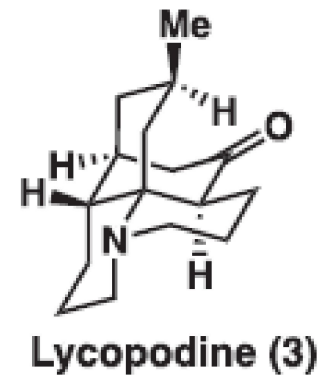
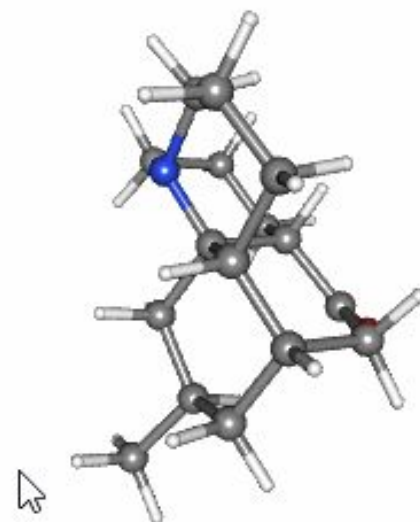
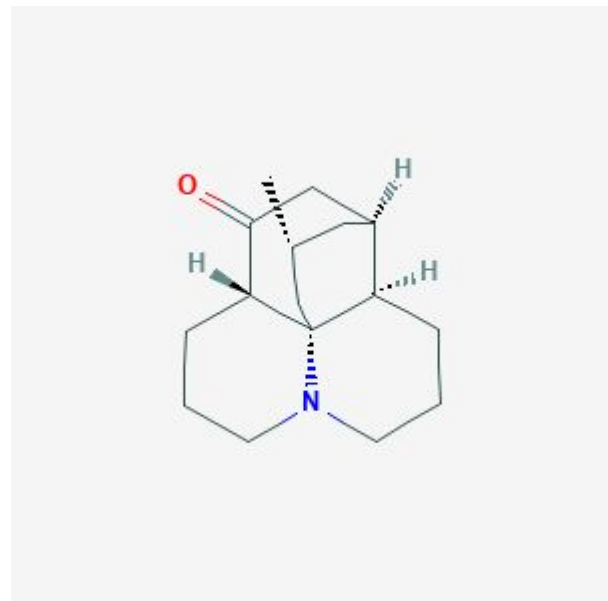
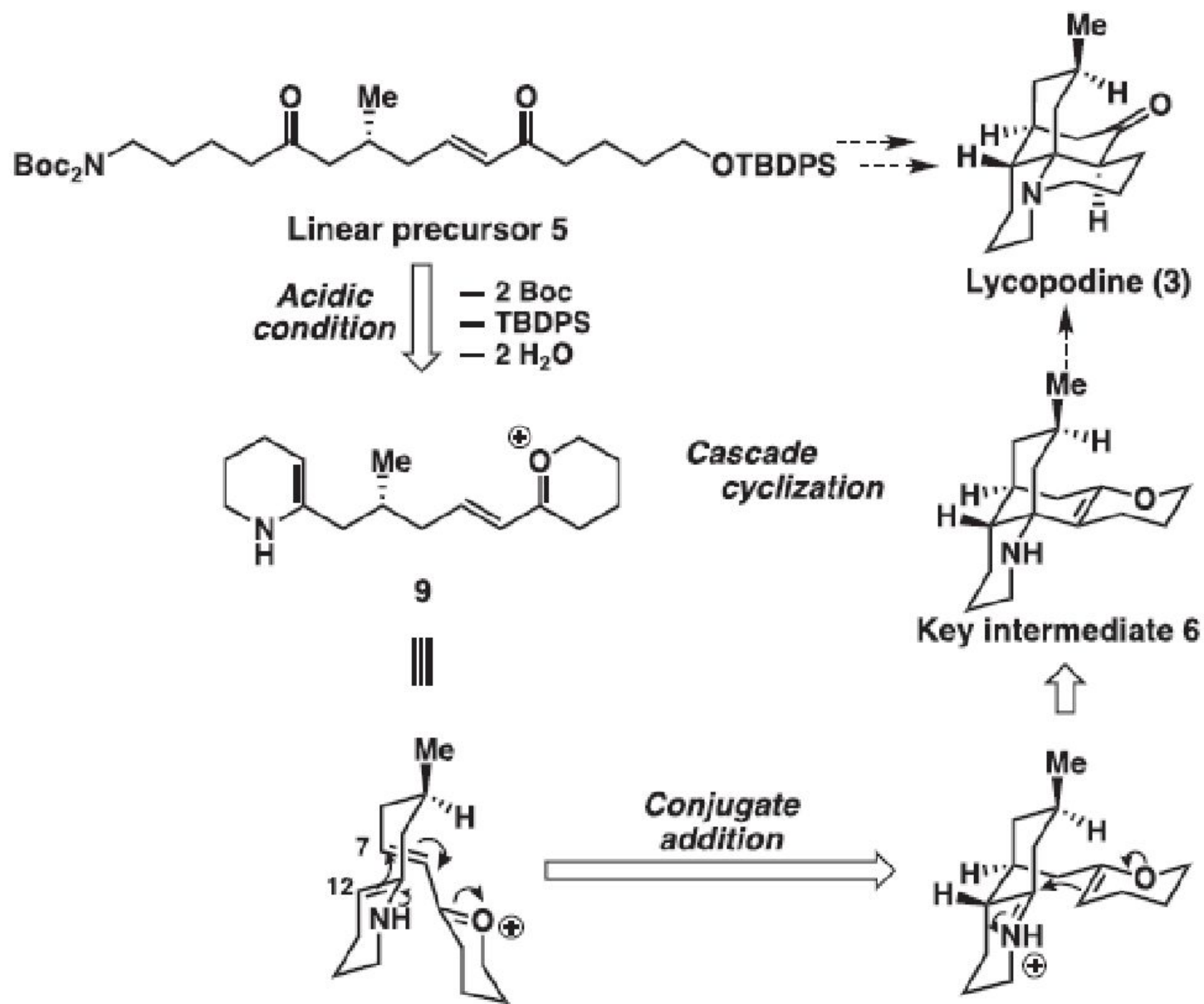


