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## Qualifications

PhD Food Sciences

## Description of research and teaching

### Natural Fortification of Vitamin B12 in Plant-based Foods by Microbial in situ Synthesis

Potential of microbes to synthesize in situ vitamins can be exploited to naturally fortify foods and to synthesize vitamins to new matrices. In our research group, we study vitamin B12 synthesis focusing on bacteria which are allowed to be used in food production. The focus is on *Propionibacterium freudenreichii*, especially its vitamin B12 synthesis mechanisms and factors affecting efficiency of the synthesis. Integrating tools of molecular microbiology with those of food chemistry and technology will give excellent ground for scientific breakthroughs. On the other hand, understanding the molecular mechanisms governing in situ vitamin B12 production will enable new innovations in production of science-based functional foods and ingredients.

## Publications

### In situ production of vitamin B12 and dextran in soya flour and rice bran: A tool to improve flavour and texture of B12-fortified bread

Wang, Y., Xie, C., Pulkkinen, M., Edelmann, M., Chamlagain, B., Coda, R., Sandell, M., Piironen, V., Maina, N. & Katina, K., 1 May 2022, In: LWT-Food Science and Technology. 161, 113407, 12 p., 113407.

### Fermentation of cereal, pseudo-cereal and legume materials with *Propionibacterium freudenreichii* and *Levilactobacillus brevis* for vitamin B12 fortification

Xie, C., Coda, R., Chamlagain, B., Edelmann, M., Varmanen, P., Piironen, V. & Katina, K., Feb 2021, In: LWT-Food Science and Technology. 137, 9 p., 110431.

### Bioaccessibility of vitamin B12 synthesized by *Propionibacterium freudenreichii* and from products made with fermented wheat bran extract

Chamlagain, B., Peltonen, L., Edelmann, M., Ramos-Diaz, J. M., Kemppinen, A., Jouppila, K., Varmanen, P. & Piironen, V., 2021, In: Current research in food science. 4, p. 499-502 4 p.

### Niacin contents of cereal-milling products in food-composition databases need to be updated

Chamlagain, B., Rautio, S., Edelmann, M., Ollilainen, V. & Piironen, V., Aug 2020, In: Journal of Food Composition and Analysis. 91, 7 p., 103518.

### Riboflavin, niacin, folate and vitamin B12 in commercial microalgae powders

Edelmann, M., Aalto, S., Chamlagain, B., Kariluoto, S. & Piironen, V., Sep 2019, In: Journal of Food Composition and Analysis. 82, 10 p., 103226.

### Co-fermentation of *Propionibacterium freudenreichii* and *Lactobacillus brevis* in Wheat Bran for in situ Production of Vitamin B12

Xie, C., Coda, R., Chamlagain, B., Varmanen, P., Piironen, V. & Katina, K., 5 Jul 2019, In: Frontiers in Microbiology. 10, July, 10 p., 1541.

### In situ fortification of vitamin B12 in wheat flour and wheat bran by fermentation with *Propionibacterium freudenreichii*

Xie, C., Coda, R., Chamlagain, B., Edelmann, M., Deptula, P., Varmanen, P., Piironen, V. & Katina, K., 4 May 2018, In: Journal of Cereal Science. 81, p. 133-139 7 p.

**In situ production of active vitamin B12 in cereal matrices using *Propionibacterium freudenreichii***

Chamlagain, B., Sugito, T. A., Deptula, P., Edelmann, M., Kariluoto, S., Varmanen, P. & Piironen, V., Jan 2018, In: Food Science & Nutrition. 6, 1, p. 67-76 10 p.

**Bioprosessoinnilla B12-vitamiinia vilja- ja palkokasvipohjaisiin elintarvikkeisiin**

Chamlagain, B. & Edelmann, M., 14 Dec 2017, In: Kehittyvä Elintarvike. 28, 6, p. 50-51 2 p.

**Microbial Metabolic Networks at the Mucus Layer Lead to Diet-Independent Butyrate and Vitamin B12 Production by Intestinal Symbionts**

Belzer, C., Chia, L. W., Aalvink, S., Chamlagain, B., Piironen, V., Knol, J. & de Vos, W. M., 19 Sep 2017, In: mBio. 8, 5, 14 p., ARTN e00770-17.

**Biofortification of riboflavin and folate in idli batter, based on fermented cereal and pulse, by *Lactococcus lactis* N8 and *Saccharomyces boulardii* SAA655**

Rajendran, S. C. C., Chamlagain, B., Kariluoto, S., Piironen, V. & Saris, P. E., 3 May 2017, In: Journal of Applied Microbiology. 122, 6, p. 1663-1671 9 p.

**Food-Like Growth Conditions Support Production of Active Vitamin B12 by *Propionibacterium freudenreichii* 2067 without DMBI, the Lower Ligand Base, or Cobalt Supplementation**

Deptula, P., Chamlagain, B., Edelmann, M., Sangsuwan, P., Nyman, T. A., Savijoki, K., Piironen, V. & Varmanen, P., 8 Mar 2017, In: Frontiers in Microbiology. 8, 11 p., 368.

