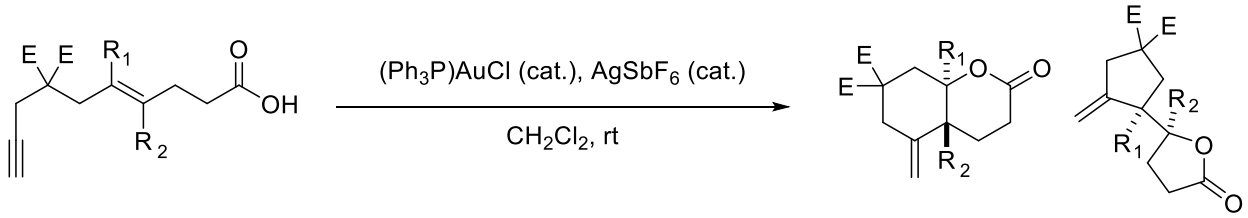
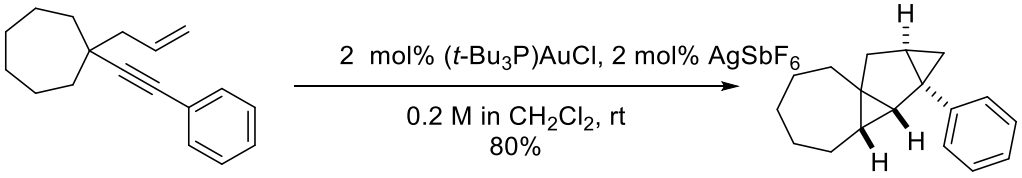
1. Gold–catalyzed cyclization are often suggested to proceed through either carbocation or gold carbene intermediates. The contribution of each mechanism is an area of ongoing discussion.
   a. Alois Fürstner collected the following data. Which mechanism does it support, and why?



R_1=R_2=H	11%	19%
R_1=Me, R_2=H	80%	-
R_1=H, R_2=Me	-	82%

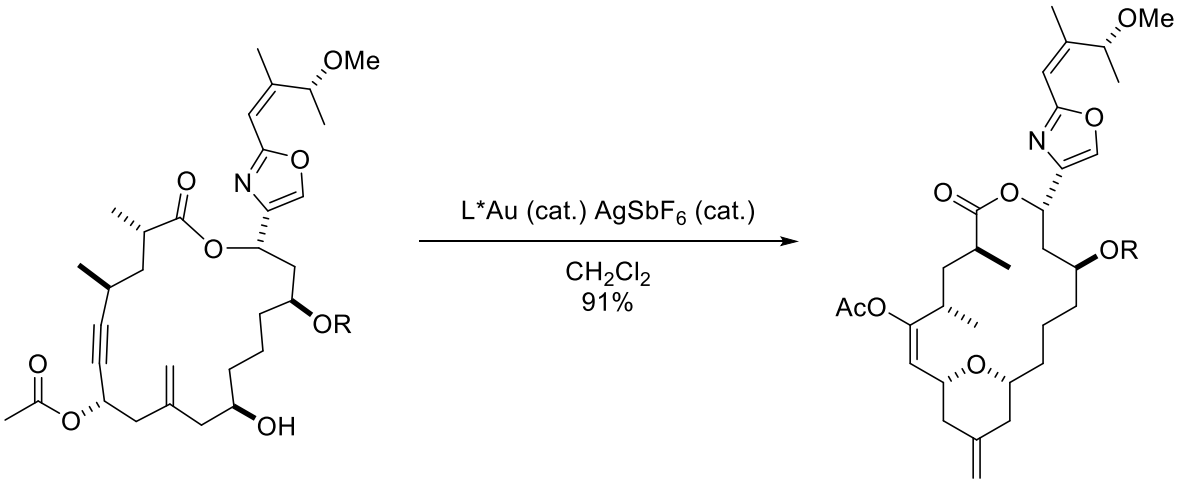
Fürstner, A., *et al. ACIEE* **2008**, *47*, 5030.

   b. Dean Toste observed the result below. Does it support or refute the above paradigm, and why?

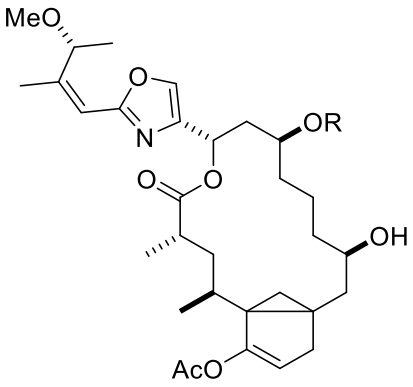


Toste, F. D., *et al*. *JACS* **2009**, *131*, 2809.

2. Gold catalysis was used, again by Fürstner, in a synthesis of engimazole A.
    a. Provide a plausible mechanism for this key step.

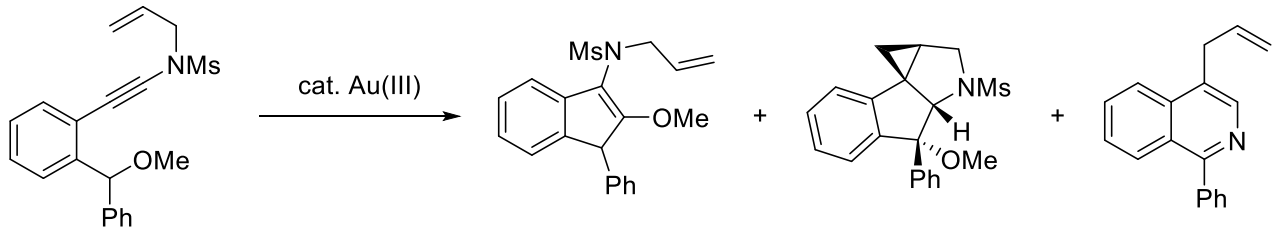


    b. If the chirality of this ligand was mismatched with the substrate, the following byproduct was formed, and the yield was substantially reduced. Provide a plausible mechanism for its formation.



Fürstner, A., *et al*. *ACIEE* **2016**, DOI 10.1002/anie.201510026.

3. Provide plausible mechanisms for the formation of these three observed products.



Davies, P. W., *et al. ACIEE* **2015**, *54*, 15525.