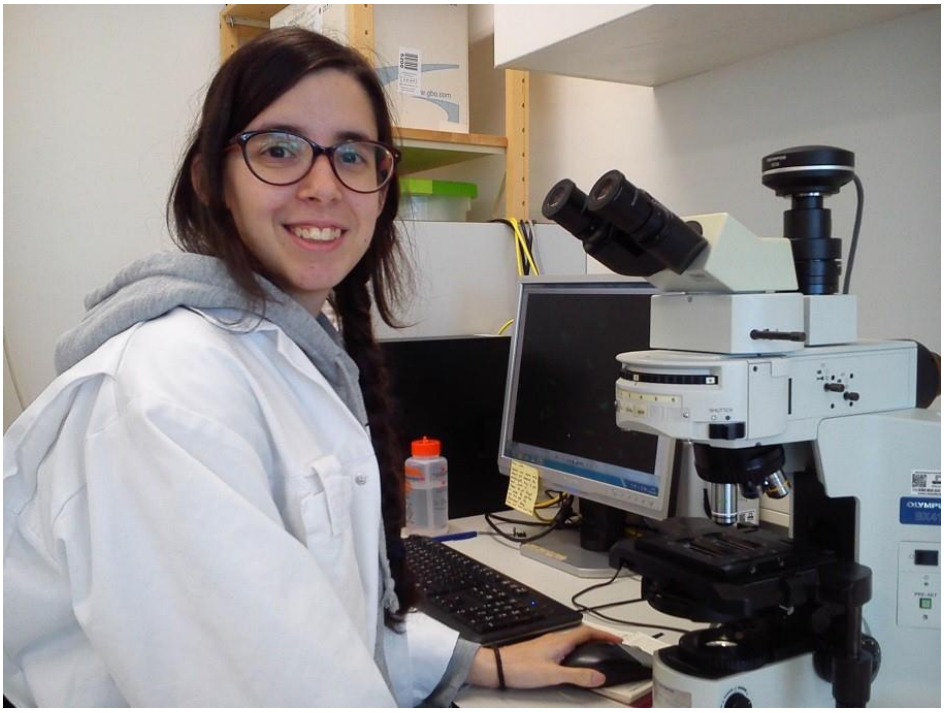
Mixed biofilms: how does *Listeria* react to the presence of other bacteria?



My name is Natalia Crespo. I am 24 years old, and I come from Spain. I did my undergraduate degree in Biological Sciences at the Universidad Complutense de Madrid, but I spent the last year working on my research project in Microbiology at the University of Calgary, in Canada. Last year I finished my MSc in Medical Microbiology at the London School of Hygiene & Tropical Medicine, and now I have just started my PhD at Wageningen University, in The Netherlands. The List_Maps network aims to understand how the bacterium *Listeria monocytogenes* responds to the many different environments that it encounters during its life cycle. My project will focus mainly on the survival of *L. monocytogenes* in the food industry: when food-processing materials get colonized by *L. monocytogenes* the raw food products pick up the bacteria as they pass through the food-processing line, which ends up in product contamination and people getting sick.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement n°641984

However, *L. monocytogenes* does not just randomly swim around food factories; it forms biofilms on the surface of food-processing equipment. Biofilms are sticky, mucoid structures that are produced by bacteria, and act as a thick glue that keeps the cells together and firmly attached to the surface. Biofilms behave like shields for bacteria: they protect the cells from disinfectant products and cleaning treatments, and are generally very hard to get rid of, which represents a great risk for food safety. Not all the bacterial cells behave the same way within the biofilm; they are organized, and they perform different functions. Moreover, biofilms in nature are not usually formed by just one species of bacteria. Biofilms are poly-microbial environments, and the presence of different species of bacteria –and even different strains of the same species-, and their interactions with each other, can play a role in the growth of the biofilm.

During my project I will study the effect of co-culturing different combinations of *L. monocytogenes* strains and secondary bacterial species in mixed biofilm ecology, using fluorescence microscopy to visualize the different cells in the biofilm. I will also try to identify the mechanisms that the cells use to communicate with each other within the biofilm, by isolating specific signaling molecules. Finally, I will use DNA and RNA-sequencing techniques to understand what makes a particular strain of *L. monocytogenes* a strong biofilm performer.

Main research objectives:

- ✓ Study the ecology and behavior of *L. monocytogenes* biofilms.
- ✓ Analyze cell-cell interactions within the biofilm, and look for strain/species competition.
- ✓ Identify genetic and/or transcriptomic biomarkers that characterize efficient biofilm performance in *L. monocytogenes.*

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