

Florence BANSEPT

ECOLOGY & EVOLUTION OF HOST-ASSOCIATED MICROBIOTA

Laboratoire de Chimie Bactérienne
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ACADEMIC PATH

- 2023 - ... | **GROUP LEADER** – *Laboratoire de Chimie Bactérienne & Aix-Marseille University, France*
Fellow of the Turing Center for Living Systems (CENTURI)
- 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 HOUCMANDZADEH, 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

RESEARCH INTERESTS

My research interests revolve around the modeling of microbial communities, in particular those that live in associations with hosts, in ecosystems named microbiotas. 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

- 2023 **Supervision of Jocksan Villaviciencio-Villavencio** - *Aix-Marseille University, France*
Master internship (6 weeks) - Modeling microbial dynamics resulting from intermittent feeding
- 2022 **Supervision of Ann-Cathrin Hofacker** - *Christian-Albrechts-Universität zu Kiel, Germany*
Master internship (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 **Advising 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-advising 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

SCIENTIFIC OUTPUT

Peer reviewed publications in international scientific journals	8
<i>Nature, PLOS Comp Bio, Evolution, Trends in Microbio, ISME-J, BMC EcoEvo, eLife</i>	
Preprints and manuscripts in preparation	4
Oral presentation at an international conference	9
<i>Circle Meeting, IUPAB & EBSA, BIFI, MMEE,...</i>	
Poster presentation at an international conference	4
<i>StatPhys, PhysBio, AMR 2017, AMR 2018</i> – including 1 abroad	
Seminars – including 6 invited seminars	10
Presentation at a local conference	11
Summer schools and thematic schools	3

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, *submitted (preprint on bioRxiv)*

MANUSCRIPTS IN PREPARATION

- F. Bansept, C. Carrère, Evolution of microbial biphasic life cycles, *in preparation*
- Y. W. Ngan, F. Bansept, A. Traulsen, J. Gallie, The effect of plastic mutations on evolutionary trajectories, *in preparation*

CONFERENCES & WORKSHOPS

- OCTOBER 4-6, 2023 **Horizons in Metaorganism Research** - Kiel, Germany - 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 "Physical and chemical determinants of biological evolution"**
Plön, Germany - invited talk
JULY 18-20, 2022 **Mathematical models in ecology and evolution** - Reading, UK - talk
MARCH 21-25, 2022 **Workshop "Mathematical models in ecology and evolution"**
Paris, France - invited talk
MARCH 10-12, 2022 **Workshop "The role of microbiomes in organismal responses
to environmental change"** - 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 **Beg Rohu Summer School: Statistical Mechanics & Emergent
Phenomena in Biology** - Quiberon, 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: Challenges and new concepts in antibiotics research**
Institut Pasteur, Paris, France - poster
FEBRUARY 6 - 8, 2018 **BIFI international conference: Complexity, networks and collective
behaviour** - Zaragoza, Spain - short talk
JULY 24 - AUGUST 5, 2017 **Beg Rohu Summer School: Out of Equilibrium Dynamics, Evolution
and Genetics** - Quiberon, France - poster
JULY 20 - 21, 2017 **AMR 2017: Quantitative approaches to antimicrobial resistance**
Edinburgh, UK - poster
JULY 16 - 20, 2017 **IUPAB & EBSA congress - British Biophysical society**
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 **2nd course on Multiscale integration in Biological Systems**
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

- 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

GRANTS, AWARDS & PRIZES

- 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€

ACADEMIC SERVICES

- 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 Communications Biology, Peer Community in 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](#)**

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 \LaTeX 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*