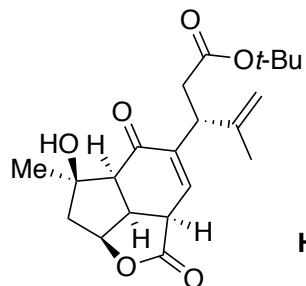




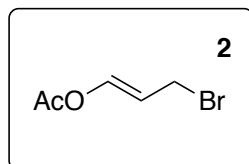
Asymmetric Total Synthesis of Havellockate



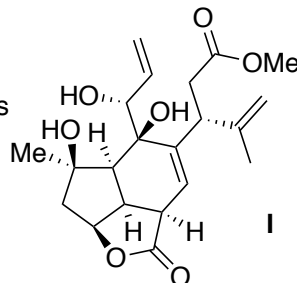
H

- o) HCO_2H , 23°C
p) CH_2N_2 , 23°C 70% 2 steps
q) **2**, Zn^0 , THF, 0°C
r) NaOMe , MeOH , 0°C

25% yield over 2 steps
11:1 dr
Explain dr and poor yield



2

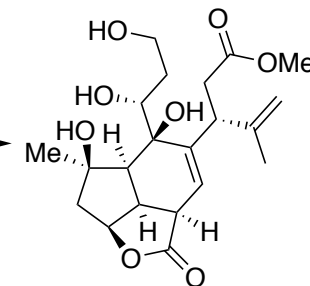


I

- s) $[\text{Ir}(\text{cod})\text{Cl}]_2$, $(\text{EtO})_3\text{SiH}$
 CHCl_3 , 23°C

- t) H_2O_2 , KF , KHCO_3
 MeOH/THF , 23°C
34% yield over 2 steps

Name of t)?
Tamao-Fleming



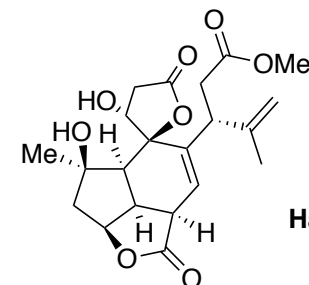
J

- u) $[\text{Cu}(\text{MeCN})_4]\text{OTf}$
TEMPO, bpy,
N-methylimidazole
 O_2 (1 atm)

MeCN , 40%

80%
single diastereomer

Name of u)?
Stahl oxidation



Havellockate