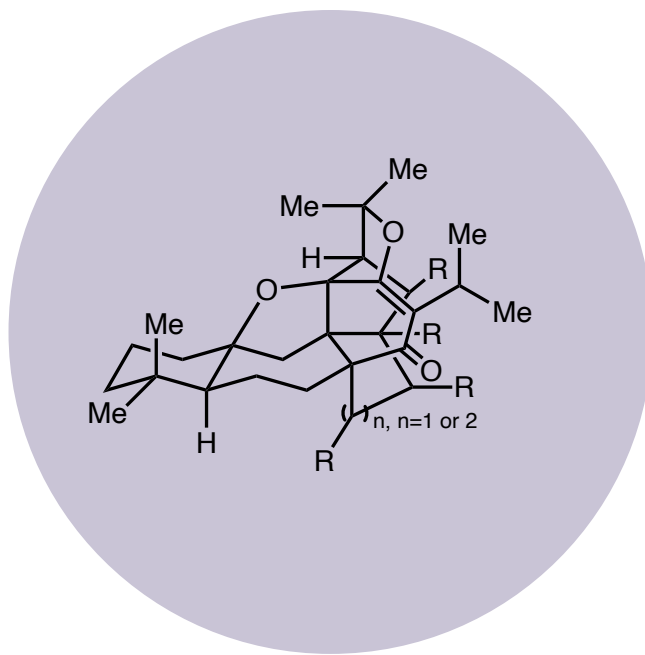


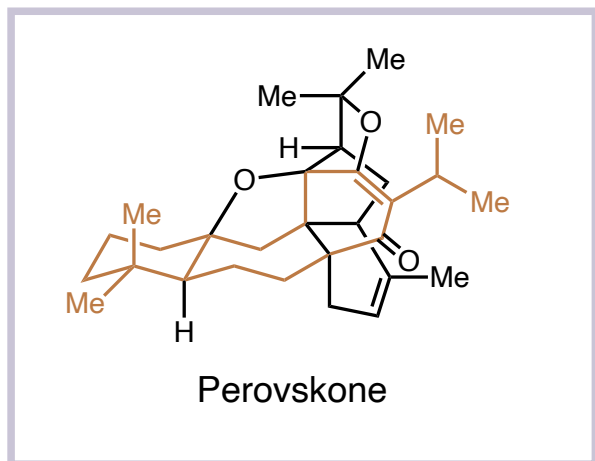
Asymmetric Total Synthesis and Biosynthetic Implications of Perovskones, Hydrangenone, and Hydrangenone B



Yu Wang

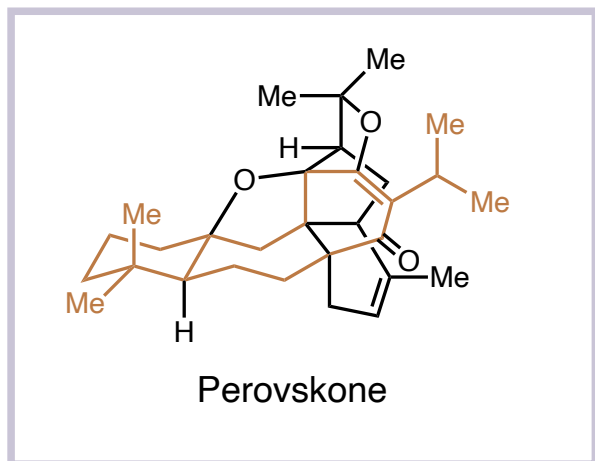
Literature 08/20/2021

Introduction

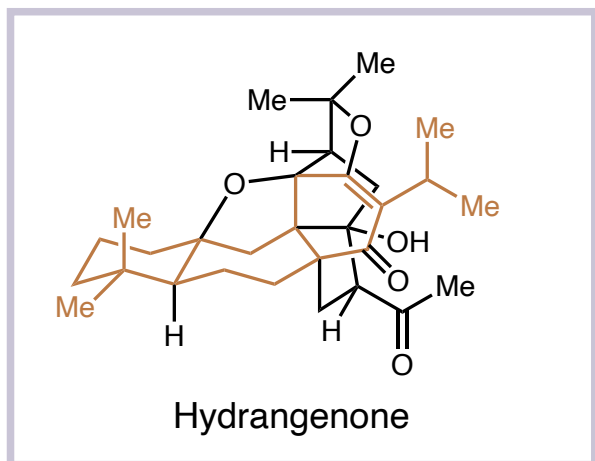


- Triterpenoids isolated from *Salvia* plants
- Featuring a complex heptacyclic framework

Introduction



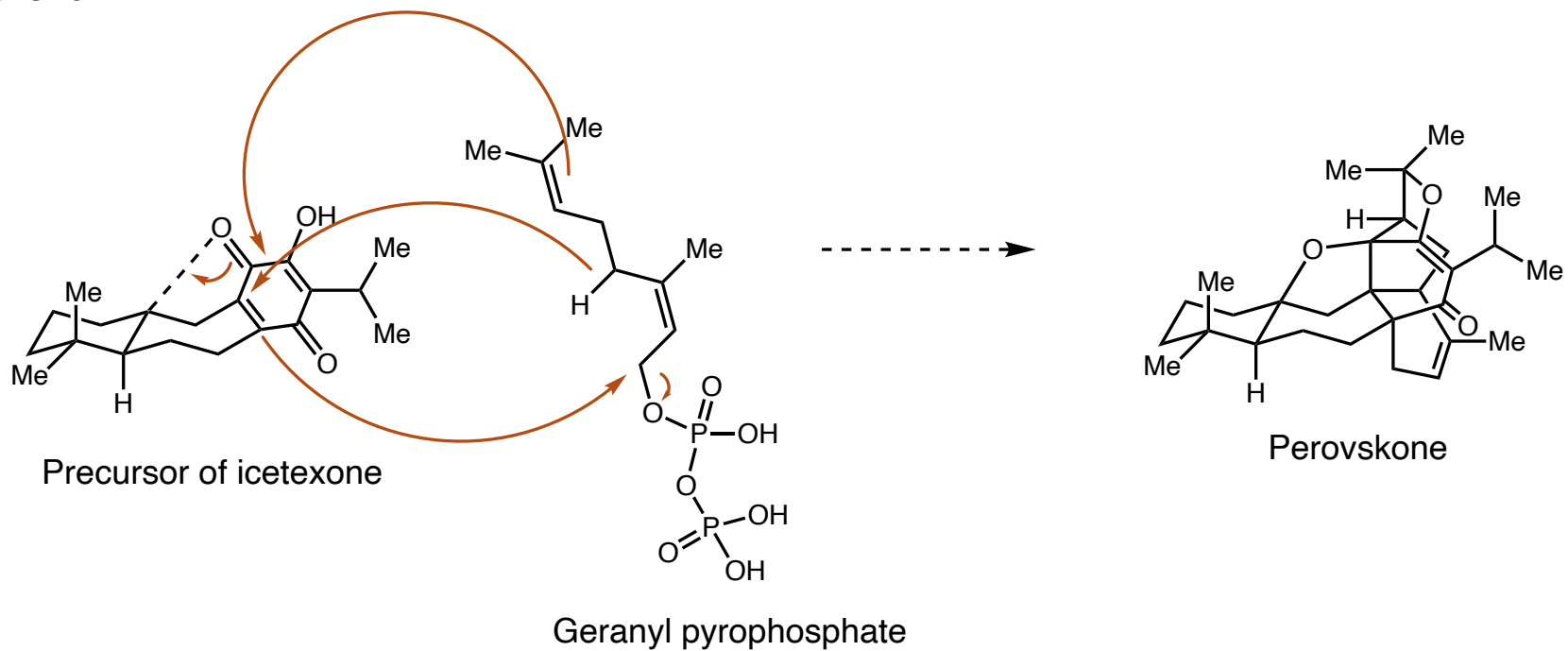
- Triterpenoids isolated from *Salvia* plants
- Featuring a complex heptacyclic framework



- Hydrangenone - analogues to the family of triterpenoids with unprecedented 6/7/6/5/5 skeleton

