PALNI KUNDRA

Biotechnology, Food Science, Nutrition, Vitamins, Metabolomics

PERSONAL STATEMENT

Driven by scientific curiosity and a commitment to advancing our understanding of bacteria, I apply my Ph.D. expertise in microbial biotechnology from ETH Zurich to pursue a postdoctoral position. With a multidisciplinary background in microbiology, biotechnology, and food science, my research focuses on the effect of vitamin B9 and B12 on the growth and metabolism in gut bacteria. I have developed skills in designing and conducting complex microbiological studies, and analyzing large-scale bacterial datasets. I am eager to expand my expertise in single-cell analysis and microfluidics to investigate non-growing bacterial states. This postdoctoral position would provide an excellent opportunity to deepen my knowledge and contribute to research in bacterial physiology, that one day can be applied on understanding microbial gut ecosystems.

KEY COMPETENCIES

- Possess in-depth knowledge across various scientific disciplines, including food science, microbiology, nutrition, gastroenterology, probiotics, biotechnology and biology.
- Proficient in translating complex scientific concepts into clear, engaging content, as well as translating scientific findings into actionable next steps.
- Proficient in designing, implementing, and executing research projects, encompassing laboratory techniques, statistics and bioinformatics.
- Proven ability to collaborate effectively with internal and external teams.

EDUCATION

2018 | 2023

ETH Zurich
Doctorate (Ph.D., Dr. sc.) — Zurich, Switzerland
Supervisor: Prof. Dr. Christophe Lacroix

2016 | 2018

McGill University
Masters of Science (M.Sc.) — Montréal, Canada
Supervisor: Prof. Jennifer Ronholm
CGPA: 3.87/ 4

2011 | 2015

Guru Nanak Dev University
Bachelor of Food Science and Technology — Amritsar, India
Advisor: Prof. Bhartendu Singla
CGPA: 8.7/ 10 (*Gold medalist*)

WORK AND RESEARCH EXPERIENCE

Sep 2018 | Jun 2023

Scientific Assistant
ETH Zurich — Zurich, Switzerland

- **Supervisor:** Prof. Dr. Christophe Lacroix
- Completed a multi-year research project investigating the modulatory potential of dietary and gut-microbially produced vitamin B9 and B12 on the complex gut microbiota, as well as on single next generation probiotic gut microbes.
- Led the planning and execution of laboratory experiments, developed experimental and analytical methods (UHPLC-UV/MS), and analyzed metagenomic and other data types.
- Completed project deliverables by preparing research findings for publication in scientific journals.
- Presented research findings at scientific conferences, effectively communicating complex scientific concepts to diverse audiences.
- Mentored Bachelor's and Master's students throughout their thesis projects, and facilitated a semester laboratory course, enhancing hands-on learning experiences.

AWARDS AND MEDALS

Gold medal (Bachelor Studies)
University topper 2015

Poster presentation award
Second prize, Green tea ice cream
Presented at science exhibition
2015

COMPUTATIONAL SKILLS

Bioinformatics skills: metagenomic data analysis
Programming: R, Bash
Version control: git
Project management: GitHub

LANGUAGES

English (Native, C1)
German (Written A2, spoken B1)
Hindi (Native)
Punjabi (Native)

CONTACT INFO

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+41 77 993 58 99

MORE INFO

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palnikundra
Palni Kundra
Palni_Kundra
pkundra

May-Sep 2017

Graduate research project

McGill University — Montréal, Canada

- **Supervisor:** Prof. Jennifer Ronholm
- Conducted whole-genome SNP-based analysis to identify changes under laboratory conditions in major foodborne pathogens responsible for global outbreaks.
- Provided support for preparing the manuscript for publication.

Jan-Feb 2015

Student research assistant

Guru Nanak Dev University — Amritsar, India

- **Supervisor:** Prof. Pankaj Gupta
- Developed an innovative food product - Green tea ice cream.
- Performed sensory and organoleptic evaluation.
- Presented the product at scientific conference.

