Total Synthesis of (−)-Retigeranic Acid A: A Reductive Skeletal Rearrangement Strategy

Dongyu Sun,[†] Ruyi Chen,[†] Dongmin Tang,[†] Qidong Xia, Yifan Zhao, Chun-Hui Liu, and Hanfeng Ding*

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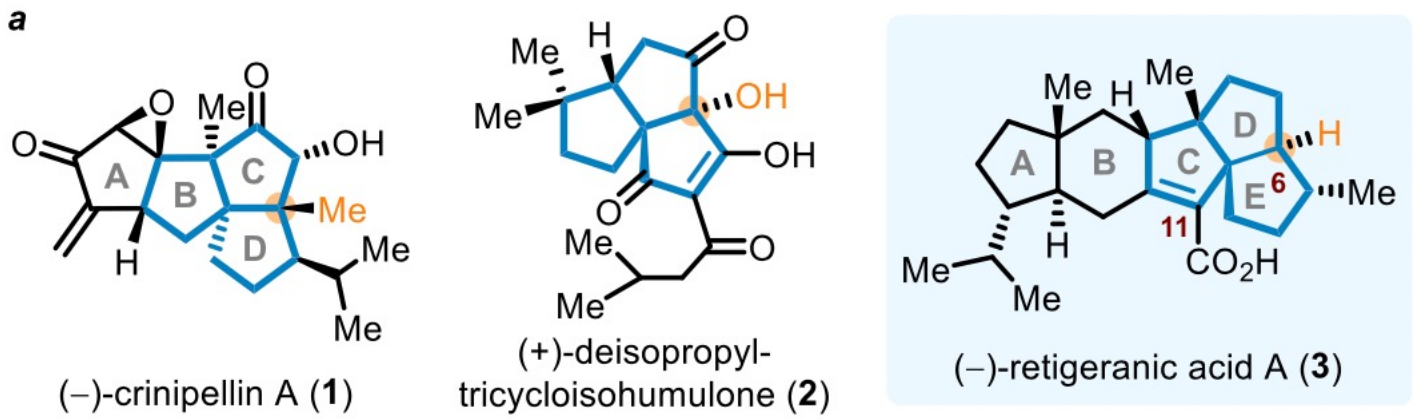

Representative Subtypes of Angular Triquinanes

For C6, it was found the tertiary or oxa-quaternary stereocenters were in the vast majority of angular triquinanes

Polyquinanes, consisting of fused five-membered ring in diverse connection patterns, belong to an important class of skeletons prominent in terpenoids and steroids.
The intriguing biological properties, congested architectures and overall stereochemical complexity have stimulated a lot of methodologies toward the construction of the core structures.

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Retrosynthetic Analysis

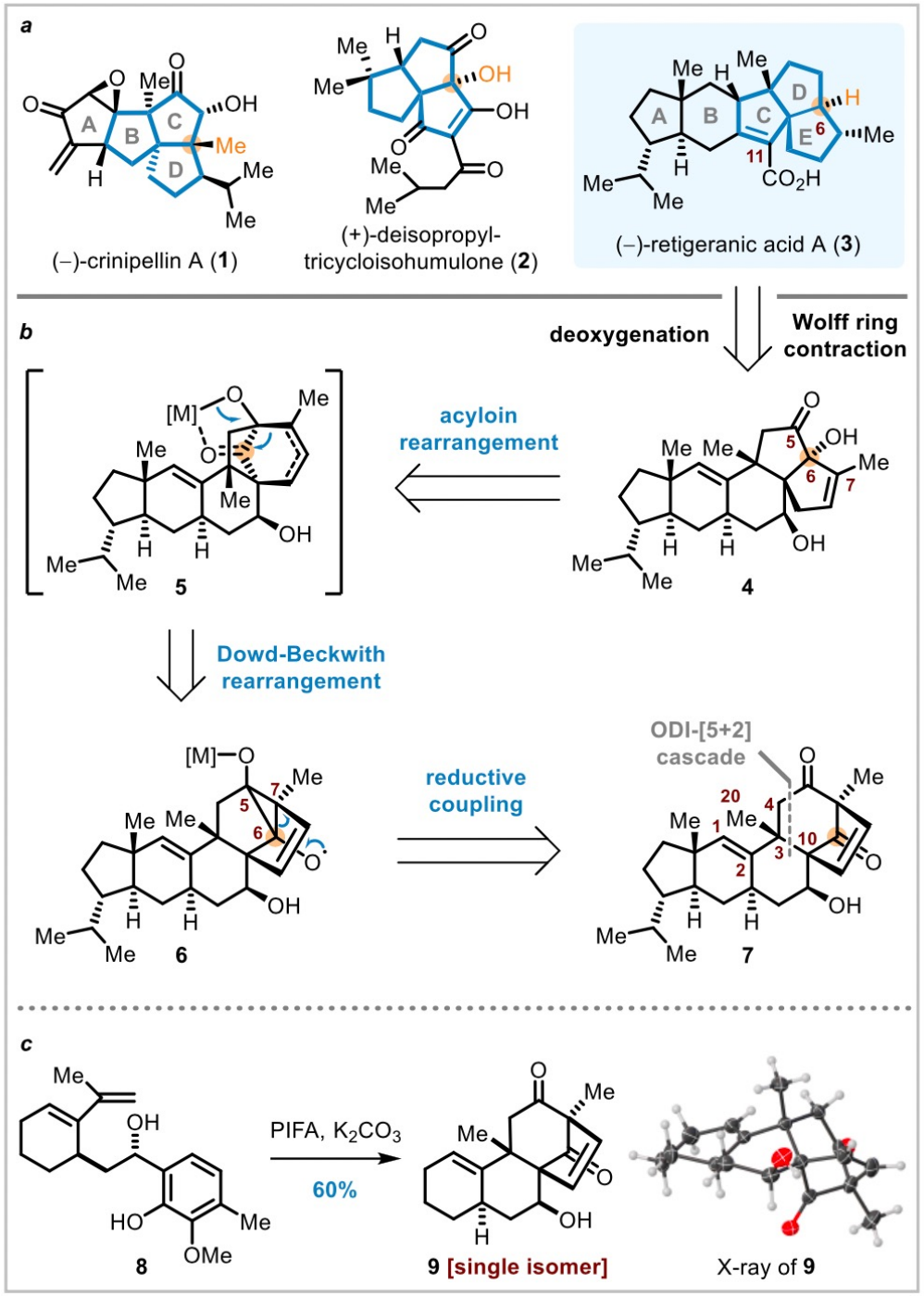
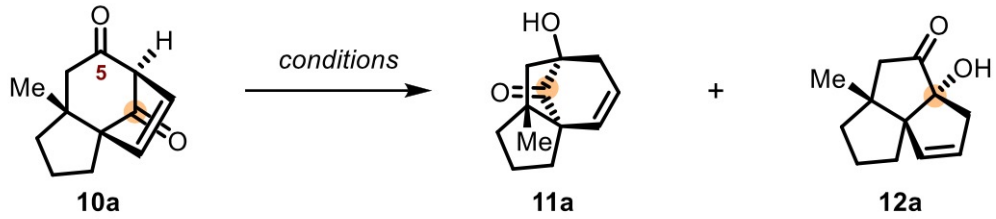
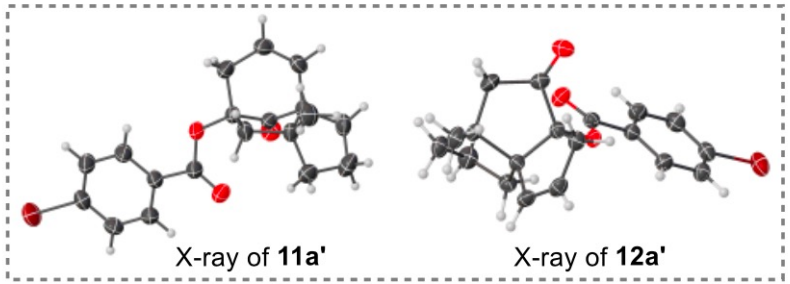


Table 1. Optimization on the Reductive Skeletal Rearrangement of 10a[a]



