

EMBL etcetera

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BioSAXS milestones

Scientists at EMBL Hamburg and EMBL Grenoble have been celebrating achievements in the development of high-brilliance BioSAXS beamlines.

In Hamburg, three major milestones have been achieved in the commissioning of the P12 BioSAXS beamline, with the first remote measurement, the implementation of a new chromatography system, and the development of a novel microfluidic system. Meanwhile in Grenoble, the BioSAXS beamline at the ESRF has reopened in a new location at the heart of the ESRF structural biology village.

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Celebrating science

Scientists from across EMBL sites spend the summer discussing science and its implications



Personal genomics at ESOF, page 12



Celebration of science at Lab Day, page 13



Summer school: 'Ask the expert', page 11

Council meets in Heidelberg

Delegates at the Summer Council Meeting welcome new support for ELIXIR, agree funding for new equipment and vote on other important issues

Outcomes from the meeting, which took place 26–27 June, included the welcoming of investment of £75 million by the UK government in the European Life Science Infrastructure for Biological Information (ELIXIR). Delegates also agreed new equipment in Hamburg and Heidelberg, a pension for EMBL fellows, approved EMBL's latest *Annual Report*, and more.

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Strengthening collaboration on the Genome Campus



EMBL Director General Iain Mattaj joined Mike Stratton, Director of the Wellcome Trust Sanger Institute, and Janet Thornton, Director of EMBL-EBI, at a ceremony to mark the formal signing of a Cooperation

Agreement between the institutes. Sanger and EMBL-EBI share the Wellcome Trust Genome Campus in Hinxton and have a long history of scientific collaboration, also having many former staff in common. Formalising

these long-standing links heralds an exciting future of ongoing scientific collaboration and cooperation in areas such as services, research, training, technology, public engagement and campus activities.

Council meets in Heidelberg

Resources, finance and funding were high on the agenda at this year's Summer Council Meeting

EMBL's Summer Council Meeting, in Heidelberg 26–27 June, brought together delegates from member states to discuss and vote on important lab-related issues.

ELIXIR funding welcomed

At the meeting, which takes place twice a year, delegates strongly welcomed investment of £75 million by the UK Government in the European Life Science Infrastructure for Biological Information (ELIXIR). The project, based at EMBL-EBI, will create a major research infrastructure for biological data in Europe, with the goal of enabling biologists to better manage the data underlying biological research.

Equipment approved

Council approved investment in a multi-colour super-resolution fluorescence microscope for the Cell Biology and Biophysics Unit and a third-generation sequencing system for the Genomics Core Facility at EMBL Heidelberg. Two PILATUS 6M Hybrid-Pixel Array Detectors have been agreed for PETRA III in EMBL Hamburg.

Pension for fellows

It was announced that EMBL fellows, such as pre- and postdocs, will be integrated into the Laboratory's pension scheme. The



decision, effective from 1 July this year, aims to maintain EMBL's competitiveness in attracting the best young researchers from around the world.

Other developments

EMBL Heidelberg's Rainer Pepperkok has been promoted to senior scientist, while Council approved EMBL's *Annual Report 2011–2012*, which showcases the most exciting research from the past year. Thanks were also given to Danish delegate Jeppe Sondergaard Pederson and Irish delegate Stephen Simpson who are stepping down from Council. View EMBL's latest *Annual Report* at: www.embl.org/annualreport.

New funding for EIPOD programme

New funding for EMBL's Interdisciplinary Postdocs (EIPOD) initiative will enable 60 more talented postdocs to carry out research between different labs or units across EMBL's sites during the next five years. A total of 12.7 million Euros has been allocated for the three-year fellowships, 40% of which will be funded through a COFUND grant from Marie Curie Actions.

The initiative grasps an opportunity presented by EMBL's international and multidisciplinary research environment to broaden the education and expertise of postdocs. Fellows may put forward their own project ideas or develop and build upon ideas outlined by EMBL group leaders. Since the programme began, EMBL has hosted 94 EIPOD fellows. "The EIPOD initiative is about finding the best talent, regardless of where the applicants are from," says academic coordinator and dean of graduate studies, Helke Hillebrand.

"EIPODs are an important part of scientific life at EMBL. The initiative presents rare training opportunities for fellows that can act as a springboard to a successful career in research," adds Detlev Arendt, academic mentor and senior scientist.

Funding begins from the latest call for applications, for which the deadline is 13 September. For more information about the EIPOD programme and current call visit www.embl.org/eipod.

ELIXIR marches on

The ELIXIR programme for sharing life science data in Europe continues its inexorable progress with the addition of both Italy and the Czech Republic as recent signatories to the Memorandum of Understanding (MoU).

Signing the MoU is a first formal – yet non-binding – step towards the implementation of ELIXIR, with signatory countries having representation on the Interim Board, the main body negotiating the final legal and governance structure of ELIXIR.

“The Italian participation in ELIXIR is a major step towards the construction of this key European research infrastructure. It represents an important opportunity for our national scientific community to contribute in a significant way to solving the critical problems in managing biological data and transforming that raw data



	Czech Republic		Norway
	Denmark		Slovenia
	Estonia		Spain
	Finland		Sweden
	Israel		Switzerland
	Italy		United Kingdom
	Netherlands		

into knowledge,” says Anna Tramontano, Professor of Biochemistry at the University of Rome, La Sapienza.

For the Czech Republic, commitment to ELIXIR is the natural progression in the country’s significant programme of investment in bioinformatics. With construction of ELIXIR’s technical hub now firmly under way on the Genome Campus in Hinxton,

“This is a major step towards the construction of this key European research infrastructure.”

– Anna Tramontano, La Sapienza

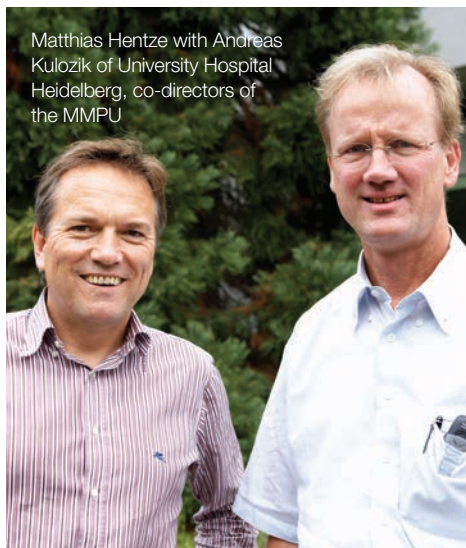
the ELIXIR project is enjoying excellent momentum in the run up to the third meeting of the Interim Board, which will be held at the Wellcome Trust headquarters in London in October.

Officially ‘excellent’ EMBL activities

Research, training, and outreach projects involving scientists from EMBL Hamburg and EMBL Heidelberg have featured prominently in the third and final round of the German Excellence Initiative. The federal and state governments announced the funding decisions for the Initiative on 15 June, following a highly competitive proposal stage. The initiative aims to promote top-level research at universities and research institutions based in Germany. Funding for the projects begins in November 2012, and continues over the course of five years.

Heidelberg

- The **Molecular Medicine Partnership Unit (MMPU)**, which combines the expertise of basic and clinical researchers from EMBL and Heidelberg University to study causes of common diseases, will develop the new Heidelberg Research Centre for Molecular Medicine. It will provide a three-tiered structure of fellowship opportunities for researchers who wish to pursue careers in translational medicine, including medical students and established clinicians.
- The **CellNetworks Excellence Cluster** – which unites leading research groups from EMBL, Heidelberg University, the German Cancer Research Centre, the Max Planck Institute for Medical Research, and the Central Institute for Mental Health – will feature collaborations involving a large number



Matthias Hentze with Andreas Kulozik of University Hospital Heidelberg, co-directors of the MMPU

of groups, including those of: Martin Beck, Peer Bork, Teresa Carlomagno, Anne-Claude Gavin, Wolfgang Huber, Edward Lemke, Rachel Mellwig and Christoph Müller.

