Loïs MAIGNIEN
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Associate Professor (HDR)
Environmental Genomics

Deep Sea Ecology and Biology Lab. Biologie
University of Western Brittany
Brest - France

I use large next-generation DNA sequencing datasets, together with environmental 'omics, bioinformatics and numerical ecology tools, to address relevant questions in marine microbial ecology. My current research focuses on bacterial genome plasticity in a coastal marine environments (**MicroBrest** Coastal Microbial Observatory project), establishing an Atlas of microbial genes and genomes from the Southern Ocean (**ACE-ecogenomics** project) and from the deep-sea sediment (**ABYSS** project). I am also interested in applying these approaches to address environmental issues such as marine **microplastic, biocorrosion** and pollutant removal.

Professional appointments

- Since 2014: **Adjunct Scientist, Marine Biological Laboratory**

Josephine Bay Paul Center for comparative molecular biology and evolution, MBL, Woods Hole, U.S.A.

- Since 2013: **Associate Professor, University of western Brittany (UBO), Brest**

Biologie Ecologie Environnements Profonds – UMR 6197

- 2011-2013: **Postdoctoral researcher, Marine Biological Laboratory**

Josephine Bay Paul Center for comparative molecular biology and evolution, MBL, Woods Hole, U.S.A.

Education

- 2024: **HDR** (accreditation to supervise research), UBO, Brest
- 2005-2011: **PhD in Applied Biological Sciences.**

Lab. of microbial ecology and technology, Ghent University, Belgium.

- 2001-2003: **Master of Science in cellular and molecular biotechnology.**

Wageningen University and Research center, The Netherlands.

- 1999-2003: **Master of Science in Bioprocess engineering.**

Polytech. Montpellier, France.

- 1997-1999: **General biology diploma (DEUG), biochemistry and genetics.**

Paris faculty of science (Paris VI).

Training

- **Good Practices for reproducible research in numerical Ecology**

CESAB – FRB, Montpellier, 2018, Course director Nicolas Casajus.

- **Functional and Comparative Genomics of Microorganisms, GenoScope, Evry.**

Workshop of genome annotation, April 2014.

- **STAMPS workshop, Marine Biological Laboratory, Woods Hole, MA, USA.**

Strategies and Techniques for Analyzing Microbial Population Structures. Aug. 2011.
Course directors: Mitchell L. Sogin and David B. Mark Welch.

- **Microbial Diversity Course, Marine Biological Laboratory, Woods Hole, MA, USA.**

(06/2005 to 08/2005). Course directors: Prof. William W. Metcalf and Thomas L. Schmidt.

Scientific expeditions

- **R/V Akademik Tryoshnikov and ROV Ropos:** 45 days, 2017, Antarctic Circumnavigation Expedition
- **R/V Pourquoi pas? and ROV victor** : 14 days, May 2015, Lucky Strike Hydrothermal vent field
- **R/V Urania**: 10 days, October 2014, Deep Hypersaline Lakes of the Mediterranean Sea
- ***R/V Marion Dufresne***, 10 days, July 2008, Gulf of Cadiz. Coordination of the microbiology team
- ***R/V Darwin and ROV Isis***: 20 days, May 2007, Gulf of Cadiz. Microbiology team
- ***R/V Maria S. Merian***: 50 days, May 2006, Gulf of Cadiz. Microbiology team

