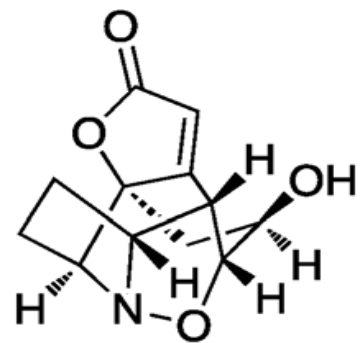
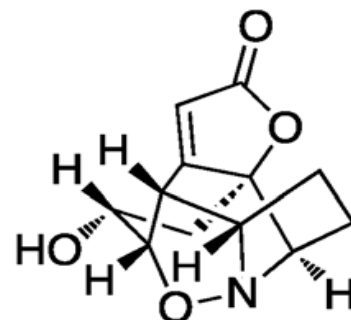


# A Concise Enantioselective Total Synthesis of (-)-Virosaine A

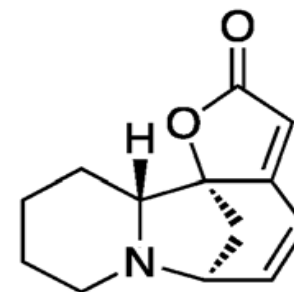
Jonathan M. E. Hughes and James L. Gleason\*



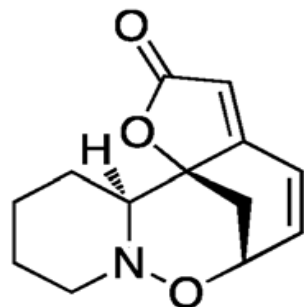
*virosaine A (1)*



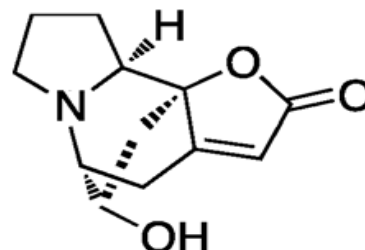
*virosaine B (2)*



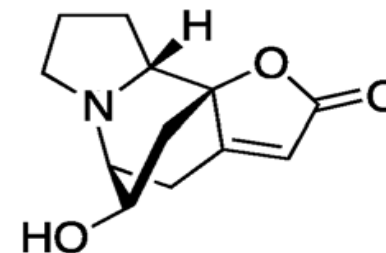
*securinine (3)*



*(+)-phyllantidine (4)*



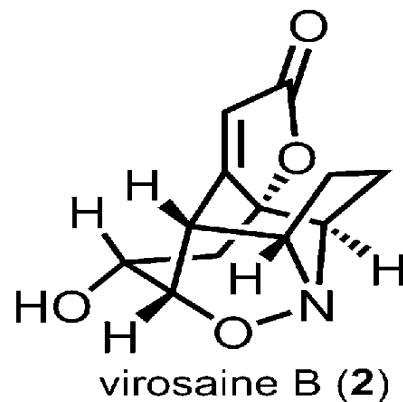
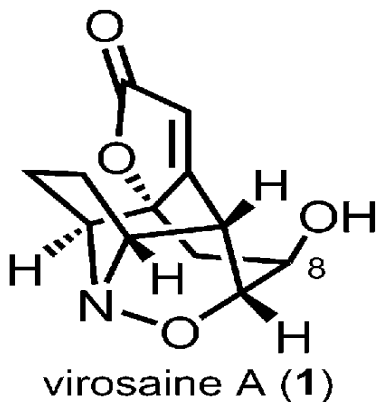
*bubbialidine (5)*



