Newsletter of the Centre for Genomic Regulation
Life @ CRG
Issue 11
July 2015

THE BARCELONA INSTITUTE OF SCIENCE AND TECHNOLOGY

CRG has come together with ICIQ, ICN2, ICFO, IFAE and IRB Barcelona to form this new institute, which emerges as one of the leading scientific institutes in Europe.

Six of the top research centres in Catalonia have taken a step forward in their collaboration to set up the Barcelona Institute of Science and Technology. The centres involved are the Institute of Chemical Research of Catalonia (ICIQ), the Catalan Institute for Nanoscience and Nanotechnology (ICN2), the Institute of Photonic Sciences (ICFO), the High Energy Physics Institute (IFAE), the Institute for Research in Biomedicine (IRB Barcelona), and us, the Centre for Genomic Regulation (CRG). They are joined on the Board of Trustees by five preeminent scientists, five large foundations and the Government of Catalonia. The Board of Trustees is chaired by Prof. Rolf Tarrach, who also chairs the European Universities Association, and will be directed by Dr. Montserrat Vendrell, who is currently the director of Biocat and the Barcelona Science Park.

Inspired by top international centres, such as Caltech in California and the Weizmann Institute in Israel, the Barcelona Institute is a scientific initiative that seeks to foster interdisciplinary research, to increase its scientific impact and to position itself among the leading European institutions. "From the interdisciplinarity of the six centres that comprise the Institute, we will consolidate a joint scientific initiative, build a graduate training offer that responds to current training challenges, and achieve the critical mass needed for efficient technology transfer," said Montserrat Vendrell.

The six research centres that make up the Barcelona Institute will continue operating autonomously while simultaneously participating in the joint undertaking, which will boost their individual potential. Activities will begin in September and will focus on three major lines of work: developing combined research from diverse disciplines and shared infrastructures, developing a joint technology and knowledge transfer strategy and launching joint international multidisciplinary graduate programs. <

WELCOME CNAG MEMBERS!

On 1 July 2015, the Centro Nacional de Análisis Genómico (CNAG) was integrated into CRG. CNAG has a key role in the advancement of biomedical research and genomics in Spain. The integration of CNAG with CRG will help to boost genome research, maximize resources and create synergies between the two institutes.

According to the Spanish and Catalan governments, both members of the CRG and CNAG Boards of Trustees, "*this incorporation will allow research projects to be carried out at national and international levels on a larger scale than would have been possible within their respective areas of competence and, further, will increase the critical mass of expertise, which will benefit the scientific community.*" Currently, the two centres already share some projects; for instance, both are involved in flagship projects such as the Chronic Lymphocytic Leukemia (CLL) Genome Project within the International Cancer Genome Consortium (ICGC). <

EDITORIAL

Gabriele Picarella
Head of the Grants Office

LOOKING BACK AT THE FIRST ROUND OF H2020

In just a few months, it will have been two years since the official launch of the European Commission's Horizon 2020 (H2020). I still recall the summer 2013 as a very hectic period, as there was still only a political agreement in place to give the general shape of H2020, which was destined to be the biggest funding programme to support research and innovation in Europe. However, little was set in stone regarding science topics, functions or participation rules. At the CRG, communication was flowing daily between our team and EC officers, research managers, scientists and stakeholders' groups across Europe to make sure that the CRG scientific community got the latest updates, anticipating the opening of the first calls for proposals.

Recently released statistics covering 2014 confirm that Catalonia set off on the right foot in H2020 and successfully obtained a greater share of funds than in the past, winning 3.1% of the grants overall and 31.4% of those for Spain. While these results still can only be used to show the initial trend, rather than to draw long-term conclusions, they nevertheless help to respond to the crucial question that I was asked so often two years ago: "Are we going to get more funding?"

Although the 7-year budget assigned to H2020 got a significant boost compared to its predecessor programme (FP7), competition has become tougher, with the odds of getting a grant dropping to around 1 out of every 8 proposals evaluated (or lower in some cases). In fact, participation has also massively increased—many trusting the assumption that 'the more applications, the more chances to make it.' This however is far from the truth: H2020 was never meant to be like an online, one-stop shop where researchers can get whatever they need—whenever they need it—to thrive in science, just one click away. Top science is a must; however, not all outstanding science is considered to be strategic, as a big chunk of the allocated budget is assigned on the basis of top-down priorities. In this respect, the success harvested by the CRG community during the last two years in H2020 rewards their contribution in gearing science to help achieve the European Union's ambitious objective of establishing a globally competitive region based on knowledge and innovation, to drive future economic growth and jobs.

Taking stock of those promising results, two of the factors at a play should be highlighted as a driver for some of the recent awards at CRG: 1) being capable of thinking outside the box to shape science around transversal matters that have an impact on economy and society at large, over and above the standard approach of seeking the best matching topic; and 2) being committed to building bridges with a wide range of actors to facilitate a quick uptake of breakthroughs and discoveries. Additionally, it has become evident that the key contribution of non-academic organizations as well as a variety of new comers makes a difference, as proved by their increasing presence in many funded projects.

