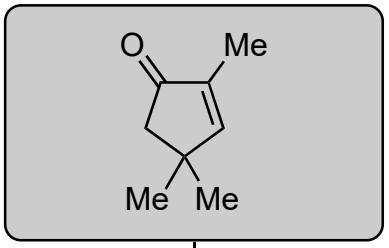
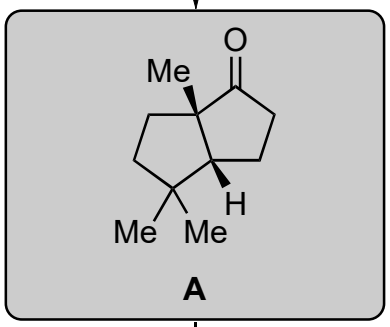
Total Synthesis of (–)-Conidiogenone B

Bo Xu, Wen Xun, Shaobin Su, Hongbin Zhai

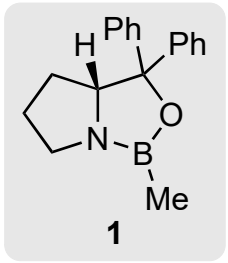
Angew. Chem. Int. Ed. **2020**, *59*, 16475–16479.



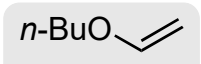
1) **1**, catecholborane, toluene/THF
2) **2**, $Hg(OAc)_2$, Et_3N
3) **3**, *t*-BuOK, THF
4) $PhSiH_3$, $Fe(acac)_3$, HFIP/EtOH



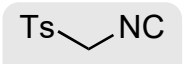
A



1

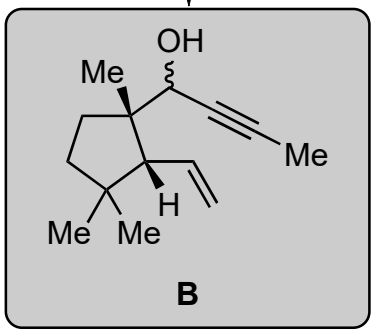


2

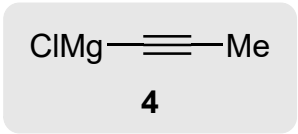


3

5) TMSOTf, Et_3N, CH_2Cl_2; *then* $MeReO_3$, pyridine, H_2O_2, HOAc/MeCN
6) **4**, THF
7) $Pb(OAc)_4$, CH_2Cl_2; *then* $CeCl_3$, $NaBH_4$, MeOH
8) *n*-Bu_3P, *o*-$NO_2C_6H_4SeCN$; *then* H_2O_2



B



4

1) Name of reaction?
hint: the new stereocenter is (*S*)-configured
Corey–Bakshi–Shibata (CBS) reduction

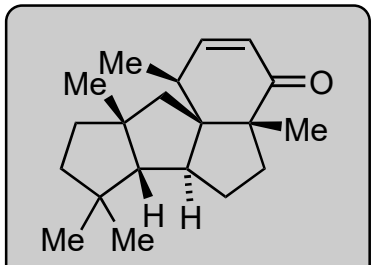
2) Name of reaction?
Claisen rearrangement

3) Name reagent and affiliated name reaction, and write out mechanism.
TosMIC, van Leusen reaction

hint: Product exhibits a pronounced IR band at 2245 cm^{-1} and features a total of three ^{13}C NMR signals between 150–110 ppm

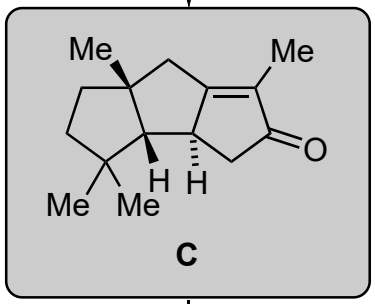
5) Name of reaction?
hint: Very special oxidation conditions. Textbook conditions would have employed *m*-CPBA.
Rubottom oxidation

8) Name of reaction?
Grieco elimination



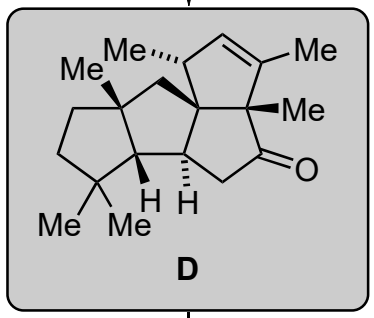
(–)-conidiogenone B

9) $Co_2(CO)_8$, CH_2Cl_2, TFA, BH_3•SMe_2; *then* NMO

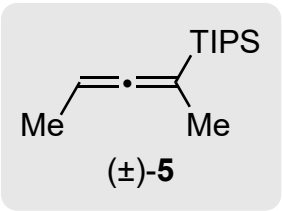


C

10) **5**, $TiCl_4$, CH_2Cl_2; *then* BF_3•$(HOAc)_2$

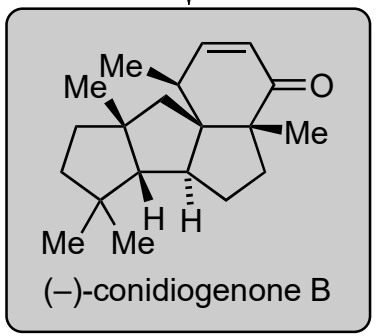


D



(±)-**5**

11) $NaBH_4$, MeOH
12) NaH, CS_2, MeI, THF
13) *n*-Bu_3SnH, AIBN, toluene
14) O_3, CH_2Cl_2; *then* Me_2S; *then* 3 M HCl, THF, reflux



(–)-conidiogenone B

9) *hint:* Two reactions are performed consecutively. Name both reactions.
Nicholas reaction (reductive), Pauson–Khand reaction

Some data of the product:
^{13}C NMR (100 MHz, $CDCl_3$) δ 211.2, 181.4, 130.8, 67.6, 52.8, 45.7, 42.9, 42.8, 40.9, 39.8, 39.6, 31.7, 29.3, 25.5, 8.2.
HRMS (ESI-TOF): calculated for $C_{15}H_{23}O$ $[M+H]^+$ 219.1743, found 219.1743

10) Name of reaction?
Danheiser annulation

hint: (a) BF_3•$(HOAc)_2$ is used for a subsequent desilylation.
(b) The tertiary stereocenter that is formed features the opposite configuration compared to the corresponding position in the natural product. This will be corrected later.

13) Name of reaction?
Barton deoxygenation

14) *hint:* (a) Classic ring expansion move.
(b) The configuration of the tertiary stereocenter that was formed in step 10 is inverted in this step. Suggest how.