

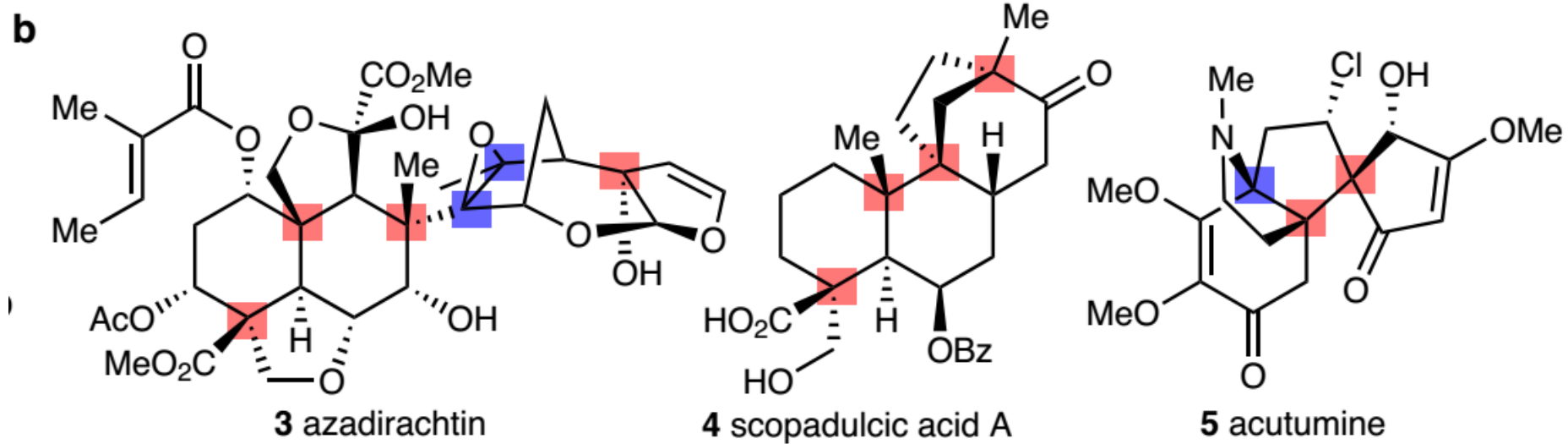
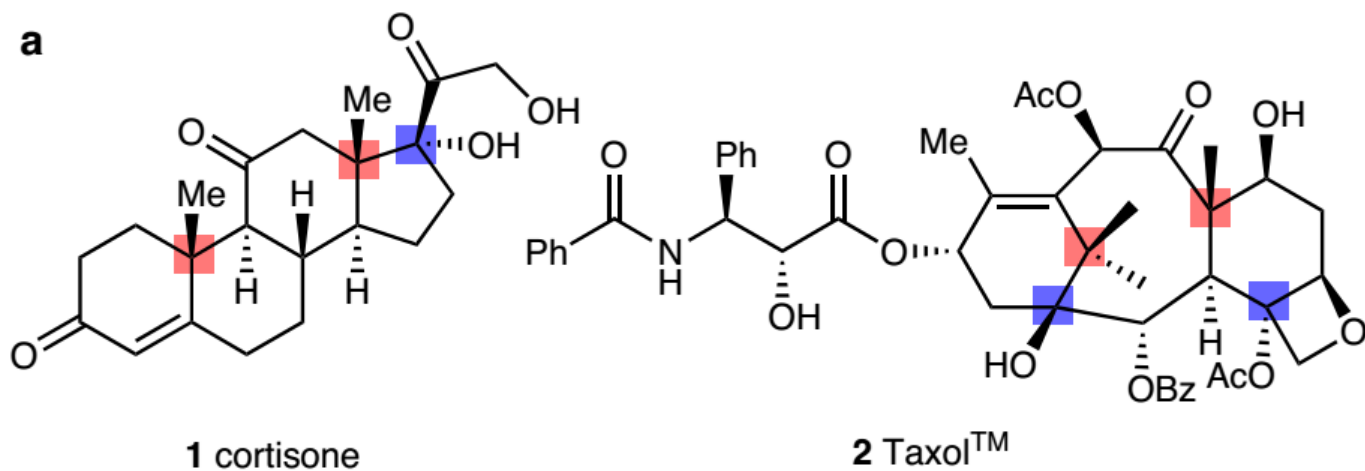
# LETTER

<https://doi.org/10.1038/s41586-019-1179-2>

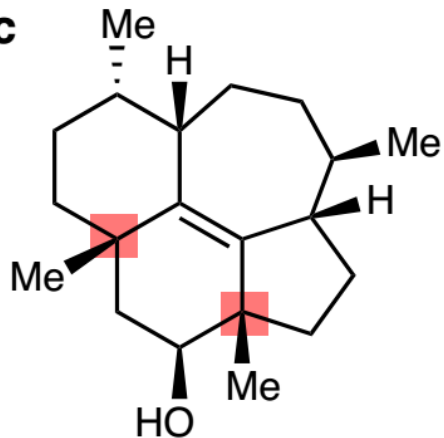
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## Quaternary-centre-guided synthesis of complex polycyclic terpenes

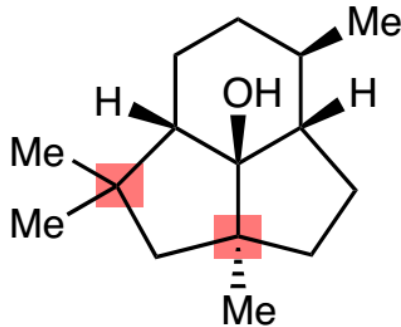
Pengfei Hu<sup>1,2</sup>, Hyung Min Chi<sup>1,2</sup>, Kenneth C. DeBacker<sup>1</sup>, Xu Gong<sup>1</sup>, Jonathan H. Keim<sup>1</sup>, Ian Tingyung Hsu<sup>1</sup> & Scott A. Snyder<sup>1\*</sup>