*bubbialine (6)*

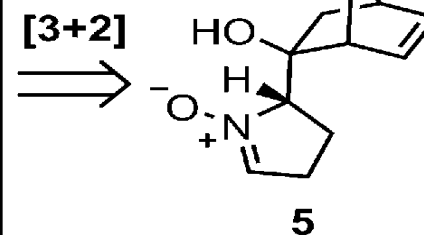
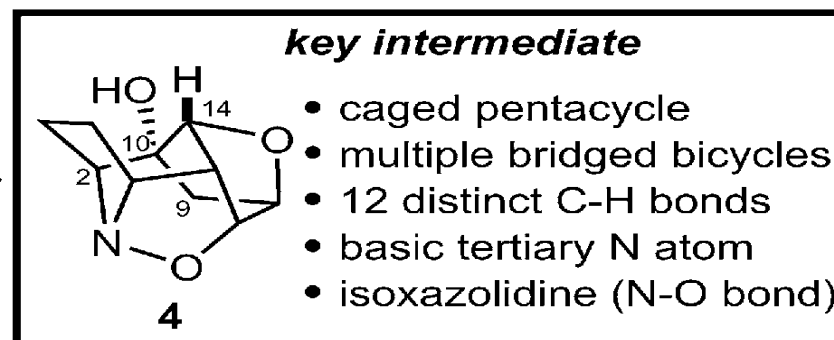
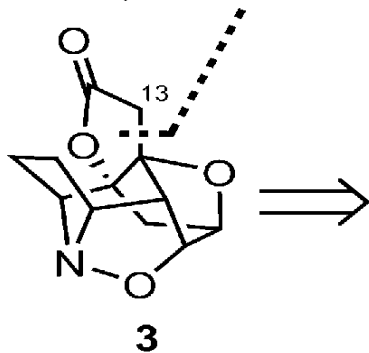
# Retrosynthetic Analysis