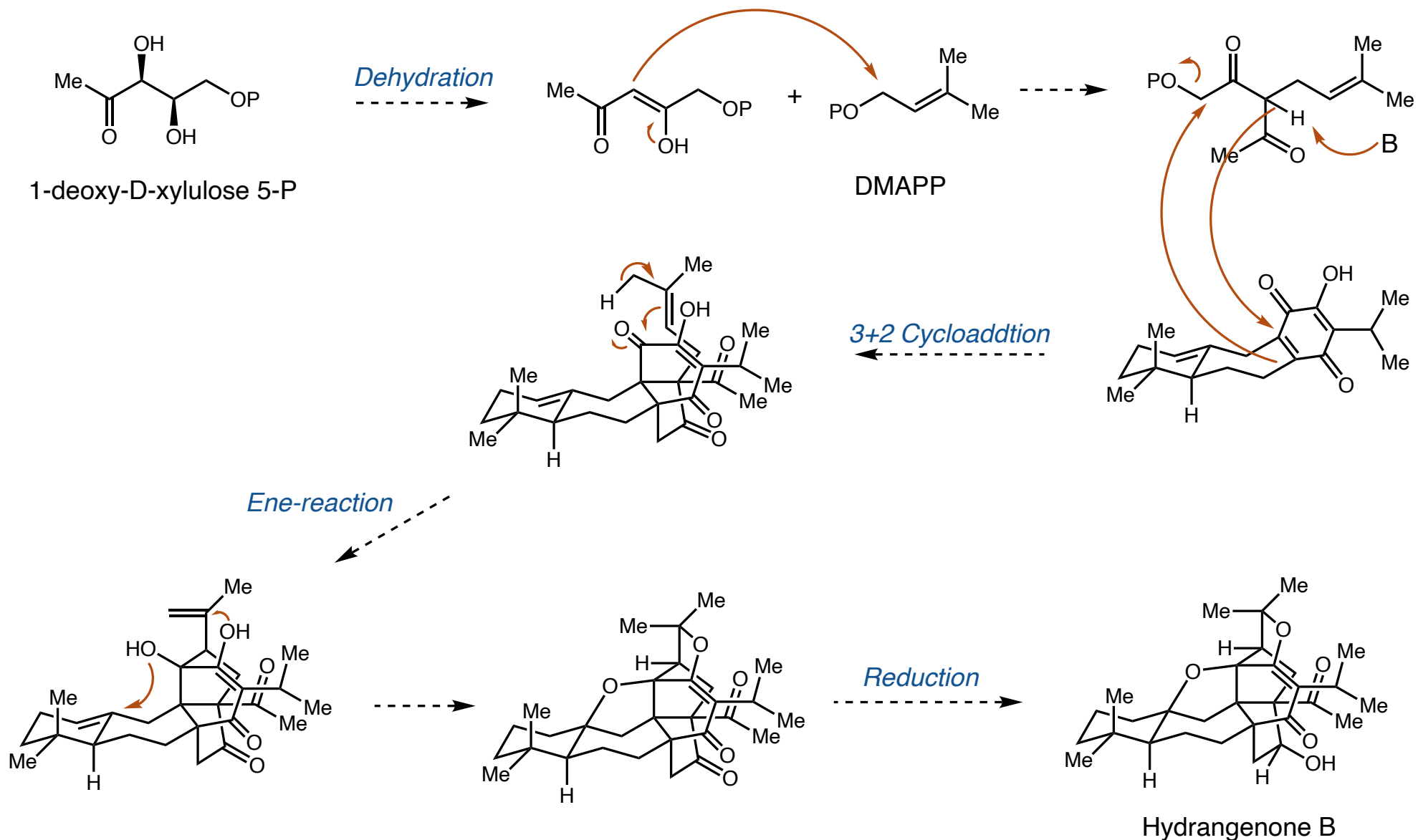
Proposed Biosynthesis

Perovskone

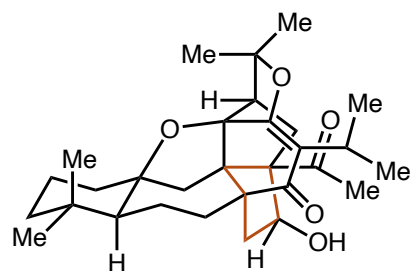


Proposed Biosynthesis

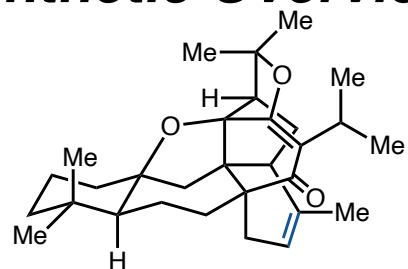
Hydrangenone B



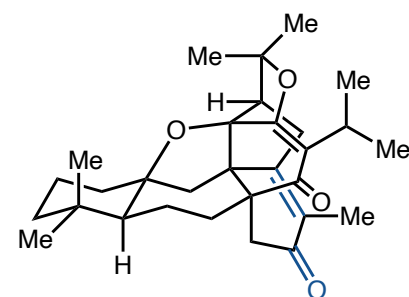
Synthetic Overview



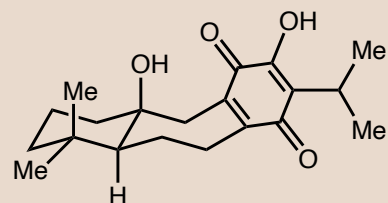
Hydrangenone B



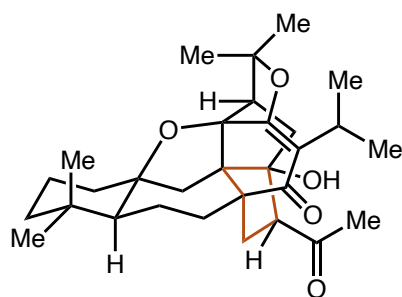
Perovskone



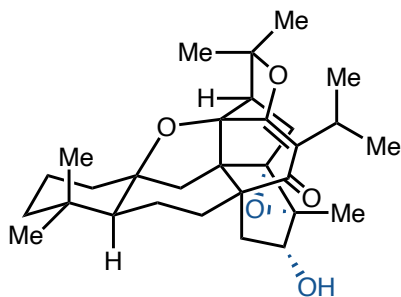
Perovskone C



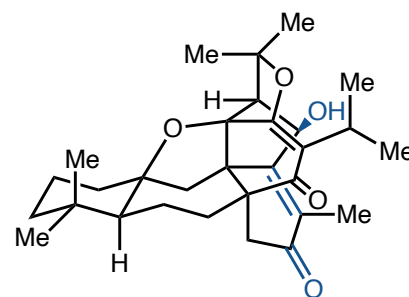
Perovskatone D



Hydrangenone

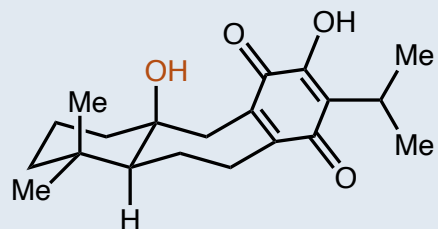


Perovskone F

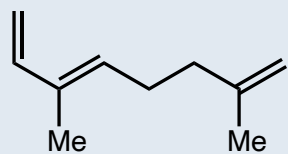


Perovskone D

Synthetic Plan

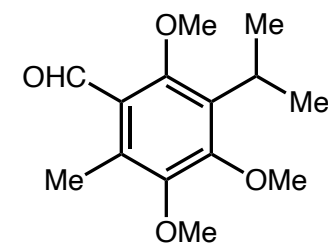
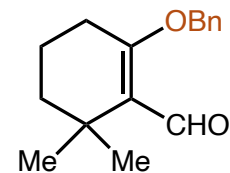