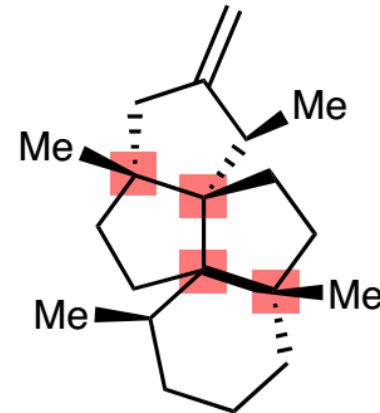
**c**



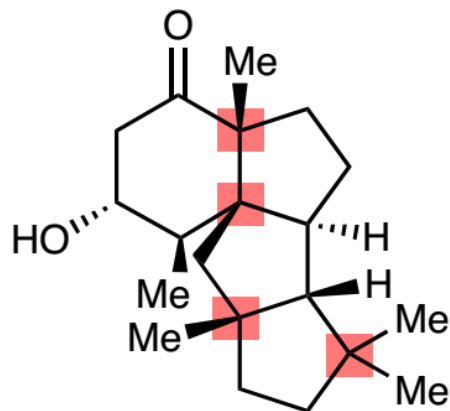
**6** rippertenol



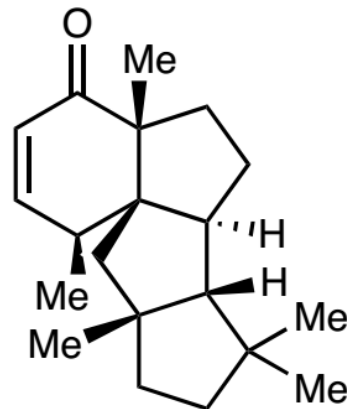
**7** presilphiperfolan-8-ol



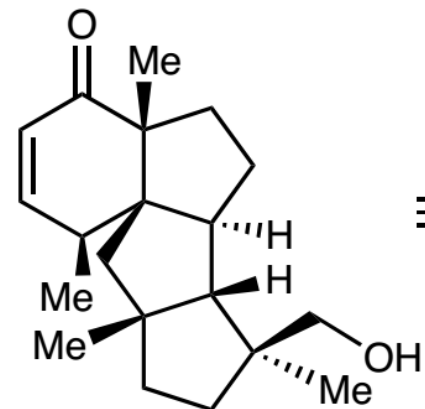
**8** waihoensene



**9** conidiogenone  
[induces conidiogenesis]

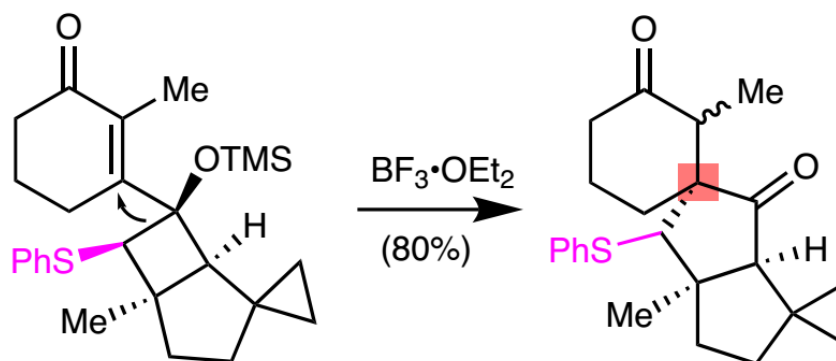
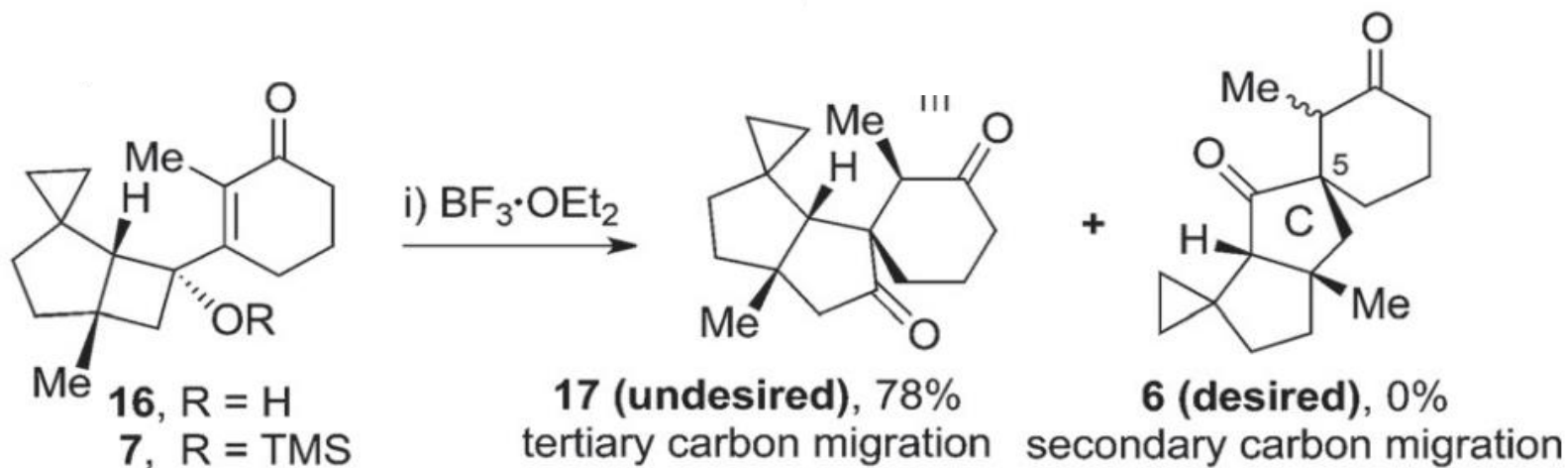


