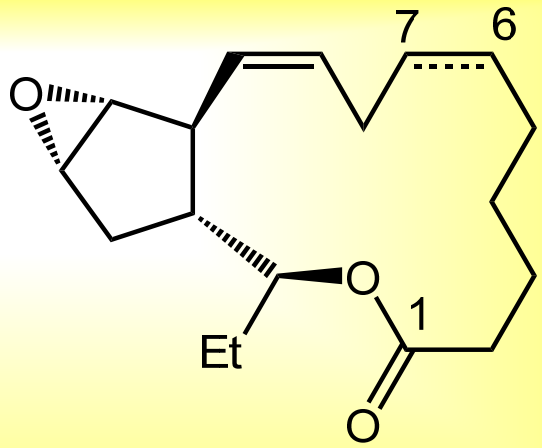
Literature Report 2011-01-11

陈庆安　　检查: 叶智识

Protecting-Group-Free and Catalysis-Based Total Synthesis of the Ecklonialactones

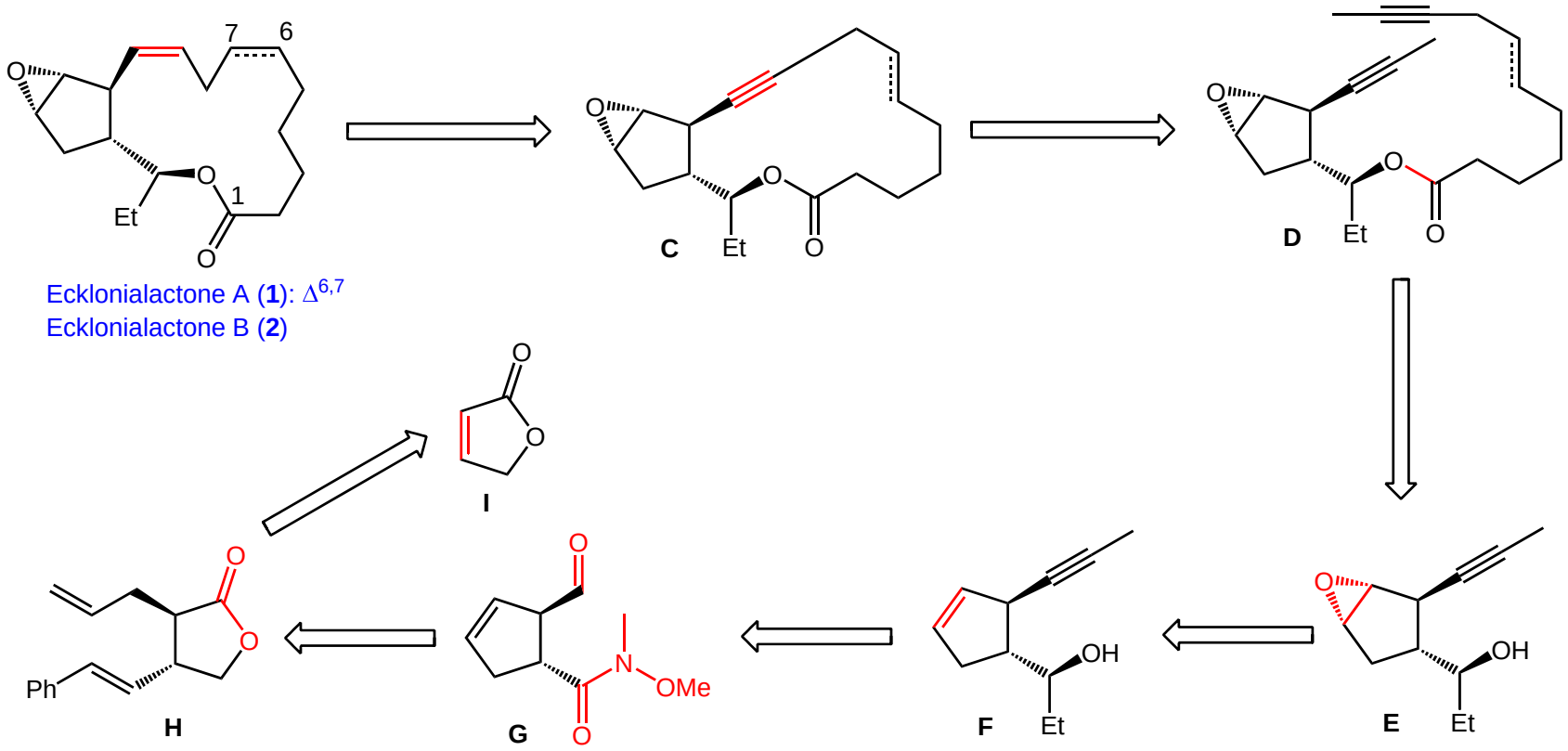
Alois Fürstner.* *et al*
J. Am. Chem. Soc. **2010**, *132,* 11042.