Coming back to the present, we are now facing a new challenge, as the publication of a new round of calls for the next two years of H2020 is approaching. As anyone who is familiar with applying for research funding will know, knowing the rules of the game already puts you one step ahead. One way to get valuable insight to this would be to join in the EC's decision making processes: the EC is always looking for experts to assist with proposal evaluations, project reviewing and programmes or policy monitoring. Why do not give it a try? If you are appointed as an evaluator, you learn about the evaluation process, meet the Commission staff and other expert evaluators and pick up useful hints and tips for writing your own proposals. <

INSIDE

MATH CLUB REACHES ITS MIDWAY POINT!

Juanjo Fraire

We are very happy tell you that the Math Club has survived its seventh version, and that we are now finishing the last chapter on integration techniques. The Math Club was initiated by a group of scientists willing to teach and learn mathematic concepts as applied to biological problems. This journey has been very exciting, as we have made it all the way from the very basics (trigonometry, quadratic equations, what is a function, and polynomial, rational, power, logarithmic and trigonometric functions) to more applied biological topics (discrete-time models, sequences and difference equations). We also covered the basics of calculus (limits and continuity, differentiation and its applications and integration) and are now ready to embark into more advanced topics! (e.g. differential equations, linear algebra and analytical geometry, multivariable calculus, systems of differential equations). While the Math Club has been successful due to the numerous people who have participated, we would like to especially thank our established participants who have consistently attended and presented topics: Jenny Semple (Lehner lab), Marcos Pérez (Lehner lab), Pez Hayes (Solon lab), Caro Gallo (Serrano lab), Oli Vujatovic (Fillion lab), Luis Zapata (Ossowski lab), Marco Musy (Sharpe lab) and Kai Dierkes (Solon lab). A special mention should also go to Vivek Senthivel (Isalan lab), who helped in the initial organization before moving to Imperial College London. We hope many of you will join future versions. We will send our usual invitation for the sessions on advanced topics, and you are more than welcome to attend and/or present. <

KEEPING TRACK OF OUR GROWING ASSET: SCIENTIFIC PUBLICATIONS

According to *Nature*, the global scientific output doubles every nine years (http://blogs.nature.com/news/2014/05/global-scientific-output-doubles-every-nine-years.html). CRG as well observes a steady increasing output of scientific publications, with an 8% growth in 2014 as compared to 2013 (with only a growth of 0.5% in the size of the CRG research staff during this time). More and more, output figures such as publication numbers, the average impact factor and number of international collaborations are increasingly seen as indicators of research performance and are often requested by funding bodies or reviewers. So, how can we keep track of it all?

CRG has now created a publication management service with a centralized database for all publications produced by CRG researchers. This digital database allows us to stay up-to-date with the newest figures related to CRG scientific publications and, most importantly, to curate and reliably exploit data. For instance, we can now efficiently extract publication lists and metadata connected to individual researchers and groups and determine indicators based on international and institutional collaborations, as well as other indicators, without having to rely on external databases. Kinga Wisniewska, the new CRG scientific documentalist, is in charge of managing both the database and the scientific publications; she can be contacted at publications@crg.eu. <

MATERNITY PROTECTION AT CRG

Sonia Alcázar

During pregnancy, a woman undergoes extreme physiological and psychological changes, such that working conditions that are acceptable and safe under normal conditions might no longer be so, as they can affect the health of the mother or fetus. The Occupational Risk Prevention Law 31/1995 of 8 November mandates that, following occupational risk assessment, employers must take all necessary measures to avoid the risk of exposing pregnant and breastfeeding employees to unsafe situations.

In light of this, CRG staff who are pregnant or breastfeeding should initiate measures to protect themselves. If it is not possible to take these measures, the employee will be assigned to new duties or to a suitable alternative work during pregnancy and until she can return to her usual work duties. If no alternative position is available, the employee may be assigned to another group or category, while retaining all of the rights of the original position (including salary). These provisions are also applicable during the breastfeeding period.

In order to help to protect your fetus from the very beginning, the CRG Health and Safety (H&S) office encourages every employee to declare her actual, suspected or planned pregnancy. CRG's responsibility for "conceptus protection" begins only after receipt of this notice of pregnancy to H&S office. Please remember that if you choose to maintain your pregnancy status confidential for a time, you may of course ask for safety information about pregnancy and chemical, biological and radiological exposures at any time from H&S office without declaring your pregnancy status.

Finally, in line with CRG's commitment to providing maternity protection, we have begun with actions in this direction, such as establishing a lactation room, which is available on the 6th floor (room 654). We also welcome you to look at the newly updated version of the Protection of Pregnant and Breastfeeding Employees Guideline for CRG staff, available on the CRG intranet, and of course to contact us at any time with questions or doubts. <

INSIDE

THE NEW TOY IN TOWN: THE PROTEOMICS UNIT BECOMES THE FIRST EU FACILITY TO GET THE NEWEST TRI-HYBRID MASS SPECTOMETER

The CRG-UPF Proteomics Unit is the first European facility to get the newest Thermo Fisher Scientific tri-hybrid mass spectrometer—the Orbitrap Fusion Lumos.

