Development of Catalytic Enantioselective Minisci-Type Reactions

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1. Heteroarenes in pharmaceuticals
Azines, or basic heteroarenes, such as pyridines and quinolines are ubiquitous motifs in molecules of biological interest. More three-dimensional structure is also being seen in successful drug candidates, necessitating methods for enantioselective synthesis.

2. What is a Minisci reaction?
The addition of a free radical to a protonated heterocycle, followed by formal hydrogen atom loss, is known as a Minisci-type reaction. They can be powerful but controlling their regioselectivity is a challenge. Moreover, we were not aware of any enantioselective variant of this transformation.

3. Non-covalent catalysis in asymmetric radical chemistry
Nature uses non-covalent interactions to manipulate molecules and exert exquisite reaction selectivity in the chemical processes of life. Organocatalytic methods employing non-covalent interactions have had a great impact on asymmetric catalysis during the past two decades.

4. Strategy

General Minisci Reaction Outline
Can we form products as single regioisomers?
Can we form an enantioenriched chiral centre in the bond forming process?

5. Scope

Both quinolines and electron-deficient pyridines were smoothly appended by a range of radicals generated from amino esters.*

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