Ecklonialactones

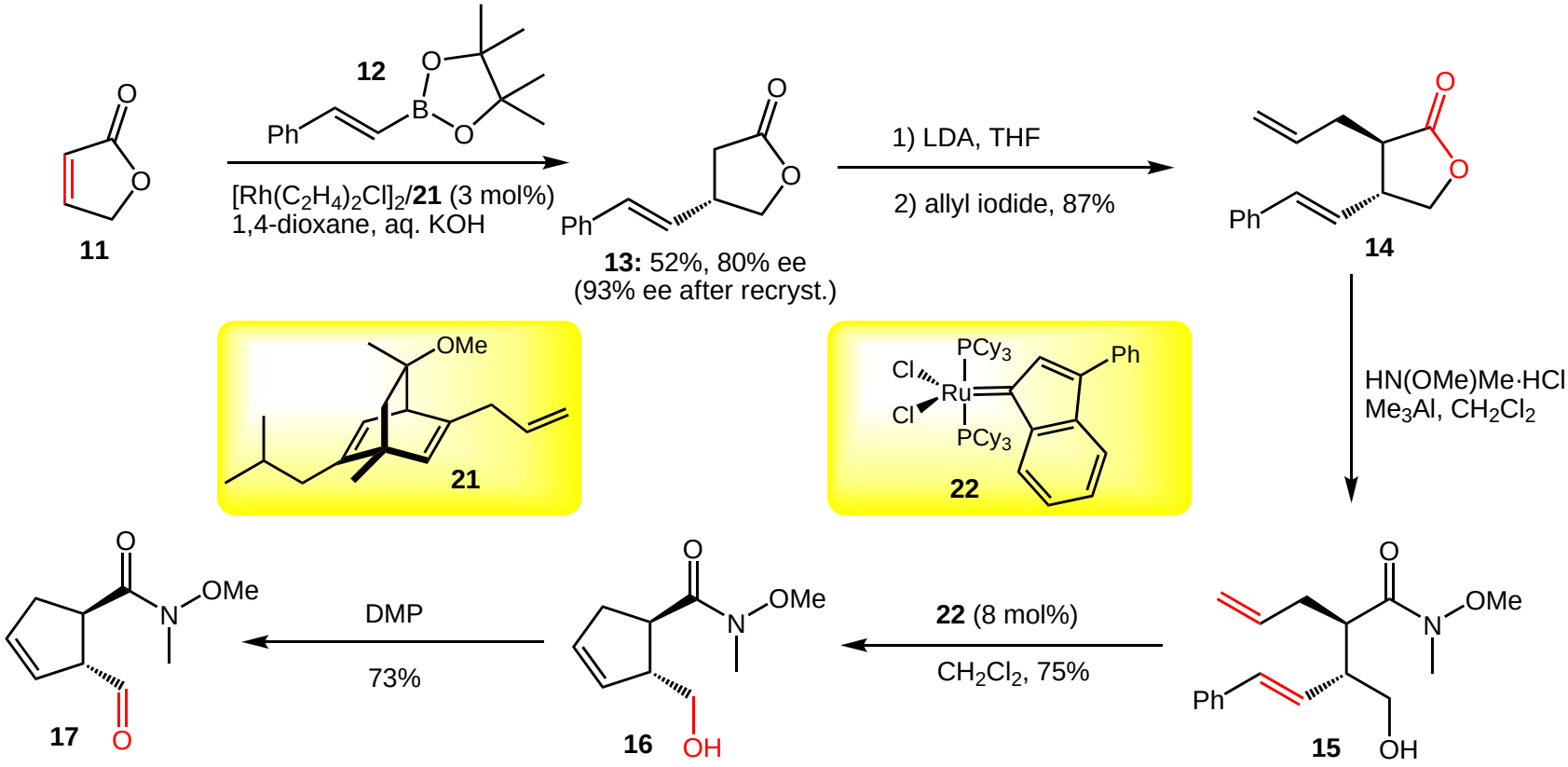


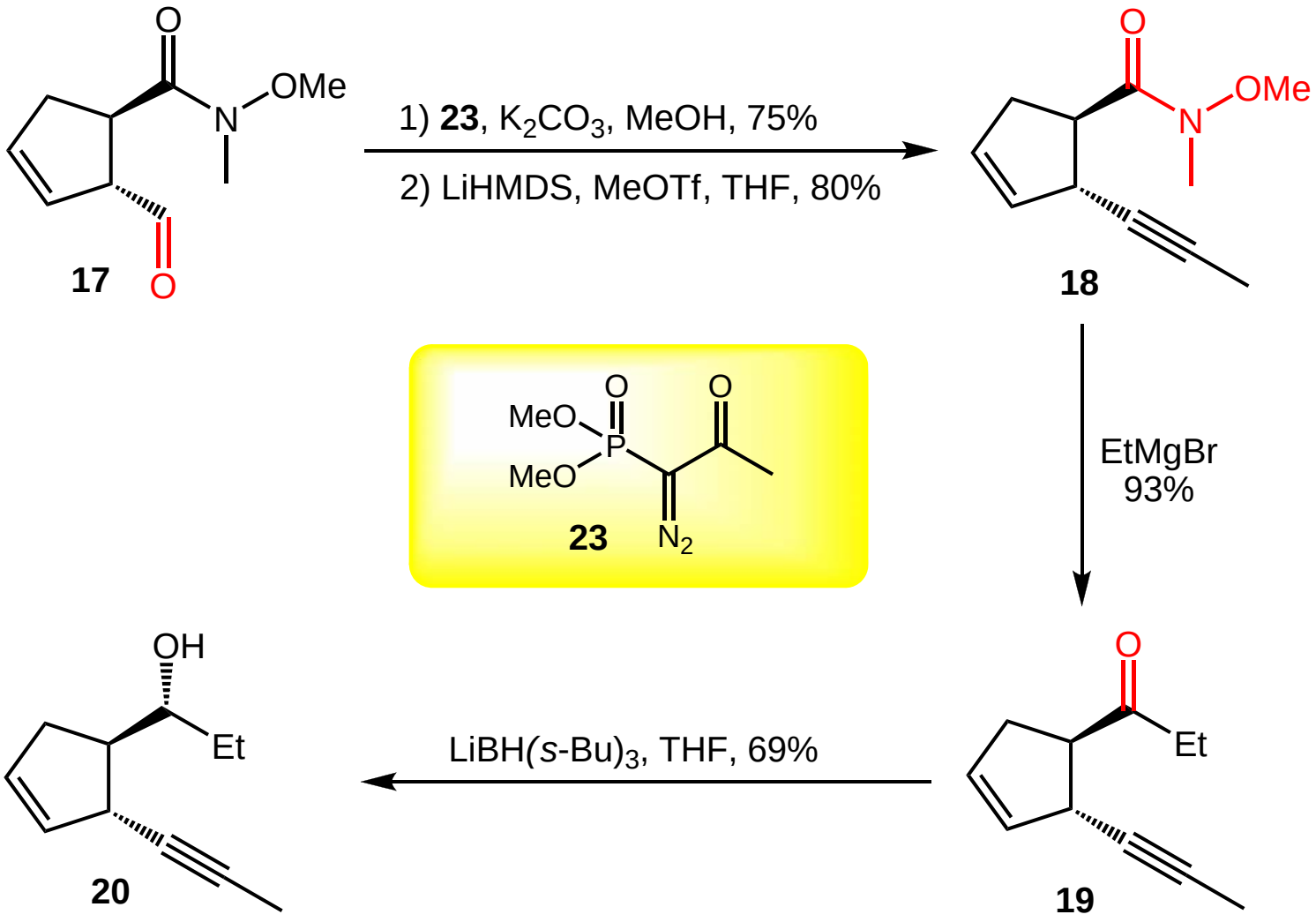
Ecklonialactone A (**1**): $\Delta^{6,7}$
Ecklonialactone B (**2**)