10a **11a** **12a**



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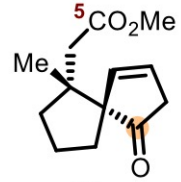
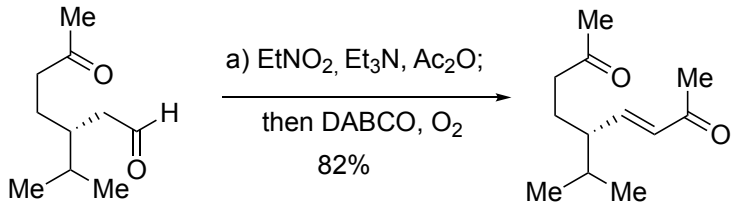


13a

entry	conditions	yield (%)[b] 11a	12a
1[c,d]	*n*-Bu_3SnH, AIBN, toluene, 90 °C	0	0
2[d]	$TiCl_4$, Zn, THF, 0 °C	0	0
3[d]	VCl_3 $(THF)_3$, Zn, CH_2Cl_2, 25 °C	0	0
4	SmI_2, THF, 0 to 25 °C	<5	0
5[e]	SmI_2, THF/MeOH, 0 °C	<5	0
6	SmI_2, THF/*t*-BuOH, 0 °C	73	0
7	SmI_2, THF/*t*-AmOH, 0 °C	70	0
8	SmI_2, THF/*t*-BuOH, 0 °C; then KOH[f]	<5	65

[a]Reaction conditions: **10a** (0.2 mmol) and low-valent metal (2.2 equiv) in solvent/cosolvent (4.5 mL/0.5 mL) at indicated temperature. [b]Isolated yields. [c]*n*−Bu_3SnH (2.0 equiv), AIBN (0.5 equiv). [d]No reaction. [e]**13a** (80% yield). [f]KOH (2.0 equiv).



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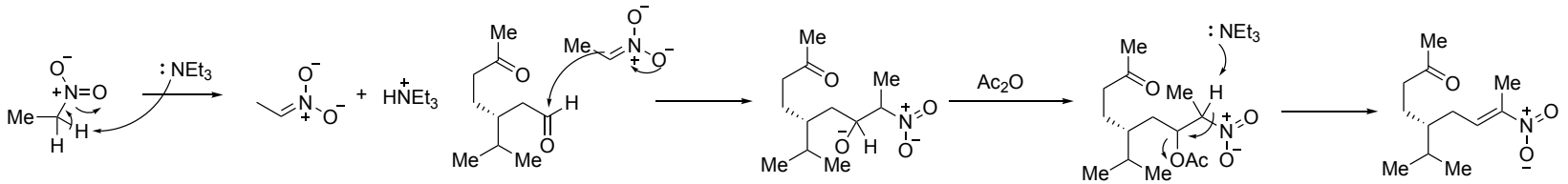
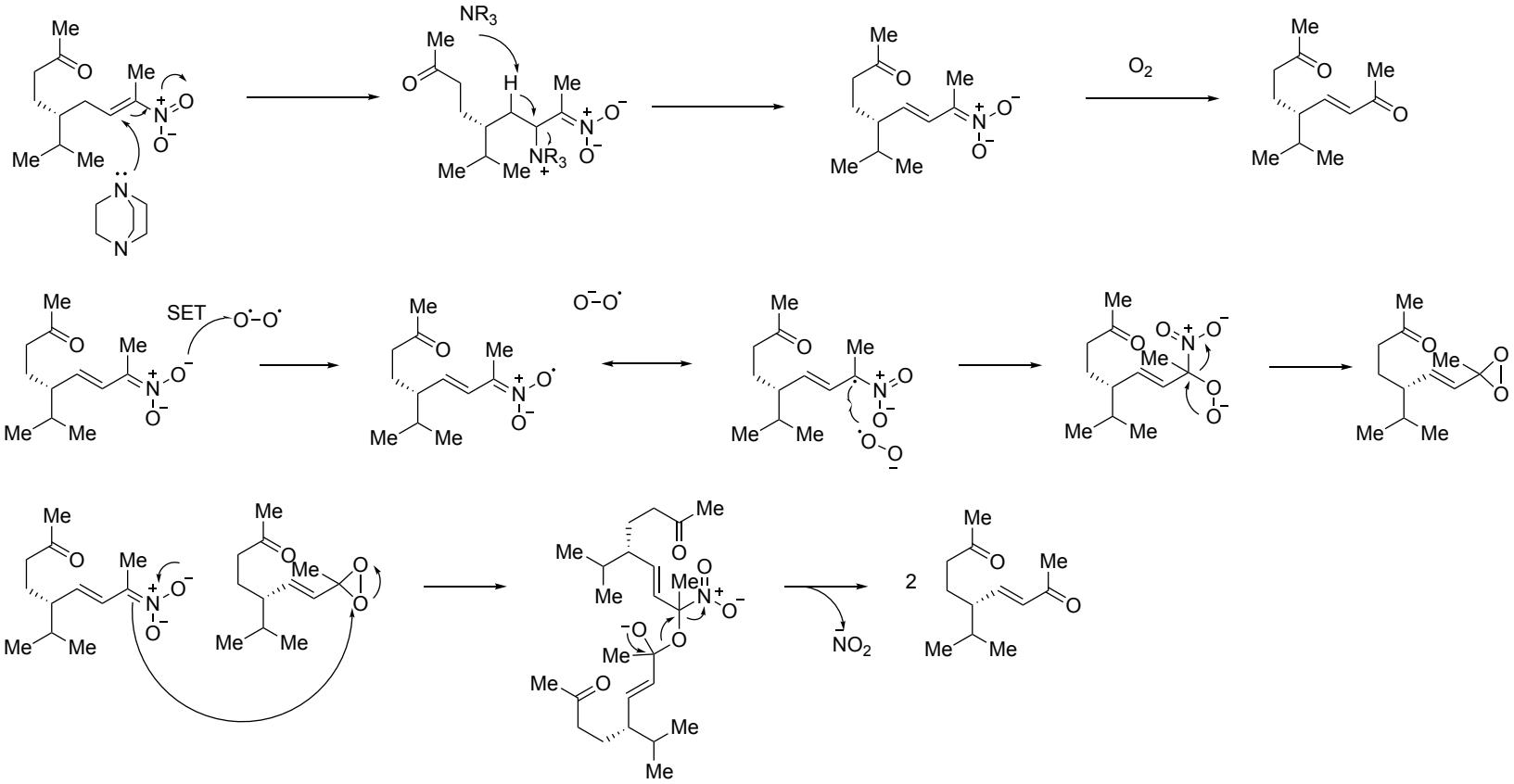
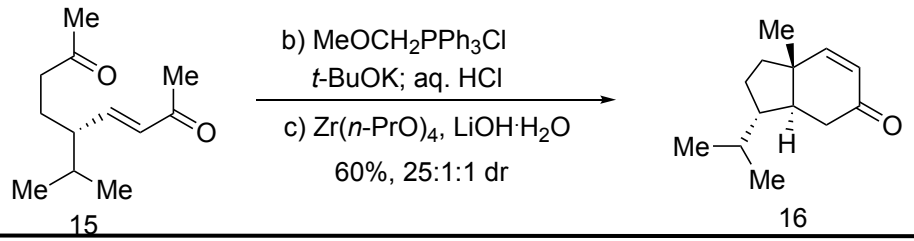
Henry condensation

