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EMBO 50TH ANNIVERSARY

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EMBO 50 years

www.embo.org

Science meets policy and politics

2014 marks the 50th anniversary of EMBO, the 45th anniversary of the European Molecular Biology Conference (EMBC), the organization of member states who fund EMBO, and the 40th anniversary of the European Molecular Biology Laboratory (EMBL). EMBO, EMBC, and EMBL recently combined their efforts to put together a joint event at the EMBL Advanced Training Centre in Heidelberg, Germany, on 2 and 3 July 2014. The anniversary celebration recognized the science that has contributed to the success of the organizations over the years and acknowledged the roles of EMBO, EMBC, and EMBL in policy, politics, and society.

The meeting featured the participation of European ministerial representatives, scientific talks from researchers, and presentations on policy issues focused on excellence and inclusion. It was also an opportunity to bring together current and former directors of EMBO and EMBL as well as former committee and council members who shaped the direction of both organizations over the last decades.

Maria Leptin, Director of EMBO, and Iain Mattaj, Director General of EMBL, opened the meeting and welcomed more than 250 scientists, politicians, policy makers, supporters of science, and friends of EMBO from across the world. In their presentations, they summarized the past, present and future roles of each organization. "EMBO's achievements have been possible due to cross-country cooperation," said Leptin. "The foundation of EMBC in 1969 had a dual aim: To secure a source of funds for the activities of EMBO and to provide a framework to establish the European Molecular Biology Laboratory. It is a remarkable testament that both goals have been achieved."

Georg Schütte, State Secretary of the German Federal Ministry of Education and Research, emphasized how EMBO and EMBL have been trendsetters in the life sciences. "Many former EMBL researchers are now directors of internationally renowned research institutions in Europe and have dispersed this philosophy of EMBL and EMBO across Europe," said Schütte. He also discussed the crucial early roles EMBO and EMBL played in helping molecular biology become a major, if not one of the most important, forces in influencing the life sciences over the last several decades.

The importance of the scientific workforce as a whole and the individual scientists contributing to research was discussed in several contexts. "EMBO and EMBL have shown that when Europe combines its forces by bringing together its best talents, it can lead the world in science and innovation," remarked Robert-Jan Smits, Director-General, Research & Innovation, for the European Commission. The development and implementation of key infrastructures and the provision of training have been important contributions to the European life science community.

The ability to bring highly trained individuals together, either within a physical infrastructure like EMBL, or in transnational research projects, will be a key contributor to advancing science and research in Europe over the next several decades.

In a scientific talk, Elizabeth Murchison of the University of Cambridge described her groundbreaking work to investigate two types of transmissible cancer: the Tasmanian devil facial tumour disease and the canine transmissible venereal tumour. After a ceremony to unveil the ScienceTree (*see box*), an oak tree planted in soil obtained from countries throughout the European Union to symbolize the importance of European integration, representatives from the governments of France, Luxembourg, Malta, Spain and Switzerland took part in a panel discussion moderated by Marja Makarow, Vice President for Research of the Academy of Finland. Mauro Dell'Ambrogio, State Secretary for Education, Research and Innovation in Switzerland, stressed that science policy, to be effective, must not only invest in knowledge but also in people. Carmen Vela, Spain's Secretary of State for Research, Development and Innovation, outlined how participation in EMBL had been essential for the development of science in her country. Evarist Bartolo, the Minister of Education and Employment of Malta, outlined the state of life science research in his country. Malta's application to become a member of both EMBL and the European Molecular Biology Conference was endorsed in the same week as the anniversary meeting, an excellent illustration of the roles of EMBO, EMBC, and EMBL in contributing to the cohesiveness of European research.

The second day of the meeting focused on concerns about excellence and inclusion in scientific research. Bruno Strasser, a science historian at the University of Geneva, opened by recounting the origins of EMBO and the European Molecular Biology Conference. "The history of the European Molecular Biology Conference illustrates how molecular biologists succeeded in bringing their discipline to national and international political agendas and gained broad intergovernmental backing." The journey was not straightforward and many of the barriers appear familiar for transnational cooperation projects. The scientists active in the early years of EMBO and the EMBC learned quickly and were remarkably astute in ascertaining what was needed in the context of science policy. The foundation of the EMBC was

Bruno Strasser

Elizabeth Murchison

European ministerial representatives discussed national and international science policy issues: (from left to right) **Evarist Bartolo** | Malta, **Marc Hansen** | Luxembourg, **Roger Genet** | France, **Carmen Vela** | Spain *and* **Mauro Dell'Ambrogio** | Switzerland

an essential step for the sustainable funding of the activities of EMBO, and of the laboratory that was established in 1974.

Marc Heppener of the European Space Agency explained how the ESA works as a platform for the inclusion of nations with emerging interests in space science and space exploration. He described some of the many successful projects that have been concluded or are in progress.

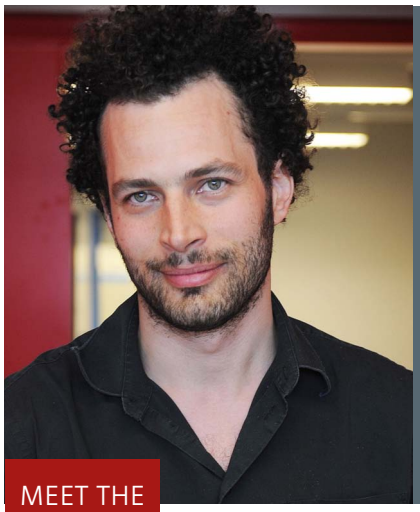
The meeting concluded with a talk and discussion specifically on the relationship between excellence and inclusion by Helga Nowotny, ERA Council Forum, Austria. The promotion of excellence is essential and well established in the European scientific landscape but challenges exist in ensuring that everyone benefits. "We are all striving to support and promote excellence in the life sciences but we have to be acutely aware that it must be inclusive and take into consideration diversity," said Nowotny. This precise concern, how to recognize and reward excellence while promoting the development of new entrants to research, is exactly the intersection where EMBO, EMBC, and EMBL will continue to work in the years ahead.

The ScienceTree

The ScienceTree project originated in the summer of 2002 when the idea of a tree to symbolize European integration was first suggested. The initial proposal was to plant a tree in soil originating from countries throughout the European Union to symbolize the importance of European integration for future generations and taking science as a leading example.

Over the years, renowned European scientists, including three Nobel laureates and 16 EMBO Members, provided soil samples from their countries. It was Marc Vidal of the Harvard Medical School who helped make the project a reality. He had the idea to collect the soil samples and use them for the ScienceTree project. By May 2014, 29 samples had been collected, 28 samples from the countries forming the European Union and one sample from the European Molecular Biology Laboratory (EMBL), which was included as an example of European integration that benefits the life sciences and to also recognize the roles of Israel, Norway and Switzerland in the support of European research.

"I would like to believe that this tree represents first and foremost our common European commitment to progress in the life sciences for the benefit of people – consolidating our very best efforts and deploying our very best scientists and innovators," commented Robert-Jan Smits, Director-General, Research & Innovation, for the European Commission at the ceremony.



Julius Brennecke

Institute of Molecular Biology, Vienna, Austria

EMBO Member elected in 2014

MEET THE SCIENTIST MEMBERS

At 38 you are one of the youngest EMBO Members. A few years ago you also received an ERC Starting Grant. What have you done right in your career?

It was the combination of finding projects that fit my type of scientific thinking and the right environment. The biology of micro-RNAs was the topic of my doctoral research at EMBL. Later, it shifted to the Piwi-interacting RNAs or piRNAs.

What I like about small RNA research is that it is on the one hand a highly sophisticated, ancient evolutionary process. On the other hand, the simple four-letter alphabet of RNA helps us keep our feet on the ground.

You started off as field researcher in the Galapagos Islands; ten years ago you switched to the competitive field of *Drosophila* research. Weren't you afraid of the risks?

During my university education I was torn between classical field biology and modern molecular biology. The job as a field biologist is doubtlessly much more exciting compared to life in an air-conditioned and illuminated laboratory. Yet in field research it takes so much time to answer very simple hypotheses. I was getting impatient.

What I find attractive about molecular biology is that we can coin sophisticated hypotheses and test them with unbelievable accuracy and speed. Competition does not worry me. Different laboratories take different routes to the truth behind the biological phenomena.

Do you plan to concentrate on small RNAs in the future?

There is no reason to change from this fascinating field. Various small RNA pathways are players in an ancient evolutionary conflict – the conflict between a host genome and parasitic DNA elements. This ancient conflict is probably the origin of small RNA pathways. This is true in plants, in animals and in fungi, and as it now turns out, even in bacteria. All of them use small RNAs, yet with completely different strategies, different adapter proteins and accessory factors. By studying RNA silencing pathways we are learning about basic biological processes in ways that we would not have understood without the small RNA angle.

What are the advantages and the drawbacks of being a scientist today?

The technical possibilities available today are an amazing advantage. Recent breakthroughs such as deep sequencing, RNA interference and genome editing give us the ability to answer questions much more precisely and much faster. The biological arena has been extended into non-standard model systems. Especially for non-standard model systems these technological revolutions have proved to be game changing. The drawbacks are on the career side. Too often, young scientists are facing uncertain prospects. One of the biggest challenges for today's scientists is the race for the good jobs that are few and far between.

Sandra Schmid

University of Texas Southwestern Medical Center, Dallas, United States

EMBO Associate Member elected in 2014

MEET THE SCIENTIST MEMBERS

What do you wish EMBO for its 50th birthday?

The problems we are now tackling are increasingly complex and require interdisciplinary efforts to solve. I applaud EMBO for its sponsorship of methods courses and meetings that bring different scientists together and allow rapid dissemination of new methods, results and ideas. EMBO should celebrate its 50 years of success and continue to promote innovation in science.

How has the focus of your research changed throughout your career?

My research has focused on understanding the molecular mechanisms that govern clathrin-mediated endocytosis (CME) since I was a graduate student with James Rothman. However, we have consistently adapted or developed new technologies and methods as rapidly as possible and whenever needed. I started my career – in the tradition of Arthur Kornberg, a mentor and force-of-nature at Stanford – with the goal of reconstituting clathrin-coated vesicle formation using purified components and defining the "minimal" molecular machinery required. The only tools were those of the "bucket biochemists" – grind and find.

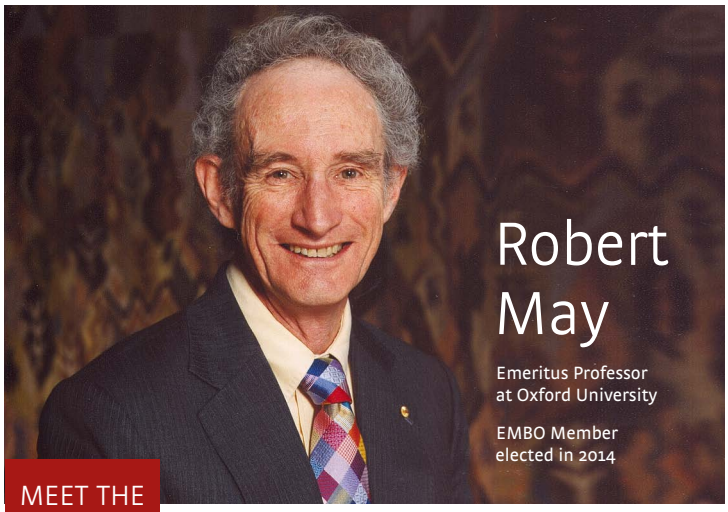
Today, with the advent of molecule biology, GFP fusion proteins, total internal reflection microscopy, siRNA technology, and powerful computers – none of which existed when I started – we can study coated pits and vesicles in their "native environment" and begin to define the "maximum" machinery that governs and, importantly, regulates clathrin-mediated endocytosis.