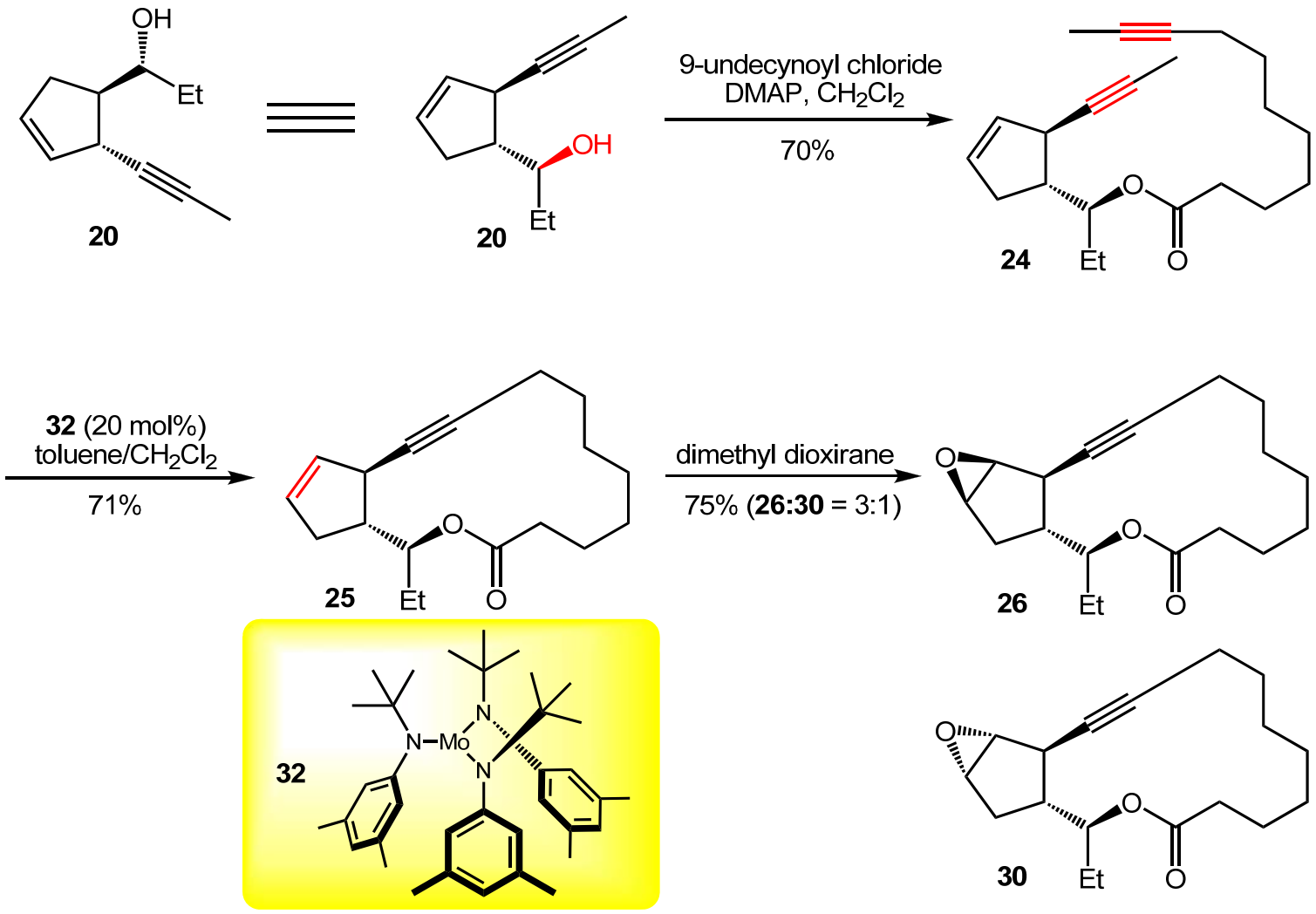
Retrosynthetic analysis

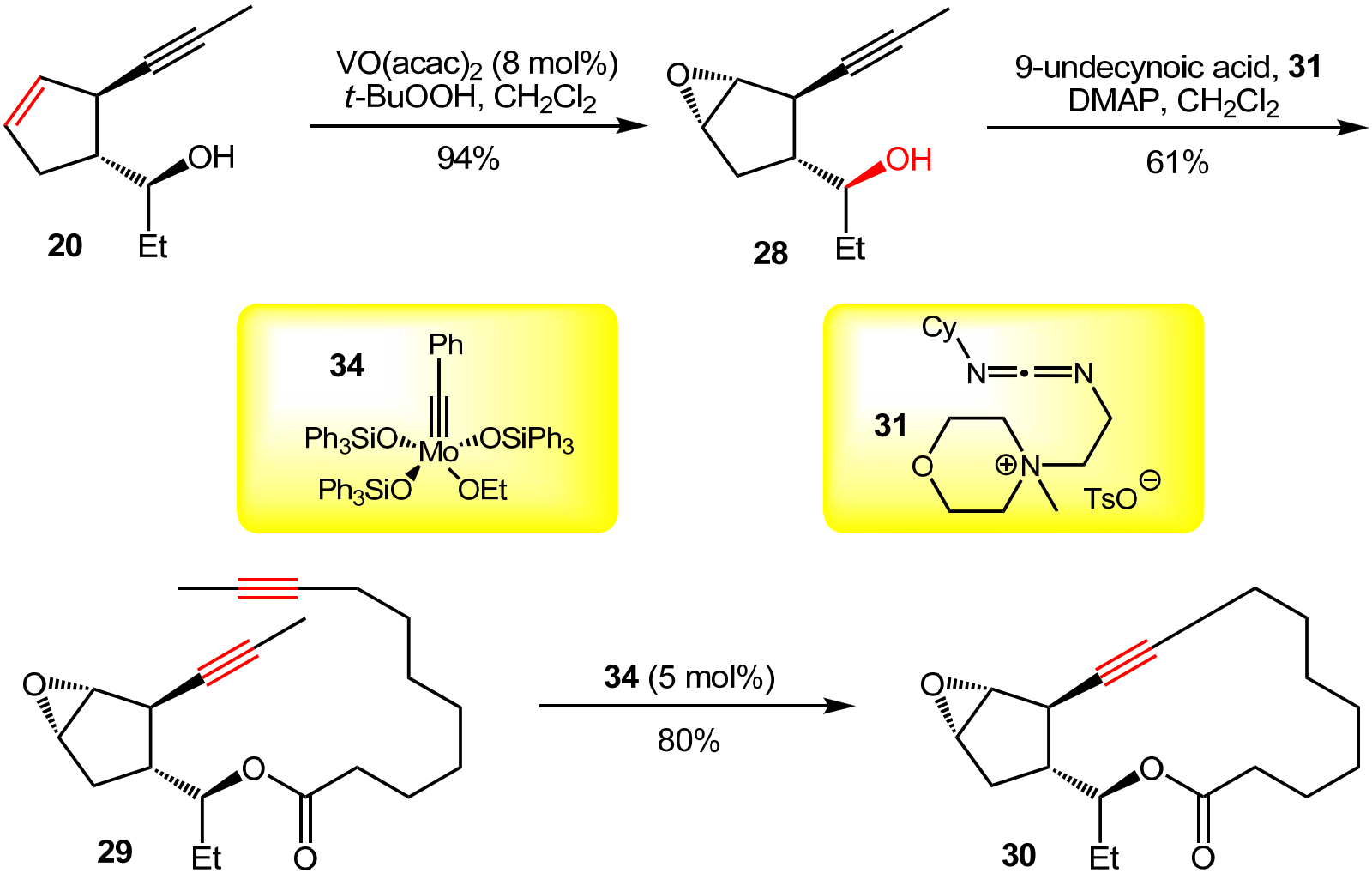


