1 Give a catalytic cycle of the following reactions.

(a)   R–M   +   R'–X $\xrightarrow{Pd(0)}$ R–R'
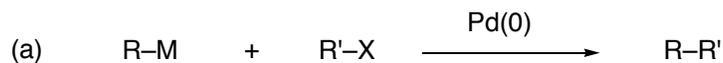
     M = MgBr, SnBu$_3$, B(OH)$_2$ etc
     X = I, Br, OTf etc.

(b)   R⌒   +   R'–X $\xrightarrow[Et_3N]{Pd(0)}$ R⌒R'
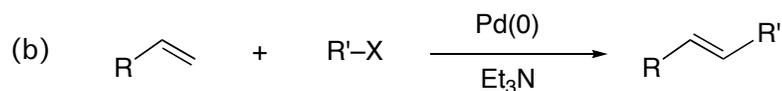
     X = I, Br, OTf etc.

       Note; give a neutral mechanism

(c)   HN(CH$_2$R^1)R^2 + Ar–X $\xrightarrow[NaOtBu]{Pd(0)/Ligand}$ Ar-N(CH$_2$R^1)R^2
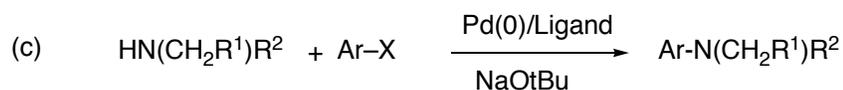
     X = I, Br, Cl, OTf etc.   Ligand = BINAP, dppf

(d)   ⌒X   +   Nuc $\xrightarrow{Pd(0)}$ ⌒Nuc
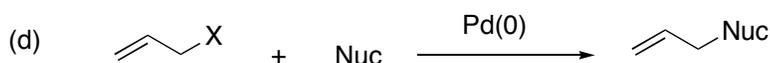
     Nuc = soft nucleophile

(e)   R≡R $\xrightarrow{MLn}$
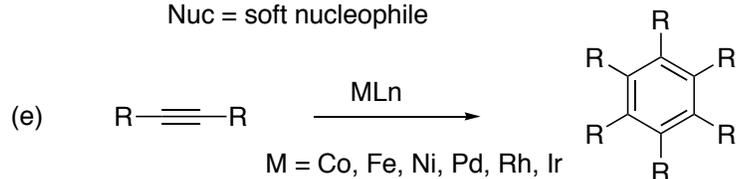
     M = Co, Fe, Ni, Pd, Rh, Ir

Give a mechanism of the following reaction

(f)

     $M=\!\!\!\!=\!\!\!\!<^R$

     M = Ru, Mo
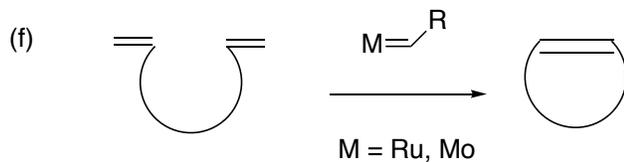
2 Provide intermediate A and product B of the following reaction.

Padwa *JOC* **1995**, *60*, 6258
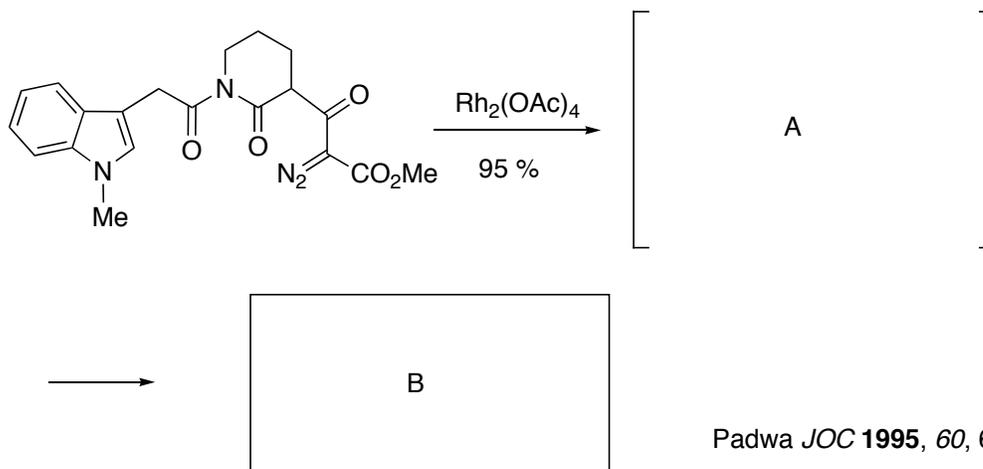
3 Provide a mechanism and intemediate A and product B of the following reaction.
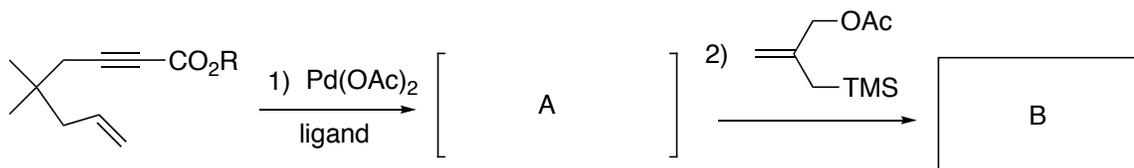
4 Provide a mechanism and a product of the following reaction.

