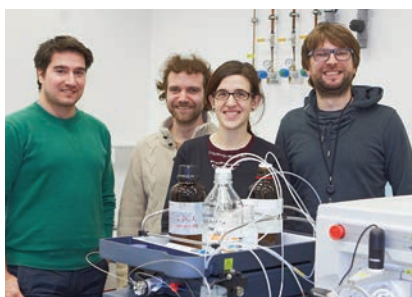


EMBL *etcetera*

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Nuclear reactions

Interdisciplinary research that combined expertise from three EMBL groups has shed light on the structure and architecture of the mysterious gatekeeper to the nucleus: the nuclear pore complex (NPC).

Scientists in the Beck, Bork and Lemke groups put their heads together, and using techniques in mass spectrometry and fluorescence microscopy revealed the relative and absolute numbers of the 30 distinct protein types that make up the NPC.

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When art and science collide



Expanding our horizons

Nordic EMBL partnership is extended and enlarged, and the roof is completed on the Genome Campus's newest addition



[New Danish node, page 2](#)



[Topping out at EMBL-EBI, page 3](#)

EMBL ambassadors around the world

How scientists from the lab are enhancing expertise and connections overseas

Advanced training has always been one of EMBL's core missions, with a significant number of activities taking place across the lab's five sites each year. But did you know that scientific ambassadors from EMBL also take many training opportunities on the road? We catch up with three such initiatives that led researchers from the lab to the Czech Republic, Morocco and Zimbabwe.

[Find out more on page 8](#)

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Difficult path to antibiotics

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EMBL alumni without borders

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Beware the Black Death!



Renewal and expansion of Nordic partnership

The Nordic EMBL Partnership for Molecular Medicine celebrated two important milestones on 5 March: the renewal of the partnership agreement for an extended period of 10 years, and the expansion of the network, with the official opening of the Danish Research Institute of Translational Neuroscience (DANDRITE) at Aarhus University, which becomes its Danish node.

The partnership was initiated in 2007 between the University of Oslo, Umeå University, University of Helsinki and EMBL. As a result, three nodes were established in Norway, Sweden and Finland. Working closely with EMBL, they aim to rise to challenges in biomedicine, develop industry collaborations, and enhance access to scientific infrastructure, services and training activities.

The research alliance is further strengthened through the inauguration of the Danish

node: five new research groups will be established at DANDRITE. Amongst its major goals is understanding more about signal processes associated with neurological and psychiatric disorders.

“We’re excited to welcome Denmark as the fourth partner in the Nordic EMBL Partnership for Molecular Medicine. Aarhus University’s scientific expertise in the neurosciences and its research environment offer an excellent base for building a world-class collaborative institute like DANDRITE,” says Iain Mattaj, Director General of EMBL.

“The partnership with EMBL has arisen from the independent research approach, and DANDRITE has high ambitions, plenty of funding, independence and excellent infrastructure,” adds Poul Nissen, Director of DANDRITE and Professor of Protein Biochemistry at Aarhus University.

Peroxisome students could smell success thanks to new initiative

EMBL Hamburg is one of eleven European research groups who together have launched the EU-funded Marie Curie Initial Training Network ‘PerFuMe’ (PERoxisome Formation, FUNction, METabolism), with the goal of training future European science leaders to work on cutting-edge peroxisome research.

Coordinated by Ida van der Klei from the University of Groningen in the Netherlands, this interdisciplinary network is at the interface of medicine, plant and fungus biology, focusing on peroxisomes. Peroxisomes are ubiquitous organelles that fulfill essential

functions in our cells, yet their importance has been underestimated, and the atlas of peroxisome functions is far from complete.

PerFuMe will train 12 PhD students and four postdocs with the latest technologies in a wide variety of fields, including cell biology, biochemistry, genomics, and protein structure analysis. Funded by the EU, the project has a total budget of 3.9 million Euros and will run until December 2016.

“PerFuMe brings together a lot of well-established expertise from several disciplines for the first time,” says Matthias Wilmanns, Head of



EMBL Hamburg, who will be leading the work at the outstation. “With this diverse range of tools and knowledge at their fingertips, the students who will profit from this programme will be in the best possible position to go on to perform world-leading research in the field of peroxisomes, and strengthen Europe’s competitiveness in this research field.”

Notice something different?

The EMBL-EBI website – www.ebi.ac.uk – was re-launched in March, providing an improved experience for visitors. The redesigned website is much easier on the eye, and more straightforward to get around.

To make it all happen, many teams worked together to articulate guidelines, design things like icons, get the code library in order, organise and centralise a huge amount of content, and create a workable, open-source content management system (in line with EMBL-EBI’s commitment to open source). The new guidelines, which are available for anyone to use, will be applied on a rolling basis over the next couple of years.

A sketchnote by EBI user experience designer, Francis Rowland, gives a peek behind the scenes



Topping out in Hinxton

On 8 March EMBL-EBI celebrated the completion of the roof on the Genome Campus's newest addition. Head of Administration, Mark Green, presided as MC, and Director Janet Thornton was joined by Chris Tredget of Wilmott Dixon and Paul Gemmill of the BBSRC in praising everyone's efforts.

Progress on the building has been swift and steady, and Janet announced she was extremely pleased to see the new South Building coming along so well – only nine months ago there was nothing under foot but a cleared site. She said: "Huge projects such as these do not happen by accident. They are the culmination of months of planning, design, discussion, collaboration and physical endeavour on the part of very many people from different organisations, working in tandem. And it is this that I want to celebrate today – the fact that fantastic things can be achieved when we work together. Collaboration is the way in which we achieve excellent science and working collaboratively is, in my opinion, the only way to succeed and deliver great projects." The building will be officially opened in the autumn, so stay tuned.

Top: Steady progress on EMBL-EBI's new building
Bottom: Janet speaking at the topping out ceremony



New gateway to super-resolution

Scientists in the lab are now able to image objects in living samples even smaller than previously possible, thanks to a collaboration agreement signed between EMBL and Leica Microsystems on 21 March.

A Leica SP8 TCS gated stimulated emission depletion (STED) confocal microscope has been installed without charge at the Advanced Light Microscopy Facility (ALMF) for at least 12 months. Scientists working at EMBL will put the microscope through its paces, with the aim of developing applications in a wide range of fields.

