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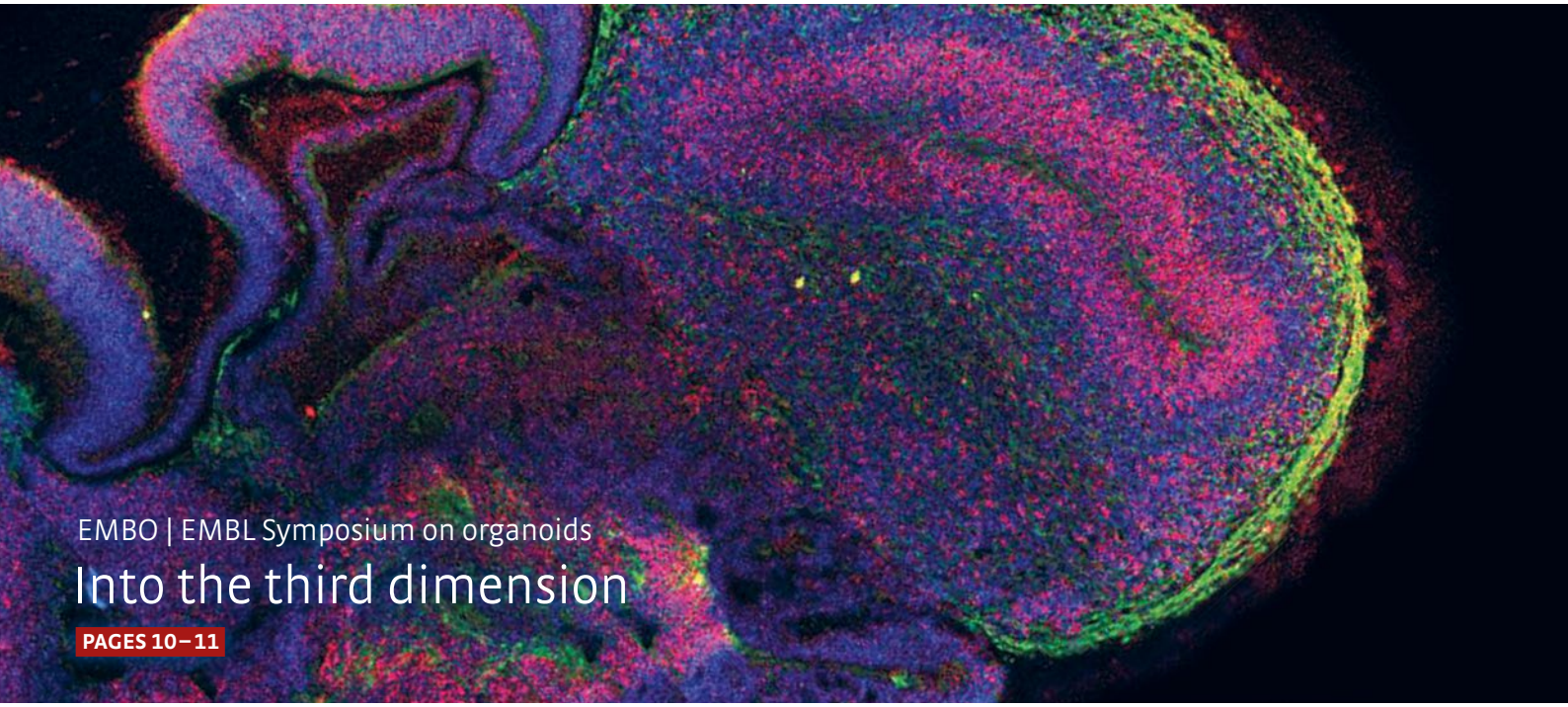
EMBO encounters



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excellence in life sciences

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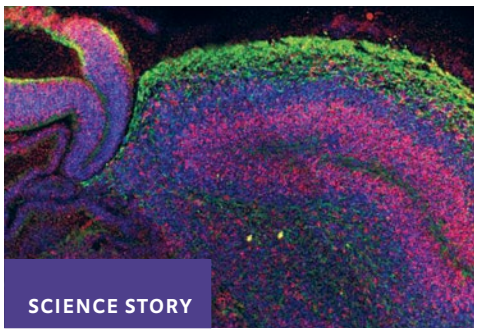

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FRESH FROM EMBO PRESS

Editorial

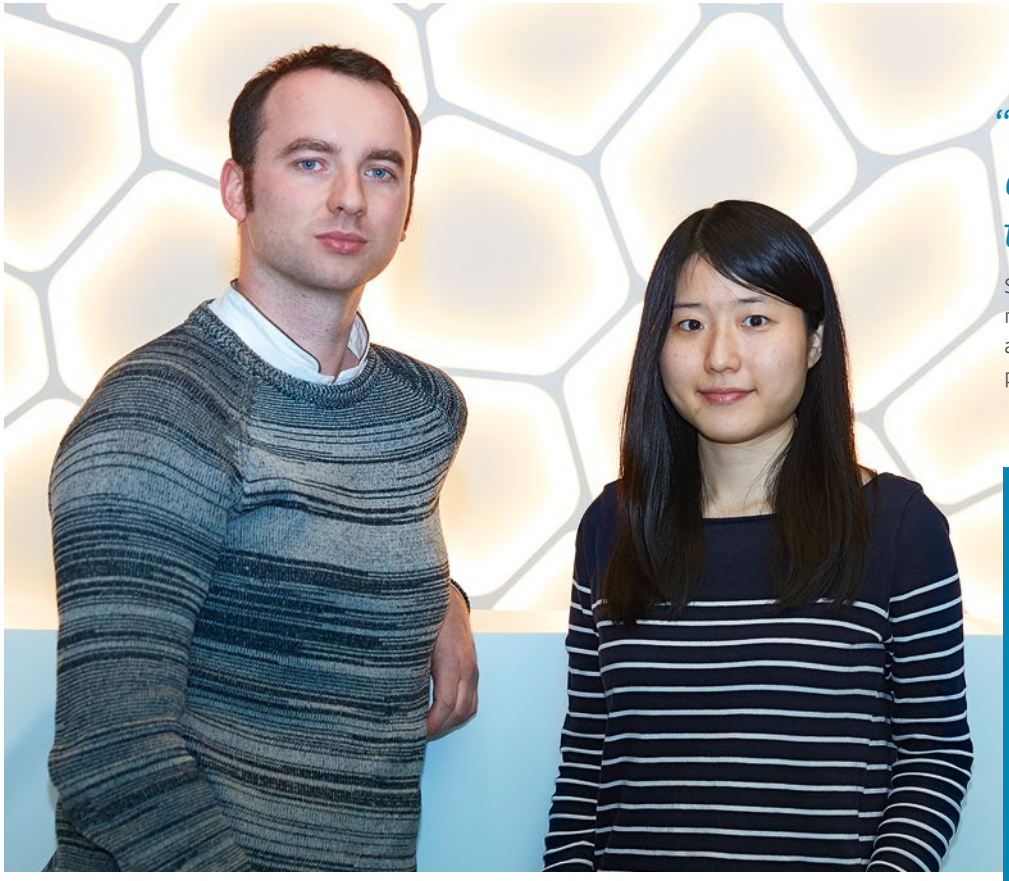
More than 50 years after EMBO awarded the first postdoctoral fellowships, international researcher mobility has become the norm. Rarely do life scientists not spend at least part of their career outside their home country. More than enough reason for us to make sure that our Fellowship Programme provides the necessary support for researchers to move between countries.

With that in mind, we announce another change to our Long-Term Fellowships (*page 3*). EMBO has continuously adapted the conditions of the Fellowship Programmes to respond to the needs of young researchers, for example through the introduction of benefits such as parental leave, part-time working options, and a portable pension scheme. The latest change – the removal of the application deadline – is no exception, and will give young researchers more flexibility in applying for funding for their research.

In addition to developing programmes that meet researchers' needs, EMBO contributes to shaping the life sciences by anticipating future problems and providing suitable solutions. For example, EMBO has been leading the discussions on Open Science and developing the necessary tools to make scientific results more transparent, accessible and reusable. In addition to the Science Policy Programme expanding its work on Open Science throughout this year, we are continuing to develop the SourceData project. I am pleased to report the launch of the first application of the SourceData platform, the SmartFigures Lab, which provides a tool to make scientific data in published figures more accessible and discoverable (*page 4*).

On *page 9*, EMBC President Gerrit van Meer reflects on the role of EMBC and EMBO in shaping the future of European research. EMBO will continue to support researchers in many different ways, and I look forward to sharing updates about our activities with you throughout next year.

Maria Leptin
Director, EMBO



"We are surrounded by deadlines. Good that this one is abandoned."

Sebastian Waszak and Mie Wong, postdoctoral researchers at EMBL, Heidelberg, were awarded their EMBO Fellowships before the programme update.

Open all year round

EMBO removes application deadlines for Long-Term Fellowships

Researchers wishing to secure an EMBO Long-Term Fellowship are now able to apply throughout the year. EMBO moved from a twice-yearly deadline to a continuous application process in order to give applicants more flexibility.

The change is the result of feedback from the scientific community: having specific eligibility cut-off points that were linked to the application deadlines meant that – depending on their PhD completion date – some candidates were only eligible for a period of 18 instead of 24 months. With the deadlines removed, it is now possible for young scientists to apply for a Long-Term Fellowship for up to a full two years after completing their PhD.

"This is an important change to the programme, which we made with our applicants in mind," explains EMBO Director Maria Leptin. Long-Term Fellowships have been part of EMBO's activities since the organization's beginning, with more than 6,000 having been awarded since 1964. Throughout this period, EMBO has continued to evolve the fellowships in a way that meets the life science community's needs.

"We recognize the challenges that young researchers face, and offer suitable solutions," continues Leptin. "Just last year, for example, we emphasized our recognition of the importance of preprints by allowing applicants to include preprint manuscripts in their list of publications. And we previously introduced parental leave, child allowance and part-time working options to ensure that we offer young researchers with family the maximum benefit from our fellowships."

The overall eligibility criteria for the fellowships remain unchanged but now refer to the date on which the candidates submit their applications instead of fixed deadlines. Applicants are required to hold a PhD or equivalent certificate at the start of the fellowship and must have obtained this degree no longer than two years before the date they complete their application.

"This is an important change to the programme, which we made with our applicants in mind. We recognize the challenges that young researchers face, and offer suitable solutions."

