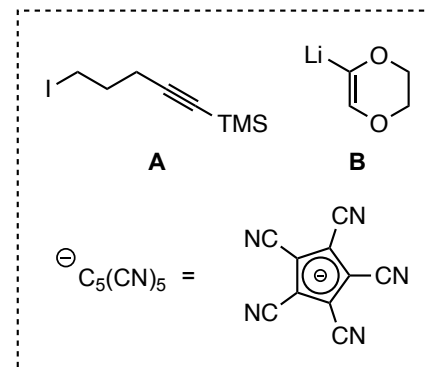
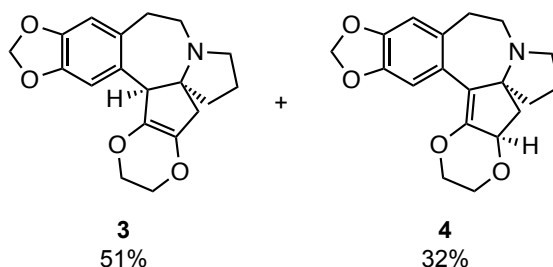
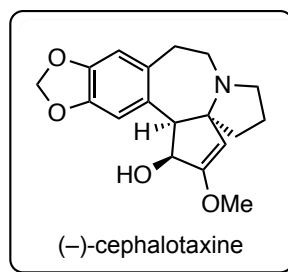


AuCl(PPh<sub>3</sub>) (2 mol%)  
 Ag[C<sub>5</sub>(CN)<sub>5</sub>] (2 mol%)  
 TsNH<sub>2</sub> (4 equiv.)  
 tBuOH, 55 °C



- Q1: Propose a synthetic plan to obtain **1** from piperonal  
 Q2: Propose reasonable intermediates and arrow-pushing mechanism of the transformations from **1** to **2**, **3** and **4**.



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 Madoka Kamiya, and Yuji Mori

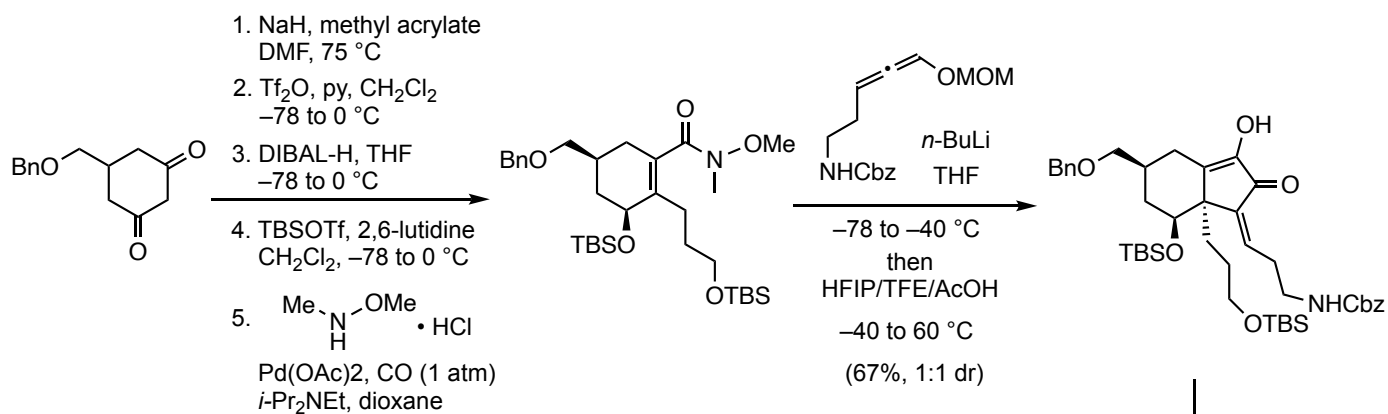
Org. Lett. ASAP

doi: 10.1021/acs.orglett.1c01323

**Hint**

- 2**→**3,4**: TsNH<sub>2</sub> is not essential to proceed the transformation. TsNH<sub>2</sub> was added to improve the yield of **3** compared with **4**. (without TsNH<sub>2</sub>: data was not shown)

Q: Propose reasonable intermediates and mechanisms of the following transformations.



Q. Plan a reasonable synthetic sequence

