

Paul Bastide

Researcher in Statistics

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🌐 pbastide.github.io

Current Position

2024 – present **Permanent CNRS Researcher, MAP5, Université Paris Cité**

Keywords

Phylogenetic Comparative Methods. Shift Detection. Model Selection. Phylogenetic Networks.

Past Position

2020 – 2024 **Permanent CNRS Researcher, IMAG, Université de Montpellier**

2017 – 2020 **Postdoctoral researcher, KU Leuven**

Bayesian Phylogenetic Comparative Methods applied to virology. With **Philippe Lemey** (KU Leuven) and **Marc Suchard** (UCLA).

Educational Background

2014 – 2017 **PhD Thesis, Université Paris Sud**

Shifted stochastic processes evolving on trees: application to models of adaptive evolution on phylogenies. Supervised by **Stéphane Robin** (MIA, UMR 518 AgroParisTech/INRA) and **Mahendra Mariadassou** (MaIAGE, UR 1404 INRA).

2013 – 2014 **Master2 MathSV, Université Paris Sud - École Polytechnique - ENS Cachan**

Master in Mathematics For Life Sciences, awarded with highest honors.

2010 – 2014 **Grande École, École Polytechnique**

(One of France's leading schools of science and engineering.)

Majoring in Applied Mathematics.

Publications

preprints — G. Le Mailloux, **P. Bastide**, J.-M. Marin, and A. Estoup. Goodness of fit for bayesian generative models with applications in population genetics, preprints.

— **P. Bastide**, A. Estoup, J.-M. Marin, and J. Stoeck. Estimating marginal likelihoods in likelihood-free inference via neural density estimation, preprints.

2025 — B. Teo, **P. Bastide**, and C. Ané. Leveraging graphical model techniques to study evolution on phylogenetic networks. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 380(1919):20230310, 2025.

— I. Ndikumana, G. Onaga, A. Pinel-Galzi, P. Rocu, J. Hubert, H. K. Wéré, A. Adego, M. N. Wéré, N. Poulicard, M. Hebrard, S. Dellicour, P. Lemey, E. Gilbert, M.-J. Dugué, F. Chevenet, **P. Bastide**, S. Guindon, D. Fargette, and E. Hébrard. Grains, trade and war in the multimodal transmission of rice yellow mottle virus: An historical and phylogeographical retrospective. *PLOS Pathogens*, 21(6):e1013168, 2025.

2024 — S. Dellicour, **P. Bastide**, P. Rocu, D. Fargette, O. J. Hardy, M. A. Suchard, S. Guindon, and P. Lemey. How fast are viruses spreading in the wild? *PLOS Biology*, 22(12):e3002914, 2024.

— F. Chevenet, D. Fargette, **P. Bastide**, T. Vitre, and S. Guindon. Evolaps 2: Advanced phylogeographic visualization. *Virus Evolution*, 10(1), 2024.

