



ICEBE
IMAGINEERING
NATURE

Faculty of Technical Chemistry
Institute of Chemical,
Environmental and Biological
Engineering

Imagineering Nature - Closing Cycles:

Examples for a bio-based industry

Research Area Biochemical Technology

Univ. Prof. Dr. Robert L. Mach

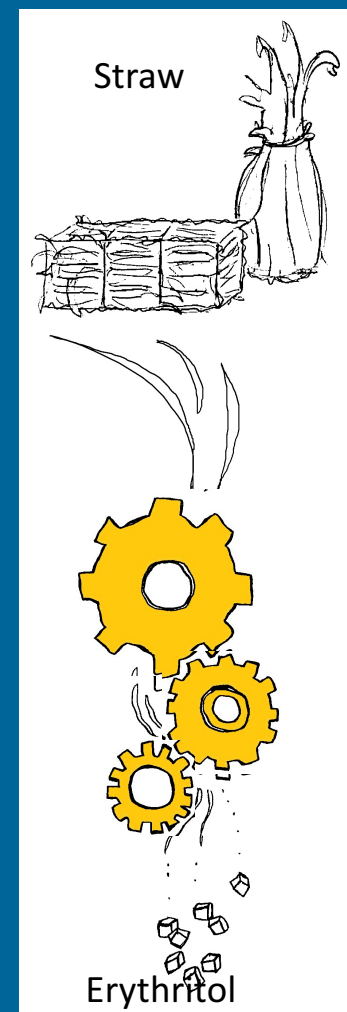


ICEBE
IMAGINEERING
NATURE

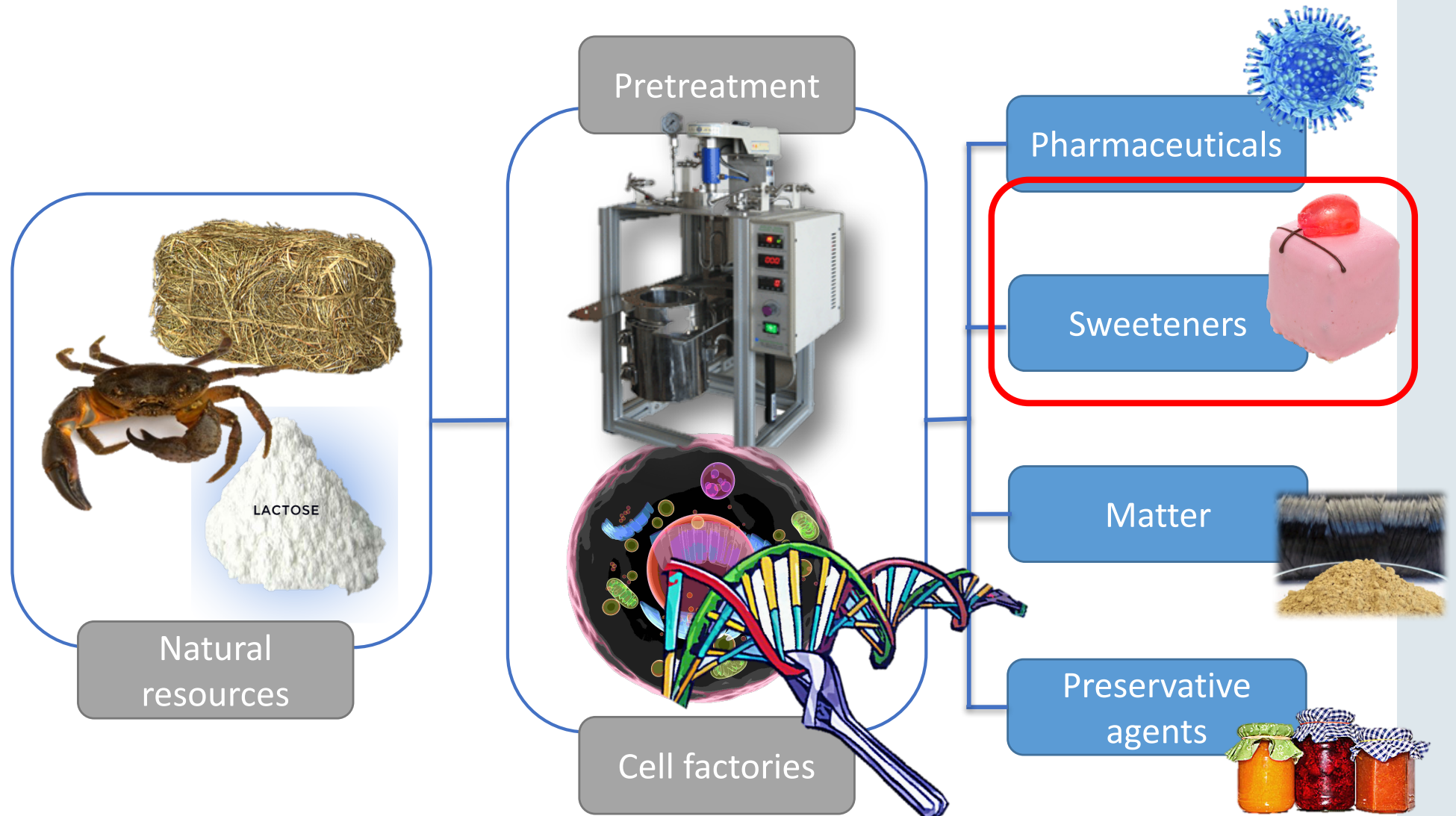
Faculty of Technical Chemistry
Institute of Chemical,
Environmental and Biological
Engineering