- Through **Marsilius-Kolleg**, a centre for advanced study focusing on interdisciplinary dialogue and basic research, group leader Jan Korbel will continue work with a project that brings together experts from various disciplines and institutes to investigate the ethical and legal aspects of whole genome sequencing.
- At the **Hartmut Hoffmann-Berling International Graduate School of Molecular and Cellular Biology**, based at Heidelberg University, EMBL Associate



Matthias Wilmanns

Director Matthias Hentze has been named as a principle investigator.

Hamburg

- Head of EMBL Hamburg Matthias Wilmanns participates in the **Hamburg Centre for Ultrafast Imaging**, focusing on aspects such as structure, dynamics and control of matter at the atomic scale.
- The outstation contributes to the **Hamburg School for Structure and Dynamics in Infection**, and the **BIO-CATALYSIS2021** project, which brings together experts from industry and academia to research industrially relevant biocatalysts from micro-organisms.



Major impact

Researchers in the Briggs group at EMBL Heidelberg and their collaborators have been causing a stir with three papers published in leading journals in as many months. Group leader John Briggs reflects on exciting times for the lab.

What areas of research are you focussed on?

We are interested in the assembly and budding of enveloped viruses, such as HIV, as well as the formation of coated vesicles (membrane ‘bubbles’ that transport material around the cell). Our goal is to understand the structures of the viruses and vesicles, and how various proteins and membranes interact in order to produce them. We want to learn how proteins collect cargo and manipulate the shape of the membrane to cause budding. We use electron microscopy as our main technique to achieve this.

What have been the most exciting developments?

One was a technique that brings together the sensitive multi-colour imaging of fluorescence microscopy with the high-resolution of electron microscopy. It enables us to study individual vesicles forming at the surface of the cell. Combining datasets from the two microscopes has enabled us to look at how different components of the cell’s machinery influence the shape of

the vesicle during its formation, and it has paved the way for our recent endocytosis study published in *Cell*. But the topics of our recent papers are quite diverse! I have been working on one of the problems – the structure of retroviruses – since I started my PhD so it is very exciting to see the progress and think about where this research might lead in the future.

“Progress in understanding the biology goes hand-in-hand with advancement in techniques.”

– John Briggs

What now?

Progress in understanding the biology goes hand-in-hand with advancement in techniques. We are using a combination of methods development, such as new approaches for correlating light and electron microscopy, and biological investigations, such as comparing and looking in even more detail at the structure of viruses. The people involved in the research are very enthusiastic.

Cell, 3 August

Researchers from the Briggs and Kaksonen groups at EMBL Heidelberg employed a method that combines data from different microscopes to learn how the cell’s machinery influences the shape of its membrane. It is the first time scientists have both followed changes in the shape of the cell’s membrane during this process and tracked proteins thought to influence those changes.

⇒ To view a 3D movie of how cells ‘swallow’, visit the EMBL YouTube channel: www.youtube.com/emblmedia.

Nature, 19 July

Research revealing the detailed structure of the shell that surrounds the genetic material of retroviruses, such as HIV, when they are still being formed (with Tomas Ruml, Institute of Chemical Technology, Prague).

Science, 15 June

Study of a complex of proteins that ‘shape-shifts’ to form transport vesicles (with Felix Wieland, Heidelberg University).

What do you get when you dissect 10 000 fly larvae?

EMBL-EBI’s Nick Luscombe and colleagues have discovered a way in which cells can adjust the activity of many different genes at once. Their findings, published in *Science*, overturn commonly held views and reveal an important mechanism behind gender differences.

Females have two X chromosomes while males have only one. So to avoid an imbalance of proteins produced on the X chromosomes, male fruit flies make their X chromosome genes work double time: one enzyme makes thousands of different genes double their output. “Imagine that you have thousands of half-filled glasses of all different sizes and shapes,” explains Nick. “Now imagine that you have to fill them all up to the top at the same time. This is an incredibly complex mechanism.”

To observe how genes are expressed, scientists try to pinpoint signals that show when a gene increases its output – usually by a factor of between 10 and 100. In this study, the researchers were looking for an increase of only a factor of two. Observing such a faint signal is a major challenge, but thanks to the painstaking efforts of graduate student Thomas Conrad, combined with the detailed analytical efforts of Flor-

ence Cavalli and Juanma Vaquerizas, the team managed to gather enough material to compare males and females directly.

They found twice as many DNA-transcribing proteins – known as polymerases – attached to the male X chromosome than to the female version. The study is the first to report a direct, clear mechanism that links a histone modification and the activity of a polymerase across thousands of genes.

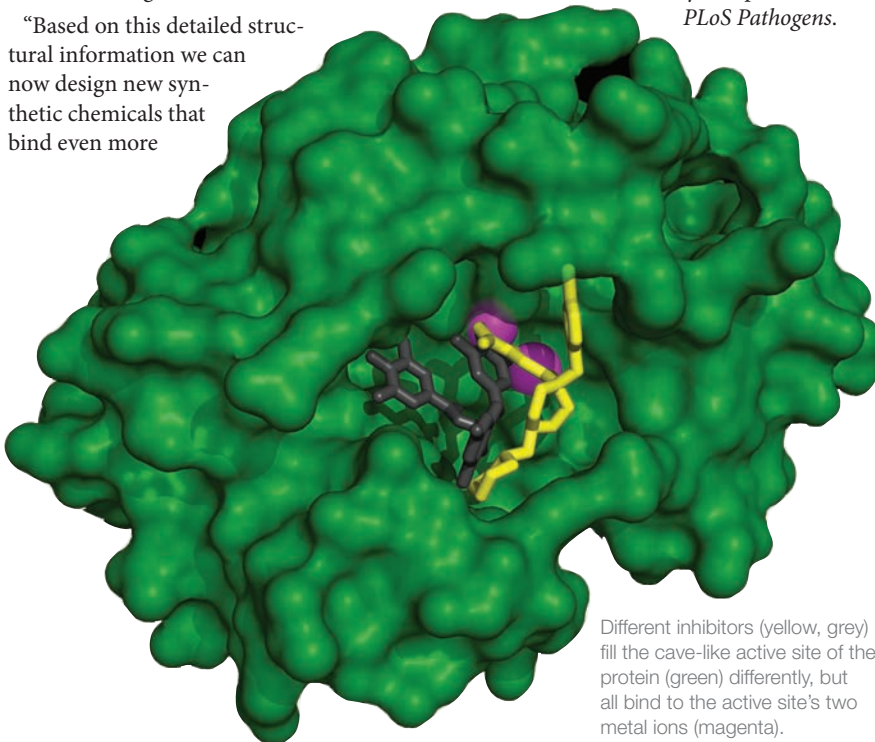


Flu virus discovery not to be sneezed at

Researchers at EMBL Grenoble have determined the detailed 3D structure of part of the flu virus' RNA polymerase – an enzyme that is crucial for influenza virus replication. The research was carried out on the 2009 pandemic influenza strain, but the study could help scientists to design innovative drugs against different influenza strains, and potentially lead to a new class of anti-flu drugs.

“Based on this detailed structural information we can now design new synthetic chemicals that bind even more

tightly to the endonuclease active site and thus will potentially be more potent inhibitors of influenza virus replication,” explains Stephen Cusack, who led the research. “We can even try to build in anti-drug resistance by making sure the inhibitors only contact those amino acids that the virus cannot mutate, since they are essential for the normal activity of the polymerase.” The study was published in *PLoS Pathogens*.