Jul 2014 | Mar 2015

Student research assistant

Guru Nanak Dev University — Amritsar, India

- **Supervisor:** Prof. Bhartendu Singla
- Developed various innovative soy-based food products to enhance gluten-free product.

May-Jun 2013

Research internship

Indian Council of Agricultural Research — Ludhiana, India

- **Supervisor:** Dr. Pranita Jaiswal
- Applied a non-destructive quality control approach to a develop spectrophotometeric method for the detection of Soy-milk adulteration in cow milk.
- Performed spectrophotometer analysis.

Jun 2013 & Jul 2014

Industrial internship

Markfed Canneries — Jalandhar, India

- Performed microbiological testing and applied quality control assurance techniques.

Jun-Jul 2013

Industrial internship

Verka Milk plant — Jalandhar, India

- Performed microbiological testing and applied quality control assurance techniques.

SCIENTIFIC PUBLICATIONS

Peer-reviewed Publications

Palni Kundra, Annelies Geirnaert, Benoit Pugin, Serafina Plüss, Susanna Kariluoto, Christophe Lacroix, Anna Greppi. Microbially-produced folate forms support the growth of Roseburia intestinalis but not its competitive fitness in fecal batch fermentations. **2024**. (Accepted for publication) *BMC microbiology*.

Palni Kundra, Anna Greppi, Monica Duppenthaler, Serafina Plüss, Benoit Pugin, Christophe Lacroix, Annelies Geirnaert. Vitamin B12 analogues from gut microbes and diet differentially impact commensal propionate producers of the human gut. **2024**. *Frontiers in Nutrition*. doi: 10.3389/fnut.2024.1360199

Palni Kundra, Annelies Geirnaert, Benoit Pugin, Paola Morales Martinez, Christophe Lacroix, Anna Greppi. Healthy adult gut microbiota sustains its own vitamin B12 requirement in an in vitro batch fermentation model. **2022**. *Frontiers in Nutrition*. doi: 10.3389/fnut.2022.1070155

Palni Kundra, Carole Rachmühl, Christophe Lacroix, Annelies Geirnaert. Role of dietary micronutrients on gut microbial dysbiosis and modulation in inflammatory bowel disease. **2021**. *Molecular Nutrition & Food Research*. doi: 10.1002/mnfr.201901271

Nicholas Petronella, **Palni Kundra**, Olivia Auclair, Karine Hébert, Mary Rao, Kyle Kingsley, Katrien De Bruyne, Swapan Banerjee, Alexander Gill, Franco Pagotto, Sandeep Tamber, Jennifer Ronholm. Changes detected in the genome sequences of Escherichia coli, Listeria monocytogenes, Vibrio parahaemolyticus, and Salmonella enterica after serial subculturing. **2019**. *Canadian Journal of Microbiology*. doi: 10.1139/cjm-2019-0235

THESES

Jun 2023

Doctor of Sciences
Palni Kundra, 2023. Dr. sc. Thesis. The effect of exogenous and endogenous vitamin B9 and B12 on microbial growth and metabolism in the human gut. doi: 10.3929/ethz-b-000641198

Jan 2018

Master of Science
Palni Kundra, 2018. M.Sc. Research project. Single Nucleotide Polymorphisms in major food-borne pathogens.

