

JORIS BELD

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Objective

To develop a leading graduate research program in chemical biology with a focus on expanding the understanding of primary and secondary metabolism.

Personal details

Titles: Ph. D. in Sciences and M. Sc. in Chemical Engineering
Nationality: Dutch
Birthdate: 15th of February 1978

Education and Employment

Postdoctoral Fellow | Michael D. Burkart laboratory | UC San Diego | 2009 - current

Involved in several projects amongst which: Selenium as an NMR probe for acyl carrier protein dynamics; Solvatochromic dyes as probes for acyl carrier protein dynamics and domain-interactions in fatty acid biosynthesis; and Manipulating fatty acid biosynthesis in cyanobacteria and microalgae.

Ph.D. Degree in Chemistry | Donald Hilvert laboratory | ETH Zürich | 2004 - 2009

Dissertation title: Selenocysteine as a probe of oxidative protein folding. In this project we synthesized selenogluthathione, a selenocysteine-containing derivative of glutathione, and discovered its catalytic activity in oxidative protein folding. This activity extends to other small molecule diselenides, enabling the folding of a large variety of therapeutically relevant proteins. In vivo, these diselenides are able to complement the deficiency of an essential foldase in bacteria.

M.S. Degree in Chemical Engineering | Dr. David Reinhoudt | University of Twente | 1999 - 2003

Master's of Science degree in Chemical Engineering with Prof. David Reinhoudt, Supramolecular Chemistry and Technology, part of MESA+ Nanotechnology Institute, University of Twente, Enschede, The Netherlands. Thesis title: Anion sensing by fluorescence using self assembled monolayers on glass. Facile construction of ordered monolayers on glass and functionalization with various moieties enabled us to sense low concentrations of various cations and anions.

Apprenticeship | Dr. Peter Timmerman | Pepscan Systems B.V. | 2001 - 2002

Project title: Binding bodies. Discovery of a novel, cheap and facile way to cyclize cysteine containing peptides, in solution and on solid phase, enabled us to generate large cyclic peptide library arrays, which were used for antigen-antibody (epitope mapping) interaction screens.

B.S. Degree in Chemical Engineering | University of Twente | 1995 - 1997

1997-1995 Bachelor's of Science degree in Chemical Engineering, University of Twente, Enschede, The Netherlands.

Teaching

2009 Teaching Assistant General Chemistry, Organic Chemistry II, ETH Zurich
2006-2007 Teaching Assistant Biological Chemistry, ETH Zurich
2005-2007 Master's student supervisor, ETH Zurich

Publications

- Cahill, J. F., Darlington, T. K., Fitzgerald, C., Shoepf, N., Beld, J., Burkart, M. D. and Prather, K. A., Introduction of a single cell mass spectrometer (SCMS) for rapid analysis of single algal and cyanobacteria cells; *submitted*
- Sonnenschein, E. C., Beld, J., Vickery, C. R., McCulloch, I.P. and Burkart, M.D., Dissecting a modular synthase: Bpsa, a case study; expected submission January 2015
- Beld, J., Abbriano, R., Hildebrand, M. and Burkart, M.D., Probing fatty acid biosynthesis using chemistry, in bacteria, cyanobacteria, green microalgae and diatoms; expected submission December 2014
- Lee, D. J., Beld, J. and Burkart, M.D., The acyl carrier protein is a molten globule; expected submission December 2014
- Beld, J., Mrse, A., Burkart, M.D., Selenium as a probe for acyl carrier protein dynamics; expected submission December 2014
- Paz-Yepes, J., Beld, J., Burkart, M. D. and Palenik, B., Grazing on marine *Synechococcus* by new marine heterotrophic nanoflagellate isolates, *submitted August 2014*
- Tran, M., Seno Ferreira, L., Beld, J., Burkart, M.D. and Mayfield, S. P., Oxidative protein folding in the eukaryotic algae *C. reinhardtii* for heterologous protein expression; *submitted July 2014*
- Beld, J., Cang, H., Burkart, M.D., Visualizing the chain-flipping mechanism in fatty acid biosynthesis, *Angewandte Chemie*, *accepted September 2014*, DOI: 10.1002/anie.201408576
- Beld, J., Lee, D. J. and Burkart, M.D., Understanding the chemical and synthetic biology behind fatty acid biosynthesis, *Molecular Biosystems*, *accepted publication*
- Beld, J., Finzel, K. and Burkart, M.D., Versatility of acyl-ACP synthetases *Chemistry & Biology*, <http://dx.doi.org/10.1016/j.chembiol.2014.08.015>,
highlighted <http://dx.doi.org/10.1016/j.chembiol.2014.10.005>
- Beld, J., Sonnenschein, E.C., Vickery, R.V., Noel, J.P. and Burkart, M.D., The Phosphopantetheinyl Transferases: Catalysis of a Posttranslational Modification Crucial for Life, *Natural Products Reports*, 31, 61-108 (2014)
- Bruegger, J., Caldara, G., Beld, J., Burkart, M.D. and Tsai, S.-C. Polyketide Synthase: Sequence, structure, function in Natural Products: Discourse, Diversity and Design, ISBN: 978-1-118-29806-0 (2014)
- Bruegger, J., Haushalter, R., Vagstad, A., Beld, J., Shakya, G., Mih, N., Townsend, C.A., Burkart, M.D. and Tsai, S.-C. Probing the Selectivity and Protein-Protein Interactions of a Nonreducing Fungal Polyketide Synthase Using Mechanism-Based Crosslinkers. *Chemistry & Biology* 20, 1135-1146 (2013) see corrigendum
- Beld, J., Blatti, J.L., Behnke, C., Mendez, M., and Burkart, M.D. Evolution of acyl-ACP thioesterases and β -ketoacyl-ACP synthases revealed by protein-protein interactions, *Journal of Applied Phycology*, 1-11 (2013)
- Blatti, J.L., Beld, J., Behnke, C., Mendez, M., Mayfield, S.P. and Burkart, M.D., Manipulating fatty acid biosynthesis in microalgae through protein-protein interactions, *PLoS One*, 7, e42949 (2012)
- Metanis, N., Foletti, C., Beld, J. and Hilvert, D. Rescue of kinetically trapped intermediates in oxidative protein folding by selenogluthathione, *Israel Journal of Chemistry*, 51, 953-959 (2011)
- Metanis, N., Beld, J. and Hilvert, D. The chemistry of selenocysteine. *Patai's chemistry of functional groups*, edited by Z. Rappoport (2011)
- Beld, J. Woycechowsky, K. J., and Hilvert, D. Diselenides as universal oxidative folding catalysts of diverse proteins, *Journal of Biotechnology*, 150, 481-489 (2010)