You signed DORA and published a commentary in *Science Careers* saying that job candidates should not be judged on the basis of their publications. What were your motives and on what basis do you employ faculty now?

Publications are important: they tell you that an individual is a 'finisher' and an effective communicator. Thus, I do not ignore publications. I would rather read with interest the two or three key publications recommended by each candidate – but ignoring the journal in which they were published, as this information is not necessarily predictive of the quality and importance of the contribution. I also gave full credit to work in progress that will eventually be published, so as not to unnecessarily delay hiring until after potentially long struggles with reviewers and editors.

What made you go back to school recently? Did your master affect your approach to running a lab?

There is nothing more complex than leadership, teaching and motivating others, and coordinating team efforts. Why not study and take advantage of established protocols and proven methods for doing this effectively and efficiently? My Masters Degree in Executive Leadership taught me invaluable and effective techniques for leading diverse individuals, creating learning and highly innovative work environments, strategic planning, and more. These have significantly changed how I run my lab and have increased my lab's productivity, morale and allowed me to more effectively train the next generation of scientists.



MEET THE SCIENTIST MEMBERS

How did you become interested in ecology?

After returning to Australia from my postdoctoral research at Harvard in 1961, I spent twelve years in the physics department at Sydney University. The head of the biology department at Sydney – a distinguished ecologist – established an organisation called *Social Responsibility in Science* and I thought I should learn more about it. I developed interest in animal population dynamics and the relationship between complexity and stability in natural communities.

You have degrees in chemical engineering and physics, you are an ecologist, zoologist and mathematician. What is your common theme?

I like looking at complicated things and asking what are the essentials of what is happening. I see the mathematical approach as a way of thinking very clearly and expressing ideas unambiguously. Mathematics is the central theme in the way I have moved from place to place in pursuit of interesting problems.

You took maths to the banking and finance system. It is a long way from chemical engineering.

That was completely accidental. I was part of the study group put together by the US National Academy of Sciences and the Federal Reserve Bank in 2006, before the banking crisis happened. At that time we had published a paper on modelling the banking system. It opened a new way of making short-term predictions on things that looked random, but were governed by rules. This is how I started working for the Bank of England.

Is it important to be flexible?

I never planned a trajectory for my life. Most of the things that have happened in my life were accidents rather than careful planning. There is an interesting book *Chance and Necessity* by Jacques Monod. He emphasises that a nature of a scientific discovery is a mixture of accident and the alertness to take advantage of the accidents. This is something I have been pretty good at.

From your time as Chief Scientific Advisor to the UK government and as President of the Royal Society, what do you think you are particularly well remembered for?

When I took on the job as Chief Scientist in 1995, the public excitement about mad cow disease was at its peak. Shortly after, I produced a formal protocol for science advice in government. This protocol emphasized that science not always tells the government what to do, but reports what the knowledge is.

During my time at the Royal Society, it was more the Society as a whole that recognised that it should widen its membership. The provision was to elect people who had been successful in the application of science in business and industry rather than those who advanced the frontiers of knowledge. Also, we did a better job at electing more women as members. I made a start on much of this and other people have carried it forward very well.

MEET THE SCIENTIST MEMBERS

How important is the expansion of EMBO membership into evolution, ecology and neurosciences?

It is extremely important to encompass these research fields as they have been using cutting edge molecular techniques for quite some time. It means going with the times. To include all the active and impactful researchers using molecular techniques can only strengthen EMBO. And vice versa: The expansion can help forge links between researchers who would not normally interact with each other.

Is evolutionary biology particularly relevant today?

I do not think it is any more or less important than it was before. There are some examples of high-profile researchers who have successfully applied evolutionary biology to areas that have not been viewed that way before. The additional media exposure raised the awareness of the potency of evolutionary biology more generally.

However, I would not necessarily view it as a new trend, as it has been going on all along. The last twenty years have seen a huge advancement in this field with the help of molecular biology tools. Only now do we have the data to unravel broader scale patterns and ask very specific questions about the genetic basis of evolution. Before, it was done from a deductive point of view.

What inspired you to go into evolutionary biology?

I have been interested in evolutionary biology and natural history from a very early age. Initially, I wanted to be an explorer and an author. Then I realised that science and evolutionary biology would allow me to find answers to all those questions I had: Where do we come from? Why do animals behave like they do? Why do they interact in certain ways?

Is mobility absolutely necessary for scientific success?

I do not know if I would have been as successful had I stayed in Sweden. It probably would have taken a lot longer. Moving to Geoff Parker's laboratory in Liverpool to do postdoctoral research was hugely influential to me. All of a sudden I had all these people that I read about during my PhD at my doorstep. I could visit them and expose them to my research. That eventually helped me get my Royal Society University Research Fellowship, which I had for almost ten years. The investment made by The Royal Society opened many doors for me. I realised that I can actually do high-risk research with potentially high return beyond the three-year cycle of a short research grant. That would have been much harder had I stayed in Stockholm.

Who are your scientific heroes, both internationally and in Sweden?

My professor of evolutionary ecology at the University of Stockholm, Birgitta Sillen-Tullberg, was absolutely pivotal for me deciding to undertake a PhD. Linda Partridge has done some amazing work on reproduction and ageing. Her ability to grasp the potential of new cutting-edge techniques and apply them to her questions is truly astounding. Of course, I am also very influenced by Carl Linnaeus. He had acute observational skills and was very capable of putting down on paper what he saw. His books were hugely inspirational for my expedition-style type of research.

Congratulations

to the following EMBO Members

EMBO Members who joined the ranks of the Royal Society in the UK and the US National Academy of Sciences this year:

New Royal Society Fellows and Foreign Members

FELLOWS

- Ewan Birney
- Liam Dolan
- Amanda Fisher
- James Naismith
- Julian Parkhill
- Sheena Radford
- David Ron
- William Rutherford
- Nicholas Talbot

FOREIGN MEMBERS

- Stephen Harrison
- Philippe Sansonetti
- Joan Steitz
- Clifford Talbot

New Members and Foreign Associates of the National Academy of Sciences

MEMBERS

- Michael Hall
- Michael R. Green

FOREIGN ASSOCIATE

- Hans Clevers
- Julian Davies
- V. Narry Kim
- Edvard Moser
- May-Britt Moser
- John Skehel
- K. VijayRaghavan
- Huanming Yang

Upcoming deadlines

EMBO Long-Term Fellowships
Mid-August

FEBS | EMBO 2014
Online registration
29 August

EMBO Keynote Lectures
1 October

Nominations 2015
Women in Science Award
15 October

EMBO Members for 2014

Anniversary election

106 scientists elected

EMBO has decided to expand the scope of its membership on the occasion of its 50th anniversary to honour the progress that has been made in the fields of neuroscience and ecology & evolution. The 106 new members for 2014 include 50 scientists who have made exceptional contributions to these research areas. The newly elected members and associate members are:

EMBO MEMBERS

DE Ralf H. Adams
PT Margarida Amaral
FR Michalis Averof
DE Ian T. Baldwin
AT Nicholas H. Barton
GB Malcolm Bennett
SE Per-Olof Berggren
ES Anna Bigas
DE Antje Boëtius
CH Sebastian Bonhoeffer
FR Déborah Bourc'his
FR Philippe Bousso
NL Ineke Braakman
GB Paul Brakefield
DE Michael Brecht
AT Julius F. Brennecke
NL Thijn R. Brummelkamp
DE Oliver Brüstle
DE Johannes Buchner
FR Carmen Buchrieser
GB Ian Chambers
GB Brian Charlesworth
GB Deborah Charlesworth
DE Emmanuelle Charpentier
FR Philippe Chavrier
FR Daniel Choquet
PT Rui M. Costa
FR Stanislas Dehaene
DE Winfried Denk
CH Emmanouil Dermitzakis
GB Raymond Dolan
GB Peter Donnelly
IL Yadin Dudai
CH Dieter Ebert
SE Hans Ellegren
GB Barry J. Everitt
HU Tamás F. Freund
CH Rainer Friedrich
GB Karl J. Friston
GB Uta Frith
DE Anne-Claude Gavin
SE Sten Grillner
FI Ilkka Hanski
DE Volker Haucke
NL Albert J.R. Heck
DE Peter Hegemann
FR Carsten Janke
FI Jukka Jernvall
NL Mike Jetten
CH Henrik Kaessmann
GB John Kendrick-Jones
DE René F. Ketting
SE Ole Kiehn
GB David Komander
GB Loeske E.B. Kruuk
DE Gilles Laurent
GR Zoi Lygerou
GB Troy W. Margrie
IT Michela Matteoli
GB Robert M. May
GB Gil McVean
GB Pascal Meier
DE Randolf Menzel
DE Hannah Monyer
GB Richard G.M. Morris
GB J. Colin Murrell
IT Marco Muzi-Falconi
FR Stéphane Noselli
GB John O'Keefe
FR Isabelle Olivieri
GB Christine A. Orengo
GB Julian Parkhill
GB Josephine Pemberton
CH Antoine Peters
FR Lluis Quintana-Murci
IT Giacomo Rizzolatti
IT Sabrina Sabatini
GB Erik Sahai
GB Vincent Savolainen
GB Christopher Schofield
GB Wolfram Schultz
DE Erin Schuman
AT Peter Schuster
IT Giorgio Scita
IL Idan Segev
FR Michael Sieweke
DE Wolf Singer
AT Michael Sixt
GB Peter Somogyi
IL Haim Sompolinsky
DE Christian Spahn
GB Karen Steel
GB Christoph M. Tang
FR Daniel Vaulot
GB Scott Waddell
CH Andreas Wagner
SE E. Gerhart H. Wagner
DE Markus Wahl
GB Nina Wedell
GB Stuart A. West

EMBO ASSOCIATE MEMBERS

US Susan Gottesman
US Tomas Kirchhausen
US Sandra L. Schmid
US David L. Spector
CN Xiaodong Wang
JP Yoshinori Watanabe

Entrance of the École Normale Supérieure in the Rue d'Ulm

Standing on the shoulders of giants in Paris

The Institut de BIOLOGIE DE L'ÉCOLE NORMALE SUPÉRIEURE in Paris (IBENS) has recently hired three new teams with a strong focus on ecology and evolutionary biology. This new initiative coincides with two milestone publications from the institute that demonstrate the role of epigenetics in underlying heritable traits in plants and ciliates. The implications for understanding the evolutionary processes underlying organism interactions with their environment are profound.

The École Normale Supérieure (ENS) on the rue d'Ulm in Paris's Quartier Latin is one of the most famous teaching institutions in France, reserved for just a few hundred students in the arts and sciences each year. Since its founding as an elitist school for teacher training by Napoleon just after the French Revolution (November 1794) it has undergone many changes and witnessed the arrival of new neighbours, including the Curie Institute and, more recently, the Paris Sciences et Lettres Research University.

IBENS was created from the ENS Département de Biologie by neurobiologist and EMBO Member Antoine Triller, who has directed the institute since 2010. The institute's only remit is to perform high quality fundamental research in biology, and a range of topics and experimental systems are addressed, from single-molecule imaging in neurobiology to the study of global plankton biodiversity, and from *Arabidopsis* to *Paramecium*. The institute is already home to several EMBO Members and European Research Council laureates, and recently launched a new initiative in ecology and evolutionary biology by hiring three new team leaders. Henrique Teotónio heads a team using experimental evolution in *Caenorhabditis elegans* to integrate the study of variation at the levels of phenotype and genotype. Hélène Morlon is leading a team modeling biodiversity to study questions ranging from macroevolution and macroecology to community assembly, biogeography, and conservation, and Regis Ferrière and Silvia de Monte are co-directing the Eco-Evolutionary Mathematics team that links mathematicians and biologists in the study of the interactions between the stochasticity of individual-level processes, the non-linearity of population-level processes and feedbacks between ecological dynamics and evolution. The ENS also hosts a world-class infrastructure for experimental aquatic and terrestrial ecology research, the Ecotron, located an hour outside Paris.

