

Florence BANSEPT

ECOLOGY & EVOLUTION OF HOST-ASSOCIATED MICROBIOTA

Laboratoire de Chimie Bactérienne
UMR 7283 – Aix-Marseille Université – CNRS
31 Chemin Joseph Aiguier
13402 Marseille Cedex 20 - France

Place and date of birth: Mulhouse (France), 18/03/1993

☎ +33 (0)4 91 16 40 80 | ✉ florence.bansept@imm.cnrs.fr | 🏠 flobansept.github.io/ | 🐦 @FlorenceBansept

ACADEMIC PATH

- 2023 - ... | **GROUP LEADER** – *Laboratoire de Chimie Bactérienne & Aix-Marseille University, France*
Fellow of the Turing Center for Living Systems (CENTURI)
Permanent Visitor at the Center for Theoretical Physics (CPT, AMU)
Max Planck Partner Group of the Max Planck Institute for Evolutionary Biology (Plön, Germany)
- 2019 - 2022 | **POSTDOC** - *Max Planck Institute for Evolutionary Biology, Plön, Germany*
Advisor: Arne TRAUlsen - Department of Evolutionary Theory
Project: *Modeling of microbial communities*
- 2015 - 2018 | **PHD THESIS** - *Laboratoire Jean Perrin, Sorbonne Université, Paris, France*
Supervisors: Raphaël VOITURIEZ & Claude LOVERDO
Dissertation title: “*Biophysical modeling of bacterial population dynamics & the immune response in the gut*”
Defense date: 05-12-2018
Funding: 3 years full fellowship (EDPIF) & teaching assistantship (UPMC)
Jury: Aleksandra WALCZAK, DR, *LPTENS Paris* – president
Bahram HOUCHEMANDZADEH, DR, *LIPHY Grenoble* – reporter
Agnese SEMINARA, CR, *LPMC Nice* – reporter
Silvia DE MONTE, CR, *IBENS Paris* – examiner
Andrea PARMEGGIANI, PR, *L2C Montpellier* – examiner
Raphaël VOITURIEZ, DR, *LJP Paris* – supervisor
Claude LOVERDO, CR, *LJP Paris* – invited member
Emma WETTER-SLACK, Ass. Prof., *ETH Zurich* – invited member
- 2012 - 2015 | **ENS DIPLOMA** - *École Normale Supérieure, Paris, France*
Major Physics - minor Musicology
- 2013 - 2015 | **MASTER “Macroscopic physics and Complexity”** - with honors
École Normale Supérieure, International Center for Fundamental Physics, Paris, France
2nd year research internship (6 months) - *Laboratoire Jean Perrin, UPMC, Paris, France*
Supervisor: Claude LOVERDO
Project: *Colonization dynamics of Salmonella Typhimurium in mice*
1st year research internship (5 months) - *Institut de Physique, UFRGS, Porto Alegre, Brazil*
Supervisor: Jeferson ARENZON
Project: *Bootstrap percolation: Fast algorithm and applications*
- 2012 - 2013 | **BACHELOR in Fundamental Physics** – *École Normale Supérieure, Paris, France*
Experimental internship (1 month) – *EC2M, Gulliver, ESPCI, Paris, France*
Supervisor: Olivier DAUCHOT
Project: *Vibrated self-propelled particles under flexible confinement*
- 2010 - 2012 | **CLASSES PRÉPARATOIRES aux Grandes Écoles** – *Lycée Kléber, Strasbourg, France*
Intensive undergraduate training in mathematics and physics to join top engineering schools
- 2010 | **BACCALAURÉAT Série S** - with first class honors – *Lycée Lambert, Mulhouse, France*
A-Levels in mathematics and physics

SCIENTIFIC OUTPUT

Peer reviewed publications in international scientific journals <i>Nature, PLOS Comp Bio, Evolution, Trends in Microbio, ISME-J, BMC EcoEvo, eLife</i>	8
Preprints and manuscripts in preparation	5
Oral presentation at an international conference <i>Circle Meeting, IUPAB & EBSA, BIFI, MMEE, PLM, SFE2...</i>	15
Poster presentation at an international conference <i>StatPhys, PhysBio, AMR 2017, AMR 2018</i> – including 2 abroad	5
Seminars – including 10 invited seminars	15
Presentation at a local conference	12
Summer schools and thematic schools	3