The number of fellowships awarded will not be affected by these changes, and applicants should note that the evaluation process will not be continuous. Applications will continue to be evaluated twice a year. Complete applications will enter the evaluation process in February or August, and the Long-Term Fellowships Committee will meet in May and in November each year to decide on the final awards of the fellowships.

Long-Term Fellowships at a glance

Since 1964, EMBO has continued to evolve the Long-Term Fellowships to ensure they meet young researchers' needs. Some of the latest changes include:

- ➔ no application deadline
- ➔ preprints accepted as part of publication record
- ➔ parental leave
- ➔ part-time working option
- ➔ child care allowance
- ➔ portable private pension scheme

Short-Term Fellowships with new eligibility criteria

In addition to the changes to the Long-Term Fellowships, EMBO has also introduced new eligibility criteria for its Short-Term Fellowships to focus on interactions among scientists in the core EMBC member and partner countries. Under the new criteria, applicants must be based in and planning to visit a laboratory in one of those countries. In addition, the restriction that applicants must have received their PhD degree (or equivalent) within the last ten years was removed. This will allow the programme to promote the sharing of knowledge and skills for researchers at all levels.

For more information on the EMBO Fellowships Programme visit embo.org/funding-awards/fellowships

Making data discoverable

SmartFigures are interactive figures that display data alongside related results published in other papers. They enable users to navigate intuitively between papers through a network of connected figures, accelerating literature browsing and data discovery.

EMBO and the publishing house Wiley launched the SmartFigures Lab at the *The 7th EMBO Meeting* in September. The site integrates SmartFigures, an open source application of the SourceData platform, combined with automated content enrichment based on semantic text mining.

→ **To test the SmartFigures Lab, visit *smartfigures.net***

SmartFigures make it easy to go straight to related findings in other papers or figures

Through the SourceData platform, figures in papers are enriched with computer-readable descriptive metadata that describe their content. This opens up a whole new range of applications, including SmartFigures. SmartFigures use this metadata to create links between figures showing the same biological entities.

For example, if the selected SmartFigure showed the result of an experiment testing the effect of insulin (X) on circulating blood glucose (Y), readers can navigate with one click to other research where a similar investigation was performed, giving them the opportunity to investigate the robustness or replicability of results. Just as easily, users can click through to figures showing the impact of changes in blood glucose level on other biological processes "downstream" (Z), thus mapping a chain of influence that could suggest new hypotheses.

The SmartFigures Lab generates links to related figures using SourceData's descriptive metadata along with semantic enrichment technology that mines the text content of papers for semantically related terminology.

How do SmartFigures work?

The data presented in figures are the key evidence supporting published scientific findings. The SourceData database, which powers the SmartFigures Lab, contains thousands of figure panels from hundreds of papers. Curators have analysed the figures in those papers and annotated them with the names of the biological entities under investigation, as well as the organism or cell line in which the experiment was conducted.

By linking to established public databases of biological terms, each biological entity (molecule, protein, cell, organ, etc.) in a figure is consistently identified. Furthermore, by classifying the role of each entity in a study, the hypothesis tested in that study can be represented in a structured form. This representation is the core of SourceData's unique ability to connect the SmartFigures across publications.

SOURCEDATA
Making data discoverable

About SourceData

SourceData, an initiative by EMBO, is an openly accessible and easily applicable data discovery tool allowing biomedical scientists to share figures and the underlying source data in a way that is machine-readable. SourceData provides a novel platform for researchers, who wish to make their publications discoverable based on their data content, to find specific data, to test or generate new hypotheses, and to share and connect data.

SourceData is based on an intuitive representation for metadata describing scientific figures, along with the tools to create, search and analyze this information. It consists of a machine-readable description of underlying data in figures and figure legends submitted by authors as part of the normal publication process. By referring to established public databases of biological terms, the specific biological entities, their roles as target, intervention or outcome measured in each paper can be consistently identified. Once a figure is represented in the SourceData standard, it can easily be found by scientists searching for data at the level of individual biological entities all the way to full experimental designs.

By consistently identifying and tagging both the biological entities and their relationships, related data can easily be linked to one another, ensuring that relevant publications can be found and cited, and will never be missed from search results due to the choice of keywords or descriptive text. The standardized data format allows for the comparison of data from many published papers, making it easier to directly examine the reproducibility of results across different studies. SourceData also offers the potential to collate and integrate data for large-scale data-mining and hypothesis generation thanks to the rich, structured data format. With these advantages, SourceData has the potential to significantly contribute to accelerating research and increasing productivity.

SourceData is being developed by EMBO in cooperation with the Swiss Institute of Bioinformatics and with support from the Robert Bosch Stiftung. In partnership with EMBO Press, the SourceData team has conducted a pilot project, importing and tagging over 17,000 experiments from papers across 23 journals, showing that the information routinely provided by scientists for publication is suitable for use with SourceData. SourceData is now integrated into the live editorial process of the EMBO Press journals, while academic publisher Wiley has worked with EMBO on the demonstration site SmartFigures.net, where SmartFigures are integrated in published papers.

Find out more about SourceData and related projects at sourcedata.embo.org.

The making of SourceData

Three questions for Thomas Lemberger, SourceData project lead at EMBO and Deputy Head of EMBO Press.

© Marietta Schupp, EMBL Photolab

Thomas Lemberger
SourceData project lead

Why did you develop SourceData?

Lemberger: The vast majority of biomedical data is locked away in published scientific illustrations and cannot be indexed by search tools. That makes them difficult to find or to re-analyze, resulting in a substantial waste of knowledge and resources, with negative impact on research output and reproducibility. We, as a community, have somehow become used to it, but we feel that this situation is not acceptable in the long run.

Why does SourceData use the figures from publications?

Lemberger: The data resulting from biological research are almost always published in the form of figures. As a visual representation of the results, figures are easy for humans to understand, but difficult for computers to index and search systematically. With the SourceData platform, we enrich figures with computer-readable descriptive metadata. This opens up a whole new range of applications, such as SmartFigures or data-oriented search of published papers.

What is the long-term ambition for SourceData?

Lemberger: With the further development of the SourceData platform, we build tools to make published data discoverable. We want to make the 'dark matter' of the literature visible. Our vision is to set up a data-rich research tool. SourceData clearly is an Open Science project, as it makes scientific results more transparent, accessible and reusable.

A cross-section through the life sciences

Mannheim meeting concludes *The EMBO Meeting* series

Between 10 and 13 September, more than 600 life scientists from across the world came together at *The EMBO Meeting 2016*. In addition to sharing and discussing their latest research, they had the opportunity to explore interdisciplinary approaches and network with the international life science community.

The EMBO Meeting 2016 took place at the Rosengarten conference centre in the heart of Mannheim. The Rhein Neckar region, whose 22 universities and more than 30 research institutes shape research and innovation, provided a suitable setting for four days of scientific discussions.

Understanding how Mother Nature works

The conference chairs Jannie Borst of the Netherlands Cancer Institute Antoni van Leeuwenhoek, Brian Charlesworth of the University of Edinburgh, and Jan Ellenberg of the European Molecular Biology Laboratory put together a varied scientific programme with more than 100 speakers and nearly 300 poster presentations.

"We wanted to highlight common biological mechanisms operating in all living organisms," explained Jannie Borst. "That meant starting at the molecular level and increasing complexity to whole organisms and even populations."

Jennifer Lippincott-Schwartz, Cell Biology and Metabolism Branch, National Institutes of Health, opened the conference with her keynote lecture on new imaging techniques that overcome some of the existing roadblocks in subcellular imaging and their use in clarifying subcellular organelle dynamics.

The second keynote lecture was given by Mathias Uhlén from the Royal Institute of Technology (KTH) in Stockholm. He shared with the audience his work on using a combination of genomics, transcriptomics, proteomics and antibody-based profiling to study the global protein expression patterns in human cells, tissues and organs, and the implications of such tissue-based protein profiling on human biology and precision medicine.

A set of three plenary sessions focused on cellular systems biology, population genomics and immune signalling in health and disease. They were complemented by 20 concurrent sessions on the topics of Molecular machines, Development and evolution, Genome structure, Cellular structures, and Organisms and environment, which provided a snapshot of some of the latest discoveries across the life sciences.

At the end of the meeting, Jannie Borst reflected: "I believe that our overarching plan worked very well. It was fantastic to see how all the high-quality research presented contributes to our common goal of trying to understand how Mother Nature works."

Recognising outstanding contributions to the life sciences

The meeting included ceremonies for the EMBO Gold Medal and the Louis-Jeantet Prize. Maria Leptin explained: "Through our work, we aim to support researchers at different stages of their careers, and by awarding the EMBO Gold Medal, we recognise and celebrate young scientists' outstanding contributions to the life sciences in Europe."

Before receiving their hand-crafted medals and bursaries of 10,000 euros each, this year's two Gold Medal recipients, Richard Benton from the University of Lausanne and Ben Lehner from the Centre for Genomic Regulation in Mannheim, shared with the audience some of their latest research.

The EMBO Career Day offered support for researchers at different career stages. Participants could learn about career options and planning, successful networking, application writing and getting their paper published.

Shaping policy

Two policy sessions enabled meeting participants to engage with current issues in shaping science policy. Jan Marco Müller, from the European Commission's Directorate General on Research and Innovation, provided an insider's view on science and policy at the European level (*also see page 8*). In the second session, Lex Bouter, Professor of Methodology and Integrity at Vrije Universiteit Amsterdam challenged listeners to think about how selective publication of only positive results can distort the publicly available record.

"These sessions offered a great opportunity to engage the scientific community in two areas we focus on," said EMBO Science Policy Programme Manager Michele Garfinkel. "The discussions on researchers' views of policymaking and their own responsibilities in research were particularly rewarding, as our focus is the governance of life sciences research. These are exactly the types of discussions we want to have with scientists in our community."

Looking ahead to new initiatives

The seventh meeting concluded *The EMBO Meeting* series as a whole. "Speaking with life scientists at all career stages, we found that instead of attending conferences with a broad scope, they often prefer meetings with a more specific focus," said Maria Leptin. "One of our core goals is to stimulate the exchange of scientific information. Our Council's decision to discontinue *The EMBO Meeting* will enable us to invest our resources in different ways to support, serve and connect our community."

© Photos: Andreas Henn

From molecular machines and cellular structures to evolution and organisms and their environment – more than 100 speakers (including, clockwise from top, Jan Ellenberg, Søren Brunak and Anna Di Rienzo) presented their latest research throughout the four days.

As part of this ongoing work to stimulate scientific exchange across the borders of Europe and beyond, EMBO has signed a two-year agreement for joint annual meetings with the American Society for Cell Biology (ASCB) in 2017 and 2018. In addition, EMBO will explore entirely different ways of connecting researchers with each other and with scientific knowledge.

