

Spring/Summer 2011 / Issue 2

# INSIDE IBEC

The newsletter of the Institute for Bioengineering of Catalonia

## *INSIDE this issue...*

The inside story: IBEC's new managing director talks about his vision for the institute

/pages 3-4



When IBEC's staff and scientists aren't at work, they're making music

/page 6



A new group for IBEC: Xavier Trepatal's Integrative Cell and Tissue Dynamics team

/page 2

...and much more!



# A new group for IBEC

## Integrative Cell and Tissue Dynamics team off to a flying start

IBEC's Biomechanics and Cellular Biophysics programme is set to expand with the addition of a new group led by Xavier Trepát, formerly a senior researcher in Daniel Navajas' Cellular and Respiratory Biomechanics group.

After four years at Harvard, Xavier has returned home to start IBEC's new Integrative Cell and Tissue Dynamics team. The group will focus on the fundamental biophysical mechanisms of cell migration, a process which underlies a wide range of

phenomena in health and disease.

With two major papers under their belts already, the group is getting off to a flying start. At the beginning of this year, the publication in *PNAS* of 'Glass-like dynamics of collective cell migration' attracted the attention of the national media, including top Spanish daily newspaper *El Mundo*. As if that wasn't enough, Xavier and his Harvard collaborators' discovery of plithotaxis, a new principle in biology, made the cover of *Nature Materials* in May.

Although IBEC lost one group at the end of last year with the departure of Enric Claverol and his Neuroengineering lab and will also say goodbye to María García-Parajo's Single Molecule Bionanophotonics group this summer, the institute's Biomechanics and Cellular Biophysics programme is boosted by Xavier's ambitious new directions.

"The unique diversity of IBEC offers great opportunities for multidisciplinary research," says Xavier. "We're very excited." //



The Integrative Cell and Tissue Dynamics group: Xavier Trepát, Xavier Serra, Ester Añón, Laura Casares, María Bintanel, Elsa Bazellières and Simón García. Three more members, Vito Conte, Romaric Vincent and Agustí Brugués, are not in the picture.

## Input from the ISC

IBEC's research received some constructive feedback in May with the annual visit of members of the institute's International Scientific Committee (ISC).

Group leaders Damien Lacroix, Antonio Juárez, Gabriel Gomila and Daniel Navajas presented their work to the six-strong panel, which included expert scientists from Italy, Canada, France, the US and Sweden. Xavier Trepát, group leader of the new Integrative Cell and Tissue Dynamics lab, was also evaluated.

The ISC plays a key role in the activities of the Institute, focusing specially on the selection and evaluation of the research group leaders. It is composed of renowned international scientists and professionals from different fields and areas relating to the activities of IBEC.

International Scientific Committee members Prof. Bernt E. Uhlin (Sweden); Prof. Luigi Ambrosio (Italy); Prof. Gunter Fuhr (Germany); Prof. Jean Louis Coatruieux (France), Prof. Samuel Stupp (USA); Léonard Aucoin (Canada).



## SCIENTIFIC NEWS

### New year, new project

The first day of January saw the official beginning of the latest EU project involving IBEC: FOCUS, or Single Molecule Activation and Computing.

Nanoprobes and Nanoswitches group leader and ICREA Research Professor Pau Gorostiza is a partner in the 36-month international collaborative project, which has been awarded funding under the EU's Seventh Framework Programme (FP7) for its work on building a next generation of biologically inspired molecular devices based on new photonic tools. Using Plasmon Polariton technology, which enables focused light spots with a diameter of just 10nm, these devices will provide a way to control activation of single light sensitive molecules

and allow the investigation of molecular computation in a biological environment and with an unprecedented resolution.

Pau will be working alongside chemists at the Karlsruhe Institute of Technology in Germany in order to develop the photoswitches and assemble the molecular devices, but the multidisciplinary project will also involve nanotechnologists, biologists and other researchers from several disciplines and countries.

