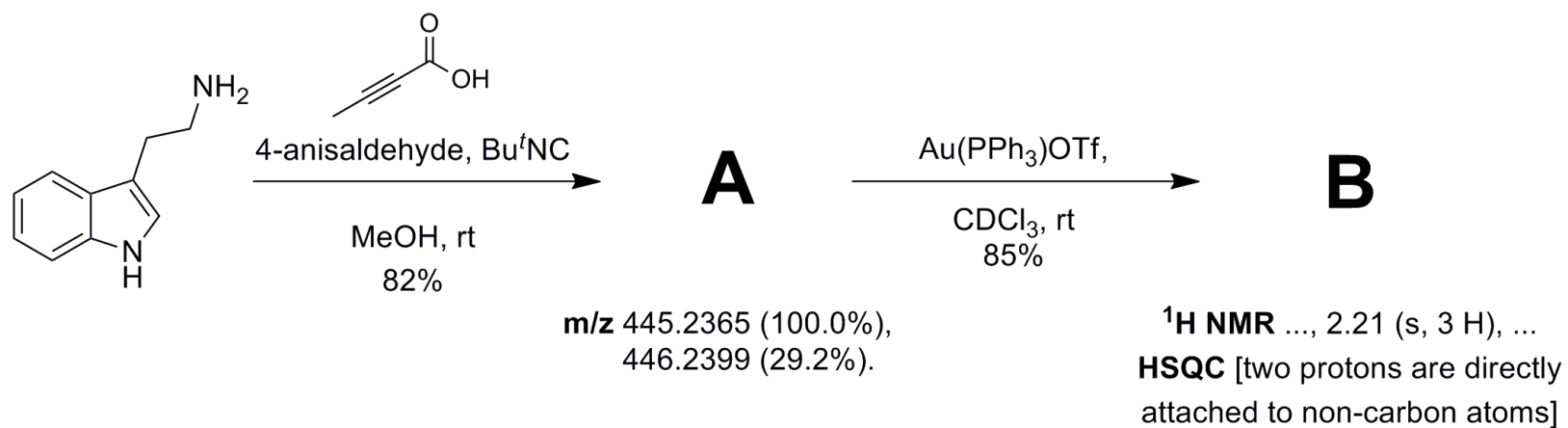


Problems 02

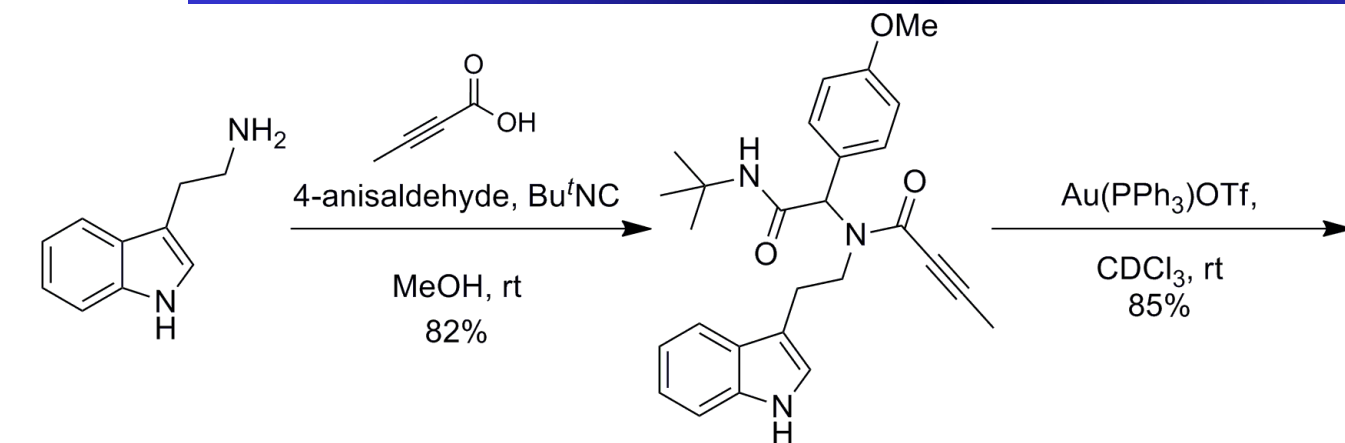
12/11/2013

APS

Ugi reaction and hydroarylation (*Chem. Comm.* 2012, 48, 6550-6552)

