University Academic Curriculum Vitae

Education since leaving school

- **2015-2019 - Bachelor's degree** in Biological Sciences. Grade 97/110. University of Florence – Italy.
- **2019-2022 – Master´s Degree** in Environmental and Behavioural Biology (Curriculum Environment). Grade 110/100 Cum Laude. University of Florence – Italy.

Present appointment

- **2022 – ongoing: Ph.D.** in Mountain Environment and Agriculture. Faculty of Science and Technology, Free University of Bozen-Bolzano – Italy. Title of the project "Molecular techniques as innovative tool for the conservation of Cultural Heritage"

Collaborations with other organizations

1) **10/2024 - 12/2024 and 02/2025-04/2025 – PhD period abroad at Lund University,** Sweden. Supervisors: Dr. Nikolay Oskilkov and Dr. Eran Elhaik.
2) **10/2021 – 02/2022 – Master thesis at Pontificia Universidad Catolica de Puerto Rico – Puerto Rico**, United States, in collaboration with the University of Florence (Italy). Supervisor: Dr. Ana E. Pérez Matos and Dr. Brunella Perito.

Technical skills

Fieldwork activity and skills
Sampling experience from different environmental matrices: soil, rhizosphere, sediment and rocks in different environments; micro- and non-invasive sampling techniques on stone cultural heritage materials.

Wet-lab skills
Biological analyses: Preparation of culture media; isolation and identification of bacterial and fungal strains; antimicrobial assays using multiple testing methods; gel, protein, and capillary electrophoresis; DNA extraction, purification, and quantification from diverse matrices; RNA extraction and quantification; qPCR analysis for bacterial and fungal quantification; next-generation sequencing library preparation.
Physical and chemical analysis: soil texture, bulk density, water content, pH measurement, element concentration using ICP-MS, measurement of TOC, TN, DOC and available phosphorus.

Statistic skills
Past3; "R" environment; parametric and non-parametric tests (Shapiro–Wilk, t-test, ANOVA, Mann–Whitney U, Kruskal–Wallis, Wilcoxon signed-rank, Tukey's post hoc); Multivariate analyses: PCA, PCoA, NMDS, CAP; Alpha and Beta diversity, Multivariate Association with Linear Models (MaAsLin 2); taxonomic composition analysis, network analysis; differential gene expression analysis (DeSeq2, EdgeR).

Informatic and bioinformatics skills
Python; "R" environment; MEGA (Molecular Evolutionary Genetics Analysis); bioinformatics database (BLAST, MIDORI, BOLD); bioinformatics databases and analysis of Sanger sequencing electropherograms; VSEARCH (a Versatile Open-Source Tool for

Metagenomics).

Tutoring and laboratory supervision

1) Bachelor student: Rafaela Germano, University of Ferrara (06-11/2023)
2) Master student: Erica Besozzi, University of Milano (11/2023)
3) Master student: Sabrina Bombardelli, University of Florence (01-05/2024)

Academic seminars

Seminar on "Biofilms and Biocrusts – the living skin of the earth". The seminar was held during Professor Tanja Mimmo's Principle of Pedology course, second semester, academic year 2022-2023.

Seminar on "Biofilms and Biocrusts – the living skin of the earth". The seminar was held during Professor Luigimaria Borruso's Soil Ecology course, first semester, academic year 2023-2024.

Seminar on "Biotecnologie per la conservazione dei beni culturali". The seminar was held during Professor Gianmarco Mugnai's Biotecnhologies course (Ca Foscari University, Venezia), first semester, academic year 2024-2025.

Seminar on "Microbiologia e beni culturali". The seminar was held during the annual meeting of Associazione Restauratori-Conservatori Alto Adige (ARCA), December 2023.

Oral presentations

Landolfi, M., Marzanni, A., Pasolli E., Mimmo, T., Cappitelli, F., Borruso, L., Villa, F. (2024) In Living Color: exploring the correlation between colors and functionality in subaerial biofilms on stone monuments. Selected oral presentation at the 6th Edition of European Conference on Biodeterioration of Stone Monuments, November 7th and 8th, 2024 (Milano, Italy)

Landolfi, M., Oskolkov, N., Villa, F., Mimmo, T., Elhaik, E., Borruso, L. (2025) Plant-Microbes Interactions: Tracing a 2-Million-Year-Old Alliance with Ancient DNA. Selected oral presentation at RHIZOSPHERE 6 – Rooting for earth, 15 – 19 of June 2025 (Edinburgh, Scotland)

Landolfi, M., Oskolkov, N., Villa, F., Mimmo, T., Elhaik, E., Borruso, L. (2025) Plant-Microbes Interactions: Tracing a 2-Million-Year-Old Alliance with Ancient DNA. Selected oral presentation at the 15th National conference on biodiversity "Perugia Biodiversity", 3-6 June 2025 (Perugia, Italy).

