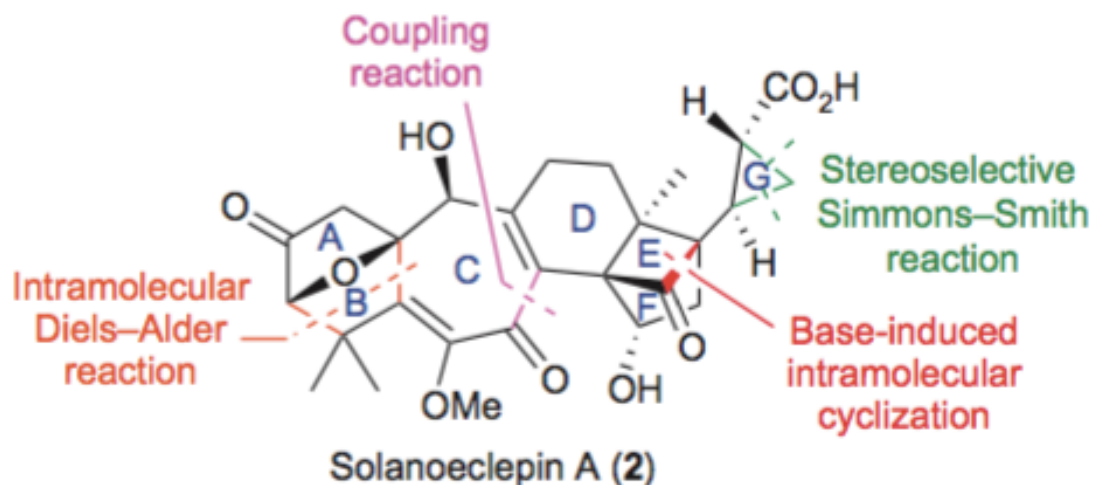


Total Synthesis of Solanoeclepin A



Keiji Tanino^{1*}, M. Takahashi¹, Y. Tomata¹, H. Tokura¹, T. Uehara², T. Narabu²
and **Masaaki Miyashita**^{3*}

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1 Faculty of Science, Hokkaido University, Sapporo, Japan

2 National Agriculture Research Center for Hokkaido Region, Sapporo, Japan

3 Faculty of Engineering, Kogakuin University, Hachioji, Tokyo, Japan

Literature Presentation

levgeniia Kovalova

28. 09. 2017

Profile



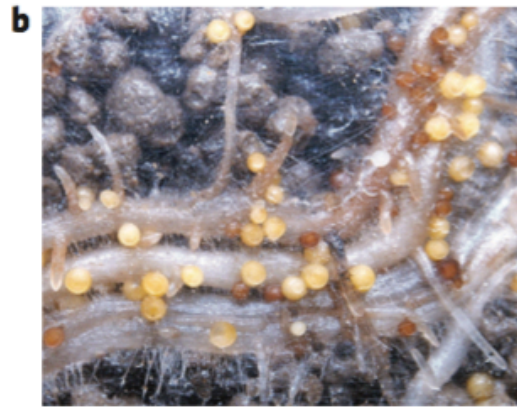
Professor Keiji Tanino, Ph. D.

- 1985 BS, Department of Chemistry, Tokyo Institute of Technology
- 1987 MS, Department of Chemistry, Tokyo Institute of Technology
- 1989 Assistant Professor, Department of Chemistry, Tokyo Institute of Technology
- 1994 Ph.D., Department of Chemistry, Tokyo Institute of Technology (Prof. Isao Kuwajima)
- 1998 Assistant Professor, Division of Chemistry, Hokkaido University
- 1999 Associate Professor, Division of Chemistry, Hokkaido University
- 2006 Professor, Division of Chemistry, Hokkaido University

Cyst nematodes and their effect on crops



Potato cyst nematode
Globodera rostochiensis.



Cysts on potato roots, which protect the nematodes until hatch stimulants produced by the host plant are present.