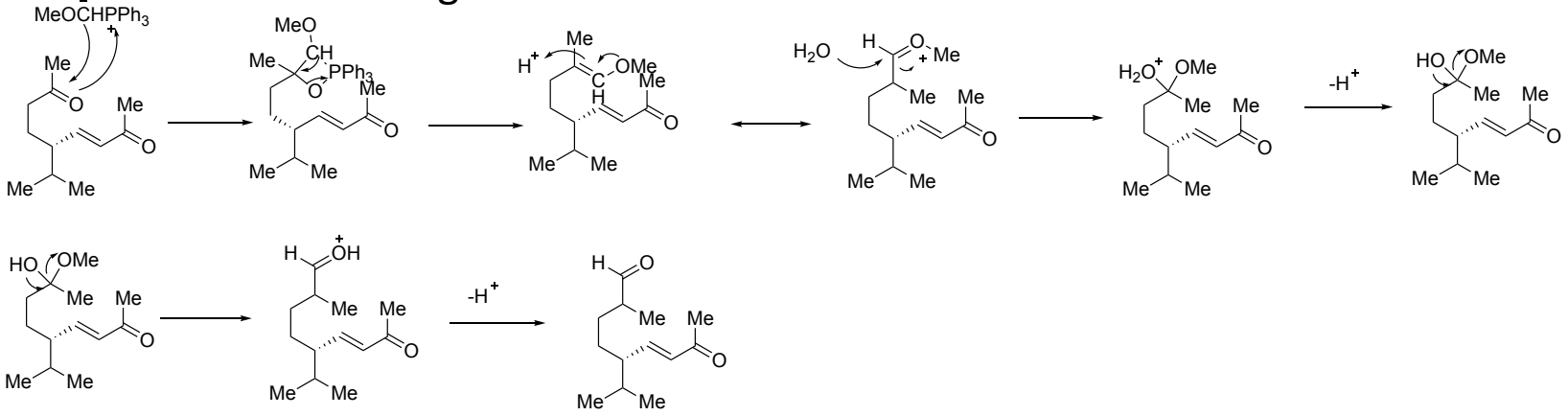


DABCO promoted Nef reaction

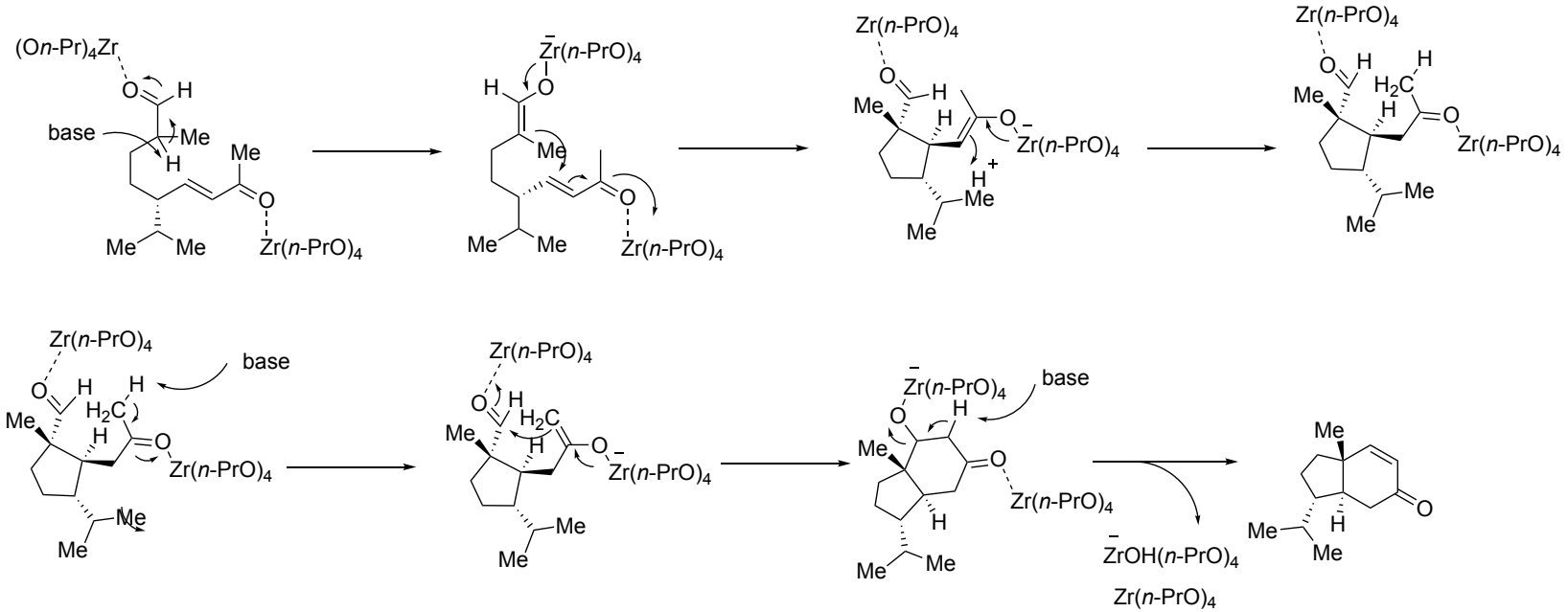


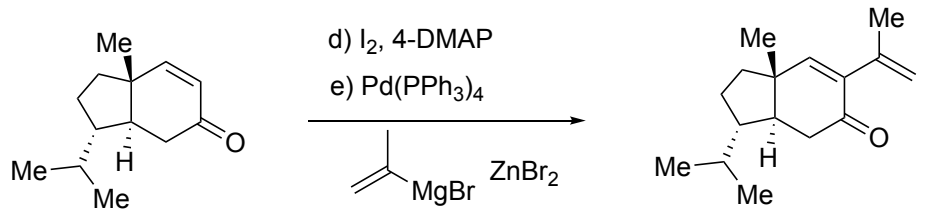


Chemo-selective Wittig olefination

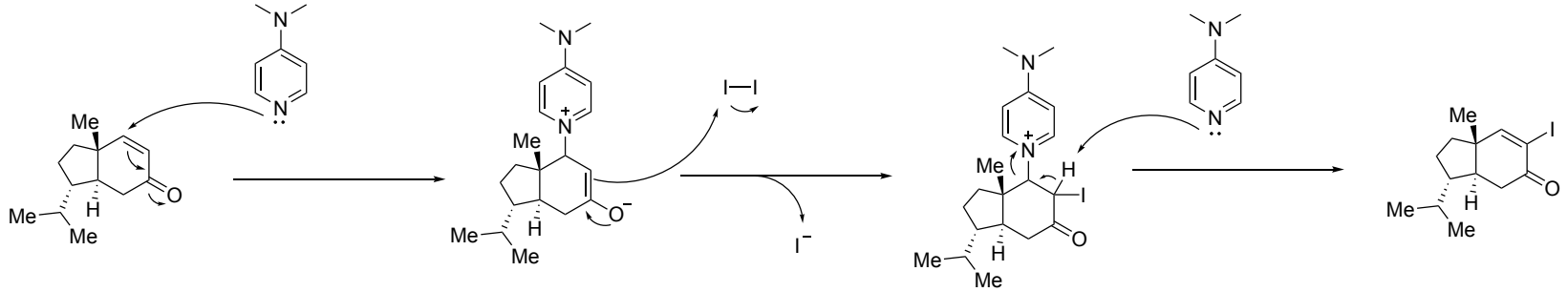


$Zr(n\text{-}PrO)_4$-mediated intramolecular Michael/aldol cyclization



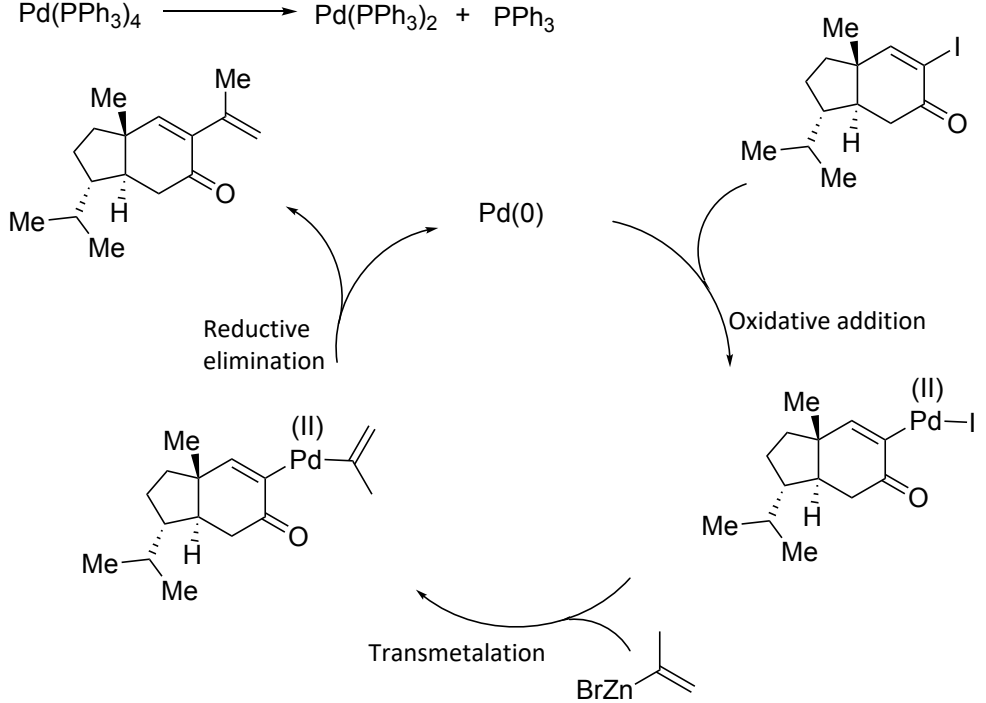


