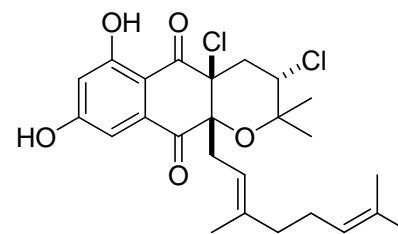
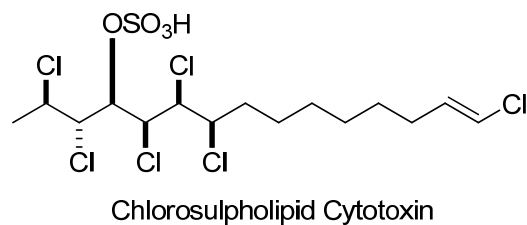


Stereocontrolled Chlorination in Natural Product Synthesis



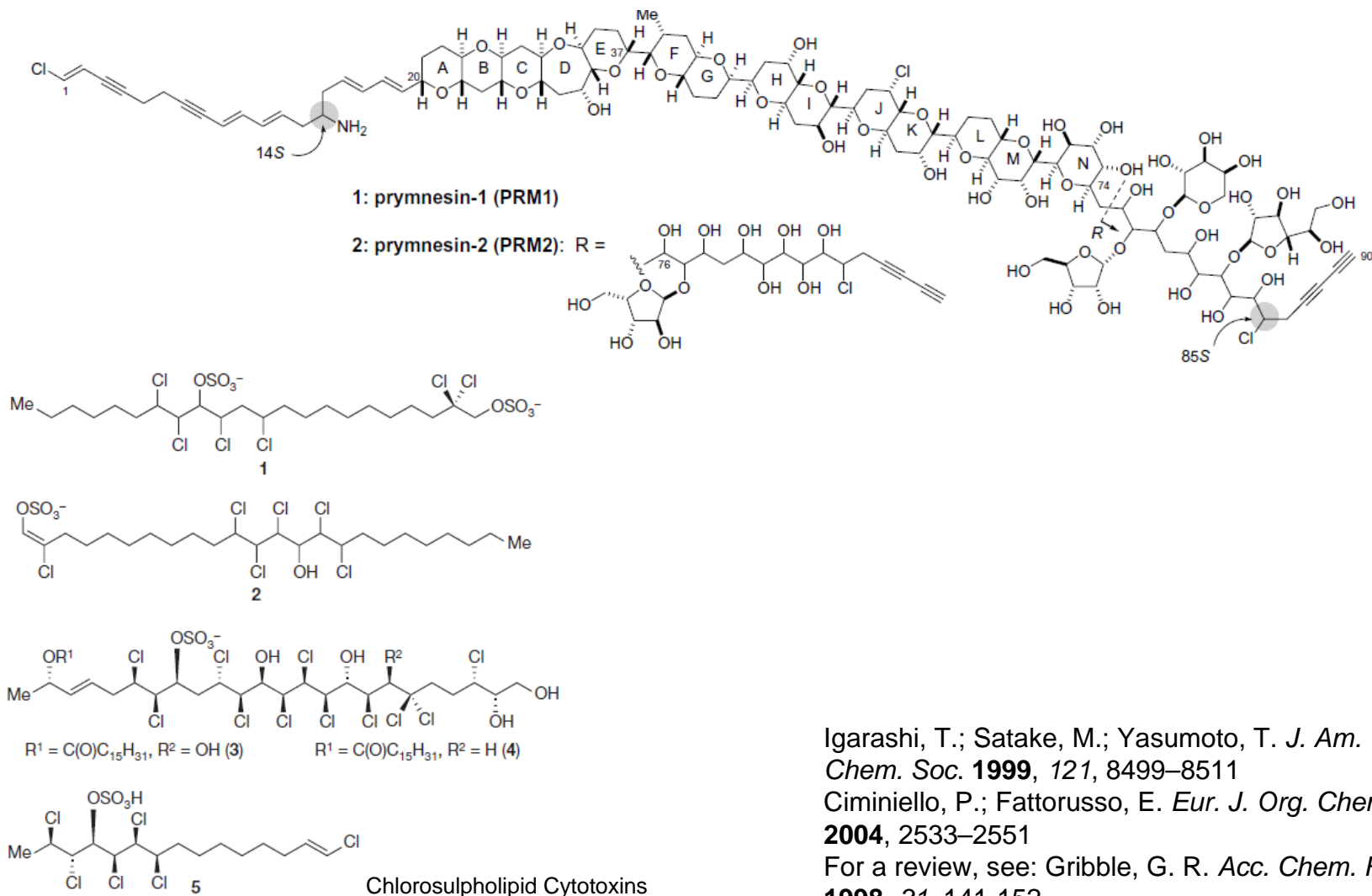
(-)-napyradiomycin A1

Christian Nilewski, Roger W. Geisser and Erick M. Carreira
Nature, **2009**, 457, 573-577

Scott A. Snyder, Zhen-Yu Tang, and Ritu Gupta
J. Am. Chem. Soc. **2009**, 131, 5744-5745

