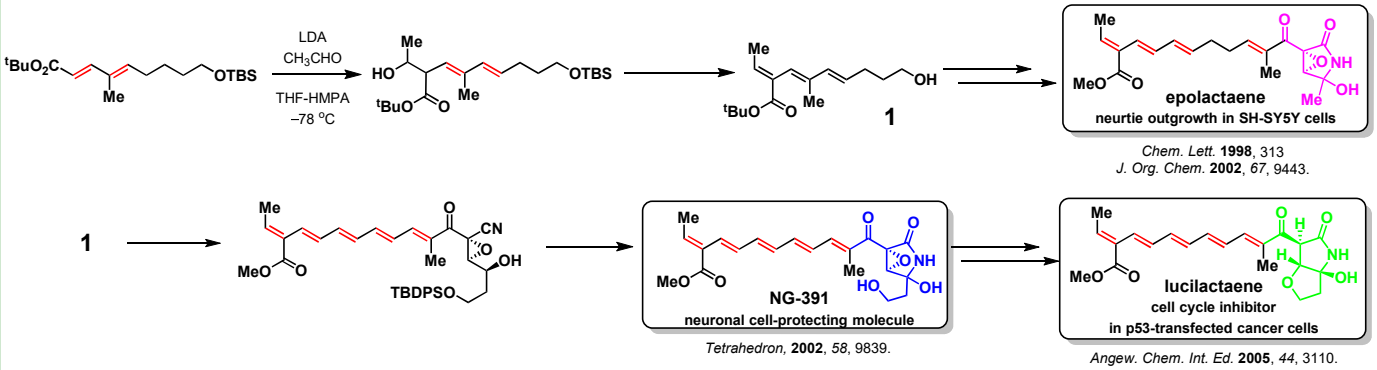
epolactaene, NG-391, lucilactaene

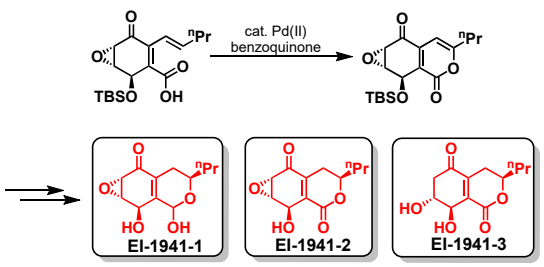


Chem. Lett. **1998**, 313
J. Org. Chem. **2002**, *67*, 9443.

Tetrahedron, **2002**, *58*, 9839.

Angew. Chem. Int. Ed. **2005**, *44*, 3110.

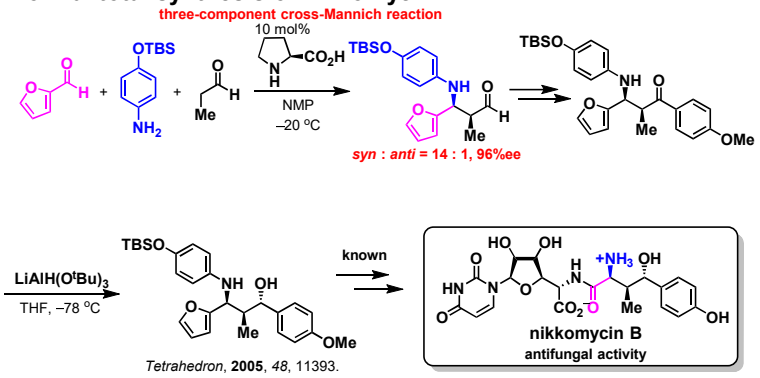
EI-1941-1, EI-1941-2, EI-1941-3



ICE (interleukin 1-β converting enzyme) inhibitor

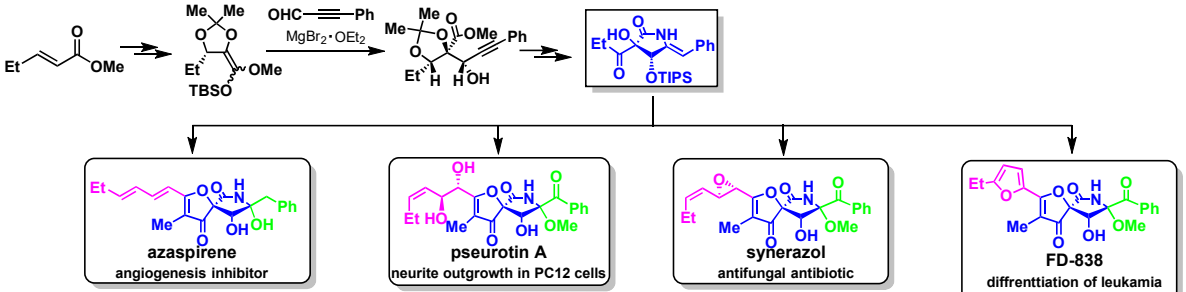
Org. Lett. **2004**, *6*, 4535.
J. Org. Chem. **2005**, *70*, 9905.

formal total synthesis of nikkomycin B



Tetrahedron, **2005**, *48*, 11393.

azaspirene, pseurotin A, synerazol, FD-838



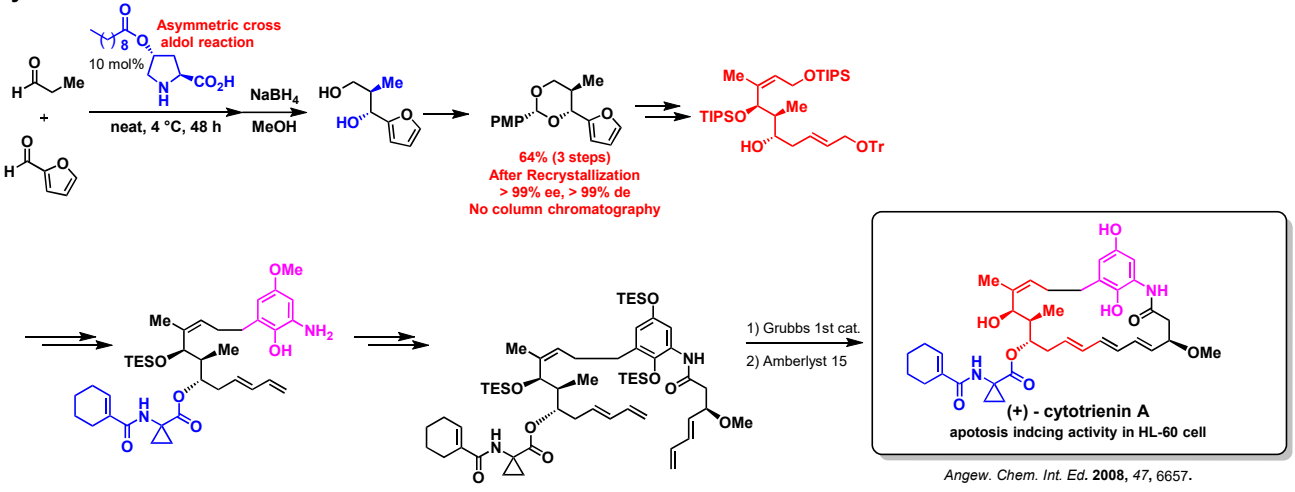
J. Am. Chem. Soc. **2002**, *124*, 12078.

Org. Lett. **2003**, 5, 2287.