Later, the devices they create will be transformed into marketable products by the industry partners in the project, RapOptoElectronic in Hamburg, Germany and NT-MDT Europe BV in the Netherlands. //



## INTERVIEW

# Goodbye Abel, hello Àlex

We talked to Àlex de Jaureguizar, the new Managing Director of IBEC since Abel Riera's departure, about his vision for the institute...

*Born in Barcelona in 1960, Àlex trained as an economist, auditor, advisor and consultant, and is an associate professor at the University of Barcelona. He has two children: Maria Rosa, 19, and Jandro, 17.*

## How would you evaluate IBEC's strengths?

Some of our strong points are the great quality of our research, the distinct position of bioengineering as our research axis, the

a low record in technology transfer.

## Do you intend to communicate with the employees to find out their needs?

Although I started fairly recently, besides day-to-day management tasks I have had the chance to meet the people in charge of the support areas and with some of the group leaders. Thanks to that, and to the information provided by the other directors, I have been able to understand how IBEC operates and get an idea about its particular characteristics. It's been particularly important to find out its institutional relationships and links to other entities such as the Generalitat and the universities, and its connections with other institutes and associations.

## What new measures do you think that might be needed to attract and keep the best international researchers in IBEC?

IBEC is currently pretty attractive for researchers, because of its international prestige in bioengineering and nanotechnology,

and the quality of life in Barcelona – a cosmopolitan and welcoming Mediterranean city which enjoys privileged geography, climate and culture.

We do need, however, to establish attractive programmes for the best university students which, at the same time, encourage the best international researchers: accompaniment programmes, training, grants for students, to give a few examples. We also need to improve our physical conditions to provide more space to develop. Thirdly, we need to manage our economic resources to allow the best researchers to develop the greatest possible number of innovative projects at IBEC.



Above: Àlex de Jaureguizar. Left: former MD Abel Riera left for Japan in March.



## // “We need to be ambitious and take on improvements as a continuous process”

fitting support structure which runs parallel to all phases of our projects, the existence of an ambitious strategic plan and our links with the UB and the UPC.

## ... and its weaknesses?

In no particular order: IBEC is still not large enough and, consequently, neither is the critical mass of its research lines; its locations are dispersed; the researchers' sense of belonging to IBEC could be improved; we have little social visibility and, thus far,



## Fair enough

Careers and science fairs attended by IBEC so far this year included the Fira en Directe at Barcelona's famous La Pedrera in April, where researchers introduced induced pluripotent stem cells to high school students and the public (far left). At the Saló de l'Ensenyament in March, IBEC shared the ACER stand (left) with Catalonia's other research centres to disseminate careers information to young scientists. Other events included the University of Barcelona's careers day in the Faculty of Physics at the beginning of May and the R&D&I conference TIC en Salut in Girona.

# Goodbye Abel, hello Àlex continued

**More generally, what other measures do you think could be introduced at IBEC that have been successful in other research institutes?**

In my opinion, it's not just about introducing experiences that work in other institutes. Of course, we don't have to reinvent

**// "In times of crisis it would be a terrible mistake to cut research budgets"**

things that are already in existence so, if something is applicable to IBEC, we should adopt it. But we are living uncertain times and resources are very limited, and in times of crisis it would be a terrible mistake to cut research budgets. This situation forces

us to go a step further, to be creative and proactive.

**What could be that step?**

We need more economic resources and, as a result, it's essential that we explore new funding sources, paying special attention to the possibilities in the private sector. To do this, we must take measures that allow us to visualize our values and aims in a way that is comprehensible and attractive to that sector. That means we must count on the best attitude from each of us and, at the same time, we must think and act as a team.

At the same time, we must improve our efficiency; we need to take on resources that maximize our tasks. To give an example, in the 21st century we need to count on IT from the 21st century, not from the 20th.