**10** conidiogenone B  
[antibacterial]



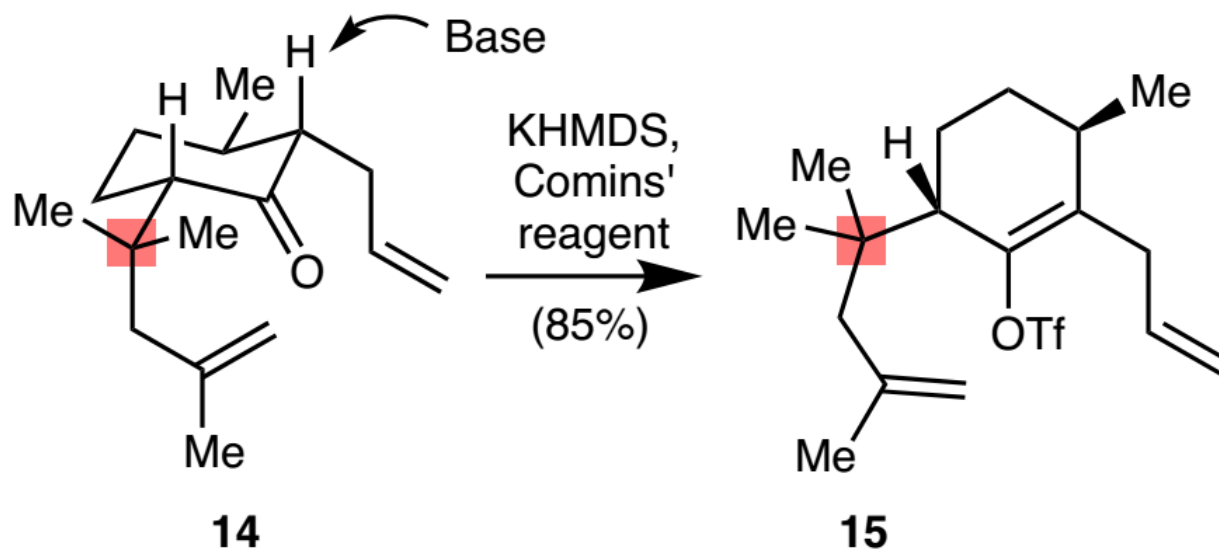
**11** conidiogenone C  
[antitumor]

- **unique, polycyclic architecture**
- **devoid of traditional reactive functional groups**
- **highly bioactive**

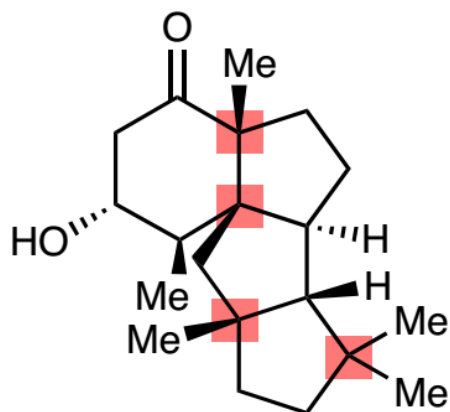


*Angew. Chem. Int. Ed.* **2016**, 55, 4456

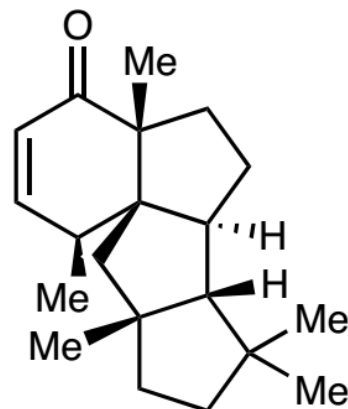
## blocking undesired reactivity



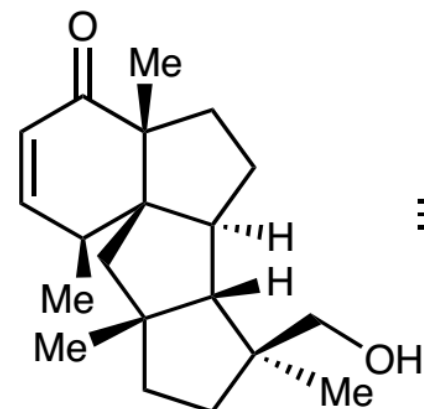
facilitating a reaction  
through rate acceleration  
Thorpe–Ingold effect