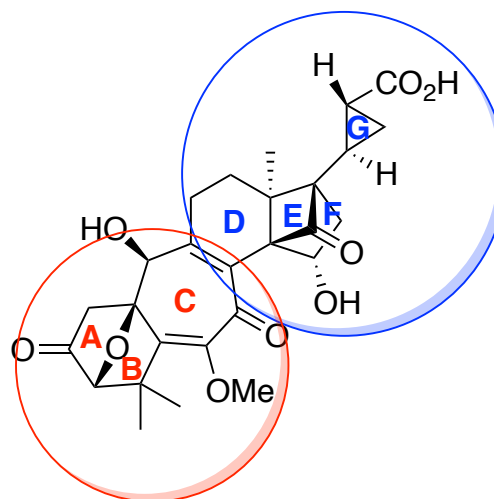


Potato field affected by potato cyst nematodes

Normal potato field

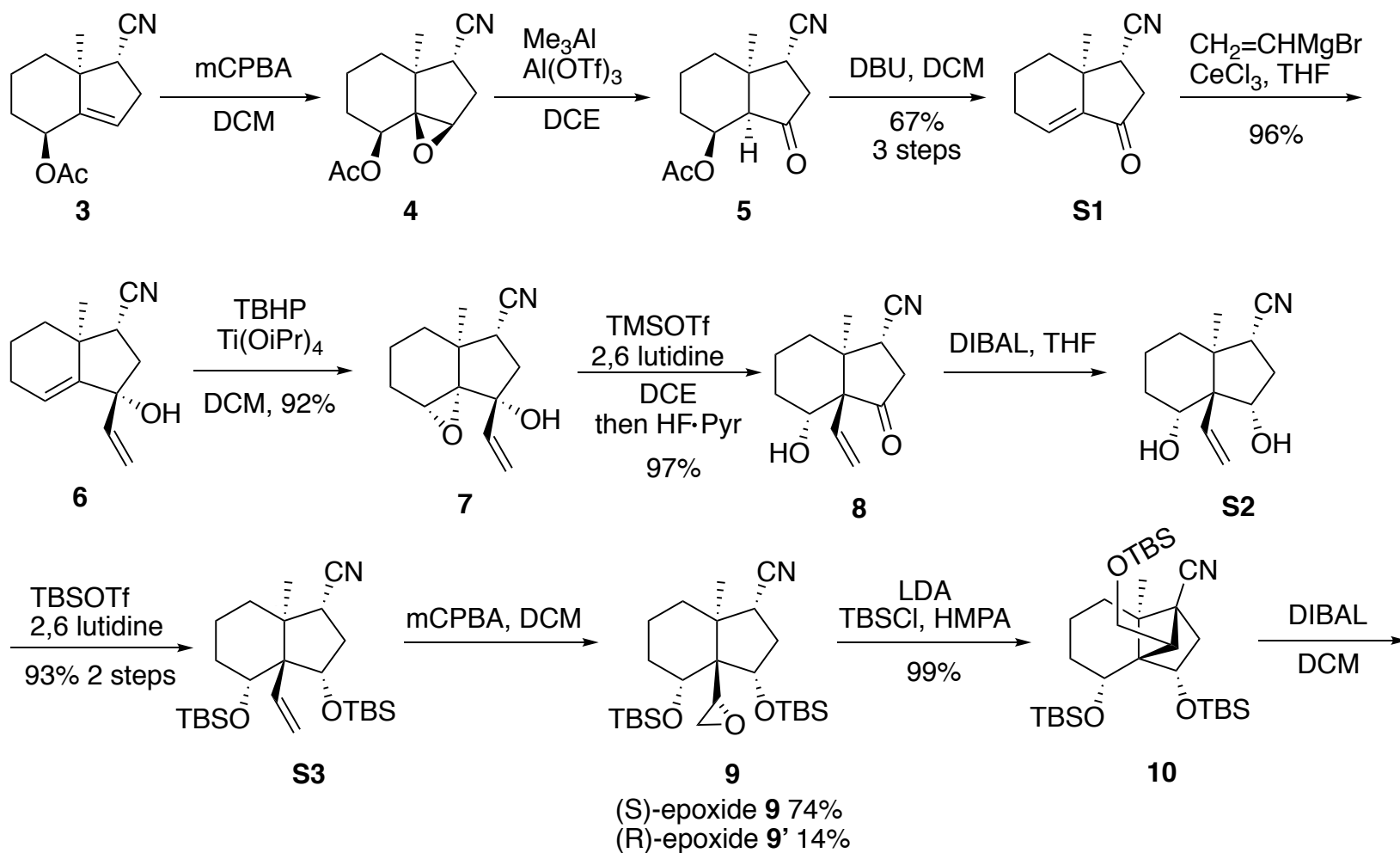


Structure of Solanoeclepin A