# Concise asymmetric total synthesis of lycopodine and flabelliformine via cascade cyclization reaction

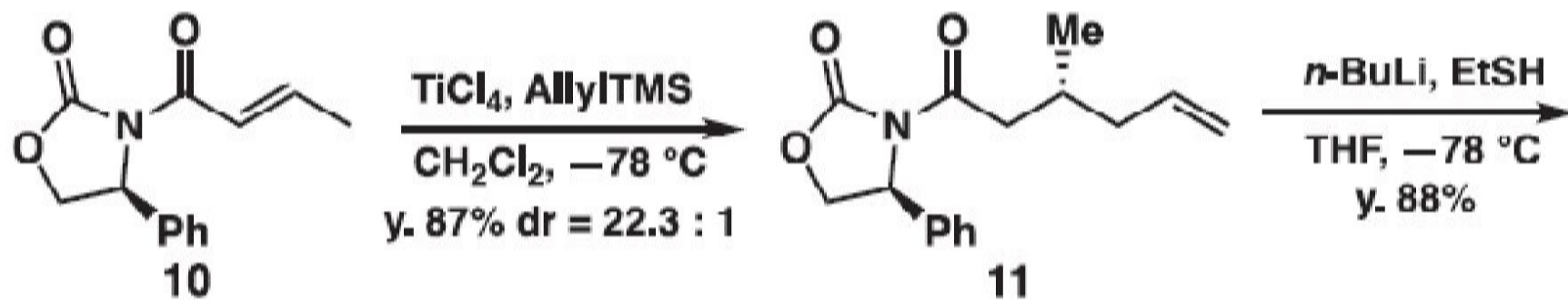
Kentaro Wada, Noriyuki Kogure, Mariko Kitajima, Hiromitsu Takayama \*

*Graduate School of Pharmaceutical Sciences, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba 260-8675, Japan*