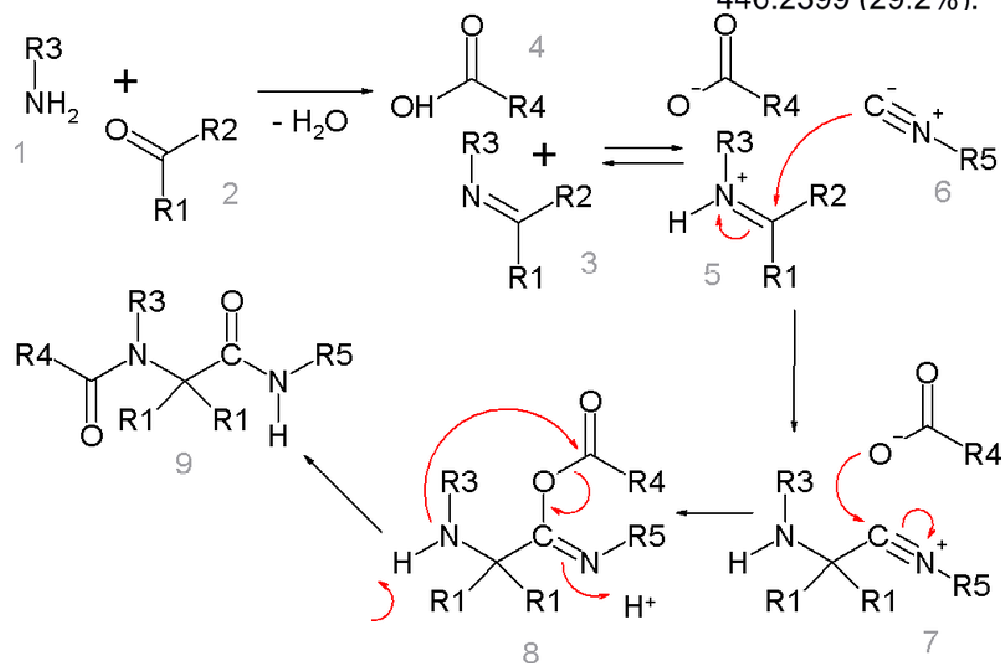


Ugi reaction and hydroarylation *(Chem. Comm. 2012, 48, 6550-6552)*

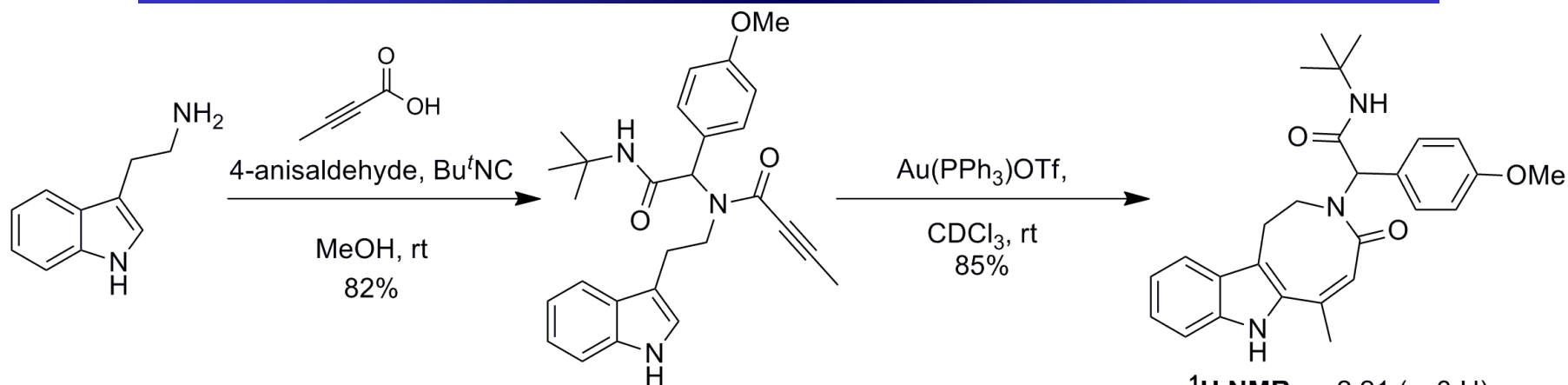


m/z 445.2365 (100.0%),
446.2399 (29.2%).

$^1\text{H NMR}$..., 2.21 (s, 3 H), ...
HSQC [two protons are directly attached to non-carbon atoms]

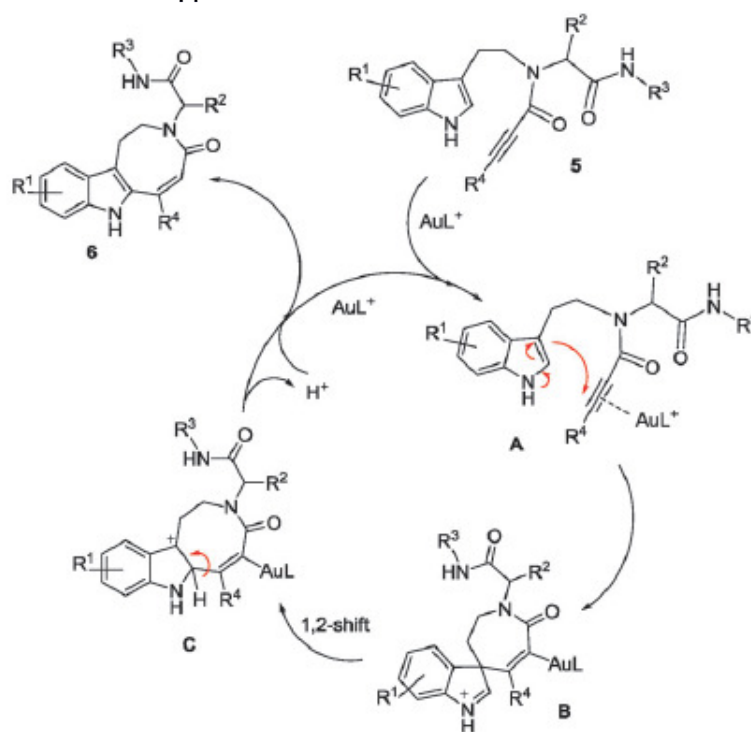


Ugi reaction and hydroarylation (*Chem. Comm.* 2012, 48, 6550-6552)

