

A. PERSONAL DATA

Name and contact details

Ingemar Eric von Ossowski, PhD
Helsinki, FINLAND
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Date and place of birth

Dec. 30/1960, Winnipeg, Manitoba, CANADA

Current position

Docent (Adjunct Professor) in Molecular
Microbiology at the Faculty of Veterinary Medicine

Employer

Veterinary Microbiology and Epidemiology
Department of Veterinary Biosciences
Faculty of Veterinary Medicine
University of Helsinki
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Start date

Mar. 01/2007

Other personal information

Nationality: Canadian and German dual citizenship

Family Status: Wife (Lotta *née* Söderholm; Finnish Citizen) and daughter (Sofia)

Hobbies: Sport fishing, listening to 70s era music, and reading biographies and cold war spy novels

B. EDUCATION

Degrees, graduation date, and institution

PhD in Microbiology (Oct. 1993)

Dissertation: Characterization of *katE* and its product, catalase HPII, from *Escherichia coli* by sequence analysis and site-directed mutagenesis

Department of Microbiology, University of Manitoba, Winnipeg, Manitoba, CANADA

MSc in Microbiology (Oct. 1986)

Dissertation: An attempt to isolate and purify development-specific surface proteins from developing cells of *Myxococcus xanthus*

Department of Microbiology, University of Manitoba, Winnipeg, Manitoba, CANADA

BSc Hons. (May 1984) First Class Honors in Microbiology
Department of Microbiology, University of Manitoba, Winnipeg, Manitoba, CANADA

Other relevant studies

Pedagogy Course 570045 (Sept.-Dec. 2012): Five-credit course in curriculum design and assessment of learning and teaching offered at the University of Helsinki

Language skills

English as a mother tongue

Some basic comprehension of German and Swedish

Completed Finnish for foreigners language training courses *Suomi 1-3* at University of Helsinki

General research interests

Protein engineering: enzyme structure-function relationships, variant construction with improved or novel properties, proteins with industrial and therapeutic applications

Molecular biology: recombinant protein expression using various host systems

Protein chemistry: protein crystallization screening and structural studies

Microbial genomics: pan-genomic analysis of bacterial strains, with a focused emphasis on surface-exposed proteins

C. RESEARCH POSITIONS AND MOBILITY

Current and previous employment

**Docent (Adjunct Professor) in Molecular Microbiology
(Senior University Research Fellow)**

(Mar. 2007 to Present)

Veterinary Microbiology and Epidemiology, Department of Veterinary Biosciences, Faculty of Veterinary Medicine, University of Helsinki, Helsinki, FINLAND

Details: An investigation into understanding the molecular phenotypes that underlie the adhesive interactions between gut-adapted lactobacilli and their animal and human hosts, a study focused on the genomic identification and functional/structural characterization of surface-exposed proteins, particularly the associated multi-subunit pilus formations.

Administrative Research Project Coordinator for the Academy of Finland-funded (2008-2013) Center of Excellence (CoE) in Microbial Food Safety (MiFoSa) research program
(May 2010 to Dec. 2013; part-time)

Department of Veterinary Biosciences, Faculty of Veterinary Medicine, University of Helsinki, Helsinki, FINLAND

Details: Duties included organizing and coordinating guest speaker and troubleshooting seminar programs, journal clubs, and seminar symposia, compiling and writing yearly reports, arranging internal and scientific advisory board meetings.

Postdoctoral Scientist

(Aug. 2003 to Feb. 2007)

Division of Biochemistry and Biotechnology, Department of Biosciences, Faculty of Biological and Environmental Sciences, University of Helsinki, Helsinki, FINLAND

Details: A structural and mutational study of the AMPA-glutamate receptor (GluR) channel proteins and their associated domain (PDZ) proteins, and the development of a Fab antibody methodology for the isolation of native AMPA-GluRs and associated proteins.

Research Scientist

(Jan. 2003 to Feb. 2003)

Carbozyme Oy, Espoo, FINLAND

Details: A short-term contracted protein-engineering project aimed at improving the existing properties of an industrially utilized enzyme.

Postdoctoral Scientist

(May 2000 to Dec. 2002)

Macromolecular Structures Group, Institute of Biotechnology, University of Helsinki, Helsinki, FINLAND

Details: A structural investigation of the expansin-like domain of a novel three-domained cellulase produced by the plant pathogen *Clavibacter michiganensis* ssp. *sepedonicus*, a study that involved the engineered cloning, soluble expression, and purification of recombinant protein in amounts suitable for undertaking crystallization screening.

Postdoctoral Scientist

(Mar. 1998 to Feb. 2000)

Enzyme Design Dept., Novo Nordisk A/S, Enzyme Business (now called Novozymes A/S), Bagsværd, DENMARK

Details: Involving the construction and screening of cellulase variants (*Humicola insolens* Cel6A, Cel6B, Cel7B, and Cel45) and having a target to adjust and modify their enzymatic capacity as active ingredients in laundry detergent powders.

