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Dr. Olga Schubert and Prof. Dr. Martin Ackermann
Microbial Systems Ecology Group
ETH Zurich and Eawag
Überlandstrasse 133
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August 14, 2024

Dear Dr. Schubert and Prof. Dr. Ackermann,

I am writing with genuine enthusiasm for the Postdoctoral Position in Microbial Systems Ecology with the Microbial Systems Ecology Group at ETH Zurich and Eawag. As a Ph.D. graduate from the Laboratory of Food Biotechnology at ETH Zurich, I am excited by the opportunity to apply my expertise in microbial ecology and metabolic interactions to marine microbial ecosystems and contribute to the work of the PriME collaboration.

My doctoral research, titled "The Effect of Exogenous and Endogenous Vitamin B9 and B12 on Microbial Growth and Metabolism in the Human Gut," has equipped me with a strong foundation in microbial community dynamics and metabolic interactions. This background fits well with your group's focus on distributed metabolism in microbial communities. Specifically, my work on how different vitamin B12 analogues from gut microbes and diet impact commensal propionate-producing bacteria has given me insights into metabolite exchange and its effects on community dynamics.

Below, I have summarized some of the key aspects of my research that are particularly relevant to this position:

1. Investigation of microbial production and utilization of essential micronutrients (B9 and B12) within complex communities, which relates to your interest in distributed metabolism.
2. Study of cross-feeding interactions between prototrophic and auxotrophic species, demonstrating my experience in examining metabolic interdependencies within microbial ecosystems.
3. Analysis of how exogenous factors (nutrient supplementation) affect community composition and metabolic outputs, which is relevant to understanding how environmental changes impact microbial ecosystems.
4. Utilization of various analytical techniques (HPLC-RI, UHPLC-DAD, UHPLC-UV/FL) and molecular biology methods (qPCR, 16S rRNA metabarcoding) to study microbial communities, showcasing my technical proficiency in microbial ecology research.

My publication record demonstrates my ability to conduct impactful research in microbial ecology. For instance, my work on "Vitamin B12 analogues from gut microbes and diet

differentially impact commensal propionate producers of the human gut" (Frontiers in Nutrition, 2024) showcases my expertise in studying how micronutrients influence microbial metabolism. This experience could be valuable in exploring similar dynamics in marine microbial ecosystems. Another relevant publication, "Healthy adult gut microbiota sustains its own vitamin B12 requirement in an *in vitro* batch fermentation model" (Frontiers in Nutrition, 2022), demonstrates my ability to design and execute complex *in vitro* experiments to study microbial community dynamics. This skill set would be directly applicable to the research conducted in your group on marine microbial communities.

I am intrigued by your research goals on proteome efficiency driving distributed metabolism and how cellular metabolic interactions influence community dynamics. My experience in experimental design, metagenomic analysis, and advanced analytical techniques would be valuable in addressing these questions.

Your group's multidisciplinary approach, combining various analyses and modeling, appeals to me. I have developed proficiency in many of these areas during my Ph.D. and am eager to expand my skills, particularly in mathematical modeling and bioinformatics.

My collaborative experience across different fields and institutions has enhanced my ability to work effectively in diverse teams and communicate complex scientific ideas clearly.

While my background is in gut microbiology, I am keen to apply my skills to marine ecosystems, exploring the similarities and differences in microbial interactions and community dynamics. My experience with diverse microbial species and community-level analyses provides a foundation for this transition.

Thank you for considering my application. I am enthusiastic about the possibility of contributing to your research and the broader goals of the PriME collaboration. I look forward to the opportunity to discuss how my background and research interests align with your group's objectives.

Sincerely,

Palni Kundra