Perovskatone D

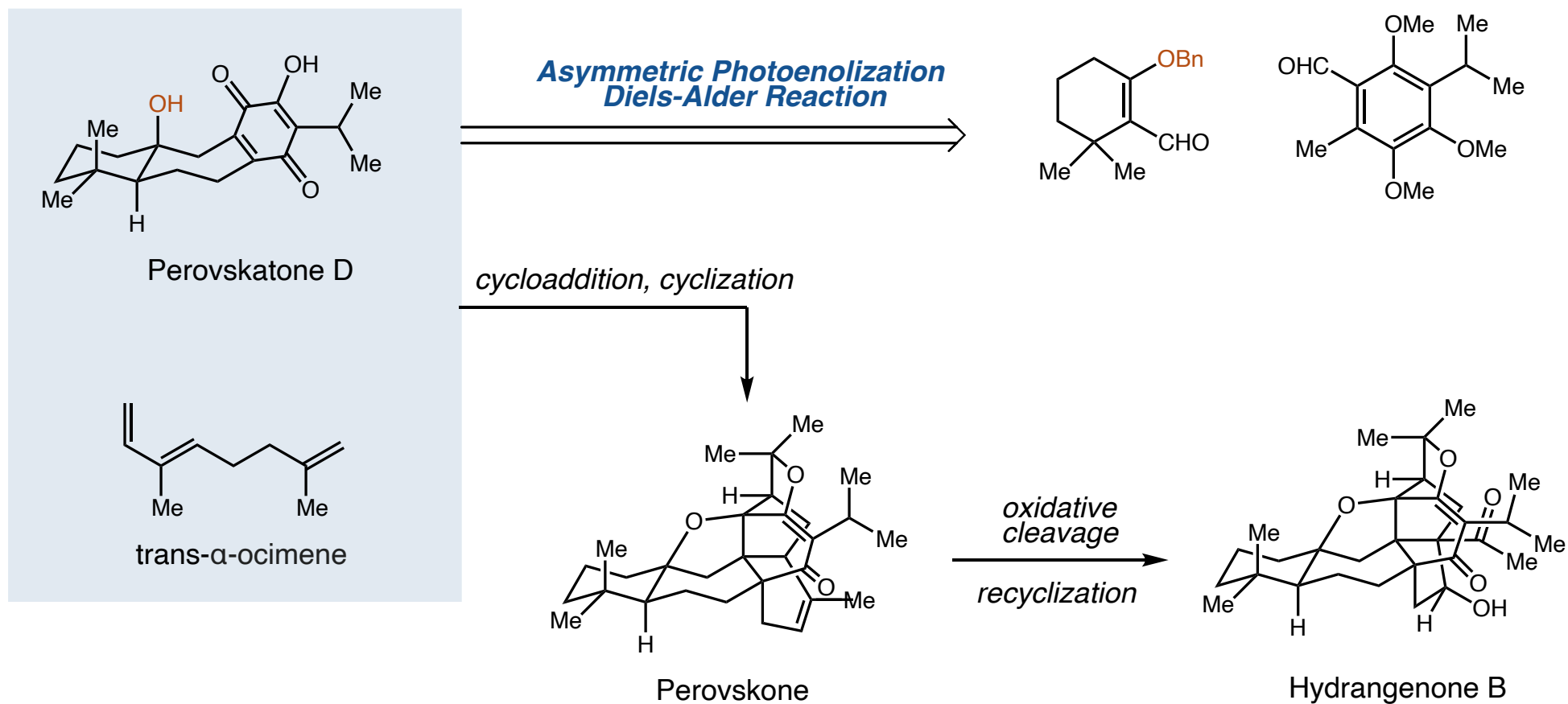


trans- α -ocimene

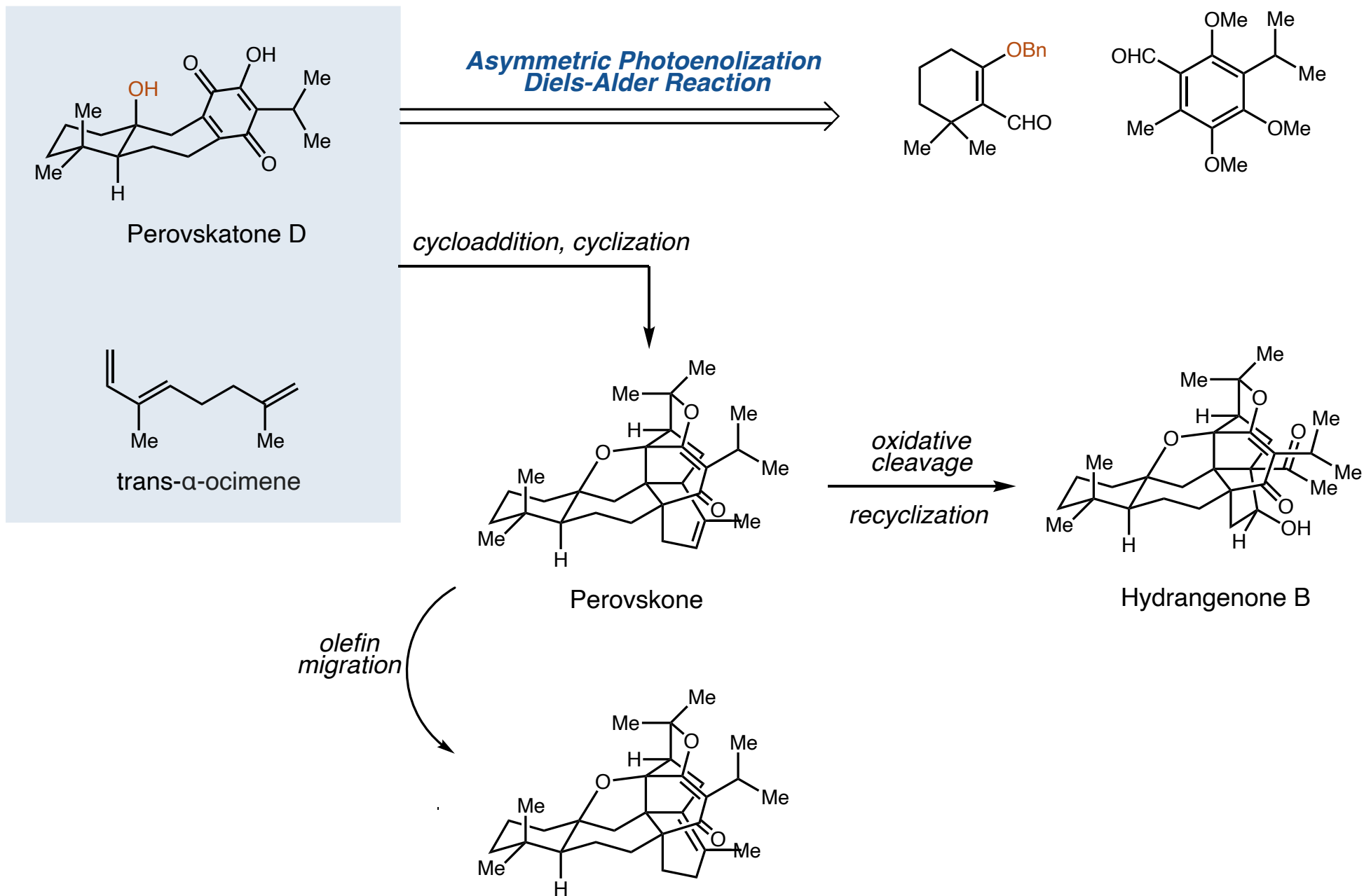
Asymmetric Photoenolization
Diels-Alder Reaction