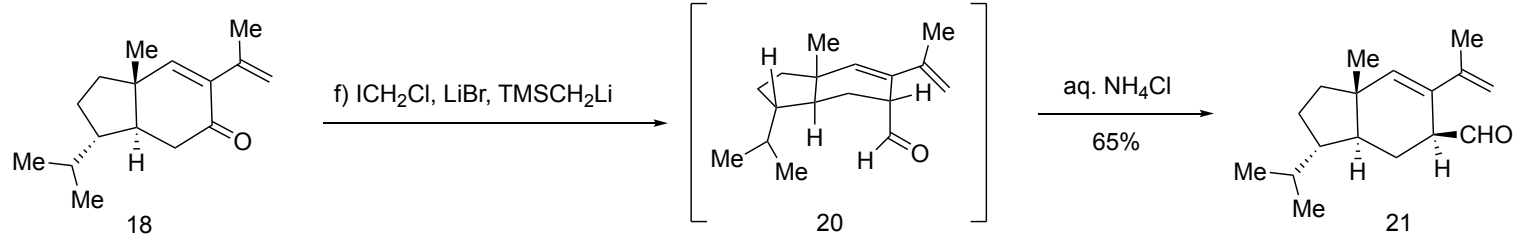
α-Iodination



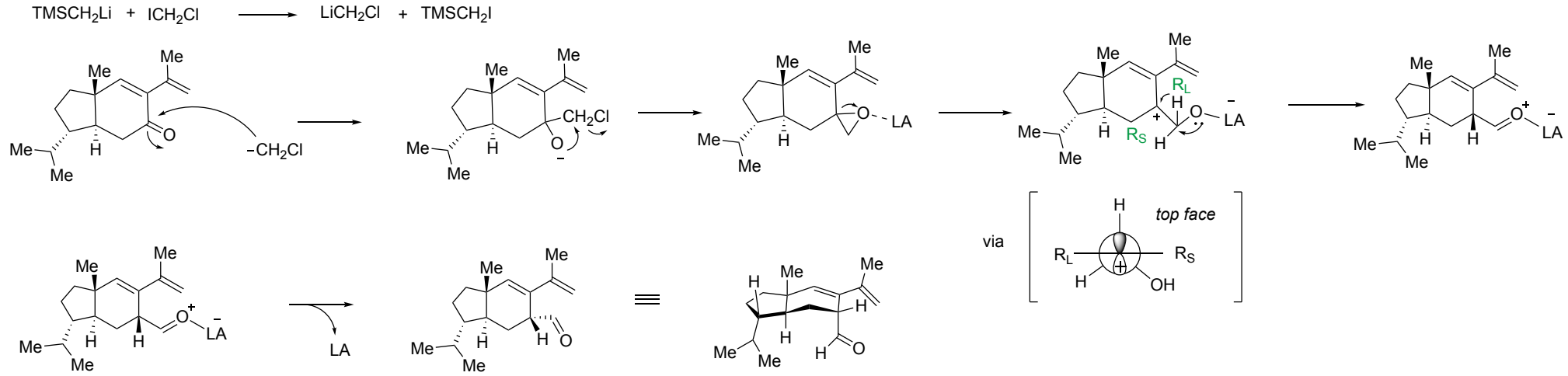
Palladium-catalyzed Negishi cross coupling

$Pd(PPh_3)_4 \longrightarrow Pd(PPh_3)_2 + PPh_3$

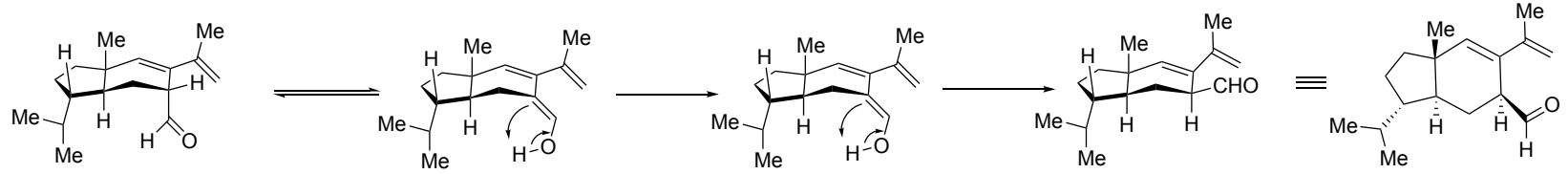


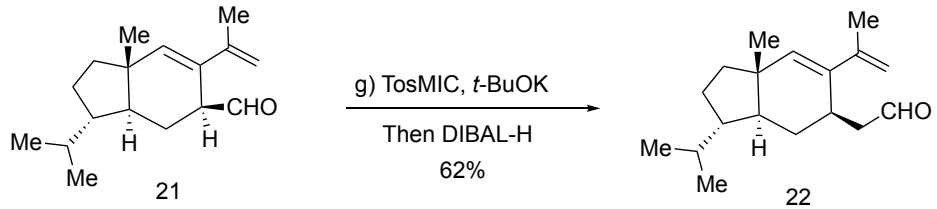


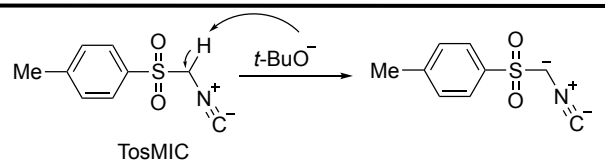
Cascade epoxidation/Meinwald rearrangement



