

## 10th ANNIVERSARY



> It all started in September 2001. From the CRG being nothing but a project until now, ten years have gone by. Ten years of growth, recruitment of new scientists, training, results, projects, grants, achievements both small and great, of change in Spain and getting closer to Europe and the world. In short, ten years of quality science by the best and among the best.

Despite not being a good time for research in Spain, everyone in the CRG must be satisfied with what we have achieved: a pioneering centre in both Catalonia and Spain, a leader in the field of genomics which in just ten years has become one of the most outstanding. It is necessary to share and celebrate this miles-

tone with the whole scientific community as well as the society that has supported us.

For this reason we are preparing various events for 2012. Thus, this year's Annual CRG Symposium will bring together diverse personalities from the world of international research to review with us the most innovative and relevant issues in our field to which, without doubt, the CRG has contributed. We are also organising activities open to all sectors of the general public so that our work reaches beyond the scientific world and society feel as proud of these ten years as we are.

Happy anniversary! <

### LIFE @ CRG

> This is the CRG bulletin, a newsletter to collect and report the latest news from the centre. To provide information about what is happening at the centre and gather the opinions, thoughts and discoveries of our researchers.

We want you to feel that this is your newsletter and send us whatever you would like to include related to research, scientific policy and life at the CRG.

Send your letters and suggestions to:

[comunicacio@crg.eu](mailto:comunicacio@crg.eu)

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> It is a pleasure to write the first editorial of the CRG newsletter, Life@CRG. This periodic publication has been conceived with the intention of becoming a means of communication for and interaction between all CRG personnel. The idea behind it is to publish important events, both scientific and social, as well as opinions on scientific issues, or issues relevant to the life of CRG personnel at the CRG itself and in Barcelona. It is similar to the newsletter published by EMBL, "EMBL etcetera". Life@CRG will be open to everyone that wants to contribute and we hope to have a vibrant and active journal that will help maintain and improve the sense of belonging to a great institution. In these troubled times it is especially important to enhance our sense of community and I hope that this newsletter will help us in this direction. The name of the newsletter reflects this intention and is part of an effort to establish a CRG brand. To this end, as well as Life@CRG, there will be Courses@CRG, Training@CRG and more. I hope that in the coming years all these @CRG activities will become internationally known and considered a reference for others. In summary, I would like to encourage you to participate, write, read and communicate your opinions, news and comments about the scientific and social life at the CRG in our new publication, **Life@CRG**.

Luis Serrano, director. <

## INSIDE

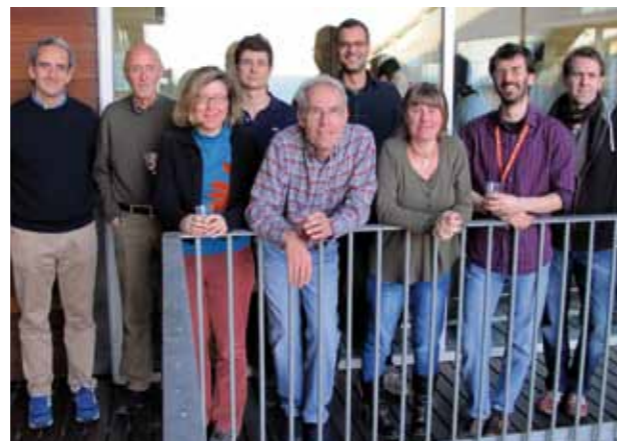
### FUSION WITH NO CONFUSION

> The former Gene Regulation and Differentiation and Cancer research programmes have merged into the new Gene Regulation, Stem Cells and Cancer programme (GRSC). They shared many projects and their research was closely related, so they finally merged. Thomas Graf and Juan Valcárcel are the coordinators of this new programme, which will be focused on mechanisms of gene expression and epigenetic regulation as well as the molecular basis of the cell decisions involved in tissue homeostasis and cancer.

