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Propositions

Associated with the PhD thesis

Structure-function relationships of (prebiotic) carbohydrates and their selective consumption by probiotic bacteria

By Markus Böger

1. Identification of enzymes and transporters involved in bacterial carbohydrate metabolism is essential for understanding beneficial effects of prebiotics on probiotic bacteria. (Chapter 1)
2. To understand cross-feeding among probiotic lactobacilli on commercial prebiotic FOS/inulin, detailed structural characterization of FOS/inulin substrates is needed. The presence of either GF- (glucose-ending) or FF-type (fructose-ending) compounds leads to different (cross-feeding) events (GF-type cross-feeding; FF-type no cross-feeding). (Chapter 2)
3. The three-dimensional structure of the endo-galactanase from *Bacteroides thetaiotaomicron* (BTGH53) shows that BTGH53 lacks additional binding sites as compared to the known structure of the endo-galactanase of *Bacillus licheniformis*. The BTGH53 enzyme releases GOS/galactan degradation products with DP ≤2 that may come available for bacterial cross-feeding in the human gut. (Chapter 3)
4. Prebiotic pGOS (purified GOS) comprises branched and linear molecules with degree of polymerization (DP) ranging from 2–6. Lactobacilli tested mostly use DP 2–3 GOS employing genes of lactose utilization pathways. Bifidobacteria tested show strain dependent differences but generally use DP 2–6 GOS, employing genes of lactose and galactan utilization pathways. (Chapter 4)
5. Using the cell-associated 4,6-α-glucanotransferase GtfB, *Lactobacillus reuteri* 121 produces homoexopolysaccharides from starch and maltodextrins that are degraded by probiotic bifidobacteria employing extracellular amylopullulanase enzymes. (Chapter 5)
6. (Commercial) prebiotic mixtures require synergistic action of multiple probiotic bacteria to be entirely degraded providing ample opportunities for development of novel synbiotics. (This thesis)
7. Conducting your PhD studies demands a great level of personal independence that brings out your real talents.
8. Culturally diverse working environments require an open inclusive communication style that allows everyone to participate to his or her best abilities.
9. Both, the Netherlands and Bavaria have a strong agricultural sector in common which makes it incredibly inspiring to work on food-related topics.
10. ‘I failed my way to success.’ (Thomas Edison). Failing is not bad, it teaches you important lessons, that you can make use of later.