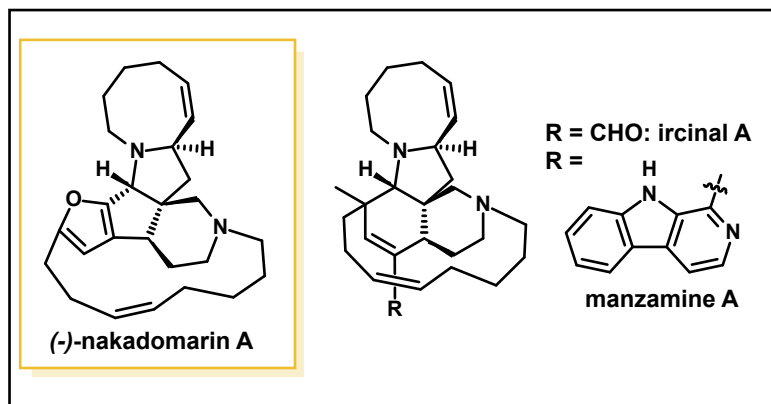




- marine alkaloid from manzamine family, isolated by Kobayashi from Okinawan sea sponge in 1997.
- only known member of manzamine family to contain a furan ring.
- contains bioactivities: anticancer, antifungal, and antibacterial. For example, $IC_{50}=1.3 \mu\text{g/mL}$ against murine lymphoma L1210 cells.
- availability limited (6 mg isolated from 1 Kg of wet sponge)
- tetracyclic core with fused 6/5/5/5 ring system, fused 8-membered, and bridging 15-membered rings.
- representative total synthesis

Nishida, *JACS*, **2003**, 125, 7484; *ACIE*, **2004**, 43, 2020.

Kerr, *JACS*, **2007**, 129, 1465.

Dixon, *JACS*, **2009**, 131, 16632.

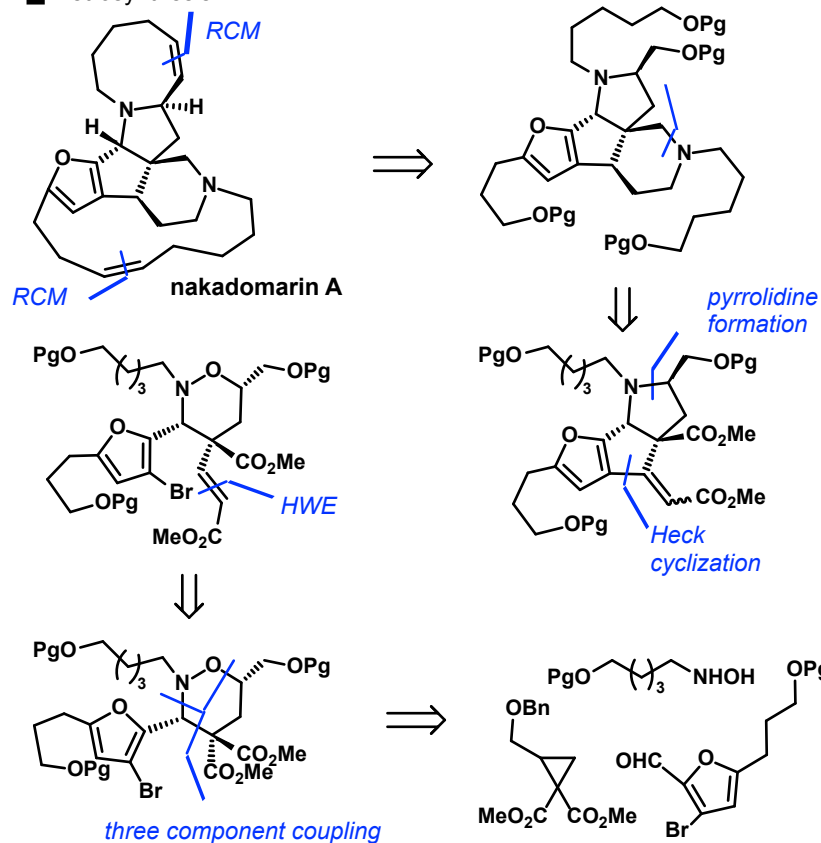
Vanderwal, *ACIE*, **2010**, 49, 2830.

Funk, *OL*, **2010**, 12, 4912.

Evans, *JACS*, **2013**, 135, 9338.

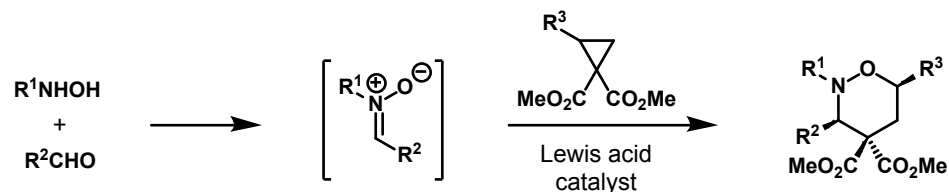
Clark, *ACIE*, **2016**, 55, 4332.

Retrosynthesis

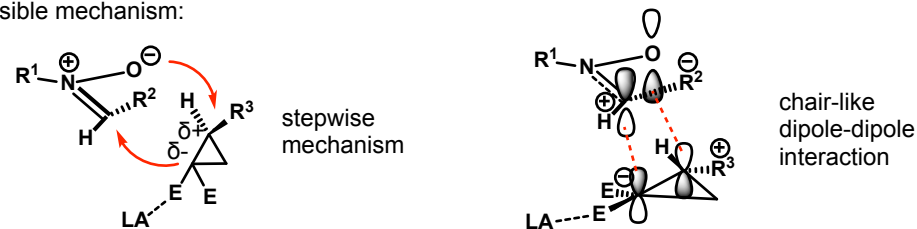


Pyrrolidine synthesis via a nitron/cyclopropane cycloaddition

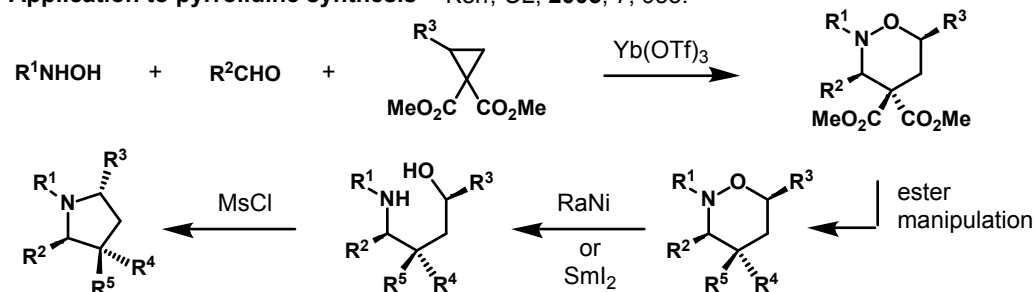
<Three component cycloaddition> Kerr, *ACIE*, **2003**, 42, 3023; *OL*, **2004**, 6, 139.



– possible mechanism:



<Application to pyrrolidine synthesis> Kerr, *OL*, **2005**, 7, 953.



I. S. Young, M. A. Kerr, *JACS*, **2007**, 129, 1465.