One such new initiative is SourceData. This platform makes it possible to search and better share the very core of published scientific evidence – the experimental data. Together with publisher Wiley, EMBO launched one application of SourceData – the SmartFigures Lab – at *The EMBO Meeting*. Attendees were able to find out how they can use it to search and connect data published as figures and illustrations in the scientific literature (*also see page 4–5*).

Impressions from Mannheim
For more impressions from *The EMBO Meeting 2016*, take a look at our Storify at https://storify.com/EMBO/the-embo-meeting-2016

Participants explored career options (top), discussed their work at the poster sessions (right), and listened to numerous presentations (left).

Open Science: A long and winding road

Panelists at *The EMBO Meeting* call for making data accessible and reusable, and outline the obstacles that need to be overcome

Open Science – the idea that the scientific process and the results it generates should be transparent, accessible and reusable – took centre stage at a panel debate at *The EMBO Meeting 2016* in September. Bernd Pulverer, Head of EMBO Press, chaired the debate between five panelists.

Ian Mattaj, Director General of EMBL, reminded the audience that global standards for data sharing are defined by a number of tried and tested data repositories. The challenge is to fund these resources in the long run, and there is a risk that inappropriate formats are chosen. Barend Mons, Chair of the European Commission High Level Expert Group "European Open Science Cloud", emphasized the importance of making published data FAIR: findable, accessible, interoperable and reusable. He proposed that FAIR Data Stewardship would bring an end to wasting data: "It is crazy that we need to rescue data which we created in the first place."

Thomas Lemberger, SourceData Project Lead at EMBO, described how the new SourceData open platform worked towards this target. With SourceData, EMBO has built a suite of tools that make scientific papers discoverable based on their data content. "We want to make the 'dark matter' of the literature visible by transforming papers into bona fide data-rich research tools," he said.

Jessica Polka, Director at the preprint initiative ASAPbio, criticized that various disincentives to openness slow down Open Science initiatives. She pointed out that any such initiative will come with a cost and will take an effort. According to Polka, preprints are an excellent way not only to openly share research results early on, but to use feedback from the community to improve manuscripts in preparation for publication. Jason Swedlow, Open Microscopy Environment (OME) at the University of Dundee, talked about the challenges in sharing image data when it comes to heterogeneity and excessive file sizes, and how OME has learnt to cope with these through open source software and data format.

Pulverer closed the panel reminding the audience that the European Council has mandated a rapid transition to Open Science. So although it is not necessarily a straightforward journey, the life science community will need to sprint down the road to Open Science to bring the sharing of research to the next level.

Science and policy: making the right connections

How does scientific information reach the European Commission? And in what ways does EMBO represent the life science community in Brussels? An update from the EMBO Science Policy Programme.

For anyone interested in ensuring that scientific evidence reaches policymakers, these are interesting times. Governments and organizations across the world are looking for means to connect decision makers and scientists in order to develop effective solutions to global challenges ranging from climate change and disease outbreaks to obesity and migration.

To debate and examine both the opportunities and the barriers to establishing evidence-informed policymaking, more than 400 policymakers, advisers and researchers from over 70 countries, including EMBO Science Policy Officer Sandra Bendiscioli, convened in Brussels in September this year at a conference organized by the European Commission and the International Network for Government Science Advice (INGSA). Using examples and case studies, the aim was to discuss the development of universal principles and practices for effective science advice systems. The proceedings from this meeting will contribute to the formulation of scientific advice guidelines that INGSA will present next year.

As a European organization, EMBO is particularly interested in the way scientific evidence reaches policymakers in Brussels. In fact, scientific advice is also high on the agenda at the European Commission (EC), and the current EC strategy was a topic of discussion at the conference.

After exploring the role of the Chief Science Advisor during the mandate of its previous President, the EC has put in place the Science Advice Mechanism (SAM). As part of this "mechanism", a group of seven distinguished scientists from different fields provide independent advice and recommendations. Two of them have a background in biology: Janusz Bujnicki from the International Institute of Molecular and Cell Biology in Warsaw and Henrik Wegener from the Technical University in Copenhagen.

One of the ways in which the SAM will gather independent, evidence-based policy advice is through a consortium of European Academies: Academia Europaea, ALLEA, EASAC, EUROCASE and FEAM. Scientists who are interested in influencing science policy can get involved through their national academies.

Although EMBO is not formally involved in the SAM, it provides insight and evidence to the EC in different ways. Science Policy Programme Manager Michele Garfinkel has recently been appointed to represent EMBO at the EU Open Science Policy Platform, a High-Level Advisory Group that directly reports to the Commissioner for Research, Science and Innovation, Carlos Moedas. EMBO Press Deputy Head Thomas Lemberger has provided expert advice to the Research, Innovation and Science Policy Experts High-Level Group at the EC.

As it has for other EC consultations, EMBO will also be submitting a formal response to the Public Stakeholder Consultation on the Interim Evaluation of Horizon 2020. Members of the EMBO community who would like to participate in the consultation process can do so individually, through their institutes or through EMBO.

Science advice at *The EMBO Meeting*

"Imagine scientific research and policymaking as two gears in a car engine. Science advising is the clutch connecting the two. And trust is the oil that's needed to make the whole engine run smoothly."

It was with this metaphor that Jan Marco Müller from the Science Advice Mechanism at the European Commission illustrated the key components for successful science advising at *The EMBO Meeting 2016*. In one of two policy sessions at the conference, he shared his experience of working with science advisers and gave insight into different ways of delivering scientific information to policymakers.

Jan Marco Müller's final message to the audience was to "speak up, stand up and gang up!" He explained that for science to make a real difference in the policymaking process, scientists can and should engage with society about science, transmit enthusiasm for their research, and, at the same time, listen to people's concerns. He also encouraged scientists to make their voices heard when science is misused, and demand that politicians listen to scientific evidence. At the same time, however, scientists should ensure that all research is carried out following responsible practices in order to assure public trust.

Interview

"Excellence is not a given."

"It is our continuous task to strive for excellence," says Gerrit van Meer, President of the European Molecular Biology Conference (EMBC) and Dean of the Faculty of Science at Utrecht University, Netherlands.

© Ivar Pel

Prof. van Meer, as the President of the EMBC, you recently conducted a survey among the representatives of the 29 countries that compose the EMBC. What did you intend to find out?

It was the effectiveness of EMBC I was interested in. The purpose of EMBC is to mediate funding from national governments to EMBO. In most countries, this runs via scientific delegates and administrative delegates from national ministries or national funding organizations.

What I was focusing on in the survey was to find out how the delegates actually interact with the national institutions, and what they require to do their work. I found different degrees of organizational complexity, varying proximity between the scientific delegates to the research community and to decision makers, as well as varieties of procedures in the national systems, with corresponding impact on the ability to act as EMBC delegate. Most remarkably, the survey revealed great enthusiasm amongst delegates for sharing and discussing their approaches and the challenges they cope with on behalf of the community.

What conclusions did you draw?

Any activity establishing closer contacts between the scientific and the administrative delegates in the ministries or funding organizations will help to further advance EMBO's mission. Defined structures that allow ministries, based on close involvement of the scientific community, to evaluate the EMBO needs and future EMBC funding proposals, and to even compare them with other funding proposals seem elegant and efficient to me.

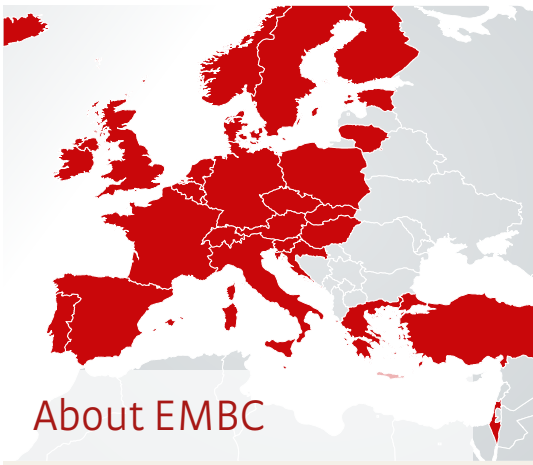
Active and moral support of the EMBO Membership in their contacts with EMBC delegates will also help! The delegates are the ones to shape the way they work in the countries, however.

The EMBC model was established in the 1960s, and a variety of national sources for life science funding enabling international science have emerged since then. Does transnational funding really remain crucial to the advancement of life science research in Europe?

Transnational funding is the original aim for which EMBC was created in 1969, which was five years after EMBO was founded. I think what is absolutely pre-eminent is that society and political decision makers are convinced of the purpose and of the value of EMBO. Obviously, EMBO would not be able to fulfil its duties if there were no money. I feel that after 50 years of existence of EMBO there could be a re-evaluation of how much money EMBO needs to fulfil its mission. Let me give you the example of the fellowships for postdoctoral researchers, EMBO's largest programme. Turning EMBO Fellowships into full-blown salaries including social benefits, as required in an increasing number of EMBC Members States, will increase the cost. I recognize it is extremely hard to make such decisions at a political level, but governments should live up to their obligations and realize that as a result of new demands, budgets need to be adjusted to provide the same support for scientists.

How do you feel about the tendency of some countries in Europe showing signs of encapsulation, with the UK deciding to leave the EU as the most recent and striking example? Are European models like the one on which EMBC is based still the ones to move forward with?

It is the purpose of EMBO to stimulate international collaboration and take responsibility for common measures to improve the possibilities for excellent scientists all across Europe. The track record of achievements in this respect is indisputable. The international ambition of this all says that we have to unite and collaborate in a science framework that is independent from the political framework. Despite the worrying political developments in the UK, there is a great interest all across the science community to remain part of the same science community. EMBO and EMBC are intergovernmental organizations that are not formally linked to the EU. The membership of the UK in the EMBC is independent of its membership in the EU.



