

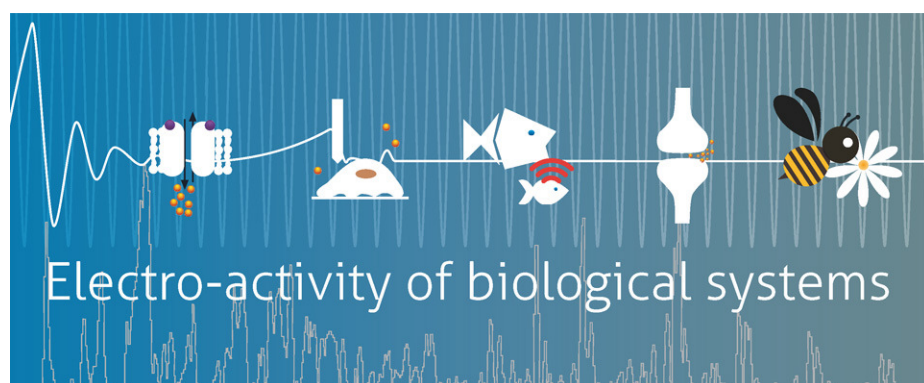
ELECTRO-ACTIVITY OF BIOLOGICAL SYSTEMS

Introduction

In every living organism or cell, a large number of electric and ionic phenomena occur simultaneously. These are often complex processes, where several elementary chemical reactions can lead to a global response of entire systems, which can then affect their interactions with their environment. The interplay between the different processes is, in essence, multiscale, while their investigation is usually sequentially performed at each scale by different research teams. This EABS workshop aimed at gathering different groups dealing with the electro-activity of biological systems in order to benefit from their methods and results. In turn, it provided a multiscale point of view of the problems associated with the generation, reception and propagation of electric fields, electrons and ions within biological systems.

This international and multidisciplinary workshop , EABS_2015, brought together scientists and students (master and PhD) not only to learn how living systems integrate, take advantage and combine electric and ionic activities to their issues, but also to exchange recent results and to stimulate further interactions.

Each day, four sessions across scales (submicron systems, cells, multicellular systems, animals) were organized with plenary lectures of leading scientists in the different fields, selected talks of young researchers and a poster session.



2015 November 18-19th

Paris (Orsay), France

<http://eabs2015.sciencesconf.org/>

Organizers

- Eric Raspaud, Laboratoire de Physique des Solides, Université Paris-Sud, Orsay - France
- Christian Marlière, Institut des Sciences Moléculaires, Université Paris-Sud, Orsay - France
- Christophe Regeard, Institute for Integrative Biology of the Cell (I2BC), Gif-sur-Yvette - France
- Renaud Cornut, NIMBE - CEA, Gif-sur -Yvette- France
- Rachel Meallet-Renault, Institut des Sciences Moléculaires, Université Paris-Sud, Orsay - France

The organizers are grateful to PALM'emergence program.

Administration

- Sabine Hoarau (assistance & secretary) and Mélanie Decraene (financial management), Laboratoire de Physique des Solides, Université Paris-Sud, Orsay - France

Acknowledgement

- The organizers would like to thank Sabine Hoarau, Mélanie Decraene, Nathalie Farnabe (financial management at DR4, CNRS, Gif sur Yvette), Anne Vanbiervliet and Anaïs Vergnolle (Pôle Communication et diffusion des sciences d'Orsay), Elisabeth Cosnuau (Bâtiment des Colloques du Campus d'Orsay)

Sponsors – Exhibitors

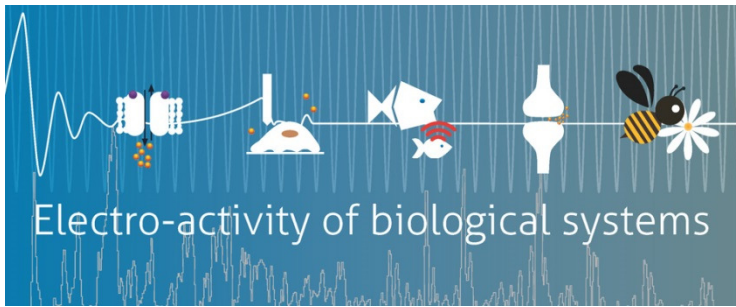
The workshop was supported in part by

- 1) the French Research Program "Investissements d'Avenir" of LabEx PALM (Physics-Atoms-Light-Matter) ANR-10-LABX-0039-PALM. The fundings from e-ABS and PhysBioPS projects have been greatly acknowledged.
- 2) the "Division de la Recherche" of the "UFR des Sciences d'Orsay" - University Paris-Saclay.
- 3) the French Chemical Society
- 4) JPK instruments
- 5) Nanosurf
- 6) Zurich Instruments



Zurich
Instruments





Wednesday, Nov. 18th 2015.