- **P. Bastide**, P. Rocu, J. Wirtz, G. W. Hassler, F. Chevenet, D. Fargette, M. A. Suchard, S. Dellicour, P. Lemey, and S. Guindon. Modeling the velocity of evolving lineages and predicting dispersal patterns. *Proceedings of the National Academy of Sciences*, 121(47):2024.06.06.597755, 2024.
- 2023 — B. S. Teo, J. Rose, **P. Bastide**, and C. Ane. Accounting for intraspecific variation in continuous trait evolution on a reticulate phylogeny. *Bulletin of the Society of Systematic Biologists*, 3(2):1–29, 2023.
- R. Kriebel, J. P. Rose, **P. Bastide**, D. Jolles, M. Reginato, and K. J. Sytsma. The evolution of ericaceae flowers and their pollination syndromes at a global scale. *American Journal of Botany*, 110(9), 2023.
- **P. Bastide**, C. Soneson, D. B. Stern, O. Lespinet, and M. Gallopin. A phylogenetic framework to simulate synthetic interspecies RNA-seq data. *Molecular Biology and Evolution*, 40(1):msac269, 2023.
- **P. Bastide** and G. Didier. The cauchy process on phylogenies: A tractable model for pulsed evolution. *Systematic Biology*, 72(6):1296–1315, 2023.
- 2022 — **P. Bastide**, M. Mariadassou, and S. Robin. Modèles d’évolution de caractères continus. In G. Didier and S. Guindon, editors, *Modèles et méthodes pour l’évolution biologique*, pages 47–85. ISTE Group, 2022, hal-03762880.
- 2021 — Z. Zhang, A. Nishimura, **P. Bastide**, X. Ji, R. P. Payne, P. Goulder, P. Lemey, and M. A. Suchard. Large-scale inference of correlation among mixed-type biological traits with phylogenetic multivariate probit models. *The Annals of Applied Statistics*, 15(1):230–251, 2021, 1912.09185.
- S. Issaka, O. Traoré, R. D. S. Longué, A. Pinel-Galzi, M. S. Gill, S. Dellicour, **P. Bastide**, S. Guindon, E. Hébrard, M.-J. Dugué, Y. Séré, S. Semballa, S. Aké, P. Lemey, and D. Fargette. Rivers and Landscape Ecology of a Plant Virus, Rice Yellow Mottle Virus Along the Niger Valley. *Virus Evolution*, 7(2):veab072, 2021.
- **P. Bastide**, L. S. T. Ho, G. Baele, P. Lemey, and M. A. Suchard. Efficient Bayesian Inference of General Gaussian Models on Large Phylogenetic Trees. *The Annals of Applied Statistics*, 15(2):971–997, 2021, 2003.10336.
- 2020 — S. Lequime, **P. Bastide**, S. Dellicour, P. Lemey, and G. Baele. nosoi: A stochastic agent-based transmission chain simulation framework in r. *Methods in Ecology and Evolution*, 11(8):1002–1007, 2020.
- S. Dellicour, S. Lequime, B. Vrancken, M. S. Gill, **P. Bastide**, K. Gangavarapu, N. L. Matteson, Y. Tan, L. du Plessis, A. A. Fisher, M. I. Nelson, M. Gilbert, M. A. Suchard, K. G. Andersen, N. D. Grubaugh, O. G. Pybus, and P. Lemey. Epidemiological hypothesis testing using a phylogeographic and phylodynamic framework. *Nature Communications*, 11(1), 2020.
- G. Baele, M. S. Gill, **P. Bastide**, P. Lemey, and M. A. Suchard. Markov-modulated continuous-time markov chains to identify site- and branch-specific evolutionary variation in BEAST. *Systematic Biology*, 70(1):181–189, 2020.
- 2018 — **P. Bastide**, C. Solís-Lemus, R. Kriebel, K. W. Sparks, and C. Ané. Phylogenetic comparative methods on phylogenetic networks with reticulations. *Systematic Biology*, 67(5):800–820, 2018.
- **P. Bastide**, C. Ané, S. Robin, and M. Mariadassou. Inference of Adaptive Shifts for Multivariate Correlated Traits. *Systematic Biology*, 67(4):662–680, 2018.
- L. Aristide, **P. Bastide**, S. F. dos Reis, T. M. Pires dos Santos, R. T. Lopes, and S. I. Perez. Multiple factors behind early diversification of skull morphology in the continental radiation of New World monkeys. *Evolution*, 72(12):2697–2711, 2018.
- 2017 — C. Solís-Lemus, **P. Bastide**, and C. Ané. PhyloNetworks: A Package for Phylogenetic Networks. *Molecular Biology and Evolution*, 34(12):3292–3298, 2017.

- **P. Bastide**, M. Mariadassou, and S. Robin. Detection of adaptive shifts on phylogenies by using shifted stochastic processes on a tree. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)*, 79(4):1067–1093, 2017, 1508.00225.
- 2014 — **P. Bastide** and T. David. Discours de réception d’Édouard Estaunié à l’Académie française : définitions croisées de la persona d’un académicien scientifique. *Épistémocritique*, 14(Greffes), 2014.

Software

- PhylogeneticEM (Main Author) An **R** package for automatic shift detection on phylogenies.
- PhyloNetworks (Contributor) A **julia** package for statistical inference, data manipulation and visualization of phylogenetic networks.
- BEAST (Contributor) A **java** cross-platform program for Bayesian analysis of molecular sequences and continuous traits using MCMC.
- nosoi (Contributor) An **R** package for flexible agent-based stochastic transmission chain/epidemic simulation.
- compcoder (Contributor) An **R** package for realistic simulation of inter-species RNA-Seq datasets.
- cauphy (Co-author) An **R** package to fit the Cauchy Process on phylogenies.
- abcgof (Co-author) An **R** package for goodness of fit in simulation based inference.

Awards and Fellowships

- 2024 – 2029 **AgroStats, PEPR Math-Vives**
Head: by Arnaud Estoup and Jean-Michel Marin.
- 2024 – 2028 **ANR IdenTHiC, Head: Alice Cleynen (IMAG)**
In collaboration with Sophie Lèbre and Gilles Didier.
- 2024 - 2025 **International Emerging Actions, CNRS**
Project based grant to collaborate with Cécile Ané, University of Wisconsin - Madison.
- 2019 **FWO long stay abroad grant, Research Foundation - Flanders**
Project based personal grant to visit Marc Suchard in UCLA.
- 2018 **FWO Fellowship, Research Foundation - Flanders**
Three years project based personal post-doctoral fellowship.
- 2018 **SFds PhD Thesis Award, French Statistical Society**
Prix Marie-Jeanne Laurent-Duhamel, for a PhD in Applied Statistics, awarded every three years.
- Fall 2015 **Fulbright Scholar, University of Wisconsin - Madison**
To work with Cécile Ané at the Departments of Statistics and Botany, and in the **Sytsma Lab**.