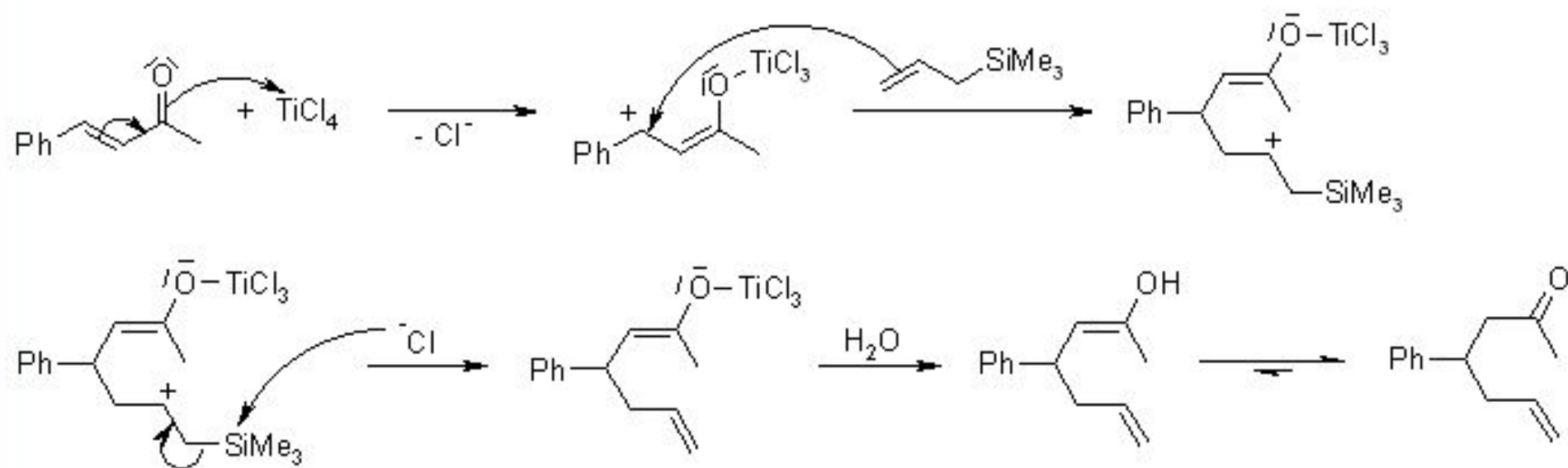


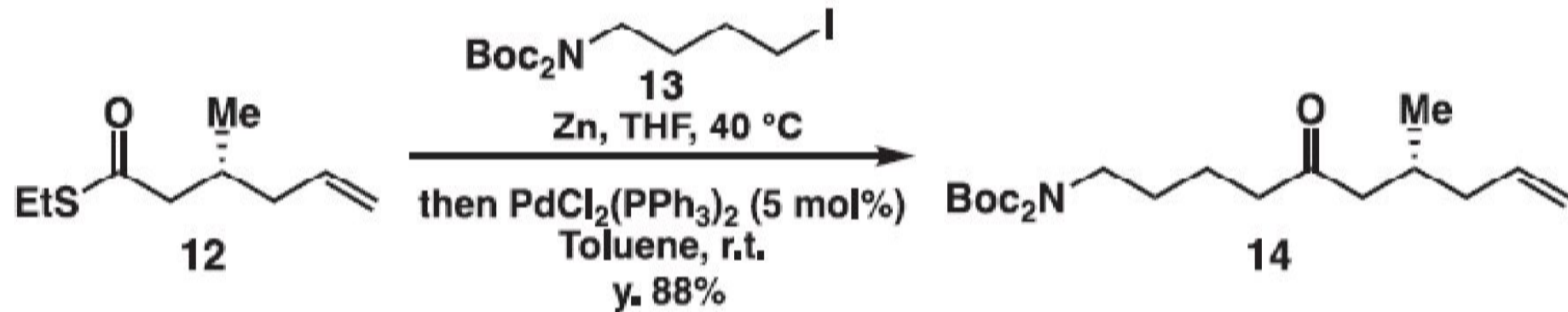


**Scheme 2.** Synthetic plan in this work.



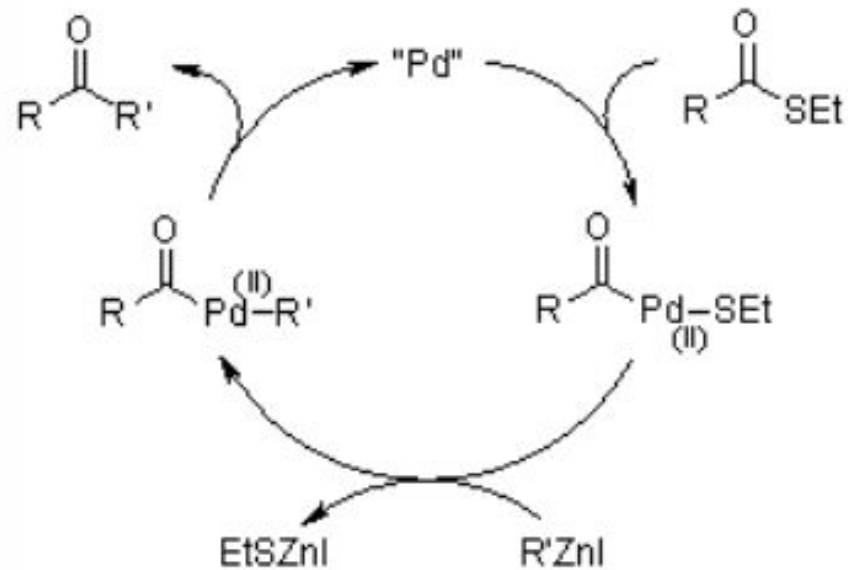
### Mechanism of the Hosomi-Sakurai Reaction

