Chemoenzymatic Synthesis Of Exo-Amino-Izidine Alkaloids

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BACKGROUND

Alkaloids are one of the most important families of nitrogen containing natural products. Among their diverse structures, the most encountered structural motifs are the fused bicyclic systems containing bridgehead nitrogen atoms. These azabicyclic scaffolds are also commonly known as izidines, and they are important building blocks commonly found in pharmaceuticals. Considering their importance, considerable efforts have been devoted to developing synthetic methods to access all izidine frameworks, such as iterative alkylation and nitro-Mannich cyclization for example. Although these methods are general and flexible, they all lack enantioselective control. Numerous enantiospecific syntheses have been reported, but these syntheses often have long reaction sequences. Therefore, finding a general, efficient, stereoselective synthesis approach to access all types of izidines still remains a challenge.

DESCRIPTION

Researchers at the University of California, Santa Barbara have created a versatile chemoenzymatic synthesis strategy to access diverse enantiopure amino-izidine heterocycles from inexpensive amino acid chiral pools. This economic, concise, and scalable route provides rapid access to a gram-level synthesis of (+)-exo-1-amino-pyrrolizidine heterocycle. The alkaloids found in many bioactive natural products and pharmaceutical leads, can be efficiently made using this chemoenzymatic synthesis approach, thereby making it an attractive strategy for stereoselective synthesis of these important building blocks. This method can significantly shortcut chemical steps for the preparation of enantiopure exo-amino-izidine alkaloids, such as 1-aminopyrrolizidine, 1-amino-indolizidine, and 1-amino-quiniolizidine with high enantiomeric purity.

ADVANTAGES

- Significantly shortens the chemical steps to create izidine frameworks enzymatically
- Produces izidine frameworks with high enantiomeric purity
- Provides economical strategy to manufacture building blocks active ingredients

APPLICATIONS

- Pharmaceuticals
- Crop protectants

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Biocatalytic Asymmetric Synthesis Of Heterocyclic Alpha, Alpha-Disubstituted Amino Acids
- Biocatalytic Stereoselective Deuteration Of Alpha-Amino Acids

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OTHER INFORMATION

KEYWORDS

alkaloids, nitrogen, izidines, pharmaceuticals, amino acid, crop protectants

CATEGORIZED AS

- **Materials & Chemicals**
  - Biological
  - Chemicals
  - Pesticides and Insecticides

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