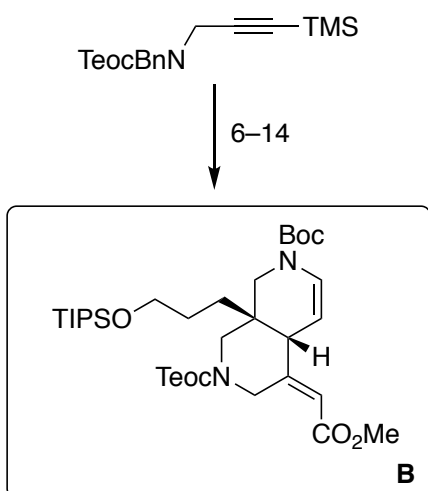
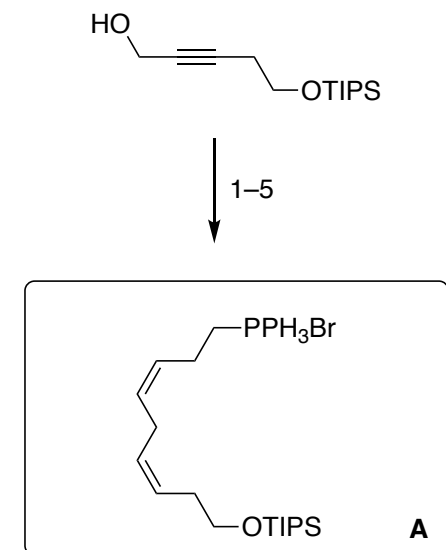


Unified Total Synthesis of Madangamines A, C, and E

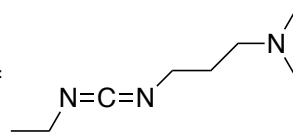
Takahiro Suto, Yuta Yanagita, Yoshiyuki Nagashima, Shinsaku Takikawa, Yasuhiro Kurosu, Naoya Matsuo, Takaaki Sato, and Noritaka Chida

JACS 2017, 139, 2952

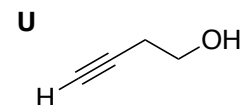


- 1) KOH, *p*-TsCl
- 2) **U**, CuI/NaI, K₂CO₃
- 3) Ni(OAc)₂·4H₂O, NaBH₄
- 4) MsCl, Et₃N, THF, 0 °C
then LiBr, 50 °C
- 5) PPh₃, MeCN, 85 °C

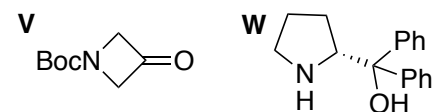
EDAC =



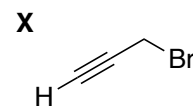
- 6) **V**, Ni(cod)₂, PPh₃, PhMe, 60 °C
- 7) **W** (cat.), B(OMe)₃, BH₃·Me₂S
- 8) *t*-BuOK
- 9) 2-PyCO₂H, EDAC, DMAP
- 10) TIPSO(CH₂)₃MgBr, ZnI₂
CuBr·Me₂S
- 11) Na, NH₃, THF/*t*-BuOH, -78 °C
- 12) **X**, NaH, TBAI
- 13) *n*-BuLi, ClCO₂CH₃, THF, -78 °C
- 14) Pd₂dba₃·CHCl₃ (2 mol%),
HCO₂H



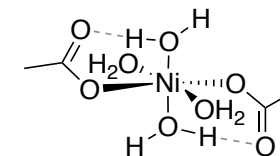
Name of central functional group present in **A**?
skipped diene.



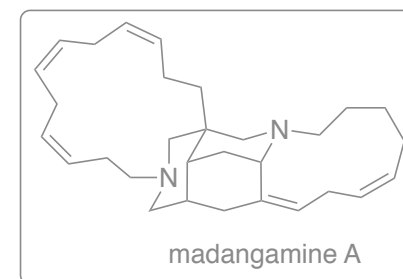
Name of reaction in step 7?
Corey-Bakshi-Shibata (CBS) reduction.