**9** conidiogenone  
[induces conidiogenesis]

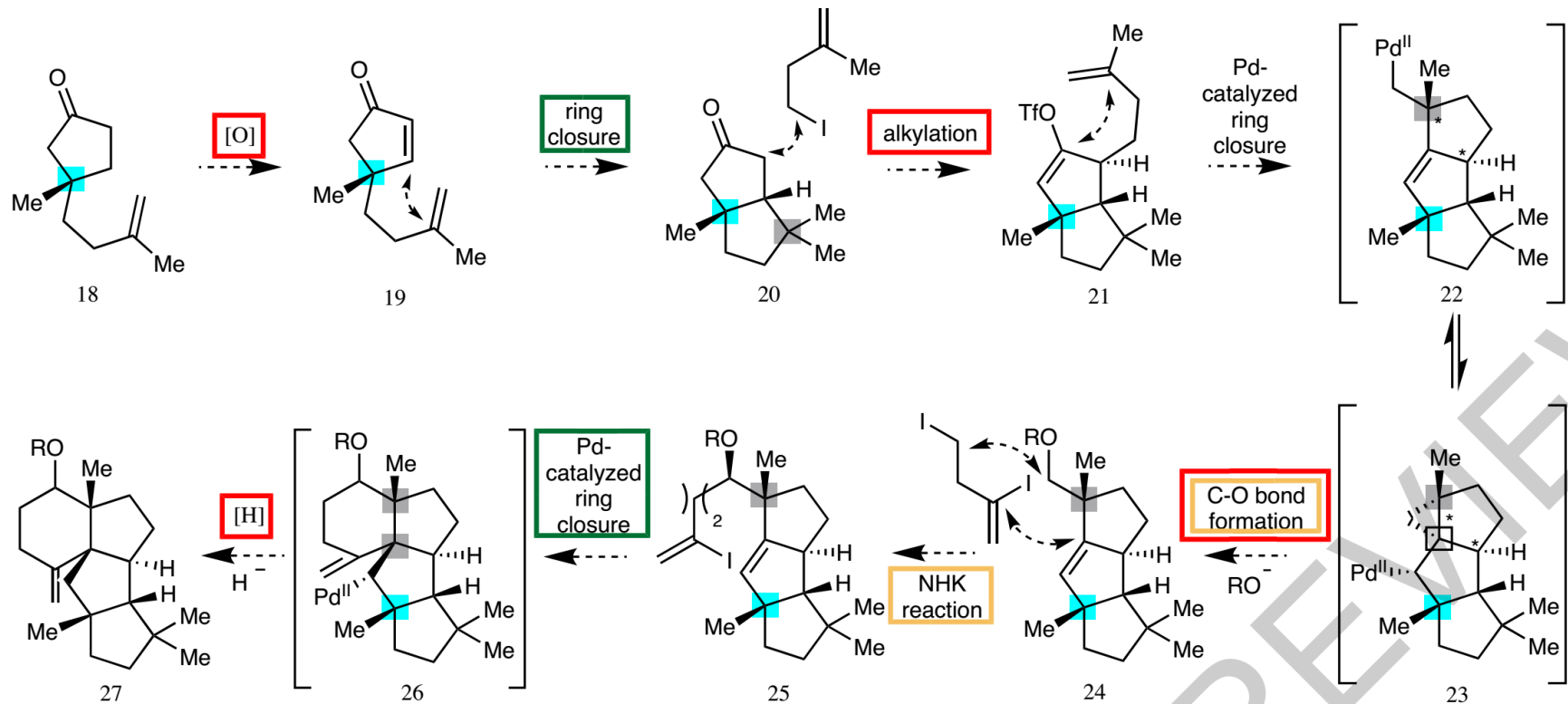


**10** conidiogenone B  
[antibacterial]

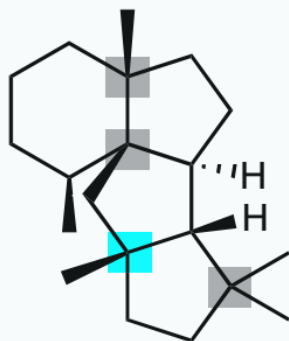


**11** conidiogenone C  
[antitumor]

“we report a design where quaternary centres are viewed as a **strategic asset** in synthetic planning to **aid** and/or **direct** the smooth and efficient **formation of other quaternary centres** without extraneous functional group manipulations.”



