



# Leo Armand Paquette

## Career-In-Review (CIR)

Zhang Wang (Danishefsky Group)

September 21, 2007

Synthesis Literacy Group

Columbia University Chemistry



# Career Snapshot

July, 15, 1934 *born*

1956 *B.S. in chemistry magna cum laude, Holy Cross College*

1959 *Ph.D. from MIT (Adv. Norman A. Nelson)*

1959-63 *Upjohn Company*

1963-69 *Ohio State University*

1969-87 *Professor at Ohio State University*

1987-present *Distinguished University Professor at OSU.*

# Awards

- **1965 Alfred P. Sloan Foundation Fellow**
- **1971 Morley Medalist of the Cleveland Section**
- **1976 – 1977 Guggenheim Fellow**
- **1979 Columbus Section Award**
- **1980 Senior Research Award, The Ohio State University**
- **1981 – 1987 Kimberly Professorship in Chemistry**
- **1987 Arthur C. Cope Scholar Award**
- **1984 National Award for Creative Work in Synthetic Organic Chemistry**
- **1989 Senior Humboldt Fellow**
- **1990 Sullivant Medal, The Ohio State University**
- **1992 Awardee of the Japanese Society for the Promotion of Science**
- **1992 Ernest Guenther Award**
- **2002 S. T. Li Prize for Science and Technology**

# Five Most Cited Papers (ISI Web of Science)

1. **PAQUETTE LA**, TERNANSKY RJ, BALOGH DW, et al.

[TOTAL SYNTHESIS OF DODECAHEDRANE](#)

JOURNAL OF THE AMERICAN CHEMICAL SOCIETY 105 (16): 5446-5450 1983

Times Cited: [194](#)

2. TERNANSKY RJ, BALOGH DW, **PAQUETTE LA**

[DODECAHEDRANE](#)

JOURNAL OF THE AMERICAN CHEMICAL SOCIETY 104 (16): 4503-4504 1982

Times Cited: [163](#)

3. **PAQUETTE LA**

[REALITIES OF EXTENDED HOMOAROMATICITY](#)

ANGEWANDTE CHEMIE-INTERNATIONAL EDITION IN ENGLISH 17 (2): 106-117 1978

Times Cited: [149](#)

4. GLEITER R, **PAQUETTE LA**

[SIGMA-PI INTERACTION AS A CONTROLLING FACTOR IN THE STEREOSELECTIVITY OF ADDITION-REACTIONS](#)

ACCOUNTS OF CHEMICAL RESEARCH 16 (9): 328-334 1983

Times Cited: [146](#)

5. **PAQUETTE LA**, FRISTAD WE, DIME DS, et al.

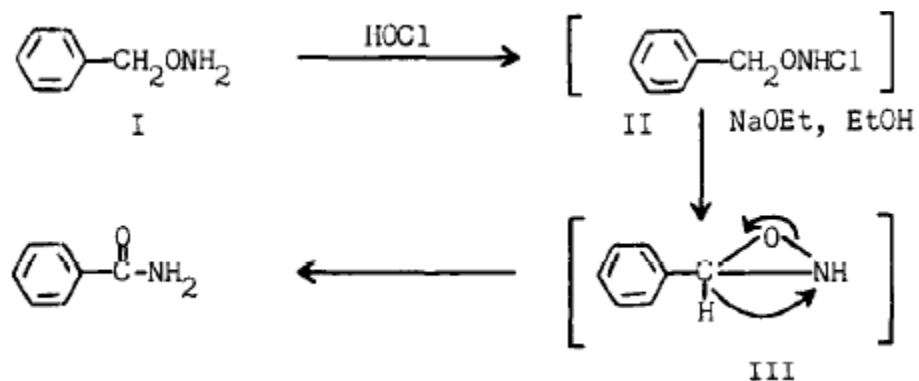
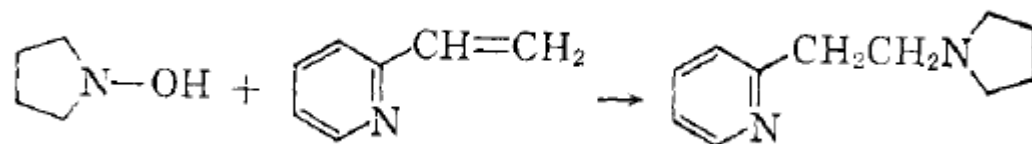
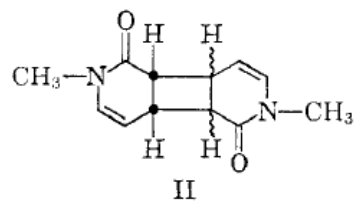
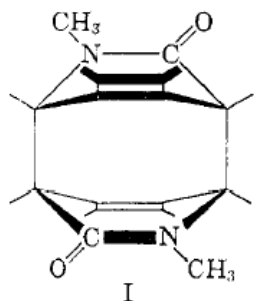
[SILANES IN ORGANIC-SYNTHESIS .8. PREPARATION OF VINYL SILANES FROM KETONES AND THEIR REGIOSPECIFIC CYCLOPENTENONE ANNULATION](#)

JOURNAL OF ORGANIC CHEMISTRY 45 (15): 3017-3028 1980

Times Cited: [146](#)

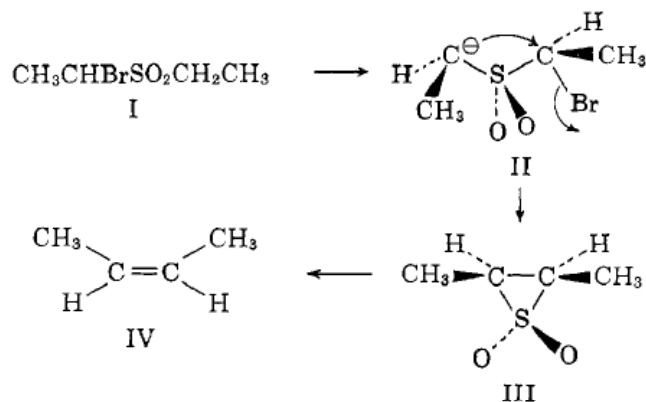


# Upjoin Company

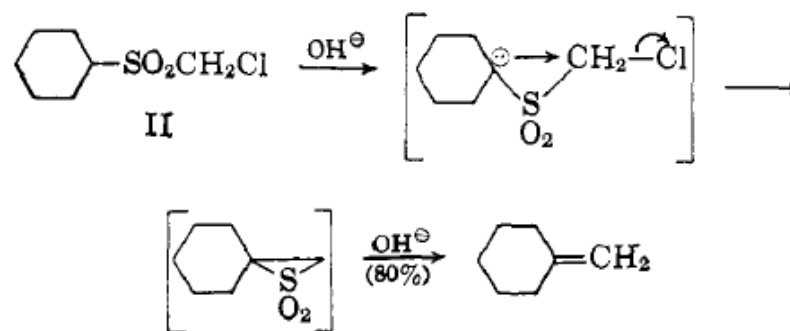
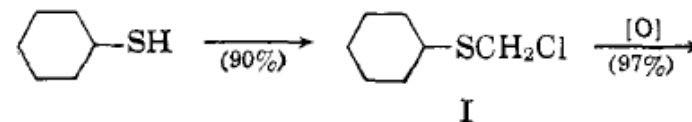
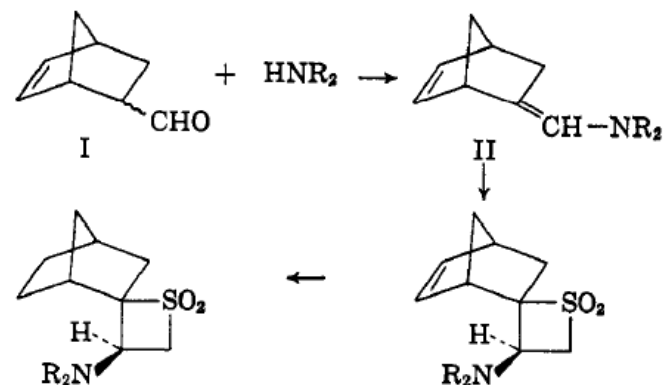
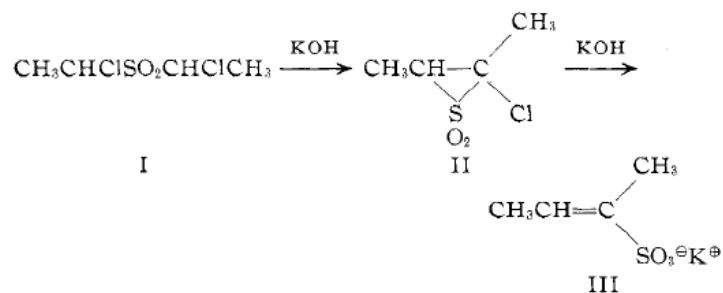


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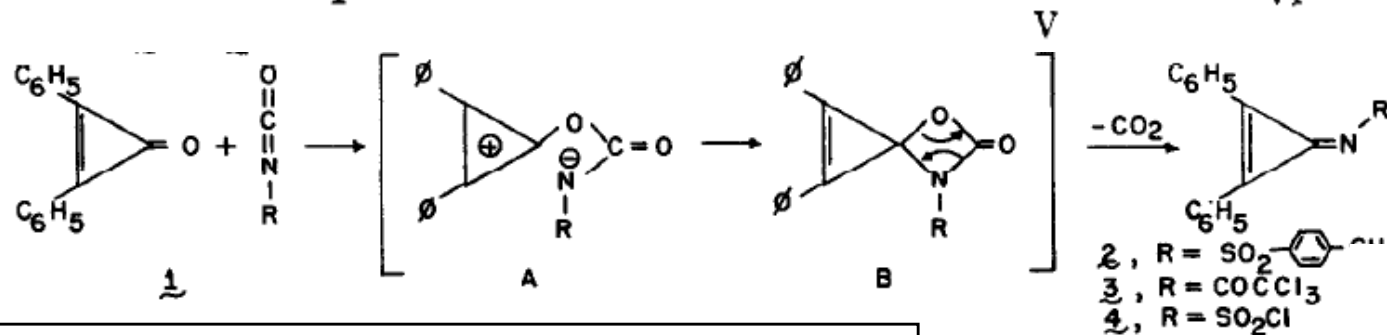
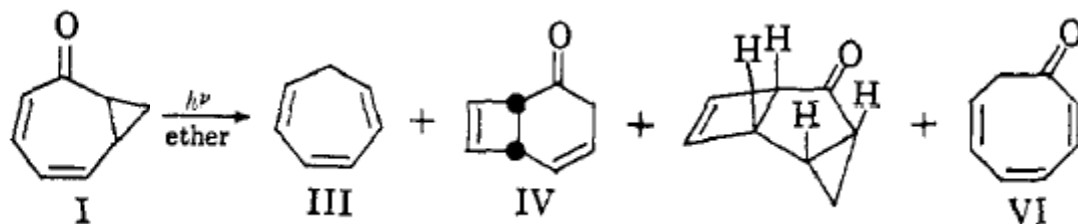
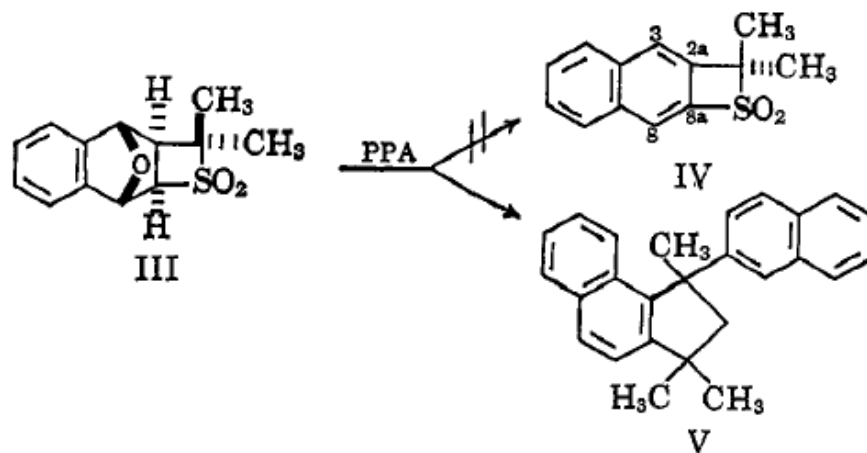
# OSU & Upjoin alpha halo-sulfones



