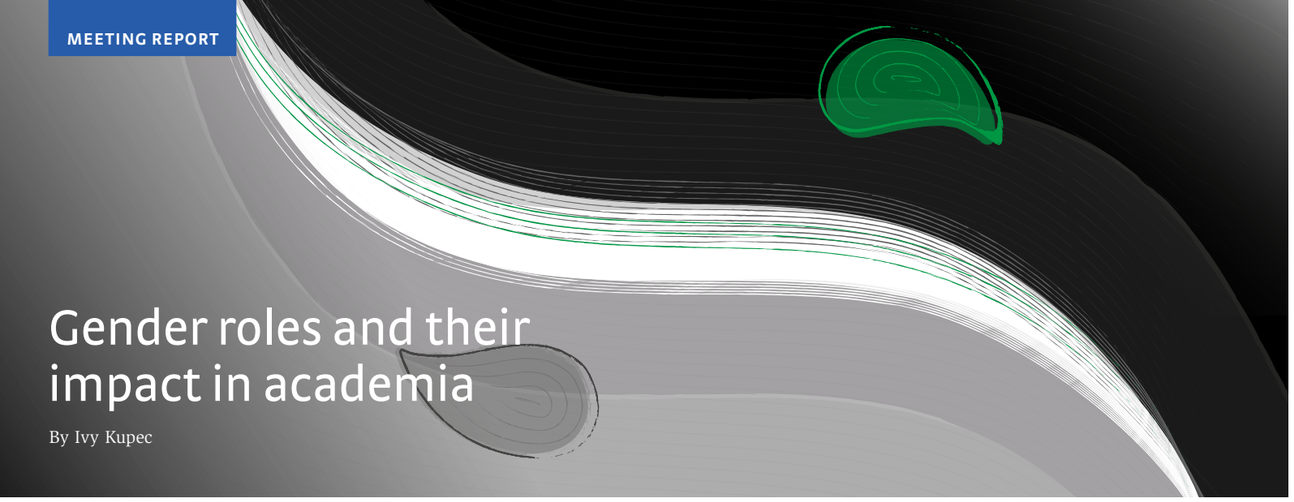
How did the COVID-19 pandemic influence your research?

When the pandemic hit Europe, we were working on a high-throughput proteomics pipeline, so we have been actively engaged in this research ever since: we have run thousands of samples on our mass spectrometers, and we can now predict COVID-19 disease progression. In a way, it was a very productive time—that’s important, because we are in the middle of a big crisis and there is a lot of work that needs to be done. My lab was always operational for projects that were considered of high importance such as the COVID-19 project. But we had to shut down the basic science projects. Many of my lab members had lots of datasets they needed to analyse, so they did this from home. Also, since my lab is split between London and Berlin, we were used to use video conferencing software already before the pandemic, all of our meetings had a virtual component. So, for us it wasn’t a big shift to move to the cloud for organizing the lab. We had a little bit of a head-start in that sense when the catastrophe started to unfold.

What does receiving the EMBO Gold Medal mean to you?

It’s just brilliant, I’m super happy. I was also so happy to hear that Sarah-Maria Fendt is the other recipient—I’ve known her for many years, and she does fantastic work. It feels great that metabolism is back in focus.

This interview has been edited for length and clarity.



Gender roles and their impact in academia

By Ivy Kupec

A conference designed not "just to talk, but to explore solutions". That's how EMBL Director General Edith Heard opened the conference 'Gender roles and their impact in academia', co-hosted with EMBO and the Howard Hughes Medical Institute. Almost 500 people from around the world registered to participate.

"There's increasing evidence that when we build diversity into organisations and research, the outputs – which then combine multiple perspectives – are richer, more resilient, and carry a lower exposure to risk," said Eileen Furlong, Head of EMBL's Genome Biology Unit and one of the conference's scientific organisers.

During the conference, participants engaged in conversation to identify conditions that enable gender equity and those that limit it, with the hope of generating new norms. The conference was anchored by the principles that norms are not set in stone and that international organisations have a responsibility to redefine the equality, diversity, and inclusion agenda.

Tracing biological and societal connections

Mel Konner, Samuel Candler Dobbs Professor in the Department of Anthropology at Emory University in Atlanta, Georgia, explored the arc of evolution in his keynote lecture. He noted the rise of women in the US Senate and among CEOs and world leaders. Mel pointed out that countries led by women were among the most successful at controlling the spread of COVID-19. "When I see all this, I'm very encouraged about the future because of the trajectory," Mel said. "Unfortunately, it is a slow process."

Claartje Vinkenburg, Associate Professor at Vrije Universiteit Amsterdam, and Joseph Hermanowicz, Professor of Sociology at the University of Georgia, noted that this is what also happens to our meritocracy. They pointed out how merit is not a well-defined concept and has a strong gender component.

Cordelia Fine, Professor of History and Philosophy of Science at the University of Melbourne, gave the keynote lecture on the second day of the conference, focusing on the question of justice. "There are several important reasons to increase workplace gender diversity which are rarely discussed in print media," she said.

Finding balance in academia

Sarah Damaske, Associate Professor of Sociology, Labor and Employment Relations, and Women's Studies at Pennsylvania State University, explored the gender issues that have arisen for men, particularly in households where family responsibilities are shared equally. By polling male academics, she found disparities that echoed the challenges faced by these academics' female counterparts, particularly among those early in their careers, who consciously opt out of marriage and family or struggle to find balance.

Tugce Bilgin Sonay, a lecturer in evolutionary biology at Columbia University, helped to found a commission for gender equality in academia and is one of three women who established SURGE, a programme to foster diversity in STEM. Her own experiences of overcoming a physical disability through the goal of simply being able to commute to work by bicycle opened her eyes to how the right infrastructure leads to success and confidence. "Diversity challenges are surmountable, especially if you build a support network. I accepted myself for who I am – with all the differences and challenges – and I address them," she explained.

EMBO organisers:
Gerlind Wallon and Michele Garfinkel

"With this conference we want to explore the science behind gender roles and their impact on academic careers, both for women and men."

Confronting unconscious bias, achieving real meritocracy, and building bridges

The final keynote address delved into one of the most challenging aspects of building a more diverse working environment: unconscious biases. Jo Handelsman, Director of the Wisconsin Institute for Discovery, looked back over 50 years of research concluding that "unconscious bias is so difficult to root out. It's very difficult to expect anyone to be free of unconscious biases. All we can do is use our conscious mind to mitigate the impact."

EMBO Director Maria Leptin raised the question of merit as an ill-defined concept in the workplace, pointing out that we have a long way to go to challenge the way merit, confidence, competence, and leadership are currently envisioned with a male bias. Looking more closely at reasons why women and minorities do not rise through the ranks proportionately, given their representation in society and academia, is key to formulating solutions.

The conference acknowledged the realities of intersectionality that exist within the group 'women'. Ijeoma Uchegbu, Professor of Pharmaceutical Nanoscience at University College London (UCL) and UCL Provost's Envoy for Race Equality, shared the multi-pronged approach that UCL is taking to tackle systemic inequality through a review of pay gaps, recruitment processes, and transparency in demographic data.

Other speakers reported on a number of measures already being taken. Some experiments involving quotas are happening in Germany and the Netherlands, while the European Research Council and Swedish Research Council are putting emphasis on educating selection panels to reach equal success rates.

The conference ended with the message that collaborative work by a range of advocates and change-makers would be key to accelerating change. During her final remarks, Maria Leptin pointed out that all discussions and contributions to the conference will be incorporated into a policy study led by the EMBO Science Policy Programme, which will be conducted over the next six months to fully analyse options that institutes may adopt to work towards equity.

Abridged version of the article "Taking charge by seeking ways to achieve gender balance", 16 October 2020, published at embl.de/news

Accelerating collaboration with SourceData

SourceData, the scientific data discovery and sharing platform from EMBO, is firmly embedded in the publishing process at EMBO Press. Over 40,000 experiments have been added to the SourceData database, joined by the figures from every new research report published in an EMBO Press journal. Curated figures are converted into SmartFigures, linked to their underlying data which is hosted in the EMBL-EBI Biostudies database and enriched with links to thematically related research. These are made openly accessible and searchable through Google Dataset Search or SourceData's own semantic search engine.

Thomas Lemberger, the SourceData project lead at EMBO, now has even bigger plans for the capabilities of SourceData. "SourceData helps in the search for published data," he explains, "but publication happens after the research is complete. Making results findable and shareable can be extremely useful at every stage of a project, not just at the end."

Motivated by this goal, the SourceData team is developing an open source, community-oriented figure-sharing platform, nicknamed "SDash" – the SourceData Dashboard. At the heart of SourceData is the concept that figures provide a convenient, comprehensible unit of research data. SDash applies this principle to collaborative research, allowing collaborators to share individual figures and their underlying data, annotated with structured keywords and linked to files, scripts, protocols or other relevant information. Through a simple gallery interface, users can share figures with project groups and invite feedback through a commenting system. SDash supports open metadata standards allowing figures to be exported to a variety of common formats. Figures can also be exported to a desktop SmartFigure Editor application where they can be prepared further for journal publication.

SourceData scientific co-ordinator Hannah Sonntag explains the enthusiasm for the project: "By providing a practical, useful platform for sharing scientific results, SDash can lower the barrier for early dissemination, exchange of ideas and critical debates."

A working prototype of SDash is currently being trialled with the multidisciplinary collaborative research centre "Mechanisms and disturbances in memory consolidation: from synapses to systems" led by Matthew Larkum of Humboldt University, Berlin. The early feedback from partnerships such as this will help to shape the development of the project.

sourcedata.embo.org

Utilizing figures as a convenient, comprehensible unit of research data: "SDash", the SourceData Dashboard, allows collaborators to share individual figures and their underlying data. A working prototype of SDash is currently being trialled at Humboldt University, Berlin.

Review Commons – the first nine months

Launched in December 2019, Review Commons is a peer review platform that offers high quality peer review for scientific manuscripts before journal submission. The platform facilitates the posting of reviews alongside preprints on bioRxiv or medRxiv and authors can transfer their reviewed manuscripts directly from the platform to any of 17 partner journals, including those published by PLOS, The Company of Biologists and EMBO Press, and to The Journal of Cell Biology, eLife and Molecular Biology of the Cell. These journals have all agreed to use Review Commons reviews for their editorial decisions without starting the peer review process afresh, bringing an efficient, streamlined publication process.

