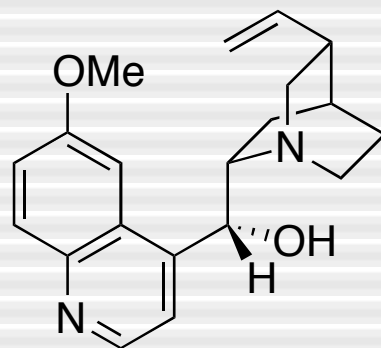


The First Stereoselective Total Synthesis of Quinine

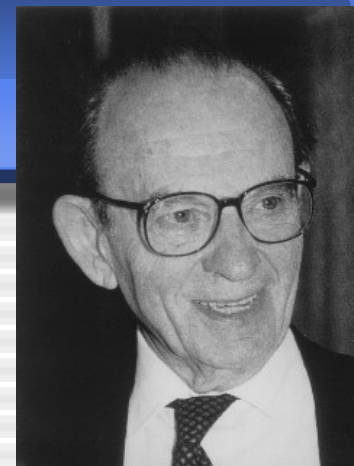
Gilbert Stork, Deqiang Niu, A. Fujimoto, Emil R. Koft, James M. Balkovec, James R. Tata and Gregory R. Dake

J. Am. Chem. Soc. **2001**, 123, 3239 - 3242



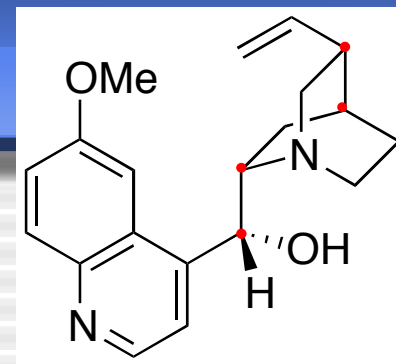
Presented by Jennifer Eddy

Gilbert Stork



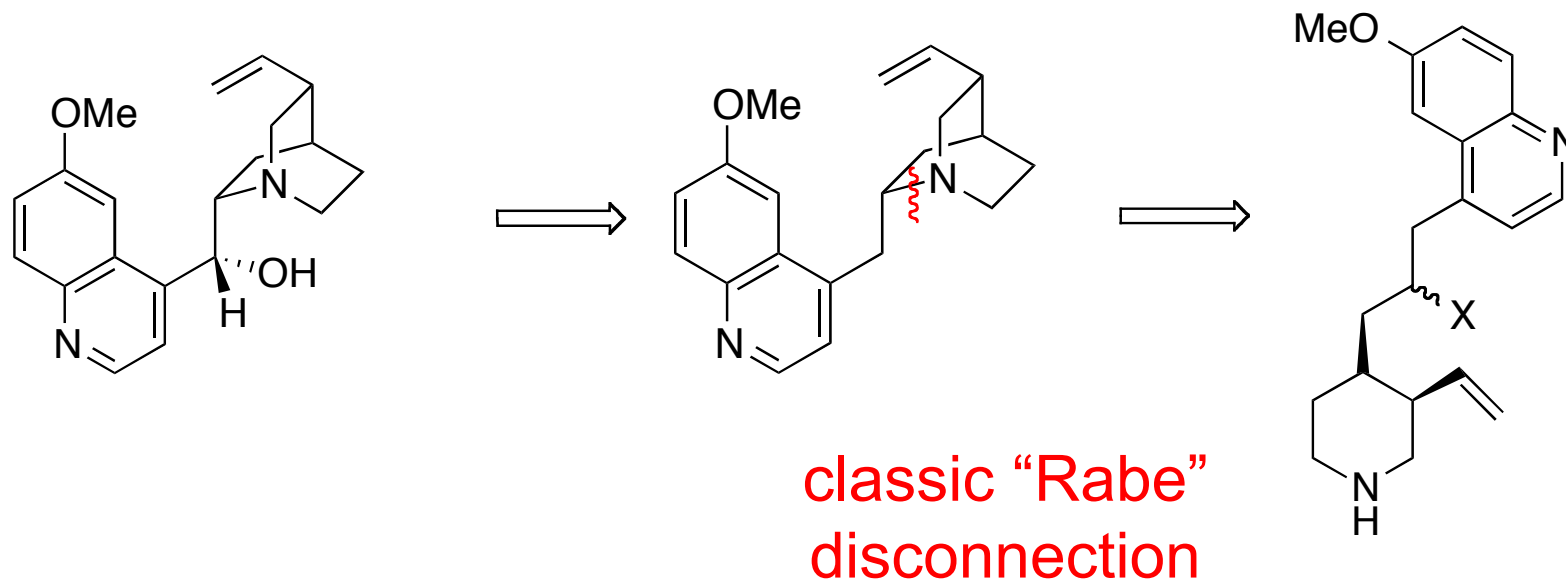
- Born in Brussels, Belgium on Dec. 31, 1921
- 1939: Moved to U.S.
- 1945: Ph.D. Univ. of Wisconsin
Advisor: S.M. McElvain
- 1945-1946: *Senior Research Chemist*, Lakeside Laboratories
- 1946- 1948: *Instructor*, Harvard University
- 1948- 1953: *Associate Professor*, Harvard University
- 1953-1955: *Associate Professor*, Columbia University
- 1955- 1993: *Professor*, Columbia University
- 1993- Present: *Professor Emeritus*, Columbia University

