


Kick-off session: "Biotechnology  
for a sustainable bioeconomy"



Title: Biotechnological production of sustainable indole

Project acronym: INDIE

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- INDIE PARTNERS

- P1: Wageningen Plant Research, The Netherlands (prof. Dirk Bosch)
- P2: National Institute of Biology, Slovenia (prof. Kristina Gruden)
- P3: Bielefeld University, Germany (prof. Volker Wendisch)
- P4: Wageningen University, Germany, (prof. Vitor Martins dos Santos)
- P5: Axxence GmbH, Germany (dr. Peter van der Schaft)

- Total project budget: 1.009.000 (total requested funding: 888.000)

- Project start: 1<sup>st</sup> May 2018



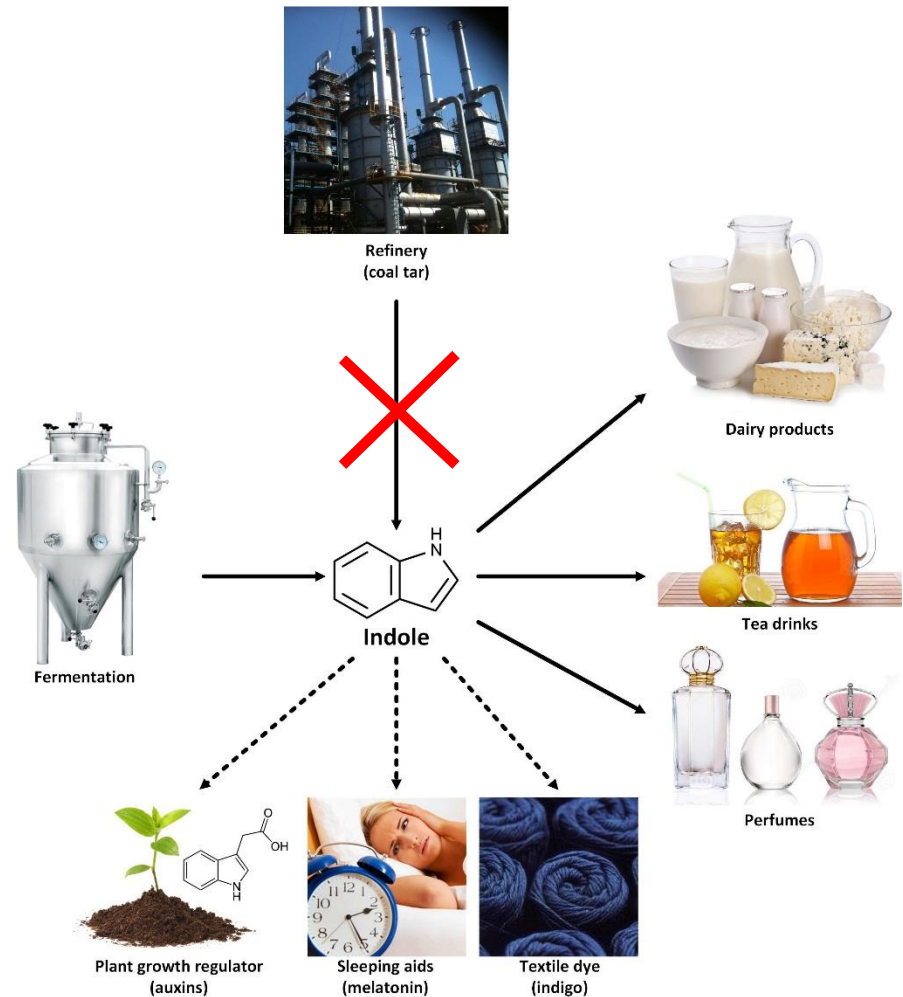
Aim: Fermentative production of  
INDOLE

Odour threshold value 140 ppb

Used in many flavour types from  
cheese to blackcurrant

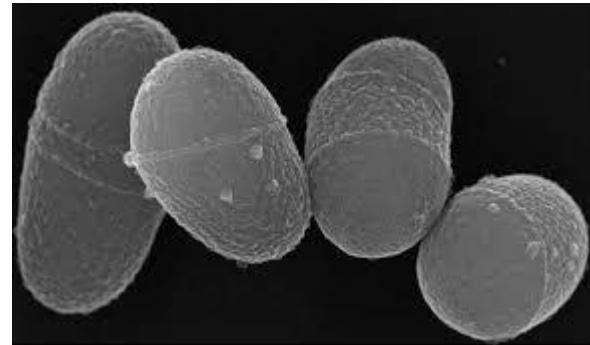
Used in fragrances for flowery  
(jasmine) impression at very low  
concentrations

Building block of other bioactive  
molecules



Host organism: *Corynebacterium glutamicum*

- G+ bacteria
- GRAS status
- well-known industrial amino acid producer *Corynebacterium glutamicum* (Glu, Lys)
- Engineered to produce succinate, lactate, PHB, isobutanol, ethanol, 1,2-propane diol, diamines
- Molecular biology tools available
- Genome-scale model available



## Scientific approach and project topic area

- Synthetic biology
  - Model-driven design
    - Genome-wide stoichiometric model of *C. glutamicum*
    - Modelling of orthogonal circuits and regulatory circuits
    - Modelling of growth parameters
  - Modular approach to pathway building
    - Metabolite overproduction modules
    - Regulatory modules
    - Indole tolerance engineering
- Standardisation of building bricks and assembly

## Scientific approach and project topic area

- Systems biology
  - Data integration of metabolomics and RNAseq data with the model
  - system-wide understanding of regulatory mechanisms limiting indole production
  - Iterative strain improvement
- Industrial biotechnology
  - Upscaling of indole production
  - Downstream processing protocols optimised
  - Quality evaluation of fermentative produced indole
  - LCA

What was proposed

- create a new sustainable process to produce natural indole

What should be achieved

- new microbial strains for production of indole available
- upscaling and DSP protocols developed
- sustainable industrial process
  
- Corynebacteria as a synthetic biology chassis for production of aromatic compounds
- Production and regulatory modules available for future use
- Models and systems biology tools developed for production of aromatic compounds in corynebacteria

Coordinator: Wageningen Plant Research

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