J. Org. Chem. **2005**, *70*, 5643.

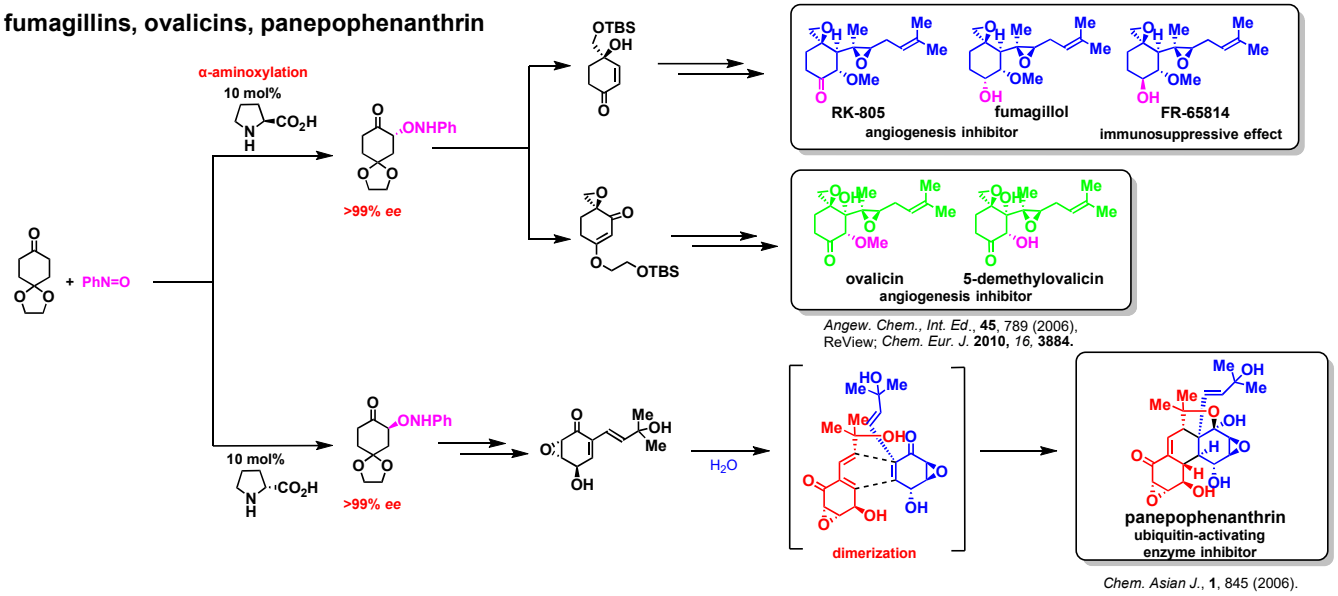
Bioorg. Med. Chem. Lett. **2009**, *19*, 3863.

(+) - cytotrienin A



Angew. Chem. Int. Ed. **2008**, *47*, 6657.

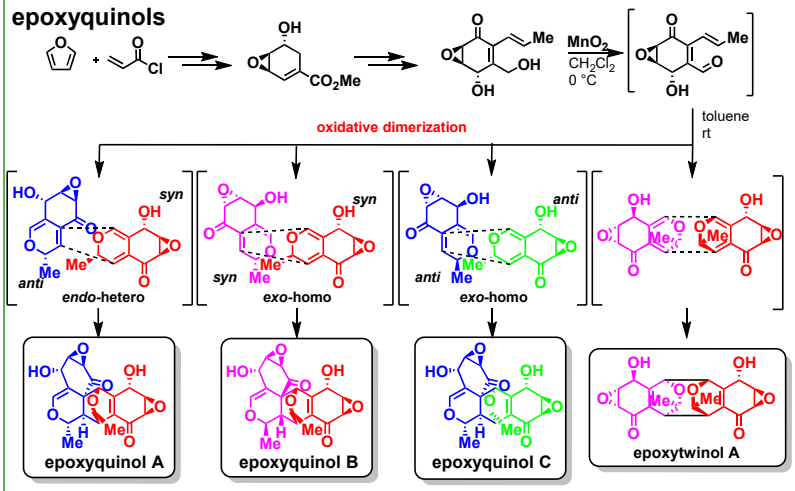
fumagillins, ovalicins, panepophenanthrin



Angew. Chem., Int. Ed., **45**, 789 (2006), ReView; *Chem. Eur. J.* **2010**, *16*, **3884.**

Chem. Asian J., **1**, 845 (2006).

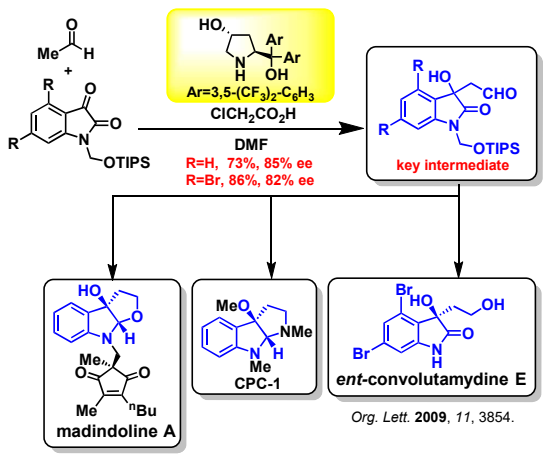
epoxyquinols



angiogenesis inhibitor

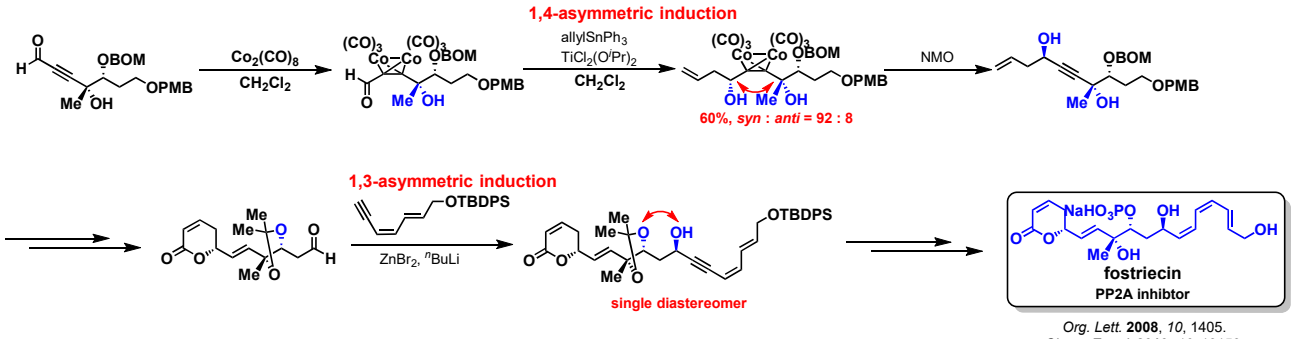
Angew. Chem., Int. Ed., **41**, 3192 (2002); *Tetrahedron Lett.*, **43**, 9155 (2002); *Tetrahedron Lett.*, **44**, 7205 (2003);*J. Org. Chem.*, **69**, 1548 (2004); *J. Org. Chem.*, **70**, 79 (2005) ; *Org. Lett.*, **8**, 1041 (2006). Review; *Eur. J. Org. Chem.*, **23**, 3783 (2007).

CPC-1, *ent*-convolutamydine E, and half segment of madindoline A



Org. Lett. **2009**, *11*, 3854.

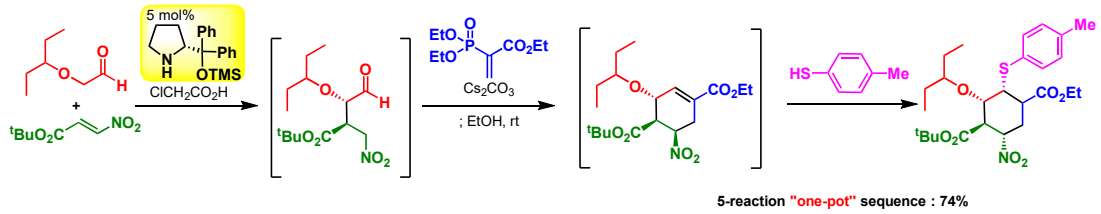
formal total synthesis of fostriecin



Org. Lett. **2008**, *10*, 1405.
Chem. Eur. J. **2010**, *16*, 10150.