Sweet straw - production of Erythritol from wheat straw

Contact: Microbiology Group
Dr. Astrid Mach-Aigner
Astrid.Mach-Aigner@tuwien.ac.at



NOT conflicting food production





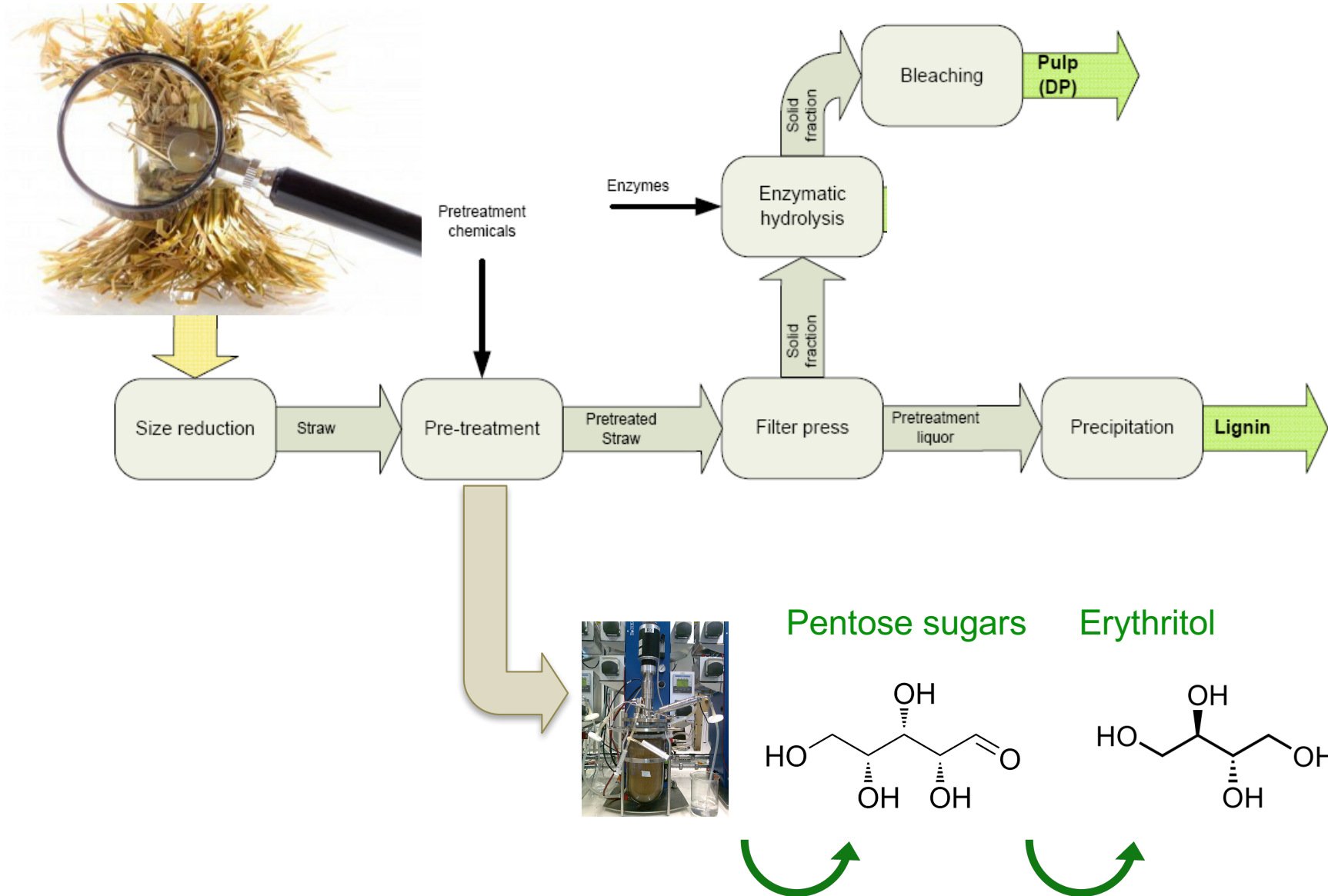
How it all began

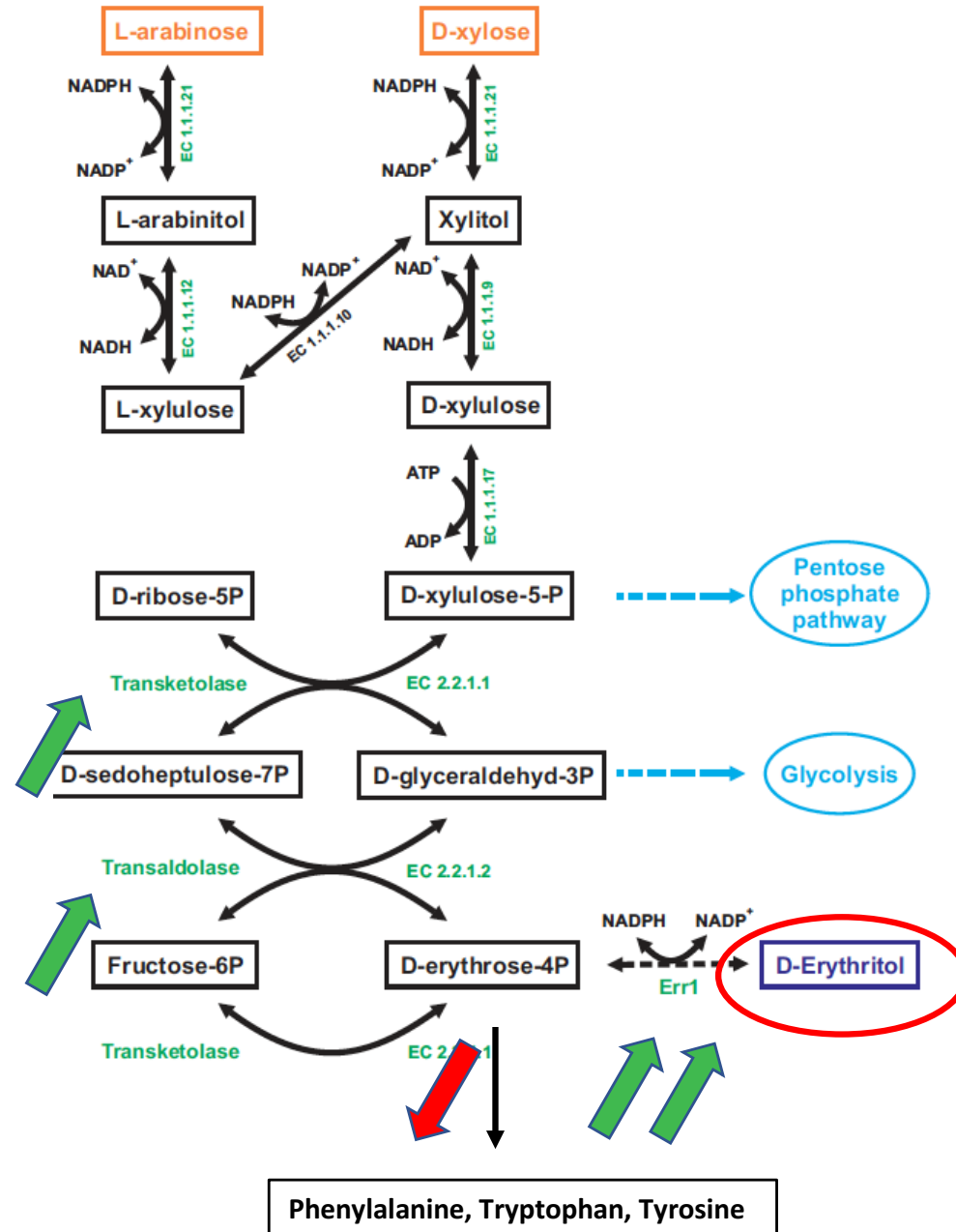