Ramberg-Bäcklund rearrangement

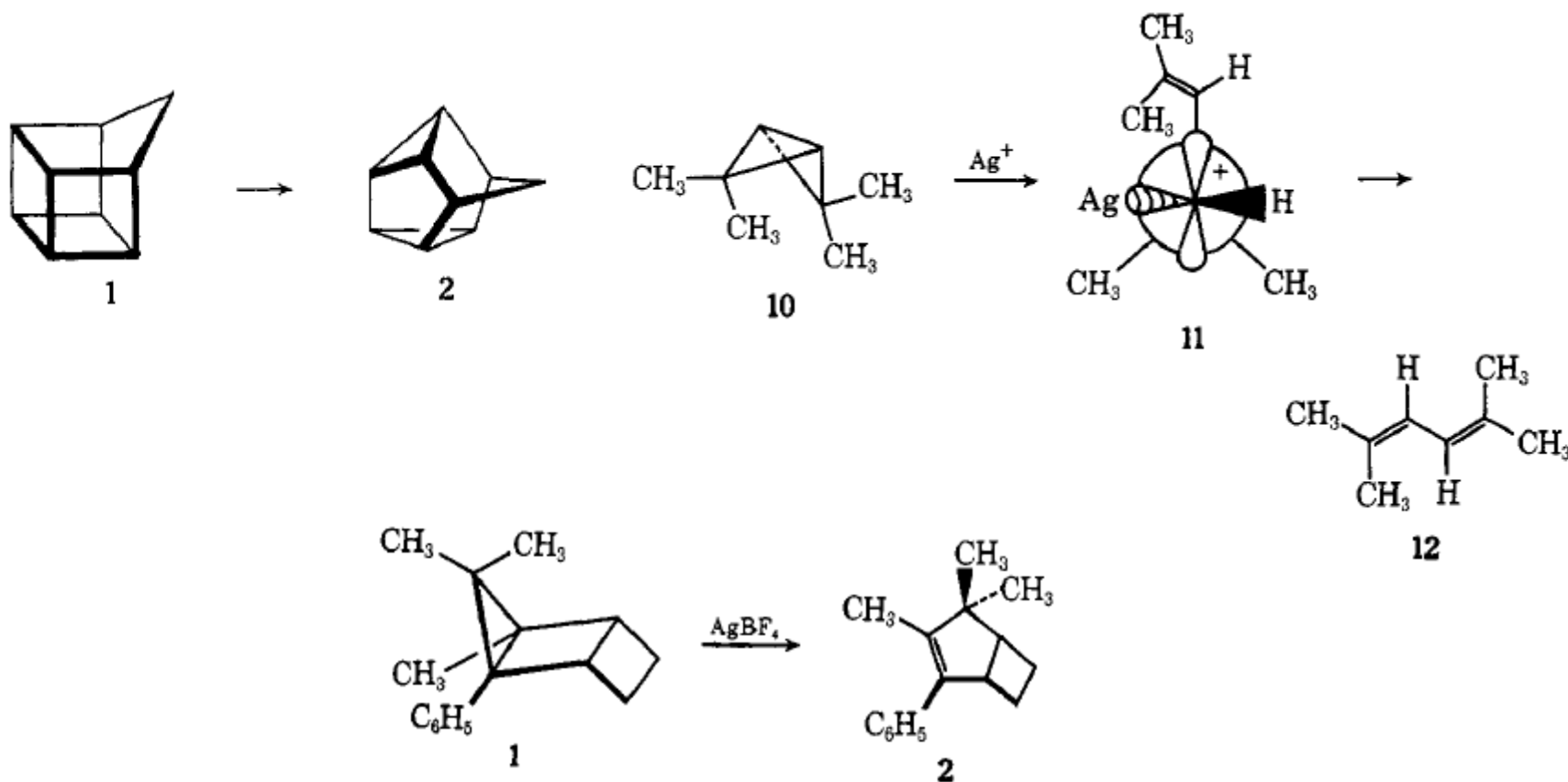


# OSU



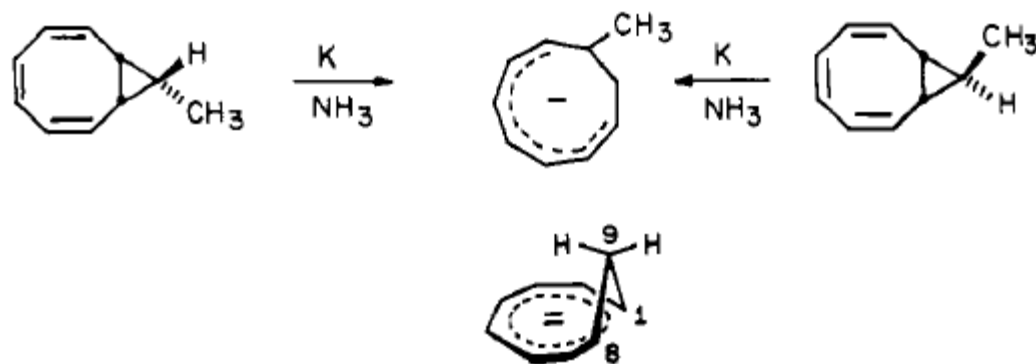
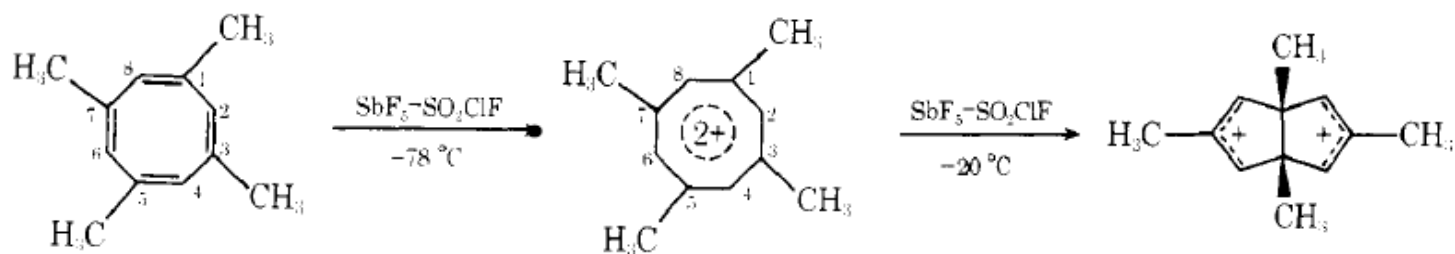
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# Silver(I)-catalyzed rearrangement



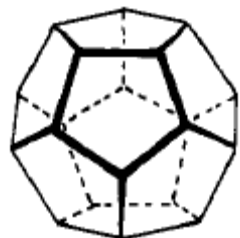
Zhang 9 - CU Synthesis Lit Group - Paquette

# Novel Aromatic and Homoaromatic Systems

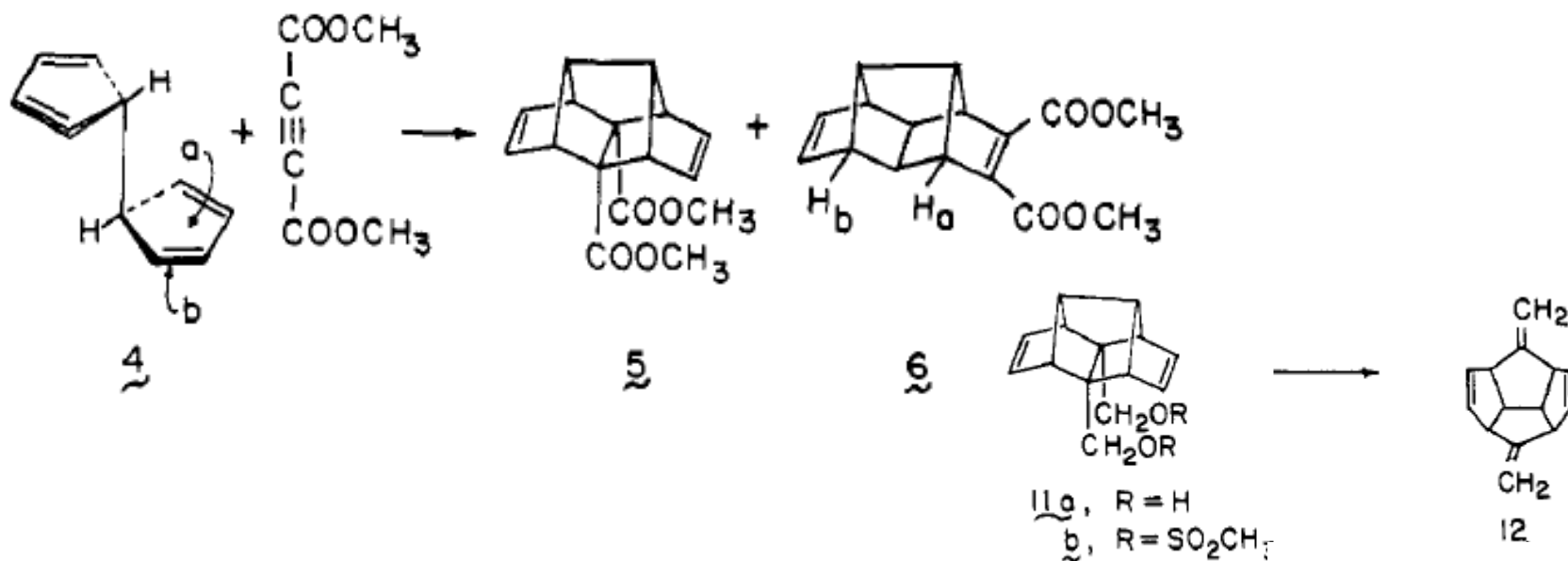


Zhang 10 - CU Synthesis Lit Group - Paquette

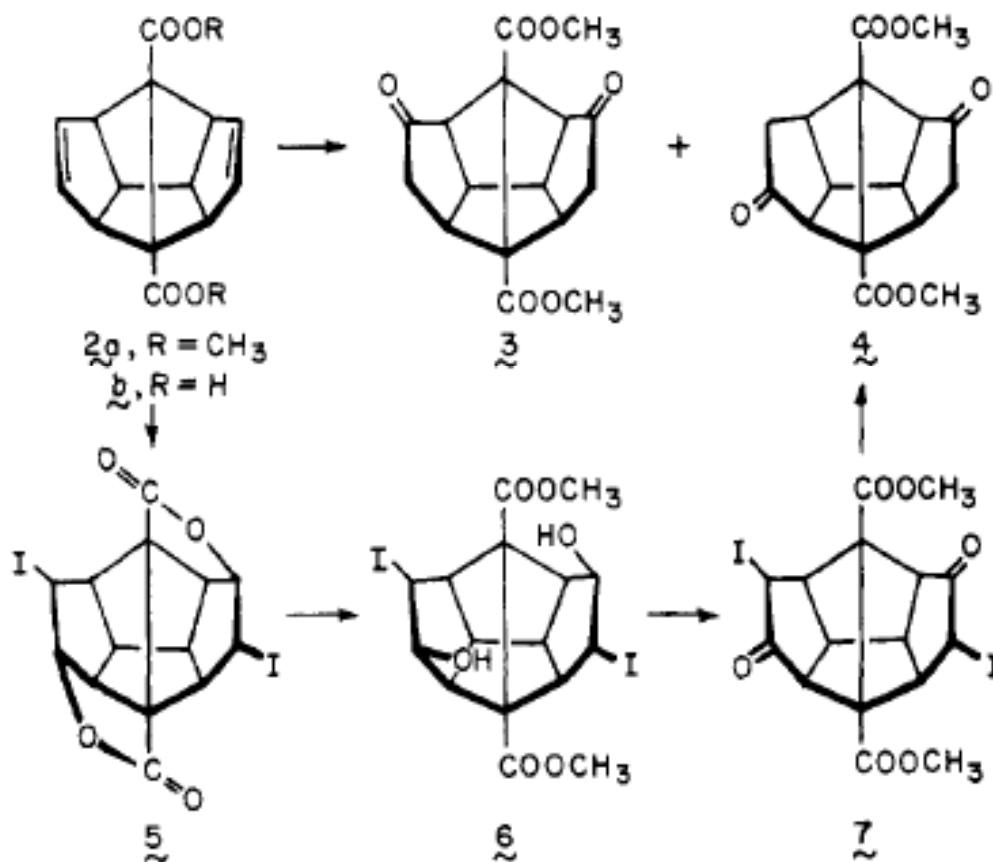
# Synthesis of Dodecahedrane



(1) The IUPAC name for dodecahedrane is undecacyclo-[9.9.0.0<sup>2,9</sup>.0<sup>3,7</sup>.0<sup>4,20</sup>.0<sup>5,18</sup>.0<sup>6,16</sup>.0<sup>8,15</sup>.0<sup>10,14</sup>.0<sup>12,19</sup>.0<sup>13,17</sup>]eicosane; Eckroth, D. R. *J. Org. Chem.* **1967**, *32*, 3362.

