Curriculum Vitae

Tâm Mignot
Directeur de Recherches – 1st Class CNRS

CNRS Director of unit “Laboratoire de Chimie Bactérienne »

Born: 04/06/1975 | CNRS Recruitment Date: 01/01/2007 | ORCID: 0000-0003-4338-9063

Research Synopsis:

Tâm Mignot is a trained biologist. After completing higher education at the University of Nice Sophia Antipolis, he carried out a PhD at the Institut Pasteur in the Toxins and Bacterial Pathogenesis laboratory, where he studied the regulation of surface protein synthesis in the anthrax bacillus, Bacillus anthracis. After defending his thesis in June 2002, he joined David Zusman’s team at the University of Berkeley in California, where he worked on the mechanisms of bacterial motility in the model organism Myxococcus xanthus. He was recruited in 2006 as a research scientist at CNRS, where he established his own team. Tâm Mignot’s group studies how bacteria move on surfaces and direct their motion to adopt social behaviors, similar to schools of fish that can reorganize very rapidly depending on environmental conditions. Over the past twenty years, the team has used “single-cell” approaches to investigate the molecular mechanisms of motility and its regulation. The team has successfully integrated these mechanisms at the multicellular scale and modeled the emergence of social behaviors such as bacterial predation.

More recently, the team has turned its attention to the molecular mechanisms of predation, particularly by identifying how bacteria detect and kill their prey. This work has led to studies on the ecological role of these bacteria, which are found ubiquitously in soils. Tâm Mignot’s team is now focusing on developing approaches to reconstruct soil communities in the laboratory and to understand the importance of predator–prey interactions within these ecosystems. This research is therefore highly interdisciplinary and aims to connect reductionist laboratory studies—linking molecular mechanisms of predation to soil ecology—with potential applications in agriculture and in restoring depleted soils. This approach requires bridging scales from molecules to interactions within complex communities.

Tâm Mignot is a member of the European Academy of Microbiology and the recipient of several awards, including the Bettencourt Schueller Foundation’s “Coup d’élan pour la recherche française,” the CNRS Silver and Bronze Medals, the Louis Pasteur Medal, and the d’Aumale Prize of the French Academy of Sciences. Since 2020, his research has been funded by an ERC Advanced Grant.

Education

- 2011 – Habilitation à Diriger des Recherches (HDR), Aix-Marseille Université
- 2002 – PhD in Microbiology, Université Paris 7

Major Research Grants (as Principal Investigator)

- 2025–2028 – PEPR Maths Vives - MAMUTCELL
- 2021–2025 – European Research Council (ERC) Advanced Investigator
- 2015–2018 – ANR “BACTOCOMPASS”
- 2011–2015 – European Research Council (ERC) Starting Grant
- 2008–2011 – Human Frontier Science Program Young Investigator Grant
- 2007–2010 – ANR “Jeune Chercheur – Jeune Chercheuse”

Honors & Awards

- 2023 – Elected Member French Academy of Sciences (Molecular and Cellular Biology Section)
- 2023 – CNRS Silver Medal
- 2022 – Louis Pasteur Medal, Academy of Sciences
- 2018 – Member, Faculty of 1000
- 2018 – Elected Member, European Academy of Microbiology (EAM)
- 2017 – Prize “Major French Advances in Biology” (with Laura Faure)
- 2013 – d’Aumale Prize, Academy of Sciences
- 2011 – Bettencourt-Schueller “Coup d’élan pour la recherche française” Prize
- 2011 – CNRS Bronze Medal

Editorial Activities

- 2013 – Editor, FEMS Microbiology Reviews
- 2015–2022 – Editorial Board, Journal of Bacteriology
- 2016–2022 – Reviewing Editor, eLife

Conferences

Invited Lectures: Since 2008, more than 50 invitations to international conferences (ESF, ASM, Gordon, EMBO, FEMS etc).

Organization:

- 2024 – Bacterial Networks – EMBO Conference (Chair)
- 2022 – Bacterial Networks – EMBO Conference (Vice Chair)
- 2022 – EMBO Workshop on Adherent Microbial Communities (with N. Henry & A. Seminara)

- 2022 – Physics of Living Matter 15 – Centuri (Marseille-Cambridge)
- 2021 – Regulation and Signal Transduction in Prokaryotes (VAAM-CNRS, J. Lassak & I. Bischof)
- 2014 – 41st International Conference on Myxobacteria, France

Training & Mentorship

Supervised 12 PhD theses (10 defended). One integration into Academia: Guzzo (CNRS Lyon).

Supervised 12 postdoctoral fellows – 3 recruited into Academia: Dinet (AMU, Marseille), S. Islam (Institut Armand Frappier, Canada), A. Ducret (CNRS Lyon).

CNRS Recruitments:

- Researchers: E. Mauriello (2010), R. Mercier (2014), Julien Herrou (2018)
- Engineers: L. My (2014)

Technology Transfer

Co-inventor of Chitozen (https://www.idylle-labs.com/shop/chitozen-203#attr=117,599,606)

A coating procedure to immobilize bacterial cells on glass coverslips and image them directly at the single cell level. This system is patented and commercialized by Idylle Laboratories.

2018 – Patent: “A film of chitosan and a device comprising the same deposited on a substrate and uses thereof”. Priority European patent application: EP18305666.2. 2020 – License granted to Idylle for production.

Leadership & Expert Committees

Director of the Laboratoire de Chimie Bactérienne since 2018. This CNRS-Aix Marseille research unit regroups 15 research groups, one technological platform and administrative services.