About EMBC

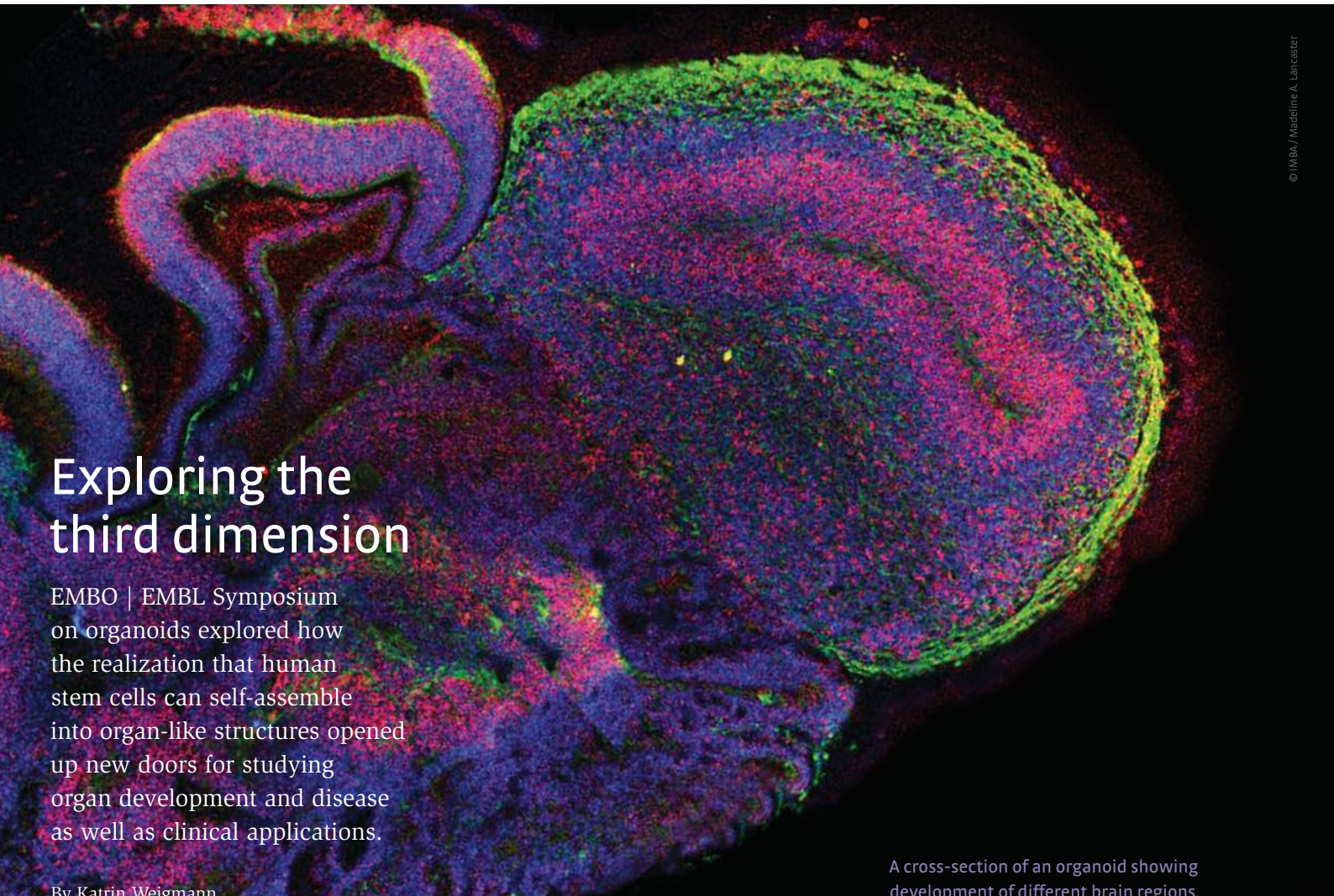
The European Molecular Biology Conference (EMBC), founded in 1969, is an inter-governmental organization comprising 29 member states that include most of the European Union. The EMBC provides a framework for European co-operation in the field of molecular biology and closely related research areas through the provision of training, teaching and research scholarships and through the establishment of programmes for courses, workshops and study meetings. Financial contributions from each member state carry the programme. The execution of the EMBC programme is entrusted to EMBO. Both EMBC and EMBO are driven by a common commitment to quality research at the European level. Their joint activities are characterized by excellence and encouragement of co-operation within the scientific community.

For more information, please visit embc.embo.org

In the past few years, EMBC has engaged with several non-European countries that became Associate Member States or established co-operation agreements. Is EMBC going to pursue this course further?

The goal of this EMBC engagement and the EMBO Global Activities is to identify and create benefits for both sides – the European and the non-European side. What is true for the European member states is true for the non-European ones: pursuing excellence in the life sciences through fostering talent in challenging career phases, and stimulating scientific exchange across borders to drive scientific advancement is equally important for European and non-European countries.

The implications from global expansion activities will need to be mutually beneficial. Associate Member States and co-operation partners are willing to invest into the community for the benefit of getting access to the EMBO Programmes and activities. Whenever we succeed to connect to excellent community members beyond Europe and vice-versa, I clearly support further expansion of the EMBO activities.



Exploring the third dimension

EMBO | EMBL Symposium on organoids explored how the realization that human stem cells can self-assemble into organ-like structures opened up new doors for studying organ development and disease as well as clinical applications.

By Katrin Weigmann

A cross-section of an organoid showing development of different brain regions.

For many decades, scientists have been culturing cells in two-dimensional monolayers on flat and rigid substrates. Although researchers have learned a lot from these systems, they also have their limitations. "There is tremendous wisdom in the architecture of a body – the architecture of a prostate, a mammary gland, or a liver," said Mina Bissell of the Lawrence Berkeley National Laboratory in Berkeley, California. This wisdom is not reflected in two-dimensional cultures. By losing the context in which cells grow, they also lose their normal function.

Back in the 1980s, Bissell stressed the importance of maintaining the cells' microenvironment and allowing them to grow in three dimensions. But it was only more recently – with the development of stem cell technologies – that the idea of growing three-dimensional 'organoids' in a dish picked up momentum. Human stem cells have enormous self-organizing capacity. Under the right conditions, they do in a dish what they do in real life: divide, differentiate and sort into realistic organ-like structures.

On 12–15 October 2016, researchers from different fields met at the EMBO | EMBL Symposium *Organoids: Modelling Organ Development and Disease in 3D Culture* in Heidelberg to discuss some of the latest discoveries in organoid research. "This is somewhat of a historic meeting, as is the very first conference on organoids," said EMBO Council Member Jürgen Knoblich of the Institute of Molecular Biotechnology in Vienna, who, together with Bissell and *EMBO reports* editor Esther Schnapp, organized the conference.

From bench to bedside

There are two types of organoids grown from stem cells, depending on whether they are derived from pluripotent or adult stem cells. EMBO Member Hans Clevers of the Hubrecht Institute in Utrecht, The Netherlands, pioneered the latter technology when, in 2007, he started growing organoids from guts. Today, his lab has applied the technology to grow organoids from a number of different tissues – liver, lung, prostate, pancreas and breast tissue – almost anything except brain.

Organoids from an adult cell can be grown very quickly. "You take a rectal biopsy and within a few days, you have a gut organoid," explained Clevers, who delivered the conference keynote lecture. This makes them ideally suited for a whole array of clinical applications.

The step from bench to bedside has been extraordinarily fast in organoid research. For example, organoids from different patients can be used as 'avatars' to test medication. Clevers has set up organoid biobanks from patients for a number of different heritable diseases and cancers. They are used for screening drugs in drug development, or to find the best medication for individual patients in a personalized medicine approach. They serve to test toxicity directly on a functional representation of human organs and may, in the future, serve people in need for organs. In the even more distant future, this may be combined with CRISPR/Cas9 gene editing technologies to correct mutations before autologous transplantation.

Modelling disease

The organoid field combines researchers from different disciplines and with different research styles, and the EMBO | EMBL Symposium brought them together to explore this interdisciplinary field from all angles. "It is high level basic cell and developmental biology meeting the clinic," said Clevers. Clinicians contribute strongly to the adult organoid area with its many medical applications. "Organoids from pluripotent stem cells are more complex and there are many very rigorous basic researchers in the field," Clevers commented.

Jürgen Knoblich is one of them. "An important part of starting organoid research is providing a detailed description of their normal development.

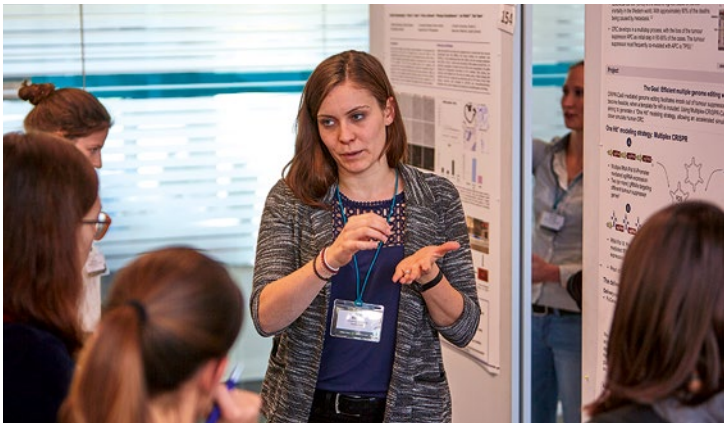
Breaking new ground

From traditional cell culture to growing organoids

Coming from a background of bacterial genetics, Mina Bissell knew that small differences in the environment could have a huge impact on bacteria. When she entered the field of cell biology, she wondered what growing cells in a petri dish would do to them and tried to come up with something more physiological. In the late 1980s, she showed that tissue architecture and function could be restored when cells are grown in the presence of extracellular matrix – material that surrounds cells in normal tissue. This observation set the foundations for modern technologies of growing cells in three dimensions.

In 2007, Hans Clevers and his team discovered that *Lgr5*, a Wnt target gene, marks epithelial stem cells of the gut. This provided a great tool to study these cells in more detail and their observations undermined textbook knowledge: Gut stem cells were much more abundant than previously thought and divided much more frequently. If they divide so well, Clevers asked, would it be possible to grow them in a dish? It was and, to the researchers' surprise, the stem cells not only gave rise to more stem cells, but formed organ-like structures within a few days.

Jürgen Knoblich has always been interested in how cells divide asymmetrically in early brain development. After having studied the question thoroughly in flies, he wanted to move his research on to vertebrates. Mouse, of course, is a traditional model organism. But there were a number of indications that early brain development in mice differs considerably from that of humans. It made sense to try and establish a system to look at the process in humans directly, which led Madeline Lancaster in Knoblich's lab to design a protocol to grow human brain organoids.



© Hugo Neves, EMBL Photolab

The symposium organisers Mina Bissell, Jürgen Knoblich and Esther Schnapp (left). Presenting and discussing research at the poster session (right).

Organoids in the clinic

Personalized medicine

Dutch boy Fabian suffered from cystic fibrosis, caused by an extremely rare mutation, and it was unknown if he would respond to medications that are available for patients with more common mutations. He was in desperate need for a therapy when organoid technology came to his rescue.

