

# CAJAL BLUE BRAIN PROJECT

Volume 6, issue 11. June 2014

## Cajal Blue Brain Project

CBBP awarded with one of the four awards of the The Zenith Fellows Award Program (ZENITH) of the US Alzheimer Organization

### INSIDE THIS ISSUE:

The Alzheimer Association 1

The Human Brain Project (HBP) 2

Dissemination Activities 3

During 2014 CBBP members were awarded with an international project within the The Zenith Fellows Award Program (ZENITH) of the US Alzheimer Organization ([www.alz.org](http://www.alz.org)).

The objective of this competition is to provide major support for investigators who have: Contributed significantly to the field of Alzheimer's disease research, Made significant contributions to other areas of science and are now beginning to focus more directly on problems related to Alzheimer's disease, and are likely to make substantial contributions in the future. The project entitled *The Pyramidal Neuron in Cognition and Alzheimer's Disease*, was selected as one of the four proposal awarded in 2014 within this Programme.



The project, led by Javier DeFelipe, will last three years and will receive 450,000 \$.

### Project Abstract

The cerebral cortex is the most human part of the nervous system because it is the brain structure whose activity is directly related to the emergence of those capacities that distinguish humans from other mammals. Thanks to this structure we can perform extraordinary and highly complex tasks, such as writing a book, composing a symphony or inventing the computer. Therefore, one of the major goals in neuroscience is to define the structural design of brain circuits and explore how they contribute to the functional organization of the brain both in health and disease. One of the major brain diseases is Alzheimer's disease (AD), which is the most common age-related neurodegenerative disorder. The clinical and pathological symptoms (senile plaques and neurofibrillary tangles) are primarily confined to the cerebral cortex, but, owing to the limited data that is available about synaptic circuits in the normal human brain and in that of the AD patient, the basic mechanism/s of cognitive deterioration are still a mystery. A progressive loss of episodic memory is a well-known clinical symptom that characterizes AD. The consequences of this loss of memory are truly terrible and the patient can be aware of the psychologically disturbing, progressive loss of his/her personal history. This was very well described by the famous filmmaker Luis Buñuel (1900-1983), who suffered from this disease and described the experience as follows: "We must have begun to lose our memory, albeit little by little, but sufficient to realize that our lives are constructed on the foundations of our memory... Our memory defines our being, our behavior, our actions, our feelings. Without it we are nothing." The problem is that there is only a weak correlation between the degree of cognitive impairment and the presence of plaques or neurofibrillary tangles. Thus, the principal question in AD pathology is what alterations in the synaptic circuitry represent the underlying anatomical changes associated with the early cognitive decline in AD and how can we prevent these changes? We propose to go beyond the state of the art by carrying out a novel kind of analysis: combining the powerful neuroanatomical technique of intracellular injections method with a modern three-dimensional electron microscopy method (Focused Ion Beam milling/Scanning Electron Microscopy), in order to quantify specific synaptic alterations in identified, 3D reconstructed cortical neurons from areas showing early histopathological changes in AD. Thus, our proposal will greatly contribute towards establishing the physiopathological basis of cognitive impairment in AD, which to date remains elusive.

### Special points of interest:

- ☐ 2014 HBP
- ☐ 2014 Project Exhibitions



## 2014 Cajal Blue Brain Project

### The Human Brain Project



Human Brain Project

Most of the members of the CBBP scientific modules participate in this project, together with the management unit. After a preparatory study that run for almost three years, the HBP project was officially launched in October 1<sup>st</sup>, 2013 and its 1<sup>st</sup> phase will last 30 (+6) months.

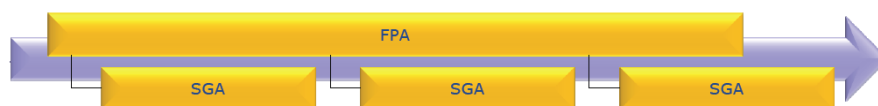
CBBP members are currently involved in the first phase of the HBP as task, work package and subproject leaders. During 2014, they have been working on the scientific work plan planned for the project first phase. In parallel, they have been involved in the drawing up of the HBP second phase. This phase is expected to be launched in April 1<sup>st</sup>, 2016 and will be run over the Horizon 2020 programme. This drawing up included the preparation of the FPA according to the EC rules.

#### Preparation of the FPA proposal

The FPA, Framework Partnership Agreement, is the collaboration framework in which the HBP 2nd phase will be implemented. This proposal follows a new scheme for the Flagship initiative (a core project & partnering projects) and includes the project roadmap and a proposal for the core consortium. This proposal was submitted in June 2014 and approved in September 2014. We are currently working on it to redefined final scientific aspects as requested by the EC.

