

Curriculum vitae – Marie VASSE

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Research interests: Evolutionary ecology of collectives

I investigate the assembly, functioning and evolution of collectives, with a focus on microbial communities. Using a combination of experimental, computational, and theoretical approaches, I study the feedbacks between ecological interactions, evolutionary trajectories, and community properties.

Keywords: coevolution, community ecology, social evolution, microbiology, bacteriophages

Current situation

2021 – 2023 **Marie Skłodowska-Curie Fellow.** MIVEGEC – CNRS, France
MINERVA: *Role of Metabolic Interactions in the Eco-evolutionary dynamics of bacterial communities in the Vagina*
Funding: Marie Skłodowska-Curie Independent Fellowship

Previous professional experience

November 2021 **Scientific advisor** for project design and grant writing. For GJ. Velicer, ETH Zürich, Switzerland

2019 – 2021 **ETH Research fellow.** Evolutionary Biology group, ETH Zürich, Switzerland
Ecology and evolution of bacterial communities and bacteriophages
Funding: ETH Career Seed Grant (independent grant for early-career researchers)

2016 – 2019 **Marie Skłodowska-Curie – ETH Research fellow.** Evolutionary Biology group, ETH Zürich, Switzerland
Bacterial predator-prey coevolutionary dynamics
Funding: Marie Skłodowska-Curie – ETH CONFUND Fellowship

Education

- 2012 – 2015 **PhD student.** Evolutionary Ecology group, Institut des Sciences de l'Évolution – Univ. of Montpellier, France. Advisor: M.E. Hochberg
Evolutionary ecology of social bacterial populations under antibiotic and bacteriophage pressure
Funding: Doctoral grant from the French Research Ministry
- Mar – Sep 2012 **MSc student.** Centre d'Ecologie Fonctionnelle et Evolutive, France.
Advisors: M.A. Selosse, D. McKey and R. Blatrix
Multilocus phylogeny of fungi involved in ant-plant symbioses
- 2008 – 2012 **Ingénieure agronome** in Ecology and Evolution. Agrocampus Ouest,
Rennes, ranked 1st of year group in 2012
- Research project #4 (Nov 2011 – Jan 2012) Agrocampus Ouest, France. Advisor: M. Plantegenest
Interplay of parasitic pressure and bacterial symbionts on aphid offspring phenotypes
- Research project #3 (Mar – Aug 2011) Laval University, Canada. Advisor: R.R. Bélanger
*Functional genomics of the fungus *Pseudozyma flocculosa**
Funding: Grant from Laval University and scholarship from the Brittany region
- Research project #2 (Oct 2010 – Feb 2011) AgResearch Ruakura Research Centre, New Zealand.
Advisor: P.J. Gerard
*Behavioural interactions between two *Microctonus parasitoid* wasps*
- Research project #1 (Jan – Feb 2010) James Hutton Institute, Scotland. Advisor: S.N. Johnson
*Predatory functional response of *Coccinella septempunctata* to *Amphorophora idaei**
Funding: Grant from Agrocampus Ouest

Projects as principal investigator

2021 – 2023 Ecology and evolution of the vaginal microbiome

For this project, I obtained individual fellowships from the **French Medical Research Foundation** (declined) and from **Marie Skłodowska-Curie Actions**. I am in charge of leading the research, supervising students (a Master 2 student until January 2022 and a Master 1 student starting in April 2022), and managing the budget.

2019 – 2021 Ecology and evolution of bacterial communities and bacteriophages

This project was funded by an early career grant to foster independent research for postdoctoral researchers (**ETH Career Seed Grant**). I developed the project and built my own team with two research assistants (for 8 and 17 months respectively) and a (voluntary) Bachelor student.

2016 – 2019 Bacterial predator-prey coevolutionary dynamics

I joined the Evolutionary Biology group at ETH Zürich with an **individual Marie Skłodowska-Curie - ETH CONFUND Fellowship**. I brought my own project and (co)supervised several student projects (three MSc and two Bachelor students). The fellowship further covered all my training and travel costs as well as a part of my experiments.

