



Barcelona  
Biomedical  
Research  
Park

**From Southern Europe  
we lead biomedical  
translational research**

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**2013**

- The PRBB is one of the largest biomedical research hubs in Southern Europe, physically connected to the ‘Hospital del Mar’, and it gathers together 7 public research centres closely coordinated amongst them.
- The Barcelona Biomedical Research Park (PRBB) is a large European scientific infrastructure and initiative of the Government of Catalonia, the City Council of Barcelona and the Pompeu Fabra University (UPF)
- PRBB generates high quality biomedical knowledge, because basic discovery today provides the foundation for tomorrow’s medicine.
- In the park, that was inaugurated in May 2006, the residents share an open space without barriers. Aggregate research spending has reached around 80M€ per year.



# Why do we need a PRBB?

- **Modern biomedical science requires multidisciplinary research groups, with the participation of clinicians and the availability of infrastructures and advanced scientific technologies.**
- **One needs to achieve an adequate critical mass to foster cross-fertilization and to constantly attract international talent.**
- **In Barcelona, the tradition in clinical research and practice needed to be complemented with a broader base of basic research groups.**



**“An excellent infrastructure for cutting-edge biomedical research with a view of the Mediterranean sea.”**





- **Our strengths are a critical mass of 1.400 people in 100 research groups coming from 55 different countries.**
- **Top researchers appointed from Harvard University, MIT, Salk Institute, EMBL, MRC, INSERM, Karolinska, Max-Planck, etc.**
- **Capacity to continuously attract researchers and students from abroad (PhD programme in English).**
- **A complementary scientific community covering a wide spectrum of biomedical research.**
- **Code of Good Scientific Practices**
- **More than 700 original articles per year in SCI journals.**



PRBB

Hospital

University

**“Seven independent research centres in an inter-institutional coalition and connected through one open creative space.”**

# Organization model and management challenges

- The PRBB manages and maintains the heritage of the park and its facilities. In addition it runs the animal facility as a scientific service. PRBB is not subsidized.
- The centres pay for the use of the equipped space in accordance to the surface and type, and for various park services.
- The PRBB coordinates various working groups and committees with representatives from each center (conferences, communication, occupational health, policy reports, waste, etc..).
- **Promote synergies and collaborations, respecting the identity and autonomy of each centre.**





# The research centres

People

- IMIM (Research Centre of the Hospital del Mar) 1985 437
- Dept. of Experimental and Health Sciences (CEXS-UPF) 1998 313
- Centre for Genomic Regulation (CRG) 2000 406
- Centre of Regenerative Medicine in Barcelona (CMRB) 2005 46
- Centre for Res. on Environmental Epidemiology (CREAL) 2006 109
- Institute of Evolutionary Biology (IBE: CSIC-UPF) 2008 \*121
- Pasqual Maragall Foundation (FPM) 16

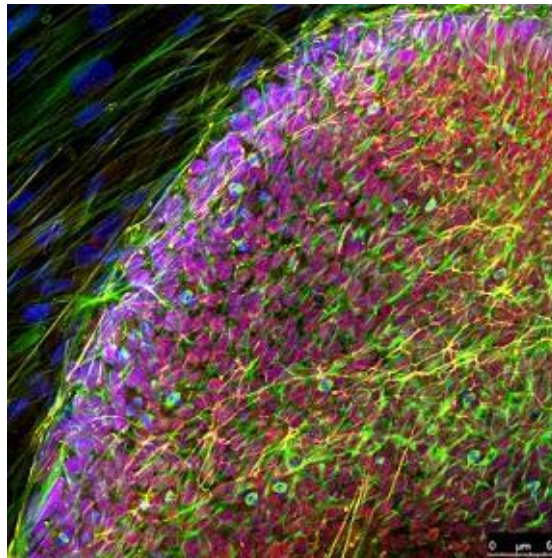
\* Personnel IBE: CSIC 69 + UPF 52



## Scientific areas:

From the molecular to the populational perspective

- Biomedical informatics and Systems biology
- Gene regulation and Epigenetics
- Cellular and developmental biology
- Pharmacology and Clinical Physiopathology
- Human genetics and Evolutionary biology
- Epidemiology and Public health



## Recent papers: Just Nature and Science in 2012 (18)

BLUEPRINT to decode the epigenetic signature written in blood. **Nat Biotechnol.** 2012 Mar 7; Graf, R Guigó, et al. CRG

Insights into hominid evolution from the gorilla genome sequence. **Nature.** 2012 Mar 7; T Marques-Bonet et al. IBE (CSIC-UPF)

KLHL3 mutations cause familial hyperkalemic hypertension by impairing ion transport in the distal nephron. **Nat Genet.** 2012 Mar 11; X Estivill et al CRG

Genome-wide meta-analysis identifies 56 bone mineral density loci and reveals 14 loci associated with risk of fracture. **Nat Genet.** 2012 Apr 15; X Nogues et al. IMIM

Detectable clonal mosaicism and its relationship to aging and cancer. **Nat Genet.** 2012 May 6; L Perez-Jurado et al. UPF, qGenomics (spin-off UPF/CRG), M Kogevinas CREAL/IMIM