Different inhibitors (yellow, grey) fill the cave-like active site of the protein (green) differently, but all bind to the active site's two metal ions (magenta).

Making waves

A traffic policeman standing at a busy intersection directing the flow of vehicles may be a rare sight these days, but scientists in Iain Mattaj's lab at EMBL Heidelberg have found a protein that effectively plays this role in our bodies when our cells divide. The protein, called Lem4, directs a crucial step of cell division by preventing the progress of one molecule while 'waving' another through.

Some of our tissues, like skin, are constantly being renewed, with dying cells being replaced by new ones. For a tissue to regenerate like this, or an embryo to grow, its cells must divide. And when a cell divides to give rise to two, the membrane that surrounds the cell's nucleus – the nuclear envelope – has to be broken down, the chromosomes dragged apart, and the nuclear envelope rebuilt. For this re-assembly to take place, a protein called BAF has to have chemical tags called phosphates removed.

The research, published in *Cell* in July, shows that Lem4 ensures BAF ends up phosphate-less by stopping one protein from adding phosphate tags to BAF and bringing in another protein to remove the existing tags. “This happens in human cells and in the worm *C. elegans*, so it seems to be a strategy which evolved long ago,” says Iain.

Mapping the cell's transport network

When the Olympics ended, thousands of professionals, from air traffic controllers to train conductors, ensured that athletes, officials and supporters made it safely back out of London. Cells, too, have an extensive transport network for exporting molecules, and scientists in the Pepperkok and Ellenberg groups have now uncovered the genes that make sure that network runs smoothly.

“Now we have the big picture, like knowing the important players for transport in the whole south of Germany” – Rainer Pepperkok

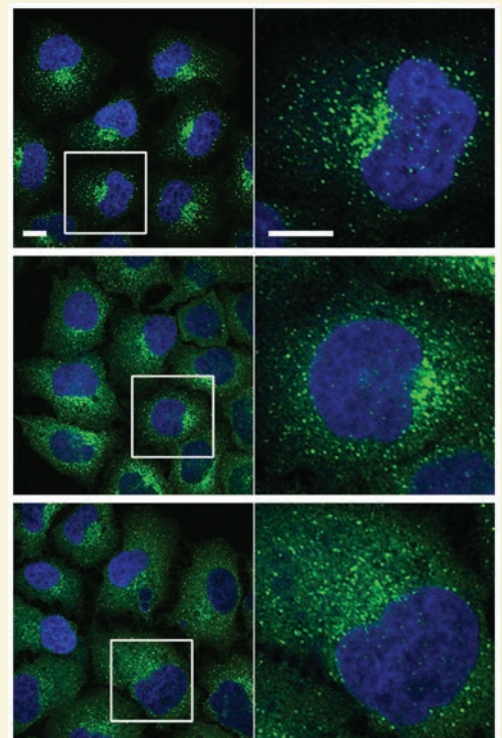
In the first comprehensive census of the human genes involved in cellular export, published in *Nature Cell Biology*, the EMBL scientists found an unexpected variety of genes. Using a combination of genetics and sophisticated microscopy, they systematically silenced each of our 22 000 genes, and observed to what extent this affected the cell's

ability to transport a protein. They found that 15% of human genes somehow influence this transport network – known as the secretory pathway – including genes that provide a link to other events in and around the cell.

“Now we have the big picture, like knowing the important players for transport in the whole south of Germany,” Rainer Pepperkok says. “Next we can look at which are important for the trains from Heidelberg to Frankfurt, which are needed for the trams within Heidelberg, and so on – to pinpoint what genes regulate each pathway.”

The groups, together with Alvis Brazma at EMBL-EBI, are developing a public repository for such image-based screens, which others can turn to when studying the function of human genes.

In cells where a gene is silenced (middle, bottom), the place where a component of the cell's transport machinery (green) is located changes compared to normal cells (top). The individual cell highlighted on the left is shown in detail on the right.





BioSAXS milestones in Hamburg

June saw a number of important events in the commissioning of the P12 BioSAXS beamline at EMBL Hamburg.

First remote measurement

The first remote user experiments using the new high-brilliance P12 beamline at the PETRA III ring took place on 15 June by researchers at the University of Salamanca. Data collection scheduling was successfully controlled from Spain and now the team is working hard to extend access to other remote users as soon as possible. “Operating from your home

institute makes experiments more cost and time effective. We expect that many users will opt for the remote access,” says Dmitri Svergun, BioSAXS group leader at EMBL Hamburg.

New chromatography system

The Svergun group implemented a new setup that allows for immediate data acquisition after purified components elute from the column. This facility will significantly improve data quality and has been in high demand from the user community. “The first user projects have already profited from the advantages of this multipronged characterisation,” says Melissa Graewert, a postdoc in the group overseeing the project.

Novel microfluidic system

A novel microfluidic system was successfully tested at the beamline for high-throughput protein studies. The setup, called SAXS-CD, was developed under the guidance of Manfred Roessle, PETRA III SAXS project leader, in collaboration with Freiburg University. The sample holder has the form of a conventional CD with a network of microfluidic channels to enable simple, rapid and efficient mixing of samples with different buffers by centrifugal forces.

BioSAXS beamline reopens in Grenoble

Increased flux, improved focus and shorter data collection times are among the benefits for users of the ESRF’s BioSAXS beamline, following its reopening on 13 June.

As part of the upgrade, the BioSAXS station has been rebuilt at the heart of the ESRF structural biology village. Work on the beamline is ongoing, and continues to extend the capabilities of automated data processing through collaborations between ESRF, Diamond Light Source, and EMBL Grenoble and Hamburg.

The beamline retains its easy-to-use robotic sample handling system, and the

team is further-developing applications for data analysis. Other priorities include extending the Information System for Protein Crystallography Beamlines database to store BioSAXS data and results, enabling indepth crosschecking and validation, with the goal of maximising data quality.

“Feedback has been extremely positive – users are happy with the improvements to data collection speed, which enables them to measure more than twice as many samples in the same time as before,” says Adam Round, a beamline scientist in the McCarthy team at EMBL Grenoble.

Advanced training at EMBL Hamburg

In June, scientists from EMBL Hamburg got together with Heidelberg colleagues to organise the first EMBL Advanced Course on Hybrid Structural Biology Approaches, sponsored by EU projects P-CUBE, BioStruct-X and Instruct.

Sixteen students from across Europe attended the six-day course, which included lectures and practical sessions on sample preparation and characterisation, small angle X-ray scattering, macromolecular crystallography and electron microscopy, and software demonstrations on how to evaluate and combine the data from the different techniques.

“Hybrid approaches are increasingly important,” says Matthias Wilmanns, head of EMBL Hamburg. “Bringing together students and experts from different scientific backgrounds led to a lively exchange of ideas. We hope this is something that can be transferred to the entire structural biology community.” For more courses to come, see back page.

Mini screening factories

Scientists in the Merten group at EMBL Heidelberg have developed a novel technique for screening antibodies for a specific function – such as the ability to inhibit a drug target – with speed and at the single cell level. The study, published in July in *PNAS*, could accelerate the development of antibody-based treatments for diseases.

Antibodies are becoming increasingly prominent human therapeutics, but screening them for therapeutic properties on a large scale using current methods is not possible. Scientists led by Christoph Merten at EMBL Heidelberg developed a solution: a technique for screening antibody-producing cells at the single cell level. The method could allow up to 300 000 cells to be screened per day.