GRANTS, AWARDS & PRIZES

- 2024 - 2029 **Max Planck Partner Group** – Collaborating grant of the MPG – 100 000 €
- 2023 - 2028 **CENTURI fellowship** – Group starting package – 150 000 € + 3 PhD/postdoc positions
- 2019 **CRC 1182 Lynn Margulis Prize** – Funding for a one-month research stay – 5000 €
- 2015 - 2018 **Three-year teaching assistantship** – selected by Université Pierre et Marie Curie, Paris
- 2015 - 2018 **Three-year full PhD fellowship** – selected by École Doctorale Physique en Île-de- France
- 2014 **Alsace and Lorraine General Association (AGAL) scholarship** - 1000€

RESEARCH INTERESTS

My research interests revolve around the modeling of microbial communities, in particular those that live in associations with hosts, in ecosystems named microbiomes I am particularly interested in importing classical models of ecology and evolution to the field of microbiome studies, by including some constraints that are specific to living in symbiosis with a host. For example, I aim at characterizing the selection gradient that results from the intertwining of the microbes and their host life cycles, taking into account traits like the host finite lifespan, migration of microbes from the environment and between hosts, possible interactions with the immune system, or microbial inheritance. I am also interested in identifying the mechanisms that favor the maintenance of the microbial community diversity and function.

Keywords: mathematical modeling; microbiota; microbial communities; population dynamics; stochastic processes; ecology; evolution; selection gradient; life cycles; immunity; feeding behavior; metabolism

TEACHING

- 2021 **Teaching assistantship for master students** - *CAU zu Kiel, Germany*
Tutorials and evaluations - Evolutionary game theory for biologists
- 2019 **Teaching assistantship for master students** - *Universität zu Lübeck, Germany*
Tutorials and evaluations - Evolutionary dynamics: Game theory
- 2015 - 2018 **Teaching assistantship for undergraduates** (192 h) - *UPMC, Paris, France*
Tutorials and oral interrogations in basic mechanics and thermodynamics
Practicals in electrokinetics and electromagnetism
- 2014 - 2015 **Physics lessons** - *Institut Bossuet, Paris, France*
Monthly oral examinations in “classes préparatoires” (undergraduate level)

MENTORING

- 2024 - 2027 **Co-supervision (20%) of Matthew Jones' PhD** - *LCB & Aix-Marseille University, France*
Co-supervisor: Maxence VINCENT - Salmonella HOC1 stress response & resulting population dynamics
- 2024 - 2027 **Thesis committee (tutor) of João Valeriano Miranda** - *Aix-Marseille University, France*
Supervisor: Pierre RONCERAY - Learning hidden structures in the stochastic dynamics of living systems
- 2024 - 2027 **Thesis committee (tutor) of Marie-Jose Chaaya** - *Aix-Marseille University, France*
Supervisor: Florence HUBERT - Mathematical modeling of cancer/nervous system interactions
- 2024 - 2026 **Advising of Vitor Marquioni-Monteiro** - *Aix-Marseille University, France*
Postdoc (2 years) - Modeling microbial dynamics resulting from intermittent feeding
- 2024 **Supervision of Dorothée Bertin** - *Aix-Marseille University, France*
M1 internship (3 months) - Biphasic life cycles with mutations
- 2024 - 2026 **Advising of Florian Labourel** - *Aix-Marseille University, France*
Postdoc (2 years) - Metabolism and multi-stable equilibria
- 2024 **Supervision of Miguel Pedraza** - *Aix-Marseille University, France*
M2 internship (3 months) - tRNA genes evolution
- 2023 **Supervision of Jocksan Villaviciencio-Villavicencio** - *Aix-Marseille University, France*
M1 internship (5 months) - Modeling microbial dynamics resulting from intermittent feeding
- 2022 **Supervision of Ann-Cathrin Hofacker** - *Christian-Albrechts-Universität zu Kiel, Germany*
M1 (6 weeks) & Student helper contract (160h) financed by the program via:mento
Bibliographic project and simulations investigating the link between gut microbiota and feeding
- 2020- 2021 **Supervision of Carla Gensana Claus** - *Christian-Albrechts-Universität zu Kiel, Germany*
Undergraduate internship, 2 months (2020) and Bachelor thesis (2021)
Epidemiological modeling around the COVID-19 pandemic in Spain
- 2020 **Co-supervision of Andonis Gerardos** - *Sorbonne Université, Paris, France*
Master internship, 4 months, co-advised with Claude Loverdo
Development of inferring methods applied to the modeling of bacterial infections