On February 23, the researchers of the new programme joined in a "cool fusion party" where they played a game to help get to know each other. It consisted of a periodic table-based puzzle so, as in many biological fusions, chemicals helped this merger too. <



> Researchers at the "cool fusion party"



> Gene Regulation, Stem Cells and Cancer group leaders and coordinators.

### NEW GRADUATE AND POSTDOC COMMITTEE COORDINATORS

> For more than 5 years, Isabelle Vernos and Juan Valcárcel have been at the head of the Graduate Committee as coordinators, and they should be very proud of the work completed and the challenges achieved. Now, Luciano Di Croce and Fátima Gebauer are stepping up to the plate and there is no doubt that they will be very successful in supporting and training our students. At the same time, Pia Cosma, will be responsible for coordinating the Postdoc Committee, lead until now by Fátima Gebauer. <

### SANOFI, A NEW CRG PARTNER

> We have begun a research collaboration with Sanofi. This strategic partnership is based on sharing scientific expertise and know-how to explore new ways to evaluate translational medicine. Within the framework of the agreement, we have already initiated a first set of projects to discover innovative therapeutic approaches for infectious diseases, develop novel delivery systems using synthetic biology, decipher disease-relevant cellular transdifferentiation pathways and identify original targets from unexploited genomic transcription mechanisms. Further, highly innovative projects will be selected and launched in the future. At the moment, the labs working together with Sanofi are led by Thomas Graf, Roderic Guigó and Luis Serrano.



The agreement was presented on March 7 in an event chaired by Andreu Mas-Colell, Minister of Economy and Knowledge of the Catalan Government together with representatives of Sanofi and the CRG. In this presentation, Luis Serrano said "research cannot remain distanced from the needs of society. The CRG must ensure that its research has a positive impact on both human health and national economies". In this way, Maya Said, vice president for Strategy, Science Policy and External Innovation, admitted "this collaboration is aimed at accelerating the pace of translating early disruptive science into validated concepts that will lead to health solutions and give added value to the public investment in basic research". Minister Mas-Colell also recognised the relevance of this agreement and its importance despite the current situation. "It shows that we are going in the right direction as it reinforces the capacity of Catalonia to integrate into the global economic dynamic", he stated. <

### NEW AGREEMENTS AND COLLABORATIONS

> Working in a network and collaborating with companies, hospitals and other institutions is one of the strategic objectives of the CRG. So far in 2012 we have already signed several agreements with organisations and companies. For example, the company Illumina,

leader in the development and creation of devices for the massive sequencing and analysis of genomes, has recently signed a collaboration agreement that will encourage the exchange of knowledge and know-how at scientific and management levels on both sides. They will also offer the CRG competitive rates for their products and support for the organisation of scientific events at the centre.

On an institutional level and in order to establish new research projects, an agreement has also been signed with the Vall d'Hebron Research Institute (VHIR) and the ACE Foundation – the Barcelona Alzheimer Treatment and Research Centre. In both cases collaborative projects are sought linking basic and clinical research to give continuity to the projects carried out at the CRG. In this way, both entities will be able to undertake projects related to various illnesses including cardiovascular, neurological, metabolic and genetic diseases.

Finally, it is also worth highlighting the agreement signed with FEDER (the Spanish Federation for Rare Diseases) to encourage research into and dissemination of information about rare diseases, with the ultimate goal of improving the health and quality of life of those affected by rare genetic diseases. <

### BIOCOMUNICA'T, ENTREPRENEURSHIP IN THE CRG

> Five CRG-trained researchers have created Biocomunica't, a company seeking to promote scientific culture in society. They all have experience in outreach and have participated in arranging various activities at the centre and, now, offer their services to all manner of collectives including schools, entities and other organisations. Biocomunica't was launched with the support of the Social Entrepreneurship Programme from the Catalan Government.