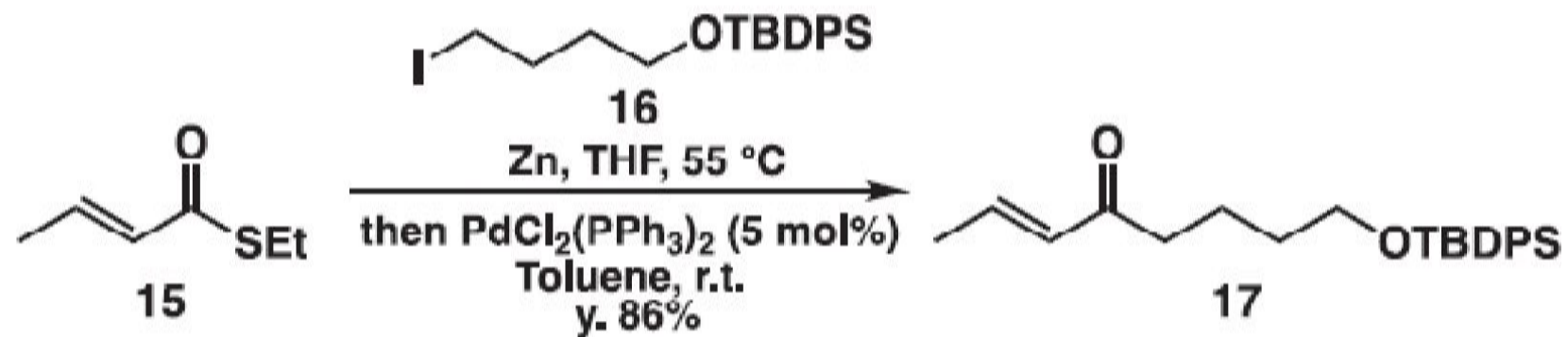




### Mechanism of the Fukuyama Coupling

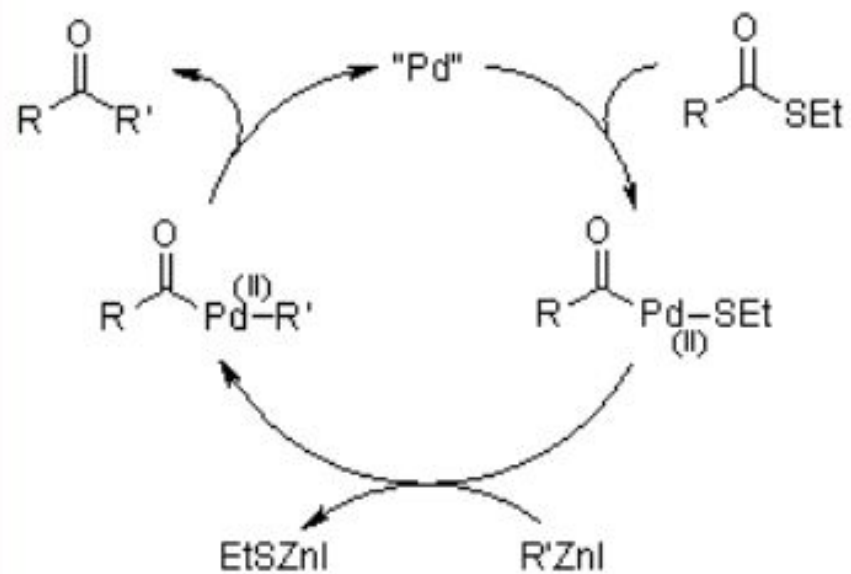
Oxidative addition of the thioester is followed by transmet

