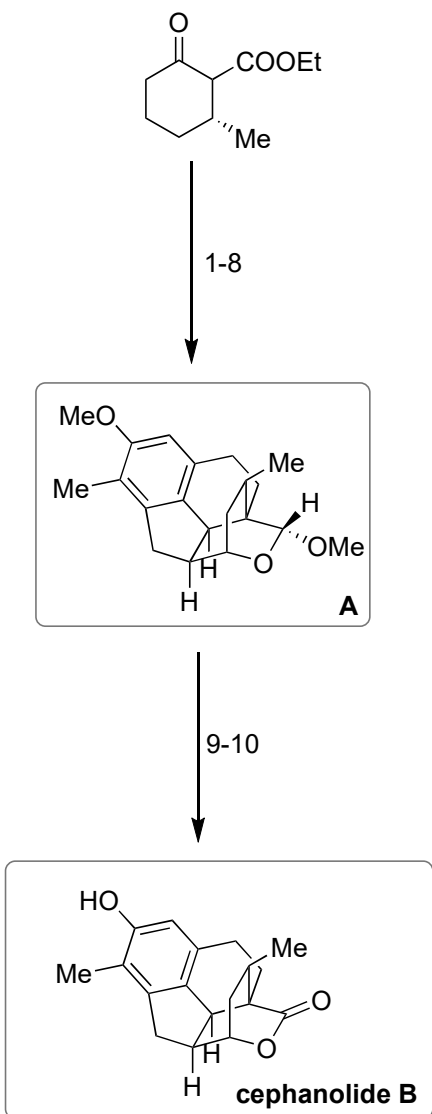
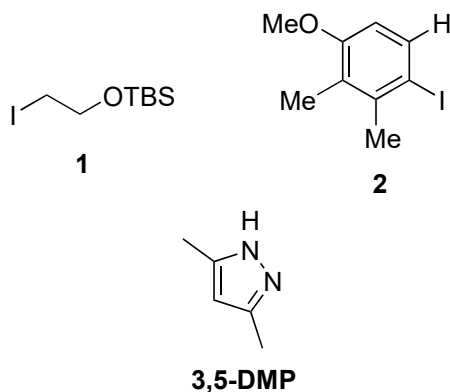


# Asymmetric total synthesis of benzenoid cephalotane-type diterpenoids through a cascade C(sp<sup>2</sup>) & C(sp<sup>3</sup>)–H activation

X. Li, Z. Lu, S. Liu, M. Sun, S. Duan, Z. Xie, *Nat. Commun.* **2025**, *16*, 4674.



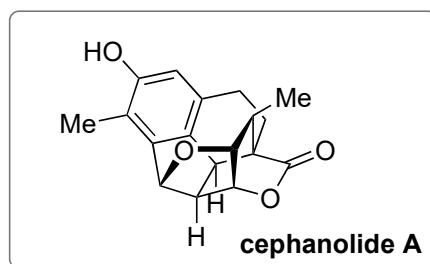
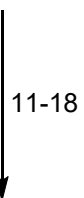
- 1) **1**, Cs<sub>2</sub>CO<sub>3</sub>
- 2) TsNHNH<sub>2</sub>, NaH, MgSO<sub>4</sub>, *then* HF (aq.)
- 3) CBr<sub>4</sub>, PPh<sub>3</sub>, *then* CrO<sub>3</sub>, 3,5-DMP
- 4) CeCl<sub>3</sub>·7H<sub>2</sub>O, NaBH<sub>4</sub>
- 5) NaH
- 6) DIBAL-H
- 7) CHCl<sub>3</sub>/MeOH
- 8) **2**, PdCl<sub>2</sub> (20 mol%), NBE, Cs<sub>2</sub>CO<sub>3</sub>, KOPiv



- 9) BF<sub>3</sub>·Et<sub>2</sub>O, *m*-CPBA, 4Å MS
- 10) BBr<sub>3</sub>

- 2) Name of the reaction:  
*Bamford-Sterens Reaction*
- 3) Name of the reaction:  
*Appel Reaction*
- 4) Name of the reaction:  
*Lucas reduction*

**A**



- 11) 3M HCl
- 12) (COCl)<sub>2</sub>, DMSO, Et<sub>3</sub>N
- 13) NaClO<sub>2</sub>, NaH<sub>2</sub>PO<sub>4</sub>, 2-methyl-2-butene
- 14) KHMDS, camphorsulfonyl oxaziridine
- 15) NaBH<sub>4</sub>, MeOH
- 16) CMPI, Et<sub>3</sub>N
- 17) I<sub>2</sub>, PIDA, hv
- 18) BBr<sub>3</sub>

12) Name of the reaction:

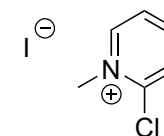
*Swern oxidation*

13) Name of the reaction:

*Pinnick oxidation*

16) Name and structure of the reagent CMPI:

*Mukaiyama reagent*



17) Name of the reaction:

*Suarez oxidation*