The three new teams join those already resident at IBENS with interests in ecology and evolutionary biology, in particular EMBO Member Chris Bowler, Jean-François Brunet, EMBO Member Vincent Colot, EMBO Member Marie-Anne Félix, Eric Meyer, Lionel Navarro, and Hugues Roest Crollius. Two of these teams have recently published significant research addressing the role of epigenetics in the transmission of heritable traits and the mechanisms at play in responding to environmental signals, heretical views according to many evolutionary biologists but with some elements resembling those proposed originally by Jean-Baptiste Lamarck, working in the Jardin des Plantes in Paris at the same time that the ENS was being built.

The team led by EMBO member Vincent Colot, together with their Dutch colleagues, has demonstrated that, at least in *Arabidopsis*, DNA sequence alone is unlikely to explain the inheritance of complex traits.[1] Using a population of epigenetic recombinant inbred lines, they have shown that heritable variation for the two quantitative traits they measured, flowering time and root length, can be almost entirely determined by epigenetic differences, in the form of multiple differentially methylated regions (DMRs) that are stably inherited independently of any DNA sequence change. Some of these DMRs are also found in nature, suggesting that they could contribute alongside DNA sequence differences to the genetic (heritable) differentiation that characterizes natural populations. The implications are profound, as these findings demonstrate that genetic differences between individuals need not be written exclusively in their genome sequence. The study also adds to previous work involving the Colot team that revealed clear connections between epigenetic variation and ecosystem function.[2]

Meanwhile, on another floor of IBENS Eric Meyer's team focuses on the genomics and epigenomics of the ciliate *Paramecium tetraurelia*. Ciliates use specialized small RNA pathways based on scan RNAs (scnRNAs) to recognize germline transposable elements and their single-copy remnants during sexual reproduction, and excise them during development of the somatic macronucleus. In *P. tetraurelia*, these genome-wide scnRNAs do not keep a memory of parasitic sequences, but instead mediate a transnuclear subtraction that allows the zygotic macronucleus to eliminate any germline sequence not present in the maternal macronucleus. The team led by Meyer and their collaborators have recently shown that this mechanism has been repeatedly adopted and used for mating-type determination and maternal inheritance.[3] They found that different genes of a conserved mating-type pathway are targeted for inactivation in different sibling species. These examples establish scnRNA-mediated regulation as a general mechanism for transgenerational epigenetic inheritance of cellular polymorphisms, allowing the somatic genome to evolve independently of germline mutations. The discovery of the adaptation of an RNA-guided DNA-deletion pathway that was proposed to prevent the invasion of foreign DNA sequences into this genome will no doubt stimulate the search for other examples of transgenerational epigenetic inheritance that are intrinsic to the cell and which are mediated by homologous RNAs in other organisms.

This new work from the ENS adds to a long tradition of excellence in the biological sciences. Louis Pasteur was a former director of the school, and previous milestones include the first reports of photoperiodism in plants by Julien Tournois in 1913,[4] and the birth of a strong tradition of Mendelian genetics in France by the population genetics studies on *Drosophila* performed by Georges Teissier and Philippe L'Héritier in the 1930s.[5] The studies of Colot and Meyer have a specific resonance with the theories of Lamarck. Sitting atop his pedestal at the entrance of the Jardin des Plantes, he is little more than a stone's throw away from IBENS. He would surely be astonished to see what his ideas have led to since the advent of molecular biology, and would also note that revolution, as well as evolution, are still in the Spring air of Paris.

LITERATURE

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4 Pigment of the imagination:
A history of phytochrome research.
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A whole new arena of questions

JENNIFER LIPPINCOTT-SCHWARTZ is a tenured investigator at the National Institutes of Health in Bethesda, United States. Her research focuses on visualisation, tracking and quantification of organelle pathways and dynamics within living cells and whole organisms. In an interview with *EMBOencounters* she talks about her new job as President of the American Society for Cell Biology (ASCB) for 2014 and evolving topics in cell biology.

Professor Lippincott-Schwartz, how exciting is the task of guiding such a large organisation as ASCB?

It is thrilling. I have been part of the ASCB throughout my whole career, going to the annual meeting every year since I was a graduate student and participating in many of its activities, from programming planning to serving as President. I have seen ASCB grow as a society. Being at the helm of the organisation this year is very gratifying but intimidating given its size. Fortunately, I am helped by a terrific professional staff at ASCB, including Executive Director Stefano Bertuzzi.

The ASCB president is changed every year. How would you like to set yourself apart?

I see that cell biology is changing. For the first time, we have the tools to interface with physical science in a big way. This is mainly due to the improved computational capabilities for predictive modelling of data. Another factor is the advanced microscopy techniques that allow us to look at cells and tissues at higher resolution and in a dynamic fashion. These new computational and imaging techniques are revealing aspects of biology that have never been seen or described before. This is opening up a whole new arena of questions for cell biologists. Since answering many of these questions will require bridging biological concepts with physical science principles, I am trying to provide ways to better build this bridge.

One of the things that I have initiated this year is a special issue of our flagship journal *Molecular Biology of the Cell*, which will be devoted to papers at the interface of cell biology and physics, as well as papers that incorporate modelling and predictive aspects of modelling involving big data analysis.

In addition to bridging with the physical sciences, we also need to integrate cell biology with the translational sciences. For this, we have designed several symposia at our annual meeting that will focus on the cell biology underlying different diseases – from infectious diseases to cancer.

What does your job look like?

My job is to run the ASCB together with Stefano Bertuzzi and his excellent staff. We work on initiatives that range from improving our journals – *Molecular Biology of the Cell* and *Life Sciences Education* – to interfacing with our large number of committees, including education, international affairs, women's issues, and public policy. The biggest job so far has been organizing the programme of the annual meeting (www.ascb.org/2014meeting), which I have done together with my Programme Chair Wallace Marshall. ASCB will be partnering this year with the International Federation of Cell Biology. I also had to recently select biology artwork from our members to be displayed at Dulles International Airport in Washington, D.C.

How do you define the role of ASCB?

Its main role is to facilitate interactions between cell biologists and to help them position themselves for opportunities in the wider field of biomedical and biophysical sciences. The society acts as a way for cell biologists to learn about other scientist's work and to communicate their own research. The annual meeting also hosts a huge group of vendors, who themselves play an important role in providing the technological developments for doing our science.

How much time remains to pursue your research?

I still find time to run my lab and continue research. That said, there are times when the job is full time. Several weeks ago we had our biannual two-day Council meeting, discussing new projects and goals of the society.

Does your position also involve political lobbying?

One day each year, the ASCB Council spends a day on Capitol Hill to talk to congressmen and senators to encourage them to support legislation and give greater financial support to the biomedical profession. I have to recuse myself for some of these activities because I am a government employee and I am not allowed to lobby.

Political lobbying is something that ASCB has been doing for at least fifteen years. For a good reason: it is important for the politicians to be aware of what is happening in cell biology. Most of our scientists believe that the big crisis and the budget cuts are major problems facing all of biomedical research right now in the United States, impacting our science in a very big way.

What is your current research project?

I use live cell imaging to address fundamental processes within cells including cell compartmentalization, cell motility, protein trafficking and organelle inheritance at different scales in space and time. My lab has introduced new approaches for visualizing and analyzing these processes, including the use of photoactivatable fluorescent proteins for photohighlighting and superresolution imaging of single molecules at high density. I have spent much of my career focused on understanding secretory organelles like the Golgi apparatus and the endoplasmic reticulum (ER). More recently, I have also studied more obscure organelles, like lipid droplets, peroxisomes, primary cilia and autophagosomes, and I am now fascinated with mitochondria and their relationship to other organelles. This has caused me to begin thinking hard about cell metabolism – how it relates to the behaviour and dynamics of organelles, in particular mitochondria, and the cytoskeleton, and how this all might be studied using microscopy.

Which were the key factors that contributed to your successful career?

I like to focus on questions that are simple but take a topic to a new level or direction. I also have a philosophical penchant for studying process and relationships between things. This explains why I am so attracted to fluorescence imaging, since a whole world of dynamics and relationships is revealed every time one looks down a microscope. I was an early user of the Green Fluorescent Protein (GFP) – and helped develop some new imaging approaches using it, including confocal photobleaching, photoactivation and photoactivated localization microscopy (PALM). Everything I am well known for came from being able to visualise at a better level.

How do you help people understand your research?

Science is about communication. All successful scientists that I know are excellent communicators. Before I went into science, I spent three years teaching at the high school level: one year in Africa, two years in California. In 2013, I co-organized the EMBO | EMBL Symposium *Seeing is Believing*. It was absolutely fantastic. I am also speaking in a session on *Membrane organization & super resolution* at the FEBS | EMBO 2014 Conference in Paris this year. We all have different ways of thinking. When I talk about my research, I try to understand the perspective of the listener and be as simple as possible.

Darwin in the desert

DARWIN21 – a project in Saudi Arabia to engineer plants and to secure world food production

Five years ago, a 36-square-kilometer university opened its gates in the desert sands of Saudi Arabia – the King Abdullah University of Science and Technology (KAUST). KAUST is not only a university – it is an experiment and a dream made reality by King Abdullah Bin Abdulaziz Al Saud, who aims to stem the exodus of young, talented students from the kingdom and promote Saudi Arabia as a business hub. The 12.5 billion US dollar campus at the Red Sea coast close to Jeddah was completed within two years. Thanks to a generous donation, the university can afford competitive salaries, grants, state-of-the-art equipment and ambitious research projects.

One of these is DARWIN21 – a project shaped by EMBO Member Heribert Hirt. At the end of last year, he decided to move from France to Saudi Arabia to give his research a head start and fulfil a long-standing wish: "KAUST promised to get my idea rolling and get the community on board." The scale of his undertaking shows parallels to the great voyage of Charles Darwin in the nineteenth century, only DARWIN21 explores life in deserts. The aim of the project is to visit arid regions to collect and analyse rhizosphere microbes. Why in deserts? Because deserts exhibit the harshest conditions of drought, salt and heat that plants are exposed to. Here, selection has shaped the interactions between plants and microbes for thousands of years.

Previous studies have shown that the ability of a variety of plants to adapt to stress conditions appears to depend on the association with rhisophere microbes. But can all plants improve stress tolerance when associated with their appropriate rhizosphere microbial partners? To answer this question, the Austrian scientist and his team launched a worldwide network of desert researchers and plan to build the world's first heritage stock centre for desert microbes. The next step is to create a molecular database on rhisophere microbial genomes and their gene functions using the latest genomic analysis methods.

Hirt's research results could be of major importance to agriculture as they provide a basis for the engineering of plants that produce higher yields or are more resistant to drought. If all goes well, the scientists could eventually help replant arid areas and thereby secure future world food production.

His laboratory has already set up collaborations with groups in Jordan, the United Arab Emirates, Pakistan, Namibia and Argentina. From several expeditions to Saudi Arabia and Jordan, the scientists have gathered a collection of more than 700 endophyte strains. They started screening those on *Arabidopsis* and found several that help these plants to survive under stress conditions. Daniele Daffonchio, a new microbiology professor at KAUST, explores the properties of these microbes. Specialists from the Center for Bioinformatics at KAUST produce publicly accessible databases. Additional field trials with some microbial strains that passed the test with *Arabidopsis* are planned for autumn 2014 with wheat and barley.

"KAUST is an exceptional place to work," concludes the 58-year-old after his first six months at the new institute. "It reminds me of a monastery where about 120 top researchers are concentrated with their teams in a small village of about four thousand people." For Hirt, what counts even more is the intensive interaction between researchers, ample funding and the most modern technology that allows realization of projects that are impossible to do elsewhere.