Postdoctoral Scientist

(Nov. 1997 to Feb. 1998)

Department of Pharmacology and Pharmacotherapy, Faculty of Pharmaceutical Sciences, Royal Danish School of Pharmacy (now called University of Copenhagen), Copenhagen, DENMARK

Details: The generation and isolation of Fab antibodies with specificity to the AMPA-glutamate receptor (GluR) channel protein using phage-display technology.

Postdoctoral Scientist

(Dec. 1996 to Oct. 1997)

Department of Cell and Molecular Biology, Uppsala University, Biomedical Center, Uppsala, SWEDEN

&

(May 1995 to Nov. 1996)

VTT Biotechnology, Espoo, FINLAND

Details: A collaborative investigation (carried out in Finland and then Sweden) into the structure-function relationship of the active site loops for the Cel7A cellobiohydrolase from *Trichoderma reesei*.

Research Scientist

(May 1993 to Dec. 1993)

Rh Pharmaceuticals Inc., Biotechnology Division (formerly Cangene Corp., now called Emergent BioSolutions Inc.), Winnipeg, Manitoba, CANADA

Details: The engineered optimization of expression vectors for the high-level production of recombinant erythropoietin in mammalian cells.

Junior Research Scientist

(Nov. 1986 to Aug. 1989)

ABI Biotechnology Inc. (now called Apotex Fermentation Inc.), Winnipeg, Manitoba, CANADA

Details: An R&D project that sought to achieve the high-level expression, purification, and functional characterization of recombinant yeast-derived human Cu/Zn superoxide dismutase.

International mobility

Relocated from Canada to Finland (~19 years in total), and spent working research visits of extended lengths in Sweden (~1 year) and Denmark (~2.5 years).

D. PROFESSIONAL ACTIVITIES AND ACHIEVEMENTS

Peer-review tasks

- Food & Function (2015)
- BMC Microbiology (2015)
- BMC Microbiology (2014); *on two occasions*
- Journal of Applied Microbiology (2014); *on two occasions*
- Antonie van Leeuwenhoek Journal of Microbiology (2014); *on two occasions*
- BMC Microbiology (2013)
- Applied and Environmental Microbiology (2010); *proxy reviewer*

Student and thesis supervision

- Co-supervised doctoral students at the Department of Veterinary Biosciences, University of Helsinki (one during 2013-2017 and one ongoing)
- Two co-supervised MSc students on their final thesis research projects at the Department of Veterinary Biosciences, University of Helsinki (during 2008 and 2012)
- Two co-supervised MSc students on their research project course (529212, Research project in biochemistry or biotechnology) at the Division of Biochemistry and Biotechnology, Department of Biosciences, University of Helsinki (during 2003 to 2006)

Laboratory personnel supervision

- Two laboratory technicians (university & industry)
- Several temporary/summer laboratory assistants (university & industry)

Teaching, coordinating, and organizing assignments

- *Ad hoc* lecturing for the second-year veterinary course 90092-Yleinen Bakteriologia (or General Bacteriology/Microbiology) offered during the autumn 2012, 2013, 2014, 2015, and 2016 sessions by the Department of Veterinary Biosciences (Veterinary Microbiology and Epidemiology), University of Helsinki

- Member of organizing committee for the CoE-MiFoSa Closing Seminar Meeting (Nov. 22/2013), Hotel Arthur, Helsinki
- Co-organizer of the Applied Bioscience (ABS) graduate school lecture course “Molecular biology of intestinal microbiota and food chain bacteria” (Nov. 26-28/2012), University of Helsinki
- Member of organizing committee for the CoE-MiFoSa Tallinn Seminar Meeting (Dec. 09-10/2010), Tallink City Hotel, Tallinn, ESTONIA
- Coordinator for Veterinary Microbiology and Epidemiology journal club (2008 to 2010), and as well CoE-MiFoSa journal club and troubleshooting seminar series (2010 to 2013) at the Department of Veterinary Biosciences (Veterinary Microbiology and Epidemiology), University of Helsinki
- Coordinator for the CoE-MiFoSa special guest speaker seminar series (2010 to 2013) at the Department of Veterinary Biosciences (Veterinary Microbiology and Epidemiology), University of Helsinki
- Teaching and instruction of the biochemistry laboratory course 51046-Proteiinitutkimuksen Menetelmiä (or Methods in Protein Research) offered in 2004 by the Department of Biosciences (Division of Biochemistry and Biotechnology), University of Helsinki
- Student-teaching assistant (STA) (1982-1983, 1984-1986, and 1989-1991) of laboratory courses (Ecological Microbiology A & B, Environmental Microbiology, Membrane and Cellular Biochemistry, Microbial Physiology, and General Microbiology) offered within the undergraduate program at the Department of Microbiology, University of Manitoba (Winnipeg, CANADA)