This instrument is the first unit installed in Europe and only the third worldwide. With the new tri-hybrid mass spectrometer, CRG researchers will now be able to perform cutting-edge experiments that allow a better and more precise detection of proteins and protein complexes. "*Thanks to this new instrument, we will now be able to run a broader range of comprehensive proteomics experiments. It features enhanced sensitivity and faster mass analyzers, and its new fragmentation capabilities will allow our scientists to better characterize post-transcriptional modifications,*" said Eduard Sabidó, head of the CRG-UPF Proteomics Unit. "*With the arrival of the new Orbitrap Fusion Lumos, we have the complete array of the currently available Orbitrap family in our facility, making us one of the most well-equipped proteomics units in Europe.*"

More information about the Orbitrap Fusion Lumos technology is available at: planetorbitrap.com <

CRG MEMBERS VOLUNTEER FOR CHANGE AND SOCIAL INNOVATION IN SCIENTIFIC INSTITUTIONS

Several CRG members have volunteered to work with the coordinated project "GENERA: Promoting a more inclusive and competitive knowledge economy." This research aims at promoting excellence in science to stimulate a more inclusive and competitive knowledge economy. The main purpose of GENERA is to generate change and social innovation in scientific institutions.

Ana M. Gonzalez and Beatriz Revelles, researchers at the Gender & ITC group from Universitat Oberta de Catalunya, interviewed some CRG members as part of their case study. Their final goal will be to compare gender biases across different environments that influence the selection and progression of men and women researchers.

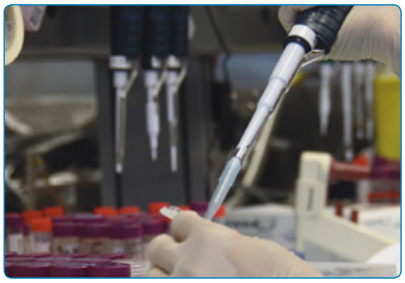
The outcomes of the project will help to design and launch strategies on human resources policies as well as a gender agenda. Having these in place should support the scientific community to set up a more balanced and fair playing field, help attract young people to science and technological professions and create the pillars for a more competitive economy. You are welcome to follow the progress and results of the GENERA project at genera-uoc.com

Encouragingly, the CRG collaboration with the UOC researchers has already generated interest and discussion, with some scientists taking advantage of their most recent visit to CRG to start spontaneous and highly interesting discussions about this and other projects related to gender balance. <

ADMINISTRATION REVS UP FOR SCIENCE

Some time ago, CRG organized activities to give the administration team a chance to get to know more about the science carried out in CRG laboratories. However, the large turnover in both the scientific and administration communities makes it time to return to action.

After vacation, we will restart some of these previous activities as well as bring in new ones. Our goal is to give all administration personnel a greater insight to CRG science, which should give them a sense



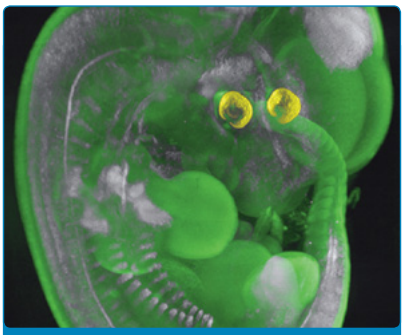
of being closer to CRG research and a firsthand understanding of what they are contributing to with their daily work.

"Easy Science" talks, visits to laboratories and even "hands-on" workshops await you this fall. We count on you to help us in this mission! <

FEATURING CRG

THE 2015 ELMI MEETING, A GREAT SUCCESS

The IRB Barcelona and CRG gathered 420 experts in Sitges at the 15th European Light Microscopy Initiative (ELMI) meeting. This annual congress is the most anticipated event for those managing microscopy platforms across leading centres in Europe, both for industry—more than 35 companies developing this technology participated, including Nikon, Leica, Carl Zeiss and Olympus—and for scientists. This 15th edition of the ELMI meeting was organised by the



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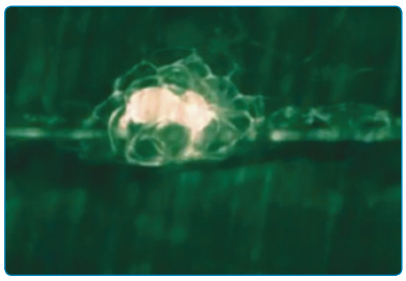
scientists Julien Colombelli (IRB Barcelona) and Timo Zimmermann (CRG), both of whom head their institute's advanced microscopy platforms.

Observing the movement of cells inside an organism, following the development of an embryo *in vivo* over two days, or seeing how synapses form between neurons are the challenges faced by microscopy in life sciences today. The technological developments in microscopy have become more sophisticated, and such advancements bring with them greater opportunity to tackle questions, particularly in the life sciences. Some examples of these developments were presented in the meeting with special attention to 3D microscopy, super-resolution microscopy and light-sheet microscopy. <

CRG CROSSES THE POND AND LANDS IN BOSTON

CRG participated in the NatureJobs Career Expo in Boston (USA) last May, presenting our institute to the more than 850 young researchers who are looking for future employers. CRG was represented by Inés Fonseca (talent officer, HR department) and Elias Bechara (training manager, International and Scientific Affairs office), who shared a full day of lectures, workshops, face-to-face meetings and networking with the participants. Both felt that the attendance of CRG as an exhibitor in this event was a great success. Indeed, hundreds of participants showed their interest in our institute and in the possibility of having a scientific career at CRG. <

TIME LAPSE VIDEO OF ZEBRAFISH WINS FIRST PLACE IN 4TH ANNUAL NIKON "SMALL WORLD IN MOTION"



CRG researchers Mariana Muzzopappa (currently working at IRB Barcelona) and Jim Swoger, (working in the Sharpe lab), won the 4th Nikon "Small World in Motion" competition with a time-lapse video of zebrafish lateral line development.