INFO: International conference on *Root desert rhizosphere microbes for sustainable agriculture* will be held at KAUST from 3–5 November 2014.

© KAUST

TOP
The KAUST Library near Jeddah at the coast of the Red Sea.

© Heribert Hirt

RIGHT
Expedition to the south of Saudi Arabia with Ton Bisseling (Wageningen University), Jacob Thomas and M. Al-Yusef from Riyadh University (left to right)

Learning from life

EMBL launches public awareness and engagement campaign in Germany

Within the science community, EMBL is recognized for its excellence in research, outstanding training opportunities and world-class research infrastructures and services. Turning 40, EMBL has become a premium "brand" in the world of science, but unlike for example CERN remains relatively unknown to the general public. To raise awareness and foster fascination for life science research, EMBL has just launched a multi-component public awareness and engagement campaign. During a pilot phase until the end of 2014, the campaign will be conducted in German with particular focus on its headquarter site in Heidelberg and on Hamburg, the site of EMBL's German outstation. From 2015, selected elements will be implemented in other languages, including English, and at the other EMBL sites.

At the centre of the campaign is a tag line that communicates EMBL's mission in basic research: 'Vom Leben lernen' (Learning from life). To strengthen EMBL's visibility and engagement regionally, a combination of events and outreach activities will take place throughout the year.

The Sunday Science Matinees at EMBL were well attended by locals interested in life sciences

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EMBL 40th Anniversary Events

→ Vernissage
DNA | Portraits
by Horst Hamann
EMBL Heidelberg, Germany
13 September 2014
www.embl.de/leben/

→ Sunday Matinee Series
Der Sonne entgegen – wie unseren Vorfahren aus dem Meer ein Licht aufging.
by Silvia Rohr
EMBL Heidelberg, Germany
26 October 2014
www.embl.org/40years

→ Symposium and Celebrations
EMBL Hamburg 40th Anniversary
EMBL Hamburg, Germany
27–28 November 2014
www.embl-hamburg.de/training/events/2014/HH-40th-Anniversary

These include Sunday Science Matinees "Mehr vom Leben" (More from Life) presented by young researchers, a Research Camp for interested participants to conduct lab work at EMBL, as well as an "arts meet science" photographic exhibition "DNA | Portraits by Horst Hamann."

EMBL also launched a new web site, its *Discovery Pages* (www.embl.de/leben/), for the general public.

Bringing science to the public

Exploring science first hand in a research lab, discussing biomedical findings with scientists – this is what high school students, teachers, legal experts and science journalists can do at the INSTITUTE OF MOLECULAR ONCOLOGY FOUNDATION (IFOM) in Italy.

© IFOM

YouScientist, the IFOM Science & Society Programme (www.ifom.eu/en/science-society), has offered to more than 25 000 people the opportunity to discover how cancer research works. Participants work side-by-side with scientists and experience not only their passion and enthusiasm, but also the difficulties and limitations of scientific research. Scientists become more aware of their role and responsibilities towards society. At a time of public funding restrictions, science activities rely increasingly on charity and spontaneous donations. There is a growing need for accountability and for returning to society what it pays into the research system.

Hands-on laboratories on molecular genetics, including simulations for BRCA1 and 2 genetic testing, kids performances about biological phenomena such as DNA replication and DNA repair, and scientific lectures from IFOM scientists are some examples of how YouScientist reaches out to the public.

Every year, IFOM also organizes a popular nationwide summer school contest, now in its tenth year. After two weeks in IFOM laboratories, students in the fourth year of secondary school are invited to present their research activity in front of an audience of non-experts. The winner of the poster day is awarded a one-week internship in an advanced European research institute.

The YouScientist programme is also engaged in editorial activities, mainly directed to students and science teachers. It offers educational science kits and protocols easily reproducible at schools, a recently published handwritten video tutorials and an e-book on cancer.

Further information: www.ifom.eu/en/
Contact: assunta.croce@ifom.eu

EMBO ADVANCED FELLOWSHIPS

New funding for senior postdoctoral researchers

It feels great to get one of the best research fellowships in the world," says Matheshwaran Saravanan, EMBO Fellow from 2009–2011, who spent his two-year fellowship at the European Molecular Biology Laboratory in Heidelberg. EMBO Fellowships are considered prestigious and offer the awardees a high degree of independence in their laboratory. However, most scientists need longer than the two years that are granted to them. "You can hardly complete a project within such a short timeframe," says Matheshwaran.

To offer outstanding postdoctoral researchers a more sustainable help, a new type of funding was introduced last July. The EMBO Advanced Fellowships allow for an additional two years of financial support to former and current EMBO Fellows. It is intended for those who have been showing exceptional progress during their postdoctoral work. The scheme is highly selective and restricted to five fellowships per year for scientists based in one of the twenty-seven EMBC Member States.

This new type of funding for senior postdoctoral researchers who are close to becoming group leaders is exceptional in Europe. "By granting postdocs the extended financial support we make it possible for them to complete a research project they have demonstrated to be on a successful track," says EMBO programme manager Andrea Hutterer. The extra money allows them to finish their work with a certain level of independence and establish their own line of research.

An additional advantage is that the scientists can take the money to their new laboratory: If during the two-year window a fellow sets up his or her own research group, the remaining amount up to a maximum of thirty thousand Euros will be transferred in one payment. It can be used for laboratory related costs such as hiring people or buying equipment.

The advanced fellowships seamlessly fit into the range of EMBO activities: They close the gap between the Fellowship and the Young Investigator Programme that offers support to the best young group leaders in Europe.

At the same time, EMBO has introduced non-stipendiary fellowships for researchers who opt out of the financial scheme but still would like to remain members of the international, interdisciplinary network. Non-stipendiary fellows can also apply for the additional funding.

The 2014 deadline for submission is Friday 22 August.
More information can be found at www.embo.org/funding-awards/fellowships/advanced-fellowships

Saving the past, documenting the present

To capture its own history and keep track of the heritage of molecular biology, the EUROPEAN MOLECULAR BIOLOGY LABORATORY (EMBL) launches an archive website to invite its staff and alumni for their contributions.

Inauguration ceremony of EMBL in 1978, outside the big lecture hall of the neighbouring Max Planck Institute for Nuclear Physics. From left to right: Mary Holmes, Peter von Sengbusch and John Kendrew. Far right, with the raincoat over his arm, is Raymond Appleyard, the first Director of EMBO.

© Ken Holmes

Let's not wait until memories have faded and papers be discarded at the end of a career before deciding to save our heritage," wrote Sydney Brenner in 2007, in a letter announcing the donation of his papers to the Cold Spring Harbor Laboratory. The letter was a key document that gave rise to a new project at EMBL, the EMBL Archive. The community endeavour, initiated by the Alumni Association Chair, Giulio Superti-Furga, was rolled out at the EMBL 40th Anniversary Reunion. At www.embl.org/archive, past and present staff from EMBL's five sites can now make valuable contributions such as letters, documents, pictures, lab books, diaries, and donations to support the processing costs of incoming collections.

"One mission of the archive is to safeguard EMBL's history in the face of its fast turnover," says Mehrnoosh Rayner, Head of Alumni Relations and project leader for this initiative. "While the short-term contracts ensure that great minds return to their countries, they also mean that they take with them small chunks of EMBL history – their own stories. We would like to engage the community to help us piece this back together."

The archive will eventually offer a unique repository for molecular biologists, historians and philosophers of science to mine and explore the primary sources and original records of past research processes. "The discovery process is never as smooth as it appears in papers," comments Giulio Superti-Furga. "The interesting twists and turns, the characters and ideas that helped along the way may never be known unless somebody records it."

The first objective will be to systematically reconstruct the full picture of the past decades at EMBL: historical documents relating to the foundation of the institute and the establishment of the units, the most important scientific achievements along with the accompanying figures and records, personal correspondence between the main players, emails, perhaps even tweets.

The donations from the community will go towards sorting, cataloguing and digitizing the material contributions, with the aim of making these available online in three years time. The project is being developed with the advice of archivists Jenny Haynes and Jenny Shaw from the Wellcome Library.

EMBL is in good company. Its archive will complement other existing molecular biology archives like those belonging to the MRC Laboratory of Molecular Biology, Cold Spring Harbor and the Weizmann Institute. What makes the EMBL archive unique however is its focus on the European life sciences and the Laboratory's international approach to scientific collaborations.

4D-Genome: Dynamics of human genome architecture

4D-Genome is an ambitious multidisciplinary project that aims to untangle the role of the 3-dimensional (3D) structure of the human genome and its dynamics in gene expression. This study is supported by a European Research Council Synergy grant of 12 million Euros that was awarded to four scientists in Barcelona: Miguel Beato, Thomas Graf, and Guillaume Filion at the Center for Genomic Regulation (CRG), and Marc A. Marti-Renom at the National Center of Genomic Analysis (CNAG) and the CRG. The leaders of this multidisciplinary project have broad expertise in gene regulation, stem cells, statistics, computational and structural biology.

"The genome is not only a linear string of letters," explains EMBO Member Miguel Beato. The classical view of genomes as nucleotide sequences is being replaced by the concept that the organization of the nucleus is dynamic, complex and functional. It has been shown that the spatial location of genes modulates gene expression but the precise molecular mechanisms and relationships are still to be elucidated. The 4D-Genome team combines expertise in genomics, genome modelling, statistics, mathematics and super resolution microscopy to study the dynamics of genome architecture in two well-established model systems: transient hormonal response in breast cancer cells and stable trans-differentiation of immortalized B cells to macrophages. They will study the conformation of the genome and its dynamic changes at various levels of resolution, from the nucleosome fiber to the distribution of chromosome territories in the nuclear landscape. State-of-the-art technology platforms and infrastructures in Barcelona, including photonics, next-generation sequencing and supercomputing, will be key elements for the success of the project.

In the long term, the researchers hope to produce a 3D "google" browser to query the genome at different resolution and time scale, and examine its interplay with changes in gene expression. "4D-Genome can lead to novel concepts in molecular biology text books and to completely unexpected findings", says Miguel Beato. "This is all part of the adventure and excitement of basic research in biology."

© 4D-Genome

The 4D-Genome team, including members from the laboratories of Miguel Beato, Thomas Graf, Guillaume Filion and Marc A. Marti-Renom.

Peer Bork speaking at the symposium in Santiago de Chile

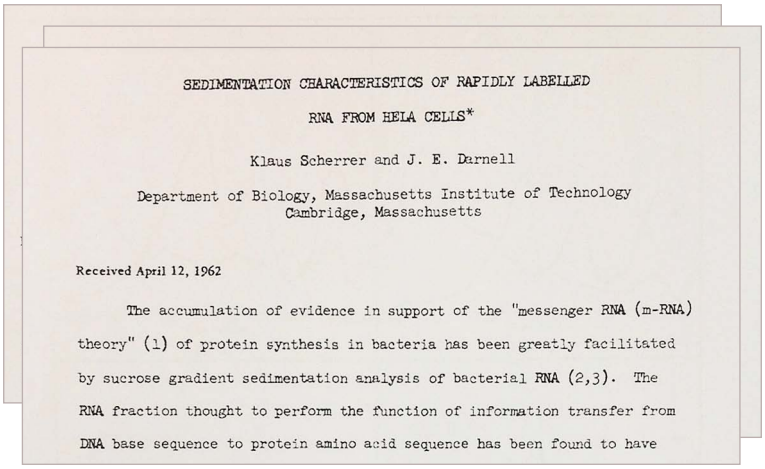
©Catholic University of Chile

EMBO COURSES & WORKSHOPS

EMBO Practical Course

EMBO Practical Course comes to Chile

Computational Biology: Genomes to systems is the title of the EMBO Practical Course that took place in Chile last April and was organised by EMBO Member Peer Bork of the European Molecular Biology Laboratory. For the course held in the city of Puerto Varas, 22 students were selected from 14 different countries. Students worked together in teams of two, contributing different expertise and skills to solve interdisciplinary problems. The international symposium subsequently held in Santiago gathered 200 attendees. Local co-organiser Francisco Melo Ledermann of the Catholic University of Chile secured a smooth running of the course onsite. "With the tremendous help of the local organiser the meeting turned out a huge success," said Peer Bork, who gave the opening keynote lecture, and also spoke at a symposium on the last day of the meeting. The course even made it to the biggest national newspaper in Chile, *El Mercurio*. "The EMBO Practical Course and the International Symposium were very important to us, because computational biology is an underdeveloped research area in Latin America with a steeply increasing demand," commented Melo.