- Beld, J., Woycechowsky, K.J., and Hilvert, D. Small molecule diselenides catalyze oxidative protein folding in vivo, *ACS Chemical Biology*, 5, 177-182 (2009) cover art: "In contrast to disulfides, small amounts of exogenously added diselenide restore motility, and cells swim to the edge of soft agar plates."
- Beld, J., Woycechowsky, K.J., and Hilvert, D. Diselenide resins for oxidative protein folding, patent application EP09013216 (2009)
- Coquiere, D., Bos, J., Beld, J. and Roelfes, G., Enantioselective artificial metalloenzymes based on a bPP Scaffold, *Angewandte Chemie International Edition*, 121, 6894-6897 (2009)
- Beld, J., Woycechowsky, K. J., and Hilvert, D. Catalysis of oxidative protein folding by small-molecule diselenides, *Biochemistry* 47, 6985-6987 (2008)
- Beld, J., Woycechowsky, K.J., and Hilvert, D. Selenocysteine as a probe of oxidative protein folding, *Oxidative folding of Proteins and Peptides*, edited by J. Buchner and L. Moroder, Royal Society of Chemistry (2008)
- Steinmann, D., Nauser, T., Beld, J., Tanner, M., Günther, D., Bounds, P. L., Koppenol, W. H. Kinetics of tyrosyl radical reduction by selenocysteine, *Biochemistry* 47, 9602-9607 (2008)
- Beld, J., Woycechowsky, K. J., and Hilvert, D. Selenogluthathione: Efficient oxidative protein folding by a diselenide, *Biochemistry* 46, 5382-5390 (2007)
- Timmerman, P., Beld, J., Puijk, W. C., and Meloen, R. H. Rapid and quantitative cyclization of multiple peptide loops onto synthetic scaffolds for structural mimicry of protein surfaces, *ChemBioChem* 6, 821-824 (2005)
- Basabe-Desmonts, L., Beld, J., Zimmerman, R. S., Hernando, J., Mela, P., García Parajo, M. F., Van Hulst, N. F., Van Den Berg, A., Reinhoudt, D. N., and Crego-Calama, M. A simple approach to sensor discovery and fabrication on self-assembled monolayers on glass, *J. Am. Chem. Soc.* 126, 7293-7299 (2004)
- Timmerman, P., Beld, J., Meloen, R. H., and Puijk, W. C. Method for selecting a candidate drug compound, International patent WO-2004-077062 (2004)