Combining resonant scanning, time-gated hybrid detection and STED super-resolution technology, the microscope allows scientists to look directly at objects less than 50 nanometres in size – such as nuclear pores or transport vesicles inside cells and live viruses. "We are very proud

that we can add another milestone to this very fruitful collaboration," says Eoghan O'Lionaird, President of Leica Microsystems. "I am keen to see how EMBL researchers will drive their science forward and develop new applications. There is a lot to discover in pushing the borders of speed, sensitivity, and resolution, and we are delighted to be a partner to EMBL in helping them make these discoveries."

"EMBL and Leica have a valuable partnership, with many years of cooperation," adds Rainer Pepperkok, Head of the ALMF. "The agreement will enable scientists to explore applications that could help bridge the gap between ultrastructural electron microscopy- and conventional light microscopy-based imaging analyses and enhance the study of biological organisation across scales."



Left to right: Christian Boulin (Director of EMBL Core Facilities), Iain Mattaj (EMBL Director General), Stefan Trager (Vice President, Leica Microsystems), Dietmar Gnass, (R&D Director Leica Microsystems)

Tara's polar circle

Tara, the research vessel that last year completed a two-and-a-half-year, 60 000-mile voyage across the Atlantic, Pacific, Antarctic and Indian Oceans, will set off on another adventure in May, to the Arctic. Tara's new mission, which will last for seven months, is to circumnavigate the Arctic Ocean by the Northeast and Northwest Passages. Bringing together scientists from a broad range of institutes and disciplines, the voyage aims to study the impact of climate change and pollution on polar marine ecosystems and raise awareness of human impact. EMBL's Eric Karsenti is scientific coordinator and Steffi Kandels-Lewis is logistics manager for the expedition.



The mysterious gatekeeper of the nucleus

To protect their DNA, cells in higher organisms are very particular about what can and cannot pass out of the nucleus – a gatekeeping function of the eukaryotic nuclear pore complex (NPC). Despite being relatively big in size (each contains about 1000 proteins), how the NPC is arranged and carries out its job remains largely unknown. But scientists at EMBL Heidelberg have taken a step towards addressing this, shedding light on its overall architecture and structure.

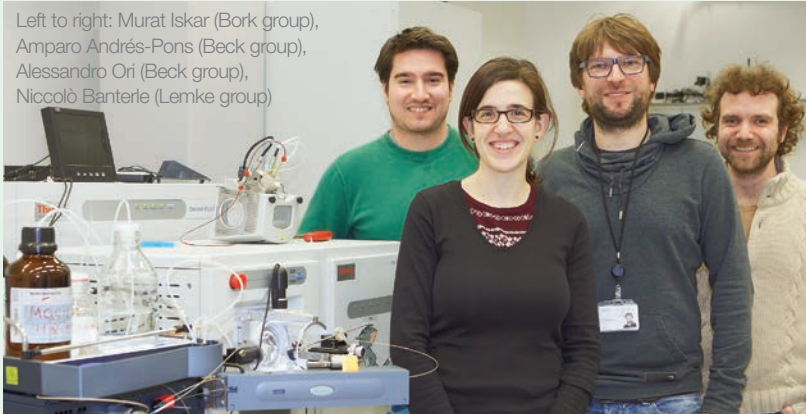
Published in *Molecular Systems Biology* in March, researchers in the Beck group used targeted mass spectrometry to study both barrier and scaffold proteins and identify the abundance of the 30 distinct protein types that make up the NPC relative to each other. Then they turned to colleagues in the Lemke group and, using fluorescence

microscopy, determined the absolute numbers of each protein in the complex.

Combining both sets of data gave the copy number of all the proteins making up the NPC, which to their surprise was double the number previously assumed. Bringing in expertise from the Bork group, they also learned that while the scaffold proteins are always found in the same ratio and copy number, this is not true of those forming the permeability barrier – possibly because the permeability barrier adjusts to different cell types' needs.

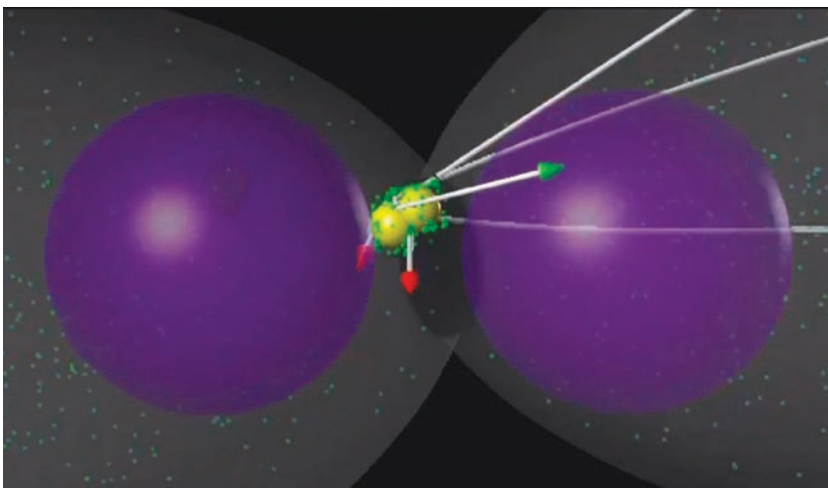
“This raises a number of important questions – why do these changes occur? What do they mean? What is regulating their formation?” says Alessandro Ori, who led the study. “The research highlights the potential benefits of taking a complex-centred approach to studying biology and disease.”