The tomato genome sequence provides insights into fleshy fruit evolution. **Nature.** 2012 May 30; R Guigo et al. CRG

Postzygotic HRAS and KRAS mutations cause nevus sebaceous and Schimmelpenning syndrome. **Nat Genet.** 2012 Jun 10; FX Real et al. CEXS-UPF

The bonobo genome compared with the chimpanzee and human genomes. **Nature.** 2012 Jun 28; T Marques-Bonet et al. IBE (CSIC-UPF)

Genetics. Human genetic variation, shared and private. **Science.** 2012 Jul 6; J Bertranpetit et al. IBE/UPF

Systems biology: A cell in a computer. **Nature.** 2012 Aug 2; M Isalan, CRG

Cancer: Exploiting collateral damage. **Nature.** 2012 Aug 16; B Lehner CRG

Chromatin organization is a major influence on regional mutation rates in human cancer cells. **Nature.** 2012 Aug 23; B Lehner CRG

Landscape of transcription in human cells. **Nature.** 2012 Sep 6; R Guigó et al, CRG

Epistasis as the primary factor in molecular evolution. **Nature.** 2012 Oct 14; C Notredame, F Kondrashov, et al. CRG

Epigenomic analysis detects widespread genome-wide DNA hypomethylation in chronic lymphocytic leukemia. **Nat Genet.** 2012 Oct 14; S Barberán-Soler, P Papasaikas et al. CRG/UPF

Progressive degeneration of human neural stem cells caused by pathogenic LRRK2. **Nature.** 2012 Oct 17; N Montserrat, JC Belmonte et al. CMRB

Coordinated control of replication and transcription by a SAPK protects genomic integrity. **Nature.** 2012 Nov 25; F Posas et al. CEXS-UPF

Hox Genes Regulate Digit Patterning by Controlling the Wavelength of a Turing-Type Mechanism. **Science.** DOI: 10.1126; J Sharpe, et al. CRG



# All the centres are associated with the UPF

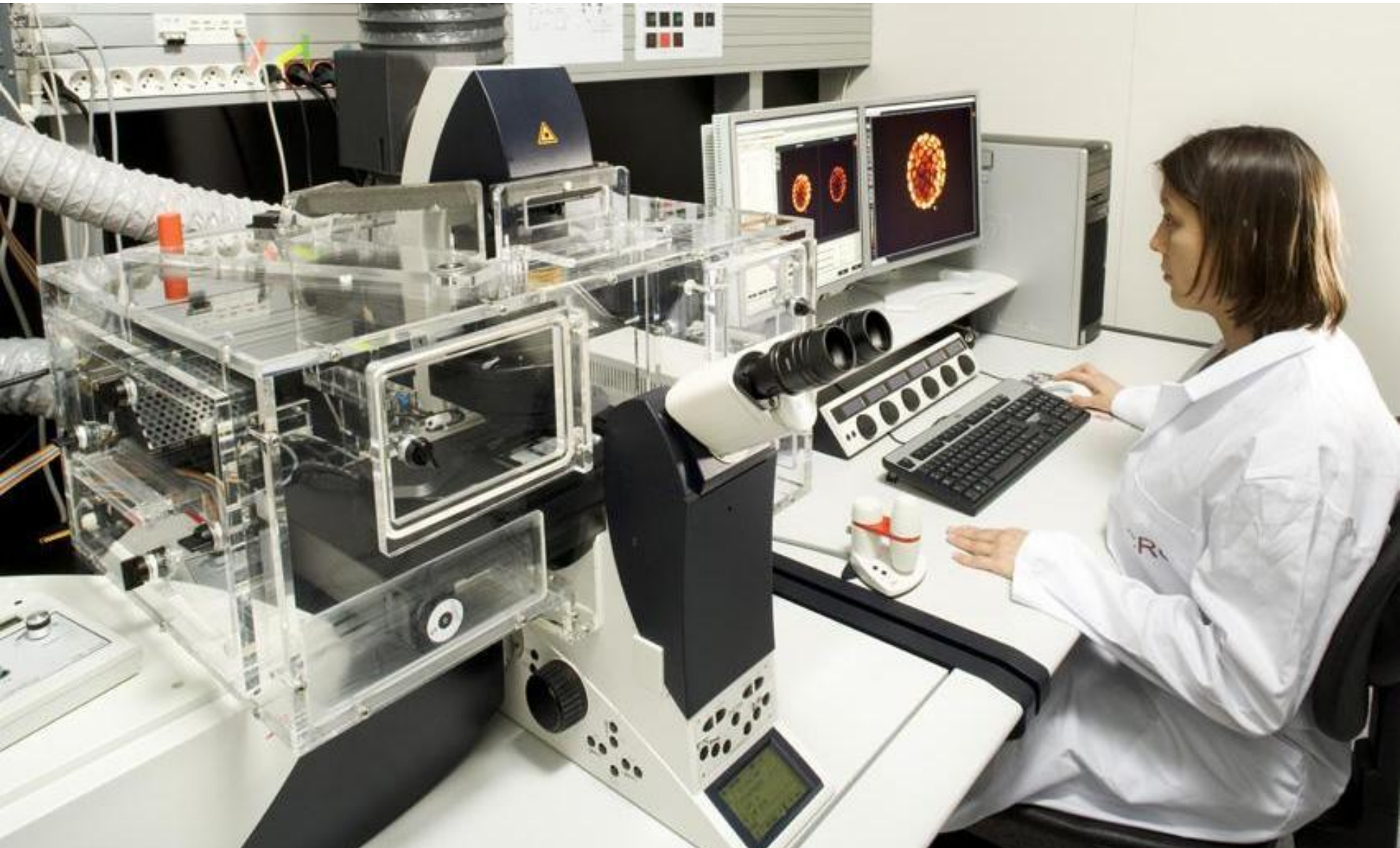
- A public university founded by the Government of Catalonia in 1990.
- Three areas of knowledge: Social sciences and humanities, Biomedicine, and Communication and information technologies.
- 12,000 students, 1,200 teaching and research staff, 3 urban campuses.
- The UPF is a Campus of International Excellence and the Spanish university with most grants (26) from ERC, the European Research Council (13 advanced and 13 starting grants).