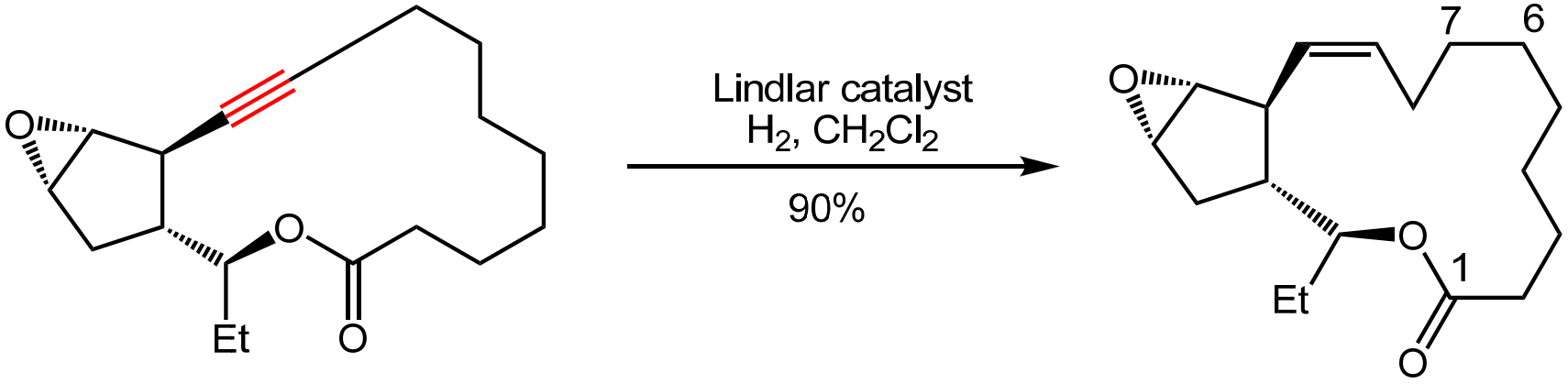
Ecklonialactone A (**1**): $\Delta^{6,7}$
Ecklonialactone B (**2**)