Left to right: Murat Iskar (Bork group), Amparo Andrés-Pons (Beck group), Alessandro Ori (Beck group), Niccolò Banterle (Lemke group)

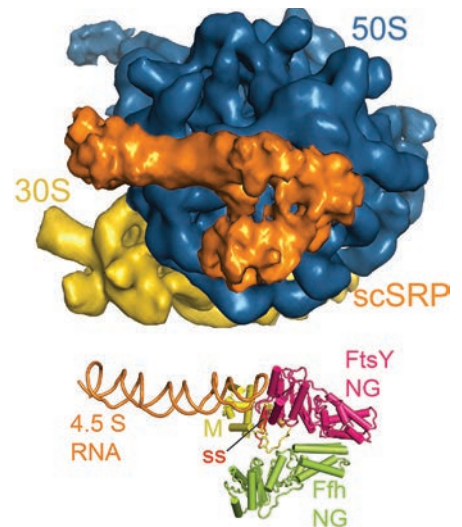


When two become one

Temperatures were raised at EMBL Heidelberg when scientists studying the sexual reproduction of yeast revealed a crucial mechanism in how the cells fuse together during mating – and it is remarkably similar to conception in humans. The researchers were able to visualise the process by combining expertise in physical biology, electron tomography and live-cell imaging. The work was published in *Genes and Development* in February. See the video here: <http://youtu.be/uC1GjTvAjzw>



Top: Structure of the ribosome (blue and yellow)-SRP-FtsY (orange) complex when membrane-targeting cannot be completed. Bottom: model for FtsY receptor (magenta) and SRP (orange, yellow, green) in complex with a signal sequence (red)



Tag team

In a cell, proteins don't just float around at random: they are directed to specific places and roles. This detailed targeting is led by 'signal peptides', molecular tags that are synthesised together with the protein by the ribosome. For proteins that will be embedded in or transported across the hydrophobic cell membrane, this signal peptide is hydrophobic. It binds to the signal recognition particle (SRP) while the nascent protein is still being synthesised. The SRP will then target the ribosome and the nascent protein to its membrane receptor.

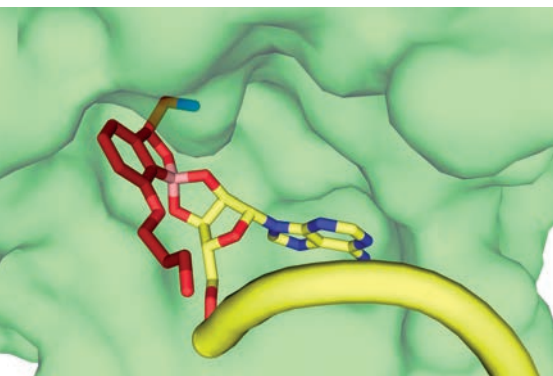
In an article published in *Nature Structural & Molecular Biology* in April, scientists in the Schaffitzel group at EMBL Grenoble have determined, with unprecedented resolution, the 3D structure of the complex formed by the nascent protein (including the signal peptide), the ribosome, the SRP, and the membrane receptor. By combining this information with thermodynamic and kinetic data from the Shan group (California Institute of Technology), they outline the necessary quality control checks for the protein to be accurately targeted to the membrane via SRP. At the core of this is the signal peptide: a strong hydrophobic signal will bind efficiently to SRP and to the receptor, thus guiding the protein towards the membrane. A weakly hydrophobic signal might still bind to SRP, but not to the receptor, and the complex will disintegrate.

“This quality-control mechanism is very important in understanding how proteins are synthesised and accurately directed to their effective place,” explains Christiane Schaffitzel. “We did this study in *Escherichia coli*, but the proteins involved are highly conserved through species, so we expect the mechanism to be similar in humans.”

Difficult path to antibiotics

A growing number of previously treatable infectious diseases are becoming harder, if not impossible to treat, as bacteria develop resistance to available antibiotics. To tackle this issue Stephen Cusack's group at EMBL Grenoble, together with California-based company Anacor Pharmaceuticals, is taking part in a global race to develop new antibiotics.

About 10 years ago, Anacor discovered that small molecules called benzoxaboroles, reduced the growth of fungi by blocking their leucyl-tRNA synthetase (LeuRS), an enzyme essential for protein synthesis in all living cells. Based on the crystal structures of LeuRS discovered by the Cusack group, which revealed the mechanism of inhibition, modified



Surface of bacterial LeuRS in green, where AN3365 (red) blocks the tRNA (yellow) and prevents protein synthesis. AN3365 reacts covalently with the last base of the acceptor stem of the tRNA (Adenosine represented by yellow sticks) and establishes other interactions to the protein and the tRNA (not shown)

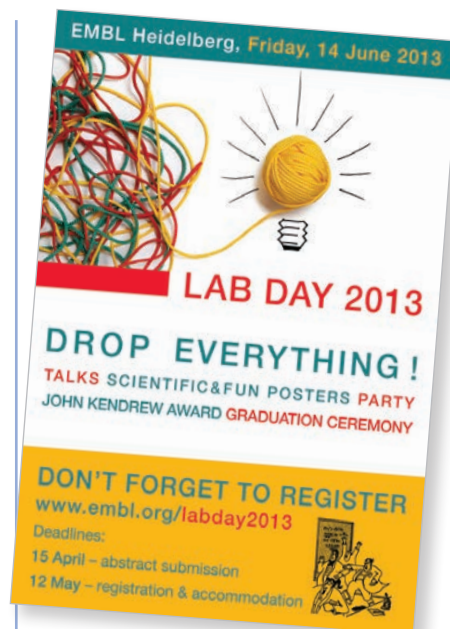
benzoxaboroles were designed to specifically block bacterial LeuRS.

One compound, called AN3365, gave promising results in pre-clinical studies against multi-resistant *Escherichia coli*, and *Pseudomonas aeruginosa* strains. It became the first completely novel antibiotic against Gram-negative bacteria to successfully complete a Phase I clinical trial in 40 years.

Hopes were therefore high for parallel Phase II clinical trials against complicated urinary tract and abdominal infections. However, despite clear evidence of clinical efficacy in some patients, some others generated resistant bacteria. As a result both clinical trials were stopped.

“Our structures helped to design novel molecules, which performed well *in vitro* and in mouse models. Indeed, AN3365 worked better than some of the most potent antibiotics used in hospitals but, unfortunately, we had problems with resistance in humans”, says Andrés Palencia from EMBL Grenoble.

Despite these setbacks, the need for new antibiotics is pressing and efforts to overcome the problem still continue (for example, by altered dosing or combination therapy). In addition, the same combination of medicinal chemistry, biochemistry, pharmacology, microbiology and structural biology is currently being used by Anacor and the Cusack group to engineer new drugs against tuberculosis, as well as malaria, lymphatic filariasis and river blindness, three debilitating parasitic diseases that are rife in the tropics.



Put down your pipette

EMBL's annual celebration of research and other activities, Lab Day, will take place on 14 June, with staff from all sites coming together to showcase science, connect with colleagues, and inspire innovation.