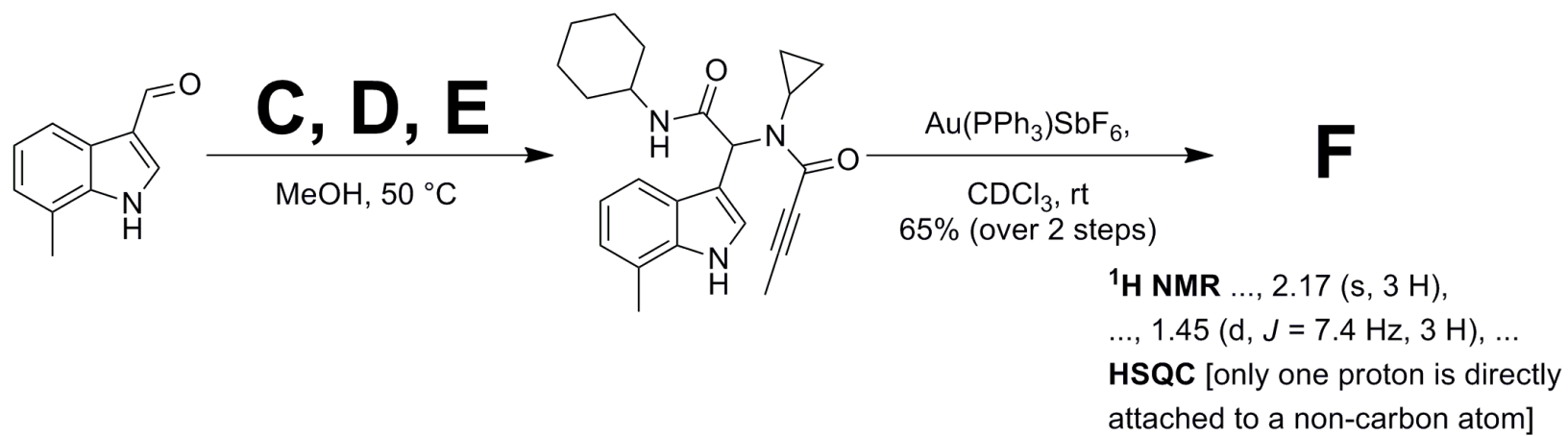


¹H NMR ..., 2.21 (s, 3 H), ...

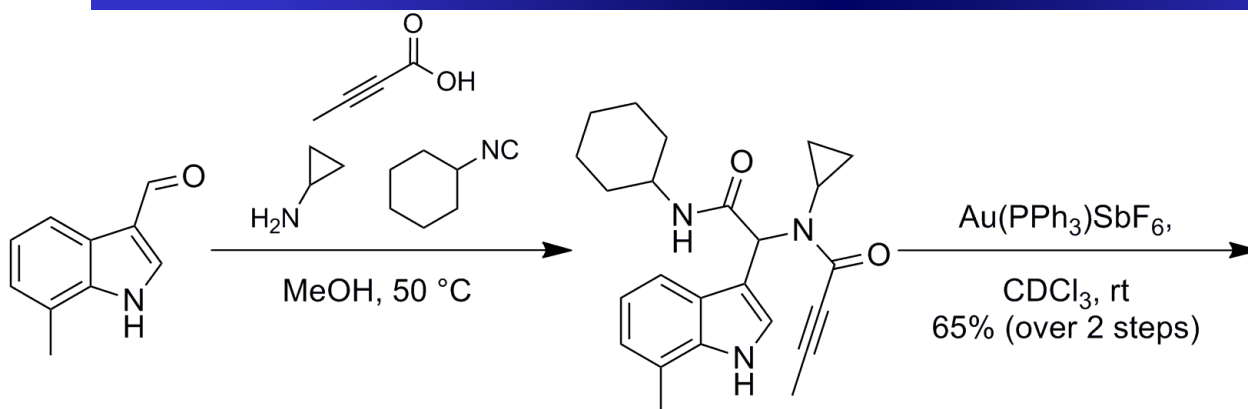
HSQC [two protons are directly attached to non-carbon atoms]



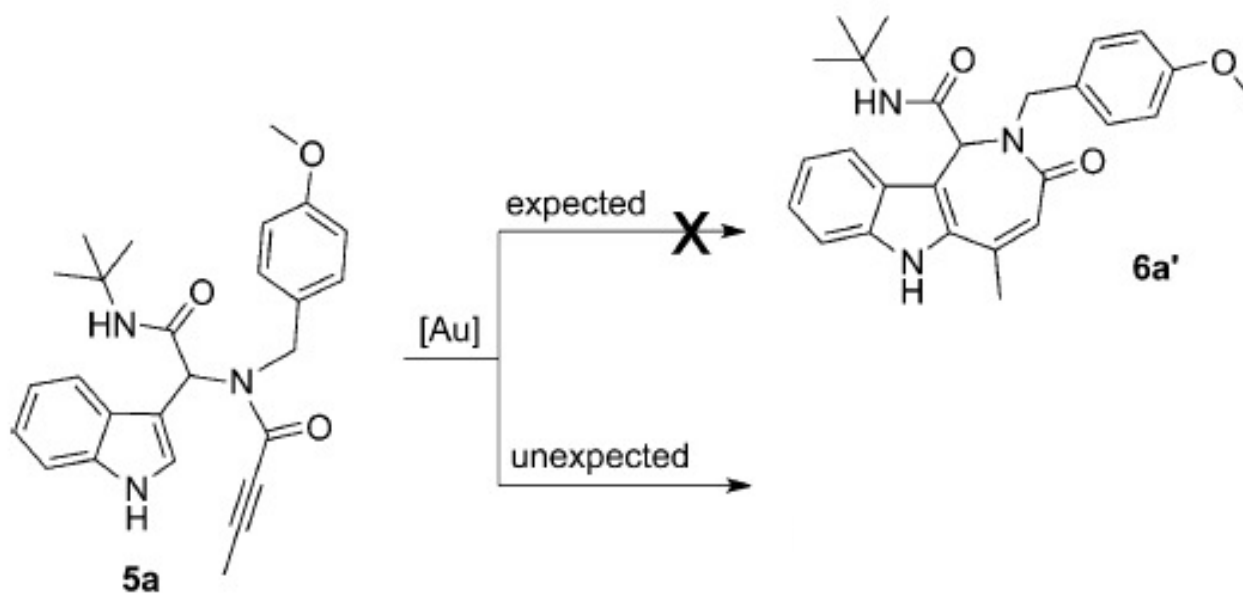
Spiroindoline formation (*Angew. Chem. Int. Ed.* **2012**, *51*, 9572-9575)