The researchers used a microfluidics device, a plastic chip barely bigger than a coin and consisting of a miniature maze of tiny channels. Droplets containing specially designed antibody-producing cells were sorted in the channels according to whether they contained enzymes that inhibited the enzyme ACE-1 – a drug target for high blood pressure. The miniature screening

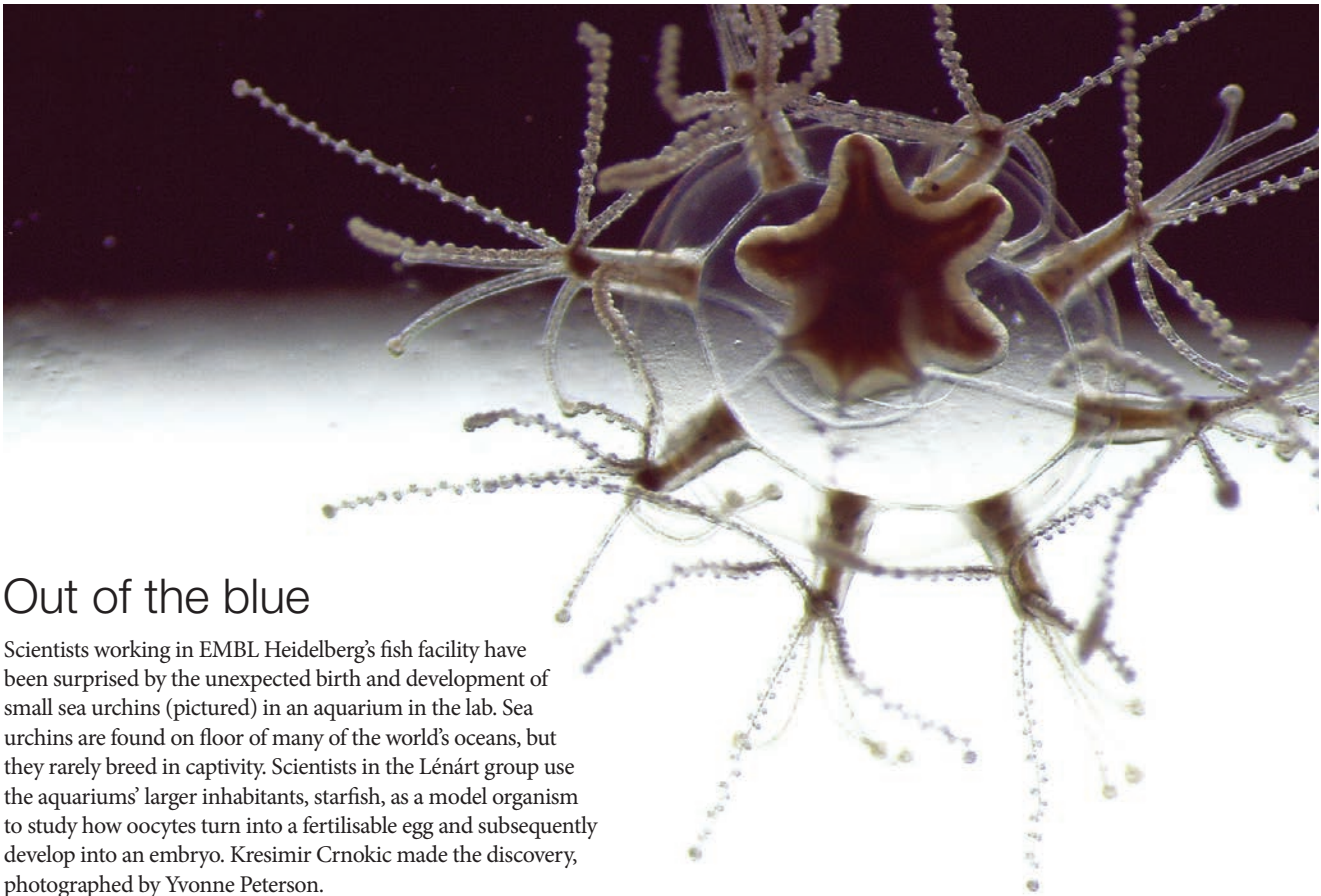
Christoph speaking at the recent conference on microfluidics, at EMBL Heidelberg 25–27 July. More than 300 experts from around the world attended



factories could ultimately be used to process humans cells.

“Because the number of cells we need in the assay is very low and because it can be performed at a single cell level, eventually it may be possible to screen antibody-releasing cells from human donors. You could take antibody-producing cells from HIV-infected individuals, for example, and try to find cells that neutralise the virus,” says Christoph.

⇒ To view a video of this new method in action, visit the EMBL YouTube channel: www.youtube.com/emblmedia.



Out of the blue

Scientists working in EMBL Heidelberg's fish facility have been surprised by the unexpected birth and development of small sea urchins (pictured) in an aquarium in the lab. Sea urchins are found on floor of many of the world's oceans, but they rarely breed in captivity. Scientists in the Lénárt group use the aquariums' larger inhabitants, starfish, as a model organism to study how oocytes turn into a fertilisable egg and subsequently develop into an embryo. Kresimir Crnokic made the discovery, photographed by Yvonne Peterson.

New malaria resource

ChEMBL, EMBL-EBI's online drug-discovery database containing data on more than one million bioactive molecules, has made it easier for researchers to access all data pertaining to malaria.

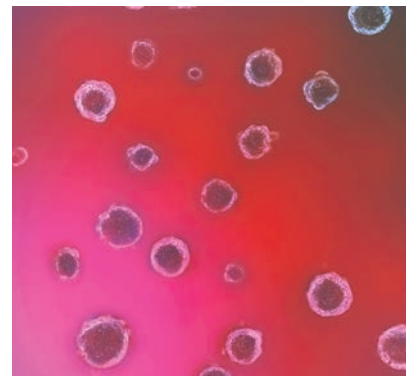
This data has recently been released into the public domain by pharmaceutical multinationals GlaxoSmithKline and Novartis, and St Jude Children's Research Hospital, through the Medicines for Malaria (MMV) venture and other open-source malaria research initiatives, and is derived from open collaboration in neglected disease drug research.

MMV and ChEMBL have been working together to maximise the strengths of the database and to make the data more discoverable by implementing an easily searchable format. ChEMBL's data on malaria-related bioactive compounds can now be searched according to structure, substructure, or a specific library or collection of compounds, and is a one-stop shop for all publicly available data amassed through recent open source drug-discovery initiatives.

Ready, steady... go!

The Bertone lab at EMBL-EBI has discovered a key component of the 'go' signal that tells stem cells to start becoming a specific cell type. Embryonic stem (ES) cells have the potential to become any type of cell (a characteristic known as pluripotency) but they can also remain as stem cells indefinitely without losing this capability. This has opened up promising avenues for the development of new biomedical therapies. But if this potential is to be realised, we need to understand exactly how stem cells exit this 'self-renewing' state and commit to becoming, say, a liver or brain cell.

In an ongoing collaboration with Brian Hendrich at the University of Cambridge, Paul Bertone and his colleagues studied differences in gene expression patterns between self-renewing and differentiating stem cells, specifically focusing on the Nucleosome Remodelling and Deacetylation (NuRD) corepressor complex. They found that NuRD directly regulates how pluripotency genes are expressed in stem cells, and that NuRD is required for their exit from pluripotency. "Essentially what we found is that NuRD modulates the expression of key pluripotency factors through chromatin modifications, and that its influence is



essential for ES cells to enter into a normal differentiation programme," Paul explains.