A

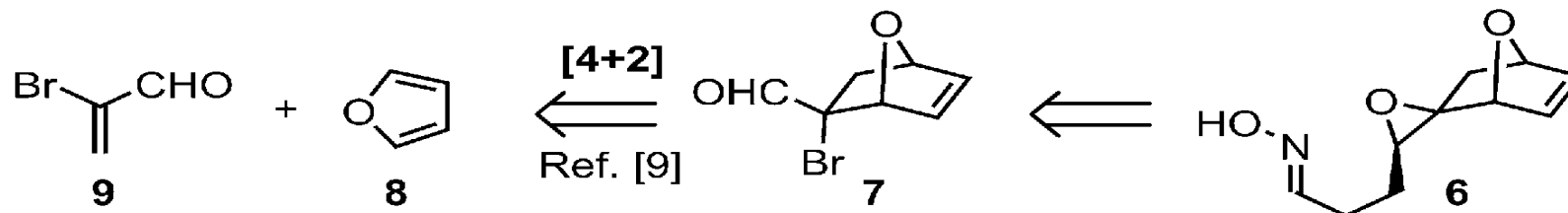


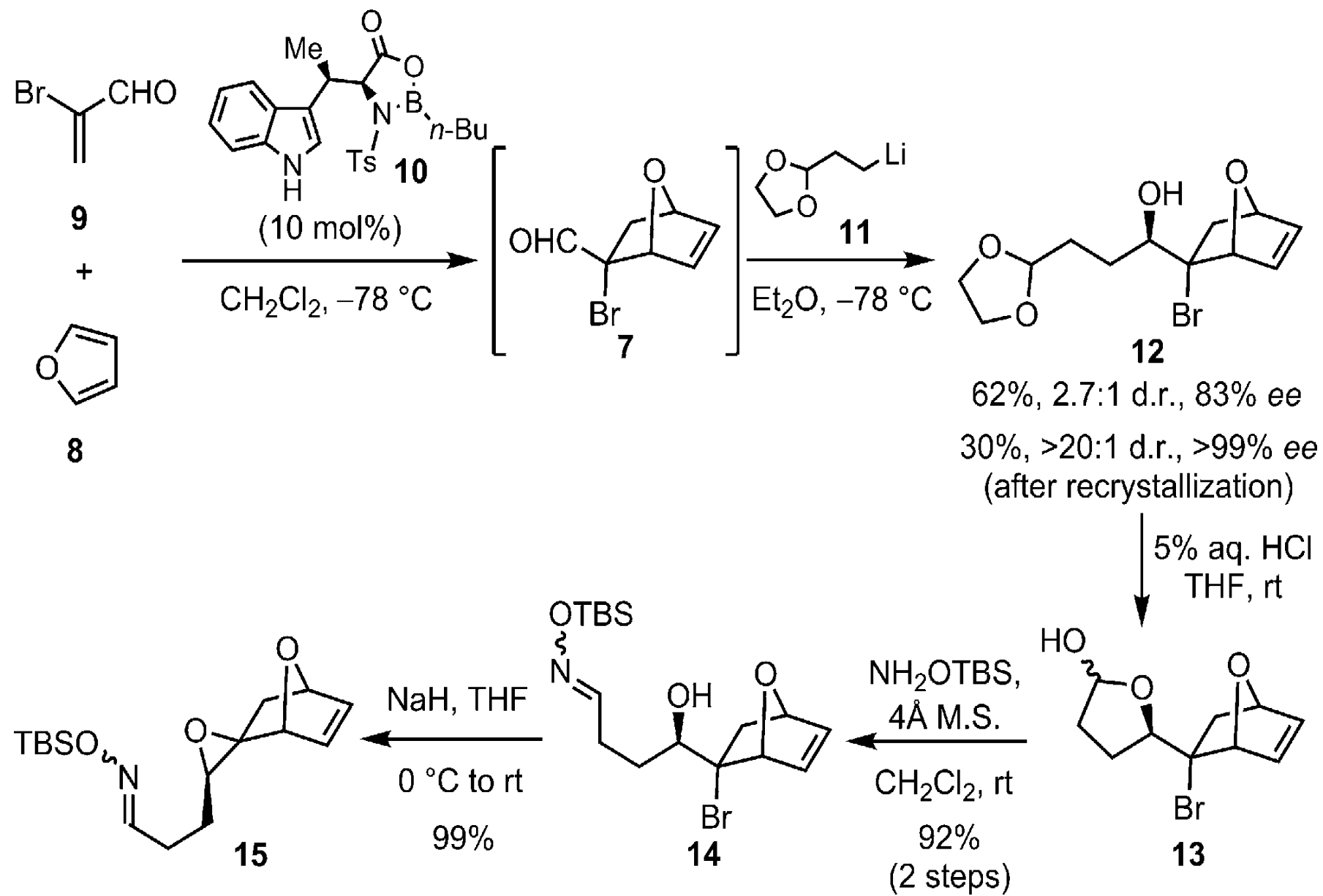
B

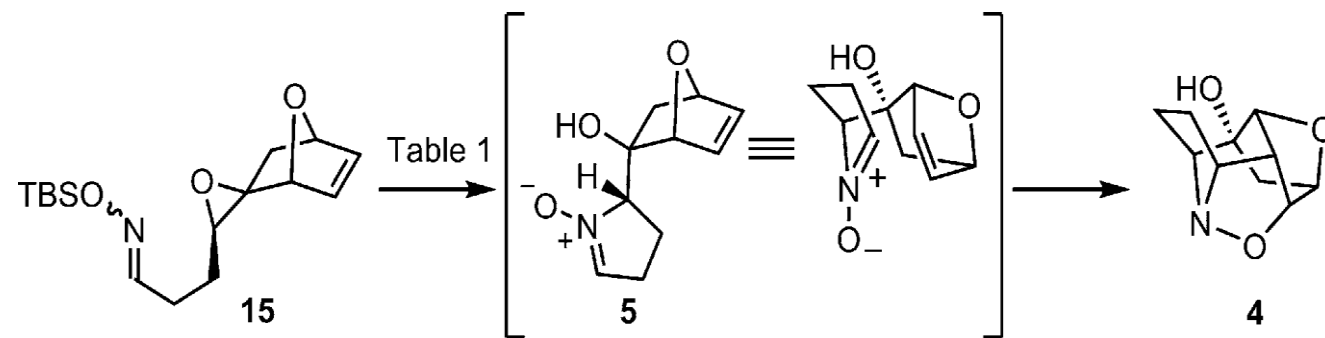
selective C14 functionalization



N alkylation/  
epoxide opening

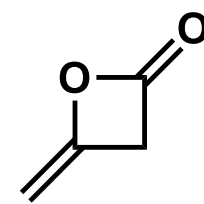
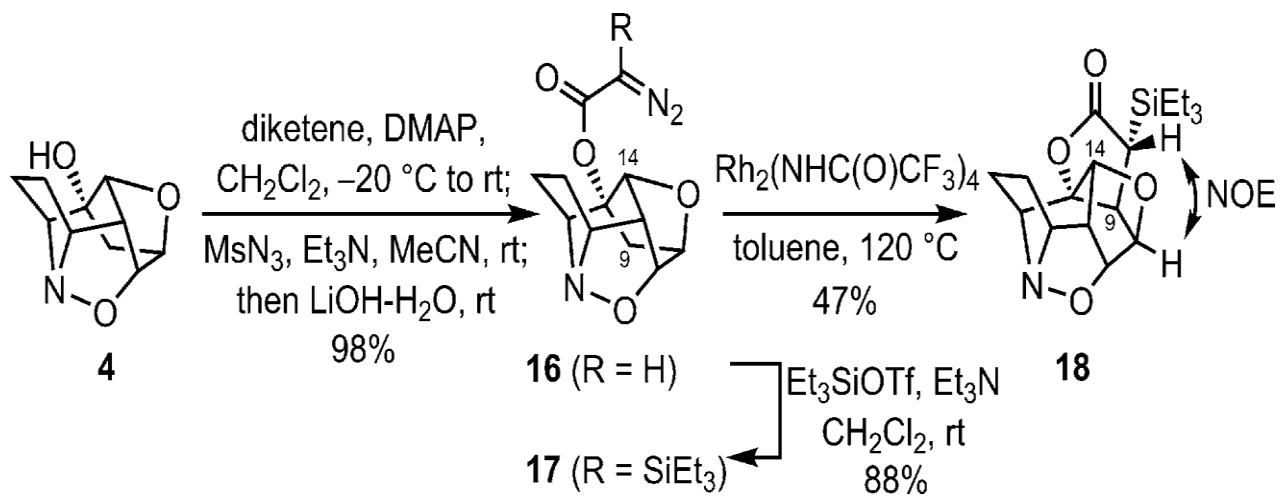




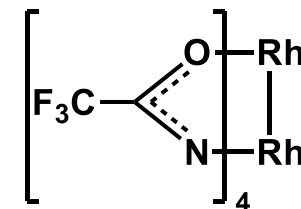


Entry	Solvent	Acid (equiv)	<i>T</i> [°C]	<i>t</i>	Yield [%] <sup>[a]</sup>
1 <sup>[b]</sup>	xylenes	PPTS (0.2)	140	8 h	26
2	THF	PPTS (1)	70	12 h	40
3 <sup>[c]</sup>	THF	PPTS (1)	100	1 h	45
4 <sup>[c]</sup>	MeOH	PPTS (1)	120	1 h	28
5 <sup>[c]</sup>	MeCN	PPTS (1)	120	1 h	50
6 <sup>[c]</sup>	MeCN	AcOH (5)	120	1 h	<10
<b>7<sup>[c]</sup></b>	<b>AcOH</b>	-	<b>120</b>	<b>30 min</b>	<b>92</b>
8 <sup>[d]</sup>	AcOH	-	120	40 min	82

