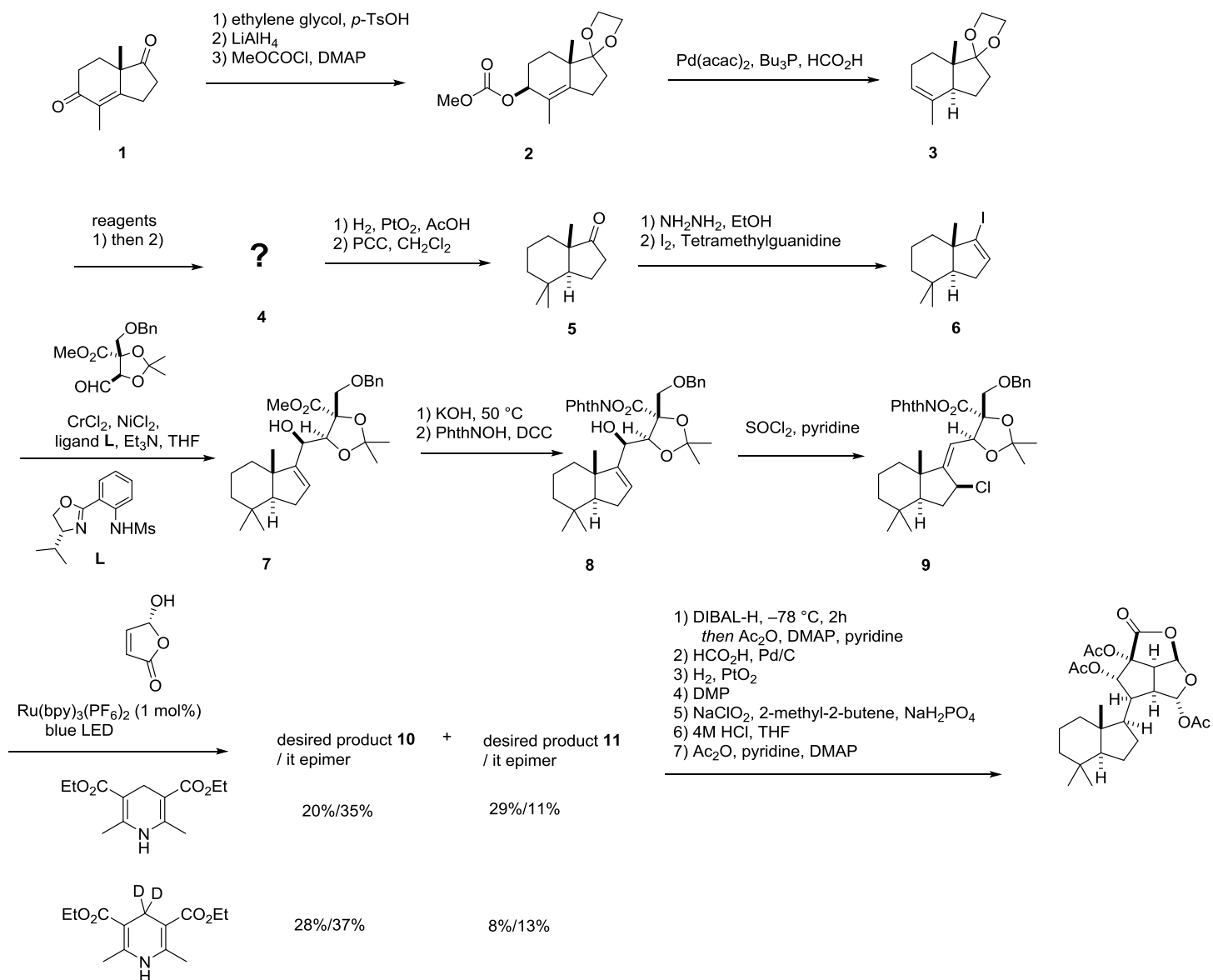


Exercise Session



Questions:

1- How would you prepare (s)-enedione **1** (even if it is commercially available!)?