The team also investigated the binding patterns of the NuRD complex to understand how it regulates its target genes. Combined with transcriptional profiling, a picture emerged of NuRD as a gatekeeper of cell differentiation. "The NuRD complex has two roles," says Paul. "In ES cells, it binds the promoters of genes involved in pluripotency and controls the range of their expression. If NuRD is missing, these genes remain at high levels even when they should be turned down. This lack of control locks ES cells in their self-renewing state and prevents them from differentiating into other types of cells."

Alumni get connected in Madrid, Dublin, Dilofo and Heidelberg



June and July were sociable months for EMBL alumni, with many meeting in their respective countries to explore areas of common interest and mutual support. EMBL Director General Iain Mattaj, Joint Head of the Structural and Computational Biology Unit Christoph Müller, and Associate Director Matthias Hentze, all attended separate meetings in Spain, Ireland, Greece and Germany.

The meetings included helpful discussions on how alumni can utilise EMBL facilities,

know-how and support. The summary of the points raised and the resources available can be found on the alumni web pages, with a few highlights listed below.

EMBL Alumni Association is grateful to the National Centre for Cardiovascular Research (CNIC) Madrid, University College Dublin, and Aspraggeloi Cultural Center Dilofo for hosting these meetings, and to the key local organisers: Maria dM Vivanco, Jez Simpson, Anastasia Politou and Freddy Frischknecht.



Alumni questions answered...

- Visiting scientists, predocs and undergraduate students can benefit from EMBL's state-of-the-art facilities through the Visitors Programme: www.embl.de/training/visitors_scholars.
- A limited number of travel grants and fee waivers are available for attending EMBL courses and conferences. For more information on this and the EMBL courses and conferences, please visit www.embl.de/training/events.
- As coordinator of ELIXIR and the Euro-BioImaging project, EMBL is always glad to advise institutions in countries interested in participating in either project: www.elixir-europe.org and www.eurobioimaging.eu.
- EMBL can inform interested alumni on key developments and ongoing consultations in the EU regarding research policy and Horizon 2020. Visit the alumni pages for more information on this and more.



Top to bottom: Alumni in Spain meet at CNIC Madrid; alumni in Greece gather in Dilofo; staff and alumni present their research, catch up with one another and celebrate the EMBL Summer Party with strawberry cake

⇒ Photos from the meetings together with the programme details, list of participants and outcomes are available at www.embl.org/alumni.

Mark your diaries

5-7 September *Uppsala, Sweden*
Symposium in Memory of Lennart Philipson

Organisers: Ruth Lehmann, Iain Mattaj. More information: www.igp.uu.se/Seminars/lennartphilipson

20 September *Cambridge, UK*
Alumni reconnection event

Venue: The Punter, Pound Hill
Enjoy a relaxed evening in the company of other alumni. Entry by ticket, available from Lindsey Crosswell, Head of External Relations, EMBL-EBI, lindsey.crosswell@ebi.ac.uk.

24 September *Acropolis, Nice*
Staff-alumni get-together – France at The EMBO Meeting

23 November *EMBL Monterotondo*
Alumni Association Board Meeting followed by staff-alumni event

For further details please visit www.embl.org/alumni or contact alumni@embl.org.



Former Lamond group predoc, Jacqueline Mermoud, now scientific staff at the Babraham Institute in Cambridge, wrote in her email to the Alumni Relations Office before setting off on a trekking challenge up Africa's second highest mountain: "I will think of you on the way up – and of nice beds and ceramic toilets on the way down." Jacqueline recounts some of the trials and triumphs of the trek, undertaken in aid of the EMBL Alumni Association (EAA) Fund:

Inspired by EMBL

"During my time as a PhD student in Heidelberg I kept a postcard above my bench depicting a man on a mountain top amidst clouds with the caption 'From time to time one needs a new standpoint in order to see the world anew'. So it seemed right to carry an EMBL flag to new heights on 27 June – the peak I conquered is just under 5000m, the highest I have ever been."

More beautiful than Kilimanjaro

"Mount Kenya may not be as high as Kilimanjaro, but it is a more beautiful climb and certainly less crowded – in the four-day ascent we did not see another person except our guides and porters."

Raising money for the EAA

"I targeted my fundraising efforts to people I knew personally from my time at EMBL as well as board members, and am extremely grateful of the sponsorship received that amounts to more than 600 Euros."

Alumna takes EMBL to new heights



Jacqueline conquers Mount Kenya. If you'd like to raise money for the EAA, or to share a similarly spectacular view, get in touch at alumni@embl.org. We'd love to see your photos, and pass on the EMBL 'travelling flag'!

Come hail or high water

"There were regular hailstorms during the climb and much of our gear got wet. In those moments the thought of all the people that so generously supported me kept me going. The joy when the sun came out and we managed to dry all our kit was enormous!"

Flying the EMBL flag

"When we arrived at the trekking summit of Mount Kenya, Point Lenana at 4985m, we were greeted by a wonderful spectacle of dawn breaking over Africa. I flew the mas-

sive EMBL flag, depicting all the member state flags around its border, in the morning wind on what felt like the top of the world."

Attack of the honey badger

"Although the trek itself passed without incident, afterwards while walking through a thick, chest-high bush I was attacked by a fiercely growling honey badger. It ran off, challenged by the raised spears of our Massai guides, but I later learned that honey badgers are one of the world's most fearless creatures and will take on a lion!"

John Kendrew Award ceremony

Staff and alumni gather to recognise and reward excellence in science and science communication

Against the buzzing backdrop of Lab Day, EMBL Alumni Association board members arrived from all corners of Europe to celebrate the John Kendrew Young Scientist Award Ceremony, followed by the EMBL Graduation Ceremony, Lab Day dinner and party – one day prior to holding their own board meeting.

This year, the Award was presented by Jochen Wittbrodt, former Developmental Biology Unit group leader. Jochen, now Director at the Centre for Organismal Studies Heidelberg, candidly shared what he misses most about EMBL: "The culture of youthfulness, informality, all-inclusiveness and internationality, and the unique language of EMBL-ish."

In addition to receiving gold medals and cash prizes for excellence in carrying out and communicating structural and developmental biology respectively, co-winners Simone Weyand and Gáspár Jékely had the opportunity to meet EMBL and EMBO

leadership, Heads of Units and group leaders from all EMBL outstations. This is one of the highlights of the award ceremony, which aims to recognise and support young scientists, as well as to bring them back to EMBL to share their success with current EMBL pre- and postdocs, and their scientific experience and requirements with senior staff.

"I spent a great day at EMBL, and was again electrified by the environment and the ease of making new contacts," says Gáspár. "It was a joy to find so many people genuinely interested in what I have been doing," adds Simone, "a lot of fruitful ideas came up during discussions." More on the winners at www.embl.org/alumni/kendrewaward.



EAA Chair Giulio Superti-Furga, John Kendrew Award winners Simone and Gáspár, Jochen Wittbrodt



Complex connections

Very few things in biology are uncomplicated. You might ask then, why people in biology are only now so excited about 'complexity'? For the answer, look no further than the 14th International PhD symposium, Networks in the Life Sciences.

The event will feature talks by leading scientists – including Richard Durbin, Rudolf Abersold and Luis Serrano – on three broad areas: genomics, proteomics and systems biology. Is it time to move away from the study of genes, proteins and molecules, and up to genomes, proteomes and even larger systems? Will the 'systems approach' – a focus on networks and interactions – allow us



Networks in the Life Sciences

Genomics, Proteomics and Systems Biology

to predict drug responses, understand tumour evolution, and use genome sequences to predict disease risk? Can these systems be analysed with modern technology and methods, or is something radically different needed? The event, spanning three days from 25 to 27 October, will see speakers address these questions and more in talks and panel discussions. Participating PhD students will also have the chance to present talks or posters on their work, with prizes for the best entries.