Current Literature
Chenbo Wang @ Wipf Group
Aug 15 2009

Naturally Occurring Organochlorine Compounds

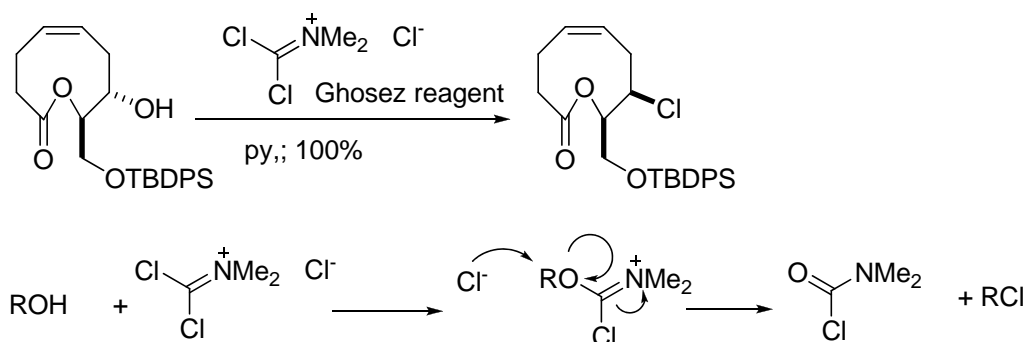
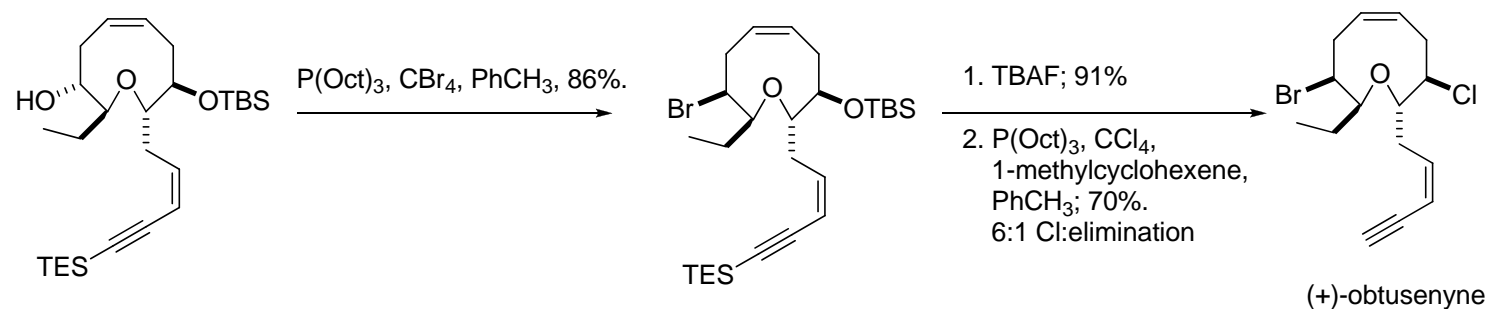


Igarashi, T.; Satake, M.; Yasumoto, T. *J. Am. Chem. Soc.* **1999**, *121*, 8499–8511

Ciminiello, P.; Fattorusso, E. *Eur. J. Org. Chem.* **2004**, 2533–2551

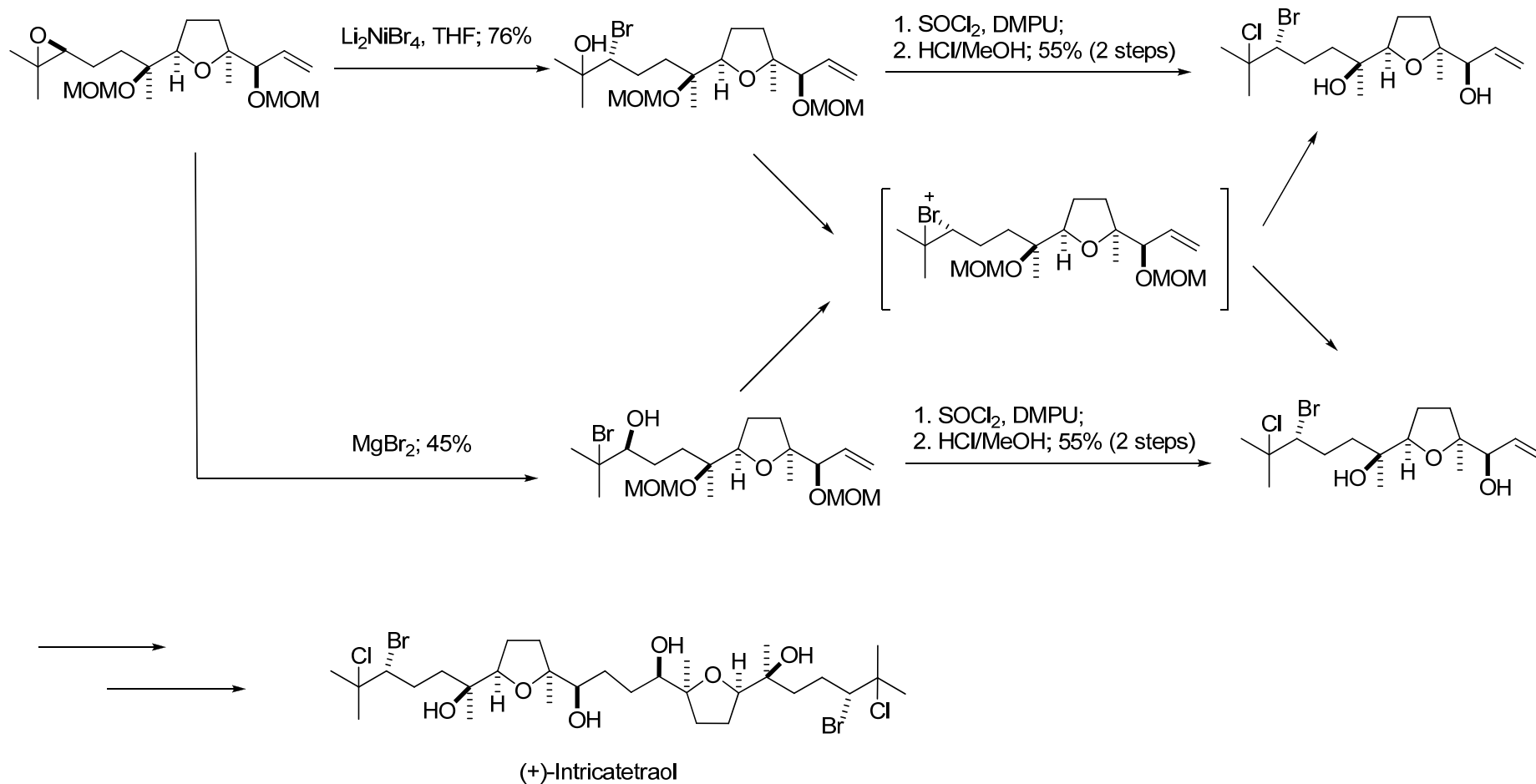
For a review, see: Gribble, G. R. *Acc. Chem. Res.* **1998**, *31*, 141-152