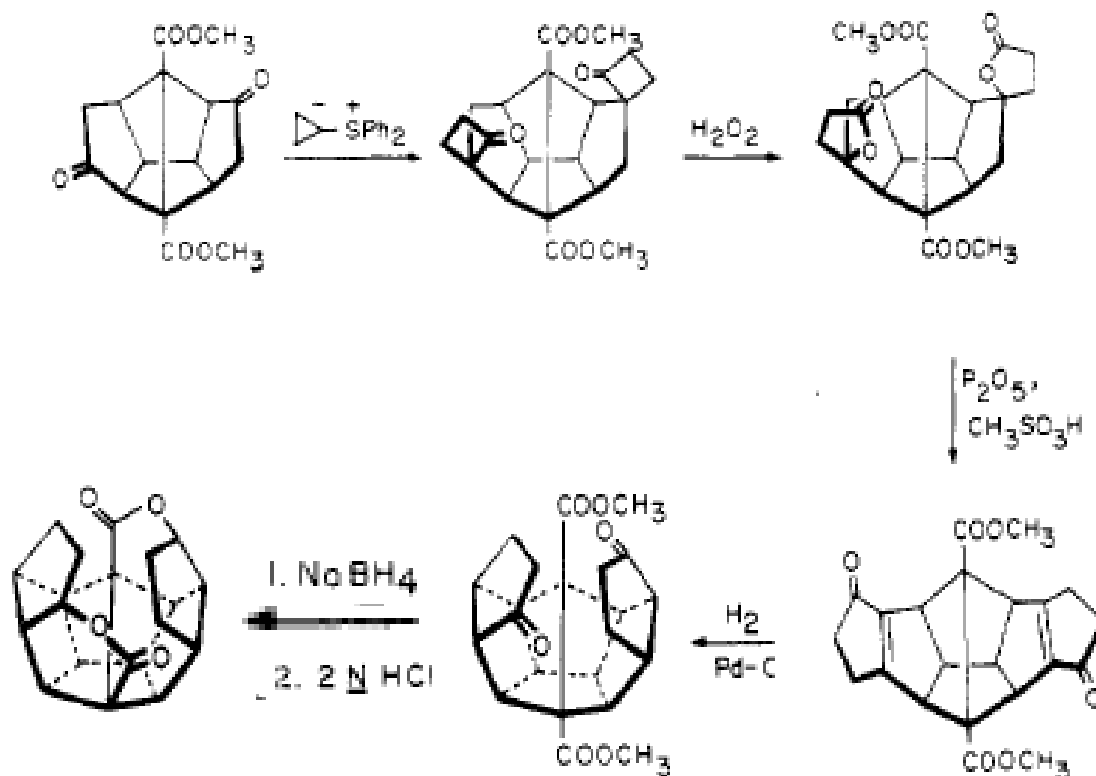


# Synthesis of Dodecahedrane



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# Synthesis of Dodecahedrane

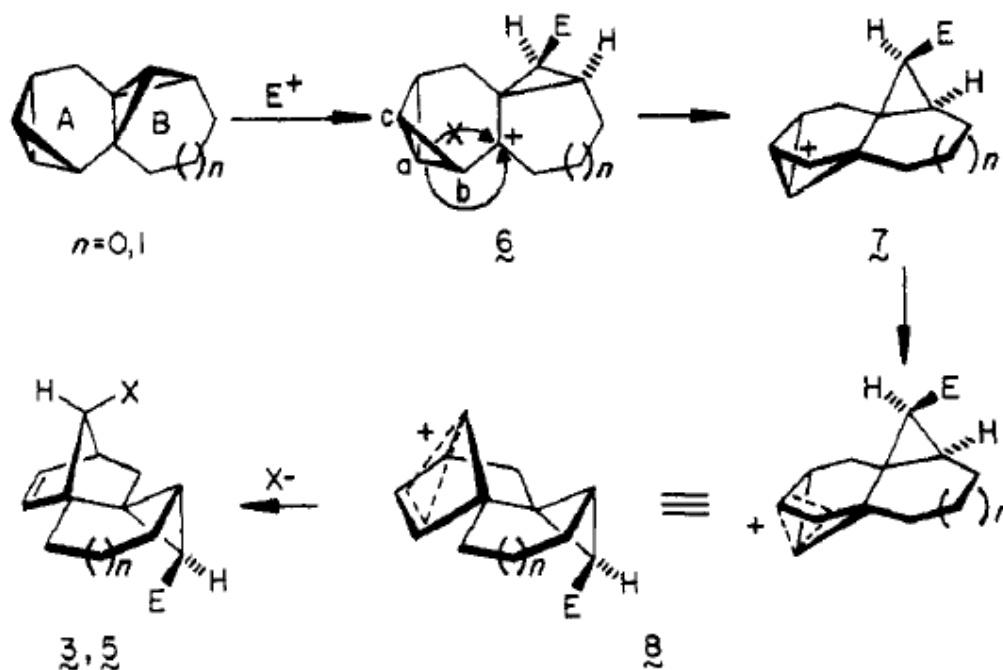
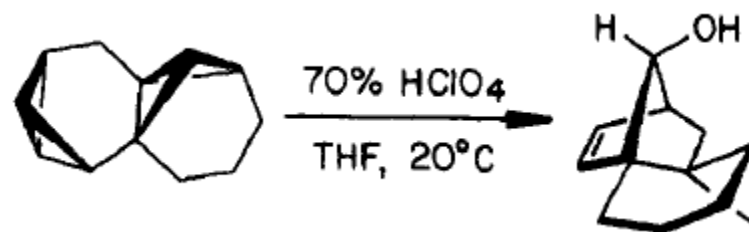




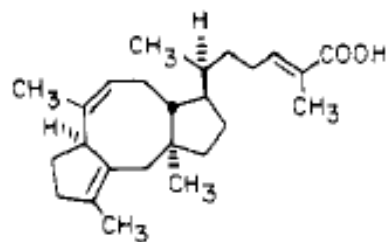
# Resolution by Sublimation

## An Example of Spontaneous Resolution by Sublimation

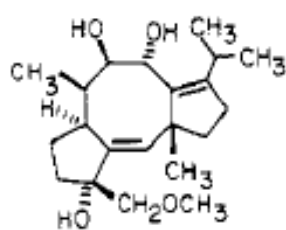
*Summary:* The unprecedented discovery has been made that it is possible to separate the racemic *anti*-7-norbornenol 2 into its enantiomorphs merely by sublimation at reduced pressure.



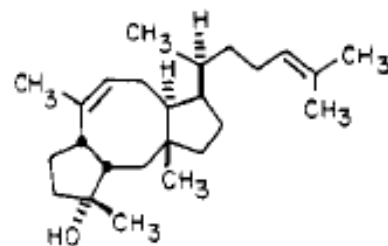
# Anionic Oxy-Cope in Total Synthesis



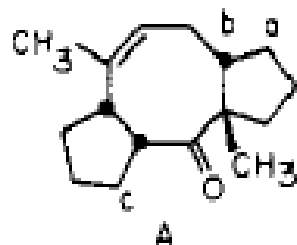
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albolin acid



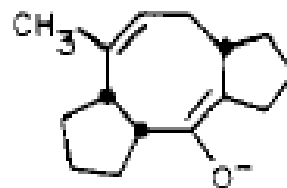
2  
cotylenol



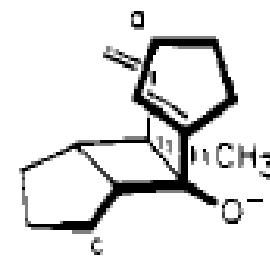
3  
Ophiobolin F



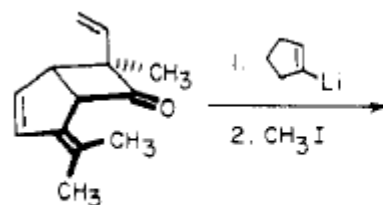
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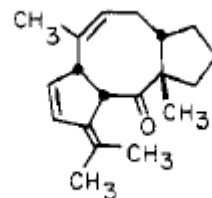
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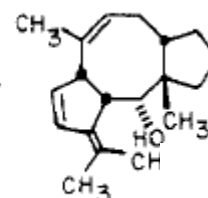
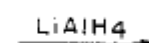
C



4



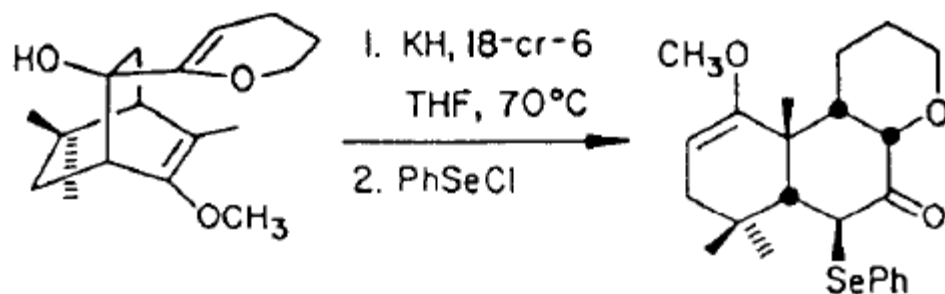
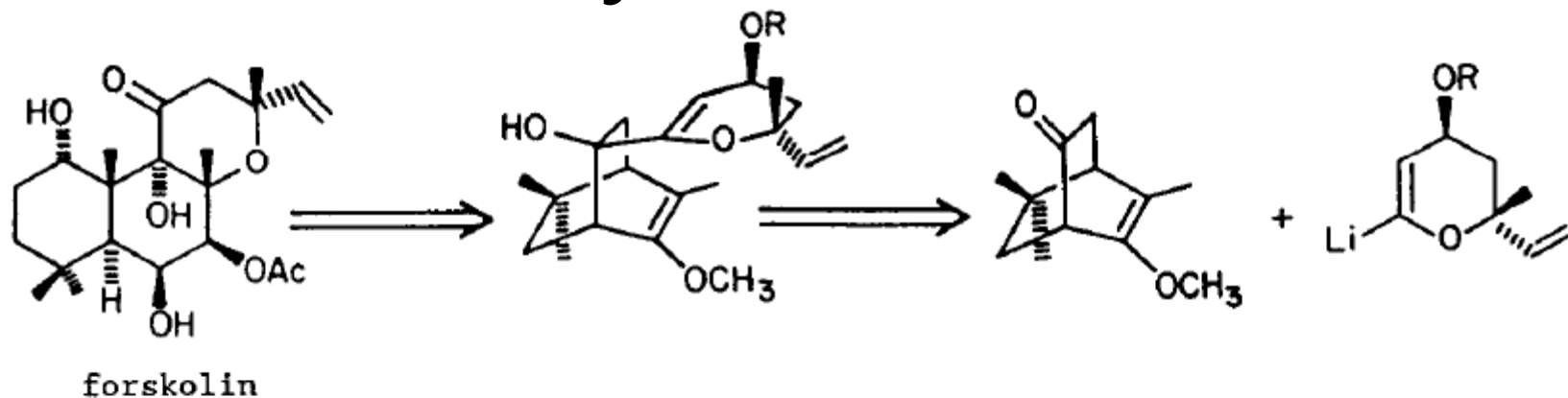
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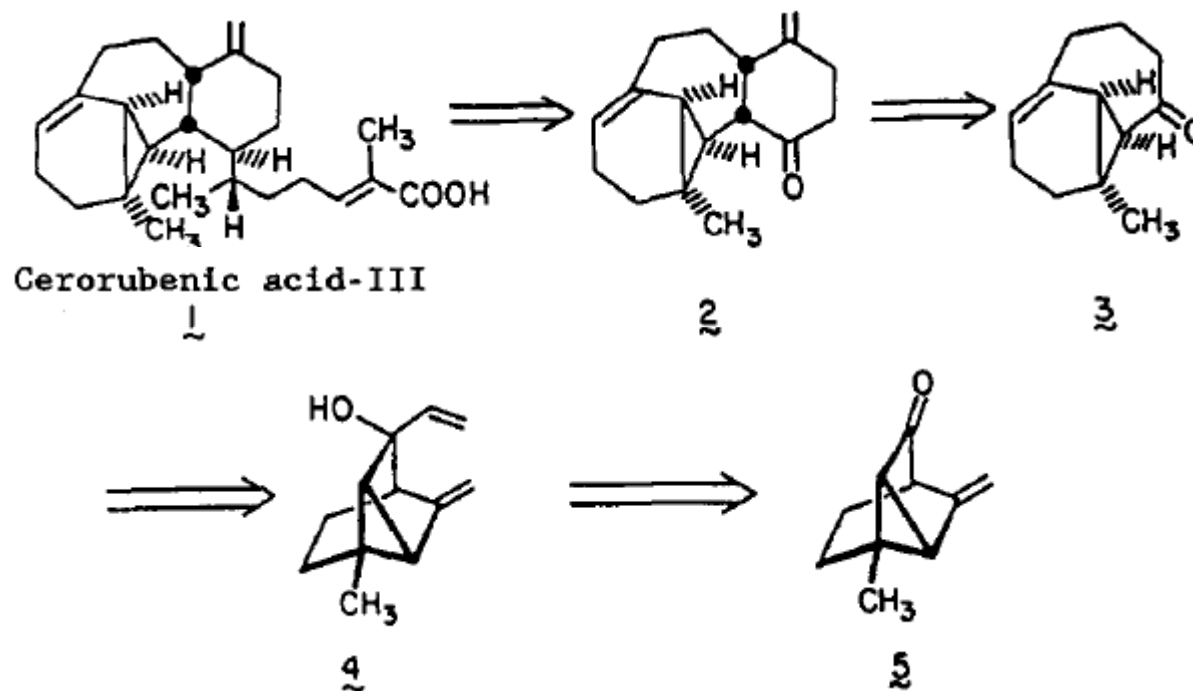
9