Previous work

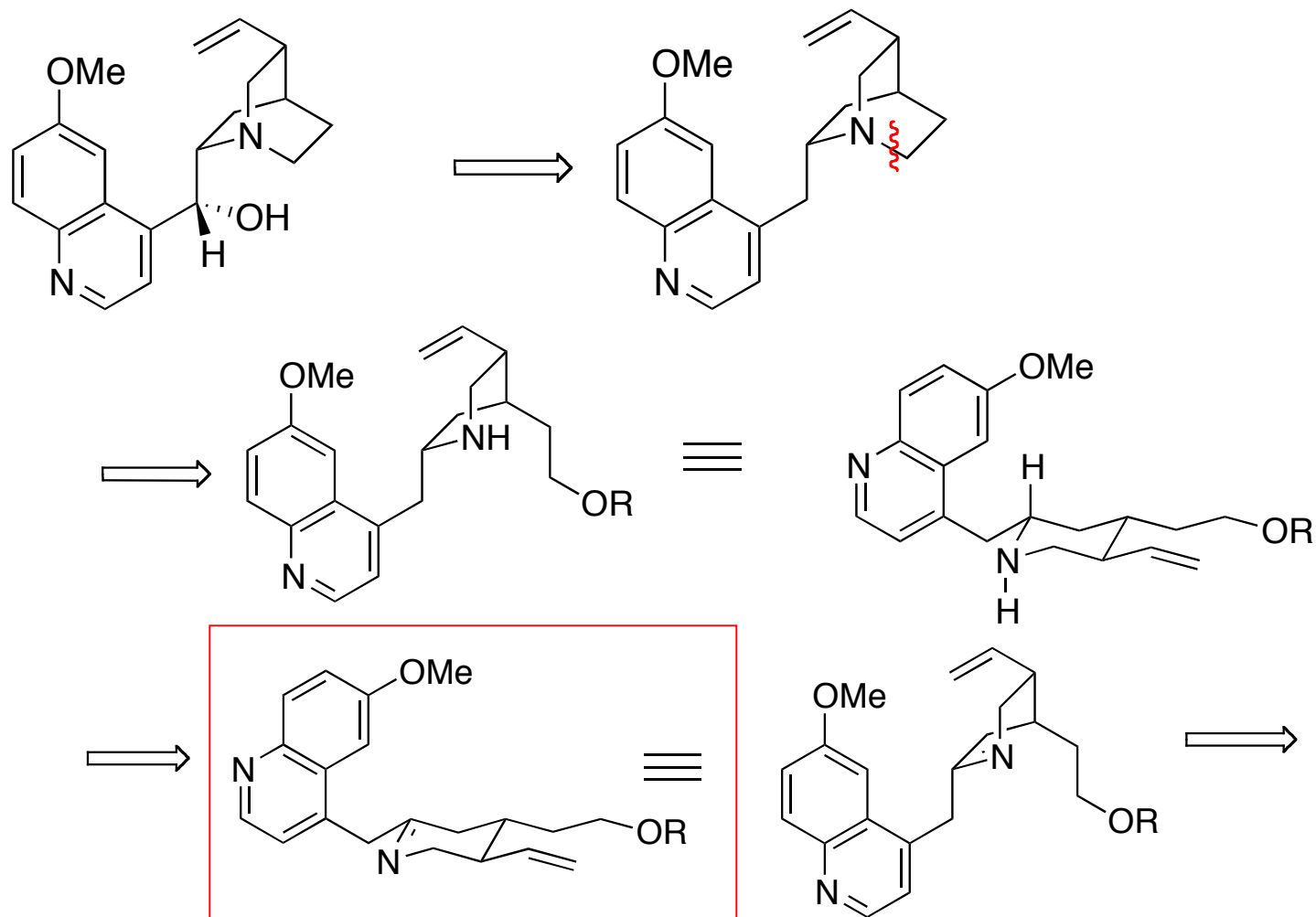


- 1907: The correct connectivity is “unraveled” by Rabe
- 1918: Rabe and Kindler synthesize quinine from quinotoxine
- 1944: Woodward and Doering synthesize quinotoxine
- 1978: Uskoković, Gutzwiller and collaborators at Hoffmann- La Roche synthesize quinine using a stereoselective approach
 - However, only 3 of the 4 stereocenters