Engagements in the scientific community

Conference organization

2019 Co-organizer of symposium “Bacterial evolution under biotic stress” at ESEB 2019, Finland

2018 – 2021 Organizer of the biweekly phage meetings at ETH Zurich, Switzerland

2016 Co-organizer of the International Conference on the Biology of the Myxobacteria, Switzerland

2014 Co-organizer of the 10th Conference “Ecology and Behavior”, France

Scientific collaboration and cooperation

While academia can be strongly competitive, I believe that we can build alternative paths and foster cooperation opportunities. My engagement for collaborative research takes three main forms. First, and as demonstrated in the report of my previous research, since the beginning of my academic career I participate and create **scientific collaborations** with students and researchers of several disciplines, including biology, physics, mathematics, and philosophy. Second, I am deeply involved in **student training** for project conceptualization, lab techniques, and data analysis. Finally, I work as a scientific advisor and coordinator for the **collaborative research** platform Crowdfight, a tool to catalyze and facilitate collaborations.

Professional memberships

2016 – present Complex Systems Society

2014 – present	European Society for Evolutionary Biology
2013 – present	French Society of Ecology and Evolution (Société Française d'Ecologie et d'Evolution)

COVID19-related contributions

In 2020 I contributed as a moderator to the Academic Resources Platform of Switzerland which links academics labs and hospitals to fulfil the need for equipment and consumables. In addition, and since the first wave of COVID-19 pandemic, I work for the Crowdfight community aiming at fostering research on diseases and beyond through international collaborations (see above).

Publications

I have authored **16 publications**, among which **6 as a leading author**. The symbol⁺ indicates the publications for which I am a corresponding author and the underlined names are the students I supervised.

First or last-author peer-reviewed publications

7. **Vasse M.**, Bonhoeffer S., Frénoy A. 2022 Ecological effects of stress drive bacterial evolvability under sub-inhibitory antibiotic treatments. *ISME Communications* 2(80) doi: 10.1038/s43705-022-00157-w
6. Mayrhofer N., Velicer GJ., Schaal K* and **Vasse M.*+** 2021 Behavioral interactions between bacterivorous nematodes and predatory bacteria in a synthetic community. *Microorganisms* 9(7), 1362 *co-last authors [Q2 in Microbiology]
5. Nair RR.*, **Vasse M.*+**, Wielgoss S., Sun L., Yuen-Tsu NY., Velicer GJ. 2019 Bacterial predator-prey coevolution accelerates genome evolution and selects on virulence-associated prey defences. *Nature Communications* 10, 4301 *co-first authors [Q1 in Biochemistry, Genetics and Molecular Biology (miscellaneous)]
4. **Vasse M.**⁺ and Wielgoss S. 2018 Bacteriophages of *Myxococcus xanthus*, a social bacterium. *Viruses* 10(7): 374 [Q1 in Virology]
3. **Vasse M.**, Voglmayr H., Mayer V., Gueidan C., Nepel M., Moreno L., de Hoog S., Selosse MA., McKey D., Blatrix R. 2017 A phylogenetic perspective of the association between ants (Hymenoptera: Formicidae) and black yeasts (Ascomycota: Chaetothyriales). *Proceedings of the Royal Society of London series B* 284: 20162519 [Q1 in Agricultural and Biological Sciences (miscellaneous)]

2. **Vasse M.*+**, Noble RJ.*, Akhmetzhanov RA., Torres-Barceló C., Gurney J., Bénateau S., Gougat-Barbera C., Kaltz O., Hochberg ME. 2017 Antibiotic stress selects against cooperation in a pathogenic bacterium. *Proceedings of the National Academy of Sciences* 114.3: 546–551
*co-first authors [Q1 in Multidisciplinary]
1. **Vasse M.**, Torres-Barceló C., Hochberg ME. 2015 Phage selection for bacterial cheats leads to population decline. *Proceedings of the Royal Society of London series B* 7;282(1818). pii: 20152207 [Q1 in Agricultural and Biological Sciences (miscellaneous)]

