

Pamela Ferretti, Ph.D.

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Computational biologist with expertise in early life microbiome, primates microbiome, host-microbe interactions in *C. difficile*, microbial ecology and population dynamics, and strain transmission in social groups.

Current Position

Postdoctoral Research Scholar **2023 - Present**
Laboratory of Prof. Ran Blekhman (Section of Genetic Medicine, University of Chicago, US)

Education

EMBL International PhD Programme in Computational Biology **2017 - 2021**
Laboratories of Prof. Peer Bork (EMBL Heidelberg, Germany) and Prof. Thomas Dandekar (University of Würzburg, Germany). Acceptance rate: 2.7%. Graduated *Magna cum laude*.

MSc Cellular and Molecular Biotechnology **2014 - 2016**
Laboratory of Prof. Nicola Segata (University of Trento, Italy)

BSc Computer Science **2011 - 2014**
Laboratory of Prof. Nicola Segata (University of Trento, Italy)

Research Experience

Postdoctoral Research Scholar (University of Chicago, US) **2023 - Present**
Supervisor: Prof. Ran Blekhman
Main projects:

- Vertical and intergenerational microbial transmission and stability in wild baboons
- Human milk and infant gut microbiome composition, strain transmission and functional potential

Bridging Postdoctoral Researcher (EMBL Heidelberg, Germany) **2022**
Supervisors: Prof. Peer Bork and Dr. Sebastian Schmidt
Main Projects: Completion of the doctoral research projects on *C. difficile* and on animal microbiomes.

Ph.D. (EMBL Heidelberg, Germany) **2017- 2021**
Supervisors: Prof. Peer Bork and Dr. Sebastian Schmidt
Main projects:

- Guidelines for microbial strains identification and interpretation in microbiomes
- Large-scale meta-analysis of *Clostridioides difficile* prevalence across age, geography, health and disease
- The gut microbiome of premature infants in a german cohort
- Geographical boundaries in microbial strain distribution in human populations
- MAGs compendium of over 100k shotgun metagenomic samples from public repositories
- Meta-analysis of animal microbiomes on a global scale

Research Assistant (University of Trento, Italy) **2016 - 2017**
Supervisor: Prof. Nicola Segata
Main projects:

- The infant gut microbiome in twins
- Vertical microbiome transmission and healthy infant microbiome development.
- Coordination of the collection of 2k+ samples from volunteers in collaboration with the clinicians involved in the study.

Awards and Honors

Travel Award for “The Human Microbiome Conference” (Germany) **2023**
Awarded by the University of Chicago

Poster Award at “International Society for Microbial Ecology” (Lausanne, Switzerland) **2022**
“*C. difficile* is overdiagnosed in adults and a commensal in infants”. Eleven poster awardees were selected among the 1700 posters presented. Included 2 years of ISME membership.

Poster Award at “The human Microbiome Symposium” (EMBL Heidelberg, Germany) **2018**
“The role of the maternal microbiomes in the establishment and maturation of the early infant microbial communities”.

Merit Award for the “MSc in Cellular and Molecular Biotechnology” (University of Trento, Italy) **2017**

Travel Grant “Symbiomes: Systems Biology of Host-Microbiome Interactions” (Pultusk, Poland). **2015**

Previous and current collaborators

Current collaborators:

- Prof. Peer Bork (EMBL Heidelberg, Germany)
- Prof. Elizabeth Archie (Univ. Notre Dame, USA)
- Prof. Jenny Tung (Max Planck Institute, Germany)
- Prof. Ellen Demerath (University of Minnesota, USA)
- Prof. Thomas Dandekar (University of Wuerzburg, Germany)
- Prof. Muhammad Naseem (Zayed University, UAE)
- Prof. Luis Pedro Coelho (now Queensland University, Australia)

Previous collaborators:

- Prof. Nicola Segata (University of Trento, Italy)
- Prof. Moran Yassour (Broad Institute, USA)
- Prof. Maria Carmen Collado (CSIC Madrid, Spain)
- Prof. Georg Zeller (Leiden University, Germany)
- Prof. Sofia Forslund (Charité University Hospital, Germany)
- Prof. Jaime Huerta-Cepas (Universidad Politécnica de Madrid, Spain)
- Prof. Falk Hildebrand (Quadram & Earlham Institute, UK)
- Prof. Erik Dassi (University of Trento, Italy)
- Prof. Michela Denti (University of Trento, Italy)
- Mario Cristofolini, MD (“Giovanni Battista Mattei” Research Institute, Italy)

Scientific Publications (titles are web links, all publications are publicly available)

Total number of publications: 16

Total number of citations (according to [Google Scholar](#)): 2,585

H-index: 13

Publications in peer-reviewed scientific journals (* indicates equal contribution).