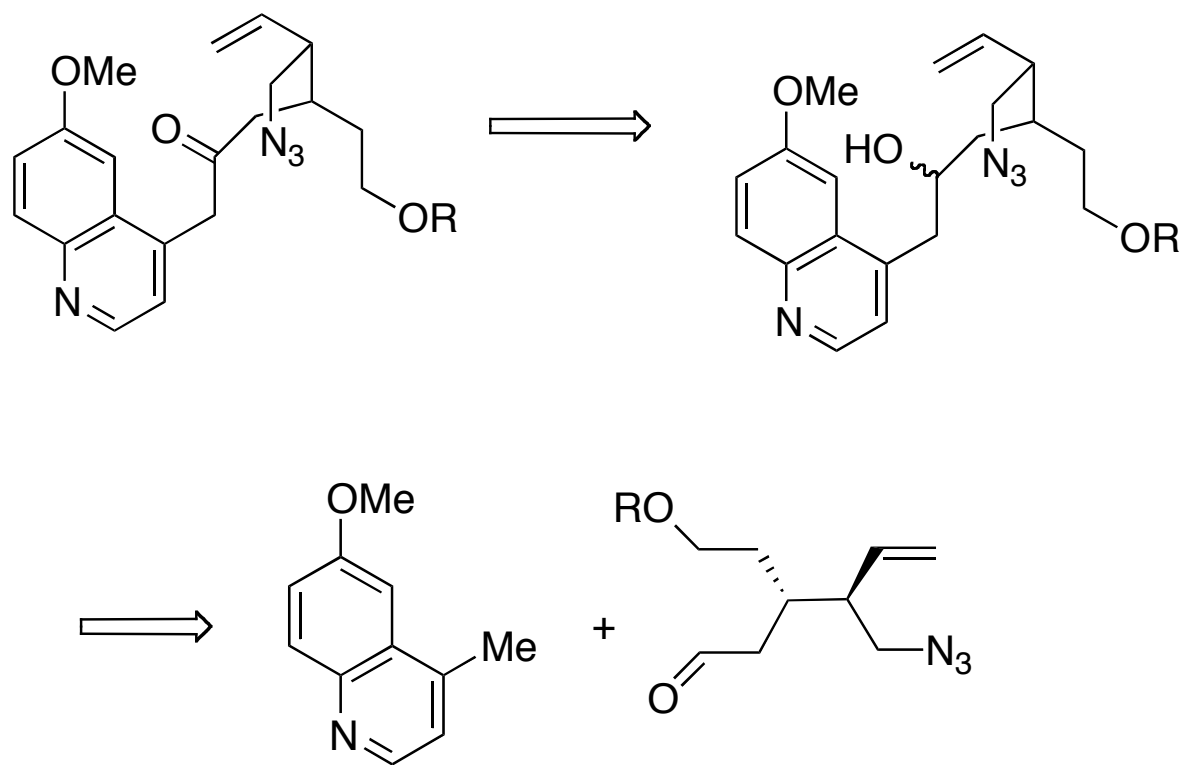
Retrosynthesis



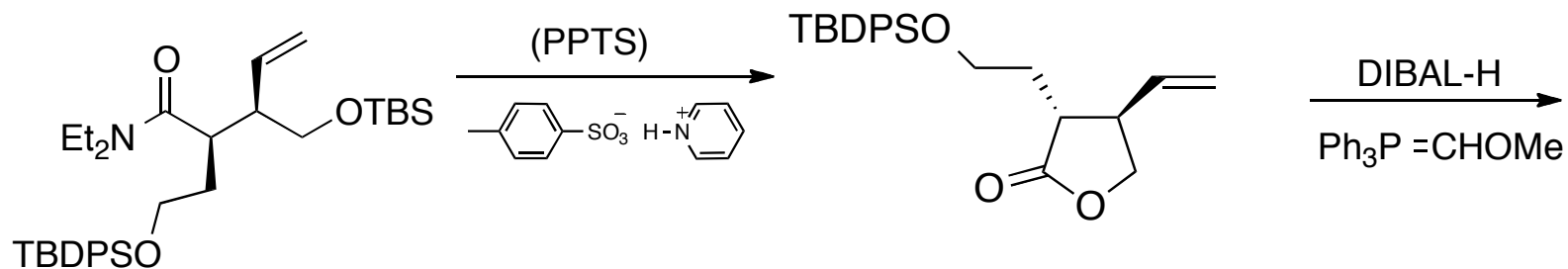
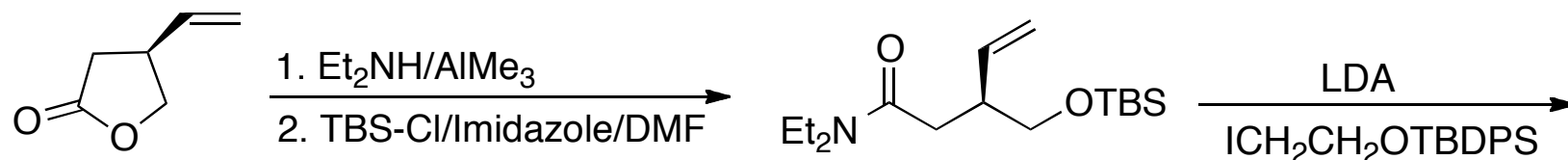
Retrosynthesis