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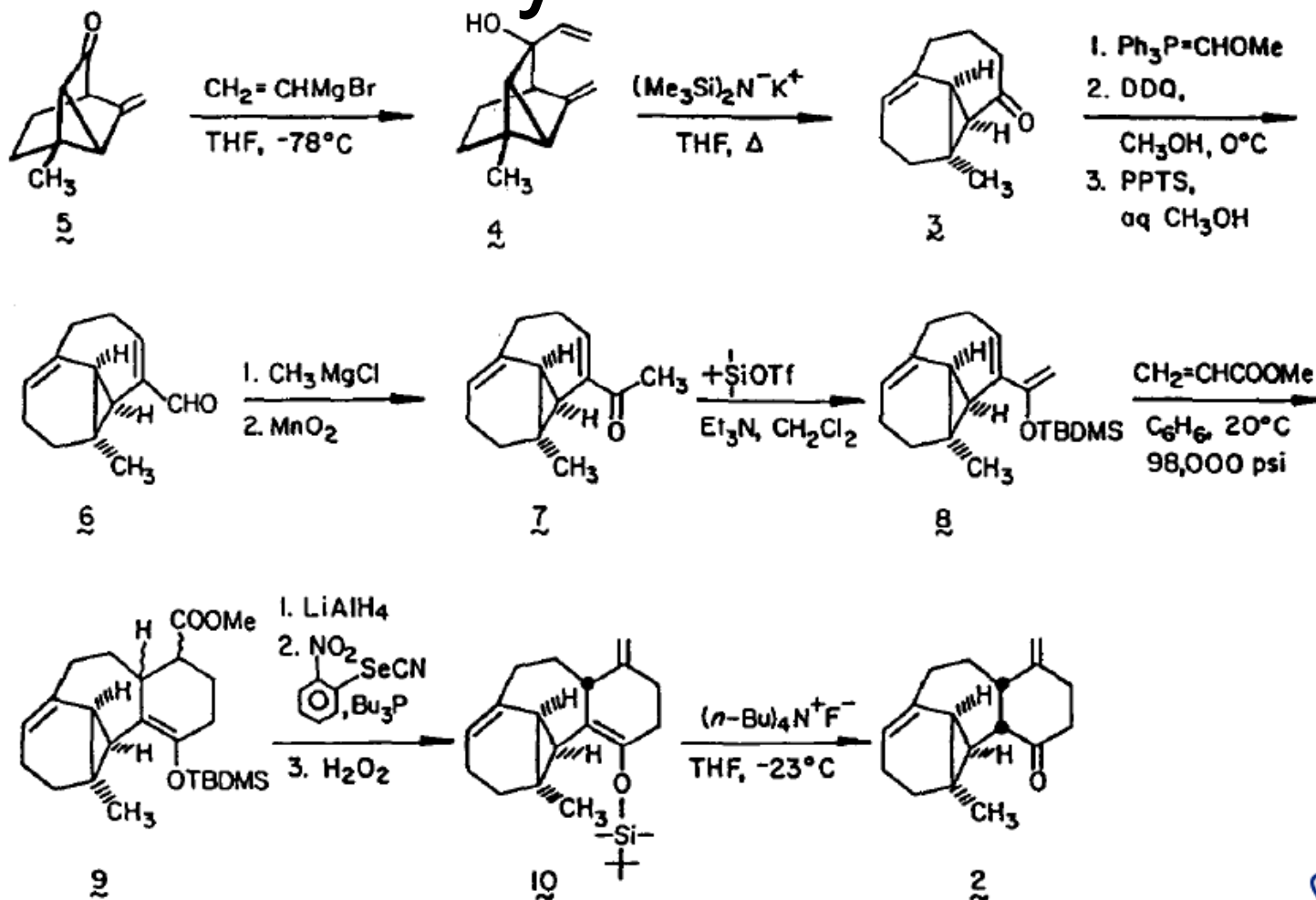
# Anionic Oxy-Cope in Total Synthesis