**It sounds as if building a sense of identity within IBEC would be a good first step.**

Yes. I think we need to boost several complementary methods: the regular meetings of the heads of the support areas are a good tool that we should reinstate, and the group leader meetings are an extraordinarily valuable channel. Of course, we must never dismiss informal meetings. The main aim of all meetings, besides the day-to-day management, must be transparency, and we must be sure that all channels of feedback remain open. We need to be ambitious and take on improvements as a continuous process. The new website, for example, will be an essential tool both for communication within IBEC and to attract talent and transmit our objectives and values to the scientific world and to society. //

More news on [www.ibecbarcelona.eu](http://www.ibecbarcelona.eu): *Lights, camera, action!* • *Opening new doors to combat bacterial infections* • *Two papers for Nanoprobosc group* • *MySpine kick-off meeting* • *Run for the hills!* • *Spanish Minister for Education visit* • ...and more!



**Safety first**

At the beginning of the year IBEC clubbed together with their neighbour, IRB Barcelona, and the Parc Científic de Barcelona (PCB) to set up a joint Health and Safety Service for improved risk prevention and occupational safety for everyone working in the three organisations.

As a result, a Health and Safety Technician employed by IBEC, Jordi Martínez (left), started work on 1 April. He will work alongside Health and Safety Service manager Sandra Barreda (right) and technician Anna Vilches (centre) to cover occupational safety, industrial hygiene and ergonomics and applied psychosociology.

The team, which is located in Tower R of the PCB on the fourth floor, is happy to answer your questions on any health and safety-related issues.

## Spanning the Iberian peninsula

IBEC has joined up with two Portuguese research institutes to organize an annual summer school with the general theme 'Interrogations at the Biointerface.'

In an initiative instigated by a meeting of IBEC group leader Àngel Raya and Raquel Seruca of the University of Porto's Institute of Molecular Pathology and Immunology (IPATIMUP), the first five-day school, entitled 'The cancer/regeneration interface', will take place in Porto (pictured) on 20-24 June.

Previous summer schools organized by IPATIMUP and Porto's Instituto de Engenharia Biomédica (INEB) have been very successful in the past, but this year is the first time that the initiative has involved an institute from outside Portugal. It's planned that the annual events will be held alternately in the two cities around 23 June when the lively festivals of San Juan and São João take place.

"The summer school is quite unique in that it is looking at the interface between two very different areas, rather than being thematic," says Àngel, who will be organizing the event from IBEC's side along with director Josep Planell. "Cancer and regeneration are normally seen as part of two

different worlds, but understanding one can improve our knowledge of the other."

Àngel, who will deliver a talk entitled 'iPS cells as model system to study cancer and regeneration', will be joined by other top speakers including Manel Esteller (ICREA Research Professor at IDIBELL), Kenneth D. Poss (HHMI) and Wiltrud Richter (Orthopaedic University Hospital, Heidelberg), and the event will include two days of interactive lab sessions. "Having cancer specialists and regeneration researchers come together in this way opens up all sorts of opportunities to ask questions you don't normally get the chance to ask," comments Àngel.

[www.summerschool2011.ineb.up.pt](http://www.summerschool2011.ineb.up.pt)



## Joining forces to beat bacteria

An IBEC group has embarked on a technology transfer venture together with two biopharmaceutical companies.

Antonio Juárez's Microbial Technology and Host-Pathogen Interaction lab has formed a consortium with CZV Veterinaria, a leader in the manufacture of veterinary products based in Porriño, Galicia, and Valls Companys' pharmaceutical arm MEVET in Lleida. Their two-year project aims to obtain strains of *Salmonella* with

weakened virulence, which can then be used to develop a vaccine to reduce the incidence of the infection in poultry farms. *Salmonella*, a leading cause of food poisoning, is zoonotic, able to spread to man through contaminated animal products.

"This is a good example of how very basic research being done at IBEC can be translated into a concrete and useful application with immediate benefits to health and society," says Antonio. //

## Electromechanics at the nanoscale

Flick a switch or pull a lever and you're operating an electromechanical device, albeit a complex one. Now an IBEC researcher and his collaborators have broken new ground with a proven concept for the first such electronic component to operate using just a single-molecule electrical contact.

In a study published in *Nature Nanotechnology*, Ismael Díez of IBEC's Nanoprobes and Nanoswitches group and Nongjian Tao from Arizona State University describe their success in finding a way to simulate the same electromechanical effects achieved on conventional electronics but in a single-molecule device that allows the accurate mechanical control of the current flow.