SEDIMENTATION CHARACTERISTICS OF RAPIDLY LABELLED RNA FROM HELA CELLS*

Klaus Scherrer and J. E. Darnell

Department of Biology, Massachusetts Institute of Technology
Cambridge, Massachusetts

Received April 12, 1962

The accumulation of evidence in support of the "messenger RNA (m-RNA) theory" (1) of protein synthesis in bacteria has been greatly facilitated by sucrose gradient sedimentation analysis of bacterial RNA (2,3). The RNA fraction thought to perform the function of information transfer from DNA base sequence to protein amino acid sequence has been found to have

Papers of influence

As part of the 50th anniversary of EMBO, *EMBOencounters* looks back on scientific publications that changed the way researchers thought about molecular biology.

The first paper to be featured was published in *Biochemical and Biophysical Research Communications* in 1962 by Klaus Scherrer and Jim Darnell.[1] The discovery of large precursor RNA molecules or "giant RNA" that are converted into ribosomal RNA (rRNA) suggested the phenomenon of RNA processing. It took 15 more years before the idea of precursor mRNA was accepted more widely by the scientific community. By that time scientists had discovered the existence of "gene fragmentation" in DNA, which pointed towards RNA processing as a general rather than an alternate phenomenon.

Today it is widely accepted that almost all functional RNA molecules arise from precursor molecules. Processing is the main mechanism visible in gene expression. The goal of the recent ENCODE project was to identify all functional elements in the human genome, acknowledging that protein-coding genes account for only around 1.5% of DNA in the human genome and that there is a wealth of information captured and expressed in different types of RNA molecules. In the 1960s, things were very different. The idea that gene expression would be controlled at the level of RNA had not even been formulated.

In 1961, Jim Darnell in the Department of Biology at The Massachusetts Institute of Technology in the United States asked his colleague Klaus Scherrer to reproduce some pulse labeling experiments first performed in *Escherichia coli* by François Gros and Jim Watson.[2] The original experiments had revealed a typical 10–20S mRNA profile but Darnell and Scherrer wanted to look at Hela cells, a human cell line.

The researchers grew HeLa cells in the presence of radioactively labeled ^{14}C-Uridine and painstakingly analyzed the kinetics of the labeling patterns using sucrose gradients. The results were very different compared to bacterial labeling patterns. Two rapidly labeled peaks were visible at 45S and 35S of guanine- and cytosine-rich RNA, followed by a trail of adenine- and uridine-rich RNA up to around 80S.

"Our unexpected results in HeLa cells revealed the presence of a high-molecular-weight RNA or giant RNA," says Klaus Scherrer, who is now Directeur de Recherche Émérite CNRS, France, at the Institut Jacques Monod. "These findings were completely at odds with what was being found in bacterial systems and our results prompted much skepticism at the time.[3] Facing general disbelief, we had to wait until 1969 to prove by a new electron microscopy technique that such giant molecules existed."

"If RNA processing as a basic mechanism was proven in 1962 for the most abundant rRNA by simple pulse chase, such types of experiments have not been conclusive for biosynthesis of specific mRNA even today except, possibly, in viral systems," says Scherrer. "For instance, in 1973 the first globin cDNA probes showing the presence of globin sequences in transcripts of high-molecular-weight RNA were eventually confirmed by reverse transcription polymerase chain reaction (RT-PCR) in 2004 with cloned globin riboprobes for transcripts up to 33 kb.[4] But the physical conversion of such transcripts into mRNA could never be proven for any gene except in viral systems. The discovery of splicing made processing of pre-mRNA a necessity. Furthermore, the protection of 5′- and 3′-ends of primary RNA, as well as of mRNA by 5′-Cap and 3′-poly(A) reinforced the validity of the processing model. However, since some primary transcripts may be cleaved, re-capped and re-polyadenylated, this was as a general rule not proof for primary pre-mRNA."

Says Scherrer: "Although the recent ENCODE data show up to 90% transcription of eukaryotic DNA and, hence, imply transcription of most genomic domains, the high throughput RNA sequencing techniques do not differentiate between Full Domain Transcripts (FDTs) and initiation from multiple promoters within a domain. The hypothesis of FDT as the most likely interpretation of facts was – and still is – based on RT-PCR data. The presence of high-molecular-weight RNA in puffs of genetically marked polytene chromosome bands and, also, the presence of DNA loops tens of kilobase pairs long in the electron micrographs of Miller-type *christmas trees* has supported since the 1960s the pre-mRNA model. Furthermore, the theory of information processing excludes due to thermodynamic noise physical or biochemical single-step selection of more than 1 molecule in 1000, a situation which may work for *E. coli*. Thus, by necessity, selection of an mRNA sequence in the human genome, 1 molecule in millions, necessitates a multi-step, cascade-type process and, therefore, complex processing machinery and regulation."

Ueli Schibler, professor at the University of Geneva, commented: "Looking back today, the discovery of large non-stable RNAs by Scherrer and Darnell can be considered to be a real breakthrough in understanding gene transcription in mammalian cells. In fact, their simple size-fractionation experiments with pulse-labeled RNA revealed the precursors of both ribosomal RNA and messenger RNA. In the B.C. (before cloning) era the precursor-product relationship of large heterogeneous nuclear RNA (hnRNA) and messenger RNA was virtually impossible to establish. However, work in a number of laboratories, including those of Jim Darnell, Robert Perry, and Klaus Scherrer during the early seventies suggested that both hnRNA – synonymous to pre-mRNA – and mRNA carried a methylated cap structure (m7GpppN) at their 5′ ends and a poly(A) tail at their 3′ ends. This obviously begged the question of how large hnRNA molecules can be processed into much smaller mRNAs. The final answer came with the discovery of pre-mRNA splicing in the laboratories of Phillip Sharp and Richard Roberts in 1977 making RNA processing not only obvious but necessary. Often, the 5′- and 3′ termini of pre-mRNAs may be conserved during mRNA maturation, and, hence, the sequences which are removed and destroyed during pre-RNA to mRNA processing are located in between the capped 5′ ends and the polyadenylated 3′ ends."

Martin Billeter, Professor Emeritus at the University of Zürich, remarked: "This seminal paper is characteristic of the whole career of Klaus Scherrer: He has always been ahead of the generally approved scientific consensus. His visions, which were based on rigorous experimentation, had to await new experimental procedures to be generally accepted. RNA has remained his main subject of study. He recognized very early on that the full domain transcripts contain a wealth of regulatory information far more complex than that required for transcriptional regulation."

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Practical Courses

Cryo-electron microscopy and 3D image processing
DE-Heidelberg, 31 August–9 September

Ubiquitin and related modifiers
IT-Alghero, 6–13 September

Protein expression, purification, and characterization (PEPC9)
DE-Hamburg, 8–16 September

Microscopy, modelling and biophysical methods
DE-Heidelberg, 8–20 September

Single-cell gene expression analysis
DE-Heidelberg, 19–25 September

Targeted proteomics: Experimental design and data analysis
ES-Barcelona, 28 September–3 October

Computational analysis of protein-protein interactions: From sequences to networks
ZA-Cape Town,
29 September–3 October

Non-coding RNA in infection
DE-Würzburg, 12–18 October

Analysis of high-throughput sequencing data
UK-Hinxton, 20–25 October

High-throughput microscopy for systems biology
DE-Heidelberg, 20–26 October

Solution scattering from biological macromolecules
DE-Hamburg, 27 October–3 November

Biomolecular interaction analysis: From molecules to cells
PT-Porto, 24–28 November

Metabolomics bioinformatics for life scientists
UK-Cambridge, 16–20 February 2015

***In vivo* plant imaging**
DE-Heidelberg, 9–15 March 2015

Single molecule and single cell fluorescence Å/nm/µ/mm-scopy
DE-Heidelberg, 15–23 March 2015

The characterization of post-translational modifications
DK-Odense, 9–15 April 2015

Computational biology: From genomes to systems
JP-Okinawa, 17–22 April 2015

Small angle neutron and X-ray scattering from proteins in solution
FR-Grenoble, 18–22 May 2015

Advanced electron microscopy for cell biology
FR-Bordeaux, 8–19 June 2015

Synthetic biology in action
DE-Heidelberg, 8–20 June 2015

Developmental neurobiology: From worms to mammals
UK-London, 21 June–4 July 2015

Image processing for cryo-electron microscopy
UK-London, 1–11 September 2015

Current methods in cell biology
DE-Heidelberg, 14–22 September 2015

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

Workshops

The regulation of aging and proteostasis
IL-Ma'ale Hachamisha, 7–12 September

Advances in protein–protein interaction analysis and modulation
FR-Hyères, 9–12 September

Current advances in membrane trafficking: Implications for polarity and diseases
CL-Puerto Natales, 9–14 September

Unraveling biological secrets by single-cell expression profiling
DE-Heidelberg, 25–26 September

Decoding neural circuit structure and function
TR-Istanbul, 26–28 September

Development and regeneration of the spinal cord
ES-Sitges, 1–4 October

Cancer stem cells 20 years later: Achievements, controversies, emerging concepts and technologies
IT-Catanzaro, 3–6 October

Human RNA viruses
TR-Istanbul, 6–8 October

Wnt signalling: Stem cells, development and disease
AU-Broome, 6–9 October

Translational advances in cancer cell signalling and metabolism
ES-Bilbao, 7–9 October

Non-coding RNAs in genome expression, maintenance and stability
FR-Cargèse (Corsica), 7–10 October

Cell plasticity and nuclear dynamics
SG-Singapore, 12–15 October

Epigenetic plasticity: Implications in neural (dys)function
PT-Braga, 22–25 October

Cancer stem cells and epigenetics
CN-Hong Kong, 16–18 October

A systems-level view of cytoskeletal function
IL-Rehovot, 27–31 October

Upstream and downstream of Hox genes
IN-Hyderabad, 14–17 December

Cortical development in health and disease
IL-Rehovot, 26–29 April 2015

Embryonic-extraembryonic interfaces: Emphasis on molecular control of development in amniotes
DE-Göttingen, 6–9 May 2015

SMC proteins: Chromosomal organizers from bacteria to human
AT-Vienna, 12–15 May 2015

Developmental circuits in aging
GR-Hersonissos, 25–28 May 2015

Macromolecular assemblies at the crossroads of cell stress and function
IL-Jerusalem, 31 May–4 June 2015

Mechanisms of plant speciation
SE-Norrtälje, 9–13 June 2015

Cell and developmental systems
CH-Arolla, 18–22 August 2015

Cell cycle
HU-Budapest, 4–7 September 2015

Stem cell mechanobiology in development and disease
IT-Capri, 18–21 October 2015

Conferences

Brain development and disorders
FR-Saint Raphaël, 5–8 September

The molecular and cellular basis of regeneration and tissue repair
ES-Sant Feliu de Guixols,
6–10 September

Interdisciplinary plant development
UK-Cambridge, 21–24 September

Innate lymphoid cells
FR-Paris, 29 September–1 October

Centrosomes and spindle pole bodies
PT-Lisbon, 30 September–3 October

Stem cells in cancer and regenerative medicine
DE-Heidelberg, 9–12 October

Experimental approaches to evolution and ecology using yeast
DE-Heidelberg, 12–15 October