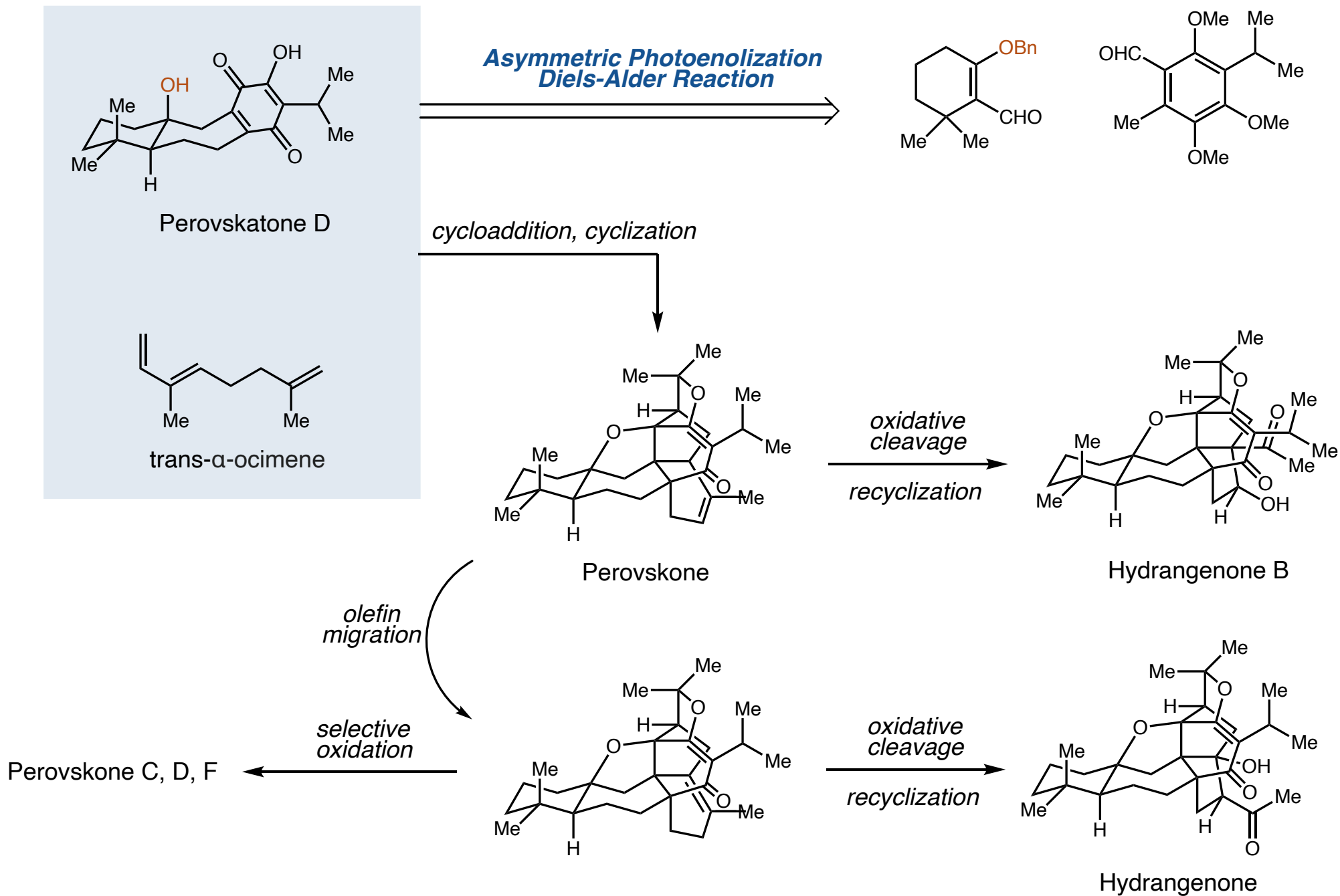
Synthetic Plan



Synthetic Plan

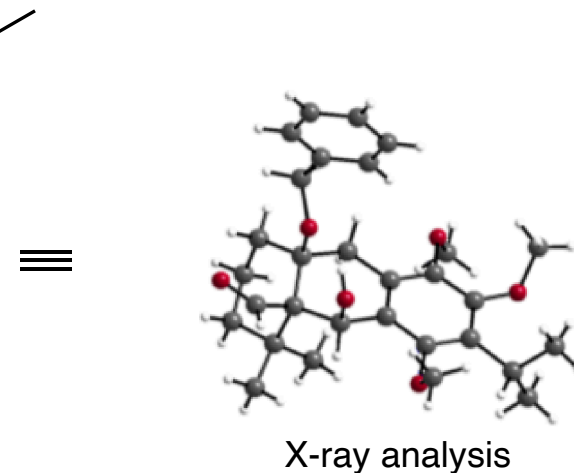
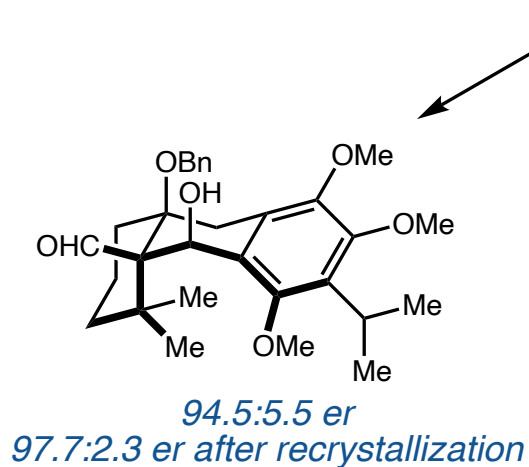
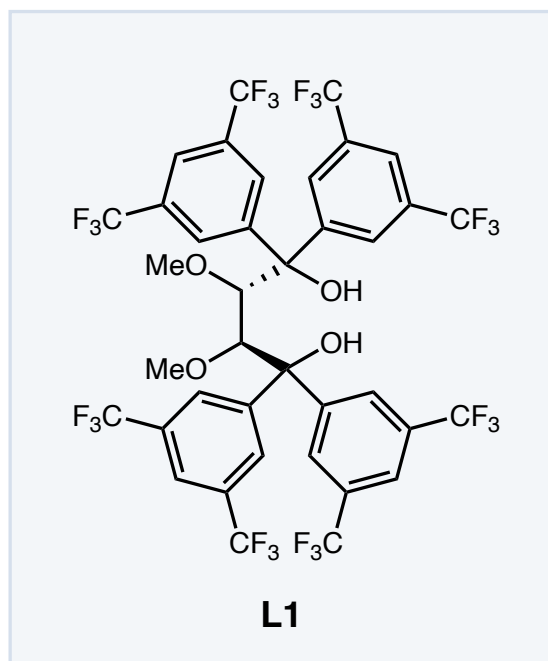
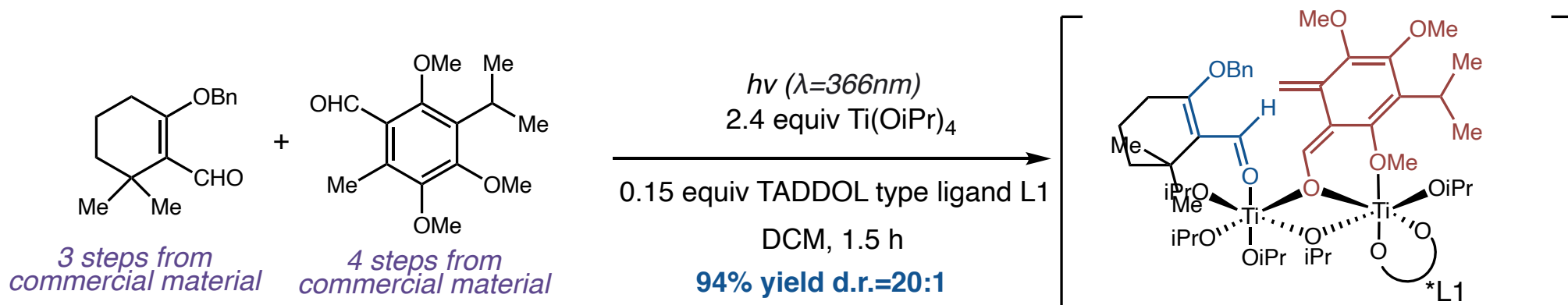


Synthetic Plan



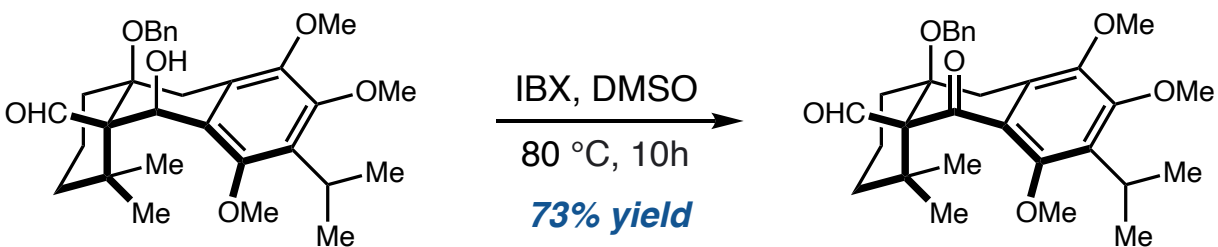
Synthesis of Perovskones and Hydrangenones

Forward Synthesis-Key Step



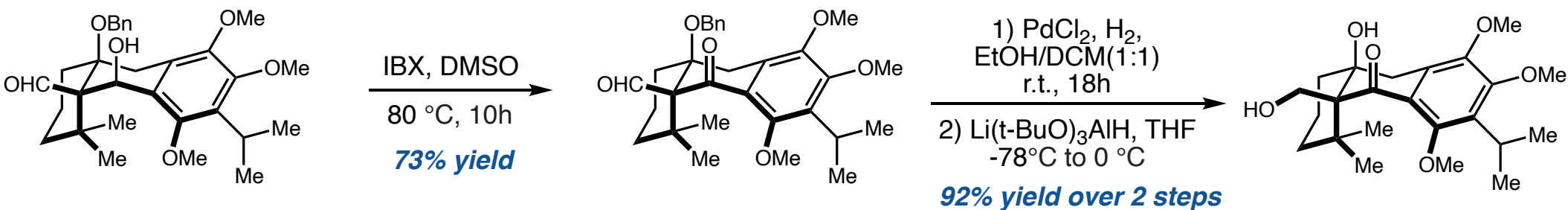
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



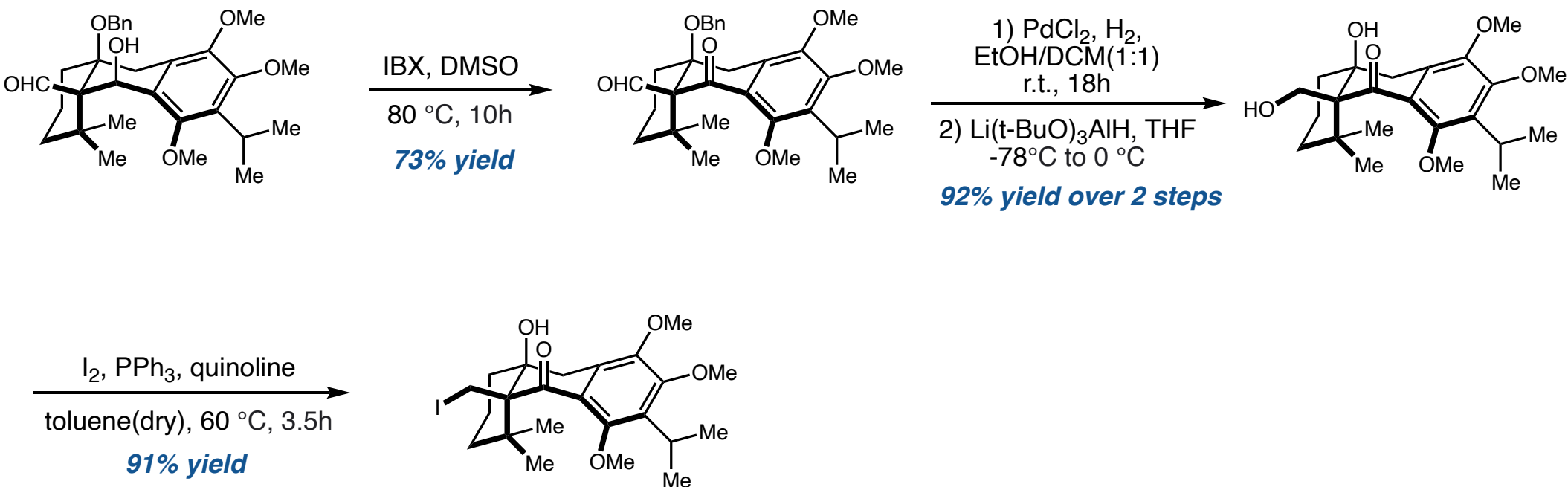
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



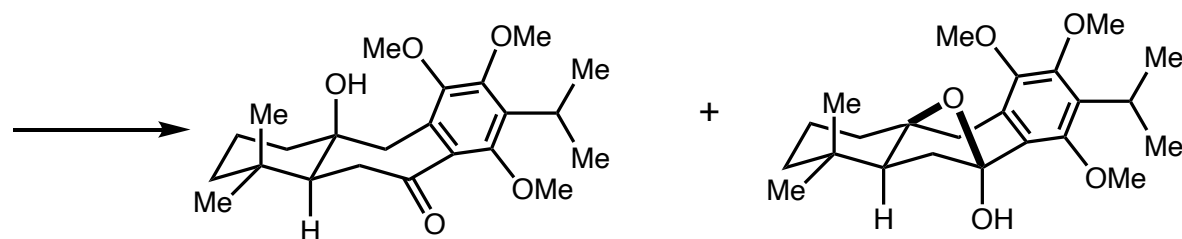
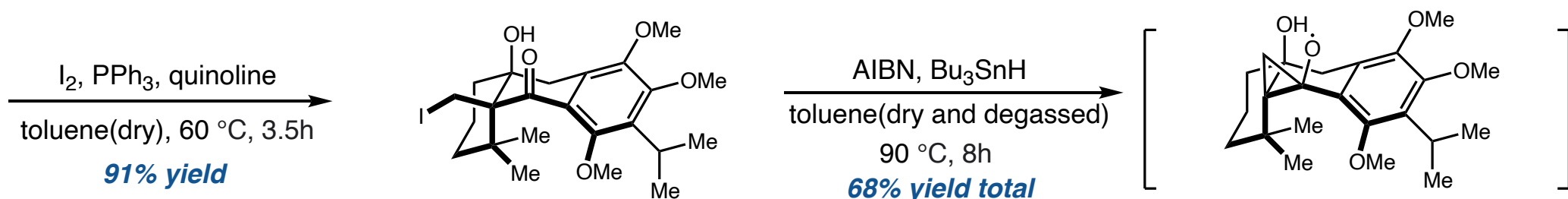
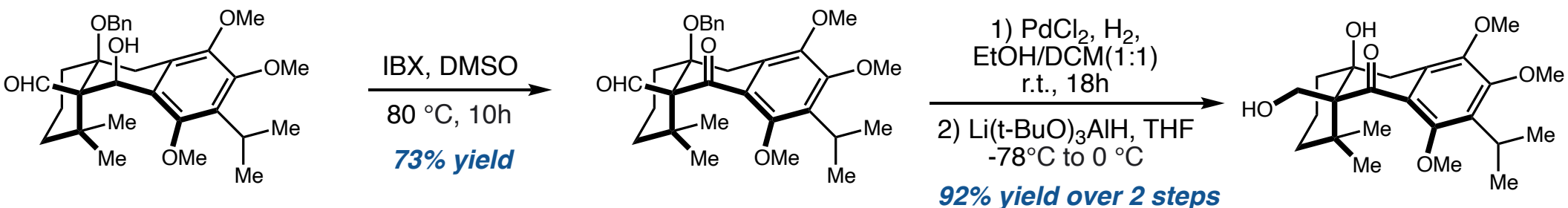
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



