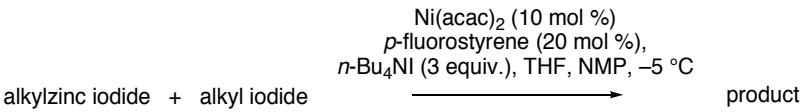
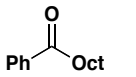
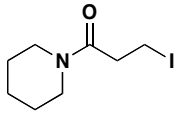
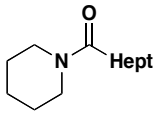
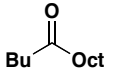
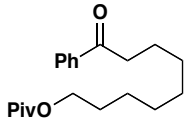
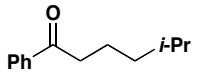
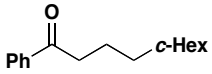
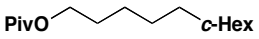
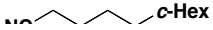
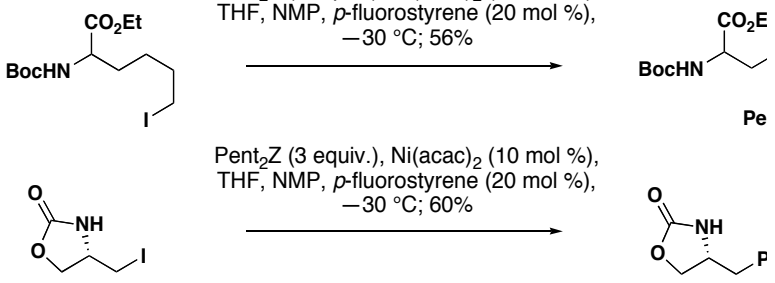
Methodology for the nickel(0)-catalyzed homologation of alkyl halides using organozinc reagents (Knochel, *JOC*, **2002**, 79.):

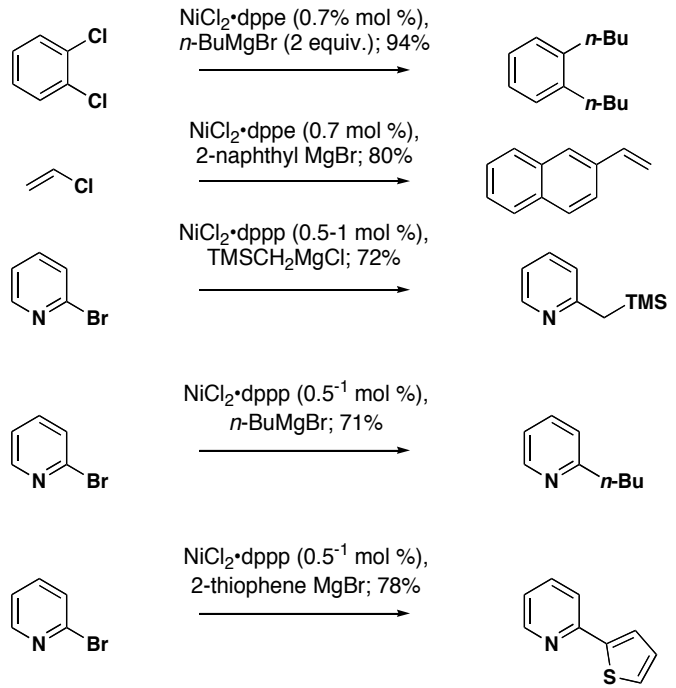


alkylzinc iodide	alkyl iodide	product	yield
n-pentZnI	$PhCO(CH_2)_3I$		78%
"			62%
"	$BuCO(CH_2)_3I$		52%
"	$EtO_2C(CH_2)_3I$	$OctCO_2Et$	48%
$PivO(CH_2)_5ZnI$	$PhCO(CH_2)_3I$		57%
i-Pr_2Zn	$PhCO(CH_2)_3I$		63%
c-Hex_2Zn	$PhCO(CH_2)_3I$		69%
"	$PivO(CH_2)_5I$		56%
"	$NC(CH_2)_4I$		67%

Compatibility with Bronsted acidic functionality:



Kumada coupling (Nickel(0)-catalyzed Csp^2 to Csp^2/C$sp3$ centers; Kumada. *Bull. Che Jpn.*, **1976**, 1958. Kumada, *Tetrahedron*, **1982**, 3347. Kumada, *Tetrahedron Lett.*, **19** Kumada, *Pure & Appl. Chem.,* **1980**, 669. Kumada, *J. Am. Chem. Soc.,* **1972**, 4374.):



