

“Training and research
in *Listeria*
monocytogenes
adaptation through
proteomic and
transcriptome deep
sequencing analysis”

Newsletter n°3

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LIST MAPS

Editorial

It has now been almost two years since the ESRs joined List_MAPS. And what a busy time!

One major milestone of 2017 was the Mid Term Review Meeting held in Brussels in the presence of our Project Officer and one independent expert. It was the opportunity for all the network to present what had been achieved and the major advances of the first period. The feedbacks from the project officer and the independent expert were excellent and both acknowledged that List_MAPS was a successful network. The Network is indeed running full speed. ESRs have engaged in secondments between labs. This is definitely a major asset of networks. Secondments are opportunities to make the most of the complementary expertise of each lab to dig deeper in the research questions.

Training wise, it was time to launch the online course on entrepreneurship. Crafted by e-learning specialists from Université de Bourgogne, the course has been especially designed to suit the needs of the ESRs. On top of theory, ESRs got hands-on experience on business plan writing with the help of the biotech professionals of the network.

The second Summer School was held in INRA, Clermont-Ferrand (France). The focus was on Proteomics. This very comprehensive week-long training session reviewed the latest technics available and the kind of approaches that can be applied to understand biological systems. Experts in the field emphasized the critical step of data analysis and interpretation. Practical demonstrations were also on the programme. After all this hard work, Auvergne's volcano climbing was a delight!

But no time to rest, destination Valencia, Spain! The FEMS 2017 international conference for microbiologists was a great opportunity for networking and dissemination. In total, members of the network presented 10 posters and two oral presentations.

As time goes by, the network is getting stronger and ESRs move confidently forward in their career development.

Dr Pascal Piveteau,
Coordinator



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PRESENTATION OF INDUSTRIAL PARTNERS



Presentation of the company

BioFilm Control is a Biotechnology R&D company, formed in 2004, which has developed one-of-a-kind proprietary technology using magnetisable microbeads, protected by 7 patents and 9 trademarks. This technology detects the biofilm behaviour of microorganisms and was automated in 2009. This is the only “biofilm” technology in Medical Analysis Laboratories (Public or Private Institutions).

BioFilm Control markets BioFilm Ring Test® and Antibiofilmogram® kits in 96-well plate format for research use only. The Antibiofilmogram® kits study the susceptibility of bacteria to antibiotics, both in planktonic and biofilm populations. Three panels of 11 antibiotics are available, defined for *Staphylococcus aureus* (in Bone & joint infections and Diabetic Foot), *Escherichia coli* (in Urinary Tract Infections), *Pseudomonas aeruginosa* (in Cystic fibrosis and Pulmonary infections). Clinical protocols are under way and the first MD-IVD versions with CE marking are scheduled for 2017.

The company also operates its biofilm expertise under R&D (pharmaceutical industry – human health and veterinary applications-, cosmetics industry, food, hygiene, etc).

Why the company participates to List_MAPS?

The foodborne pathogen, *Listeria monocytogenes* (*L. monocytogenes*) has been a great threat to food manufacturers especially of meat and dairy foods for the past few decades. BioFilm Control looks to extend its expertise out of the Human Health field, and *Listeria* is a very interesting challenge to access the Agro-Food market.

The project List_MAPS is an opportunity to collaborate at the European scale with Key Opinion Leaders, and, with a dedicated Ph.D student, to adapt the BioFilm Ring Test® for various conditions that *L. monocytogenes* most frequently encounters in food processing environment, such as cold temperature, presence of salts, and disinfectants. The goal is to market with *Listeria* a new In Vitro Test for labs involved pathogen testing, mostly biofilm-forming bacteria, which is of major importance in establishing a HACCP program and is key in minimizing and preventing product contamination by pathogenic organisms.

Dr Thierry Bernardi, CEO of BioFilm Control¹

Website: <http://www.biofilmcontrol.com/en/>

¹ See the page of the company and the presentation of Thierry Bernardi on the website of List_MAPS: <http://blog.u-bourgogne.fr/list-maps/consortium/beneficiaries/biofilm-control/>

MID-TERM MEETING



The mid-term meeting was held in Brussels on **Thursday 23rd of February 2017**. All the beneficiaries, the partner organisation and the ESRs were present and met the Project Officer of the REA and the external expert.

The meeting started with the coordinator's report including the scientific, training, networking, and management parts of the project. Then, the ESRs' presented a slideshow of their project explaining their first results and methodology, their training activities within and outside the network and their Personal Career Development Plan.