Invited speaking and teaching presentations

- Team A (Intestinal Microbiota and Host-Microbe Interaction): An Overview. CoE-MiFoSa Closing Seminar Meeting. (Nov. 22/2013) Hotel Arthur, Helsinki, FINLAND
- MolMecGG research project summary (From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG). Annual Seminar of ELVIRA (Research Program on Nutrition, Food, and Health). (Mar. 07/2011) Hotelli Crowne Plaza, Helsinki, FINLAND; *proxy speaker*
- Functional characterization of *Lactobacillus rhamnosus* GG mucus-binding proteins. 4th Finnish Gut Day. (Nov. 12/2010) Biomedicum, Helsinki, FINLAND
- Comparative genomics brings to light a piliated probiotic *Lactobacillus* strain. Advanced PhD-training Course: Next Generation Genomics. (Jan. 14-15/2010) University of Helsinki, Helsinki, FINLAND
- Characterization of *Lactobacillus rhamnosus* GG as a piliated probiotic isolate. The University of Helsinki Center of Excellence in Microbial Food Safety Research (MiFoSa) Seminar and Retreat. (Aug. 25-26/2009) Lammi Biological Station, Lammi, FINLAND
- From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG (LGG). The ELVIRA (Nutrition, Food, and Health Research Program) Annual Seminar on Nutrigenomics and Utilizing Postgenomic and Related Technologies in Nutrition and Food Studies. (Mar. 19/2009) Sokos Hotel Vantaa, Vantaa, FINLAND

Conference/symposium participation (with presented poster or as public seminar speaker)

- **2011:** Annual Seminar of ELVIRA (Research Program on Nutrition, Food, and Health), Hotelli Crowne Plaza, Helsinki, FINLAND (*poster and speaker*)
- **2010:** 4th Finnish Gut Day, Biomedicum, Helsinki, FINLAND (*poster and speaker*)
- **2009:** The ELVIRA (Nutrition, Food, and Health Research Program) Annual Seminar on Nutrigenomics and Utilizing Postgenomic and Related Technologies in Nutrition and Food Studies, Sokos Hotel Vantaa, Vantaa, FINLAND (*poster and speaker*)
- **2008:** 9th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS (*poster*)
- **2008:** The ELVIRA (Nutrition, Food, and Health Research Program) Annual Seminar, Hotel Presidentti Auditorium, Helsinki, FINLAND (*poster*)
- **1999:** 3rd Carbohydrate Bioengineering Meeting, University of Newcastle Upon Tyne, Newcastle, UNITED KINGDOM (*poster*)
- **1997:** 1st Annual Conference of the Swedish Structural Biology Network (SBNet), Tällberg, SWEDEN (*poster*)
- **1990:** 40th Annual Canadian Society of Microbiology Meeting, University of Calgary, Calgary, Alberta, CANADA (*poster*)
- **1988:** 31st Annual Meeting for the Canadian Federation of Biological Societies, University of Laval, Quebec City, Quebec, CANADA (*poster*)
- **1987:** International Symposium on Free Radicals in Health and Disease, St. Boniface General Hospital Research Center, Winnipeg, Manitoba, CANADA (*poster*)

Professional memberships

- LOIMU (The Union of Professionals in Natural, Environmental and Forestry Sciences)
- American Society for Microbiology
- The Docents' Association of the University of Helsinki

Appointments

- Title of Docent (Adjunct Professor) in Molecular Microbiology at the Faculty of Veterinary Medicine (University of Helsinki)

Awards and funding

- Dean of Science Honor List (1982, 1983, and 1984)
- Natural Sciences and Engineering Research Council of Canada (NSERC) Postgraduate Scholarship (1990)
- University of Manitoba Graduate Fellowship (1991)
- NSERC Industrial Postdoctoral Fellowship (1993); *declined*
- Author of the Academy of Finland-funded research grant No. 277362 entitled "Understanding the molecular mechanisms of gut commensal colonization, pathogen exclusion, and host-microbe interplay" (Sept. 01/2014 to Aug. 31/2018)

Number of research publications

- Peer-reviewed: **37**
- Non peer-reviewed: **4**
- Patents: **2**

Citation statistics (calculated according to Google Scholar on September 15/2017)

- Number of citations: **2151**
- h-index: **22**
- i10-index: **28**

E. OTHER RELEVANT INFORMATION**Acquired research-related skills**

Lactococcal cloning and expression of Gram-positive pili; Immunogold-labeling for electron microscopy; Purification of pilus fibers by antibody-affinity chromatography; Production and purification of pilin-specific polyclonal antibodies; Bacterial cloning, expression, and purification of histidine-tagged pilin subunit and other sortase-anchored proteins from *Lactobacillus rhamnosus* GG; Bacterial cloning, expression, and purification of histidine-tagged human-derived domain proteins (PDZs, GluRs, expansin); Crystallization screening and production of x-ray diffracting protein crystals; Routine use of protein structure viewing programs (PyMol); microtiter plate binding assay development (PDZs); Bacterial expression and purification of GFP-tagged domain proteins (GluRA); Bacterial cloning, periplasmic expression, and purification of soluble Fab fragments (histidine-tagged); Intracellular expression of Fab fragments in the Origami *E.coli* strain (histidine-tagged, biotin-tagged); Use of phage display technology to generate antibody fragments; Cloning and expression in *E. coli*, yeast, *Trichoderma reesei*, *Aspergillus oryzae* (cellulases); Protein variant construction by rational design or directed evolution; Cellulase variant purification and kinetic analysis; Fungal transformation and cloning techniques (*Trichoderma reesei*, *Aspergillus oryzae*); Insect cell-baculovirus recombinant protein expression (fungal cellulase); Mammalian cell culturing and DNA transfection methodologies; Fermenter-scale (20 L) yeast cultivation (recombinant protein expression studies); Scale-up purification studies (copper chelating chromatography and HPLC); General biochemical characterization (1- and 2-D SDS-PAGE, immunoblotting, autoradiography, analytical IEF, activity and binding assays, etc.); Generation of hybridoma monoclonal antibodies; Large-scale purification of polyclonal antibodies; Routine bacterial cloning, DNA sequencing, PCR, *in vitro* mutagenesis; Production and kinetic characterization of amino acid-substituted catalase variants; Use of sequence analysis programs for phylogenetic reconstructions; purification of native myxococcal membrane proteins; Iodination (¹²⁵I) of membrane proteins; Cultivation of developmentally regulated bacterial cells.