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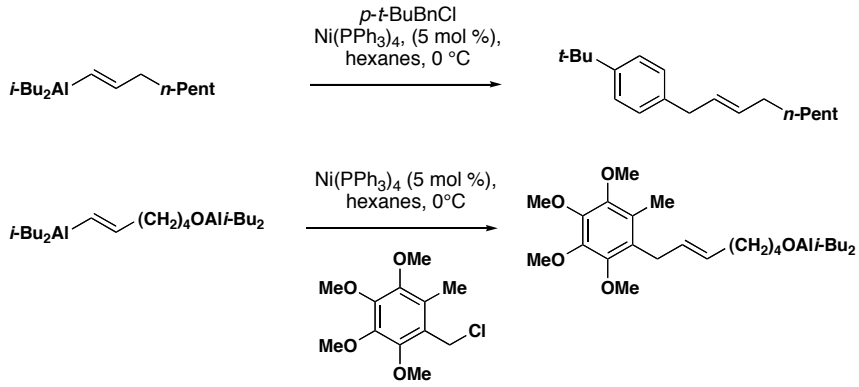
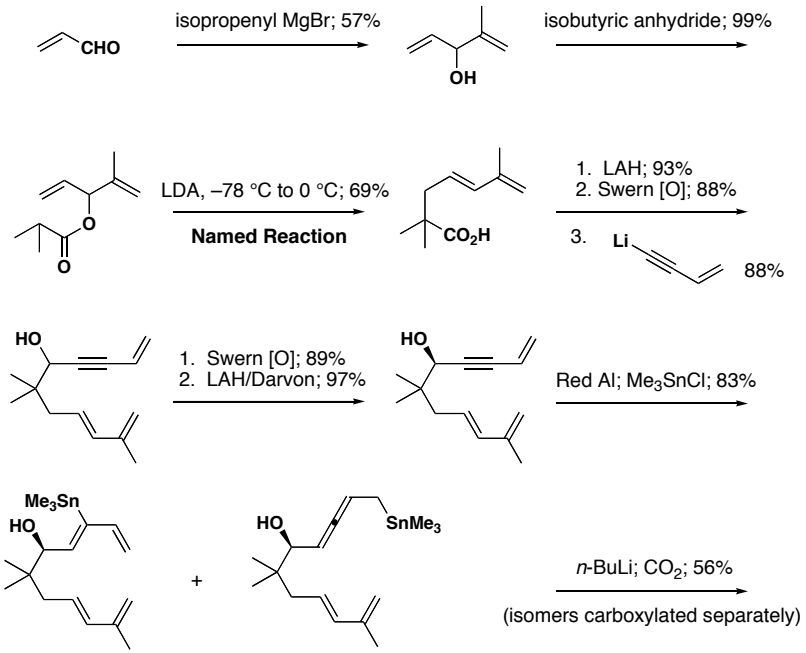
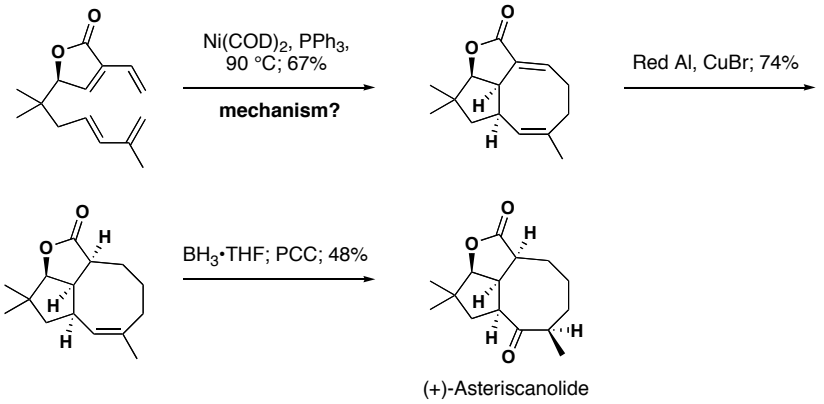
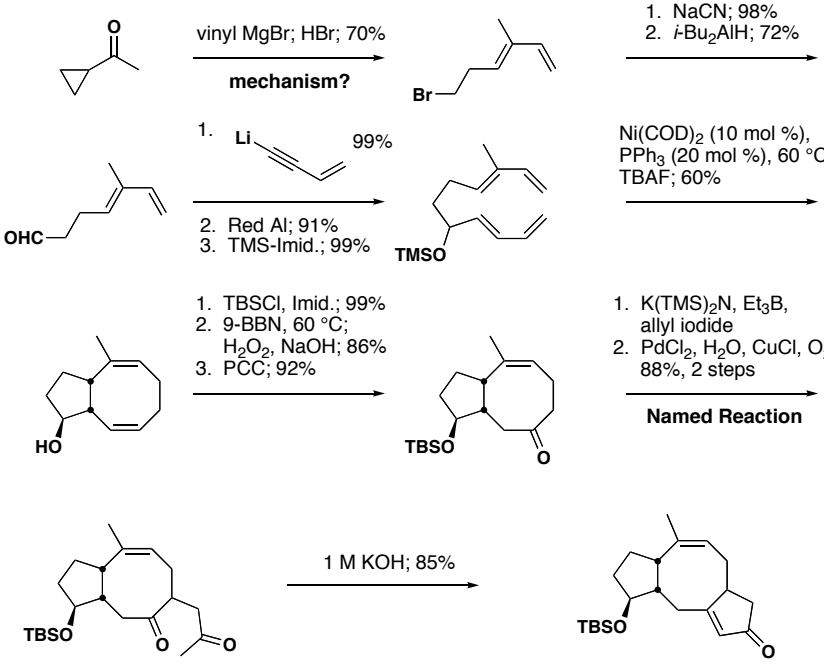
Kumada—Negishi coupling (Lipshutz, *Tetrahedron*, **1996**, 7265.):