**Comparative genomics and physiology of the butyrate-producing bacterium *Intestinimonas butyriciproducens***

Nam Bui, T. P., Shetty, S., Lagkourdos, I., Ritari, J., Chamlagain, B., Douillard, F., Paulin, L. G., Piironen, V., Clavel, T., Plugge, C. M. & de Vos, W. M., 7 Oct 2016, In: Environmental microbiology reports. 8, 6, p. 1024-1037 14 p.

**Stability of added and in situ-produced vitamin B12 in breadmaking**

Edelmann, M., Chamlagain, B. S., Santin, M., Kariluoto, S. & Piironen, V., 10 Feb 2016, In: Food Chemistry. 204, p. 21-28 8 p.

**Effect of the lower ligand precursors on vitamin B12 production by food-grade *Propionibacteria***

Chamlagain, B., Deptula, P., Edelmann, M., Kariluoto, S., Grattepanche, F., Lacroix, C., Varmanen, P. & Piironen, V., 2016, In: LWT-Food Science and Technology. 72, p. 117-124 8 p.

**Letter to the editor on 'Enhancing vitamin B<sub>12</sub> content in soy-yogurt by *Lactobacillus reuteri*, IJFM. 206:56–59'**

Varmanen, P. K., Deptula, P., Chamlagain, B. S. & Piironen, V. I., 2016, In: International Journal of Food Microbiology. 228, p. 33 1 p.

**BluB/CobT2 fusion enzyme activity reveals mechanisms responsible for production of active form of vitamin B 12 by *Propionibacterium freudenreichii***

Deptula, P., Kylli, P. T., Chamlagain, B. S., Holm, L. U. T., Kostianen, R. K., Piironen, V. I., Savijoki, K. K. & Varmanen, P. K., 23 Nov 2015, In: Microbial Cell Factories. 14, 12 p., 186 .

**Ultra-high performance liquid chromatographic and mass spectrometric analysis of active vitamin B12 in cells of *Propionibacterium* and fermented cereal matrices**

Chamlagain, B., Edelmann, M., Kariluoto, S., Ollilainen, V. & Piironen, V., 2015, In: Food Chemistry. 166, p. 630-638 9 p.

**Trends of antibiotic resistance in mesophilic and psychrotrophic bacterial populations during cold storage of raw milk**

Munsch-Alatossava, P., Gauchi, J-P., Chamlagain, B. & Alatossava, T., 2012, In: ISRN Microbiology. 2012, Art. No. 918208, 13 p.

## Projects

**B12WEGAIN: Natural vitamin B12 fortification of future foods by bioprocessing and controlled cell-lysis of Propionibacterium freudenreichii**

Varmanen, P., Piironen, V., Sillanpää, L. A., Loivamaa, I., Savijoki, K., Chamlagain, B. & Edelmann, M.  
01/01/2021 → 31/12/2023

**Molecular basis for natural vitamin B12 fortification of emerging new foods by utilization of Propionibacterium freudenreichii**

Piironen, V., Loivamaa, I., Edelmann, M., Chamlagain, B., Savijoki, K., Varmanen, P., Sillanpää, L. A. & Zhang, R.  
01/09/2019 → 31/08/2023

**Leg4Life: Legumes for sustainable food system and healthy life**

Pajari, A., Piironen, V., Vanhatalo, A., Simojoki, A., Jouppila, K., Kariluoto, S., Päivärinta, E., Konttinen, H., Hyytiäinen, K., Lombardini (former Lombardini-Riipinen), C., Lamminen, M., Alakukku, L., Chamlagain, B., Coda, R., Ertbjerg, P., Edelmann, M., Halmemies-Beauchet-Filleau, A., Itkonen, S., Katina, K., Knaapila, A., Kokkonen, T., Kuoppala, K., Lampi, A., Mäkelä, P., Nurmi, V., Ramos-Diaz, J. M., Salonen, A., Sandell, M., Sihvonen, M., Sontag-Strohm, T., Stoddard, F., Tenkanen, M. & Varmanen, P.

01/06/2019 → 31/08/2022

**B-GELS: Water-in-oleogel emulsions as vitamin B12 delivery and protective systems for plant-based products (Faculty of Agriculture and Forestry Proof of Concept Grant, University of Helsinki)**

Valoppi, F. & Chamlagain, B.

01/09/2020 → 31/12/2020

**BIOB12: Vitamin B12-bioenriched wheat bran ingredients for food applications (BIOB12)**

Piironen, V., Chamlagain, B., Edelmann, M., Varmanen, P. & Katina, K.

01/07/2018 → 30/06/2019

**BIOFORCE: Bio-enriched bran ingredients - in situ synthesis of vitamin B12 and folate with propionibacteria and lactic acid bacteria**

Piironen, V., Varmanen, P., Chamlagain, B., Edelmann, M. & Katina, K.