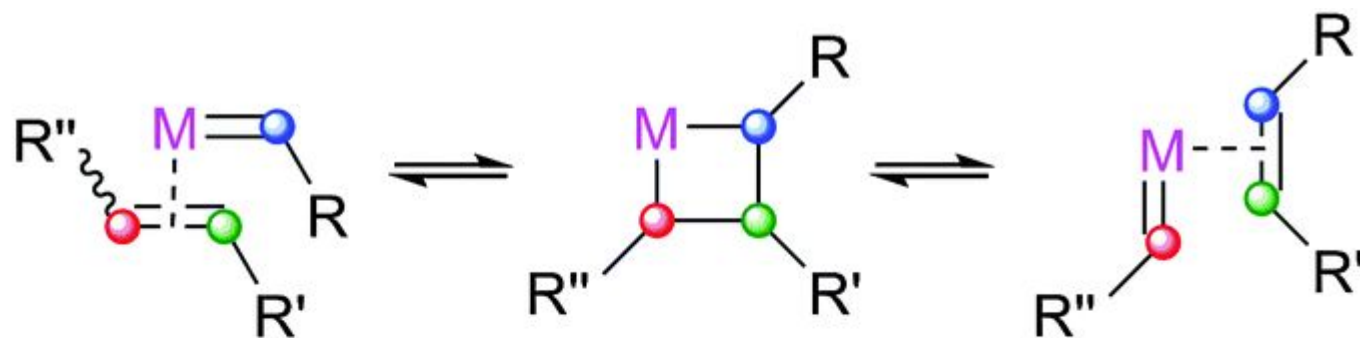
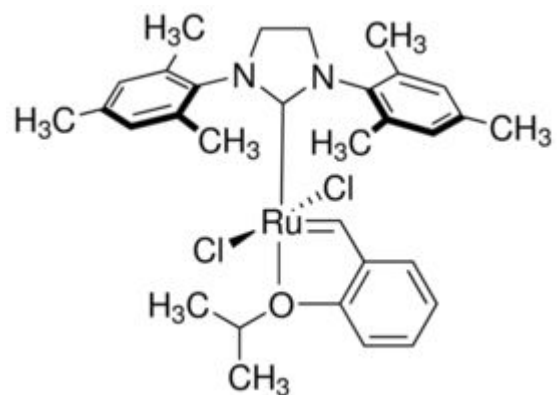
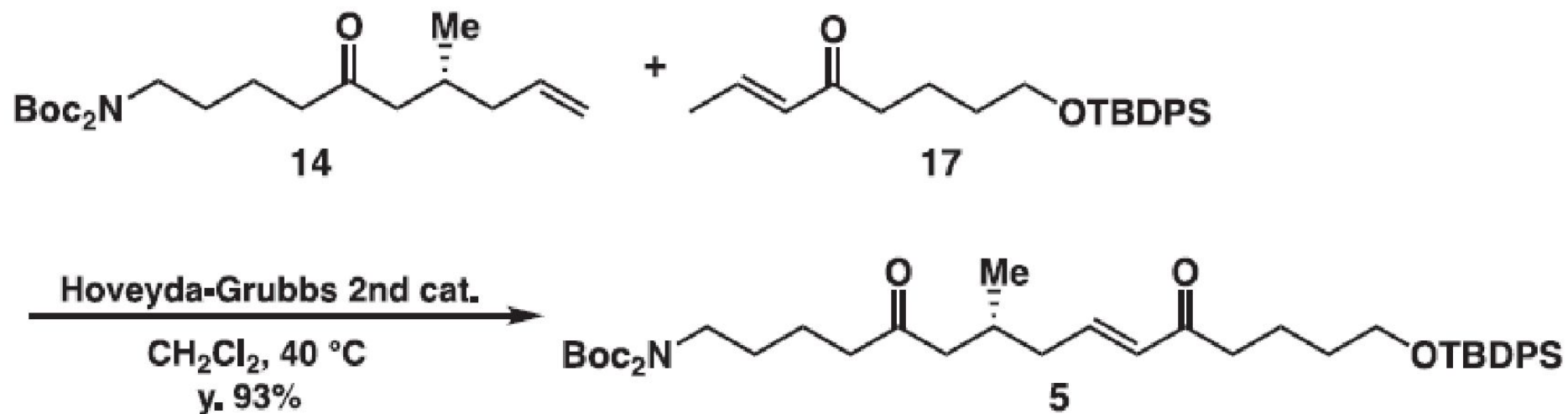