Grants as Assistant Professor / Adjunct Researcher since 2014

- **COMET:** Co-PI, ANR chaire excellence, 220 k€, Development of new methods to detect mobile genetic elements and find their hosts in the environments (Brest Bay observatory)
- **Piano:** Co-PI, ANR PRCE, 120 k€, Role of heterotrophs Bacteria in the Iron cycling in the Southern Oceans. 2023-2028
- **Irontech:** Co-PI, ANR PRCE,120 k€, N removal from river streams in Brittany using denitrifying microorganism coupled to electrochemical systems. 2023-2027
- **Indigene:** Co-I, OFB, Données génétiques et indicateurs de biodiversité microbienne pélagique. 2020-2022. https://ofb.hal.science/hal-04495506
- **ACE Ecogenomics:** PI, ANR JCJC (young researcher grant) Molecular ecology of the Southern Ocean. PI. 2018-2022.
- **S4CE -Science for clean energy:** Co-I, 320 k€ EU H2020, Microbial interactions with carbon capture processes in the deep terrestrial biosphere. 2017-2021.
- **DNAbyss:** Co-PI, France Genomique large sequencing grant with the Genoscope (PI Sophie Arnaud-Haond), since 2017.
- **Pourquoi Pas Les Abysses?:** Co-PI, 1.4M€ (IFREMER, PI Sophie Arnaud-Haond), Since 04/2016, Molecular diversity and ecology of the deep-sea.
- **Nanoplastic:** Co-PI: 580 k€ (ANR, French National Research Agency, PI Fabienne Lagarde), Since 02/2016. Marine biofilms and microscale plastic particles in oceans and coastal areas.
- **A Systems Analysis of Plant Growth Promotion by the Rhizosphere Microbiome, Co-PI,** $1.2 M (U.S National Science Foundation, PI Cynthia Weinig). Since 09/2015.
- **REGEX**: PI, 2 yrs**,** 99 k€ (Brittany research fund). Since 09/2013. Regulation and Expression of Genomes from Extremophiles for the discovery of new metabolic pathways.
- **M2BIPAT:** Co-PI, 2 yrs, 40 k€ (LabexMer Cluster of Excellence, PI Laurent Memery)
  Marine Microbial Biodiversity Patterns: setting up a coastal abservatory.
- **GenoLimit :** PI, 3 yrs**, 9**8 k€. (LabexMer Cluster of Excellence)
  Genomic adaptations to life limit conditions: Comparative and functional genomics of isolated extremophilic Archaea and Bacteria.

Teaching

(* = course responsibility)

- **Master Microbiologie Fondamentale et Appliquée** (UBO / U. Rennes):
  M1 UE Ecogenomique 1* (3 ECTS, 100%) et Ecogenomique 2* (3 ECTS, 100%)
  M2 UE Analyses Metagenomiques* (6 ECTS, 100%)
- **International Master of Science in Marine Biological Resources**:

UE M1 Marine Genomics (3 ECTS, 33%)

- **Licence Biologie cellulaire et moléculaire** :
  L3 UE Bio-informatique* (100%), UE Introduction à la Génomique (25%)

Committees and public services

- 2025-present: Scientific coordinator of the Southern Ocean 4 seasons project aboard the **RV Perseverance**.
- 2025-present: coordination of the **MESO workgroup**, Microbiome Ecogenomics of the Southern Ocean, within the international Antarctica inSync program.
- 2025-present: coordinator of the molecular ecology teaching group at Brest University
- 2023-present: Scientific planning committee for the Biogeoscapes international program
- 2014-present: coordinator of the MicroBrest LTER, a coastal genomics observatory of marine microbes in the bay of Brest.
- 2022-present: member of the French research fleet committee.
- 2018-2022: member of the IUEM institute scientific committee.

Supervision

Postdoctoral researchers:

- **Hugo Doré**: (2021-present): Eco-evolutionary trajectories of coastal microorganism from the MicroBrest Genomic observatory
- **Emile Faure** (2021-2023): Biogeography of Southern Ocean plankton using a gene centric approach. Now postdoctoral researcher a SB Roscoff
- **Scott Klasek:** (2021-2024): Role of the rhizosphere in plant growth promotion (at the Marine Biological Institute, Woods Hole, USA)
- **Ashley Grosche:** (2020-2022): Functional diversity of Archaea and Bacteria living in deep terrestrial aquifers, implication for carbon capture and storage in the deep subsurface. Now Senior Microbiologist in Biotech Industry.