11
12
Ph
[Rh(C2H4)2Cl]2/21 (3 mol%)
1,4-dioxane, aq. KOH
13: 52%, 80% ee
(93% ee after recryst.)
1) LDA, THF
2) allyl iodide, 87%
14
HN(OMe)Me·HCl
Me3Al, CH2Cl2
15
22 (8 mol%)
CH2Cl2, 75%
16
DMP
73%
17
21
22
OMe
PCy3
Cl
Ru
Ph
OH

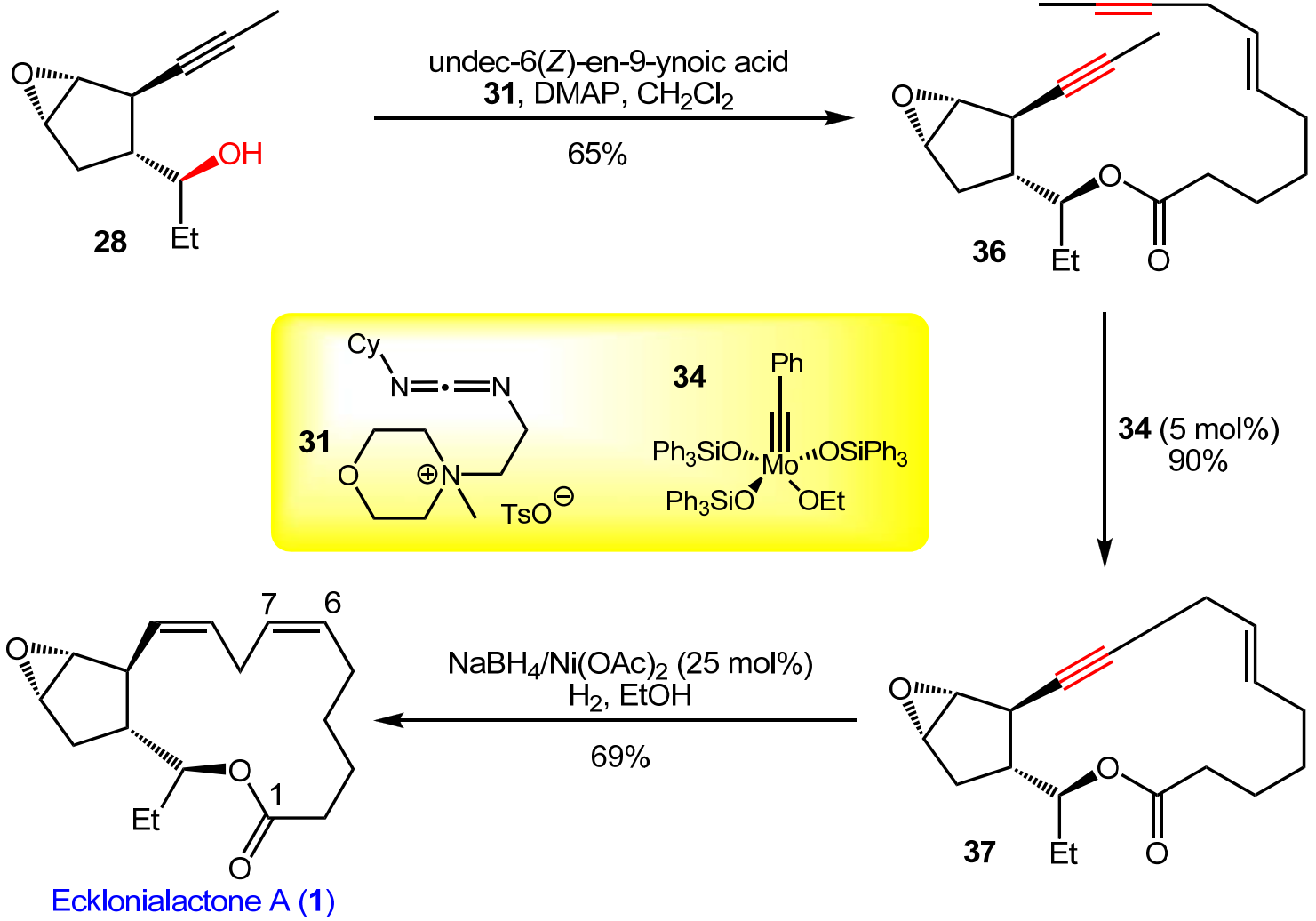

O
OMe
N
O
17
1) 23, K2CO3, MeOH, 75%
2) LiHMDS, MeOTf, THF, 80%
O
OMe
N
18
MeO
MeO
P
O
O
N2
23
EtMgBr
93%
OH
Et
20
LiBH(s-Bu)3, THF, 69%
O
Et
19