Hint: **1** has a name. One Reagent is a Michael acceptor one is a diketone

2- Give mechanism of the formation of **3** from **2**

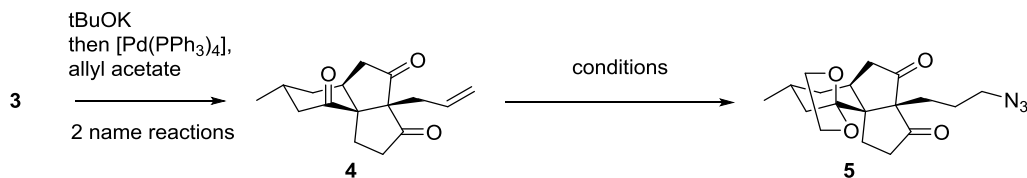
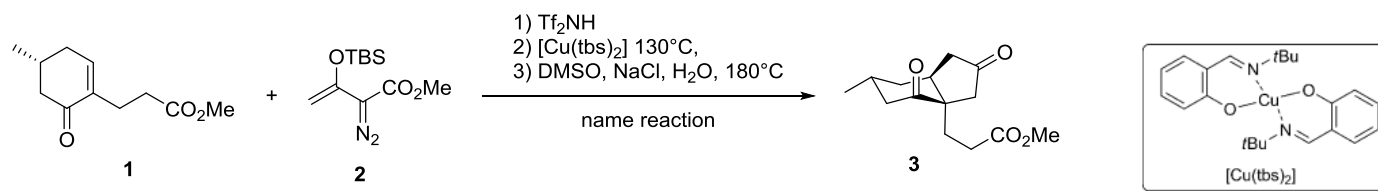
3- Give the missing reagents and the missing product **4**

4- Explain the formation of compound **6**

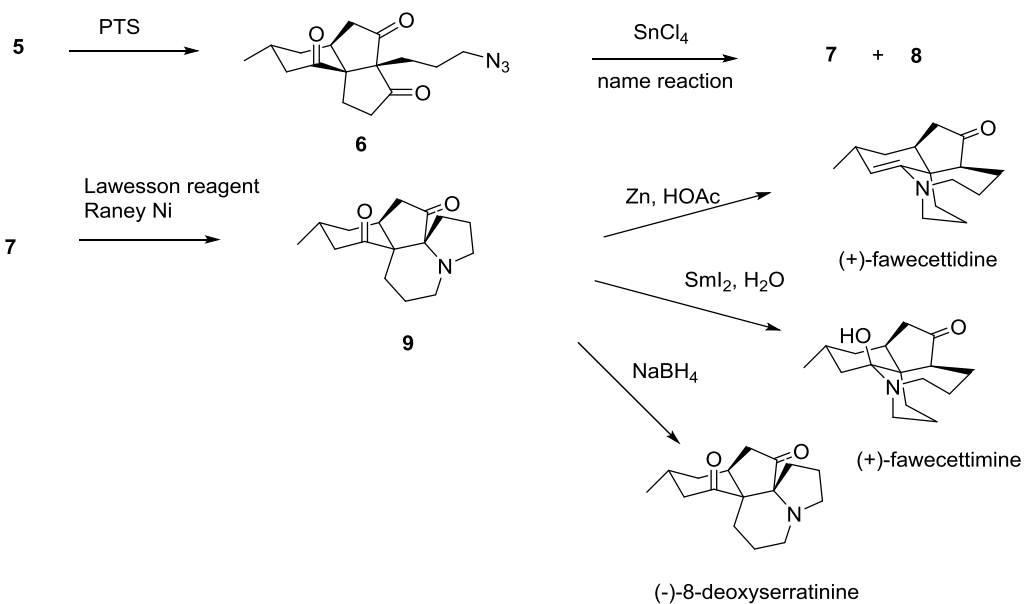
5- From **9** to **10** 2 products and 1 epimer of each are formed. Identify them and explain their formation.

Using deuterated Hantzsch ester has an influence on the outcome of the reaction, which one?

Synthesis of (+)-fawecettidine, (+)-fawecettimine and (-)-8-deoxyserratinine

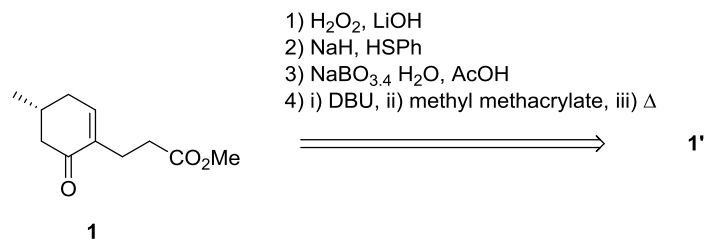


- ◆ Propose a mechanism for the formation of the cis-bicyclic dione **3** from **2** and **1** (2 pathways are possible!) and give the name reaction
- ◆ Give the 2 name reactions for the transformation of **4** from **3**
- ◆ Give the conditions for the preparations of **5** from **4**



