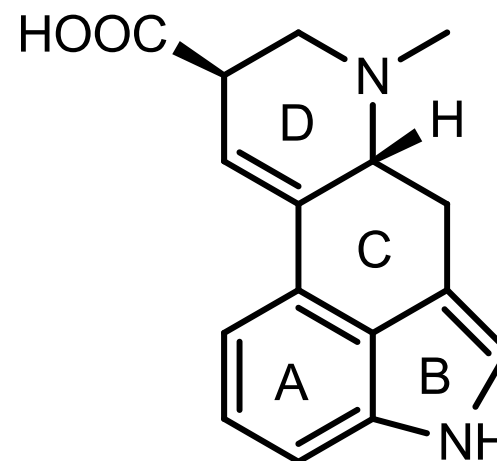
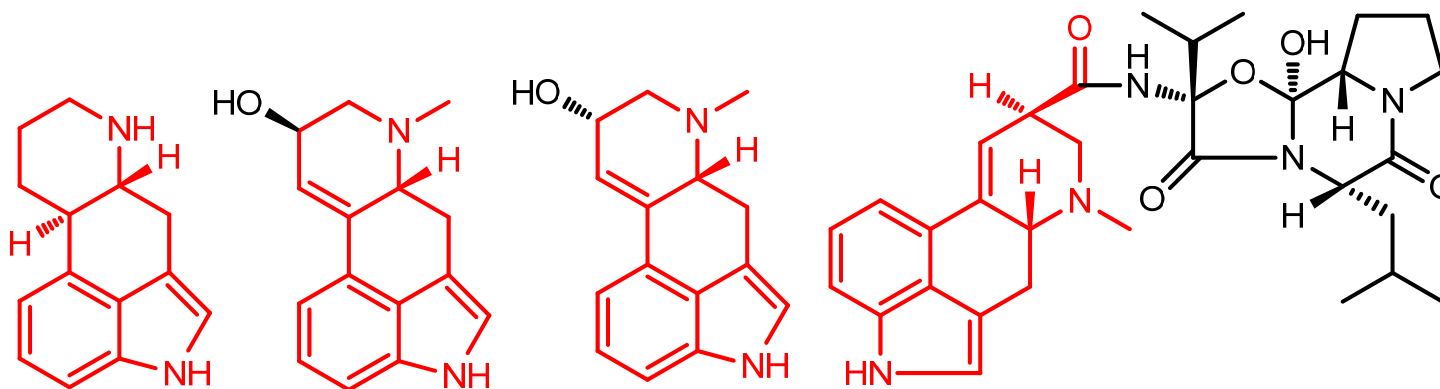


Total Synthesis of Lysergic Acid

Penghao Chen
Dong Group Seminar
Nov 14th 2012



Core Structure of Ergot Alkaloids

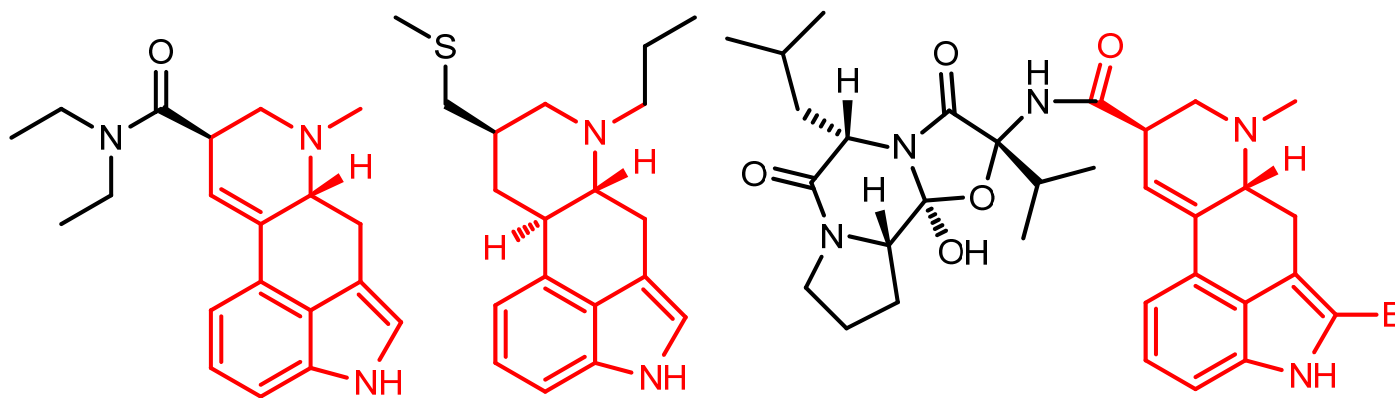


ergoline

lysergol

isolysergol

bromocriptine

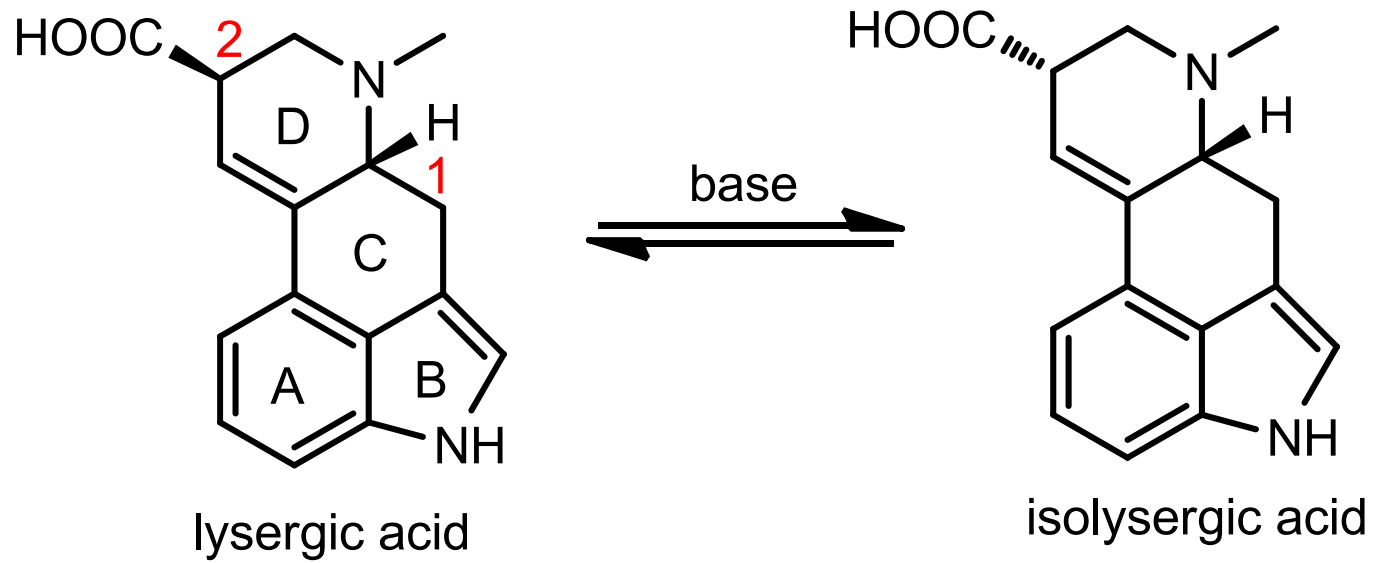


lysergic acid diethylamide(LAD)

pergolide

α -ergocryptine

Epimerisation of lysergic/isolysergic acid

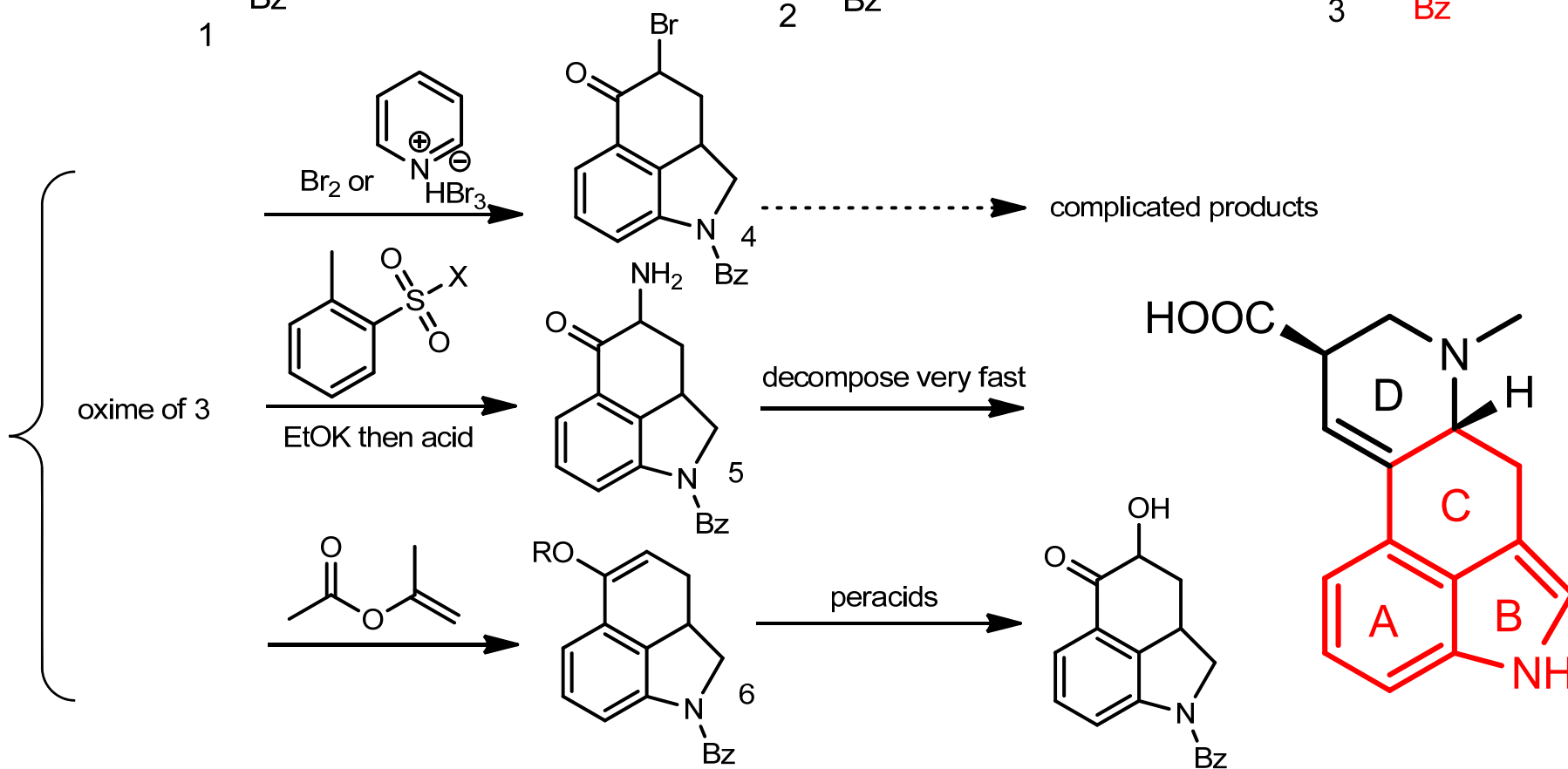
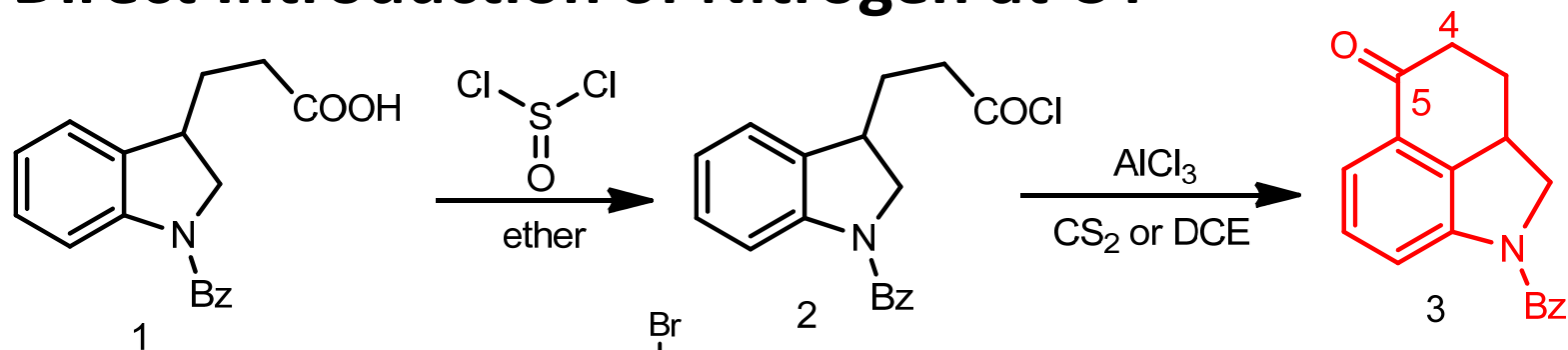