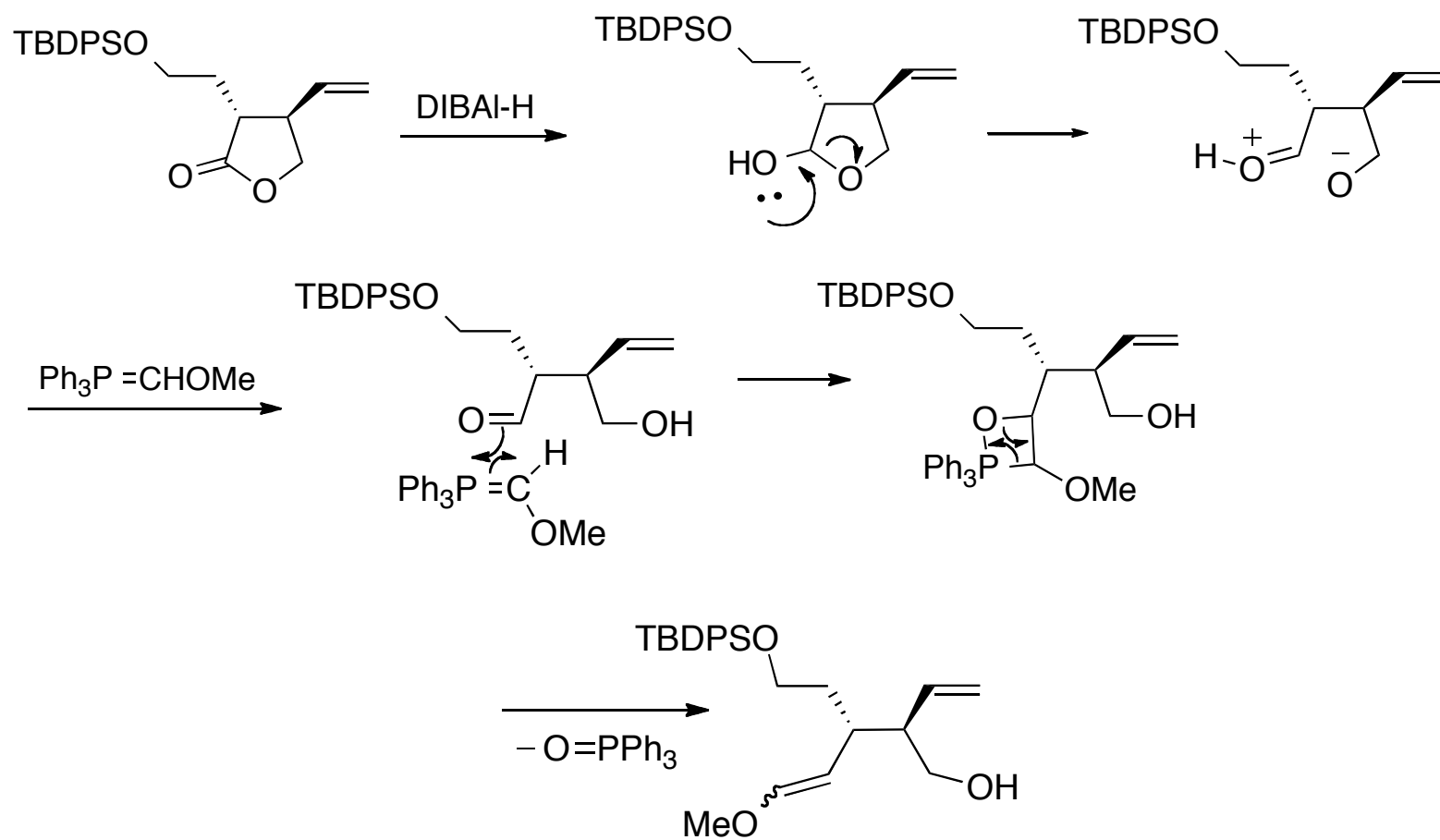
Retrosynthesis



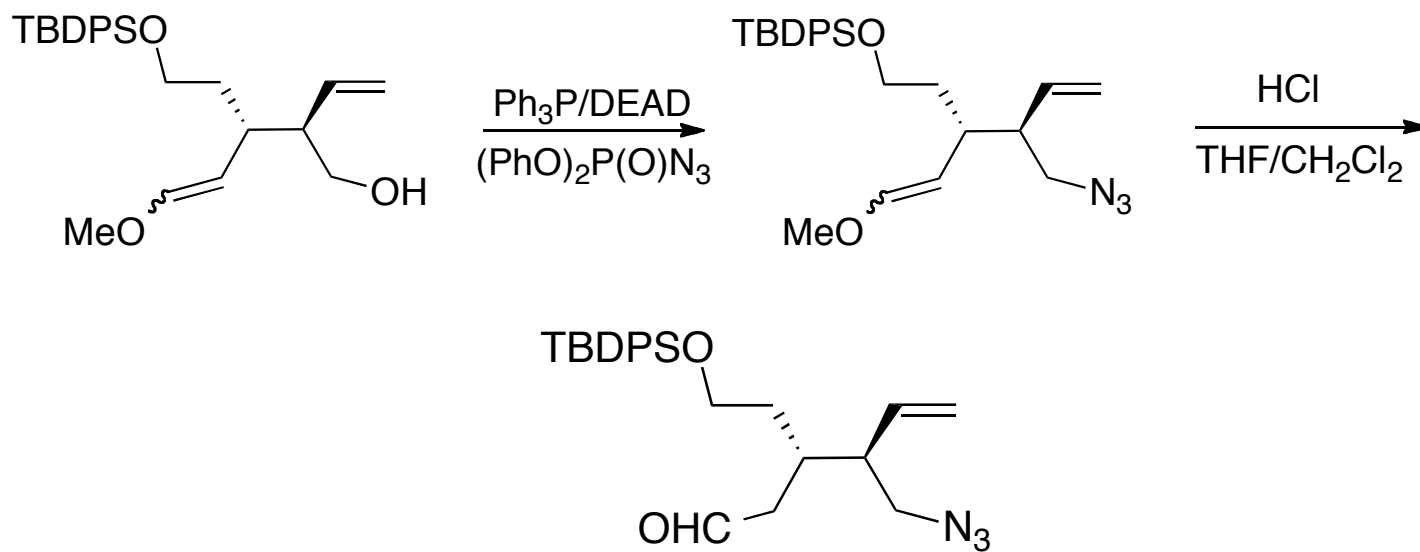
Formal Total Synthesis