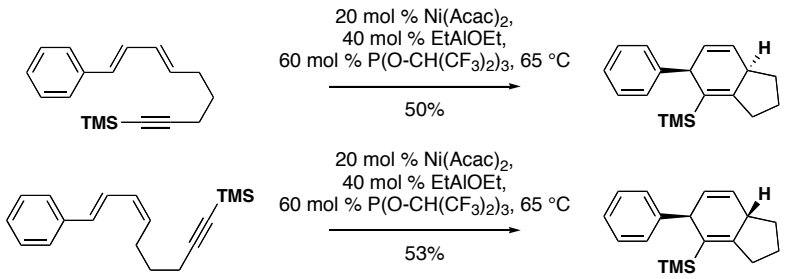
Nickel(0)-catalyzed 4 + 4 cycloadditions and applications to the total syntheses of (+)-Asteriscanolide and Dicyclopenta[a,d]cyclooctene 5–8–5 Ring Systems (Wender, *J. Am. Chem. Soc.*, **1988**, 5904. Wender, *J. Am. Chem. Soc.*, **1997**, 4908.)



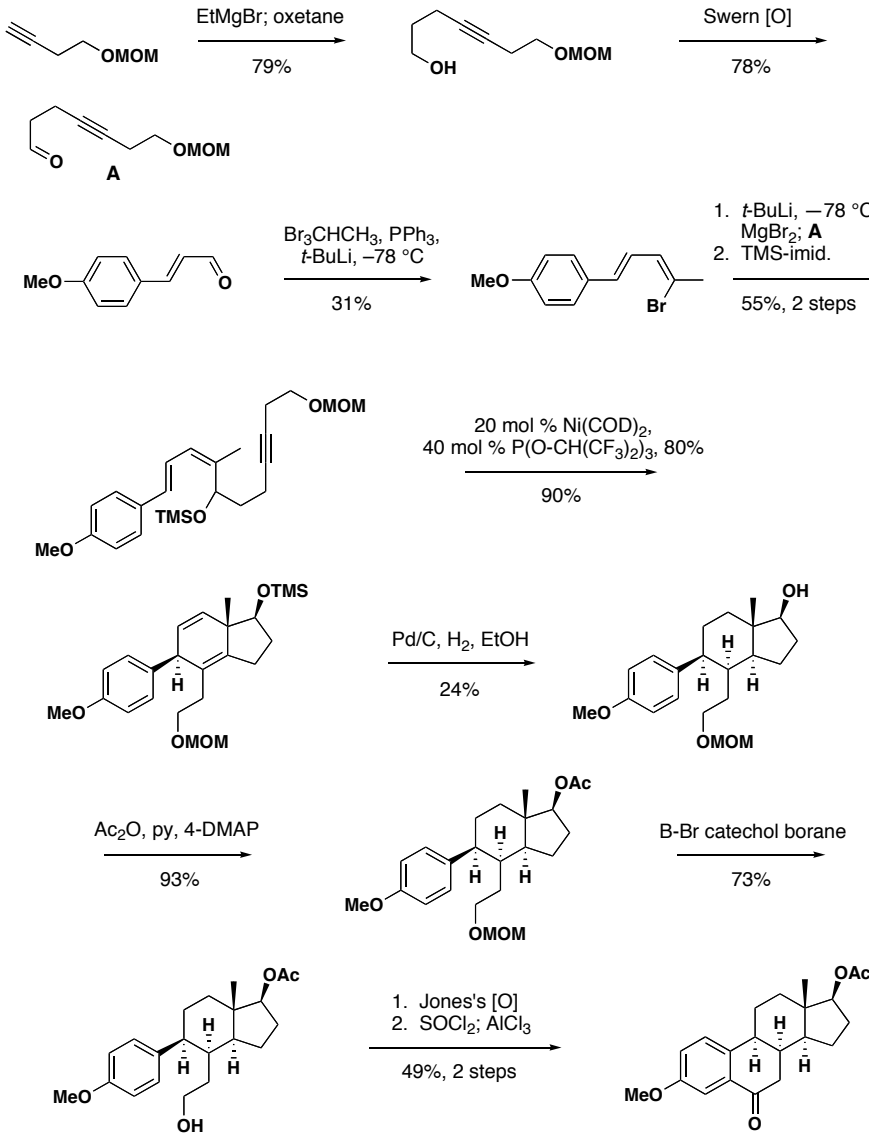




Nickel(0)-catalyzed 4 + 2 cycloadditions: room tempereature Diels-Alder reactions that produce 1,4-cyclohexadienes (Wender, *J. Org. Chem.