1. Schmidt TSB*, Fullam A*, **Ferretti P**, Orakov A, Maistrenko O, Ruscheweyh HJ, Duan Y, Van Rossum T, Sunagawa S, Mende D, Kuhn M, Coelho LP, Bork P. *SPIRE: a Searchable, Planetary-scale, Integrated REsource of microbial diversity and function*. [Nucleic Acids Research](#) (2023)
2. **Ferretti P**, Wirbel J, Maistrenko OM, Van Rossum T, Alves R, Fullam A., Akanni W, Schudoma C, Schwarz A, Thielemann R, Thomas L, Kuhn M, Zeller G, Schmidt TSB, Bork P. *C. difficile may be overdiagnosed in adults and is a commensal in infants*. [eLife](#) (2023)
3. Klopp J, **Ferretti P**, Meyer CU, Hilbert K, Haß A, Marißen J, Henneke P, Hudalla H, Sabine Pirr, Viemann D, Zemlin M, Forslund SK, Härtel C, Bork P, Gehring S, Van Rossum T and the PRIMAL consortium. *Meconium microbiome of very preterm infants across Germany*. [mSphere](#) (2021)
4. Coelho LP, Alves R, del Río AR, Myers PN, Cantalapiedra CP, Giner-Lamia J, Schmidt TSB, Mende D, Orakov A, Letunic I, Hildebrand F, Van Rossum T, Forslund SK, Khedkar S, Maistrenko OM, Jia L, **Ferretti P**, Sunagawa S, Zhao XM, Nielsen HB, Huerta-Cepas J and Bork P. *Towards the biogeography of prokaryotic genes*. [Nature](#) (2021)

5. Hildebrand F, Gossmann TI, Frioux C, Özkurt E, Myers PN, **Ferretti P**, Bahram M, Nielsen HB and Bork P. *Dispersal strategies shape persistence and evolution of gut bacteria.*
Cell Host & Microbe (2021)
6. Bahram M, Netherway T, Frioux C, **Ferretti P**, Coelho LP, Geisen S, Bork B and Hildebrand F. *Global distribution and diversity of bacteria and fungi across diverse habitats.*
Environmental Microbiology (2021)
7. Van Rossum T*, **Ferretti P***, Maistrenko OM* and Bork P. *Diversity within species: interpreting strains in microbiomes.*
Nature Reviews Microbiology (2020)
8. **Ferretti P**, Pasolli E, Tett A, Asnicar F, Gorfer V, Fedi S, Armanini F, Truong DT, Manara S, Zolfo M, Beghini F, Bertorelli R, De Sanctis V, Bariletti I, Canto R, Clementi R, Cologna M, Crifò T, Cusumano G, Gottardi S, Innamorati C, Masè C, Postai D, Savoi D, Duranti S, Lugli AG, Mancabelli L, Turroni F, Ferrario C, Milani C, Mangifesta M, Anzalone R, Viappiani A, Yassour M, Vlamakis H, Xavier R, Koren O, Tateo S, Soffiati M, Pedrotti A, Ventura M, Huttenhower C, Bork P and Segata N. *Mother-to-infant microbiome transmission from different body sites shapes the developing infant gut microbiome.*
Cell Host & Microbe (2018)
9. Yassour M, Jason E, Hogstrom L, Siljander H, Selvenius J, Oikarinen S, Hyöty H, Ilonen J, Virtanen S, **Ferretti P**, Pasolli E, Tett A, Asnicar F, Segata N, Vlamakis H, Lander ES, Huttenhower C, Knip M and Xavier RJ. *Strain-level identification of mother-to-child bacterial transmission during the first few months of life.*
Cell Host & Microbe (2018)
10. Dassi E*, **Ferretti P***, Covello G, Bertorelli R, Denti MA, De Sanctis V, Tett A and Segata N. *The short-term impact of probiotic consumption on the oral cavity microbiome.*
Scientific Reports (2018)
11. Duranti S, Lugli GA, Mancabelli L, Armanini F, Turroni F, James K, **Ferretti P**, Gorfer V, Ferrario C, Milani C, Mangifesta M, Anzalone R, Zolfo M, Viappiani A, Pasolli E, Bariletti I, Canto R, Clementi R, Cologna M, Tiziana Crifò, Cusumano G, Fedi S, Gottardi S, Innamorati C, Masè C, Postai D, Savoi D, Soffiati M, Tateo S, Anna Pedrotti, Segata N, Van Sinderen D and Ventura M. *Maternal inheritance of bifidobacterial communities and bifidophages in infants through vertical transmission.*
Microbiome (2017)
12. Asnicar F, Manara S, Zolfo M, Truong D, Scholz M, Armanini F, **Ferretti P**, Gorfer V, Pedrotti A, Tett A and Segata N. *Studying vertical microbiome transmission from mothers to infants by strain-level metagenomic profiling.*
mSystems (2017)
13. **Ferretti P**, Farina S, Cristofolini M, Girolomoni G, Tett A and Segata N. *Experimental metagenomics and ribosomal profiling of the human skin microbiome.*
Experimental Dermatology (2016)
14. Milani C, Mancabelli L, Lugli G, Duranti S, Turroni F, Ferrario C, Mangifesta M, Viappiani A, **Ferretti P**, Gorfer V, Tett A, Segata N, van Sinderen D and Ventura M. *Exploring vertical transmission of the gut microbiota from mother to child.*
Applied and Environmental Microbiology (2015)
15. Fusco da Costa AR, Fedrizzi T, Lopes ML, Pecorari M, Oliveira da Costa WL, Giacobazzi E, da Costa Bahia JR, De Sanctis V, Batista Lima KV, Bertorelli R, Grottola A, Fabio A, Mariottini A, **Pamela Ferretti**, di Leva F, Fregni Serpini G, Tagliacuzzi S, Rumpianesi F, Jousson O, Segata N and Tortoli E. *Characterization of 17 strains belonging to the Mycobacterium simiae complex and description of Mycobacterium paraense sp. nov.*
International Journal of Systematic and Evolutionary Microbiology (2015)
16. Enrico Tortoli, Tarcisio Fedrizzi, Monica Pecorari, Elisabetta Giacobazzi, Veronica De Sanctis, Roberto Bertorelli, Antonella Grottola, Anna Fabio, **Pamela Ferretti**, Francesca Di Leva, Giulia Fregni Serpini, Sara Tagliazucchi, Fabio Rumpianesi, Olivier Jousson and Nicola Segata. *The new phylogenesis of the genus Mycobacterium.*
International Journal of Systematic and Evolutionary Microbiology (2014)