**“The PRBB animal facility is one of the most complex and robotized installations in Europe and is fully AAALAC accredited.”**



**“All the other very sophisticated scientific services at the park are shared and managed by the different centres.”**



- **Microarrays:** Affymetrix GeneChip® (IMIM), Agilent and Illumina platforms (CRG)
- **Ultrasequencing:** 2 Illumina Genome Analyzer II (GA II) and 1 Roche 454 FLX (CRG)
- **National Genotyping Center (CEGEN)**
- **Proteomics (CRG/UPF)**
- **Advanced light microscopy:** Two photon microscopy, Confocal microscopy, Total Internal Reflection Fluorescence (TIRF) microscopy, Fluorescence Lifetime Imaging Microscopy, Fluorescence Correlation Spectroscopy, Automated widefield imaging (all CRG), Leica TCS SP2, Leica DM IRBE (all UPF) and multi-photon confocal laser microscope (CMRB)
- **Flow cytometry:** modular flow cytometer from Dako (CMRB), FACScan, FACScalibur, LSR I, FACSDiVa (all UPF/CRG)
- **National Institute of Bioinformatics (INB)**
- **Antidoping Control Laboratory (IMIM)**
- **PET and MRI (HMar)**
- **Clinical trials unit phase I with 12 beds (CAIBER, IMIM)**



## Scientific conferences at the park

- 319 scientific conferences took place in 2012.
- 50% of the speakers come from around the world (16% from the USA)
- 46 PRBB-CRG Conferences which are organized by a mixed group of researchers and financed by CRG and PRBB in equal parts.







# prbb intervals

Continuing Professional  
Development Programme

Space for Reflective  
Learning

- Continuing professional development programme for PRBB residents.
- Set up in 2008 to provide space for interdisciplinary learning and reflection.
- Program structure:
  - Leadership, management and career development
  - Science communication
  - Biomedicine, society and good scientific practice
- 298 participants in 24 courses in 2012 (free of charge and only residents).
- Flagship course is “Leading for success in science” run by HFP Consulting.