The awarded video was captured thanks to Selective Plane Illumination Microscopy (SPIM), a new imaging technology that combines optical sectioning with multiple-view imaging. It allows one to observe tissues of large samples and living organisms with high resolution over extended periods of time, making it perfect for developmental research projects.

Muzzopappa and Swoger captured this video to study the development of the zebrafish lateral line, a sensory organ with hair cells that are homologous to those in the inner ear in humans. The video shows how hair cells are differentiated and how the lateral line is developed throughout a 36-hour time frame. Related research from this was published in the *Journal of Biophotonics* (Swoger *et al.* 2011). <

EU & MORE

GREAT H2020 SUCCESS AT THE CRG

Three new ERC Advanced Grants and four European Coordinated projects are the latest results of the CRG in the H2020 call of the European Commission. These successful results are fruit of a strong commitment and support to frontier research on the basis of excellence, competitiveness and creativity. CRG continues to be one of the leading biomedical institutes with more ERC grants per researcher (more than 50% of CRG group leaders awarded) and the most successful Spanish research centre to attract EU competitive funding.

We invite you to discover the new H2020 projects that CRG scientists will lead and we encourage you to be involved in future calls either presenting a proposal or playing other relevant roles. Both, the Grants Office and the International and Scientific Affairs Office will be happy to help you, guide you and support you to make your H2020 dream come true!

ERC Advanced Grants

SIMBIONT (ERC Adv. Grant Ref. 670555)

Coordinator: James Sharpe. **Time period:** 01/09/2015-31/08/2020. **Budget:** 2,075,055 Euros

Abstract: *Organogenesis* is the process by which multiple different cell types grow, differentiate and interact with each other to create large complex structures with integrated functions. Understanding this process has enormous potential impact, both scientifically and medically. The SIMBIONT project represents both a grand technical challenge and a fundamental scientific question. The *grand technical challenge* is to build the first ever multi-scale computer model of mammalian organogenesis—specifically, limb development. This purpose of the model is to help us address the *deep scientific question*: how are the complex interactions at multiple scales (genes, molecules, cells and tissues) coordinated so as to build a carefully constructed 3D organ?

MASCP (ERC Adv. Grant Ref. 670146)

Coordinator: Juan Valcárcel. **Time period:** 01/09/2015-31/08/2020. **Budget:** 2,159,574 Euros

Abstract: Alternative splicing of mRNA precursors is a prevalent form of gene regulation that greatly expands the coding capacity and regulatory opportunities of higher eukaryotic genomes. Alternative splicing contributes to programs of cell differentiation and pluripotency and its deregulation contributes to cancer progression, as evidenced by the frequent occurrence of cancer-associated mutations in splicing factors, which are also targets of anti-tumor drugs. Despite its relevance to predict genome outputs at a time when genome sequencing is becoming routine, the underlying mechanisms of regulation remain poorly understood. This proposal aims to develop and apply novel systematic approaches that can allow us to carry out the equivalent of genetic analysis of splicing regulation in cancer and pluripotent cells.

MYCOCHASSIS (ERC Adv. Grant Ref. 670216)

Coordinator: Luis Serrano. **Time period:** 01/11/2015-31/10/2020. **Budget:** 2,454,522 Euros

Abstract: Engineering bacteria to deliver therapeutic agents or to present antigens for vaccination is an emerging area of research with great clinical potential. The most challenging issue in this field is selecting the right bacteria to engineer into what is referred to as a "chassis." While the best chassis depends on the application, there are two common drawbacks to bacteria used currently that limits genome engineering to classical trial-and-error approaches. In this project, we want to engineer the genome-reduced bacterium *M. pneumoniae* using a data-driven, whole-cell model to engineer a chassis for human and animal therapy.
By combining bioinformatics, omics, and biochemistry approaches with genome engineering tools, systems biology analyses, and computational whole-cell models, MycoChassis aims to develop a whole-cell model and to use it both to predict its genome modifications and to be able to engineer a therapeutic chassis so that it can be used against lung pathogens.

H2020 CRG Coordinated projects

LIBRA: Leading Innovative measures to reach gender Balance in Research Activities

Coordinator: Isabelle Vernos
Time period: 01/10/2015–01/04/2019
Budget: 2,300,000 Euros
Abstract: The main goals of LIBRA are to implement innovative Gender Equality Plans that will empower women researchers to achieve successful careers in science, remove gender barriers and biases at an institutional level and raise awareness of gender aspects in the experimental design of pre-clinical research projects.
To achieve these goals, the team will conduct an initial external assessment to identify gender bias, including an analysis of the current cultural and institutional attitudes towards gender issues. Also, they will design and implement innovative strategies to remove any identified biases or barriers, including the identification of best practices and subsequently the development of training programmes, mentoring schemes and family-friendly policies. Finally they will define targets, agree on quantitative and qualitative indicators, monitor results and ensure sustainability of the project.

