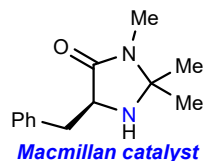
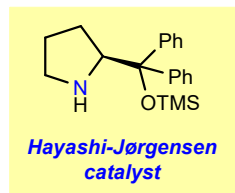
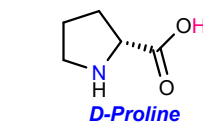
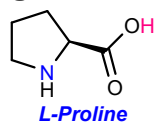


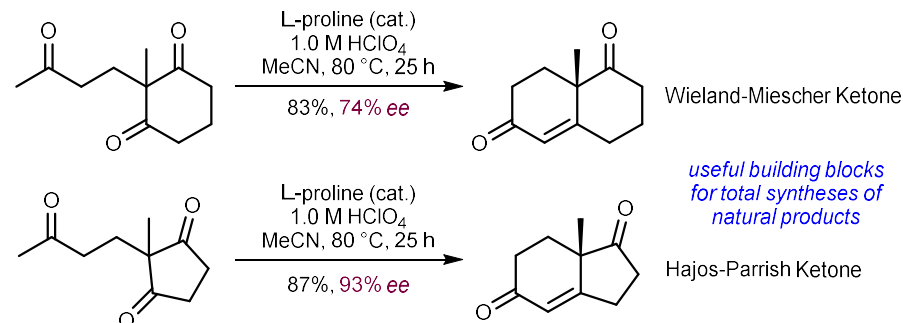
Prof. Yujiro Hayashi



Prof. Karl Anker Jørgensen



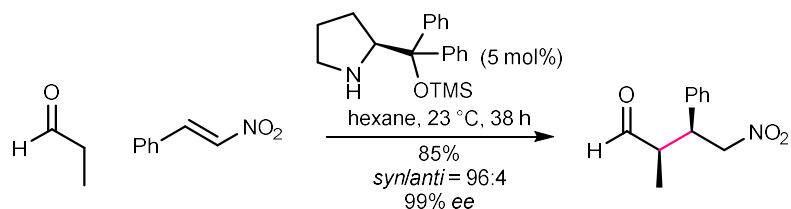
## Proline-catalyzed Asymmetric Reactions



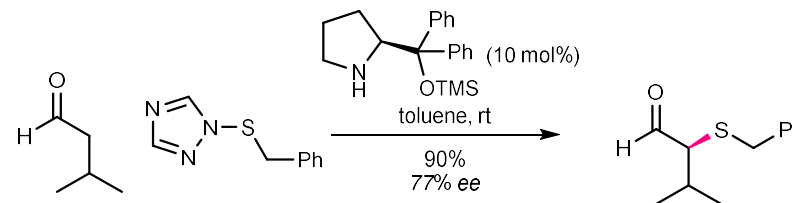
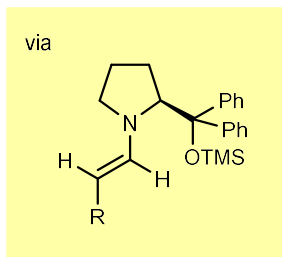
Recent review, see: Bradshaw, B.; Bonjoch, J. *Synlett* **2012**, 23, 337.

• Selectively activates an aldehyde and an  $\alpha,\beta$ -unsaturated aldehyde

## Initial Reports by Hayashi and Jørgensen Groups



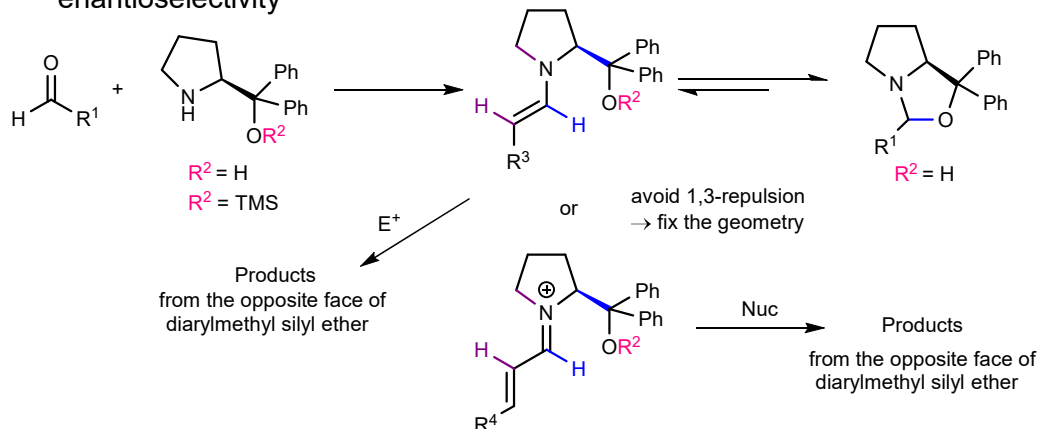
Hayashi, Y. et al. *Angew. Chem., Int. Ed.* **2005**, 44, 4212.