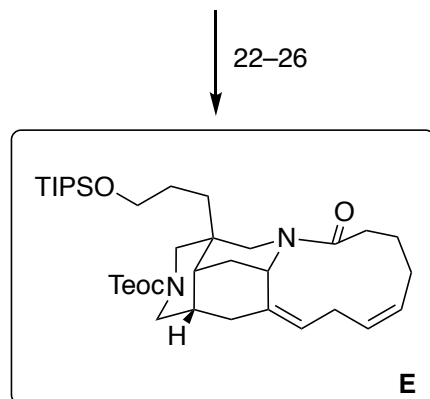
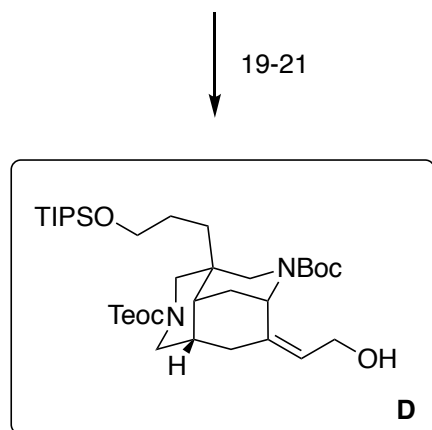
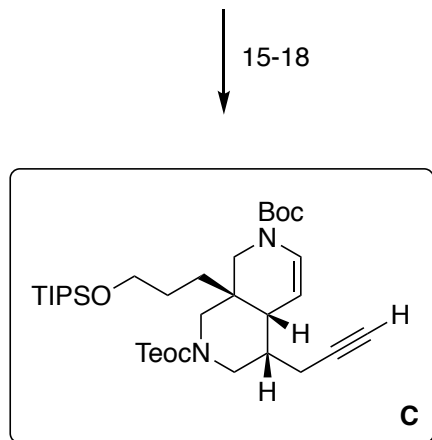


Structure and color of
Ni(OAc)₂·4H₂O?

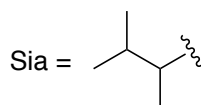


teal green.



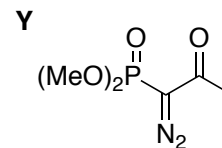
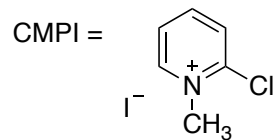


- 15) NaBH₄, CuCl, EtOH, -20 °C
- 16) MeNHOMe·HCl, *i*-PrMgCl, THF, -20 °C
- 17) DIBAL-H, THF, -78 °C
- 18) **Y**, K₂CO₃, MeOH, rt



- 19) , *n*-BuLi
- 20) TFA, MeCN, EtOH, 50 °C
- 21) (Sia)₂BH, THF, rt
then 3M NaOH, H₂O₂, 0 °C

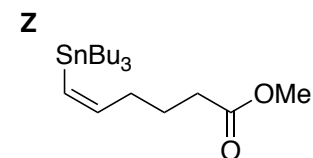
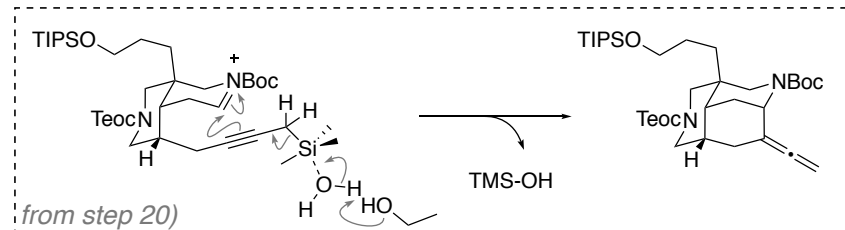
- 22) ClCO₂CH₃, py
- 23) **Z**, cat. Pd₂(dba)₃·CHCl₃, LiCl, DMF, rt
- 24) LiOH (aq), THF, 60 °C
- 25) 2,6-lutidine, TMSOTf
- 26) CMPI, *i*-Pr₂NEt



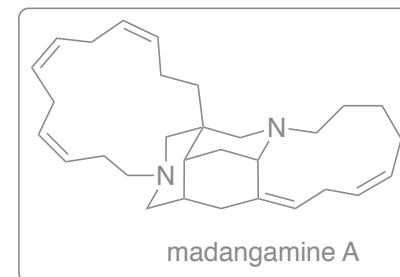
Name of reaction in step 18?
Ohira-Bestmann modification of Seyferth-Gilbert homologation.

Please provide a detailed arrow-pushing mechanism for step 20.

Hint for step 21: Z/E = 20.4:1



Hint for step 23: (Z,Z)/(E,Z) = 14.3:1



↓ 27-34
madangamine A

- 27) CSA, MeOH, 40 °C
- 28) cat. AZADOL[®], PhI(OAc)₂
- 29) **A**, NaHMDS
- 30) CSA, MeOH, 40 °C
- 31) *p*-TsCl, Et₃N, DMAP
- 32) BF₃·OEt₂, CH₂Cl₂, rt
- 33) *i*-PrNEt₂, MeCN, 70 °C
- 34) LiAlH₄, THF, rt

AZADOL[®] =