Alcohols to Chlorides: Total Synthesis of (+)-Obtusenyne



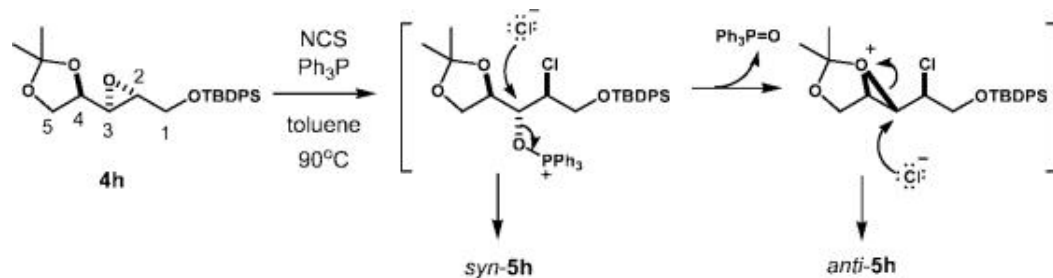
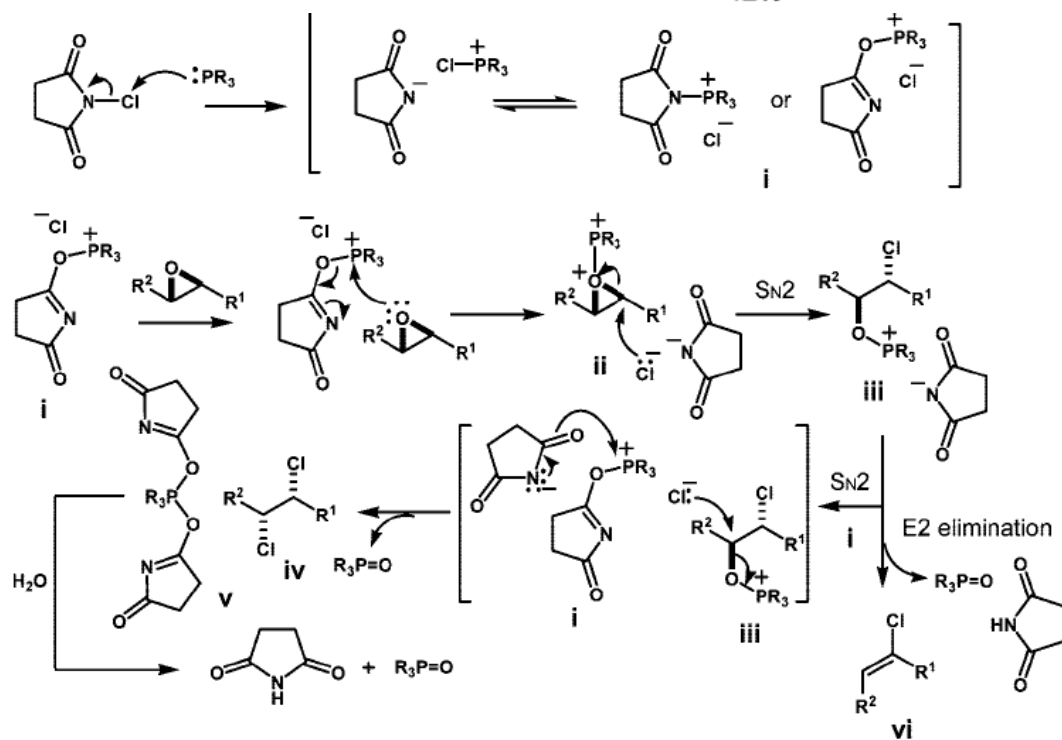
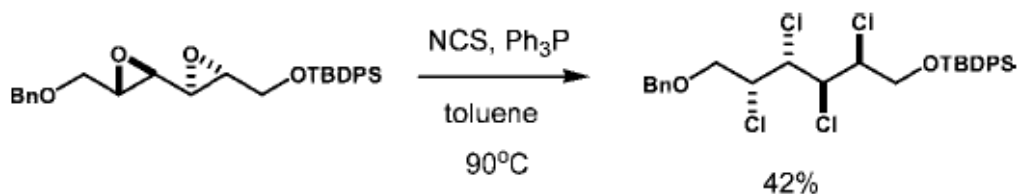
Crimmins, M. T. and Powell, M. T. *J. Am. Chem. Soc.* **2003**, *125*, 7592-7595
 Holmes, A. B. et al *Chem. Eur. J.* **2008**, *14*, 2867 – 2885
 Holmes, A. B. et al *Chem. Commun.*, **1997**, 1067 - 1068

