# Diverse Aromatic-catabolic Enzymes are Reviewed for Lignin Valorization

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## Background

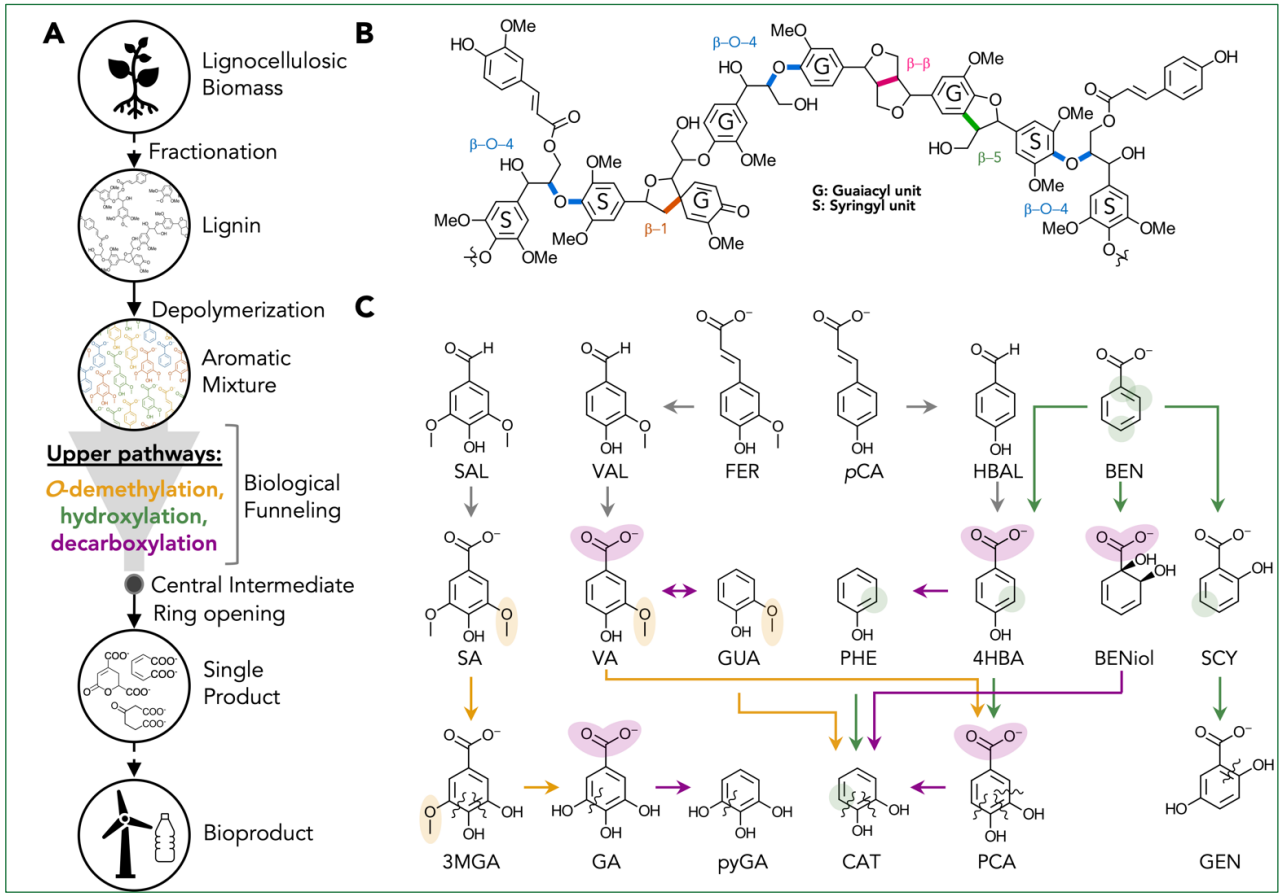
- Lignin is a heterogeneous aromatic plant cell wall biopolymer with three primary monomers and a number of different covalent bonds which must be cleaved for conversion.

## Approach

- We describe the known enzymatic mechanisms for aromatic *O*-demethylation, hydroxylation, and decarboxylation, which are often rate-limiting reactions for efficient biological funneling of lignin-related compounds.
- This review highlights opportunities at the nexus of biochemistry, enzyme engineering and evolution, and metabolic engineering for microbial lignin valorization.
- We focus on approaches and tools for translating robust *in vitro* characterization of key enzymatic paradigms into improved *in vivo* performance.

## Significance

- While many enzymes that conduct important biochemical reactions in aromatic-catabolic pathways have been extensively characterized, exciting opportunities in biological lignin valorization should encourage renewed focus on these pathways and their potential application in industrial bioprocessing.




Valorization of lignin through biological funneling can convert a mixture to single products. Three critical steps, *O*-demethylation (yellow), hydroxylation (green), and decarboxylation (purple) of lignin-derived aromatic compounds are often rate limiting for efficient biological funneling.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