Together with colleagues at the Utrecht University Medical School, Hans Clevers had developed an assay to test if a given drug would restore function in organoids of cystic fibrosis patients. Testing Fabian's organoids, a drug called Ivacaftor (trade name Kalydeco) proved effective. This was encouraging enough to have him try the extremely expensive medicine. Fabian was the first patient to ever have profited from personalized medicine based on organoid technology.

It's just like establishing a new model organism," he explained. After studying neural development in flies and mice, brain organoids became a new model system for him in 2011, when his lab pioneered a new protocol for growing them from stem cells.

A thorough knowledge of the normal development, Knoblich explained, is required for the next step towards clinical application, namely investigating the exact causes of developmental abnormalities in disease models. As one example, he has explored brain organoids derived from a patient with microcephaly and found that the phenotype arose because a defect in spindle orientation impeded precursor cells to divide sufficiently. Spindle orientation in early nervous system development has been Knoblich's field of interest ever since his early fly research. "It has been very rewarding to take the same research question from flies all the ways to humans, and now even starting to work with individual patients," he said.

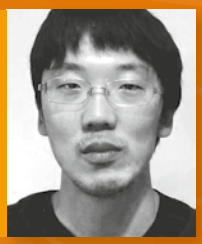
"Organoids are really another name for 3D thinking," said Bissell. They have already contributed to new approaches and discoveries, but there is more to come. Scientists around the world are working on improving organoid complexity to reflect normal organ development in more detail. "We are expanding our repertoire," said Knoblich. And with that, organoids will continue to open up opportunities to explore new questions.

www.embo-embl-symposia.org/

Welcoming the new EMBO Young Investigators

This year, 25 young researchers were selected as EMBO Young Investigators. In addition to becoming part of a network of 74 current and 382 past Young Investigators, they will be able to support their research and laboratory with a range of different benefits, including an award of 15,000 euros, professional development opportunities for them and their students, and access to core facilities at EMBL.

Igor Adameyko
Skeletal development and regeneration
Vienna, AT



Bungo Akiyoshi
Unconventional trypanosome kinetochores
Oxford, UK

Stefan Ameres
RNA silencing
Vienna, AT

Yosef Buganim
Nuclear reprogramming and embryonic cell fate
Jerusalem, IL

Jeremy Carlton
Membrane remodeling during mitosis
London, UK

Ana Cvejic
Blood development
Cambridge, UK

Christophe Dessimoz
Phylogenetic analysis
Lausanne, CH | London, UK

Ana Jesus Garcia Saez
Membrane dynamics during cell death
Tuebingen, DE

Jerome Gros
Vertebrate limb formation
Paris, FR

Annika Guse
Molecular basis of symbiosis
Heidelberg, DE

Grzegorz Kudla
Quantitative RNA Biology
Edinburgh, UK

Martin Lenz
Cytoskeletal mechanics
Orsay, FR

Michelle Linterman
The ageing immune system
Cambridge, UK

Ana Claudia Marques
Intergenic long noncoding RNAs
Lausanne, CH

Miratul Muqit
PINK1 kinase signalling
Dundee, UK

John O'Neill
Cellular rhythms and metabolic regulation
Cambridge, UK

Giulia Rancati
Adaptive evolution in eukaryotes
Singapore, SG

Jan Rehwinkel
Innate immune receptors
Oxford, UK

Pere Roca-Cusachs
Cellular mechanosensing
Barcelona, ES

Suzan Rooijakkers
Complement and bacteria
Utrecht, NL

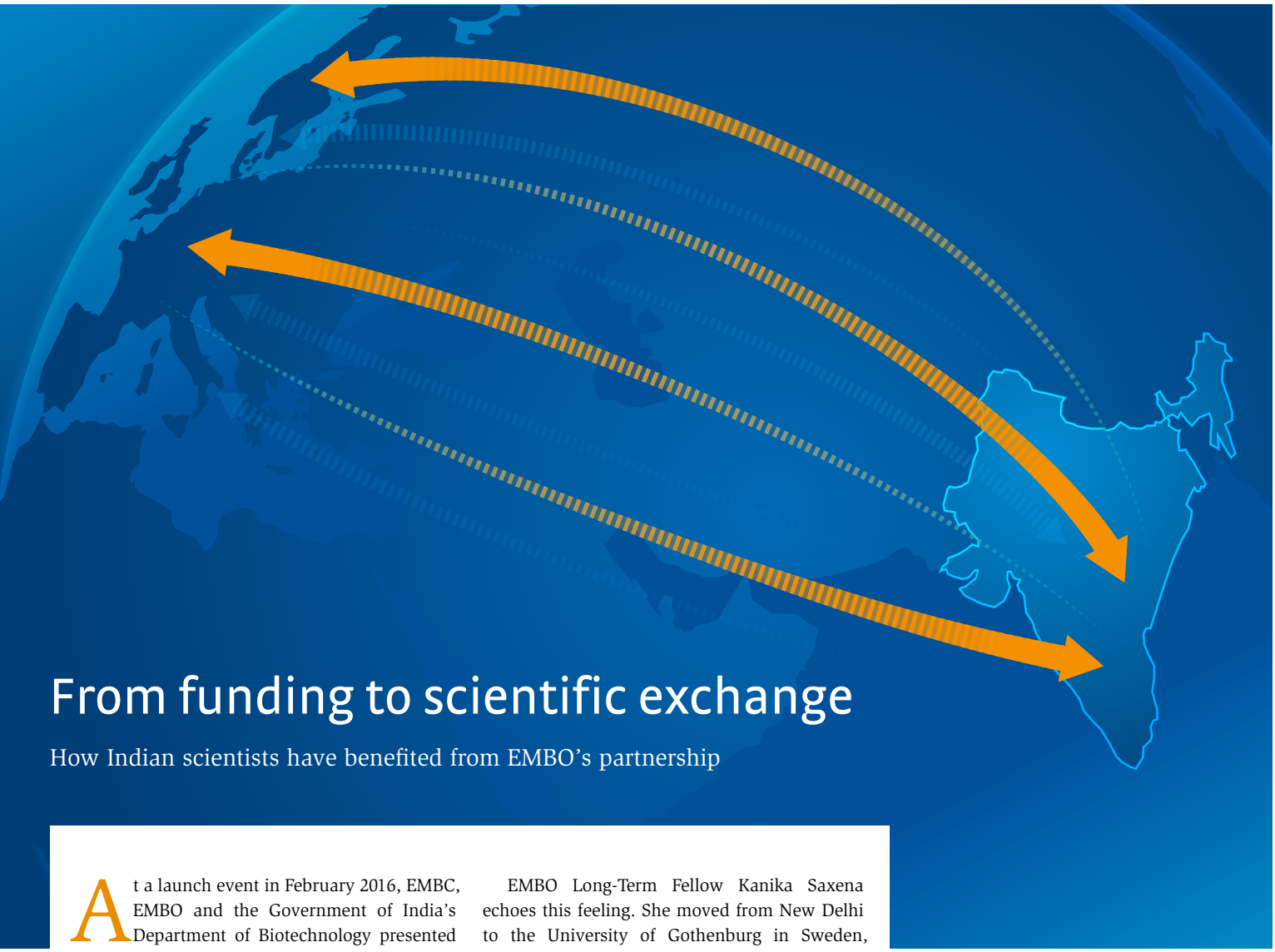
Carmine Settembre
Lysosome-autophagy pathway
Pozzuoli, IT

Minhajuddin Sirajuddin
Regulation of microtubules
Bangalore, IN

Kikue Tachibana-Konwalski
Oocyte-to-zygote transition
Vienna, AT

Igor Ulitsky
Long noncoding RNAs
Rehovot, IL

Claire Wyart
The interface between cerebrospinal fluid and central nervous system
Paris, FR



From funding to scientific exchange

How Indian scientists have benefited from EMBO's partnership

At a launch event in February 2016, EMBC, EMBO and the Government of India's Department of Biotechnology presented a cooperation agreement, under which India became an EMBC Associate Member State. Nearly one year on, the partnership is picking up momentum, with Indian scientists benefiting from the full range of EMBO programmes in order to forge international collaborations and jointly explore new ideas.

EMBO-supported events are one activity that Indian scientists now have full access to. Aparup Das of the Centre for Research in Medical Entomology in Madurai, India, is the main organizer of an EMBO-funded meeting on malaria genomics and public health that will take place in Madurai in 2017. "The concept of the Global Exchange Lecture Courses and the flexibility that EMBO provides enticed me to organize EMBO funded events in India," he says.

Das already coordinated another conference earlier this year and found that young Indian scientists are very interested in attending EMBO events in India and meeting world leaders in biological research. "Since India became the second country to acquire the status of an EMBC Associate Member State, EMBO has helped young scientists in India to advance their research, promote their international reputations, interact with top-level scientists and ensure their mobility to carry out innovative research ideas. In my view, Indian science has immensely benefited from this partnership."

EMBO Long-Term Fellow Kanika Saxena echoes this feeling. She moved from New Delhi to the University of Gothenburg in Sweden, where she took up a fellowship to work at the laboratory of EMBO Member Thomas Nyström. "Working in a European science institute can help Indian scientists in developing interpersonal skills, communication skills, management and networking," she says. "I did not have much experience with yeast biology and I gained deeper understanding of it and had a chance to learn new techniques such as metabolomics."

"EMBO has helped young scientists in India to advance their research, promote their international reputations, interact with top-level scientists and ensure their mobility."

The EMBO Fellowship Programme supports researchers in developing an internationally mobile career and encourages scientific exchange between India and Europe. Like Kanika, Tanmay Bharat took advantage of the programme to carry out postdoctoral work in a lab outside of India. He joined the MRC Laboratory of Molecular Biology in Cambridge, UK in 2013 and, as a result of receiving an EMBO Advanced Fellowship, will stay there until May 2017. "Without funding from EMBO my time here would not have been possible," he says. "With EMBO's support I could stay in Cambridge to work on exciting projects that would otherwise have been left unfinished."

The closer partnership with India is also encouraging international mobility in the other direction. The Dutch biologist Thomas van Zanten took the opportunity to move to the National Centre for Biological Sciences (NCBS) in Bangalore, India, where he specifically wanted to do research in the group of EMBO Associate Member Satyajit Mayor. He says about his experience: "Getting the EMBO Long-Term Fellowship has allowed me to venture into a different region of the world to do my postdoctoral training. The NCBS is a great institute that hosts a large variety of scientists spanning many fields of biology. The facilities here allowed me to use all kinds of microscopy to answer very fundamental cell biology questions. That, I think, is the beauty of life sciences here in India: there is still ample room for fundamental science."