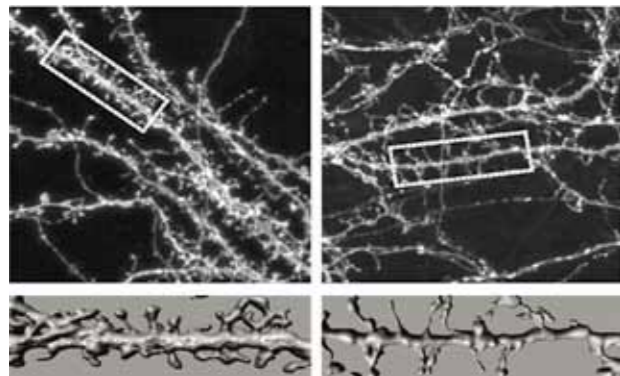
From the CRG we would like to congratulate them for their initiative and wish them all the best in their adventure. We hope to be able to collaborate in this task of bringing science to society. <



> Biocomunica't team



## STUDYING NEURONAL DAMAGE IN DOWN'S SYNDROME



> In culture, neurons over-expressing Dyrk1A display reduced dendritic spine density (right panel).

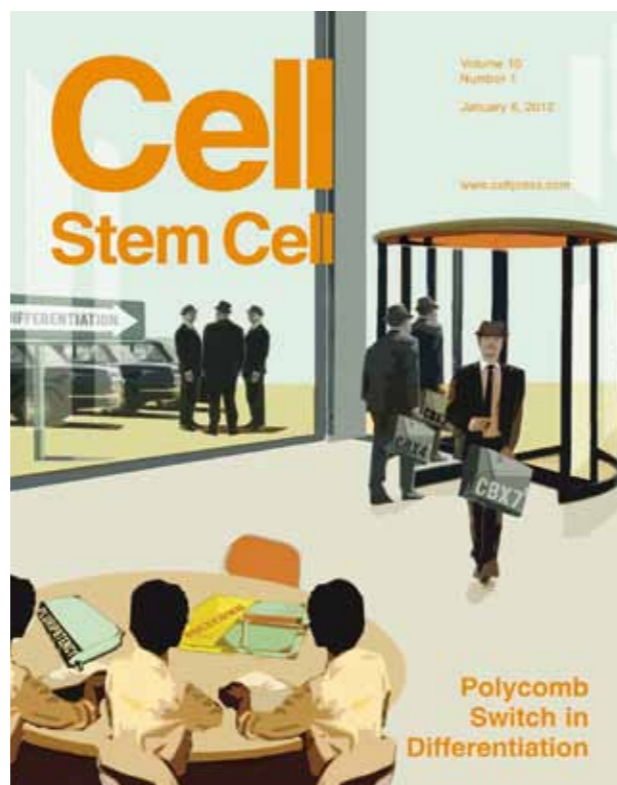
> Morphological and functional patterns of neuronal connections are the key to acquiring cognitive skills. In people with Down's syndrome, the dendrites are shorter and their tree-like structure is less complex compared to those of a healthy person. The Neurobehavioural Phenotyping of Mouse Models of Disease group, has published a study in the journal *Cerebral Cortex* where they explain the role of the DYRK1A gene located on chromosome 21, commonly present in Down's syndrome patients. In tests made on mice, an over-expression of this gene caused a dendritic morphology similar to that seen in Down's syndrome brains. "This discovery may help scientists find new molecular therapeutic targets to aid not only the treatment of Down's syndrome but also other pathologies involving intellectual disability, such as Fragile X syndrome", says Mara Dierssen, head of the group. <

## CBX PROTEINS AND THE FATE OF EMBRYONIC STEM CELLS

> For an embryonic stem cell (ESC), there are two major events that determine its fate: proliferation and differentiation. The ESCs rapidly proliferate and then differentiate into adult somatic cells forming a specific human tissue. But how this happens is still a mystery.

Researchers from the Differentiation and Cancer group, led by Luciano Di Croce, studied the role of a protein group in the genetic regulation of ESCs. In a recent paper, highlighted on the cover of the *Cell Stem Cell* journal, it has been found that "Polycomb repressive complex 1" (PCR1) is directly implicated in the proliferation of embryonic stem cells and their later differentiation into somatic cells. The most important aspect of this investigation is the discovery of the exact functions of certain proteins from this complex during cell development.