(–)- oseltamivir (Tamiflu®)

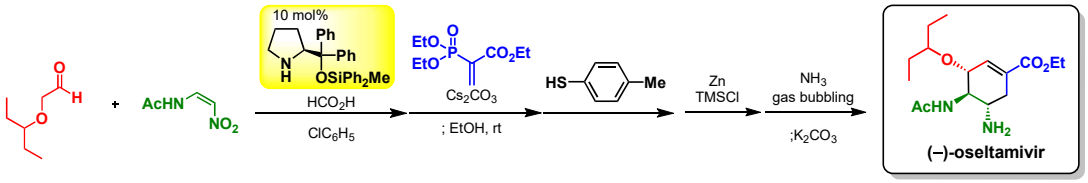
1st and 2nd generation



Total yield : 60%

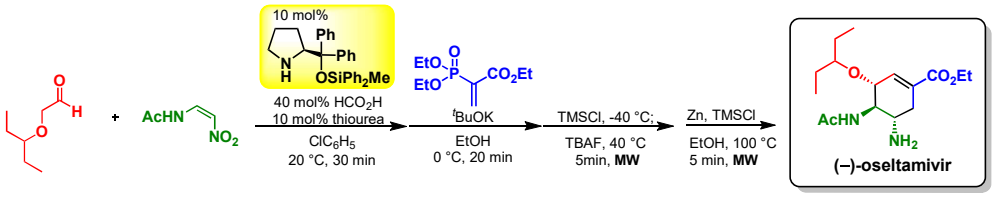
Angew. Chem. Int. Ed. **2009**, *48*, 1304.
Chem. Eur. J. **2010**, *16*, 12616.
Eur. J. Org. Chem. **2011**, 6020.

3rd generation



"one-pot" operation : 34%
Chem. Eur. J. **2013**, *19*, 17789.

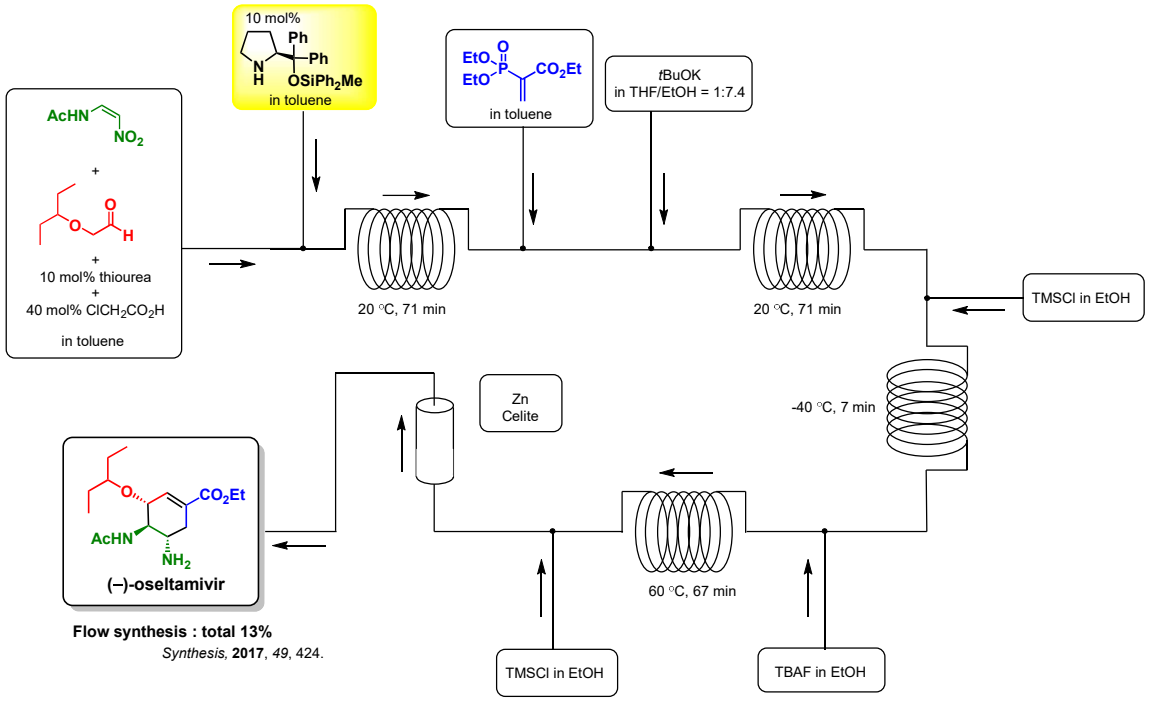
4th generation : Time economical synthesis



Total time 60 min

"one-pot" operation : 15%
Org. Lett. **2016**, *18*, 3426.

5th generation : Flow synthesis

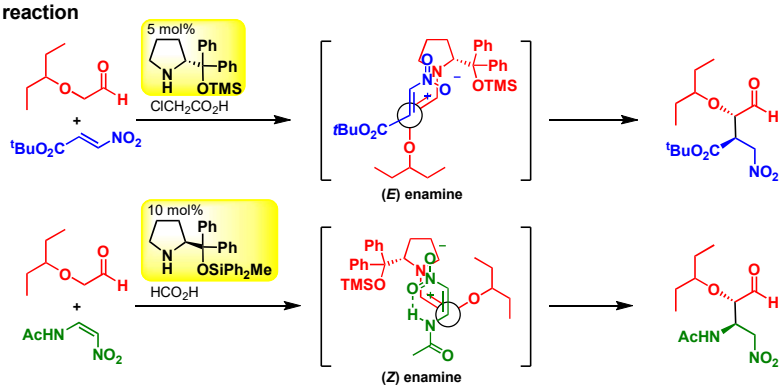


Flow synthesis : total 13%
Synthesis, **2017**, *49*, 424.

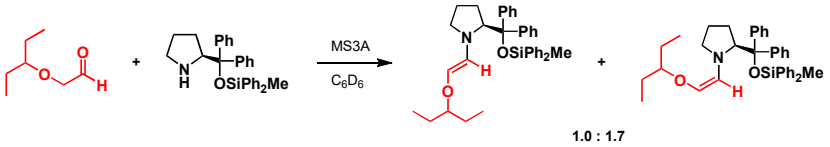
Computational study on *E*/*Z*-alkoxyenamines

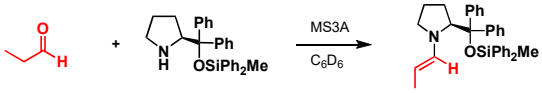
Bull. Chem. Soc. Jpn. **2016**, *89*, 455.

Stereoselectivity in Michael reaction



experimental study on generation of *E*- and *Z*- alkoxyenamine





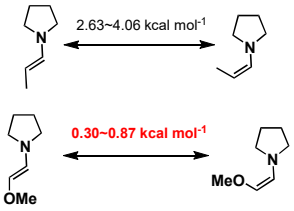
A mechanistic study identified the origin of streoselectivity in the Michael reaction.

It revealed that *E*-enamine selectively reacts with trans-nitroalkene while *Z*-enamine reacts with cis-nitroalkene.

In this case, an equilibrium exists between *E*- and *Z*- alkoxyenamine under acidic condition.