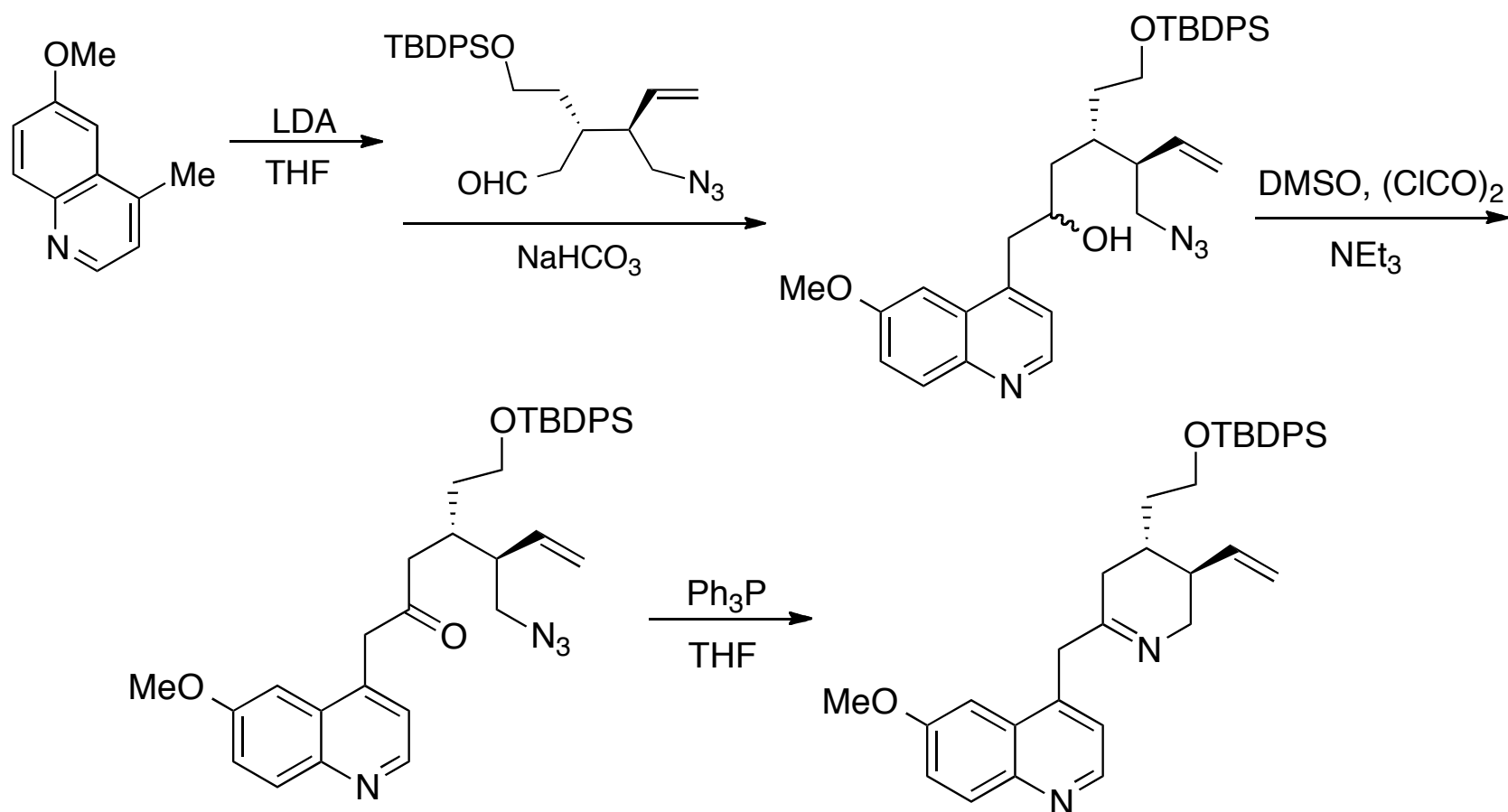
Mechanism of Wittig



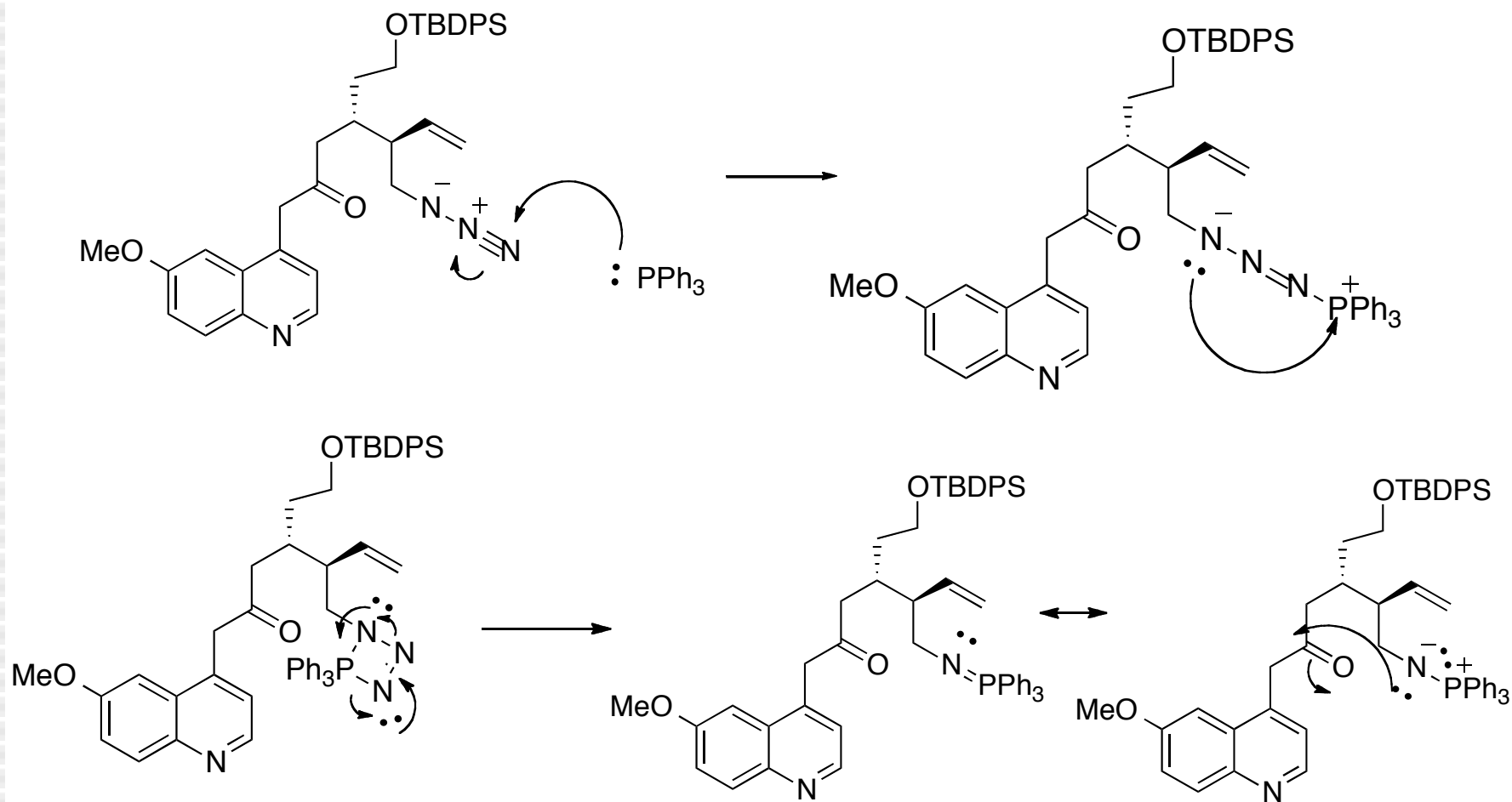
Formal Total Synthesis