More information on the unit: https://lcb.cnrs.fr/

- 2025 – Expert, SNSF (Swiss National Science Foundation)
- 2025 – SAB Member, MMSB Unit (Christophe Greangeasse)
- 2021 – Recruitment Committee, EMBL (Germany)
- 2021 – Recruitment Committee, Université de Namur (Belgium)
- 2021 – SAB Member, CIRB (Collège de France)
- 2020 – Expert, FRS-FNRS (Fond National de la recherche, Belgium)

Science Communication

- 2019 – “A bacterium with a fascinating molecular motor”, La Recherche n°551
- 2020 – “The fascinating gliding motility of Myxococcus xanthus, essential to its social behavior”, Médecine/Sciences

Science Outreach Activities

- 2020 – Web series: “Spread Science, not the Virus”, supported by CNRS (24 episodes on COVID-19, relayed by Brut and other media)
- 2020 – Blogger, Huffington Post
- 2021 – Jury Member, Symbiose Prize, Pariscience International Science Film Festival
- 2022 – CNRS Think Tank (ChpLab) on the future of science outreach
- 2022 – Speaker, Office français de l’intégrité scientifique Symposium (June 2022)
- 2022 – Jury Member, Paris semifinals of “My Thesis in 180 Seconds” competition
- 2023 – Musée de la Microbiologie, Arbois (with the Academy of Sciences & CNRS)

Outreach to Schools

- 2021 – “Letter to Jade”, educational video explaining COVID-19 vaccination to high school students
- 2022 – Year of Biology: “Mysteries of Soil Microbiology”
- 2025 – Launch of BIONEXTGEN, an environmental microbiology research project led by high school students. This 18-month project will engage students in hands-on research exploring soil microbiology within an ecological framework. Participants will not only conduct experiments and collect samples but will also formulate the scientific questions to be addressed and write a research article for publication.This unique initiative will be supported by research teams in microbiology and mathematics, and closely monitored by researchers in educational sciences.

Publications

79 publications including:

- 61 peer-reviewed research articles
- 15 peer-reviewed reviews
- 3 preprints under revision

Selection of important articles in the last 10 years in chronological order:
The choice is meant to illustrate research topics and their recent evolution in the team.

1. Faure LM, Fiche JB, Espinosa L, Ducret A, Anantharaman V, Luciano J, Lhospice S, Islam ST, Tréguier J, Sotes M, Kuru E, Van Nieuwenhze MS, Brun YV, Théodoly O, Aravind L, Nollmann M, Mignot T. The

mechanism of force transmission at bacterial focal adhesion complexes. Nature. 2016 Nov 24;539(7630):530-535. doi: 10.1038/nature20121. Epub 2016 Oct 5. PMID: 27749817; PMCID: PMC5465867.
This article demonstrates that bacterial motility complexes traffic helically and propel cells in a screw-like rotational motion when they become tethered to the substratum, thus forming focal adhesions.

2. Guzzo M, Murray SM, Martineau E, Lhospice S, Baronian G, My L, Zhang Y, Espinosa L, Vincentelli R, Bratton BP, Shaevitz JW, Molle V, Howard M, Mignot T. A gated relaxation oscillator mediated by FrzX controls morphogenetic movements in Myxococcus xanthus. Nat Microbiol. 2018 Aug;3(8):948-959. doi: 10.1038/s41564-018-0203-x. Epub 2018 Jul 16. PMID: 30013238.
This article demonstrates that directional motility is regulated by a signal transduction system that inverts the cell polarity and functions in two modes, as an excitable system when the signal is low and as an oscillatory system when the signal is high. The work identifies the molecular basis of these behaviors.

3. Panigrahi S, Murat D, Le Gall A, Martineau E, Goldlust K, Fiche JB, Rombouts S, Nöllmann M, Espinosa L, Mignot T. Misic, a general deep learning-based method for the high-throughput cell segmentation of complex bacterial communities. Elife. 2021 Sep 9;10:e65151. doi: 10.7554/eLife.65151. PMID: 34498586; PMCID: PMC8478410.
Here we developed the first deep learning method to segment bacterial cells in communities of thousands of cells with high accuracy. This algorithm was key to develop methods to study how single cell motility contributes to multicellular patterns.

4. Herrou J, My L, Monteil CL, Bergot M, Jain R, Martinez E, Mignot T. Tad pili with adaptable tips mediate contact-dependent killing during bacterial predation. Nat Commun. 2025 May 13;16(1):4425. doi: 10.1038/s41467-025-58967-0. PMID: 40360469; PMCID: PMC12075869.
Here we show that predatory bacteria kill their prey cells using a novel type of pilus that becomes assembled upon contact with the prey and uses an arsenal of different tips adjusted to penetrate distinct prey types.

5. Jain R, Le NH, Bertaux L, Baudry J, Bibette J, Denis Y, Habermann BH, Mignot T. Fatty acid metabolism and the oxidative stress response support bacterial predation. Proc Natl Acad Sci U S A. 2025 Feb 4;122(5):e2420875122. doi: 10.1073/pnas.2420875122. Epub 2025 Jan 27. PMID: 39869799; PMCID: PMC11804543.
Here, using an evolutionary approach, we explore the metabolism underlying bacterial predation and show that predatory bacteria not only exploit lipids derived from their prey but also experience a significant oxidative burst as a consequence of this metabolic strategy.

6. Saulnier JB, Romanos M, Schrohe J, Cuzin C, Calvez V, Mignot T. The mechanism of spatial pattern transition in motile bacterial collectives. bioRxiv 2024.10.28.620572
doi: https://doi.org/10.1101/2024.10.28.620572.
Here we demonstrate that the single cell rules determined in article 2 are sufficient to explain very large-scale multicellular transitions during predation.