Other peer-reviewed publications

9. Schaal K., Yuen-Tsu NY., **Vasse M.**, Velicer GJ. 2022 Allopatric divergence limits cheating range and alters genetic requirements for a cooperative trait. *BMC Ecology and Evolution* 22(141), doi: 10.1186/s12862-022-02094-7
Contribution: data analysis, manuscript writing
8. Freund L., **Vasse M.**, Velicer GJ. 2021 Hidden paths to endless forms most wonderful: Parasite-blind diversification of host quality. *Proceedings of the Royal Society of London series B* 288 (1949), 20210456 [Q1 in Agricultural and Biological Sciences (miscellaneous)]
Contribution: project conceptualization, PhD student supervision, data analysis and visualization, manuscript writing
7. Courcol JD., Invernizzi CF., Landry ZC., Minisini M., Baumgartner DA., Bonhoefer S., Chabriw B., Clerc EE., Daniels M., Getta P., Girod M., Kazala K., Markram H., Pasqualini A., Martínez-Pérez C., Peaudecerf FJ., Peaudecerf MS., Pfreundt U., Roller BRK., Słomka J., **Vasse M.**, Wheeler JD., Metzger CMJA., Stocker R., Schürmann F. 2021 ARC: An open web-platform for request/supply matching for a prioritized and controlled COVID-19 response. *Frontiers in Public Health* 9, 71 [Q2 in Public Health, Environmental and Occupational Health]
Contribution: database management, manuscript edition
6. Ronai I.*, Greslehner GP.*, Boem F.*, Carlisle J.*, Stencel A.*, Suárez J.*, Bayir S., Bretting W., Formosinho J., Guerrero AC., Morgan WH., Prigot-Maurice C., Rodeck S., **Vasse M.**, Wallis JM., Zacks O. 2020 “Microbiota, symbiosis and individuality summer school” meeting report. *Microbiome* 8, 117 *co-first authors [Q1 in Microbiology]
Contribution: project conceptualization, summer school participation, manuscript writing
5. Torres-Barceló C., Gurney J., Gougat-Barbera C., **Vasse M.**, Hochberg ME. 2018 Transient negative effects of antibiotics on phages do not jeopardise the advantages of combination therapies. *FEMS Microbiology Ecology* 94(8) [Q1 in Microbiology and Q1 in Ecology]
Contribution: project conceptualization, experimental work, data analysis, manuscript edition
4. Torres-Barceló C.*, Franzon B.*, **Vasse M.**, Hochberg ME. 2016 Long-term effects of single

and combined introductions of antibiotics and bacteriophages on populations of *Pseudomonas aeruginosa*. *Evolutionary Applications* 9: 4, 583-595 *co-first authors [Q1 in Ecology, Evolution, Behavior and Systematics]

Contribution: project conceptualization, student supervision, experimental work, data analysis, manuscript edition

3. Torres-Barceló C., Arias-Sanchez FL, **Vasse M.**, Ramsayer J., Kaltz O. and Hochberg ME. 2014 A window of opportunity to control the bacterial pathogen *Pseudomonas aeruginosa* combining antibiotics and phages. *PlosOne* 9 (9): e106628 [Q1 in Multidisciplinary]

Contribution: project conceptualization, student supervision, experimental work, data analysis, manuscript edition

2. Betts A., **Vasse M.**, Kaltz O. and Hochberg ME. 2013 Back to the future: evolving bacteriophages to increase their effectiveness against the pathogen *Pseudomonas aeruginosa* PAO1. *Evolutionary Applications* 6 (7): 1054–63 [Q1 in Ecology, Evolution, Behavior and Systematics]

Contribution: experimental work, data analysis, manuscript edition

1. Gerard PJ., **Vasse M.**, Wilson DJ. 2012 Abundance and parasitism of clover root weevil (*Sitona lepidus*) and Argentine stem weevil (*Listronotus bonariensis*) in pastures. *New Zealand Plant Protection* 65: 180-185 [Q3 in Agronomy and Crop Science]

Contribution: experimental work

Press coverage for first author papers

2017 CNRS En direct des labos: “Les antibiotiques favorisent le jeu de dupe de certaines bactéries” for Vasse *et al.*, *Proceedings of the National Academy of Sciences* 2017

2016 CNRS En direct des labos: “Chez certaines bactéries, la tricherie conduit à l'extinction” for Vasse *et al.*, *Proceedings of the Royal Society of London series B* 2015

Public outreach articles

Vasse M. 2017 Quand les antibiotiques entravent la coopération bactérienne. Planet-Vie. <http://planet-vie.ens.fr/article/2460/quand-antibiotiques-entravent-cooperation-bacterienne> [in French]

Conferences and workshops

As invited speaker

- 2021 Seminar – Institute for Philosophy in Biology and Medicine, Bordeaux, France
- 2021 Conference – Crowdfight Symposium on the Science of Collaboration, Online
- 2021 Seminar – Institute of Integrative Biology at ETH, Zurich, Switzerland
- 2019 Seminar – Ecology and Evolution seminar series (SEEM), Montpellier, France
- 2018 Conference – 22nd Evolutionary Biology Meeting, Marseille, France
- 2016 Seminar – Erasmus MEME Winter School, Montpellier, France
- 2015 Seminar – Institute of Integrative Biology at ETH, Zurich, Switzerland