Review Commons improves upon traditional peer review in three ways:

- It increases the efficiency of the process by eliminating repeated peer review cycles.
- It focuses the peer review process on science by asking reviewers to evaluate the reported findings in a journal-independent manner.
- It accelerates the transparent dissemination of peer reviewed research by encouraging authors to post their referee reports alongside their manuscript on the preprint servers bioRxiv and medRxiv.

After nine months of service from Review Commons, the project team from ASAPBio and EMBO are assessing progress towards these goals. To date 16 of the 17 partner journals have accepted papers based on Review Commons reports, suggesting that their science-focus and independence makes them highly portable and usable across a broad range of journals. Survey results from 95 corresponding authors showed that Review Commons produced collegial, reasonable and unbiased reviews as compared to the traditional approach.

An impact on avoiding serial reviews is also evident. Review Commons manuscripts are transferred to a median of two partner journals. No additional reviews are sought in 98% of accepted and 86% of rejected papers. Although it is too early to compare average publication cycle durations, avoiding delays due to repeat reviews is expected to result in a faster publication time overall.

At present, 30% of manuscripts have been posted to bioRxiv as refereed preprints and 90% of the published papers are accompanied by transparent reviews on the publishing journal's website. Support for open science is cited as the most common motivator for posting a refereed preprint.

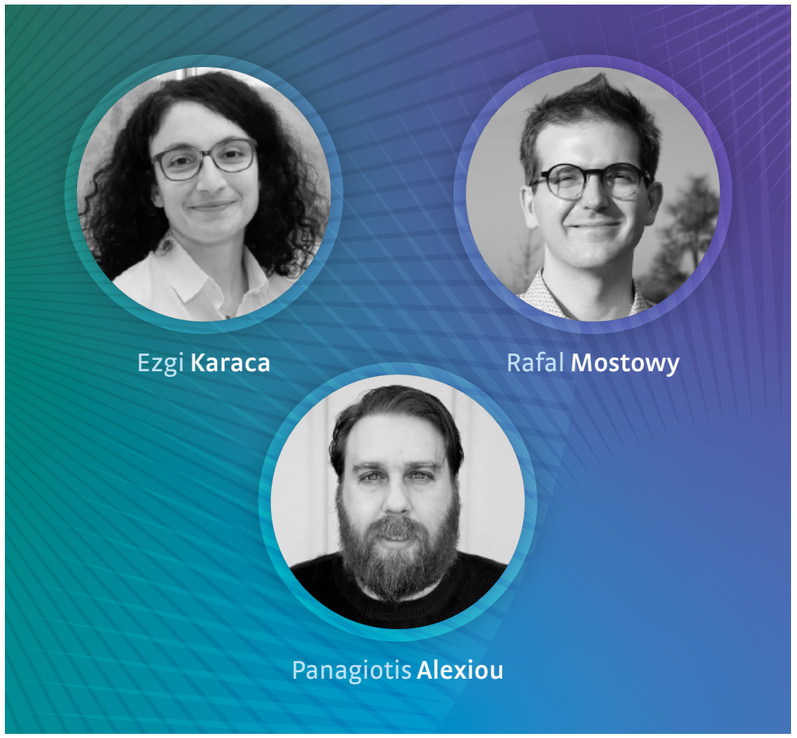
For a more in-depth look at the first nine month of Review Commons, see https://asapbio.org/review-commons-9-months

reviewcommons.org

Homecoming – experiences from EMBO Installation Grantees

Three of the 2019 Installation Grantees explain how the programme has helped them establish their labs in some of Europe's regions with less well-developed infrastructures

By Giorgia Guglielmi



Computational structural biologist Ezgi Karaca always wanted to go back to Turkey, her home country, but she didn't expect it would be so hard to get her lab going. After her Master's at Boğaziçi University in Istanbul, where she became fascinated with how the structure of biomolecules dictate their function, Karaca moved to the Netherlands to do a PhD in computational structural biology. She then relocated to Germany for a postdoc, and in 2017 she got an Assistant Professor position at the Izmir Biomedicine and Genome Center in Turkey.

For the first two years as an independent researcher, Karaca struggled to get funding. Structural biology is an emerging research field in Turkey, and after years abroad, her name wasn't well known in the local scientific community. Then, at the beginning of this year, EMBO announced that Karaca was among the 11 recipients of its Strategic Installation Grants. Karaca was elated. "The most amazing thing is that you can decide where to spend the money—none of the national grants offers this luxury," she says. "With the grant money, I could get instruments that helped me to establish my lab."

Since 2006, EMBO has used the Strategic Development Installation Grants to help talented early-career scientists to establish their own laboratories in some of Europe's countries with less-developed infrastructures. So far, six countries—Czech Republic, Estonia, Montenegro Poland, Portugal and Turkey—have taken part in the programme and financed the labs. The grantees receive 50,000 euros annually for three to five years. They also become part of the EMBO Young Investigator Network, through which they can attend conferences, access lab management training courses, and set up collaborations with other young scientists in Europe.

With the coronavirus pandemic continuing to have a huge impact on face-to-face scientific gatherings, EMBO has moved this year's Young Investigator meeting online, so Karaca couldn't participate in person. But she tried to get the most out of it. "I met so many people," she says. "That made me feel the power of the EMBO Young Investigator Network—it was great."

Karaca, whose research goal is to dissect the structures of molecular complexes to uncover the physical principles of biomolecular interactions, is not the only EMBO Installation Grantee who went back to their home country. After a PhD in Switzerland and a postdoc in England, infectious disease biologist Rafał Mostowy got a group leader position at Jagiellonian University in Krakow, Poland, the country where he grew up.

Mostowy's group focuses on the genomics of infectious microbes. The researchers are looking at the interactions between bacteria and their viruses, called phages. "Many bacteria have stopped responding to antibiotics, and we have been coming back to the idea of using phages to kill bacteria," Mostowy says. Using bioinformatics tools, Mostowy and his team aim to understand microbial population dynamics in order to help design better medical interventions against disease-causing bacteria.

In the long run, Mostowy hopes that the EMBO Installation Grant will help his team to supplement the bioinformatics work with simple experiments. "It's hard for computational biologists to start doing experiments, so we're building collaborations," he says. "The flexibility of the EMBO Installation Grant will hopefully give us the opportunity to do experiments by ourselves."

Other grantees are keeping the money as a strategic reserve at a time when national research budgets are tight. "We don't know how much local funding we'll be able to get next year, especially with the COVID-19 pandemic," says bioinformatician Panagiotis Alexiou, a Junior Group Leader at the Central European Institute of Technology (CEITEC) in Brno, Czech Republic. Born and raised in Greece, Alexiou established his independent lab at CEITEC in 2018, after completing a Master's in the Netherlands, a PhD in Greece and a postdoc in the United States.

Alexiou's team uses machine learning tools to identify patterns in genomic data. One promising project is aimed at building models of how different RNA-binding proteins bind their targets. This information could then be used to predict the function of newly discovered RNA-binding proteins. "During my first years as an independent researcher, the EMBO Installation Grant gives me the stability that I need to become competitive for other grants," he says.

Mostowy agrees that financial stability is important to succeed. "Perhaps you want to launch a risky project—with an EMBO Installation Grant, you can generate preliminary results that you can use to apply for more ambitious grants later on." What's more, he says, the grant gives researchers visibility and prestige. "When people look you up and see the EMBO stamp, they immediately know that you're doing exciting, ambitious research."

EMBO welcomed its new members

EMBO has bestowed upon 63 leading scientists the lifetime honour of EMBO Membership in recognition of their remarkable achievements in the life sciences.

52 new Members and 11 Associate Members, residing in 25 countries, have been elected in 2020 and join the community of the EMBO Membership. The new Members boast a large range of accomplishments, with candidates elected based on scientific excellence and pioneering research. 44% of the new EMBO Members are women.

EMBO's tradition of recognising outstanding life scientists as Members dates back to 1963. Since then, EMBO Members have been invited to nominate and elect exceptional researchers to join the community, which now exceeds 1,800 Members and Associate Members. The new EMBO Members join a growing list of renowned researchers elected before them, which includes 90 Nobel laureates.

An online directory listing all EMBO Members, their affiliations and areas of expertise is available at people.embo.org.

Gregor Anderluh
National Institute of Chemistry, Ljubljana, SI

Alexander Aulehla
EMBL, Heidelberg, DE

Eva Bártová
Institute of Biophysics of the Czech Academy of Sciences, Brno, CZ

Patricia Bassereau
Institut Curie, Paris, FR

Filippo Del Bene
Institut de la Vision, Paris, FR

Caroline Dive
Cancer Research UK Manchester Institute, University of Manchester, UK

Fiona Doetsch
Biozentrum, University of Basel, CH

Wolfgang Driever
Universität Freiburg, DE

Paul Flicek
EMBL-EBI, Hinxton, UK

Alain Goossens
VIB - UGent (Flanders Institute for Biotechnology - Ghent University), Ghent, BE

Berthold Göttgens
Wellcome - MRC Cambridge Stem Cell Institute, University of Cambridge, UK

Eva R. Hoffmann
University of Copenhagen, DK

Thorsten Hoppe
University of Cologne, DE

Ursula Klingmüller
German Cancer Research Center (DKFZ), Heidelberg, DE

Pierre-François Lenne
Developmental Biology Institute of Marseilles (IBDM), FR andTuring Center for Living Systems (CENTURI), Marseille, FR

François Leulier
Institut de Génomique Fonctionnelle de Lyon (IGFL), FR

Kathryn S. Lilley
University of Cambridge, UK

Guillermina López-Bendito
Instituto de Neurociencias, UMH-CSIC, San Juan de Alicante, ES

Jean-Christophe Marine
VIB-KU Leuven Center for Cancer Biology, BE

Sascha Martens
Max Perutz Labs, University of Vienna, AT

Maria Dolores Martín-Bermudo
Centro Andaluz de Biología del Desarrollo, Universidad Pablo de Olavide, Sevilla, ES