OH
Et
20
OH
Et
20
9-undecynoyl chloride
DMAP, CH2Cl2
70%
O
O
24
Et
32 (20 mol%)
toluene/CH2Cl2
71%
O
O
25
Et
dimethyl dioxirane
75% (26:30 = 3:1)
O
O
26
Et
32
N
N–Mo
N
O
O
30
Et

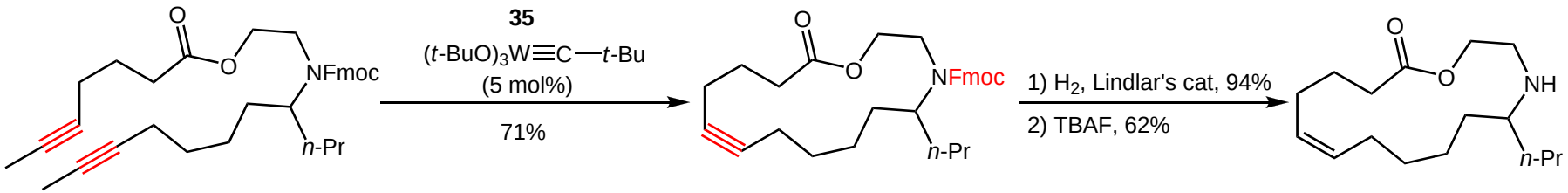

VO(acac)2 (8 mol%)
t-BuOOH, CH2Cl2
94%
9-undecynoic acid, 31
DMAP, CH2Cl2
61%
20
28
34
Ph
Ph3SiO
OSiPh3
Mo
Ph3SiO
OEt
31
Cy
N
N
O
N
TsO
29
34 (5 mol%)
80%
30
Et
O

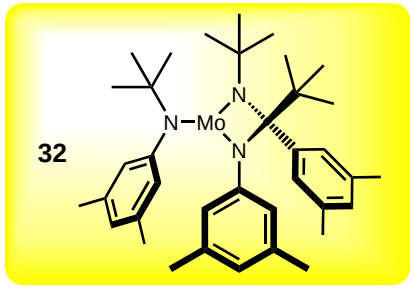


Ecklonialactone B (**2**)

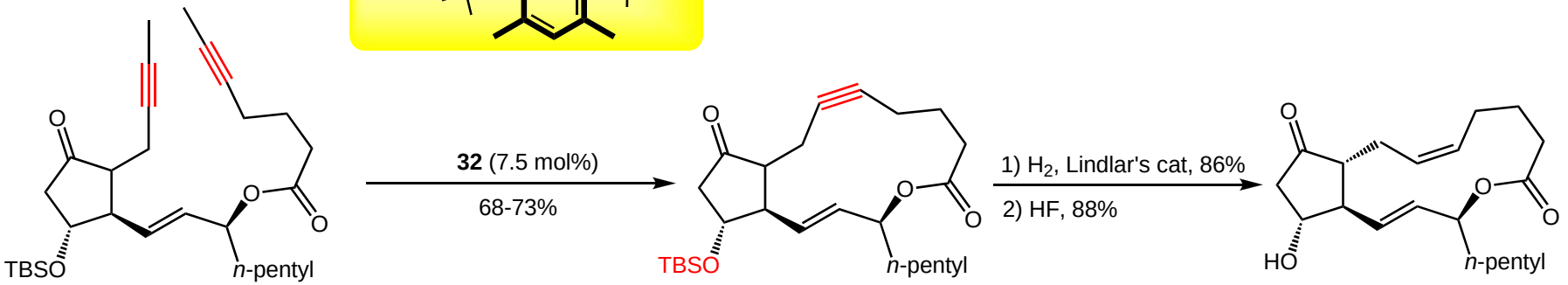

undec-6(Z)-en-9-ynoic acid
31, DMAP, CH2Cl2
65%
28
36
34 (5 mol%)
90%
31
34
NaBH4/Ni(OAc)2 (25 mol%)
H2, EtOH
69%
37
Ecklonialactone A (1)