## Building a vibrant scientific community

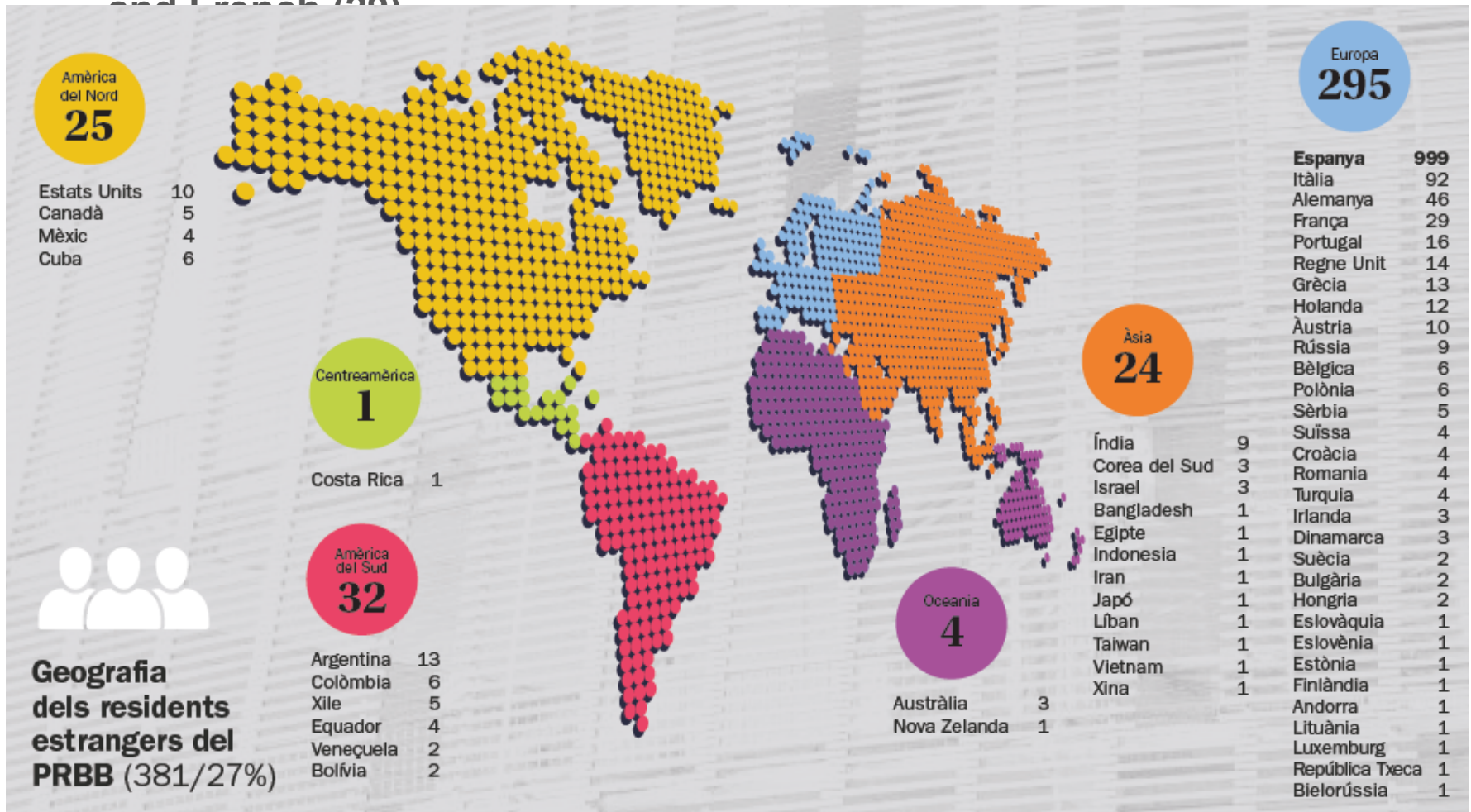
- The park supports and organizes a variety of activities for the residents.
- PRBB Beach Volleyball Championship
  - 32 (6x6) and 22 (4x4) teams and >500 participants
  - 3-4 daily games from April to July
- Summer party for all residents with live music and performances
- Saint Jordi celebration and book exchange
- Weekly activities:
  - Theatre group
  - Yoga
  - Choir
- Punctual activities:
  - Capoeira
  - African dance and percussion

**“The almost 1,400 residents are the best that the park has: they are young, creative, daring, enthusiastic and very hard workers.”**



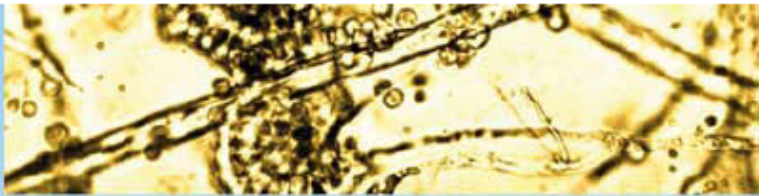
# The geography of the PRBB

- 78% of the foreign residents come from European countries, 15% are from America and 7% from Asian countries.
- In 2012 the most numerous foreigners are Italians (92), Germans (46) and French (29)



- PRBB is a member of Biocat
- Catalonia offers unique capabilities in biomedical sciences, thanks to a strong research background and a network of large, modern facilities:

- Barcelona Supercomputing Centre
- Alba Synchrotron
- New Genomic Ultrasequencing Platform (CNAG)
- Top-ranked research centres and university hospitals



## Why Barcelona?

**Because it is the ideal location for your biobusiness.**

**Barcelona City Council** and **Biocat** are proud to introduce you the “**biocapital**” of **Southern Europe**. With more than 350 companies, 400 centres and research groups on life sciences, 17 science & technology parks, 12 universities and 13 top level hospitals, Catalonia is the most dynamic bioregion in the Euro-Mediterranean area and its capital, **Barcelona**, the main biotechnology hub.



**“It took 20 years for this project to come true and compete with the best European centres. The Olympic games of 1992 were key in the transformation.”**



Barracas del Somorrostro en la Barceloneta año 1950



PLATJA  
DEL  
SOMORROSTRO

BARRI DE BARRAQUES (C.1875-1966)





May 1987



Josep Maria Bricall, Pasqual Maragall, Joan Clos, Mercè Sectrich y Ramon Pascual

## Maragall promete el "Parc del Mar" para una mejor investigación sanitaria

El alcalde Pasqual Maragall y los rectores de la Universidad de Barcelona y de la Universidad Autónoma firmaron ayer sendos convenios de colaboración e intercambio entre las instituciones que presiden. El alcalde de la ciudad confirmó durante el acto la futura creación de un "parque científico sanitario" junto al recién remodelado Laboratorio Municipal.