By studying metal-molecule orbitals coupling, in which a flow of electrons is modulated by the overlapping level of the molecular ' $\pi$ -orbitals' and the orbitals of the electrodes binding to it, they found a new way to control the electrical conductance in a single-molecule junction. "We mechanically modulated the angle of a molecule bridged between two metal electrodes," explains Ismael. "Changing its angle from highly-tilted to nearly perpendicular to the electrodes changes the conductance by an order of magnitude."

Single-molecule electromechanical devices would open up huge possibilities in being able to create things at an ever-smaller scale. "We can move things just angstroms of distance with really precise control," says Ismael. "This will surely have an important impact on future technological advances."

Díez-Pérez, I., et al. (2011). Controlling single-molecule conductance through lateral coupling of  $\pi$  orbitals. *Nat Nanotechnol.* 6 (4), 226-31

## ERC grant for Damien

Biomechanics and mechanobiology group leader Damien Lacroix has been awarded a prestigious European Research Council (ERC) Starting Grant for his research on finite element simulations of mechanobiology in tissue engineering.



of mechanical loading and stimuli on cell behaviour and the subsequent formation of tissues.

"A breakthrough in this project would have a radical effect on the methodology used by scientists in this field, and it would greatly aid the development of computer modelling in biomedicine," says Damien. "I'm very proud to have had this potential of this work recognised by the ERC."

Damien is the third IBEC researcher to win one of these highly sought-after grants, about of which are awarded each year to EU-based researchers with talent and proven potential. In the last call, nearly 4100 proposals were submitted. In 2008 Pau Gorostiza, group leader in IBEC's Nanoprobes and Nanoswitches group, received an ERC Starting Grant, as did Xavier Trepat in 2009. //

### News in brief • News in brief • News in brief • News in brief • News in brief • News in brief • News in brief • News in brief

// At the beginning of the year, IBEC Director Josep Planell was elected to the **Steering Committee of the Associació de Centres de Recerca (ACER)**. An independent association that brings together institutions in Catalonia whose main mission is carrying out research activities, ACER aims to define priorities and policies and consolidate the region as an international benchmark for scientific and technological research in all disciplines.

// On 13 May a press conference at Barcelona's Museu Collet presented the IBEC-led alliance **BioNanoMed Catalunya** to the media. This first-ever platform to connect Catalan research institutes, hospitals and businesses working in nanotechnology to create synergies, promote research in the field and strengthen the region's inter-

national influence starts life with a total of 18 partners. For more information, visit the website at [www.bionanomedcat.org](http://www.bionanomedcat.org).

// The new **IBEC Annual Report 2010** (English version) is now available. It can be viewed online or downloaded as a PDF from the IBEC website under 'Documents', or if you'd like a printed copy, please contact [vleight@ibecbarcelona.eu](mailto:vleight@ibecbarcelona.eu).





# What do scientists do when they're not doing science?

In IBEC's case, they make music! Representing almost all genres from jazz to prog rock to gospel, some hobbyists are even gaining a measure of renown...



Group leader **Xavier Trepas** (centre, above) is a trombonist in jazz ensemble La Locomotora Negra, who have played all over Europe and alongside some of the jazz greats of the US. "It's a great escape," says Xavi, who chose science over music as a professional career. "Music and science are both creative, but in very different ways."



HR technician **Ricard Rius** (above right) sings and plays in not one but three bands: Arial Black, the Tall Tutsies and Herba

d'Hamelí, which perform shoegaze, dance covers and prog rock respectively. "Music is my favourite thing," he says. "Every moment when I'm not listening to music is a moment lost forever."



PhD student **Marta Mattotti** studied piano from the age of six and regularly performs Italian songs, boleros and blues and jazz standards in venues across the city. "My dream is to perform my songs in a theatrical way, like a musical cabaret," she says. "The best thing about music is connecting people and making things happen."