MENTORING

Master projects at ETH Zurich

Monica Duppenthaler Vitamin B9 and B12 driven trophic interactions in the human gut. *Master in Food Science*. Jul 2021 - Jan 2022 (Thesis)

Janik Mutter Vitamin B9 production and cross feeding among human gut microbial strains. *Master in Biology*. Mar 2021 - Jul 2021 (Research project)

Bachelor thesis projects at ETH Zurich

Sabina Galli B-vitamin bio-factory in the gut: In-vitro vitamin B9 production and utilization by human gut microbes. *Bachelor in Food Science*. Jul 2022 - Oct 2022

Sara De Crescenzo In-vitro Vitamin B12 Production by Human Gut Bacteria. *Bachelor in Food Science*. Jul 2021 - Oct 2021

Giuliano Menegon B-vitamin sharing: In-silico and in-vitro study to determine B9 and B12 cross-feeding between human gut microbial strains. *Bachelor in Food Science*. Jun 2020 - Nov 2020

Lucie Kuhn Give them vitamins: Impact of B9 and B12 on the acetate and butyrate production on human gut microbes. *Bachelor in Food Science*. Nov 2019 - Feb 2020

Blandine Genet Give them vitamins: Impact of B9 and B12 on the butyrate and propionate production on human gut microbes. *Bachelor in Food Science*. Jun 2019 - Sep 2019

TEACHING

2019 - 2022

752-5004-00L: Food Biotechnology Laboratory Course — Semester course
ETH Zurich — Zurich, Switzerland
Main responsible for cheese practical (2019 & 2020) and sour dough bread practical (2021 & 2022).

ORAL AND POSTER PRESENTATIONS

Sep 2021

Human Gut Microbial Strains Produce Vitamin B12 — Oral & Poster
6th International Vitamin Conference — Denmark

Jul 2021

In-Vitro Vitamin B12 Production by Human Gut Microbial Strains — Poster
ANAEROBE 2021: THE MICROBIOTA AND BEYOND — Online

Feb 2015

Development of soy-based product and their organoleptic evaluation — Poster
Advances in agricultural Science & biotechnology, *DAV College Jalandhar* — India

Jan 2015

“Green tea ice cream”
Science exhibition, *DAV College Jalandhar* — India

Poster

WORKSHOPS/ COURSES (NOT ON TRANSCRIPTS)

2024 **A practical introduction to bioinformatics and RNA-seq using Galaxy**
Online — Zurich, Switzerland
Sequencing, quality control and reference based mapping, Differential gene expression, DESeq2, Bioinformatic and RNA-seq data analysis on Galaxy Platform.

2023 **PMDA Summer School**
Roche — Basel, Switzerland
Predictive modelling and data analytics summer school to solve problems in drug discovery and development.

2022 **Project Management for research – for doctoral students**
ETH Zurich — Zurich, Switzerland
Project risk management, project management.

2021 **Scientific poster design**
University of Zurich — Zurich, Switzerland
content structure, typography do's and don'ts, design principles, design grids, design tools, image editing, perception, color theory.

2021 **Energy and stress management: How to perform in the storm**
University of Zurich — Zurich, Switzerland
Energy management, understand obstacles and overcome them, achieve targeted change.

2021 **Time and self management for PhD Candidates**
ETH Zurich — Zurich, Switzerland
Assess habits, values, goals, energy, and time management techniques.

2021 **Leadership skills for PhD Candidates**
University of Zurich — Zurich, Switzerland
Management, leadership, needs analysis, behavior, destructive leadership, and case studies.

2020 **Statistics for Experimental Research**
ETH Zurich — Zurich, Switzerland
Experimental designs, statistical analyses using R, report analyses and results in a scientifically appropriate manner.

2018 **Mass spectrometry-based metabolomics - from theory to practice**
Functional Genomics Center of University and ETH Zurich — Zurich, Switzerland
Metabolomics overview, and data analysis and interpretation.

2017 **Introduction to genomic analysis**
Compute Canada & University of British Columbia — (Online) Canada
UNIX programming, alignment, Variant calling and annotation, data visualization, and RNA-Seq including statistical analysis.

2014 **36th Post-harvest technology - short course**
University of California, Davis — Davis, USA
Advanced Crops handling and harvesting systems.