Taking place at EMBL Heidelberg, the event will deliver an exciting programme of short scientific seminars, parallel themed plenaries, and poster sessions. Research abstracts are invited from every lab at EMBL and some will be selected for oral presentations, while those remaining will be presented as posters. All groups and units are also invited to show off their creative edge in the popular fun poster sessions. There are awards for the best three posters in each category.

As in previous years, the day will also feature a graduation ceremony for EMBL's newest doctors, the prestigious John Kendrew Award ceremony, live music from an EMBL band, and an evening get-together. Organisers Eileen Furlong (Heidelberg), Ramesh Pillai (Grenoble), Alvis Brazma (EMBL-EBI), and Donal O'Carroll (Monterotondo) welcome your ideas and feedback.

Past Lab Days live long in the memory and staff from all sites are urged to put down their pipettes, close their computers, adjourn their assays, and get involved.

Lab Day will be preceded by Career Day, on 13 June in the EMBL Advanced Training Centre. Organised by EICAT (PhD and Postdoctoral Programmes) together with EMBLEM – the commercial arm of EMBL – Career Day provides an overview of alternative, non-academic career possibilities for scientists from all EMBL sites and the local scientific community.

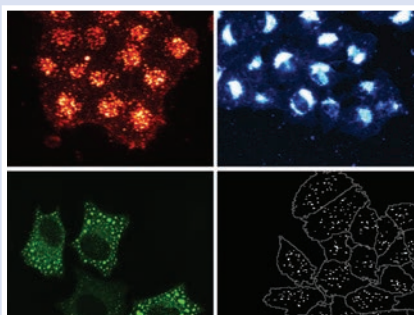
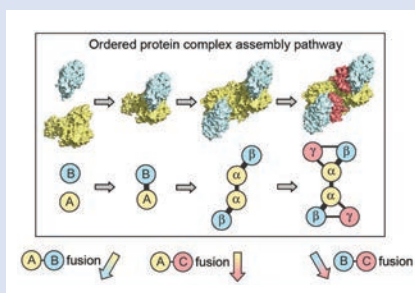
Research highlights

Perfect proteins preferred

Research published in *Cell* in April involving the Teichmann group at EMBL-EBI has revealed that the way proteins assemble into complexes has a significant impact on their function. The genetic study, which pinpointed 'gene fusion' events that take place over millions of years, found that nature prefers well-ordered protein assembly – an important question in evolution.

Zeroing in on heart disease

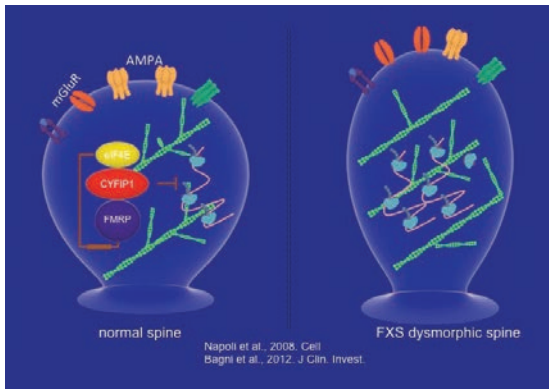
The Pepperkok (EMBL) and Runz (University of Heidelberg) groups have identified genes that could have a role in the onset of heart disease. Using RNA interference to study 56 regions previously identified by genome-wide association studies as being linked with cardiovascular disease, the team deduced specific genes likely to be involved in its onset. It was published in *PLoS Genetics* in February.



EMBL exports to Belgium

Belgium, an EMBL member state since 1990, is currently home to more than 40 known alumni. Half continue to work in academia, at the universities of Brussels, Leuven and Ghent among others. Just over one-third have made the move to industry. Here, two alumni in Belgium share their different paths since leaving EMBL.

On the road to understanding intellectual disabilities



Claudia, right, investigates how local protein synthesis shapes and reshapes the synapse

Since joining the laboratory of Molecular Neurobiology at the University of Leuven (KU Leuven) five years ago, former EMBL postdoc and Professor at the University of Rome Tor Vergata, Claudia Bagni, has been appointed Director of the Neurogenetics Program at KU Leuven's Center for Human Genetics (2012), been elected an EMBO Member (2011), set up a successful laboratory attracting international pre- and postdocs, and obtained several scientific achievements, including a paper in *Cell* (Napoli *et al*, *Cell* 2008).

What is the current focus of your work?
My group aims to understand the cellular and molecular aspects of intellectual disabilities, such as Fragile X Syndrome (FXS), the most common inherited cause of learning disability. We aim to identify synaptic pathways that are impaired in FXS, as well as autism, schizophrenia and, recently, Alzheimer's disease. Examining molecular mechanisms at the synapses could make major inroads into processes that govern learning and memory, as well as human behaviour and neurodegenerative diseases that arise from malfunctioning synapses.

Why did you decide to go to Belgium?
I joined the Center for Human Genetics because it is one of the largest in Europe, with the most diverse patient population with inherited intellectual disabilities. Its founder, Professor Herman Van den Berghe, was among the pioneer clinicians who described patients with FXS. I'm also interested in developing possible pharmacological approaches to modulate aspects of FXS and autism, and VIB and KU Leuven support this approach and research.

What do you enjoy about your work?
The Center for Human Genetics is part of KU Leuven, the University Hospital Leuven (UZ Leuven) and VIB; the integration and complementary vision of these different entities creates many opportunities and provides excellent technology platforms.

⇒ EMBL and VIB scientists collaborate in several fields and have published 22 joint publications since 2011.



In the business of science

Emmanuel Lacroix works at the cross-section of science and industry, as Senior Director of Global Business Development for UCB, a Brussels-headquartered global biopharmaceutical company.

With a PhD from EMBL's Structural and Computational Biology Unit, Emmanuel began his career in the biopharma industry in 2001 as project leader and later head of a research group at a biotech company in Paris. Emmanuel further graduated with an MBA in 2006, and from here returned home to Belgium in 2007, where he now seeks, assesses and negotiates potential partnerships and product licensing opportunities for UCB's neurology pipeline and global portfolio.