ACADEMIC SERVICES

- SINCE 2024 **Equal Opportunity Officer & Communication Team**
Laboratoire de Chimie Bactérienne, *Marseille, France*
- SEPTEMBER 2024 **Co-organizer of the international conference Physics of Living Matter 18**
Palais du Pharo, *Marseille, France*
- SEPTEMBER 2022 **Co-organizer of the workshop Mathematical Modelling of Microbiomes**
Max Planck Institute for Evolutionary Biology, *Plön, Germany*
- JULY 2022 **Co-organizer of a minisymposium within the MMEE conference**
"Cancer vs microbial community modeling: divides and bridges", *Reading, UK*
- 2020 **Outreach project on the Corona crisis** - with the MPI Plön theory department
Collaborative creation of an educational website for the general public: writing and translation of scientific articles about the pandemic, creation of simulation activities for highschool students.
One of them has been funded by the Robert Bosch Stiftung and produced as a real board game & distributed in over 10 000 copies over more than 5 countries
- SINCE 2019 **Reviewer for Nature Com., Com. Bio, PCI Ecology, ISF grants,...**
- 2019 - 2022 **Member of the local Max Planck Sustainability Network**
Organizer of a Climate Emergency Journal Club and of related seminars
- NOV 10, 2017 **Principal organizer of the Paris Biological Physics Community Day 2017**
A conference bringing into contact young scientists from the Paris region with invited external speakers
- OCT 21, 2016 **Co-organizer of the Paris Biological Physics Community Day 2016**

PEER-REVIEWED PUBLICATIONS

1. N. Obeng, A. Czerwinski, D. Schütz, J. Michels, J. Leipert, [F. Bansept](#), M. J. García García, T. Schultheiß, M. Kemlein, J. Fuß, A. Tholey, A. Traulsen, H. Sondermann & H. Schulenburg, Bacterial c-di-GMP has a key role in establishing host–microbe symbiosis, [Nature Microbiology](#), 2023
2. D. Hoces, G. Greter, M. Arnoldini, M.L. Stäubli, C. Moresi, A. Sintsova, S. Berent, I. Kolinko, [F. Bansept](#), A. Woller, J. Häfliger, E. Martens, W-D. Hardt, S. Sunagawa, C. Loverdo, E. Slack, Fitness advantage of *Bacteroides thetaiotaomicron* capsular polysaccharide in the mouse gut depends on the resident microbiota, [eLife](#) 12:e81212, 2023
3. R. Zapién-Campos, [F. Bansept](#), M. Sieber, and A. Traulsen, On the effect of inheritance of microbes in commensal microbiomes, [BMC Ecol Evo](#) 22, 75, 2022
4. [F. Bansept](#), N. Obeng, H. Schulenburg, and A. Traulsen, Modeling host-associating microbes under selection, [The ISME Journal](#), 2021
5. N. Obeng, [F. Bansept](#), M. Sieber, A. Traulsen, H. Schulenburg, Evolution of microbiota-host associations: the microbe’s perspective, [Trends in Microbiology](#), 2021
6. [F. Bansept](#), L. Marrec, A-F. Bitbol and C. Loverdo, Antibody-mediated cross-linking of gut bacteria hinders the spread of antibiotic resistance, [Evolution](#) 73-6: 1077–1088, 2019 ([arXiv:1903.05723v1](#))
7. [F. Bansept](#), K. Moor, M. Diard, W-D Hardt, E. Slack and C. Loverdo, Enchained growth and cluster dislocation: a possible mechanism for microbiota homeostasis, [PLoS Comput Biol](#) 15(5):e1006986, 2019
8. K. Moor, M. Diard, M. E. Sellin, B. Felmy, S. Y. Wotzka, A. Toska, E. Bakkeren, M. Arnoldini, [F. Bansept](#), A. Dal Co, T. Völler, A. Minola, B. Fernandez-Rodriguez, G. Agatic, S. Barbieri, L. Piccoli, C. Casiraghi, D. Corti, A. Lanzavecchia, R. R. Regoes, C. Loverdo, R. Stocker, D. R. Brumley, WD Hardt, E. Slack, High-avidity IgA protects the intestine by enchainning growing bacteria, [Nature](#), 544(7651):498-502, 2017