For more information on EMBO Global Activities, visit embo.org/about-embo/global-activities

Group photo of the attendees at the EMBO Members' Meeting (above).

© Photos: Marietta Schupp, EMBL Photolab

Members met with each other and with EMBO employees during the course of the meeting (below) and an evening reception in the EMBO building (left).

Connecting across disciplines

EMBO's newest members come together at the annual Members' Meeting

Between 26 and 28 October more than 80 EMBO Members attended the Members' Meeting in Heidelberg. The annual event is an opportunity to welcome newly elected members and associate members to the organisation. The meeting is open to all EMBO Members, and some of those who have been part of the EMBO Membership for several years joined the most recently elected members.

The meeting presents some of the latest advances across the spectrum of the life sciences, as each newly elected member gives an overview of their research.

In 11 scientific sessions, the participants discussed all aspects of the life sciences, from evolutionary biology and plant science to development and structural biology. Each of the 62 new members received a membership certificate from EMBO Director Maria Leptin.

Commenting on the broad range of science shared at the meeting, Alexander Stark of the Institute of Molecular Pathology (IMP) in Vienna, who became a member in 2015, said: "EMBO is very good at bringing people together. As scientists we are good at making connections locally and within our fields internationally. Meetings like this are great at bringing us together across countries and topics."

The ability to find out about research outside one's own area of interest is also what Michael Way, Francis Crick Institute, London enjoys about this event. Having been elected to the EMBO Membership ten years ago he has attended several EMBO Members' Meetings. "I really like coming to this meeting," he explained. "What's not to like? You get to hear about some great science."

In addition to meeting each other, participants also found out more about EMBO, its activities and how they can support them. Maria Leptin provided a summary of EMBO's most recent activities, and members were able to talk to EMBO employees about the different programmes at an informal evening reception in the EMBO building.

embo.org/members

Nobel Prize awarded to EMBO Associate Member

Yoshinori Ohsumi from the Tokyo Institute for Technology, Yokohama, Japan received the Nobel Prize in Physiology or Medicine 2016 for mapping genetic wiring of autophagy – the highly controlled process whereby cells break down their constituents in response to stress. He and his group identified the ATG genes that are essential for starvation-induced autophagy, linking the autophagy machinery to central signal transduction pathways and ubiquitin-like conjugation systems. In his current research, Ohsumi elucidates the molecular details of membrane dynamics during autophagy. He was appointed an EMBO Associate Member in 2013.

Molecules of Life: new doctoral school in Vienna

The University of Vienna and the Medical University of Vienna founded the Vienna Doctoral School – Molecules of Life in March of this year. The aim of this joint initiative is to foster education, cooperation and interaction among students and group leaders from different backgrounds and disciplines in an open and creative environment.

© Vienna Doctoral School – Molecules of Life

Researchers and students from the Vienna Doctoral School – Molecules of Life at their first annual retreat.

The doctoral school, led by EMBO Member Manuela Baccarini, comprises 53 scientist from different disciplines, including EMBO members Kristina Djinovic-Carugo, Javier Martinez and Andrea Barta, as well as EMBO Young Investigators Claudine Kraft, Sascha Martens and Kristin Tessmar-Raible. Together, they work towards the common goal of training PhD students who will be able to meet the challenges of interdisciplinary research.

"Molecules of Life is an experiment in PhD education. The school's activities are designed to maximize cross-pollination among disciplines and to complement rather than duplicate more traditional, high-level PhD programs already in place at our institution." says Baccarini.

She continues: "Rather than providing the students with a structured curriculum, we aim to foster their creativity and to help them expand their scientific horizon. This will ultimately put them in an optimal position to contribute fundamental insights into life on a molecular level."

The doctoral school was inaugurated on 5 September by Heinz Faßmann, Vicerector of Research and International Affairs at the University of Vienna. Markus Müller, Rector at the Medical University of Vienna, introduced the kick-off lecture on CRISPR/Cas-9 delivered by EMBO Member Emmanuelle Charpentier.

www.vds-molecules-of-life.org

Practical Courses

UK-Cambridge | 13–17 February 2017 | R. Salek
Metabolomics bioinformatics for life scientists

DE-Cologne | 26 March–7 April 2017 | P. Schulze-Lefert
Plant microbiota

PT-Faro | 24–29 April 2017 | T.M. Embley
Tree building: Advanced concepts and practice of phylogenetic analysis

GR-Thessalonica | 5–17 June 2017 | C. Ouzounis
Bioinformatics and genome analyses

DE-Heidelberg | 13–23 June 2017 | P. Ronchi
Advanced electron microscopy for cell biology

UK-London | 18 June–1 July 2017 | C. Kiecker
Developmental neurobiology: From worms to mammals

DE-Dresden | 10–20 July 2017 | M. Sarov
Mouse genome engineering

NL-Wageningen | 24–28 July 2017 | C. Welte
Breathless microbes: Techniques and theory in anaerobic microbiology

DE-Heidelberg | 24 September–1 October 2017 | V. de Lorenzo
Synthetic biology in action: Programming bacteria to do amazing things

Workshops

FR-Mandelieu-la-Napoule | 27 November–1 December 2016 | L. Johannes
Transducing glycan information into function: Lessons from galectins

AT-Obergurgl | 10–14 January 2017 | A. Villunger
Cell death, inflammation and cancer

AT-Goldegg am See | 10–15 January 2017 | M. Zerial
Emerging concepts in cell organization

DE-Dresden | 23–26 April 2017 | N. Vastenhouw
Awakening of the genome: The maternal to zygotic transition

ES-Palma de Mallorca | 23–26 April 2017 | E.F. Wagner
Metabolic disorders and liver cancer

IT-Santa Margherita di Pula | 8–12 May 2017 | F. Bard
Signalling and endomembranes

UK-Edinburgh | 6–9 June 2017 | J. Welburn
Dynamic kinetochore

CN-Xi'an | 2–5 July 2017 | Q. Chen
Mitochondrial quality control

DE-Berlin | 10–15 July 2017 | C. Faulkner
Intercellular communication in development and disease

DE-Planegg-Martinsried | 6–8 September 2017 | S. Hake
Histone variants: Molecular functions in health and disease

ES-Girona | 10–14 September 2017 | C. Mauri
To-B or not to-B: B-cells in health and disease

CH-Les Diablerets | 17–21 September 2017 | C. Austin
DNA topoisomerases and DNA topology

ES-Sant Feliu de Guixols | 17–21 September 2017 | E. Hidalgo
Thiol oxidation in toxicity and signalling

PT-Ericeira | 17–21 November 2017 | P. Domingos
Proteostasis

Conferences

DE-Heidelberg | 20–23 November 2016 | D. Panne
Molecular machines: Integrative structural and molecular biology

IN-Thiruvananthapuram | 27 November–1 December 2016 | S. Radhakrishnan
Bacterial morphogenesis, survival and virulence: Regulation in 4D

DE-Berlin | 30 November–2 December 2016 | C. Romagnani
Innate lymphoid cells – 2016

NL-Groningen | 6–8 March 2017 | D.J. Slotboom
Towards novel therapies: Emerging insights from structural and molecular biology

HR-Cavtat | 18–22 March 2017 | A. Driessen
Protein translocation and cellular homeostasis

DE-Heidelberg | 3–6 May 2017 | A. Akhtar
Chromatin and epigenetics

GR-Heraklion | 7–10 May 2017 | C. Hoogenraad
Cell biology of the neuron: Polarity, plasticity and regeneration

ES-Sant Feliu de Guixols | 14–19 May 2017 | A. Bertolotti
Protein quality control: Success and failure in health and disease

DE-Heidelberg | 23–26 May 2017 | D. O'Carroll
Advances in stem cells and regenerative medicine

ES-San Feliu de Guixols | 4–9 June 2017 | F. Martín Belmonte
Cell polarity and membrane dynamics

FR-Paris | 13–16 June 2017 | M. Yaniv
Hijacking host signalling and epigenetic mimicry during infections

DE-Bad Staffelstein | 23–28 July 2017 | D. Klostermeier
Helicases and nucleic acid-based machines: Structure, mechanism and regulation and roles in human disease

HR-Hvar | 27 August–1 September 2017 | I. Tolić
Meiosis

For a complete and up-to-date list of EMBO events please go to events.embo.org

DE-Heidelberg | 30 August–1 September 2017 | A. Flaus
The nucleosome: From atoms to genomes

UK-Newcastle upon Tyne | 31 August–3 September 2017 | R. Hirt
Anaerobic protists: Integrating parasitology with mucosal microbiota and immunology

ES-Sant Feliu de Guixols | 9–14 September 2017 | J. Vorholt
Bacterial networks (BacNet17)

PL-Serock | 10–15 September 2017 | M. Miaczynska
Endocytic trafficking and signalling in health and disease

HR-Cavtat | 15–19 September 2017 | F. Melchior
Ubiquitin and SUMO: From molecular mechanisms to system-wide responses

DE-Heidelberg | 24–27 September 2017 | G. Pereira
Centrosomes and spindle pole bodies

HR-Cavtat | 25–29 September 2017 | I. Dikic
Autophagy: From molecular principles to human diseases

DE-Heidelberg | 2–4 November 2017 | J. Garcia Ojalvo
Quantitative principles in biology

EMBO | FEBS Lecture Courses

IT-Sicily | 14–20 May 2017 | P. Tammaro
Biophysics and medicine of channels and transporters: Electrifying new insights

FR-Cargèse | 12–22 June 2017 | E. Breukink
Molecular architecture, dynamics and function of biomembranes

GR-Spetses | 24 September–1 October 2017 | D. Otzen
Proteins and organized complexity

IT-Brindisi | 9–13 October 2017 | P. Cantatore
Mitochondria in life, death and disease

EMBO | EMBL Symposia

DE-Heidelberg | 10–13 May 2017 | T. Alexandrov
Metabolism in time and space: Emerging links to cellular and developmental programmes

DE-Heidelberg | 14–17 May 2017 | R. Benton
Neural circuits in the past, present and future

DE-Heidelberg | 21–23 May 2017 | B. Brügger
Molecular and cell biology of membranes

DE-Heidelberg | 14–17 June 2017 | C. Haass
Mechanisms of neurodegeneration

DE-Heidelberg | 27–30 June 2017 | P. Cossart
New approaches and concepts in microbiology