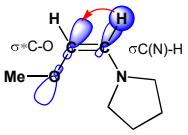
DFT calculation with NBO analysis

Calculated enthalpy differences between the E- and Z- isomers

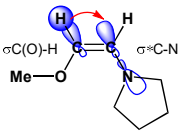


Total electronic energy difference between *E*- and *Z*- isomers was calculated to be relatively small.

The orbital interactions in (Z)-alkoxyamine : antiperiplanar stabilization



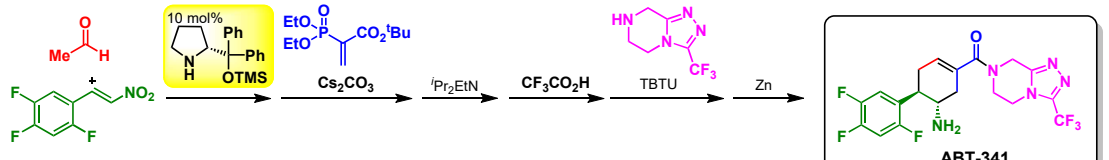
σC(N)-H → σ*C-O : 7.80 kcal mol^{-1}



σC(O)-H → σ*C-N : 7.40 kcal mol^{-1}

The antiperiplannar interactions are likely to be most contributing for stabilizing the *Z*-alkoxyenamine.

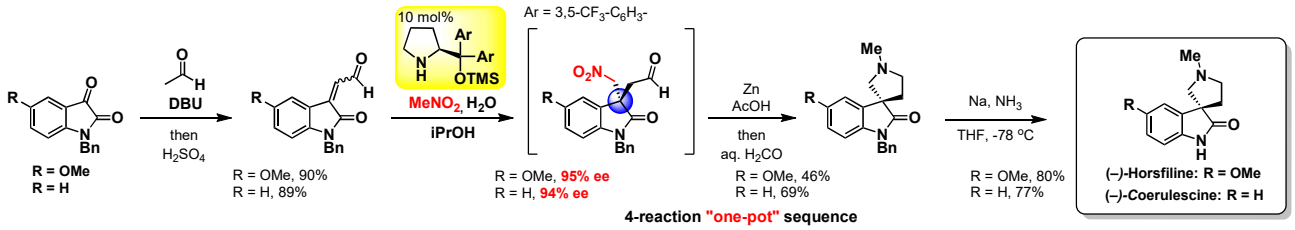
ABT-341



6-reaction "one-pot" sequence : 61%

Angew. Chem. Int. Ed. **2011**, *50*, 2824.

(–)-horsfiline and (–)-coerulescine



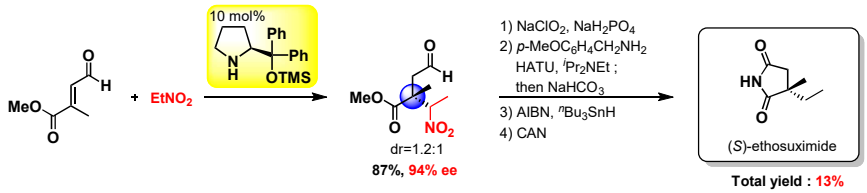
4-reaction "one-pot" sequence

Three "one-pot" operations

Total yield
(–)-Horsfiline : 33%
(–)-Coerulescine : 46%

Chem. Eur. J. **2014**, *20*, 13583.

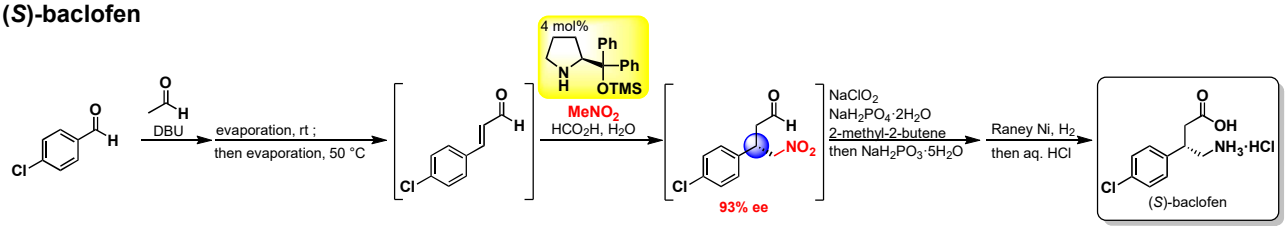
(*S*)-ethosuximide



Total yield : 13%

Chem. Eur. J. **2014**, *20*, 12072.

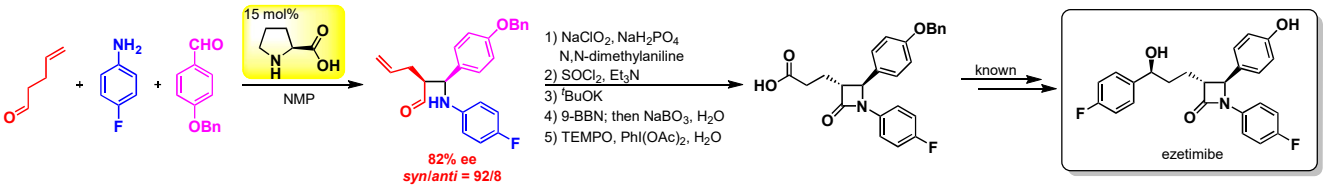
(*S*)-baclofen



4-reaction "one-pot" sequence : 31%

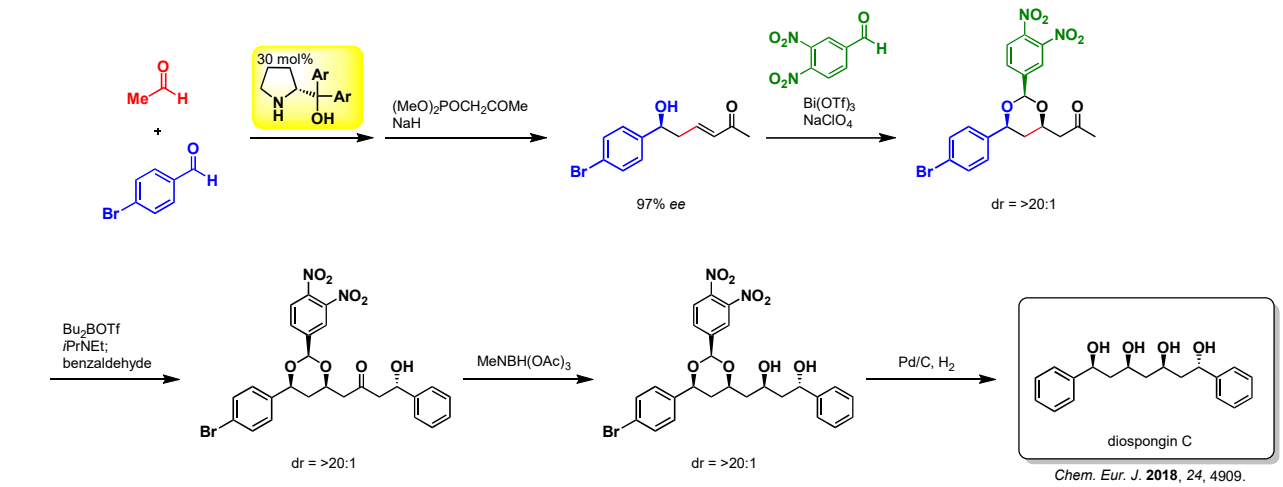
Org. Lett. **2016**, *18*, 4.

formal total synthesis of ezetimibe



Chem. Lett. **2016**, *45*, 32.