PREPRINTS AND SUBMITTED MANUSCRIPTS

- A. Galeev, [F. Bansept](#), N. Benny, V. Chaves Vargas, A. Habich, A. Traulsen, D. Unterweger, Type VI secretion systems of *Pseudomonas aeruginosa* modulate infection dynamics and immune responses in *Galleria mellonella* larvae, *in revision*
- R. Zapién-Campos, [F. Bansept](#), A. Traulsen, Inferring interactions from microbiome data, *in revision* ([preprint on bioRxiv](#))

MANUSCRIPTS IN PREPARATION

- [F. Bansept](#), D. Bertin, C. Carrère, Evolution of microbial biphasic life cycles, *in preparation*
- Y. W. Ngan, [F. Bansept](#), M. Pedraza, A. Traulsen, J. Gallie, The effect of plastic mutations on evolutionary trajectories, *in preparation*
- V. Marquioni Monteiro, J. Villavicencio Villavicencio, A-C. Hofacker, [F. Bansept](#), How does intermittent feeding shape the gut microbiome?, *in preparation*

CONFERENCES & WORKSHOPS

- OCTOBER 21-25, 2024 **Congress of the French Society for Eco & Evo** - *Lyon, France* - invited talk
- SEPTEMBER 16-17, 2024 **Physics of Living Matter** - *Marseille, France* - invited talk
- JULY 9-12, 2024 **Workshop “Math mod of microbial communities”** - *Leeds, UK* - invited talk
- JUNE 17-19, 2024 **Workshop “Developments in evolutionary Theory”** - *Plön, Germany* - poster
- MAY 20-24, 2024 **Conference “Stochastic Processes in Evol Bio”** - *CIRM, France* - talk
- JANUARY 9, 2024 **μ Net day** - *Marseille, France* - talk
- OCTOBER 4-6, 2023 **Horizons in Metaorganism Research** - *Kiel, Germany* - talk
- MAY 11, 2023 **CENTURI day** - *Marseille, France* - talk
- APRIL 17-21, 2023 **BEvAS workshop** - *Bernouilli center, EPFL, Switzerland* - invited talk
- OCTOBER 24-26, 2022 **CRC 1182 Retreat** - *Schleswig, Germany* - poster
- SEPTEMBER 5-7, 2022 **Workshop “Phys & chem det. of bio. evo.”** - *Plön, Germany* - invited talk
- JULY 18-20, 2022 **Mathematical Models in Ecology and Evolution** - *Reading, UK* - talk
- MARCH 21-25, 2022 **Workshop “Math. mod. in eco-evo”** - *Paris, France* - invited talk
- MARCH 10-12, 2022 **Workshop “Role of microbiomes”** - *Luzern, Switzerland* - invited talk
- NOVEMBER 8-9, 2021 **Workshop Mathématiques & Microbiote** - *Besançon, France* - invited talk
- NOVEMBER 4-5, 2021 **CRC 1182 Retreat** - *Timmendorfer Strand, Germany* - talk
- JUNE 17-18, 2021 **Aquavit - Internal symposium** - online edition - *MPI Plön, Germany* - poster
- MAY 31 - JUNE 12, 2021 **Summer School: Stat Mech & Emergent Phenomena** - *Beg Rohu, France* - poster
- OCTOBER 26, 2020 **CRC1182 Retreat** - *Online* - short talk
- JUNE 19 - 23, 2020 [Cancelled] **Evolution 2020 (ASN, SSE, SSB)** - *Cleveland, Ohio, USA* - talk
- JUNE 11, 2020 **Aquavit - Internal symposium** - online edition - *MPI Plön, Germany* - talk
- AUGUST 8 - 9, 2019 **Young Investigator Research Day of CRC 1182** - *Kiel, Germany* - poster
- JULY 16 - 19, 2019 **Mathematical Models in Ecology and Evolution** - *Lyon, France* - talk
- NOVEMBER 23, 2018 **Rencontre des Jeunes Physiciens** - *Paris, France* - talk
- MARCH 19 - 21, 2018 **AMR 2018** - *Institut Pasteur, Paris, France* - poster
- FEBRUARY 6 - 8, 2018 **BIFI: Complexity, networks & coll. behaviour** - *Zaragoza, Spain* - short talk
- JULY 24 - AUGUST 5, 2017 **Summer School: Out-of-Eq Dyn, Evo & Gen** - *Beg Rohu, France* - poster
- JULY 20 - 21, 2017 **AMR 2017** - *Edinburgh, UK* - poster
- JULY 16 - 20, 2017 **IUPAB & EBSA congress** - *Edinburgh, UK* - talk
- JUNE 19, 2017 **Journée des Doctorants 2017 - EDPIF** - *Paris, France* - poster
- MARCH 8 - 10, 2017 **Physical Biology Circle Meeting** - *Heidelberg, Germany* - talk
- NOVEMBER 3 - 9, 2016 **Course “Multiscale integration in Bio Sys”** - *Institut Curie, Paris, France* - talk
- OCTOBER 24 - 26, 2016 **Physics and Biological Systems 2016** - *École Polytechnique, France* - poster
- JULY 18 - 22, 2016 **Statphys26** - *Lyon, France* - poster
- JANUARY 28 - 29, 2016 **Days of statistical physics** - *Paris, France* - short talk
- NOVEMBER 10, 2015 **Rencontre des Jeunes Physiciens** - *Paris, France* - poster