DIVIDE: A multidisciplinary approach to cell division: From human oocyte to synthetic biology

Coordinator: Isabelle Vernos.
Time period: 01/04/15–01/04/2020
Budget: 2,800,000 Euros
Abstract: DivIDe aims to investigate the mechanisms and principles of cell division and to reproduce them *in vitro* with synthetic approaches. Crucial to cell division is the mitotic spindle, a structure whose main duty is the separation of chromosomes. The mitotic spindle is the one of the cellular structures that best represents the ability of biological matter to self-organize though arrays of dynamic protein-protein interactions. The complexity and dynamic behaviour of the mitotic spindle captures the imagination of synthetic biologists and modellers.
These "molecular engineers" try to understand and harness the principles of self-organization to generate new biological structures endowed with the most typical features of biological matter, the ability to harness energy to do mechanical or chemical work. DivIDe will train a new generation of molecular engineers with strong basis in quantitative computational and biochemical methods, and therefore capable of addressing cellular and molecular mechanisms.

MYCOSYNVAC: Engineering of Mycoplasma pneumonia as a broad-spectrum animal vaccine

Coordinator: Luis Serrano
Time period: 01/04/2015–01/04/2020
Budget: 8,000,000 Euros
Abstract: There is no effective vaccination against many *Mycoplasmas* that infect pets, humans and farm animals. Annually, infections caused by *Mycoplasma* species result in multimillion Euro losses in USA and Europe. Furthermore, most *Mycoplasmas* are difficult to grow in axenic culture, requiring a complex media that includes animal serum. Consequently, even in those cases for which effective vaccines are available, the production process of the vaccines is very irreproducible and prone to contamination by animal viruses. MycoSynVac partners will capitalize on their extensive systems biology knowledge of *M. pneumoniae* and on cutting-edge synthetic biology methodologies to design a universal *Mycoplasma* chassis that can be deployed as single- or multi-vaccine in a range of animal hosts. The chassis will be free of virulence determinants and will be optimized for fast growth in a serum-free medium.

OPATHY: From Omics to Patient: Improving Diagnostics of Pathogenic Yeasts

Coordinator: Toni Gabaldón
Time period: 01/09/2015–31/08/2019
Budget: 3,300,000 Euros
Abstract: OPATHY is an innovative translational research training network that will explore the potential of omics technologies, including genomics, transcriptomics and proteomics, to study the interactions of yeasts that cause disease to humans with their host, and to develop new diagnostic tools to monitor yeast infections in the clinic.
Today, these infections are poorly understood, difficult to diagnose, and are becoming increasingly frequent and serious. OPATHY will exploit omics technologies to investigate host-pathogen interactions during yeast infection and colonization with a primary focus on their potential to develop innovative diagnostics tools to improve health care.
OPATHY will train Early Stage Researchers in several scientific technologies and fields and transferable skills, to boost their careers as innovative and creative researchers.

BUSINESS & INNOVATION

SCIENCE2BUSINESS (S2B) CONCEPT CHALLENGE

The *S2B Concept Challenge* is an initiative of the Technology and Business Development Office (TBDO) that celebrates the spirit of innovation and entrepreneurship among CRG researchers and collaborators with a goal of stimulating early investment in CRG-grown concepts.

S2B aims to address critical healthcare and market needs, while stimulating CRG entrepreneurs to create innovative strategies to address them. The 2015 concepts must fall under the following three research areas: novel therapeutic approaches, diagnostics and biomarkers and software.

After selecting and pre-evaluating proposals, a committee will judge them a final time to carefully analyze projects for their proof of concept and business strategy. The winning team will receive a €2,500 cash prize plus an entrepreneurial package of up to €22,500 to help kickstart their concept. The second prize will consist of an entrepreneurial package of €15,000. TBDO will assist the winning teams as they progress through their proof of concept plans and business strategies. <

EVERYTHING READY FOR THE 2ND BIOBUSINESS SCHOOL

The 2nd CRG BioBusiness School is coming soon! This new edition of the school is booked out (the organisers received more applications than available places) and promises to be even better than its predecessor. The 5-day course (5–9 October) comprises several modules that combine lectures and workshops to motivate and teach participants by working on real-life examples. The school was organized by the Technology and Business Development Office (TBDO) and the Training Unit.

Based on the great success of the first edition, the 2nd CRG BioBusiness School aims to: raise awareness about technology transfer among the participants by lectures and hands-on practical sessions; teach the challenges, opportunities and tools to successfully transfer basic knowledge; identify projects with technology transfer/business potential that could otherwise remain undisclosed; match basic science with business; have participants function as "signal amplifiers", able to spread the knowledge acquired amongst other colleagues, and apply it to new projects; and stimulate a culture of innovation and entrepreneurship. <

A FULL AGENDA FOR TBDO

The TBDO team has had a full schedule of events in recent months. For instance, TBDO participated in the 2015 BIO International Convention in Philadelphia (USA), the world's largest biotechnology event. Also, they participated as a guest at several events in the sector, such as the round table organized by Knowledge Innovation Market (KIM), Barcelona, and the conference "Lessons learned: Licenses, the art of buying and selling intangibles in biotechnology," organized by Biocat and CataloniaBio . On the home front, they have launched a new series of seminars entitled "TBDO Sessions," to present CRG members with examples of research done in the industry. To date, the speakers invited to CRG have been Dr. Antonio Gómez, of Johnson & Johnson (in May), and Dr. Richard J. Law, of EDVOTEK (in June). <

TRAINING

TOTAL IMMERSION IN PROTEOMICS

The now annual "Courses@CRG: Advanced Proteomics Course for Molecular Biologists and Clinicians" took place in CRG at the end of June for the third time. The course was organized by the CRG-UPF Proteomics Unit and focused on the principles of mass spectrometry, discovery and targeted proteomics and statistical methods and data analyses of proteomics data-

sets. The course hosted students from national and international institutions, including the Hospital Sant Pau i de la Santa Creu, the Catalan Institute of Oncology (ICO), Universitat Pompeu Fabra (UPF), the Technische Universität München (TUM), and the Institute of Molecular Medicine and Cell Research in Freiburg, among others.

