

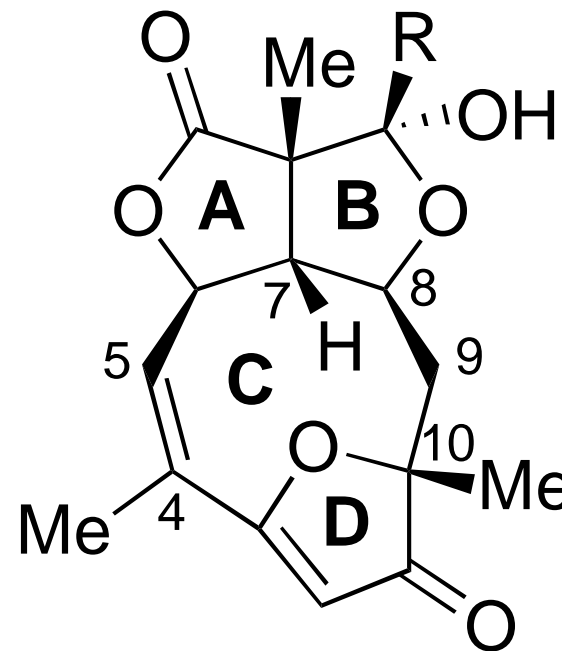
Synthesis of (+)-Eremantholide A

October 8, 2008

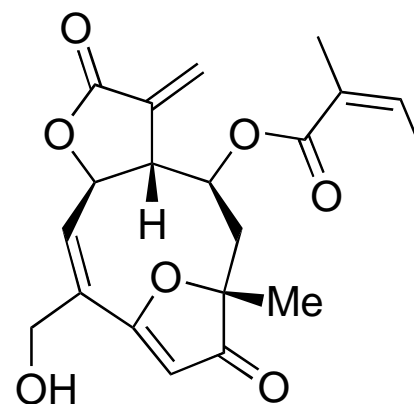
Daniel Yao

(+)-Eremantholide A

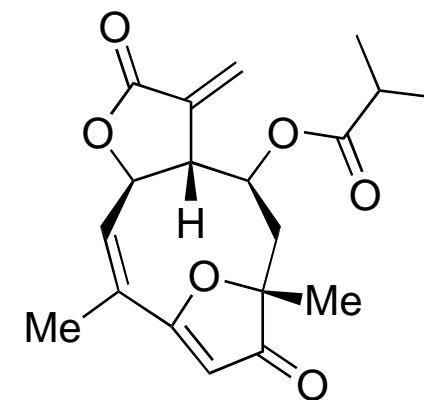
- Isolated from the Brazilian plant *Eremanthus Elaeagnus* in 1975 by Le Quesne
- Member of the furanoheliangolide family of natural products
- Unique structural features:
 - Dioxabicyclo[3.3.0]octanone ring system (A/B)
 - Oxabicyclo[6.2.1]undecadienone ring system (C/D)
 - 3(2*H*)-furanone ring
 - Conserved stereochemistry at C7



(+)-Eremantholide A R = *i*-Pr
 (+)-Eremantholide B R = *s*-Bu
 (-)-Eremantholide C R = C(CH₃)=CH₂



Lychnophorolide A

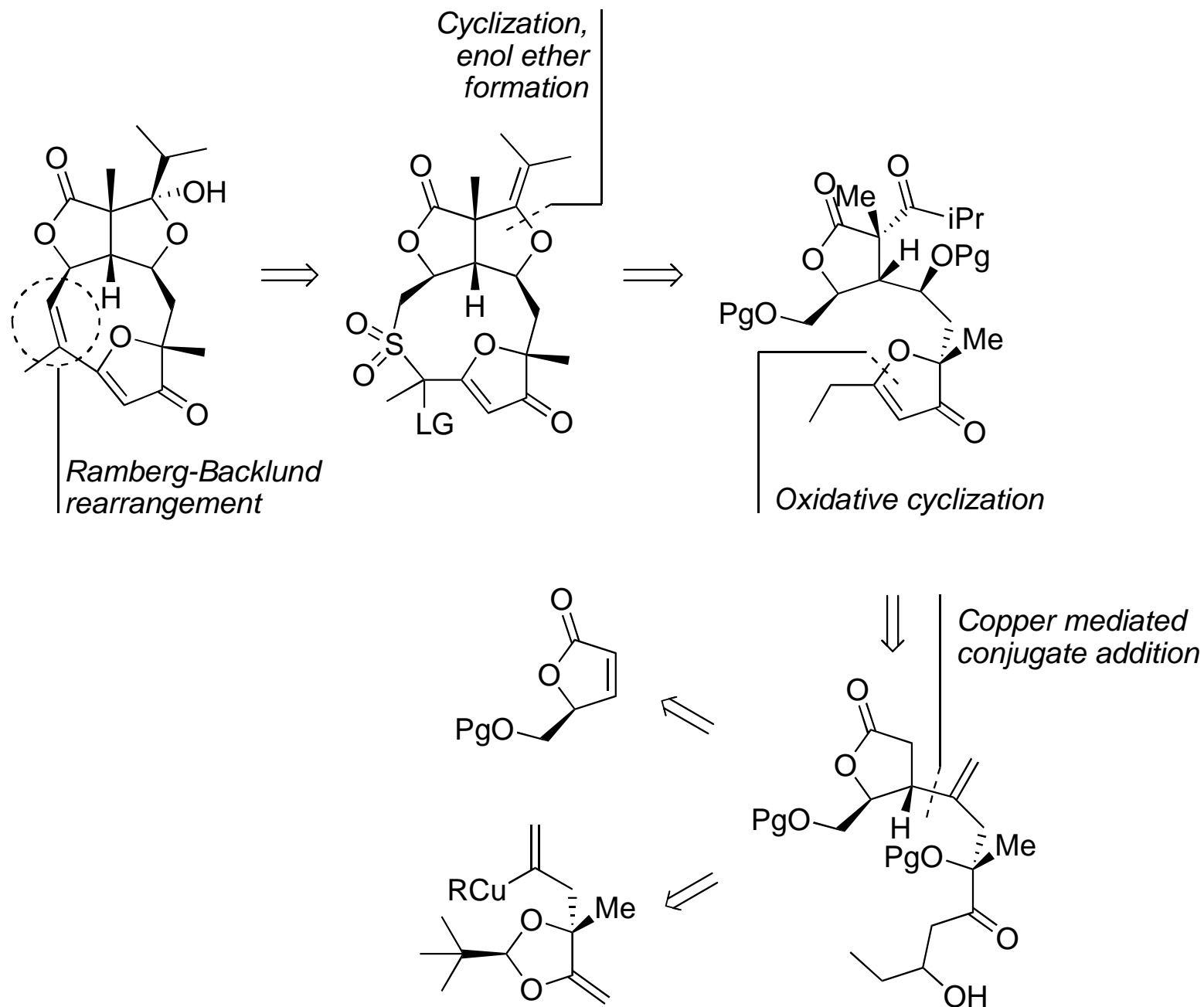


Ciliarin

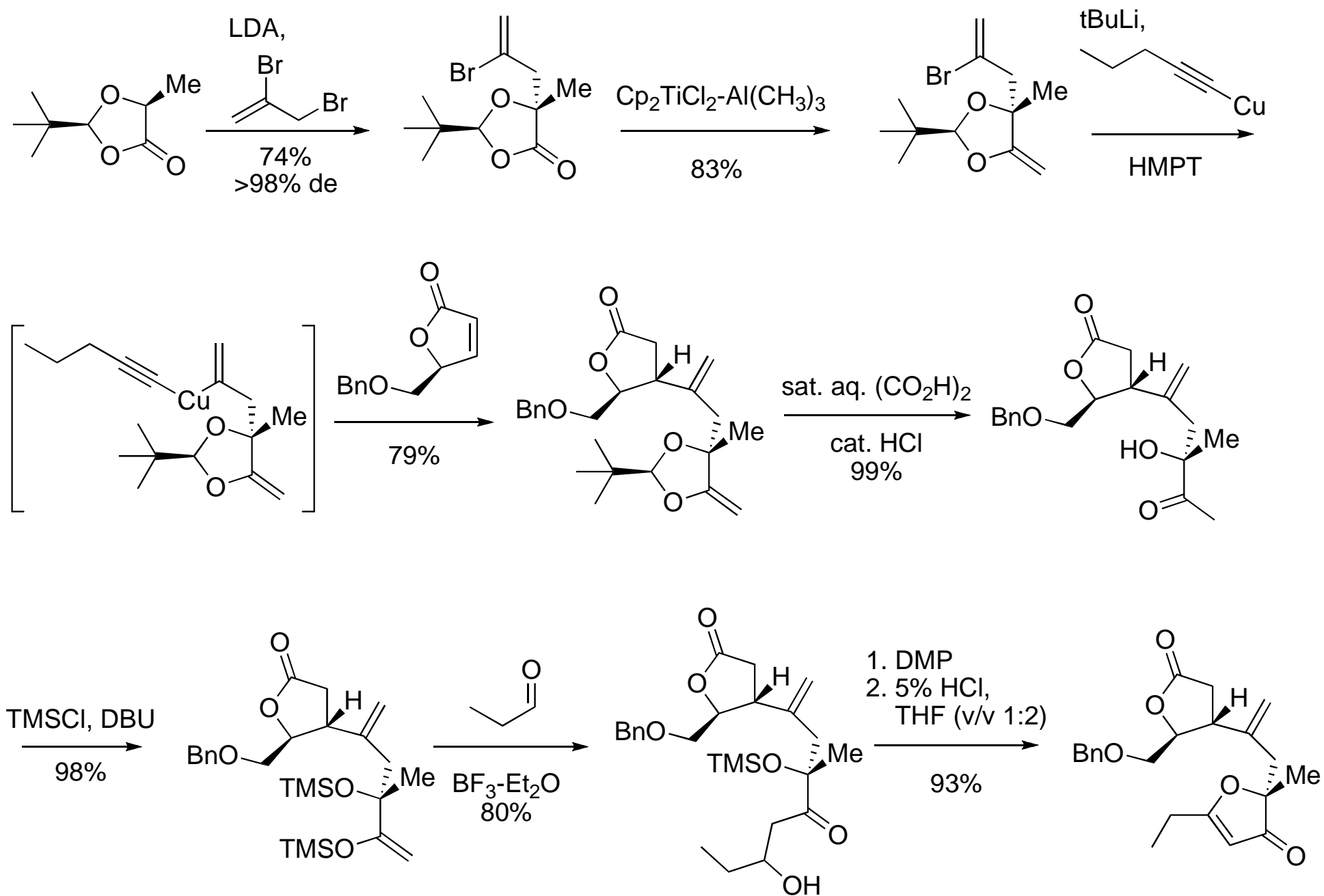
Syntheses

- Total Syntheses
 - Boeckman (1991)
 - Tadano (1995)
 - Hale (2007)
- Formal Synthesis
 - Hale (2007)

