

Research Topic for the ParisTech/CSC PhD Program
(one page maximum)

***Field (cf. List of fields below):** Life and Health Science and Technology, Life Science and Engineering for Agriculture, Food and the Environment

Subfield: Life Science, OneHealth

ParisTech School: AgroParisTech

Title: Could tick symbionts interfere with tick-borne pathogen transmission?

Advisor(s): (name, email, website)

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Short description of possible research topics for a PhD:

Interactions between arthropods and their microbiota could interfere with vector-borne pathogen transmission. Recent studies have indeed shown that virus infection and transmission (e.g. Dengue and Chikungunya) in mosquitoes can be impeded by co-infection with the bacteria *Wolbachia*. In ticks, until recent years, few information was available regarding their microbiota and symbionts that could be implicated in tick-borne pathogen transmission. Recent works using high throughput sequencing approaches gave the opportunities to discover symbionts that could be implicated in the transmission of tick-borne pathogens. In our team, we successfully use the 16S rRNA gene sequencing to identify tick microbiota and their interaction with tick-borne pathogens. Different species of symbionts will be test *in vivo* for their possible implication in the transmission of tick-borne pathogens by *I. ricinus* with a specific interest in the transmission of *Borrelia* species (for Lyme group) and Tick-borne encephalitis virus as models. These data on *I. ricinus* pathogens and symbionts might be a first step towards developing successful control strategies by manipulating tick microbiomes and helping to control tick-borne diseases such as Lyme disease.

Required background of the student:

We expect a highly motivated student with experience in entomology (ticks mainly), microbiology and/or cell culture and/or molecular biology. Experience working with animal models and/or virus will be highly appreciated. Good command of English and/or French is crucial.

A list of 5 (max.) representative publications of the group: (Related to the research topic)

- Cabezas-Cruz et al. 2018. Handling the microbial complexity associated to ticks. Book Chapter IntechOpen Ticks and Tick-borne Pathogens Chapter. In press.
- Raileanu et al. 2017. *Borrelia* diversity and Co-infection with Other Tick Borne Pathogens in Ticks. Front. Cell. Infect. Microbiol. 7:36. doi: 10.3389/fcimb.2017.00036.
- Michelet et al. 2016. Tick species, tick-borne pathogens and symbionts in an insular environment off the coast of Western France. Ticks and Tick-Borne Diseases, 2016. Aug 29. pii: S1877-959X(16)30138-8. doi: 10.1016/j.ttbdis.2016.08.014.
- Moutailler et al. 2016. Co-infection of ticks: the rule rather than the exception. Plos Neglected Tropical Diseases. 2016 Mar 17;10(3):e0004539. doi: 10.1371/journal.pntd.0004539.
- Michelet et al 2014. High-throughput screening of tick-borne pathogens in europe. Frontiers in Cellular and Infection Microbiology, 4:103. doi: 10.3389/fcimb.2014.00103.