### conidiogenone skeleton

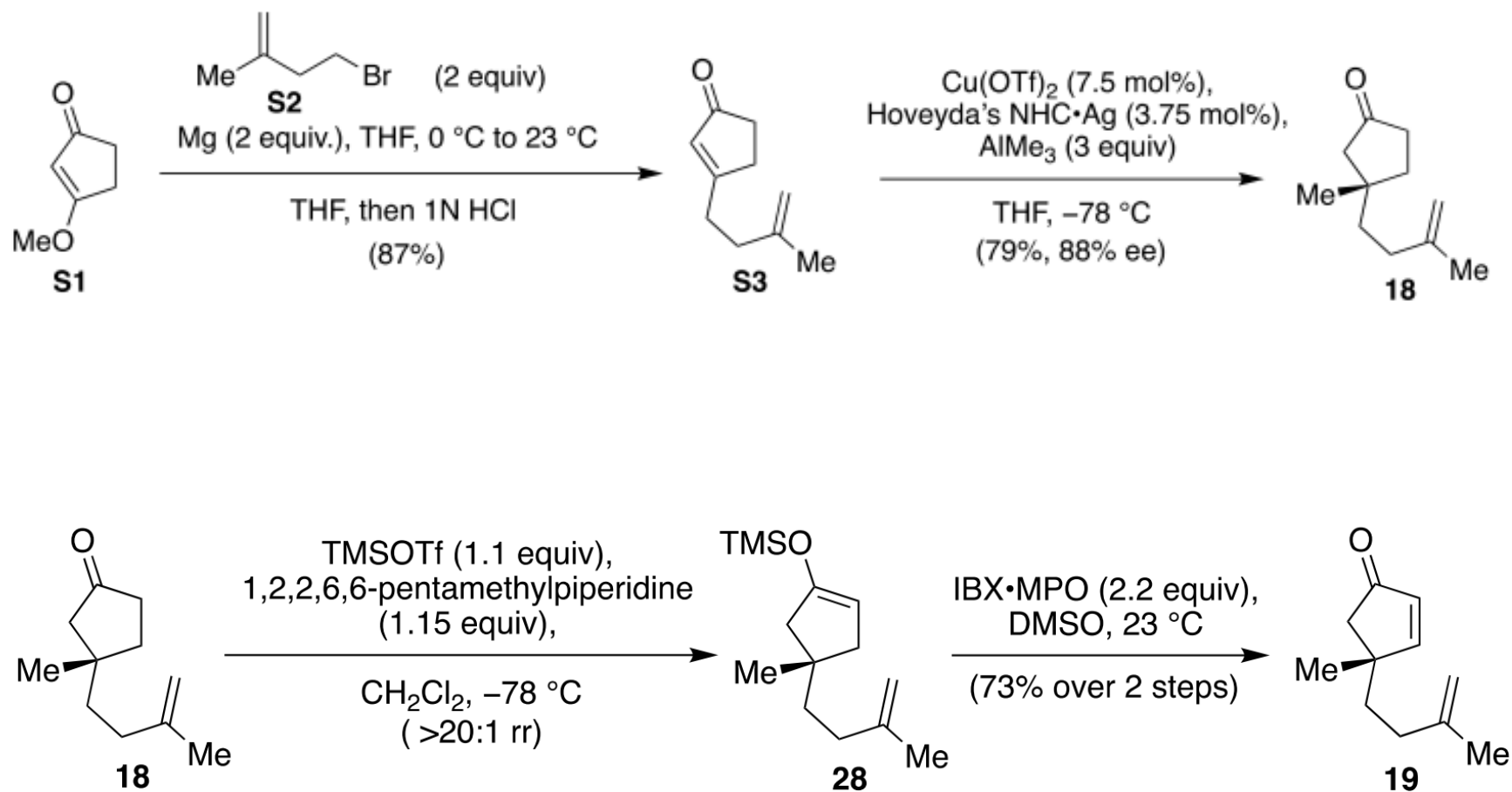


- = guiding QC
- = subsequent QC
- = temporary QC

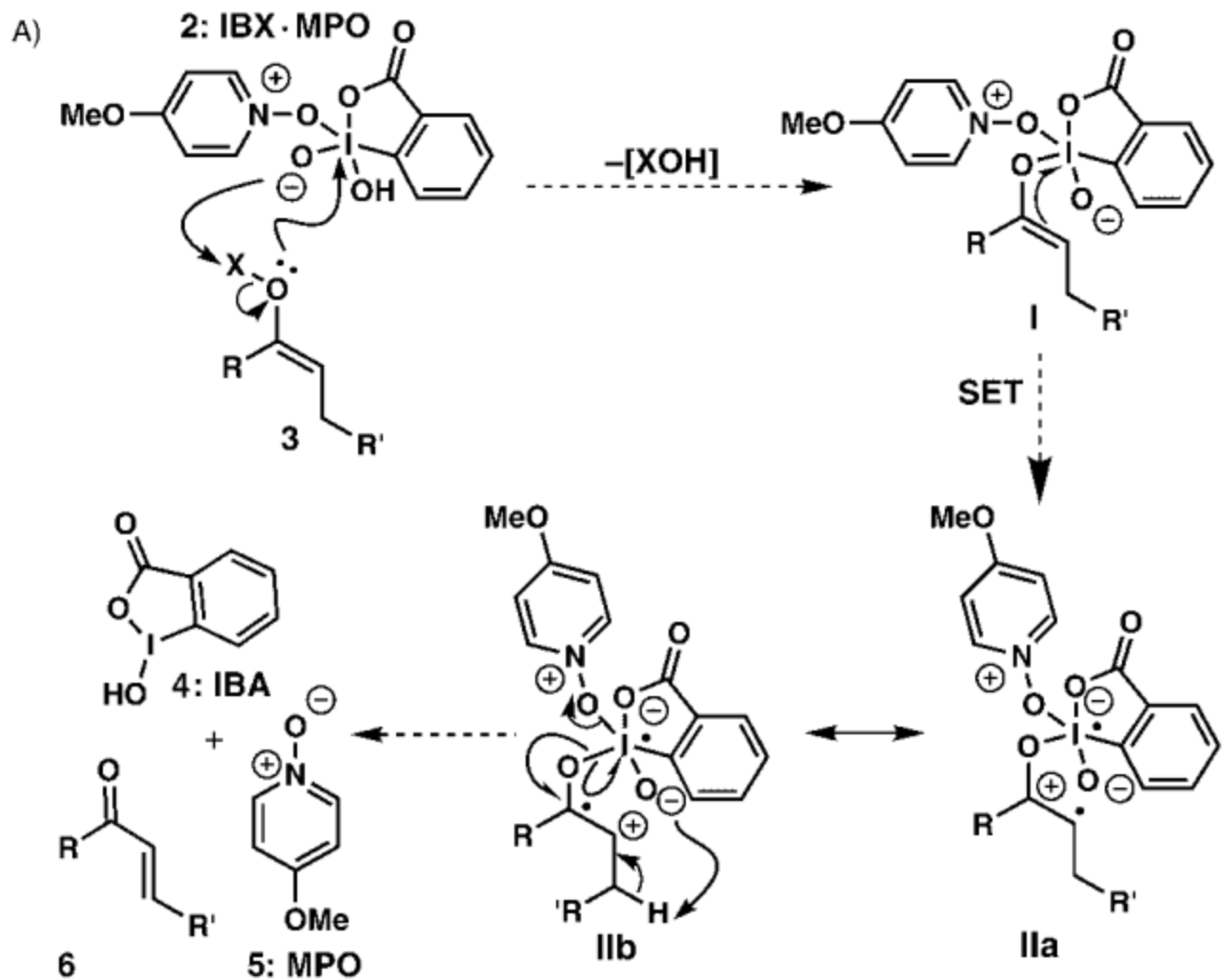
QC Blocking