Teaching

- 2025 – present **Université Paris Cité, in French**
Linear regression. Master 1 Ingénierie Mathématique et Biostatistique (30h)
- 2022 – present **EvoGEM, Université Paris Cité, in English and French**
Phylogenetic Comparative Methods (15h).
- 2021 – 2024 **Université de Montpellier, in French**
Linear regression. Master level, Statistics (21h).
Data visualisation. Bachelor level, Computer Sciences (15h).
- 2021 **IFUM Research School, Montevideo, in English and Spanish**
Introduction to Phylogenetic Comparative Methods (9h).
- 2018 **KU Leuven, Teaching Assistant, in English and Dutch**
Applied Biostatistics. Master level, Biomedical sciences.

- Introduction to Biostatistics. Bachelor level, Biomedical sciences.
- 2014 – 2017 **Université Paris Sud**, *Teaching Assistant*, in French
- Introduction to Mathematical Modeling. Bachelor level, Applied Mathematics (L3).
- Introduction to Statistics. Bachelor level, Biology (L2, L3).
- Mathematics for Biology. Bachelor level, Biology (L1).
- Measure Theory and Probabilities. Bachelor level, Mathematics (L3).

Research Mentoring

- 2025 – present **PhD Thesis**, *Nicolas Noirault*, with Gilles Didier, Alice Cleynen and Sophie Lèbre
- 2022 – present **PhD Thesis**, *Guillaume Le Mailloux*, with Jean-Michel Marin and Arnaud Estoup
- 2025 **Post-Doc**, *Emre Anakök*, with Arnaud Estoup, Mathieu Gautier and Cécile Ané
- 2024 **M1 projet**, *Camille Motier & Abel Silly*, master SSD (Montpellier)
- 2023 **M2 projet**, *Louis Lacoste & Alizee Geffroy*, MathSV (Paris Saclay), with Mélina Gallopin
- 2023 **M1 projet**, *Thamara Renoir & Ema Cerezo*, master SSD (Montpellier)
- 2022 **M2 internship**, *Pauline Rocu*, with Stéphane Guindon and Denis Fargette

Jurys and Comities

- 2020-present **M2 internships**, *Master SSD*, internship defenses
- 2020-present **M1 projets**, *Master SSD*, internship defenses
- 2023 **PhD thesis comity**, *Paola Montoya*
- 2020-22 **Fulbright**, *Doctoral and research programs*, admissibility jury
- 2021 **Doctoral school I2S**, *biostatistics*, jury for PhD grant allocation

Implication in the Research Community

- Reviewer Systematic Biology, NeurIPS, PNAS, Evolution, Theoretical Population Biology, Evolutionary Bioinformatics, PeerJ, PlosOne, French ANR, Fulbright Program.
- Learned Society Member of the *Société Française de Statistique (SFdS)* and the *Society of Systematic Biologists (SSB)*.
- 2025 – present **Associate Editor**, *Systematic Biology*
- 2022 – present **GdR Phylodynamique**, *Board member*, INSMI representative
- 2020 – present **SFds**, *GDPR compliance coordination*
- 2024 **GdR Phylodynamique**, *Organisation of the third phylodynamic workshop*, with Ignacio Bravo et Stéphane Guindon
- 2022 – 24 **CdL IMAG**, *Elected member of the Laboratory council*
- 2020 – 24 **IMAG seminar**, *Organisation of the Probability and Statistics seminar*, once a week
- 2020 – 22 **KIM seminar**, *Organisation of the interdisciplinary KIM Data and Life Sciences seminar*, once a month
- 2019 – 22 **SFds**, *Member of the "communication" focus work group*

Talks and Posters in Conferences

- 03/06/2025 **JdS 2025**, *56èmes Journées de Statistique de la SFdS, Marseille*, contributed talk
- 29/08/2024 **Journées MAS 2024**, *Poitier, France*, invited contributed talk
- 30/05/2024 **Phylodynamics Workshop**, *Montpellier, France*, contributed talk
- 07/12/2024 **Conférences de la Maison Française**, *Madison French House, Wisconsin*, invited speaker
- 04/07/2023 **Phylodynamics Workshop**, *Lyon, France*, contributed talk