⇒ To find out more and register, visit <http://phdsymposium.embl.org>.

Welcome to EMBL!

EMBL is such a unique and complex organisation that sometimes grasping what other people do, as well as getting the bigger picture, may be a little daunting. That's why, from September onwards, a series of activities will be organised at EMBL Heidelberg with the dual aim of enhancing newcomers' orientation and enabling existing staff to learn more about roles and responsibilities at EMBL.

"We are really excited about this programme," says organiser Anna Efstathiou. "Pilots in the past were extremely well received by both scientific and support staff. Our ambition is to make sure that all sites have similar types of activities as well as organise tailor-made programmes for specific groups in the future."

For more information contact Anna: anna.efstathiou@embl.de.

- **'Who does what?'**
A session taking place every two months that introduces new staff to services offered by EMBL's Administration and other key aspects of the lab through talks, networking sessions and a tour of the lab.
- **'The bigger picture'**
Outlining the role of parts of EMBL that staff may not have regular interactions with, like the Science and Society programme and external training.
- **Lab tours and seminars**
Lab tours, and seminars hosted at the biannual Administrative Assembly at EMBL Heidelberg, will be open to all staff, new and old.

EMBL-EBI in Japan

The EMBL-EBI Industry Programme met with some 100 pharmaceutical R&D leaders in Japan in June to discuss how public databases can be used to support the global biotechnology and pharmaceutical industry.

Hosted by the British Foreign and Commonwealth Office (FCO), the event featured presentations by the European Patent Office, the Japanese Patent Office, the DNA Databank of Japan, and EMBL-EBI. Discussions centred on the dissemination of public data about patented sequences and compounds.

"This was an invaluable opportunity for key representatives from industry, academia and government to share information with the patent offices and with each other," says Dominic Clark, EMBL-EBI industry programme manager.

"Part of our job is to make information about patented sequences and compounds available to the public," says Jennifer McDowall of EMBL-EBI. "Such information is of interest not just to people in industry but to the entire scientific community, as patents are the only source of information for many of these novel sequences and compounds. It's a rich data seam that's worth mining."

The event was jointly funded by the EMBL-EBI Industry Programme and the FCO Science and Innovation Network, which aims to promote British industry abroad.





‘Why did you become a scientist?’

High school students from around the world got to grips with exciting EMBL research as part of Heidelberg’s International Summer Science School (ISH) in July.

Twenty-four participants from places as far flung as Israel, South Korea and Australia took part in hands-on experiments, scientific talks, and tours of EMBL facilities. The ISH gives selected students the chance to experience life at research institutes around Heidelberg.

EMBL’s interdisciplinary programme, developed by Philipp Gebhardt of the European Learning Laboratory for the Life Sciences, aimed to enlighten students on careers in molecular biology across diverse scientific areas, while also enabling participants to speak directly to scientists about science. “Talks and visits were very accessible, evoked strong interest, and stimulated highly intelligent questions from the students,” explains Philipp.

Dirk Sieger, postdoc in the Peri group at EMBL Heidelberg, speaks to ISH students Amit Nir, Kaori Murayama, Shoko Hirose, Goda Kijauskaite, Saskia Hendriks and Maria Barbara Gerards

Why did you decide to become a scientist?

I have been interested in science my whole life, particularly in biology and the function of cells within an organism. After I completed my second degree, I still had many unresolved questions that I wanted to learn the answer to, and so I decided to progress to my PhD and postdoctoral research.

Why research the microglia?

I wanted to understand the basic mechanism of the microglia, and the signals that affect their migration during a response to injury or infection in the brain. The microglia are non-neuronal cells that provide the first line of defence, as well as performing other house-keeping functions within the brain. I hope that completing this research will have an impact on the field of medicine. By figuring out how the brain’s emergency system works, we might be able to help people who suffer from brain damage, for instance.

Will you use other model organisms?

No, zebrafish are the perfect models for this research. Their embryos are transparent, making them easy to image. They also readily accept drugs. To conduct these tests with mice, you would first have to open their skulls to see what happens in their brains – such an operation would impact results, as the action itself stimulates the microglia.

“Many months can pass by without any positive results – be patient and curious.”

– Dirk Sieger

What are the ethical issues in your research?

Every single injury experiment is performed in a living organism. It is important to carefully consider which experiment is really necessary to answer a question, and keep the number of injured embryos as low as possible. You always have to be aware of, and follow, the ethical guidelines for animal research. Unfortunately, it is not possible to complete this research without injuring zebrafish to some extent.

What advice do you have for young students interested in becoming scientists?

Follow your interests. Don’t choose your subject just to find a job or to earn money. Being a scientist can be frustrating; many months can pass by without any positive results – be patient and curious.

What’s next?

My next goal is to become independent. I will soon leave EMBL and start my own group at the University of Edinburgh. I am planning to continue to study the microglia, focusing on tumours: initially, the microglia attack the tumour but, for some unknown reason, the tumour reprogrammes the microglia and eventually they begin to protect it. I hope that my group will be able to find out the reason for this reprogramming, and subsequently how to reverse these effects.

From biology to the big bang

‘Educate, inspire, connect’: the motto of the annual Lindau Nobel Laureate Meetings, which take place on the shores of Lake Constance each year. In July, EMBL Heidelberg predocs Sigrid Milles and Felix Klein joined hundreds of young researchers and 27 Nobel Laureates from around the world with the goal of exchanging ideas, discussing science and building international networks.

This year, the week-long meeting focused on physics, and featured a series of lectures, panel discussions, and social events. It gave young researchers the opportunity to discuss and engage with topics as diverse as quasicrystals, energy security, and funding challenges with the Nobel Laureates. In the week that the Higgs Boson discovery was announced by scientists at CERN, particle physics also provided a major talking point,

especially given that the idea of founding the intergovernmental institution arose during one of the first Lindau meetings.

The event concluded with a boat trip to the island Maniau, and the meeting ended as it began, with participants taking home the spirit and inspiration of Lindau.



Sigrid and Felix on Lake Constance

Europe's largest general science event took place in Dublin in July, with more than 500 of the world's top scientists convening together with young researchers, funders, policy makers, journalists and members of the public.

EMBL scientists featured prominently across the five-day programme, with Heidelberg's Lars Steinmetz and Eric Karsenti delivering keynote talks in front of packed auditoria. Lars, who discussed how studies in his lab are connecting fundamental and medical genomic research, also took part in a panel session together with Halldór Stefánsson (EMBL), Barbara Janssens and Christoph von Kalle (German Cancer Research Centre), and Richard Tutton (Lancaster University).



Lars gives a keynote address at ESO2012

Eric, who presented some of the early findings from the Tara Oceans expedition, later spoke to participants onboard the ship itself. Tara was paying a special visit to Dun Laoghaire Port to coincide with the event.

Others speaking at the event included EMBL-EBI Director Janet Thornton, who joined a podium discussion focussed on the importance of research infrastructures, alongside Emma Teeling and Des Higgins of University College Dublin, and Eero Vuorio of Biocenter Finland. This session highlighted the practical application of bioinformatics in the research undertaken by Emma and Des and drew attention to the importance of the ELIXIR initiative.



Eric is interviewed aboard Tara

Lena Raditsch, Head of Communications at EMBL, gave a presentation addressing the question 'Can outreach make you a better scientist?'

- ⇒ Conference season got under way in July, with EMBL-EBI out in force at the Intelligent Systems for Molecular Biology (ISMB) conference in Long Beach, California, contributing with talks, posters, workshops and an exhibition stand. Cath Brooksbank, Head of Outreach and Training, co-led a workshop on the future of bioinformatics training, while Katrina Pavelin, scientific engagement officer, presented a talk and poster at the Student Council Symposium.