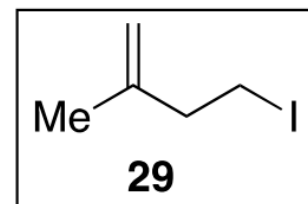
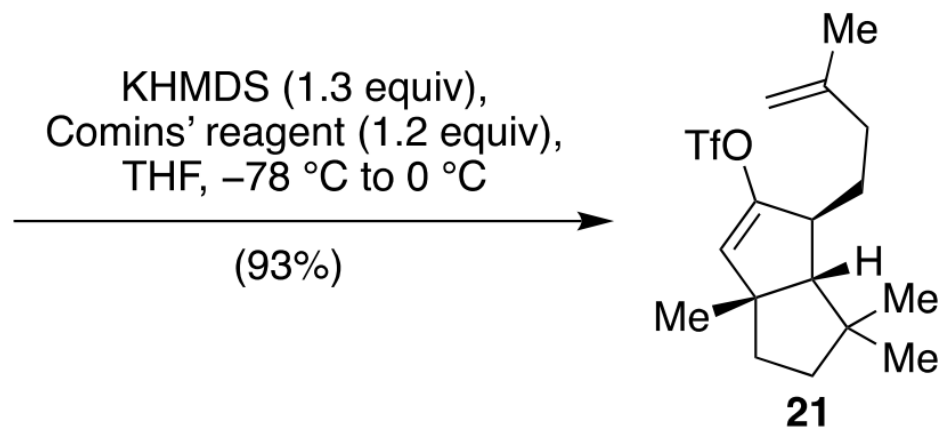
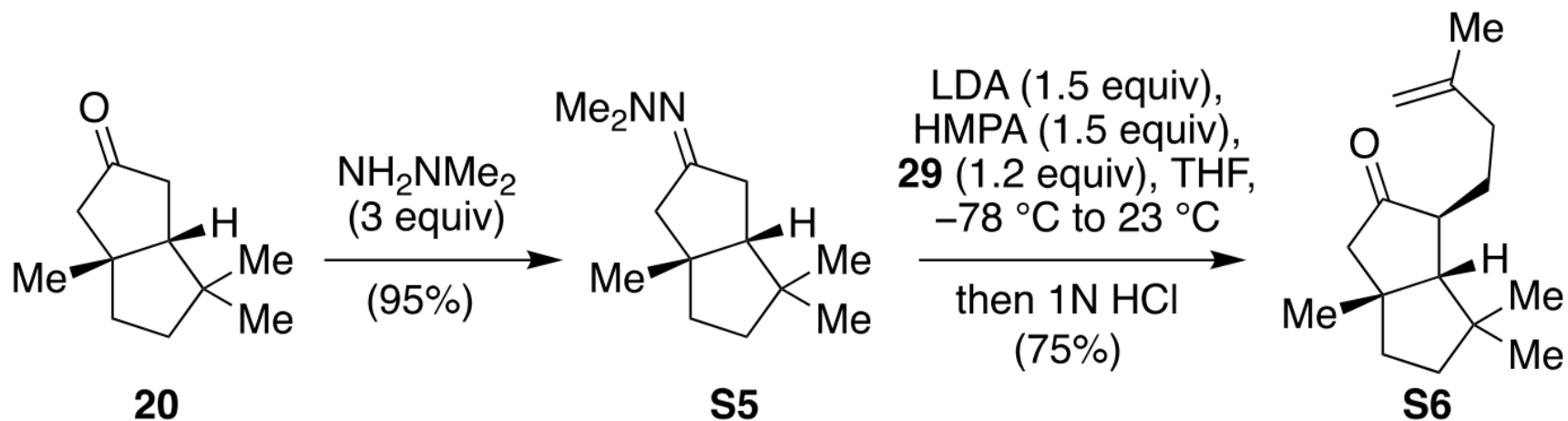
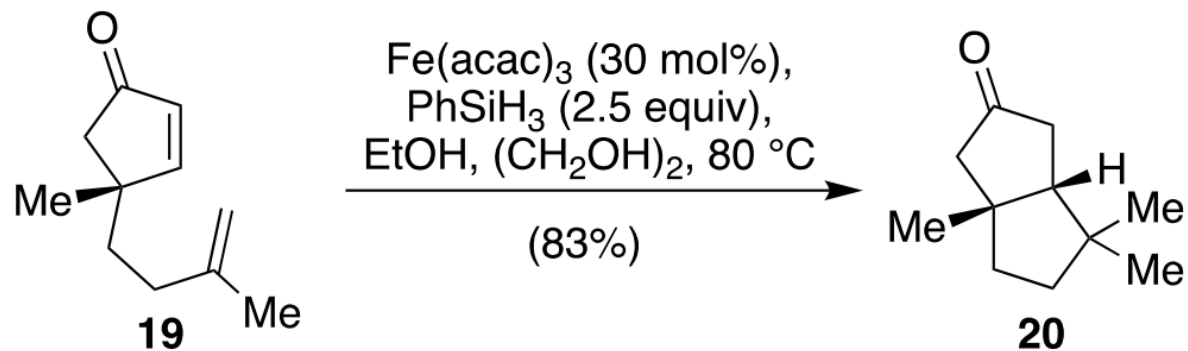
QC Opportunity