Related Work



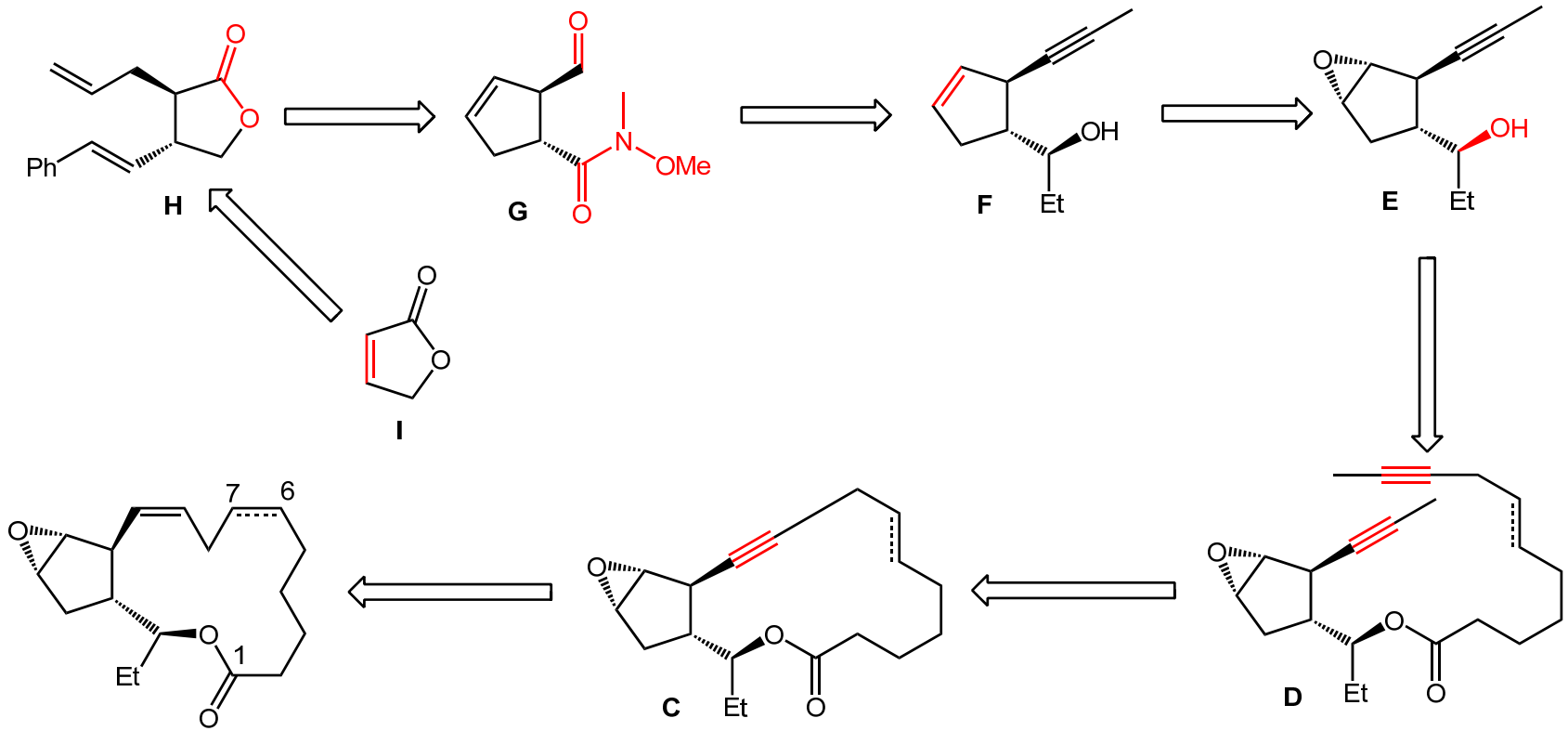


Fürstner, A. et al *J. Am. Chem. Soc.* **1999**, *121,* 11108-11113.



Fürstner, A. et al *Angew. Chem. Int. Ed.* **2000**, *39,* 1234-1236.

Summary



Ecklonialactone A (**1**): $\Delta^{6,7}$

Ecklonialactone B (**2**):

Despite tremendous strategic and methodological advances, the art and science of natural product total synthesis is still far from mature. Even target molecules of moderate size usually impose significant protecting group requirements on a workable synthesis plan. As structurally unproductive steps, however, such manipulations adversely affect all desirable “economies” of synthesis. The pursuit of complex targets without recourse to protecting group maneuvers was therefore recognized as a challenging for chemical invention.

Overall, the concise and protecting-group-free entry into this unusual class of marine oxylipins features respectable levels of atom, redox, and step economy and relies, to a notable extent, on catalysis. It bears witness for the power of complex **34**, which sets new standards in the field of alkyne metathesis. In essence, it is the ability to rigorously distinguish between alkenes and alkynes which forms the chemical basis for the success of this endeavor.