JACS, **1996**, *118*, 6634

5 Provide a mechanism of the following reaction.

Tetrahedron 1996, 52, 11545
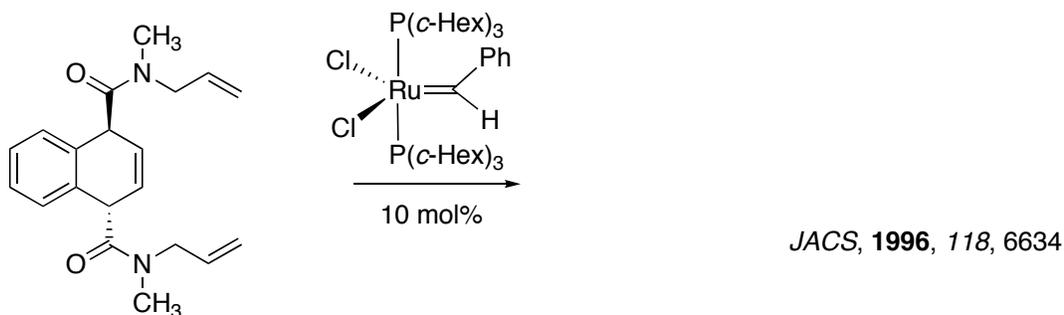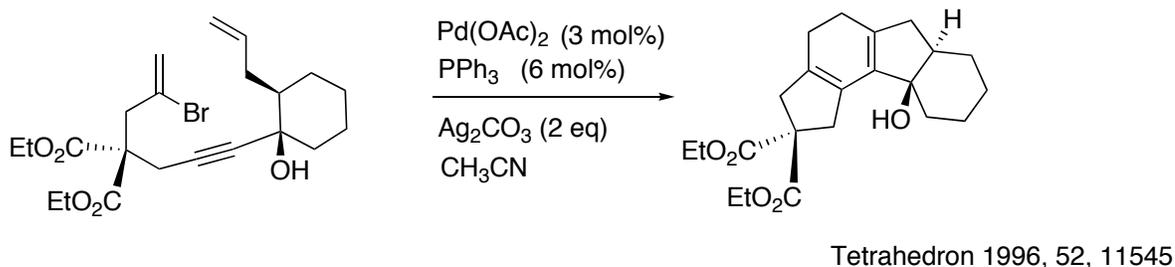
6 Provide a mechanism of the following reaction. Note: Specify the stereochemistry of the product.

Angew. Chem. Int. Ed. Engl. **1997**, *35*, 1124
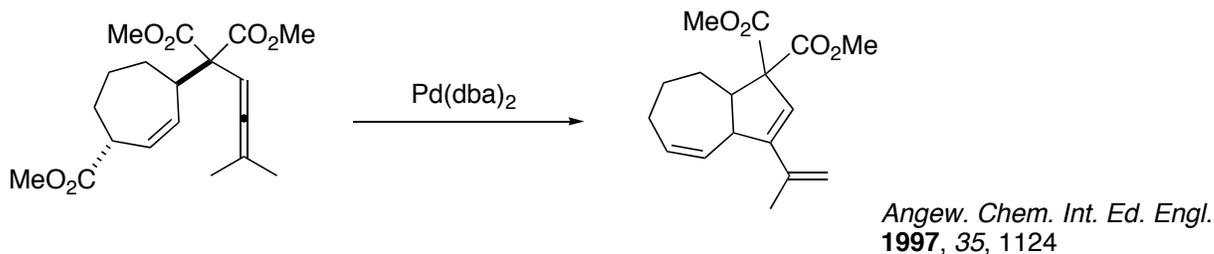
7 Provide the product and mechanism of the following reaction.

JOC, **1989**, *54*, 3625