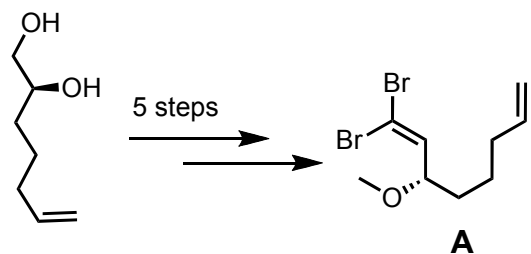


## Total Synthesis of (-)-Himandrine

Movassaghi, M.; Tjandra, M.; Qi, J. *JACS* **2009**, *131*, 9648-9650.



- 1) **X**, Pd(PPh<sub>3</sub>)<sub>4</sub>, Ti<sub>2</sub>CO<sub>3</sub>, THF, 97%
- 2) 2-Azetidinone, CuI, K<sub>2</sub>CO<sub>3</sub>, (MeNHCH<sub>2</sub>)<sub>2</sub>, 85%
- 3) TBAF, THF
- 4) DMSO, DIPEA, SO<sub>3</sub>-py
- 5) TBSOTf, NEt<sub>3</sub>, CH<sub>2</sub>Cl<sub>2</sub>, 82%

- 1) Acrolein, G.H, CH<sub>2</sub>Cl<sub>2</sub>, r.t., 85%
- 2) BHT, *N,N*-diethylaniline, 95 °C, 75%, 5:1 dr

- 3) TiCl<sub>4</sub>, CH<sub>2</sub>Cl<sub>2</sub>
- 4) Martin sulfurane, 57%

**B**

- 1) **Y**, *n*BuLi, CuBr-SMe<sub>2</sub>
- 2) NaBH<sub>4</sub>
- 3) ClCO<sub>2</sub>Bn, DIPEA, K<sub>2</sub>CO<sub>3</sub>, 50%

- 1) TsOH-H<sub>2</sub>O, PhH, 23 °C, 81%
- 2) POCl<sub>3</sub>, DMF, CH<sub>2</sub>Cl<sub>2</sub>, 71%

**C** 5,6,6-tricycle + 4-membered ring

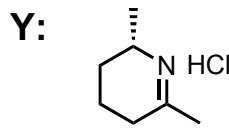
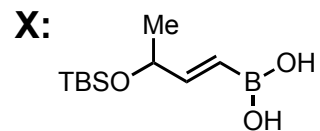
*mechanism of first step ?*

**D**

**E**

- 1) DDQ, SiO<sub>2</sub>, MeCN, H<sub>2</sub>O
- 2) NaClO<sub>2</sub>, NaH<sub>2</sub>PO<sub>4</sub>, 2-methyl-2-butene, H<sub>2</sub>O, *t*BuOH
- 3) CH<sub>2</sub>N<sub>2</sub>, THF, 0 °C, 61 %
- 4) TMSI, 2,6-di-*t*Bu-4-Me-Pyr, 66%
- 5) NEt<sub>3</sub>-(HF)<sub>3</sub>, THF, 90%

- 1) NCS, MeCN, 89%
- 2) NaBH<sub>4</sub>, EtOH, 90%
- 3) BzCl, py, 7d, 87%



**F**

**G**

