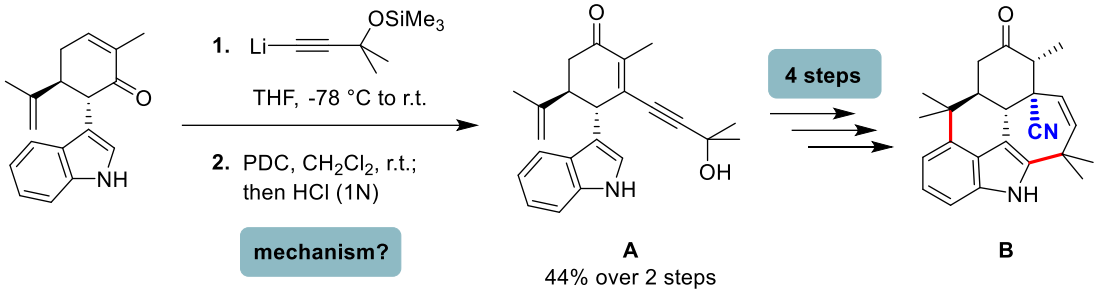
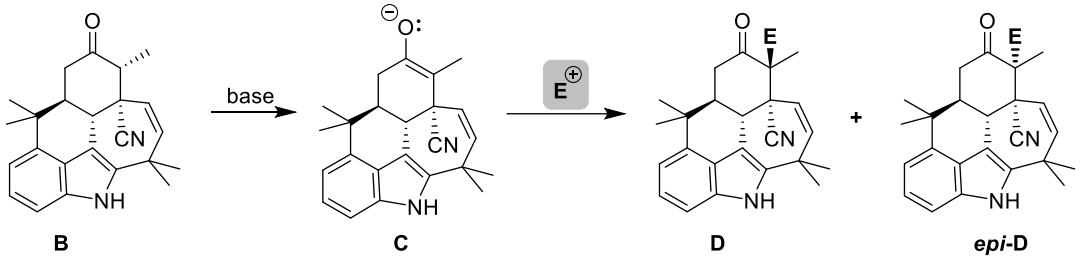
Recent Highlights in Total Synthesis

1. Consider the sequence shown below, from the Sarpong synthesis of ambiguine P.



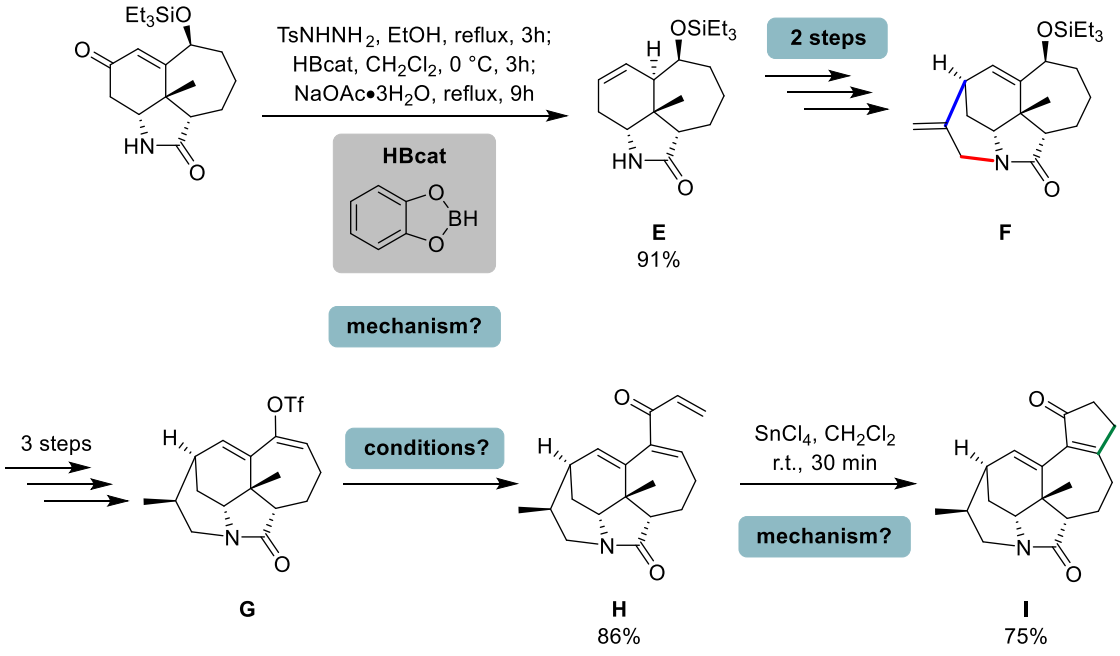
J. Am. Chem. Soc., **2019**, *141*, 2233

a. Provide a mechanism for step 2, and suggest reagents for the conversion of **A** to **B**.
b. Deprotonation of **B** gives enolate **C**, as shown below. Upon addition of an electrophile to this enolate, two possible diastereoisomers can be formed – **D** and *epi*-**D**. Which diastereoisomer is expected to be favoured?