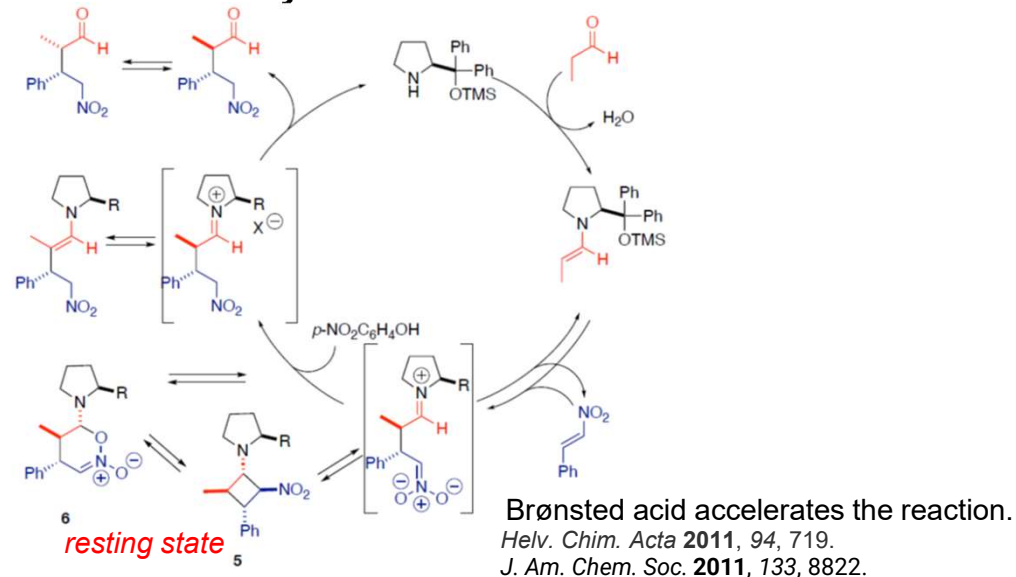
Jørgensen, K. A. et al. *Angew. Chem., Int. Ed.* **2005**, 44, 794.

## Role of Diarylmethyl Silyl Ether

1. Control the geometry of enamine/iminium intermediates
2. High concentration of reactive enamine/iminium intermediates
3. Shield one of the enantiofaces of the enamine/iminium to determine the enantioselectivity

