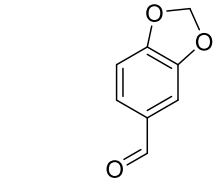
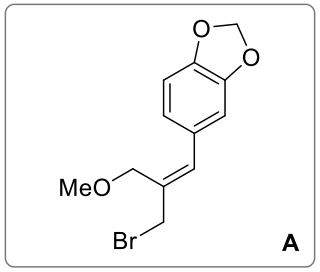
# Collective Asymmetric Total Synthesis of C-11 Oxygenated *Cephalotaxus* Alkaloids

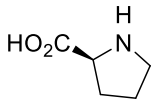
Kim, J. H.; Jeon, H.; Park, C.; Park, S.; Kim, S. *Angew. Chem. Int. Ed.* **2021**, *60*, 12060-12065.



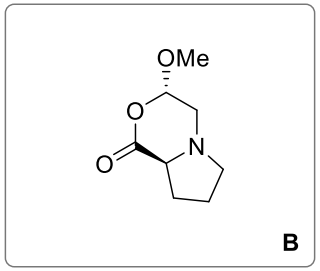
1 - 4




**A**

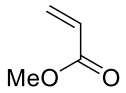



5 - 6



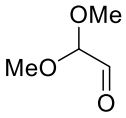

**B**

1) **1**, NaH, MeOH, THF *then* NaOH (aq)
2) $ClCO_2Et$, $Et_3N$, THF
3) $NaBH_4$, MeOH
4) $PBr_3$, $Et_2O$



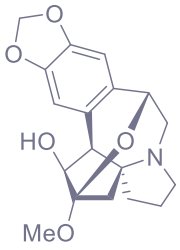

**1**

5) **2**, $NaCNBH_3$, $H_2O$, $CH_2Cl_2$
6) $BF_3{\bullet}OEt_2$, MeCN




**2**

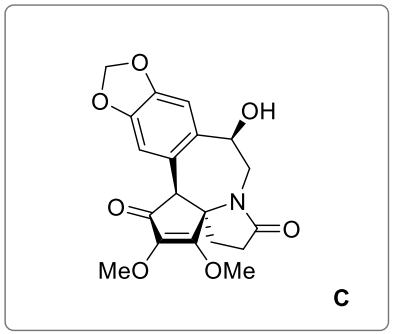
Common names of starting materials used to generate **A** and **B**?
piperonal (heliotropin) and L-proline




**Drupacine**

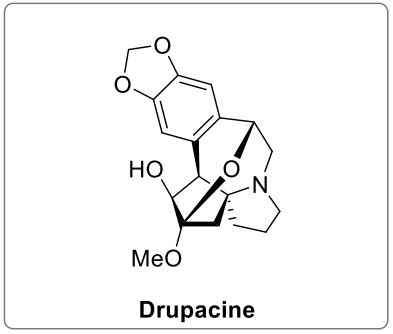
**A + B**

7 - 12




**C**

13 - 17

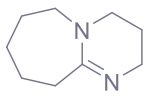


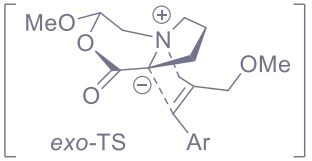

**Drupacine**

7) MeCN
8) DBU, $CH_2Cl_2$
9) MsOH, $CH_2Cl_2$
10) NBS, 1,4-dioxane, $H_2O$
11) $O_3$, $CH_2Cl_2$ *then* $Me_2S$
12) KO*t*Bu, THF *then* $Me_2SO_4$

13) $H_2$, $PtO_2$, EtOH
14) $K_2CO_3$, MeOH
15) $NaBH_4$, MeOH
16) $LiAlH_4$, THF
17) HCl, $H_2O$, THF

Step 8: Name? Show structure of DBU and transition state.
[2,3]-Stevens rearrangement




Step 12: Name of the reaction?
Dieckmann condensation