During the afternoon, two meetings were held with the REA representative and the expert, one for the ESRs' and the second for the partners. This meeting was **a great opportunity for the ESRs to discuss their experience** within the network in terms of training, progress, and impact on their future careers.

At the end of the meeting, **the REA representative and the expert gave a very good feedback.**

SUMMER SCHOOL

The second Summer school of List_MAPS was organized by the partner INRA Theix unit 454 Microbiology from the **3rd to the 7th of July 2017**.

During one week, the ESRs and attendees outside the network received a high-quality training on the **potential and power of proteomics** to address biological questions through a Systems Biology approach. They had a working knowledge of the proteomics approaches, from the subproteome extraction and sample preparation to the bioinformatics and biostatistics tools to exploit results.

Topics addressed were:

- Proteomic strategies and approaches
- Sample separation/Subproteomic/Depletion
- In-gel vs off-gel separations
- Mass Spectrometry
- Semi-quantitative and quantitative proteomics
- Imaging Mass Spectrometry
- Bio-Informatics and Bio-Statistics
- Proteomics in addressing biological questions

And because every time there is an event, it is the opportunity to discover a new city, Michel Hébraud organized on Wednesday afternoon a **hike in the volcanoes**, before going to the restaurant and taste one of the food specialties “la truffade”.



Tuesday 4th, speaker: Thibault Chaze



Wednesday 5th, speaker: Conor O'Byrne



Wednesday 5th, speaker: Laëtitia Théron



Wednesday 5th, hiking on the Auvergne's volcanoes



Thursday 6th, PFEM visit



Friday 7th, group photo with speakers Thierry Rabilloud and Conor O'Byrne and the organizer Michel Hébraud

FEMS CONGRESS

The 7th Congress of the Federation of European Microbiological Societies (FEMS) took place in Valencia (Spain) **from the 9th to the 13th July 2017**.

It was an event that List_MAPS couldn't miss! Right after the Summer school, ESRs and supervisors went to Spain to **attend several talks, meet international microbiologists** and be updated on the state of the art on antimicrobial resistance and infections, food microbiology, sustainability, etc.

With the bookmarks and leaflets of List_MAPS, **posters and oral presentations** of ESRs and supervisors and an **award**, the network had everything to ensure a good presence and show its first results.

It was definitely a unique moment in the training of the ESRs.



Top left: session posters, on Monday 10th; top right: award ceremony, on Thursday 13th; middle: group photo, on Wednesday 12th; right: dinner, on Wednesday 12th

SECONDMENTS



ESR4 Amber DOREY

From: National University of Ireland, Galway (NUIG)

To: Wageningen University (WUR)

Dates: 27/03/17 to 05/05/17

“ Overall the secondment was a **very beneficial and enjoyable experience**. I feel I achieved a lot that will be **useful to my project**, but this was only made possible because of the preparation carried out in advance by WUR (organising inductions, purchasing reagents, etc.). The staff that I worked with were friendly and very open to collaboration, as were Natalia Crespo and Tjakko Abee who I was working with closely. The work tasks themselves were not difficult, but the research area was very much outside of my expertise so there was a lot of ‘playing catch up’ in terms of reading around the research area to ensure that experiments were planned out well. However, **I was given lots of support** so this was never an overbearing problem. Every effort was made to ensure my stay was as enjoyable as possible, both in and outside of work and this is something that I feel is very important. The biggest difficulty I experienced was maintaining a healthy work-life balance as 6 weeks is not long enough to integrate fully in terms of taking up sports/hobbies, so it can be very tempting just to work. However, my colleagues ensured that I was included in lots of social events so this was not a problem in the end. Overall, **I would definitely be open to returning to and collaborating with WUR in the future!** ”

”

ESR8 Catarina MARINHO

From: University of Burgundy (UB)

To: University of Southern Denmark (SDU)

Dates: 02/04/17 to 27/05/17



“ I have never been in Denmark before and I arrived knowing only one word of Danish “tak”, which means thank you. I thought I would find a language barrier similar to what I’ve found in France but in fact I was remarkably wrong: **in Denmark everyone speaks English quite fluently, so my integration was very smooth!** In order to have a full Danish living experience I rented a bicycle and it was my only mean of transportation during those 2 months in Odense. It turned out to be a great decision since I was spending long periods of time on the lab so I had no time to spare to do any sports. At the end, **I enjoyed the freedom of riding a bike everywhere** so much that by it was sad to leave my bicycle behind. Denmark in its all, is very well organized and Danes are generally reserved but kind people. **The Biochemistry and Molecular Biology lab at SDU was the biggest I’ve ever work**, with several benches on its three floors, and though it were many researchers and students sharing the space it was always very tidy. For the first time I had to work with radioactivity in order to label probes for northern blotting so I had an introduction to the isotope lab to learn how to work securely during my stay. **Odense is a cozy city and I got the chance of visiting the island** and see its famous Zoo and the Hans Christian Anderson Museum. Summarizing, my stay in Denmark had many positive sides, not only enabled me to adapt to a different country with a different life style and develop my social skills, **it also offered me the experience of working in another lab, trying new techniques, interacting with new peers and broad my networking.** ”

