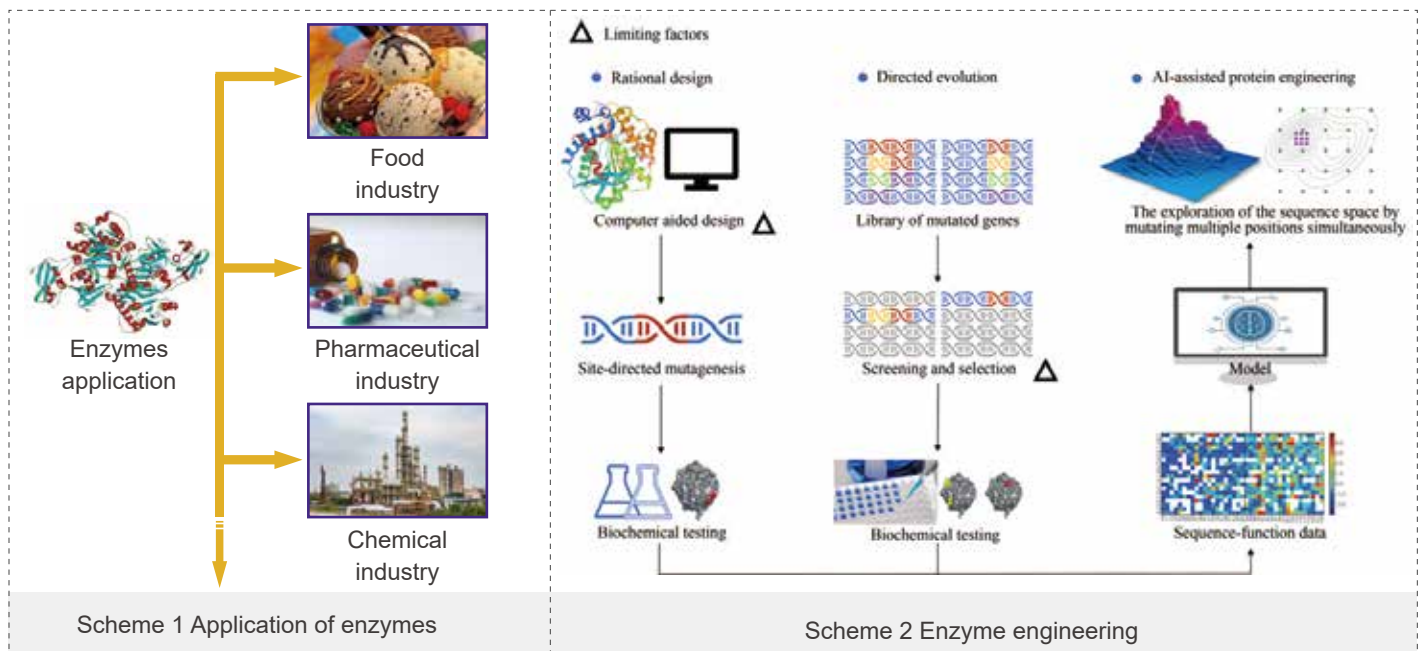


Medicilon Enzyme Catalytic Platform

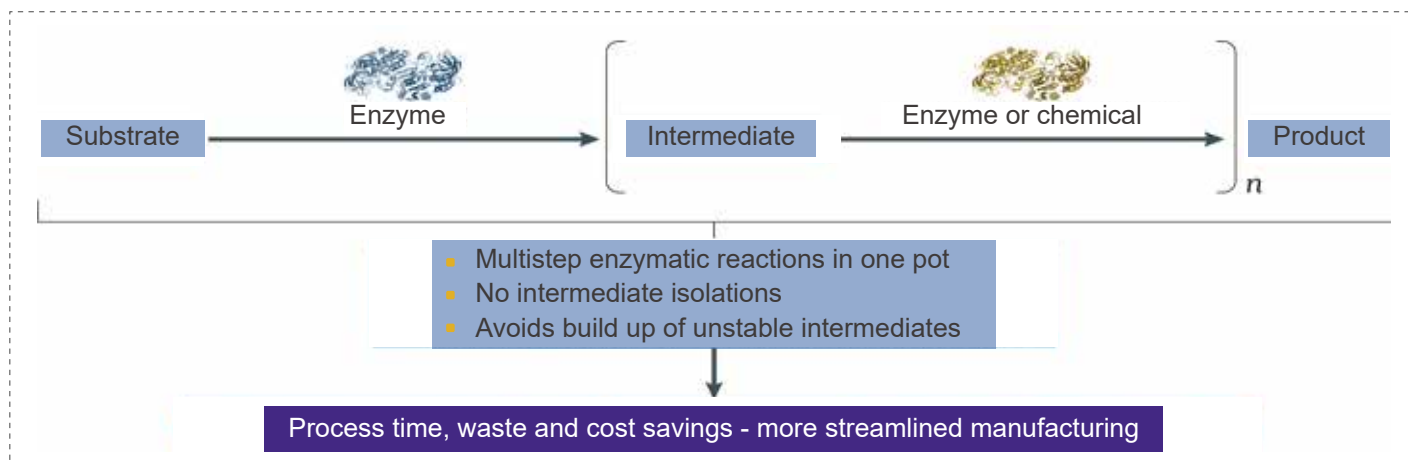
Enzymes, the cornerstone of synthetic biology, can catalyze diverse reactions, and could be used in various industry, such as food, pharmaceutical, chemical industry, etc.