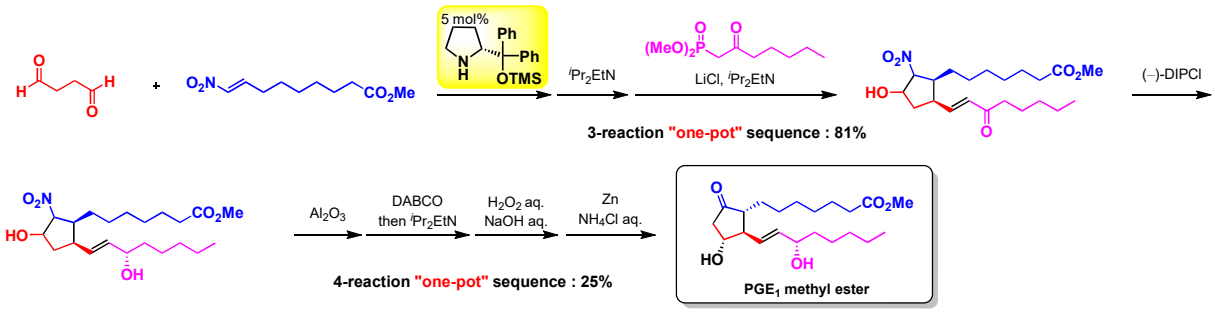
diospongin C



Chem. Eur. J. **2018**, *24*, 4909.

Prostaglandin derivatives

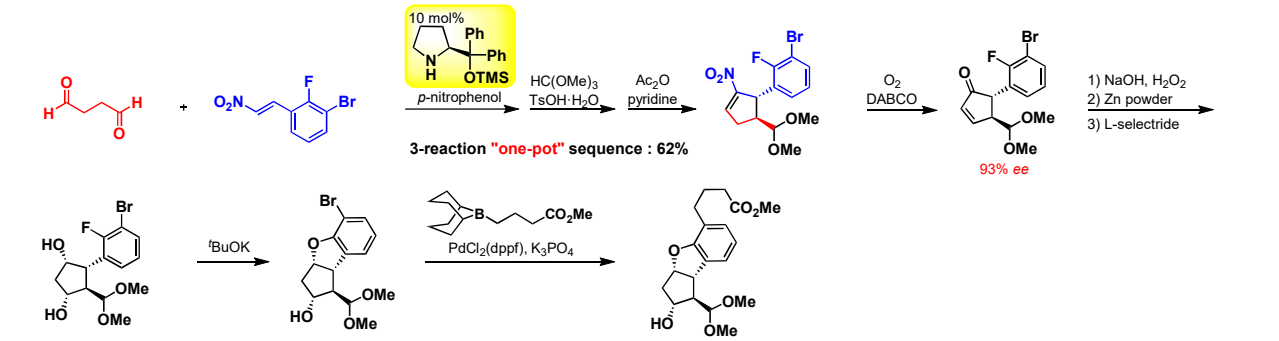
prostaglandin E_1 methyl ester

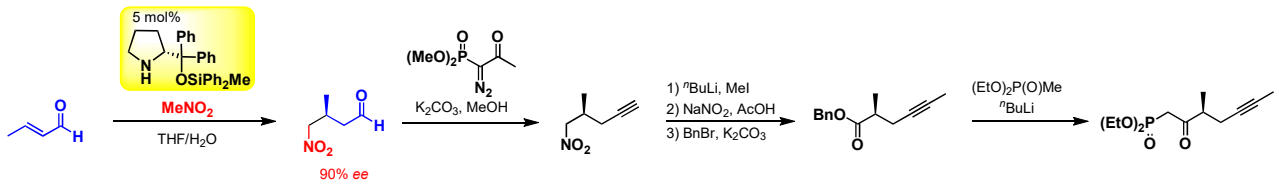


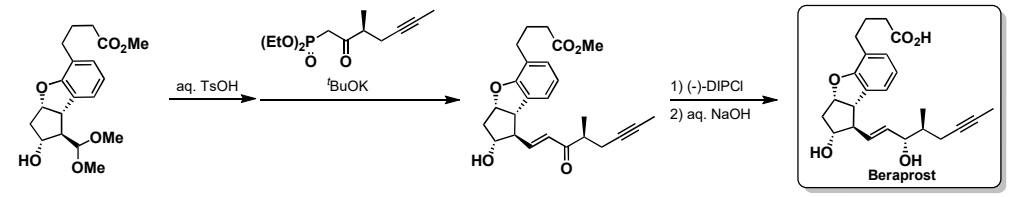
Total yield : 14%, 3 pot

Angew. Chem. Int. Ed. **2013**, *52*, 3450.

beraprost

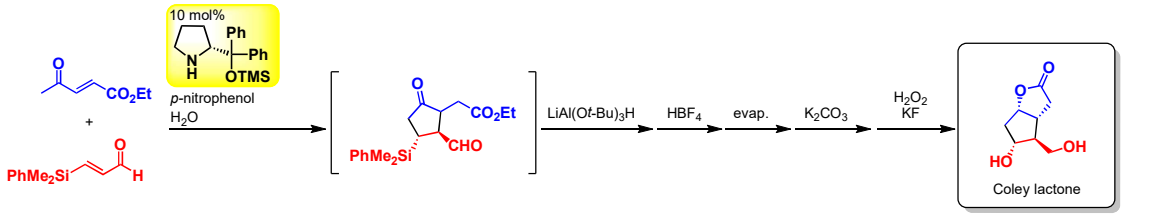






Org. Lett. **2017**, *19*, 1112.

Corey lactone



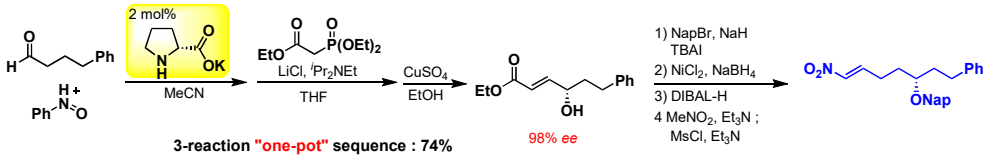
7-reactions "one-pot" sequence
Total yield: 50%
Total reaction time: 152 min
One purification

Chem. Sci., **2020**, *11*, 1205.