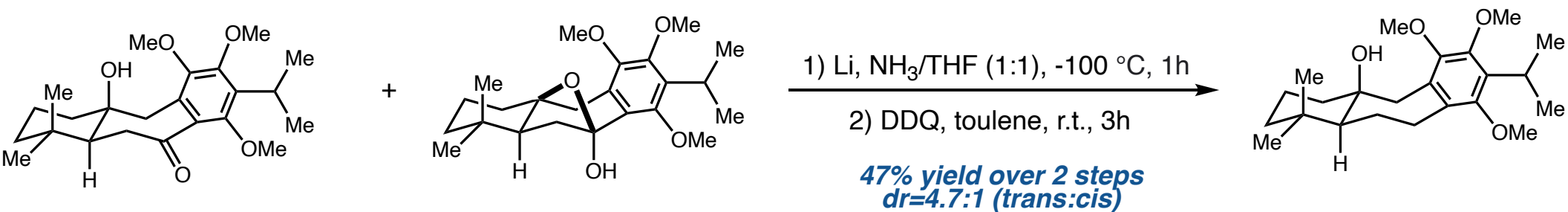
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



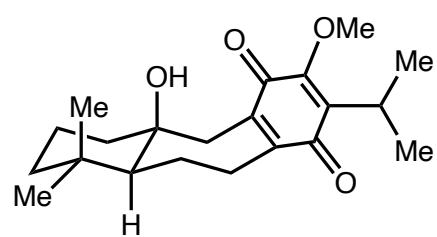
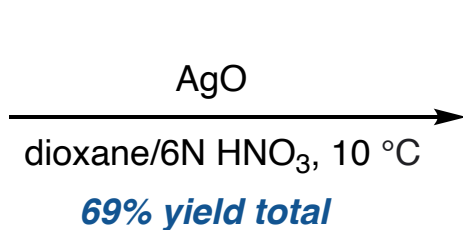
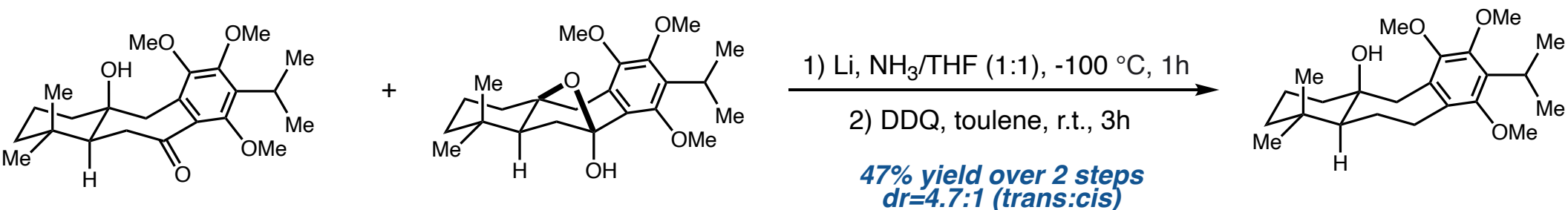
Synthesis of Perovskones and Hydrangenones

Forward Synthesis

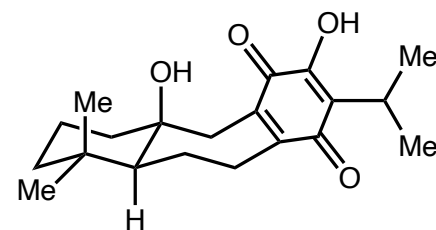


Synthesis of Perovskones and Hydrangenones

Forward Synthesis



Methyl-Perovskatone D

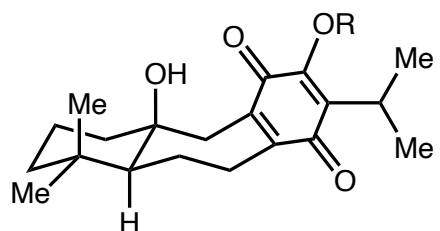


Perovskatone D

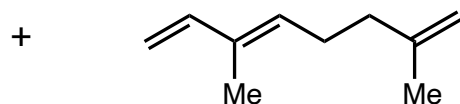
Product Ratio: 6.7:1

Synthesis of Perovskones and Hydrangenones

Forward Synthesis



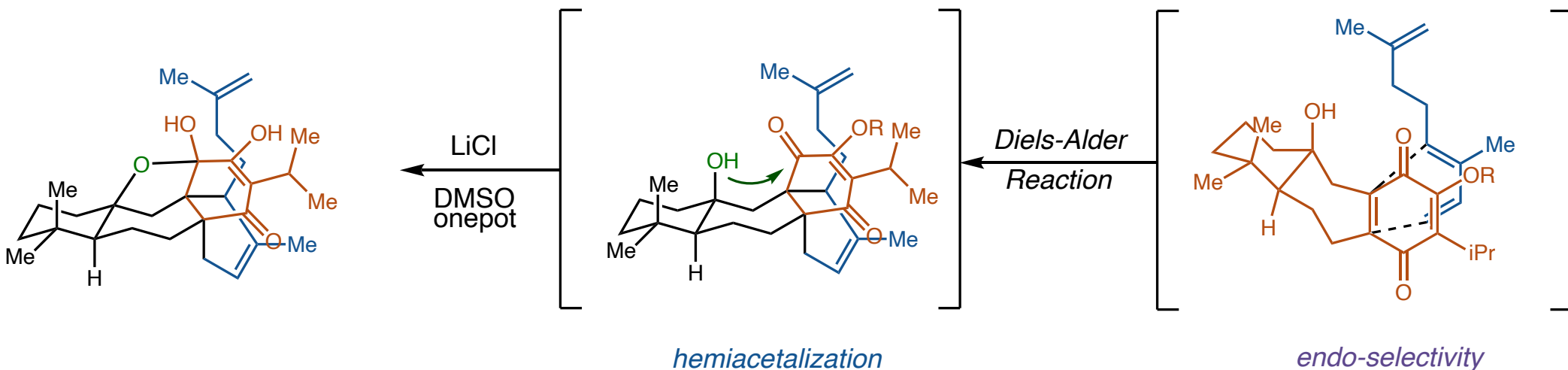
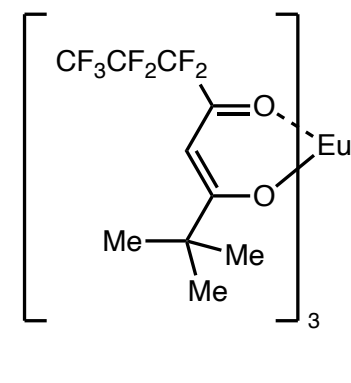
R=H, Perovskatone D
R=Me, Methyl-Perovskatone D



