

TECHNICAL BIOCHEMISTRY

UNIVERSITY OF STUTTGART

Prof. Dr. Bernhard Hauer



Technische Biochemie

Mitglieder:

30 PhD Studenten und Postdoktoranden aus den Bereichen Chemie, Biologie, Lebensmittelchemie

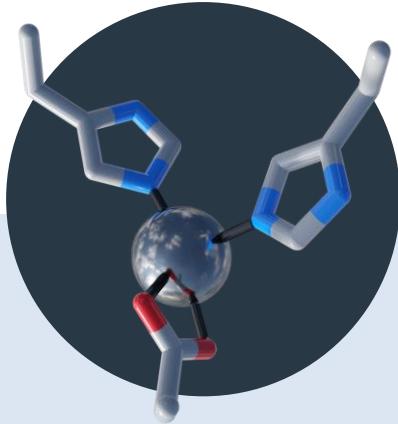
Techniken und Methoden

- Molekular- und mikrobiologische Arbeitstechniken
- Assays zur Bestimmung enzymatischer Aktivitäten
- Biokatalytische Transformationen
- Instrumentelle Analytik (GC, HPLC etc.)
- Struktur-Funktionsbeziehungen



Scientific Focus

Proteins with New Functions



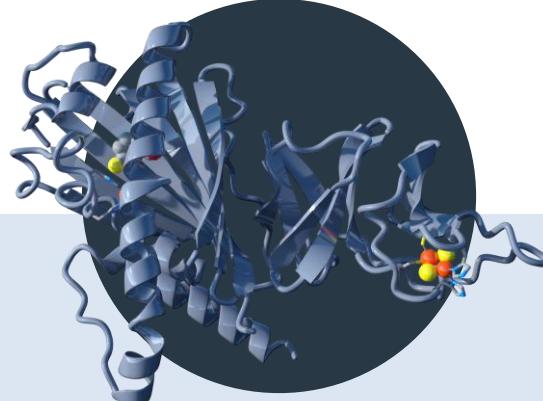
FUNCTIONAL PEPTIDES

metal binding peptides

- phage display
- expression
- functional studies

Materials applied:

- electronics
- pharma
- catalysis



BIOCATALYSIS

non physiological reactions

- chemistry based
- mechanism
- focused libraries

Target reactions:

- CC, CN, CO bond formation
- reduction / oxidation
- dehydration



SYNTHETIC BIOLOGY

establish novel pathways

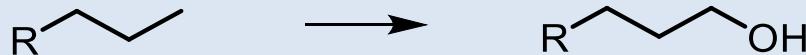
- combining enzymes
- heterogeneity
- retrosynthesis

Examples:

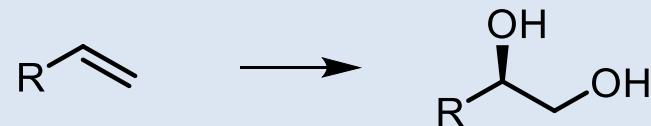
- monomers e.g. HO-FA
- terpenes, e.g. menthol
- heterocyclic compounds