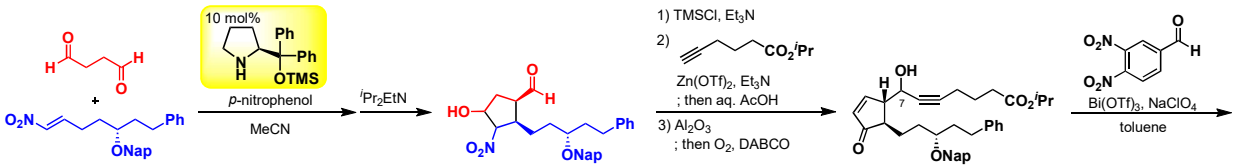
Prostaglandin derivatives

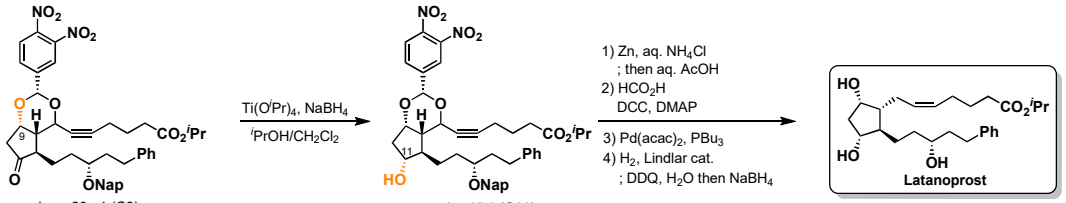
latanoprost

1st generation



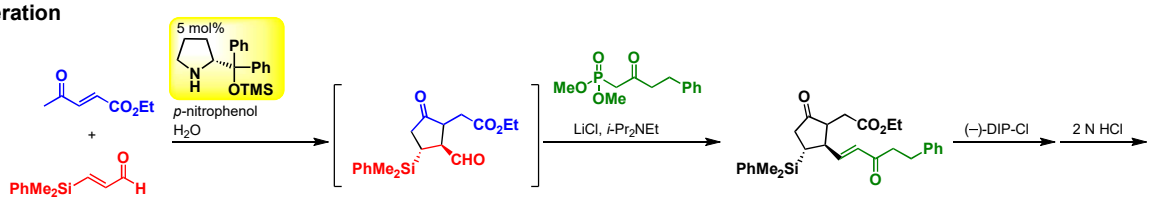
3-reaction "one-pot" sequence : 74%

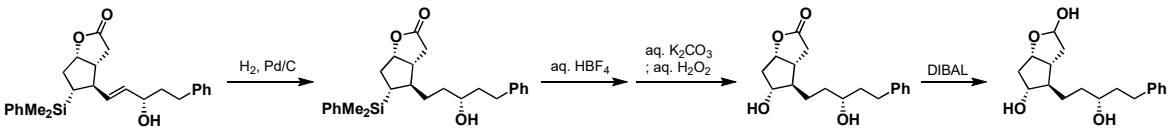


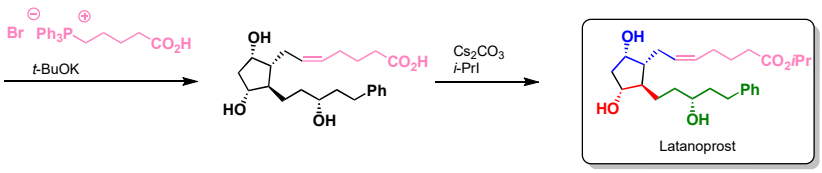


Chem. Eur. J., **2018**, *24*, 8409.

2nd generation



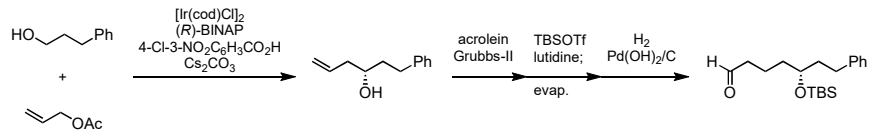




Total yield: 50%
10-reaction steps, 7-pot reaction
One purification

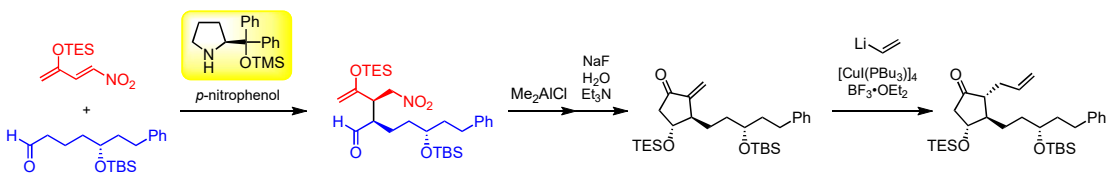
Eur. J. Org. Chem., **2020**, 6221.

3rd generation



one reaction : 88%

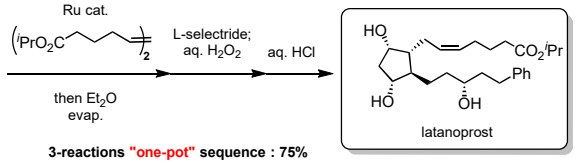
3-reactions "one-pot" sequence : 67%



one reaction : 89%

2-reactions "one-pot" sequence : 74%

one reaction : 83%



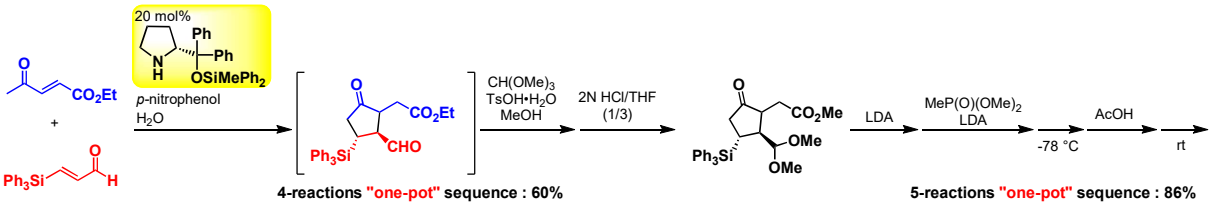
3-reactions "one-pot" sequence : 75%

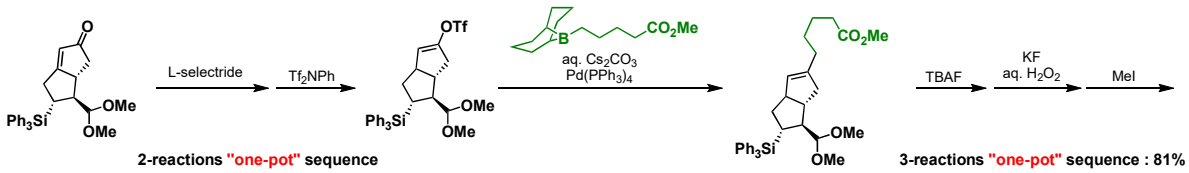
Total yield: 24%
11-reaction steps
6-pot reaction

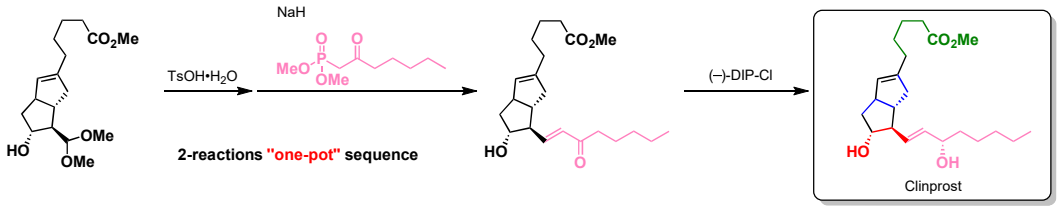
Chem. Sci., **2023**, *14* 10081.