F. PUBLICATION LIST**Peer-reviewed publications**

von Ossowski I (2017) Novel molecular insights about lactobacillar sortase-dependent piliation. Int J Mol Sci 18(7):1551

Mishra AK, Megta AK, Palva A, **von Ossowski I**, Krishnan V (2017) Crystallization and X-ray diffraction analysis of SpaE, a basal pilus protein from gut-adapted *Lactobacillus rhamnosus* GG. Acta Crystallogr F Struct Biol Commun F73:321-327

Kant R, Palva A, **von Ossowski I**^a (2017) An *in silico* pan-genomic probe for the molecular traits behind *Lactobacillus ruminis* gut autochthony. PLoS ONE 12(4):e0175541

Yu X, Åvall-Jääskeläinen S, Koort J, Lindholm A, Rintahaka J, **von Ossowski I**, Palva A, Hynönen U (2017) A comparative characterization of different host-sourced *Lactobacillus ruminis* strains and their adhesive, inhibitory, and immunomodulating functions. *Front Microbiol* 8:657

Chaurasia P, Pratap S, **von Ossowski I**, Palva A, Krishnan V (2016) New insights about pilus formation in gut-adapted *Lactobacillus rhamnosus* GG from the crystal structure of the SpaA backbone-pilin subunit. *Sci Rep* 6:28664

Kant A, **von Ossowski I**, Palva A, Krishnan V (2016) Crystallization and X-ray crystallographic analysis of the adhesive SpaC pilin subunit in the SpaCBA pilus of gut-adapted *Lactobacillus rhamnosus* GG. *Protein Pept Lett* 23:365-371

Yu X, Jaatinen A, Rintahaka J, Hynönen U, Lyytinen O, Kant R, Åvall-Jääskeläinen S, **von Ossowski I**^a, Palva A^a (2015) Human gut-commensalic *Lactobacillus ruminis* ATCC 25644 displays sortase-assembled surface piliation: Phenotypic characterization of its fimbrial operon through *in silico* predictive analysis and recombinant expression in *Lactococcus lactis*. *PLoS ONE* 10(12):e0145718

Chaurasia P, **von Ossowski I**, Palva A, Krishnan V (2015) Purification, crystallization, and preliminary X-ray diffraction analysis of SpaD, a backbone-pilin subunit encoded by the fimbrial *spaFED* operon in *Lactobacillus rhamnosus* GG. *Acta Crystallogr F Struct Biol Commun* F71:103-106

Vargas García CE, Petrova M, Claes IJJ, De Boeck I, Verhoeven TLA, Dilissen E, **von Ossowski I**, Palva A, Bullens DM, Vanderleyden J, Lebeer S (2015) Piliation of *Lactobacillus rhamnosus* GG promotes adhesion, phagocytosis, and cytokine modulation in macrophages. *Appl Environ Microbiol* 81:2050-2062

Ganguli K, Collado MC, Rautava J, Lu L, Satokari R, **von Ossowski I**, Reunanen J, de Vos WM, Palva A, Isolauri E, Salminen S, Walker WA, Rautava S (2015) *Lactobacillus rhamnosus* GG and its SpaC pilus adhesin modulate inflammatory responsiveness and TLR-related gene expression in the fetal human gut. *Pediatr Res* 77:528-535

Rintahaka J, Yu X, Kant R, Palva A^a, **von Ossowski I**^a (2014) Phenotypical analysis of the *Lactobacillus rhamnosus* GG fimbrial *spaFED* operon: Surface expression and functional characterization of recombinant SpaFED pili in *Lactococcus lactis*. *PLoS ONE* 9(11):e113922

Kant R, Rintahaka J, Yu X, Sigvart-Mattila P, Paulin L, Mecklin J-P, Saarela M, Palva A^a, **von Ossowski I**^a (2014) A comparative pan-genome perspective of niche-adaptable cell-surface protein phenotypes in *Lactobacillus rhamnosus*. *PLoS ONE* 9(7):e102762

Lähteinen T, Lindholm A, Rinttilä T, Junnikkala S, Kant R, Pietilä TE, Levonen K, **von Ossowski I**, Solano-Aguilar G, Jakava-Viljanen M, Palva A (2014) Effect of *Lactobacillus brevis* ATCC8287 as a feeding supplement on the performance and immune function of piglets. *Vet Immunol Immunopathol* 158:14-25