E. C. Kornfeld & R. B. Woodward

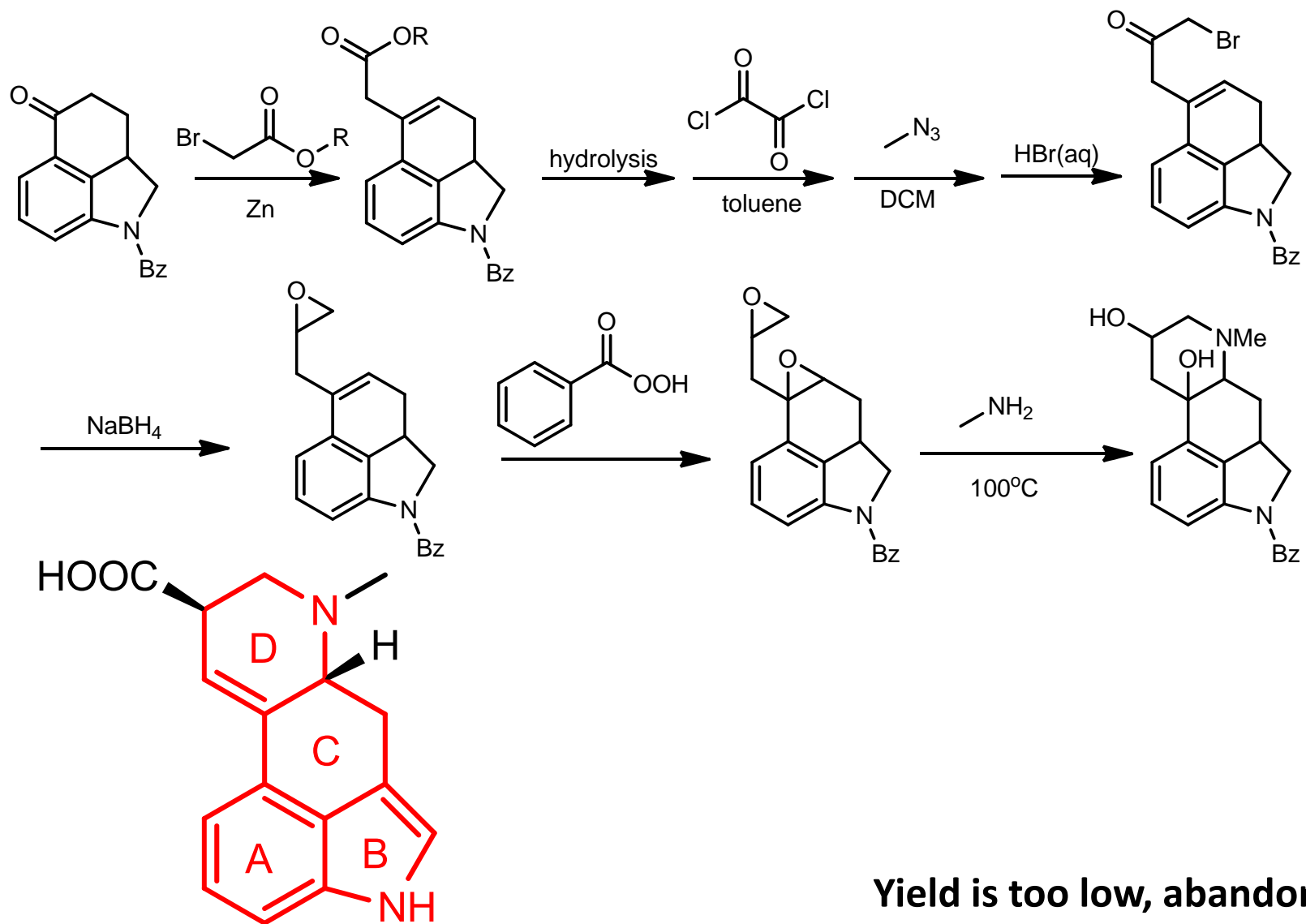


J. Am. Chem. Soc. 1956, 78, 3087–3114.

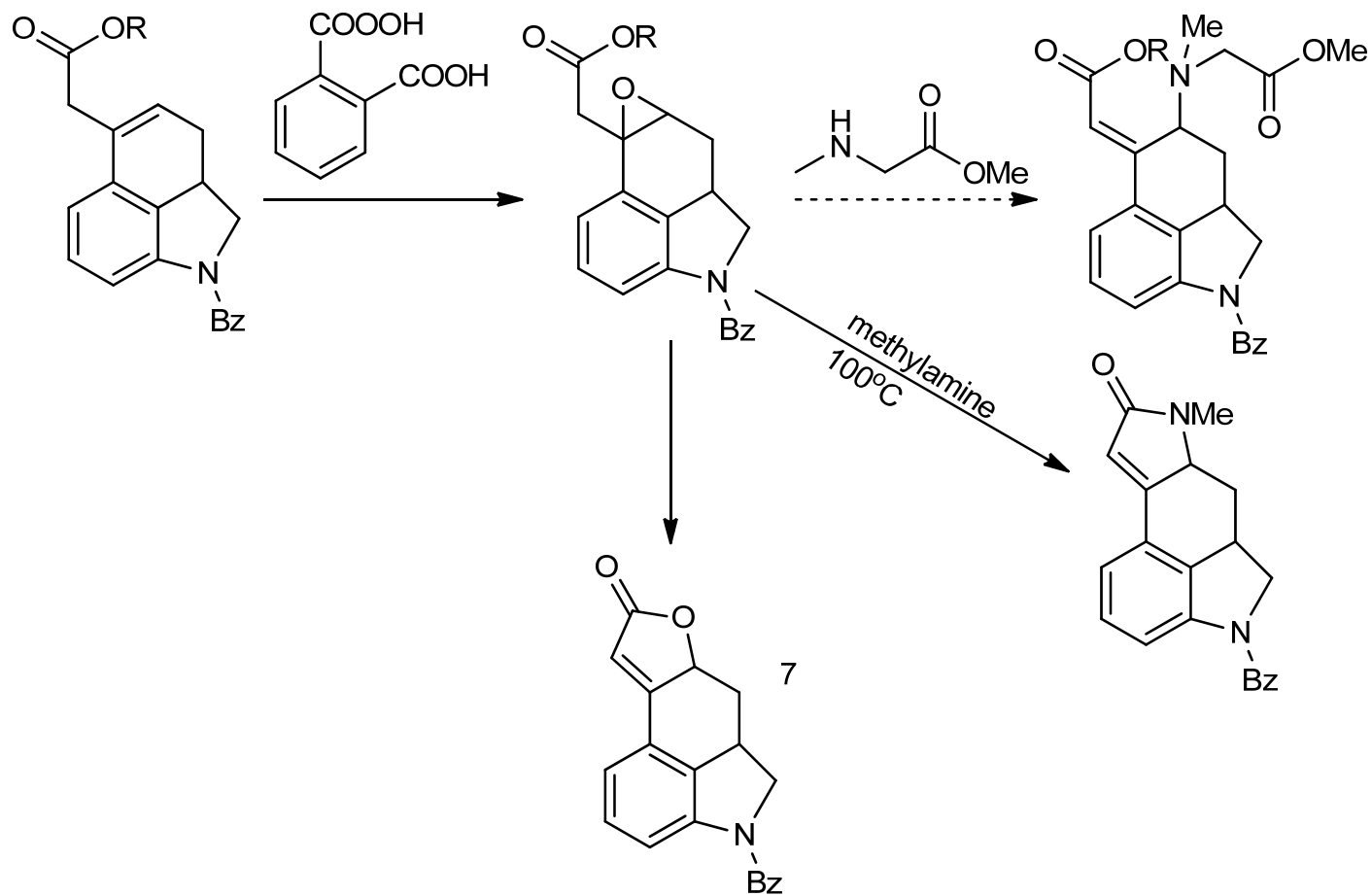
Direct Introduction of Nitrogen at C4



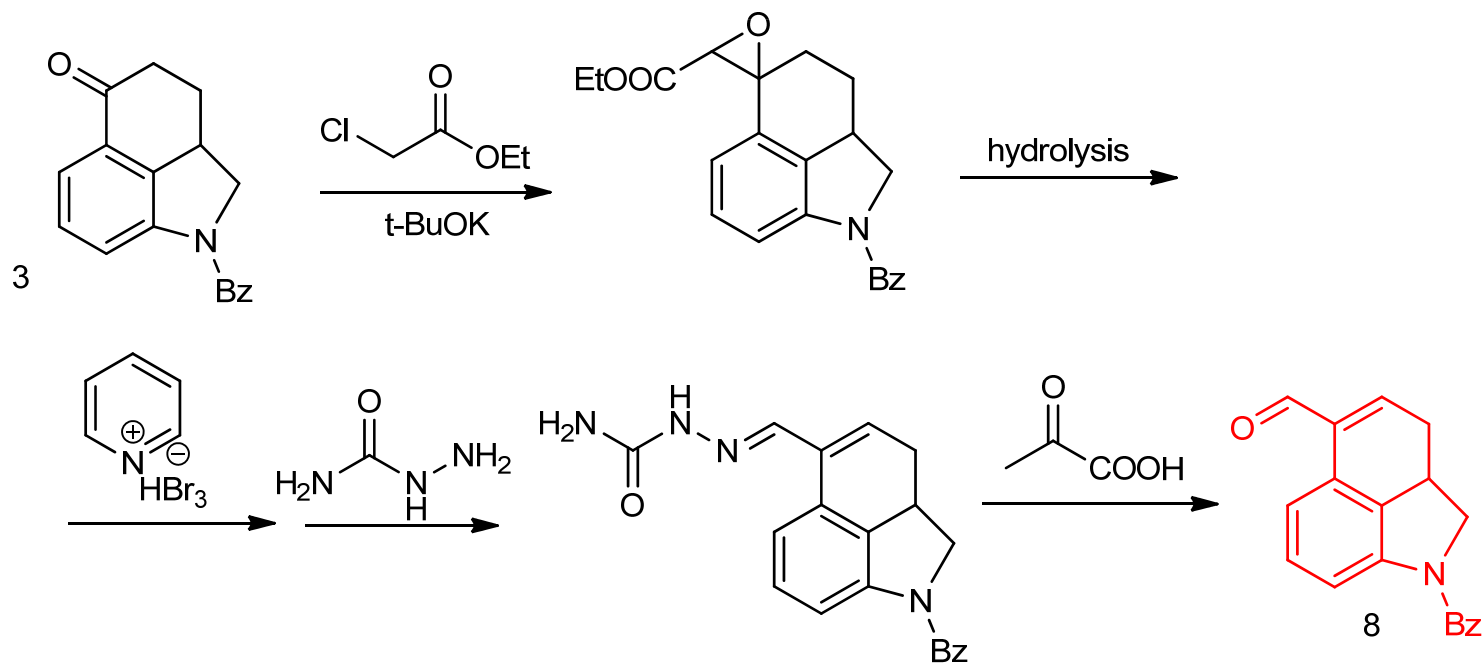
Addition of a Carbon Chain at C5