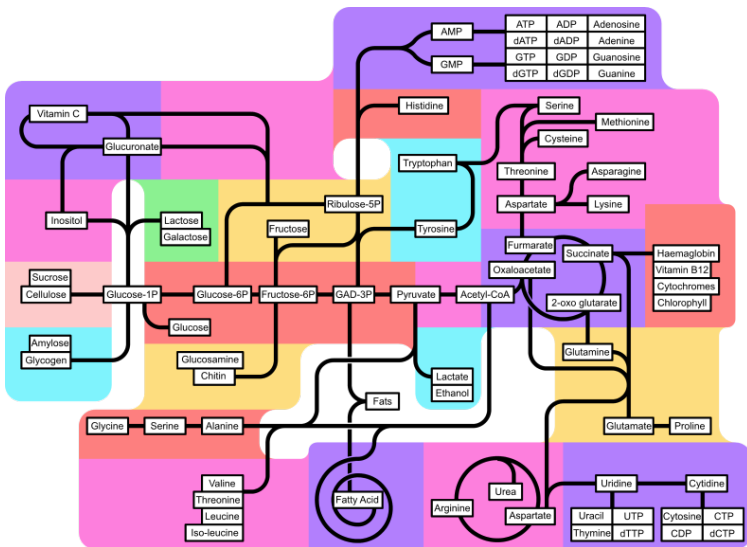
Trichoderma a biological warfare agent?

The collage features several key elements: a map of the Solomon Islands showing various island groups like the Tulun, Takuu, and Nukumanu Islands, and the main island of Guadalcanal with Honiara marked; a photograph of a tropical beach with palm trees and turquoise water; a photograph of a boat on clear turquoise water; a scanning electron micrograph (SEM) showing the intricate structure of fungal hyphae; and a photograph of a petri dish containing a green mold culture, likely *Trichoderma reesei*.