El alcalde de Barcelona, Pasqual Maragall, confirmó ayer la futura creación del "Parque de Investigación Biomédica y Sanitaria de Barcelona", en el transcurso del acto oficial de firma de convenios de colaboración entre el Ayuntamiento y las Universidades de Barcelona y Autónoma. La firma de estos convenios se hizo coincidir con la inauguración formal del remodelado Laboratorio Municipal de Barcelona en la calle de We-

mente, es de 3.000 millones de pesetas.

La utilización del "parque" estará reservada a entidades de nivel científico reconocido, sean públicas o privadas. En principio, habrá de contar con instalaciones válidas para la investigación farmacéutica y alimentaria, control de calidad y homologación de productos alimentarios. Contará también con un área de "exhibición científica y tecnológica, co-

Autónoma) quedó ratificada ayer con la firma que el propio Margall y los respectivos rectores, Josep Maria Bricall y Ramon Pascual, estamparon en los documentos de los convenios de cooperación e intercambio. La firma de los convenios tuvo lugar en la sede del Laboratorio Municipal, de manera que el acto oficial servía de inauguración no ya del edificio (que alberga al laboratorio desde 1931), sino de las instalaciones renovadas y mejoradas.

El Laboratorio Municipal, de cuya creación como tal se cumplieron cien años el pasado 5 de enero, ha ampliado en los últimos años el ámbito de sus actividades, merced, entre otras cosas, a los 150 millones de pesetas que se han invertido en él entre 1982 y 1986, según su directora, Mercè Sectrich.

## The history of PRBB

- 1985-1988: First actions to promote the research park.
- May 1991: Registered in the urban plan of Barcelona.
- 1991 - 1999: Crossing the desert.
- May 1999- July 2000: Final political agreements between different institutions.
- September 2000: Start of the construction.
- May 2006: Inauguration of the PRBB building.



## Things that went well:

- Creation of a large space for a critical mass of 1.400 people.
- Recruitment of top scientists.
- Set-up of state-of-the-art facilities and equipment.
- Incubating academic research centres as a new model has proven to be successful.
- The impressive building has helped to create a sense of community and is now a symbol for excellent research in Spain.
- Strong support from the local government and the city.
- Having implemented an attractive programme of scientific conferences has positioned the PRBB very fast.



## Things that could have been done better:

- Leading scientists were too much involved in developing the architectural plans and space distributions.
- In spite of having 4.000m<sup>2</sup> of terrace, there are too little quiet and interior spaces for reading or social activities.
- Requirements for the size of the data centre, electricity consumption and climate capacities were underestimated.
- The final project for the animal facility was approved after the start of the construction (basement location).
- About 55% of the total cost of the infrastructure was financed with credits. 40% would have been better.



## Lessons learned and recommendations:

- Oversize the data centre and if you have wet labs also KWH and climate.
- If you plan to build an animal facility, have the executive project ready before starting construction.
- Paying rent is a good educational instrument to teach scientists, that space, light, cleaning and security are not given by the universe and actually have a cost.
- Provide as many meeting and conference rooms as possible.
- The change of science is accelerating. Build fluid and flexible organizational structures and spaces.
- Good things and bad things will happen. Just go and try to make a difference.



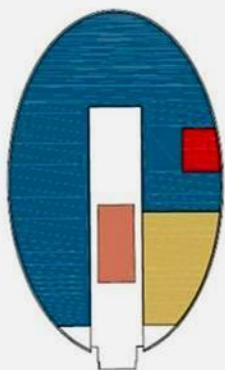
# The PRBB building

- Architects: Manel Brullet and Albert de Pineda.
- Elliptical floating shape of large dimensions with a hanging construction: 55,000 m<sup>2</sup>, 117 x 74m
- Spaces for scientific use: 40,000 m<sup>2</sup>.
- Ground floor, 9 upper floors and 3 basements.
- Almost half of the weight of the building is sustained from the roof.
- Hanging conference hall with 250 seats.
- Solar systems for hot water production.
- Wooden façade (red cedar).
- Construction: from September 2000 to October 2006.



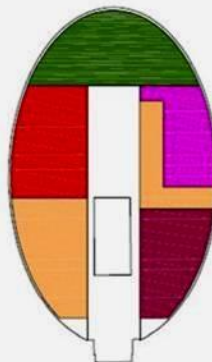
### PLANTA 01

IMIM	2.862'0 m2
CEXS	201'5 m2
CREAL	724'5 m2
AUDITORI	333'0 m2
<b>Total</b>	<b>4.121'0 m2</b>



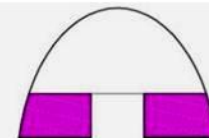
### PLANTA 04

CRG	887 m2
GRIB	762 m2
CEXS	713 m2
PRBB	500 m2
CMRB	466 m2
<b>Total</b>	<b>3.328 m2</b>



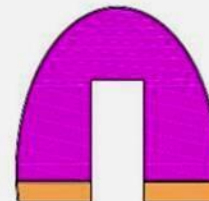
### PLANTA 08

CMRB	475 m2
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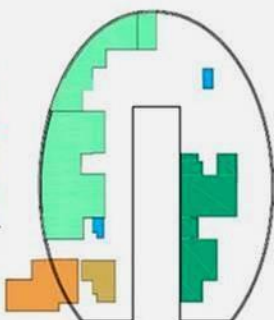
### PLANTA 07