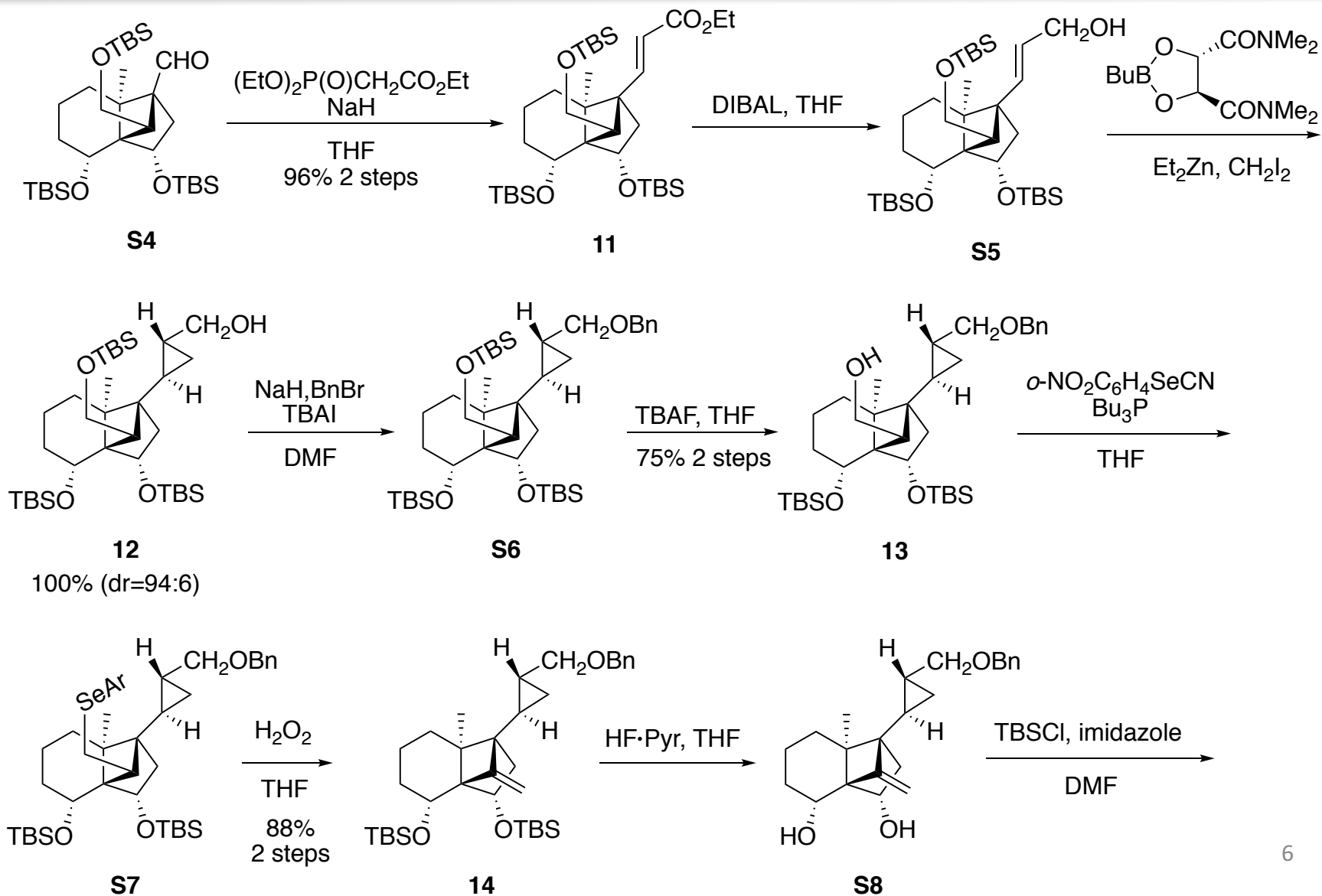


Solanoeclepin A (2)

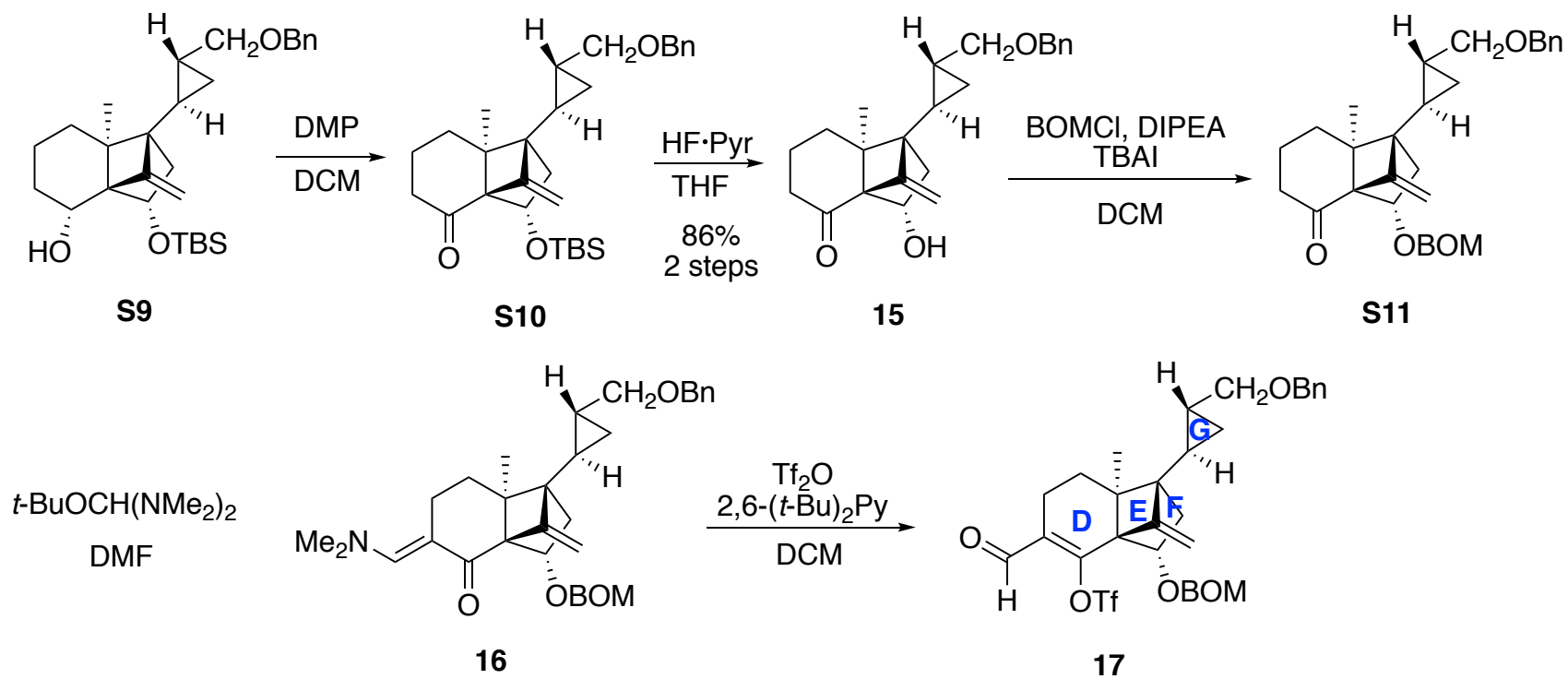
Stereoselective synthesis of right-hand segment



