REPORT OF ISOPOL XIX
14-16 June 2016

The 19th edition of the International Symposium On Problems of Listeriosis (ISOPOL) was held in Paris from the 14th to the 17th of June of this year. Over 260 scientists gathered at the prestigious Pasteur Institute to discuss the latest developments in the field of research related to this astonishing opportunistic pathogen.

International experts were invited to share their experience and breakthroughs with the rest of the community. As a model organism for infection biology, *Listeria monocytogenes* gave new insights in the mechanisms required for intracellular lifestyle and virulence. While cases of sporadic listeriosis have been on the rise since 2006, Next Generation Sequencing (NGS) has been implemented as the new tool for epidemiologists. As sequencing cost is decreasing, massive genome sequencing will give in depth understanding of the infraspecific diversity of the species and virulence determinants. Indeed, immunity is the other side of the coin and the complete understanding of the complex interactions between the infected cell and the bacterium remain to be fully understood.

But of course, *Listeria monocytogenes* is also a ubiquitous organism and several aspects of its saprophytic life were presented. From soil to the food industry, many discoveries are ahead of us.

A great conference is not limited to the quality of the scientific programme and indeed the organising committee put together a social programme that one will remember for a long time, from the opening concert and cocktail to the conference dinner in the Musée d'Orsay, attendees had many opportunities to mingle and meet their peers.

In a word, ISOPOL the XIXth was a complete success. What could have been a better way for the ESRs of List_MAPS to start feeding their professional social network with this first international conference.

In this special issue, you will find testimonies of some of the ESRs who will give you the inside story of a scientific conference.

Pascal Piveteau, coordinator of List_MAPS

On Wednesday 15th, Pascal Piveteau, *University of Burgundy*

"Ecology of *Listeria monocytogenes* in the soil environment"

A central habitat in the routes of transfer of *Listeria monocytogenes*

Multiple routes of transmission of *Listeria monocytogenes* from outdoor environments to foodstuff result in a complex contamination cycle. One of the intriguing facets of *Listeria monocytogenes* is its ability to adapt its physiology to extremely different habitats such as soil, plants, food processing facilities, foodstuff, gastro intestinal tract of animals and intracellular surroundings. This further suggests the ability to integrate environmental cues in the circuitry of regulation of transcription. Soil is a central habitat in the transmission routes of *L. monocytogenes*. Soil is a highly heterogeneous habitat that can be characterised by both abiotic (pH, texture, chemistry) and biotic factors. In order to decipher the intrinsic and extrinsic factors that shape the fate of *L. monocytogenes* in soil, we investigated the response of *L. monocytogenes* EGD-e in microcosms through a combination of transcriptomic approaches and population dynamics. The fate of *L. monocytogenes* in soil is dependent on both abiotic and biotic characteristics and the latter have a major impact on the dynamics of the populations of *L. monocytogenes* in soil. Major transcriptome reshaping is observed in the soil environment where *L. monocytogenes* recruits its repertoire of transporters and specific pathways to access and utilize the available substrates. The biotic environment further affects transcriptome. The fitness of the populations of *L. monocytogenes* in soil requires appropriate responses to the biotic environment in which the response regulator AgrA is involved.

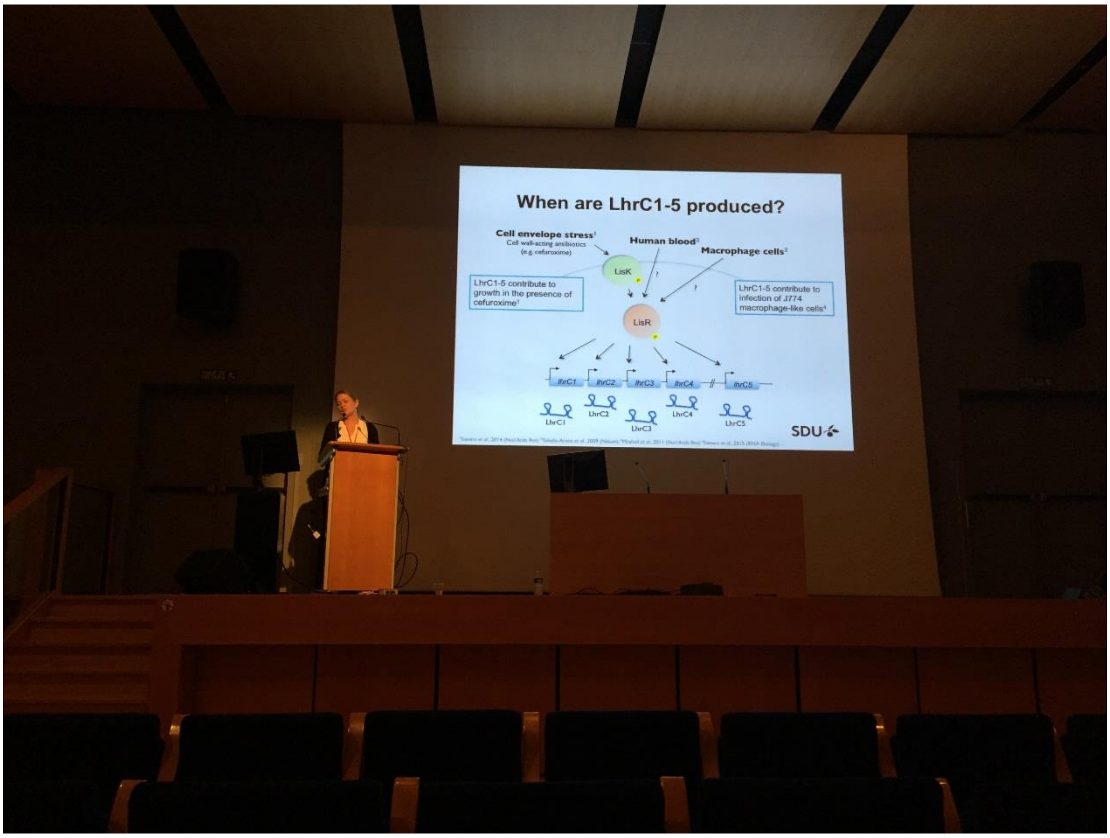
On Wednesday 15th, Conor O'Byrne, *National University of Ireland Galway*