Ubiquitin and ubiquitin-like proteins: At the crossroads from chromatin to protein
AR-Buenos Aires, 19–24 October

The Endoplasmic Reticulum (ER) as a hub for organelle communication
ES-Girona, 26–31 October

From functional genomics to systems biology
DE-Heidelberg, 8–11 November

Mechanisms and regulation of protein translocation
HR-Dubrovnik, 21–25 March 2015

Chromatin and epigenetics
DE-Heidelberg, 6–10 May 2015

RNA localization and local translation
GR-Hersonissos, 28 June–3 July 2015

DNA replication, chromosome segregation and cell division
UK-Egham, 27–31 July 2015

Ribosome synthesis
BE-Brussels, 19–23 August 2015

Meiosis
UK-Oxford,
30 August–4 September 2015

Autophagy signalling and progression in health and disease
IT-Chia, 9–12 September 2015

Ubiquitin and ubiquitin-like modifiers: From molecular mechanisms to human diseases
HR-Cavtat, 18–22 September 2015

The multidisciplinary era of endocytic mechanics and functions
FR-Mandelieu-la-Napoule,
27 September–2 October 2015

Other EMBO events

FEBS | EMBO 2014
FR-Paris, 30 August–4 September 2014

EMBO Members' Meeting
DE-Heidelberg, 29–31 October 2014

15th EMBO|EMBL Science and Society Conference
Foods are us! On eating and becoming
DE-Heidelberg , 6–7 November 2014

The EMBO Meeting 2015 – Advancing the life sciences
UK-Birmingham, 5–8 September 2015

ESF | EMBO Symposia

Synthetic biology of antibiotic production
ES-Sant Feliu de Guixols,
30 August–4 September

Long regulatory RNAs
PL-Pułtusk, 13–18 September

Flies, worms and robots: Combining perspectives on minibrains and behaviour
ES-Sant Feliu de Guixols,
8–13 November

EMBO | EMBL Symposia

The complex life of mRNA
DE-Heidelberg, 5–8 October

Frontiers in metabolism: From molecular physiology to systems medicine
DE-Heidelberg, 17–20 November

Frontiers in stem cells and cancer
DE-Heidelberg, 29–31 March 2015

Cellular heterogeneity: Role of variability and noise in biological decision-making
DE-Heidelberg, 15–18 April 2015

Mechanisms of neurodegeneration
DE-Heidelberg, 14–17 June 2015

Enabling technologies for eukaryotic synthetic biology
DE-Heidelberg, 21–23 June 2015

The mobile genome: Genetic and physiological impacts of transposable elements
DE-Heidelberg, 16–19 September 2015

Seeing is believing: Imaging the processes of life
DE-Heidelberg, 7–10 October 2015

New approaches and concepts in microbiology
DE-Heidelberg, 11–14 October 2015

The non-coding genome
DE-Heidelberg, 18–21 October 2015

Biological oscillators: Design, mechanism, function
DE-Heidelberg, 12–14 November 2015

EMBO Global Activities Lecture Courses

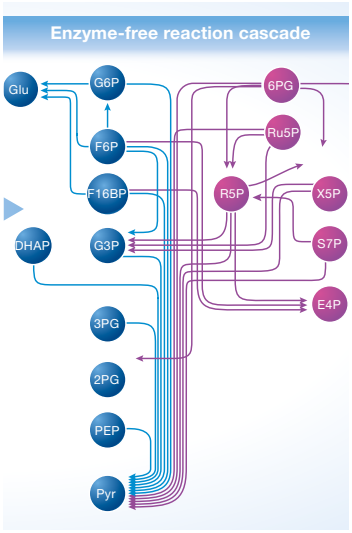
High-throughput NGS applied to infectious diseases
TN-Tunis, 15–25 September 2014

Biochemistry and molecular biology bench to bedside approaches
BR-Cuiabá/Poconé, 27 October–7 November 2014

Structural and biophysical methods for biological macromolecules in solution
TW-Taipei, 4–10 May 2015

For further information, please visit EMBO Courses & Workshops
www.embo.org/funding-awards/courses-workshops

molecular systems biology



RESEARCH ARTICLE

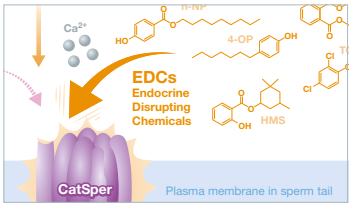
Reconstructed ancient ocean reveals secrets about the origin of life

Researchers from the University of Cambridge have published details about how the first organisms on Earth could have become metabolically active. The results permit scientists to speculate how primitive cells learned to synthesize their organic components – the molecules that form RNA, lipids and amino acids. The findings also suggest an order for the sequence of events that led to the origin of life.

"Our results demonstrate that the conditions and molecules found in the Earth's ancient oceans assisted and accelerated the interconversion of metabolites that in modern organisms make up glycolysis and the pentose-phosphate pathways, two of the essential and most centrally placed reaction cascades of metabolism," says Markus Ralser, Group Leader at the Department of Biochemistry at the University of Cambridge and the National Institute for Medical Research. "In our reconstructed version of the ancient Archean ocean, these metabolic reactions were particularly sensitive to the presence of ferrous iron that helped catalyze many of the chemical reactions that we observed."

Non-enzymatic glycolysis and pentose phosphate pathway-like reactions in a plausible Archean ocean
Markus A. Keller, Alexandra V. Turchyn, Markus Ralser
Read the paper:
doi: 10.1002/msb.20145228

EMBO reports



RESEARCH ARTICLE

Endocrine disruptors impair human sperm function

A plethora of endocrine-disrupting chemicals interfere with human sperm function in a way that may have a negative impact on fertilization. These are the findings of a German–Danish team of researchers from the Center of Advanced European Studies and Research in Bonn, Germany, and the University Department of Growth and Reproduction, Rigshospitalet, Copenhagen, Denmark. The work suggests that endocrine disruptors may contribute to widespread fertility problems in the Western world in a way that hitherto has not been recognized.

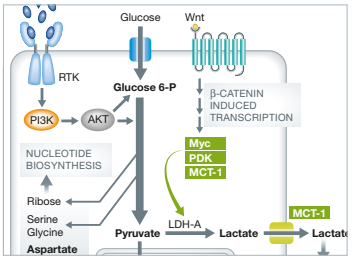
"For the first time, we have shown a direct link between exposure to endocrine disrupting chemicals from industrial products and adverse effects on human sperm function,'' said Niels E. Skakkebaek, professor and leader of the Danish team.

In this initial study, about one hundred chemicals were tested. Around one third, including ultraviolet (UV) filters like 4-methylbenzylidene camphor (4-MBC) used in some sunscreens, the anti-bacterial agent Triclosan used in toothpaste, and di-*n*-butylphthalate (DnBP), showed adverse actions.

The scientists looked at the impact of these chemicals on the CatSper ion channel, a calcium channel controlling sperm motility. They showed that endocrine disruptors – applied at concentrations measured in body fluids – directly open CatSper and, thereby, increase calcium levels in sperm, change their swimming behavior, and trigger the release of digestive enzymes that help sperm to break through the egg coat.

Direct action of endocrine disrupting chemicals on human sperm
C. Schiffer, T. Strünker and colleagues
Read the paper:
doi: 10.15252/embr.201438869

THE EMBO JOURNAL



RESEARCH ARTICLE

Researchers identify link between colon cancer and metabolism

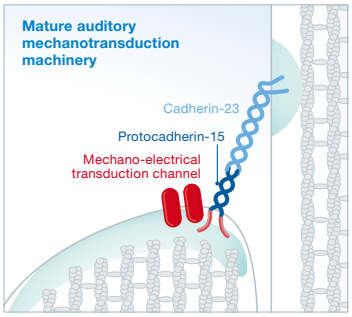
More than 60 years ago Otto Warburg recognized that cancer cells differ from normal cells in the metabolic pathway they use for the oxidation of sugar. Rather than the typical series of oxidative steps that take place in the citric acid cycle, cancer cells metabolize sugar via the glycolytic pathway irrespective of whether oxygen is present or not. Researchers in the United States report that the reason for this difference in colon cancer is changes in the Wnt signaling pathway, an essential communication pathway operating in these tumours.

"Cancer cells have different metabolic demands than normal cells," remarked Marian Waterman, Professor at the University of California, Irvine and the lead author of the study. "However, until now the molecular evidence for how this metabolic reprogramming takes place in cancers of the colon has not been very well defined. Our results show that Wnt signaling plays an important role in establishing aerobic glycolysis as the predominant sugar-metabolizing pathway to support colon cancer."

Biochemical assays and advanced imaging techniques in live cells revealed that blocking the activity of Wnt reduced glycolysis, promoted a shift to sugar metabolism by the citric acid cycle, and reduced tumour growth. The researchers also identified the enzyme pyruvate dehydrogenase kinase 1 as one of the targets for Wnt activity related to its effects on metabolism.

Wnt signaling directs a metabolic program of glycolysis and angiogenesis in colon cancer
Kira T. Pate, Marian L. Waterman and colleagues
Read the paper:
doi: 10.15252/embj.201488598

EMBO Molecular Medicine



RESEARCH ARTICLE

Hearing protein required to convert sound into brain signals

A specific protein found in the bridge-like structures that make up part of the auditory machinery of the inner ear is essential for hearing. The absence of this protein or impairment of the gene that codes for this protein leads to profound deafness in mice and humans, respectively.

"The goal of our study was to identify which isoform of protocadherin-15 forms the tip-links, the essential connections of the auditory mechanotransduction machinery within mature hair cells that are needed to convert sound into electrical signals," remarks Christine Petit, the lead author of the study and Professor at the Institut Pasteur in Paris and at Collège de France.

Three types of protocadherin-15 are known to exist in auditory sensory cells of the inner ear but it was not clear which of these protein isoforms was essential for hearing."Our work pinpoints the CD2 isoform of protocadherin-15 as an essential component of the tip-link and reveals that the absence of protocadherin-15 CD2 in mouse hair cells results in profound deafness."

The researchers engineered mice that lack only the CD2 isoform of protocadherin-15 exclusively during adulthood. While the absence of this isoform led to profound deafness, the lack of the other protocadherin-15 isoforms in mice did not affect their hearing.

The CD2 isoform of protocadherin-15 is an essential component of the tip-link complex in mature auditory hair cells
Elise Pepermans, Christine Petit and colleagues
Read the paper:
doi: 10.15252/emmm.201403976

Foods are us! On eating and becoming

The 15th EMBL | EMBO Science and Society Conference will be held on 7–8 November

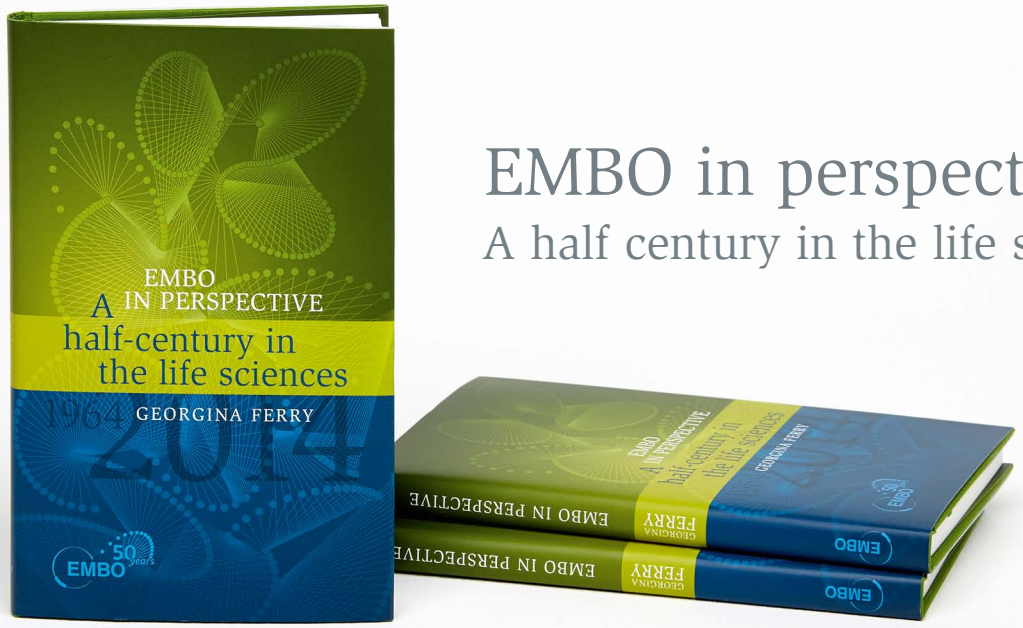
Biologically, as well as metaphorically, in what sense are we what we eat? The focus of this year's EMBL | EMBO Science and Society Conference will be the impact food has on our body and mind, both from the long-term evolutionary perspective and the view of everyday life. The conference programme will highlight the biological and cultural processes through which food both defines us and transforms us.