Epoxides to Chlorides: Total Synthesis of (+)-Intricatetraol



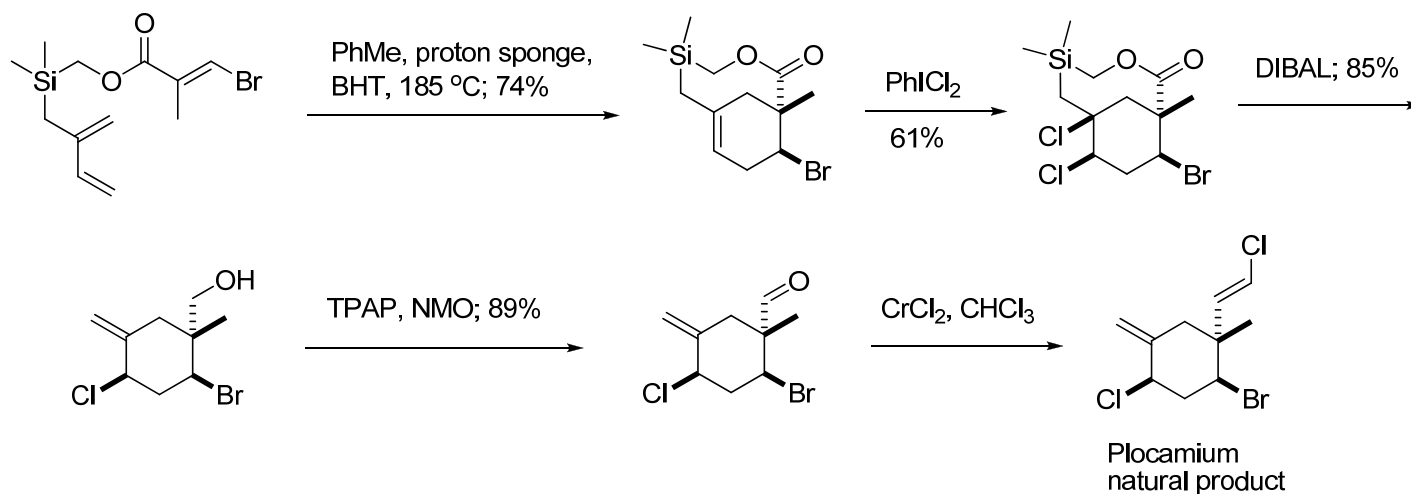
Morimoto, Y; Okita, T; Takaishi, M. and Tanaka, T, *Angew. Chem. Int. Ed.* **2007**, *46*, 1132 –1135

Epoxides to Chlorides: Towards the Total Synthesis of Chlorosulpholipid Cytotoxins



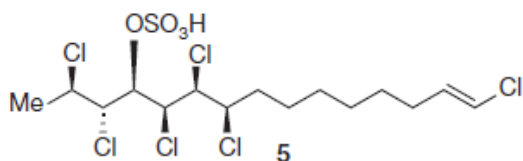
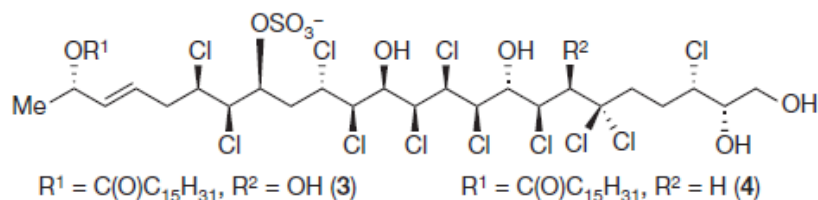
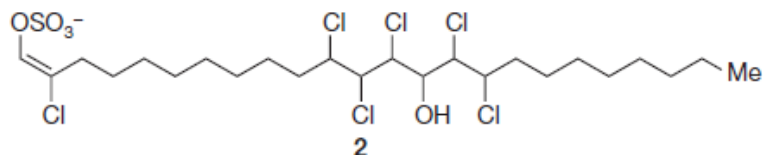
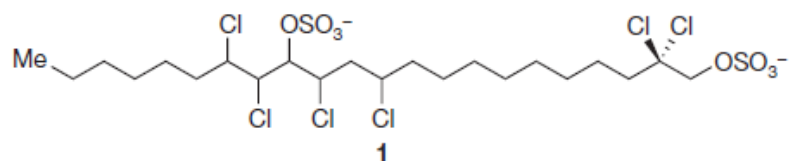
Yoshimitsu, T.; Fukumoto, N. and Tanaka, T. *J. Org. Chem.* **2009**, *74*, 696–702

Olefin to Vicinal Dichlorides: Total Synthesis of a Plocamium Natural Product



Whitney, J. M.; Parnes, J. S. and Shea, K. J. *J. Org. Chem.* **1997**, *62*, 8962-8963

Chlorosulpholipid Cytotoxins



- Disulphate **1** and vinyl sulphate **2** have been isolated from *Ochromonas danica* and *Poterochromonas malhamensis*, respectively, and their configurations have not been assigned.
- Lipids **3–5** have been extracted from digestive glands of contaminated shellfish *Mytilus galloprovincialis* along the Adriatic coast of Italy and are associated with seafood poisoning. They have been configurationally assigned by NMR spectroscopy using J-based configuration analysis.

Elovson, J. & Vagelos, P. R. *Biochemistry* **1970** 9, 3110–3126

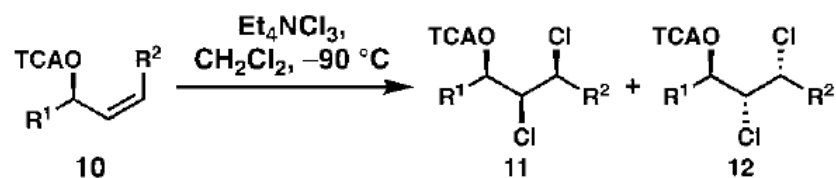
Chen, J. L., Proteau, P. J., Roberts, M. A. & Gerwick, W. H. *J. Nat. Prod.* **1994**, 57, 524–527.