"My work in business development is intense and varied," he reveals. "It requires not only interfacing with multiple parties outside UCB, but also leveraging UCB's own internal strengths and expertise from every function. That's where a combined background in science and business proves very valuable." He enjoys this diversity, but moreover, finds the work extremely rewarding: "At UCB, we aim to contribute significantly to the lives of patients in strong need, especially those with severe, disabling and chronic conditions in neurology and immunology."

"We aim to contribute significantly to the lives of patients in strong need"
– Emmanuel Lacroix

Asked how EMBL has shaped his career, Emmanuel says: "EMBL's facilities – its lab resources, leaders and experts in many areas – helped me accomplish lots of good research during my PhD and postdoc, which I could immediately put to use in the biotech industry. EMBL is a well-known and respected institution, not least in industry: alumni have good credibility, which is very helpful, as in my case, when a scientist turns to business."

⇒ For further information about research and innovation in Belgium, visit www.research.be.

Mark your diaries

7 June *Institut Curie, Paris*
Alumni in France meet to discuss grants, networks and resources

13/14 June *EMBL Heidelberg*
Alumni Association Board meeting

14 June *EMBL Heidelberg*
John Kendrew Award Ceremony during Lab Day. Winner: Katharina Ribbeck, Presenter: Ari Helenius

29 June *EMBL Heidelberg*
EMBL staff/alumni get-together followed by the Summer Party

18 July *University of Lisbon, Portugal*
Molecular biology in Portugal, at EMBL and by EMBL alumni

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

Alumni without borders

Patricia Kahn, former staff scientist from the Structural and Computational Biology Unit, relates her humbling and rewarding experience working as a medical editor for Médecins Sans Frontières (MSF).

“MSF is known for its medical work after natural disasters, in very poor, neglected populations and in war zones. Less known about MSF is that we do a lot of operational research in these settings, and publish quite a bit in medical journals – 150 papers last year. That’s where I come in. I didn’t work on all 150, fortunately, but I help with some of them, from the initial brainstorming about what issues to focus on, to shaping and editing manuscripts, selecting journals and helping authors respond to reviews. Besides research articles, MSF also publishes lots of perspective-type pieces and policy articles about what our teams on the ground are seeing and learning about health care delivery in very difficult contexts.

“It’s impossible not to feel really humbled by the work MSF does, and proud to be even a tiny part of it. Every day I meet

people who are coming from or going to the conflict or (post-) disaster zones we read about in the newspapers – Syria, South Sudan, Afghanistan, Haiti. Lots of other people are off to work in places that don’t make the headlines but where the need is huge: we’re doing a lot now in Central African Republic, one of the biggest ongoing disasters you’ve probably never heard about. The clarity of purpose within MSF, and the dedication and professionalism of its staff, are extremely powerful, and inspire me every day.

“Although I’ve moved from molecular biology into medicine and public health, research is research – and the scientific excellence and rigor that surrounded me at EMBL was training that continues to help me every day. I also made my first career shift while at EMBL, away from the



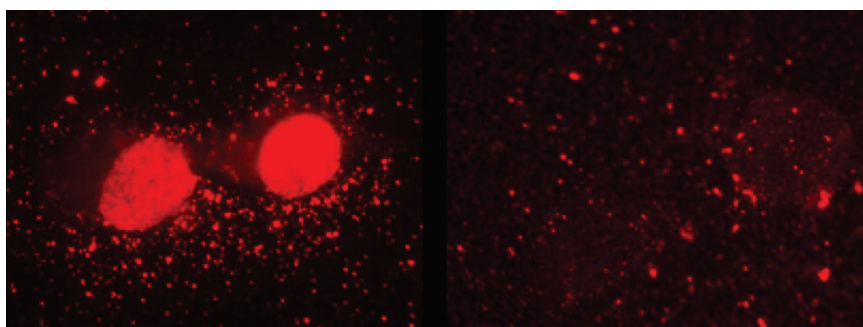
Patricia (inset) edits operational research papers, covering topics such as pioneering vaccination campaigns that inform new strategies for medical aid

bench and into the EMBL Data Library (the seedling for EMBL-EBI). The Data Library was my first in-depth exposure to science communication across a big communication gap – biologists and computer people inhabited different planets back then, and they spoke very different languages. This was a very useful experience for a budding writer!”

Discovering the enzymes that shout ‘back to normal’

Former Genome Biology Unit group leader Andreas Ladurner and colleagues, recently discovered the enzymes responsible for indicating when cell stress is over and when the cell machinery should come out of defence and repair mode to resume normal functions. They also found that the absence of one of these crucial enzymes leads to a serious neurodegenerative disease.

The two discoveries, published in *Nature Structural & Molecular Biology* and in *The EMBO Journal* in March, pinpoint enzymes that researchers have been seeking for the past 30 years. Andreas, now Professor and Chair of the Department of Physiological Chemistry at the Ludwig-Maximilians-University (LMU) in Munich, talks about his next steps, as well as reflecting on his workplace priorities.



The newly discovered enzyme shuts down the cell’s response to DNA damage (right)

Did you collaborate with other EMBLers?
EMBL’s Protein Expression and Purification Core Facility was very much involved through Vladimir Rybin, who does a fantastic job providing biophysical support. The work would not have been possible without my former postdoc Markus Hassler, now in the Häring group. He was a driving force behind a lot of the structural work in our lab.

What are your next research steps?
To study the role of the new enzymes at the cellular and physiological levels. Since there appears to be a fair amount of genetic redundancy for these components, we plan to look at the function of

Ladurner family: Andreas, one-year old Aaron, EMBL Kinderhaus alumna Mia, EMBL alumna Carla Margulies – now group leader at LMU

these proteins in the fruit fly. We are also keen to exploit proteomic approaches to figure out what proteins are modified by ADP-ribosylation during normal growth, as well as in various stress conditions, from DNA damage and heat-shock to hormone-induced gene activation and during metabolic manipulation.

How does your new workplace compare?
There are many incredible colleagues here who complement what we do and are focused on doing great science. This was my biggest wish when leaving EMBL – to find a new home for my team that would allow us to continue to have critical feedback, a mass of expertise to tap into, and opportunities for collaboration. This collegiality and openness brings back the EMBL and EMBO spirit.

Programme manager

Leaving the bench after a PhD does not necessarily mean wearing an ill-fitting suit. Take alumna Anne-Marie Glynn, for instance, who as manager of EMBO's courses, workshops and global activities applies scientific expertise to a diverse range of professional settings.