ESCs are the key to embryonic development. "While proliferating, at a stage when the cells still maintain their pluripotency, we found the protein Cbx7; then, when differentiation occurs, it is replaced by proteins Cbx2 and Cbx4. This simple change has significant consequences", says Lluís Morey, first author of the paper. <



## FINE TUNING FOR ENHANCED FUNCTIONALITY

> The bacterium *Mycoplasma pneumoniae* is helping scientists to uncover how cells make the most of limited resources. By measuring all the proteins these bacteria produce, scientists at the EMBL and the CRG-EMBL unit (Tobias Maier, Eva Yus and Luis Serrano), along with other collaborators, have found that the secret is fine-tuning.

Researchers observed that the most common post-translational modifications of proteins are as equally prevalent in human cells as in those of bacteria. These two types of modifications, phosphorylation and lysine acetylation, also communicate and interfere with each other. Since *M. pneumoniae* is one of the organisms

with the fewest different proteins, this interplay between phosphorylation and lysine acetylation may be a way of obtaining additional functions. Scientists also found that phosphorylation levels in *M. pneumoniae* control how much of each protein the bacteria has.

The study was published in the journal *Systems Biology*. It may help in understanding how cells make the most of limited resources. Hence, mapping the different networks may one day enable us to predict where a targeted disruption might do the most damage, or might eventually provide valuable information for drug design. <

## NEW GENES DISCOVERED IN HUNTINGTON'S DISEASE AND HYPERTENSION

> Xavier Estivill and collaborators have described a mechanism that causes neuronal death in patients with Huntington's disease. Huntington's disease is a rare disease caused by a mutation in the HTT gene. The disease develops in people who have more than 40 repetitions of the CAG nucleotide triplet on the HTT gene.

In the article published in *PLoS Genetics*, researchers show that the toxic effect of the gene acts at the RNA level. It produces small-sized RNA formed by repetitions of CAG with neurotoxic activity. These fragments are incorporated into the intracellular gene silencing machinery with lethal consequences in neuronal physiology.

The activity of the abnormally expressed CAG fragment repeats can be counteracted through the use of complementary sequences, which eliminate the toxic effect. The work paves the way for new therapies aimed at blocking the toxic effects of these CAG fragments in the neurones of patients with the disease. Now that the cause of neuronal damage in this disease is known, specific therapeutic solutions can be sought.

At the same time, Xavier Estivill's Laboratory has described a new gene causing the majority of cases of a rare form of familial hypertension.

The work is the product of genome sequencing in various families affected by this disease and demonstrates the power of genomic medicine and bioinformatics to identify the cause of rare diseases and help, in the future, with their diagnosis.

Researchers observed that the gene KLHL3 was mutated in patients with hereditary hypertension with hyperpotassaemia. They also observed that the mutations of the KLHL3 gene affect the same pathway as the genes previously described and therefore end up causing the same disease.

All these genome sequencing projects give us a better understanding of genetic diseases and help with their diagnosis. <

## NEW EU PROJECTS COORDINATED AT THE CRG

> The CRG encompasses a wide variety of research topics; some of them closely related to health, systems biology or biocomputational issues. Currently, the CRG research groups are coordinating the following EU-funded research initiatives, which have begun recently:

> **SysteMTB**, a project to understand the physiology of tuberculosis (*Mycobacterium tuberculosis*) and to identify the key aspects for developing therapeutic targets. 13 of the most renowned research institutions in the EU are collaborating in this project coordinated by the CRG. ([www.systemtb.org](http://www.systemtb.org))

> **4DCellFate**. This project is aimed at understanding the different roles of certain proteins in the differentiation process of an embryonic stem cell. Elucidating why a cell differentiates after proliferating is one of the key aspects to understanding how cancer begins. ([www.4dcellfate.org](http://www.4dcellfate.org))

> **Geuvaris** (Genetic European Variation in Disease): using high-throughput next-generation DNA sequencing technologies, this ambitious consortium (17 prestigious institutions) aims to discover the relationship of genomic variability with healthy and non-healthy phenotypes. < ([www.geuvaris.org](http://www.geuvaris.org)).