Prostaglandin derivatives

clinprost

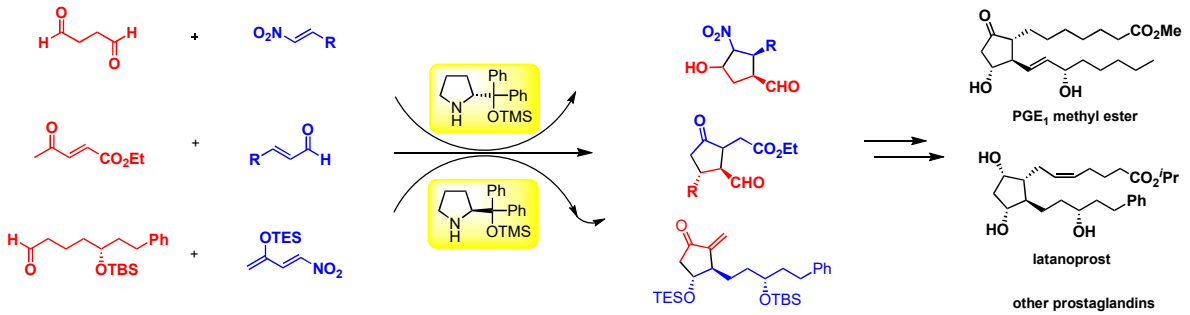






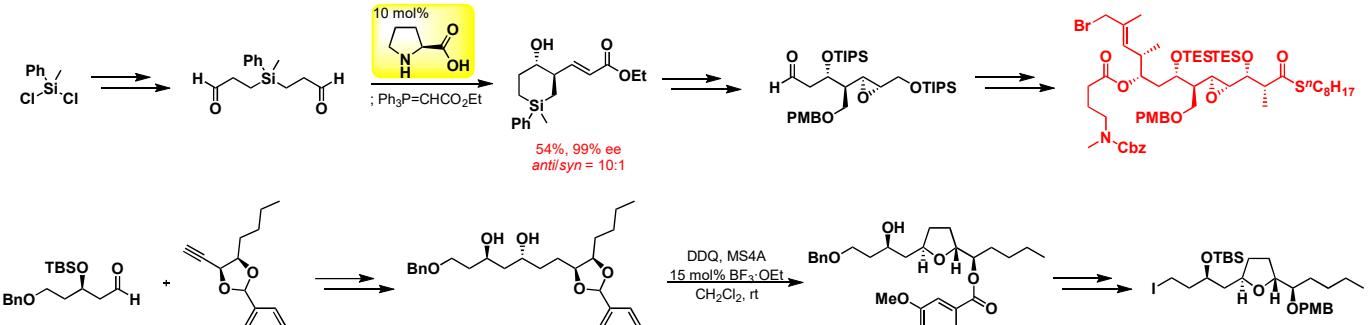
Org. Lett., **2020**, *22*, 9365.

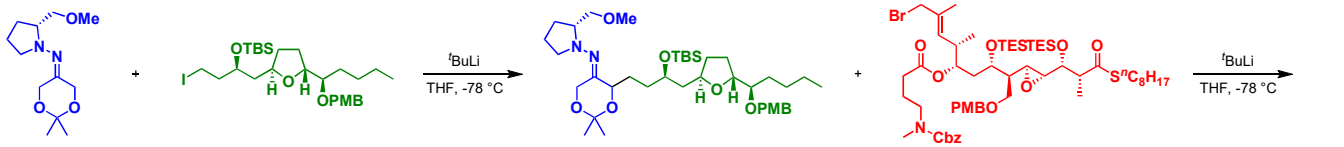
review article

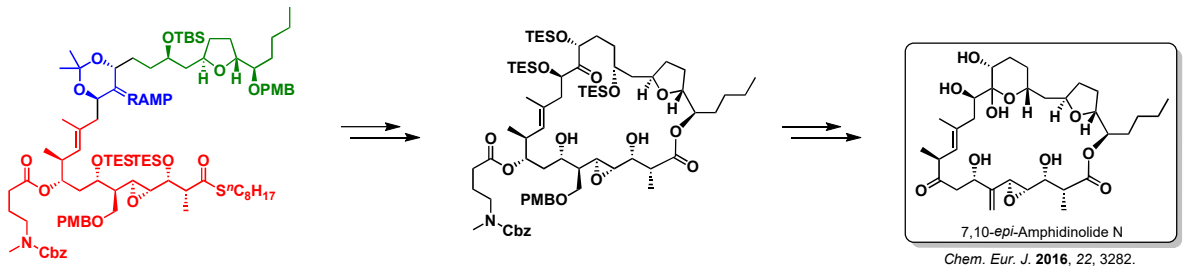


Bull. Chem. Soc. Japan, **2024**, *97*, 4.

7,10-*epi*-amphidinolide N

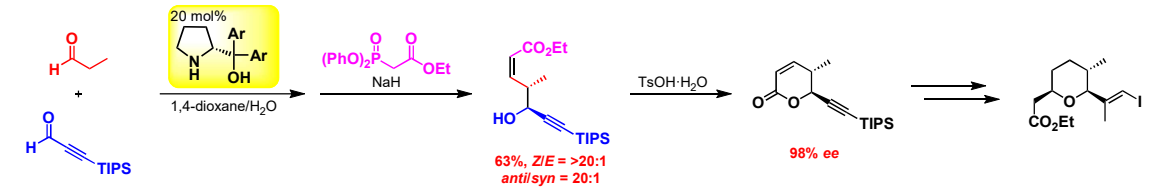


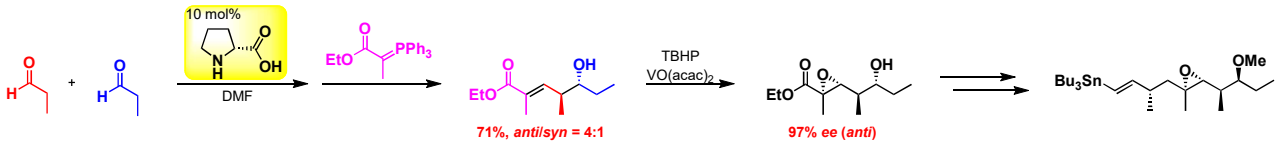


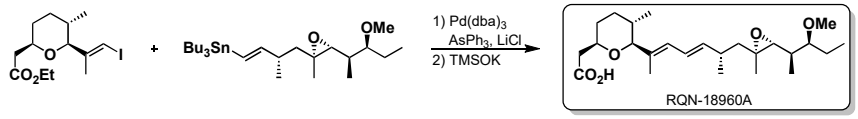


Chem. Eur. J. **2016**, *22*, 3282.
Chem. Eur. J. **2016**, *22*, 3287.

RQN-18690A

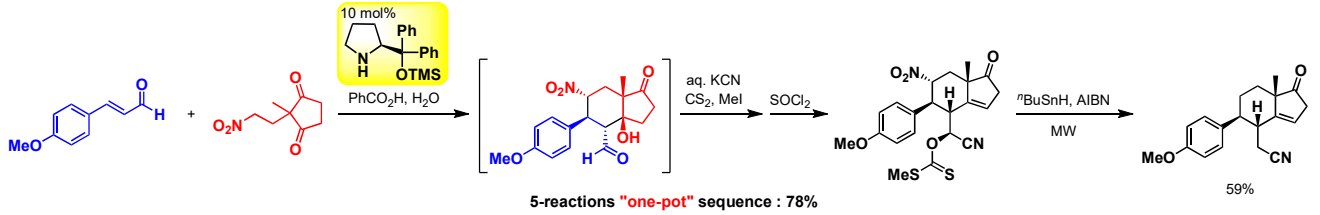


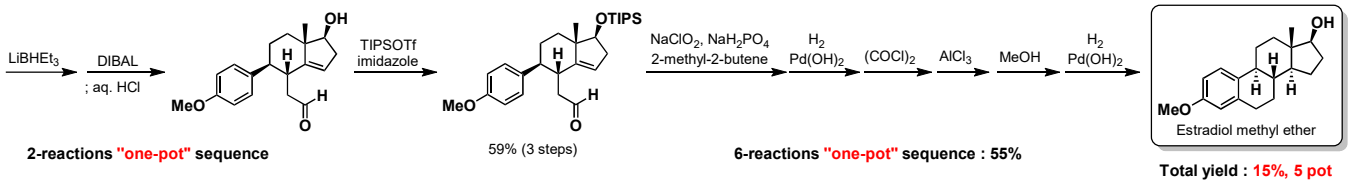




Org. Lett. **2016**, *18*, 3382.