9h15-10h00 Registration and welcome coffee

Session: subcellular systems.

Chairwoman: Emily C. Hollenbeck

10h00-10h40 Invited speaker **Pierre Charnet**
“Voltage-gated Ca²⁺ channels: structure, permeation and inactivation properties”

10h45-11h25 Invited speaker **Tomaso Zambelli**
“Force-controlled electrophysiology”

11h30-11h55 Coffee break

Session: tissues, organs, biofilms.

Chairman: Vic Norris

12h00-12h40 Invited speaker **Dominique Chapelle**
“Multi-scale modeling of chemo-mechanical coupling in muscle contraction and applications to cardiac modeling”

12h45-14h15 Lunch

Chairwoman: Cécile Delacour

14h20-14h40 Oral conference

- **Christian Marlière:** "A direct and at nanometer scale study of electrical charge distribution on membranes of alive cells."

14h45-15h25 Invited speaker **Derek Lovley**
“Electromicrobiology: Electron Transfer via Biowires in Nature and Practical Applications”

Session: animals, plants.

Chairwoman: Cécile Delacour

15h30-16h10 Invited speaker **Jean-Marie Frachisse**

“Ion channels in mechanosensing and electrical signaling in plants”

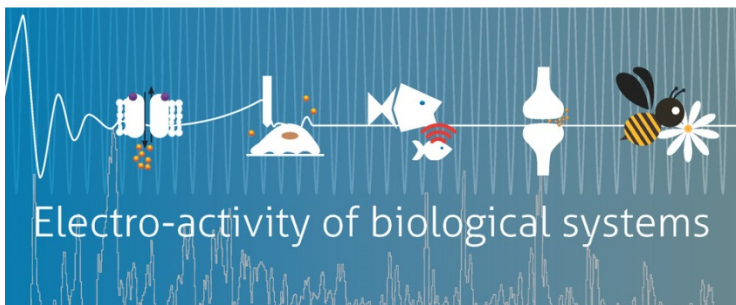
16h15-16h45 Exhibitors

16h50-17h30 Beer session and poster

Chairman: Eric Raspaud

17h35-18h15 Invited speaker **Daniel Robert**

“The bee, the flower and the electric field”



Thursday, Nov. 19th 2015.

9h00-09h25 Tea-Coffee

Session: subcellular systems.

Chairman: Gregory Sutton

9h30-10h10 Invited speaker **Manon Guille-Collignon**

“More Transparency in BioAnalysis of Exocytosis: Coupling of Electrochemistry and Fluorescence Microscopy at ITO Electrodes”

10h15-10h35 Selected conferences

- **Michal Cifra:** " Cellular electrodynamic activity "

10h44-11h10 Coffee break

Session: cells and networks.

Chairman: Renaud Cornut

11h15-11h55 Invited speaker **Pascal Darbon**
"Spinal cellular and network properties modulate pain perception"

12h00-12h20 Selected conferences

- **Clément Lafargue:** " Electro-Optic Microscopy (EOM) for cell biology "

12h25-13h55 Lunch

Session: tissues, organs, biofilms.

Chairman: Jérôme Delacotte

14h00-14h40 Invited speaker **Alain Bergel**
"How could chemical engineering help in deciphering electro-microbial mechanisms?"

Session: animals, plants.

14h45-15h25 Invited speaker **Rüdiger Krahe**
"The active electric sense of weakly electric fish: from electric organ discharge to sensory processing and behaviour."

15h30-15h50 Selected conferences

- **Thomas Boulier:** " A mathematical model for electrolocation in weakly electric field"

15h55-16h25 Coffee break and posters

Chairman: Eric Raspaud

16h30-17h15 Selected conferences

- **Gregory Sutton:** "*Bumble Bees (Bombus terrestris) use mechanosensory hairs to detect electric fields*" (16h30-16h50)
- **Eric Herbert:** "Green Thermoelectricity: Observation and analysis of plant thermoelectric response" (16h55-17h15)