Ana Martin-Villalba
German Cancer Research Center (DKFZ), Heidelberg, DE

Sophie G. Martin
University of Lausanne, CH

Brian McStay
National University of Ireland, Galway, IE

Raphaël Mercier
Max Planck Institute for Plant Breeding Research, Cologne, DE

Felix Naef
Swiss Federal Institute of Technology, Lausanne, CH

Serena Nik-Zainal
University of Cambridge, UK

Caren Norden
Instituto Gulbenkian de Ciência, Oeiras, PT

Dónal O'Carroll
Centre for Regenerative Medicine, UK and Wellcome Centre for Cell Biology, Edinburgh, UK

Giles Oldroyd
The Sainsbury Laboratory, UK and Crop Science Centre, University of Cambridge, UK

Uta Paszkowski
University of Cambridge, UK

José R. Penadés
Imperial College London, UK

Anna Philpott
University of Cambridge, UK

Mariana G. Pinho
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, PT

Karel Říha
CEITEC Masaryk University, Brno, CZ

Pere Roca-Cusachs
University of Barcelona, ES andInstitut de Bioenginyeria de Catalunya (IBEC), Barcelona, ES

María Carla Saleh
Institut Pasteur, Paris, FR

Yardena Samuels
Weizmann Institute of Science, Rehovot, IL

Anne Simonsen
University of Oslo, NO

Jan Steyaert
VIB-VUB Center for Structural Biology, Vrije Universiteit Brussel, BE

Katja Sträßer
Justus Liebig University, Giessen, DE

Eörs Szathmáry
Centre for Ecological Research, Tihany, HU

Christopher G. Tate
MRC Laboratory of Molecular Biology, Cambridge, UK

Luis Teixeira
Instituto Gulbenkian de Ciência, Oeiras, PT

Aurelio A. Teleman
German Cancer Research Center (DKFZ), Heidelberg, DE

Matthias H. Tschöp
Helmholtz Zentrum München, German Research Center for Environmental Health, Neuherberg, DE

Beatrice Vallone
University of Rome 'La Sapienza', Rome, IT

Danijela Matic Vignjevic
Institut Curie, Paris, FR

Dolf Weijers
Wageningen University, NL

Sara A. Wickström,
University of Helsinki, FI

Eske Willerslev
University of Cambridge, UK and University of Copenhagen, DK

Marta Zlatic
MRC Laboratory of Molecular Biology, Cambridge, UK and University of Cambridge, UK

Sumantra Chattarji*
National Centre for Biological Sciences, Bangalore, IN

Job Dekker*
Howard Hughes Medical Institute, University of Massachusetts, Worcester, US

Anne-Claude Gingras*
Lunenfeld-Tanenbaum Research Institute, Toronto, CA

Christian Gonzalez-Billault*
Universidad de Chile, Santiago de Chile, CL

Noboru Mizushima*
University of Tokyo, JP

Akihiko Nakano*
RIKEN Center for Advanced Photonics, Saitama, JP

Jodi Nunnari*
University of California, Davis, US

Mitinori Saitou*
Kyoto University, JP

Geraldine Seydoux*
Johns Hopkins University, Baltimore, US

Peter M. Visscher*
Institute for Molecular Bioscience, University of Queensland, Brisbane, AU

Hongyan Wang
Duke-NUS Medical School, Singapore, SG

***EMBO Associate Member**

Some of the EMBO Members elected this year recall surprising moments that influenced their research

By Adam Gristwood

Surprising symbionts

In 2008, EMBO Member Luis Teixeira was screening fruit flies for genetic mutations that could make them more vulnerable to viral infection. But his postdoc project was not going to plan. "I was looking for innate immunity genes that might be antiviral, but it was clear something was terribly wrong – my control flies were dying faster than my mutant strains," explains Teixeira, whose group studies host-microbe interactions at the Instituto Gulbenkian Ciência in Lisbon, Portugal.

Luis Teixeira

After weeks fretting over his project, it occurred to Teixeira that although he had treated his flies with antibiotics to combat any interference from bacteria, that batch of mutant strains was not treated. He had read about a remarkable intracellular bacterium called Wolbachia and wondered now if the antibiotics in his control had killed off a key line of defence. "Wolbachia is exceptionally common in insect species: sometimes it's pathogenic, sometimes it's beneficial, but it did not seem to have strong effects in Drosophila melanogaster," he explains. He decided to find out. "It was the difference between living and dying of viral infection."

Wolbachia, it turned out, gives protection against viral foes not only to fruit flies, but also mosquitos. The work has informed studies led by others looking to spread Wolbachia in mosquitos to tackle vector-borne diseases such as dengue and yellow fever. Now, Teixeira continues to explore the mysteries of how hosts such as Drosophila interact on a functional and evolutionary level with microorganisms in nature – pathogenic or mutualistic. "Under every stone we turn there is something new," he says. "It's very exciting."

Driving division

In 2005, Hongyan Wang was performing a novel genetic screen, aiming to isolate genes involved in the development of the central nervous system of fruit fly larvae. She was amazed to see that mutations in a gene called *aurora-A* – a well-known cell cycle regulator – had led to the larvae developing unusually large brains, brimming with neural stem cells. "They resembled tumours, and I thought this could be a great new model to study brain tumour suppressors," says Wang, whose group at Duke-NUS Medical School in Singapore investigates how neural stem cells divide and proliferate. "But it also raised a puzzling question: how could mutations that slow the cell cycle generate so many neural stem cells?"

Stem cells typically divide asymmetrically: one daughter cell retains self-renewing ability, while the other is more fate-restricted. Wang discovered that mutations in *aurora-A* led neural stem cells to divide symmetrically, sending the production of self-renewing stem cells into overdrive. She also identified the oncogenic role of a key transmembrane receptor called Notch in the brain, which was negatively regulated by Aurora-A. "We showed that tumour suppressors could play a crucial role in the asymmetric division of neural stem cells – and that defects lead to brain overgrowth," says Wang.

Hongyan Wang

Neural stem cells are now an established model for studying stem cell renewal and tumour formation. Following these initial discoveries by Wang and a handful of other groups, a similar association was identified in human brain tumours. Wang's research now focuses on related puzzles such as how differentiated neural cells can revert back to stem cells and how quiescent – or "sleeping" – neural stem cells can reenter the cell cycle. "This field is still very new, at each stage there are new discoveries to be made," Wang adds.

Exploring evolution

Eörs Szathmáry

In 1992, Eörs Szathmáry returned home to find a letter waiting on his desk addressed in familiar handwriting. It was from his former mentor, John Maynard Smith, a renowned evolutionary biologist, who was inviting him to cowrite a book on the major transitions of evolution. "In the letter, John said that no one could write such a book alone and suggested we do it together: this letter is the biggest honour of my life," says Szathmáry, whose broad ranging research at the Centre for Ecological Research, Tihany, Hungary, investigates the comparative aspects of such transitions.

In the book, they argue that evolution depends on changes in the information passed between generations – and that major transitions such as the first replicating molecules, cells, multicellular organisms, and human societies have involved major changes in the way information is stored and transmitted. Szathmáry's research has sought to answer major related questions in relation to how higher levels of evolutionary units appear from lower level ones, and how new types of inheritance systems emerge. "Essentially, we want to understand how we came about," Szathmáry says.

"Questions such as the origin of the genetic code or our language capacity are still very much open questions, but there has been progress – partly because of better experimental techniques and partly because we are now asking more focused questions," he explains. "One question that I find particularly exciting is whether something like replication with variation is happening in the brain in real time on the millisecond scale when you are doing complex problem solving – for instance when a child acquires language. I have ideas, but that is very much in the making."

Obituary

Hermann Bujard (1934–2020) – pioneering researcher and visionary science politician

By Bernd Bukau, Michael Lanzer, Fritz Melchers and Gerlind Wallon

On July 31, 2020, Hermann Bujard (*16.04.1934) passed away. Hermann pioneered our understanding of gene promoters, developed the widely used Tet system to induce and precisely tune gene expression, and advanced the development of a malaria vaccine from basic research to phase I clinical trials. He was also an exceptional person who touched many people's lives as a teacher and mentor, an advocate for liberal research structures similar to those he implemented at the Center for Molecular Biology of Heidelberg University (ZMBH), and a visionary science politician.

Hermann was born in 1936 in Heidelberg, Germany, and grew up in Freiburg as one of five children of a protestant priest. He often said that the high moral values taught and lived by his father had imprinted him for life. After his PhD in organic chemistry in Göttingen, Hermann left for the United States in 1962, inspired by the tea hours held by Manfred Eigen, to do his postdoc with Charly Heidelberger and Gobind Khorana in Madison, Wisconsin. After only two years, he was offered an assistant professorship at the Southwest Center for Advanced Studies in Dallas, Texas, where he started his research on DNA structure and DNA-protein interactions. When he was appointed as a professor of molecular genetics at Heidelberg University in 1970, he, his wife, and two children moved to Heidelberg where he changed his focus to study transcriptional control mechanisms in prokaryotes. Hermann teamed up with a colleague, Peter von Sengbusch, to work out a new curriculum, which transformed teaching at the faculty. Well-trained students with a strong background in molecular biology soon became a treasure of the faculty.

In the early 1970s, EMBO invited proposals for a laboratory to be set up somewhere in the Federal Republic of Germany. Munich initially seemed the most likely choice, but Hermann, Peter, and Ken Holmes, during long nights, worked out a compelling proposal, so that Heidelberg eventually got the nod for the EMBO/EMBL campus. The proposal offered EMBO young talented local students taught by the modernized biology curriculum, and scientific cooperation with local university departments, as well as the Max Planck Institute for Medical Research and the German Cancer Research Center (DKFZ). The EMBO site committee arrived in Heidelberg after having been wined and dined in Munich, and Hermann and his fellow campaigners, including the mayor of Heidelberg and the directors of the different institutes, took them to rather more down-to-earth boisterous student pubs. The enthusiasm of the locals and the unique status that the EMBO lab would have in Heidelberg apparently convinced the committee. This success also shows a characteristic of Hermann that runs like a red thread throughout his life: He was never shy to take on a challenge and had the intelligence, political wit, and tenacity to pull it through.

