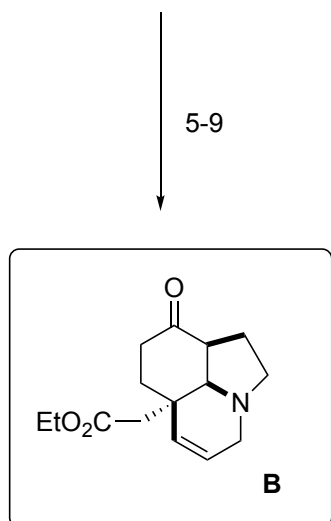
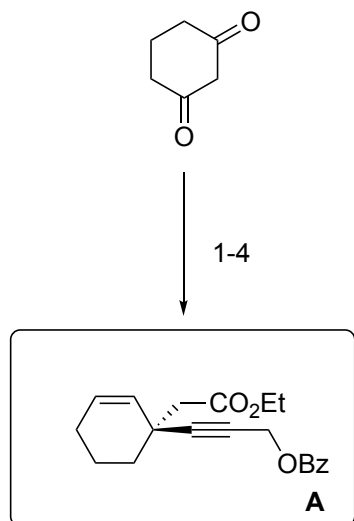


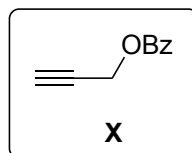
## Total Syntheses of (–)-Deoxoapodine, (–)-Kopsifoline D and (–)-Beninine

Yi-Guo Zhou, Henry N. C. Wong and Xiao-Shui Peng

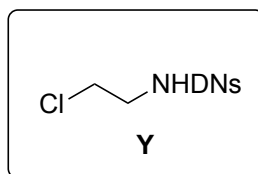
*J. Org. Chem.* **2020**, *85*, 2, 967-976.



- 1) Tf<sub>2</sub>O (1.5 equiv), 2,6-lutidine
- 2) **X**, PdCl<sub>2</sub>(PPh<sub>3</sub>)<sub>2</sub>, CuI
- 3) CBS-cat, catecholborane
- 4) *o*-nitrophenol, (EtO)<sub>3</sub>CCH<sub>3</sub>



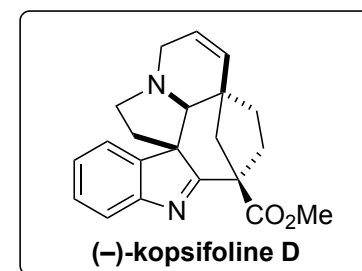
- 5) K<sub>2</sub>CO<sub>3</sub>, EtOH
- 6) Lindlar-Cat, H<sub>2</sub>
- 7) **Y**, PPh<sub>3</sub>, DIAD
- 8) CrO<sub>3</sub>, TBHP
- 9) PhONa



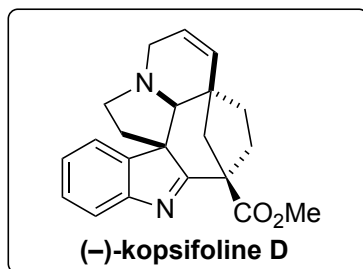
Name of step 4 and characterization?

Name and structure of protecting group of **Y**?

Mechanism for step 9?



10-17



- 10) PhNHNH<sub>2</sub>, TFA
- 11) TFA, Et<sub>3</sub>SiH
- 12) LiAlH<sub>4</sub>
- 13) TBSCl, imH
- 14) (COCl)<sub>2</sub>, DMSO, Et<sub>3</sub>N
- 15) *n*-BuLi, Mander's reagent
- 16) TBAF
- 17) TsCl, Et<sub>3</sub>N, *t*-BuOK

Name, mechanism and characterization  
of key-step of 10

*hint*: two products isolated

Structure of Mander's reagent?