Total Synthesis of Bipolamine I
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1) Mg(OEt)$_2$, 1, CDI
2) propargyl amine, AcOH
3) DIBAL-H
4) vinyl magnesium bromide
5) TBSCl, imidazole, DMAP

6) $t$-BuOK, $t$-BuOH
7) 2, 10 mol% HClRu(CO)(PPh$_3$)$_3$, 10 mol% dippf, 1M dioxane, 115 °C
8) Grubbs II, 80 °C
9) TBAF
10) MnO$_2$

2) Please name the reaction
Paal–Knorr pyrrole synthesis

6) What about reaction that makes terminal alkyne from internal alkyne? What reagents could be used?
Alkyne Zipper Reaction; 1,3-diaminopropane and strong base, e.g. KH, BuLi

7) Hint: alkyne-to-allene isomerization and enantioselective allene-alcohol coupling
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10) Hint: ether bridge formed, allylic alcohol oxidized and pyrrole addition
11) LiHMDS, acetaldehyde
12) imidazole, DMAP, TBSCI
13) Sml$_2$
14) KHMDS, DMAP, 3
15) BE$_3$, n-Bu$_3$SnH, then TBAF

13) Hint: ether bridge cleaved and shifted