One of us (Fritz Melchers), at the time the director of the Roche-owned Basel Institute for Immunology (BII), proposed to Roche's president to hire Hermann as the director of a newly established section of molecular biology. Hermann, having grown unhappy with the conservative environment at the University of Heidelberg at that time, accepted and set up biomolecular research at Roche. His influence on the future development of the company cannot be overestimated: He established the use of large molecular weight pharmaceuticals, based on his expertise on gene expression, which has transformed Roche into what is today one of the largest pharmaceutical companies.

After three years at Roche, he was hired back to Heidelberg in 1986 to direct the newly established ZMBH. Many visits to the ministry in Stuttgart were necessary to give it the constitution and departmental structure that he desired, drawing on his experience of the departments that he had seen in the United States. He wanted early independence for young scientists, and an institute structure that offers scientists maximal freedom to pursue challenging research questions. Under his 10-year directorship, the ZMBH developed into an internationally highly recognized research centre that promoted countless successful research careers.

Hermann had brought with him from Roche a new project: the quest for a malaria vaccine. He set up collaborations with Yeya Touré and Ogoabara Doumbo in Mali and went several times to Africa to collect serum samples in endemic areas, once contracting malaria himself. He often talked about the children who were most at risk and that many of them would no longer be alive when they returned a year later to collect more samples. He identified the major surface protein 1 (MSP1) as the, in his well-argued but challenged view, most promising candidate for a protective antigen.

At that time, his group worked on a tetracycline repressor-based gene switch, the Tet system, together with his PhD student and later postdoc Manfred Gossen. Heidelberg University felt that the challenge and effort to patent this were too large, so Hermann set off to do this himself. His company TET Systems was able to market and innovate the technology such that it is still today, some 25 years after the initial discovery, making good profits from licensing, which Hermann used to finance the development of the malaria vaccine. This was very much needed, since Hermann had to realize that while the German government was happy to fund his basic research on malaria with millions of euros, there was no money available when it came to translate his findings into an experimental vaccine.

In 2007, at the age of 73 and well into his retirement, Hermann was asked to take on the directorship of EMBO for a short interim period until a new director was found. His directorship turned into three years during which he launched The EMBO Meeting and changed the management structure of EMBO Press among many other reforms. Crucially, yet unnoticed by many, he saw to it that the status of EMBO as a not-for-profit organization registered in Switzerland, but located in Heidelberg, was rendered legally sound.

After his short but decisive stint at EMBO, he returned to concentrate on the malaria vaccine. In order to continue the clinical evaluation of MSP1, Hermann founded Sumaya Biotech in 2014. However, since it was difficult to find capital, he eventually financed the manufacturing of full-length MSP1 under GMP conditions and the first in-human study mostly out of his own pocket. Sumaya Biotech will continue to evaluate MSP1 in clinical trials and test the prime/boost strategy in challenge studies in Africa.

Hermann's impact on German parasitology cannot be overestimated. He was instrumental in revitalizing this discipline in Germany and contributed to a roadmap commissioned by the Deutsche Forschungsgemeinschaft (DFG). Hermann further helped shaping the Zentrum für Infektionsforschung at the University of Würzburg, where he served as chair of the scientific advisory board.

Over the course of his long life, Hermann has received numerous prizes and awards for his scientific oeuvre, such as the Beckurts Award, the Prix Yvette Mayent, the Robert-Koch Gold Medal, and the Medal of Merit of the Federal State of Baden-Wuerttemberg. But he was most proud of the feedback from his former students who praised him as a great teacher and mentor. With his sharp mind and impressive knowledge in broad aspects of life, he was an inspiring and stimulating discussion partner, not afraid of controversies. At the same time, he had a fine sense of humor and was a delightful and charming storyteller. Hermann was a great scientist, a charismatic and disarmingly humorous colleague, mentor, and friend.

Honoré de Balzac said that you live twice: once in reality, the second time, in memories. In OUR memories.

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EMBO around the world

We catch up on some of the recent global activities EMBO has carried out together with Associate Member States India and Singapore and cooperation partners in Chile and Taiwan

By Adam Gristwood

Online odysseys

In February 2020, when Smita Jain and Shantala Hari Dass sat down with Gerlind Wallon, Head of the EMBO Courses & Workshops Programme, to explore ideas for a new online seminar series focused on essential skills for young researchers, they did not imagine the initiative could come to fruition within just a few months. But then the COVID-19 pandemic hit. "We met for coffee and the idea immediately began to take shape, although at the time I had no idea it could take off and fly so quickly," says Jain, who is Executive Director of IndiaBioscience. It has developed several initiatives together with EMBO, including conferences, lectures, and awareness-raising programmes. "The first workshop, focused on grant writing, took place in June and attracted more than 450 participants. We followed this up with a second in September and the series will eventually include a wide range of themes such as science communication, lab management, and research integrity. Both sides have put in an enormous amount of effort during the pandemic and the response has been remarkable."

"Both sides have put in an enormous amount of effort, the response has been remarkable"

Smita Jain

EMBO|IndiaBioscience online workshop on essential skills for young researchers

Amongst those attending the first EMBO|IndiaBioscience online workshop was Zille-Anam, a final-year PhD student at Jawaharlal Nehru University in New Delhi. "We learned how to make grant applications stand out from the crowd," says Anam, whose work focuses on malaria drug discovery and who was one of 20 participants selected to take part in a further hands-on session. "The exercises helped me to see where I am going right and wrong, and how I can do better – for instance by soliciting feedback from colleagues outside my specific field, building a compelling narrative that makes sense to outsiders, and identifying a backup plan for if experiments do not go as expected. The trainer, Chapin Rodriguez, was very knowledgeable and gave me some great tips and tricks to get started. I have gained skills that I can put into practice when I come to write my own grant applications – in some respects it was better than an in-person workshop."

Innovative investigators

While the COVID-19 pandemic has presented unexpected hurdles for scientific training and networking, it has not stopped EMBO's first cohort of Global Investigators forging international connections. Amongst them is Yen-Ping Hsueh, a group leader at the Institute of Molecular Biology, Academia Sinica in Taipei, Taiwan, whose work focuses on the cross-kingdom communication and co-evolution of predator fungi and their nematode prey. "Carnivorous fungi are not very well studied despite being almost universal in the soil environment," she explains. "By using genetics to study the molecular interactions between the nematode C. elegans and carnivorous fungi, we want to shed light on how their interaction shapes predator-prey coevolution and maybe come up with ways to combat parasitic nematodes in the future. EMBO provides a great platform to learn, network and share ideas. I have taken part in online trainings and am looking forward to travelling when the situation allows. Connections with EMBO provide a great opportunity for researchers in Taiwan to meet and work with scientists around the world."

"EMBO provides a great platform to learn, network and share ideas"

Yen-Ping Hsueh

The EMBO Global Investigator Network, launched in 2019, supports researchers in areas such as training, attending conferences, setting up joint lab meetings, and childcare. Yansong Miao, Assistant Professor at Nanyang Technical University in Singapore, says that being part of the EMBO network will be a boon to his research studying how cellular signals influence the shape of the diverse actin networks that coordinate different cellular processes. "Actin cytoskeleton assembly is

EMBO NEWS

"Being an EMBO Global Investigator will enable me to develop collaborations with researchers across a range of disciplines"

Yansong Miao

important for numerous cellular activities including migration, protrusion, and immune response," he explains. "We want to learn more about how signal transduction can reshape and reorganise actin filaments, and how proteins that regulate this framework are able to sense different signals. The massive complexity means taking an interdisciplinary approach and being an EMBO Global Investigator will enable me to develop collaborations with researchers across a range of disciplines. While it has not yet been possible for me to travel to Europe, there have been a lot of opportunities to meet virtually, attend training courses and connect with scientists all over the world."

Alluring lectures

EMBO also supports lecture series involving exchanges between scientists internationally. In November 2019, Michael Hall, Professor of Biochemistry at the Biozentrum of the University of Basel and an EMBO Member, visited Chile to take part in a series of events across the country. Hall is renowned for his groundbreaking work in TOR (target of rapamycin) signaling. "TOR proteins play a central role in regulating cell growth and function but can also contribute to many disorders, including cancer, heart disease and diabetes," explains Hall, who was joined on the trip by Nahum Sonenberg, an EMBO Associate Member who is Professor of Biochemistry at McGill University, Canada. "One of our recent studies found that diet-induced obesity in mice can cause hyperglycaemia, despite normal insulin signaling – and we have pinpointed a gene, also found in naturally hyperglycaemic Mexican cavefish, that could be contributing to that. My lectures focused largely on these findings that could shed light on how diet causes diabetes. In Chile there is clearly a real desire to do science yet there is also a sense of isolation. Through such initiatives, we are able to close that gap and it was very gratifying to give these lectures."

"Thinking about the connections, exchanges and discussions brings a smile to my face, it was a really great moment"

Soledad Matus
(second from right)

On the lip of a volcanic crater on Easter Island, also known as Rapa Nui. The stone marks this place as the site where rapamycin producing bacteria were first found in 1965.
From left to right: Michael Hall, Mauro Costa-Mattioli, René Luis Vidal Gómez, Soledad Matus, Nahum Sonenberg

"In Chile there is a real desire to do science yet also a sense of isolation... we were able to close that gap"

Michael Hall

Rapamycin, the drug Hall used in yeast that led to his discovery of TOR in the early 1990s, was originally found in Easter Island bacteria. Hall visited the Chilean island, also known as Rapa Nui, as well as giving talks in Puerto Varas and Santiago during a week-long programme of activities. The events were initiated by Soledad Matus, a group leader at the Fundación Ciencia & Vida, who also manages the institute's international programme. "Even though we have a very productive science community, it's not always easy for people to come here because of money and time," explains Matus, whose work focuses on the biology of neurodegeneration. "For us it was not only about the lectures themselves, but establishing strong relationships. Thinking about the connections, exchanges and discussions that stemmed from Dr Hall's visit brings a smile to my face – it was a really great moment for us. EMBO provided great support and as soon as it is possible to do so again, I recommend anyone who has the opportunity to organise such a lecture series to do so."