DE-Heidelberg | 12–15 July 2017 | B. Thompson
Mechanical forces in biology

DE-Heidelberg | 13–16 September 2017 | E. Izaurralde
The non-coding genome

DE-Heidelberg | 3–6 October 2017 | J. Ellenberg
Seeing is believing: Imaging the processes of life

DE-Heidelberg | 12–14 November 2017 | J. Zaugg
From single cells to multiomics: Applications and challenges of large-scale data integration

Global Exchange Lecture Course

IN-Madurai | 29 January–11 February 2017 | A. Das
Malaria genomics and public health

EMBO Laboratory Management Courses

EMBO Laboratory Management Courses for Group Leaders

DE-Leimen | 30 Jan–2 Feb 2017
DE-Leimen | 20–23 February 2017
DE-Leimen | 6–9 March 2017
DE-Leimen | 20–23 March 2017
DE-Leimen | 3–6 April 2017
DE-Leimen | 15–18 May 2017
DE-Leimen | 3–6 July 2017
DE-Leimen | 10–13 July 2017

Dates later in the year to be announced

EMBO Laboratory Management Courses for Postdocs

DE-Leimen | 14–16 February 2017
DE-Leimen | 14–16 March 2017
DE-Leimen | 28–30 March 2017
DE-Leimen | 25–27 April 2017
DE-Leimen | 9–11 May 2017
DE-Leimen | 6–8 June 2017

Dates later in the year to be announced

ORGANIZERS: APPLY NOW FOR:

2018 funding for courses, workshops and conferences by 1 March and 1 August 2017

Keynote lectures given by EMBO members at major international scientific meetings in 2018 by 1 February, 1 June and 1 October 2017

EMBO | FEBS lecture courses planned for 2018 by 1 March 2017

For further information see: www.embo.org/funding-awards/courses-workshops

Awards of Excellence

EMBO MEMBERS

Körber Prize

The 2016 Körber European Science Prize was awarded to **Hans Clevers** for his work on stem cells and organoids. The prize, which is endowed with 750,000 euros, honours outstanding scientists working in Europe and is awarded to research projects that show great potential for application.

Kimura Motoo Award

Giorgio Bernardi from Roma Tre University (Rome) and Stazione Zoologica Anton Dohrn (Naples) was awarded the Kimura Award for Molecular Evolution and Evolutionary Genomics. The award was created in commemoration of the 10th anniversary of the Kimura Motoo Foundation and was awarded for the first time this year.

Balzan Prize

Reinhard Jahn from the Max Planck Institute for Biophysical Chemistry, Göttingen, received this year's Balzan Prize in the field of molecular and cellular neurosciences. The prize, which was established by Italian journalist Eugenio Balzan, includes a prize fund of 750,000 Swiss francs.

Order or Merit of the Grand Duchy of Luxembourg

Rudi Balling was bestowed the Order of Merit by Grand Duke Henri of Luxembourg for his contribution to research, including his recent efforts in establishing the Luxembourg Centre for Systems Biomedicine.

Gardner Middlebrook Lifetime Achievement Award

Stewart Cole, École polytechnique fédérale de Lausanne, was awarded the Gardner Middlebrook Lifetime Achievement Award for his work on tuberculosis. The award recognizes significant lifetime contributions to improving diagnosis and treatment of mycobacterial diseases.

Marcel Benoist Prize

The Marcel Benoist Prize was awarded to **Johan Auwerx** from the École polytechnique fédérale de Lausanne for his work on mitochondria and their role in metabolism. The award, which was established in 1920, includes a cash prize of 50,000 Swiss francs and honours scientists based in Switzerland who have made scientific discoveries of significance for human life.

German Immunology Award

Hans-Reimer Rodewald's research on the development of the immune system from stem cells was honoured with the first German Immunology Award. It is the highest science award given by the German Society for Immunology (DGfI), and includes a prize of 10,000 euros.

ERC Scientific Council

Nektarios Tavernarakis from the University of Crete has been appointed as one of two new members of the Scientific Council of the European Research Council by the European Commission.

Fungal Biology Research Award

Nick Talbot, University of Exeter, was awarded the Fungal Biology Research Award 2016 by the British Mycological Society. He received the award in recognition of his outstanding original contributions to fungal biology research.

Multiple honours

Emmanuelle Charpentier is the recipient of the Wilhelm Exner Medaille (Austrian Industry Association), the Tang Prize for Biopharmaceutical Science (together with Jennifer Doudna and Feng Zhang, 1.67 million US dollars), the Canada Gairdner International Award (100,000 Canadian dollars), the Warren Alpert Foundation Prize (250,000 US dollars), and the Otto Warburg Medal (German Society for Biochemistry and Molecular Biology, 25,000 euros).

Steve Jackson, Gurdon Institute, University of Cambridge, has won the Dr A.H. Heineken Prize for Medicine with a value of 200,000 US dollars for his research on DNA repair in human cells. Together with Vamsi Krishna Mootha, Harvard Medical School, his work was also recognized by the King Faisal International Prize for Science (200,000 US dollars).

EMBO YOUNG INVESTIGATORS

Mary Lyon Medal

Petra Haijkova, Imperial College London, was awarded the Mary Lyon Medal 2017 by the Genetics Society in the UK. The award was established in 2015 to recognize outstanding research in genetics by mid-career scientists. As part of the award, Petra will present a lecture at a Genetics Society scientific meeting.

Good Read – Publications from the EMBO community

An evolutionarily conserved pathway controls proteasome homeostasis

Anne Bertolotti (EMBO Member) and Adrien Rousseau (EMBO Fellow)

Nature | 11 August 2016
Doi: 10.1038/nature18943

Grad-seq guides the discovery of ProQ as a major small RNA binding protein

Jörg Vogel (EMBO Member) and colleagues

PNAS | 26 September 2016
Doi: 10.1073/pnas.1609981113

Single cell RNA-seq ties macrophage polarization to growth rate of intracellular Salmonella

Jörg Vogel (EMBO Member) and colleagues

Nature Microbiology |
Doi: 10.1038/nmicrobiol.2016.206

Long-Lived Binding of Sox2 to DNA Predicts Cell Fate in the Four-Cell Mouse Embryo

Nicolas Plachta (EMBO Young Investigator) and colleagues

Cell | 24 March 2016
Doi: 10.1016/j.cell.2016.02.032

Germline NLRP1 Mutations Cause Skin Inflammatory and Cancer Susceptibility Syndromes via Inflammasome Activation

Bruno Reversade (EMBO Young Investigator), Sebastian Hiller (EMBO Young Investigator) and colleagues

Cell | 23 September 2016
Doi: 10.1016/j.cell.2016.09.001

Inflammatory monocytes hinder antiviral B cell responses

Matteo Iannacone (EMBO Young Investigator) and colleagues

Science Immunology | 21 October 2016
doi: 10.1126/sciimmunol.aah6789

Poster Prizes

Through our four journals, we sponsor a number of poster prizes at various conferences. This year's winners include:

Martin Graef

Max Planck Institute for Biology of Ageing, Cologne, Germany

Lipid droplet-mediated ER homeostasis regulates autophagy and cell survival during starvation

Presented at the Gordon Research Conference: Autophagy, in Stress, Development & Disease
Ventura, USA, 20–25 March 2016

Mario Mauthe

University Medical Center Utrecht, The Netherlands

Viral infections reveal the extent of unconventional functions of the autophagy proteome

Presented at the Gordon Research Conference: Autophagy, in Stress, Development & Disease
Ventura, USA, 20–25 March 2016

Alaksh Coudhury

University of Colorado, USA

Poster title not available

Presented at the Synthetic Biology: Engineering, Evolution & Design Conference
Chicago, USA, 18–21 July 2016

Michal Lubas

University of Copenhagen, Denmark

Investigating RNA-dependent interactions in the autophagy network

Presented at the Nordic Autophagy Network
Keflavik, Iceland, 31 August – 2 September 2016

Teemu Miettinen

University College London, UK

Cellular allometry of mitochondrial functionality establishes the optimal cell size

Presented at The 7th EMBO Meeting
Mannheim, Germany, 10–13 September 2016

Imre Gaspar

EMBL, Heidelberg, Germany

Dynamic recruitment of Kinesin-1 to oskar mRNPs by an atypical RNA-binding Tropomyosin

Presented at The 7th EMBO Meeting
Mannheim, Germany, 10–13 September 2016

Radhakrishnan Sabarinathan

University of Pompeu Fabra, Spain

Increased mutation rate in transcription factor binding sites across tumors

Presented at The 7th EMBO Meeting
Mannheim, Germany, 10–13 September 2016

Ruud Wijdeven

Leiden University Medical Centre, The Netherlands

Cholesterol and ORP1L-mediated ER contact sites control autophagosome transport and fusion with the endocytic pathway

Presented at The 7th EMBO Meeting
Mannheim, Germany, 10–13 September 2016

Panagiotis Galanos

University of Athens, Greece

Poster title not available

EMBO Workshop: Nuclear function and cell fate choice
Kyllini, Greece, 18–22 September 2016

Upcoming deadlines

for applications

EMBO Young Investigators
1 April

Installation Grants
15 April

Short-Term Fellowships
Ongoing

Editorial

Coordinating editor
Annika Grandison

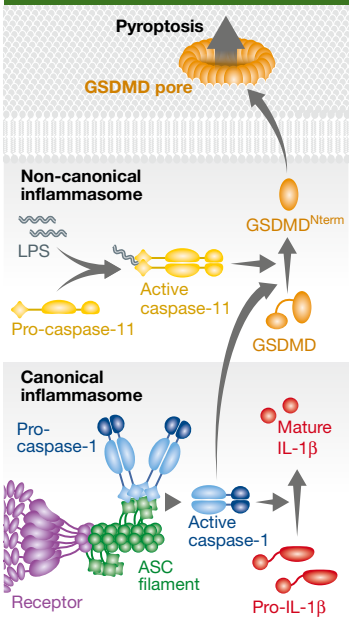
Text
Sandra Bendiscioli, Annika Grandison, Yvonne Kaul, Tilmann Kiessling, Stephen Pewter, Katrin Weigmann

Print & web layout
Sandra Krahl

Next issue

The next ***EMBO Encounters*** issue will be dispatched in **March 2017**. Please send your suggestions, contributions and news to **communications@embo.org** by **15 February 2017**.