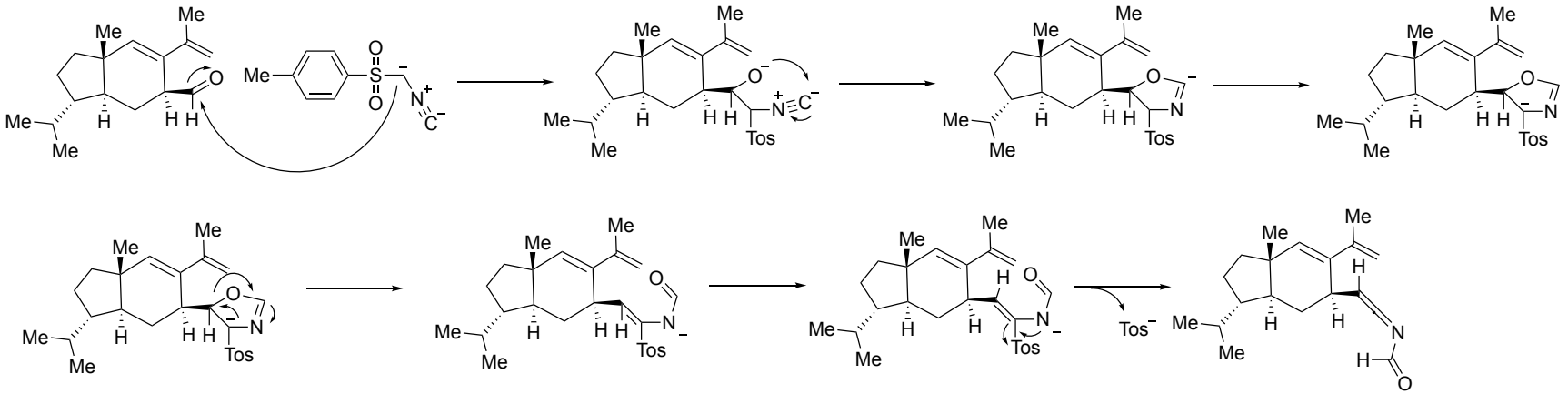
Epimerization



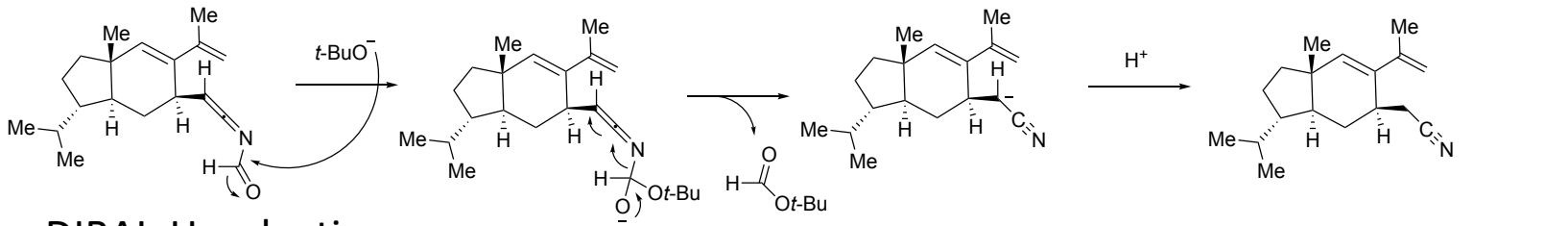


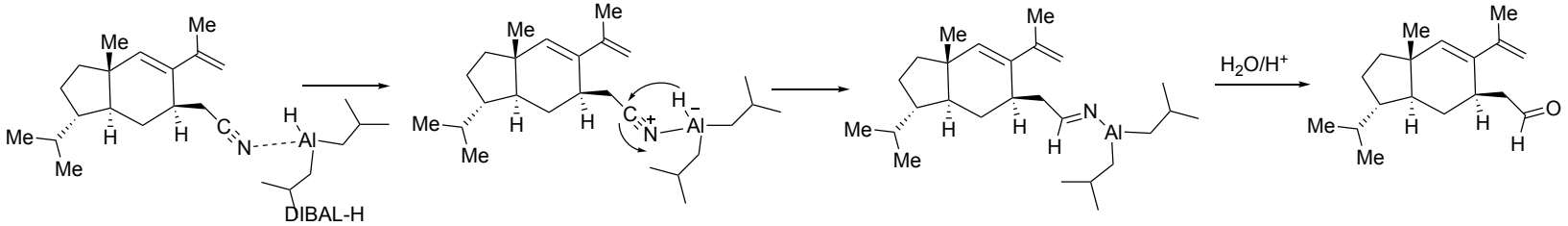


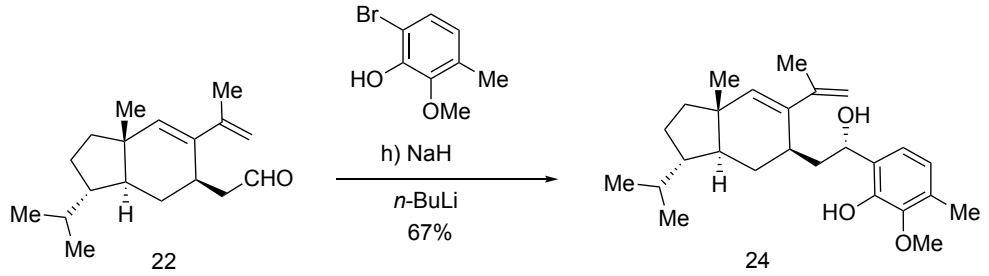
Van Leusen homologation



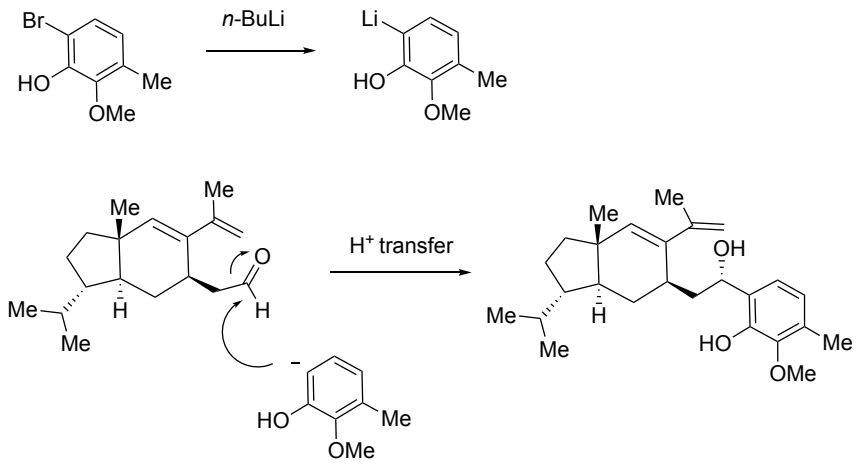
DIBAL-H reduction

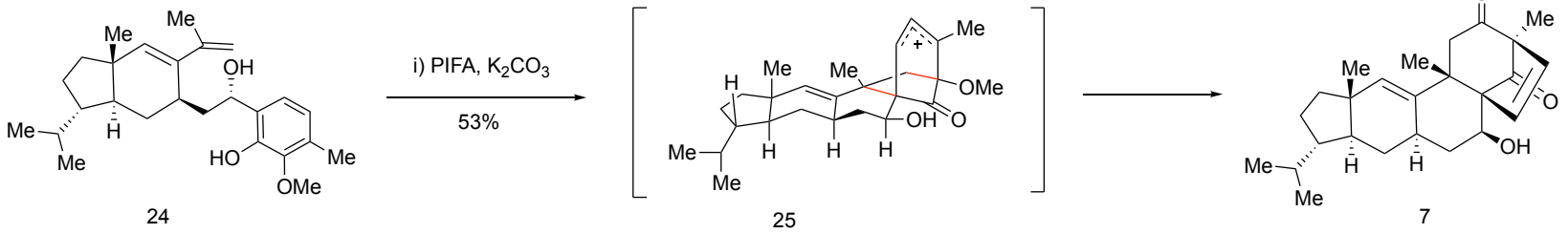






1,2-Addition to aldehyde





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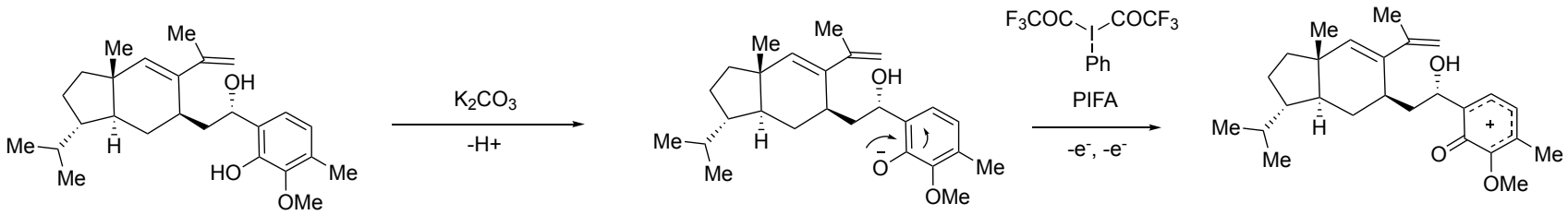
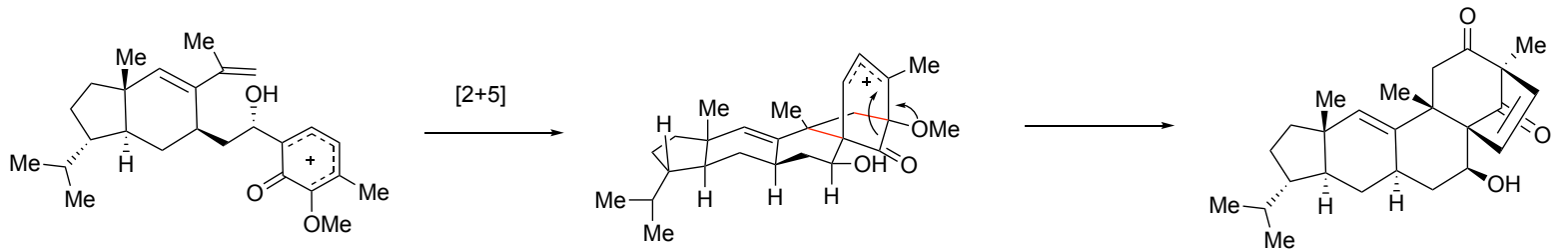
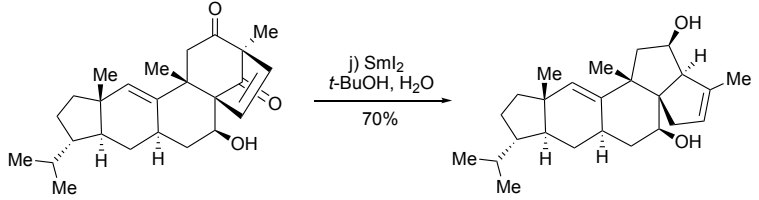
ODI-[5 + 2] cascade reaction