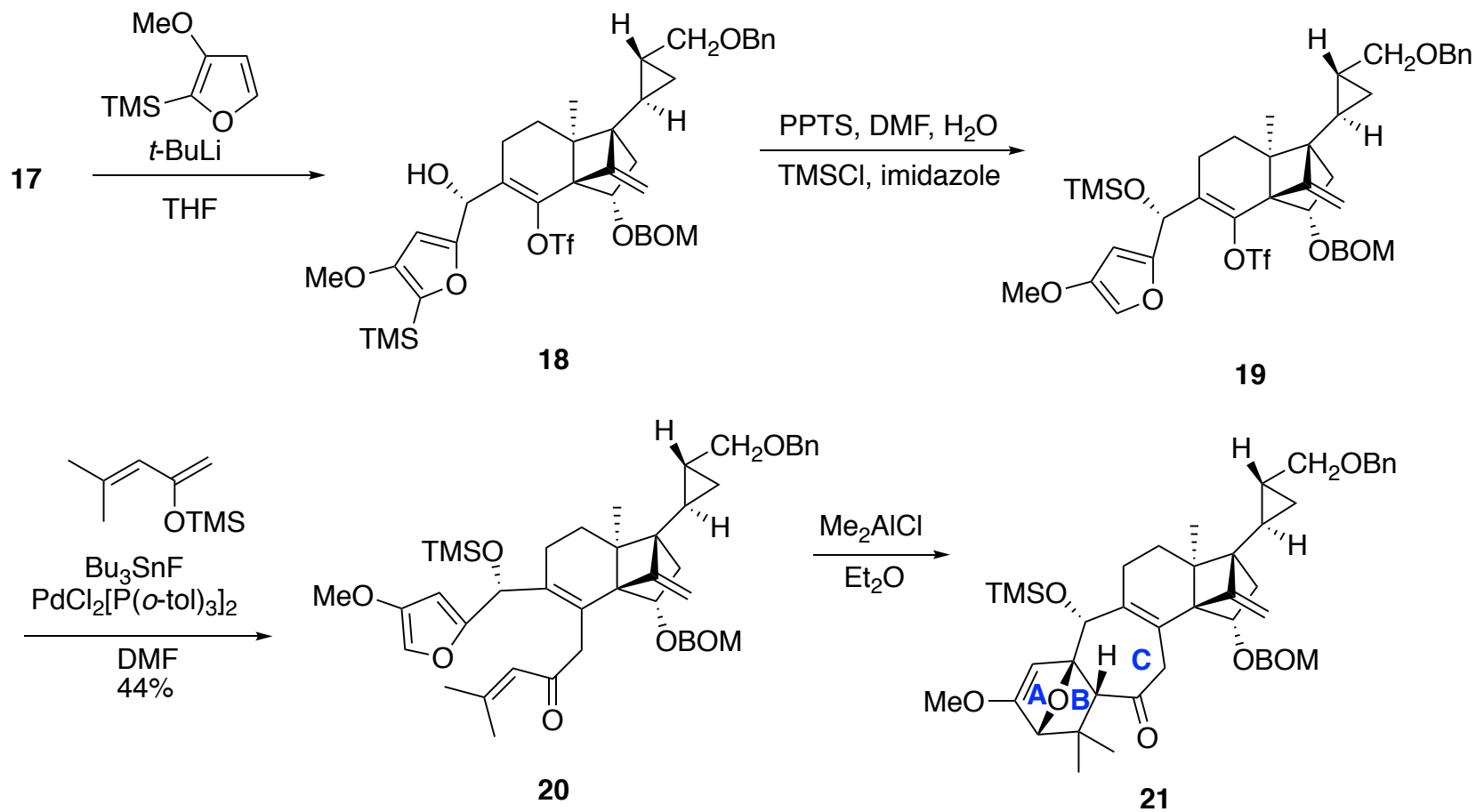
Stereoselective synthesis of right-hand segment