Douillard FP, Rasinkangas P, **von Ossowski I**, Reunanen J, Palva A, de Vos WM (2014) Functional identification of conserved residues involved in *Lactobacillus rhamnosus* GG sortase specificity and pilus biogenesis. *J Biol Chem* 289:15764-15775

Singh D, **von Ossowski I**, Palva A, Krishnan V (2013) Purification, crystallization and preliminary crystallographic analysis of the SpaA backbone-pilin subunit from probiotic *Lactobacillus rhamnosus* GG. *Acta Crystallogr Sect F Struct Biol Cryst Commun* F69:1182-1185

von Ossowski I^{a,b}, Pietilä TE^b, Rintahaka J^b, Nummenmaa E, Mäkinen V-M, Reunanen J, Satokari R, de Vos WM, Palva I, Palva A^a (2013) Using recombinant lactococci as an approach to dissect the immunomodulating capacity of surface piliation in probiotic *Lactobacillus rhamnosus* GG. *PLoS ONE* 8(5):e64416

Tripathi P, Beaussart A, Alsteens D, Dupres V, Claes I, **von Ossowski I**, de Vos W, Palva A, Lebeer S, Vanderleyden J, Dufrêne YF (2013) Adhesion and nanomechanics of pili from the probiotic *Lactobacillus rhamnosus* GG. *ACS Nano* 7:3685-3697

Douillard FP, Ribbera A, Kant R, Pietilä TE, Järvinen HM, Messing M, Randazzo CL, Paulin L, Laine P, Ritari J, Caggia C, Lähteinen T, Brouns SJJ, Satokari R, **von Ossowski I**, Reunanen J, Palva A, de Vos WM (2013) Comparative genomic and functional analysis of 100 *Lactobacillus rhamnosus* strains and their comparison with strain GG. *PLoS Genet* 9(8):e1003683

Douillard FP, Ribbera A, Järvinen HM, Kant R, Pietilä TE, Randazzo C, Paulin L, Laine PK, Caggia C, **von Ossowski I**, Reunanen J, Satokari R, Salminen S, Palva A, de Vos WM (2013) Comparative genomic and functional analysis of *Lactobacillus casei* and *Lactobacillus rhamnosus* strains marketed as probiotics. *Appl Environ Microbiol* 79:1923-1933

Claes IJJ, Schoofs G, Regulski K, Courtin P, Chapot-Chartier M-P, Rolain T, Hols P, **von Ossowski I**, Reunanen J, de Vos WM, Palva A, Vanderleyden J, De Keersmaecker SCJ, Lebeer S (2012) Genetic and biochemical characterization of the cell wall hydrolase activity of the major secreted protein of *Lactobacillus rhamnosus* GG. *PLoS One* 7(2):e31588

Lebeer S, Claes IJJ, Balog CIA, Schoofs G, Verhoeven TLA, Nys K, **von Ossowski I**, de Vos WM, Tytgat HLP, Agostinis P, Palva A, Van Damme, EJM, Deelder AM, De Keersmaecker SCJ, Wuhler M, Vanderleyden J (2012) The major secreted protein Msp1/p75 is O-glycosylated in *Lactobacillus rhamnosus* GG. *Microb Cell Fact* 11:15

Reunanen J, **von Ossowski I**, Hendrickx APA, Palva A, de Vos WM (2012) Characterization of the SpaCBA pilus fibers in the probiotic *Lactobacillus rhamnosus* GG. *Appl Environ Microbiol* 78:2337-2344

Lebeer S, Claes I, Tytgat HLP, Verhoeven TLA, Marien E, **von Ossowski I**, Reunanen J, Palva A, de Vos WM, De Keersmaecker SCJ, Vanderleyden J (2012) Functional analysis of *Lactobacillus rhamnosus* GG pili in relation to adhesion and immunomodulatory interactions with intestinal epithelial cells. *Appl Environ Microbiol* 78:185-193

von Ossowski I^a, Satokari R, Reunanen J, Lebeer S, De Keersmaecker SCJ, Vanderleyden J, de Vos WM, Palva A^a (2011) Functional characterization of a mucus-specific LPXTG surface adhesin from probiotic *Lactobacillus rhamnosus* GG. *Appl Environ Microbiol* 77:4465-4472

von Ossowski I^a, Reunanen J, Satokari R, Vesterlund S, Kankainen M, Huhtinen H, Tynkkynen S, Salminen S, de Vos WM, Palva A^a (2010) Mucosal adhesion properties of the probiotic *Lactobacillus rhamnosus* GG SpaCBA and SpaFED pilin subunits. *Appl Environ Microbiol* 76:2049-2057

