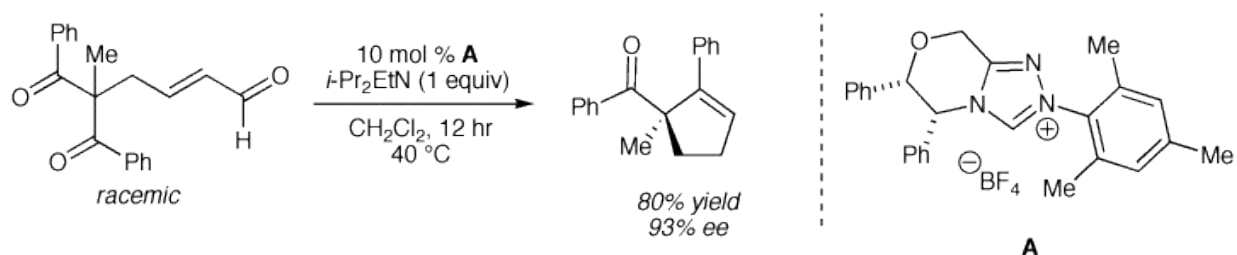


Dr. Andreaana Group Meeting – Fun Problem Set ☺

(Credit: Dr. Evans CCB Problem Sets)

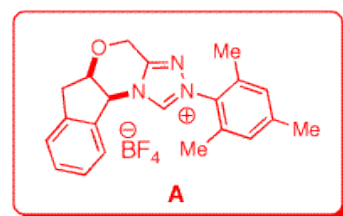
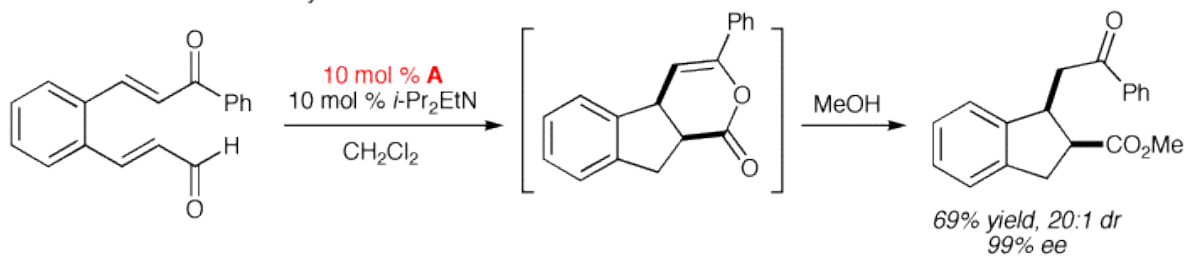
**Problem 1a**

Scheidt and co-workers have recently disclosed the following reaction catalyzed by an *N*-heterocyclic carbene (*J. Am. Chem. Soc.* **2007**, *129*, 10098-10099). Please provide a mechanism that accounts for the high levels of selectivity.



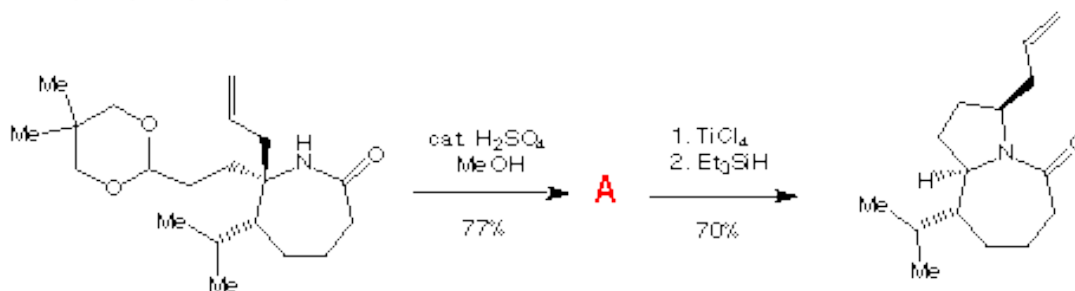
**Problem 1b**

Scheidt and co-workers have reported the following transformation utilizing an *N*-heterocyclic carbene as a catalyst (*Angew. Chem.* **2007**, *46*, 3107). Please provide a detailed mechanism and an explanation for the high levels of diastereo- and enantioselectivity.