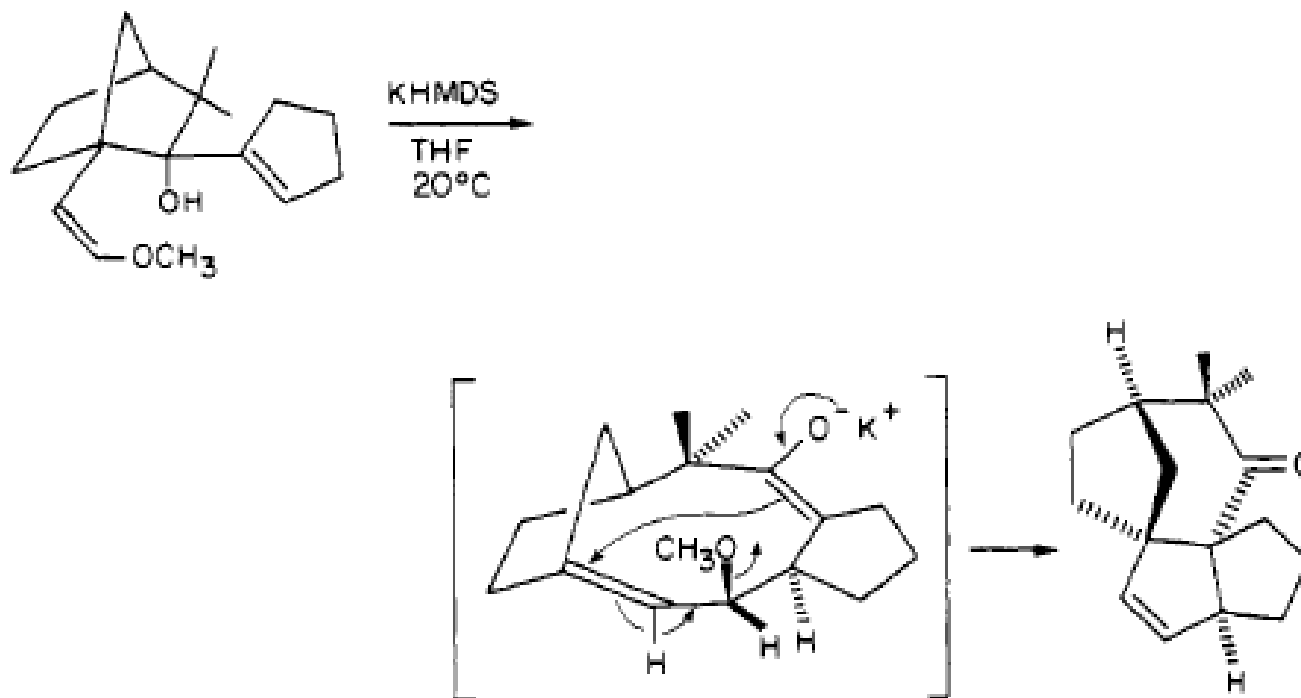
# Anionic Oxy-Cope in Total Synthesis



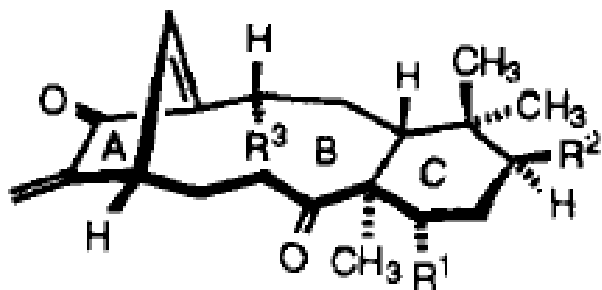
# Anionic Oxy-Cope in Total Synthesis



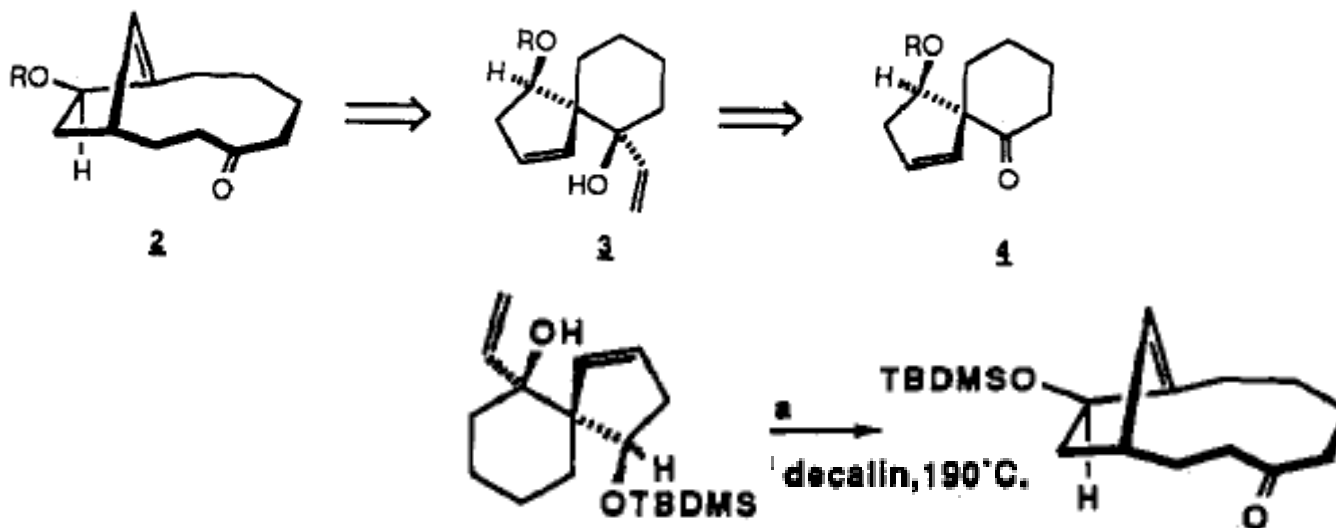
# Anionic Oxy-Cope in Total Synthesis



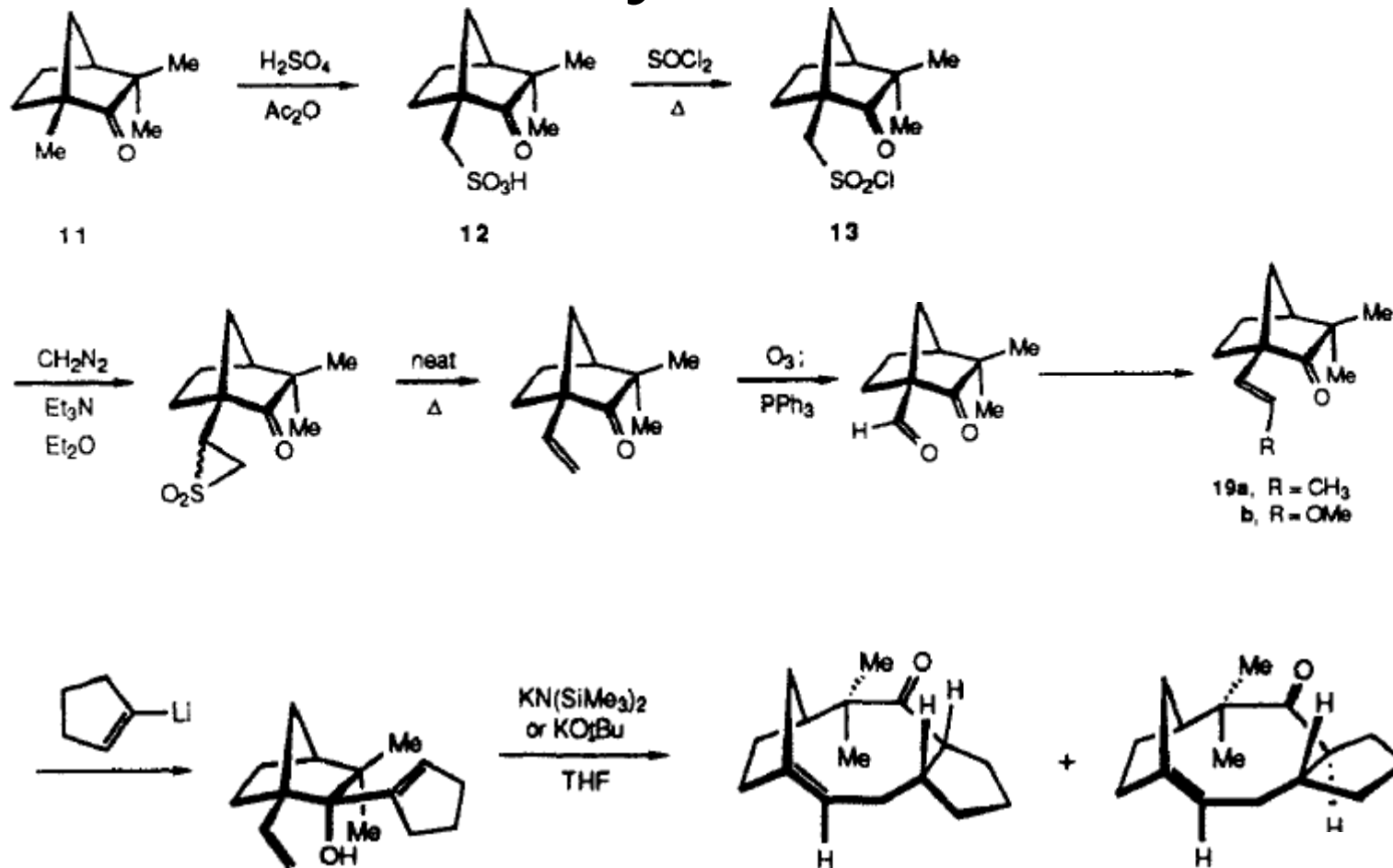
# Anionic Oxy-Cope in Total Synthesis



Shikodomedin

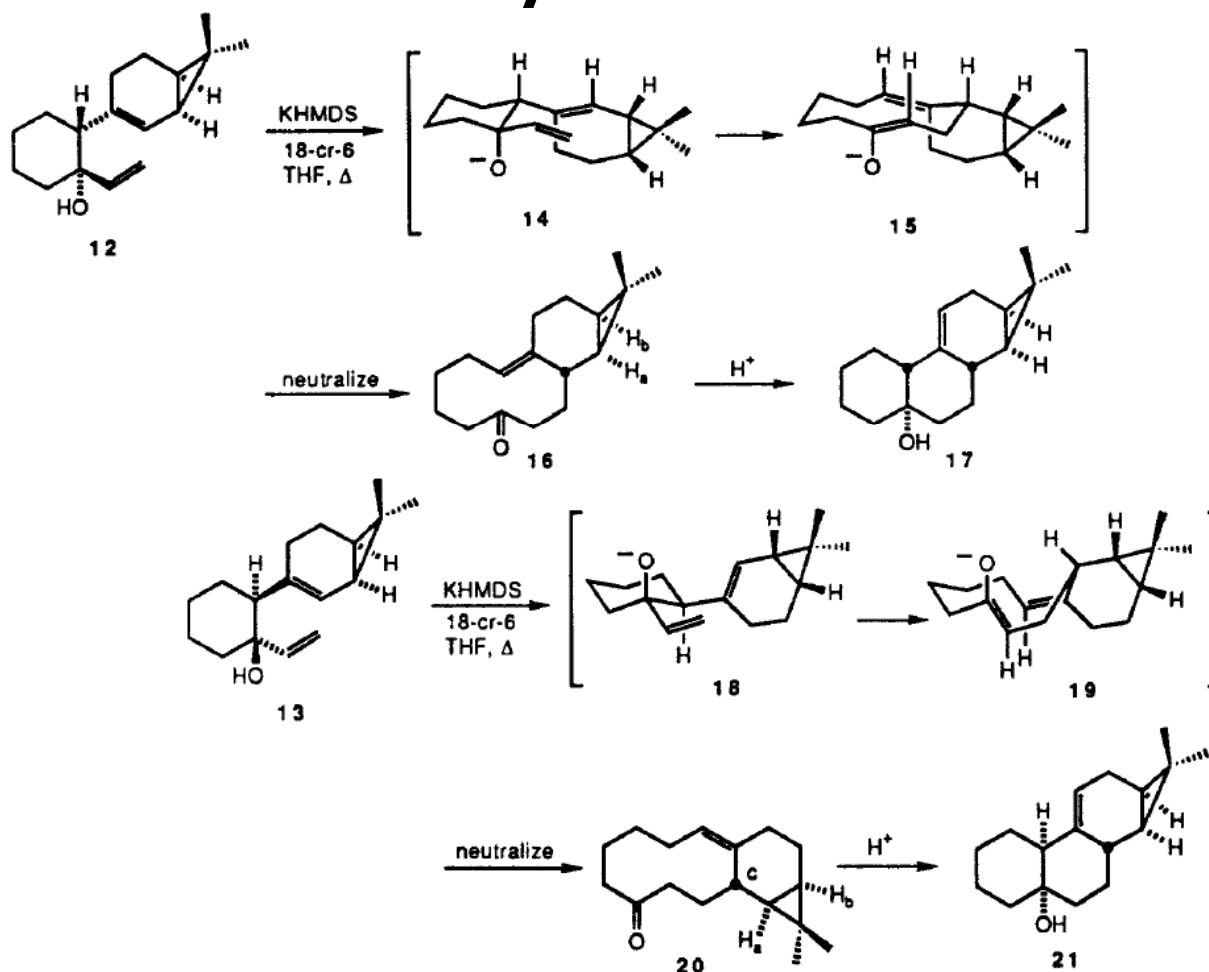


# Anionic Oxy-Cope in Total Synthesis



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# Anionic Oxy-Cope in Total Synthesis

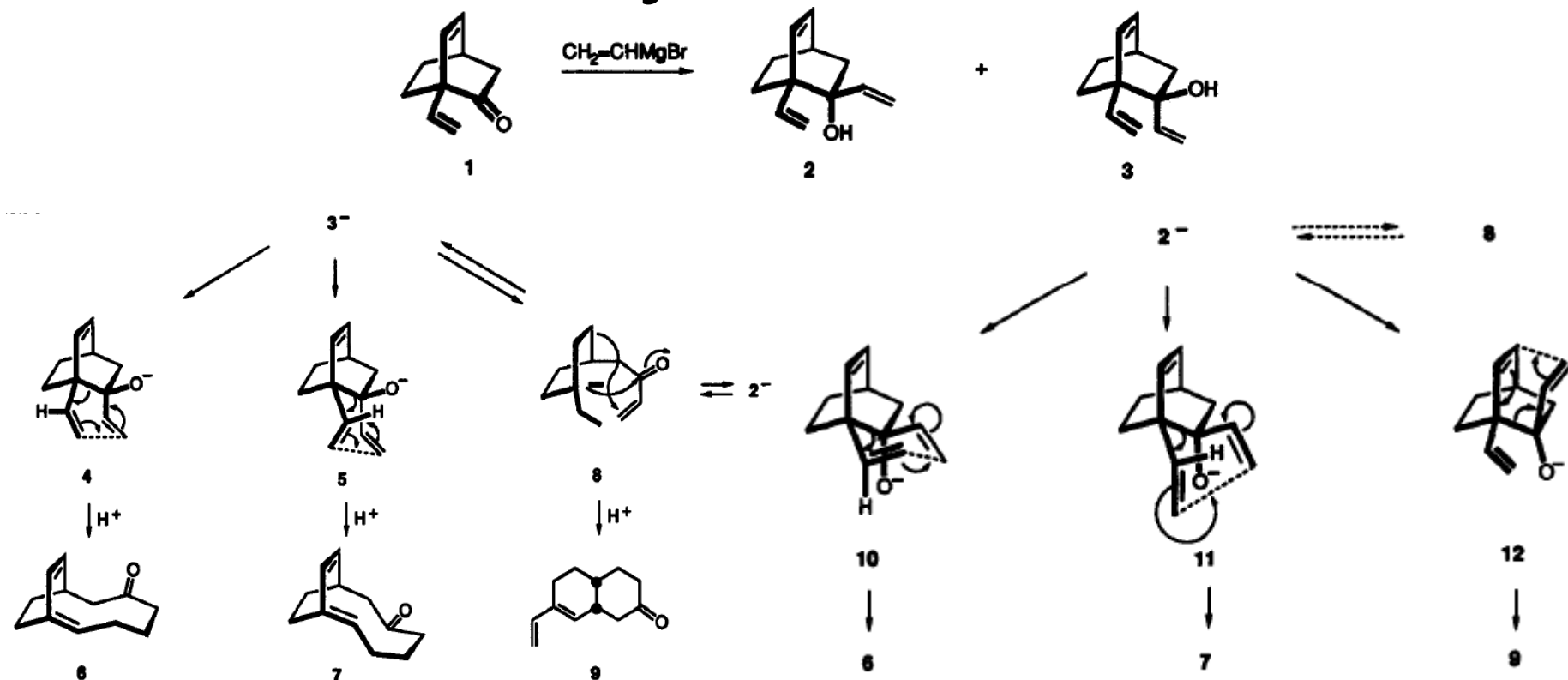


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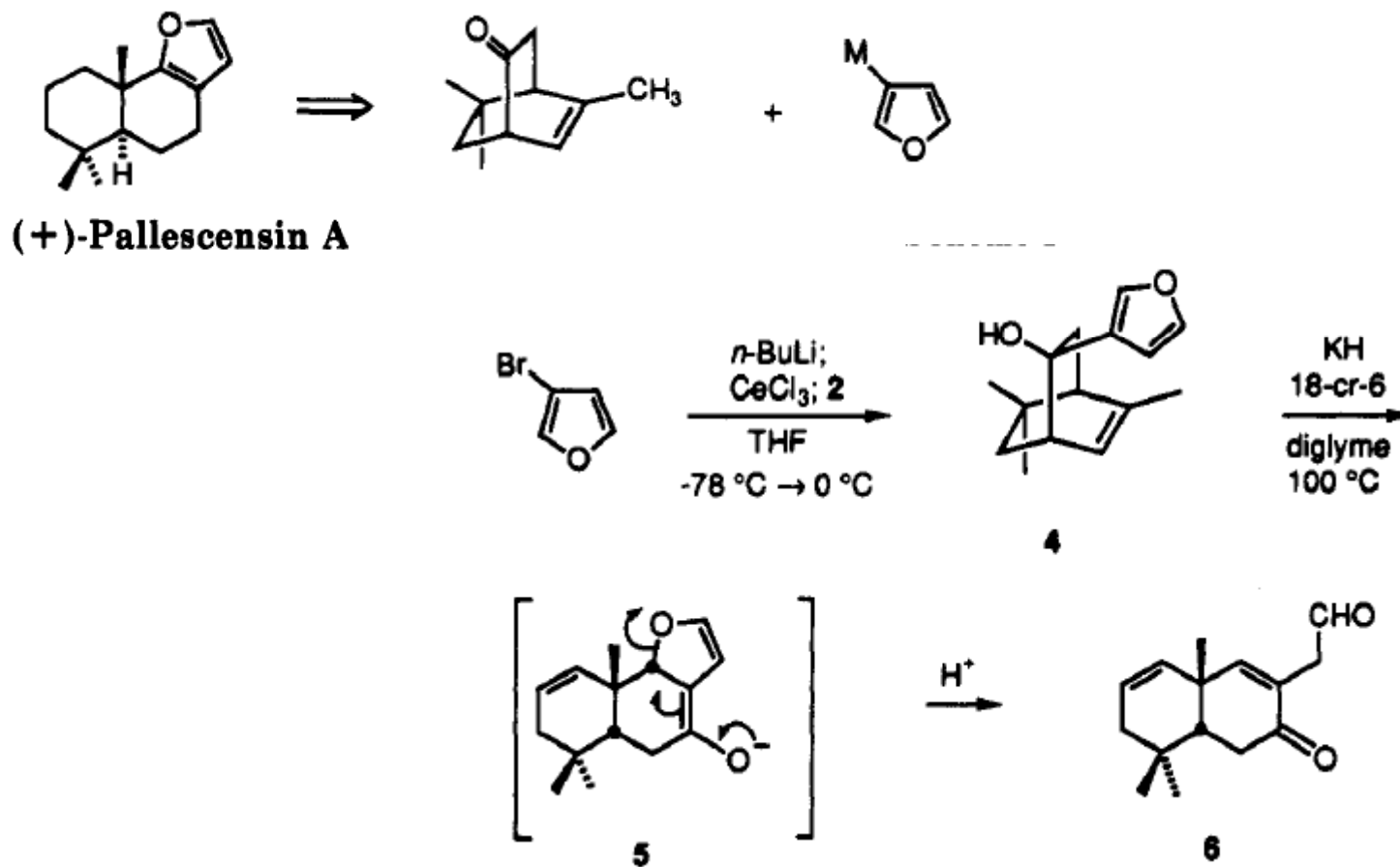
# Anionic Oxy-Cope in Total Synthesis