Stereoselective synthesis of right-hand segment **17**

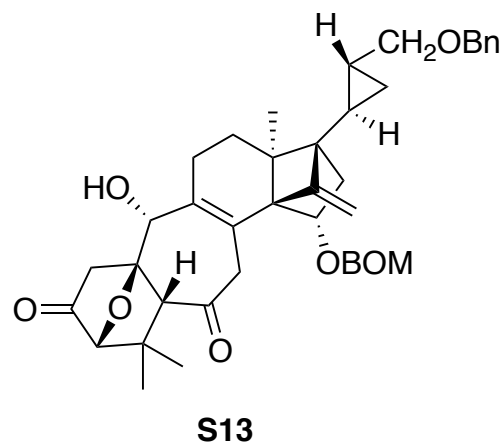


Stereoselective synthesis of the heptacyclic compound **21**

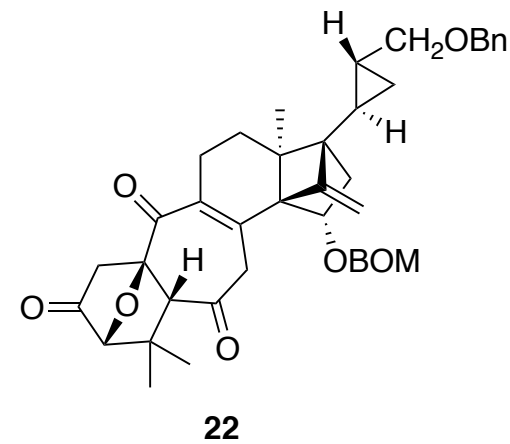


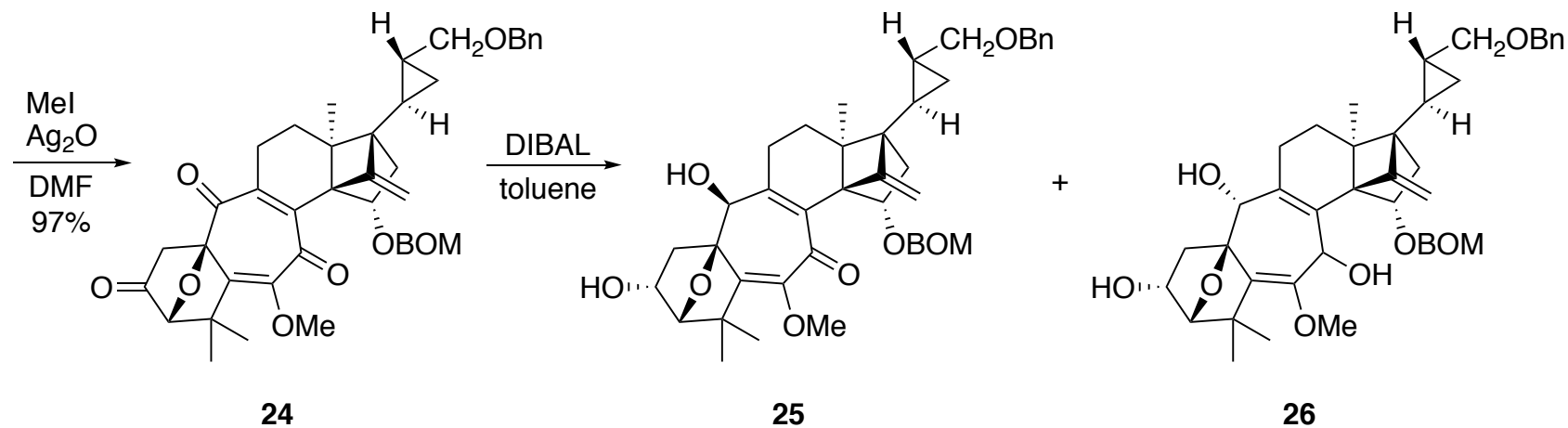
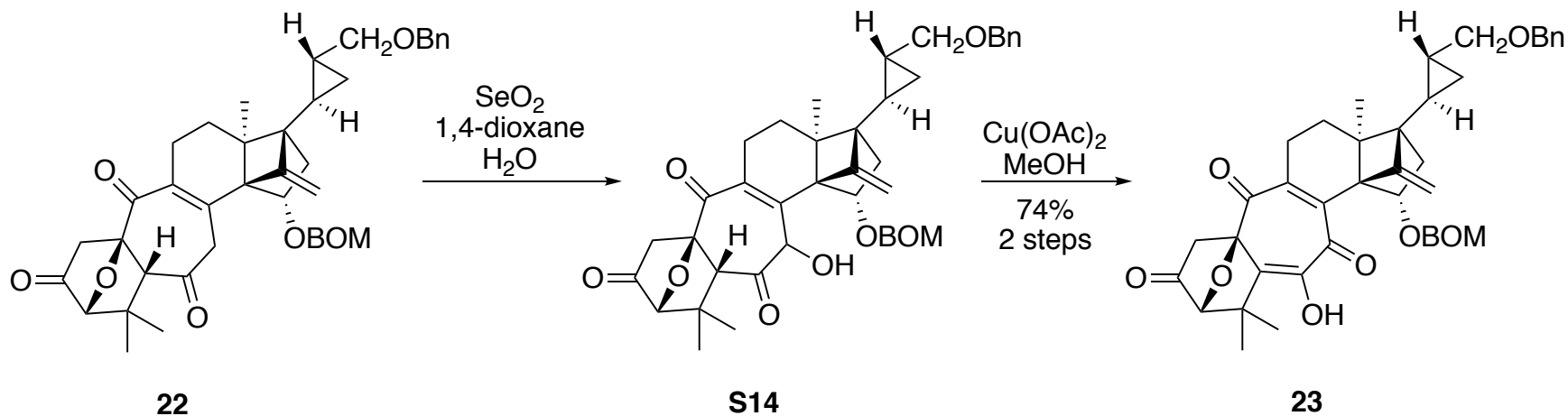
Stereoselective synthesis of the heptacyclic compound **22**