CMRB	1.760 m2
CRG	239 m2
Despatxos-lab.	1.999 m2



### PLANTA BAIXA

Espais Comuns	1.204 m2
Espais Mixte	821 m2
CREAL	222 m2
Espais Comercials	88 m2
F. P. Maragall	344 m2
<b>Total</b>	<b>2.679 m2</b>



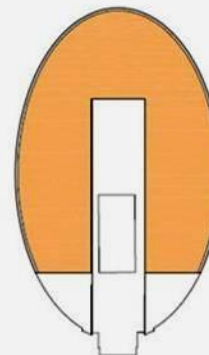
### PLANTA 03

CEXS(-GRIB)	3.562 m2
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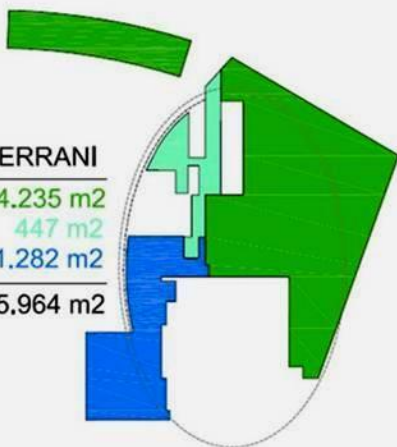
### PLANTA 06

CRG	2.891 m2
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### PLANTA SEMISOTERRANI

Estabulari	4.235 m2
Esp. Comuns	447 m2
IAT	1.282 m2
<b>Total</b>	<b>5.964 m2</b>



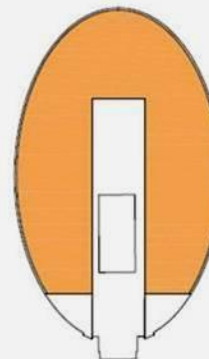
### PLANTA 02

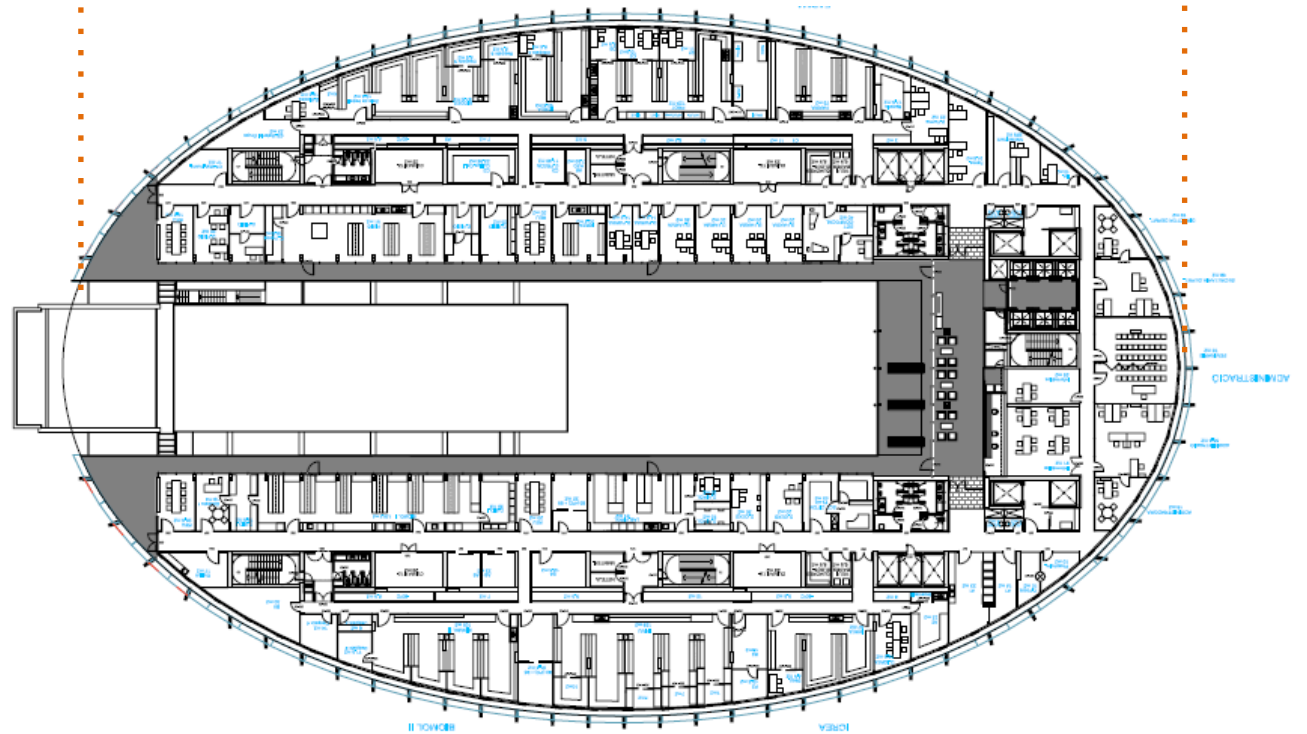
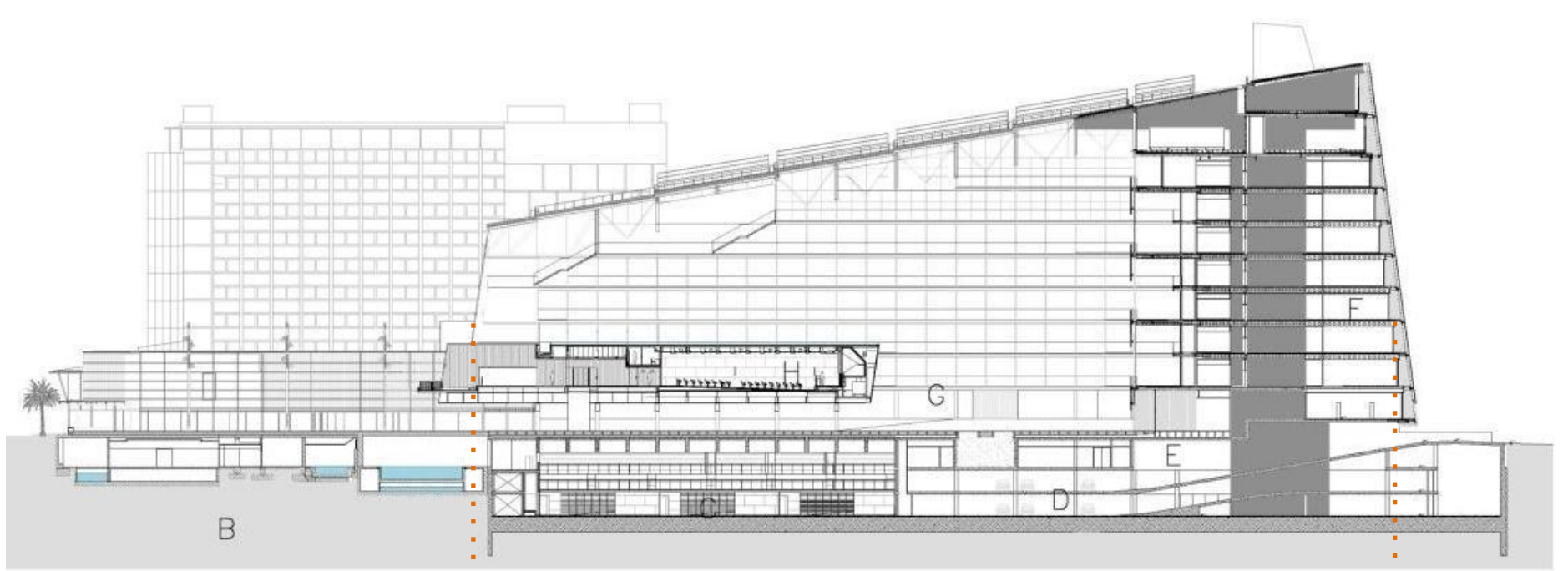
IMIM (-GRIB)	3.631 m2
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### PLANTA 05