”



ESR6 Natalia CRESPO TAPIA

From: Wageningen University (WUR)
To: National University of Ireland Galway (NUIG) and University College Cork (UCC)
Dates: 01/05/17 to 31/05/17 and 01/06/17 to 30/06/17

“ Both of my secondments took place in Ireland, in two different universities. I spent the first month at the National University of Ireland, Galway (NUIG), and continued after that to my secondment in the University College of Cork (UCC). **It was actually very efficient for me to do both secondments in the same country, one right after the other, even though it was quite intense.**

During my time in Cork, I was able to do some virulence experiments and learn new techniques that will be useful for my future career. Our collaboration with NUIG was particularly interesting. During Amber Dorey’s secondment at my university in the Netherlands (WUR) and my secondment at her university, we combined our research interests and worked together as a team on the same project.

It was an amazing experience. I had a great time during my secondments, both at work and on a personal level. I found that life in Ireland is quite similar to life in my own country (Spain), in many ways. I have spent most of my career working abroad, and living in Ireland for a while almost felt like being back home.

”

ESR2 Vanessa LAS HERAS

From: University College Cork (UCC)
To: University of Ireland, Galway (UB)
Dates: 12/06/17 to 23/06/17



“ **Working in a new lab is always challenging,** especially when you are learning a completely new technique. This experience enriched me as a researcher, as adaptation to new working environments is a crucial skill to develop as an early stage researcher. Even though I’m not fluent in French, **the adaptation to the new country was considerably smooth,** especially in Dijon, a region marked by its great gastronomy and wine history. Furthermore I was lucky to see the music festival in the streets of Dijon, where I saw some amazing jazz bands.

*The overall aim of my project is to study the behavior of Listeria in the gut ecosystem. **With this secondment I was able to gain a broader perspective of Listeria response to other ecosystems it naturally inhabits,** which allowed me to see the parallels between the two environments.*

”



ESR11 Bohyung LEE

From: GenXPro (GXP)

To: University of Burgundy (UB)

Dates: 06/06/17 to 31/07/17

“ *This secondment was the fundamental part of my project in GenXPro where I pursue the second half of my PhD. Because the laboratory in GenXPro doesn't have facility that can support experiments engaging living microorganisms such as *Listeria monocytogenes*, I was more than happy when Pascal Piveteau suggested me this secondment. This is the one of the best benefits of List_MAPS that you can seek for help in the network.*

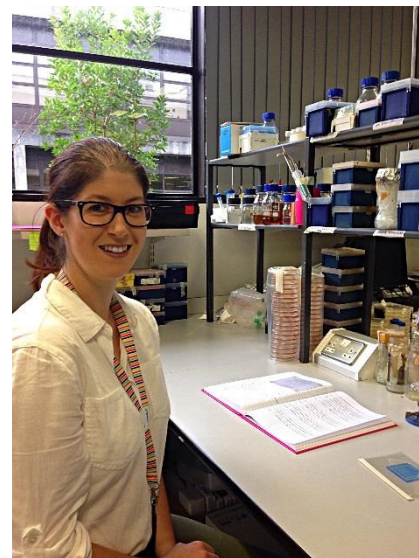
It was a challenge to adapt to a new environment and schedule all the experiments in short period. However, after all, I found it as a positive stress that made me practice 'planning' and 'time management'. Despite some difficulties (delivery of materials and working spaces when there were too many people working at same place), I enjoyed working at INRA in generally for having a spacious office and being surround by friendly people who greet 'bonjour' to each other even you don't know them. Once I had a chance to be engulfed in wines and cheeses from Bourgogne which was extraordinary! I found the city center of Dijon very wealthy and elegant and it was pleasant to stroll around and visit museums.

”

ESR4 Amber DOREY

It is nearly two years you are in Galway, in Ireland, what do you like the most about this city?