Kankainen M^b, Paulin L^b, Tynkkynen S, **von Ossowski I^b**, Reunanen J, Partanen P, Satokari R, Vesterlund S, Hendrickx APA, Lebeer S, De Keersmaecker SJ, Vanderleyden J, Hämäläinen T, Laukkanen S, Salovuori N, Ritari J, Alatalo E, Korpela R, Mattila-Sandholm T, Lassig A, Hatakka K, Kinnunen KT, Karjalainen H, Saxelin M, Laakso K, Surakka A, Palva A, Salusjärvi T, Auvinen P, de Vos WM (2009) Comparative genomic analysis of *Lactobacillus rhamnosus* GG reveals pili encoding a human-mucus binding protein. *Proc Natl Acad Sci USA* 106:17193-17198

von Ossowski I, Oksanen E, von Ossowski L, Cai C, Sundberg M, Goldman A, Keinänen K (2006) Crystal structure of the second PDZ domain of SAP97 in complex with a GluR-A C-terminal peptide. *FEBS J* 273:5219-5229

von Ossowski L, Tossavainen H, **von Ossowski I**, Cai C, Aitio O, Fredriksson K, Permi P, Annala A, Keinänen K (2006) Peptide binding and NMR analysis of the interaction between SAP97 PDZ2 and GluR-A: Potential involvement of a disulfide bond. *Biochemistry* 45:5567-5575

von Ossowski I^b, Eaton JT^b, Czjzek M, Perkins SJ, Frandsen TP, Schulein M, Panine P, Henrissat B, Receveur-Brechot V (2005) Protein disorder: conformational distribution of the flexible linker in a chimeric double cellulase. *Biophys J* 88:2823-2832

von Ossowski I, Ståhlberg J, Koivula A, Piens K, Becker D, Boer H, Harle R, Harris M, Divne C, Mahdi S, Zhao Y, Driguez H, Claeysens M, Sinnott M, Teeri TT (2003) Engineering the exo-loop of *Trichoderma reesei* cellobiohydrolase, Cel7A. A comparison with *Phanerochaete chrysosporium* Cel7D. *J Mol Biol* 333:817-829

Ducros VMA, Tarling CA, Zechel DL, Brzozowski AM, Frandsen TP, **von Ossowski I**, Schulein M, Withers SG, Davies GJ (2003) Anatomy of glycosynthesis: Structure and kinetics of the *Humicola insolens* Cel7B E197A and E197S glycosynthase mutants. *Chem Biol* 10:619-628

Varrot A, Frandsen TP, **von Ossowski I**, Boyer V, Cottaz S, Driguez H, Schulein M, Davies GJ (2003) Structural basis for ligand binding and processivity in cellobiohydrolase Cel6A from *Humicola insolens*. *Structure* 11:855-864

von Ossowski I, Teeri T, Kalkkinen N, Oker-Blom C (1997) Expression of a fungal cellobiohydrolase in insect cells. *Biochem Biophys Res Commun* 233:25-29

Loewen PC, Switala J, **von Ossowski I**, Hillar A, Christie A, Tattre B, Nicholls P (1993) Catalase HPII of *Escherichia coli* catalyzes the conversion of protoheme to *cis*-heme d. *Biochemistry* 32:10159-10164

von Ossowski I, Hausner G, Loewen PC (1993) Molecular evolutionary analysis based on the amino acid sequence of catalase. *J Mol Evol* 37:71-76

Loewen PC, **von Ossowski I**, Switala J, Mulvey MR (1993) KatF (σ^S) synthesis in *Escherichia coli* is subject to posttranscriptional regulation. *J Bacteriol* 175:2150-2153

von Ossowski I, Mulvey MR, Leco PA, Borys A, Loewen PC (1991) Nucleotide sequence of *Escherichia coli katE*, which encodes catalase HPII. *J Bacteriol* 173:514-520

Non peer-reviewed publications

Yu X, Rintahaka J, Jaatinen A, Hynönen U, Åvall-Jääskeläinen S, Lindholm A, **von Ossowski I**, Palva A (2016) Phenotypic characterization of a lactobacillar fimbrial operon through recombinant expression in *Lactococcus lactis*. *J Clin Gastroenterol* 50(Suppl 2):S209

Chaurasia P, **von Ossowski I**, Palva A, Krishnan V (2015) X-ray diffraction analysis of two crystals forms of backbone pilin SpaA fragment from *Lactobacillus rhamnosus* GG. *J Proteins Proteom* 6(1):30

Reunanen J^b, **von Ossowski I**^b, de Vos WM, Palva A (2012) Adhesion of microbes to the intestinal surface: lessons from the paradigm probiotic *Lactobacillus rhamnosus* GG. *Jpn J Lactic Acid Bact* 23:7-13

Teeri TT, Divne C, Jones TA, Kleywegt G, Koivula A, Linder M, Ståhlberg J, **von Ossowski I**, Wohlfahrt G, Zou J-Y (1999) Engineering the catalytic and binding properties of the cellobiohydrolases from *Trichoderma reesei*, p. 303-308. In Gilbert HJ, Davies GJ, Henrissat B, and Svensson B (eds.), *Recent Advances in Carbohydrate Bioengineering*. The Royal Society of Chemistry, Cambridge, UNITED KINGDOM

Patents

de Vos, WM, Palva A, Palva I, Reunanen J, **von Ossowski I**, Satokari R, Vesterlund S, Kankainen M, Salusjärvi T, Tynkkynen S (2010) Novel peptides and methods for producing them. WO2010086512; US2010196524