Ciminiello, P. et al. *J. Org. Chem.* **2001** 66, 578–582.

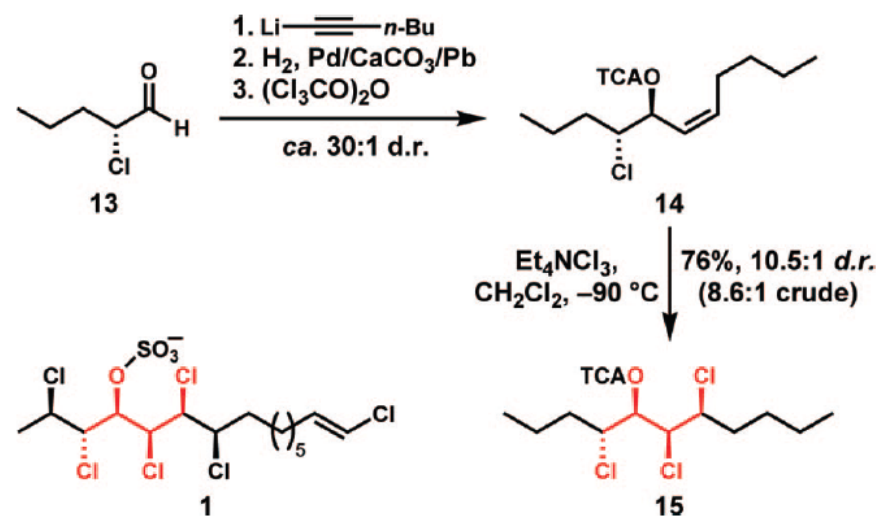
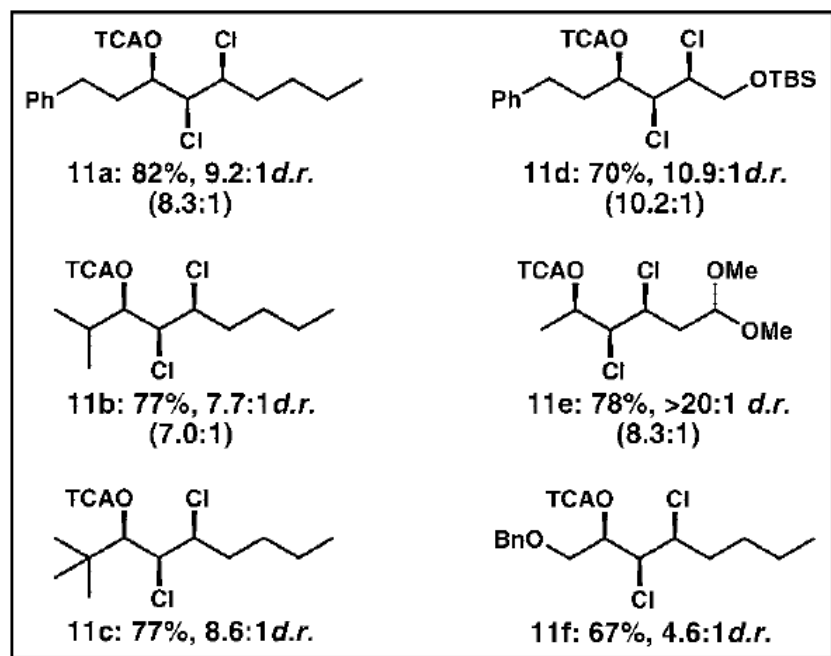
Ciminiello, P. et al. *J. Am. Chem. Soc.* **2002**, 124, 13114–13120.

Ciminiello, P. et al. *Tetrahedron* **2004**, 60, 7093–7098.

Olefin to Vicinal Dichlorides: Towards the Total Synthesis of Chlorosulpholipid Cytotoxins

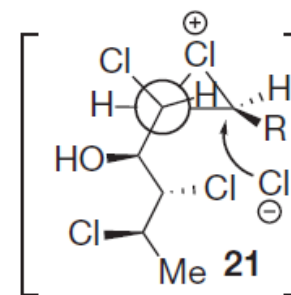
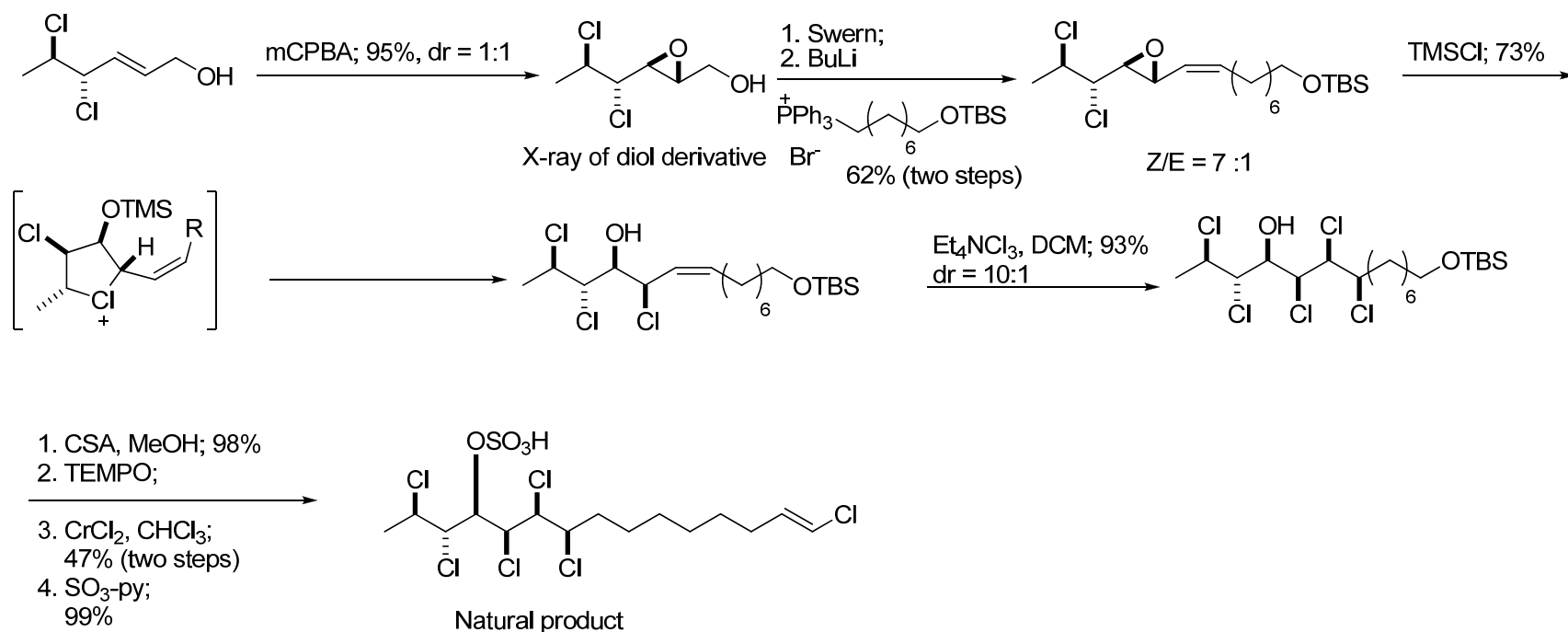