Enzyme engineering is the process of modifying the structure and function of proteins or creating new proteins based on the relationship between molecule structures and biological functions in order to finish the set target.

Enzyme Engineering Introduction

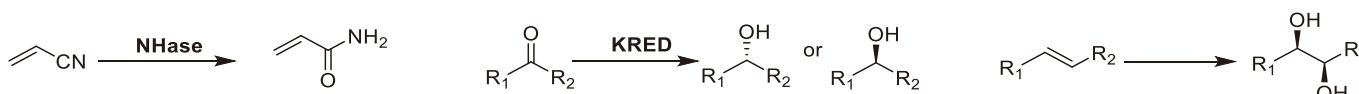


Medicilon Enzyme Catalytic Platform



Enzyme Catalyzed Reactions

- Redox reactions
- Hydrolytic reactions
- C-Het Atom formation
- C-C bond formation
-



Natural/Unnatural Amino Acids

Enzyme selection or discovery, such as:

- Amino-acid aminotransferase
- Amino acid hydroxylase
- C-N lyase
-



Capability & Capacity

- ~300 m² Biological Lab.
- Our team own rich experiences in enzyme engineering.
- We can quickly perform data mining and enzyme evolution according to customers' needs based on our mature bioinformatics and molecular biological platform.
- We can provide a more environmentally friendly and economical process based on our complete biotransformation ability.

Enzymes libraries building

- 2000 enzymes used for diverse catalytic reactions

Directed evolution of enzymes

- Gene mutations libraries building, using the strategy of combining rational and semi-rational design.
- High throughput screening: plate screening, microplate screening, FACS screening

Synthesis of modified nucleoside

- Low value added nucleosides converted into high value added nucleosides through enzymatic catalysis

Synthesis of unnatural amino acid


- Enzymatic catalysis

Synthesis of pharmaceutical intermediates

- Reduce chemical reaction steps and costs through enzymatic catalysis, and which is applied to process scale up

Jobs	Month 0.5	Month 1	Month 1.5	Month 2	Month 3
Finish the experiment plan					
Optimize the screening conditions (microplate & flask)					
Construct and screen mutants					
Combine positive mutants and screen					