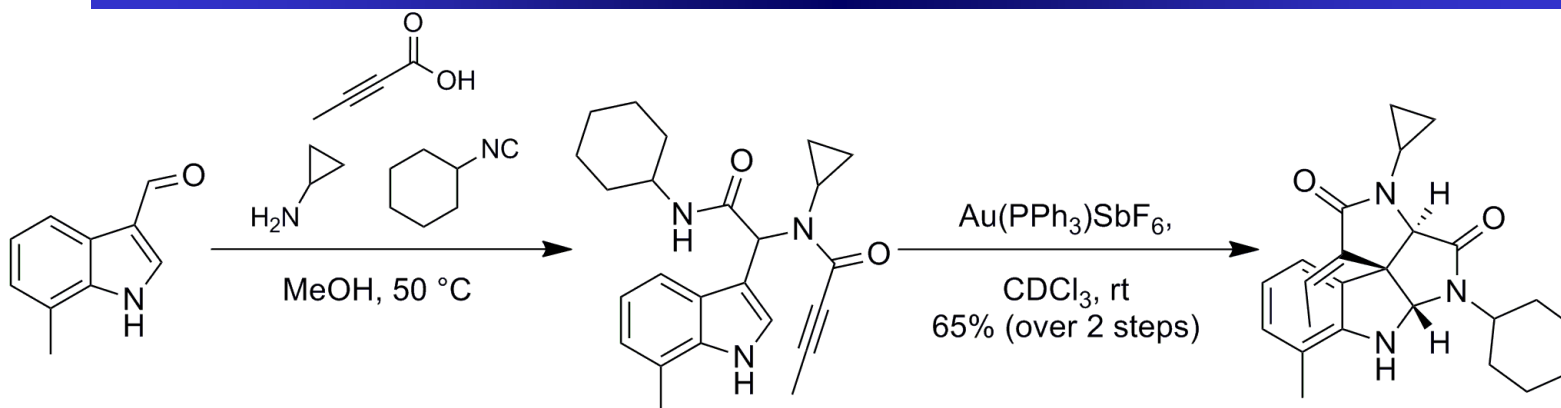
Spiroindoline formation (*Angew. Chem. Int. Ed.* **2012**, *51*, 9572-9575)



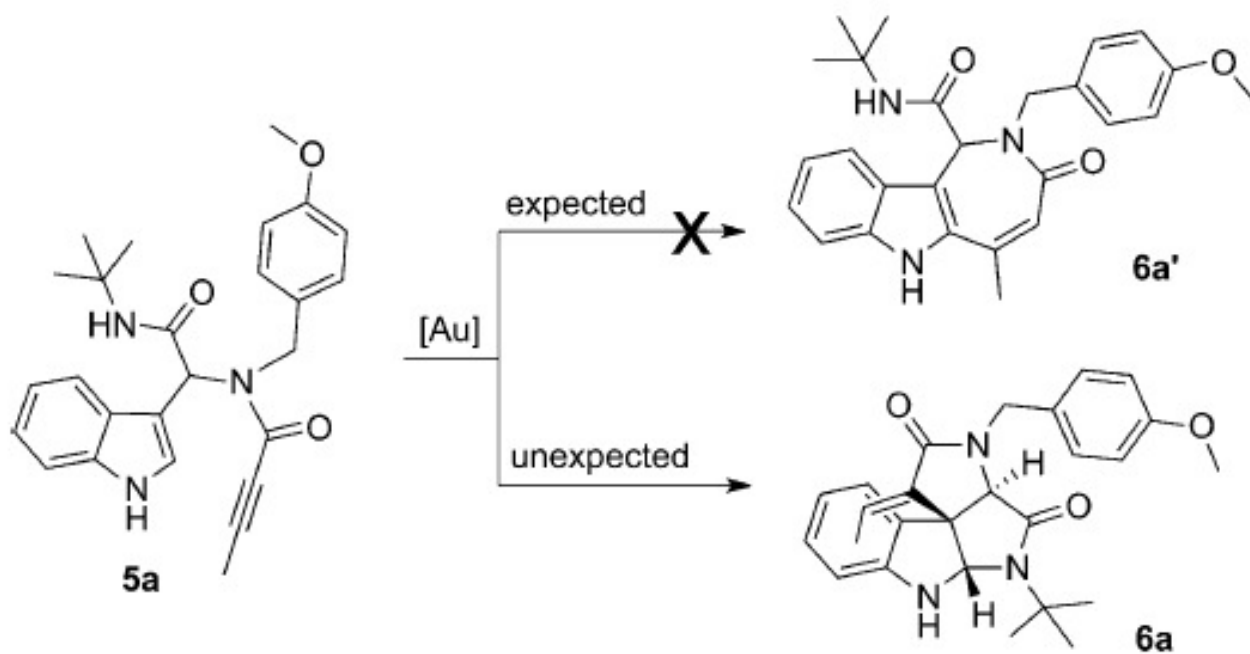
¹H NMR ..., 2.17 (s, 3 H),
..., 1.45 (d, *J* = 7.4 Hz, 3 H), ...
HSQC [only one proton is directly
attached to a non-carbon atom]