"I like research but I did not want to commit to focusing on one area in depth," says Anne-Marie, who gained her doctorate in the Frangakis group at EMBL Heidelberg. "EMBO is an organisation of more than 1500 experts from across the spectrum of molecular life sciences, and our courses and workshops aim to reflect that diversity."

Her role includes communication, negotiation, report writing, developing new ideas and, just a year after securing the position, it expanded to coordinating EMBO's activities beyond Europe. She says that the variety of responsibilities she has is one of the most fascinating aspects.

"We are trying to increase interactions between top-level scientists," Anne-Marie explains. "A typical day might involve thinking



Alumna Anne-Marie Glynn is a programme manager at EMBO

about effective evaluation systems, discussing funding arrangements, or speaking to ministries in Asia, Africa or South America about scientific or economic impact. It is my job to make people aware of platforms, such as courses, fellowships and travel grants that EMBO can provide, in order to bring researchers together. Sometimes things happen at very short notice – I might be asked to give a presentation, or an election might be unexpectedly called in a country we are working with, which could mean we need to adapt."

Programme management suits many personalities and skill sets, but it is important to

take advantage of opportunities to find out what works for you, she explains. "At EMBL I was involved in activities such as working as a representative for the Staff Association and organising student symposia. This can prepare you for everyday challenges, such as finding solutions if a speaker cancels an appearance on the morning of an event. Ask yourself what you like doing, take advantage of training opportunities, develop your personal network, and get involved."

➔ **For more from off the beaten track: Career Day, 13 June, EMBL Heidelberg**

EMBL ambassadors around the world

Prudence Mutowo: funded through EMBL-EBI's new Ambassador Scheme, which supports EBI staff to run scientific engagement activities

"I visited the African Institute of Biotechnology in Zimbabwe, which trains biomedical scientists from across Southern Africa. I ran a session that explored web-based resources for biomedical scientists, as well as giving a talk on my personal experiences as a scientific database curator. Most had not heard about our resources and were enthusiastic about how useful the databases could be for their research. They were especially interested in Train online, which means that they don't have to travel to EMBL-EBI to benefit from our training. This was a fantastic opportunity to meet potential new users – they inspired me to think about our resources in new ways."



Vladimír Beneš: joint initiative by EMBL, Charles University (Prague) and South Bohemian University (Budweis)

"Staff from EMBL's Core Facilities teamed up to deliver a course in Budweis, Czech Republic, focused on enhancing use of methods in functional genomics. More than 100 participants, including undergraduates, pre- and postdocs, took part and it helped to forge further scientific connections with colleagues in the country and with those attending from further afield. Our goal was to share our expertise in genomics, proteomics, protein expression, siRNA and



live cell imaging to benefit research in a fast-moving field that uses a diverse range of cutting edge tools.

Aidan Budd: African Bioinformatics Conference (pre conference workshop)

"This one-day workshop in Casablanca, Morocco, taught African scientists to use and interpret the results of molecular evolutionary tools; these can be applied to a range of economic and health-related issues in Africa. It was a great opportunity to support the use of such methods in an African context, and to help build a social and scientific network of scientists in this field. Training can play a key role in promoting development and equality, and building bridges between scientists worldwide. It was delivered together with Olivier Gascuel (LIRMM-CNRS, Montpellier) and Sheila Ommeh (Jomo Kenyatta University of Agriculture and Technology, Nairobi)."



BRINGING THE BLACK DEATH TO EMBL

As word arrived that a brutal sickness spreading across medieval Europe was headed towards London, residents hurried outside to dig mass graves in preparation for what must have felt like the end of the world. The Black Death eventually claimed the lives of up to half of the city's population. 650 years on, its plague pits are now providing insights into the causes of the disease.

By wiggling teeth out of the skulls of four victims at the Museum of London – a man, two women and a child – Kirsten Bos and her team obtained enough DNA samples of *Yersinia pestis*, the bacteria believed to be the cause of the Black Death, to reconstruct its full genome. It was the first time an ancient pathogen genome had been computationally reconstructed. “We never thought this would be possible at the outset,” says Bos, who visited EMBL Heidelberg to give a Science

and Society Forum lecture in March. “It is very exciting because it means we are able to locate a proverbial needle in a haystack – amazingly we can isolate the DNA of a single bacterium from the complex background of soil bacteria that have accumulated in bones buried for centuries.”

As well as prompting a renaissance in genetic studies of ancient pathogens, the sequence, which was published in 2011, could help explain how pathogens evolve and potentially inform preventative measures to tackle infectious diseases.

“The Black Death wasn't just about bacteria – environmental and epidemiological factors likely supported its spread”
– Kirsten Bos

“The Black Death persisted as an infectious disease that reoccurred every 20 years or so in European populations and moreover we found that modern strains of *Y. pestis* are remarkably similar,” Bos says. “We are now looking to answer new questions: What made it resurge? Were humans doing something? Or animals? And, just as puzzling, what made the Black Death itself so devastating?”

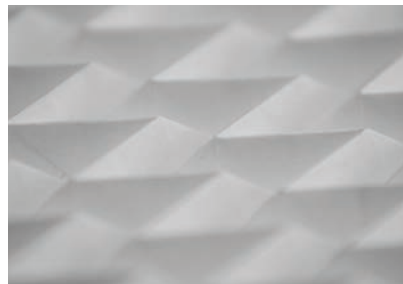
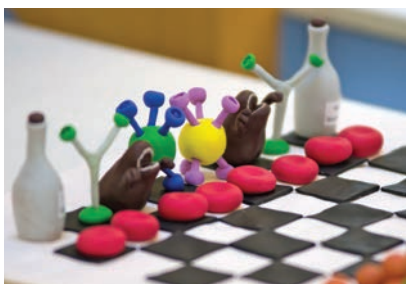
To answer them, the team are looking for other clues from skeletal remains from before, during and after the Black Death: genetic traits or changes in immunity genes that might explain why some survived while oth-

ers didn't. But they are also combining their research with social, historical and medical studies. “The Black Death was not just about bacteria – environmental and epidemiological factors likely supported its spread across the continent,” she points out.