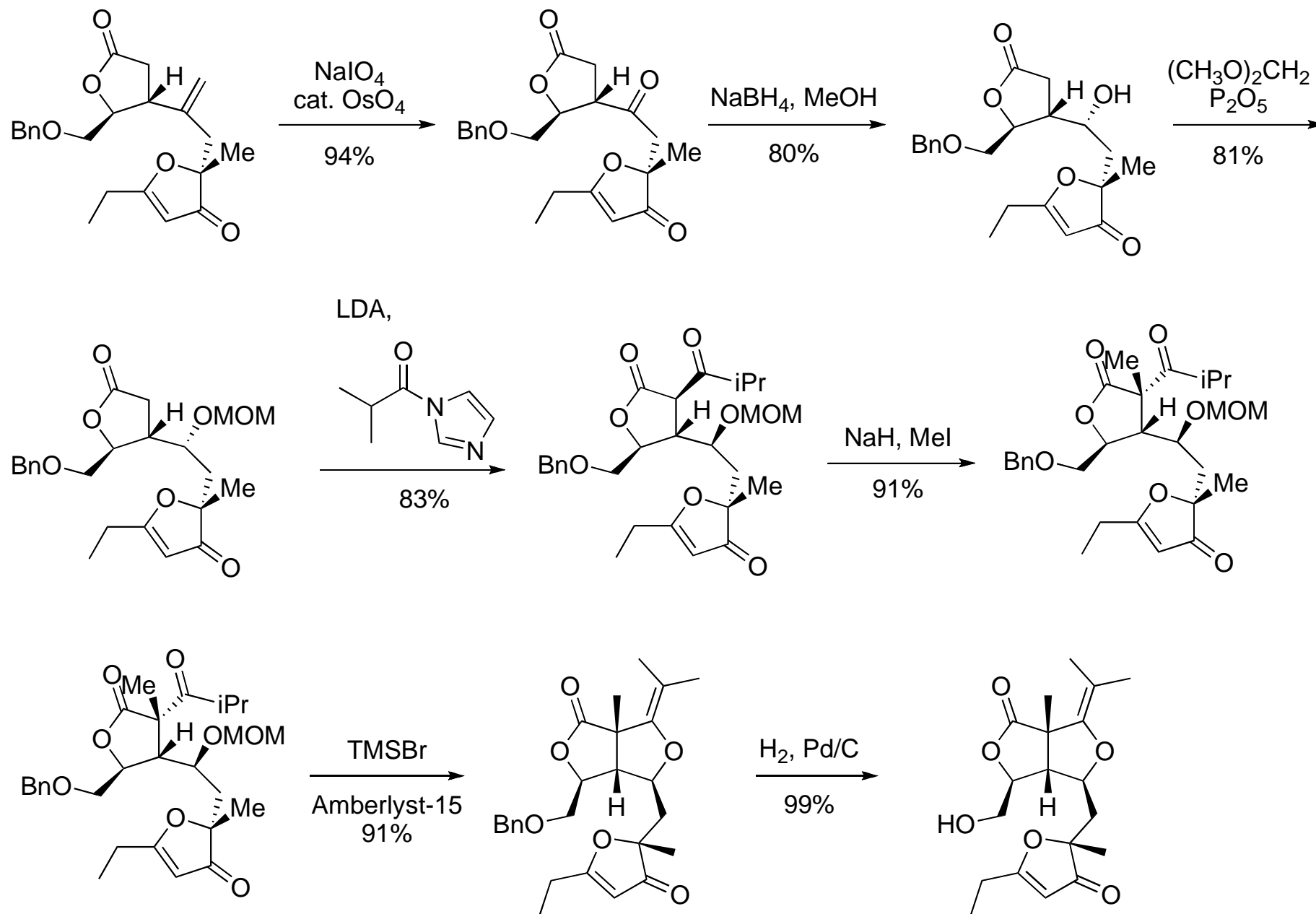
Boeckman 1991 - Retrosynthesis



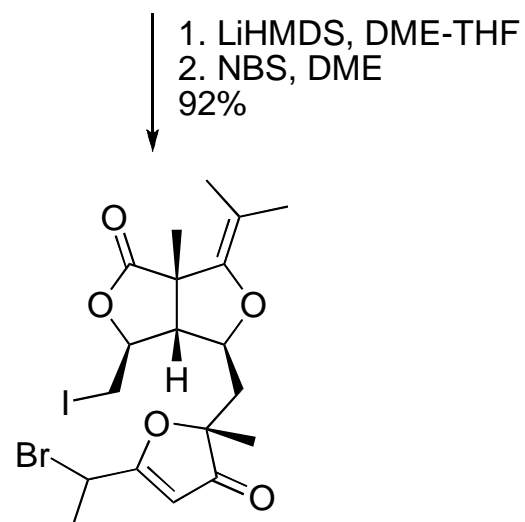
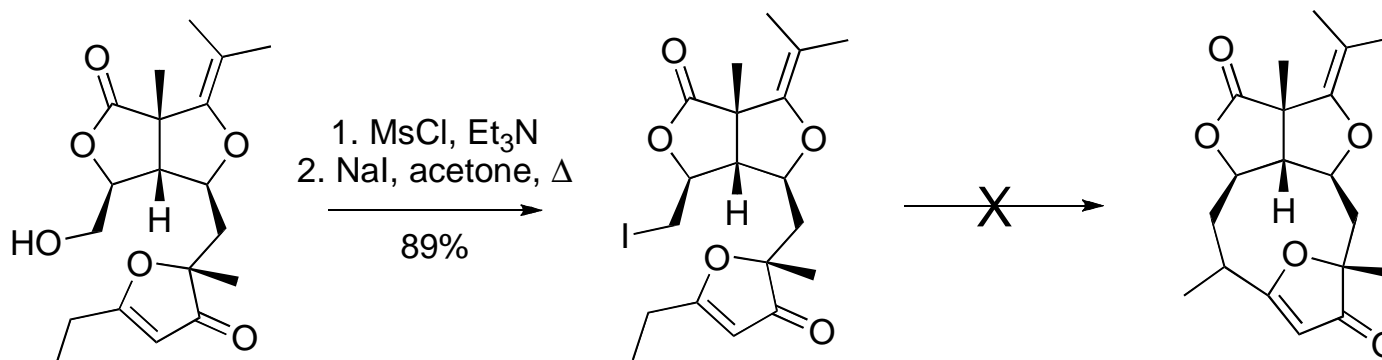
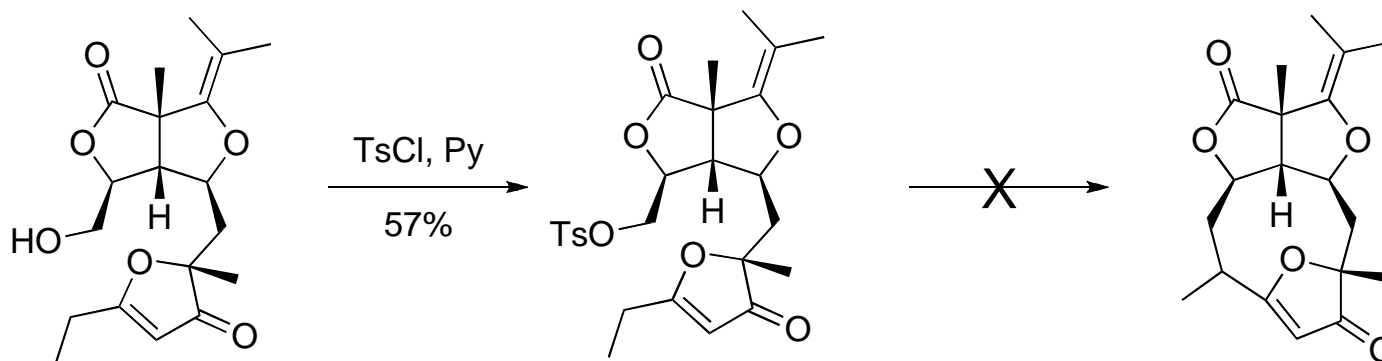
Boeckman 1991 - A and D Ring Synthesis