## CRG BOOSTS EU SCIENCE COMMUNICATION

> The CRG is now taking part in two European projects related to science communication and outreach.

On one hand, we joined the EuroStemCell project. This is a network of 19 European institutions bringing to the general public innovations, the state of research, educational resources and much more regarding stem cell research. The CRG researcher Thomas Graf is one of the contributors to this project and the CRG communications department is also participating. On April 26 and 27, the CRG will host the annual meeting of EuroStemCell. Making the most of the visit to Barcelona, they are organising a public event. We hope to see you there! ([www.eurostemcell.org](http://www.eurostemcell.org))

CommHere is another EU project focused on science communication. The project brings 10 research institutions together in an effort to improve the communication of EU-funded health research to the media and general public. The idea is to establish science communication networks, develop tools and guidelines to successfully communicate results and to engage the general public through outreach activities. < ([www.commhere.eu](http://www.commhere.eu))

## LA CAIXA PhD PROGRAMME

> Applicants to La Caixa International PhD Programme Fellowships visited the CRG last 18th of April. More than 30 applicants from Asia, Europe and Latin America were interviewed by the group leaders of the CRG and also get to know the insights of the centre by listening to other PhD students.

One of the applicants, Gireesh Bogu, from the Genome Institute of Singapore (GIS), said about the programme: "Is a great opportunity to be trained in one of the best research centres in the world. The integration of scientific disciplines and facilities make the CRG very attractive to anyone who wants to pursue a significant research career."



At the end of the day, they had the opportunity mingle with the community during a "happy hour" organized by the newly open group of Genome Architecture, lead by Guillaume Filion.

## CRG & SOCIETY

### CELL SCULPTURE CONTEST

> For the third year running, the CRG has organised the cell art competition. This contest aims to bring science to young people through art. The sculptures presented to the competition must have a sound scientific basis as well as be artistic in their approach.

As in previous years, the contest is one of the most-participated-in activities organised by the CRG. This time there have been over 150 entries presented by some 50 centres in Catalonia. Additionally, the distribution of the participating centres is very varied and work has been received from all over Catalonia, from small villages in the Pyrenees right down to the Ebro river.

The jury, composed of representatives from the worlds of research, education, art and culture, met to decide on the winning entries. On May 5 there will be an awards ceremony in the square inside the PRBB where all the pieces will be on display. Everyone is invited! <

Drosophila! Reservations and further information at [www.bcn.cat/educacio/pae](http://www.bcn.cat/educacio/pae).

Secondary school students from 16 to 18 years old can participate in workshops organised in the laboratories and there are lectures, talks and guided tours of the centre for younger secondary school students. Reservations and further information at [www.escolab.cat](http://www.escolab.cat).



All in all, this is a very interesting educational offer which is among the most sought after and which is a reference standard among the educational projects related to science. <

### SCHOOL @ CRG

> They are young, some very young, and maybe you have found them eavesdropping in the corridors or watching you whilst you sip your coffee. Each year the CRG receives nearly 500 visits from primary school children and more than 250 students from secondary schools. They come to participate in the educational activities organised by the centre which, as much as possible, tries to get kids closer to science and awaken their interest in research. In the first few months of 2012 already 650 young people have visited.

Primary children, aged 9 to 12, can come to the CRG to participate in one of the experimental workshops that we offer: "The cell, a well-organised factory" where they learn what a cell is and how it functions, or "The senses and the brain" where they discover the senses by carrying out experiments themselves, even with

### SHALL WE HAVE A COFFEE?

> Having a coffee is a very relaxed way to talk about something. There is even room for science if the conversation is adapted to the level of the audience and we are ready to have some fun.

