Enantioselective N-Heterocyclic Carbene Catalyzed Mannich Reaction

**Significance:** An enantioselective addition of α-aryloxyacetaldehyde 3 to aromatic imines 2 was reported to proceed under N-heterocyclic carbene catalysis. Initial products, amino esters E were transformed to the corresponding amides by treatment of the reaction mixture with benzylamine. With chiral precatalyst 1, β-amino amides 4 have been obtained in useful yields and high enantioselectivity. Other in situ transformations of E were also demonstrated affording β-amino alcohols, esters, carboxylic acids or peptides in a one-pot reaction.

**Comment:** The catalytic generation of enolates is of a great importance due to their broad utility in organic synthesis. The Scheidt group previously reported that N-heterocyclic carbenes catalyze the formation of enolates/enols through an elimination process of α-aryloxyaldehydes (Org. Lett. 2009, 11, 105). Here, they use this strategy to perform a Mannich reaction. Enolate/enol intermediate C is trapped by tosylimine to afford β-amino acyl azolium intermediate D. Aryloxy anion liberated during enol formation step reacts with D to regenerate the catalyst and deliver the product E which serves as an activated intermediate for subsequent transformations.

**Proposed catalytic cycle:**

1. (10 mol%) NHTs Ar1 = 4-NO2C6H4
2. 4 NO2C6H4ONa (2 equiv) THF–CH2Cl2 4 Å MS, 0 → 20 °C then BnNH2
3. 10 examples 56–75% yield er from 94.6 to 97.5:2.5

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