Humans are the only species that cook their food and this unique trait coincided with the evolutionary emergence of our earliest ancestors about two million years ago. Scientists argue that cooking must have had a profound effect on our evolution because it increased food efficiency, which allowed human ancestors to spend less time foraging, chewing, and digesting. Then, as humans spread to every corner of the planet, the availability of diverse food sources caused groups of humans to adapt differently to different environments, and this may have left its mark on their genomes.

This raises some fascinating questions: Do genetic differences predispose individuals to perceive the taste of foods differently? How does the sociocultural environment into which we happen to be born, and within which we are raised, shape our food preferences and perception? What is the relationship between the food we eat and the microorganisms we carry within us? Why does the genetic make-up of some people make them particularly vulnerable to certain foods – reactions that range from addictive responses to allergic reactions?

These are some of the questions that will be the focus of the 15th EMBL | EMBO Science and Society Conference in Heidelberg.

More information is available at www.embl.de/training/events/2014/SNS14-01



EMBO in perspective:
A half century in the life sciences

Based on personal interviews with Sydney Brenner, L. Luca Cavalli-Sforza, Georges Cohen, James Watson and the directors of EMBO, this anniversary book tells the story of the journey from the study of molecules and microbes in the nuclear age to the growth and expansion of EMBO and the life sciences. It also provides new perspectives on some of the creation myths of the organization.

For more information on how to obtain a copy of *EMBO in perspective: A half-century in the life sciences* please contact **anniversary-embo@embo.org**

CONTENT

Symposium honours Hermann Bujard

A scientific symposium held at the Centre for Molecular Biology at the University of Heidelberg (ZMBH) last May celebrated the eightieth birthday of Hermann Bujard, former EMBO Director. A number of eminent scientists came to Heidelberg to honour the internationally renowned molecular biologist including Richard Losick from Harvard University and Tim Hunt from the London Research Institute. Hunt chaired the EMBO Council from 2007 to 2009 – at the time when Hermann Bujard led the organization. At the symposium, the Nobel Laureate spoke about *The Control of Mitosis* while Richard Losick gave a presentation on *Chance and Memory in Bacterial Decision Making.*

Hermann Bujard was at the helm of EMBO for three years. He influenced the development of the organization and receives continued recognition for this work. Bujard expanded the geographical scope of EMBO activities by signing an agreement with South Africa. During his tenure, the annual conference *The EMBO Meeting* was launched and the new journal *EMBO Molecular Medicine* was first published.

He also shares the credit for EMBO coming to Heidelberg in 1973. Teaming up with Peter von Sengbusch and Ken Holmes at the Max Planck Institut for Medical Research in Heidelberg, they put together the case for EMBO to come to Heidelberg. "I always thought we could only develop if we attracted more molecular biologists who had been 'culturally immersed' in the Anglo-Saxon way of doing science. This objective helped Heidelberg become one of the most important centres of biosciences in Europe," says Bujard.

His experience of working in American laboratories in the 1960s made him try to introduce a flat hierarchy type of scientific culture. After returning to Germany in 1969, he accepted a professorship in molecular genetics at Heidelberg University.

In the early 1980s, Bujard helped to set up the Centre for Molecular Biology at the University of Heidelberg (ZMBH). However, at that time the authorities refused to set aside centuries of tradition and to adopt a departmental structure. In 1983 Bujard therefore joined the pharmaceutical company Hoffmann-LaRoche in Basel to build up a division for molecular biology. There, he began to work on a vaccine against malaria. A few years later, he was asked back to head the ZMBH as Director. "He developed an absolutely unique scientific environment in the German research landscape," said current Director Bernd Bukau in his symposium speech.

Since leaving EMBO at the end of 2009, he has been a Distinguished Professor of the University of Heidelberg at ZMBH and still runs an active lab. His candidate malaria vaccine is about to enter clinical trials after twenty years of research. 'If these studies look promising, my goal is to go back to Africa and see if we can demonstrate efficacy,' he says. "Obviously a reason to keep me going."

A quail embryo as never seen before

An award-winning video from the Gulbenkian Institute of Science reconstructs the development of a quail embryo in its first ten days in the egg.

A video showing a sequence of "virtual" slices through a quail embryo in the first ten days of gestation inside the egg won the first prize of this year's *Nikon Small World in Motion Photomicrography Competition*. Gabriel G. Martins, head of the Advanced Imaging Unit at the Gulbenkian Institute of Science in Oeiras, Portugal, used an imaging technique called optical tomography that reveals the anatomy of large samples. The images are several times larger than those available by conventional microscopy.

The whole adventure started when Gabriel received quail embryos from a colleague, Robert Bryson-Richardson from Monash University, Australia. He had the challenge to complete the full three-dimensional atlas up to 15 days of development, overcoming the technical difficulties of commercial microscopes that could not visualize stages later than 8–9 days. The full atlas has now been published and is accessible online at http://quail.anatomyportal.org. Since the production of commercial equipment that allows optical tomography ceased in 2012, Gabriel Martins started to develop his own system at Centro de Biologia Ambiental of the Faculty of Sciences of the University of Lisbon, Portugal, with pieces from other microscopes and low-cost components. As Martins explains: "The system is able to photograph transparent embryos from more than 1000 angles. By image processing we compute a series of 'virtual' slices, with all internal anatomical details, as seen in the video." The reconstructions can, for example, be used in classes to teach students about internal anatomy of embryos, or how embryos vary from stage to stage, or from species to species. They can even be used in "virtual dissections."

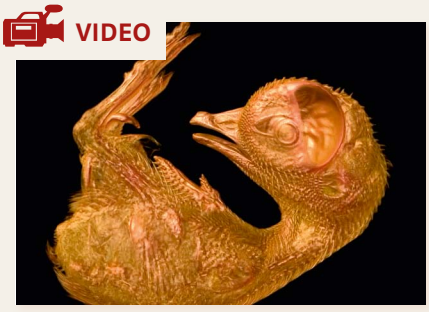
In the spirit of open source, Martins and his colleagues Emilio Gualda and Nuno Moreno from the Advanced Imaging Unit at the institute, started a project – OpenSPIN (https://sites.google.com/site/openspinmicroscopy) – to share publicly the plans to build this and other microscopes that can rotate and view samples from multiple angles, a feature that commercial microscope manufacturers always disregarded. This work was published last year in the journal *Nature Methods*.

"I have entered images for the Nikon contest in the past, but this year I was lucky to get three represented: two images in the Photo Competition and one in the Video Competition. It is a great honour and, personally, a special recognition of my work."

This year's video competition had hundreds of videos submitted. In second place was Michael Weber from the Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG, Germany) with a video showing the beating heart of a two-day-old zebrafish embryo. In third place, was Lin Shao from Janelia Farm Research Campus, Howard Hughes Medical Institute, USA with a video showing the inner details of the mitochondria in a living HeLa cell.

These and other images can be seen here: www.gabygmartins.info/research/haeckaliens

VIDEO



3D reconstruction of a quail embryo – comprised of more than 1,000 separate images

http://www.nikonsmallworld.com/galleries/entry/2013-small-world-in-motion-competition/1

Events

EMBO MEMBERS

Crossing Frontiers in Life Sciences
Vienna, Austria | 11–12 September 2014

EMBO Member **Graham Warren** is co-organizing a symposium on the occasion of the **100th birthday of Max F. Perutz.** The symposium entitled *Crossing Frontiers in Life Sciences* will take place at the University of Vienna from 11–12 September 2014.

To view the full programme go to https://frontiers.univie.ac.at

Targeting the Kinome III
Basel , Switzerland | 26–28 September 2014

The **University of Basel** and the **Friedrich Miescher Institute** in Basel are jointly organizing the meeting *Targeting the Kinome III* from 26–28 September 2014 in Basel. The conference will focus on the latest scientific developments in protein kinase research, molecular signal transduction in cancer, and translational approaches involving kinases relevant for other disease states.

More information can be found at www.targetingthekinome3.org

Proteases at work: Cues for understanding neural development and neurodegeneration
Baeza, Spain | 20–22 October 2014

EMBO Member **Paola Bovolenta** is coorganizing the workshop *Proteases at work: Cues for understanding neural development and neurodegeneration* together with **Paul Saftig** of the University of Kiel. The workshop will take place at Baeza, Spain, from 20–22 October 2014.

For further information visit www.unia.es/content/view/3769/1021

SAVE THE DATE – 2015 EMBO Laboratory Management Courses: Registrations for the courses open in **October 2014.**

A good read – Publications from the EMBO Community

EMBO MEMBERS, YOUNG INVESTIGATORS & FELLOWS

The alarmin IL-33 promotes regulatory T cell function in the intestine

Ahmed N. Hegazy (EMBO Fellow), Fiona Powrie (EMBO Member) and colleagues

Nature | 16 July 2014
doi: 10.1038/nature13577

Processing properties of ON and OFF pathways for *Drosophila* motion detection

Rudy Behnia (EMBO Fellow), Claude Desplan (EMBO Member) and colleagues

Nature | 6 July 2014
doi:10.1038/nature13427

Enhancer loops appear stable during development and are associated with paused polymerase

Eileen E.M. Furlong (EMBO Member), Yad Ghavi-Helm (EMBO Fellow) and colleagues

Nature | 2 July 2014
doi: 10.1038/nature13417

Inferring human population size and separation history from multiple genome sequences

Stephan Schiffels (EMBO Fellow) and Richard Durbin (EMBO Member)

Nature Genetics | 22 June 2014
doi:10.1038/ng.3015

Generation of mouse models of myeloid malignancy with combinatorial genetic lesions using CRISPR-Cas9 genome editing

Monika S Kowalczyk (EMBO Fellow) and colleagues

Nature Biotechnology | 22 June 2014
doi:10.1038/nbt.2951

The faces of Big Science

Gottfried Schatz (EMBO Member)

Nature Reviews Molecular Cell Biology | 23 May 2014
doi:10.1038/nrm3807

Structure of the AcrAB-TolC multidrug efflux pump

Ben Luisi (EMBO Member) and colleagues

Nature | 22 May 2014
doi:10.1038/nature13205

Cell adhesion geometry regulates non-random DNA segregation and asymmetric cell fates in mouse skeletal muscle stem cells

Shahragim Tajbakhsh (EMBO Member) and colleagues

Cell Reports | 22 May 2014
doi: http://dx.doi.org/10.1016/j.celrep.2014.04.016

The Ctenophore genome and the evolutionary origins of neural systems

Inna S. Povolotskaya (EMBO Fellow) Fyodor A. Kondrashov (EMBO Young Investigator) and colleagues