Selected Presentations

- Beld, J. Interrogating the fatty acid synthase in bacteria and algae, Hilvert Group Reunion, Zurich, Switzerland (June 2014), oral presentation
- Beld, J. Cang, H., Burkart, M. D., Visualizing the chain-flipping mechanism in fatty acid biosynthesis, GRC Bioorganic, Proctor Academy (June 2014), poster presentation
- Lee, D. J., Beld, J., Vuong, H., Vickery, C. and Burkart, M. D., The dynamic acyl carrier protein: chain length effects and protein-protein interactions, GRC Bioorganic, Proctor Academy (June 2014), poster presentation
- Beld, J. Interrogating the fatty acid synthase in bacteria and algae, NOBCCHe, San Diego, USA (March 2014), <http://ucsd.academia.edu/NOBCCHeUCSD>, oral presentation
- Beld, J., Schoepp, N., Pu, Y. and Burkart, M. D., Algae research in the Burkart Lab: Metabolic food for thought, CALCAB Symposium, San Diego (January 2014), poster
- Ferreira-Camargo, L., Tran, M., Tusakul, L., Beld, J., Burkart, M. D., Mayfield, S. P., Chemical and biological strategies for protein accumulation in *Chlamydomonas reinhardtii* chloroplasts, CALCAB Symposium, San Diego (January 2014), poster, award received
- Beld, J. Probes for fatty acid synthase dynamics, Natural Product Affinity Group (NPAG), San Diego, USA (February 2013), <http://npag.ucsd.edu>, oral presentation
- Beld, J. Fatty acid synthase evolution teaches us protein-protein interactions, San Diego Center for Algae Biotechnology (SDCAB), San Diego, USA (January 2013), <http://algae.ucsd.edu/student-postdoc-symposiums.html>, oral presentation

- Beld, J. and Burkart, M.D., Tuning fatty acid biosynthesis in algae by redox chemistry, San Diego Center for Algae Biotechnology (SDCAB), San Diego, USA (March 2012), oral presentation
- Beld, J., Woycechowsky, K.J., Hilvert D. Diselenides catalyze protein folding in vivo, Natural Product Affinity Group (NPAG), San Diego, USA (September 2010), oral presentation
- Beld, J., Woycechowsky, K.J., Hilvert, D. Diselenides are oxidative protein folding catalysts in vivo, EUCHEM conference on stereochemistry - Bürgenstock, Brunnen, Switzerland (May 2009)
- Beld, J., Woycechowsky, K.J., Hilvert, D. Catalysis of oxidative protein folding by diselenides, EMBL conference on Chemical Biology 2008, Heidelberg, Germany (October 2008)
- Beld, J., Woycechowsky, K.J., Hilvert, D. Efficient oxidative protein folding by selenogluthione, 1st Global Centre of Excellence Symposium on Bio-Environmental Chemistry, Osaka, Japan (January 2008) Poster presentation award received.
- Beld, J., Woycechowsky, K.J., Hilvert, D. Selenogluthione, ESF Research Conference on Probing the Molecular Basis of Protein Function through Chemistry, San Feliu de Guixols, Spain (October 2005)

Fellowships

- Netherlands Organisation for Scientific Research (NWO) Rubicon Postdoctoral fellowship (2009-2011)
- Swiss National Fund (SNF) Postdoctoral fellowship (2009) Declined funding due to concurrency of the NWO award.

Professional Skills

- Human tissue culture
- Gas chromatography and GCMS analysis of fatty acids and metabolites
- Computational protein-protein and substrate-enzyme docking
- Detailed (Bayesian) phylogenetic tree analyses
- Lipid and fatty acid assays (UV spectroscopy, fluorescence, lipid thin layer chromatography)
- Beckman XL-A analytical ultracentrifugation for protein molecular weight, oligomerization state and protein-protein binding efficiency determination
- Manual and automated solid phase peptide synthesis (ABI 433A)
- Multistep organic synthesis (including selenium synthesis)
- NMR spectroscopy (small molecule and protein)
- Protein (sub)cloning, expression and purification
- HPLC/LCMS analysis, repair and maintenance (Agilent, Waters and Thermo-Finnigan)
- Linked/non-linked computer System Administration (Linux, Macintosh, Windows)
- Behringer Simon lecture series coordination (<http://www.behringerSimonlecture.ethz.ch>)

Languages

- Fluent in Dutch, English and German
- Read and speak French

References

- Prof. Michael D. Burkart (Postdoc advisor at University of California San Diego), Department of Chemistry and Biochemistry, University of California San Diego, +1 858 534 5673, e-mail: mburkart@ucsd.edu
- Prof. Donald Hilvert (PhD advisor at ETH Zurich), Laboratory of Organic Chemistry, ETH Zurich, +41 44 632 3176, e-mail: hilvert@org.chem.ethz.ch
- Prof. Kenneth Woycechowsky, University of Utah, kwoycech@chem.utah.edu (moved in 2014 to Tianjin University, China)