"Regulation of the general stress response in *Listeria monocytogenes:* Evidence for sensitive and transient post translational control of sigma B"

The ability of *Listeria monocytogenes* to survive and grow in a diverse range of environments including the mammalian gastrointestinal tract is underpinned by a robust stress response, which is under the control of the alternative sigma factor Sigma B (σ). Mutants lacking σ are compromised B B in a variety of different ways; they are sensitive to acid and bile, they have defective osmoregulation and have attenuated virulence in an animal model. The activity of σ is thought to be controlled B post-translationally but thusfar its regulation has been little studied. We have investigated the induction of σ activity by osmotic stress using an egfp reporter fused to a strongly σ -dependent B B promoter and showed that activation is rapid but transient. We used flow cytometry to investigate its activation within an osmotically stressed population and found that activation occurred heterogenously. We purified the putative anti-sigma factor RsbW and showed that it could interact with both σ and a putative antagonist of the anti-sigma factor, RsbV, providing the first biochemical evidence for post-translational regulation of σ activity. While studying the role of rsbV in σ regulation we found that overexpression of RsbV is inhibitory to the activity of σ, an effect that we interpret to indicate that hyper-activition of σ is detrimental to growth. In support of this we showed that mutants lacking σ (or with a reduced capacity to activate σ) are capable of faster growth B B B B B B B under a variety of different conditions. We propose that the complexity of the regulatory circuitry controlling σ can probably be explained by the negative impact of σ on growth and suggest that B B the cell finely calibrates it decision to deploy the general stress response.

On Thursday 16th, Birgitte Kallipolitis, *University of Southern Denmark*

“A family of small RNAs in *Listeria monocytogenes*: when, where and how do they act?”



When are LhrC1-5 produced?

LhrC1-5 contribute to growth in the presence of cefuroxime[1]

LhrC1-5 contribute to infection of J774 macrophage-like cells[4]

Small non-coding RNAs (sRNAs) act as regulators of bacterial gene expression. In some cases, two or more highly related sRNAs, termed “sibling sRNAs”, are produced in a single bacterium. *Listeria monocytogenes* encodes hundreds of sRNAs and serves as a model for studies of sRNA-mediated control in Gram-positive species. Five homologous sRNAs in *L. monocytogenes*, named LhrC1-5, are highly induced in response to cell envelope stress and contribute to infection in macrophage-like cells. Under inducing conditions, LhrC1-5 down-regulate expression of genes encoding cell envelope-associated proteins, including the adhesin LapB; the oligo-peptide binding protein OppA, and the CD4 T-cell stimulating antigen TcsA, which are all required for full virulence of *L. monocytogenes*. LhrC1-5 exert their regulatory function at the post-transcriptional level by base pairing with complementary sequences in target mRNAs. + Recent evidence suggests that the LhrC family of sRNAs is even larger than first anticipated. Two novel members of the LhrC family have been revealed, making it the largest multicopy family of sRNAs reported so far. The sibling sRNAs were found to act in a functionally redundant manner, however, other characteristics, such as differential expression profiles under infection-relevant conditions, suggest that the sRNAs might also possess non-overlapping functions. Furthermore, each sibling sRNA encodes multiple CU-rich regions engaged in sRNA-mRNA interactions, providing another layer of complexity. This makes the LhrC family a unique case for studying the purpose of sRNA multiplicity in the context of bacterial virulence.