QC Facilitating

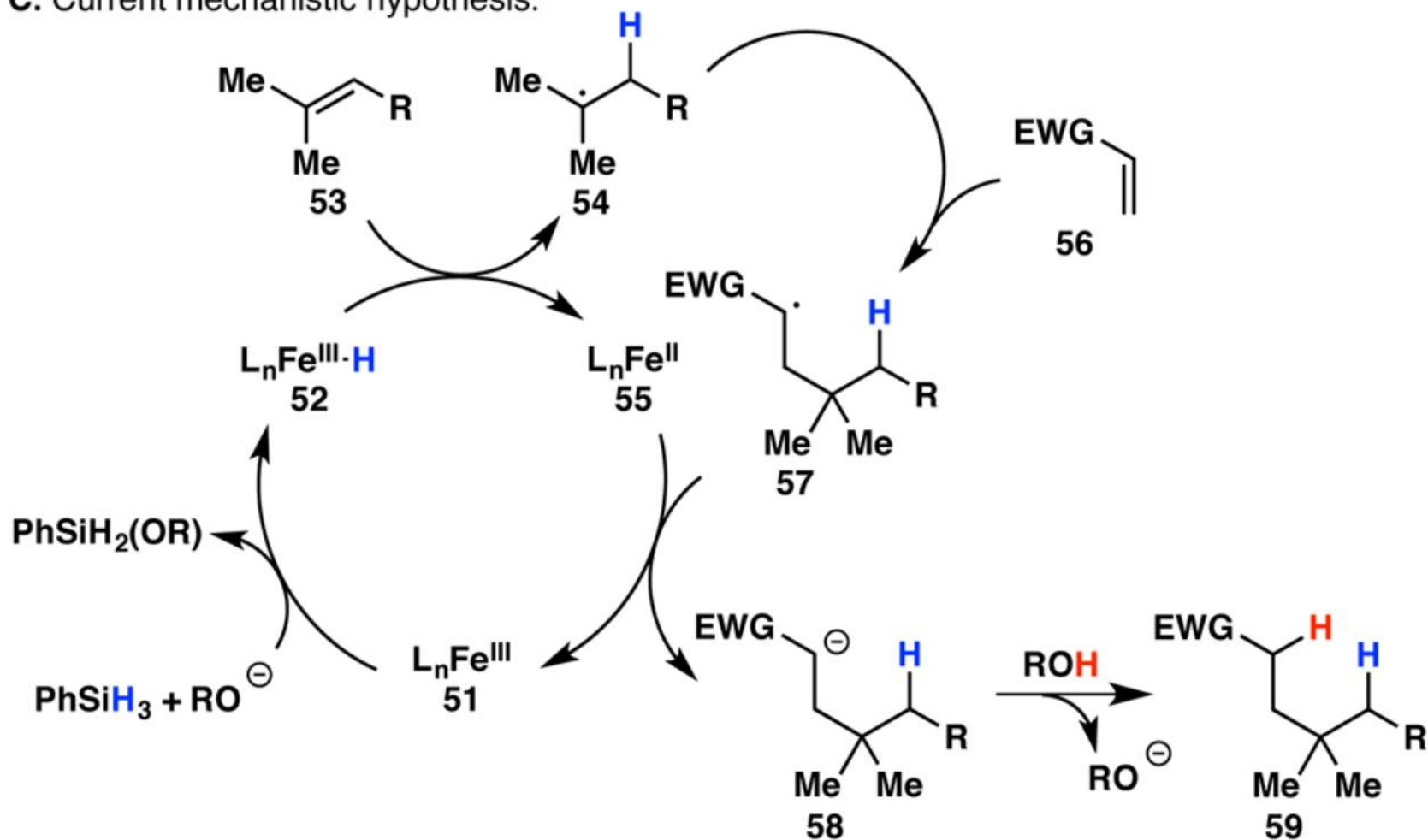


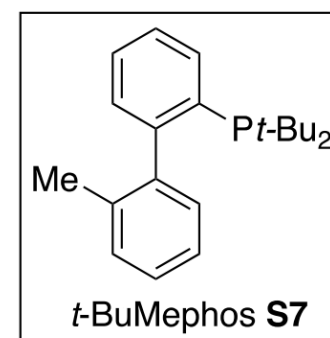
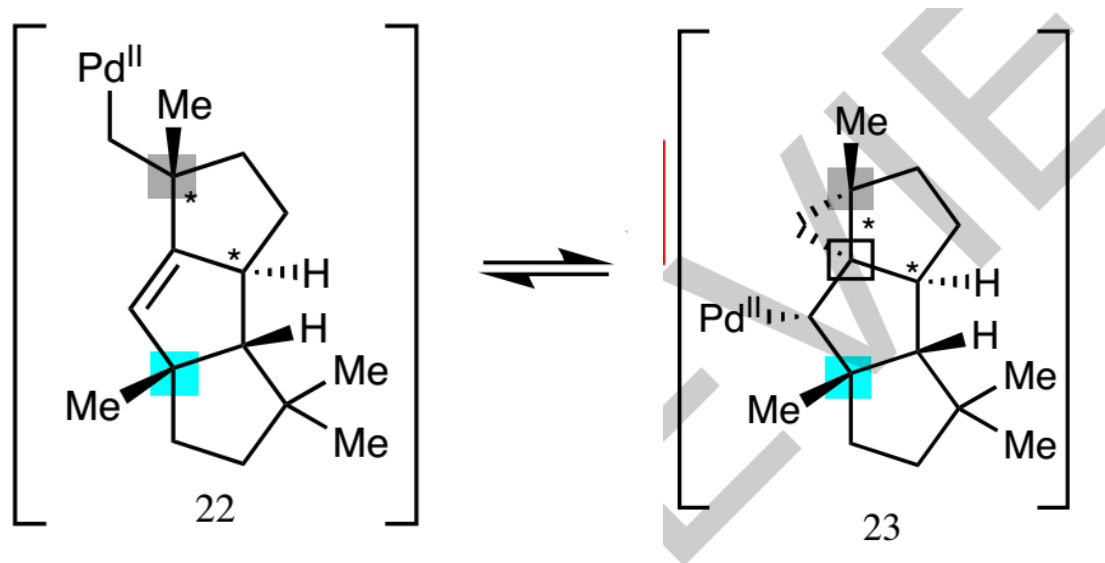
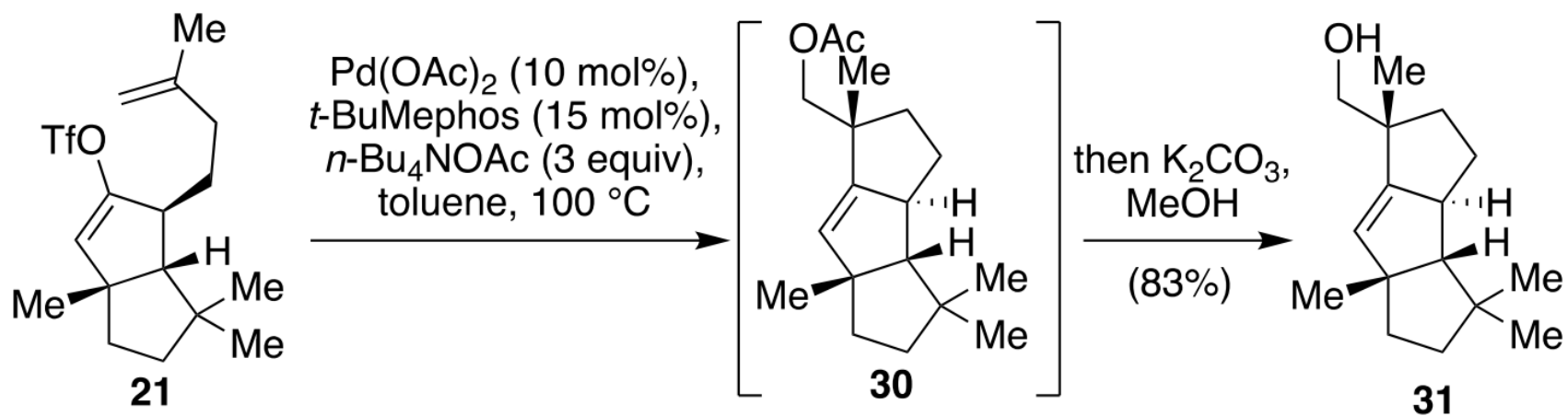