Nature | 21 May 2014
doi:10.1038/nature13400

Amygdala interneuron subtypes control fear learning through disinhibition

Jan Gründemann, Gilad A. Jacobson (EMBO Fellows), Andreas Lüthi (EMBO Member) and colleagues

Nature | 11 May 2014
doi:10.1038/nature13258

Identification of LRRC8 heteromers as essential component of the volume-regulated anion channel VRAC

Thomas Jentsch (EMBO Member) and colleagues

Science | 9 May 2014
doi: 10.1126/science.1252826

Phosphorylation modulates clearance of alpha-synuclein inclusions in a yeast model of Parkinson's disease

Tiago Fleming Outeiro (EMBO Installation Grantee) and colleagues

PLOS Genetics | 8 May 2014
doi: 10.1371/journal.pgen.1004302

Proliferation, dispersal and patterned aggregation of iridophores in the skin prefigure striped colouration of zebrafish

Ajeet Pratap Singh (EMBO Fellow), Christianes Nüsslein-Volhard (EMBO Member) and colleagues

Nature Cell Biology | 28 April 2014
doi:10.1038/ncb2955

Origins and functional evolution of Y chromosomes across mammals

Henrik Kaessmann (EMBO Member) and colleagues

Nature | 24 April 2014
doi: 10.1038/nature13151

Yeast DJ-1 superfamily members are required for diauxic-shift reprogramming and cell survival in stationary phase

Tiago Fleming Outeiro (EMBO Installation Grantee) and colleagues

PNAS | 2 April 2014
doi: 10.1073/pnas.1319221111

MTH1 inhibition eradicates cancer by preventing sanitation of the dNTP pool

Ronnie P-A Berntsson (EMBO Fellow) and colleagues

Nature | 2 April 2014
doi: 10.1038/nature13181

Maternal retinoids control type 3 innate lymphoid cells and set the offspring immunity

Henrique Veiga-Fernandes (EMBO Installation Grantee), Elaine Dzierzak (EMBO Member) and colleagues

Nature | 19 March 2014
doi: 10.1038/nature13158

Structural basis for translocation by AddAB helicase/nuclease and its arrest at Chi sites

Wojciech W. Krajewski (EMBO Fellow) and colleagues

Nature | 16 March 2014
doi:10.1038/nature13037

Mapping the epigenetic basis of complex traits

Vincent Colot (EMBO Member) and colleagues

Science | 7 March 2014
doi: 10.1126/science.1248127

EMBO at 50

Paul Nurse (EMBO Member)

Science | 10 January 2014
doi: 10.1126/science.1247701

Neuronal control of metabolism through nutrient-dependent modulation of tracheal branching

Irene Miguel-Aliaga (EMBO Young Investigator) and colleagues

Cell | January 2014
doi: 10.1016/j.cell.2013.12.008

EMBO MEMBERS & YOUNG INVESTIGATORS

BOOKS

Quantitative Genetics in the Wild

Loeske E. B. Kruuk (EMBO Member) and colleagues

Oxford University Press | April 2014
ISBN 978-0-19-967424-4

Antibiotics–Targets, Mechanisms and Resistance

Claudio Gualerzi (EMBO Member) and colleagues

Wiley-VCH | October 2013
ISBN 978-3-527-33305-9

Bacterial Gene Regulation

M. Madan Babu (EMBO Young Investigator)

Caister Academic Press | March 2013
ISBN 978-1-908230-14-0

Appointments

EMBO MEMBER

EMBO Member **Oscar Marín** has been appointed as the new Director of the MRC Centre for Developmental Neurobiology at King's College London, and has taken up the role in July 2014. Professor Marín is currently a Research Professor at Instituto de Neurociencias, Alicante (Spain).

EMBO Press Poster Prize winners

Congratulations to the following winner:

EMBO MOLECULAR MEDICINE

Firdous Ahmad Bhat
University of Madras, Chennai, India

Quercetin inhibits EGF induced signalling molecules involved in prostate cancer metastasis – *in vitro*

Presented at the International Conference on Cancer Biology: *Molecular Mechanisms and Novel Therapeutics*

Chennai, India
30 January – 2 February 2014

Next issue

EMBOencounters

The next *EMBOencounters* issue – **Autumn 2014** – will be dispatched in **October 2014.**

Please send your suggestions, contributions and news, to **communications@embo.org** by **14 September 2014.**

Editorial

Managing Editor
Barry Whyte

Editor
Yvonne Kaul

Proof reading
Meryl Schneider

Print layout
Uta Mackensen

E-Newsletter & Web version
Yvonne Kaul
Sandra Krahl

Awards of excellence

EMBO MEMBERS

Paul Ehrlich and Ludwig Darmstaedter Prize

Michael Reth is the recipient of this prize, which is one of the highest honours in science in Germany and comes with an award of 100,000 Euros. Reth is professor for Molecular Immunology at the University of Freiburg and his research aims at decoding how immunity operates at the molecular level to find new therapies for cancer and infectious diseases.

2014 Körber Prize

Edvard and **May-Britt Moser,** co-directors of the Kavli Institute for Systems Neuroscience at the Norwegian University of Science and Technology, have been selected for the 750 000 Euros award from the Hamburg-based Körber Foundation. Their selection is yet another recognition of their seminal finding of specialized neurons called grid cells, which are critical in helping all mammals, including humans, find their way. The Körber prize is awarded to research projects that show great potential for possible application and international impact.

L'Oréal-UNESCO for Women in Science Award

Brigitte Kieffer receives the 2014 L'Oréal-UNESCO for Women in Science Award. The prize honours her work on the mechanisms in the brain involved in pain, mental illness and drug addiction. Kieffer has been selected as the winner for Europe for her research at the Institut de Génétique et de Biologie Moléculaire et Cellulaire, in Strasbourg, France. Four other women scientists will receive this prize, one from each continent. This award, funded by the L'Oréal Foundation and by UNESCO, recognizes the exceptional career paths and contributions of women scientists worldwide.

Wolf Prize 2014

Leif Andersson of Uppsala University, Sweden is one of the winners of the Wolf Prize in Agriculture awarded by the Israel-based Wolf Foundation. Andersson received this recognition for contributions to plant and animal sciences using genomics. The prize comes with a monetary award of 100,000 US dollars and was given to eight researchers on 1 June at Knesset in Israel.

Shaw Prize in Life Science and Medicine

EMBO Associate Member **Peter Walter** has received Asia's highest scientific honour, the 2014 Shaw Prize in Life Science and Medicine. Walter, a University of California San Francisco professor, received this prize for his discovery of a system that makes "life and death decisions" for the cell. He shares the prize with Kazutoshi Mori, PhD, a professor of biophysics at Kyoto University in Japan.

Ernst Jung Gold Medal for Medicine

Charles Weissmann, professor emeritus on the Florida campus of The Scripps Research Institute, has been awarded the 2014 Ernst Jung Gold Medal for Medicine, presented by the German Jung Foundation for Science and Research. Bundesverdienstkreuz

Mary Osborn of the Max-Planck-Institute for Biophysical Chemistry in Goettingen, Germany, has been awarded the Bundesverdienstkreuz 1. Klasse des Bundespräsidenten.

Waddington Medal 2014

Philip Ingham, Joint Research Director at A*STAR's Institute of Molecular and Cell Biology in Singapore, has been awarded the Waddington Medal 2014 by the British Society for Developmental Biology. The medal is awarded annually to development biologists for outstanding research performance. As of February 2014, Ingham took up the position as Distinguished Professor and Vice Dean of Research at the Lee King Chian School of Medicine in Singapore.

Luigi Sacconi Medal

Roland Lill of the Philipps University of Marburg, Germany, has been awarded the 2014 Luigi Sacconi Medal of the Italian Chemical Society and the Luigi Sacconi Foundation. Lill also received the Albrecht-Kossel Prize of the German Society of Chemistry this year, the first time this prize was awarded for achievements in biochemistry.

Carl Zeiss Lecture 2014

Ernst Stelzer received the Carl Zeiss Lecture 2014 at the International Meeting of the German Society for Cell Biology in Regensburg, Germany, on 18 March 2014. This prize is awarded annually for internationally outstanding achievements in the field of light and electron microscopy. Ernst Stelzer's development and patents for light sheet microscopy have led to the availability of a new fluorescence microscopy system to scientists worldwide.

2014 Carol Nachman Prize

George Kollias of the Biomedical Sciences Research Center Alexander Fleming in Greece, has been awarded this year's Carol Nachman Prize for his pioneering work in the field of pro-inflammatory cytokines. He was honoured for establishing the human tumour necrosis factor transgenic animal model for rheumatoid arthritis.

American Academy of Arts & Sciences

EMBO Associate Member **David L. Spector,** Professor and Director of Research at Cold Spring Harbor Laboratory, United States, was elected to the American Academy of Arts & Sciences in 2014.

American Academy of Microbiology

Cecília Maria Arraiano of the University of Lisbon, Portugal, became a Fellow of the American Academy of Microbiology this year. AAM Fellows are elected through a highly selective, annual, peer review process, based on their records of scientific achievement and original contributions that have advanced microbiology.

Professor *honoris causa*

Klaus Scherrer, EMBO member since its foundation, was awarded the title Professor *honoris causa* by the University of Brasilia. Scherrer is known for the discovery of "giant" RNA and RNA processing at the Massachusetts Institute of Technology, and subsequent studies on genome and gene expression. Since 1968, six of his former collaborators have contributed to the development of molecular biology at the University of Brasilia.

Doctor *honoris causa*

Edward De Robertis received a Doctor *honoris causa* from Pierre et Marie Curie University in Paris in December 2013.

Nature Mentoring Award

Michela Matteoli of the University of Milan, Italy, has been awarded the *Nature* Mentoring Award – a yearly award given by *Nature* magazine since 2005 for "outstanding scientific mentorship." She was the winner of the "mid-career award". The prize was given out by President of the Italian Republic Giorgio Napolitano together with Philip Campbell, the editor-in-chief of *Nature* magazine.

EMBO YOUNG INVESTIGATORS

Colworth Medal

Helen Walden, a principal investigator at the University of Dundee, has been awarded the 2014 Colworth Medal, sponsored by Unilever and presented by the Biochemical Society. The medal is the most distinguished award that a biochemical researcher in the early stages of their independent research can receive in the United Kingdom.

Protein Science Young Investigator Award

M. Madan Babu from the MRC Laboratory of Molecular Biology, Cambridge, United Kingdom, is the recipient of the 2014 Protein Science Young Investigator Award, which recognises important contributions to the study of proteins by a scientist in the early stages of an independent career. He received the award for his contributions to our understanding of the principles of regulation in biological systems – especially in the fields of intrinsically disordered proteins and gene regulation.

Cell Press

Five EMBO Young Investigators **Óscar Fernández-Capetillo, Maya Schuldiner, Aurelio Teleman, Jacob Hanna** and **David Keays** were selected to the list of "40 under 40" by Cell Press on the occasion of 40 years of *Cell.*

EMBO FELLOWS

Heinz Maier-Leibnitz Prize 2014

Former EMBO Fellow **Dorothee Dormann** of the University of Munich, Germany, is one of the recipients of the 2014 Heinz Maier-Leibnitz Prize, considered one of the most important prize for early career researchers in Germany. Each of the ten recipients was presented with the prize of 20,000 Euros. Dormann's group is looking into the transport processes and pathomechanisms of RNA-binding proteins in neurodegenerative disorders. The prize was based on two papers published in *The EMBO Journal.*

Vidi Grant

Taco Kooij of the Max-Planck-Institute for Infection Biology in Berlin has been awarded with the prestigious Vidi Grant to develop an innovative and independent line of research. The grant facilitates his return to the Netherlands where he will join the malaria research community at the University of Nijmegen. Kooij is one of 94 scientists who received a Vidi Grant from the Netherlands Organisation for Scientific Research (NWO) this year. Each scientist receives a maximum amount of 800,000 Euros for the coming five years.

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