At the India|EMBO Symposium on synthetic biology, Chennai/India, January 2020

Constructive conferences

Ideas for EMBO's Global Activities Programme often snowball from previous initiatives, one example being an India|EMBO Symposium focused on synthetic biology that took place at the end of January. The event stemmed from long-standing connections between Victor de Lorenzo, a Group Leader at the Spanish National Centre for Biotechnology, and Himanshu Sinha and Karthik Raman, both Associate Professors at the Indian Institute of Technology (IIT) in Chennai. "Chennai is somewhat off the beaten track, but the campus at IIT and the city are amazing – when you arrive you see many talented young people involved in many activities," says de Lorenzo, an EMBO Member whose work looks at the interface between synthetic biology and environmental biotechnology. "The event covered a fascinating range of interdisciplinary practical and theoretical questions, from new ways to biodegrade plastics to understanding how proteins avoid forming knots when they fold, but also addressed wider issues such as gender equality. This was one of the most memorable discussions I have ever been involved in – it was not easy, and really touched on people's lives. There is an entire world of interesting science going on in India – it provides a massive opportunity to build partnerships."

"There is an entire world of interesting science going on in India, it provides a massive opportunity to build partnerships"

Victor de Lorenzo

"Synthetic biology can help to address some of the most pressing challenges that humanity faces"

Himanshu Sinha

The symposium, which featured 70 participants and 18 speakers, also delivered practical outcomes. "Synthetic biology can help to address some of the most pressing challenges that humanity faces, and one of the key things to come out of the meeting was a policy statement on how synthetic biology in healthcare, agriculture and the environment should proceed in India," says Himanshu Sinha, whose research deals with complex genetics and systems biology. "There are significant opportunities to address areas such as pollution, food production, and green chemistry and it is about looking at how to mitigate some of the big challenges that the field faces, such as ethical concerns amongst the public. Some of these issues were also taken up by participants who were invited to co-edit a special edition of a leading biotechnology journal. This was one of the first conferences on synthetic biology to be held in India and you can really see the impact of the event on the ground – students in Chennai are not often in a position where they can travel to conferences and it makes a huge impact, while at the same time scientists from across the world can learn about the science that is happening in India."

Standards in synthetic biology

EMBO is a partner in the Horizon 2020 project "BioRoboost: Fostering synthetic biology standardization through international collaboration". Along with over 20 other organizations from Europe and around the world, the group is working to define and promulgate the importance of standards in biological research, from a molecular part all the way through biosafety and industrial standards. Several EMBO Members are involved in this project through their institutions.

Michele Garfinkel, Head of EMBO's Research and Policy Affairs, along with her collaborators from Biofaction (Vienna) was responsible for work to initiate interactions between science, industry and risk assessment authorities in the general area of standards in biosafety. This work was carried out primarily through a workshop held in October 2019 and resulted in a report identifying options for funders, researchers, publishers, regulators, and risk assessors to use for considering their use of standards in their work.

BioRoboost continues through 2021 and EMBO remains involved in the work.

standardsinsynbio.eu/

standardsinsynbio.eu/wp-content/uploads/2020/09/Deliverable-6.1.pdf

EMBO is listening

As a life scientist, you are part of a growing community and we would like to hear from you on all things about EMBO! If you are interested in a conversation, please write to the Senior Community Engagement Officer, Vid Nukala (vid.nukala@embo.org).

New fellowships for core facility staff

Earlier this year, EMBO announced an extension of its fellowship programme to include a scheme for core facility staff. The new EMBO Core Facility Fellowships will support training exchanges between scientists and technicians working in core research facilities, with the purpose of learning specific techniques and acquiring expertise that they can then implement at their home facility.

EMBO recognizes the essential role that core facilities play in supporting scientists to perform the highest-quality research, and the value of having the most up-to-date expertise available at them. These new EMBO Fellowships, funded by EMBC, will facilitate the advancement of technologies at these facilities and promote excellence in the life sciences.

"Staff working at core facilities offer invaluable support to research scientists and are an integral part of the scientific research community," says EMBO Director Maria Leptin. "It is therefore essential that we support the scientists and technicians working in these facilities to update and

advance their knowledge and skills, which these fellowships will help to do."

These are the first EMBO Fellowships tailored to core facility staff. The fellowships may last for between one week and one month, and are intended to be international in nature, so the home and host facilities must be located in different countries.

Applications are accepted on a rolling basis, but it is recommended to apply three months before the proposed starting date.

www.embo.org/funding-awards/fellowships/core-facility-fellowships

Exchanges with Japanese institutes eligible for EMBO Fellowships throughout 2020 and 2021

Until the end of 2021, two of EMBO's Fellowship Programmes will consider applications for scientific exchanges involving institutes in Japan and institutes in an EMBC Member State, EMBC Associate Member State or a country or territory covered by a cooperation agreement with the EMBC.

This update applies to EMBO Short-Term Fellowships and EMBO Core Facility Fellowships. EMBO Short-Term Fellowships promote international research exchanges between laboratories in order to facilitate valuable collaborations with research groups applying techniques that are unavailable in the applicant's laboratory. EMBO Core Facility Fellowships, newly launched in February, support international training exchanges between core research facilities that provide services to institutes and universities.

Fellowship applications are accepted on a rolling basis.

www.embo.org/funding-awards/fellowships/short-term-fellowships.html

www.embo.org/funding-awards/fellowships/core-facility-fellowships.html

EMBO Member Emmanuelle Charpentier receives Nobel Prize

The Royal Swedish Academy of Sciences has awarded this year's Nobel Prize in Chemistry to Emmanuelle Charpentier, Max Planck Unit for the Science of Pathogens in Berlin, and to Jennifer Doudna, University of California, Berkeley, USA, for their groundbreaking work on the CRISPR-Cas9 gene editing technology.

"There is enormous power in this genetic tool, which affects us all. It has not only revolutionized basic science, but also resulted in innovative crops and will lead to ground-breaking new medical treatments," said Claes Gustafsson, chair of the Nobel Committee for Chemistry.

Elected to the EMBO Membership in 2014, Emmanuel Charpentier is now the 90th Nobel Laureate among the EMBO Members and Associate Members.

Making waves in the life science

The Instituto Gulbenkian de Ciência is advancing life science by fostering interdisciplinary and collaborative research

When cell and developmental biologist Caren Norden was offered to join the Instituto Gulbenkian de Ciência (IGC) as deputy director in 2019, her decision was a no-brainer. "I came to IGC because I felt that I could be part of something that can set an example for the rest of the world," she says.

The IGC, located close to beautiful beaches with surfable waves just outside of Lisbon in Oeiras, is one of the most competitive research centres in Portugal. Founded by the Calouste Gulbenkian Foundation in 1961, the institute is dedicated to fostering transformative discoveries in the life sciences—exploring how organisms form, and how they interact amongst each other and with their environment. The vision is that this knowledge can have an impact on both human health and ecosystem sustainability.

Together with Norden, at the helm of the IGC there's biologist Mónica Bettencourt-Dias, who became the institute's director in 2018. As a research institution, Bettencourt-Dias says, "we're quite unique in Europe". For one, the institute is leading in promoting gender equality in science. Nearly half of the 32 research groups of IGC are led by women, and—unlike other research centres—it attracts many female applicants for group leader positions. What's more, scientists at IGC work in an environment with minimal hierarchical structure, which fosters bottom-up interactions. The research teams, which include people from 44 nationalities, pursue scientific questions in a wide range of fields—from biophysics to evolutionary biology to immunology and host-microbe interaction. "We see very often that ground-breaking ideas come from people of all

Eight group leaders at the IGC are EMBO Members, including Caren Norden (left) and Mónica Bettencourt-Dias (right).

levels, from very different fields, who meet each other and start talking," Bettencourt-Dias says.

The collaborative approach of IGC is paying off. The institute has attracted talented early-career scientists from Portugal and abroad. Six researchers who set up their independent laboratory at IGC received EMBO Installation Grants, which were funded by the Portuguese Ministry for Science, Technology and Higher Education. Because "with very few strings attached," as Norden says, they give researchers the freedom to pursue innovative ideas, and the prestige and networking opportunities that come with these grants are a stepping stone to secure future funding. Eight group leaders are EMBO Members, including Norden and Bettencourt-Dias, who have also received support through the EMBO Young Investigator Programme earlier in their careers.

The benefits of the IGCs collaborative spirit go beyond grant money. Thanks to its multidisciplinary environment, research infrastructures, and the support of the Gulbenkian Foundation, the IGC has been able to quickly redirect part of its research activities to address the coronavirus pandemic. In collaboration with hospitals and industry, the institute helped to produce and implement coronavirus diagnostic tests, and it launched collaborative efforts to test the immunity to the virus in different groups of the Portuguese population.

In parallel with conducting high-quality research, the IGC offers a number of training opportunities, including a graduate programme for scientists from African countries of Portuguese language. The institute has also developed a project to foster critical thinking and scientific curiosity in schools, in Portugal and several Portuguese-speaking African countries. This year, with the support of Oeiras City Council, the IGC established a Collaborative Centre, which hosts sabbatical programmes, research workshops, and collaborative retreats, and it provides training and collaboration opportunities for African scientists. "For us at IGC it is essential that science is accessible to all," Bettencourt-Dias says.

Mobilizing young researchers in Europe and Japan

Elite programmes for young researchers can make the difference between success and failure in a scientific career. But what is the secret to a successful programme? How can they be enhanced through international exchange? And what role can they play in shaping the global research system to better support young scientists? EMBO joined forces with the EU Delegation to Japan and the Molecular Biology Society in Japan to organize an expert meeting in Tokyo, Japan on 6 February to reflect on these questions and more.

More than 30 experts from the worlds of policy and research in Europe and Japan convened to discuss issues such as funding, training, and mobility opportunities for young researchers. Participants from ministries, funding agencies, and research institutions discussed areas of common ground for cooperation. This included boosting success factors such as the development of multidisciplinary networks, community building, mentoring, and training, but also addressing issues that can hold back young scientists, such as high workloads, uncertain career paths, and lack of financial security.