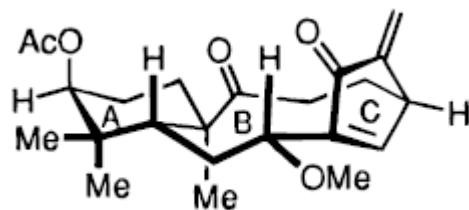
# Anionic Oxy-Cope in Total Synthesis



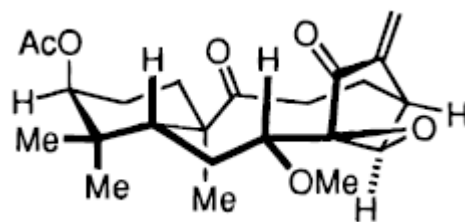
# Anionic Oxy-Cope in Total Synthesis



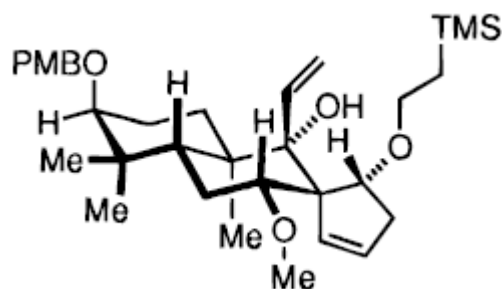
# Anionic Oxy-Cope in Total Synthesis



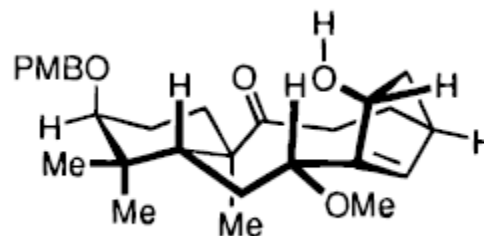
*O*-methylshikoccin



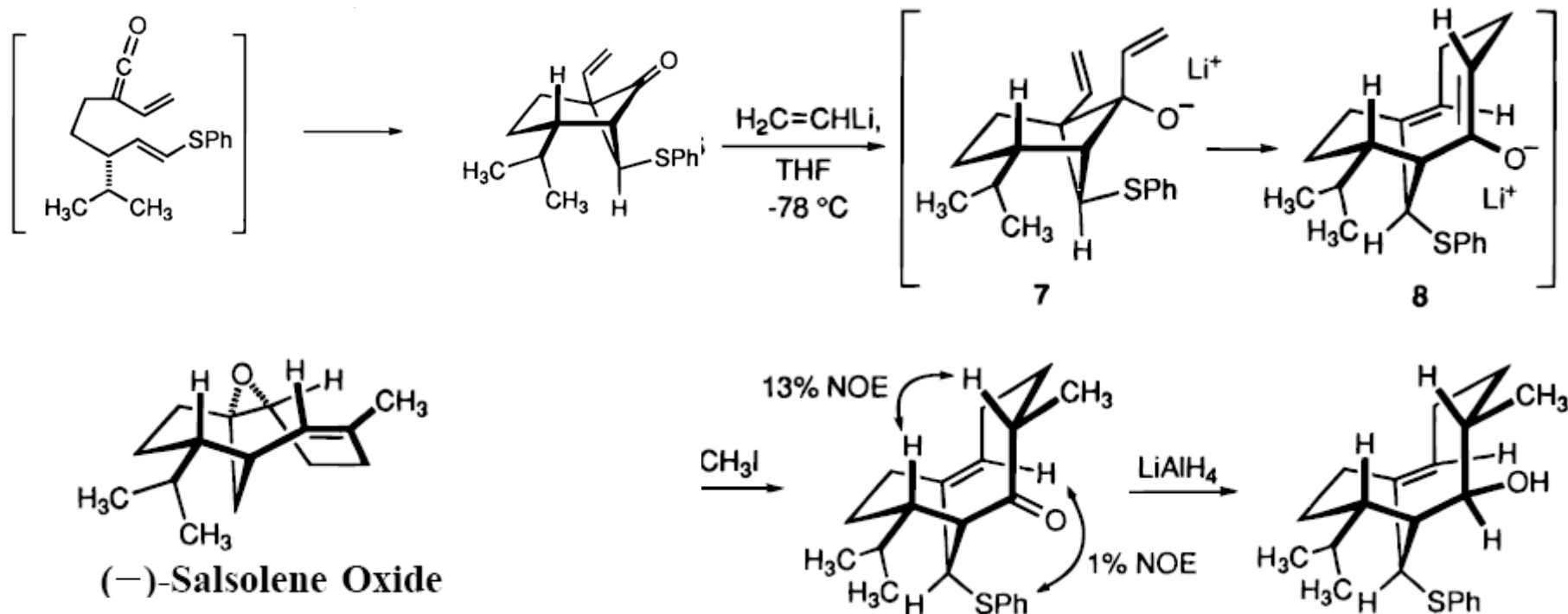
*O*-(methylepoxy)shikoccin



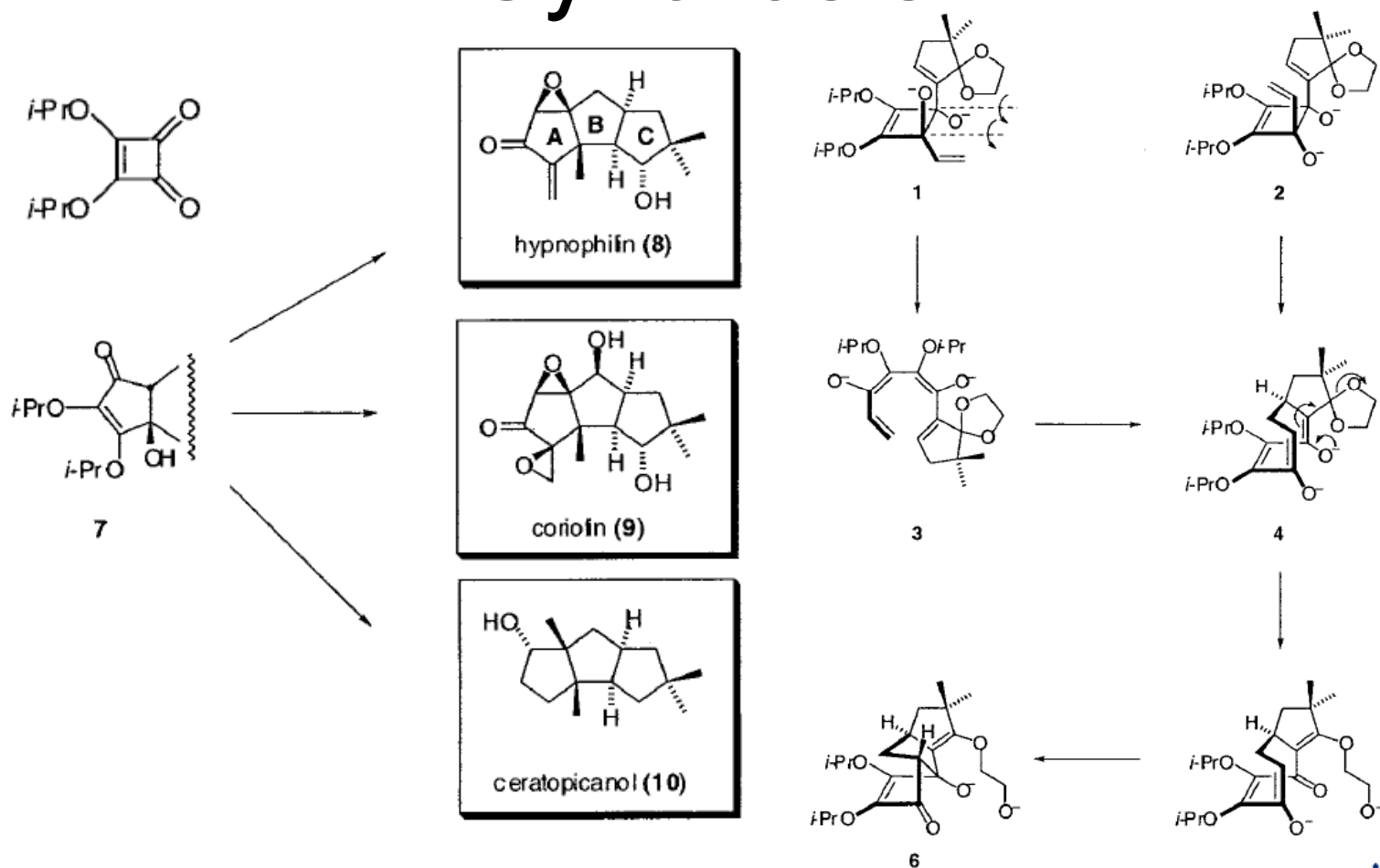
1. 230-240 °C, DMF, 19 h
2. CsF, DMF, 210 °C, 6 h (65%)