## Problem 2a

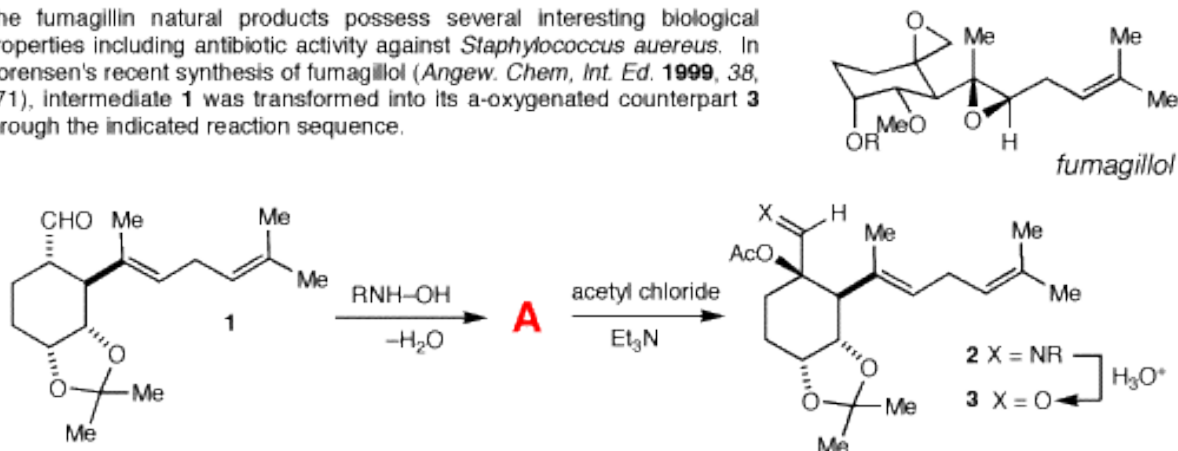
In Heathcock's recent synthetic approach to the *Stemona* alkaloids, an interesting series of transformations were used (Heathcock, JOC, 2001, 66, 7751).



Please provide a mechanism for each reaction and identify the structure of intermediate A.

## Problem 2b

The fumagillin natural products possess several interesting biological properties including antibiotic activity against *Staphylococcus aureus*. In Sorensen's recent synthesis of fumagillol (*Angew. Chem, Int. Ed.* 1999, 38, 971), intermediate **1** was transformed into its  $\alpha$ -oxygenated counterpart **3** through the indicated reaction sequence.