c. Suggest suitable conditions for the α-vinylation of **B**.

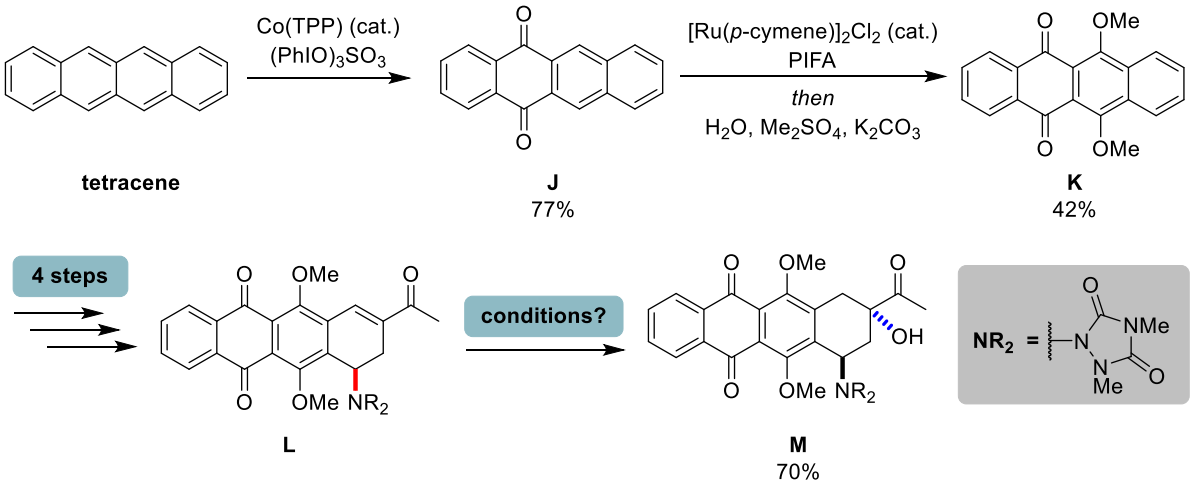
2. Consider the sequence shown below, from the Hing/Xu synthesis of himalensine A.



Angew. Chem. Int. Ed., **2019**, *58*, 7390

a. Provide a mechanism for formation of **E**. Explain why the diastereoisomer of **E** shown is believed to form exclusively.
b. Give conditions for the conversion of **E** to **F**. Explain how the success of the ring-forming step here helps to confirm the stereochemistry of **E**.
c. Suggest conditions for the conversion of **G** to **H**.
d. Provide a mechanism for the cyclisation of **H** to give **I**.

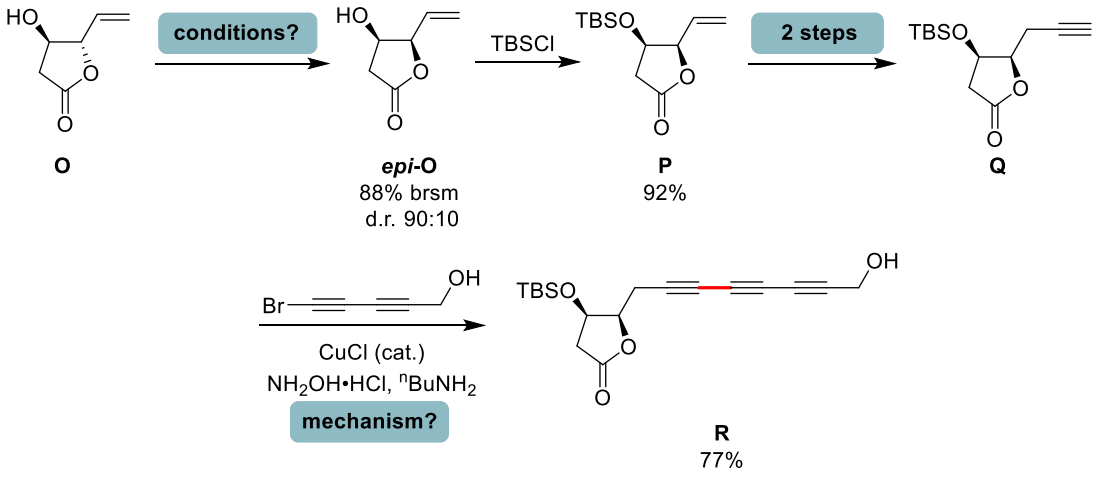
3. Consider the sequence shown below, from the Sarlah synthesis of idarubicinone.