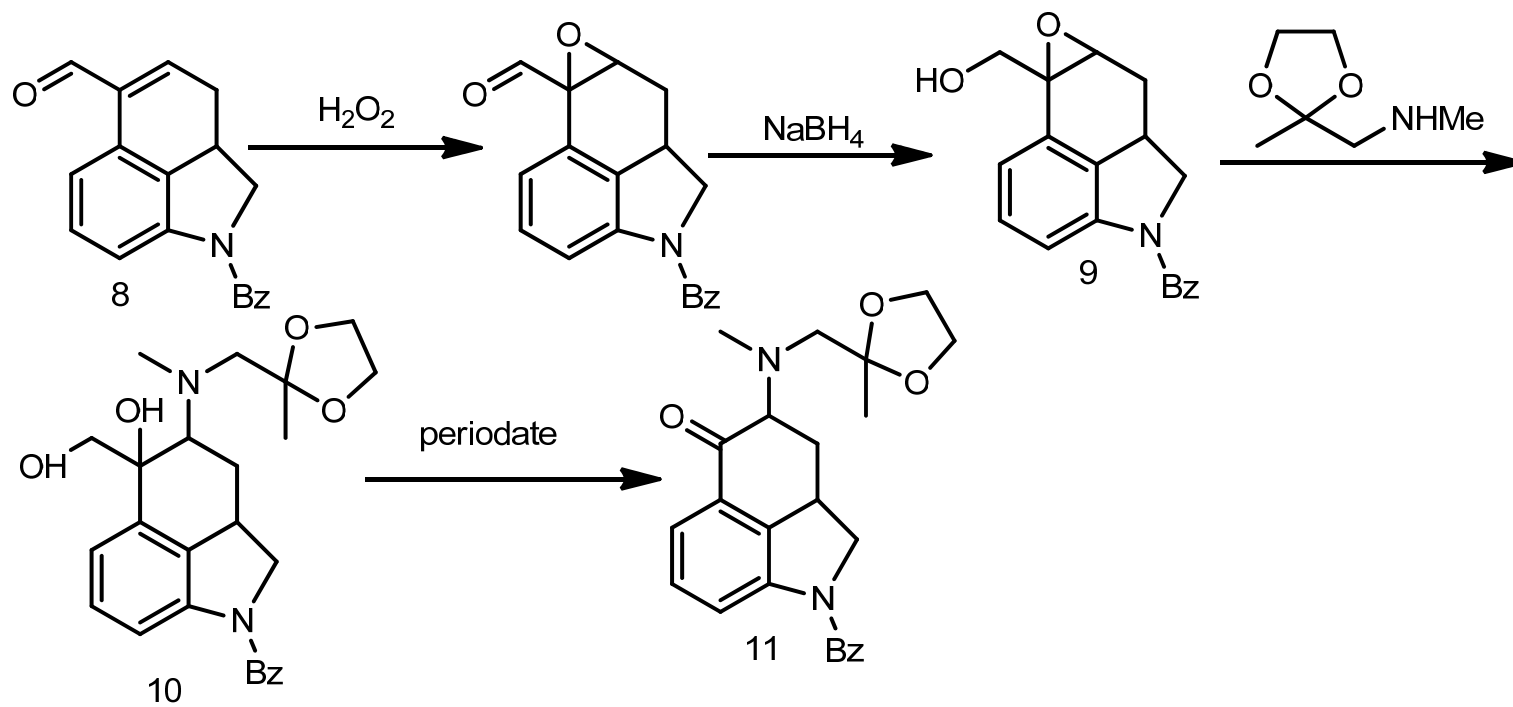
Addition of a Carbon Chain at C5



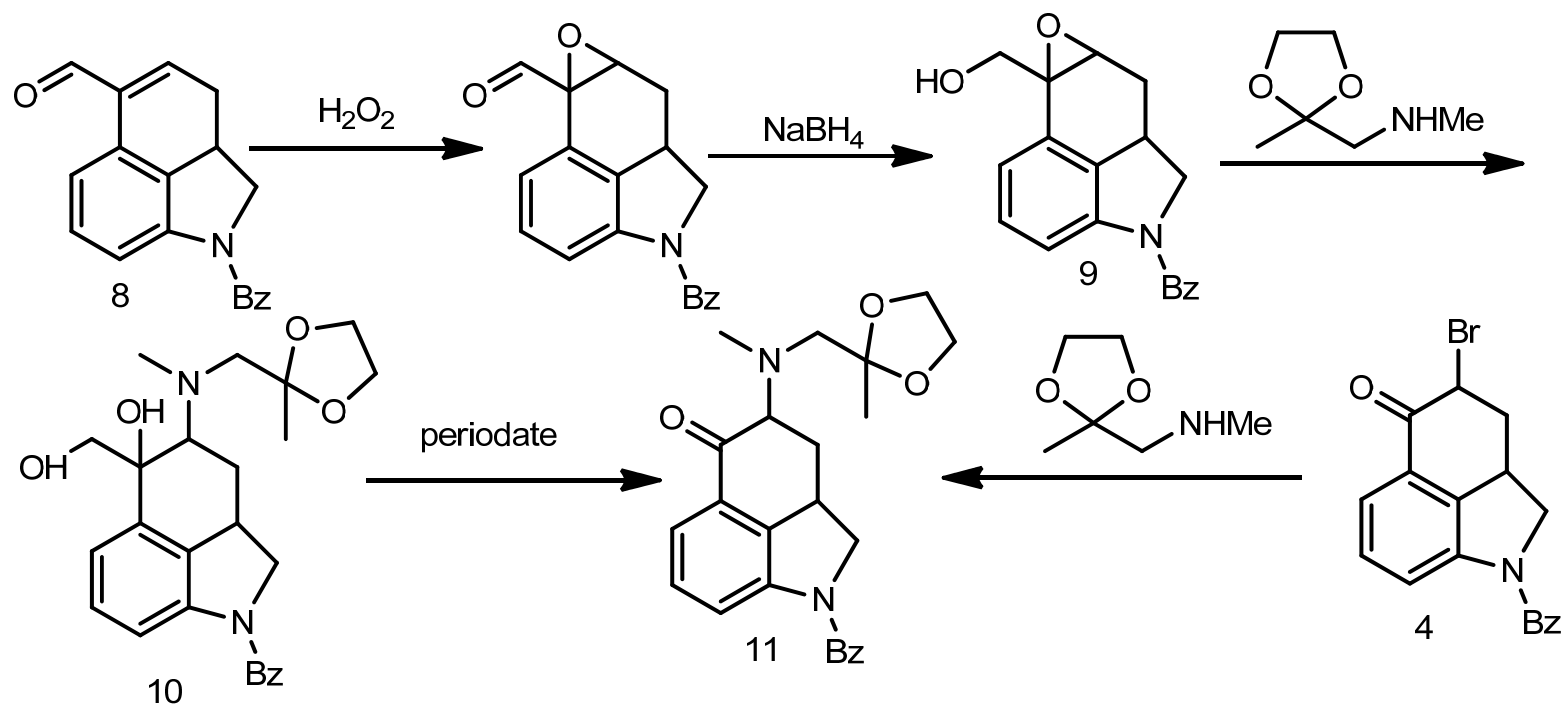
Unsaturated Aldehyde



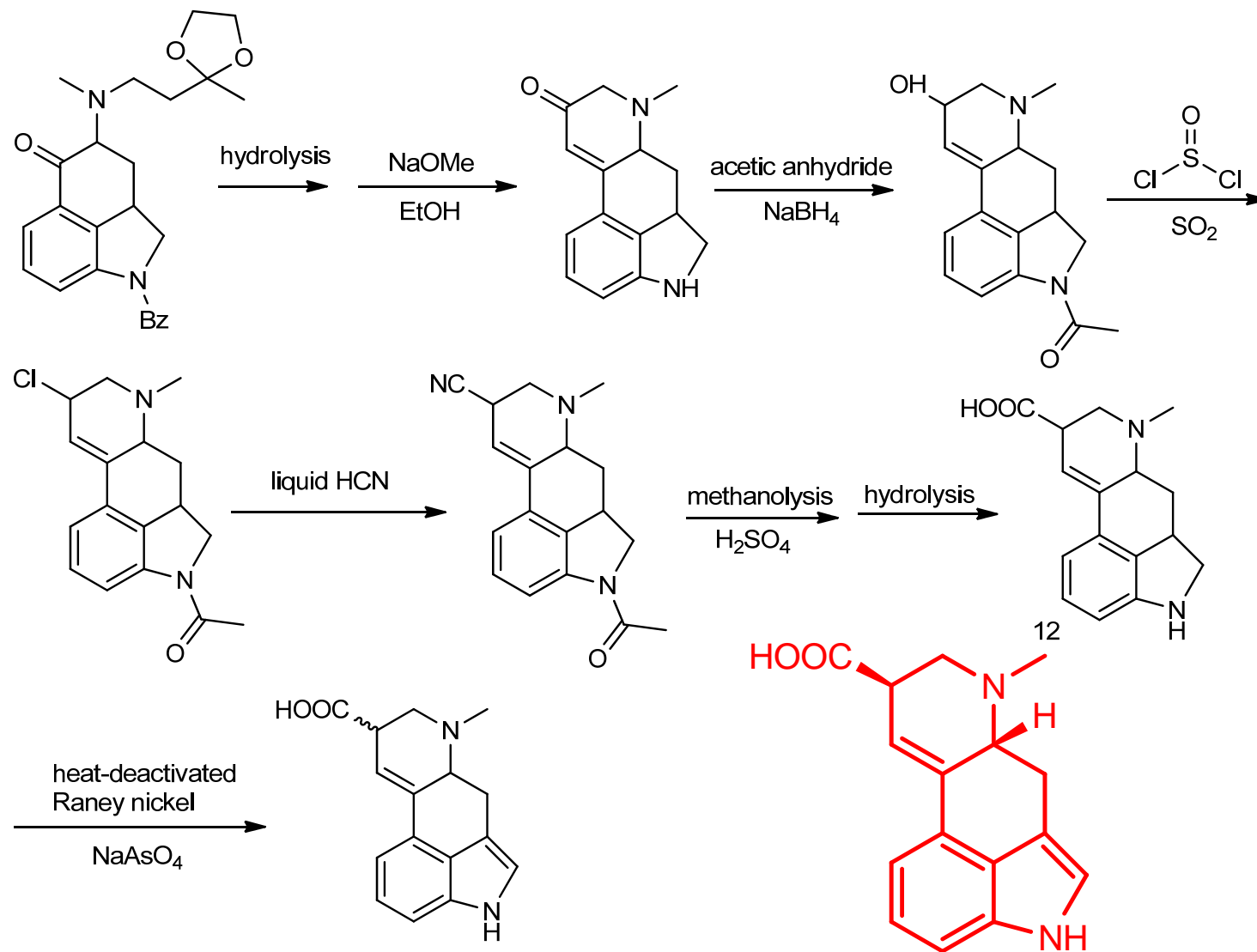
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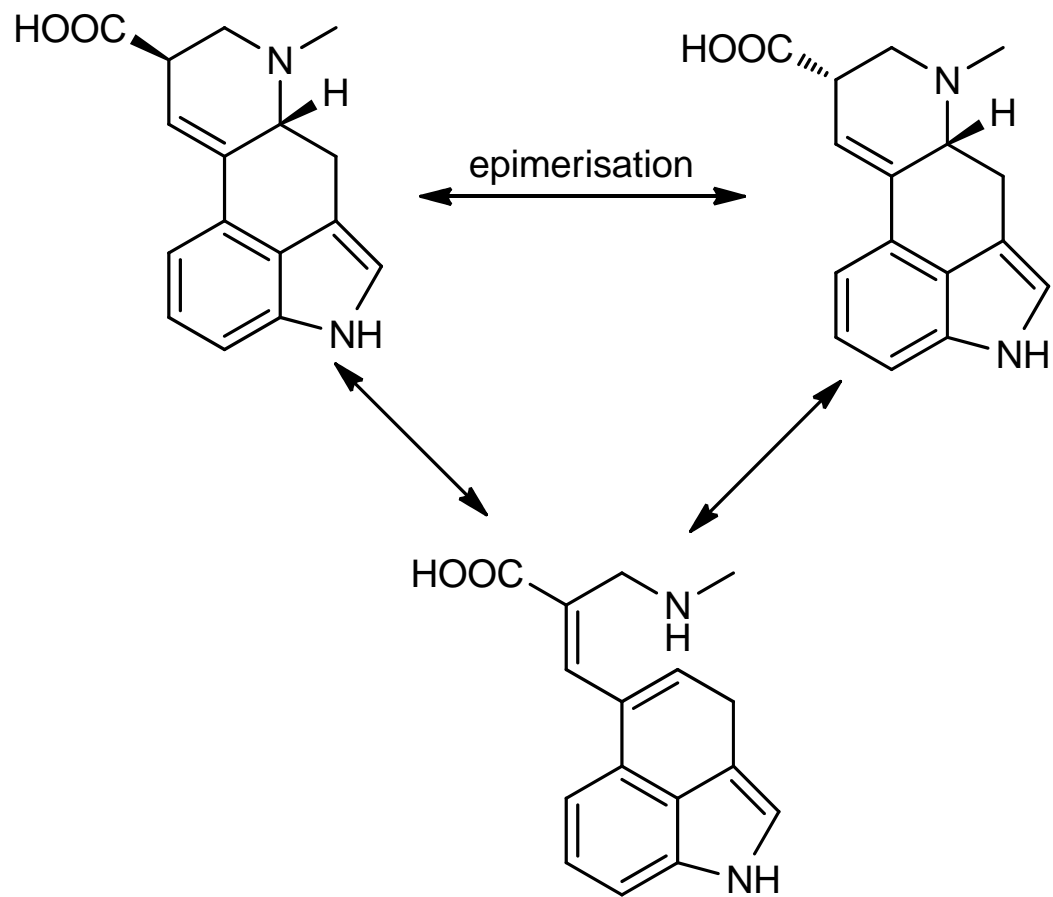
Unsaturated Aldehyde