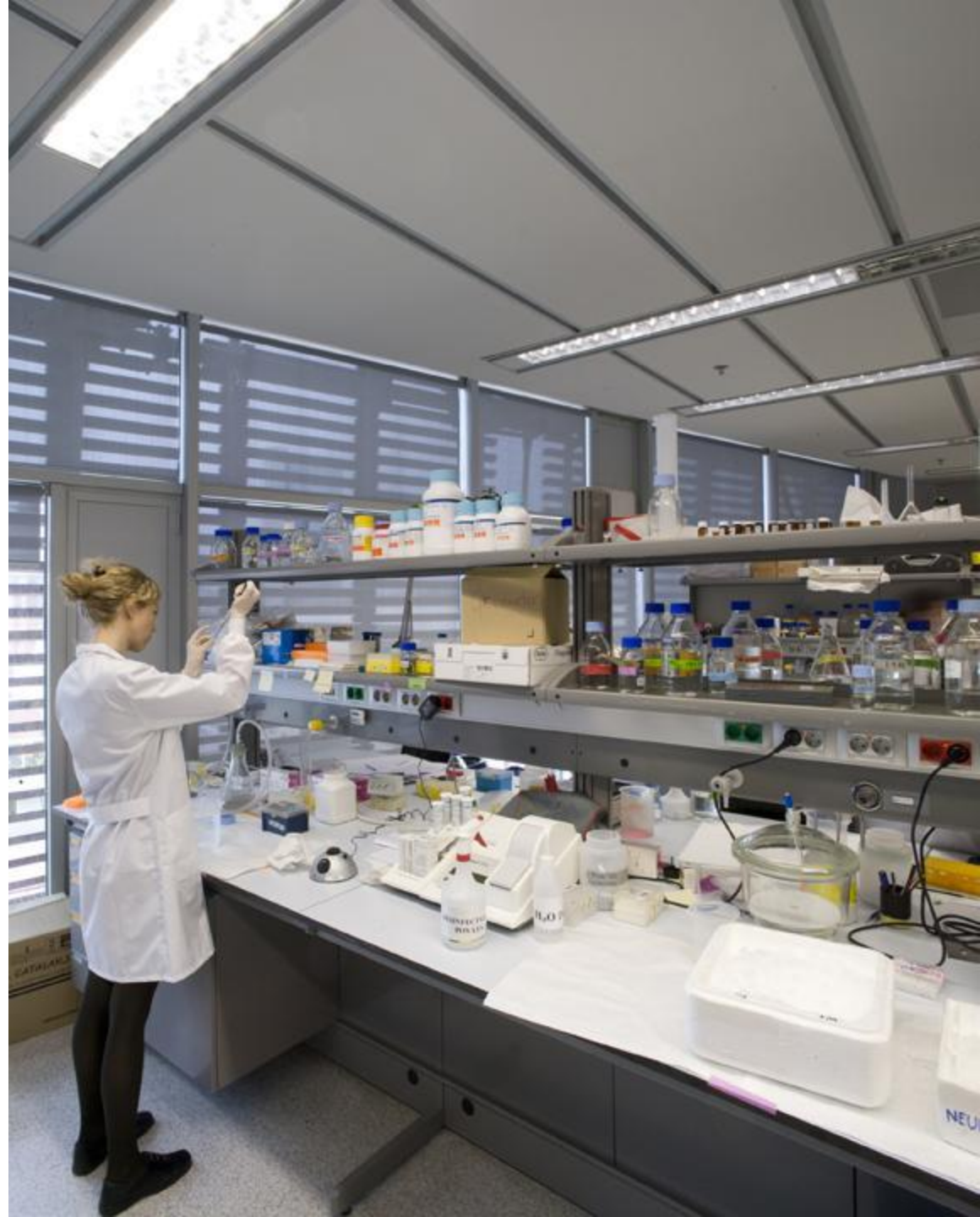
CRG	3.195 m2
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# The initial laboratory infrastructure