ESR 11: Bohyung LEE, *BioFilm Control*

“ I attended the ISOPOL conference for the first time as a student and it was such a valuable experience. There were many experts in their own field of studying Listeria but in cooperation with other researchers, which reminded me of how important the network is in solving problems we have been confronting with this bacteria. The oral presentations were well organized from the history of studying Listeria to the up-to-date news of noble discoveries. They covered wide variety of topics from food safety and epidemiology to pathogenesis and immune responses. Some topics were particularly interesting in that this pathogenic bacteria can benefit our life, for example, implications of Listeria monocytogenes for future vaccine development or the application of Listeria monocytogenes as a vector and small molecule based therapy for immuno-oncology. There were much discussions about national monitoring systems by genetic structuring and typing of strains using whole genome sequencing, more specifically MLST (multilocus sequence typing). It seemed like governmental and international agreement is inevitable to develop worldwide comprehensive control of Listeria and I hope to see this development in 3 years during the next ISOPOL. ”

ESR 9: Ibrahim SULTAN, *INRA*

“ ISOPOL conference was a good opportunity for me to learn about many new issues related to Listeria in particular and to biology in general. It was my first time to attend an international conference, furthermore it was my first conference about a biological topic. In the poster sessions there were many topics useful for the network and related to my project, I had discussions with the researchers representing those topics, those discussions were of mutual interest, we shared our ideas and points of view and I learnt about new available websites and tools which can be useful to my work area and to the network. For the oral presentations there were interesting talks all over the days of the conference, especially there was a presentation about identifying all the proteins expressed by Listeria monocytogenes EGD-e strain grown in certain conditions, this talk is strongly related to the system biology approach which will be developed by the network. Meeting researchers coming from all over Europe and the world with knowledge and experience in different research areas and having discussions with them was very useful. I wish to attend the next ISOPOL meeting and probably present our work. ”

ESR 2: Vanessa LAS HERAS, *University College Cork*

“ Personally ISOPOL was an amazing experience as it was my first international conference. I was surprised with the quality and content of some presentations. Even though the presentations were short they were very detailed regarding the relevance of the data, which made it easy to follow but at the same time very informative. Another positive aspect of ISOPOL was the easy access to the people behind the papers we read, as the conversations during the coffee breaks were very interesting for me. I had the chance to talk with people that work for years in the same area that I do now, which allowed me to understand other perspectives that will definitely help me in the future. Personally I was very interested in the multiple infection models presented, the proteins involved in the processes (especially transcytosis and transfection) and the associated metabolic changes, topics that were a big focus of the conference, allowing me to get new ideas to explore in future experiments. ”

ESR 3: Miguel VILLORIA RECIO, *University of Copenhagen*

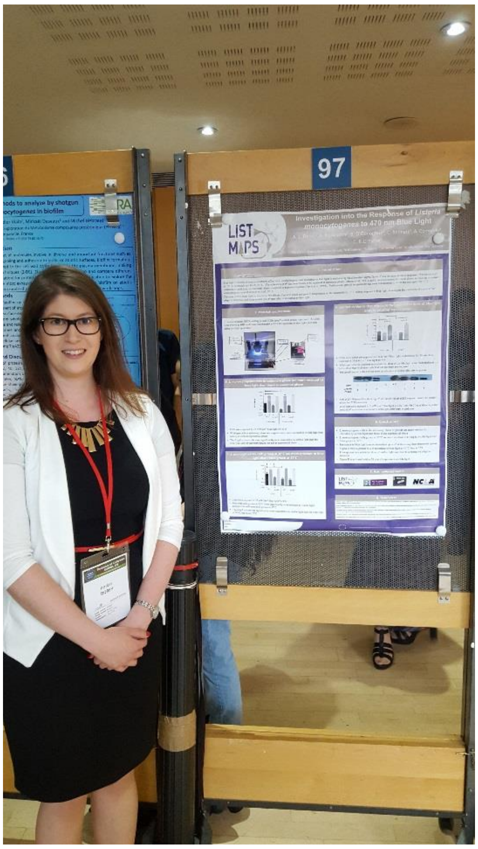
“ ISOPOL was the second international conference I attended, but the very first time I spent such nice 4 days listening to world-class scientists speaking exclusively about Listeria monocytogenes.