Even with ongoing uncertainties, Bos is keen to apply the latest sequencing methods to other ancient epidemics: she has just returned from a Roman catacomb to collect samples from the time of the Antonine plague (AD 165-180). Another study is focused on the plague of Justinian (AD 541-750). “It is fascinating to learn about what health and daily life was like for individuals in different time periods,” she says. “Every time I look at a skull, I see a person. It is something very special if we can use molecular methods to help bring that person's story to life.”



Kirsten Bos is a postdoc at the Institute of Archaeological Sciences, University of Tübingen



Courtesy of Johannes Dibbern

Connecting art and science

Art and science collided head-on at EMBL Heidelberg on 21 February at the launch of a biology-inspired exhibition of work by local school students, organised jointly by EMBL's Arts Committee and the Paul-von-Denis Gymnasium, Schifferstadt.

Held at the Advanced Training Centre, the exhibition inspired a wide range of arts and crafts, including impressions of the inside of cells, clay models of infectious diseases, and even an electrifying take on the EMBL logo. More than 150 students, teachers, and staff convened for the event, which featured presentations from EMBL's Matthias Hentze and Helke Hillebrand, and

the school's director Gabrielle Steinbach and arts teacher Oliver Schollenberger, as well as live music, refreshments, and a chance to meet the stars of the show – 20 talented young artists.

“We learned how to bring together ideas from different academic worlds,” says Leonard Stegmaier, whose work used a paper-folding technique to depict folding proteins (pictured). “It was great to meet researchers and learn about what life is like as a scientist – it inspired us to think about the different and unexpected things we might connect with art,” explains Katja Logemann, who focused her work on the difference between

plant and animal cells. “While there are many places where art and science come together, my work aimed to show some of the difficulties in combining the fields,” adds Carmen Hotopp, whose dramatic – and gory – cartoons caught the eye of many attendees.

“The work on display at the exhibition was outstanding – it has doubtlessly prompted many researchers to see scientific research from a different angle and has provided a valuable platform for talented students to showcase their work and learn new ideas, techniques and perspectives,” says Helke Hillebrand, EMBL's Dean of graduate studies.

Where do you do your best thinking?



Running in the mountains

Where it happens can be so unpredictable! But my favourite place is where I go running – in the mountains around EMBL at lunchtime. The first part is uphill, what I call ‘brain resetting’ as it’s hard work and there’s not much room for thinking. But then it’s downhill, the oxygen becomes more abundant, and it can lead to inspiration. Everyone should remember the Latin quote *Mens sana in corpore sano* (a healthy mind in a healthy body). Even better, you can convince colleagues to go with you and exchange ideas. EMBL has plenty of talent, so where better to get different views and put them all together to see what comes out?

Andrés Palencia, research scientist, Cusack group



Cycling to work

Most of the solutions and new ideas I come up with, I do so while riding my bike to or from work. I cycle to work every day, like I did when I lived in the Netherlands. During this time I plan for the day ahead and think about the challenges I am facing. I presume that the lack of stress, the fresh air and the mild distraction of watching for traffic allows my thoughts to run freely: there’s no pressure to come up with a solution at that exact moment. Not every form of exercise works like that, however: my boxing class demands me to focus entirely on what I am doing!

Matthia Winter-Karreman, postdoc, Schwab team



Over a cup of coffee

My worst thinking happens typing on a keyboard, and occurs just before deadlines. The opposite situation is a relaxed conversation, where ideas flow from curiosity rather than impatience. But creativity in science has to be coupled with a ruthless self-criticism if it is to connect with reality. Being human, I tend to like my own ideas more than they deserve and I find airing them to someone else forces a certain discipline. It also requires the courage to risk a certain loss of face. This is probably why I do my best thinking in relaxed conversation with colleagues, over coffee.

Dermott Harnett, predoc, Furlong group

Entente Cordiale

EMBL Heidelberg hosted a delegation from the French Higher Education and Research Ministry on 2 April. Philippe Lavocat (chief scientific advisor), Gilles Bloch (CEA) and Michel Kochoyan (CNRS) met with EMBL representatives to discuss hot projects, including EMBL’s participation in large-scale infrastructure projects such as Euro-BioImaging, and ELIXIR. On 18 April, EMBL also welcomed Martin Ehrenhauser, an Austrian Member of the European Parliament.



bookreview

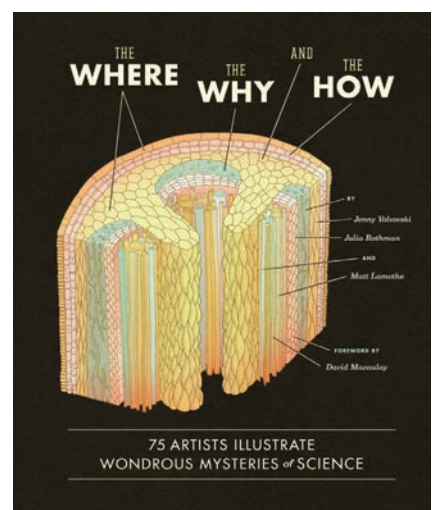
The Where, the Why and the How, Jenny Volvovski et al.

Isabelle Kling reviews a book that artfully illustrates a collection of 75 ‘wondrous mysteries of science’

What existed before the big bang? Why do some underwater organisms light up? How can cancer be such a biologically unlikely event, and still be so common? These and a further 72 scientific questions that everybody, scientist or not, is likely to wonder about are addressed in *The Where, the Why, and the How*. Answers for your rational side lie in simple yet relevant and attractive texts, while your creative side will find food for thought in the artistic representations just opposite.

Seventy-five pairs – one scientist with one artist – were brought together for this book. Each duo answers a very basic, yet (more or less) fundamental scientific question, explaining not only what we know, but also what is still unknown and requires further research. The texts are simple and scientifically accurate, and the illustrations are artistic and informative: together they give an interesting and inspiring overview on the question they

answer. One might just wish that some pages could be transformed into a 3D exhibition.