Major Products^a

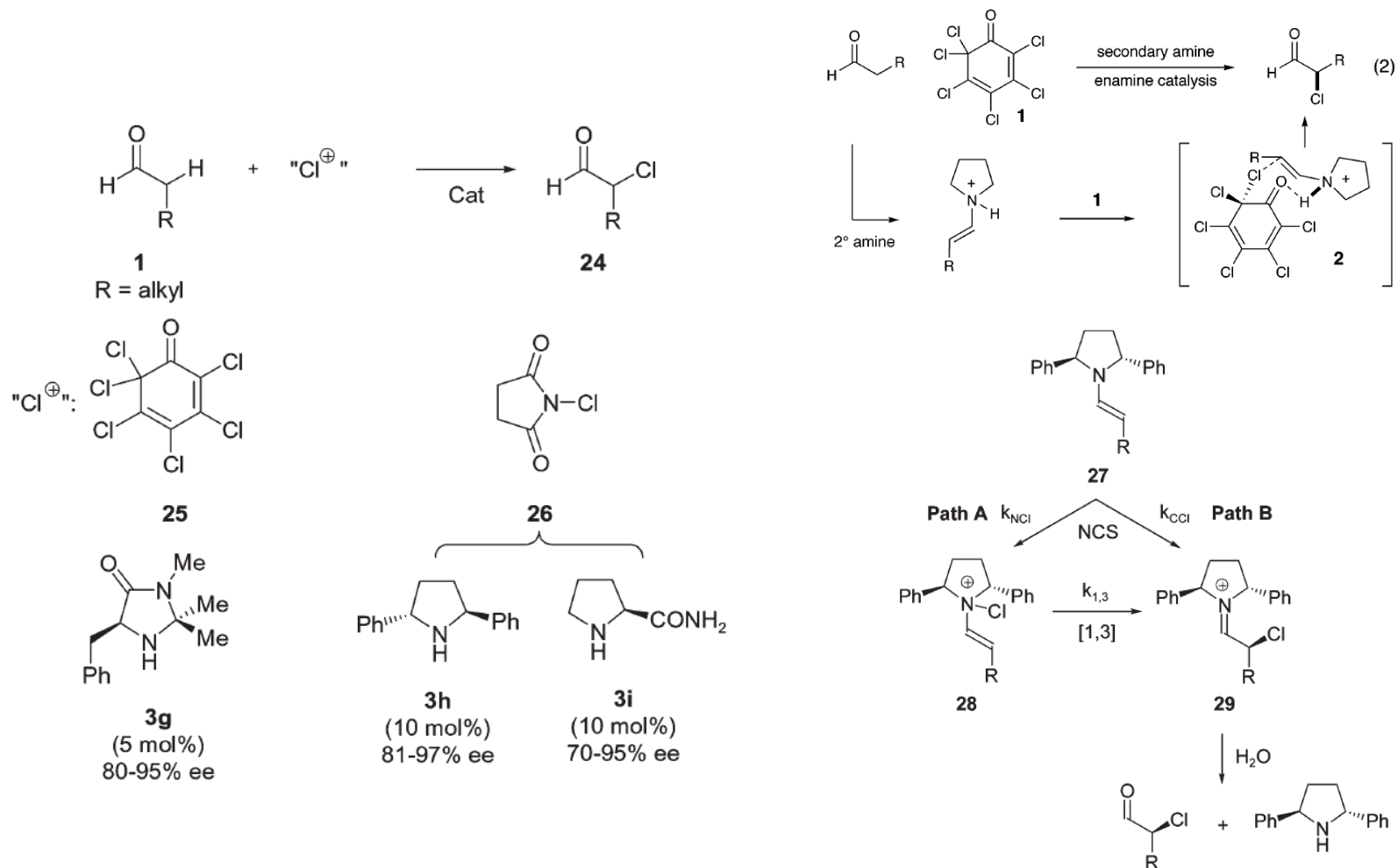


Shibuya, G. M.; Kanady, J. S. and Vanderwal, C. D. *J. Am. Chem. Soc.* **2008**, *130*, 12514–12518

Title Paper: Total Synthesis of a Chlorosulpholipid Cytotoxin- 2nd Generation Approach