estradiol methyl ether

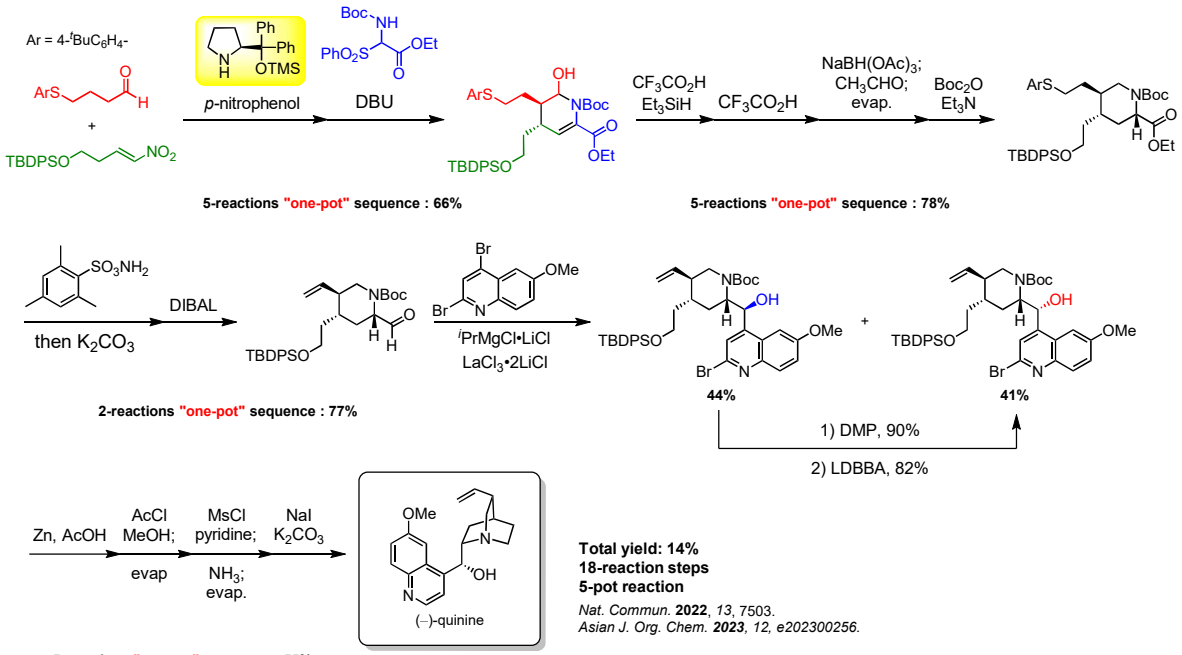




Total yield : 15%, 5 pot

Angew. Chem. Int. Ed. **2017**, *56*, 11812.
Eur. J. Org. Chem. **2018**, *41*, 5629.

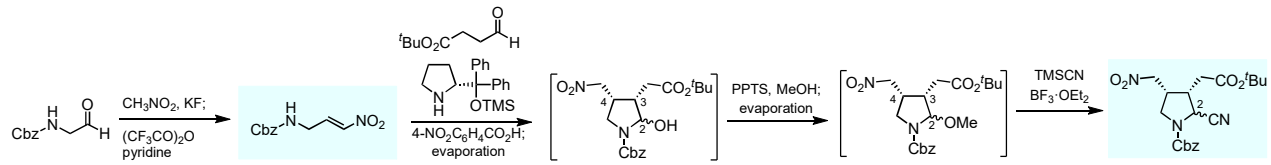
(–)-quinine



Total yield: 14%
18-reaction steps
5-pot reaction

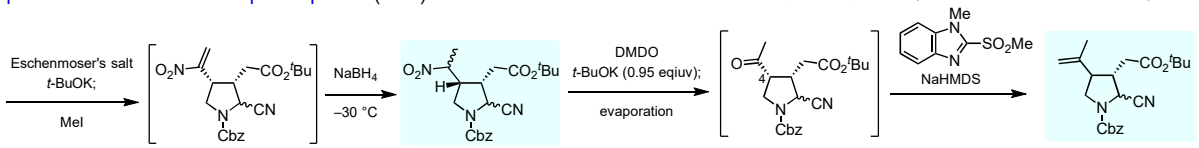
Nat. Commun. **2022**, *13*, 7503.
Asian J. Org. Chem. **2023**, *12*, e202300256.

(–)-Kainic Acid



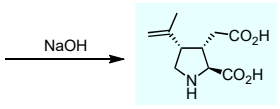
pot 1: Two reactions in one-pot sequence (77%)

pot 2: Four reactions in one-pot sequence (78%, *cis* : *trans* = >20 : 1 (C3, C4))



pot 3: Three reactions in one-pot sequence (56%)

pot 4: Two reactions in one-pot sequence (65%, *cis* : *trans* = 9.2 : 1 (C3, C4))

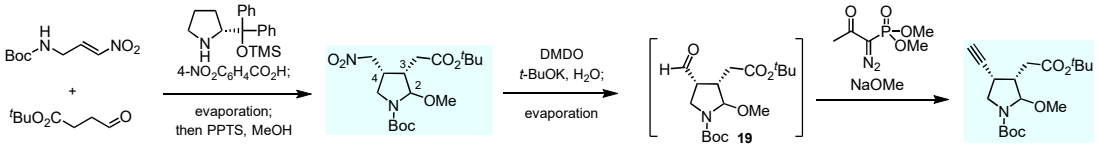


Total yield: 15.7%
Total 4 pots

pot 4: One reaction (56%)

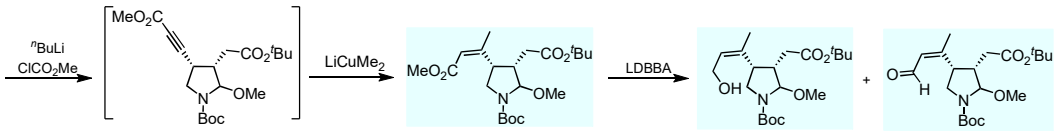
JACS. Au. **2026**, *6*, 4793–4802.

(−)-Domoic Acid



Two reactions in one-pot sequence
46% (α), 46% (β), *cis* : trans = >20 : 1 (C3, C4)

Two reactions in one-pot sequence
92% (α), 85% (β), *cis* : *trans* = >20 : 1

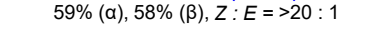


Two reactions in one-pot sequence
59% (α), 58% (β), *Z* : *E* = >20 : 1

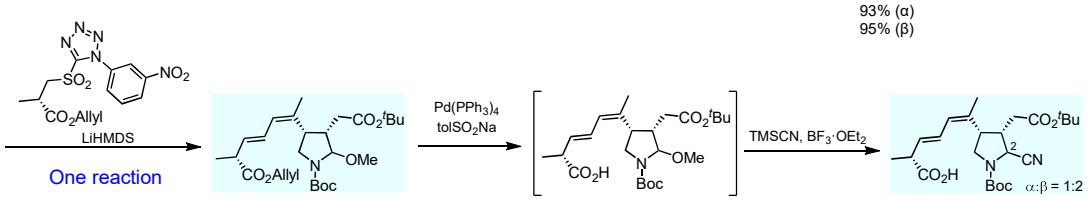
Two reactions
Two pots

79% (α)
41% (β)

8% (α)
7% (β)



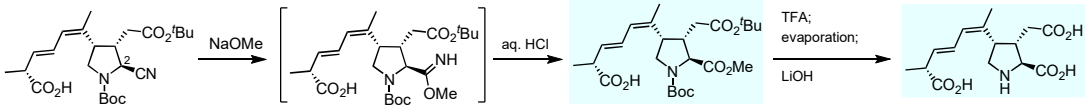
93% (α)
95% (β)



One reaction

62% (α)
63% (β)

Two reactions in one-pot sequence
91% (α), 89% (β)



β-isomer

Two reactions in one-pot sequence (67%)

One reaction (quant.)

(–)-domoic acid

Total yield: 10.8%
Total 10 pots
including the isomerization

JACS. Au. **2026**, *6*, 4793–4802.