Unsaturated Aldehyde

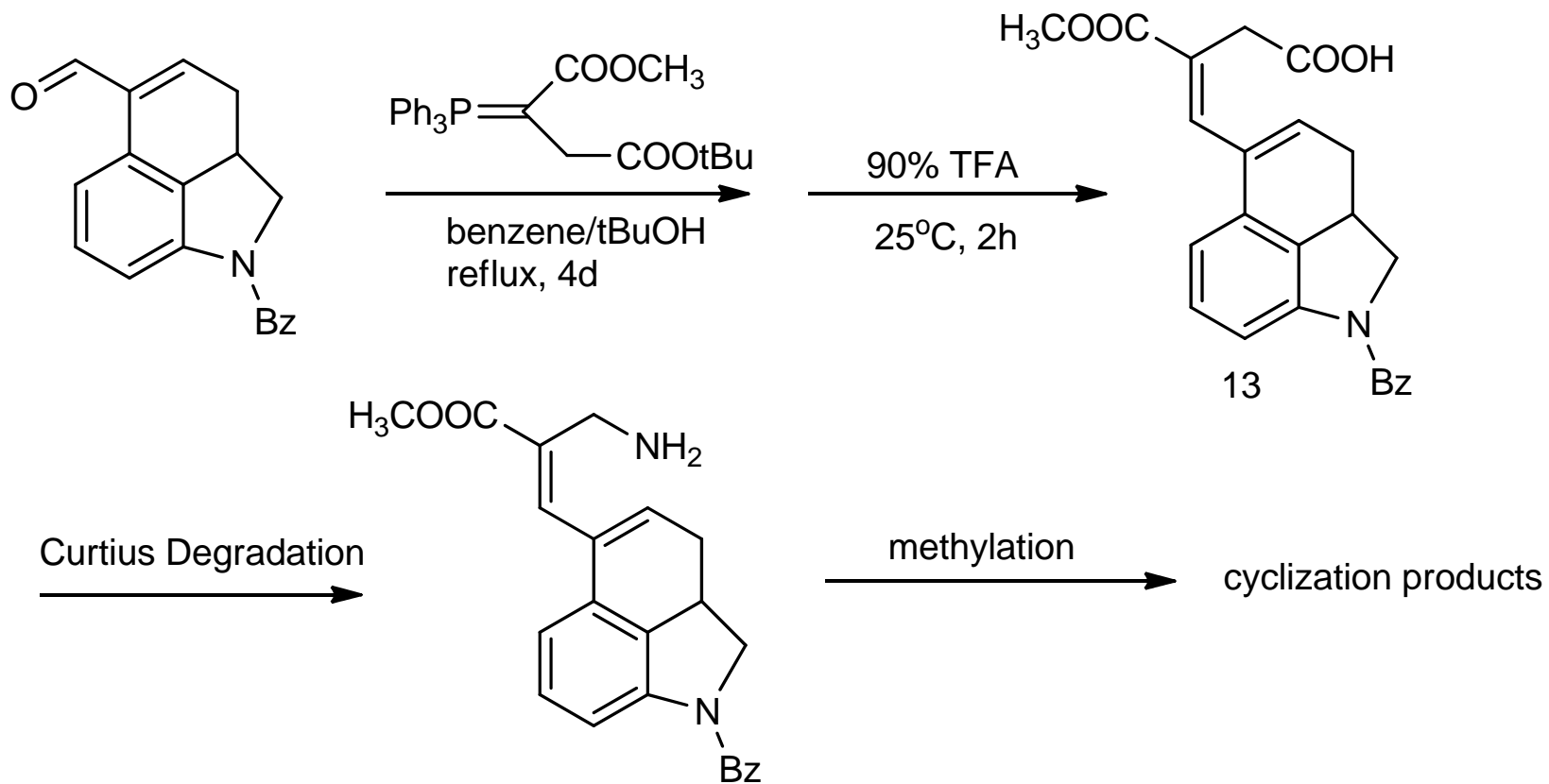


R. Ramage

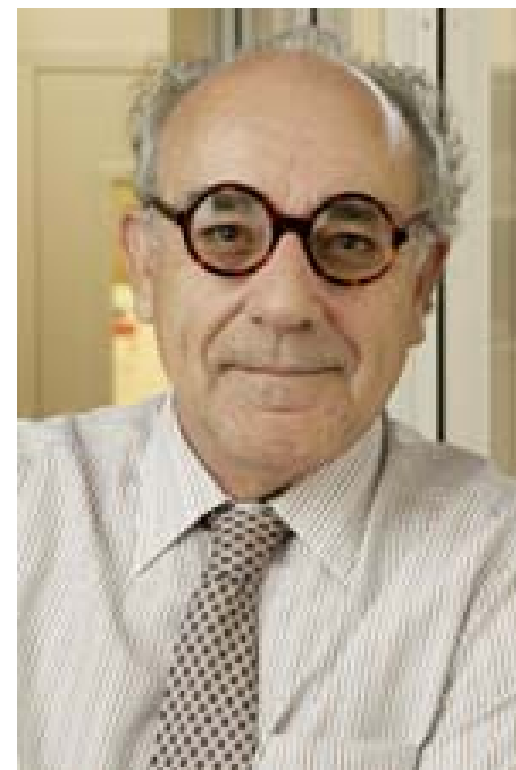
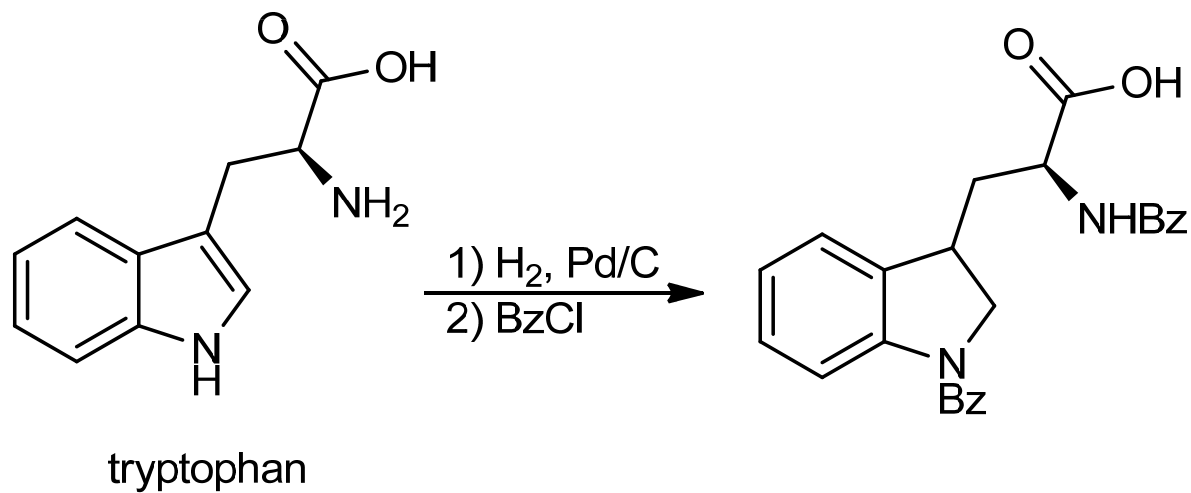


Tetrahedron Letter No. 47, pp 4311-4314, 1976

R. Ramage

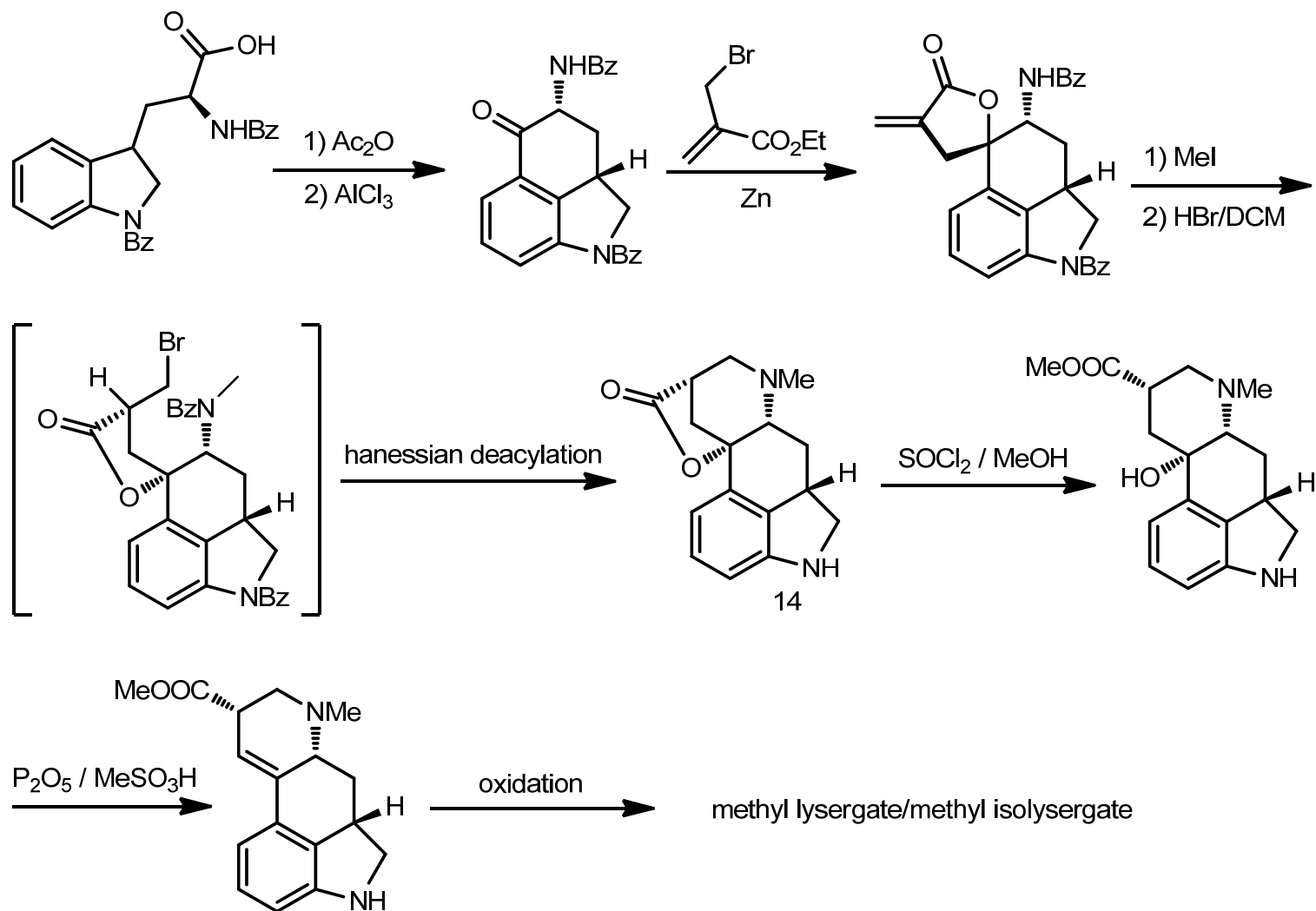