Selected Posters and Talks

Posters:

6. **EMBL The Human Microbiome Conference** | EMBL Heidelberg, Germany. **2023**
"Composition, function and strain-sharing between maternal breast milk and the infant gut microbiome".
5. **International Human Microbiome Consortium – IHMC22** | Kobe, Japan. **2022**
"*C. difficile* is overdiagnosed in adults and a commensal in infants".
4. **International Society for Microbial Ecology – ISME18** | Lausanne, Switzerland. **2022**
"*C. difficile* is overdiagnosed in adults and a commensal in infants".
3. **The Human Microbiome Symposium** | EMBL Heidelberg, Germany. **2018**
 - "The role of the maternal microbiomes in the establishment and maturation of the early infant microbial communities"
 - "Vertical microbiome transmission from maternal breast milk to the infant gut by combined cultivation and metagenomic approaches".
2. **The 7th International Human Microbiome Congress** | Killarney, Ireland. **2018**
"A metagenomic approach to track and characterize the mother-infant microbial transmission and early infant colonisation"
1. **Symbiomes: Systems Biology of Host-Microbiome Interactions** | Pultusk, Poland. **2015**
"Toward optimizing de novo hybrid assembly from short and long reads sequencing for isolate and microbiome samples".

Oral presentations:

8. **Microbiome Virtual International Forum n.9 (invited)** **2022**
"*C. difficile* is overdiagnosed in adults and a commensal in infants"
7. **Laboratory of Prof. Ed Kuijper (invited)** | Leiden, Netherlands. **2021**
"A large-scale meta-analysis of *C. difficile* prevalence across age, geography, health and disease"
6. **Laboratory of Dr. Falk Hildebrand (invited)** | Norwich, UK. **2020**
"Mother-to-infant microbiome transmission from different body sites shapes the developing infant gut microbiome"
5. **XIII Incontro della Rete Insieme per l'Allattamento (invited)** | Verona, Italy. **2018**
"The impact of the maternal microbiome on the neonatal microbiome development". Conference organized by Unicef.
4. **Comano Incontra la Dermatologia Trentina (invited)** | Comano Terme, Italy. **2016**
"The human skin microbiome"
3. **Theodor Escherich Symposium** | Graz, Austria. **2015**
"Assessment of Illumina-Nanopore hybrid assembly performance for bacterial genomes"
2. **Il Microbiota: Salute, Terme e Alimentazione** | Comano Terme, Italy. **2015**
"The skin microbiome in psoriasis: The Comano Terme Project"
1. **Web Valley Summer School** **2014**
"Microbial genome assembly"