Thinking about your future

Strategic thinking, customer orientation, innovation, and communication – choice words that Siemens' Alexander Levin used to describe his role in developing imaging and therapy systems at the company during EMBL's Career Day. Alexander realised his calling was in industry after being inspired by others already working in such roles. At the event, which took place on 4 July at EMBL Heidelberg, there were many other examples of people who have followed non-academic career paths, possibly striking a chord with those thinking about their next move.

"Speakers candidly discussed the huge diversity of career choices available to young scientists, and the inspiring talks reflected opportunities and challenges of positions covering topics as varied as science communication, policy making or software engineering," says Helke Hillebrand, academic coordinator and dean of graduate studies.

The day took off with alumnus Beat Rupp, a physicist by training who, after a successful PhD in the Nédélec group in 2011, is now a software engineer for Element1 Media working on the development of technical infrastructures for web-based businesses. Also speaking was biologist Susanne Benner who left the bench to pursue a career in public relations, and in her various roles at a technology museum, in industry and now at the Max Planck Institute for Chemistry, has engaged on issues as diverse as GM crops and methane measurements on Mars.

Further talks were given by European Commission policy officer Dagmar Meyer who has a background in mathematics; Merck consultant Daniel Gau; and BASF industrial engineer Wilma Dausch, who started her career as a bench chemist. "The quality of presentations was exceptionally good, as were introductions given by EMBL pre- and postdocs," says



Predoc Dermot Harnett introduces Susanne Benner to a 200-strong audience from inside and outside EMBL

Brenda Stride, programme administrator of the EMBL Postdoc Programme. "It's a great and very informative day, not only for EMBL pre- and postdocs but for the whole EMBL community," adds Céline Revenu, an EIPOD postdoc in the Gilmour and Hufnagel groups.

Science social

Annual showcase of research and activity at Lab Day brings together staff from across EMBL's sites



A huge celebration of science and life in the lab took place on 5 July at EMBL Heidelberg, as more than 200 staff from across EMBL's sites convened for Lab Day.

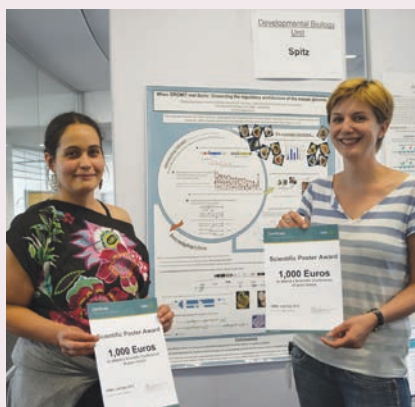
"As the talks during the sessions are so diverse, everyone gets to see different aspects of biology"
 – Claudio Alfieri,
 EMBL Heidelberg



Talks profiled some of the finest work carried out at EMBL over the past year (pictured is EMBL Heidelberg's Erika Dona).



The event featured an extensive programme, including a significant number of short talks by pre- and postdocs from across EMBL sites (pictured is Monterotondo's Noelia Madronal).



A panel of judges comprising EMBL group leaders awarded Orsolya Symmons (Spitz group) and Wanda Kukulski (Briggs group), pictured, and Katrin Eichelbaum (Krijgsveld team) prizes for the best scientific posters.

"I really like the format: short talks with plenty of time for discussion."
 – Mar González-Porta,
 EMBL-EBI

"Everyone did a great job preparing for their talks and hit the right balance to let a very wide audience pick up the key points from their exciting work."
 – Eileen Furlong,
 EMBL Heidelberg



The day was organised by EMBL Heidelberg's Eileen Furlong and Carolina Sabate, Grenoble's Ramesh Pillai, Monterotondo's Donal O'Carroll and Alvis Brazma from EMBL-EBI – and involved input from countless others.



The graduation ceremony for 13 of EMBL's latest doctorates took place in a packed auditorium, with presentations by Mirna Marinic (Spitz group) and Nereo Kalebic (Heppenstall group).

"We were very happy to see so many people attending from the outstations."
 – Ramesh Pillai,
 EMBL Grenoble



The event featured performances from some of EMBL's most talented musicians: the EMBL Choir, and the percussion band Macumba.



The fun poster prizes were in part judged by members of Administration and went to the labs of Nédélec, Schultz and Merten for their very creative displays.

Which Olympic sport might your research qualify you for?

At this summer's Olympic and Paralympic Games, there were no medals for longest experiment, fastest pipetting, or most papers published. But in a question chosen by visitors to EMBL's Facebook page – www.facebook.com/embl.org – scientists from the lab consider at which event they might excel.



Triathlon

I strongly believe that, after having studied for three years, an Olympic medal would be in my grasp had my PhD been a triathlon competition. Resilience in the long run has been key in surviving the past years. Still, sometimes legs are not enough and one needs to learn how to use every tool to speed things up, be it a bike or, in my case, one of EMBL's core facilities. And for the swimming part – well, trying to catch zebrafish when they are in a frenzy really taught me how to swim fast!

Federico Rossi, predoc, EMBL Heidelberg



Marathon

Staying power, great patience, and constant effort is required in my research work. This is true also of marathon running – only people who can endure the mental and physical stress can experience the euphoria of crossing the finish line. The ideals of the marathon are central to all sports; likewise, my area of expertise – crystallography – is essential to science. I am currently running my marathon: training day after day in purification and crystallisation. These constant efforts that push me towards my goals in the atomic resolution world are only possible with the support of many people.

Emiko Uchikawa, postdoc, EMBL Grenoble



Relay

Like a stage in a relay race, the services provided by our Core Facility form a crucial part of the research work for many scientists, providing information and data needed to attain their goal. Successful relay teams require preparation, communication, coordination, and precision. Such skills are a central part of our lab, particularly when handling, loading, and analysing protein samples – our own relay baton. Good mental preparation is also crucial: we have to solve puzzles, and interpret unexpected results – this is a challenge relay runners also face when reflecting on their performance, where fractions of a second can win or lose the race.

Joanna Kirkpatrick, senior mass spectrometrist, Proteomics Core Facility

science&society

The kindness of strangers

“Why do organisms sacrifice themselves for the benefit of others?” Oren Harman asks the audience at his Science and Society Forum lecture at EMBL Heidelberg in July. It is a question that has puzzled scientists studying the selfless actions of animals such as gazelles, amoebas and bats, since Darwin first outlined his theory of evolution, and it is also interconnected with understanding of our own behaviour. “If altruism evolved over time in nature, it must serve an ulterior purpose. This leads to the dreaded question: does true selfless altruism exist?” he asks.

To answer this, step forward tragic mathematician George Price. “Price wrote an equation used to study genetic evolution. From this he deduced that true (psychological) altruism cannot exist,” says Harman, who chairs the Graduate Programme in Science, Technology and Society at Bar Ilan University, Tel Aviv. “For him this was a terrible realisation, and he set out, on the dingy

streets of London in the 1970s, to become a radical altruist in order to prove that the math were wrong. Yet in trying and failing to truly help the homeless, he ended up becoming one of the vagabonds that he had set out to save – and paid the ultimate price when he committed suicide.”

A clear moral says Harman – who used Price's story in his book *The Price of Altruism* to illustrate 150 years of efforts to find the origins of kindness – is that there are limits to the contribution that science can make in understanding such phenomena. “Price's story is a personification of the very paradox of altruism,” he explains. “It shows that the tools that science has in its possession are not always relevant to the kind of questions we are interested in. People are trying to find the genes for altruism and the particular regions of the brain that play a role in altruistic behaviour. But if we are able to answer all the scientific questions we can pose, will it



explain everything that we want to understand? George Price's story demonstrates that the answer to this question is: no.”