J. Rebek, Jr.

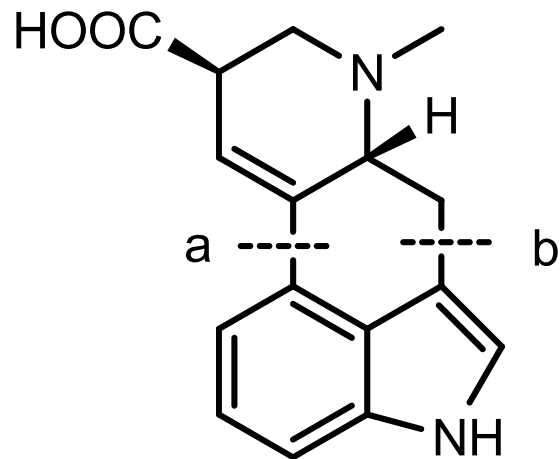


Tetrahedron Letters, Vol. 24, No. 9, pp 859-860, 1983
J. Am. Chem. Soc. 1984, 106, 1813-1819

J. Rebek, Jr.

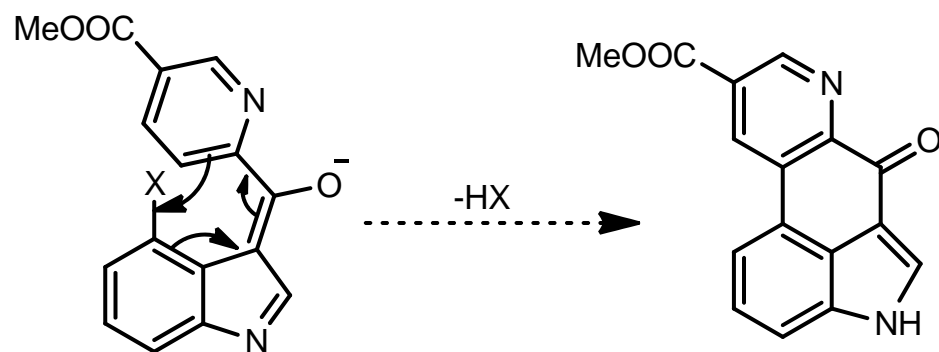
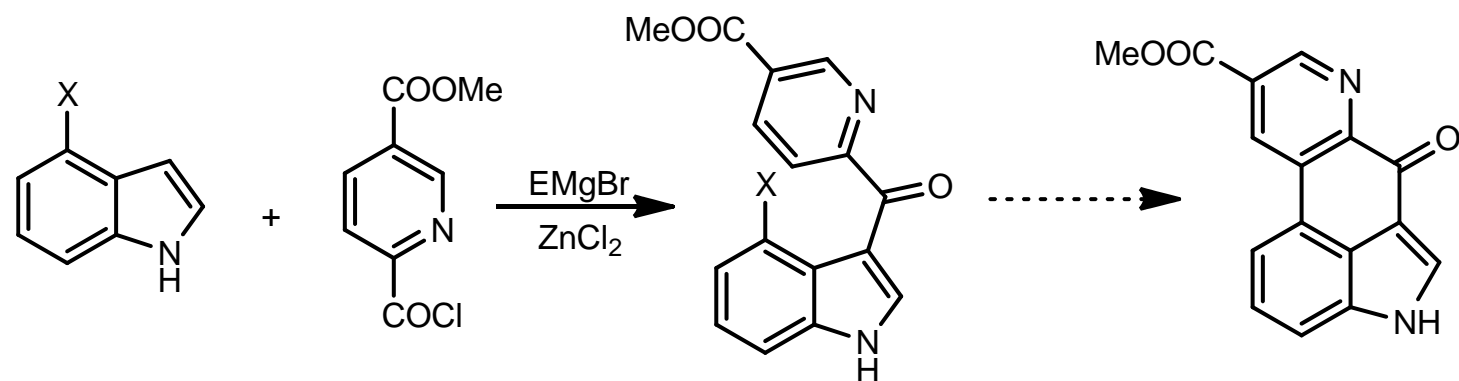