Amongst participants there was a broad sentiment of the benefits of more cooperation between Europe and Japan, as well as the opportunities for elite programmes to drive positive changes from within a complex global research system.

Network for cell biologists

EMBO Member Vivek Malhotra's work is focussed on understanding the mechanism of cell compartmentation and protein secretion. He has been studying these processes since the late 1980s and is now ICREA professor and chair of cell biology at the Centre for Genomic Regulation (CRG) in Barcelona. Just like his lab, many other labs in Catalonia concentrate on cell and tissue biology. Yet they are often located in different institutes and universities.

Earlier this year, Malhotra initiated a new network that brings together Catalonian research groups sharing his passion for membranes, lipids, cell compartmentation, division and growth. CATCAT – or Cell and Tissue research in Catalonia – comprises 36 laboratories from institutes including the Institute for Bioengineering of Catalonia (IBEC), the EMBL site in Barcelona, the Department of Health and Life Sciences at the University Pompeu Fabra (UPF), the Molecular Biology Institute of Barcelona (IBMB), the Institute of Photonic Sciences (ICFO), the Institute

for Research in Biomedicine (IRB) and the CRG. What they also have in common is their interdisciplinary approach involving methods in molecular biology, physics, mathematics and engineering. CATCAT promotes exchange amongst the member groups, attracts talented young researchers and shares technologies and resources.

www.catcat-celltissuebiology.cat

New platform to coordinate research on brain tumours

photo by Amparo Garrido

Brain metastases, or secondary brain tumours, occur in 10 to 30 percent of adults with cancer, and the number of cases is increasing. Yet the hunt for effective drugs has a poor track record, because pharmaceutical companies often exclude patients with brain metastasis from clinical trials. The chances to develop new therapies are therefore low. "Spread of cancer to the brain remains an unmet medical need," concludes EMBO Young Investigator Manuel Valiente from the National Cancer Research Center (CNIO) in Madrid.

In a concentrated effort involving 19 laboratories across Europe, Valiente and his team generated the first comprehensive database of organotropic cancer cell lines metastatic to the brain. The publicly available database is open for researchers who need information about the existing cell lines. "Our publication is a white paper of how to use the models of brain metastases," explains Valiente.

Currently, 62 different cell lines are listed in the database, accompanied by information such as type of cancer, mouse strain and other practical data. "This is not a finished effort since we want to incorporate more models in future," explains the scientist. He and his team expect other investigators to contribute to the tool in order to create synergies and avoid duplications. "In times of COVID saving resources is an important thing," states Valiente.

apps.cnio.es/app/BrainMetastasis/CellLines

cancerres.aacrjournals.org/content/early/2020/09/09/0008

LifeTime: A vision for cell-based medicine

The pan-European project LifeTime was selected last year by the European Commission for one million euros funding to develop its vision and strategic plan. The resulting LifeTime Strategic Research Agenda was now presented together with a perspective article signed by hundreds of experts from all over Europe. Their vision: a personalized, "cell-based interceptive medicine" that enables us to detect diseases earlier and treat them more precisely, based on a better understanding of the cellular processes in the human body. Among the authors were many members of the EMBO community.

In its roadmap, LifeTime presents a ten-year plan to advance personalized treatment for five focus areas: cancer, neurological diseases, infectious and chronic inflammatory diseases and cardiovascular diseases. The aim is to improve healthcare by detecting and intercepting diseases at the earliest stage – even before symptoms arise. According to EMBO Member Geneviève Almouzni, co-coordinator of LifeTime: "Interceptive, cell-based medicine should strongly impact both our economy and our society. Lifting the burden of the disease will impact the societal perception of illness".

An essential component of LifeTime is its transdisciplinary scientific and clinical approach. The initiative has brought together scientists, clinicians and industry experts across many fields – biologists, data scientists, engineers, mathematicians, and physicists – to enable a much-improved understanding of molecular mechanisms driving disease onset and evolution at cellular resolution. "This level of detail will lead to a cell-based medicine and allow doctors to diagnose diseases earlier and intercept them before irreparable organ or tissue damage has occurred," according to co-coordinator and EMBO Member Nikolaus Rajewsky from the Max Delbrück Center for Molecular Medicine in Berlin. The systems biologist is convinced that "LifeTime has a unique value proposition that promises to improve patients' health in Europe."

Rajewsky, Almouzni, Gorski et al., Nature (2020), The LifeTime initiative and the future of cell-based interceptive medicine in Europe, DOI: 10.1038/s41586-020-2715-9

Life Time Strategic Research Agenda: lifetime-initiative.eu/lifetime-strategic-research-agenda-2/

Torres-Padilla, M. E. et al. Thinking 'ethical' when designing a new biomedical research consortium. EMBO J, DOI: 10.15252/embj.2020105725 (2020)

Mapping the Atlantic Ocean microbiome

AtlantECO
Atlantic Ecosystems Assessment, Forecasting & Sustainability

An ambitious project to zoom in on the hidden universe of microbes in the Atlantic Ocean was launched on 1 September. Atlantic Ecosystems Assessment, Forecasting, and Sustainability (AtlantECO) is an EU-funded initiative that brings together 36 organisations from 13 countries. Researchers, including EMBO Members Peer Bork (EMBL) and Chris Bowler (CNRS), want to advance understanding of the populations, environments and dynamics of marine microbes in the Atlantic and make predictions about future marine ecosystem services.

Ocean microbes such as viruses, bacteria, archaea, and microalgae form the base of the ocean food web, produce around half of the oxygen on our planet through photosynthesis, sequester huge amounts of carbon dioxide, and provide ecosystem services that underpin the lives and livelihoods of people around the world. These floating, drifting, interacting communities – found everywhere from boiling hydrothermal vents to polar ice – collectively form the ocean's microbiome. Yet despite composing at least two thirds of the biomass in the oceans, researchers know relatively little about them. AtlantECO aims to change that.

One goal is to develop tools that can help researchers understand how microbes and ecosystems are connected from pole to pole across the

Atlantic – including open ocean, the seabed, coastal regions and even the atmosphere. The team also want to build predictive models incorporating diverse aspects such as ocean circulation and upwellings that could enable them to understand how microbial communities react to stressors such as microplastics and other pollutants, and climate change – and inform how to tackle them.

Collaborators will use purpose-built vessels to sample the ocean at multiple locations and depths, including the schooner Tara that enabled the well-known Tara Oceans programme led by Eric Karsenti at EMBL. Stopovers are planned in towns around the Atlantic Basin, with a range of capacity building, outreach and citizen science initiatives planned. The project includes researchers from fields as diverse as oceanography, molecular biology, genetics, and ecology. It is also hoped that the project will close gaps in understanding of the north and south Atlantic Ocean.

www.atlanteco.eu

Inauguration of the Danish national cryo-EM facility

In recent years, advances in hardware and software have paved the way for the current growth of the application of cryogenic electron microscopy (cryo-EM). Denmark was one of the first countries to recognize and exploit the potential of this technique on a national level with first investments in 2011 into a high-performance cryo-EM for both materials research and structural biology, and later also with co-support from the Lundbeck Foundation and the Carlsberg Foundation into further performance enhancement.

Recently, the Danish Agency for Research and Innovation awarded 4.2 million euros to a proposal for the establishment of the Danish National Cryo-EM Facilities for Biological Nanomaterials (EMBION) on the Danish research infrastructure roadmap. The award allowed the purchase of another high-performance cryo-EM devoted to biological samples.

EMBION is a research collaboration led by EMBO Member Poul Nissen from Aarhus University, with participation from the University of Copenhagen as a co-host, as well as the University of Southern Denmark, the Statens Serum Institut, and the Technical University of Denmark as partners. Aalborg University also supports EMBION. The facilities were inaugurated in October 2020. "The goal of EMBION is to provide the cryo-EM technology to the Danish research community in general," explains Poul Nissen, and adds that small companies and industry also can gain access.

More recently 1.8 million euros financial support from the Novo Nordisk Foundation were also granted for the introduction of further infrastructure at EMBION for cryo-electron tomography, namely a cryogenic focused ion beam scanning electron microscope and a high-pressure freezing device for tissue and cell samples.

The Novo Nordisk Foundation is also supporting the cryo-EM facilities in Copenhagen led by EMBO Member Guillermo Montoya as well as a network grant (cryoNET) for the two facilities in Aarhus and Copenhagen. The network encompasses the two cryo-EM facilities in Sweden at Stockholm University (led by EMBO Member Gunnar von Heijne) and Umeå University (led by EMBO Member Bernt-Eric Uhlin), both supported by the Wallenberg Foundation.

embion.au.dk

Centre of Excellence Severo Ochoa

The Centre for Research in Agricultural Genomics (CRAG, Barcelona, Spain) has been accredited as a "Centre of Excellence Severo Ochoa" for the period 2020-2023 by the Spanish State Research Agency. EMBO Member and CRAG vice-director Paloma Mas explains that this award which is named after the Spanish physician, biochemist and Nobel laureate represents both a milestone and a steppingstone for this research centre with a strong focus in plant sciences. "It is the second time that CRAG obtains this recognition. For us it is a milestone, that recognizes the work done during the previous 4-year period, and also a steppingstone to keep working towards the path to consolidate CRAG as a top-leading international centre in plant and farm animal biology," she says.

The new CRAG-Severo Ochoa project will focus on attracting talent, from doctoral students to group leaders and support personnel. Currently, there are various open positions.

www.cragenomica.es

Vienna BioCenter PhD Programme cooperation agreement

Vienna BioCenter PhD PROGRAM

Research institutions based at the Vienna BioCenter, one of Europe's leading life science hubs, have signed a cooperation agreement with the University of Vienna and the Medical University of Vienna that enhances the hub's PhD program. Launched in 1993, the Vienna BioCenter PhD Program serves students based at four institutes on the campus – the Gregor Mendel Institute of Plant Biology, the Institute of Molecular Biology, the Research Institute of Molecular Pathology, and the Max Perutz Labs. Headed by EMBO Member Manuela Baccarini, a professor at the Max Perutz Labs, is one of Europe's prestigious training programmes in the life sciences.