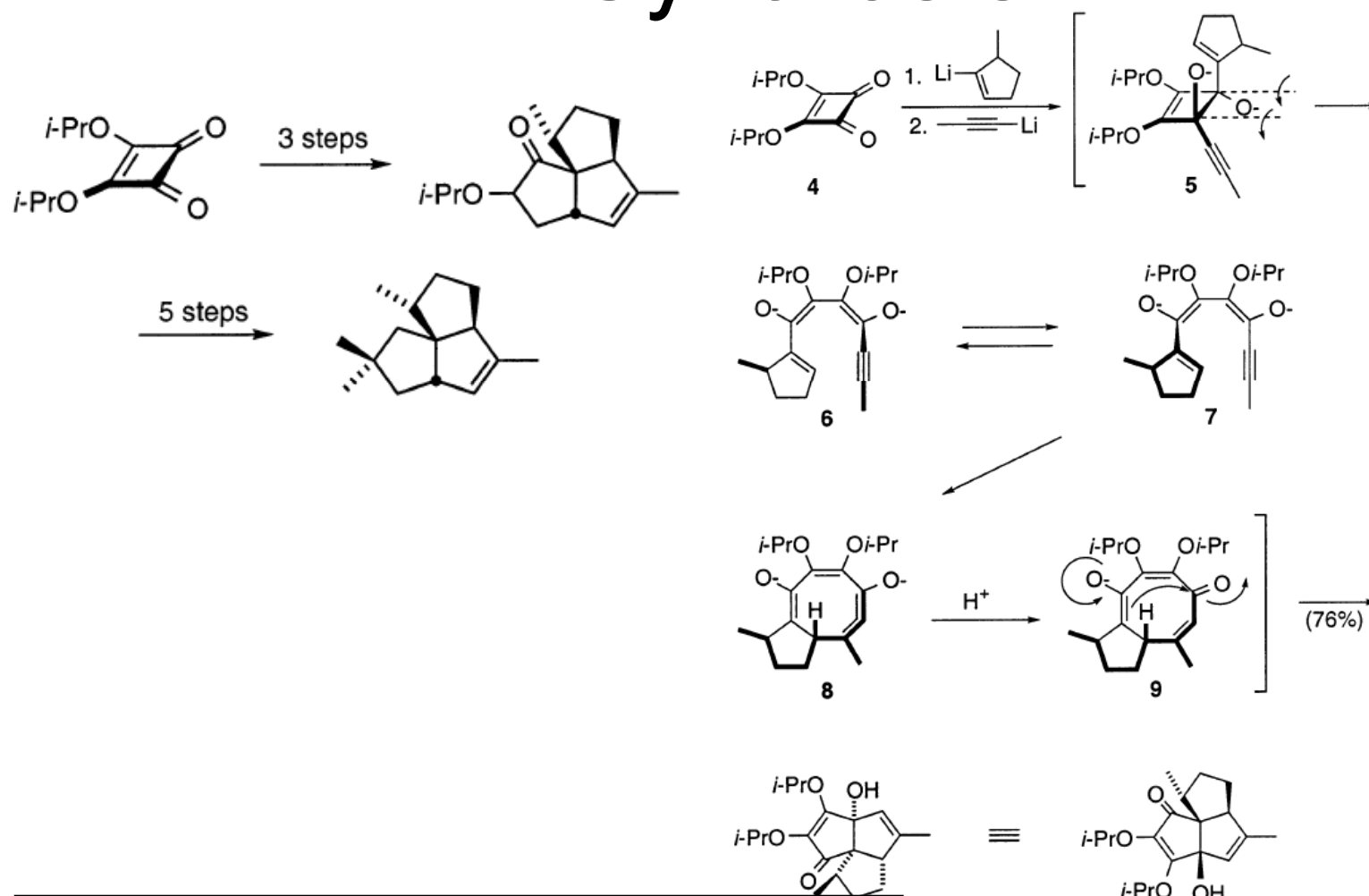
# Anionic Oxy-Cope in Total Synthesis



# Anionic Oxy-Cope in Total Synthesis

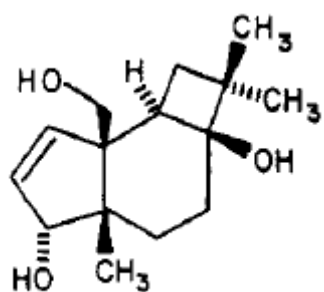


# Anionic Oxy-Cope in Total Synthesis

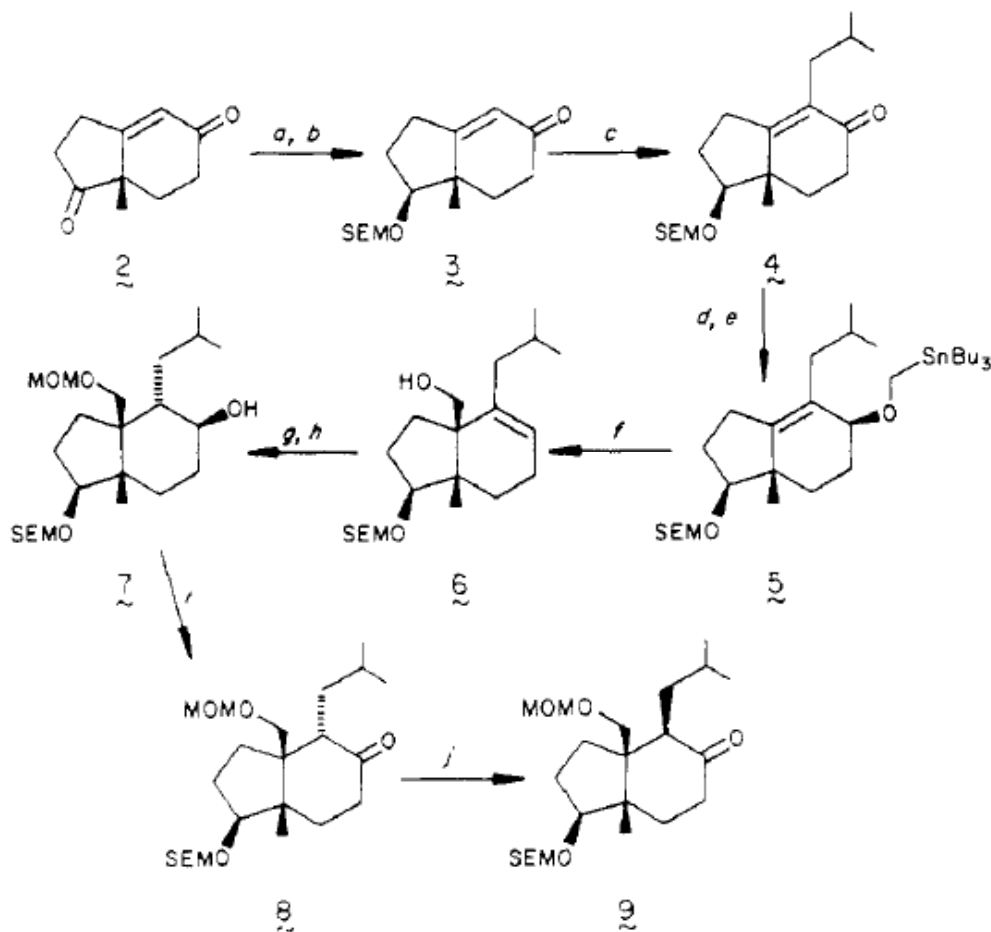
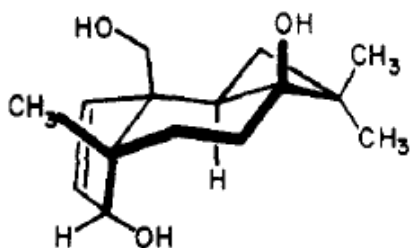


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# Other Total Syntheses

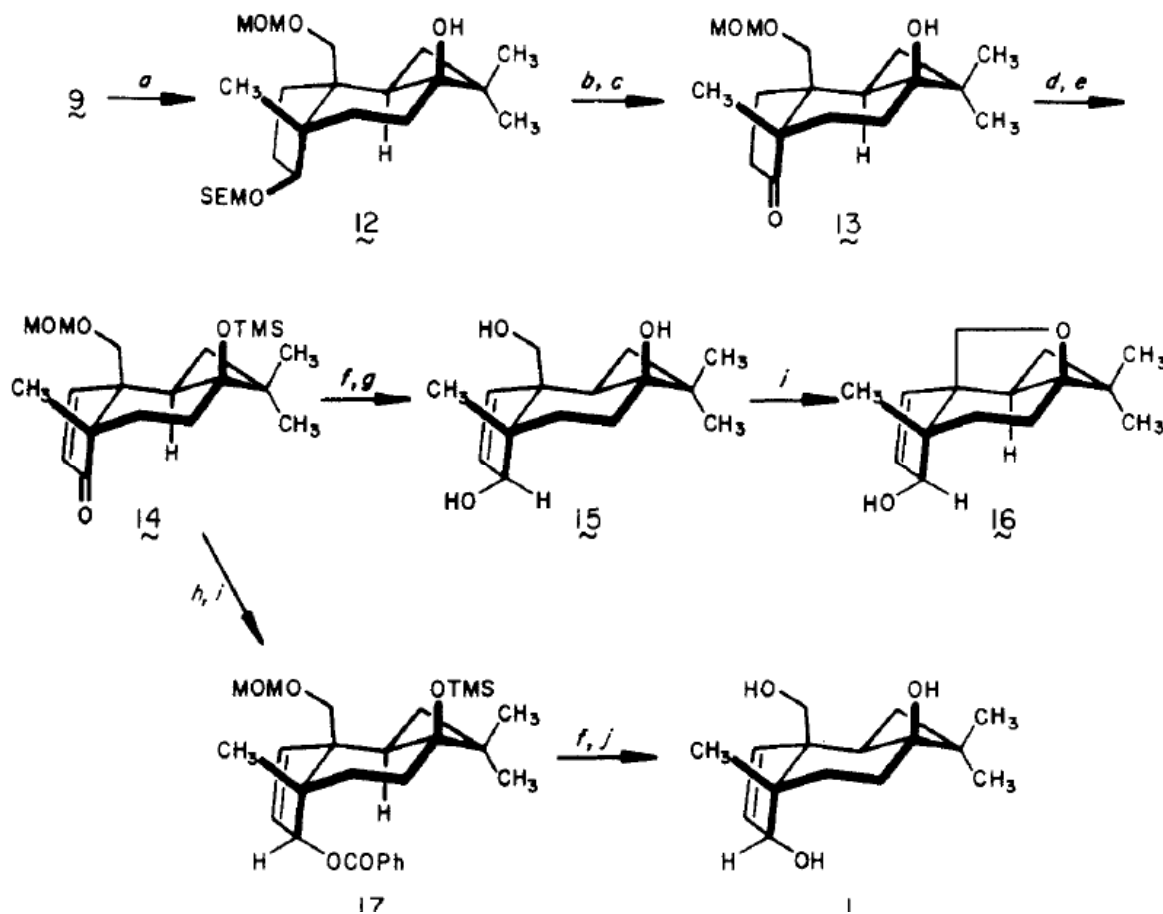


punctatin A.



<sup>a</sup> LiAlH(O-*t*-Bu)<sub>3</sub>, ether. <sup>b</sup> Me<sub>3</sub>SiCH<sub>2</sub>CH<sub>2</sub>OCH<sub>2</sub>Cl, (*i*-Pr)<sub>2</sub>NEt.  
<sup>c</sup> CH<sub>3</sub>SOCH<sub>2</sub><sup>-</sup>Na<sup>+</sup>, (CH<sub>3</sub>)<sub>2</sub>CHCH<sub>2</sub>I, Me<sub>2</sub>SO. <sup>d</sup> LiAlH<sub>4</sub>, ether. <sup>e</sup> KH,  
 ICH<sub>2</sub>SnBu<sub>3</sub>, THF. <sup>f</sup> *n*-BuLi, hexane, -78 → 0 °C. <sup>g</sup> CH<sub>3</sub>OCH<sub>2</sub>Cl,  
 (*i*-Pr)<sub>2</sub>NEt. <sup>h</sup> BH<sub>3</sub>·THF, diglyme; H<sub>2</sub>O<sub>2</sub>, NaOH, H<sub>2</sub>O. <sup>i</sup> PCC, CH<sub>2</sub>-  
 Cl<sub>2</sub>. <sup>j</sup> NaOCH<sub>3</sub>, CH<sub>3</sub>OH.

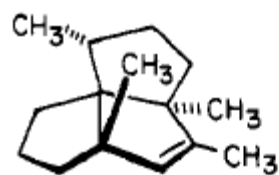
# Other Total Syntheses



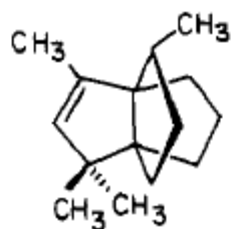
<sup>a</sup>  $h\nu$ , 253.7 nm,  $C_6H_6$ , room temperature. <sup>b</sup>  $(n-Bu)_4N^+F^-$ , 55 °C, 2 mmHg. <sup>c</sup> PCC,  $CH_2Cl_2$ . <sup>d</sup>  $Me_3SiCH_2COOCH_3$ ,  $(n-Bu)_4N^+F^-$ , THF. <sup>e</sup> Pd-(OAc)<sub>2</sub>,  $CH_3CN$ . <sup>f</sup>  $HClO_4$ , THF- $H_2O$ , room temperature. <sup>g</sup> Dibal, THF, 0 °C. <sup>h</sup>  $NaBH_4$ ,  $CeCl_3$ ,  $CH_3OH$ , 0 °C. <sup>i</sup>  $(=NCOOC_2H_5)_2$ ,  $Ph_3P$ ,  $C_6H_5COOH$ , room temperature. <sup>j</sup>  $KOH$ ,  $C_2H_5OH$ , 50 °C, 3 h.

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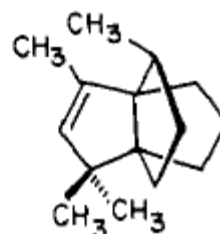
# Other Total Syntheses