THE EMBO JOURNAL



RESEARCH ARTICLE

Killing cells by perforation

There are many reasons why cells of the body kill themselves, and a number of ways in which they do so. Pyroptosis is a cell death programme that is triggered by pathogens or endogenous damage-associated signals and is important for fighting a microbial infection. Pyroptosis leads to plasma membrane rupture and release of cytoplasmic content. In the August issue of *The EMBO Journal*, Lorenzo Sborgi *et al.* added the last piece of the puzzle to our understanding of the molecular pathway leading to pyroptosis.

When a cell is infected with a pathogen, it triggers the immune system's inflammatory response and activates a protein called gasdermin D to begin pyroptosis. The researchers now showed what exactly gasdermin D does to kill the cell: it permeabilizes the cell membrane by perforating it with pores, making the cell swell and burst. In addition, the scientists were able to visualize the formation of gasdermin D pores using advanced microscopy technology.

GSDMD membrane pore formation constitutes the mechanism of pyroptotic cell death
Lorenzo Sborgi, Sebastian Rühl, Estefania Mulvihill, Joka Pipercevic, Rosalie Heilig, Henning Stahlberg, Christopher J Farady, Daniel J Müller, Petr Broz, Sebastian Hiller
Read the paper: emboj.embopress.org/content/35/16/1766

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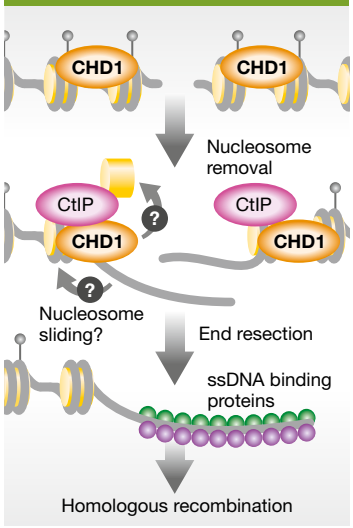

RESEARCH ARTICLE

A therapy tailored to a molecule

CHD1 is one of the most commonly mutated genes in prostate tumors and mutations in the gene come with a poor prognosis. However, a study by Vijayalakshmi Kari *et al.* published in *EMBO reports* now suggests that patients with CHD1 mutations may respond particularly well to a class of cancer drugs called PARP inhibitors.

The researchers found that the CHD1 protein plays a role in a specific DNA repair mechanism called homologous recombination. This finding allowed drawing a parallel to BRCA mutations that affect the same molecular process and are often found in breast and ovarian cancers. Patients with BRCA mutations respond well to PARP inhibitors, presumably because PARP inhibition damages the DNA and will kill cells if homologous recombination is impaired. PARP inhibitors are currently being tested as a treatment for prostate cancer, and it is possible that CHD1 could be used as a biomarker to select patients that are most likely to profit from this treatment.

Loss of CHD1 causes DNA repair defects and enhances prostate cancer therapeutic responsiveness
Vijayalakshmi Kari, Wael Yassin Mansour, Sanjay Kumar Raul, Simon J Baumgart, Andreas Mund, Marian Grade, Hüseyin Sirma, Ronald Simon, Hans Will, Matthias Dobbelstein, Ekkehard Dikomey, Steven A Johnsen
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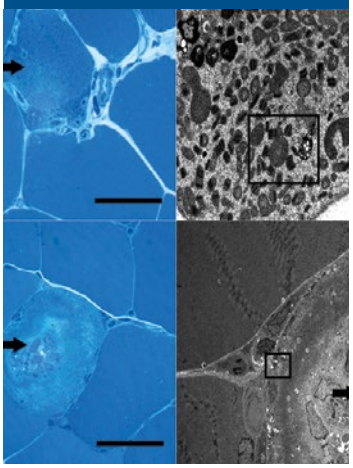

RESEARCH ARTICLE

Diet in mitochondrial diseases

Diet can have a strong impact on the progression of mitochondrial disease, according to a study by Sofia Ahola *et al.* published in *EMBO Molecular Medicine*. Patients with a mitochondrial disease called progressive external ophthalmoplegia suffer from weakness of muscles in the arms or legs. Their muscular problems were severely aggravated by a low-carbohydrate diet. However, the patients recovered quickly and 2.5 years later they had actually gained in muscle strength as compared to pre-diet state. The short-term muscle damage induced by diet had a modest beneficial impact in the long run.

To explain this devious route to improvement, the researchers showed that a low-carbohydrate diet selectively kills muscle fibers that were already damaged through disease-related mitochondrial dysfunction. The authors speculate that this could stimulate muscle regeneration: healthy muscle stem cells are activated; they divide and eventually fuse with existing muscle fibers, supplying them with healthy mitochondria. More research is needed before a change in diet can be used as a tool in therapeutic strategy.

Modified Atkins diet induces subacute selective ragged-red-fiber-lysis in mitochondrial myopathy patients
Sofia Ahola, Mari Auranen, Pirjo Isohanni, Satu Niemisalo, Niina Urho, Jana Buzkova, Vidya Velagapudi, Nina Lundbom, Antti Hakkarainen, Tiina Muurinen, Päivi Piirilä, Kirsi H Pietiläinen, Anu Suomalainen
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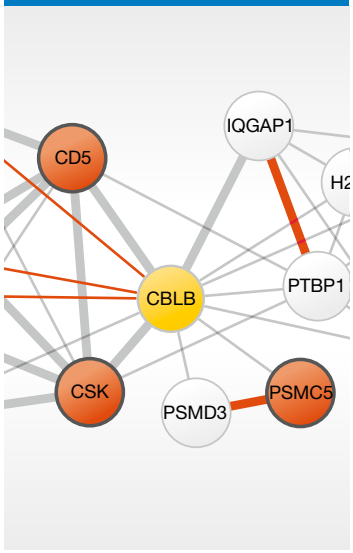
molecular systems biology



RESEARCH ARTICLE

A very complex complex

T cells play a central role in immunity; they patrol the body and launch an attack when they find infected cells. Terminating the attack is just as important – an overreaction may turn against the body's own cells. The ubiquitin ligases CBL and CBLB mark proteins for degradation and are key components of a large signalling complex that downregulates T cell activation. But which other proteins are in the complex and what is their function? A study by Guillaume Voisinne *et al.*, published in the July issue of *Molecular Systems Biology*, addresses this question.

The researchers used mouse genetics, affinity purification and mass spectrometry to take an inventory of the whole complex and monitor the kinetics of its formation. They identified as many as 117 interaction partners of the two proteins and showed that a transmembrane receptor called CD5 is a key regulator of CBL- and CBLB-induced ubiquitylation. Their comprehensive analysis paves the way for a better understanding of the complexes' function.

Co-recruitment analysis of the CBL and CBLB signalosomes in primary T cells identifies CD5 as a key regulator of TCR-induced ubiquitylation
Guillaume Voisinne, Antonio García-Blesa, Karima Chaoui, Frédéric Fiore, Elise Bergot, Laura Girard, Marie Malissen, Odile Burlet-Schiltz, Anne Gonzalez de Peredo, Bernard Malissen, Romain Roncagalli
Read the paper: msb.embopress.org/content/12/7/876

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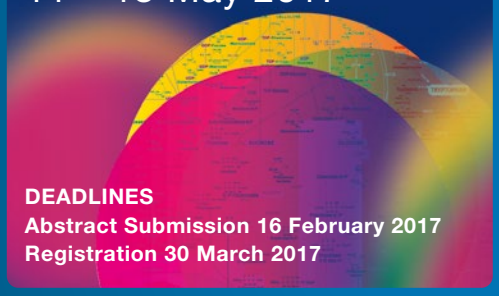

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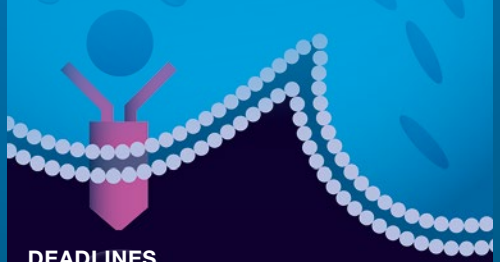

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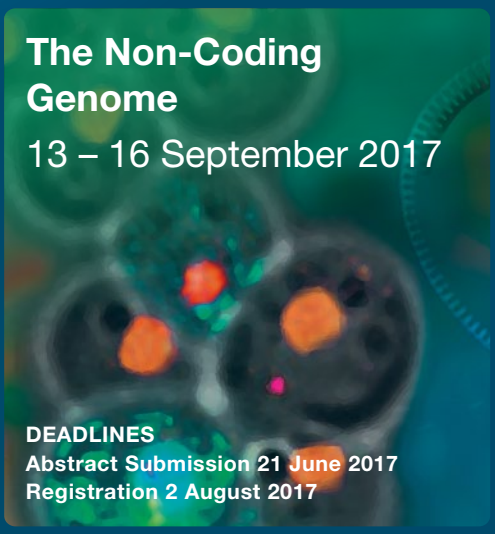

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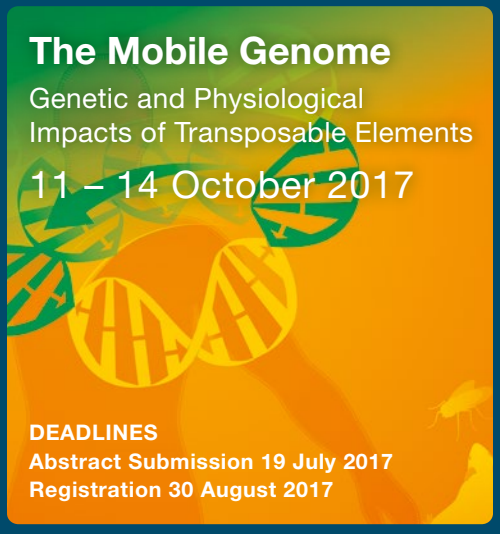

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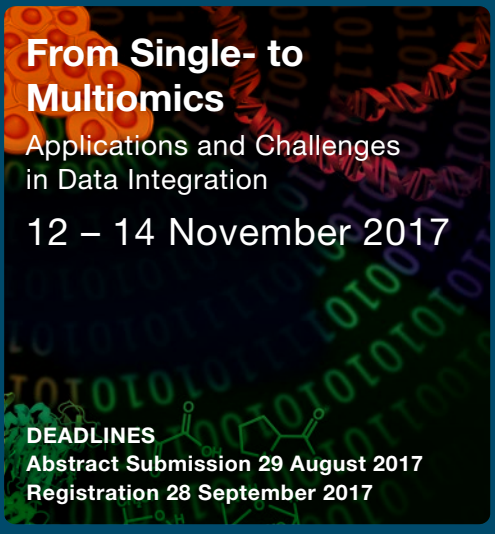

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