*, **1995**, 2962. Wender, *J. Org. Chem.*, **1996**, 824.)



Mechanism:



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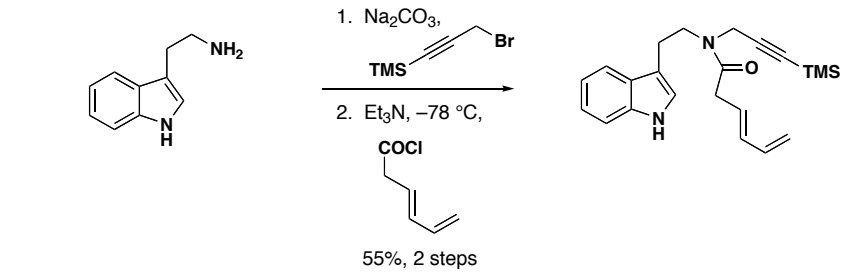
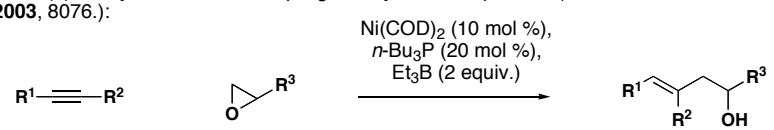
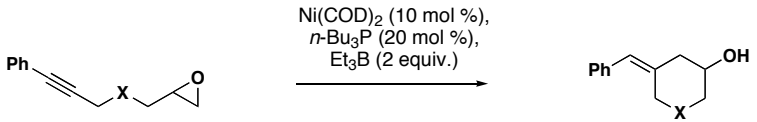


Nickel(0)-catalyzed reductive coupling of Alkynes and Epoxides (Jamison, *J. Am. Chem. Soc.*, **2003**, 8076.):