James B. Hendrickson

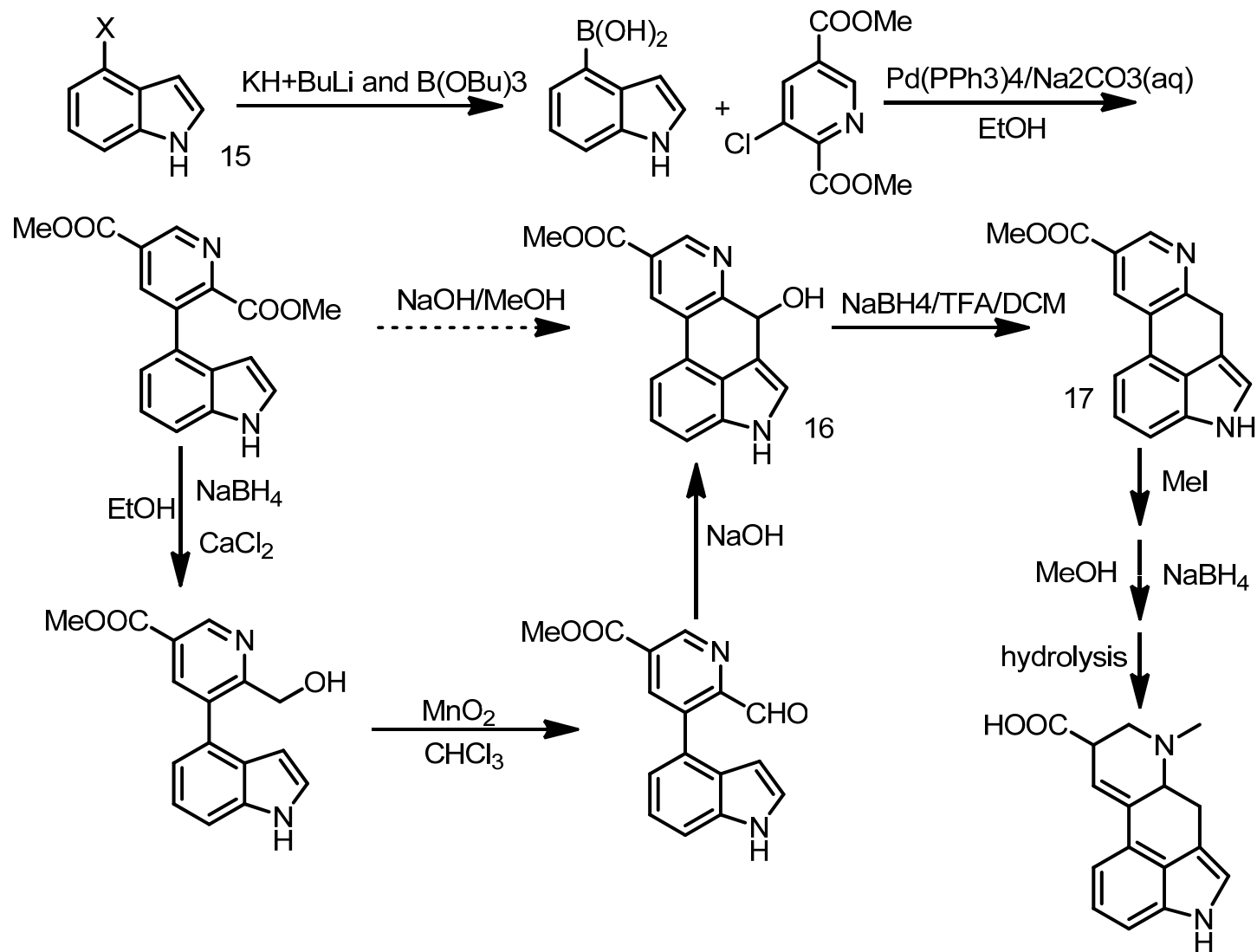


Org. Lett., Vol. 6, No. 1, 2004

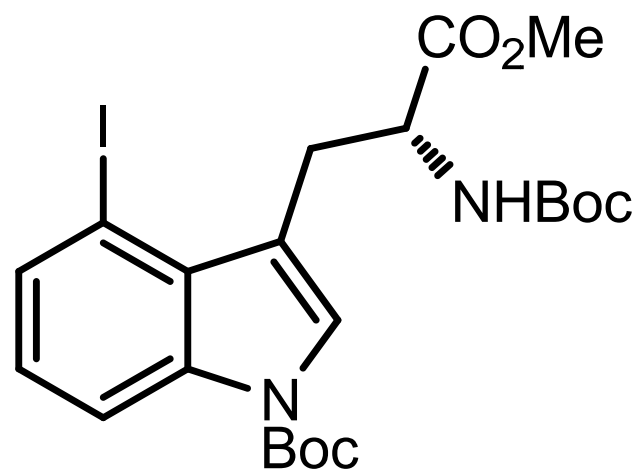
Bondset b->a



Bondset a->b

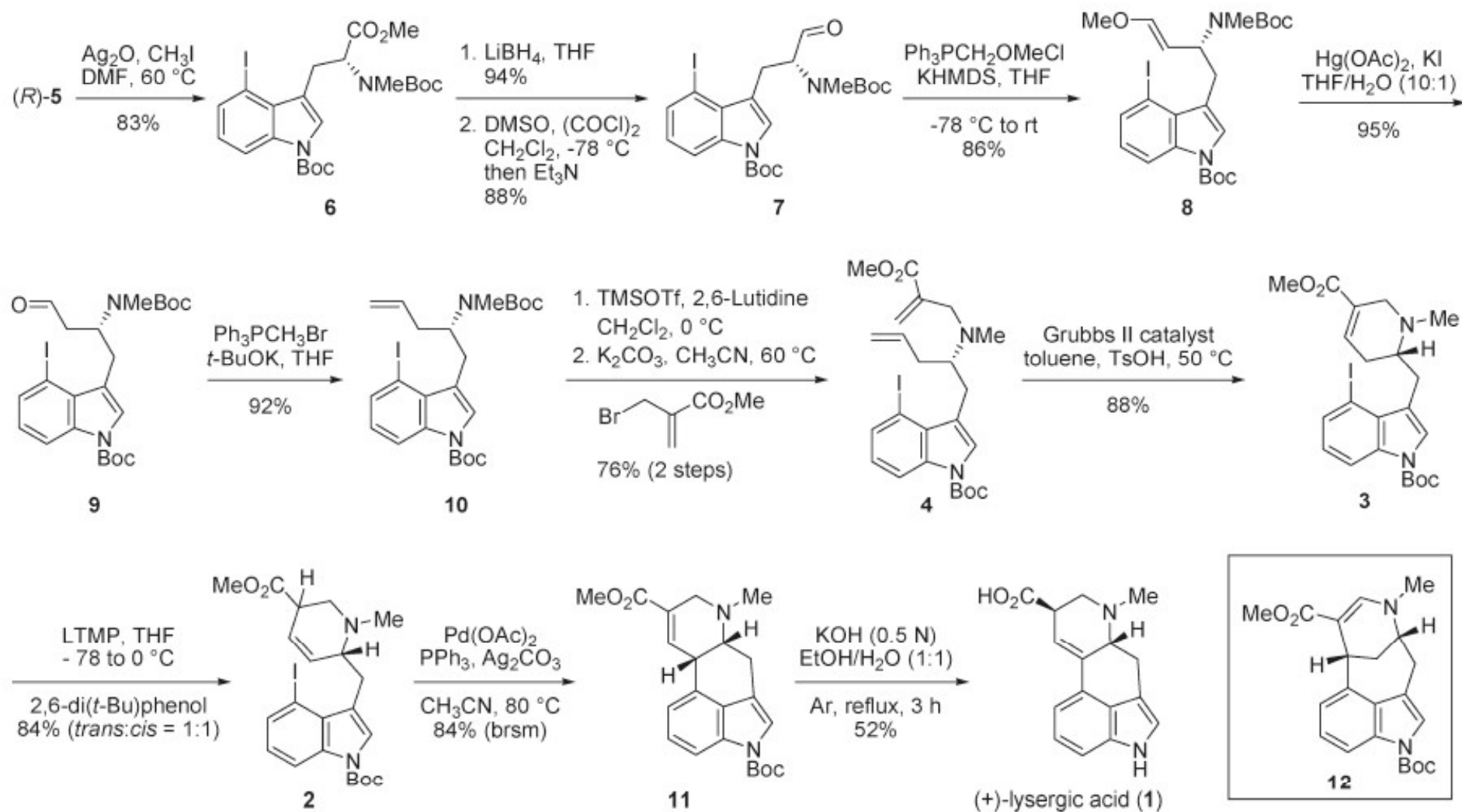


Yanxing Jia

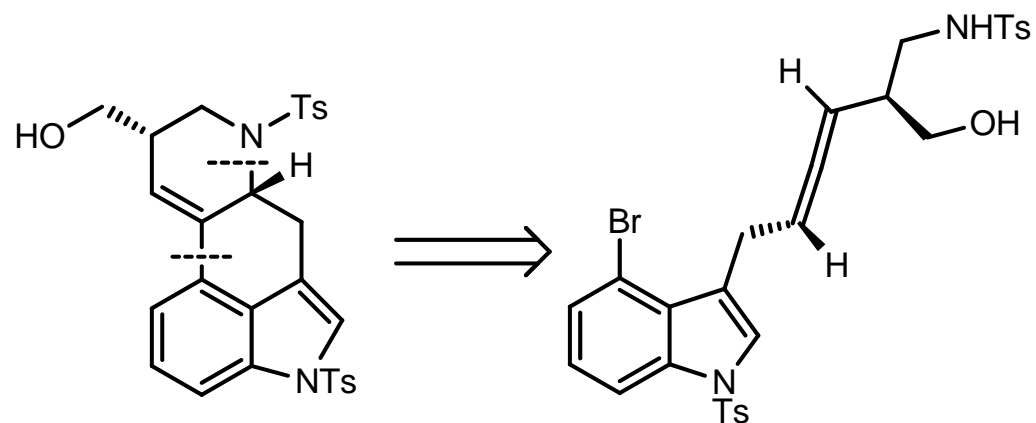


(R)-4-iodotryptophan derivative
(R)-5

Yanxing Jia



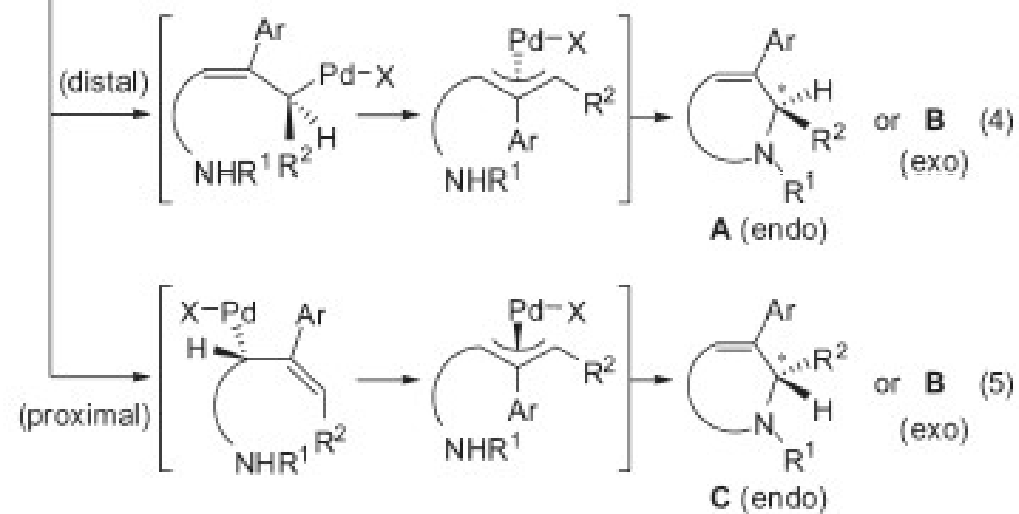
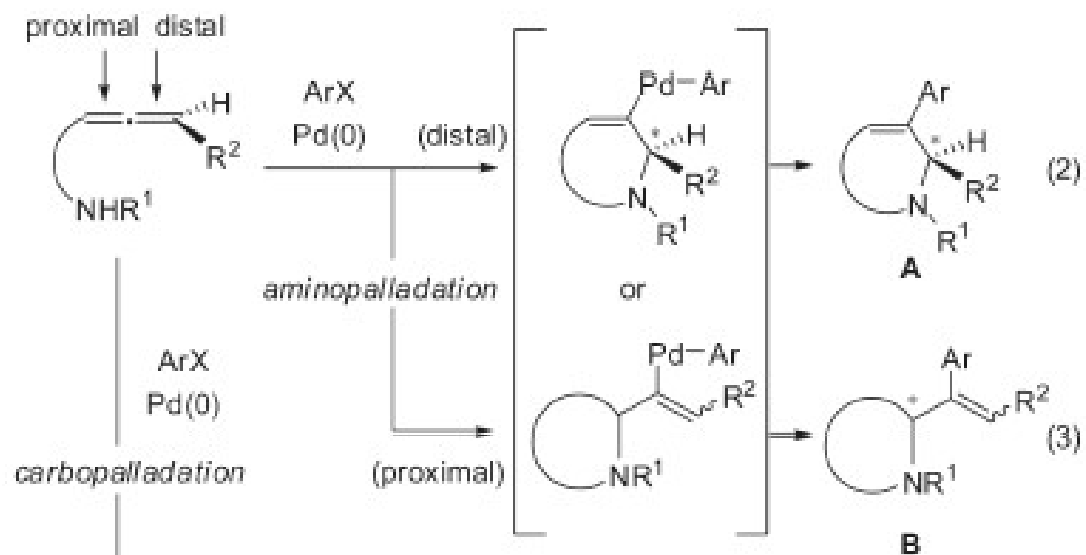
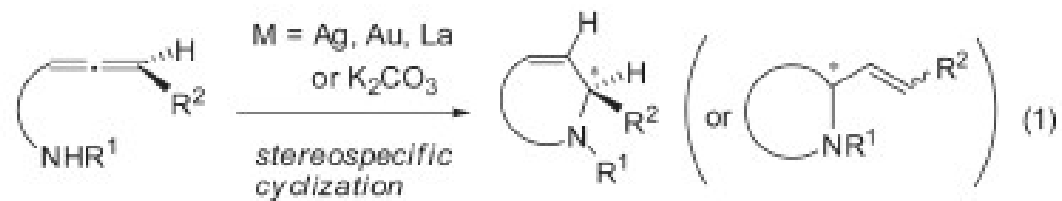
Hiroaki Ohno & Nobutaka Fujii