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Biozentrum
University of Basel
Spitalstrasse 41, 4056 Basel
Switzerland

September 20, 2024

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

DIE
EIDGENÖSSISCHE
TECHNISCHE
HOCHSCHULE
ZÜRICH

8382 5682 1425

verleiht

Palni Kundra

Master of Science, McGill University
geboren am 30. November 1991

den Titel

DOKTORIN DER WISSENSCHAFTEN

aufgrund der Doktorarbeit

THE EFFECT OF EXOGENOUS AND ENDOGENOUS VITAMIN B9 AND B12 ON MICROBIAL GROWTH AND METABOLISM IN THE HUMAN GUT

Leiter der Doktorarbeit: Prof. em. Dr. Christophe Lacroix

und der mündlichen Prüfung vom 21. Juni 2023

Zürich, 27. November 2023

Der Rektor

Prof. Dr. Günther Dissertori

Die Vorsteherin des Departements
Gesundheitswissenschaften und Technologie

Prof. Dr. Laura Nyström

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

McGILL UNIVERSITY

MONTREAL

TO ALL TO WHOM THESE PRESENTS MAY COME, GREETING:

WE, THE GOVERNORS, PRINCIPAL, AND FELLOWS OF McGILL UNIVERSITY TESTIFY THAT

Palni Kundra

HAVING DILIGENTLY COMPLETED THE REQUIRED COURSE OF STUDY AND PERFORMED THE PRESCRIBED EXERCISES HAS BEEN ADMITTED TO THE DEGREE OF

MASTER OF SCIENCE

WITH ALL THE HONOURS, PRIVILEGES, AND PREROGATIVES PERTAINING TO THAT DEGREE, IN WITNESS WHEREOF WE HAVE AFFIXED OUR SIGNATURES AND HAVE CAUSED THE SEAL OF THE UNIVERSITY TO BE ATTACHED HERETO. GIVEN IN CONVOCATION THIS 6TH DAY OF JUNE IN THE YEAR 2018.

DEAN

REGISTRAR

CHANCELLOR

PRINCIPAL

ਗੁਰੂ ਨਾਨਕ ਦੇਵ ਯੂਨੀਵਰਸਿਟੀ

ਬੈਚੁਲਰ ਆਫ ਫੂਡ ਸਾਇੰਸ ਐਂਡ ਟੈਕਨੋਲੋਜੀ (ਆਨਰਜ਼)

ਰੋਲ ਨੰ. Roll No. 92015036408

ਰਜਿਸਟਰਡ ਨੰ : 2011.ਜੇ/ਏ.37

Regd. No. : 2011 J/A.37

ਪ੍ਰਮਾਣਿਤ ਕੀਤਾ ਜਾਂਦਾ ਹੈ ਕਿ ਪਲਨੀ ਕੁੰਦਰਾ ਪੁੱਤਰ/ਪੁੱਤਰੀ ਸ਼੍ਰੀ ਕਿਰਨ ਕਿਸ਼ੋਰ ਕੁੰਦਰਾ

ਅਤੇ ਸ਼੍ਰੀਮਤੀ ਦਿਵਿਆ ਕੁੰਦਰਾ ਨੇ ਡੀ.ਏ.ਵੀ.ਕਾਲਜ, ਜਲੰਧਰ

ਤੋਂ ਨਿਸ਼ਚਿਤ ਕੋਰਸ ਦਾ ਅਧਿਐਨ ਕਰਨ ਉਪਰੰਤ ਅਪ੍ਰੈਲ, 2015 ਵਿਚ ਹੋਈ ਲੋੜੀਂਦੀ ਪ੍ਰੀਖਿਆ ਪਹਿਲੀ (ਵਿਸ਼ੇਸ਼ਤਾ ਸਹਿਤ) ਡਿਵੀਜ਼ਨ ਵਿਚ ਪਾਸ ਕਰਕੇ