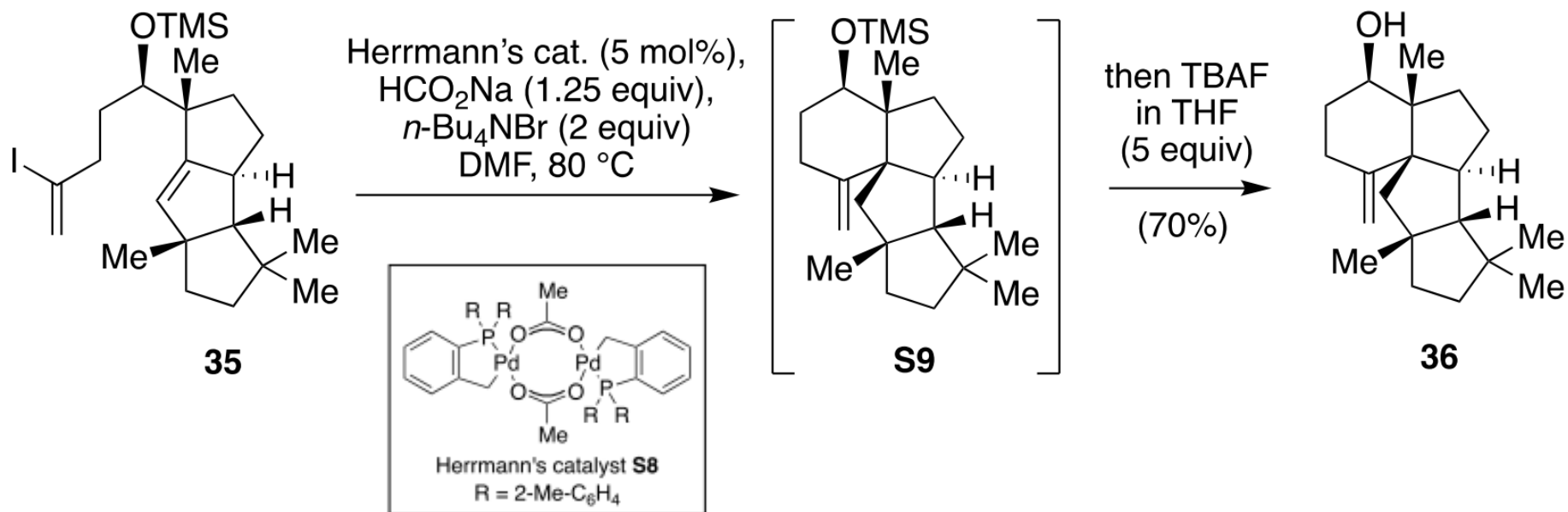
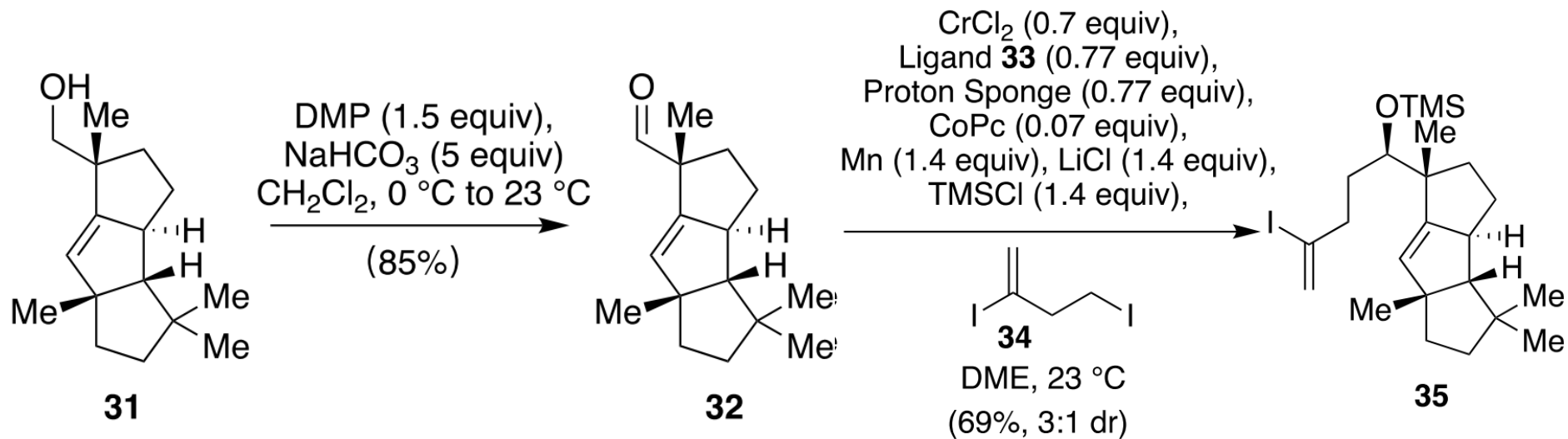




C. Current mechanistic hypothesis.



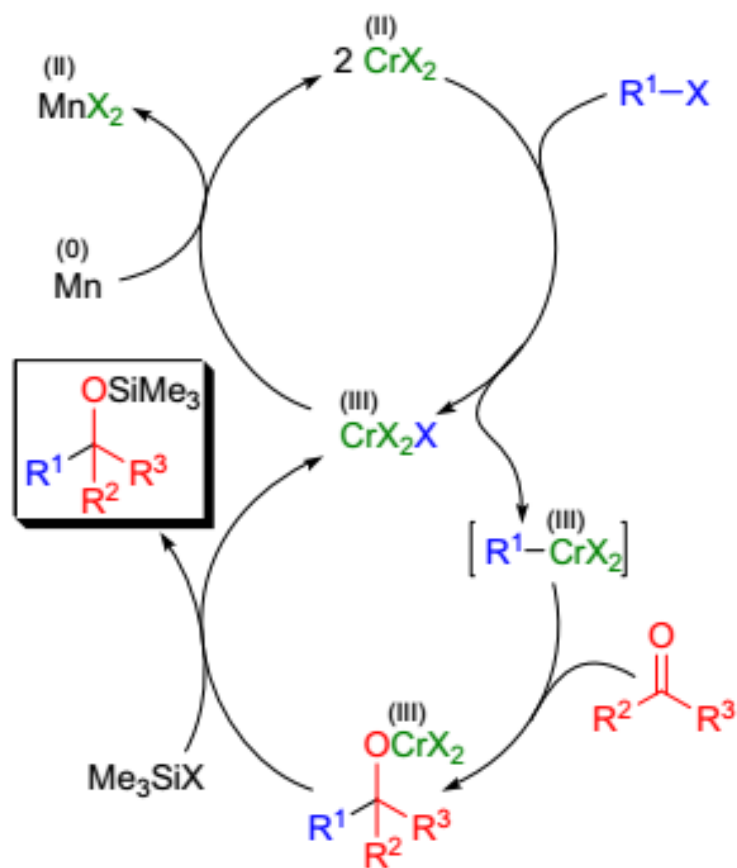




## NOZAKI-HIYAMA-KISHI REACTION

### Mechanism:

Chromium-catalyzed process:



**B**

