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Biozentrum
University of Basel
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Dear Prof. Erik van Nimwegen and Dr. Thomas Julou,

I am writing to express genuine interest in the postdoctoral position in quantitative biology of non-growing bacteria at the Biozentrum, University of Basel. As a recent Ph.D. graduate from the Laboratory of Food Biotechnology at ETH Zurich, with a focus on gut microbial biotechnology, I am excited about the opportunity to apply my skills in bacterial physiology and metabolism to your innovative research on non-growing bacterial states.

My academic journey began with a fascination for food science and its impact on human health. This interest drove me to broaden my knowledge by pursuing a Master's degree in Food Science at McGill University. Subsequently, I delved deeper into understanding how diet affects our gut microbiota, recognizing the crucial link between gut health and overall well-being. This path culminated in my doctoral research, which focused on the complex interactions between vitamins B9 and B12, human gut microbial communities, and probiotic gut microbes.

While my background differs from the specific techniques mentioned in your project, I believe my skills and experience can contribute significantly to your research:

1. **Bacterial physiology and metabolism:** My work with gut microbiota has given me a deep understanding of bacterial physiology under various conditions, including nutrient-limited environments. This knowledge could be valuable in studying the behavior of bacteria in non-growing states.
2. **Method development and intracellular analysis:** I developed a novel method to extract and study the intracellular vitamin content of bacteria. This experience in method development and analysis of intracellular components could be particularly relevant to your work on cellular physiology in non-growing state. I have experience working with postbiotics in my experiments, which has given me insights into the metabolic products of bacteria and their effects. This knowledge could be valuable in understanding the physiological states of bacteria in different growth phases.
3. **Quantitative data analysis:** I am proficient in analyzing complex datasets, including metagenomic data and metabolite profiles, using advanced techniques and programming in R. This experience will be beneficial in interpreting data from your experiments on bacterial populations.
4. **Experimental design and techniques:** I have designed and implemented complex experimental protocols to study bacterial communities under various environmental conditions. I have experience with several techniques such as DNA extraction, Flow cytometer, anaerobic and aerobic cultivations. I have recently completed a practical course to perform Bioinformatics and RNA seq analysis using Galaxy platform. This skill will be crucial for investigating the physiological states of non-growing bacteria in your project.
5. **Metabolite analysis:** I have extensive experience in analyzing bacterial metabolites using advanced techniques such as HPLC-RI and UHPLC-DAD. For instance, I developed a method to measure different vitamin B12 forms produced by gut bacteria using UHPLC-MS/UV.

6. Interdisciplinary approach: My background spanning food science, microbiology, and biotechnology allows me to approach research questions from multiple perspectives, which I believe will be valuable in addressing the physiological and evolutionary aspects of stationary phase in your project.

Some key achievements from my doctoral work that demonstrate my expertise include:

- Discovering how different vitamin B12 analogues uniquely affect certain bacteria in the gut, boosting propionate production and potentially improving overall health (published in *Frontiers in Nutrition*, 2024).
- Demonstrating that healthy adult gut microbiota can sustain its own vitamin B12 requirement in an in vitro batch fermentation model (published in *Frontiers in Nutrition*, 2022).
- Demonstrating that microbially-produced folate forms support the growth of *Roseburia intestinalis* but does not provide any competitive fitness benefits in the human gut in fecal batch fermentations (accepted for publication in *BMC Microbiology*, 2024).

I am particularly excited about the opportunity to expand my skill set and contribute to your team's work on understanding the behavior of bacterial cells in non-growing states. While I don't have direct experience with single-cell analysis or microfluidics, I am a quick learner and am eager to acquire these new techniques. My background in studying bacterial interactions, intracellular components, and metabolite production under various conditions provides a solid foundation for understanding the complex questions your research addresses about single-cell heterogeneity during stationary phase, survival mechanisms, and the impact of previous growth states on bacterial physiology.

Looking ahead, I envision pursuing an academic career in microbiology and bacterial physiology. This postdoctoral position fits with my career aspirations, as it would provide me with invaluable experience in learning and applying mathematical approaches in the cutting-edge research and allowing me to contribute to foundational knowledge in the field. The opportunity to work in your esteemed research group at the Biozentrum would be an ideal stepping stone towards my goal of eventually leading my own research team and making significant contributions to our understanding of bacterial behavior and its implications for human health.

Thank you for considering my application. I am eager to bring my passion for studying bacterial physiology, my expertise in method development, metabolite analysis and bioinformatics, and my unique perspective on the interplay between bacterial communities and their environment to your team. I am available to start immediately and am enthusiastic about the possibility of joining your dynamic research environment at the Biozentrum. I look forward to the opportunity to discuss how my skills and experience, combined with my eagerness to learn, can contribute to your research goals and how this position can support my path towards an academic career.

Sincerely,


Palni Kundra