Galway is a beautiful, seaside city set in the West of Ireland. I love that it has such a variety of things to offer in such close proximity to one another. You can head into the city centre to find a large selection of shops, bars and restaurants, but then barely a 15 min walk away is Salthill which has the beach and promenade, as well as a very different offering of restaurants. Overall, my integration into society in Galway has been very smooth, mostly helped by friendliness of people both in and out of work and the fact that everybody speaks English so there is no language barrier to overcome.



You get the opportunity to visit other European countries as part of List_MAPS. Do you enjoy these visits?

Getting to travel to several countries a year is definitely a fabulous benefit of being a part of List_MAPS. In 2016 I was able to visit Paris and Frankfurt, both wonderful but very different cities, and this year I have visited Brussels, Wageningen, Clermont-Ferrand and Valencia, and I will be heading to Copenhagen in October. While we are there to benefit from summer schools and workshops, the hosting institutions always make an effort to arrange ways we can have a whistle-stop tour of the local area. This is usually through eating at traditional restaurants and taking walking tours through the city. I was very fortunate that Easter weekend fell in the middle of my secondment to Wageningen, so I hired a car and used the time to travel around the Netherlands and visit other places including Rotterdam, Amsterdam, Utrecht and Gouda. While they are brief visits, it's a great way to compose a list of places I'd like to visit for a holiday.

You finish in a few months your 2nd PhD year, do you feel more confident in your work?

Yes I do. I do not know of anyone who says that they feel fully confident and on top of their work during their PhD, but I can definitely look back over the last 20 months and see an improvement in my skills. These skills are not only practical skills in the lab, but improvements in my literature research, experimental planning and design, time management and communication skills. Everytime I work through the problems that I encounter with my experiments and manage to produce good data, it boosts my confidence as it confirms that I can 'do science'. The experiments do not need to be complicated and technical, they just need to be able to answer the question I am asking, but often it is those that seem the easiest that require the most work to optimise.

Do you think the network-wide activities of List_MAPS will add value to your future career?

Yes I think that the additional skills which I have obtained from being a MSCA ESR will help to make me stand out from the crowd in job applications. In addition to having a PhD like all the other applicants, I will have a whole host of additional skills such as the ability to communicate my work to a non-scientific audience, proven ability to undertake work outside of my main lab, bioinformatics and proteomics skills from the summer schools and workshops, and an understanding of how to design and construct a business plan. These additional skills do not come as a standard part of a PhD, unless your project specifically requires them, so I believe they will help to make me stand out from other applicants.

ESR7 Patrícia DOS SANTOS

You had an Erasmus period in Odense for your master and now you live there, does the city still have secrets for you?

It was good to be back. The city was almost the same as before, so I didn't feel so "lost". However, there was still a lot to discover and a lot of things to do. I think the integration was a bit easier, but it is always something new! Denmark is a really beautiful country, with a lot of green areas and everything looks always very organized. Even though the city where I am living, Odense, is the third largest city in Denmark, it can be considered a small city. But I like it as it is! I like all the small streets in the city center, the old and small houses, including the house where the famous writer Hans C. Andersen was born! Odense is really cozy, but the winters are still a bit difficult for me. Not because of the cold, but because of the grey days. But in the summer, the very long days are awesome!



Do you find some activities to do outside your work/the laboratory?

Even though most of my time is spent at work, I still have some free time. When I have the time, I like to rest, watch something, and read. On the weekends, I used to go quite often to Sweden to visit my boyfriend. When in Odense, I like to go for a walk in the city center, and when the weather allows it I like to go to the park, like all the Danes do! I meet some Portuguese friends and we make barbecues, or in case of rain, we go out for a beer. During winter, most of my time is spent inside, under the blanket and drinking something warm, an example of the so famous Danish concept "hygge".

The last year of your project will start in a few months, what will be your objectives and priorities for that year?

I am already in the second half of my PhD, so I feel a bit the pressure of getting some nice result! I am waiting for some RNA-seq results, so those results will determine my future experiments. Of course, I have in mind what probably needs to be done, but the results will hopefully lead me in the right direction. Meanwhile, I hope I will be able to publish soon the results that I have obtained in the first half of my PhD. My first secondment is approaching as well, and I am looking forward for this experience, because I am sure it will be very useful for my PhD and it will help me to achieve even better results.

Being a PhD student and an ESR means years full of work, training, and new experiences, how do you perceive all these activities?