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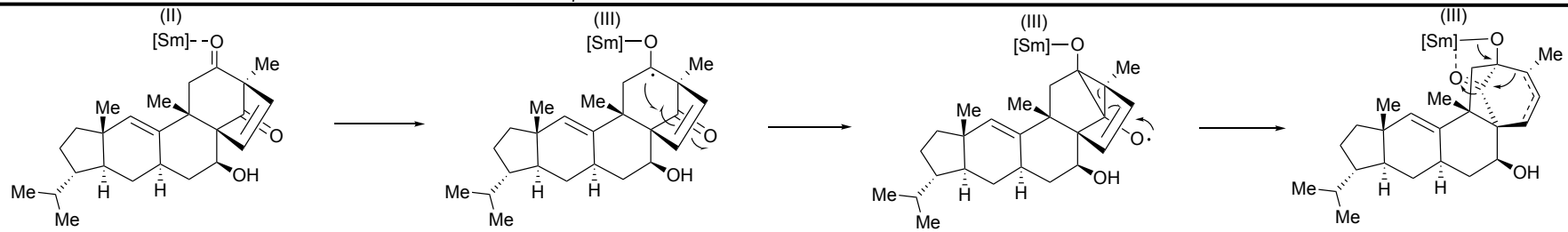
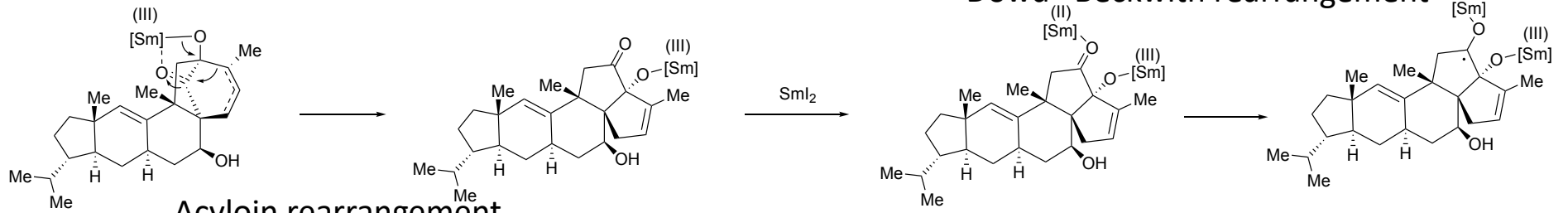
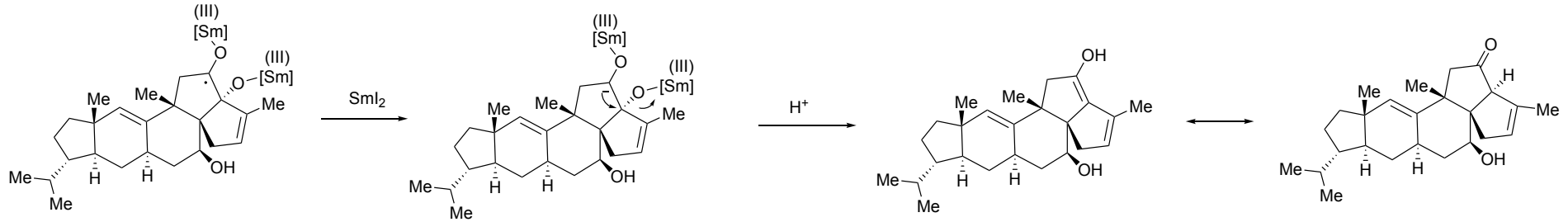
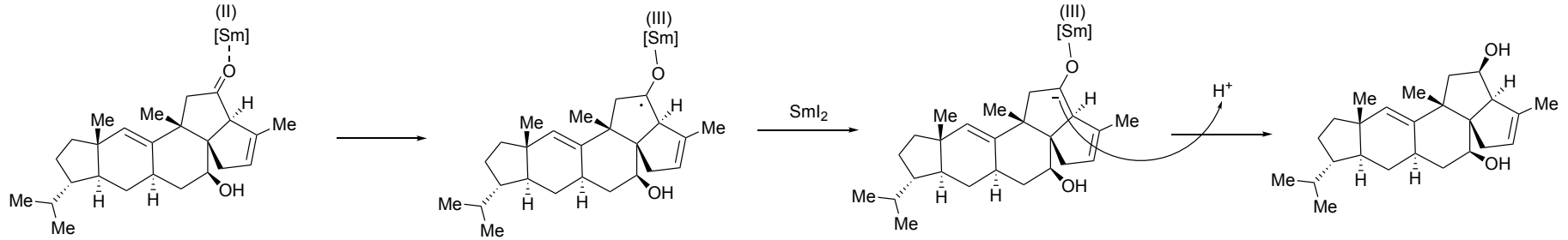