Other oral contributions

- 2021 Virtual Evolution Conference
- 2020 ERC–Idem virtual meeting on Holobionts, Microbiota and Biological Individuality
- 2019 Phage.fr Phage Network Conference, France
- 2018 French Society of Ecology and Evolution Conference (SFE²), France
- 2017 ESEB Conference, Netherlands
- 2016 International Conference on the Biology of the Myxobacteria, Switzerland
- 2015 ESEB Conference, Switzerland
- 2014 Seminar - Institute of Evolution Science (ISEM), France
- 2014 MICOM Conference, Germany
- 2011 Seminar – Agrocampus Ouest, France
- 2011 Seminar – AgResearch Ruakura Research Centre, New Zealand

Poster presentations

- 2022 SFM Conference, France
- 2022 ESEB Conference, Switzerland
- 2019 Jacques Monod Conference, France
- 2019 ESEB Conference, Finland
- 2018 Evolution–ESEB Conference, France
- 2017 Winter School “Ecological genomics of coevolutionary interactions”, Switzerland
- 2014 Summer school “Understanding Microbial Communities; Function, Structure and Dynamics”, Isaac Newton Institute for Mathematical Sciences, UK
- 2011 Conférence Internationale sur les ravageurs en Agriculture, France
- 2010 Journées scientifiques, Agrocampus Ouest, France

Teaching and supervision

As a PhD student, I was involved in the teaching of Integrative Biology and Ecology and Evolution at the University of Montpellier (136 hours of presence between 2013 and 2015). At ETH Zürich, I took part in teaching the Master course on writing scientific reviews (75 hours). In addition, I directly supervised nine projects and co-supervised another seven since 2014. Bachelor and Master projects are short-term projects of three to five months, while Bachelor and Master theses last at least six months.

2022	Supervision of Nabila Sebbagh's MSc project . University of Montpellier
2019 – present	Co-supervision of Lisa Freund's PhD thesis . ETH Zürich, Switzerland
2021 – 2022	Supervision of Nicola Mayrhofer's MSc thesis . ETH Zürich and MIVEGEC
2020 – 2021	Supervision of August Paula as a research assistant employed on the Career Seed Grant. ETH Zürich, Switzerland
2019 – 2021	Supervision of Nicola Mayrhofer as a research assistant employed on the Career Seed Grant. ETH Zürich, Switzerland
2019 – 2021	Supervision of Ben Kriesel's Bachelor project . ETH Zürich, Switzerland
2019 – 2020	Supervision of August Paula's MSc thesis . ETH Zürich, Switzerland
2018	Supervision of August Paula's MSc project . ETH Zürich, Switzerland
2018	Supervision of Ahmet Temiz's Bachelor project . Bogaziçi University, Turkey
2018	Co-supervision of Nicola Mayrhofer's Bachelor thesis . ETH Zürich, Switzerland
2017	Supervision of Xianda Guo's MSc thesis . ETH Zürich, Switzerland
2016	Co-supervision of Charlotte Rosher's MSc thesis . Erasmus MEME program
2016	Co-supervision of James Kavanagh's MSc thesis . Erasmus MEME program
2015	Co-supervision of Doriane Daniel's MSc thesis . University of Montpellier
2014	Co-supervision of Blaise Franzon's MSc thesis . University of Montpellier
2013	Co-supervision of Flor Aria-Sanchez's MSc thesis . University of Montpellier

Courses and workshops attended

November 2021	Course – Metagenomics bioinformatics EMBL-EBI Training. Online
January 2020	Course – Microbiota data analysis. Switzerland
July 2019	Summer school – Microbiota, Symbiosis and Individuality: Conceptual and Philosophical Issues. France

February 2019	Course – Flow cytometry (BD LRSFortessa and BD FACSCanto II) and HTS plate reader. Switzerland
November 2017	Course – Experimental evolution: From theory to practice. Austria
January 2017	Winter school – Ecological genomics of coevolutionary interactions. Switzerland
November 2016	Course – Beckman Coulter laboratory robot: handling and programming. Switzerland
October 2014	Summer school – Methods for Mathematical and Empirical Analysis of Microbial Communities. UK
June 2014	Workshop – Spatial Evolutionary Epidemiology. France
December 2013	Workshop – Games in Evolution: Models and Microbes. France
June 2013	Workshop – Inclusive Fitness and Game Theory. Switzerland