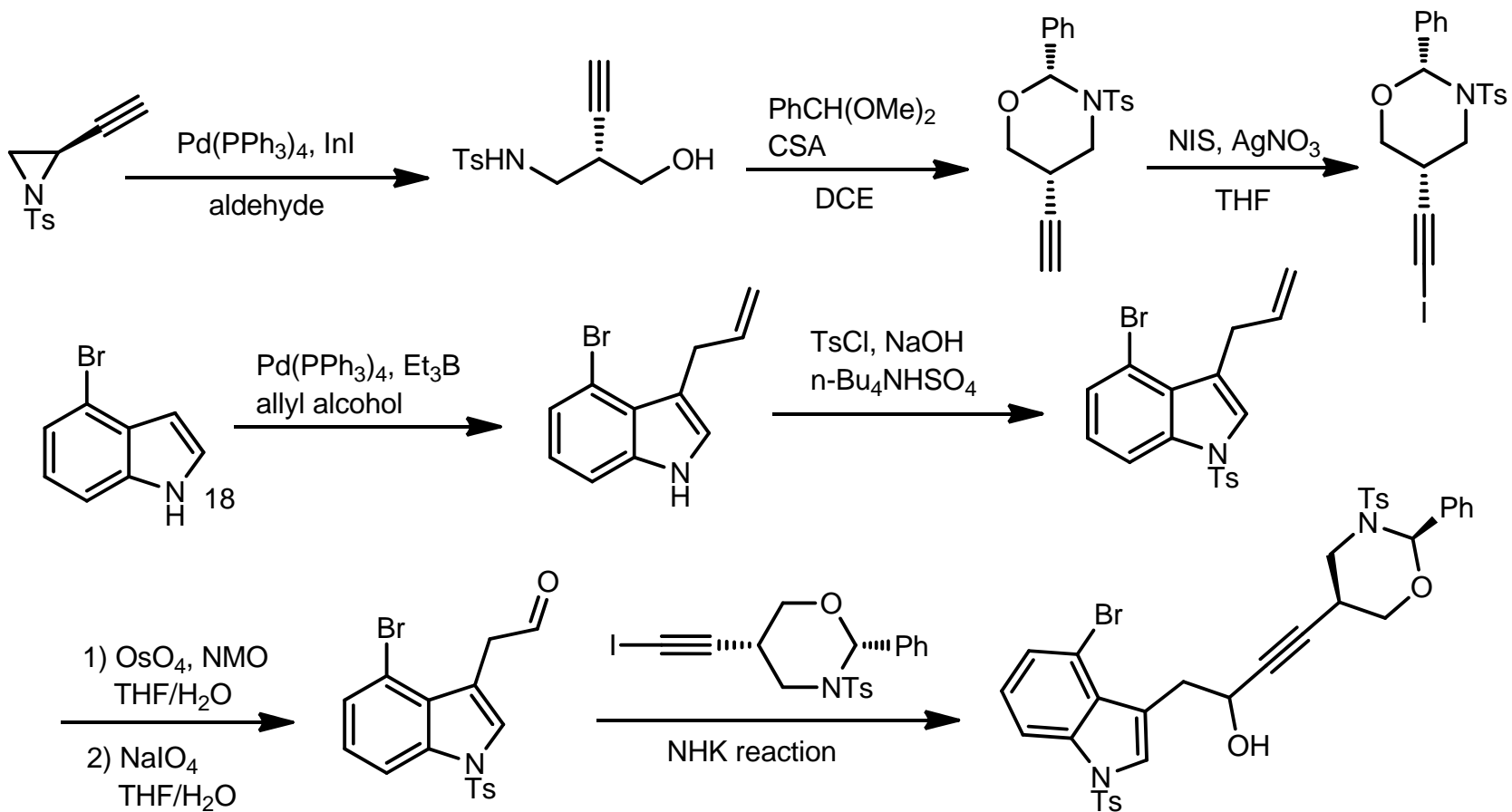
Org. Lett., Vol. 10, No. 22, 2008

J. Org. Chem. 2011, 76, 5506-5512

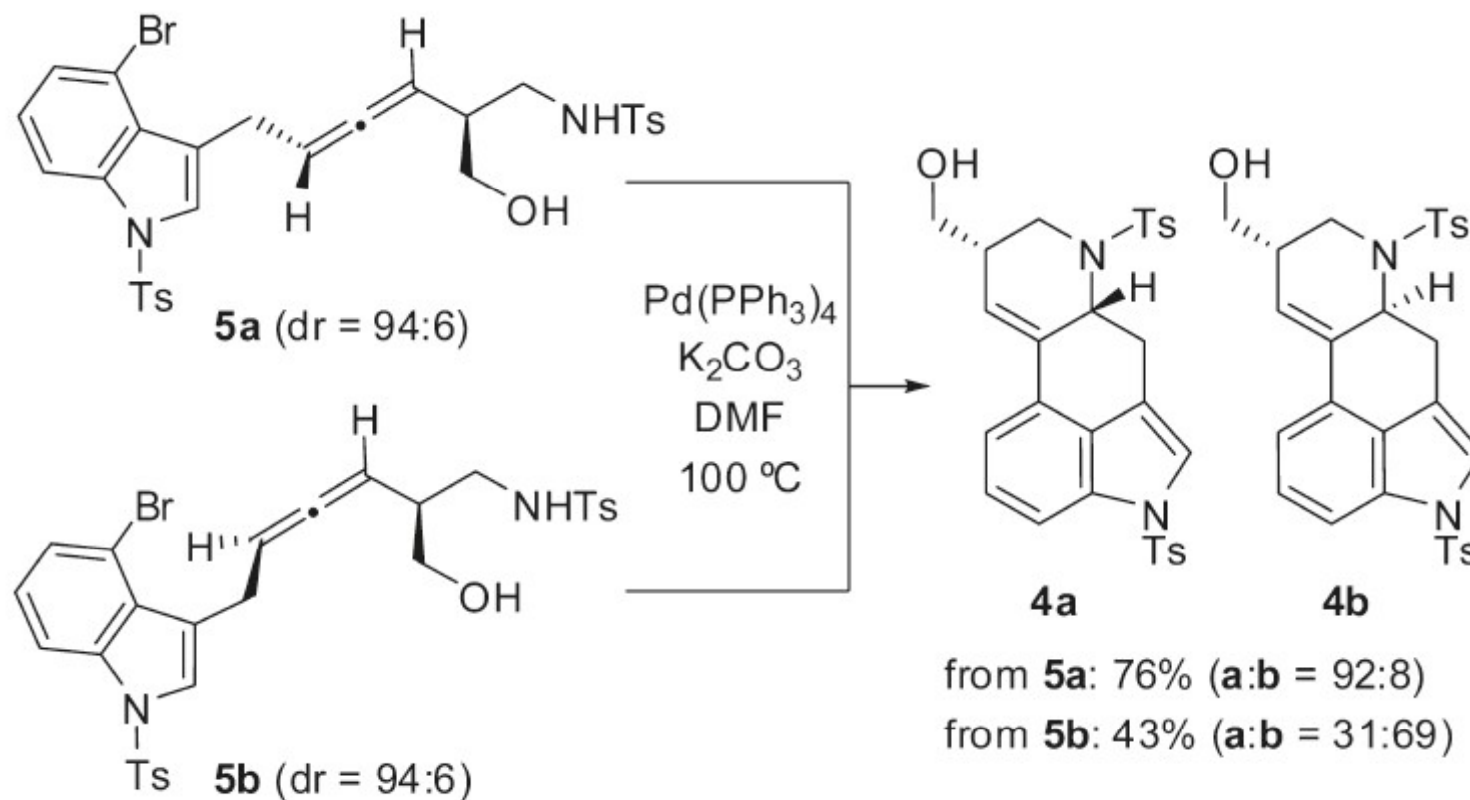