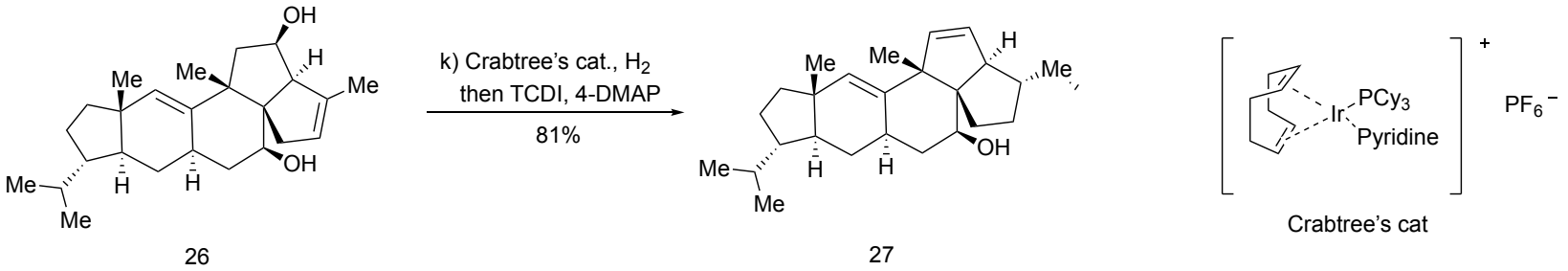
Dowd–Beckwith rearrangement



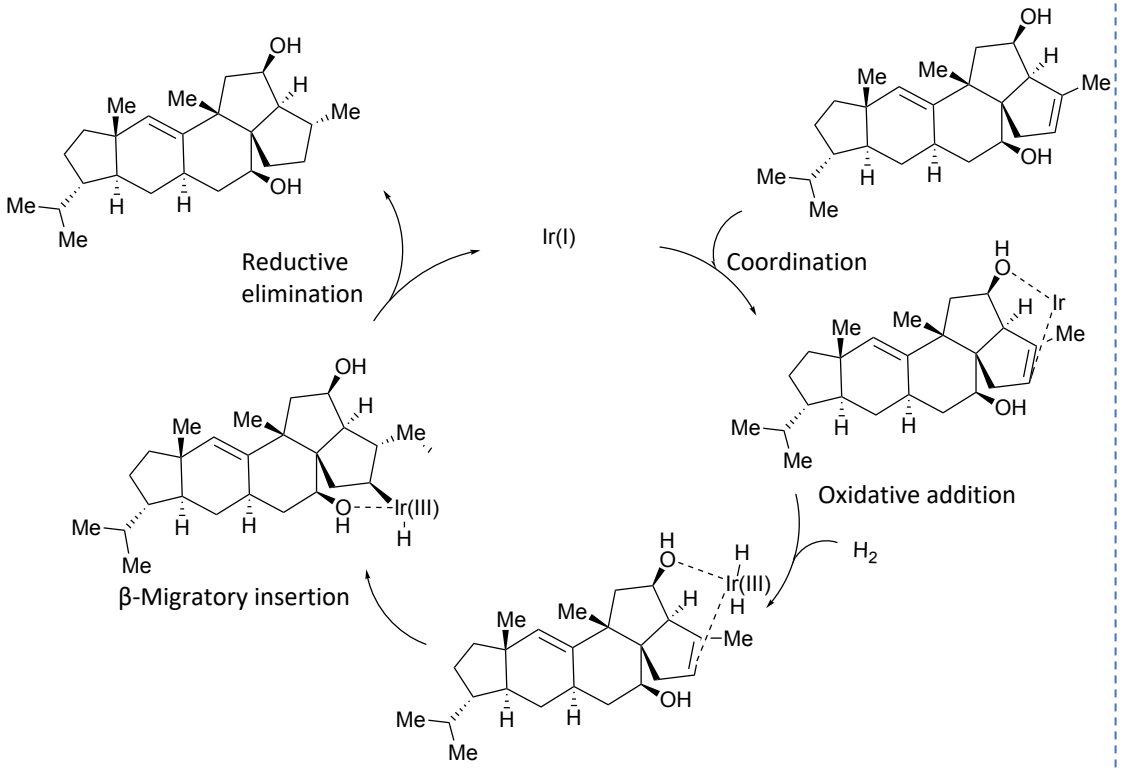
Acyloin rearrangement



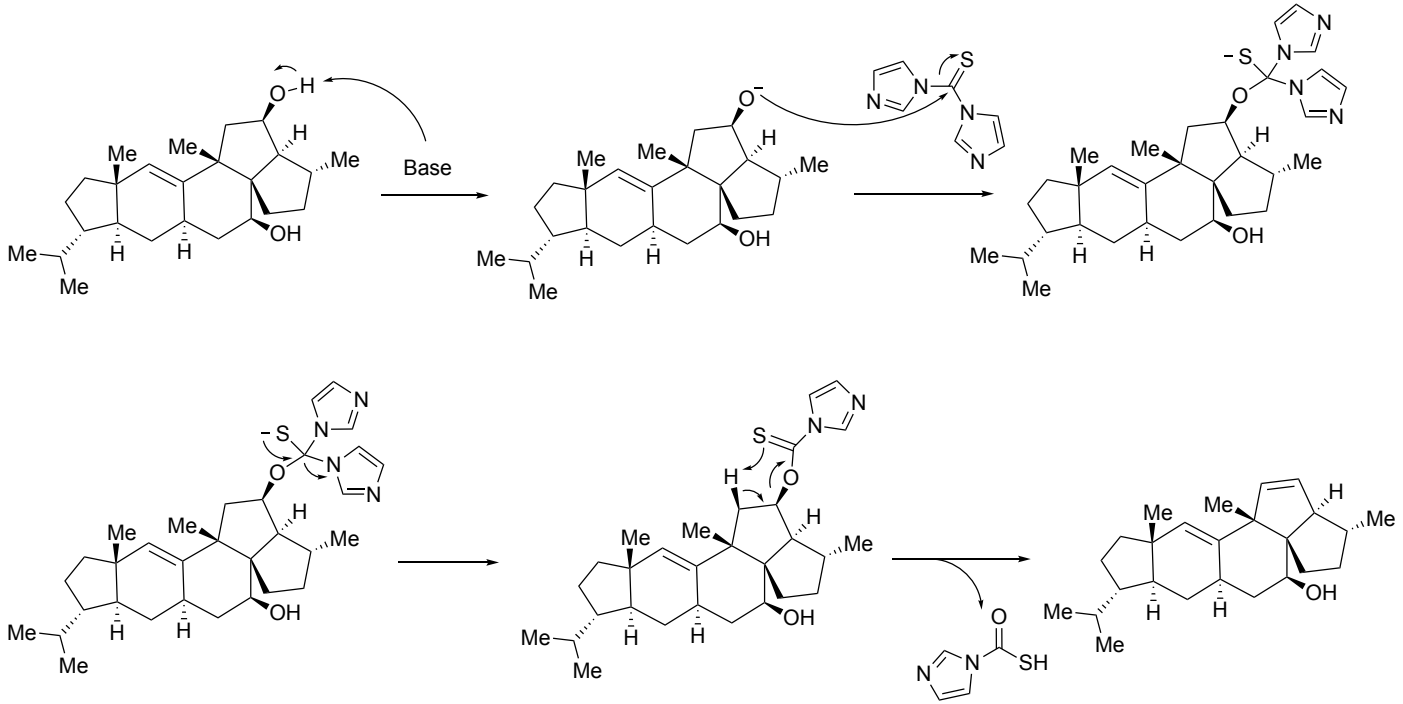


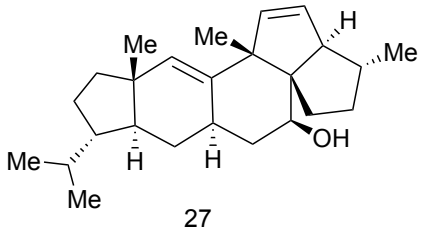


Side- and stereoselective hydrogenation



Chugaev elimination





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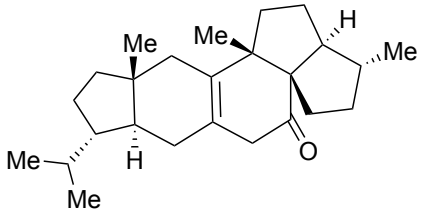

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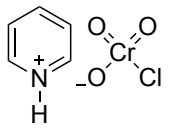
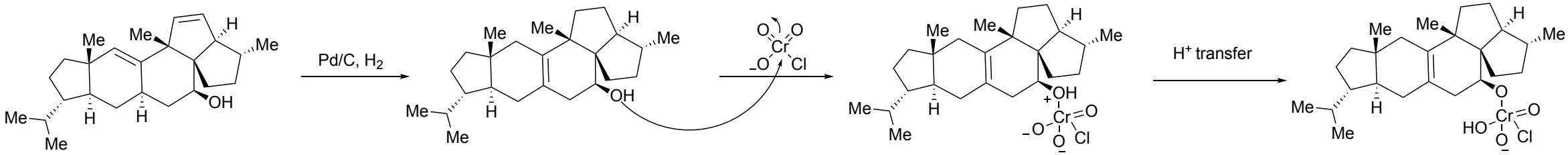
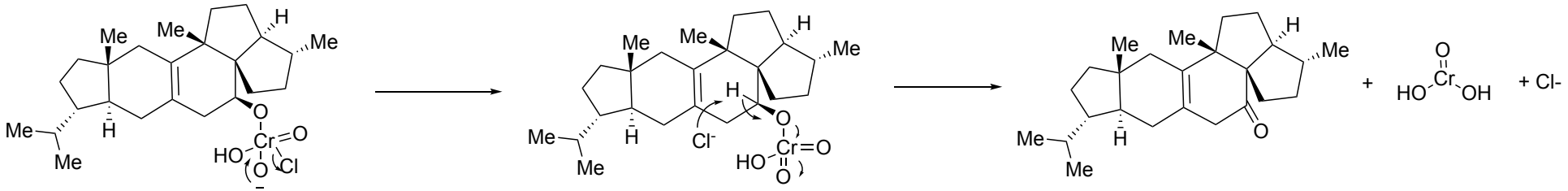