Andrew Harrison (right), Director of the Institut Laue-Langevin (ILL) with EMBL DG Iain Mattaj on a visit to EMBL Heidelberg



Team EMBL completes the most laps in a race that raised over 20 000 Euros for the German National Centre for Tumor Diseases



Dancing the night away at the EMBL Summer Party in Heidelberg, 7 July

Courtesy of Toby Gibson



Swing dancing EMBL-style – predocs Daniela Casarubea and Erika Dona during a meeting of the Swing Dance Club



Members of the Alpine Club scale the Mer de Glace glacier in Chamonix, during a training course in June

Courtesy of Pablo Rios



Staff and visiting students during EMBL's 2012 undergraduate reception on 14 August

newsinbrief

- ⇒ EMBL has signed a Memorandum of Understanding (MoU) with Infrafrontier, which aims to develop a pan-European infrastructure that provides the biomedical research community with the tools needed to unravel the role of gene function in human disease, such as phenotyping, archiving and distribution of mouse models. Signatories to the MoU, which include several European countries, express an interest in implementing Infrafrontier, including the establishment of a legal entity for the coordination of the pan-European activities of research infrastructure, and the financial support of the contributing national facilities.
- ⇒ User experience and communication experts at EMBL-EBI have recently published a perspectives piece in *PLoS Computational Biology* that explores

the benefits of applying user-centred design (UCD) to the creation of bioinformatics resources. It includes case studies of recent projects at the EBI (headed by Jenny Cham and Paula de Matos) that have incorporated UCD. “UCD involves finding out what users need before you even create the first mock-up,” says Katrina Pavelin, lead author on the paper. “As a result,



Published in *PLoS*: Jenny, Katrina and Paula

the end product will provide a better user experience, and more people will have access to the data. This raises the profile of the resource and could lead to more scientific discoveries.”

<http://bit.ly/UCDperspective>

- ⇒ EMBL's Staff Association has appointed Rachel Mellwig, interim Head of Electron Microscopy, and Liselott Maidment, EMBO long term fellowships administrator, as co-chairs. For the first time, vice-chairs of the association have also been appointed at each of EMBL's five sites: Vladimir Benes, Head of Genomics Core Facility, EMBL Heidelberg; Andy Jenkinson, information integration specialist EMBL-EBI; Christoph Bieniossek, postdoc, EMBL Grenoble; Johannes Schmidt, Head of IT Services, EMBL Hamburg; and Daniel Bilbao, staff scientist, EMBL Monterotondo.

events@EMBL

3–11 September *EMBL Hamburg*
EMBO Practical Course: Protein Expression, Purification, Characterisation and Crystallisation

6 September *EMBL Heidelberg*
Science and Society Forum Lecture:

Egg to organism: Visualising the concepts of development, Benny Shilo, Weizmann Institute, Israel

7 September *EMBL Heidelberg*
Distinguished Visitor Lecture: Huanming Yang, Beijing Genomics Institute

13–16 September *EMBL Heidelberg*
EMBO|EMBL Symposium: Diabetes and Obesity

19–22 September *EMBL Heidelberg*
EMBO|EMBL Symposium: Quality Control – From Molecules to Organelles

20 September *EMBL Heidelberg*
Science and Society Forum Lecture: Sharing bioresources and data: ethical aspects, incentives and evolving framework, Anne Cambon-Thomsen, CNRS, France

7–10 October *EMBL Heidelberg*
EMBO|EMBL Symposium: The Complex Life of mRNA

13–16 October *EMBL Heidelberg*
EMBO|EMBL Symposium: Germline – Immortality through Totipotency

16 October *EMBL Heidelberg*
Science and Society Forum Lecture: Race and gender in a post genomic age, Sarah Richardson, Harvard University

17–24 October *EMBL Hamburg*
EMBO Practical Course: Solution Scattering from Biological Macromolecules

18 October *EMBL Heidelberg*
Distinguished Visitor Lecture: Mike Levine, University of California at Berkeley

19 October *ZMBH Heidelberg*
10th Public Molecular Medicine Partnership Unit (MMPU) Research Day

19 October *EMBL Monterotondo*
Distinguished Visitor Lecture: Thomas Gingeras, Cold Spring Harbor Laboratory

For more details about these events and more, visit www.embl.org/events.

people@embl



Graham goes ‘down under’

Former EMBL-EBI Associate Director Graham Cameron has been tempted out of retirement to help develop bioinformatics services at EMBL Australia. Joining the University of Queensland in October, Graham will work with experts in EMBL's associate member state to develop and expand access to bioinformatics resources, such as those delivered by EMBL-EBI.

EMBL Australia, formed in 2008, is an unincorporated joint venture between a group of eight research universities, the Commonwealth Scientific and Industrial Research Organisation, and others, whose mission is to oversee the implementation of the Australian associate membership to EMBL. Australia's strengths in areas such as cell biology and regenerative medicine are seen as highly complementary, and scientists collaborate in areas such as imaging and training.

Australia's membership is up for renewal in 2015, which will be preceded by a comprehensive evaluation process that will start this autumn with a review conducted in Australia by an external experts panel, and will be completed in May 2013 following the recommendations of EMBL's Scientific Advisory Committee to EMBL Council on the country's participation.

The decision on renewal will be based on the outcomes of the evaluation, and will require a formal written request to the EMBL Council by the Australian Government no later than 1 September 2013, followed by a unanimous approval from the EMBL Council.

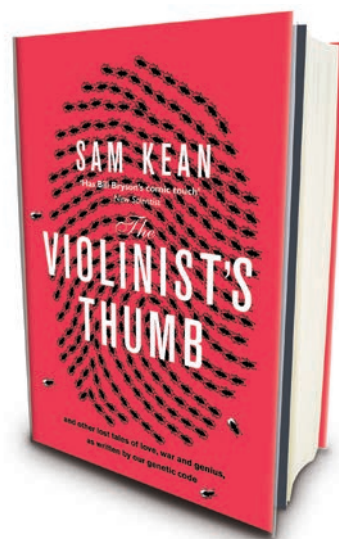
bookreview

The Violinist's Thumb, Sam Kean

Predoc Dermot Harnett enjoys the storytelling in a book of ‘lost tales of love, war, and genius, as written by our genetic code’

The science of DNA doesn't usually make for good dinner conversation. *The Violinist's Thumb* by Sam Kean, is here to help. Kean has a knack for depicting the human stories behind scientific discoveries, and ferreting out memorable stories, such as the violinist Paganini's “faustian bargain” with his DNA, that gave him inhumanly flexible fingers at the price of illness and an early death. Even someone intimately familiar with the material will be engaged by the story of Calvin Bridge's philandering, or Jean-Baptiste Lamarck's death as a pauper.

Amidst all this Kean manages to summarise almost all the major developments in genetics from the past 100 years. Kean also does a good job avoiding the temptations and pitfalls rife in the media's reporting of molecular biology. His refusal to overplay either genetic determinism or environmental influence is spot on. His own account of his experience with personal genotyping also deserves a hat tip for its candor. Kean is weakest when discussing evolution – his account of the evolution of multicellularity, for instance, overstates the consensus on what is still a contentious issue.



Kean is a storyteller, first and foremost. He is not a scientist, nor a historian of science, and has no such pretensions. There is little, if any, technical detail here. What Kean does well is entertain while he informs. This book is a good introduction for anyone interested in DNA and molecular biology, and for its storytelling alone, is well worth a read.

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