Enzymes for Organic Synthesis

HYDROXYLATION



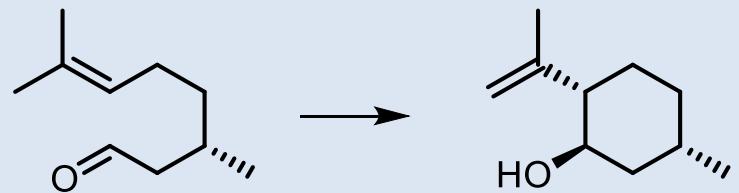
DIHYDROXYLATION



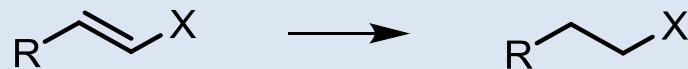
DEHYDRATION



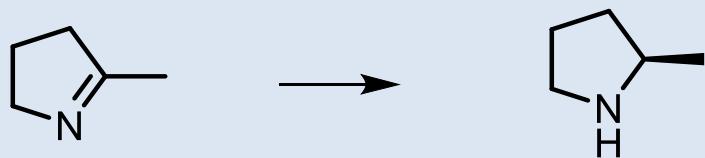
BRØNSTED ACID CATALYSIS



ENE REDUCTION

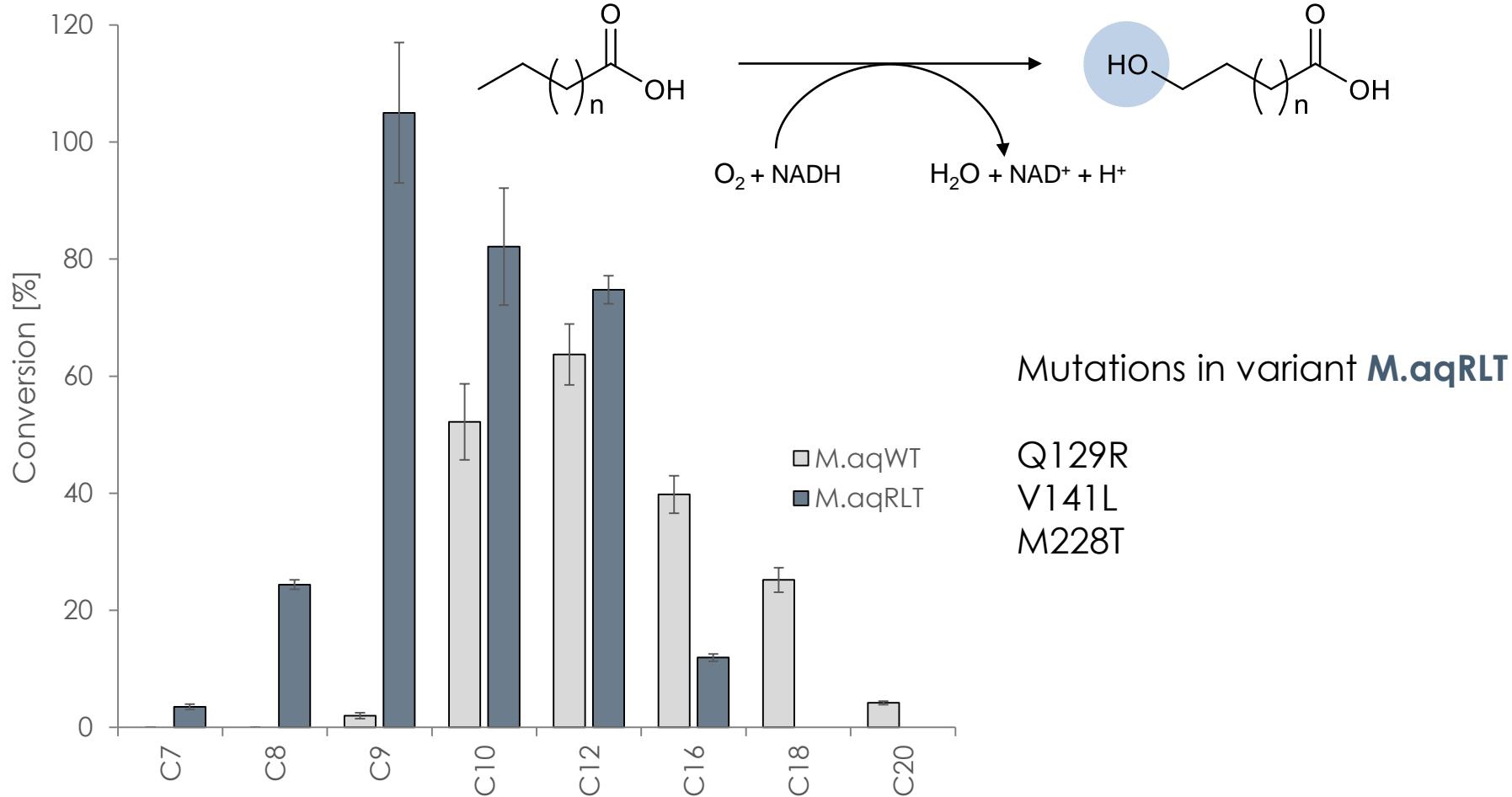


IMINE REDUCTION