Table 1 The period of enzyme evolution in Medicilon



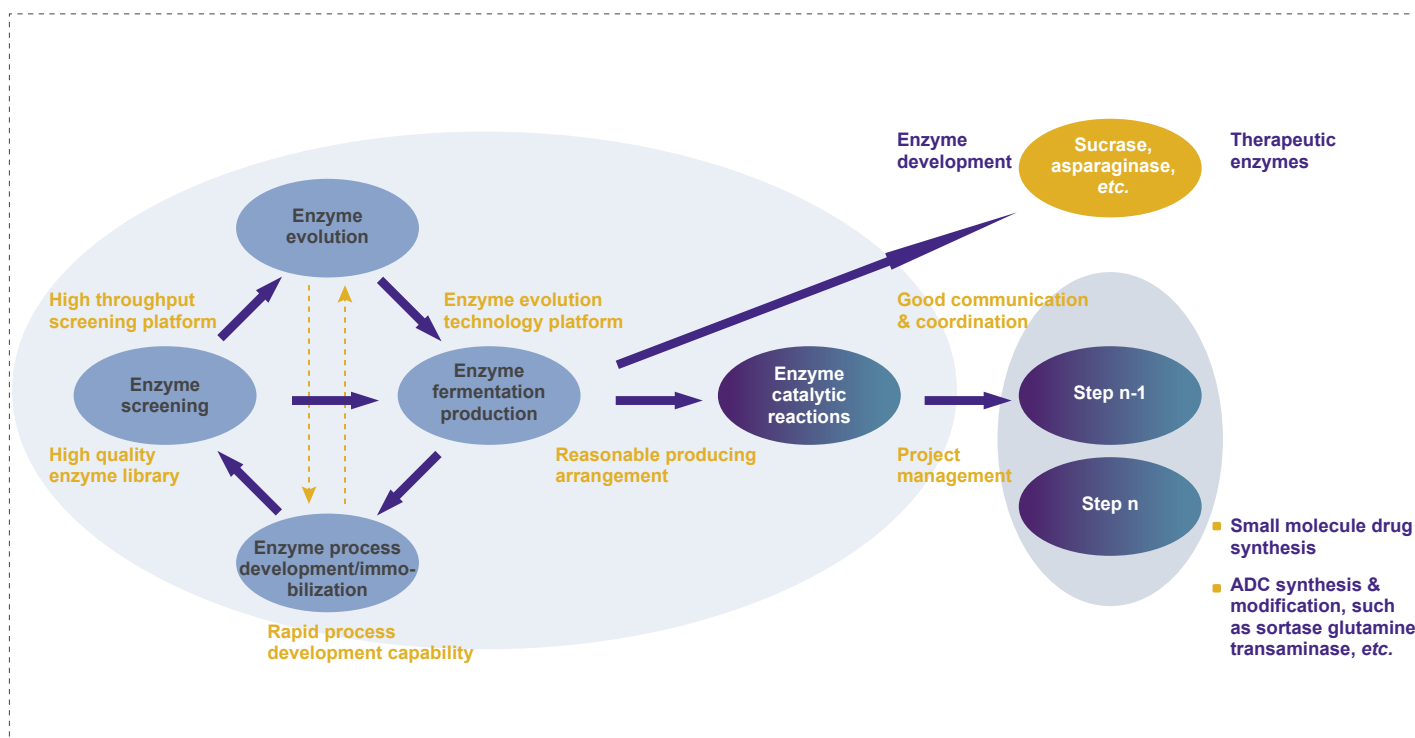
The period of enzyme evolution was **~3 months** in **Medicilon** **1500~2000 mutants** (including site directed mutants and libraries) were screened during this term.

- **Note:** one library contained 90 mutants

Activity based classification for enzyme evolution and/or enzymatic process:

- The effect of early improvement exceeds the results of the later period

Development of Enzyme Process in Drug Synthesis



- Mature platform ability
- High speed collaborative cooperation of each functional modules
- Good project management ability
- Timely and effective information transmission

Medicilon Cases

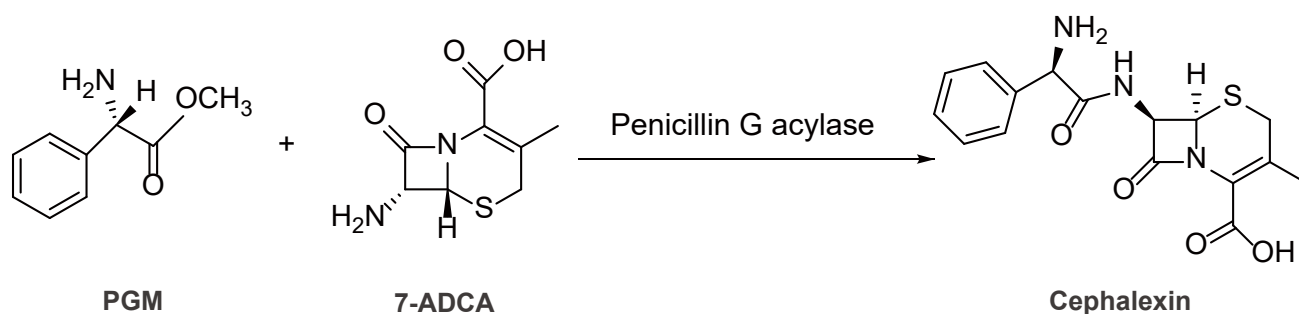


Figure 1 Process of Penicillin G acylase catalysis

- Computer-assisted design were used for Penicillin G acylase modification, the **substrate tunnels** were rebuilt with combinatorial active-site saturation test.
- The activity enhanced **~5.8 fold**, the conversion rate improve to **94.84%** from 90.84% at the condition of 15 g/L PGM+15 g/L 7-ADCA.