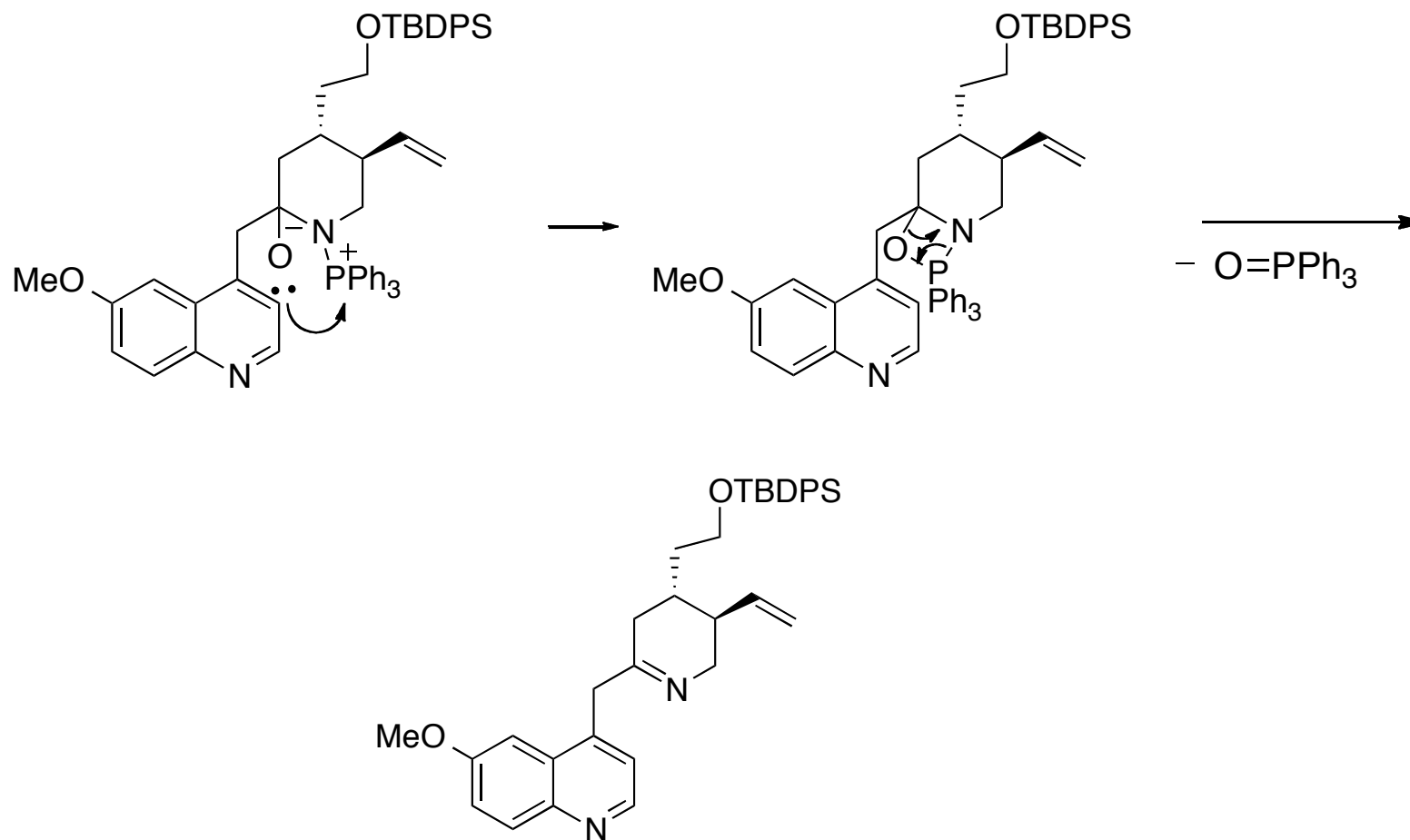
Formal Total Synthesis



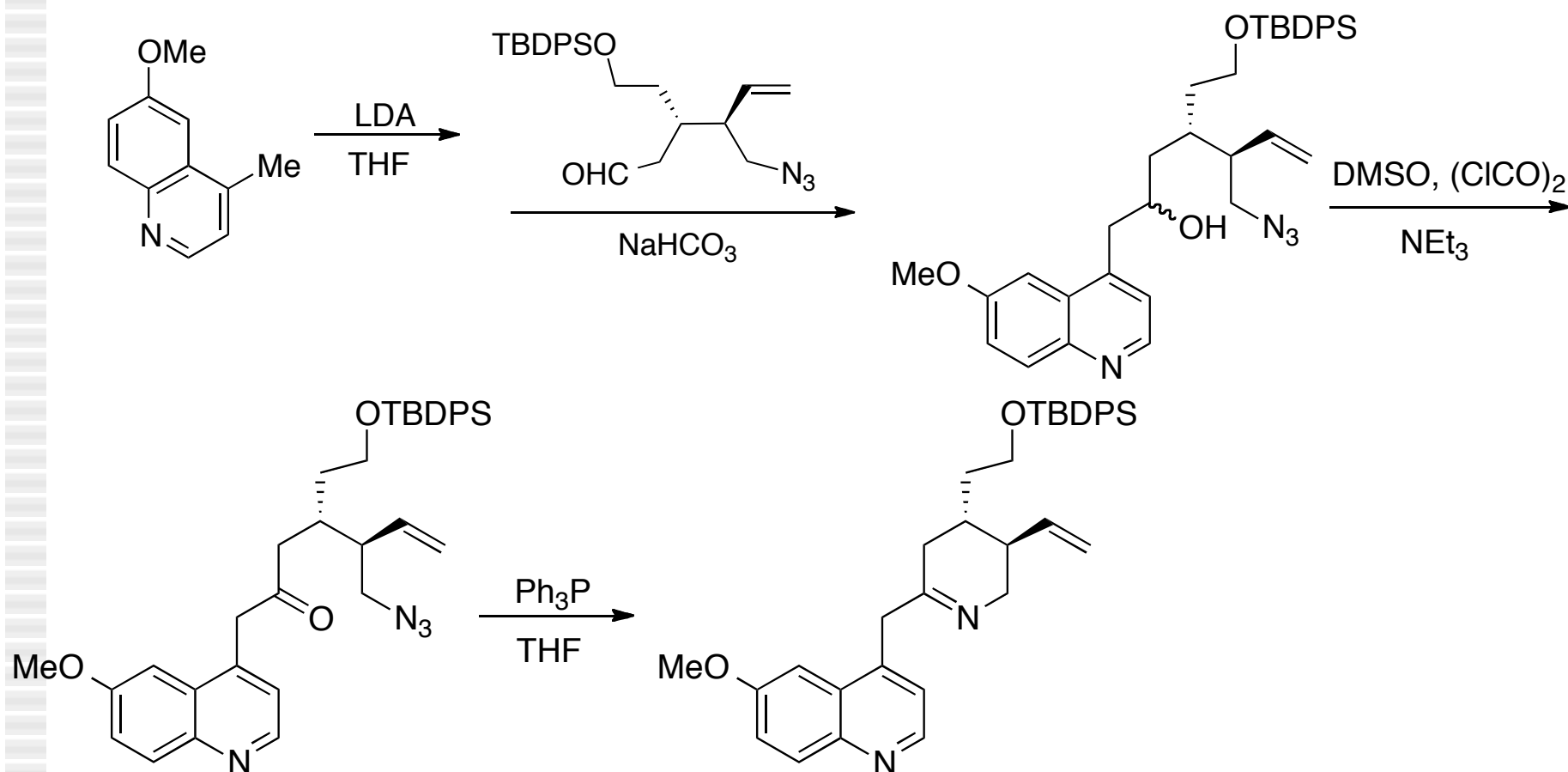
Staudinger/Aza-Wittig Mechanism