- ◆ Give the 2 products **7** and **8** obtained from **6** and the name of the reaction
- ◆ Explain the mechanism of the formation of (+)-fawecettimine from **9**

Synthesis of starting material **1**



- ◆ What can be **1'**? Give the mechanism for the synthesis of enone **1** from **1'**

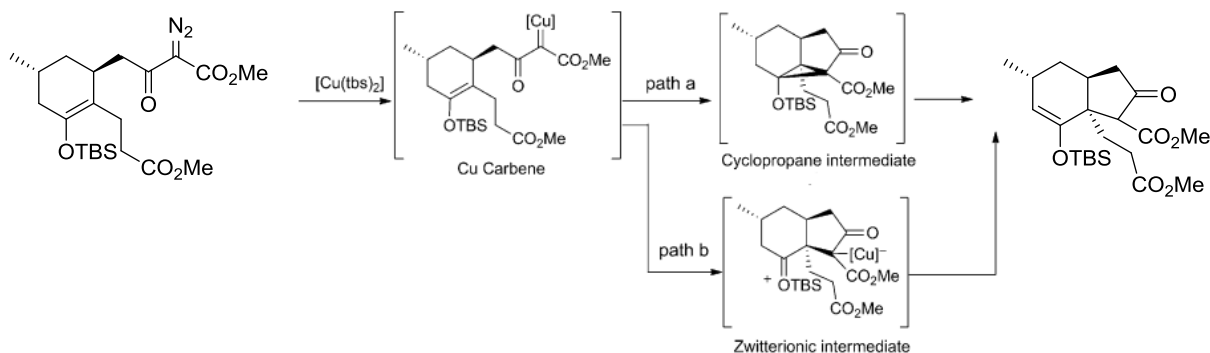
Divergent and Efficient Syntheses of the *Lycopodium* Alkaloids (-)-Lycojaponicum C, (-)-8-Deoxyserratinine, (+)-Fawcettimine, and (+)-Fawcettidine

Tu et al. *Angew. Chem. Int. Ed.* **2013**, *52*, 11373–11376

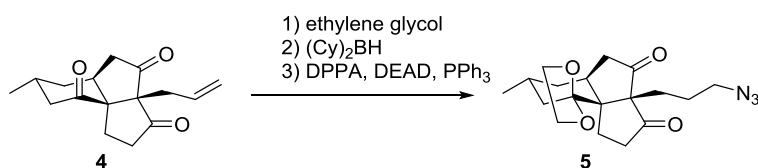
- ◆ Cis-bicyclic dione **3** from **2** and **1**:

Mukaiyama– Michael addition from known enone and vinyl diazoacetate
carbene addition/cyclization

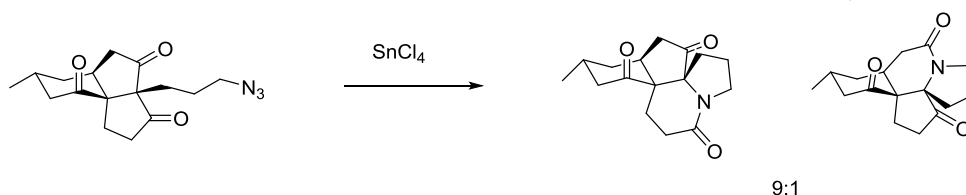
Proposed mechanism: Decomposition of diazo compound induced by [Cu(tbs)₂] at 130°C to afford Cu carbene, which reacted with the enol silyl ether moiety to give the last intermediate via the cyclopropane intermediate or the zwitterionic intermediate



- ◆ **4** from **3** : Dieckmann condensation / Tsuji-Trost allylation
- ◆ Conditions for formation of **5** (protection, hydroboration, Mitsunobu)



- ◆ 2 Products of the Schmidt reaction of Study of Aube on tether length and ring size (G. L. Milligan, C. J. Mossman, J. Aubé, *J. Am. Chem. Soc.* **1995**, *117*, 10449–10459)



6 membered ring favored over 7 membered ring amide

Size of the ketone ring would not change selectivity (5 vs 6 membered ring)

- ◆ Fragmentation with SmI₂: Selective cleavage of the C-N bond of **9** with SmI₂ followed by an in situ aza-ketalization (T. Honda, *Heterocycles* 2011, **83**, 1–46)
- ◆ Starting material from (R)-(+)-Pulegone (J. A. Kozak, G. R. Dake, *Angew. Chem.* **2008**, *120*, 4289–4291)