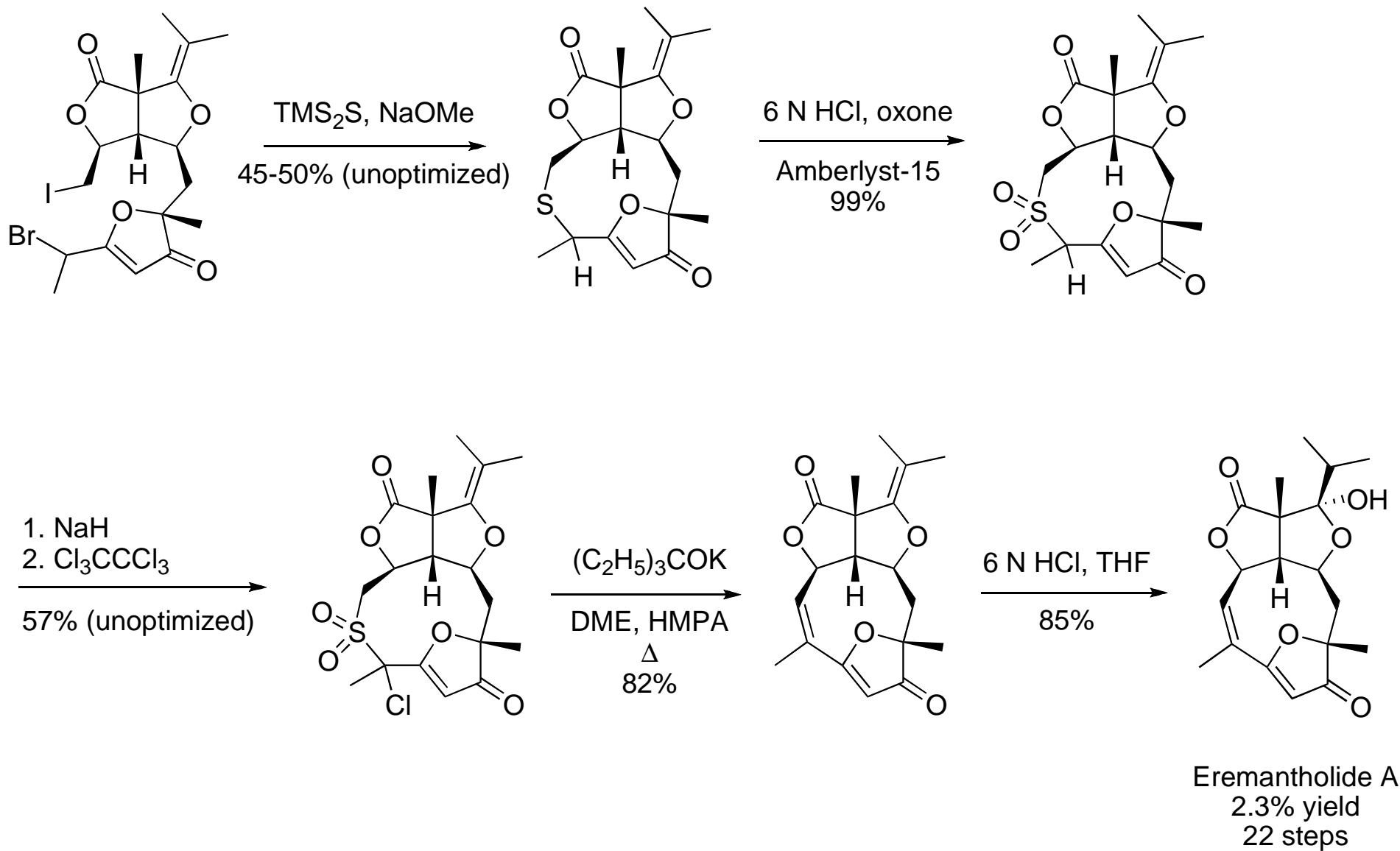
Boeckman 1991 - Installation of the B ring



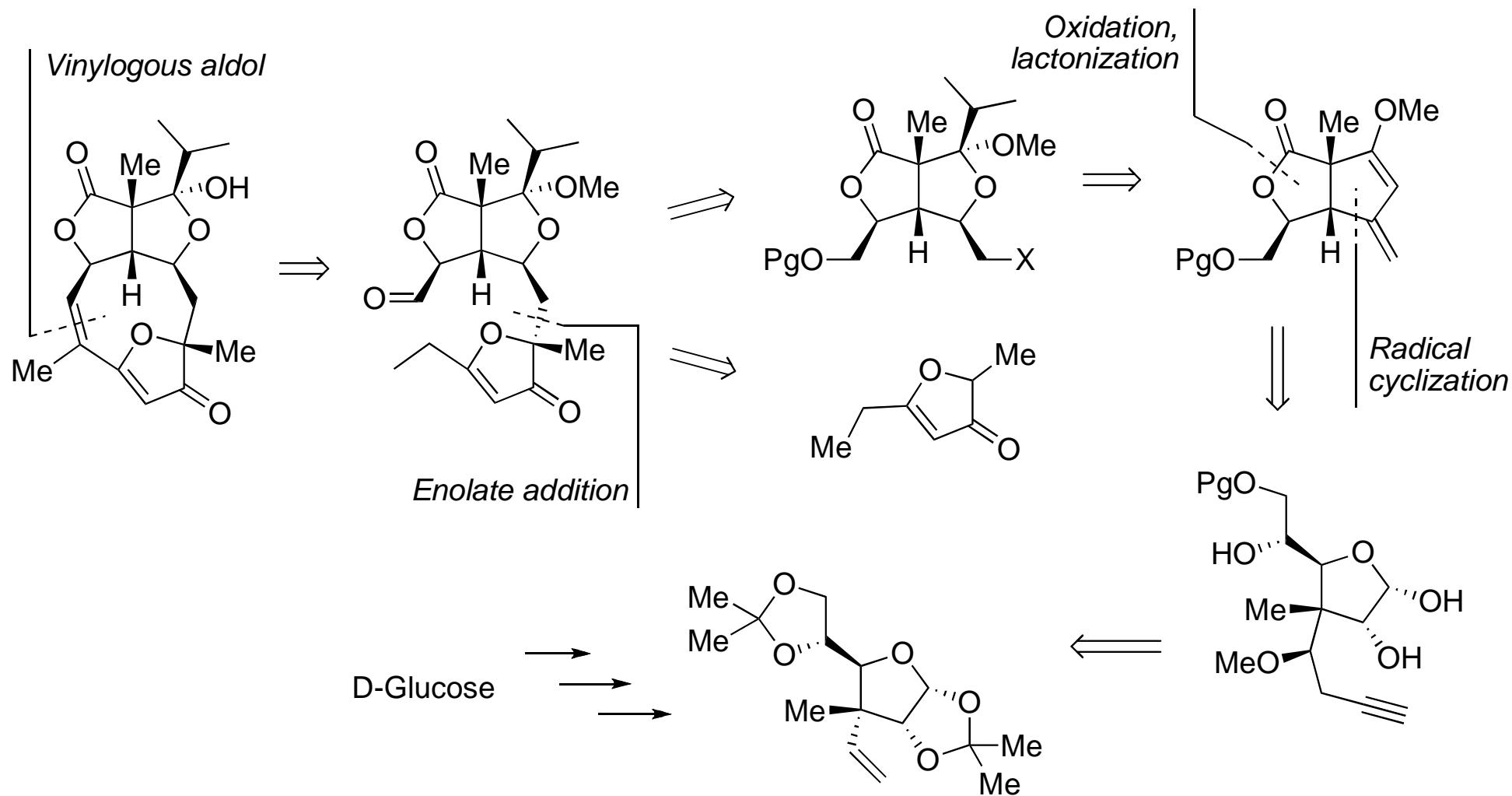
Boeckman 1991 - Attempt at C Ring Cyclization