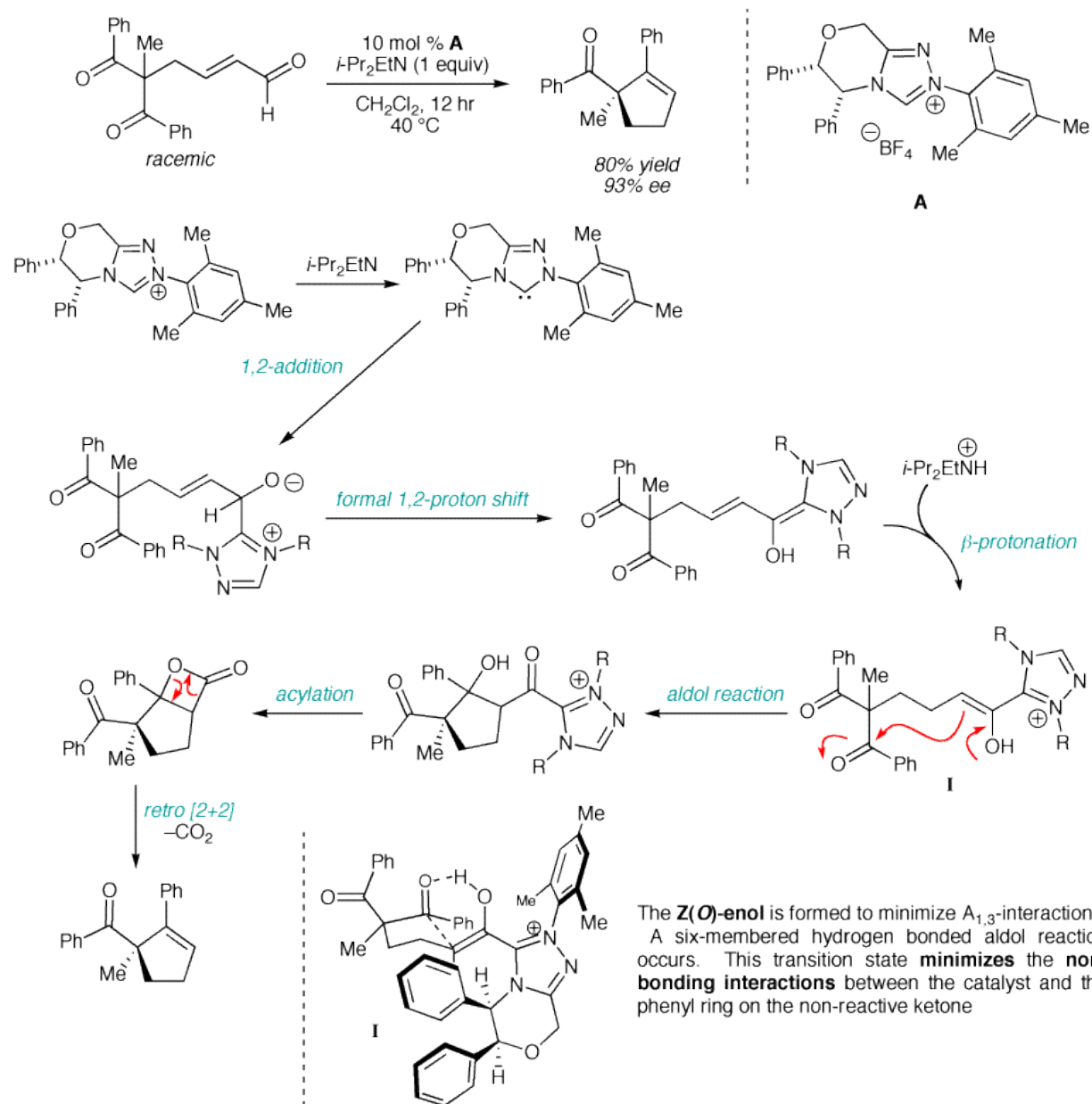


In the space below, identify the structure of intermediate A and provide a mechanism for the transformation of 1 into 2.