Trichoderma reesei QM6a

Was isolated from US army tent canvas in 1945







ICEBE
IMAGINEERING
NATURE

Faculty of Technical Chemistry

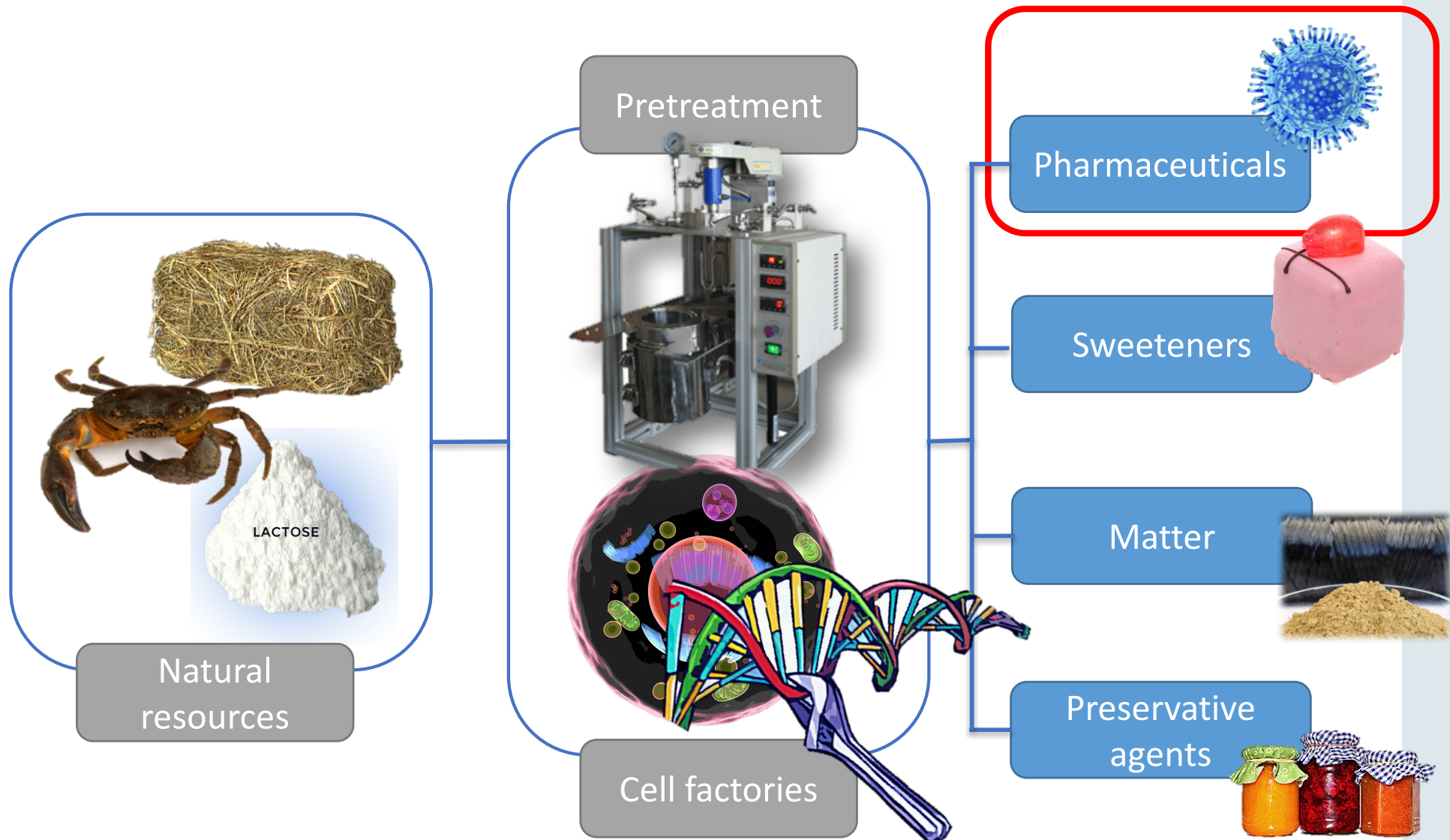
Institute of Chemical,
Environmental and Biological
Engineering

Pharmaceuticals from bio residues

Production of a cholesterol lowering drug

Contact: Synthetic –Biology Group
Dr. Astrid Mach-Aigner
Astrid.Mach-Aigner@tuwien.ac.at
Dr. Christian Derntl
Christian.Derntl@tuwien.ac.at

NOT conflicting food production



Natural producers produce many secondary metabolites - not just the desired pharmaceutical