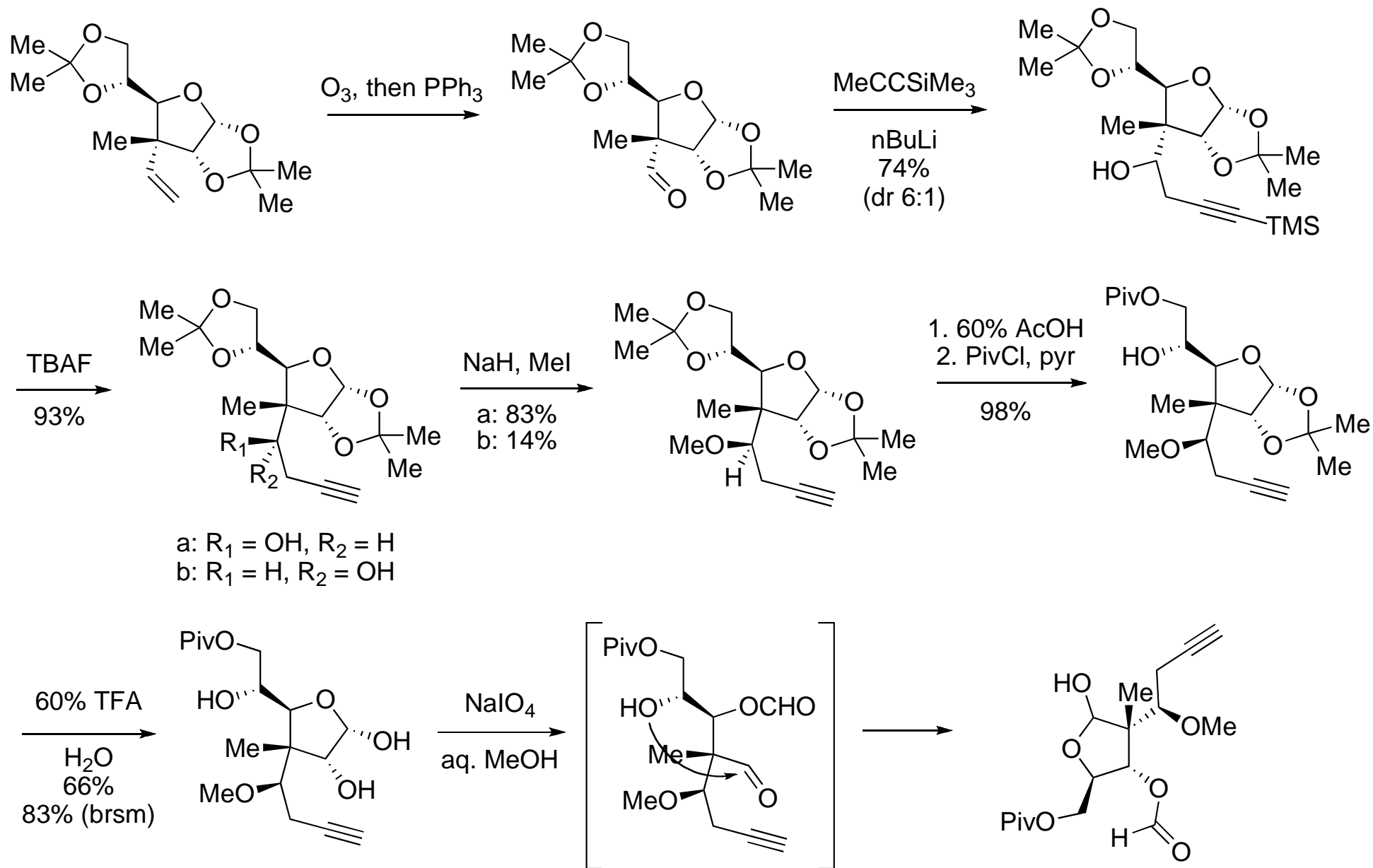
Boeckman 1991 - Endgame



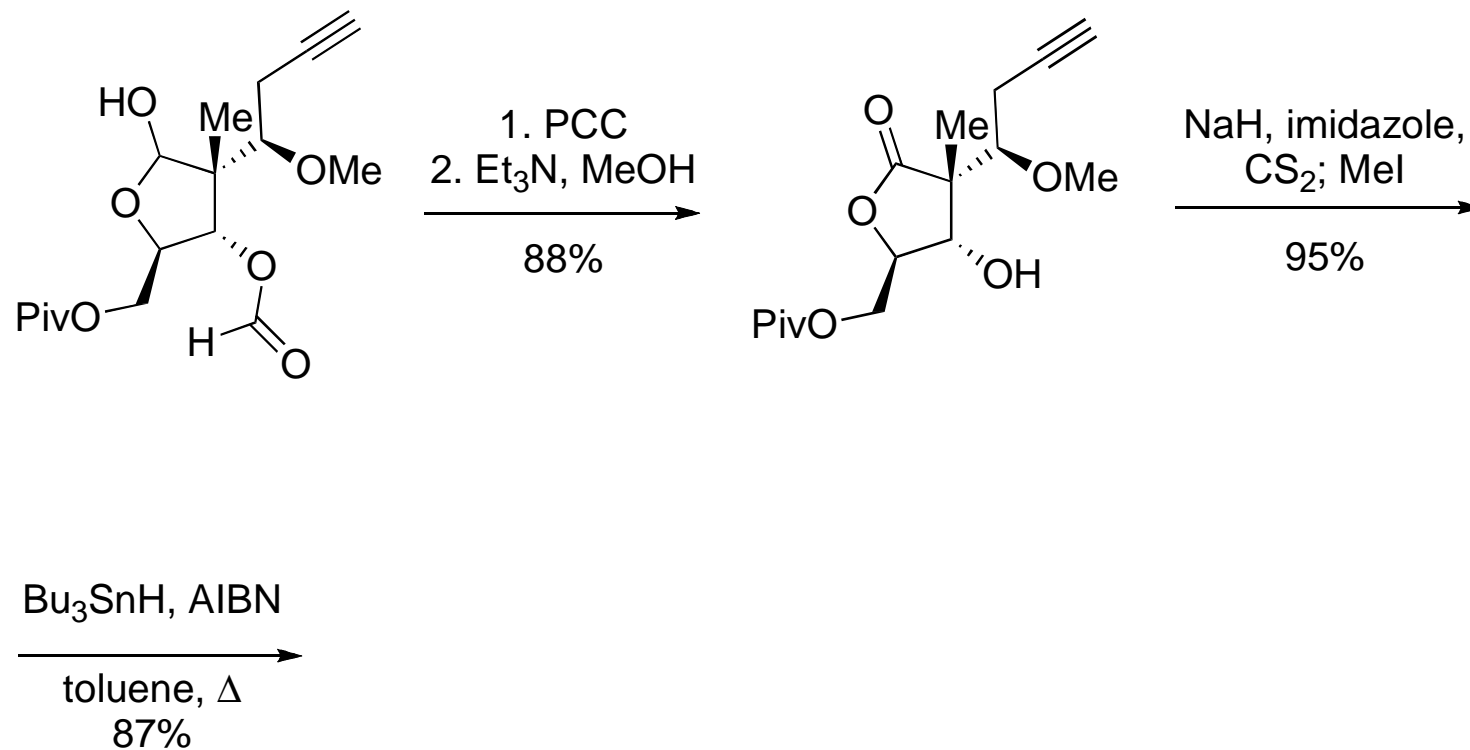
Tadano 1995 - Retrosynthesis



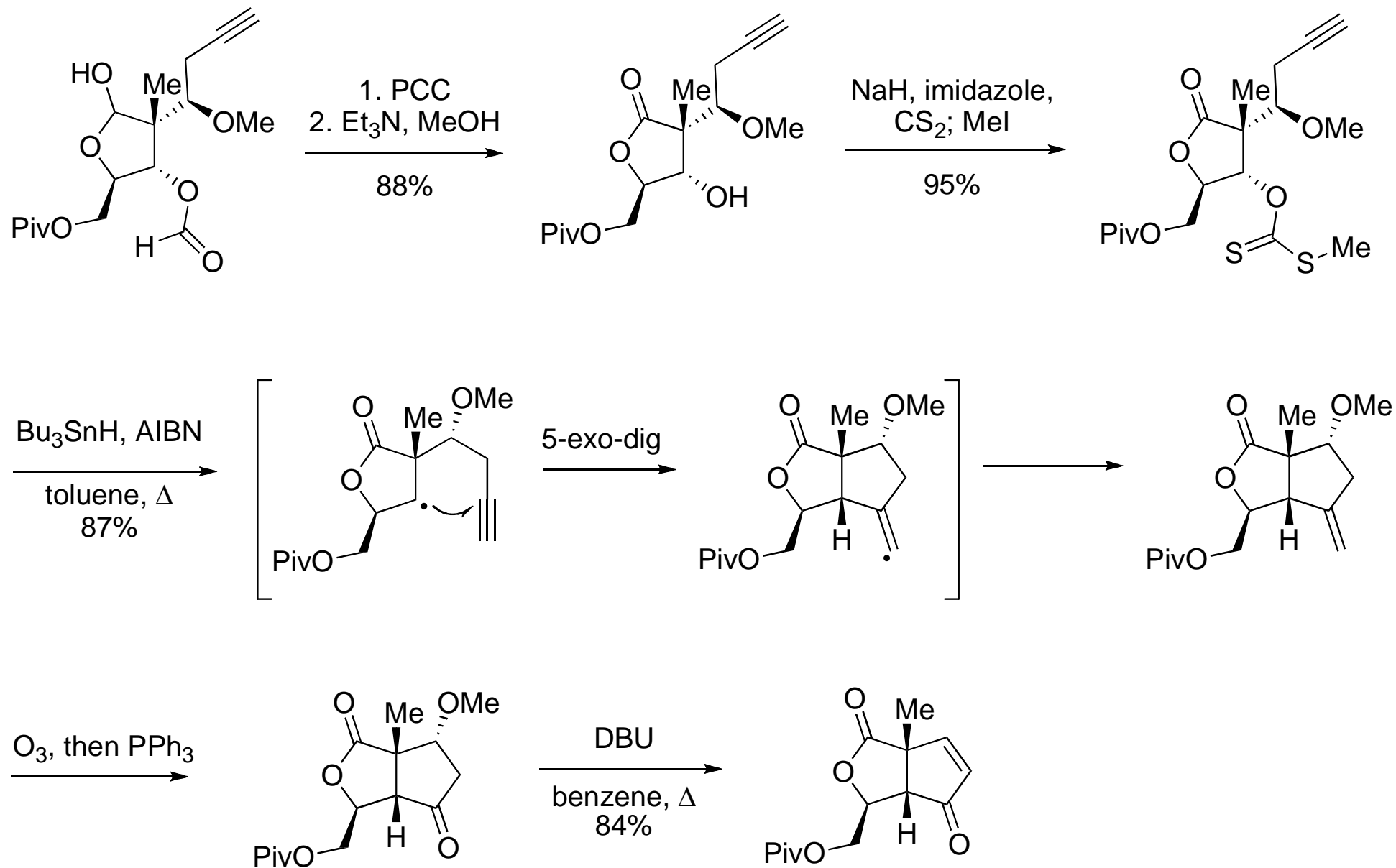
Tadano 1995 - A Ring Synthesis