It was very peculiar to put faces to all those names that I have been reading and naming before from the papers I use to get the forming knowledge I have about this bacterium. Interacting with other researchers has been one of the most valuable things during this ISOPOL. It was very important for me to see how connected the listeria scientists are and what that brings into play. Sometimes the science world can be very little! That also means good, though. I particularly enjoyed how the conference was themed in field sections such as history, epidemiology, pathogenesis, environment and so on, so that you could sometimes choose what to attend to satisfy your own research interests. Sometimes they would match at the same time, but one can only have one body. For my research, I found pretty satisfactory to hear speakers talking more specifically about environment and its implication in virulence regulation and more personally, I also enjoyed a lot the pathogenesis section. It was very convenient to see the interests of other research groups and see what the current hot topics are. Besides all the knowledge, sometimes far too much, that you can soak up, networking was one of the most successful elements of this event.

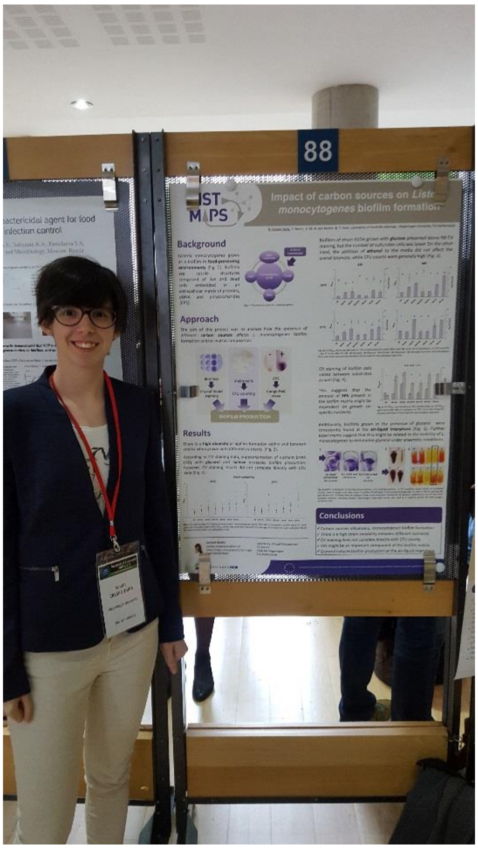
I also appreciated the lending hand and support that some researchers showed to the ESRs, caring also about sharing knowledge and people's scientific career. As a PhD student, I greatly appreciated that some Listeria world-leaders took the time to benefit us, early career researchers, with their time. At the end, we are all a matrix that can only work with one another, and ISOPOL confirmed how important it is to have a nice flow of communication and interaction within the forming scientific world. I believe this was a good reminder of how important it is to be united against pathogenic diseases such as listeriosis, leaving behind any kind of scientific conflicts of interest and contributing to the common world-wide health care. I wish that, me together with the other ESRs, can soon contribute to the next ISOPOL meeting. ”

PHOTOS OF THE EVENT

Some selected photos of the event:



Amber Dorey, ESR4



Natalia Crespo Tapia, ESR6

From left to right : Ignasi Ferrer Lluis (ESR10), Ibrahim Sultan (ESR9), Miguel Villoria Recio (ESR3), Patricia Dos Santos (ESR7), Tiago Santos (ESR5), Catarina Marinho (ESR8)

From left to right : Birgitte Kallipolitis (SDU), Vanessa Las Heras (ESR2), Laurent Gal (AgroSup Dijon), Conor O'Byrne (NUIG), Dominique Garmyn (uB), Pascal Piveteau (uB), Catarina Marinho (ESR8), Ignasi Ferrer Lluis (ESR10), Tiago Santos (ESR5), Angela Rocio Ortiz Camargo (ESR1), Marianne Halberg Larsen (UCPH), Amber Dorey (ESR4), Patricia Dos Santos (ESR7), Miguel Villoria Recio (ESR3), Natalia Crespo Tapia (ESR6)

You can find the rest of the photos on the google plus account of List_MAPS: https://plus.google.com/u/0/events/gallery/cgj4m0fkkvjc4bqgvqfijqom7ro

LIST OF PARTICIPANTS

University of Burgundy:

1. Pascal Piveteau
2. Laurent Gal (AgroSup Dijon)
3. Dominique Garmyn
4. Angela Ortiz Camargo
5. Catarina Marinho

University College Cork:

6. Cormac Gahan
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University of Copenhagen:

8. Marianne Halberg Larsen
9. Miguel Villoria Recio

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10. Conor O'Byrne
11. Amber Dorey

INRA Microbiology:

12. Tiago Santos

INRA Applied Mathematics and Computer Science, from Genomes to the Environment:

13. Islam Ibrahim Sultan

Wageningen University:

14. Natalia Crespo Tapia

University of Southern Denmark:

15. Brigitte Kallipolitis
16. Patricia Dos Santos

BioFilm Control:

17. Bohyung Lee

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18. Ignasi Ferrer Lluis

Next conference

2017

9-13 July: FEMS Congress, Valencia, Spain http://www.fems-microbiology2017.kenes.com/

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