Commencing on 1 October 2020, the programme overhaul unites key aspects of past programmes, while the University of Vienna and the Medical University of Vienna will now jointly award degrees to successful candidates. Students in the programme undertake research projects supervised by faculty members – which include 16 EMBO Members and 3 EMBO Young Investigators –, participate in a diverse introductory course, and benefit from a flexible curriculum that includes interdisciplinary lectures, practical courses, and initiatives such as journal clubs, retreats, and career development events.

Research themes at the Vienna BioCenter campus span biochemistry, molecular medicine, neuroscience, plant biology, bioengineering, and evolutionary biology – amongst many more –, providing a stimulating environment for around 200 PhD candidates. Around 60 to 70 new students will be recruited each year. "With this programme, we want to equip young researchers with the best possible resources and training so they can follow their curiosity, immerse themselves in cutting-edge research projects, and develop the skills to leap into an independent career," says Eva Schmid, Head of the Vienna BioCenter training unit.

www.training.vbc.ac.at/phd-program/

Free, open, online course in chemical biology launched

Filming of a MOOC module, featuring Marcus Long, Research Associate at the University of Geneva, and head of the project Mooc Chemical Biology creation

A new course in chemical biology has been launched by the University of Geneva that is free, online, and open for enrolment. Developed by a team of more than 20 experts, including several EMBO Members, the initiative is the first 'massive open online course' (Mooc) in chemical biology and can be accessed through the Coursera platform.

Moocs have grown in popularity in recent years, covering a broad range of themes and topics. Today, hundreds of universities deliver courses to millions of participants around the world, with a huge surge in enrolments reported since the onset of the Covid-19 pandemic. But until now, there was no Mooc available in chemical biology.

Chemical biology sits on the intersect of disciplines spanning chemistry, molecular biology, bioinformatics, physics, and more. It enables scientists to zoom in on mechanisms within live cells, by applying powerful chemical techniques and analyses – often making use of specially designed synthetic molecules.

The course includes tailor-made films, written materials, and lab videos. It is the result of a collaboration between experts at the University of Geneva and the Swiss National Centre of Competence in Research (NCCR) Chemical Biology. EMBO Members Anne-Claude Gavin, Howard Riezman and Aurélien Roux, NCCR group leaders, are amongst those who contributed to content development.

Targeted at students, scientists, and educators, the Mooc takes around 20 hours to complete, with organisers at the University of Geneva aiming to provide participants with skills to solve multidisciplinary questions. "We want to help participants break down the barriers between disciplines and have confidence in applying knowledge to difficult areas," said Marcus Long, a research associate at the university. "Good communication, especially between parties of different backgrounds, never comes easily – it's to bridge this challenge that we created this course," added Robbie Loewith, professor of molecular biology.

www.coursera.org/learn/chemical-biology

Leszek Kaczmarek becomes new EMBC President

As of 1 January 2020, Leszek Kaczmarek is the new President of the EMBC (European Molecular Biology Conference), the funding body of EMBO. He takes over from Gerrit van Meer, whose term as EMBC President has ended.

Leszek Kaczmarek is a professor at the Nencki Institute of Experimental Biology in Warsaw/Poland. He studies the molecular and cellular foundations of the brain-mind connection under both physiological and pathological conditions. His lab's discovery, 30 years ago, that learning produces a robust and transient activation of c-fos gene expression led him to his current studies of extracellular proteolysis at the synapse in health and disease. Leszek Kaczmarek was elected EMBO Member in 2000 and served on the EMBO Council from 2010 to 2015.

The EMBC is the international and independent funding body that was set up in 1969 to provide stable finances for EMBO to carry out its activities. Today, EMBC comprises 30 Member States in Europe and beyond.

www.embc.embo.org

Awards of Excellence

EMBO MEMBERS

Wolf Prize in Agriculture

Caroline Dean, John Innes Centre, UK, has received the 2020 Wolf Prize in Agriculture for her ground-breaking work on flowering time control and epigenetic basis of vernalization – the process by which plants delay flowering until they have experienced a period of prolonged cold. The Wolf Prize is awarded annually to prominent scientists and artists for their unique contribution to humanity.

2020 RNA Society Lifetime Achievement Award

Matthias Hentze, European Molecular Biology Laboratory (EMBL), is recognized by the RNA Society for his longstanding contributions in the fields of RNA biology and gene regulation. According to the jury, discoveries by his team have contributed not only to the fundamental understanding of gene control at the level of RNA, but have also provided critical insights in the areas of developmental biology, brain function, cancer development and other diseases. In addition to his scientific contributions, Matthias Hentze has been recognized for his leadership, training and mentoring of hundreds of young scientists within his lab, at EMBL, and throughout Europe.

2020 Canada Gardner International Awards

EMBO Members **Mina J. Bissell**, **Rolf Kemler**, **Roel Nusse**, and EMBO Associate Members **Elaine Fuchs** and **Masatoshi Takeichi** are the winners of the 2020 Canada Gairdner International Awards. The prizes are given annually by the Gairdner Foundation for outstanding discoveries or contributions to medical science. Until now, 387 awards have been given to laureates from over 35 countries and of those awardees, 92 have gone on to receive Nobel Prizes. Each winner receives a grant of 100,000 Canadian dollars.

2020 Brain Prize

Adrian Bird, University of Edinburgh, UK, receives the 2020 Brain Prize from the Lundbeck Foundation, Denmark's largest private funder of neuroscience research. Bird receives this award for his outstanding contribution to research on Rett Syndrome, a rare neurological disorder that primarily affects girls during their early childhood. He shares the prize with Huda Zoghbi from the Texas Children's Hospital in Houston, US. Both prize winners are awarded 10 million Danish krones – approximately one million euros.

2020 Tang Prize in Biopharmaceutical Science

Marc Feldmann, Emeritus Professor at the University of Oxford, and **Charles Dinarello**, University of Colorado, US, have been awarded the 2020 Tang Prize in Biopharmaceutical Science. They were announced as joint winners along with Tadamitsu Kishimoto "for the development of cytokine-targeting biological therapies for treatment of inflammatory diseases". According to the jury, their research not only advanced the understanding of cytokines but also revolutionized the way inflammatory diseases are treated. The three scientists share a prize of 1.3 million US dollars as well as a research grant of 330,000 US dollars.

Swiss Science Prize Marcel Benoist

Ruedi Aebersold, ETH Zurich and the University of Zurich, receives the Swiss Science Prize Marcel Benoist, one of the highest Swiss honours for scientists. Aebersold was honoured for the part he has played in founding and advancing the field of proteomics, a branch of biology that is considered the foundation of personalised medicine. The prize is worth 250,000 Swiss francs.

FWO Excellence Awards

Wout Boerjan, VIB-UGent Center for Plant Systems Biology, is the laureate of the Dr. De Leeuw-Damry-Bourlart Excellence Award 2020 in Applied Sciences. According to the jury, Boerjan's research is seminal in advancing the progress towards the use of plant biomass instead of fossil resources, paving the way for a sustainable bio-economy. The prizes are awarded by the Research Foundation Flanders (FWO) every five years and are worth 100,000 euros.

2020 Wiley Prize in Biomedical Sciences

Anthony Hyman, Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, received the 2020 Wiley Prize in Biomedical Sciences for revealing a new principle for subcellular compartmentalization based on formation of phase-separated biomolecular condensates, a process implicated in both physiological and pathological events. He shares the award with Clifford Brangwynne and Michael Rosen. The award of 50,000 US dollars will be presented to the winners in 2021 during a ceremony held at The Rockefeller University in New York City.

EMBO YOUNG INVESTIGATORS

Medal for Life Sciences

Yanlan Mao, University College London, is the winner of the 2021 Medal for Life Sciences from the Royal Microscopical Society. The award recognises Mao's contribution to the understanding of how cells and tissues are shaped and organised during the developmental process. According to the jury, her innovative approaches combine elegant microscopy with probing of the biophysical environment.

Randall Jeffrey Platt was selected as one of the "35 Innovators Under 35" for 2020 by *MIT Technology Review*. The selection includes the most promising young innovators around the world whose accomplishments are poised to have a dramatic impact on the world. The list is split into five categories: inventors, entrepreneurs, visionaries, humanitarians, and pioneers.

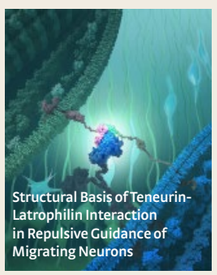
Corrigendum

The Nobel Prize in Physiology or Medicine (to Peter Ratcliffe) is awarded by the Nobel Assembly at the Karolinska Institutet, not the Royal Swedish Academy of Sciences as stated in the last issue of *EMBOencounters*. We apologise for the mistake.

Good Read – Publications from the EMBO community

Specific Residues in a PurineTransporter Are Critical for Dimerization, ER Exit, and Function
George Diallinas and colleagues
Genetics | 1 December 2019
DOI: 10.1534/genetics.119.302566

Global shape of Toll activation is determined by wntD enhancer properties
Ben-Zion Shilo and colleagues
PNAS | 21 January 2020
DOI: 10.1073/pnas.1918268117



Rüdiger Klein, Elena Seiradake and colleagues
Cell | 23 January 2020
DOI: 10.1016/j.cell.2019.12.014

The microbiota programs DNA methylation to control intestinal homeostasis and inflammation
Yehudit Bergman, Eran Elinav and colleagues
Nature Microbiology | 3 February 2020
DOI: 10.1038/s41564-019-0659-3

Distinct structural modulation of photosystem I and lipid environment stabilizes its tetrameric assembly
Alexey Amunts and colleagues
Nature Plants | 9 March 2020
DOI: 10.1038/s41477-020-0610-x

A unified nomenclature for vertebrate olfactory receptors
Doron Lancet and colleagues
BMC Evolutionary Biology | 15 April 2020
DOI: 10.1186/s12862-020-01607-6

Pyruvate kinase variant of fission yeast tunes carbon metabolism, cell regulation, growth and stress resistance
Jürg Bähler and colleagues
Molecular Systems Biology | 22 April 2020
DOI: 10.15252/msb.20199270

Translocation of nutrient transporters to cell membrane via Golgi bypass in Aspergillus nidulans
George Diallinas and colleagues
EMBO Reports | 26 May 2020
DOI: 10.15252/embr.201949929