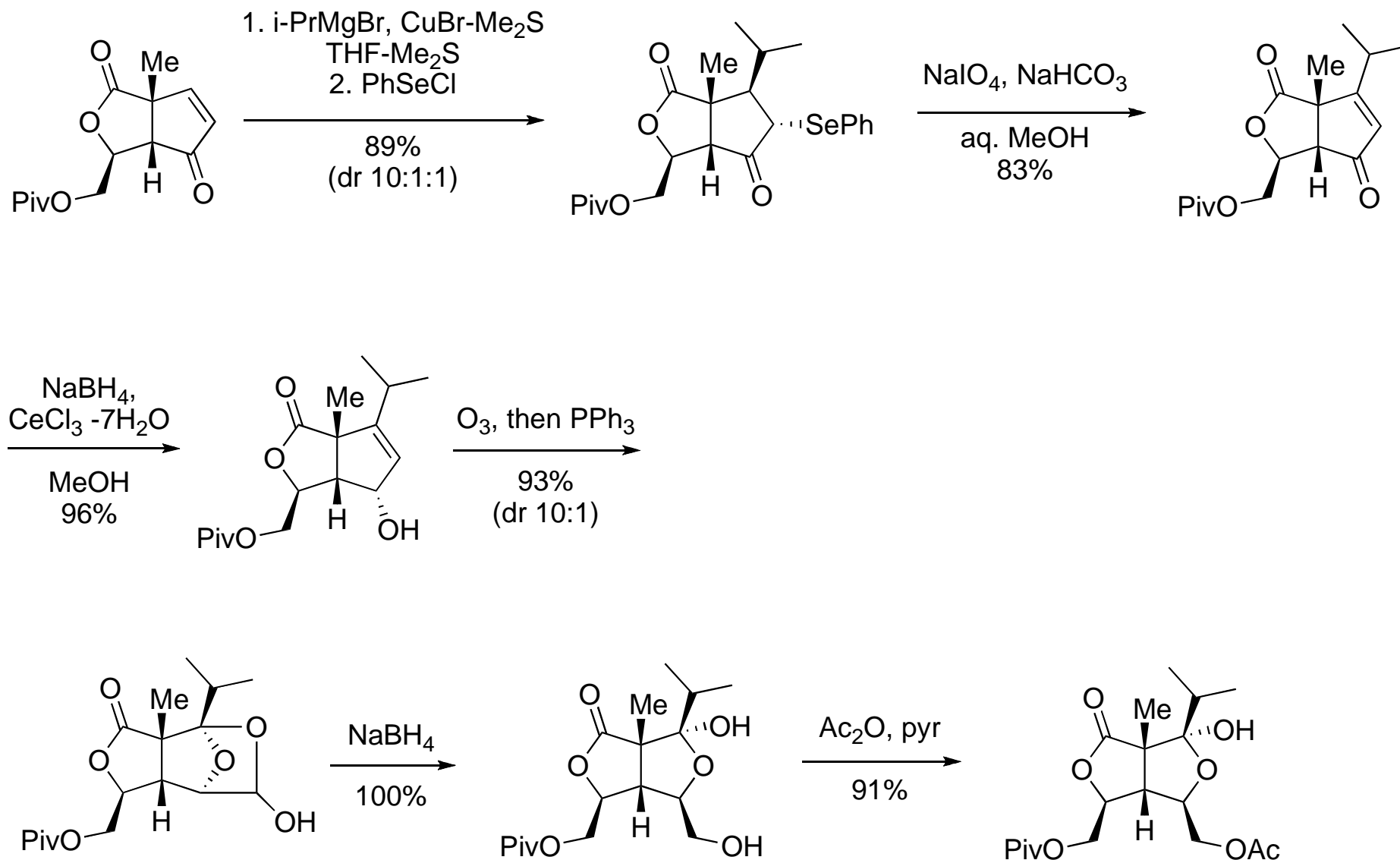
Tadano 1995 - B Ring Cyclization



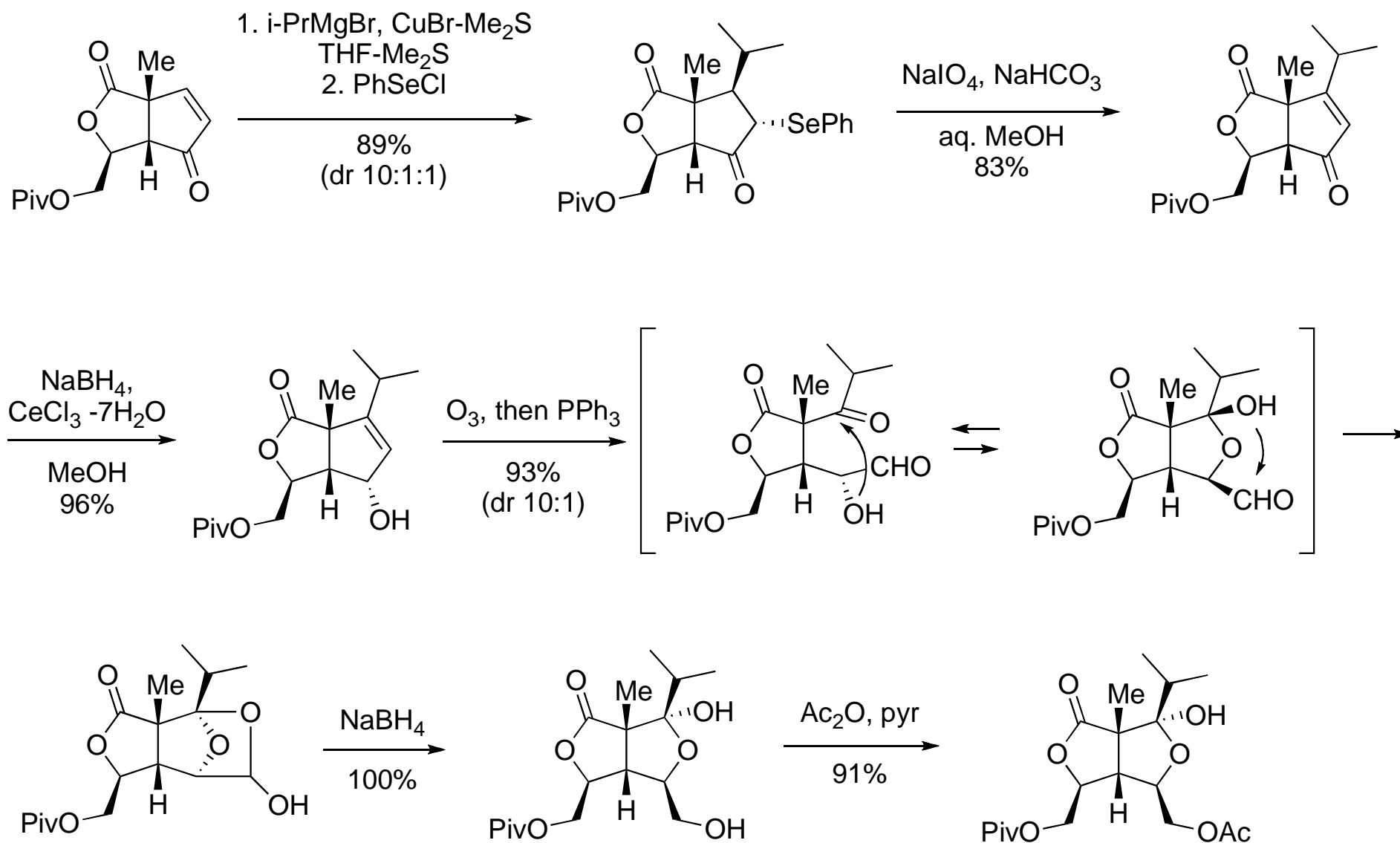
Tadano 1995 - B Ring Cyclization



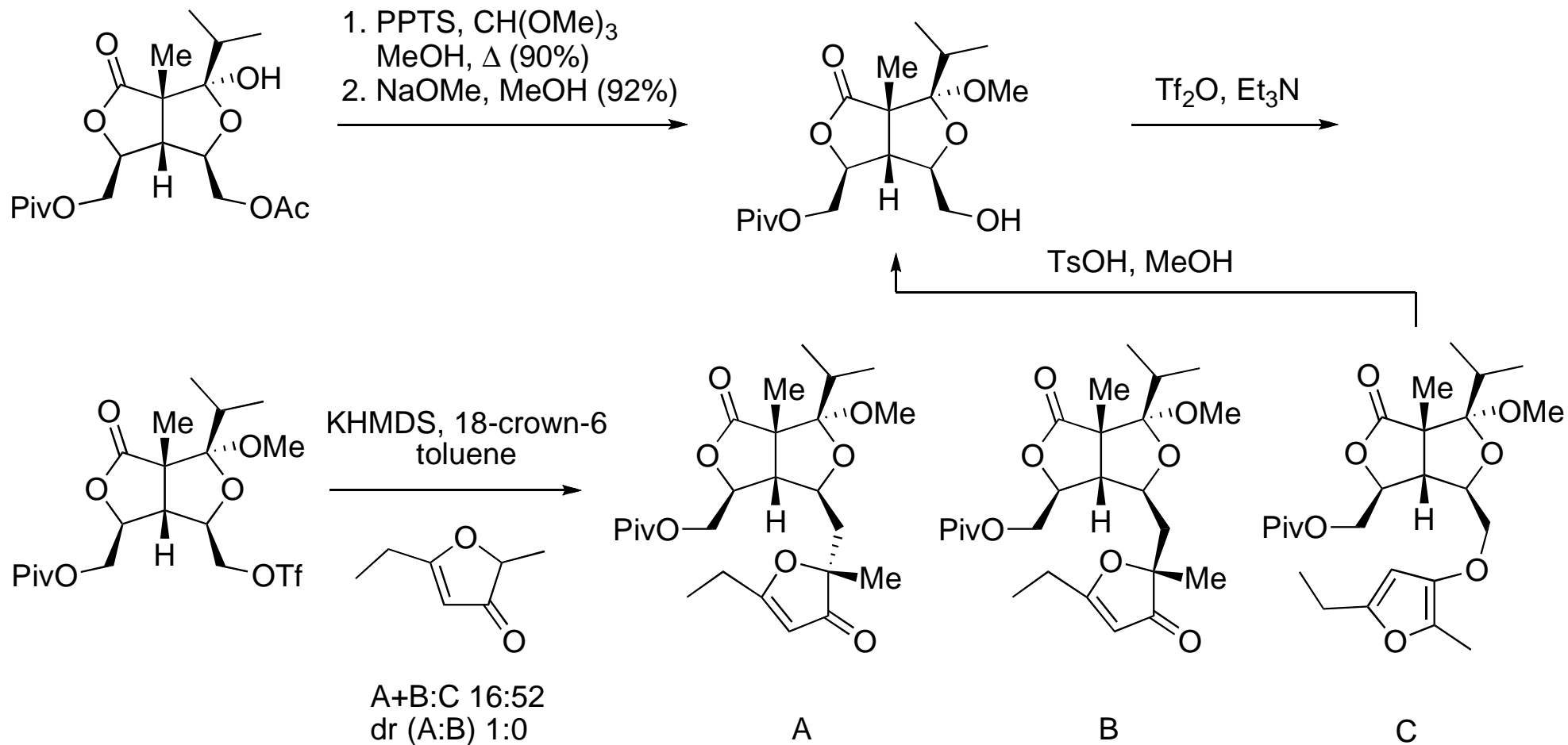