Funding

Scholarship - Department of Cellular, Computational and Integrative Biology, University of Trento, Italy (Decreto n. 259 dd 19.12.2016). Active from Jan 2017- Jul 2017. Total amount: 6,000€

Scholarship - Department of Information Engineering and Computer Science, University of Trento, Italy (Decreto n. 134 dd 21.04.2016). Active from May 2016- Nov 2016. Total amount: 6,000€

Teaching and Mentorship

Mentor for Ph.D. Student Mattea Allert (University of Minnesota, US) **2023 - Present**
I supervised Mattea's work on the study of the composition, function and strain sharing between the maternal milk and the infant gut microbiome.

Mentor for Ph.D. Student Askarbek Orakov (EMBL Heidelberg, Germany) **2020 – 2021**
I supervised Askarbek's meta-analysis on the *Fusobacterium* genus species across a collection of 42,900 publicly available metagenomes.

Lecture: "The newborn's microbiome: recommendations for the clinical practice" **2021**
Santa Chiara Hospital, Trento, Italy.

Predoctoral Fellows Course: Python Module (EMBL Heidelberg, Germany) **2018**

Lecture: "Introductory lesson on the human microbiome" **2016 - 2017**
II Level Master in Hydrology and Thermal Medicine, Comano Terme, Italy

Tutor for BSc and MSc Students **2014 - 2017**
C++, Object oriented C++ programming, Project management, Network security and Video compression algorithms.

Tutor at Web Valley Summer School **2014**
Tutor and speaker on genome assembly algorithms and next-generation sequencing platforms.

Scientific Journal Covers

Nature Reviews Microbiology **2020**
Cell Host & Microbe **2018**

Outreach Experience

Book Interview **2023**
by Dr. Valeria Burgio, Faculty member at Università Ca' Foscari Venezia, Dept. of Philosophy and Cultural Heritage. I was interviewed on data visualization best practices and recent trends in microbiome research, as part of a book currently in preparation.

Book Interview **2020**
"Anthropology of the microbes: How metagenomics is reshaping human health" ([ISBN 9788879756983](#)) by Prof. Roberta Raffaeta', Università Ca' Foscari Venezia, Dept. of Philosophy and Cultural Heritage. I was interviewed by the author on how researchers approach metagenomics and the current epistemological limitations.

Local News "Buongiorno Regione Trentino Alto Adige" **2018**

Extracurricular & Service

Peer review of >15 manuscripts by personal invitation **2021 - Present**
from the following academic journals: *Nature Communications*, *PLOS Computational Biology*, *FEMS Microbiology Ecology*, *Current Opinion in Microbiology* and *Scientific Reports*.

Microbiome Virtual International Forum | Organization Committee **2023 - Present**
Organisation of a virtual, inclusive and monthly-recurring mini-conference, accessible in all time zones, with on average over 200 participants per session.

Postdoctoral Fellows Association | Steering Committee Member **2023 - Present**
International Society for Microbial Ecology (ISME) Member **2023-2025**

Complementary Skills Training

Preventing Harassment and Discrimination (University of Chicago) **Apr 2023**
HIPAA Privacy and Security Awareness (University of Chicago) **Apr 2023**
Deep learning and neural networks (EMBL) **Feb 2022**
Biological network analysis (EMBL) **Mar 2021**

Negotiation for scientists (EMBL)
Applying for group leader position (EMBL)
Academic CV (EMBL)
Grant writing for postdocs (EMBL)
Scientific writing (EMBL)
Project Management (University of Trento)

Jan 2021
Dec 2020
Aug 2020
Mar 2020
Oct 2020
2016

Languages

Italian: Native
English: Professional working proficiency
German: Limited working proficiency
Spanish: Limited working proficiency
Japanese: Elementary proficiency

References

Prof. Elisabeth Archie | University of Notre Dame, US.
Associate Professor, Postdoc supervisor
elizabeth.a.archie.2@nd.edu

Prof. Ran Blekhman | University of Chicago, Illinois, US.
Associate Professor, Postdoc supervisor
blekhman@uchicago.edu

Prof. Peer Bork | EMBL, Heidelberg, Germany.
Head of Unit, Senior Scientist and Strategic Head of Bioinformatics, PhD supervisor
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Prof. Georg Zeller | previously EMBL Heidelberg, now Leiden University.
Collaborator and member of the yearly PhD Technical Assessment Committee
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