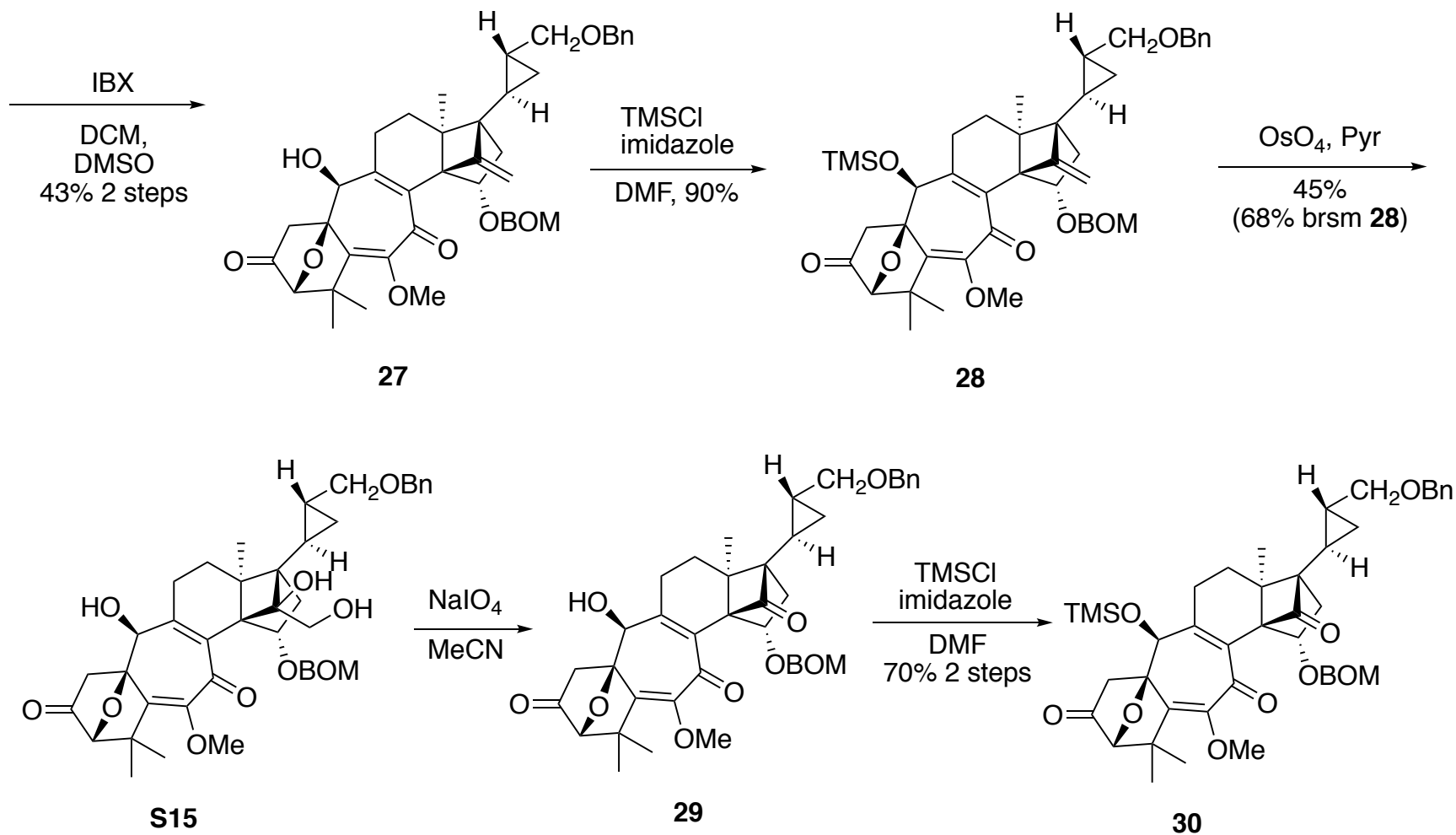
AcOH, H₂O
62% 2 steps



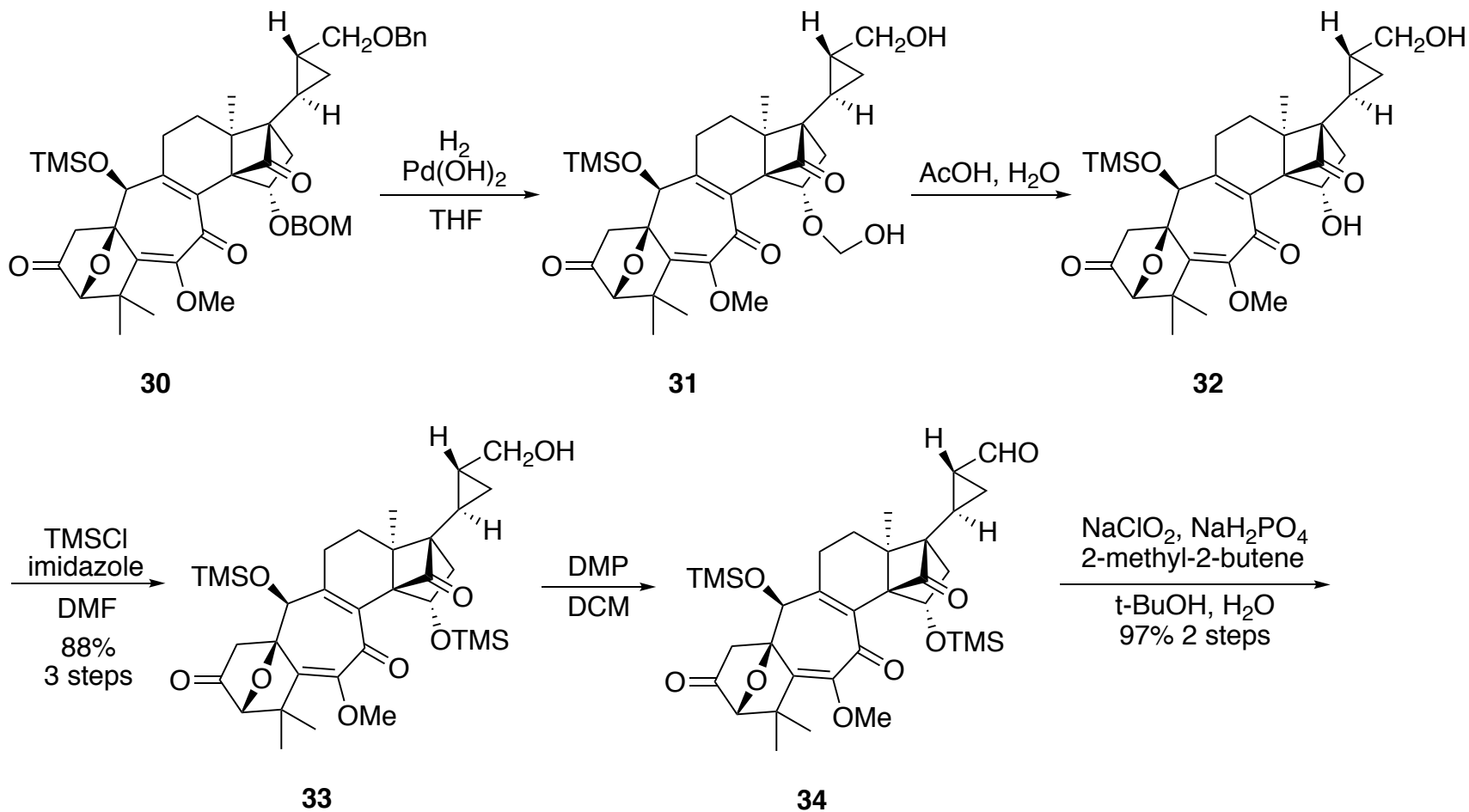
DMP
DCM
90%



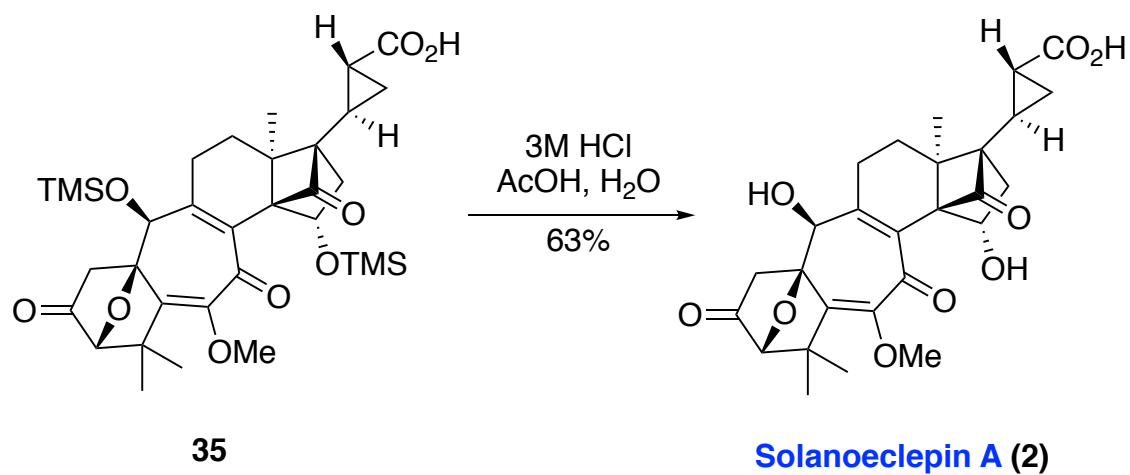
Stereochemical synthesis of the heptacyclic compound **25** and **26**

Stereochemical synthesis of the heptacyclic compound **30**

End game in total synthesis of solanoeclepin A



End game in total synthesis of solanoeclepin A



Conclusion

- Achieved the first chemical synthesis of **Solanoeclepin A**, the key hatch-stimulating substance for potato cyst nematode