## Answer Key

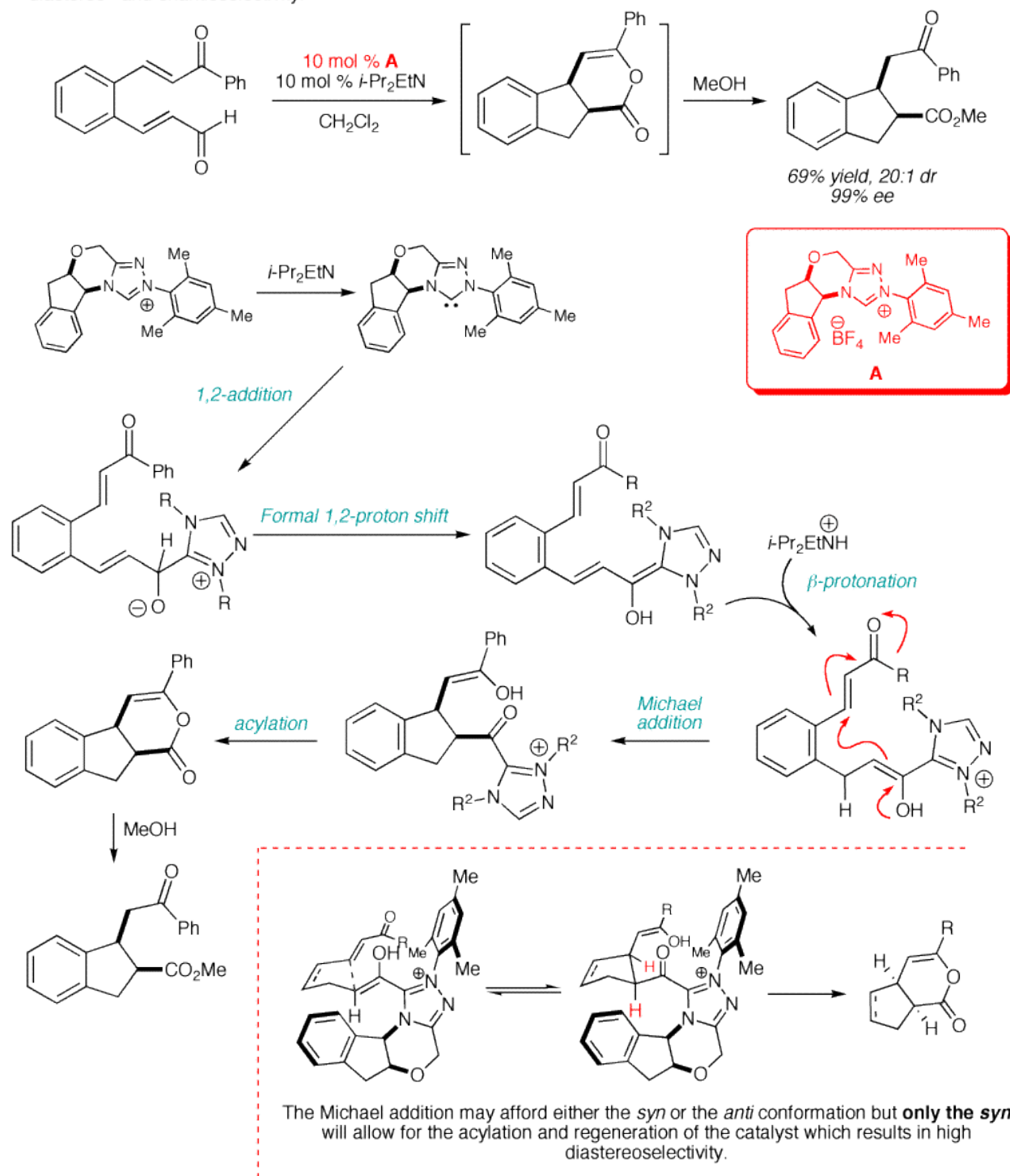
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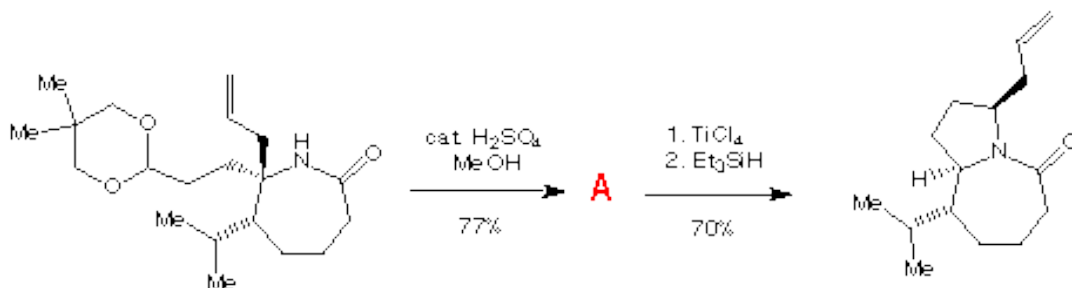
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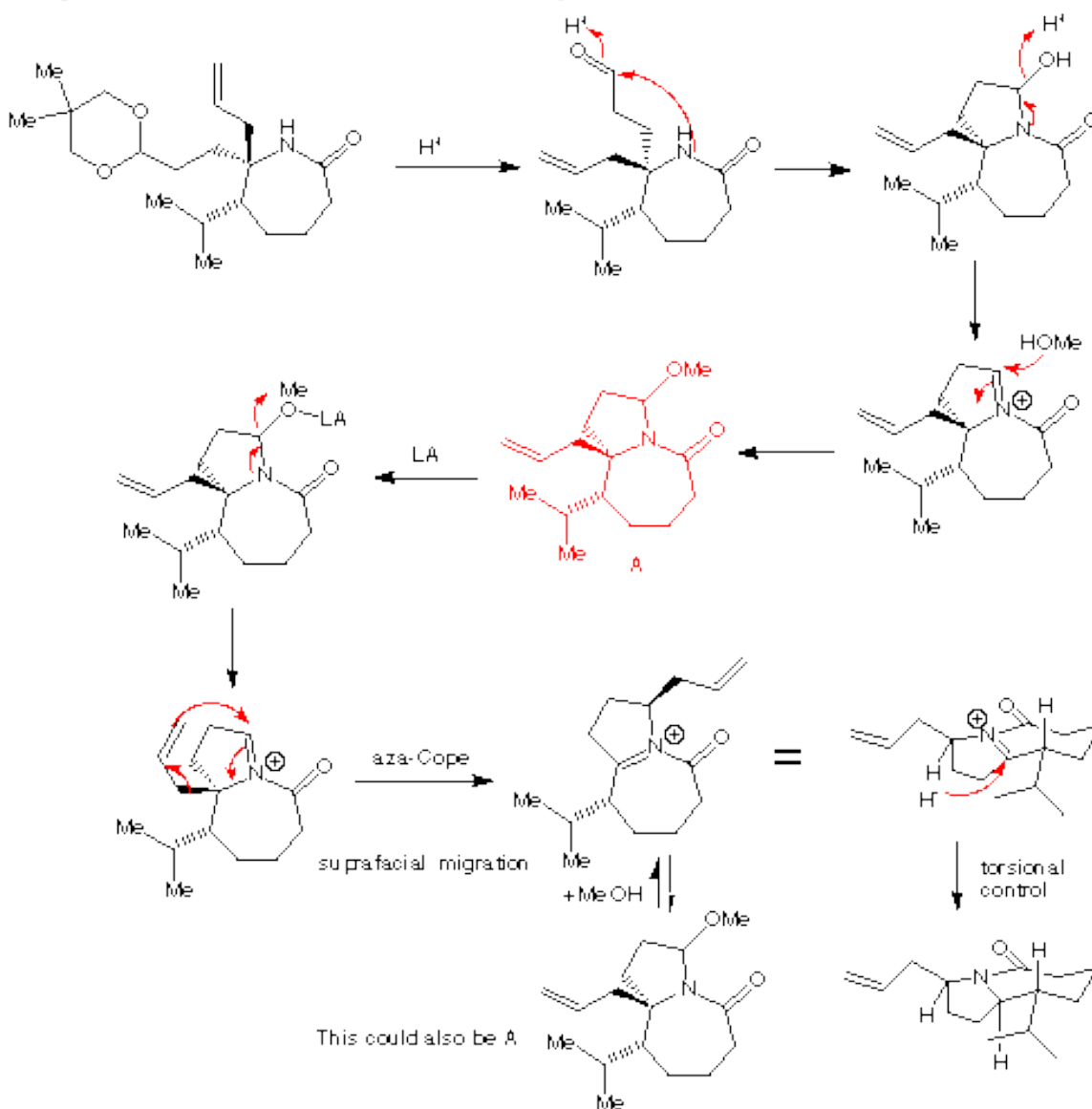