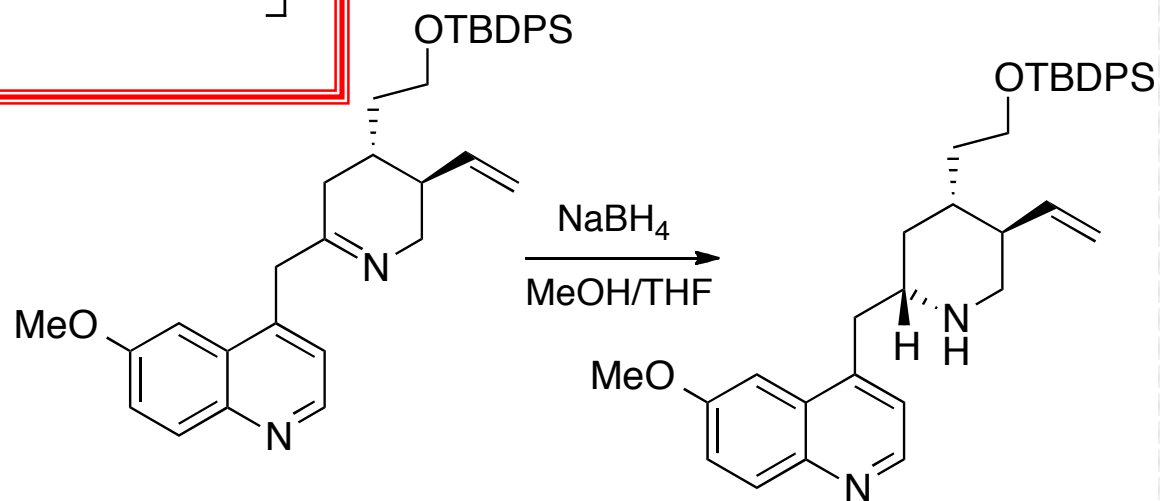
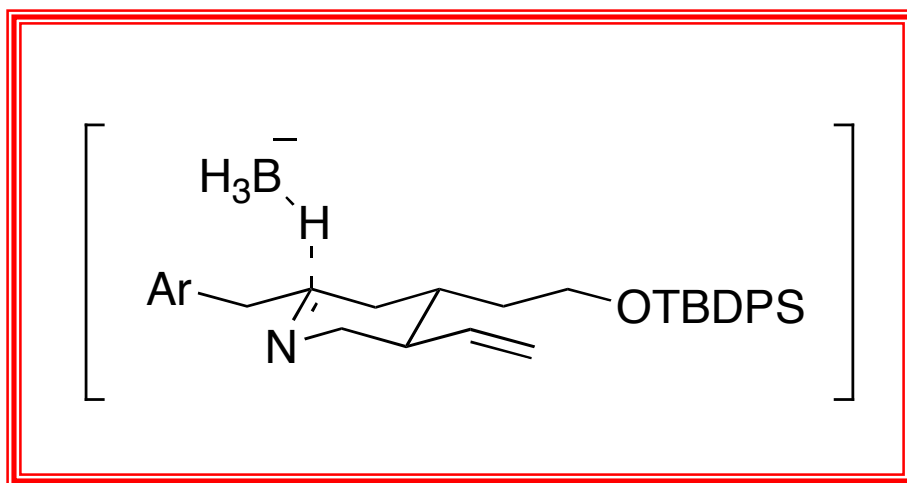
Staudinger/Aza-Wittig Mechanism