Published by Chronicle Books



EMBL Grenoble predoc Pietro Spinelli gave a nice introduction to RNA and his research on a Université de Grenoble radio show



Susan Gasser, Director, Friedrich Miescher Institute for Biomedical Research, speaks at a Heidelberg Forum on Biosciences and Society



A (very) slow spring awakening in Heidelberg, captured, shared and much-liked on the EMBL Events facebook page



EMBL head of communications, Lena Raditsch, (far left) joins Anne Glover (centre) at the launch of the <http://horizonhealth.eu> web portal



Staff on this year's EMBL ski trip enjoy the snow at St. Anton, Austria, 21-24 March



Heidelberg group leader Jan Korbel visited EMBL Grenoble in March to give a science and society seminar on the ethics of genetics

newsinbrief

- ⇒ On 14 March, EMBL-EBI welcomed nearly 40 early-career scientists who came to find out about career opportunities, research and services at the EBI. Highlights included a genomics research talk from new group leader Pedro Beltrao, and a presentation by Brenda Stride from EMBL Heidelberg about PhD and postdoctoral opportunities across EMBL. The next Open Day will take place on 7 November 2013 and will feature a new talk: Life as a Bioinformatician: www.ebi.ac.uk/training/openday.
- ⇒ Register by 10 May for the EMBL-EBI hands-on course: Networks and Pathways Bioinformatics for Biologists, 9-12 July. www.ebi.ac.uk/training/handson
- ⇒ Computational biologists from EMBL headed to Garmisch, Germany for the 13th annual biocomputing retreat, 3-5 March (pictured). Participants took part in a diverse programme of team activi-



ties and discussions, the unstated agenda being bioinformatics community building (plus a little skiing). One highlight was an evening of debates as eight teams contested four strategies for decision-making in scientific careers: as postdoc, do you move on early or wait for the big result? Should you weight your interview technique more to established fact or futuristic fantasy? The argumentation was vigorous and offered plenty of food for thought about when, where, and how to shape a career in science.

- ⇒ EMBL-EBI hosted the first EMBO Practical Course in Metabolomics: Bioinformatics for Life Scientists on 25 March. 30 participants took part in

lectures, practical exercises and discussion sessions designed to provide firm understanding of optimal study design and data analysis.

- ⇒ EMBL Hamburg hosted the fourth EMBO course on computational structural biology, 15-19 April – the first time the event has been held at the outstation. 20 students attended the course, jointly organised by EMBL Hamburg and EMBL-EBI, which included lectures on structure-determination techniques such as X-ray diffraction, SAXS, NMR spectroscopy and EM, as well as hands-on sessions using a wide range of data analysis packages and tools.

1–4 May EMBL Heidelberg

EMBO | EMBL Symposium: New model systems for linking evolution and ecology

13–15 May EMBL Heidelberg

9th Annual BioMalPar | EVIMalaR Conference: Biology and Pathology of the Malaria Parasite

15 May EMBL Heidelberg

Distinguished Visitor Lecture:

Merging genomics with human genetics: DNA variation (CNV + SNV) underlying disease, James Lupski, Baylor College of Medicines, Houston, Texas, USA

22–24 May EMBL Heidelberg

Instruct Biennial Structural Biology Meeting

23 May EMBL Monterotondo

Science and Society Forum Lecture:

Neurobiology of human prosocial behavior: Mechanisms and clinical implications, Markus Heinrichs, Albert-Ludwigs-University of Freiburg, Germany

30 May EMBL Grenoble

Distinguished Visitor Lecture:

Biochemistry of small RNA pathway in insects, Yukihide Tomari, University of Tokyo, Japan

31 May EMBL Monterotondo

Distinguished Visitor Lecture:

Innate regulation of adaptive immunity by dendritic cells, Caetano Reis e Sousa, London Research Institute, UK

7–10 June EMBL Heidelberg

EMBO | EMBL Symposium:

Cardiac Biology: From Development to Regenerative Medicine

10–14 June EMBL-EBI

Joint Wellcome Trust - EMBL-EBI Summer School in Bioinformatics

13 June EMBL Heidelberg

EMBL Career Day

14 June EMBL Heidelberg

EMBL Lab Day

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

New centres to promote internal collaboration

Staggered by statistics? Bewildered by biological networks? Mind blown by mathematics? Three new EMBL centres, launched to support use of computational biology resources across EMBL's scientific community, may well be able to help. The thematic centres, focused on statistical data analysis, biomolecular network analysis and mathematical modelling, provide a bottom-up solution to the evolving needs of diverse research groups across EMBL's Units. Through the organisation of seminars, conferences, training activities, and technology development they aim to promote internal collaboration across disciplines and to provide a platform for EMBL scientists to connect with external researchers and groups.

The Centre for Statistical Data Analysis, headed by Bernd Klaus (Huber group), will promote efficient data mining, for instance the automation of analysis workflows, machine learning, statistical discovery and probabilistic inference. The Centre for Biomolecular Network Analysis, led by Matt Rogon (Gavin group), will provide a resource in the development of new methods, within the framework of network biology, for the representation, integration, visualisation and interpretation of complex datasets. The Centre for Mathematical Modelling, headed by Sven Mesecke (Nédélec Group), provides guidance, support and specialised training in areas such as predictive networks, models, and simulations.



Left to right: Bernd Klaus, Sven Mesecke and Matt Rogon are located at EMBL Heidelberg

awards&honours

Tanmay Bharat, who gained his PhD in the Briggs group in 2012, has been awarded the Bayer Healthcare Promotionspreis for best doctoral research in the fields of biochemistry or molecular biology. Tanmay, whose studies focused on the structure and budding of the Marburg and Ebola viruses, was presented the 1500 Euro award at a ceremony at the spring meeting of Germany's Society for Biochemistry and Molecular Biology on 5 April. "The prize recognises the excellent facilities and supervision that I have benefited from while working towards my doctorate – I was lucky to be in an environment of significant scientific freedom, which encouraged me to develop my own ideas within the context of our group's main ambitions," he says.

There were double celebrations in the Lemke group at EMBL Heidelberg in February, as predocs **Swati Tyagi** and **Niccolo Banterle** scooped prizes at the Biophysical Society's annual Student Research Achievement Awards. They were amongst 13 winners who impressed judges during the poster competition at the society's annual meeting in Philadelphia – the biggest biophysics meeting in the world, with more than 5000 participants. The awards recognise achievements across the spectrum of biophysics. Swati showcased work on a novel micro/nanofluidic hybrid device to study single molecules, Niccolo on determining the absolute numbers of each protein in the nuclear pore complex using quantitative superresolution microscopy ([see page 4](#)).

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