The course, which was supported by ProteoRed, ABSciex and the Severo Ochoa Excellence Programme award to CRG, was well received, with feedback from the students including comments such as "well programmed, well organized and great teachers" and "I realized of the complexity of analyzing data as well as some useful softwares to do it relatively easily and friendly." <

CRG & SOCIETY

"SACA LA LENGUA" AT THE 2ND BCN CITIZEN SCIENCE DAY

In April, researchers and scientific communicators gathered for the 2nd Barcelona Citizen Science Day to discuss citizen science projects being planned and already underway in Barcelona as well as to brainstorm ideas.

Annick Labeeuw presented in one of the programmed Ignite Talks, our flagship project on citizen science, "Saca La Lengua". This project aims to improve the understanding of the oral microbiome. She presented some positive side effects and changes that have been made at the organizational level as well as the challenges that have had to be overcome to make this project possible.

The 2nd Barcelona Citizen Science Day was part of the Barcelona Science, Technology and Innovation festival. CRG additionally participated with several activities and practical workshops at an open science campus in Les Glòries. <

INTERVIEW WITH A SCIENTIST

On 30 April, a group of 50 children from the primary school "Lluis Millet de El Masnou" participated in the PRBB-organized activity "Interview with a scientist." The postdoc Pedro Vizan (CRG, Di Croce lab) was the protagonist of the day, meeting with and answering lots of different types of questions from the 4th graders. In addition to the interview, the students also visited the UPF genomics service and observed some zebrafish samples with a magnifying glass. <

FOSTERING RESEARCH IN AFRICA AND PROMOTING AFRICAN WOMEN RESEARCHERS

Luis Serrano, CRG director, and Maria Teresa Fernándes de la Vega, president of the Mujeres por África Foundation, signed a collaboration agreement to launch projects and activities of common scientific interest, with women scientists from Africa taking centre stage.

In particular, both organisations expressed their intention to: collaborate on biomedical research programmes and projects for African women; promote research and training on health-related issues, life sciences and biomedicine; drive the transfer of scientific discoveries from the lab to people, prioritising the study of diseases that particularly affect the African population; and organise conferences and seminars on topics related to biomedical research that involve the participation of women scientists from Africa. <

CRG MUMS BRING SCIENCE TO PRIMARY SCHOOLS

It all started in 2011 with a simple request: Mariana Lopez from Mathieu Louis's lab was asked to talk about being a scientist by her son's teacher in primary school. Her first presentation raised a large amount of interest among the children about the scientific processes of inquiring, experimenting, and discovering, which led to a second highly anticipated session: an actual experiment! Together with Lopez, a lucky group of primary school children conducted an exciting experiment on the olfactory system of *Drosophila*. The successful event, and the intuitive but striking nature of the experiment, convinced other CRG scientists to adopt it for their kids' classes (Bàrbara Negre, Andreea Munteanu and Paula Pifarre). And now, for the first time, this experiment will also be presented at the PRBB Open Day next October.

In the past four years, this simple fruit fly experiment has fascinated children and teachers alike from three primary schools. In fact, the experiment has been extended and adapted to the primary school curricula. Thus, not only do schools come to CRG for science (about 2,000 school students every year), but CRG science also goes to schools, contributing a little to the urgent necessity of more science and critical thinking in primary schools. <

REMOTE CONTROL OF BEHAVIOUR

Matthieu Louis and his lab have been striving to better understand the computations achieved by neural circuits controlling odour perception and its motor response in the fruit fly larva. After having identified elements of the neural circuitry involved in sensorimotor control in orientation (Tastekin *et al.*, 2015, *Current Biology*), they have now reached a major milestone by proposing the first model for the sensorimotor control of olfactory behaviour in the fruit fly larva (Schulze *et al.*, 2015, *eLife*).

In previous work, the team has shown that the information transmitted by only 1 olfactory sensory neuron is sufficient for a larva to efficiently ascend an odour gradient.

Combining fly genetics and microfluidics, they thoroughly explored every piece of this jigsaw puzzle, from the analysis of neural activity in single sensory neurons to their control in the navigational behaviour.

The authors developed a model describing the computations achieved by an olfactory sensory neuron, which clarifies how a single neuron is capable of keeping track of the rate of change of the stimulus.

In collaboration with the Janelia Research Campus, they built a high-tech machine to monitor the behaviour of a larva in real time and to stimulate its olfactory system by pre-determined light patterns. Thanks to this device, the team was able to characterize the rules that control the behaviour of the larva and mathematically model how olfactory inputs are converted into a basic form of behavioural decision.