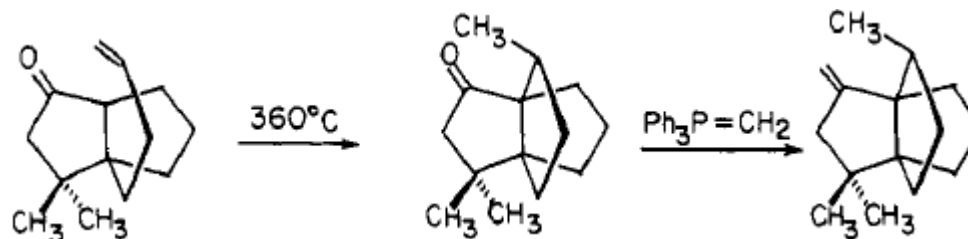
isocomene



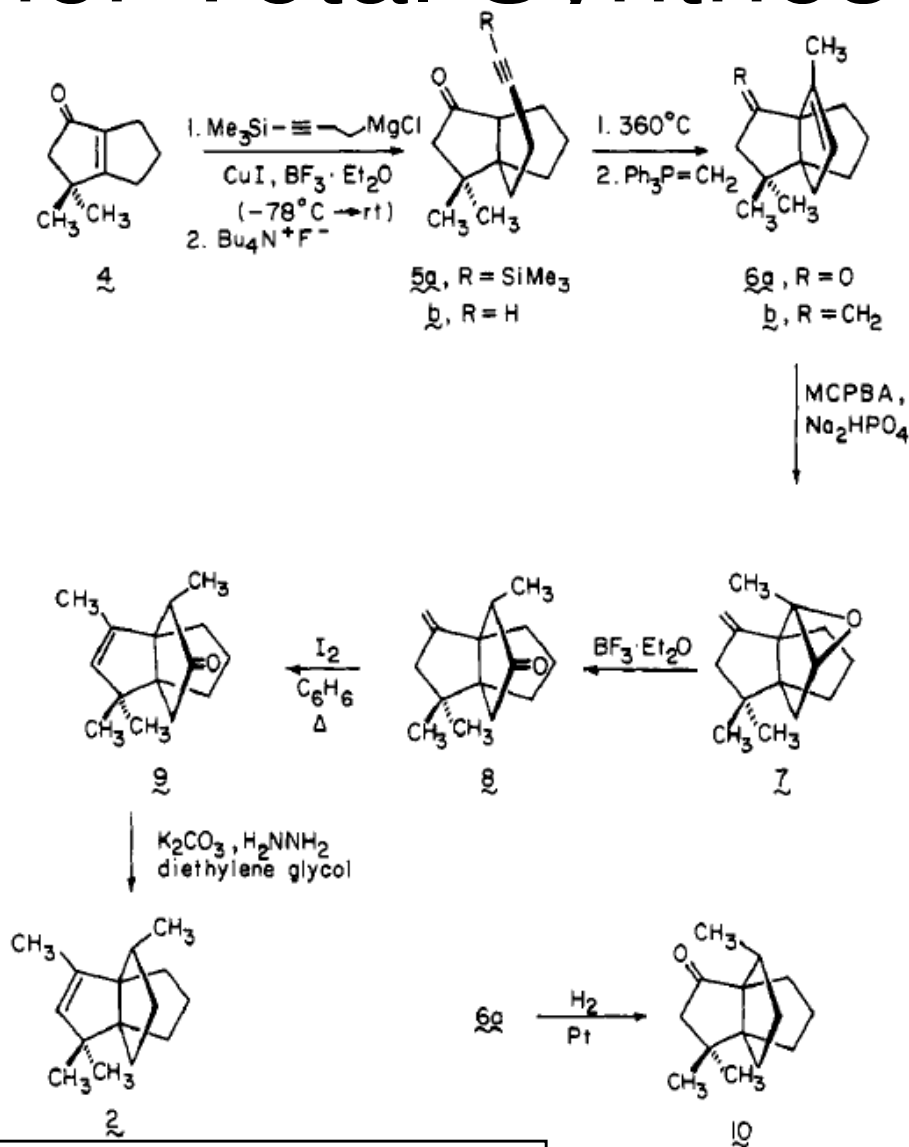
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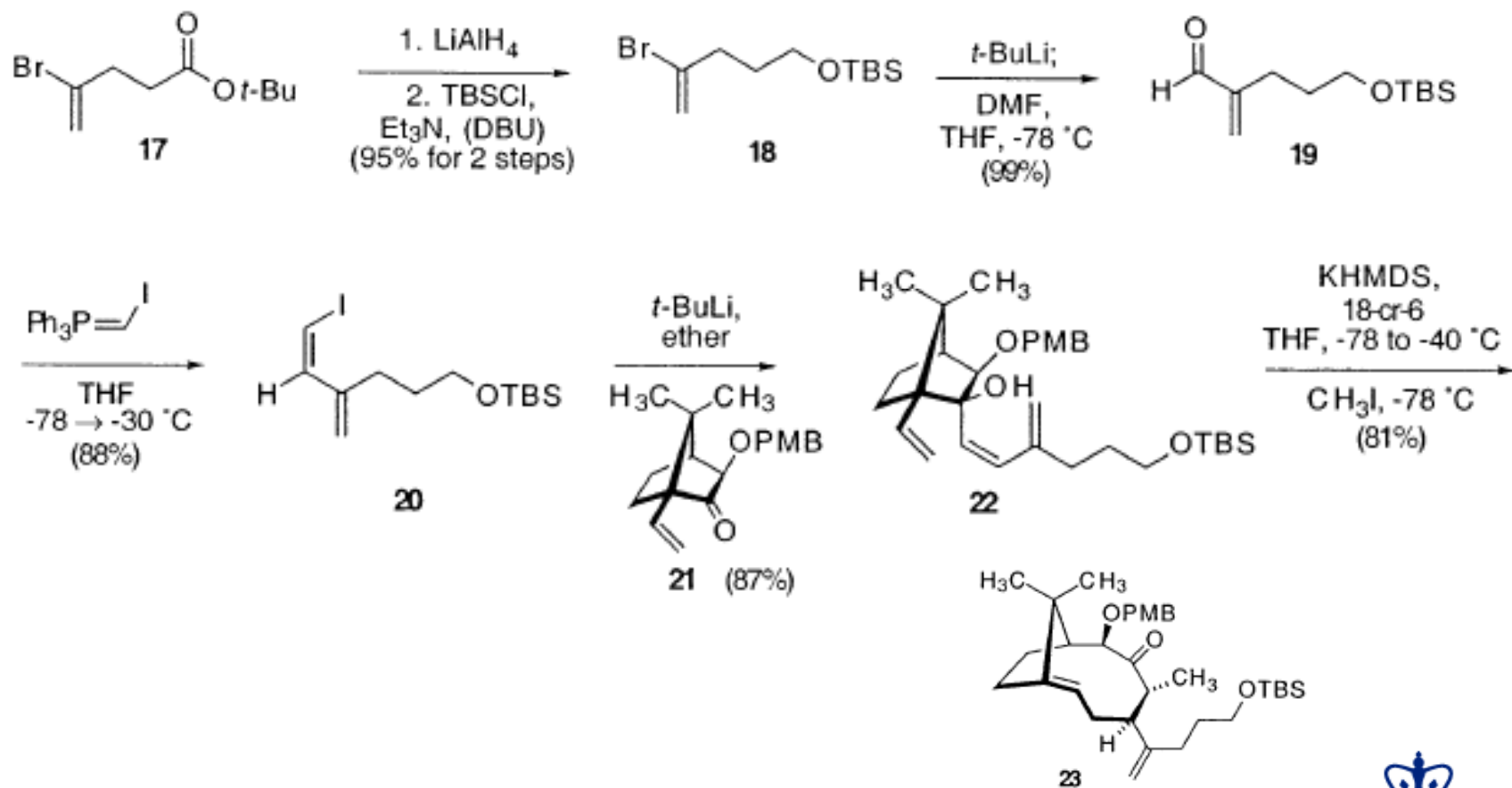
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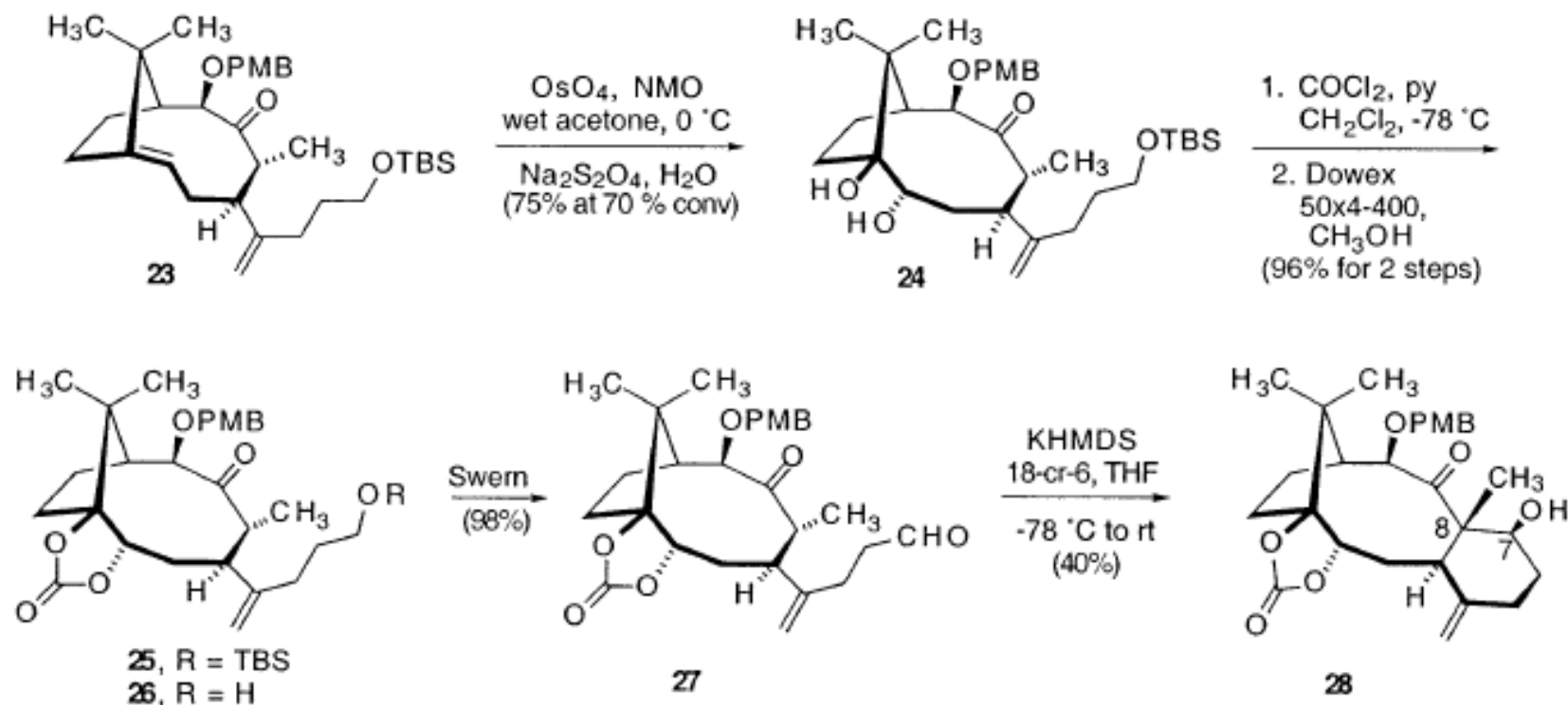
# Other Total Syntheses



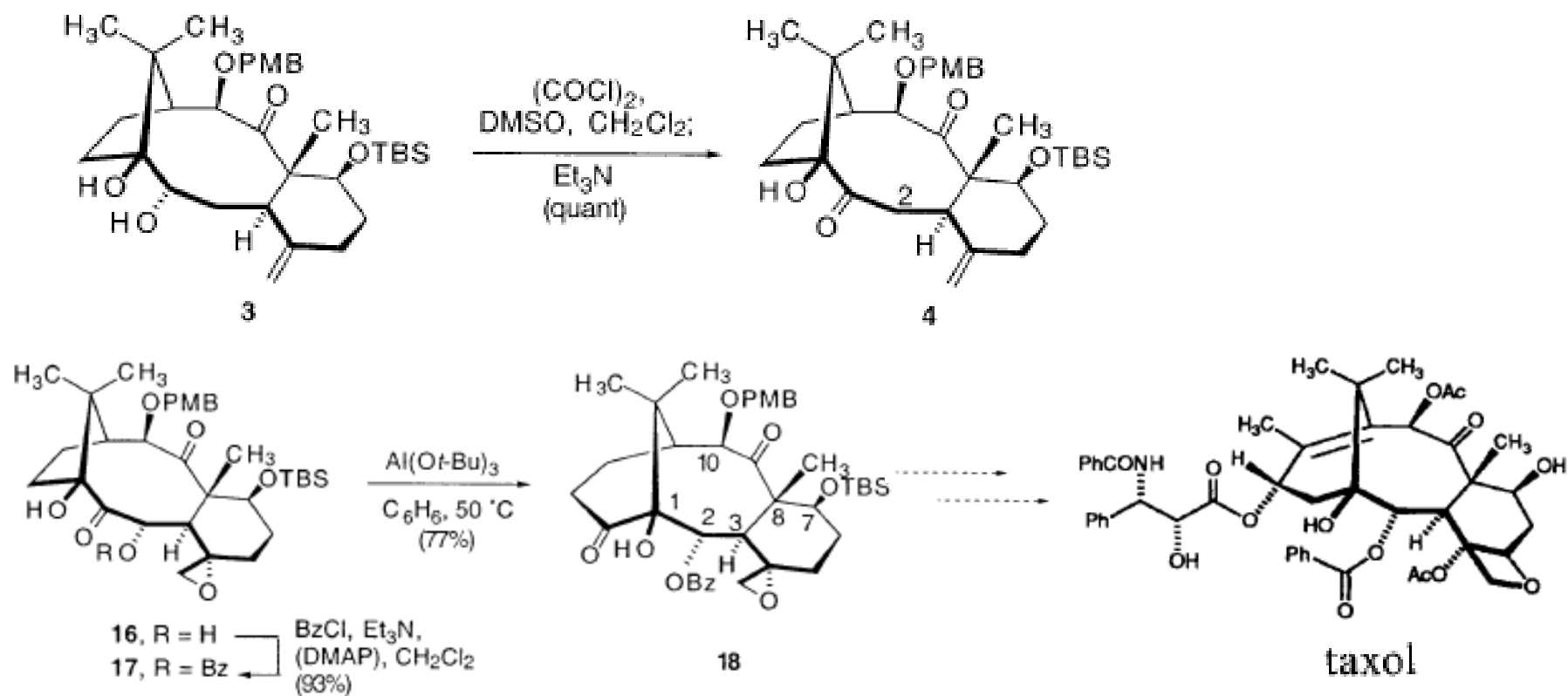
# Study toward Taxol



# Study toward Taxol



# Study toward Taxol



# Books

- Organic Reactions Vol. 32, 33, 43,46,47, 50, 51
- Topics in Current Chemistry Vol. 119
- Comprehensive Organic Synthesis: Selectivity, Strategy and Efficiency in Modern Organic Chemistry, Vol. 5
- Encyclopedia of Reagents for Organic Synthesis

# A Brilliant Chemist

- 1332 publications to date by SciFinder
- Covering many fields of organic chemistry: heterocycles, aromaticity, novel hydrocarbons, transition metals, total synthesis of natural products

Thanks to the Lit Group!

Thank you for your  
attention!