Tadano 1995 - A/B Coupling Fragment



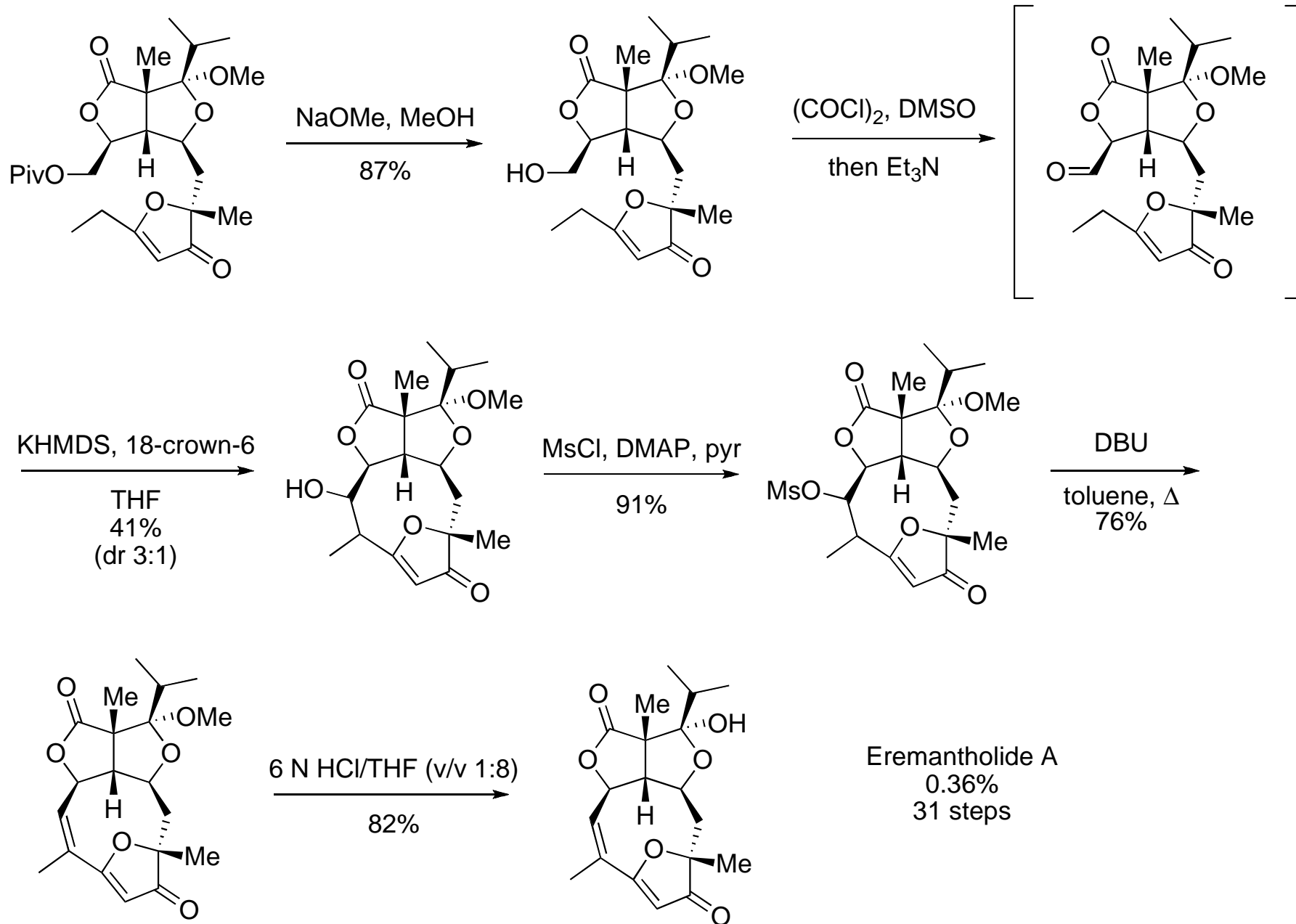
Tadano 1995 - A/B Coupling Fragment



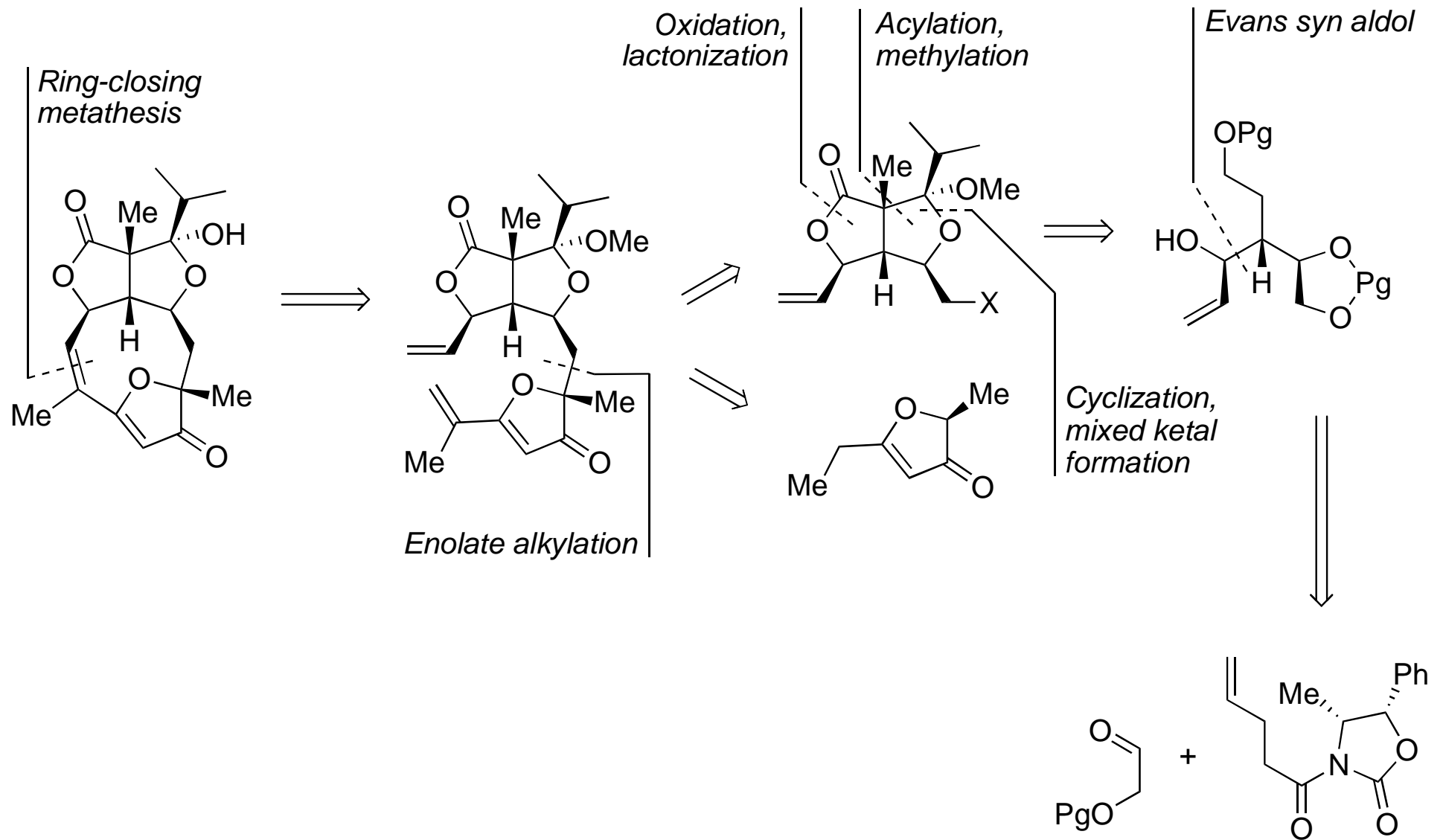
Tadano 1995 - Enolate Alkylation