1 step from commercial material

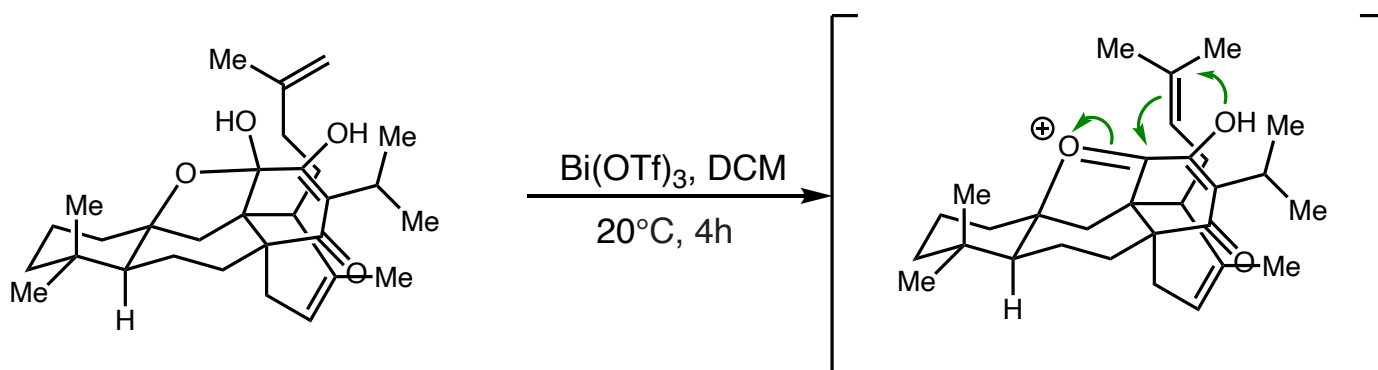
Eu(fod)₃, toluene

60°C



Synthesis of Perovskones and Hydrangenones

Cascade Cyclization- Perovskone and Derivative

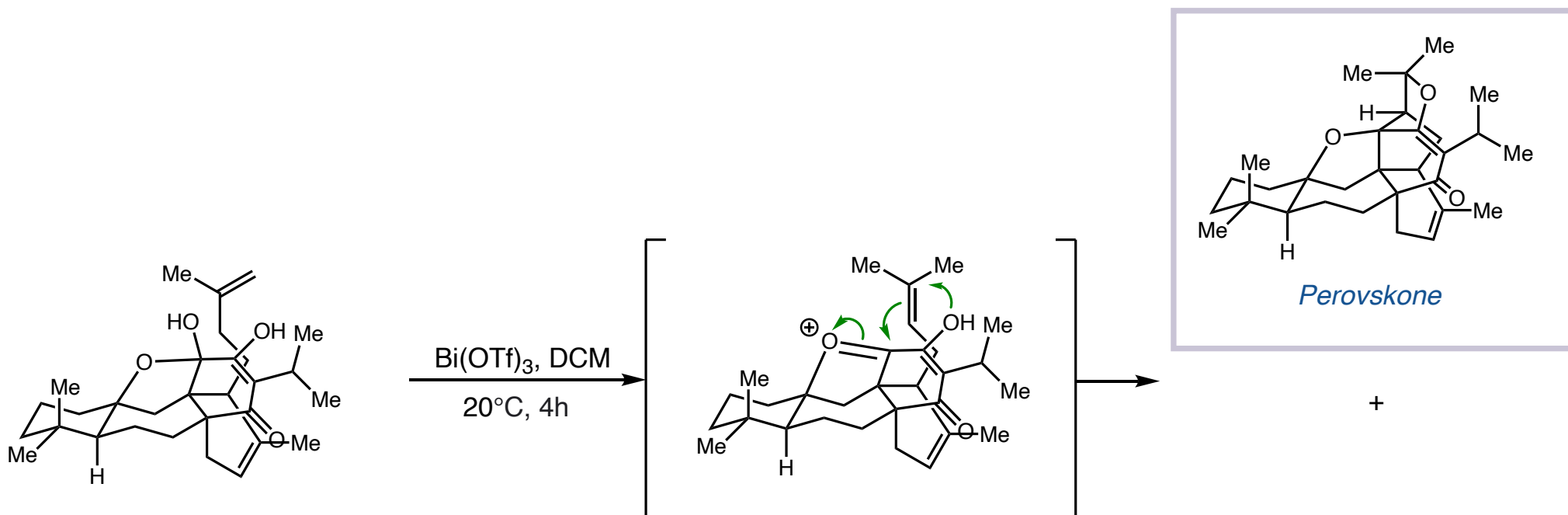


63% yield over 2 steps

Product ratio: 1.5:1

Synthesis of Perovskones and Hydrangenones

Cascade Cyclization- Perovskone and Derivative

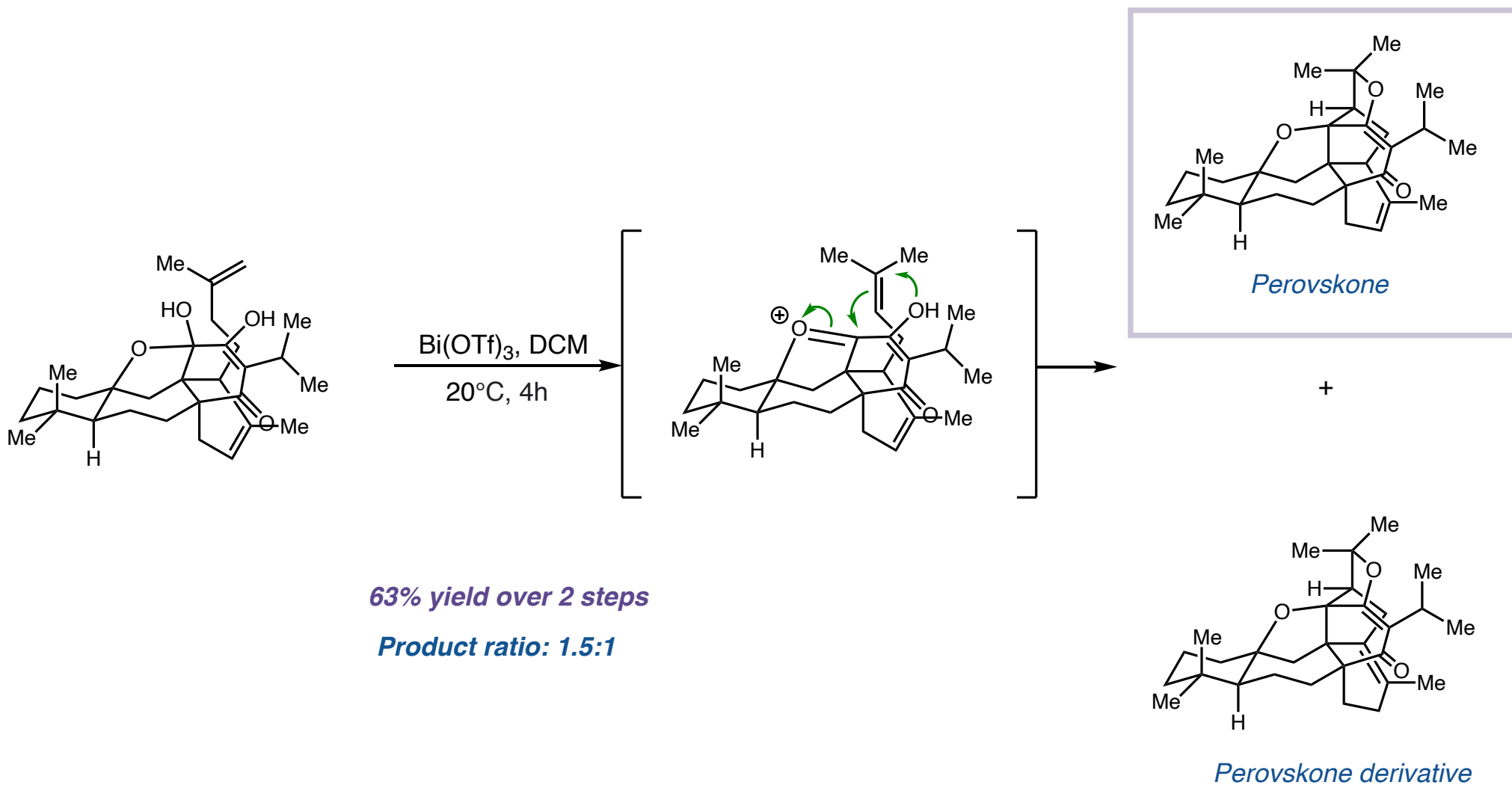


63% yield over 2 steps

Product ratio: 1.5:1

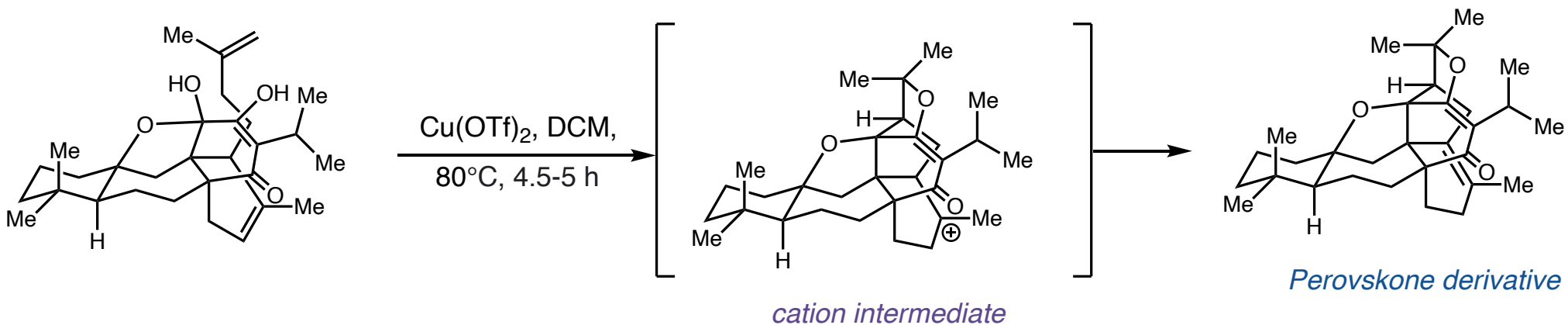
Synthesis of Perovskones and Hydrangenones