- Synthetic solanoeclepin A was shown to stimulate hatching activity at high dilutions in water
- The chemistry described here opens a chemical way to other naturally occurring Solanoeclepin analogues, and synthetic, designed Solanoeclepin derivatives that could contribute to solving a critical food supply issue of the twenty-first century

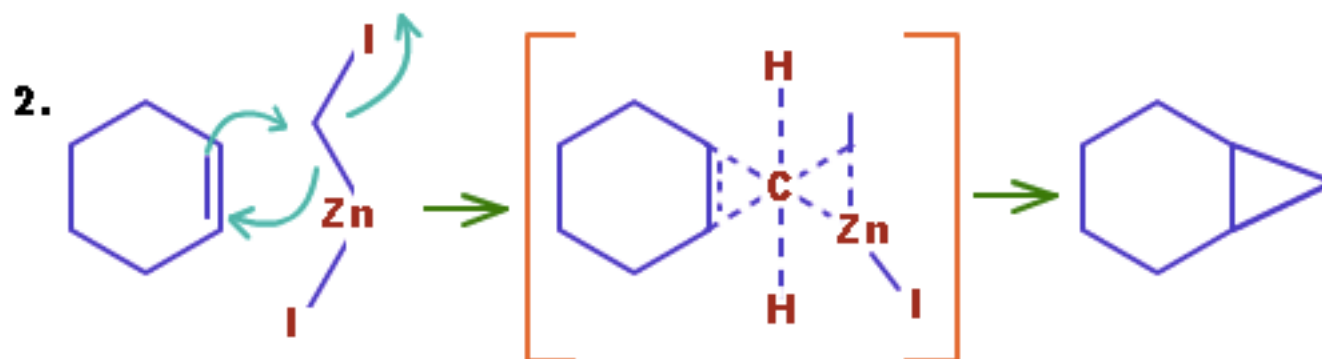
Thank you for your attention!

Meinwald rearrangement

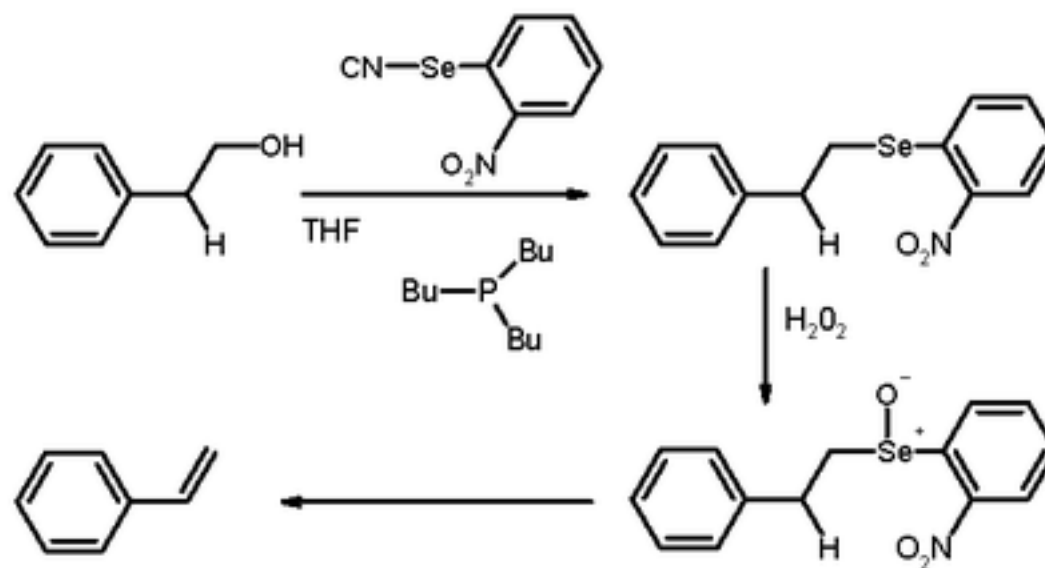


Fig. 1 Mechanism of the Meinwald rearrangement of epoxides activated by a Lewis acid.