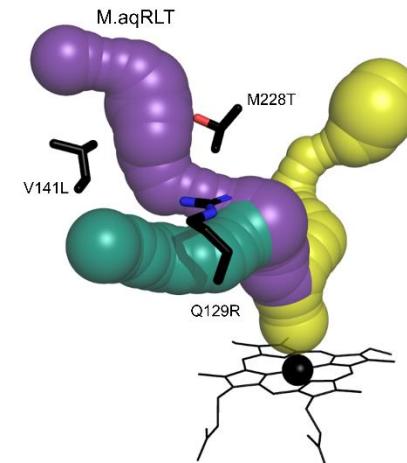
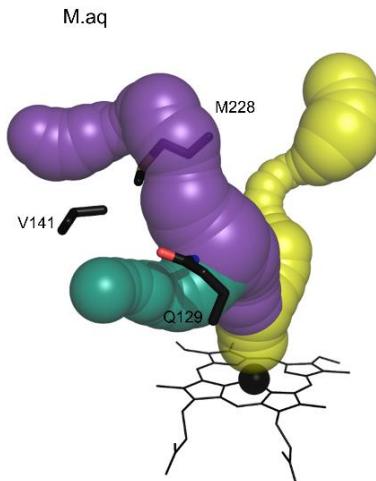
P450 monooxygenases

Terminal hydroxylation of fatty acids



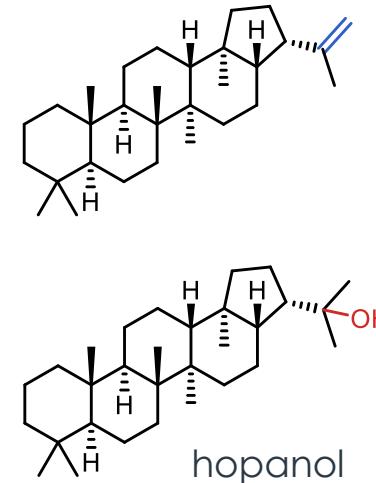
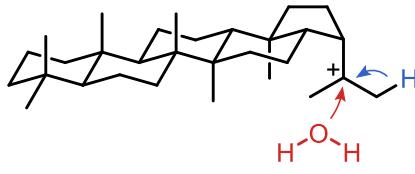
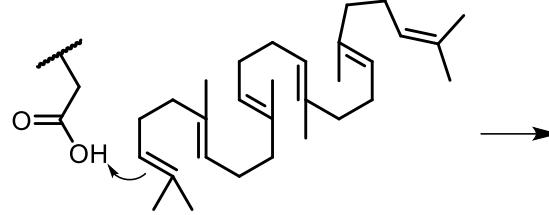
Terminal hydroxylation of fatty acids