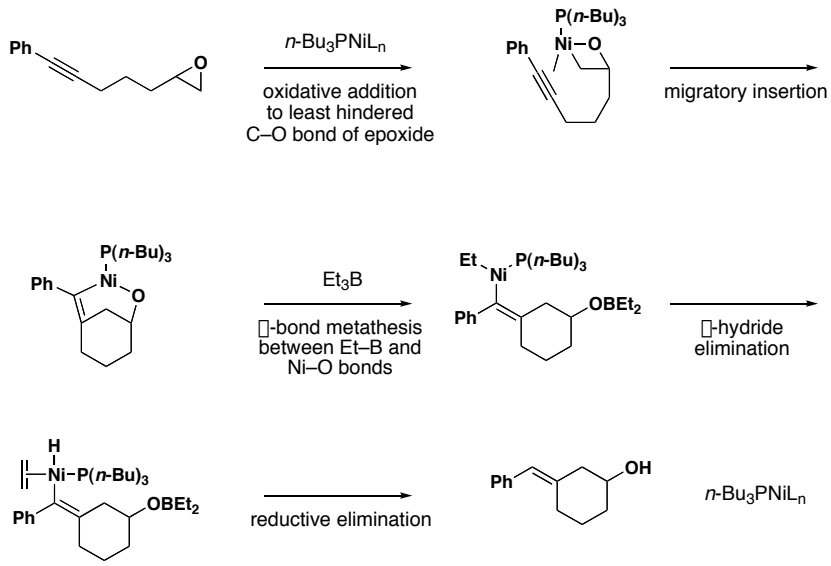


R1	R2	R3	yield
Ph	Me	Me	71%
Ph	Me	*n*-Hex	68%
Ph	Me	Ph	50%
n-Pr	*n*-Pr	Et	35%



X	yield
CH_2	45%
O	50%
NBn	65%
$C(CO_2Me)$	88%

Proposed Mechanism:



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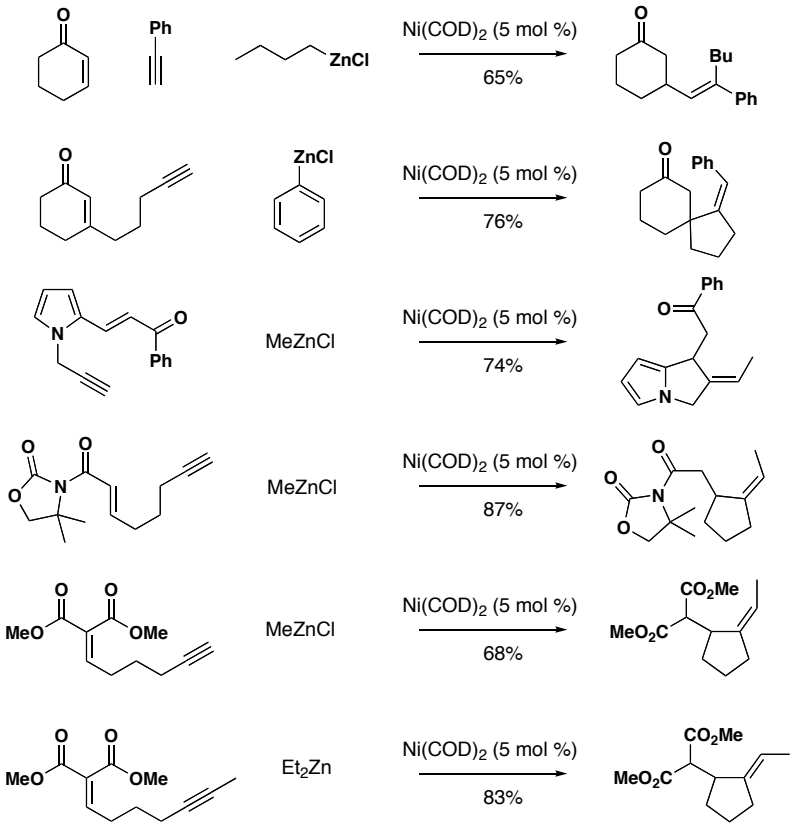
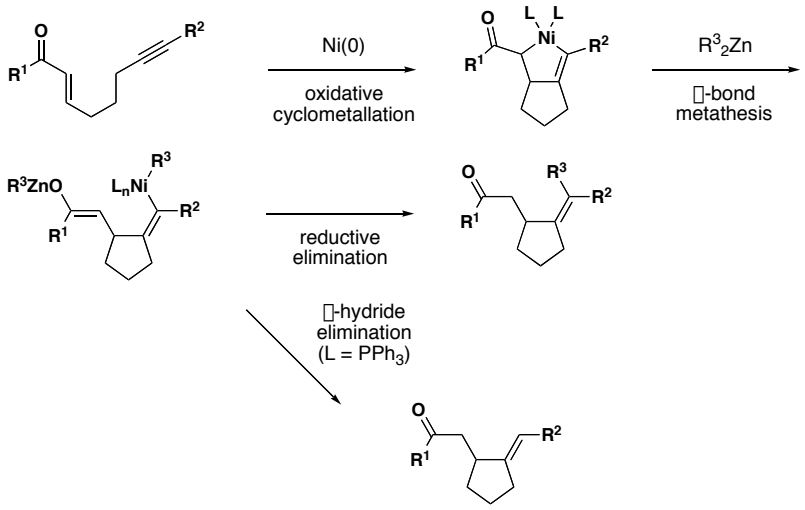
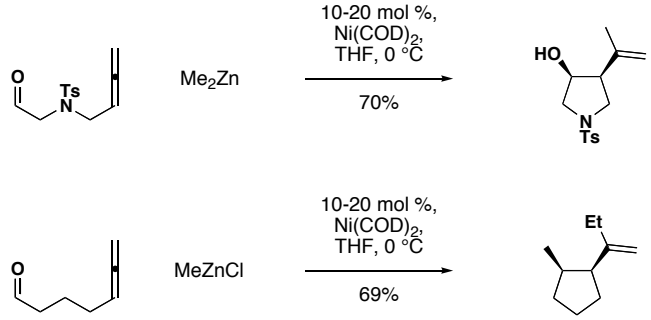
Coupling of an enone, alkyne, and organozinc (Montgomery, *Acc. Chem. Res.*, **2000**, 467.):