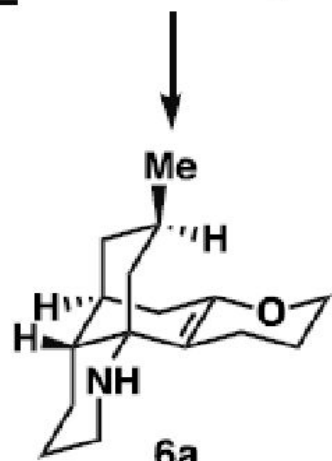
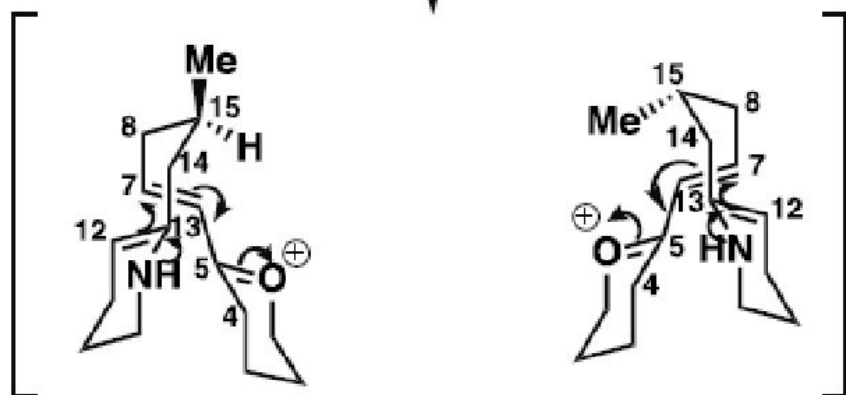
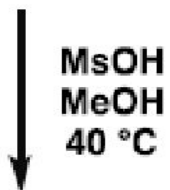
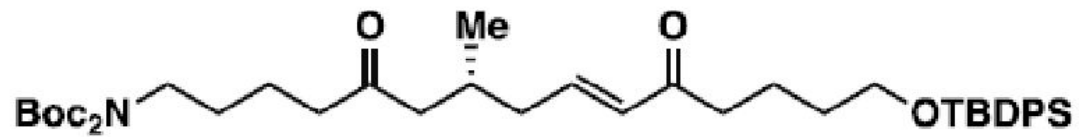


### Mechanism of the Fukuyama Coupling

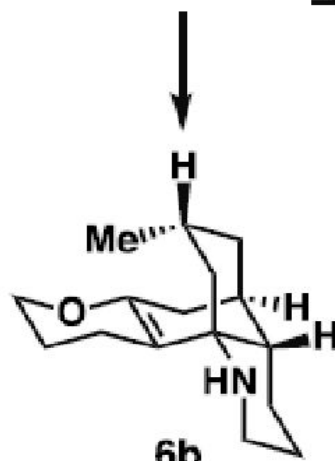
Oxidative addition of the thioester is followed by transmet



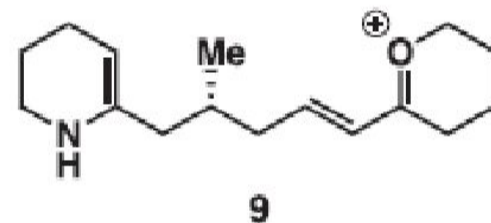


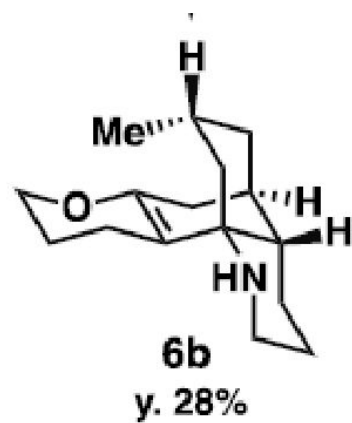
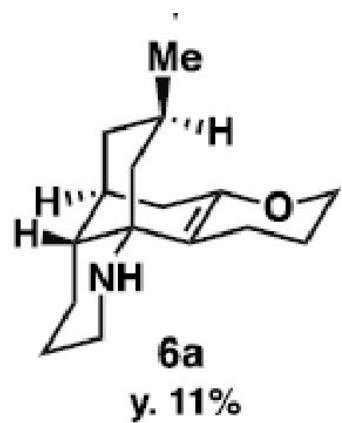


y. 11%



y. 28%





Et<sub>3</sub>N  
3,5-Dinitrobenzoyl chloride  
CH<sub>2</sub>Cl<sub>2</sub>