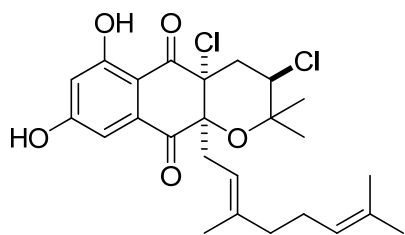
Enantioselective Chlorination of Aldehydes



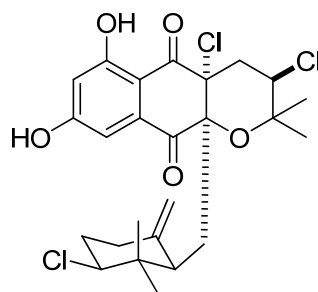
M. P. Brochu, S. P. Brown and D. W. C. MacMillan, *J. Am. Chem. Soc.*, **2004**, 126, 4108;

M. Marigo, A. Branton, S. Bachmann, M. Marigo and K. A. Jørgensen, *J. Am. Chem. Soc.*, **2004**, 126, 4790

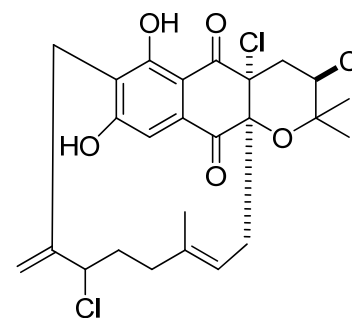
Napyradiomycins



napyradiomycin A1



napyradiomycin B1

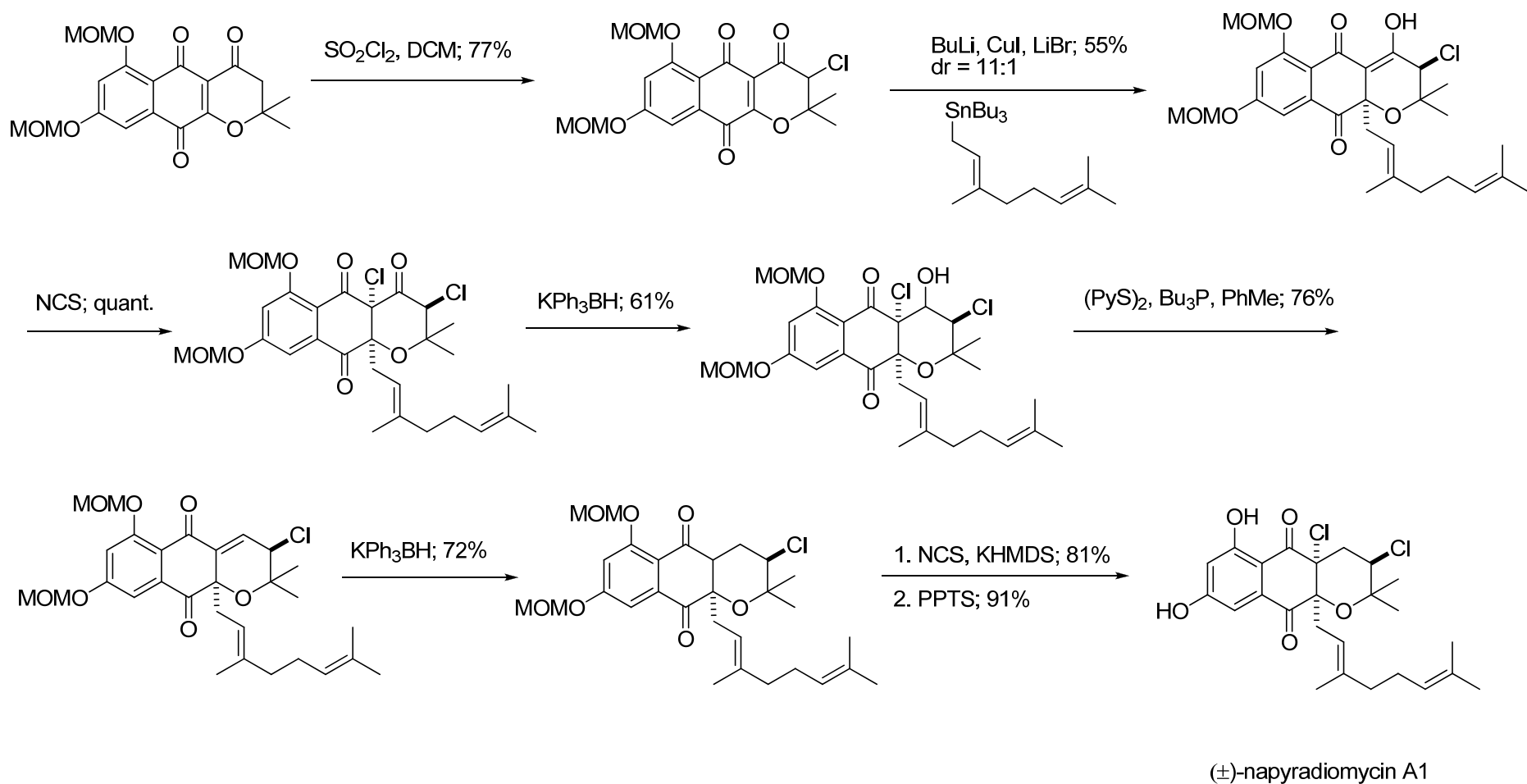


napyradiomycin C2

- Isolated from terrestrial strains of *Streptomyces* bacteria
- Characterized by spectroscopic, degradative, and X-ray crystallographic means.
- Biological profiles include activity as nonsteroidal estrogen antagonists, antibacterial activity against methicillin- and vancomycin-resistant strains and antitumor potency against colon carcinoma cells