01/03/2017 → 31/03/2018

**Natural Fortification of Foods: Microbial in situ Synthesis of Vitamin B12 and Folate in Cereal Matrix**

Piironen, V., Varmanen, P., Chamlagain, B., Deptula, P., Edelmann, M., Kariluoto, S., Ollilainen, V., Nyman, T., Korhola, M., Lampi, A. & Salovaara, H.

01/09/2012 → 31/08/2016

**FOLAFIBRE-Aqueous processing of oats and barley...**

Piironen, V., Lampi, A., Kariluoto, S., Edelmann, M., Nyström, L., Pokela, L., Chamlagain, B. & Koivumäki, T.

01/01/2007 → 31/12/2010

**Peer-review of manuscripts**

**Applied Microbiology and Biotechnology (Journal)**

Bhawani Chamlagain (Reviewer)

2022

**Frontiers in nutrition (Journal)**

Bhawani Chamlagain (Reviewer)

2022

**Microbial Cell Factories (Journal)**

Bhawani Chamlagain (Reviewer)

2022

**ACS food science & technology (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Food Chemistry (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Frontiers in Microbiology (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Frontiers in nutrition (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Frontiers in nutrition (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Journal of Food Composition and Analysis (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Journal of Food Composition and Analysis (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**LWT-Food Science and Technology (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**LWT-Food Science and Technology (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Microorganisms (Journal)**

Bhawani Chamlagain (Reviewer)

2021

**Biocatalysis and agricultural biotechnology (Journal)**

Bhawani Chamlagain (Reviewer)

2020

**Food Chemistry (Journal)**

Bhawani Chamlagain (Reviewer)

2020

**Foods (Journal)**

Bhawani Chamlagain (Reviewer)

2020

**Food Chemistry (Journal)**

Bhawani Chamlagain (Reviewer)

2019

**Food analytical methods (Journal)**

Bhawani Chamlagain (Reviewer)  
2019

**Journal of food science and technology Nepal (Journal)**

Bhawani Chamlagain (Reviewer)  
2019

**LWT-Food Science and Technology (Journal)**

Bhawani Chamlagain (Reviewer)  
2019

**Preparative Biochemistry and Biotechnology (Journal)**

Bhawani Chamlagain (Reviewer)  
2019

**Food Chemistry (Journal)**

Bhawani Chamlagain (Reviewer)  
2018

**International Journal for Vitamin and Nutrition Research (Journal)**

Bhawani Chamlagain (Reviewer)  
2018

**Journal of food science and technology Nepal (Journal)**

Bhawani Chamlagain (Reviewer)  
2018

**Antonie van Leeuwenhoek (Journal)**

Bhawani Chamlagain (Reviewer)  
2017

**Activities**

**Evaluation of Master thesis**

Bhawani Chamlagain (Participant)  
2022

**Evaluation of Master thesis**

Bhawani Chamlagain (Participant)  
2020

**Evaluation of Master thesis**

Bhawani Chamlagain (Participant)  
2020

**Activities**

**6th International Vitamin Conference 2021 22-24 September Copenhagen**

Bhawani Chamlagain (Speaker: Presenter)  
22 Sep 2021 → 24 Sep 2021

**Institute of Food, Nutrition and Health (IFNH) seminars, ETH Zurich**

Bhawani Chamlagain (Speaker)

29 Oct 2019

**4th International Vitamin Conference (25-27 May 2016), Copenhagen, Denmark**

Bhawani Chamlagain (Speaker: Presenter)

25 May 2016 → 27 May 2016

**EURO FOOD CHEM XVIII**

Bhawani Chamlagain (Poster Presentation)

13 Oct 2015 → 16 Oct 2015

**The 32nd Nordic Cereal Congress: Future Food Security – New Opportunities for Nordic Crops**

Bhawani Chamlagain (Speaker: Presenter)

7 Sep 2015 → 9 Sep 2015

**3rd International Vitamin Conference (12-15 May 2014, Washington, DC, USA)**

Bhawani Chamlagain (Poster Presentation)

12 May 2014 → 15 May 2014

**V Symposium on Sourdough: Cereal Fermentation for Future Foods 2012, 10-12 October 2012, Helsinki, Finland**

Bhawani Chamlagain (Poster Presentation)

10 Oct 2012 → 12 Oct 2012

**2nd International Vitamin Conference, 23-25 May 2012, Copenhagen, Denmark**

Bhawani Chamlagain (Poster Presentation)

23 May 2012 → 25 May 2012

**Award and prizes**

**"Best Doctoral Thesis Award" by Doctoral Programme in Food Chain and Health**

Chamlagain, Bhawani (Recipient), 15 Nov 2017

**"Best Doctoral Dissertation Award" by The Finnish Society of Food Science and Technology (ETS)**

Chamlagain, Bhawani (Recipient), 21 Mar 2017