- 1,125 m linear lab benches at wall
- 549 m linear central lab benches
- 261 m linear lab benches without shelves
- 95 m of stainless steel lab benches
- 31 mobile lab benches
- 454 m of working tables
- 5 m of anti-vibrating tables
- 174 sinks
- 91 fume hoods with extraction through the roof
- 91 low security closets
- 7 high security closets

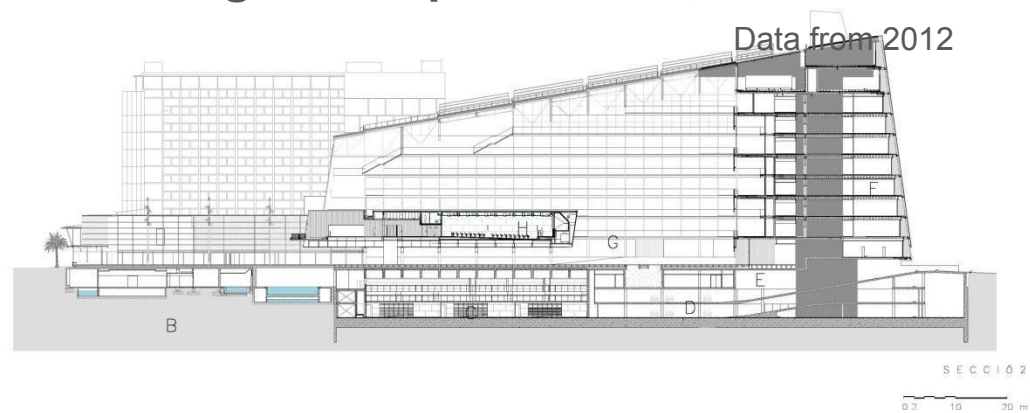






## Maintenance and consumptions

- Electricity: KWh/year 14 M  
Climate 27%
- Natural gas: KWh 6.5M
- Water: m<sup>3</sup> 38,389  
Decalcified 41%
- Liquid nitrogen: litres 213,120
- Carbon dioxide: Kg 22,972
- Residues: Kg 280,145  
Regular waste 52%  
Carton/paper 15%  
Organic 17%
- Cleaning: hours per week 1,250



# An asset with future

## ■ Investments €

Premises	8,414,770
Building	102,694,689
Scientific equipment	11,901,030
<b>Total:</b>	<b>123,010,489</b>

## ■ Financing

Capital funds:

Generalitat	22,564,910
City Council	17,987,536
UPF	14,390,028

Refundable credit from:

Ministry of Science	31,798,611
Cofinancing EU Cohesion Funds (FEDER)	8,260,312
Long-term bank credits	24,193,376
Other financing	3,815,815
<b>Total:</b>	<b>123,010,489</b>



# Our strategic challenges

- To improve visibility and create constantly competitive advantages within the international scientific community.
- To integrate the different biomedical disciplines within the building and strengthen the connection between basic science and clinical research, especially at the Hospital del Mar.
- To transform the scientific power into an engine for the economic development in Catalonia together with Biocat, the Catalan bioregion.
- To reach out to society for a better understanding of science and its impact in the health industries.



# Thank you!

- For more information please consult our web:  
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