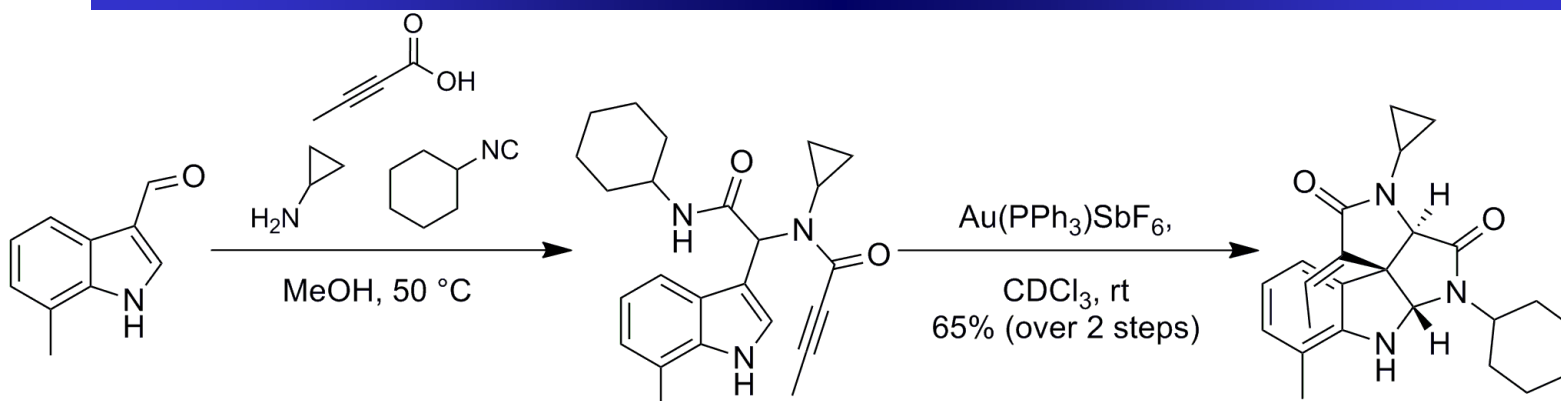
Spiroindoline formation (*Angew. Chem. Int. Ed.* 2012, 51, 9572-9575)



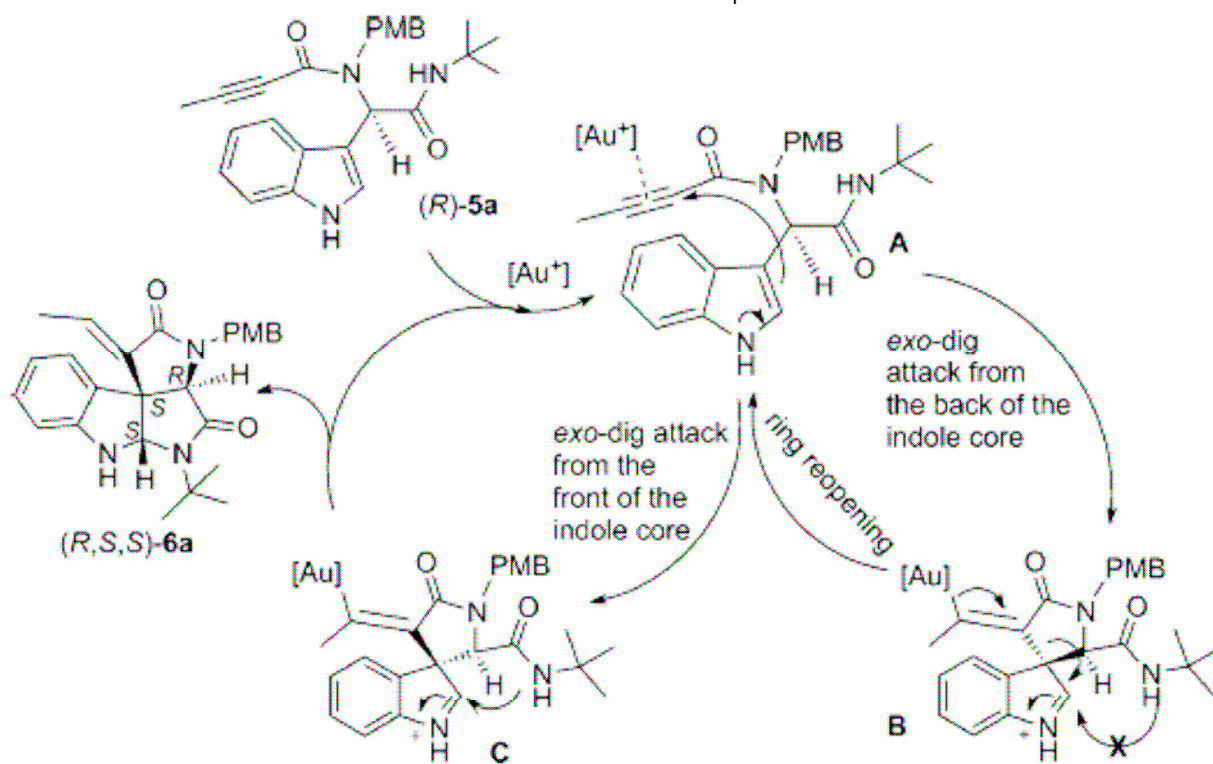
¹H NMR ..., 2.17 (s, 3 H),
 ..., 1.45 (d, *J* = 7.4 Hz, 3 H), ...
 HSQC [only one proton is directly
 attached to a non-carbon atom]



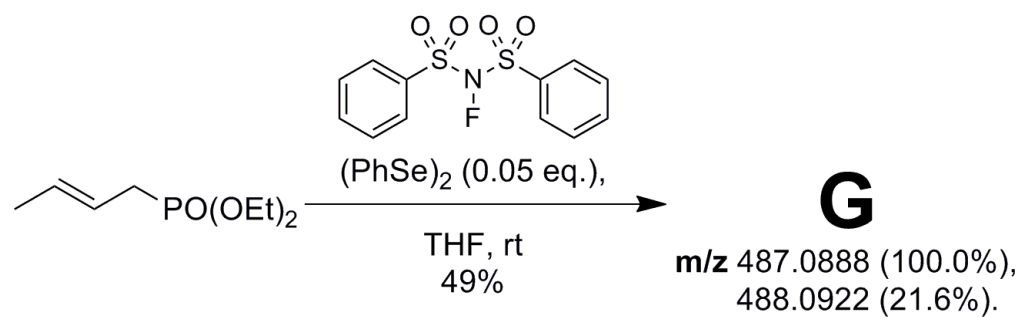
Spiroindoline formation (*Angew. Chem. Int. Ed.* 2012, 51, 9572-9575)