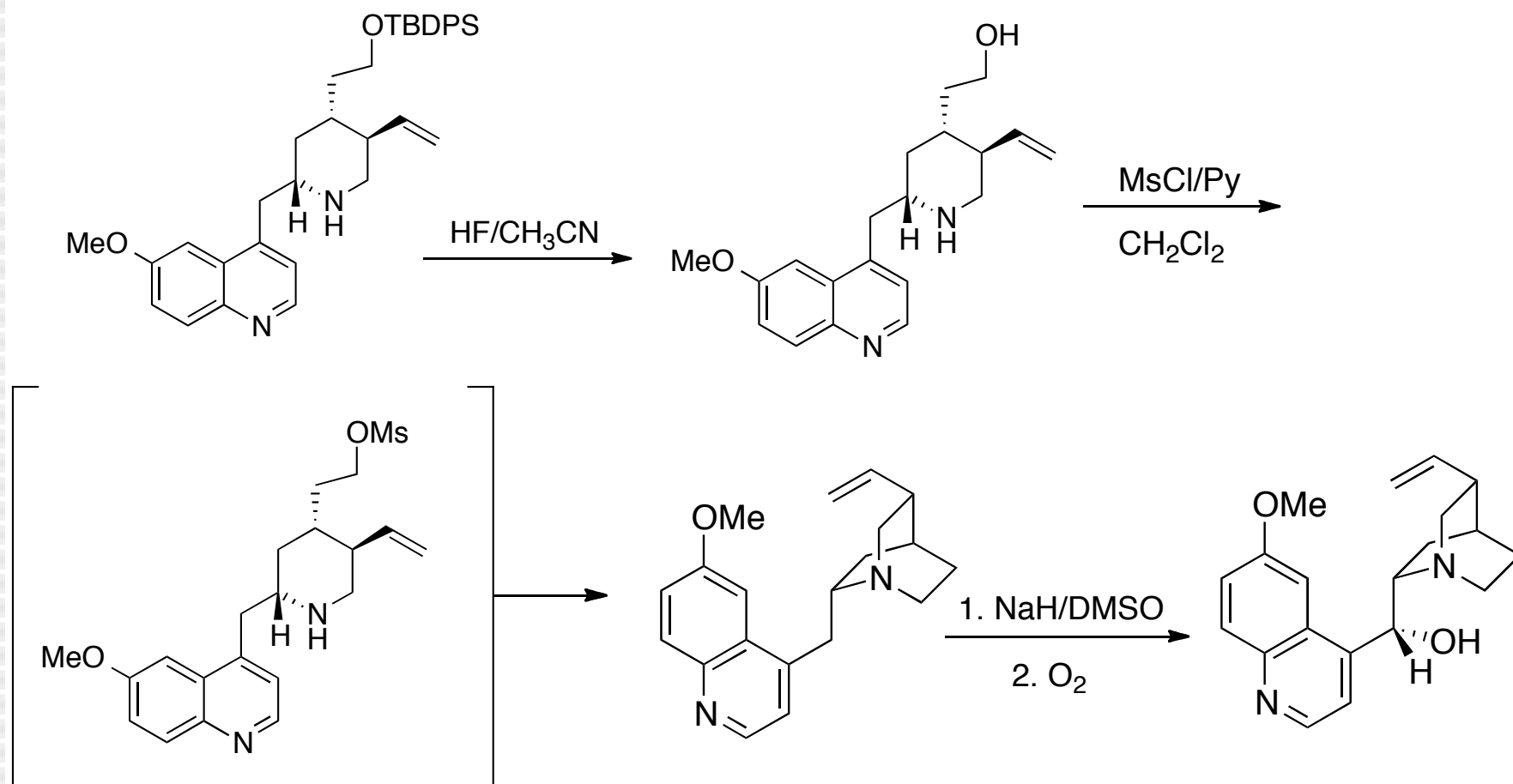
Formal Total Synthesis



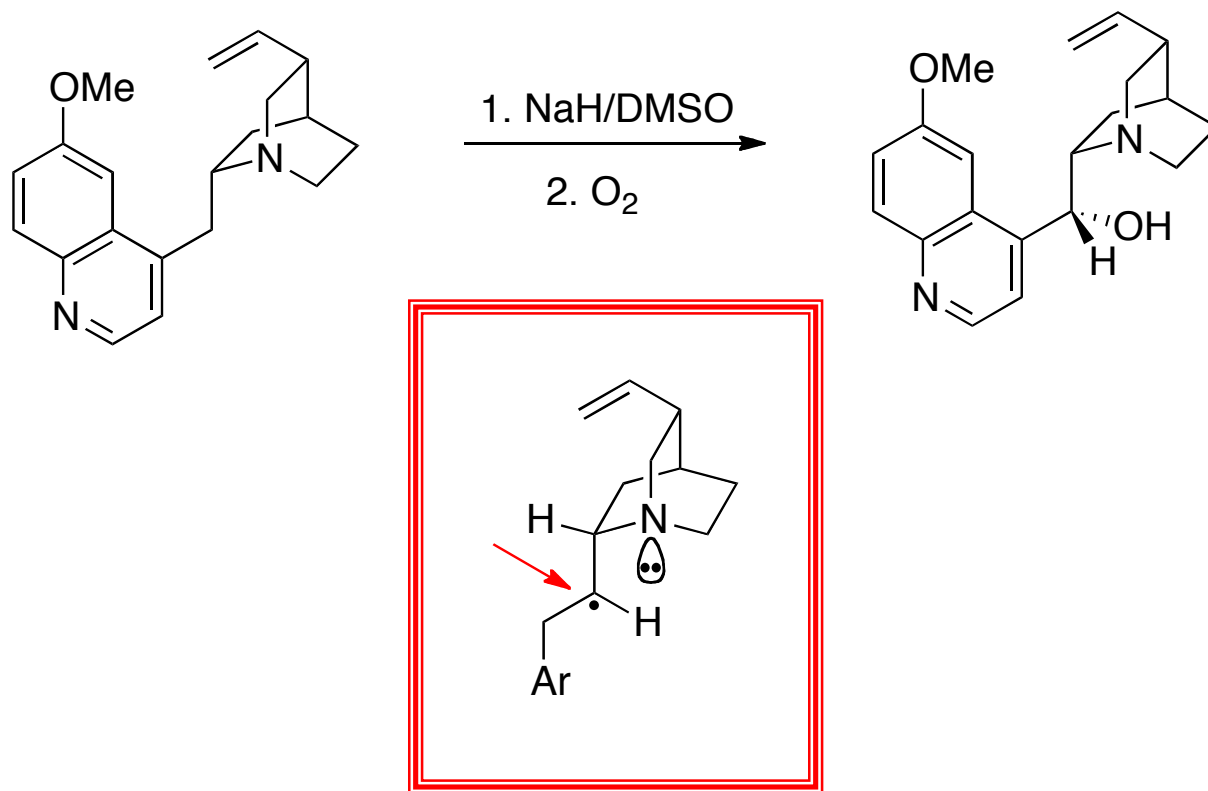
Formal Total Synthesis



Formal Total Synthesis

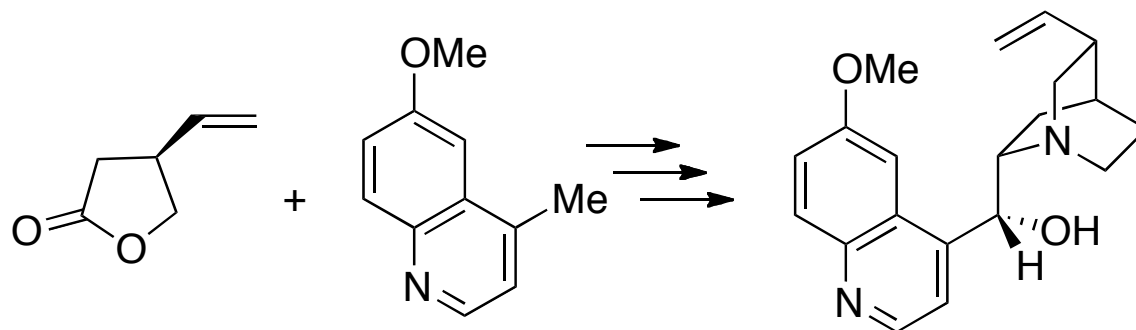


Formal Total Synthesis



Gutzwiller, J.; Uskoković, M.R. *J. Am. Chem. Soc.* **1978**, *100*, 576

Stork's synthesis of quinine



- Unique retrosynthetic analysis provided first stereoselective synthesis of quinine
- Completed in 19 steps
- The majority of steps were high yielding (70-95%)