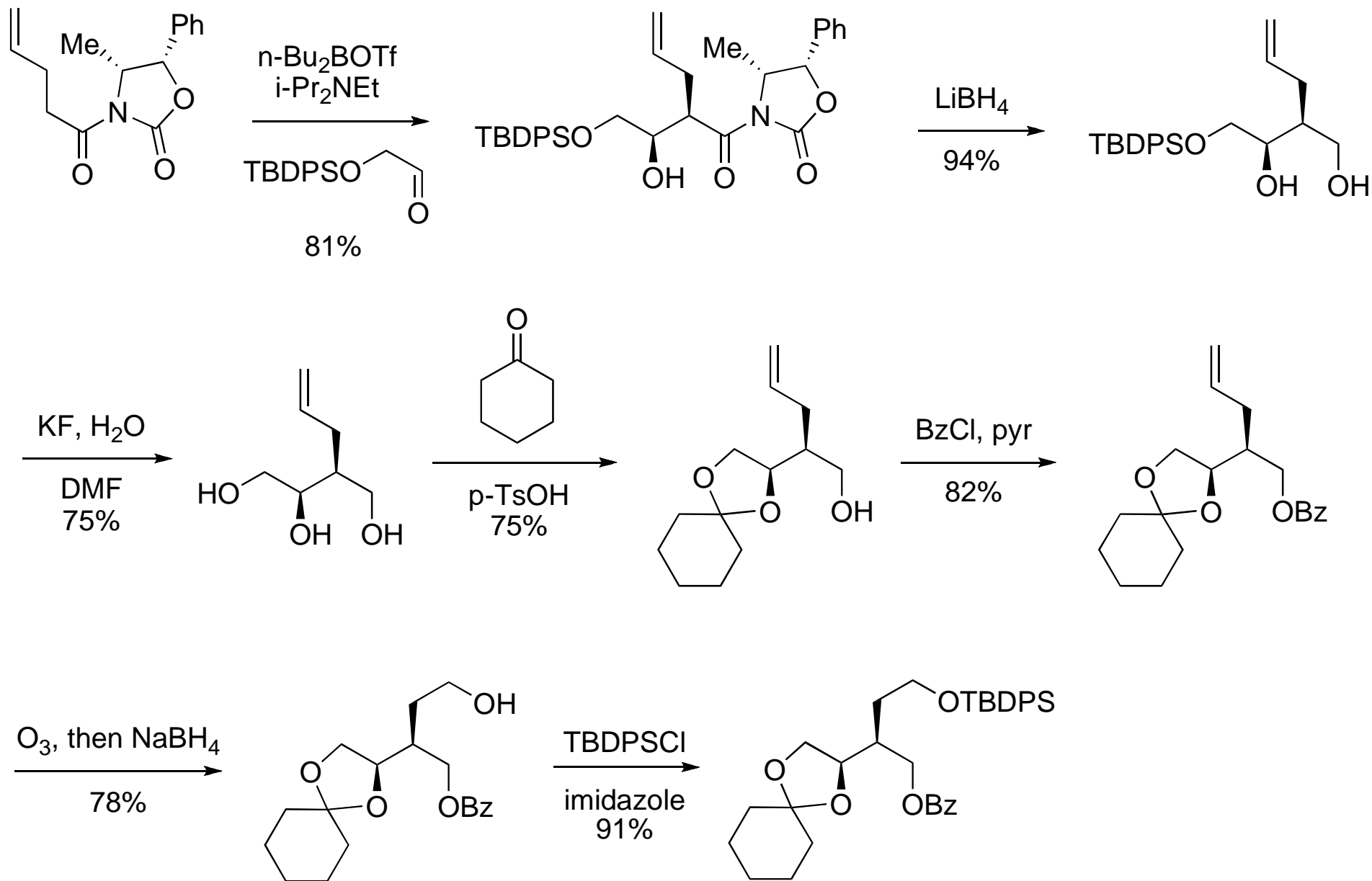
Tadano 1995 - Endgame



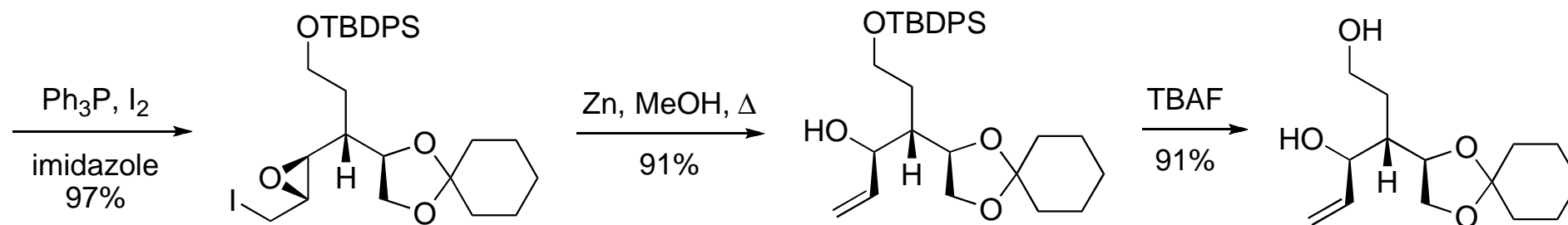
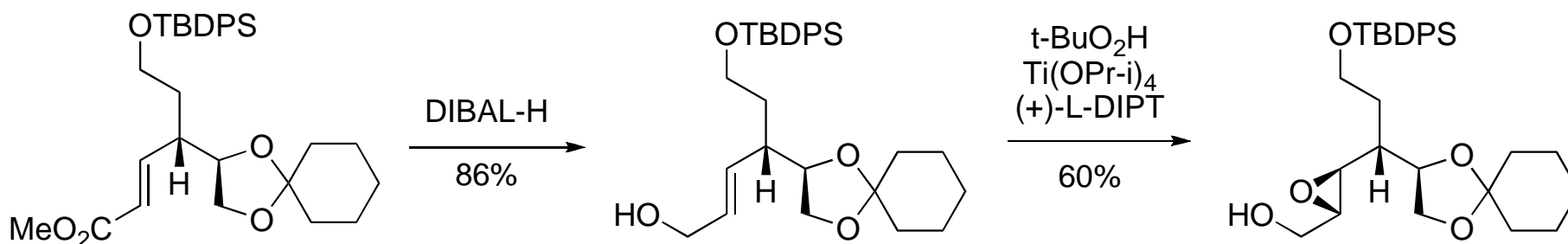
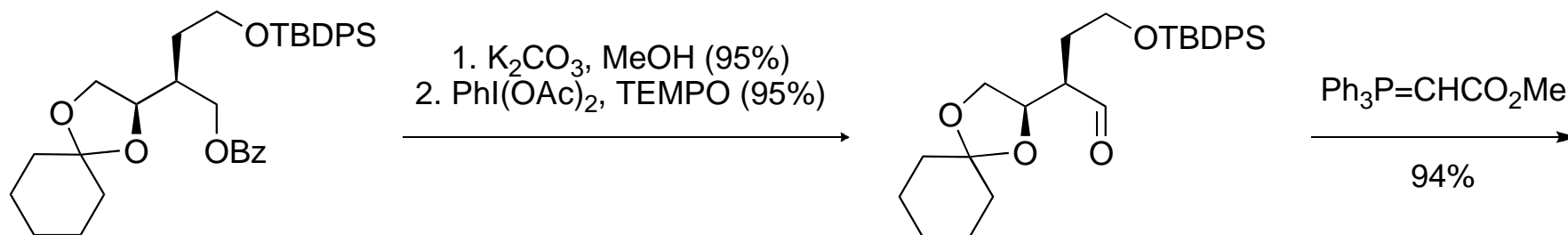
Hale 2007 - Retrosynthesis