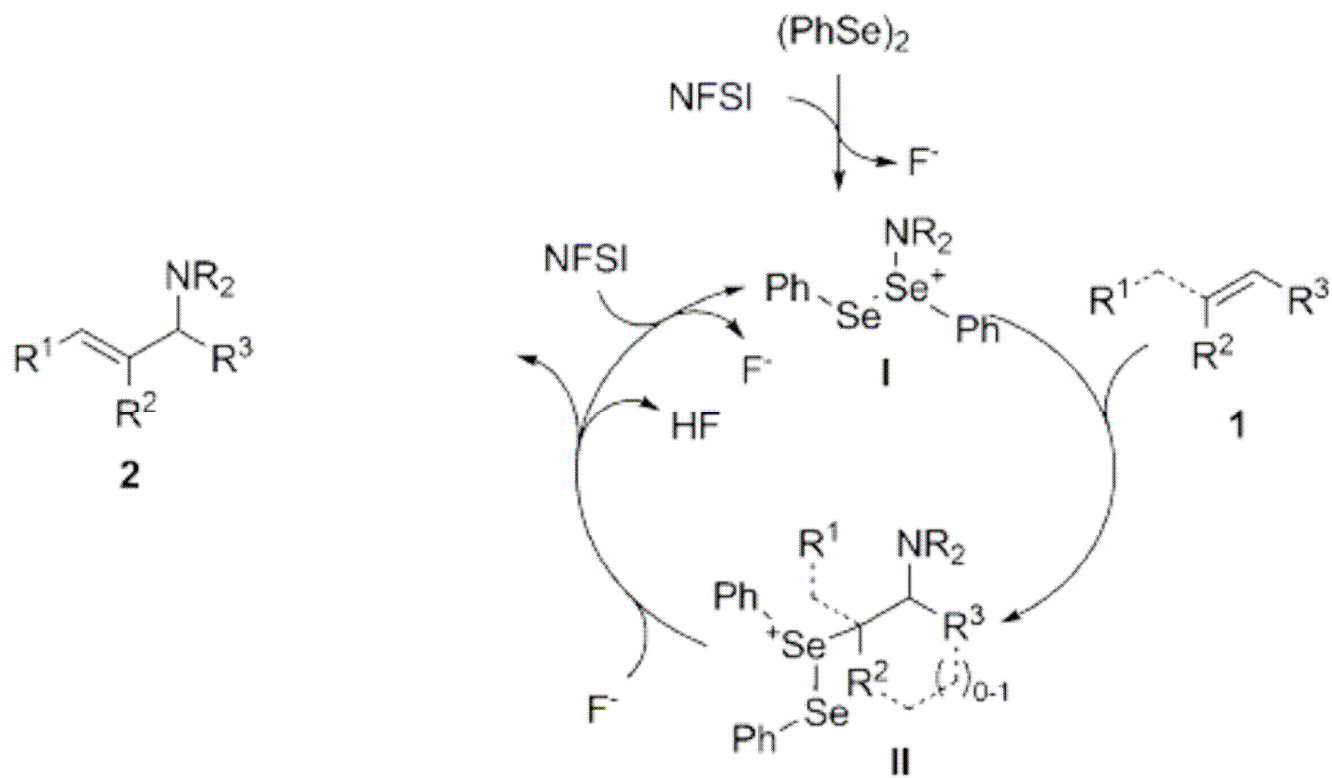
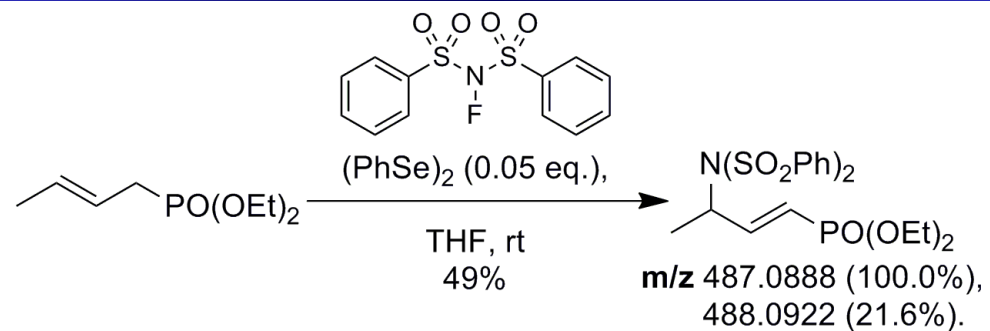
$^1\text{H NMR}$..., 2.17 (s, 3 H),
 ..., 1.45 (d, $J = 7.4$ Hz, 3 H), ...
HSQC [only one proton is directly
 attached to a non-carbon atom]



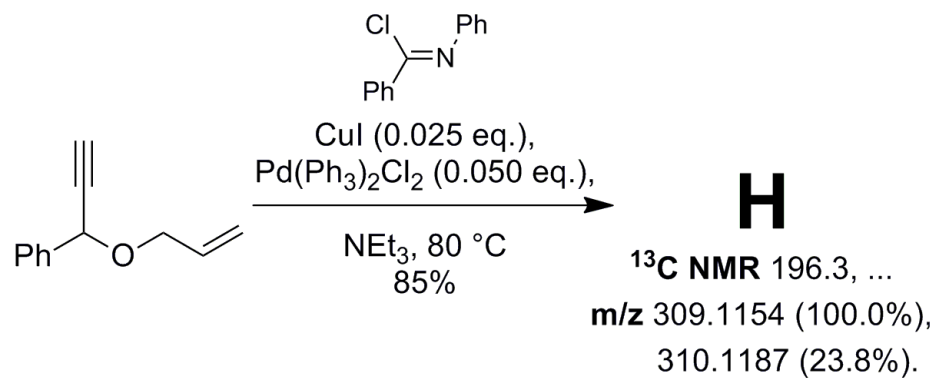
Oxidative Amination (*Angew. Chem. Int. Ed.* **2013**, *52*, 8952-8956)