Postdoc **Christian Morgenstern** has played keyboards and guitar in his band The ALL since his university days in Germany. "We've played in front of crowds of 2000



people," says Christian (above, second from left). "Even now, we get together every year to play gigs for friends, colleagues and fans."

■ PhD student **Sabine Oberhansl** has been in the UB's medical faculty choir, The New Zombis (below), for 10 months. "We sing mainly gospel, but also songs like Destiny's Child *Survivor*," she says. "It's a chance to focus on something other than work, make new friends and have a good time." //



## SCIENTIFIC NEWS

### TV star funds IBEC research

Eduard Torrents, senior researcher in IBEC's Microbial Biotechnology and Host-pathogen Interaction group, was a recipient of the 2010 Pablo Motos award from the Federación Española de Fibrosis Quística (Spanish Association of Cystic Fibrosis) at the beginning of the year.

Pablo Motos, a well-known TV personality and creator of the popular show 'El Hormiguero', donates the royalties from his book 'Frasas célebres de niños' to the foundation to provide the annual prize, which

aims to support research projects in cystic fibrosis or social initiatives that benefit sufferers of the disease.

Eduard's project, 'Ribonucleotide reductase: a novel therapeutic target against bacterial pathogens in cystic fibrosis patients' was one of four winners chosen by the foundation from many proposals entered from all over the country. A quarter of the total prize amount will fund his work on the project for up to two years.

"I'm delighted that my efforts have been

recognized by such a prestigious association," says Eduard, who has already published some results from the project in high-ranking journal *Infection and Immunity*, 'Shift in ribonucleotide reductase gene expression in *P. aeruginosa* during infection', which looks at a common and potentially fatal pathology in many cystic fibrosis sufferers. //





## Building bridges

In a special event on 6 June, IBEC presented its research activities to clinicians and biomedical researchers from IDIBELL (the Bellvitge Biomedical Research Institute).

The event, which kicked off an official collaboration agreement between the two institutes, was hosted by Biopol'H and held in the Sala d'Actes of the Hospital de Bell-

vitge in L'Hospitalet de Llobregat. After a welcome address by Ramón López, director of Biopol'H, and the directors of IBEC and IDIBELL, the programme featured talks by associate director Josep Samitier and group leaders Àngel Raya and Alícia Casals about IBEC's new strategic areas of research into nanomedicine, cell engineering and intelligent healthcare. The presentations were followed by discussion sessions, during which all the researchers and clinicians in attendance were able to air their views.

The close interaction of researchers at IBEC and medical staff at IDIBELL will enable clinicians to benefit from the technology being developed at IBEC and allow investigators here to gain access to clinical opinion. With the official kick-off of the activities of this Memorandum of Understanding, which was originally signed in 2009, IBEC will be able to ensure that its research in these three areas develops in directions that have the most impact on health and society. //

## Reaching out



IBEC's efforts to reach diverse audiences with its science continued in February when the institute took part in ESCOLAB, a government-run annual initiative that invites high school students into research centres to take a look at how science happens at the bench (above). In another outreach event in the same month, scientists from IBEC got creative at the Arts Santa Mònica centre's Think Lab event (below), which brought artists and researchers together.



## IBECinPICTURES



Meetings and events held at IBEC since the start of the year have included the visit in February of the Spanish Minister for Education, Ángel Gabilondo, to the Nanobioengineering lab; the kick-off meetings of the Connect-EU Nanobio and Nanomed Working Group and the EU projects MySpine and BOND in March; and the Neurochem Workshop on Bioinspired Computation for Chemical Sensing (left)



in the same month. In April, Spanish national TV channel RTVE paid a visit to the institute to interview Àngel Raya and film his lab (right) for the science programme 'tres14', which aired on national TV channel La 2 on 29 May. Finally, IBEC Seminar speakers so far have included visitors from France, Sweden, the UK and Israel.

For a list of IBEC events for the next few months, turn to the back page.