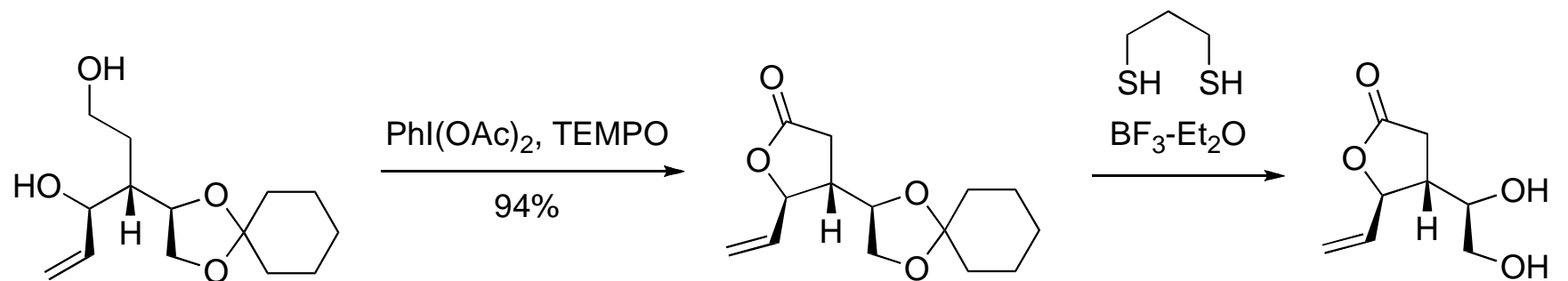
Hale 2007 - In the Beginning



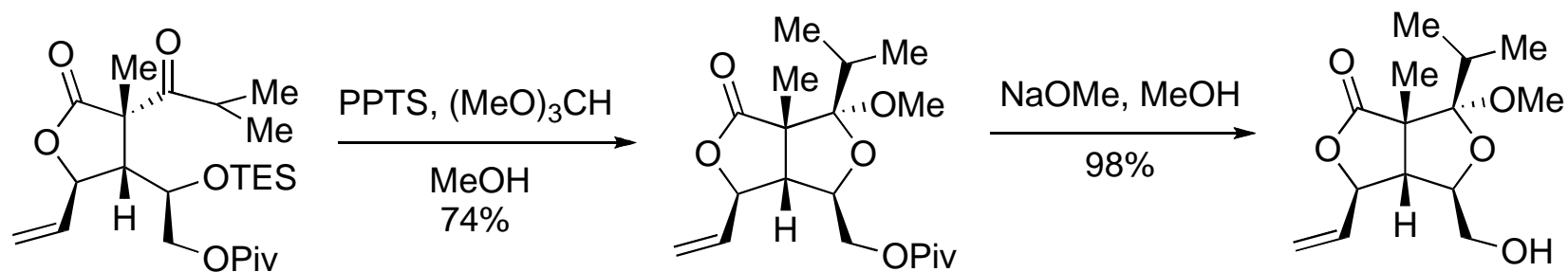
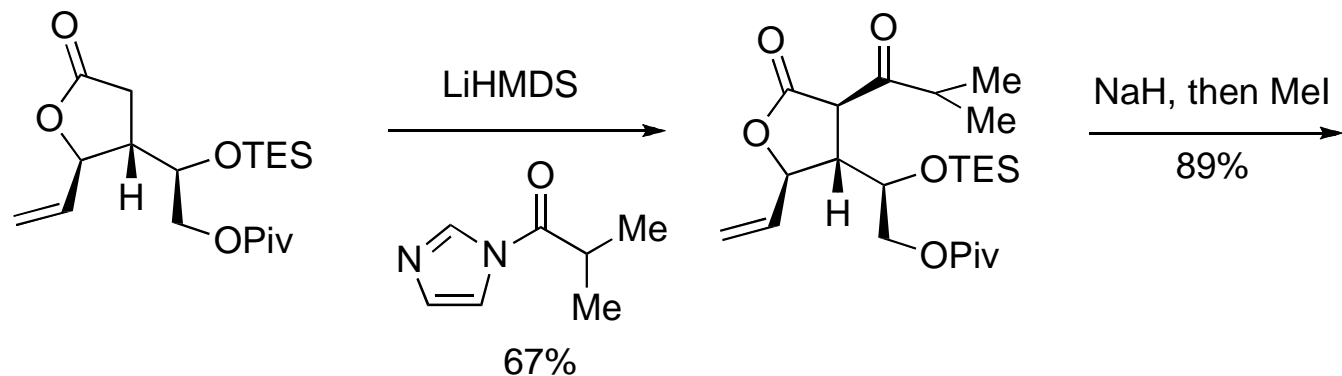
Hale 2007 - A/B Fragment Precursor



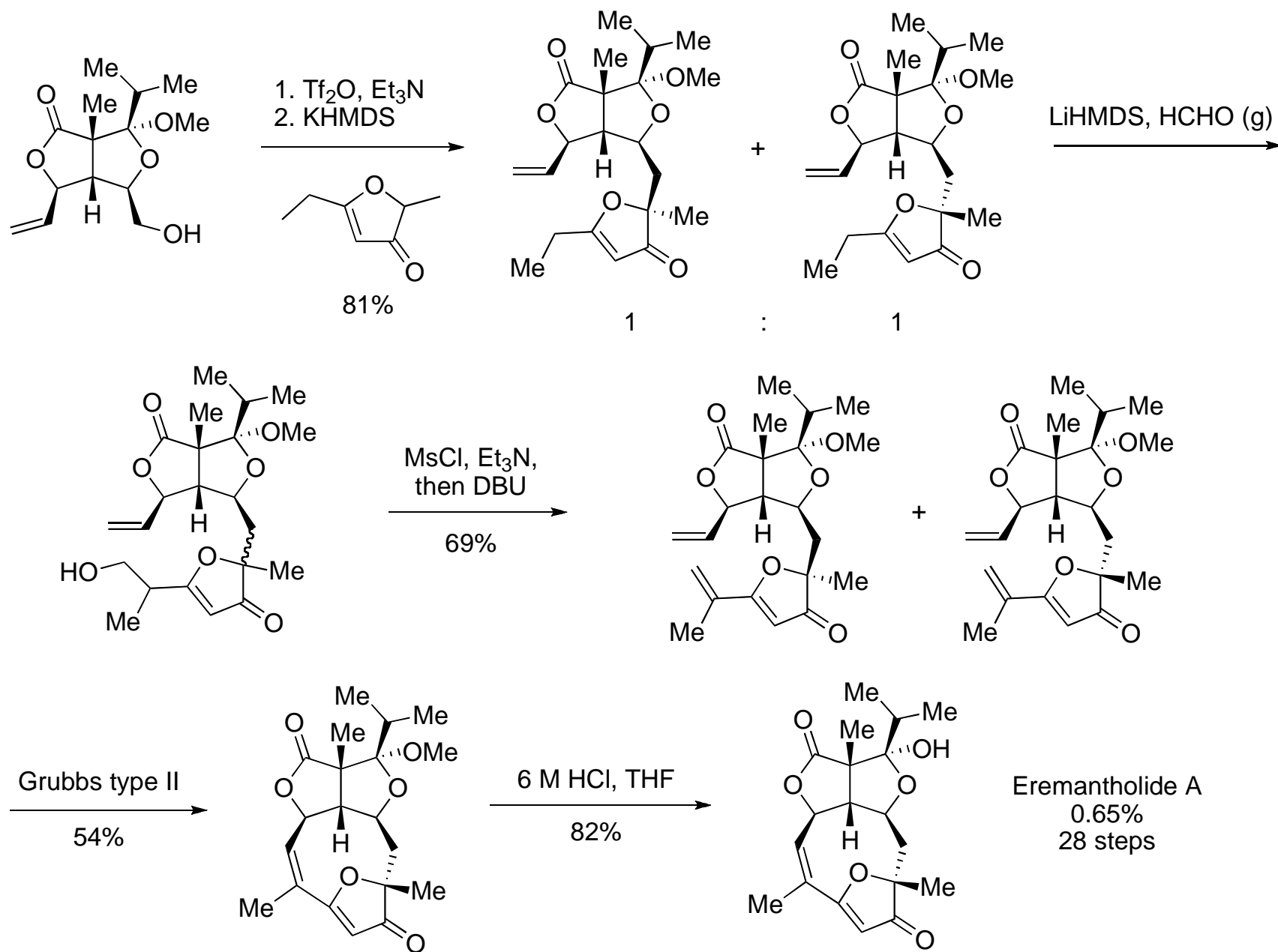
Hale 2007 - Arrival at the A/B Coupling Partner



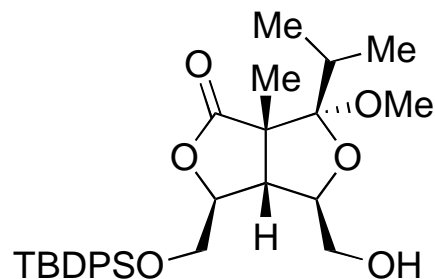
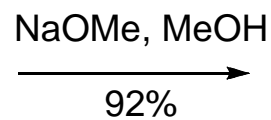
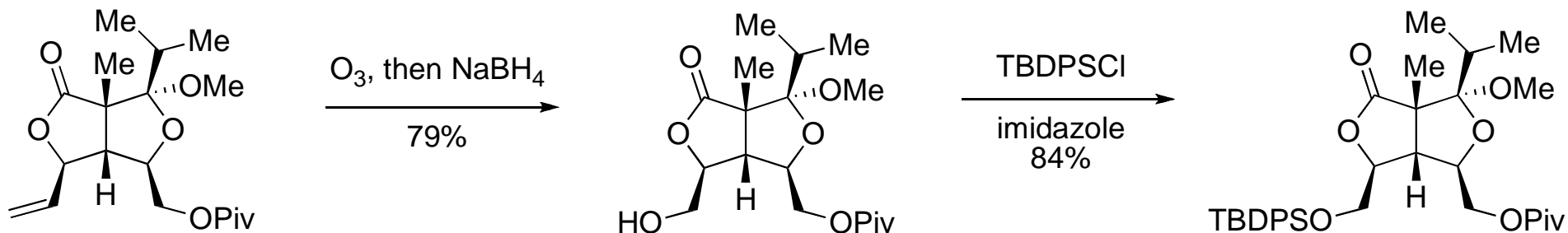
1. PivCl, pyr (79%)
2. TESOTf,
2,6-lutidine (93%)



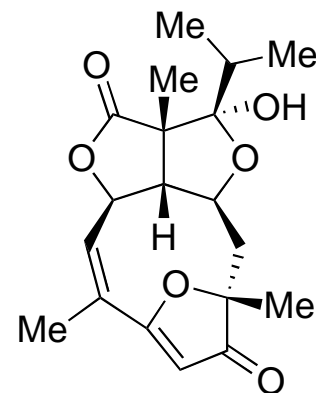
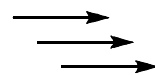
Hale 2007 - The Endtimes



Hale 2007 - Interception of Tadano's A/B Alcohol



Tadano's A/B alcohol



Eremantholide A
(shortens Tadano's
A/B alcohol synthesis
by 8 steps)

References

- Boeckman, R. K. *JACS*. **1991**, *113*, 9682.
- Tadano, K. *JOC*. **1995**, *60*, 8179.
- Tadano, K. *TL*. **1995**, *36(9)*, 1487.
- Tadano, K. *JOC*. **1987**, *52*, 1201.
- Hale, K. J. *OL*. **2007**, *9(7)*, 1267.