PhD students:

- **Jolann Pommellec** (PhD Candidate 2021-2025): Genome resolved microbial ecology of the Southern Ocean plankton
- **Blandine Trouche** (PhD candidate 2017-2020): Molecular Microbial Ecology of the deep-sea environnement (IFREMER – UBO scholarship), Now Research Scientist at Odense University, Denmark
- **Floriant Trigodet** (PhD candidate 2016-2019): Molecular microbial ecology of electroactive biofilms on conductive surface in marine environments (CIFRE scholarship with *Institut de la corrosion*). Now Research Scientist at Oldenburg University, Germany
- **Clarisse Lemonnier** (PhD candidate 2015-2019): A Genomic Microbial Observatory for the study of temporal and spatial dynamics of marine microbes in a coastal environment (UBO scholarship). Now Postdoctoral researcher at INRAE Thonon les Bains, France

- **Damien Courtine** (PhD candidate 2014-2017): Evolutionary constrains on the hypertermophile Archaeon *Thermococccus* through population genomics and pangenomics approaches. Now Ingenieur de Recherche, Université Clermont, France

Jury Participation

- 2025. HDR. **Pierre-Pol Liebgott** PhD., Microbial bioelectrochemistry. Marseille Institute of Oceanography.
- 2025 PhD **Mathilde Bourreau,** Adaptation and evolution of diatoms over the last 10,000 years in the North Antarctic Peninsula'. Institut de Biologie de l'École Normale Supérieur (Paris).
- 2025. PhD **Margaux Credeville.** Quantifying plancton with omics methods. Université Paris Saclay.
- 2023. PhD **Dimitra-Ioli Skouroliakou,** Organisation saisonnière des communautés microbiennes planctoniques en relation avec la diversité et l'écologie d'espèces responsables d'efflorescences. Université cote d'Opal
- 2023. PhD **Lucas Robidou,** Moteur de recherche pour données de séquençage génomique Université de Rennes
- 2020. PhD **Guillaume Reboul,** Metabarcoding and metagenomic approaches to decipher microbial communities in suboxic environments. Université Paris-Saclay
- 2019. PhD **Pavla Debeljak**, The coupling of carbon and iron cycles in the Southern Ocean through microbial metabolism. Sorbonne Université
- 2017, PhD **Hugo Doré**, Adaptation à la niche écologique chez deux représentants majeurs du phytoplancton marin, Synechococcus et Prochlorococcus : des gènes à l'écosystème. Université Paris 6
- 2017, PhD **Gaëtan Benoit,** Métagénomique comparative de novo à grande echelle. U. Rennes

Hosting invited researchers:

- 2021-2022, **Fabien Giroud**, Assistant professor. U. Grenoble Alpes. Screening for electrotrophs marine microorganisms for Microbial fuel cell cathodes.

Workshop teaching and organization

- **EBAME 1-10** Emerging Bioinformatics Applications in Microbial Ecogenomics – UBO) 2014-2024 organizer, 14 days/6ECTS, 12 faculties, 55 participants. https://Maignienlab.gitlab.io/ebame/
- **METABIODIV Workshops, CNRS.** Exploration of microbial diversity with metabarcoding, Lecturer. https://anfmetabiodiv.mio.osupytheas.fr/
- **STAMPS** (Strategies and Techniques for Analyzing Microbial Population Structures – MBL Woods Hole), 2012 Teaching Assistant, 12 Faculty, 60 participants https://www.mbl.edu/education/advanced-research-training-courses/course-offerings/strategies-and-techniques-analyzing-microbial-population-structures

Selected publications since 2020

(full list available on Google Scholar)

1. Emile Faure, Jolann Pommellec, Cyril Noel … **Loïs Maignien**. Water mass specific genes dominate the Southern Ocean microbiome, Nature Communications, 2026 (*in press*) https://doi.org/10.21203/rs.3.rs-5608865/v1

2. Sophie Arnaud-Haond et al. Omics exploration of deep-sea biodiversity: data from the "Pourquoi Pas les Abysses?" and eDNAbyss projects. Scientific Data. https://www.nature.com/articles/s41597-025-06009-1

3. Brock, M. T., Morrison, H. G., **Maignien**, L., & Weinig, C. (2024). Impacts of sample handling and storage conditions on archiving physiologically active soil microbial communities. *FEMS Microbiology Letters*, *371*, fnae044. https://academic.oup.com/femsle/article-abstract/doi/10.1093/femsle/fnae044/7692031