Pedersen H, Lamsa M, Hansen PK, Frisner H, Vind J, Ernst S, Kongsbak L, Jørgensen BR, Beck TC, Husum TL, **von Ossowski I** (2001) Microtiter plate (MTP) based high throughput screening (HTS) assays. WO0132844; EP1230348; CA2388982; AU7646200

Poster presentation co-authorships

Yu X, Rintahaka J, Jaatinen A, Hynönen U, Åvall-Jääskeläinen S, Lindholm A, **von Ossowski I**, Palva A (2015) Phenotypic characterization of a lactobacillar fimbrial operon through recombinant expression in *Lactococcus lactis*. 8th Probiotics, Prebiotics & New Foods: for microbiota and human health. Università Urbaniana, Rome, ITALY; *non-attendee*

Yu X, Rintahaka J, Jaatinen A, Hynönen U, Lindholm A, **von Ossowski I**, Palva A (2014) Phenotypic characterization of a lactobacillar fimbrial operon through recombinant expression in *Lactococcus lactis*. 11th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS; *non-attende*

von Ossowski I, Pietilä TE, Rintahaka J, Nummenmaa E, Mäkinen V-M, Reunanen J, Satokari R, de Vos WM, Palva I, Palva A (2013) Using recombinant lactococci constructs as a molecular tool to dissect the immunomodulating capacity of surface piliation in *Lactobacillus rhamnosus* GG. 10th International Veterinary Immunology Symposium, Università degli Studi di Milano, Milan, ITALY; *non-attende*

von Ossowski I, Pietilä TE, Rintahaka J, Nummenmaa E, Mäkinen V-M, Reunanen J, Satokari R, de Vos WM, Palva I, Palva A (2013) Using recombinant lactococci constructs as a molecular tool to dissect the immunomodulating capacity of surface piliation in *Lactobacillus rhamnosus* GG. 15th International Congress of Immunology, MiCo Milano Congressi, Milan, ITALY; *non-attende*

Ganguli K, Collado MC, Satokari R, Rautava J, Palva A, **von Ossowski I**, Reunanen J, de Vos W, Isolauri E, Salminen S, Walker WA, Rautava S (2013) *Lactobacillus rhamnosus* GG modulates immune gene expression and inflammatory responses in the fetal human gut. Pediatric Academic Societies Annual Meeting 2013, Walter E. Washington Convention Center, Washington, D.C., UNITED STATES OF AMERICA; *non-attende*

Claes I, Segers M, **von Ossowski I**, Reunanen J, Palva A, de Vos W, Vanderleyden J, De Keersmaecker S, Lebeer S (2011) Two major secreted proteins as probiotic effectors of *Lactobacillus rhamnosus* GG. Microbes for Health: 2nd International Symposium, Institut Pasteur, Paris, FRANCE; *non-attende*

Lebeer S, Claes IJJ, Balog CIA, Schoofs G, Verhoeven TLA, **von Ossowski I**, Tytgat HLP, De Keersmaecker SCJ, Wuhler M, Vanderleyden J (2011) The major secreted protein Msp1/p75 is O-glycosylated in *Lactobacillus rhamnosus* GG. 13th Gut Day Symposium, Wageningen University, Wageningen, NETHERLANDS; *non-attende*

Vargas C, Lebeer S, Claes I, Petrova M, Deforche L, Kasran A, Coorevits L, Dilissen E, Segers M, Tytgat H, **von Ossowski I**, De Keersmaecker S, Bullens D, Vanderleyden J (2011) Immunomodulatory role of the pili of *Lactobacillus rhamnosus* GG in dendritic cells. 10th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS; *non-attende*

Segers M, Lebeer S, Claes I, Petrova M, Verhoeven T, **von Ossowski I**, De Keersmaecker S, Vanderleyden J (2011) The interaction between *Lactobacillus rhamnosus* GG extracellular proteins and Toll-like receptors. 10th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS; *non-attende*

Pietilä T, **von Ossowski I**, Reunanen J, Satokari R, de Vos WM, Palva A (2011) Activation of innate immune responses by heterologously expressed SpaCBA pili. 10th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS; *non-attende*

Rautava S, Satokari R, Nanthakumar N, Lu L, Reunanen J, **von Ossowski I**, de Vos WM, Palva A, Walker WA (2011) *Lactobacillus rhamnosus* GG pilus protein SpaC binds to intestinal epithelial cells and attenuates inflammatory responsiveness in the immature human gut. Pediatric Academic Societies and Asian Society for Pediatric Research (PAS/ASPR) 2011 Joint Meeting, Colorado Convention Center, Denver, Colorado, UNITED STATES OF AMERICA; *non-attende*

MolMecGG Consortium: Palva A, de Vos WM, Palva I, **von Ossowski I**, Reunanen J, Salminen S, Satokari R, Vesterlund S (2011) MolMecGG research project summary (From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG). Annual Seminar of ELVIRA (Research Program on Nutrition, Food, and Health), Hotelli Crowne Plaza, Helsinki, FINLAND