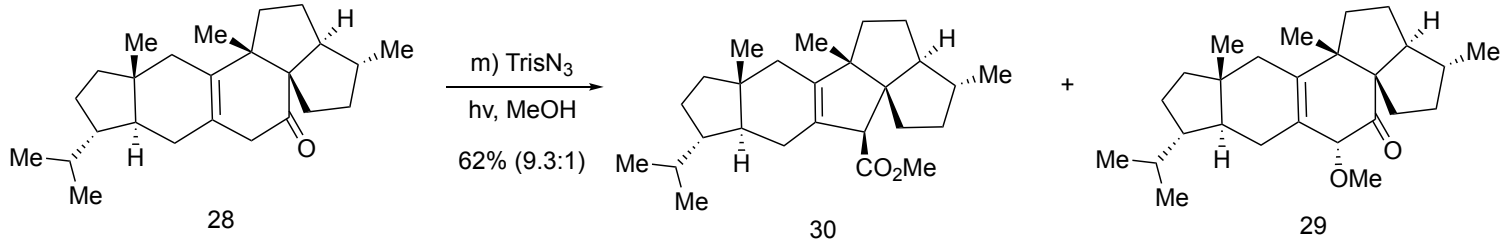
PCC

Pd/C Hydrogenation

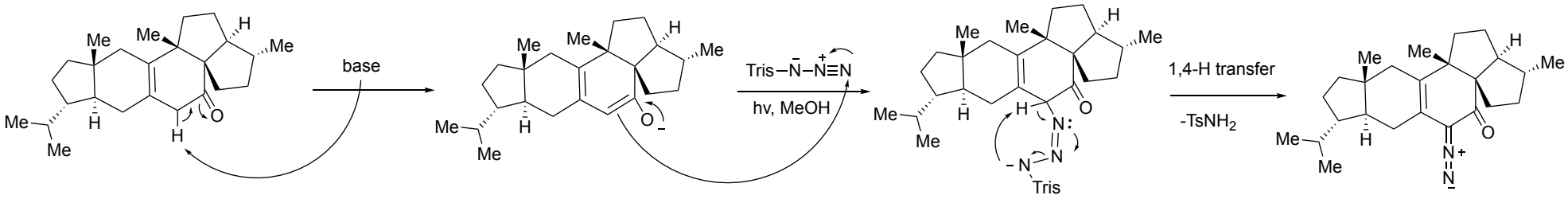


PCC Oxidation

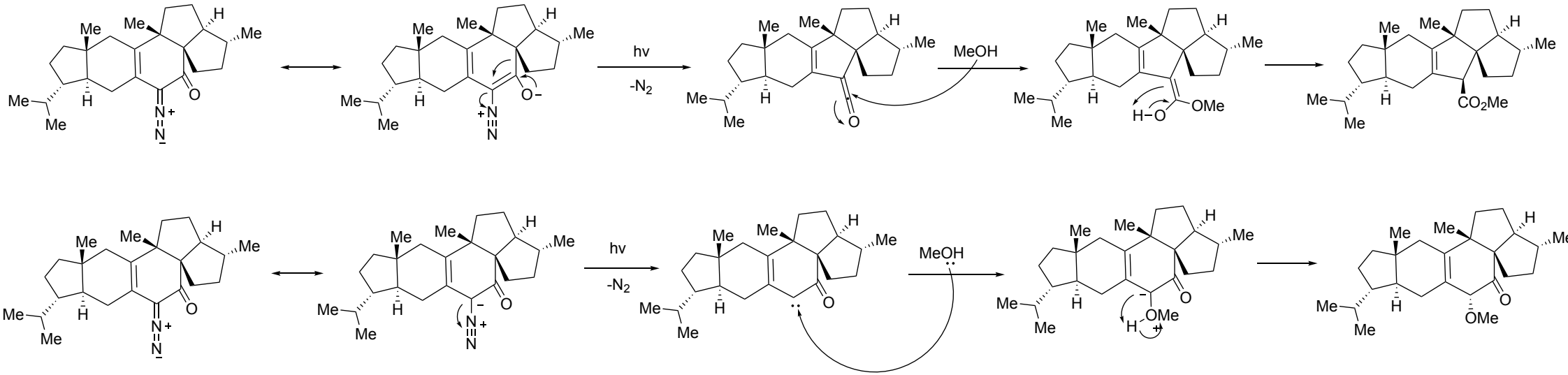


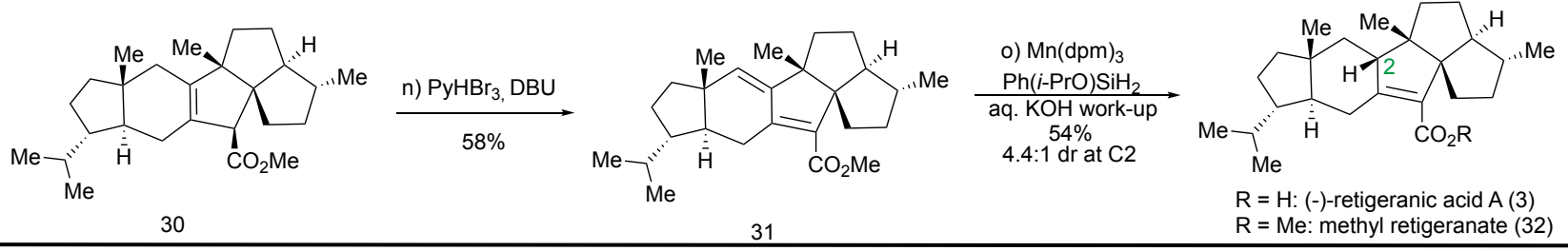


Synthesis of Diazo compound



Wolff ring contraction





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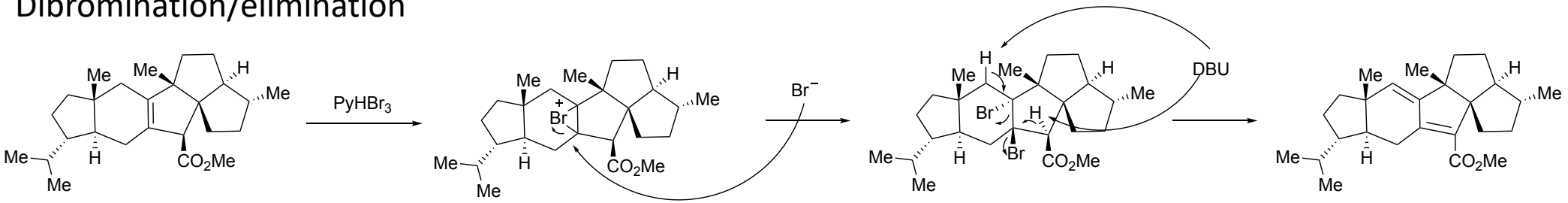
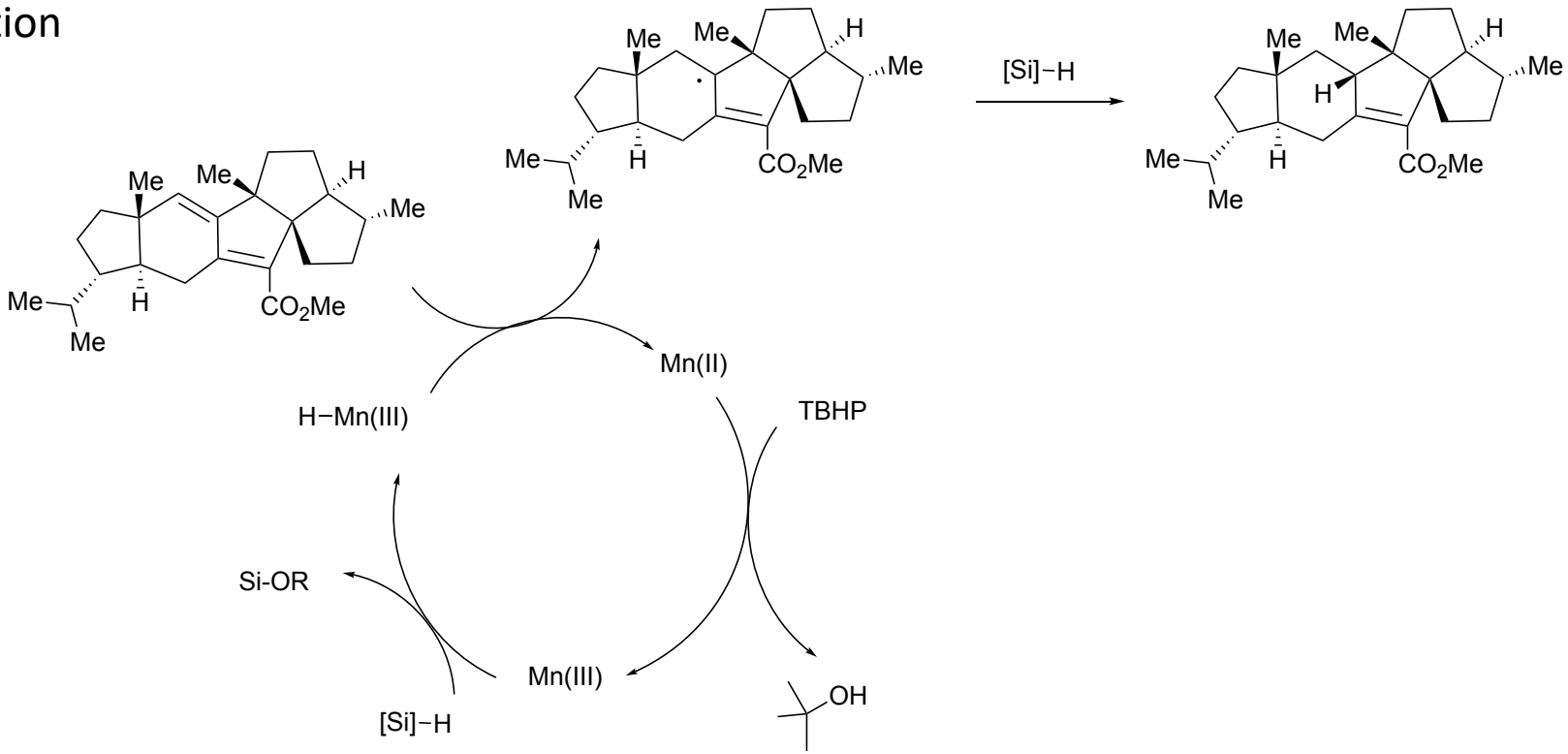
Dibromination/elimination



MHAT reduction



Thanks!
Questions?