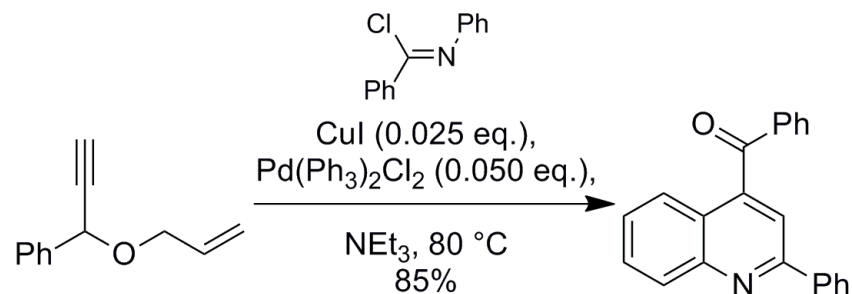
Oxidative Amination (*Angew. Chem. Int. Ed.* 2013, 52, 8952-8956)



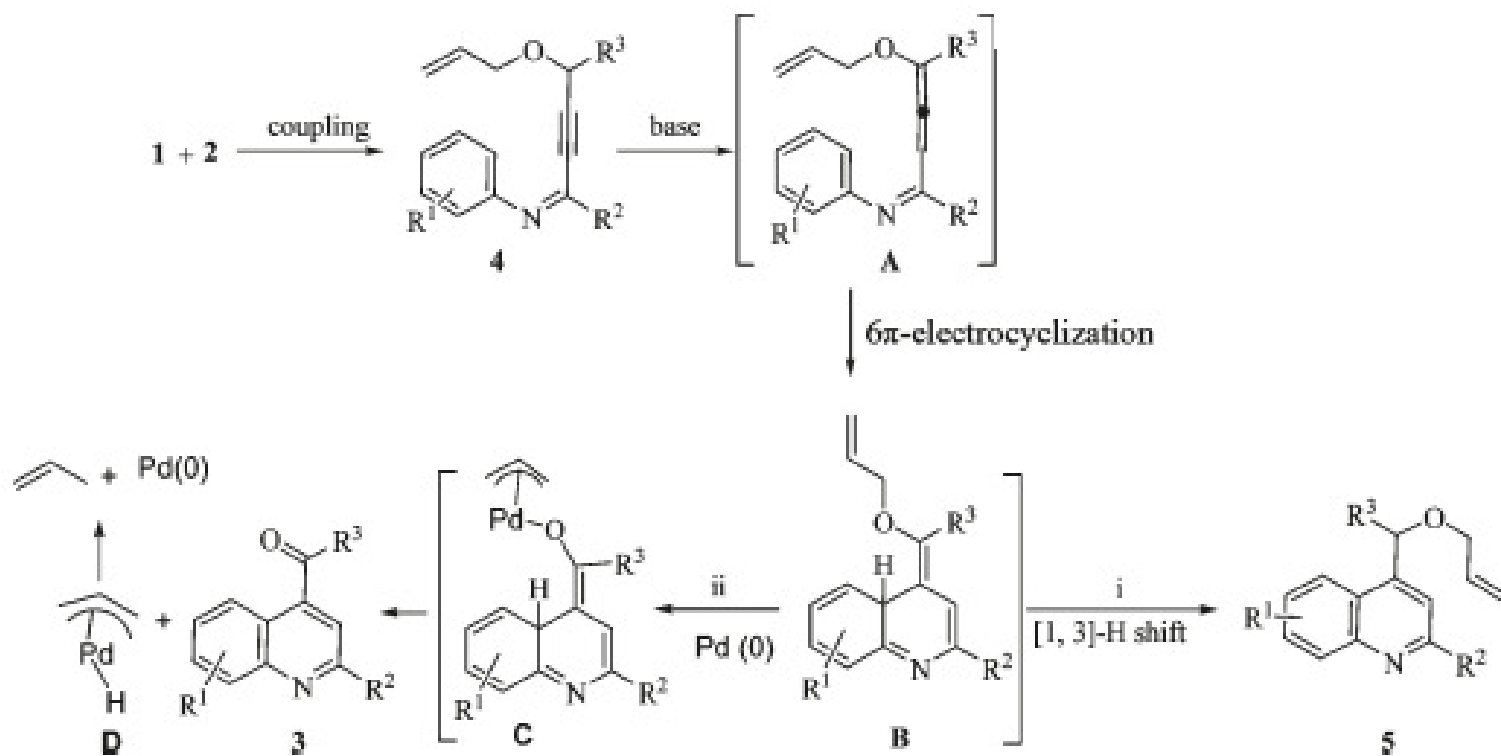
Quinoline synthesis (*J. Org. Chem.* **2010**, *75*, 1305-1308)



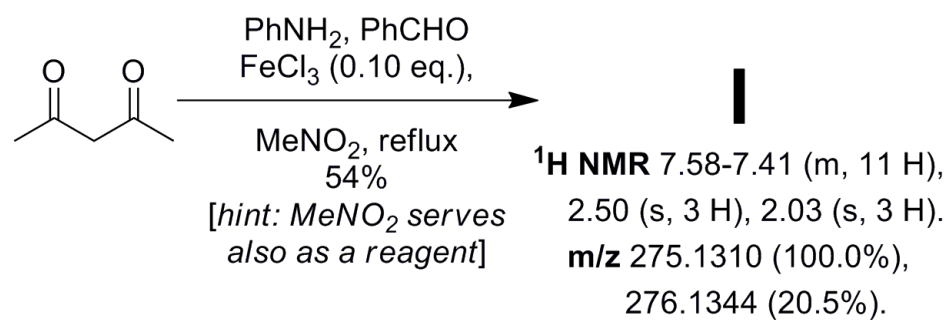
Quinoline synthesis (*J. Org. Chem.* 2010, 75, 1305-1308)