SEMINARS

- OCTOBER 1, 2024 **Invited seminar at the Institute of Ecology and Evolution** - *Bern, Switzerland*
- SEPTEMBER 26, 2024 **Invited seminar at Computational Biology Dept., Pasteur** - *Paris, France*
- FEBRUARY 26, 2024 **Invited seminar at MABioS (I2M) & SB (MMG)** - *Marseille, France*
- JUNE 29, 2023 **Internal seminar at LCB** - *Marseille, France*
- JUNE 19, 2023 **Internal seminar at CENTURI** - *Marseille, France*
- APRIL 26-28, 2023 **Invited seminar at Inria/INRAE, Pléiade team** - *Bordeaux, France*
- APRIL 4, 2023 **Invited seminar (Samma) at Institut Pasteur** - *Paris, France*
- JULY 8, 2022 **Invited seminar at the Leibniz Institute on Aging** - *Jena, Germany*
- JUNE 2, 2022 **Invited seminar at the Turing Center for living systems** - *Marseille, France*
- NOVEMBER 18, 2021 **Invited seminar at the LBBE lab** - *Lyon, France*
- NOVEMBER 17, 2021 **Invited seminar at the Ecobio lab** - *Rennes, France*
- SEPTEMBER 29, 2020 **CRC1182 - Metaorganism Seminar** - *Online* - talk
- APRIL 25, 2018 **Invited seminar at the MPI for Evolutionary Biology** - *Plön, Germany*
- MAY 24, 2016 **LJP internal seminar** - *Paris, France* - talk
- JUNE 17, 2015 **Institute for integrative biology seminar** - *ETH Zürich, Switzerland* - short talk

LANGUAGES

FRENCH	Native
ENGLISH	Fluent
PORTUGUESE	Good understanding and expression
GERMAN	Good understanding, basic conversation

COMPUTER SKILLS

OPERATING SYSTEMS	proficient user of Mac OS X, working knowledge of Linux and Windows
PROGRAMMING	proficient user of R, working knowledge of Python and C
SCIENTIFIC SOFTWARE	proficient user of Mathematica, working knowledge of Maple, Vision Assistant, Image J, Labview, git
TYPESETTING	proficient user of L ^A T _E X and Pack Office

FURTHER QUALIFICATIONS & CAREER DEVELOPMENT

- 2020 - 2022 **Mentee at Mentoring program [via:mento](#)** - *Selected by Kiel University, Germany*
- 2020 - 2022 **Coaching on Professional Positioning by [Ute Jülly](#)**
- 2019 - 2026 **Qualified for assistant professorship applications in France** (Sections 28, 29, 30, 67)
- 2018 **Musical Studies Diploma (DEM)** - Major piano - *Conservatoire of Cachan, France*
- 2017 **Basic first aid skills certificate (PSC1)**
- 2011 **Driving Licence (Permis B)**
- 2010 **Musical Studies Certificate (CEM)** - Major piano - *Conservatoire of Mulhouse, France*