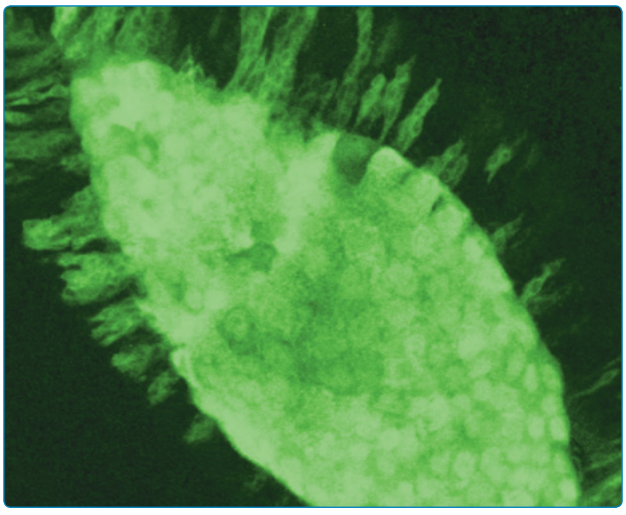
"This study has been a challenge from many angles. It is a prefect illustration of the essential role mathematical modelling plays in neuroscience. Now that we have solved one part of the mystery behind larval chemotaxis, it will be exciting to define whether our model helps explain how mice, rats and dogs track odour trails. These are necessary steps towards an understanding of how the human brain solves similar problems", concluded Louis.

A NEW FORCE DRIVING CELL CONTRACTION

Cells and tissues must generate forces to shape organs and for proper development. A team of scientists led by Jérôme Solon has now described a new mechanism that generates the forces that drive cell movements during development (Saias *et al.*, 2015, *Developmental Cell*). They focused particularly on one of the most studied developmental processes—dorsal closure in *Drosophila* .

"Mechanisms shaping cells and tissues described until now are based on forces generated by the remodelling of the cell cytoskeletal meshwork and structures that pull, push or shrink cells. What we have now described is that cells can also generate forces simply by modulating their volume," said Solon.

Solon and colleagues quantitatively described dorsal closure at a three-dimensional level. They imaged the cells and, together with Guillaume Salbreux of the Francis Crick Institute in London, built a 3D model to enhance our understanding of what was happening at the single cell level. A curious aspect of this research is that the mechanisms driving these volume changes are the same as those that have been found during programmed cell death (apoptosis). So, it is important to highlight the dual role of apoptosis in this particular developmental process. <

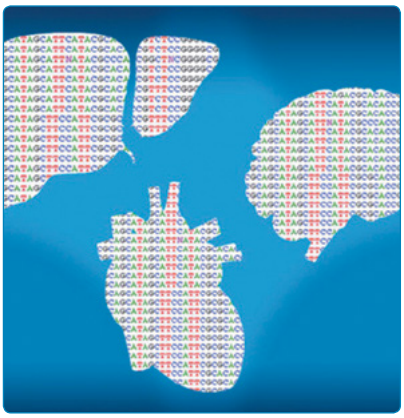


SCIENCE@CRG

OF GENE EXPRESSION, TISSUES AND DISEASE SUSCEPTIBILITY

Although the genetic blueprint of every cell is the same, each cell has the potential to become specific for a tissue or organ by controlling its gene expression. Launched by the NIH in 2010, the Genotype-Tissue Expression (GTEx) Project aims to create a reference database and tissue bank for scientists to study how genomic variants affect gene activity and disease susceptibility.

Following their two-year pilot study, GTEx scientists—including scientists from CRG—have now published their initial results in three articles in *Science*. These



breakthrough studies provide new insight into how genomic variants control gene expression in different tissues. The number of tissues examined in GTEx provides an unprecedented depth of genetic variation and allows scientists to gain unique insight into how people differ in gene expression in tissues and organs due to both genomic and environmental causes.

One of these articles (Melé et al., 2015, *Science*) investigates the variation of gene expression between individuals and, in particular, between organs and tissues. This research was led by Roderic Guigó at CRG and involved scientists from the Broad Institute. "We realized that gene activity differed much more across organs or tissues than across individuals. Variation between individuals accounted only for about 5% of the total variation in gene activity," said Guigó. <

ALUMNI

LLUÍS ARMENGOL I DULCET

CSO, CEO and one of the founders of qGENOMICS

I have a degree and a PhD in biochemistry from the University of Barcelona. Besides being the father of three, I am currently the CSO and CEO of qGenomics, a Catalan biotech company. My contact with research started with cell biology at the Department of Cell Biology in the Faculty of Biology at the UB. The initial part of my thesis introduced me to the world of molecular and human genetics, at the now defunct Institute for Cancer Research, before taking the leap to the new-established CRG, in the group of Xavier Estivill. Here I began to apply computer sciences to solve biological problems, in full swing of the Human Genome Project. I learned a lot and have really good memories of that time, thanks to all of my colleagues in both the Genes and Diseases group and the Bioinformatics and Genomics group of Roderic (Guigó). During this stage of my doctorate, I was able work for short terms abroad, which showed me that the level of resources and knowledge of our local research groups were not far from those of the top labs in our fields.