➔ complicated purification

These by-products can even be toxic

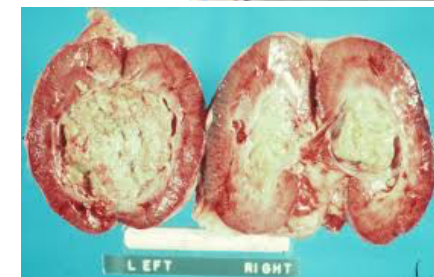
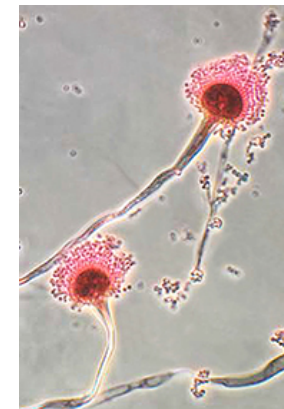
➔ elaborate handling

The secondary metabolism is subordinated hierarchically to the primary metabolism

➔ reduced yield

The fungi need partly expensive additives in the cultivation

➔ high cost

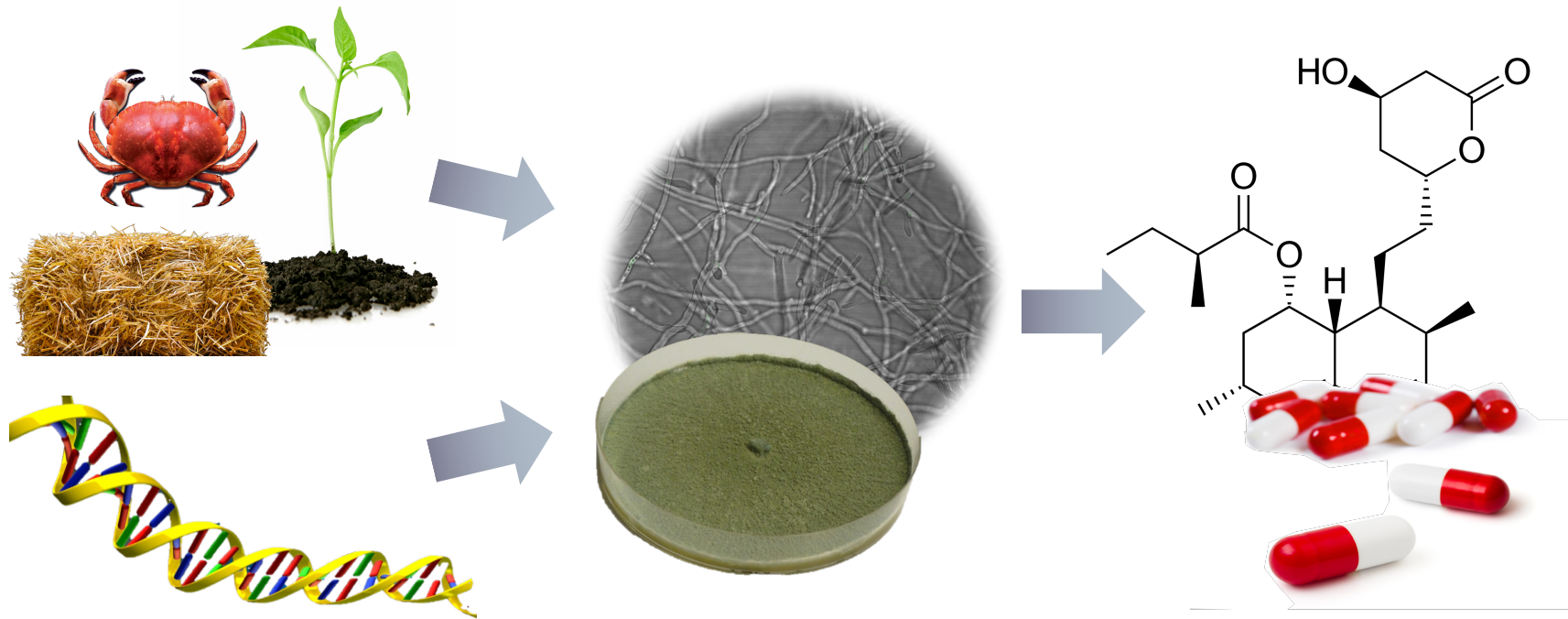


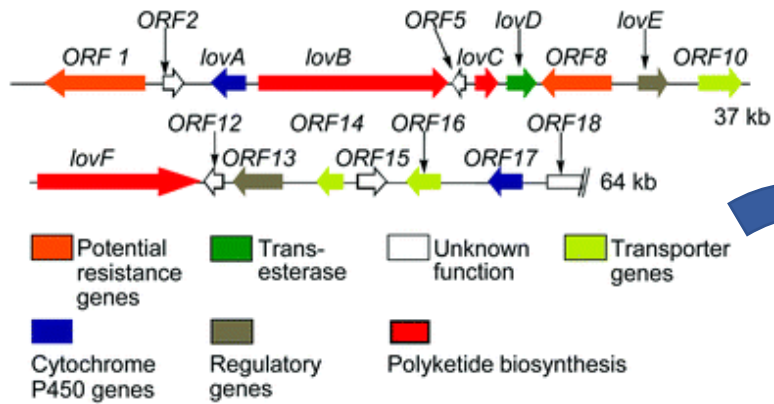


