Organocatalytic Total Syntheses of (+)- and (−)-Trigonoliimine A

Significance: The Zhu group reports an enantioselective Michael addition of methyl α-aryl-α-isocyanocacetates to vinyl phenylselenone catalyzed by a cinchona-alkaloid derivative. The obtained enantioenriched α-aryl-α-(2′-phenylselenonylethyl)-α-isocyanocacetates are successfully transformed into linear and cyclic quaternary α-amino acids, oxindoles, and pyrrolidinones. A concise total synthesis of (+) and (−)-trigonoliimine A (9 steps, 7.5% and 6.8% overall yield) from the shown Michael adduct was completed via a modified Bischler–Napieralski cyclization.

Comment: α-Isocyanocacetates are well-established glycine templates for the synthesis of racemic α,α-disubstituted α-amino acids. Yet, the catalytic enantioselective allylation of α-isocyanocacetates remains underexploited. The reported Michael addition products are converted further without racemization into the corresponding amines and azides. The absolute configuration of the products obtained from the shown cinchona-alkaloid catalyst was determined after derivatization by X-ray analysis to be R.