Proposed Mechanism:



Coupling of an aldehyde, allene, and organozinc (Montgomery, *Acc. Chem. Res.*, **2000**, 467. Montgomery, *Org. Let.*, **2002**, 4009.)



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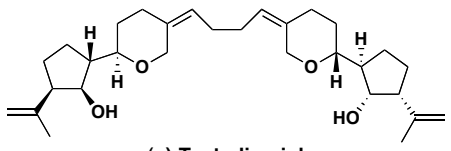
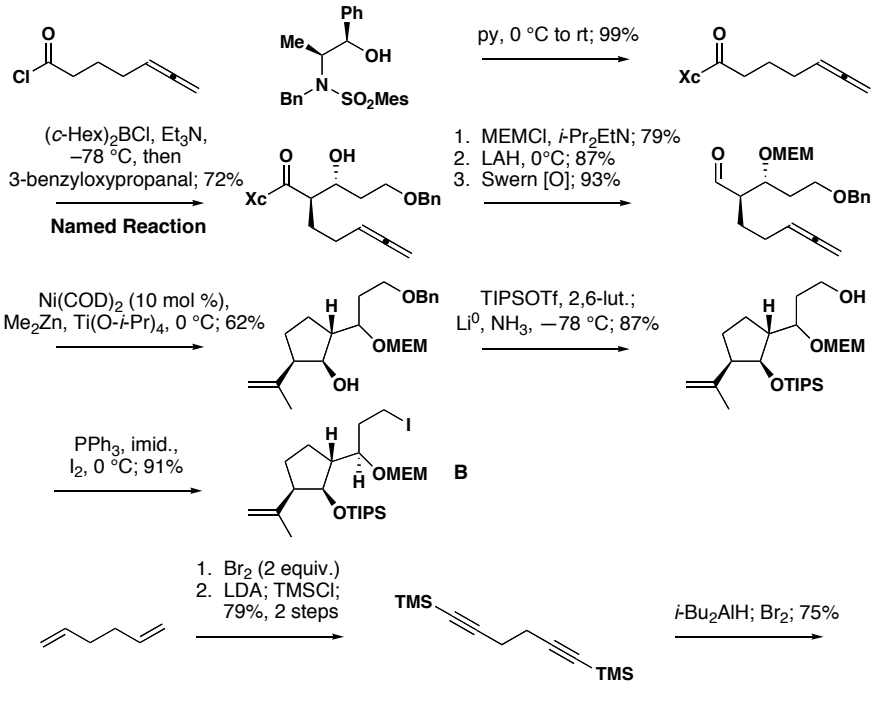
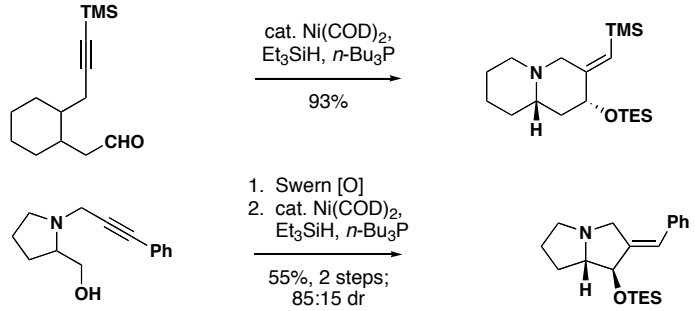
Enantioselective total synthesis of (+)-Testudinariol A (Montgomery, *J. Am. Chem. Soc.*, **2002**, 9366.):



