

# JAMES RENNIE BEQUEST

## REPORT ON EXPEDITION/PROJECT/CONFERENCE

**Expedition/Project/  
Conference Title:**

Advanced Lecture Course on Systems Biology 2014

**Travel Dates:**

March 2-8 2014

**Location:**

Innsbruck, Austria

**Group member(s):**

Mr Jose Maria Uriel Urquiza Garcia

**Aims:**

- Interaction with current leaders in systems biology
- Interaction with PhD students doing systems biology across Europe
- Presenting current research in the form of poster
- Acquire know how for modelling whole organisms
- Broaden my perspective in the systems biology field

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**OUTCOME (not less than 300 words):-**

The aim of the Advanced Lectures on Systems Biology meeting is to gain expertise in systems biology approaches. I attended lectures from leaders in field in theoretical and experimental tools. For one week I had the opportunity to interact with PhD students mainly from Europe that are working in different questions but using systems biology approaches to answer these questions. This interaction helped me to realise that I am using state of the art theoretical tools to understand the circadian clock from *Arabidopsis thaliana*. For example, one important goal in my project is to propagate the uncertainty we have in the data into the mathematical model that we are using for studying the clock. The theoretical tools that I am using were well represented in the projects presented in the meeting. Furthermore, I was able to interact closely with students that are working on improving the tools I am using. Therefore, I obtained a significant advice about the pros and cons of the methodologies I am implementing for the clock in plants.

The projects presented in the meeting were at different stages, from very preliminary ones to near to publish ones. This helped me to understand the state in which my PhD project is. Furthermore, I was able to see what kind of other elements I need to incorporate in order to do a more solid data analysis. Furthermore, during the Poster session where I presented the project "The *Arabidopsis thaliana* circadian clock: ODE model refinement by means of

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parameter dimensionalisation” I received very important feedback on how to improve my science communication skills. For example, elements that might be very useful when presenting a poster in a conference.

I also had the opportunity to interact with leaders in the field of whole cell modelling. For me, this interaction was very important because one of my long-term objectives is the creation of predictive whole-organism mathematical models. In particular, I was able to talk to Mark Calvert, who lead the team that created the first whole cell model of a real organism (*Mycoplasma genitalium*). He gave me some tips on how to organize databases in other to keep track of the elements that come into consideration when modelling at this massive scale. I was able to create connections with several PhD students not only from Europe but also from the US. In particular with Jason Lomnitz, who works with Michael Savageau in the University of California Davis. It is possible that in the near future I collaborate with him by using his theoretical tools to understand the phenotypic space of the circadian clock.



Jason Lomnitz, Innsbruck, Austria

The lecture given by Mathias Heinemann was that has a very direct impact in my research. He uses microfluidic devices and microscopy with the aim of increasing our understanding of metabolism at the single cell level. His expertise in the microfluidics field for biological systems helped me to realise how difficult is to use this technology. Therefore, in some way saved me from trying hard experiments where the success rate might be supper low. Instead I am planning now experiments that produce data with less quality but have a higher success rate. Furthermore, currently I am building the experimental system that will allow me to study the circadian clock at single cell level using microfluidic devices.

One of the most important parts of the meeting was the opportunity of interacting in a non-academic activity with other PhD students. This was a lot of fun and helped me to make new

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good friends. I think that these new connections will be very important as I advance in my academic carrier and as I advance towards a better understanding of the circadian clock. The objective, increase food security and quality of life across the world.

Finally, I want to express my appreciation to the James Rennie Bequest for the partial support for travels costs for this academic activity. This has been one of the best experiences both in my academic and personal life. The cultural enrichment I obtained is invaluable and has a direct impact in the development of the science conducted in the University of Edinburgh.