J. Am. Chem. Soc., **2019**, *141*, 10193

a. Explain why, in the conversion of tetracene to **J** and then to **K**, oxidation occurs selectively at the shown positions.
b. What are the structures of the two hypervalent iodine reagents used in these oxidation steps – $(PhIO)_3SO_3$ and PIFA?
c. Suggest a strategy for the conversion of **K** to **L**.
d. Suggest conditions for the conversion of **L** to **M**.

4. Consider the sequence shown below, from the Fernandes synthesis of a triyne natural product.

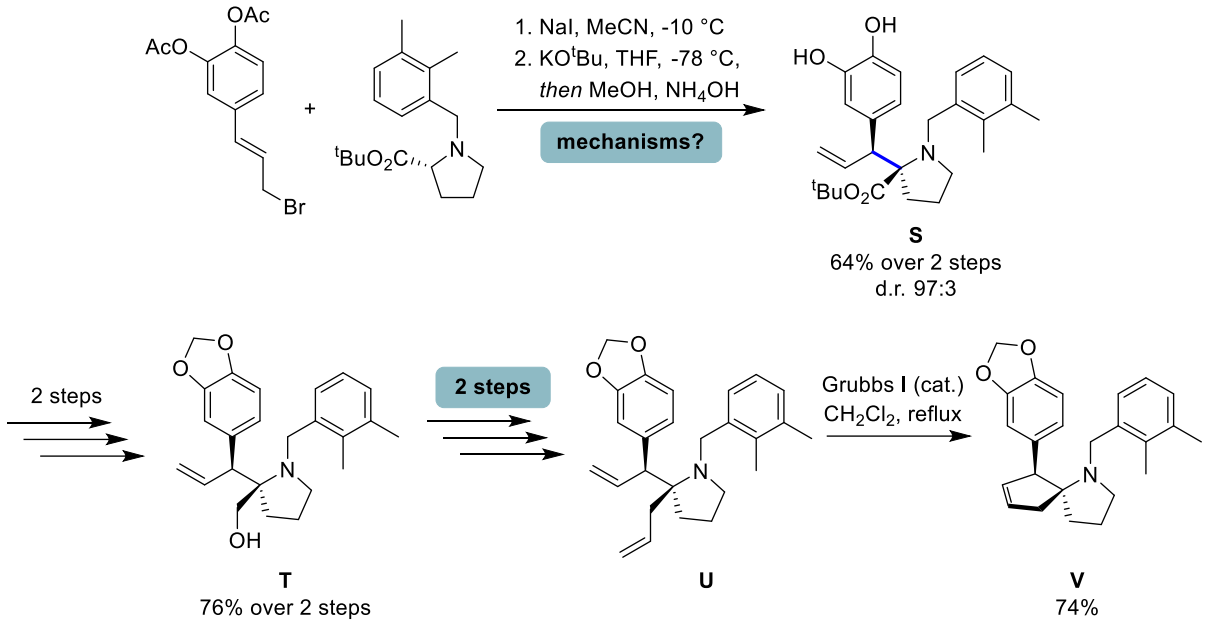


Org Lett, **ASAPs**

a. Suggest conditions for the epimerisation of **O** to *epi*-**O**.
b. Suggest conditions for the conversion of **P** to **Q**.

c. Provide a mechanism for the formation of **R**.

5. Consider the sequence shown below, from the Kim synthesis of cephalezomine G.



Org Lett, **2019**, *21*, 1121

a. Provide mechanisms for the formation of **S** from the starting materials shown, accounting for the observed stereoselectivity.
b. Suggest conditions for the conversion of **T** to **U**.
c. Propose a strategy for the completion of cephalezomine G from **V** (see below).