The CRG scientific coffee programme is still going strong. The next talk "Blueberries, braintraining and raisin stalks" is about the brain and whether its development and ageing are already described in the genes or can be modulated by changing our habits. Mercè Boada, neurologist and medical director of the ACE Foundation and Xavier Estivill, Genes and Disease Programme Coordinator at CRG, will help us find out. <

## FEATURING CRG

### WOMEN IN SCIENCE SYMPOSIUM

> On March 9, one day after International Women's Day, the first CRG Women in Science Symposium was held. The event was organised by the CRG pre- and postdoctoral fellows and was attended by over 150 people. The aim of the symposium was to reflect upon the representation of women in research and to discuss new challenges in this area.

It was a success not only in terms of attendance but also the high quality of the speakers as well as the lively participation of the audience. It made it clear that this is an important issue to be considered and we hope it will help to highlight the female face of science and to find solutions to make equality real. <





# PEOPLE @ CRG

## WELCOMES



**Eduard Sabidó** is the new head of the CRG/UPF Proteomics Unit. He arrived from Zurich where he was joining the Institute of Molecular Systems Biology at the ETH Zurich. He will run the joint CRG/UPF unit providing proteomic services as well as testing, implementing and optimising proteomic-based protocols as new analytical research tools. <



**Gillaume Filion** is heading up the new Genome Architecture laboratory of the Gene Regulation, Stem Cells and Cancer Programme. He is looking at the organisation and evolution of the regulatory genome with a new technology called TRIP (Thousands of Reporters in Parallel). He has come to the CRG from the Bas van Steensel laboratory of the Netherlands Cancer Institute. <

## FAREWELLS



**Mariona Arbonés** and her laboratory have moved to the Molecular Biology Institute of Barcelona (IBMB-CSIC). They will continue their studies on the role of DYRK1A and gene dosage related to the regulation of growth and cell diversity in the mammalian central nervous system. <



**Cristina Fillat** and collaborators have left the CRG and joined the IDIBAPS (Institut d'Investigacions Biomèdiques August Pi i Sunyer). Her laboratory, Gene Therapy, is now within the Pediatrics and Developmental Medicine Programme at the IDIBAPS. <



**Hernán López-Schier** has moved to the Helmholtz Zentrum München. There, he will run the Sensory Biology & Organogenesis Unit. <

## AWARDS AND HONOURS

- > **Pedro Carvalho**, head of the Organelle Biogenesis and Homeostasis group and **Fyodor Kondrashov**, group leader of the Evolutionary Genomics group have been awarded the "*International Early Career Award*" by the Howard Hughes Medical Institute.
- > **Ben Lehner**, group leader of the CRG Genetic Systems laboratory, has been awarded the *2012 City of Barcelona Award* in the category of Scientific Research for his research on gene expression.
- > **Salvador Aznar-Benitah**, head of the Epithelial Homeostasis and Cancer group at the CRG and **Ben Lehner**, head of the Genetic Systems laboratory were both nominated for the "*Vanguardia de la Ciencia*" Award from the La Vanguardia newspaper.

## DIARY

16/05/2012

> **Symposium** "*From fundamental research to medical unmet needs*"  
PRBB Auditorium, Dr. Aiguader, 88, Barcelona.  
[www.crg.eu/HdM\\_CRG\\_workshop\\_2](http://www.crg.eu/HdM_CRG_workshop_2)

26-28/09/2012

> **Courses@CRG** "*Förster Resonance Energy Transfer (FRET) microscopy*"  
More info coming soon at [www.crg.eu](http://www.crg.eu)

22/05/2012 at 19h.

> **Scientific Coffee** "*Blueberries, braintraining and raisin stalks*"  
La Casa Elizalde, València, 302, Barcelona.

22-26/10/2012

> **Courses@CRG** "*Second generation sequencing: lab methods and data analysis*"  
More info coming soon at [www.crg.eu](http://www.crg.eu)

20-22/09/2012

> **Meeting**  
"*Chromosomes, Stem Cells and Disease*" & *Satellite Workshop "Modelling 3D-Structure of Chromosomes"*.  
Registration deadline: **25 May**.  
[www.crg.eu/chromosomes\\_meeting](http://www.crg.eu/chromosomes_meeting)