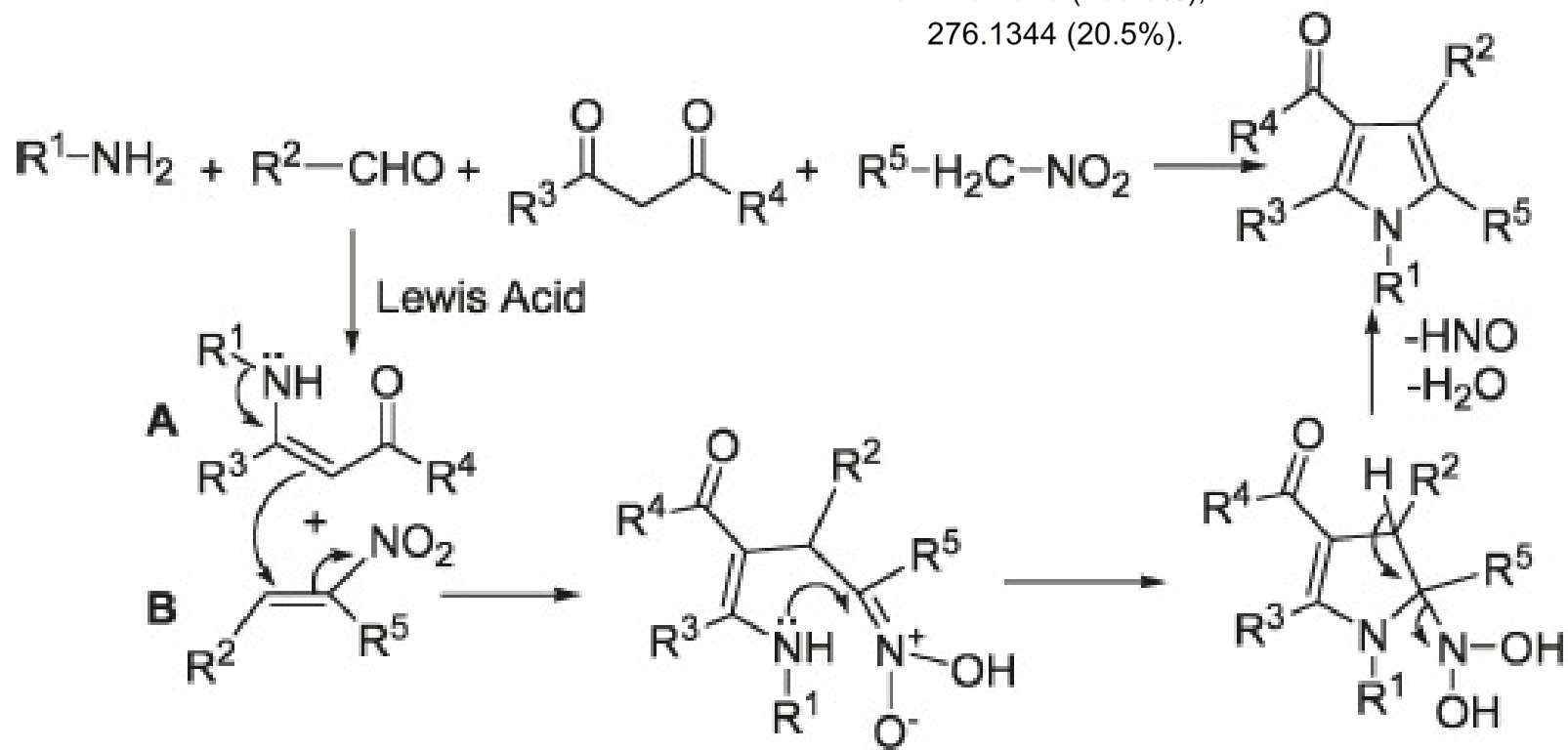
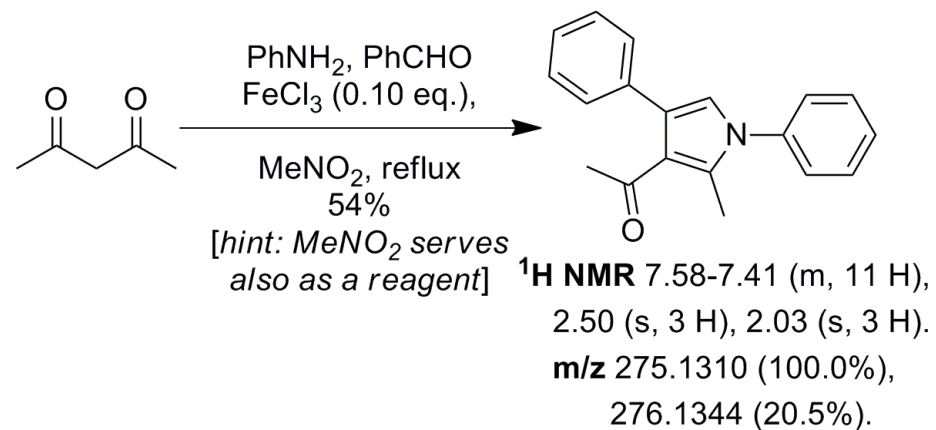
$^{13}\text{C NMR}$ 196.3, ...
 m/z 309.1154 (100.0%),
 310.1187 (23.8%).



Pyrrole synthesis (*J. Org. Chem.* **2010**, *75*, 1674-1683)



Pyrrole synthesis (*J. Org. Chem.* 2010, 75, 1674-1683)



Acknowledgements

**Thank you very much
for your attention!**