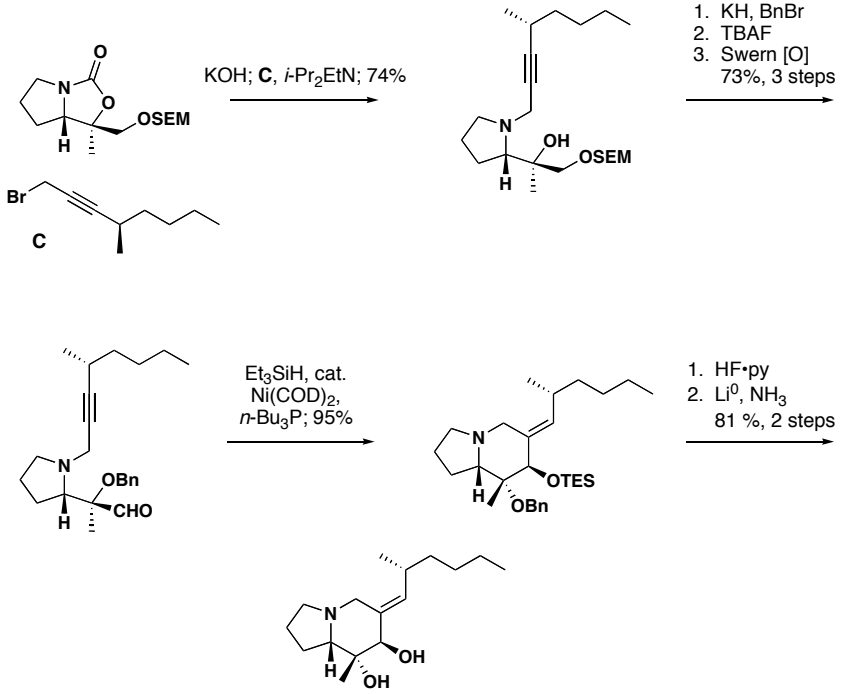
(+)-Testudinariol



Coupling of an aldehyde, alkyne, and silane (Montgomery, *Acc. Chem. Res.*, **2000**, 467.):



Total synthesis of (+)-allopumilotoxin 267A (Montgomery, *J. Am. Chem. Soc.*, **2000**, 6950.):