- 13/06/2023 **MCEB 2023**, *Mathematical and Computation Evolutionary Biology*, Cargèse, poster
- 29/06/2022 **MCEB 2022**, *Château d'Ex, Switzerland*, contributed talk
- 24/10/2021 **AMS**, *AMS Sectional Meeting, New Mexico (online)*, **invited contribution** to the session *Mathematics and Modeling of Phylogenetic Networks*
- 20/05/2021 **Bio Hasard Workshop**, *Grenoble (online)*, **invited speaker**
- 29/07/2019 **JSM 2019**, *Joint Statistical Meeting, Denver*, contributed speed talk
- 05/06/2019 **JdS 2019**, *51èmes Journées de Statistique de la SFdS, Nancy*, contributed talk
- 21/08/2018 **Evolution 2018**, *Joint Congress on Evolutionary Biology, Montpellier*, contributed talk
- 30/05/2018 **JdS 2018**, *50ème Journées de Statistiques de la SFdS, Saclay*, **invited speaker** for the Prix Marie-Jeanne Laurent-Duhamel
- 13/06/2017 **MCEB 2017**, *Porquerolles*, poster
- 30/05/2017 **JdS 2017**, *49èmes Journées de Statistique de la SFdS, Avignon*, contributed talk
- 28/06/2016 **JOBIM 2016**, *Journées Ouvertes en Biologie, Informatique et Mathématiques, Lyon*, contributed talk
- 19/04/2016 **JPS 2016**, *Jeunes Probabilistes et Statisticiens, École de Physique des Houches*, talk
- 22/06/2015 **MCEB 2015**, *Porquerolles*, poster
- 02/06/2015 **JdS 2015**, *47èmes Journées de Statistique de la SFdS, Lille*, contributed talk

Seminars and Workshops

- 20/03/2025 **Séminaire de modélisation mathématique en sciences de la vie et santé**, LAGA
- 29/01/2025 **Rencontres de la chaire Modélisation Mathématique et Biodiversité**, Museum
- 24/01/2025 **All About that... Semniar Series**, SCAI
- 20/11/2024 **Workshop for ANR IdenTHiC**, Montpellier
- 11/10/2024 **MAP5 Seminar**, Paris
- 25/03/2024 **Rochebrune Statistics seminar**, Rochebrune
- 04/12/2023 **UW Student Statistics Seminar**, University of Wisconsin - Madison
- 16/01/2023 **LMA Statistics Seminar**, Avignon
- 25/10/2022 **StatOmique Workshop**, AgroParisTech, Saclay
- 18/10/2022 **LMAC Statistics Seminar**, Compiègne
- 12/05/2022 **Dalhousie Statistics Seminar**, Halifax, Canada (online)
- 08/04/2022 **Toulouse Mathematics and Biology Seminar**, Toulouse
- 22/03/2022 **Rochebrune Statistics seminar**, Rochebrune
- 12/10/2020 **IMAG Statistics Seminar**, Montpellier
- 25/02/2020 **LPSM Statistics seminar**, Paris Diderot
- 25/10/2019 **TSU Statistics seminar**, Texas State University
- 25/04/2019 **IMO Statistics seminar**, Orsay
- 21/01/2019 **MaIAGE Statistics Seminar**, Jouy-en-Josas
- 19/10/2018 **LBBE Statistics Seminar**, Lyon
- 28/09/2018 **LaMME Statistics Seminar**, Évry
- 27/09/2018 **LJK Probability & Statistics Seminar**, Grenoble
- 15/02/2018 **"Modélisation Mathématique et Biodiversité"**, Institut de Mathématique d'Orsay
- 20/11/2017 **"Mathématiques, Évolution, Biologie"**, Institut de Mathématiques de Marseilles
- 08/11/2017 **Bioinformatic Seminar (BIG)**, KU Leuven
- 23/02/2017 **Bioinformatics Team Meeting**, INRA, Jouy-en-Josas
- 14/11/2016 **StatInfOmics Team Meeting**, MaIAGE, Jouy-en-Josas

04/10/2016 **Journées des maths-info de l'INRA**, *Mallemort*
27/06/2016 **AgroParisTech Statistics Seminar**, *Paris*
23/06/2016 **Université Paris Sud Statistics Seminar (PhD Session)**, *Orsay*
09/06/2016 **Université Paris Descartes PhD Seminar**, *Paris*
18/05/2016 **EDMH PhD Seminar**, *Paris*
11/04/2016 **SupAgro Statistics Seminar**, *Montpellier*
10/02/2016 **Sauquet Lab Botany Seminar**, *Université Paris Sud - Orsay*
19/11/2015 **Sytsma Lab Botany Seminar**, *University of Wisconsin - Madison*
18/11/2015 **University of Wisconsin Statistics Seminar**, *Madison*
22/07/2015 **Morlon Lab Evolution Seminar**, *IBENS, Paris*
23/06/2015 **SSB Statistics Seminar**, *Jouy-en-Josas*
16/02/2015 **MaAIGE Internal Seminar**, *Jouy-en-Josas*