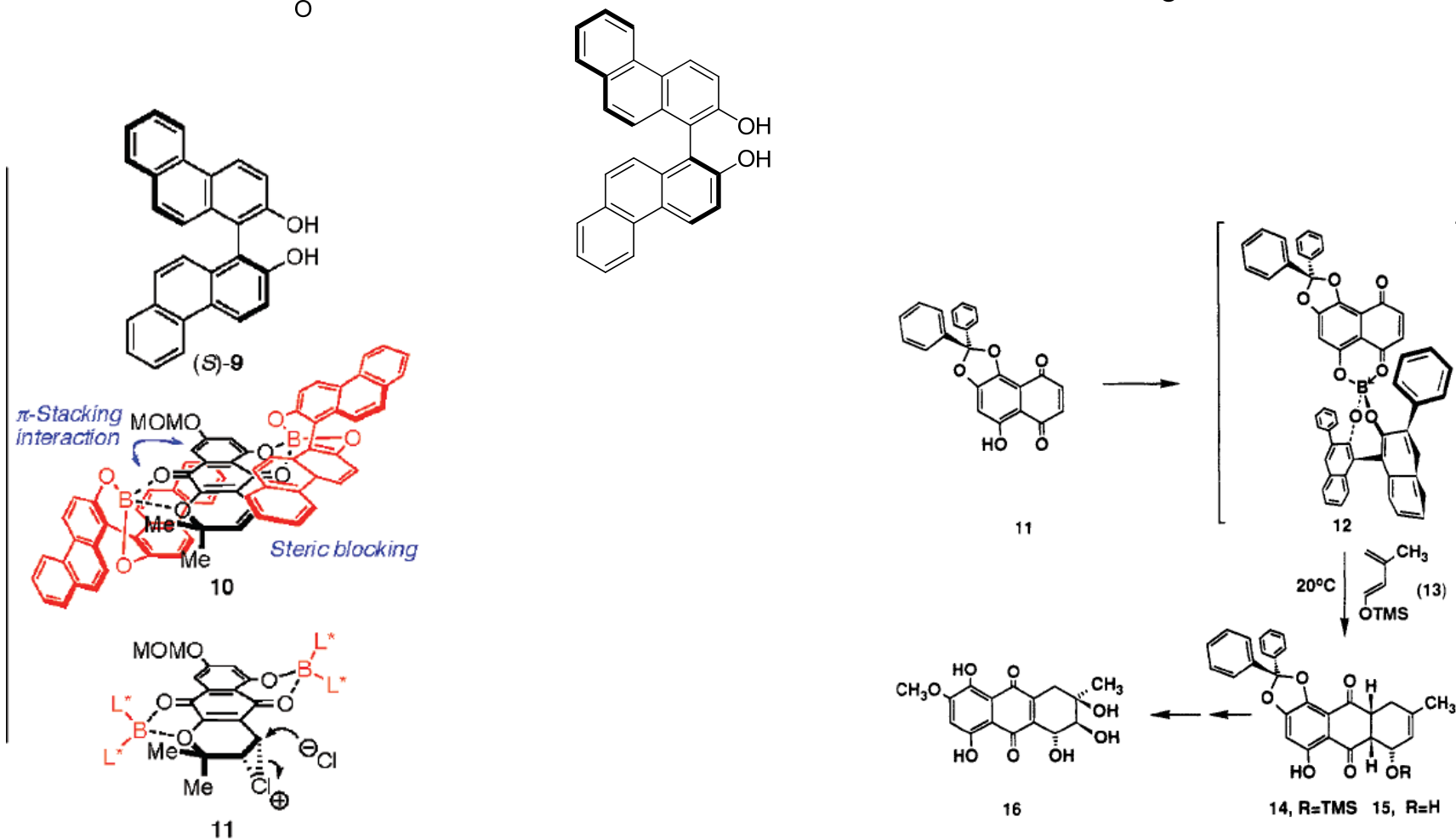
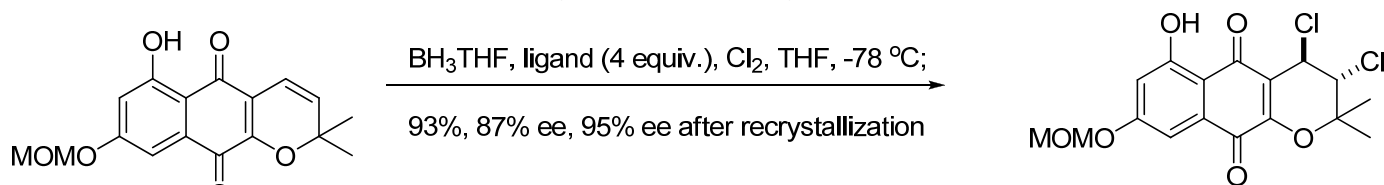
Shiomi, K.; Nakamura, H.; Iinuma, H.; Naganawa, H.; Takeuchi, T.; Umezawa, H.; Iitaka, Y. *J. Antibiot.* **1987**, *40*, 1213. (b) Shiomi, K.; Iinuma, H.; Naganawa, H.; Isshiki, K.; Takeuchi, T.; Umezawa, H.; Iitaka, Y. *J. Antibiot.* **1986**, *39*, 494

Racemic Total Synthesis of Napyradiomycin A1



Tatsuta, K.; Tanaka, Y.; Kojima, M.; Ikegami, H. *Chem. Lett.* **2002**, 14

Title Paper: Enantioselective Chlorination in the Total Synthesis of Napradiomycin A1



Kelly, T. R.; Whiting, A.; Chandrakumar, N. S. *J. Am. Chem. Soc.* **1986**, *108*, 3510.

Title Paper: Completion of Synthesis