Marzanni, A., Melada, J., **Landolfi, M.,** Ripamonti, D., Battaglia, I., Sarti B., Ludwig, N., Mimmo, T., Cappitelli, F., Borruso, L., Villa, F. (2024) Structural and functional differences in black and green subaerial biofilms on tombstones: implications for stone conservation. Selected oral presentation at the 6th Edition of European Conference on Biodeterioration of Stone Monuments, November 7th and 8th, 2024 (Milano, Italy)

Marzanni, A., **Landolfi, M**., Sarti, B., Mimmo, T., Kunova, a., Cappitelli, F., Borruso, L., Villa, F. (2025) Stress resistance in colored biofilms at the stone-air interface: impacts on heritage conservation. Selected oral presentation at TechnArt2025, 6—9 May 2025 (Perugia, Italy)

Poster presentations

Landolfi, M., Mimmo, T., Cappitelli, F., Borruso, L., Villa, F. (2023) Microbial communities' interactions in subaerial biofilm inhabiting stone heritage. Selected poster presentation at the 10th Congress of European Microbiologist (FEMS), 9 – 13 July 2023 (Amburg, Germany).

Landolfi, M., Marzanni, A., Pasolli E., Bruni, S., Longoni, M., Mimmo, T., Cappitelli, F., Borruso, L. Villa, F. (2024) In Living Colour: exploring the correlation between taxonomic and functional properties of subaerial biofilms and their colour. Selected poster presentation at Omics and Heritage Workshop, 14-15 May 2024 (Rome, Italy)

Marzanni, A., Melada, J., **Landolfi, M**., Ripamonti, D., Battaglia, I., Ludwig, N., Mimmo, T., Cappitelli, F., Borruso, L., Villa, F. (2024) Bridging the Gap: Exploring the Relationship Between Biological and Physical Properties of Biofilms on Stone Monuments. Selected poster presentation at Omics and Heritage Workshop, 14-15 May 2024 (Rome, Italy)

Marzanni, A., **Landolfi, M**., Bombardelli, S., Tiziani, R., Pittertschatscher, M., Celi, D., Mimmo, T., Villa, F., Cappitelli, F., Perito, B., Borruso, L. Pink and salty: Exploring the inter-kingdom ecological networks within pink biofilms thriving on salt-weathered lithic substrates.
Selected poster presentation at Omics and Heritage Workshop, 14-15 May 2024 (Rome, Italy)

Publications

Pérez Matos, A. E., Bacci, G., Borruso, L., **Landolfi, M**., Petrocchi, D., Renzi, S., & Perito, B. (2023). Characterization of the bacterial communities inhabiting tropical propolis of Puerto Rico. *Microorganisms*, *11*(5), 1130. https://doi.org/10.3390/microorganisms11051130

Landolfi, M., Tiziani, R., Riviere, S., Trevisan, F., Petraretti, M., Jäger, H., ... & Borruso, L. (2025). Life on the edge: mineral incrustations colonized by fungal communities in the sulfur fumarole on Sierra Negra volcano (Galápagos Archipelago). *Royal Society Open Science*, *12*(3), 250010. https://doi.org/10.1098/rsos.250010

Courses and workshop

- "Metabarcoding in Microbial Ecology" (online): winter school organized by Physalia, 5-9 February 2024.
- "Introduction to Ancient Metagenomics" (online): summer school organized by Spaam, 5-9 August 2024.

Statement of interest

During my academic career, I have primarily focused on microbiology and microbial ecology across a wide range of environments, from soils to extreme environments. In my PhD research, I investigate microbial biodiversity and chemistry in cultural heritage objects (both natural and tangible), exploring the application of advanced molecular techniques as innovative tools for their characterization and conservation. I have gained extensive experience in RNA and DNA extraction from diverse matrices, with a particular focus on low-biomass samples. I have successfully optimized DNA extraction, concentration, and PCR protocols to improve the analysis of samples with limited biomass and low DNA yields. Additionally, I have developed skills in physicochemical analysis with the aim of obtaining data that can integrate and explain the observed biological data. My work in data analysis has further strengthened my statistical skills and advanced my proficiency in Python and R Studio environments.

Language competence

Italian – Mother tongue
English – B2
Spanish – A2

Driving license

Type of driving license B

Date Signature