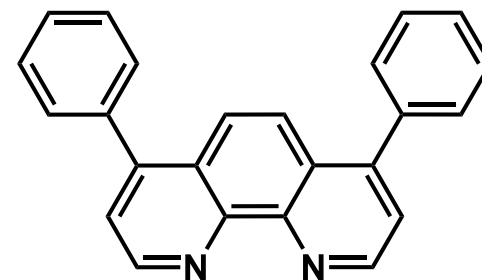
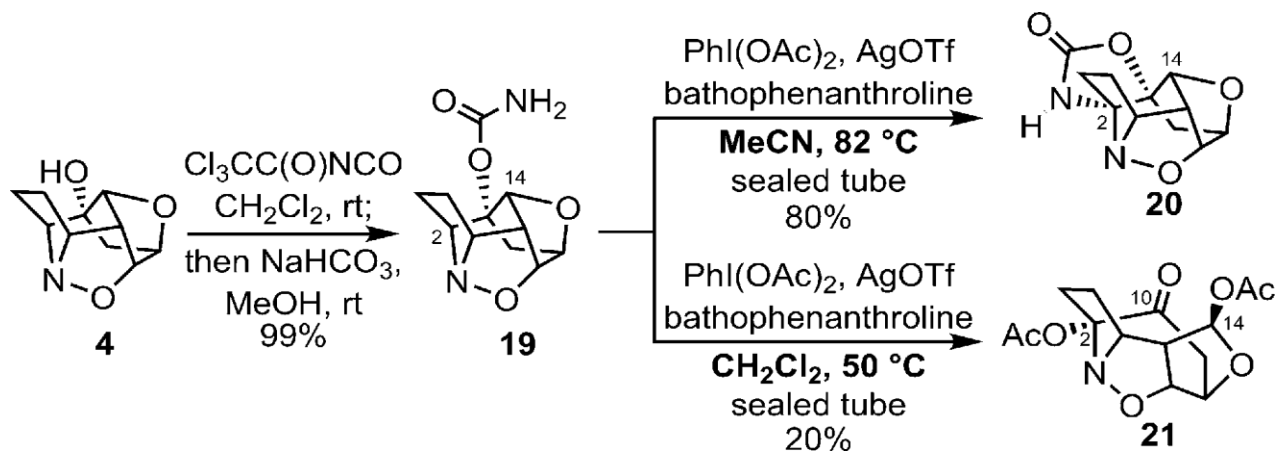
[a] Yield of isolated **4**. [b] Oxime **6** was used as the starting material. [c] Microwave heating. [d] On 5 mmol scale.



