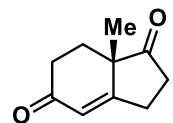
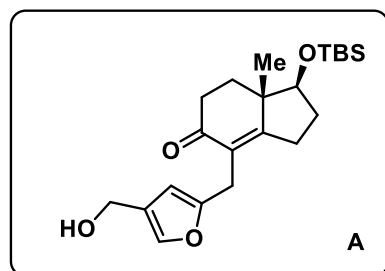


Enantioselective Total Synthesis of (+)-Wortmannin

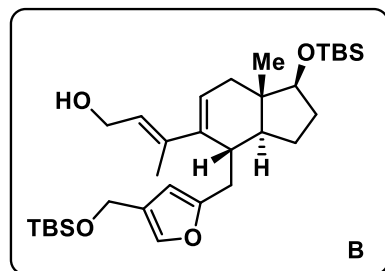
Yinliang Guo, Tianfei Quan, Yandong Lu, and Tuoping Luo, *J. Am. Chem. Soc.* **2017**, *1391*, 6815–6818.



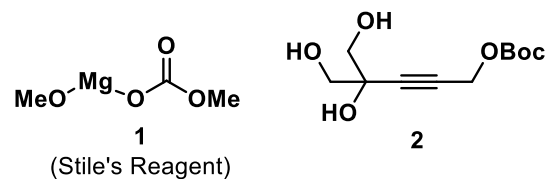
1-4



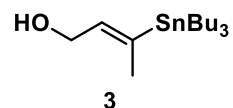
5-8



- 1) NaBH₄, EtOH
- 2) TBSCl, imidazole, DMF
- 3) **1**, DMF, Δ
- 4) **2**, Pd₂(dba)₃, dppf, DIPEA, PhCl, Δ

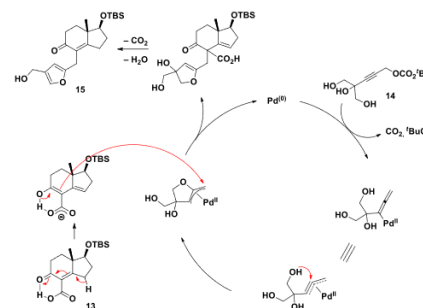


- 5) TBSCl, imidazol, DMF
- 6) NiCl₂·6H₂O, NaBH₄, MeOH
- 7) LiHMDS, PhNTf₂, THF
- 8) **3**, Pd₂(dba)₃, AsPh₃, NMP, Δ



Step 4: Name Reaction? Mechanism?

Wipf furan synthesis



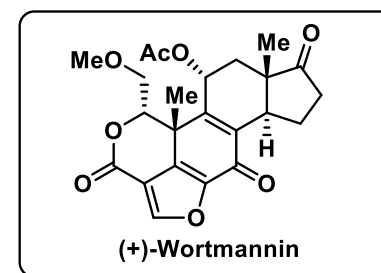
Step 6: What is the active species of this step?

Nickel-boride

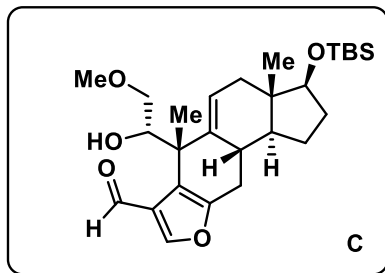
e.g. see: *Adv. Synth. Catal.* **2011**, *353*, 3319–3324.

Step 7: Name of PhNTf₂ reagent?

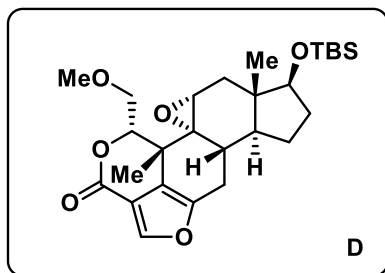
Hendrickson-McMurry reagent



9-13



14-16

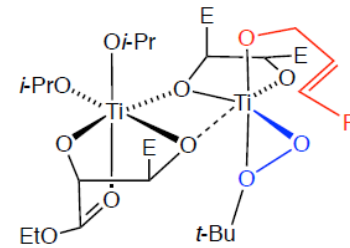


- 9) TBHP, (-)-DIPT, Ti(OiPr)₄, 4 Å MS, CH₂Cl₂
- 10) NaH, MeI, DMF
- 11) Ph₄PBF₄, CH₂Cl₂-HFIP
- 12) TBAF·3H₂O, THF
- 13) TEMPO, PIDA, CH₂Cl₂

- 14) Pinnick Oxidation
- 15) Mukaiyama Reagent, NEt₃, CH₂Cl₂
- 16) H₂O₂-urea, TFAA, Na₂CO₃, CH₂Cl₂

Step 9: Name Reaction? Mechanism?

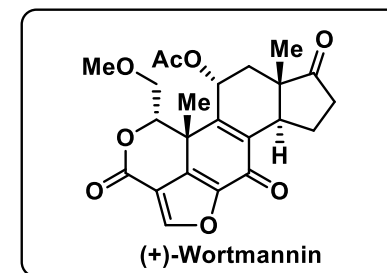
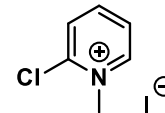
Sharpless Asymmetric Epoxidation



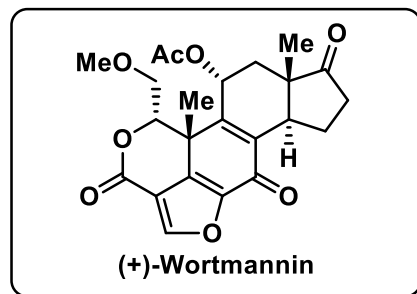
Step 14: Typical conditions of Pinnick Oxidation?

-> 2-methyl-2-butene, NaClO₂, NaH₂PO₄, tBuOH/THF/H₂O

Step 15: Structure of Mukaiyama Reagent?



17-22



- 17) NBS, AIBN, CCl₄, Δ
- 18) AgBF₄, NEt₃, DMSO
- 19) HF·NEt₃, THF
- 20) DMP, CH₂Cl₂
- 21) HNEt₂, DBN, CH₂Cl₂, *then* HCl, THF
- 22) Ac₂O, pyridine

Step 18: Name Reaction?
Kornblum Oxidation