It clearly means years full of work! Because of all the List_MAPS events and the secondments, we have to travel quite often, which is really great, but also tiring. We really need to be very organized and have a good sense of time and project management, to find the time to do all our lab experiments. But in my opinion, even though it feels really overwhelming sometimes, I think these experiences are helping us to grow and to be prepared for the future either in academia or in industry. We are definitely acquiring a lot of hard skills with our own projects, the workshops and summer schools, but a lot of soft skills as well, even without noticing it. I am grateful that I have been given the opportunity to become part of this project.

DISSEMINATION

All ESRs presented a poster or an oral presentation at the FEMS Congress:

V. Las Heras, K. Govindarajan, S. Joyce, P. Casey, R. Rubio, P. Cotter, C. Hill, C. Gahan, Impact of dietary fat content on host susceptibility to *Listeria monocytogenes* infection. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

M. Villoria Recio, M. Halberg Larsen, H. Ingmer, The expression of the chitinolytic system of *Listeria monocytogenes* is subject to different regulation depending on carbon source utilisation including cellobiose and glucose. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

A. Dorey, A. Oliveira, K. NicAogain, B. O'Donoghue, C. O'Byrne, The effects of growth conditions and secondary environmental stresses on the response of *Listeria monocytogenes* to visible light. Poster. FEMS Congress 9-13 July 2017, Valencia, Spain.

T. Santos, L. Théron, D. Centeno, C. Chambon, D. Viala, M. Hébraud, Development of a MALDI Imaging Mass spectrometry approach to bacterial proteomics: first application to *Listeria monocytogenes* biofilms exposed to desiccation. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

N. Crespo Tapia, H.M.W Den Besten, T. Abee, Glycerol metabolism includes biofilm formation at the air-liquid interphase in *Listeria monocytogenes*. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

P. Dos Santos, D. Sabharwal, P. Menendez-Gil, E.M. Sternkopf Lillebaek, B.H. Kallipolitis, A family of sRNAs plays a role in the response of *Listeria monocytogenes* to heme toxicity. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

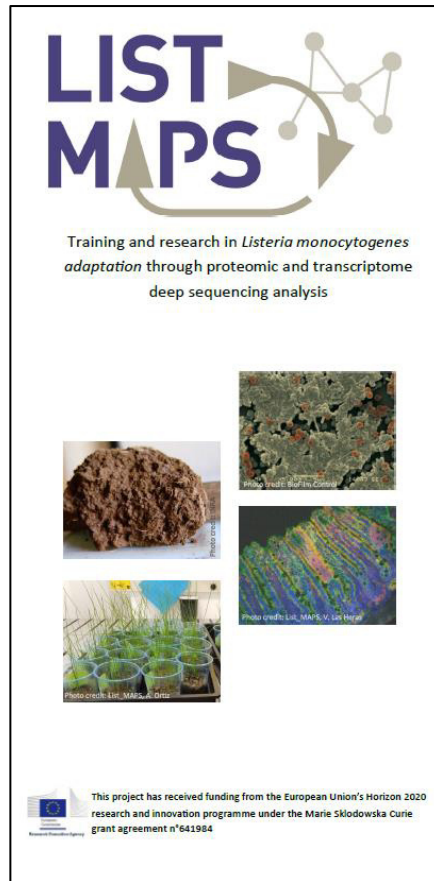
C. Marinho, D. Garmyn, L. Gal, C. O'Byrne, P. Piveteau, SigB and AgrA regulation in *Listeria monocytogenes*: effect on survival in soil/rhizosphere under biotic and abiotic conditions. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

I. Sultan, S. Schbath, V. Fromion, P. Nicolas, Improved Promoter Sequence Models for de novo Transcription Factor Binding Site Prediction in Bacteria. Oral presentation. FEMS Congress 9-13 July 2017. Valencia, Spain.

B. Lee, S. Cole, M. Hébraud, T. Bernardi, S. Badel-Berchoux, Biofilm formation of *Listeria monocytogenes* strains in food processing environments. Poster. FEMS Congress 9-13 July 2017. Valencia, Spain.

COMMUNICATION

Discover the leaflet and the bookmark of the project!



Click on the pictures to download

WHAT'S NEXT ?

EVENTS AND MEETINGS

29 September 2017: Researcher's Night

9-11 October 2017: workshop 2 in Copenhagen

11-12 October 2017: annual meeting in Copenhagen

SECONDMENTS

ESR3: Miguel (UCPH) to UCC

ESR5: Tiago (INRA MEDIS) to UCPH

ESR7: Patricia (SDU) to NUIG

ESR9: Ibrahim (INRA MaIAGE) to GenXPro

ESR10: Ignasi (GenXPro) to INRA MaIAGE

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List_MAPS Consortium