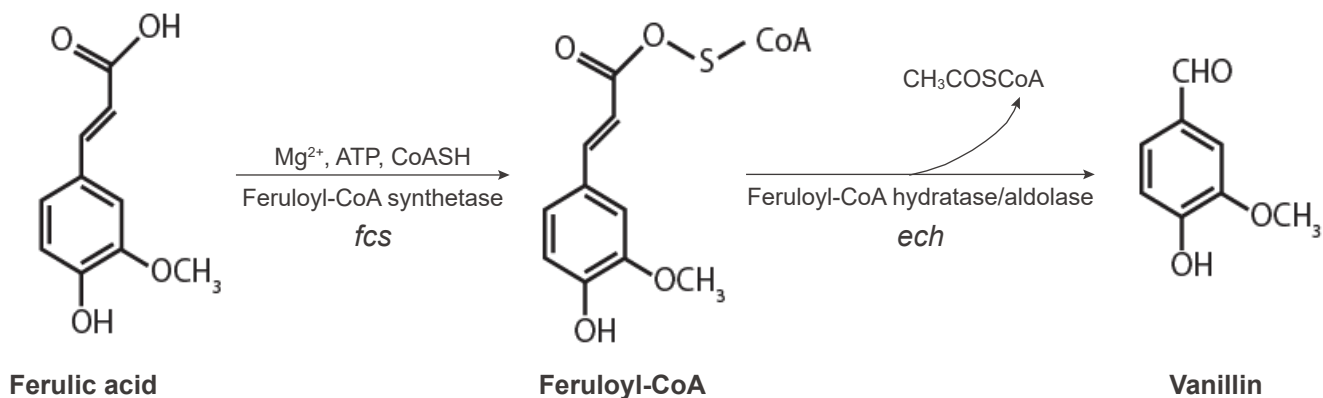


Figure 2 The synthesis pathway of Vanillin from Ferulic acid

- The **multi enzyme catalytic system** of Vanillin synthesis was optimized through improving the activity of FCS and/or ECH.
- The yield of Vanillin enhanced obviously.

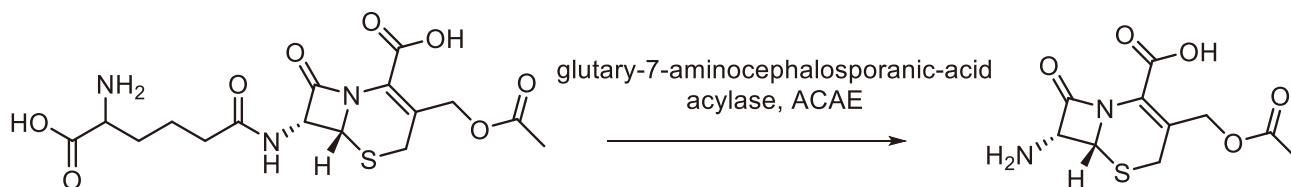


Figure 3 Process of ACAE catalysis

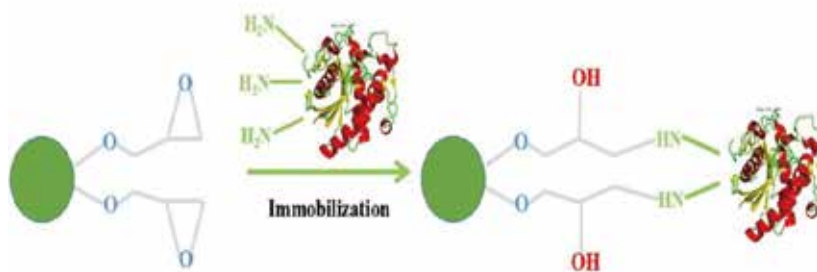


Figure 4 ACAE immobilized onto epoxy resin through ω -NH₂ of Lys

- The immobilization ability of ACAE onto epoxy resin was improved by increasing the number of Lys on the surface of ACAE.
- The yield of 7-ACA improved.



MEDICILON

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