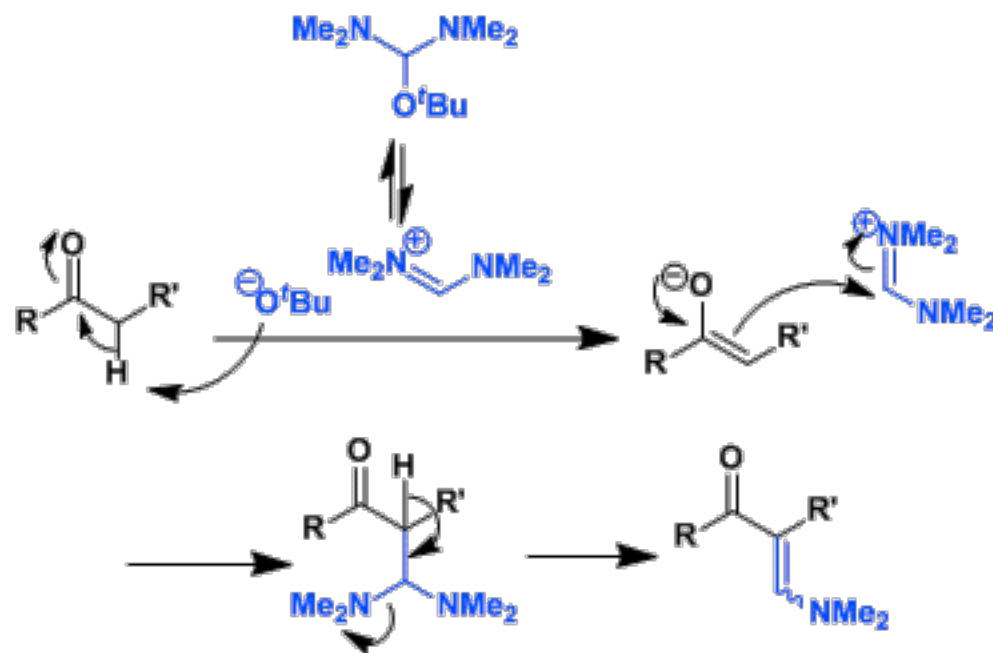
Simmons-Smith

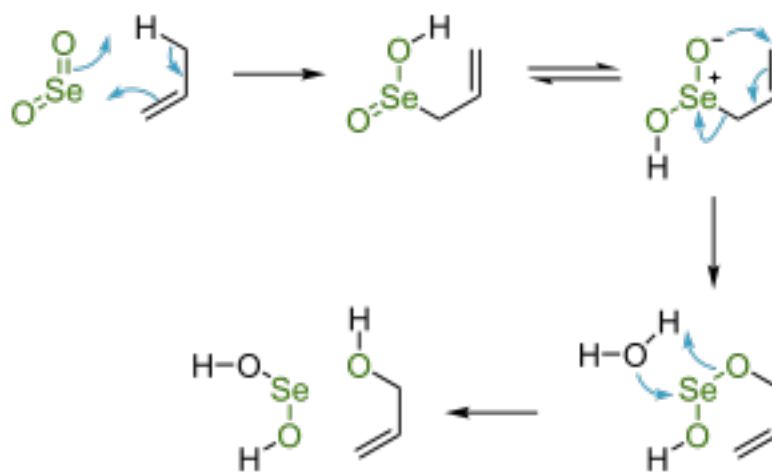


Grieco elimination

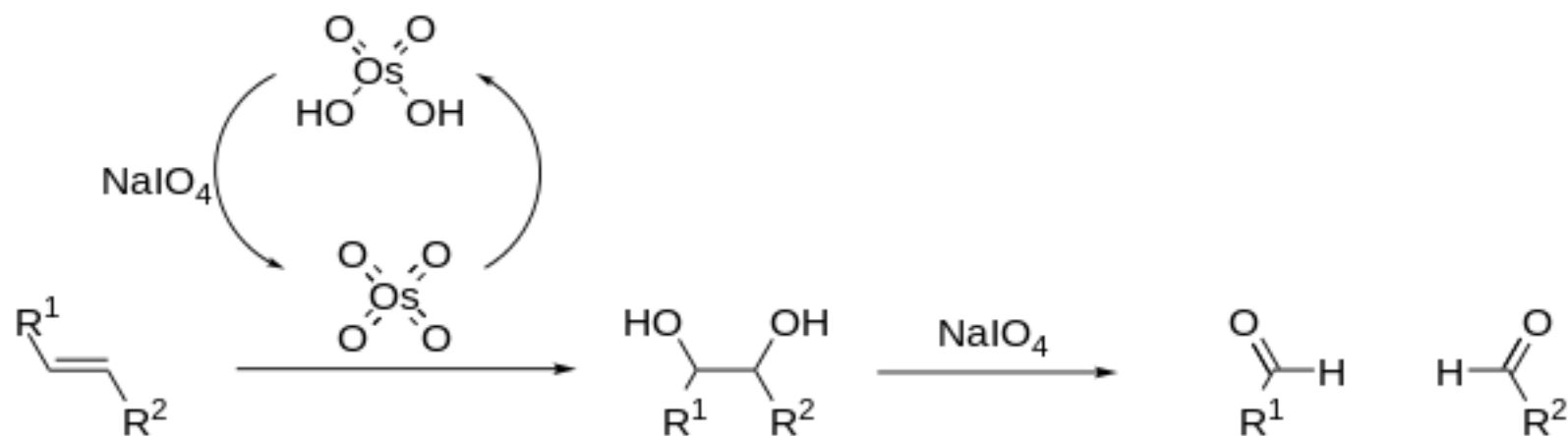


Bredereck's reagent





Lemieux–Johnson oxidation



Pinnick oxidation