## IBEC PEOPLE



In March **Robert Fabregat** joined the administration department as Project Manager to assist the groups of Damien Lacroix, Alicia Casals and Raimon Jané. Before coming to IBEC and after completing a PhD in Organic Chemistry at the University of Barcelona, Robert worked as R+D manager at the R+D Center of Organic Synthesis for Chemical and Pharmaceutical Companies (SINTEFARMA) and was an Associate Professor at the UB.

In April **Roger Rafel** joined IBEC's Corporate Projects unit as project assistant. Working part time, he takes care of the administration and website of the IBEC-led Connect-EU Nanobio+Nanomed working group. Before joining IBEC, Roger studied telecommunication engineering and worked as a software developer and project manager. Alongside his work at the institute, he's also studying for a masters degree in innovation and entrepreneurship.



## AWARDS AND HONOURS

In January IBEC associate director and head of the Nanobioengineering lab **Josep Samitier** was invited to join the Strategic Scientific Board of the Institut des Technologies Avancées en Sciences du Vivant in Toulouse.

In March, Robotics group leader **Alicia Casals** was elected Secretary of the Secció de Ciència i Tecnologia de l'Institut d'Estudis Catalans. At the end of last year, she was also elected member of the Advisory Board of the University of Vic.

At May's General Assembly of the International Society of Olfaction and Chemical Sensing at Rockefeller University, New York, Artificial Olfaction group leader **Santiago Marco** was elected President of the society for a period of two years.

### More news on the web...

You can keep up-to-date with news and events at IBEC by visiting [www.ibecbarcelona.eu](http://www.ibecbarcelona.eu)

## Want to get involved?

If you have an idea for an article for *InsideIBEC* or would like to write one yourself, please contact us. Is your group starting or finishing a project? Is there an important change in procedure that people should know about, or a deadline coming up? Perhaps something interesting has happened in your area of research, or perhaps you've had an interesting visitor. Maybe you'd just like to find out what the IBEC community thinks about something, or you have a request for help.

Send your ideas to [vleigh@ibecbarcelona.eu](mailto:vleigh@ibecbarcelona.eu).

## IBEC EVENTS

### 20-24 June Advanced Summer Schools: Interrogations at the Biointerface

The cancer/regeneration interface.  
Porto, Portugal

[www.summerschool2011.ineb.up.pt](http://www.summerschool2011.ineb.up.pt)

### 1 July IBEC Seminar

Terapia Celular aplicada al aparato locomotor: Estado del Arte.

Dr. Lluís Orozco, *Institut de Teràpia Regenerativa Tissular (ITRT)*

This seminar will be in Spanish.

### 15 July IBEC Seminar

Towards a tuneable nanoscale architecture of protein-only artificial viruses.

Prof. Antonio Villaverde, *Institute for Biotechnology and Biomedicine and Department of Genetics and Microbiology, Universitat Autònoma de Barcelona/CIBER-BBN*

### 23-27 August 4th International Meeting on AFM in Life Sciences and Medicine

Co-organised by Daniel Navajas (IBEC).

*Institut Curie, Paris*

<http://afmbiomed.org>

### 17-18 October 4th IBEC Symposium on Bioengineering & Nanomedicine

More details coming soon at [www.ibecbarcelona.eu/-events/symposium2011](http://www.ibecbarcelona.eu/-events/symposium2011)



INSIDEIBEC issue 2, Spring/Summer 2011.  
Published at IBEC, Baldri Reixac 10-12, 08028 Barcelona, Spain. Available online: [www.ibecbarcelona.eu/content/view/199/52/lang\\_en\\_EN/](http://www.ibecbarcelona.eu/content/view/199/52/lang_en_EN/). Editor: Vienna Leigh. Contributors: Marta Redón, Angels López. Please send contributions to [vleigh@ibecbarcelona.eu](mailto:vleigh@ibecbarcelona.eu).

## IBEC in pictures

The new-look IBEC website with its user-friendly, modern design, improved functionality and dynamic homepage – which is constantly updated with the latest top publications, news, press coverage and events – will be up and running soon. Other new features include extended research group pages and the improved jobs section. Also, check out IBEC's official Facebook page: it's waiting for your posts!