Cascade Cyclization- Perovskone and Derivative



Synthesis of Perovskones and Hydrangenones

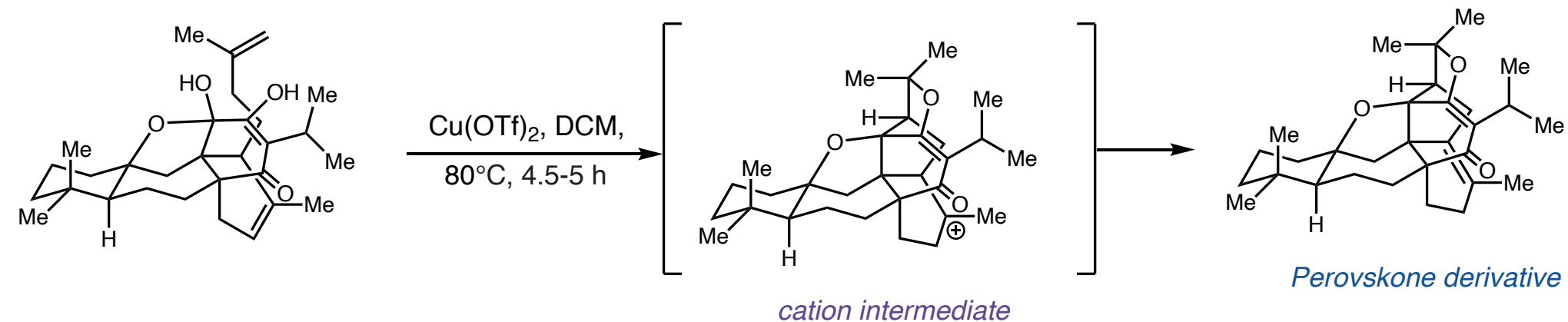
Forward Synthesis



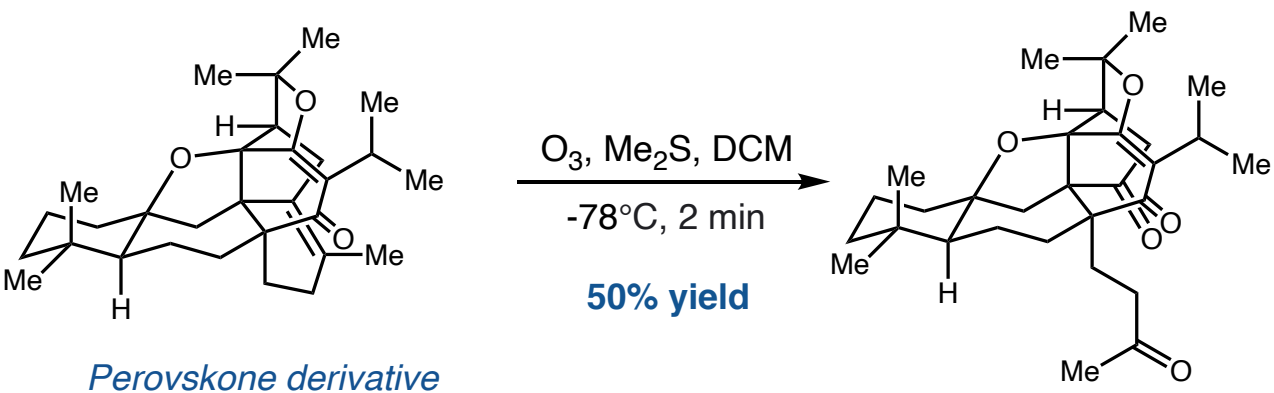
43% yield over 2 steps from perovskatone
56% yield over 2 steps from methyl-perovskatone

Synthesis of Perovskones and Hydrangenones

Forward Synthesis

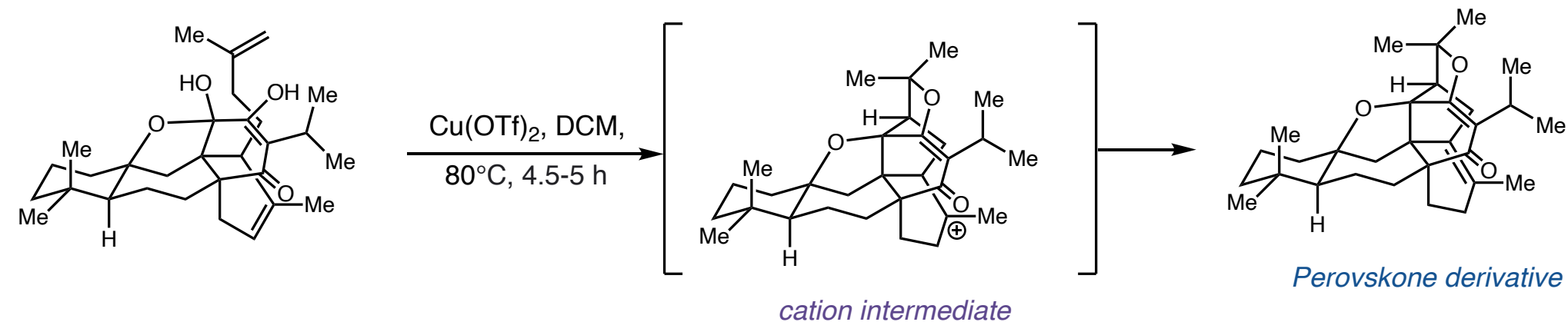


43% yield over 2 steps from perovskatone
56% yield over 2 steps from methyl-perovskatone

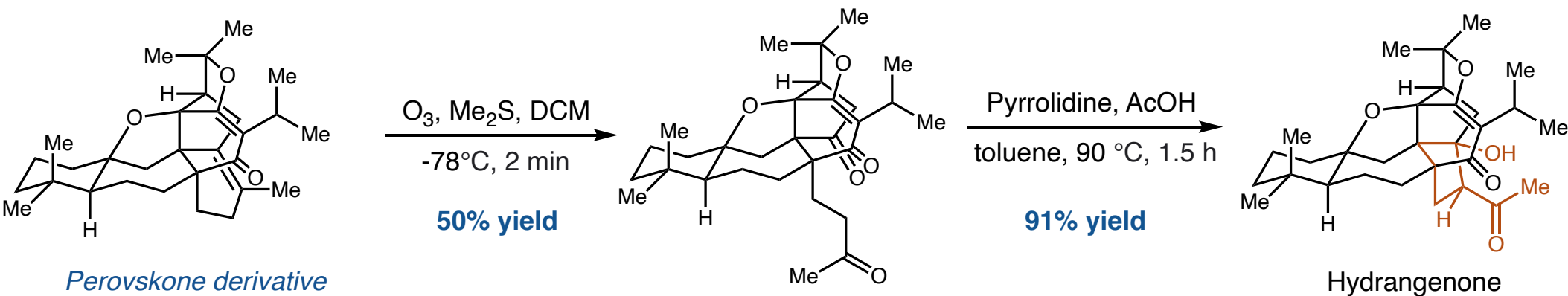


Synthesis of Perovskones and Hydrangenones

Forward Synthesis

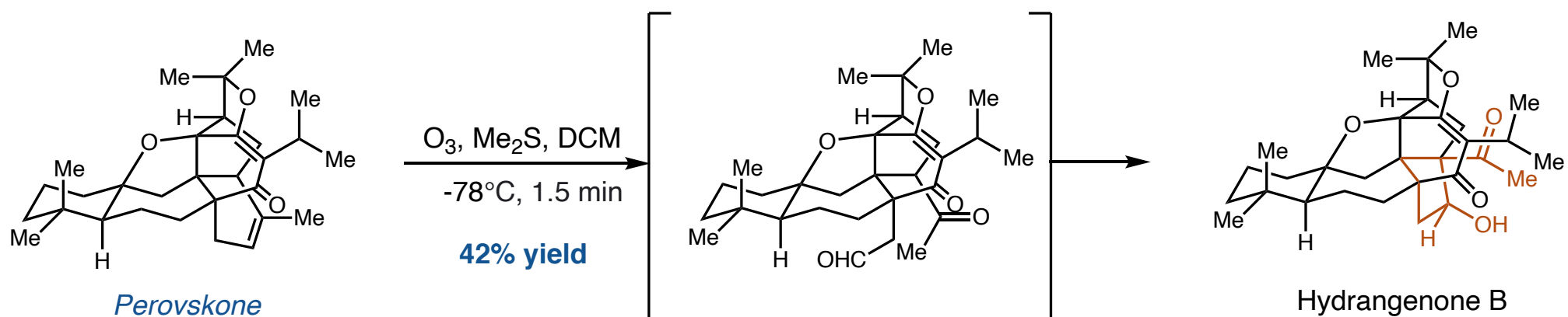


43% yield over 2 steps from perovskatone
56% yield over 2 steps from methyl-perovskatone



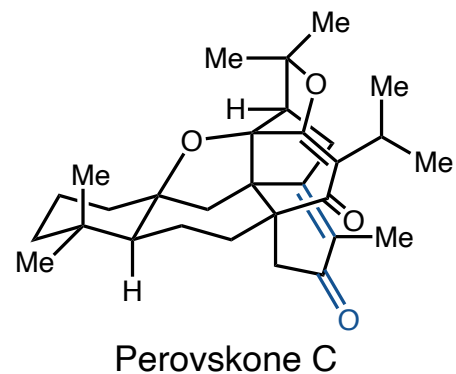
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



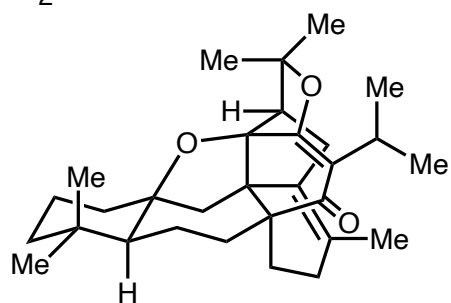
Synthesis of Perovskones and Hydrangenones

