S5-6

Marine and Microbial Epoxide Hydrolases and Their Application to Stereospecific Biocatalysis

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Chiral epoxides and diols are valuable intermediates for the synthesis of high-value-added chiral pharmaceuticals (1). Chiral epoxide and diols can be prepared using epoxide hydrolase(EH)-catalyzed enantioselective hydrolysis of racemic epoxides. EH is an enzyme that catalyses a hydrolysis reaction of an epoxide to the corresponding vicinal diol (2). Enantioselective hydrolysis of one enantiomer of racemic epoxides by EHs yields the remaining enantiomer in an enantiopure form(Fig. 1A). EH is a cofactor-independent, relatively stable and easy-to-use biocatalyst (3). EHs are ubiquitous enzymes. Recently, marine bioresource-originated EHs have been characterized for the development of novel EHs (Fig. 2)(4-6). Some marine and microbial EHs have been shown to have enantio-complementary regioselectivity on racemic epoxide substrates, leading to an enantioconvergent process (Fig. 1B). In this presentation, the discovery of EHs from marine/microbial bioresources and its application to stereospecific biocatalysis will be presented.

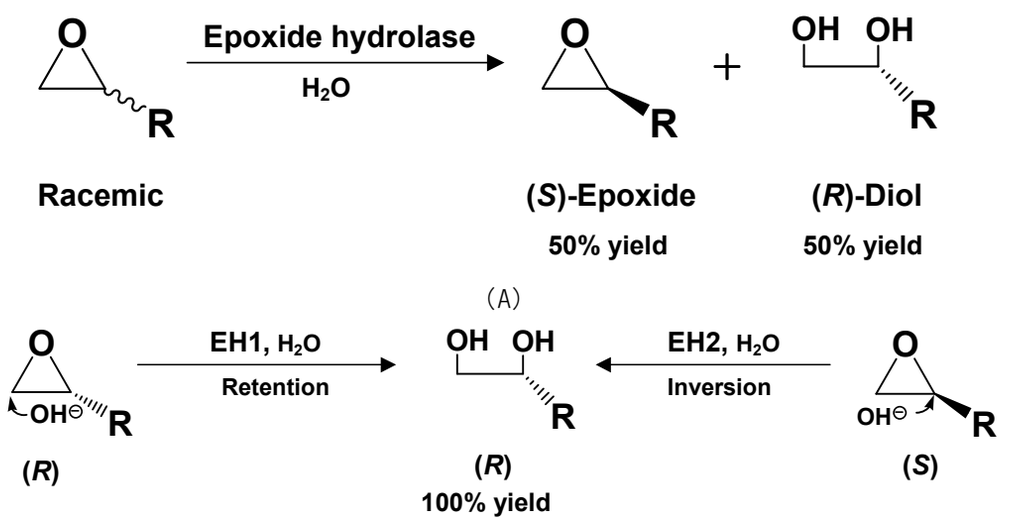

Fig. 1. The kinetic resolution(A) and enantioconvergent hydrolysis(B) of racemic epoxides for preparation of chiral epoxides and diols using EHs(from Ref. 2).

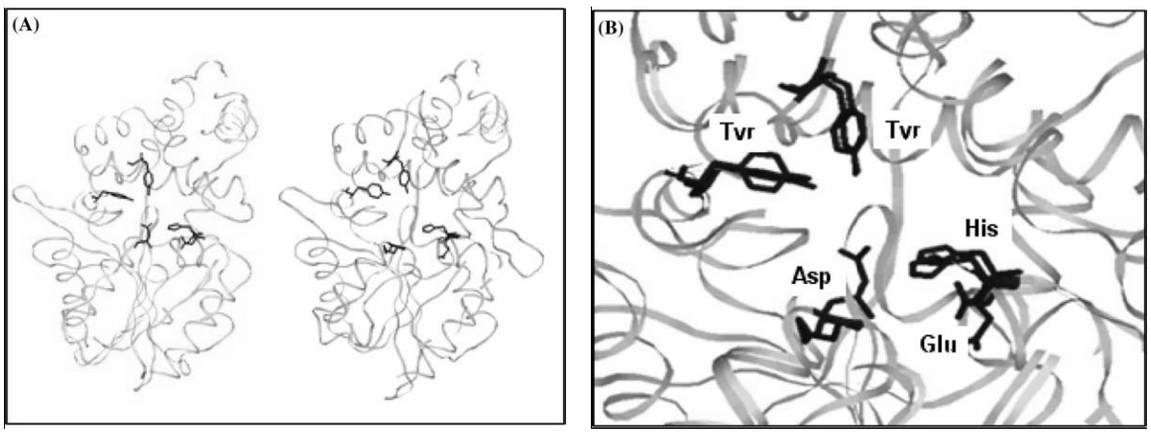

Fig. 2. Superimposition of *Mugil cephalus* mEH model (gray) on *Aspergillus niger* EH, 1qo7.pdb (yellow), shows similarity of the active site region and residues (blue wire frame). The representation was made using RASWIN. *M. cephalus* mEH model was constructed using 396 residues from 62nd to 467th amino acid sequence. (A) Structural alignment of the putative mEH model and 1qo7.pdb. (B) Expanded view of active site region with the catalytic triad and two tyrosine residues (from Ref. 6).

Acknowledgment

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