FPA main features:

- A framework for implementing Specific Grant Agreements (SGA)
- The FPA has no budget.
- It has an overall roadmap and sets out most of the contractual conditions.
- A specific grant agreement (SGA) is concluded to execute some part of the roadmap.
- An SGA is always concluded in the context of an FPA.
- Core projects (implemented as SGAs) will take the FET Flagship along the 10-year strategic roadmap
- Complementary projects are foreseen to complement the core project



FPA-SGA General Scheme

The proposal describes:

- Flagships as a model for European science
- How the HBP Flagship fits in and evolves with Europe's strategic agenda
- Principles, structures and agreements for the Flagship model
- The Core Project ("The Flagship Project") – defines the action plan and the Consortium that will enter into the FPA
- Complementary Projects – defines the areas of independent research and future potential partners ("The Flagship Initiative")
- European and International projects – defines areas of cooperative and independent research, and future potential collaborators (collaborators of the Flagship initiative)
- Medium and long-range plans: Research, Education, Dissemination, Sustainability, Commercial, Governance
- The HBP's ability to adapt to national, European and international initiatives

## 2014 Cajal Blue Brain Project




### Dissemination Activities

#### Exhibition 'The Garden of Neurology'

During 2014 CBBP has been involved in the organization of the Exhibition 'The garden of Neurology'. The exhibition was inaugurated in the CAIT (UPM, Campus de Montegancedo) in March 6<sup>th</sup>, 2014.

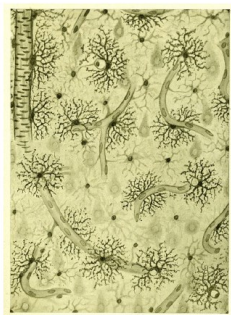
The exhibition it will include a total of 31 figures most of which date from 1865 to 1914 and represent some characteristic examples of the golden era for artistic creativity in neuroscience. The observer will find that some of the illustrations can be considered to belong to different artistic movements, such as modernism, surrealism, cubism, abstraction or impressionism. Indeed, these illustrations may also provide artists with a source of inspiration since they reveal a fantastic and virtually unknown world of forms, a microuniverse with an aura of mystery.

#### 'The Garden of Neurology'






### 'El Jardín de la Neurología'

**Comisario**  
Prof. Javier DeFelipe  
(Cajal Cortical Circuits Laboratory, UPM-CSIC)



**Agradecimientos**  
Proyecto Cajal Blue Brain (Representación española en el proyecto Blue Brain Project internacional coordinado por la EPFL),  
CIBERNED y proyecto Human Brain, HBP (CE).



© 2014 Cajal Blue Brain Project

*"Qué duda cabe, a la ciencia no van más que los artistas... Yo comprendí que para adquirir nombre con los pináculos es preciso convertir la mano en un instrumento de precisión. A mis eficientes artísticas de niño — a las que mi padre se opuso intensamente— debo lo que soy ahora. Hasta la fecha habré hecho más de 12.000 dibujos. Para un profano son dibujos extraños, cuyos detalles se miden por millésimas de milímetro para que descubran mundos misteriosos de la arquitectura del cerebro"*  
Santiago Ramón y Cajal (1852-1934)

Tamaño de una entreciña que le hicieron en 1860 (Ramón y Cajal MA. Paisajes neurales: homenaje a Santiago Ramón y Cajal. CSIC, Madrid, 2007)

Título Figura: Neuroglia perivascular, 1925  
Referencia Figura: del Río-Hortega F (1925) Algunas observaciones acerca de la neuroglia perivascular. Boletín de la Sociedad Española de Historia Natural, abril de 1925, pp. 1-21 y 184-210.

#### Exhibition "BRAI.NS 2014"

This event was held in February 2014. In this exhibition a total of 31 figures were included, most of which date from 1865 to 1914 and represent some characteristic examples of the golden era for artistic creativity in neuroscience.

The observer found that some of the illustrations can be considered to belong to different artistic movements, such as modernism, surrealism, cubism, abstraction or impressionism. Indeed, these illustrations may also provide artists with a source of inspiration since they reveal a fantastic and virtually unknown world of forms, a microuniverse with an aura of mystery.

#### Scientific Exhibition at the Scientific Educational meeting 'BRAI.NS 2014'



Exhibition Curator  
Javier DeFelipe

Acknowledgements  
In collaboration with  
Cajal Blue Brain (Spanish  
partner of the Blue Brain  
Project initiative from  
EPFL), CIBERNED and HBP

017 part 3



#### CTB

The Cajal Blue Brain Project is hosted by the Universidad Politécnica de Madrid (UPM) in the Scientific and Technological Park of Montegancedo Campus. Computational needs and support infrastructure required by CajalBBP are provided by two of the Research Centers of the Park, the Centro de Tecnología Biomédica (CTB) and the Centro de Supercomputación y Visualización de Madrid, CeSViMa, which is focused on the massive storage of information, high-performance computing and advanced interactive visualization.

**More information: [www.ctb.upm.es](http://www.ctb.upm.es)**



## Sponsorship