Trichoderma reesei

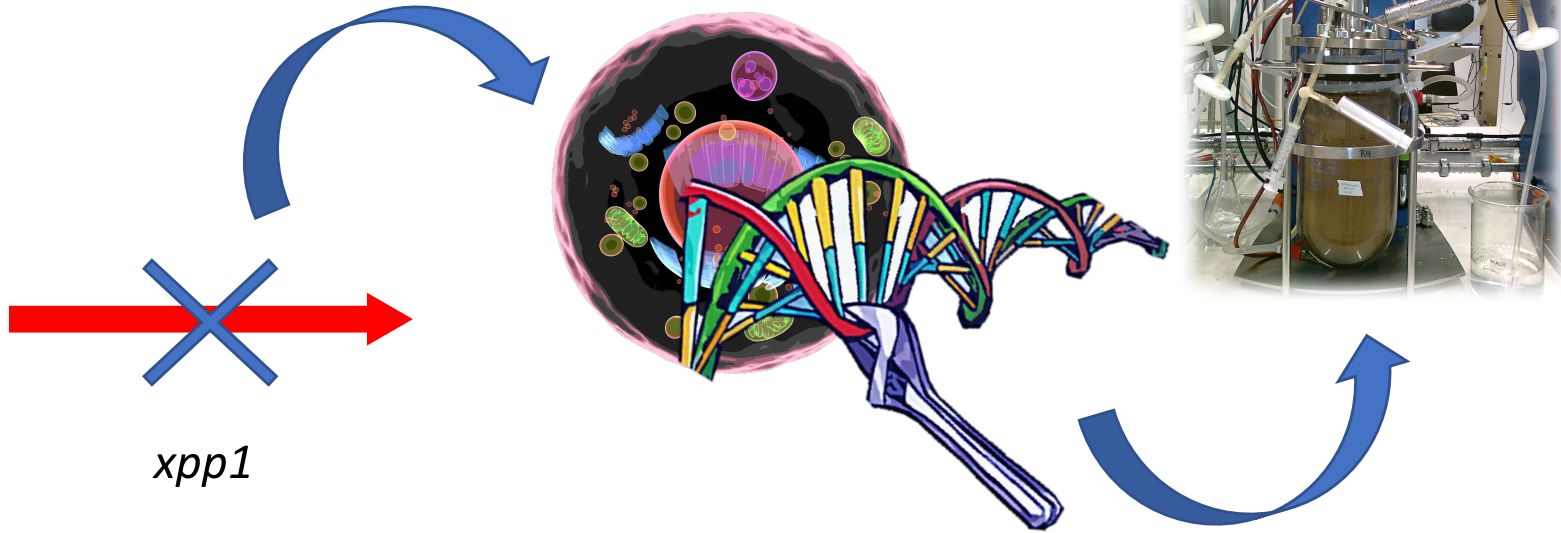
- ➔ Established industrial mushroom for the production of cellulases
- ➔ Model organism, laboratory protocols available
- ➔ GRAS status easier handling
- ➔ Very few secondary metabolites esimple downstream processes
- ➔ Classical saprophyte grows on favorable substrates







One step whole cell bio-catalysis





ICEBE
IMAGINEERING
NATURE

We rethink technology