ਬੈਚੁਲਰ ਆਫ ਫੂਡ ਸਾਇੰਸ ਐਂਡ ਟੈਕਨੋਲੋਜੀ (ਆਨਰਜ਼) ਦੀ ਡਿਗਰੀ ਪ੍ਰਾਪਤ ਕੀਤੀ ਹੈ ।

Guru Nanak Dev University

BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONOURS)

This is to certify that PALNI KUNDRA son/daughter of Mr. KIRAN KISHORE KUNDRA and Mrs. DIVYA KUNDRA and of the D. A. V. COLLEGE, JALANDHAR having pursued the prescribed course of study and passed the requisite Examination, held in APRIL, 2015 has been admitted to the Degree of BACHELOR OF FOOD SCIENCE & TECHNOLOGY (HONOURS) and been placed in First Division (with Distinction).

ਯੂਨੀਵਰਸਿਟੀ ਸੀਲ ਅਧੀਨ ਪ੍ਰਮਾਣਿਤ ਕੀਤੀ ਗਈ ।

Given under the seal of the University.

ਪ੍ਰੋਫੈਸਰ ਇੰਚਾਰਜ (ਪ੍ਰੀਖਿਆਵਾਂ)
Professor Incharge (Exams.)

ਰਜਿਸਟਰਾਰ
Registrar

ਵਾਈਸ-ਚਾਂਸਲਰ
Vice-Chancellor

ਚਾਂਸਲਰ
Chancellor

ਅੰਮ੍ਰਿਤਸਰ Amritsar June 17, 2015

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institute of Food, Nutrition and Health
Department of Health Sciences and Technology

ETH Zurich
Prof. Dr. Christophe Lacroix
Head, Laboratory of Food Biotechnology
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Zurich, 20 July 2023 LC

Letter of reference

Palni Kundra, born on November 30, 1991 and a citizen of Indien, was 100.00 % employed by ETH Zurich as doctoral student from September 1, 2018 until June 30, 2023. About 30,000 people from more than 120 countries study, carry out research and work at ETH Zurich.

Ms Palni Kundra's duties and responsibilities in this capacity primarily comprised:
- working on her own thesis in the specialist field of Food Biotechnology on the subject of modulation effects of B-vitamins on the human gut microbiota
- publishing her research results in the form of papers, conference papers, articles for books
- publishing her research results in the form of papers in recognised specialist journals
- presenting papers at academic conferences
- supervising students writing semester papers and/or Master theses
- guiding Bachelor students during exercise and practical sessions
- supervising Master students during practical work in the laboratory/institute/field

Palni Kundra possessed proven expertise and extensive experience in her area of responsibility. She successfully applied herself to new duties and used the acquired knowledge with good results. The effort she put into her work was in proportion to the achieved outcome, and she met the requirements. With her rational and precise approach to her work, she always delivered a good performance. Her good command of languages was of great value for the communication in her work environment.

Palni Kundra showed initiative and complete commitment. Under challenging conditions, she remained calm and assured, adapting to changing circumstances with ease. Perceptive in evaluating the scope and impact of her actions, she was careful when weighing up the related risks and opportunities. In the decision-making process she exercised autonomy blended with a great deal of expertise. When arranging the deployment of staff, she was good at doing so according to need and objective. It was important to her to align her outlook and her actions with the goals of Food Biotechnology.

Palni Kundra immediately conveyed key information to the relevant recipients, and chose the appropriate moment to involve management when the situation demanded it. In terms of verbal and writing skills, she displayed tremendous adroitness when tailoring her communications to her addressees. Moreover, she was adept at presenting her own ideas in a convincing manner. She took on board other opinions and constructive criticism; she listened to what was said and was tuned in to the needs of her conversational partners. She supported and encouraged collaboration within the team and was highly adept at reconciling differing views. Management, staff and students alike appreciated her greatly and held her in high esteem.

Palni Kundra left us on expiry of her fixed-term employment contract. We thank her for her contribution and wish her every success going forward.

Christophe Lacroix

Cynthia Kümin