Reunanen J, **von Ossowski I**, de Vos WM, Palva A (2010) Structure of mucus-binding pili in *Lactobacillus rhamnosus* GG. 4th Finnish Gut Day, Biomedicum, Helsinki, FINLAND

Claes IJ, Lebeer S, Schoofs G, Depreeuw J, Rolain T, Hols P, **von Ossowski I**, Vanderleyden J, De Keersmaecker SC (2010) Cell wall hydrolase activity of the major secreted proteins of the probiotic *Lactobacillus rhamnosus* GG. 3rd American Society for Microbiology Conference on Beneficial Microbes, James L. Knight Center and Miami Convention Center, Miami, Florida, UNITED STATES OF AMERICA; *non-attende*

Lebeer S, Verhoeven TL, Marien E, **von Ossowski I**, Reunanen J, Tynkkynen S, de Vos WM, De Keersmaecker SC Vanderleyden J (2010) Reach out and touch down: the pili of the probiotic *Lactobacillus rhamnosus* GG are key adhesins that mediate immunomodulatory interactions with epithelial cells. 3rd American Society for Microbiology Conference on Beneficial Microbes, James L. Knight Center and Miami Convention Center, Miami, Florida, UNITED STATES OF AMERICA; *non-attende*

Reunanen J, **von Ossowski I**, de Vos WM, Palva A (2010) Structure of mucus-binding pili in *Lactobacillus rhamnosus* GG. 13th International Society for Microbial Ecology Conference, Washington State Convention and Trade Center, Seattle, Washington, UNITED STATES OF AMERICA; *non-attende*

von Ossowski I, de Vos WM, Satokari R, Reunanen J, Kojo K, Vesterlund S, Huhtinen H, Kankainen M, Tynkkynen S, Salminen S, Palva A (2008) From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG (LGG). 9th Symposium on Lactic Acid Bacteria, Hotel Zuiderduin, Egmond aan Zee, NETHERLANDS

von Ossowski I, Satokari R, Kojo K, Vesterlund S, Reunanen J, Huhtinen H, Salminen S, de Vos WM, Palva A (2008) From secretome to interactome: molecular analysis of probiotic mechanisms of *Lactobacillus rhamnosus* GG (LGG) – An introduction and the present status. The ELVIRA (Nutrition, Food, and Health Research Programme) Annual Seminar, Hotel Presidentti Auditorium, Helsinki, FINLAND

Varrot A, Frandsen TP, **von Ossowski I**, Fort S, Boyer V, Fruchard S, Driguez H, Davies GJ (2002) Thiooligosaccharides: probes for the study of glycoside hydrolases mechanism. 21st

International Carbohydrate Symposium, Cairns Convention Centre, Cairns, AUSTRALIA; *non-attendee*

Ståhlberg J, Koivula A, Wolhfahrt G, Boer H, **von Ossowski I**, Mäntylä A, Suominen P, Fagerström R, Jones TA, Harris M, Mahdi S, Divne C, Zou J-Y, Puls J, Sinnott M, Becker D, Claeysens M, Piens K, Nerinckx W, Vasella A, Pipelier M, Vonhoff S, Lorthois E, Teeri TT (2001) Engineering the catalytic properties of *Trichoderma reesei* cellobiohydrolases: Summary of an EU-project. 4th Carbohydrate Bioengineering Meeting, Royal Institute of Technology, Stockholm, SWEDEN; *non-attendee*

Frandsen TP, Henrissat B, Ernst S, **von Ossowski I**, Andersen KV, Schüle M (1999) Stopped-flow fluorescence investigation of cellulase: Substrate interactions using cellobiohydrolase Cel6A and endoglucanase Cel6B from *Humicola insolens*. 3rd Carbohydrate Bioengineering Meeting, University of Newcastle Upon Tyne, Newcastle, UNITED KINGDOM

von Ossowski I, Teeri T, Kalkkinen N, Oker-Blom C (1997) Expression of a fungal cellobiohydrolase in insect cells. 1st Annual Conference of the Swedish Structural Biology Network (SBNet), Tällberg, SWEDEN

von Ossowski I, Switala J, Hillar A, Tattrie B, Nicholls P, Loewen P (1993) Probing the active site of *E. coli* Catalase HPII by site-directed mutagenesis. 36th Annual Meeting for the Canadian Federation of Biological Societies, Cleary International Centre, Windsor, Ontario, CANADA; *non-attendee*

von Ossowski I, Sorby PA, Mulvey MR, Loewen PC (1990) Characterization and sequencing of *katE* from *E. coli*. 40th Annual Canadian Society of Microbiology Meeting, University of Calgary, Calgary, Alberta, CANADA

von Ossowski I, Campbell C, Friesen AD, Langstaff JM (1988) Purification and characterization of human Cu/Zn superoxide dismutase from yeast. 31st Annual Meeting for the Canadian Federation of Biological Societies, University of Laval, Quebec City, Quebec, CANADA

von Ossowski I, Campbell C, Friesen AD, Langstaff JM (1987) Production of high levels of human Cu/Zn superoxide dismutase in yeast. International Symposium on Free Radicals in Health and Disease, St. Boniface General Hospital Research Center, Winnipeg, Manitoba, CANADA

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