After a short postdoc, I had the chance to move to the 'dark side' of science… and the knowledge that we acquired and generated at this stage was the seed to create qGenomics, the first spin-off from CRG. qGenomics is dedicated to the research and development of solutions to improve human health using tools and resources derived from genomics. Although we founded the company in a bit of a rush, I think we should all be very satisfied because it is an exemplary case of using research (which is now called "translational" research) to promote CRG and the country.

The CRG is truly a great setting, and I hope that the PhD students, postdocs, researchers and the diverse staff of the centre, as well as the centre itself, do not forget the need to do everything in their power to bring their excellent scientific knowledge to society. This allows it to be transformed and used for the multiple facets of societal wellbeing, so that we are giving back for the support and public financing we have received for R&D. <

PEOPLE@CRG

WELCOMES

We warmly welcome:

Jochen Hecht joined the CRG as Head of the Genomics Unit. Dr. Hecht was previously heading the next-generation sequencing core facility at the Berlin-Brandengurg Center for Regenerative Therapies, which is a Charité Research Center in Berlin. His sequencing laboratory was running NGS platforms of Illumina and Life Technology and was involved in NGS methods development for functional genomics as well as for disease gene identification screens.

Peter Stienen has joined the CRG Technology and Business Development Office as a Translational Project Manager. Dr. Stienen holds a PhD in Biological Sciences from Utrecht University were he also worked as postdoctoral scientist. He worked as senior scientist in a spin-off biotech company and then he moved to the pharmaceutical sector as senior scientist in Ferrer International and, more recently, in the AstraZeneca Translational Science Centre.

Stefani Marti (Gene Function and Evolution), Mauricio Moldes (EGA), Daniel Poglayen (Transcriptomics of Vertebrate Development and Evolution), Daniel Sánchez and Veronica Venturi (Genomics and Disease), Jordi Sala (Cellular and Systems Neurobiology), Tommaso Andreani, Marina Ruiz and Ramil Nurtdinov (Computational Biology of RNA Processing), Javier Quilez (Chromatin and Gene Expression), Kinga Wisniewska and Natalia Dave (ISA), Valerio Di Carlo (Epigenetic Events in Cancer), David Tadres (Sensory Systems and Behaviour), Marc Weber and Carlos Piñero (Design of Biological Systems), Laura Buxó (Organelle Biogenesis and Homeostasis), Marie Victoire Neguembor (Reprogramming and Regeneration), and Pedro Corral (Grants Office).

FAREWELLS

Our best wishes to:
David Morrow (TBDO), Luis Bejarano (Communication), Damjan Cicin-Sain (Comparative Analysis of Developmental Systems), Martina Niksic and Andreea Munteanu (Multicellular Systems Biology), Lluís Morey (Epigenetic Events in Cancer), Alexandra Leopoldi (Chromatin and Gene Expression), Philippe Julien (Genetic Systems), Jacobo Cela (Cell and Developmental Biology), Andreas Lackner (Hematopoietic Stem Cells, Transdifferentiation and Reprogramming), Veronica Raker (ISA), Patrik Erlmann (Intracellular Compartmentation), Alexandra Grippa and Annamaria Ruggiano (Organelle Biogenesis and Homeostasis), Valeria Di Giacomo and Mekayla Storer (Mechanisms of Cancer and Aging), German Patterson (Cellular and Systems Neurobiology) and Núria Jané (HR).

AWARDS & HONOURS

Miguel Beato, senior group leader of the Chromatin and Gene Expression laboratory, has been awarded the Lilly Foundation Prize of Biomedical Research in the category of preclinical research.

Mara Dierssen, group leader of the Cellular and Systems Neurobiology laboratory, has been appointed "Distinguished Alumni" of the Universidad de Cantabria.

DIARY

17-22/10/2015
EMBO Conference
Exploring the Genomic Complexity and Diversity of Eukaryotes
Hotel Eden Roc, Port Salvi 57
17220 Sant Feliu de Guixols
(Spain)
events.embo.org/15-eukaryotes/

22-13/10/2015 –
14th CRG Annual Symposium
Cellular Machineries
PRBB Auditorium,
Dr. Aiguader 88
08003 Barcelona (Spain)
2015symposium.crg.eu/

23-28/10/2015
Courses@CRG
Somatic Cell Reprogramming
CRG, Dr. Aiguader 88
08003 Barcelona (Spain)
www.crg.eu/event/coursescrg-somatic-cell-reprogramming

29-30/10/2015 – BCEC 2015
Coding and non-coding functions of the genome
CosmoCaixa Barcelona
Isaac Newton 26, Barcelona.
www.bdebate.org/en/forum/coding-and-non-coding-functions-genome-2015-bcec

CRG Centre for Genomic Regulation

Life@CRG, Newsletter of the Centre for Genomic Regulation. Published by the Centre for Genomic Regulation. Communications and Public Relations Department. Carrer Doctor Aiguader, 88, 08003 Barcelona. www.crg.eu

Editors: Laia Cendrós and Gloria Lligadas. Contributors: Gabriele Picarella, Juanjo Fraire, Kinga Wisniewska, Sonia Alcázar, Eduard Sabidó, Inés Fonseca, Elias Bechara, Jim Swoger, Michela Bertero, Pablo Cironi, Mariana López, Andreea Munteanu, Paula Pifarré, Bàrbara Negre, Annick Labeeuw and Lluís Armengol. Design: Ondeuev. Please, feel free to send your suggestions and proposals to: comunicacio@crg.eu