diketene

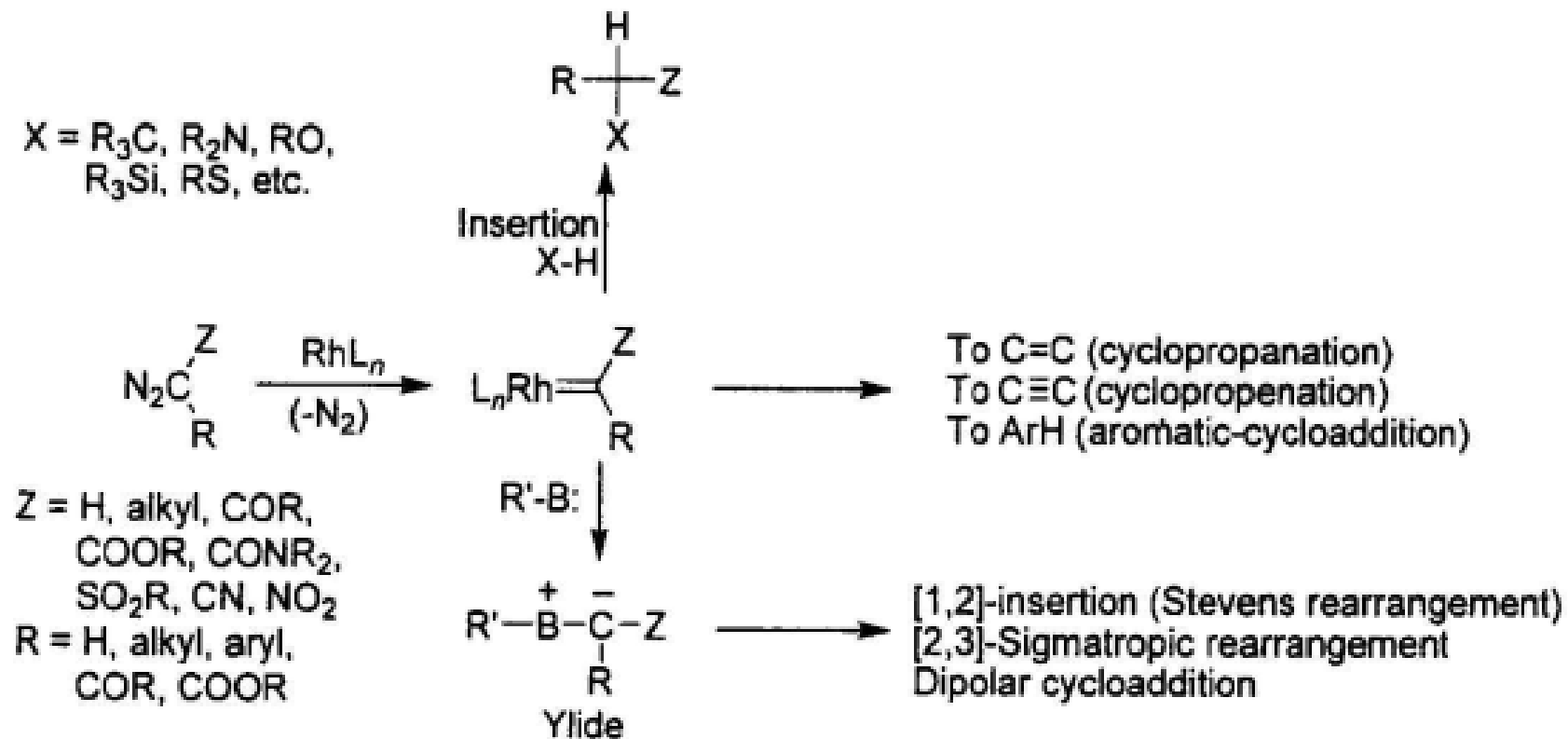


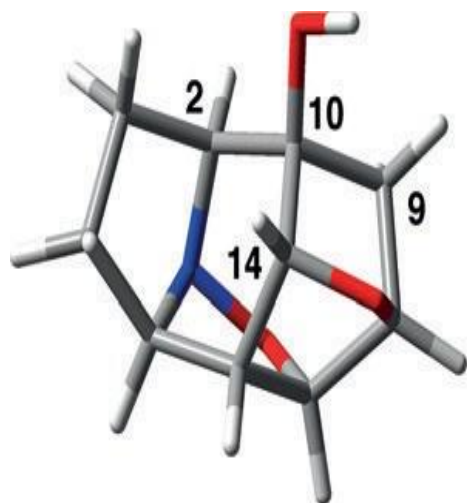
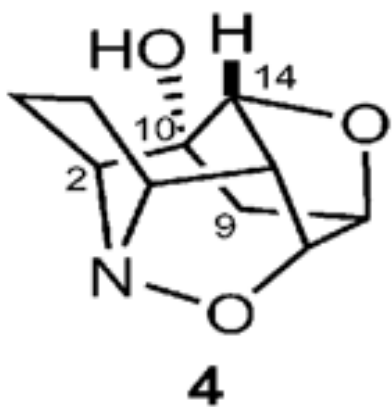
$\text{Rh}_2(\text{HNOCCF}_3)_4$



bathophenanthroline

X = R<sub>3</sub>C, R<sub>2</sub>N, RO,  
R<sub>3</sub>Si, RS, etc.





4: "top-down" perspective

Site	$^1\text{H}$ ( $\delta$ , ppm)	$^{13}\text{C}$ ( $\delta$ , ppm)	NPA partial atomic charge on carbon	C-H HOMO Energy (eV)
2	3.59	66.8	-0.037	-13.69
9	1.73	45.5	-0.423	-13.71
14	4.72	85.7	+0.095	-14.48