## Problem 2a

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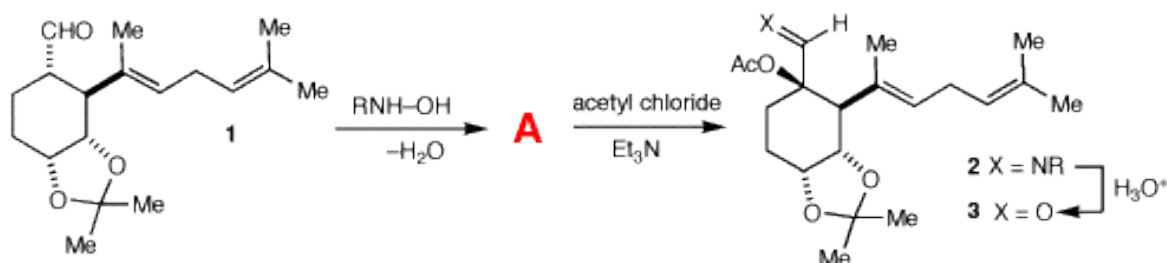
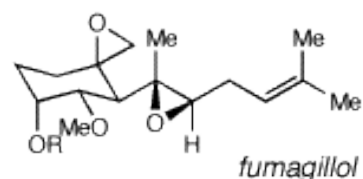


Please provide a mechanism for each reaction and identify the structure of intermediate A.



## Problem 2b

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In the space below, identify the structure of intermediate **A** and provide a mechanism for the transformation of **1** into **2**.

