TECHNISCHE UNIVERSITÄT DRESDEN

DRESDEN concept

Chair of Bioprocess Engineering

ScampiLys: production of lysine from shrimp waste for feed additives using a metabolically optimized *V. natriegens*

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Motivation

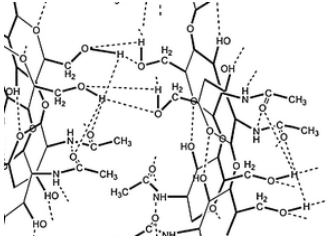
Production of L-lysine from shrimp waste for feed additives using a metabolically optimized *Vibrio natriegens* strain

fractionation

shrimp waste

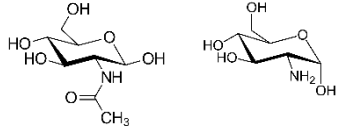
- protein (50 %)
- chitin (25 %)
- lipids
- minerals

chitin



hydrolysis

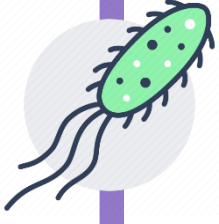
N-acetylglucosamine (GlcNAc), glucosamine (GlcN)



„ScampiLys“
biorefinery concept

fermentation

Vibrio natriegens



L-lysine

Applied Techniques

Engineering *V. natriegens* for efficient conversion of chitin monomers to L-lysine

Metabolic engineering

- enzyme engineering and characterization
- strain engineering
- genome mining

Systems biology and fermentation

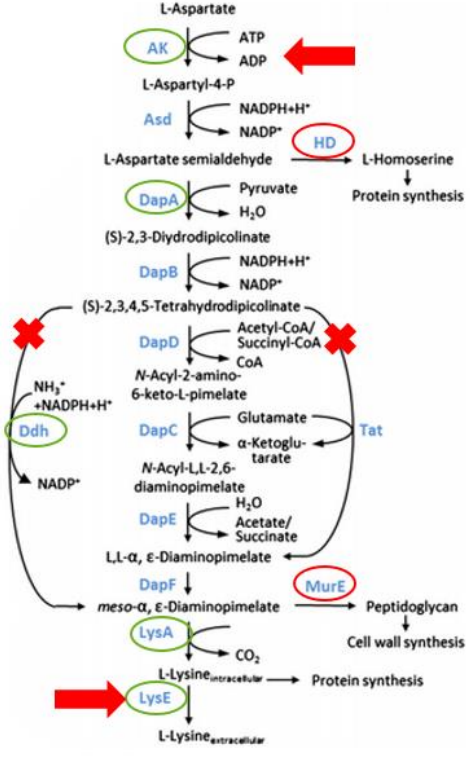
- shake flask and bioreactor cultivation
- 13C flux analysis

Analytics

- HPLC
- LC/MS

State of the project

Engineering *V. natriegens* for efficient conversion of chitin monomers to L-lysine



Strain engineering

- Removal of product feedback inhibiton and enzymatic bottlenecks
- Optimizing global metabolic carbon flux repartioning

Characterziation of *V. natriegens* physiology

- Growth on chitin monomers
- Regulation of substrate uptake

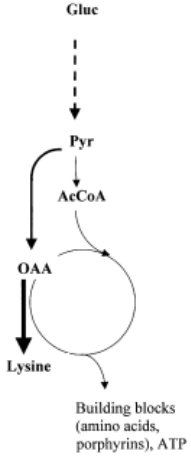
Optimization of fermentation conditions under lab conditions

- Systems-level analyses of lysine producers
- Optimization of cultivation conditions for high lysine production

Possible student projects

Cloning of mutant pyruvate carboxylase from *C. glutamicum* for increased lysine production

- Cg.pyc P132A shows increased L-lys titer and production in *C. glutamicum*
- Hypothesis: higher affinity to pyruvate leads to higher flux towards oxalacetate production
- *V. natriegens* lacks Pyc: Expression of Cg.pyc and Cg.pyc P132A should increase L-lys production



Engineering simultaneous glucose/glucosamine and acetate assimilation in *V. natriegens*

- identification of acetate metabolic pathways
- metabolic engineering of simultaneous uptake and strain screening