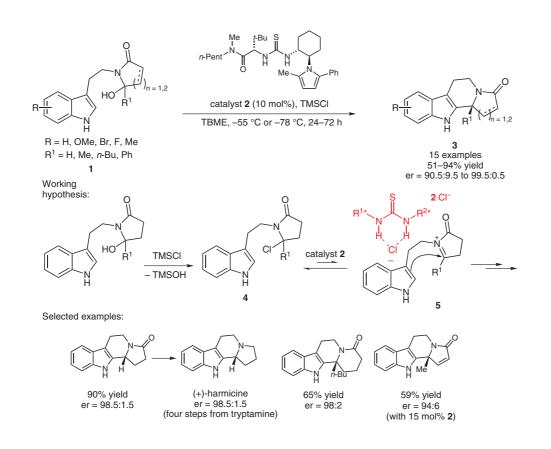
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Enantioselective Pictet–Spengler-Type Cyclizations of Hydroxylactams: H-Bond Donor Catalysis by Anion Binding *J. Am. Chem. Soc.* **2007**, *129*, 13404-13405.

Thiourea Catalysis via Anion Binding



Significance: Asymmetric Pictet–Spengler-type cyclizations of β -indolyl ethyl hydroxylactams **1** have been achieved in the presence of thiourea derivative **2** as chiral catalyst. Both indolizidinones (**3**, n = 1) and quinolizidinones (**3**, n = 2) are obtained in good to excellent yields and optical purities. TMSCI is required for the generation of chlorolactams **4**. Plausibly thiourea catalyst **2** abstracts the chloride from **4** generating a chiral *N*-acyl iminium chloride-thiourea complex **5** as reactive intermediate. Subsequent cyclization in the chiral environment provided by the chiral thioureachloride anion complex (**2**·CI⁻) leads to enantiomerically enriched products.

Comment: In 2004, Taylor and Jacobsen have discovered Pictet-Spengler-type reactions, which proceed through initial acylation of imines and are promoted by thiourea catalysts of type 2 (J. Am. Chem. Soc. 2004, 126, 10558). In the present study, the Jacobsen group describes a new reaction variant and elucidates the unprecedented reaction mechanism supported by their experimental observations and the well-known anionbinding properties of (thio)ureas. Since the chiral information is exclusively provided by the chiral counteranion (2·CI⁻) during the enantiodetermining step, this study may be considered a new example of asymmetric counteranion-directed catalysis (S. Mayer, B. List Angew. Chem. Int. Ed. 2006, 45, 4193).

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Key words

Pictet-Spengler reaction

H-bonding catalysis

anion binding

ACDC (asymmetric counteraniondirected catalysis)