(+)-allopumilotoxin

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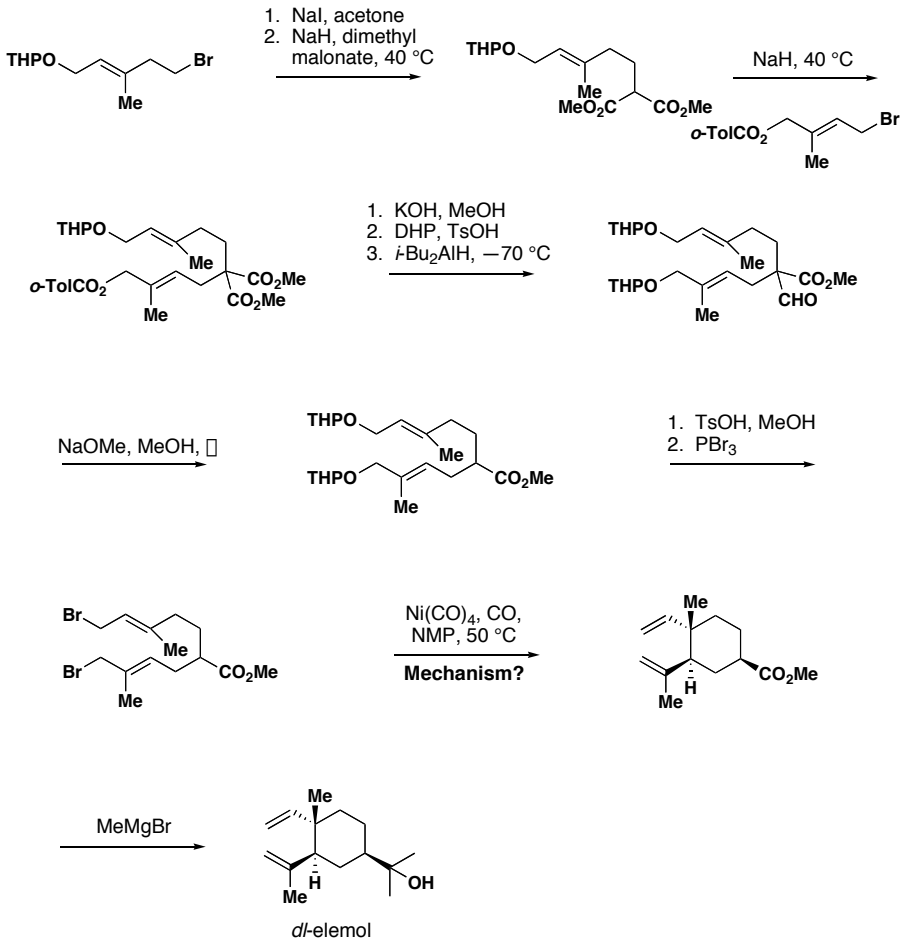
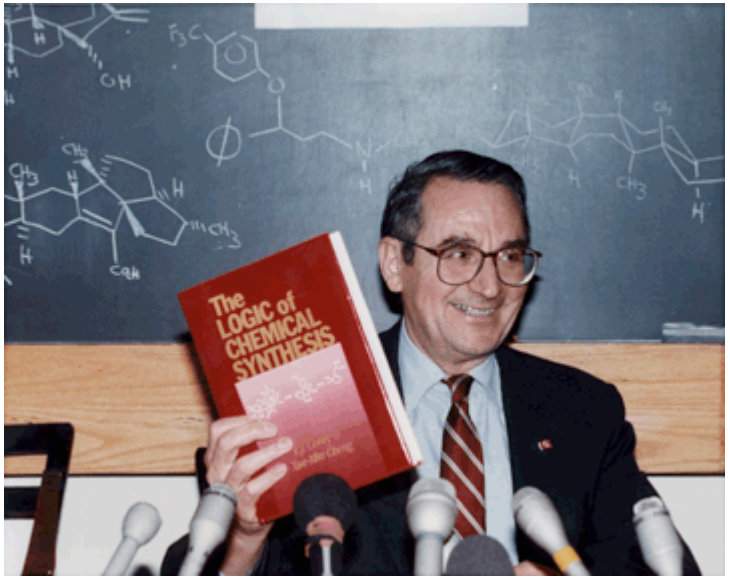
21 April 2004
Carlos Guerrer

Total Synthesis of *dl*-Elemol (Corey, *TL*, 1969, 1779; *JACS*, 1967, 2758.):

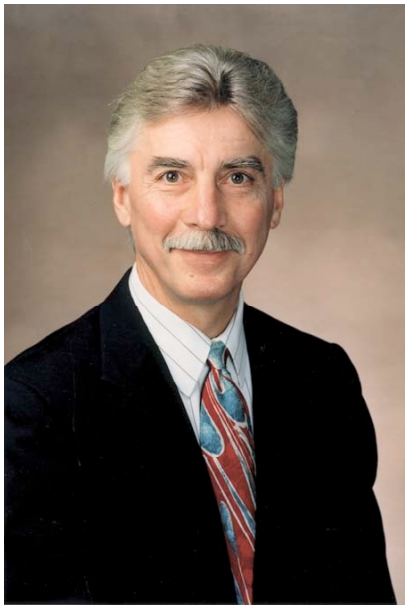




E. J. Corey, Harvard

John A. Montgomery,
Wayne State University, MI

Timothy F. Jamison, MIT



Paul A. Wender, Stanford