4. McLellan, S. L., Chariton, A., Codello, A., McClary-Gutierrez, J. S., Schussman, M. K., Marzinelli, E. M., O'Neil, J. M., Schott, E. J., Bowen, J. L., & Vineis, J. H. **Maignien** L. et al. (2024). Universal microbial indicators provide surveillance of sewage contamination in harbours worldwide. *Nature Water*, 1–10. https://www.nature.com/articles/s44221-024-00315-5

5. Schauberger, C., Thamdrup, B., Lemonnier, C., Trouche, B., Poulain, J., Wincker, P., ArnaudHaond, S., Glud, R. N., & **Maignien**, L. (2024). Metagenome-assembled genomes of deep-sea sediments: Changes in microbial functional potential lag behind redox transitions. *ISME Communications*, *4*(1). https://doi.org/10.1093/ismeco/ycad005

6. Trouche, B., Schauberger, C., Bouderka, F., Auguet, J.-C., Belser, C., Poulain, J., Thamdrup, B., Wincker, P., Arnaud-Haond, S., Glud, R. N., & **Maignien**, L. (2023). Distribution and genomic variation of ammonia-oxidizing archaea in abyssal and hadal surface sediments. *ISME Communications*, *3*(1), 133. https://doi.org/10.1038/s43705-023-00341-6

7. Klasek, S. A., Brock, M. T., Calder, W. J., Morrison, H. G., Weinig, C., & **Maignien**, L. (2022). Spatiotemporal Heterogeneity and Intragenus Variability in Rhizobacterial Associations with *Brassica rapa* Growth. *mSystems*, *7*(3), e00060-22. https://doi.org/10.1128/msystems.00060-22

8. Dibner, R. R., Weaver, A. M., Brock, M. T., Custer, G. F., Morrison, H. G., **Maignien**, L., & Weinig, C. (2021). Time outweighs the effect of host developmental stage on microbial community composition. *FEMS Microbiology Ecology*, *97*(9), fiab102. https://academic.oup.com/femsec/articleabstract/97/9/fiab102/6321163

9. Eren, A. M., Kiefl, E., Shaiber, A., Veseli, I., Miller, S. E., Schechter, M. S., Fink, I., Pan, J. N., Yousef, M. Fogarty, **Maignien** L. et al. (2021). Community-led, integrated, reproducible multi-omics with anvi'o. *Nature Microbiology*, *6*(1), 3–6. https://www.nature.com/articles/s41564-020-00834-3

10. Klasek, S. A., Brock, M. T., Morrison, H. G., Weinig, C., & **Maignien**, L. (2021). Soil microsite outweighs cultivar genotype contribution to Brassica rhizobacterial community structure. *Frontiers in Microbiology*, *12*, 645784. https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2021.645784/full

11. Thamdrup, B., Schauberger, C., Larsen, M., Trouche, B., **Maignien**, L., Arnaud-Haond, S., Wenzhöfer, F., & Glud, R. N. (2021). Anammox bacteria drive fixed nitrogen loss in hadal trench sediments. *Proceedings of the National Academy of Sciences*, *118*(46), e2104529118. https://doi.org/10.1073/pnas.2104529118

12. Trouche, B., Brandt, M. I., Belser, C., Orejas, C., Pesant, S., Poulain, J., Wincker, P., Auguet, J.-C., Arnaud-Haond, S., & **Maignien**, L. (2021). Diversity and Biogeography of Bathyal

and Abyssal Seafloor Bacteria and Archaea Along a Mediterranean-Atlantic Gradient. *Frontiers in Microbiology*, *12*, 702016.

13. Lemonnier, C., Perennou, M., Eveillard, D., Fernandez-Guerra, A., Leynaert, A., Marié, L., Morrison, H. G., Memery, L., Paillard, C., & **Maignien**, L. (2020). Linking spatial and temporal dynamic of bacterioplankton communities with ecological strategies across a coastal frontal area. *Frontiers in Marine Science*, *7*, 376.