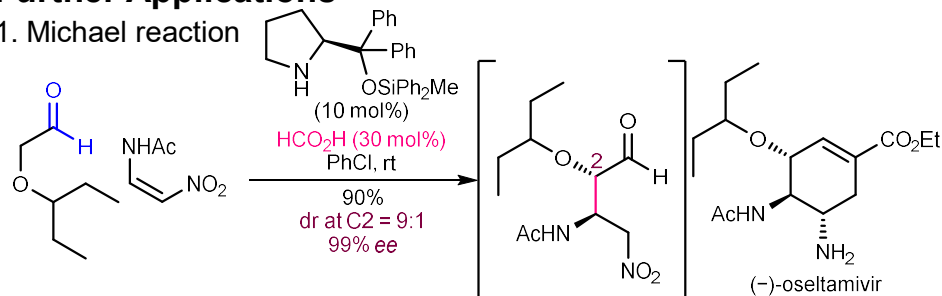


## Mechanistic Study

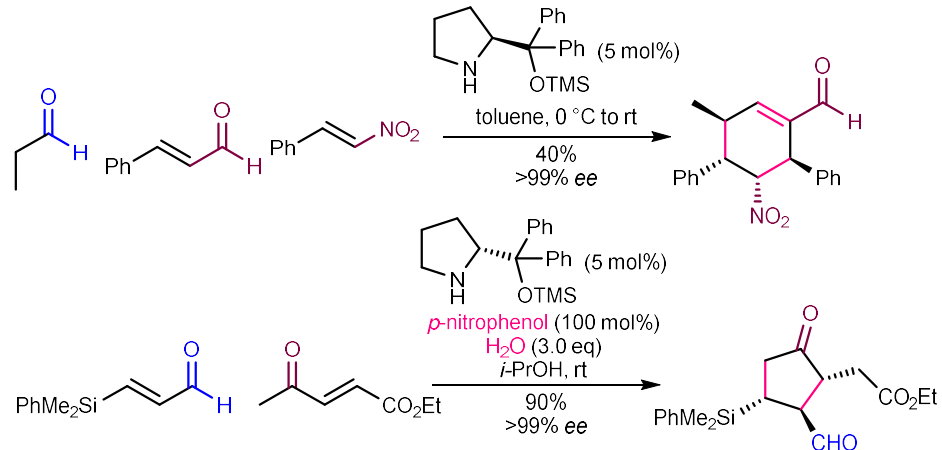


## Further Applications

### 1. Michael reaction

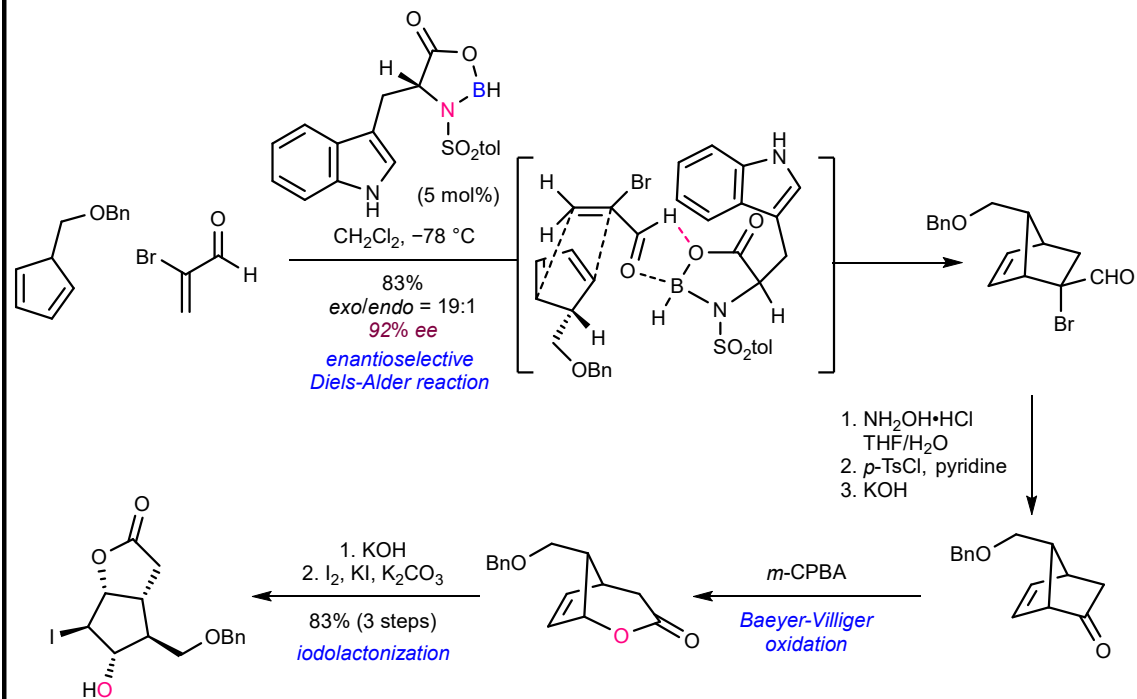


### 2. Michael/Michael/Aldol and Michael/Michael reaction



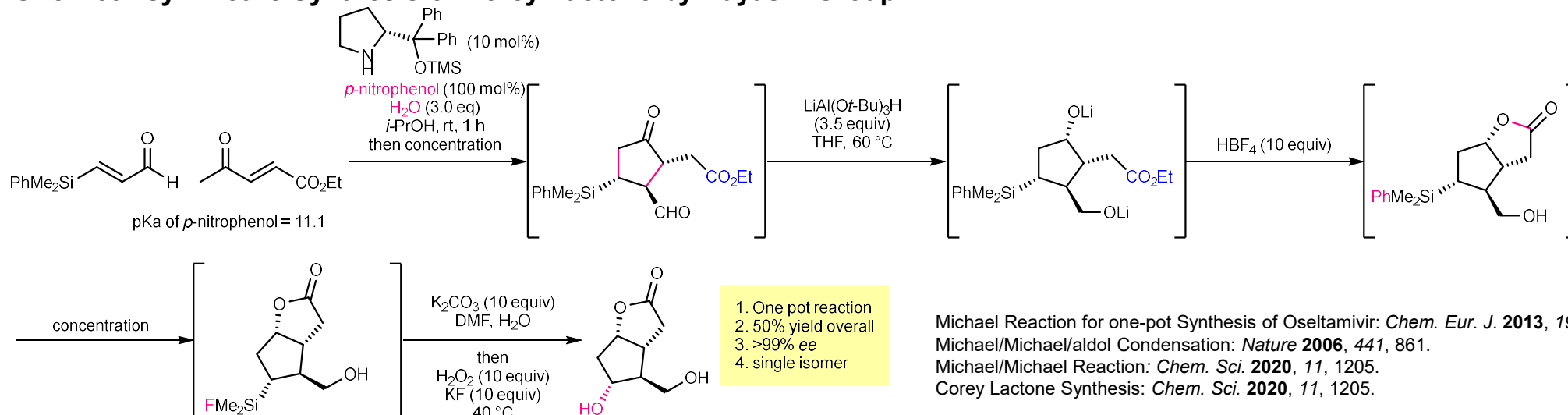
## Asymmetric Synthesis of Corey Lactone by Corey Group

Corey: Enantioselective Diels-Alder reaction



Review for synthesis of Corey Lactone, see: Corey, E. J. *Angew. Chem., Int. Ed.* **2002**, *41*, 1650.

## One-Pot Asymmetric Synthesis of Corey Lactone by Hayashi Group



Michael Reaction for one-pot Synthesis of Oseltamivir: *Chem. Eur. J.* **2013**, *19*, 17789.  
Michael/Michael/aldol Condensation: *Nature* **2006**, *441*, 861.  
Michael/Michael Reaction: *Chem. Sci.* **2020**, *11*, 1205.  
Corey Lactone Synthesis: *Chem. Sci.* **2020**, *11*, 1205.