Forward Synthesis



Na_2CrO_4 , NaOAc, 60°C
toluene, AcOH/Ac₂O

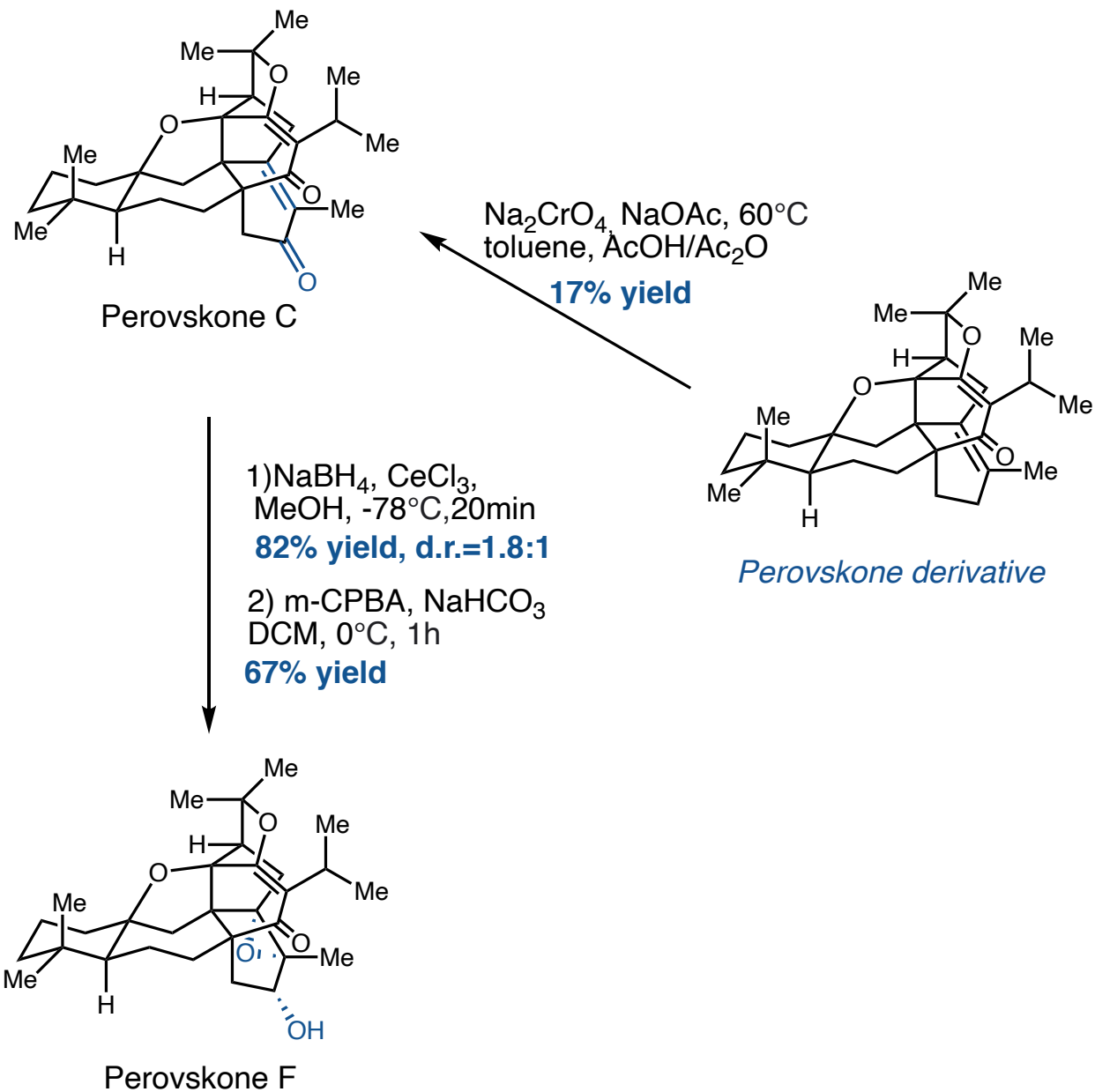
17% yield



Perovskone derivative

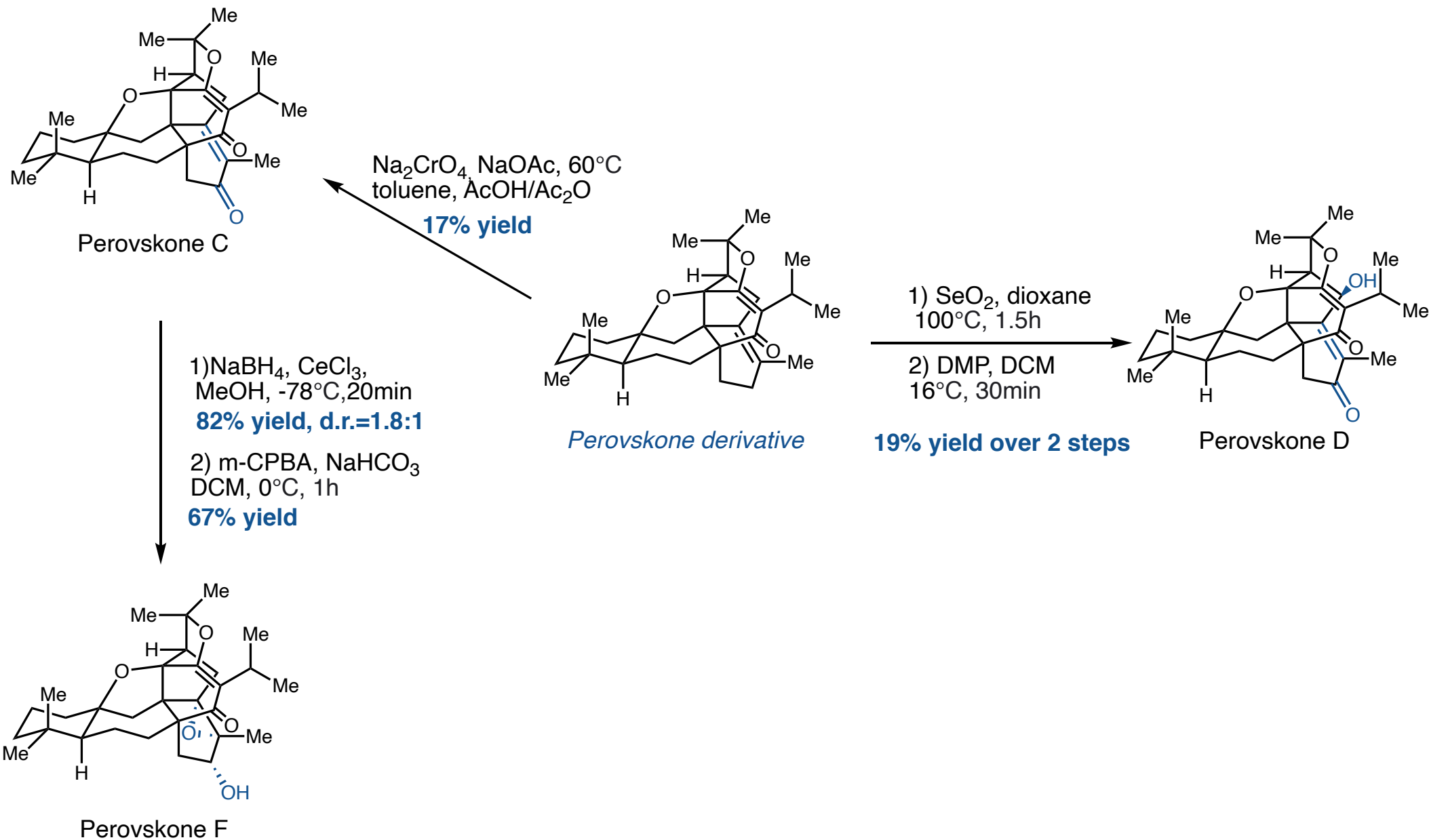
Synthesis of Perovskones and Hydrangenones

Forward Synthesis

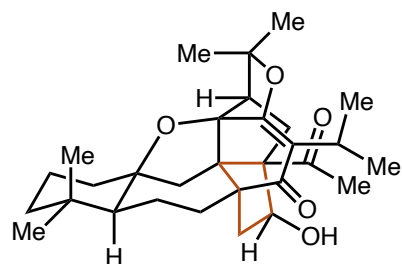


Synthesis of Perovskones and Hydrangenones

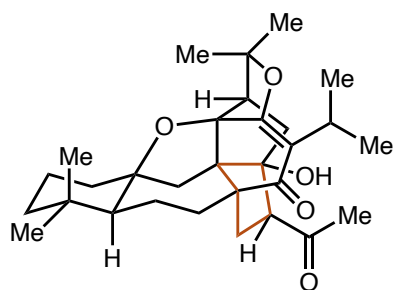
Forward Synthesis



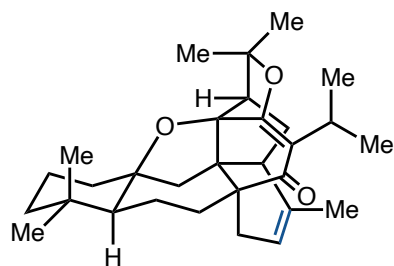
Synthesis of Perovskones and Hydrangenones



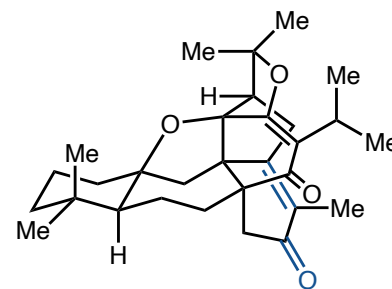
Hydrangenone B



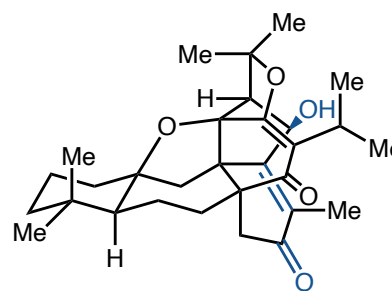
Hydrangenone



Perovskone



Perovskone C



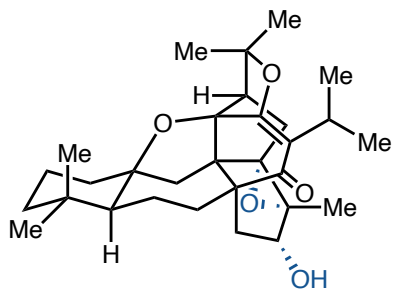
Perovskone D

- 19-24 steps from commercial available materials

-asymmetric PEDA

- stereospecific Diels-Alder reaction followed by cascade cyclization produced perovskone

-selective oxidations produced other members in the natural product family



Perovskone F