Molecular modeling and MD simulations of tunnels

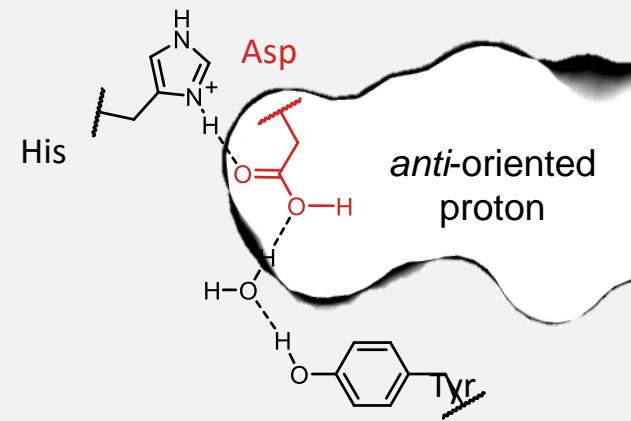
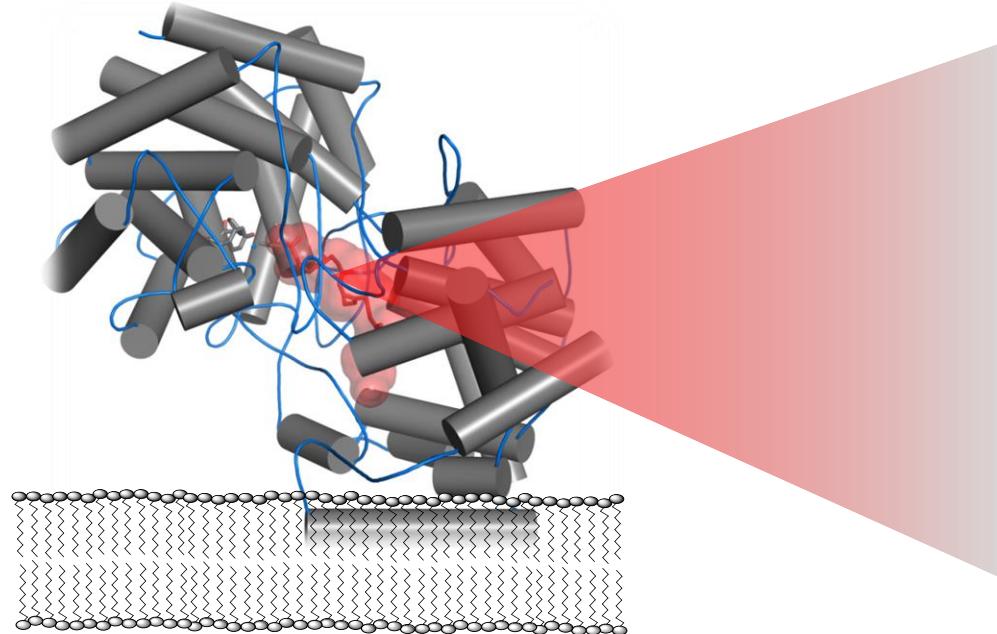


Squalene Hopene Cyclase

Brønsted acid catalysis

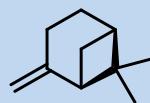


hopanol

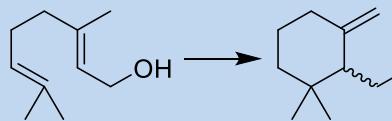


Cyclase

Promiscuous Biocatalysts



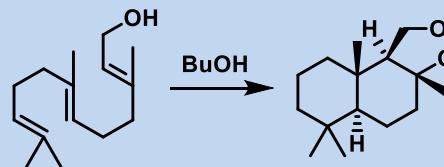
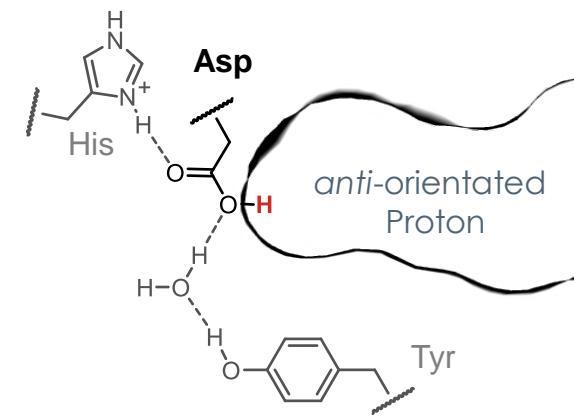
Acidic isomerization
of (+)- β -pinene



