**Problem session – 18/04/2024 – Vincent:**

**Exercise 1:** Gold-Catalyzed Cascade Cycloisomerization of 3-Allyloxy-1,6-diynes to Cyclopropyl- and Cyclobutyl-Fused Benzofurans and Chromen-3a(1*H*)-ols. (Z. Wang, J. Chen, L. Yu, C. Zhang, W. Rao, P. Wai Hong Chang, *Org. Lett.* **2024**, *26*, 13, 2635–2640).

**Propose a mechanism for the conversion of 1 into 2 and 3.**



**Exercise 2:** Enantioselective Total Syntheses of (+)-Hippolachnin A, (+)-Gracilioether A, (−)-Gracilioether E, and (−)-Gracilioether F (Q. Li, K. Zhao, A. Peuronen, K. Rissanen, D. Enders, Y. Tang, *J. Am. Chem. Soc.* **2018**, *140*, 5, 1937–1944).

**Propose a mechanism for the conversion of 2 into (+)-Gracilioether A and (−)-Gracilioether E**.





**Exercise 3:** Total Syntheses of Polycyclic Diterpenes Phomopsene, MethylPhomopsenonate, and *iso*-Phomopsene via Reorganization of C−C Single Bonds (J.-J. Yin, Y.-P. Wang, J. Xue, F.-F. Zhou, X.-Q. Shan, R. Zhu, K. Fang, L. Shi, S.-Y. Zhang, S.-H. Hou, W. Xia, Y.-Q. Tu, *J. Am. Chem. Soc.* **2023**, *145*, 39, 21170–21175.) **Give the structures of missing intermediates and the mechanism when asked.**