Runx3 prevents spontaneous colitis by directing the differentiation of anti-inflammatory mononuclear phagocytes
Yoram Groner and colleagues
PloS One | 26 May 2020
DOI: 0.1371/journal.pone.0233044

Building an international consortium for tracking coronavirus health status
Eran Segal and colleagues
Nature Medicine | 2 June 2020
DOI: 10.1038/s41591-020-0929-x

Molecular basis of β-arrestin coupling to formoterol-bound β1-adrenoceptor
Arun K. Shukla, Christopher G. Tate and colleagues
Nature | 17 June 2020
DOI: 10.1038/s41586-020-2419-1

DNA surface exploration and operator bypassing during target search
Sebastian Deindl, Johan Elf and colleagues
Nature | 24 June 2020
DOI: 10.1038/s41586-020-2413-7

Interrogation of the Microenvironmental Landscape in Brain Tumors Reveals Disease-Specific Alterations of Immune Cells
Johanna A. Joyce and colleagues
Cell | 25 June 2020
DOI: 10.1016/j.cell.2020.05.007

Single-cell analysis of clonal maintenance of transcriptional and epigenetic states in cancer cells
Amos Tanay and colleagues
Nature Genetics | 29 June 2020
DOI: 10.1038/s41588-020-0645-y

mRNA structural dynamics shape Argonaute-target interactions
Marvin E. Tanenbaum and colleagues
Nature Structural & Molecular Biology | 13 July 2020
DOI: 10.1038/s41594-020-0461-1

Dynamic changes in glioma macrophage populations after radiotherapy reveal CSF-1R inhibition as a strategy to overcome resistance
Johanna A. Joyce and colleagues
Science Translational Medicine | 15 July 2020
DOI: 10.1126/scitranslmed.aaw7843

3D genome organization contributes to genome instability at fragile sites
Batsheva Kerem and colleagues
Nature Communications | 17 July 2020
DOI: 10.1038/s41467-020-17448-2

Comparing the utility of in vivo transposon mutagenesis approaches in yeast species to infer gene essentiality
Judith Berman and colleagues
Current Genetics | 17 July 2020
DOI: 10.1007/s00294-020-01096-6

Spectrum of genes for inherited hearing loss in the Israeli Jewish population, including the novel human deafness gene ATOH1
Karen B. Avraham and colleagues
Clinical Genetics | 20 July 2020
DOI: 10.1111/cge.13817

Association of COVID-19 inflammation with activation of the C5a–C5aR1 axis
Eric Vivier and colleagues
Nature | 29 July 2020
DOI: 10.1038/s41586-020-2600-6

Sumoylation on its 25th anniversary: mechanisms, pathology, and emerging concepts
Umut Sahin and colleagues
The FEBS Journal | 3 August 2020
DOI: 10.1111/febs.15319

Towards a cancer mission in Horizon Europe: recommendations
Anton Berns, Julio E. Celis, Alberto Bardelli, René Bernards, Carlos Caldas, Caroline Dive, Douglas Hanahan, Klas Kärre and colleagues
Molecular Oncology| 4 August 2020
DOI: 10.1002/1878-0261.12763

Good Read – Publications from the EMBO community (continued)

The Use of Gapmers for In Vivo Suppression of Hepatic mRNA Targets
Hermona Soreq and colleagues
Methods Mol Biol. | 1 September 2020
DOI: 10.1007/978-1-0716-0771-8_13

Targeting TRIM37-driven centrosome dysfunction in 17q23-amplified breast cancer
Ross Chapman and colleagues
Nature | 9 September 2020
DOI: 10.1038/s41586-020-2690-1

Cell synchronization enhances nuclear transformation and genome editing via Cas9 enabling homologous recombination in Chlamydomonas reinhardtii
Roberto Bassi and colleagues
ACS Synthetic Biology | 11 September 2020
DOI: 10.1021/acssynbio.0c00390

Bioinspired Suprahelical Frameworks as Scaffolds for Artificial Photosynthesis
Ehud Gazit and colleagues
ACS Applied Materials & Interfaces | 14 September 2020
DOI: 10.1021/acsami.0c13295

Prokaryotic viperins produce diverse antiviral molecules
Rotem Sorek and colleagues
Nature | 16 September 2020
DOI: 10.1038/s41586-020-2762-2

Cells of the adult human heart
Sarah A. Teichmann and colleagues
Nature | 24 September 2020
DOI: 10.1038/s41586-020-2797-4

A Division of Labor between YAP and TAZ in Non-Small Cell Lung Cancer
Moshe Oren and colleagues
Cancer Research | October 2020
DOI: 0.1158/0008-5472.CAN-20-0125

The structure of a triple complex of plant photosystem I with ferredoxin and plastocyanin
Nathan Nelson and colleagues
Nature Plants | 5 October 2020
DOI: 10.1038/s41477-020-00779-9

Determination of isoform-specific RNA structure with nanopore long reads
Yue Wan and colleagues
Nature Biotechnology |26 October 2020
DOI: 10.1038/s41587-020-0712-z

Ivan Matic and colleagues
Cell | 12 Nouember 2020
DOI:10.1016/j.cell.2020.09.055

THE EMBO JOURNAL

SARS-CoV-2 infection may cause neurodegeneration

The potential for SARS-CoV-2 infection to cause subsequent neurodegenerative effects in some people has been demonstrated in recent research on human brain organoids derived from pluripotent stem cells. This could provide a scientific basis for clinical reports of neurological symptoms in people who had earlier tested positive for SARS-CoV-2 infection, suggesting that damage could be caused to elements of the central nervous system (CNS).

The research by a predominantly German team across several university hospitals showed that the virus can enter cerebral organoids, which are tiny laboratory-developed 3D structures around 2 mm diameter that replicate key aspects of the human brain. The work went on to show that this could induce pathological effects similar to early stages of diseases of the CNS such as Alzheimer's.

These initial insights will be followed by further experiments combining mature brain organoids with other techniques including animal investigation in vivo to unravel more critical details of neuropathology associated with SARS-CoV-2. This could help develop therapies to combat such pathologies at early stages while they are still reversible.

SARS-CoV-2 targets neurons of 3D human brain organoids
Anand Ramani et al.
Read the paper: www.embopress.org/doi/full/10.15252/embj.2020106230

EMBO *reports*

Countering the Covid-19 infodemic

The challenges posed for both the scientific community and wider society by the "infodemic" of fake news and misinformation in the wake of the COVID-19 pandemic are discussed in two articles, by Robert Grimes and Emilia Niemiec.

The two papers at first sight appear to diverge over how best to tackle the problem, with Grimes indicating a role for stronger regulation of social media. Niemiec on the other hand warns that supposedly independent regulation brings obvious and real risks of political, commercial, religious or other biases dictating or even censoring dissemination of information and knowledge.

However, the papers agree that in the long term a sustainable remedy can come from society itself. Grimes contends that the only lasting vaccine against pernicious fictions lies in developing stronger critical-thinking skills. Niemiec concurs that prudence or wisdom using the Internet, including critical appraisal of information, should be inculcated in people as early as possible.

Health disinformation & social media
David Robert Grimes
Read the paper: https://www.embopress.org/doi/10.15252/embr.202051819

COVID-19 and misinformation
Is censorship of social media a remedy to the spread of medical misinformation?
Emilia Niemiec
Read the paper: https://www.embopress.org/doi/full/10.15252/embr.202051420

molecular systems biology

Proteomic analysis identifies new targets for treating advanced breast cancers

Proteomics research by Israeli scientists has illuminated therapeutic targets for reducing relapse rates among women with advanced stage breast cancer that cannot be treated directly by hormone therapy, surgery or radiotherapy. Such patients often undergo neoadjuvant treatment, that is chemotherapy administered before surgery to shrink the tumour and is often used to assess how successfully malignant disease in the breast and related axillary lymph nodes will be eradicated. The extent of neoadjuvant treatment response can indicate the level of resistance to cytotoxic drugs and subsequent survival rates.

Geiger and colleagues compared protein expression patterns between tissue samples obtained from tumours before and after treatment, as well with normal tissue nearby. This identified many proteins with potential roles in mediating drug resistance. A promising candidate revealed through additional *in vivo* functional analysis was PYCR1, a mitochondrial metabolic protein, here identified as a candidate cancer regulator irrespective of the cancer subtype.

The results open a therapeutic path for potential combination of chemotherapy with PYCR1 inhibitors to treat some solid cancers in the breast and even other areas of the body where this protein is upregulated.

Proteomic patterns associated with response to breast cancer neoadjuvant treatment
Anjana Shenoy et al.
Read the paper: www.embopress.org/doi/full/10.15252/msb.20209443

EMBO Molecular Medicine

SARS-CoV-2 outbreak in meat processing plant suggests aerosol transmission in confined workspace

An outbreak of the SARS-CoV-2 virus at a German meat processing plant during May and June 2020 has been confirmed to have originated from a single worker on the meat processing production line by a study published in *EMBO Molecular Medicine*. This article highlights the importance of maintaining high quality air flow to restrict transmission of the virus, given the study's conclusion that in such confined spaces where unfiltered air is recirculated at low rates of external air exchange, transmission can occur over distances of at least eight metres.

The authors reached this conclusion through a multifactorial investigation that took into account timing of infection events, spatial relationship between workers, climate and ventilation conditions, sharing of housing and transport, and full-length SARS-CoV-2 genotypes. They demonstrated that a single employee transmitted the virus to more than 60% of co-workers within that eight-metre range.

Additional studies are required to confirm the most important workplace parameters that could be altered to lower infection risk, but optimization of airflow and ventilation conditions are clearly indicated.

SARS-CoV-2 outbreak investigation in a German meat processing plant
Thomas Günther et al.
Read the paper: www.embopress.org/doi/full/10.15252/emmm.202013296

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Drosophila genetics and genomics

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Correlative light electron microscopy

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Population genomics: Background, tools, and programming

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Microbial metagenomics: A 360° approach

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The epitranscriptome

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Molecular biology of mitochondrial gene maintenance and expression

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Persistent cancer cell: Molecular mechanisms, dynamic models towards therapy

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