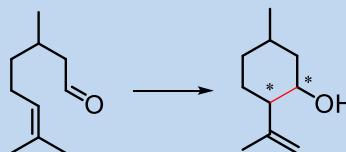
Cyclization of
small molecules



Friedel Crafts
alkylation



Intramoleculare
ether linkage

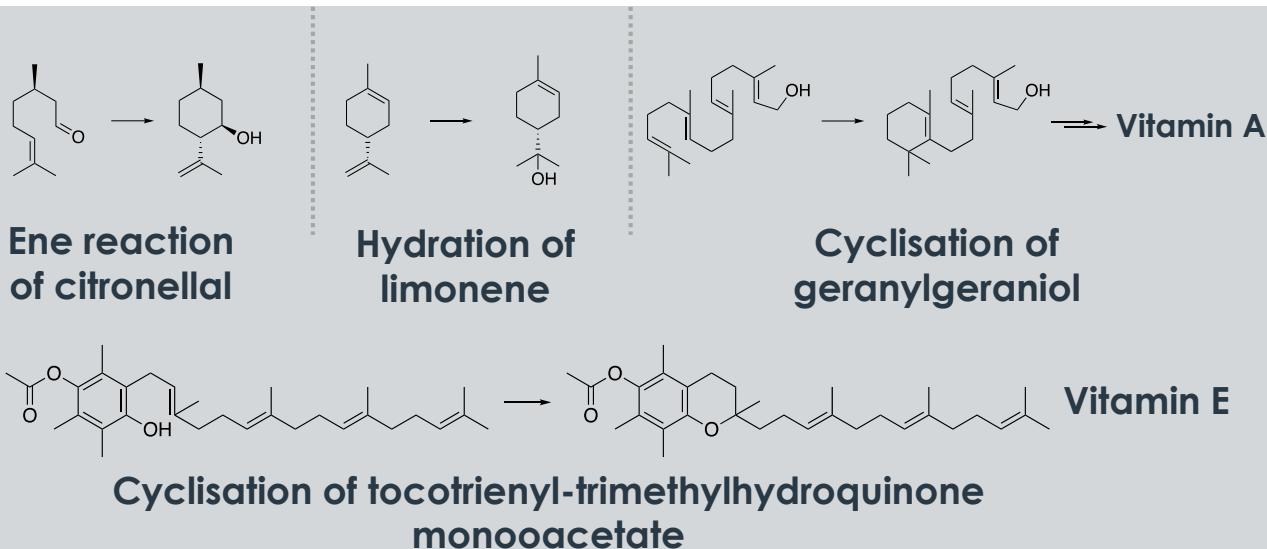


Prins reaction

Engineering of Catalytic Peptides

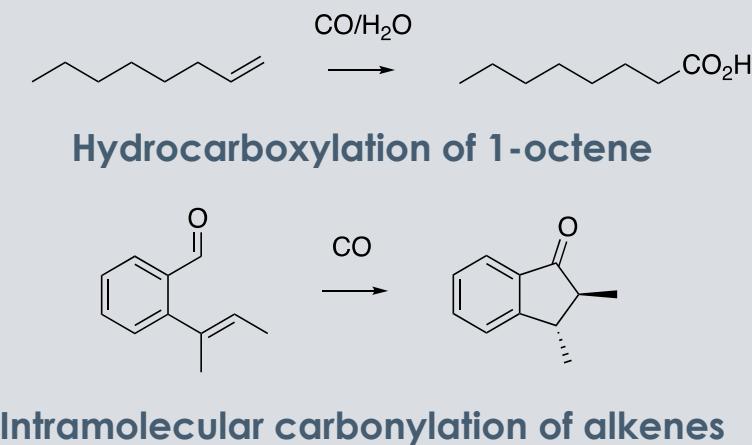
Zn-biohybrid

Novel platform to access novel terpenes and food supplements



Co-biohybrid

Novel protein-based reactivity to access acids and ketones



ACKNOWLEDGEMENT



COLLABORATION

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University of York, GB

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DTU Lyngby, DK

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