J. Org. Chem. 2011, 76, 2072-2083



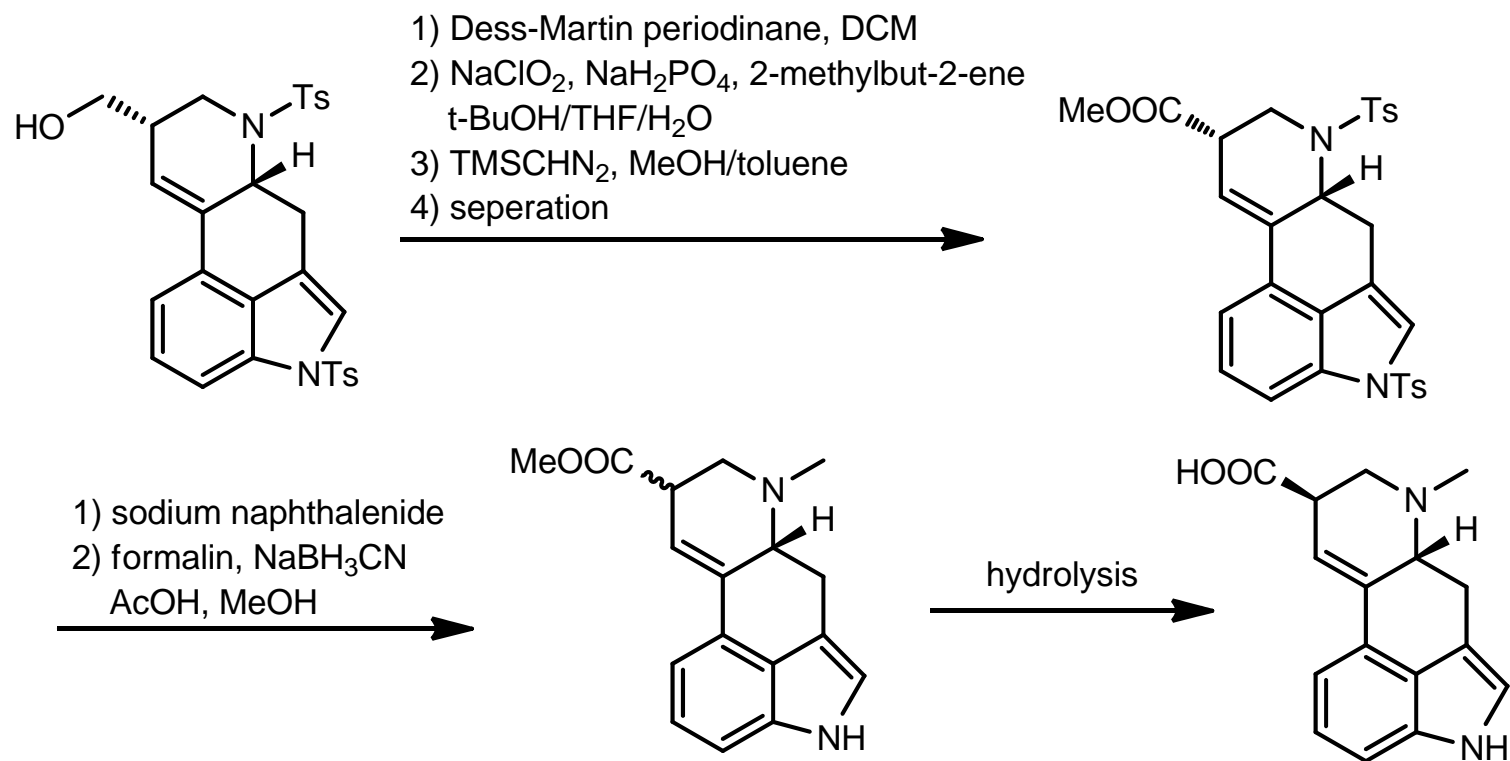
Hiroaki Ohno & Nobutaka Fujii



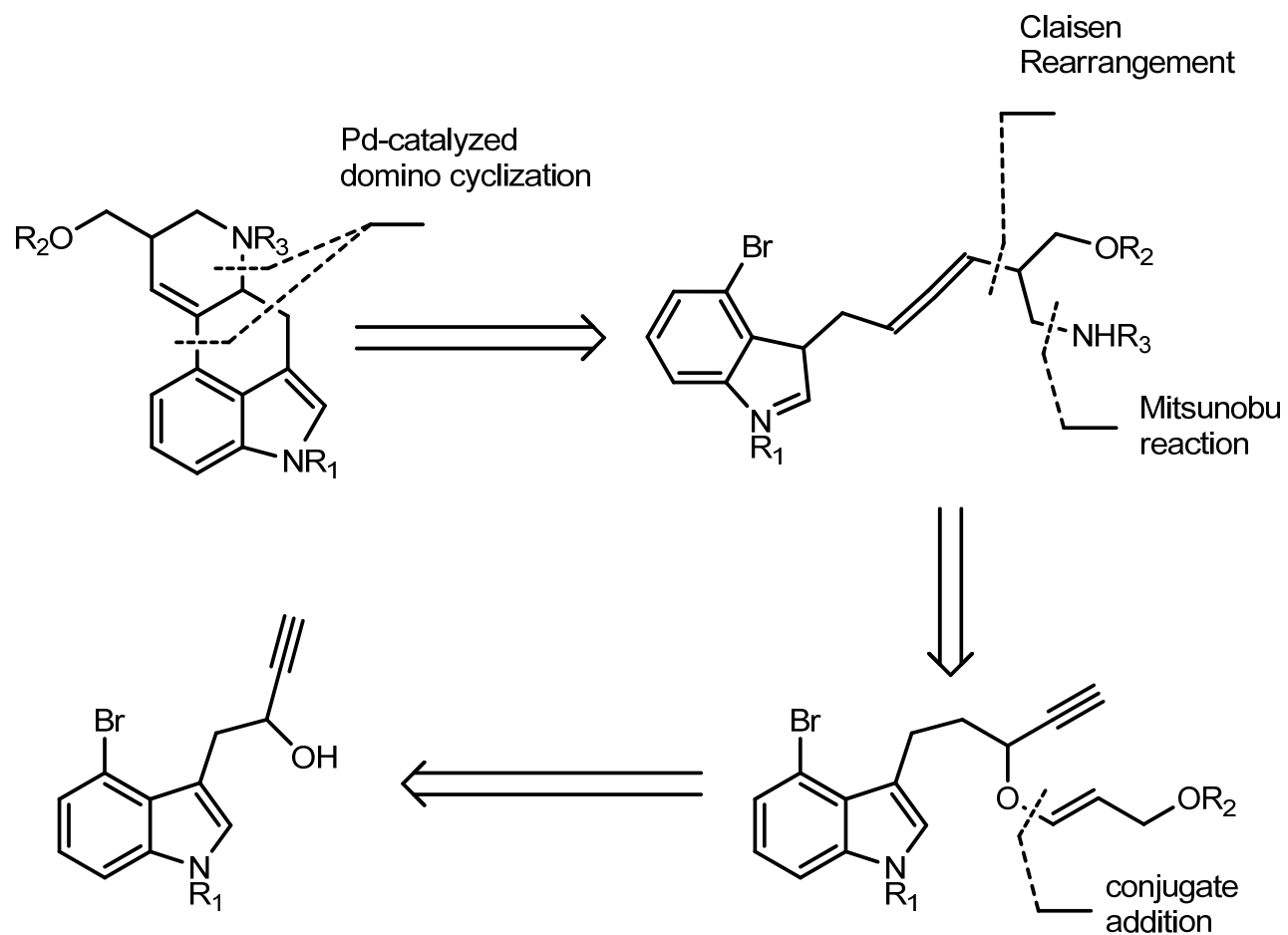
Hiroaki Ohno & Nobutaka Fujii



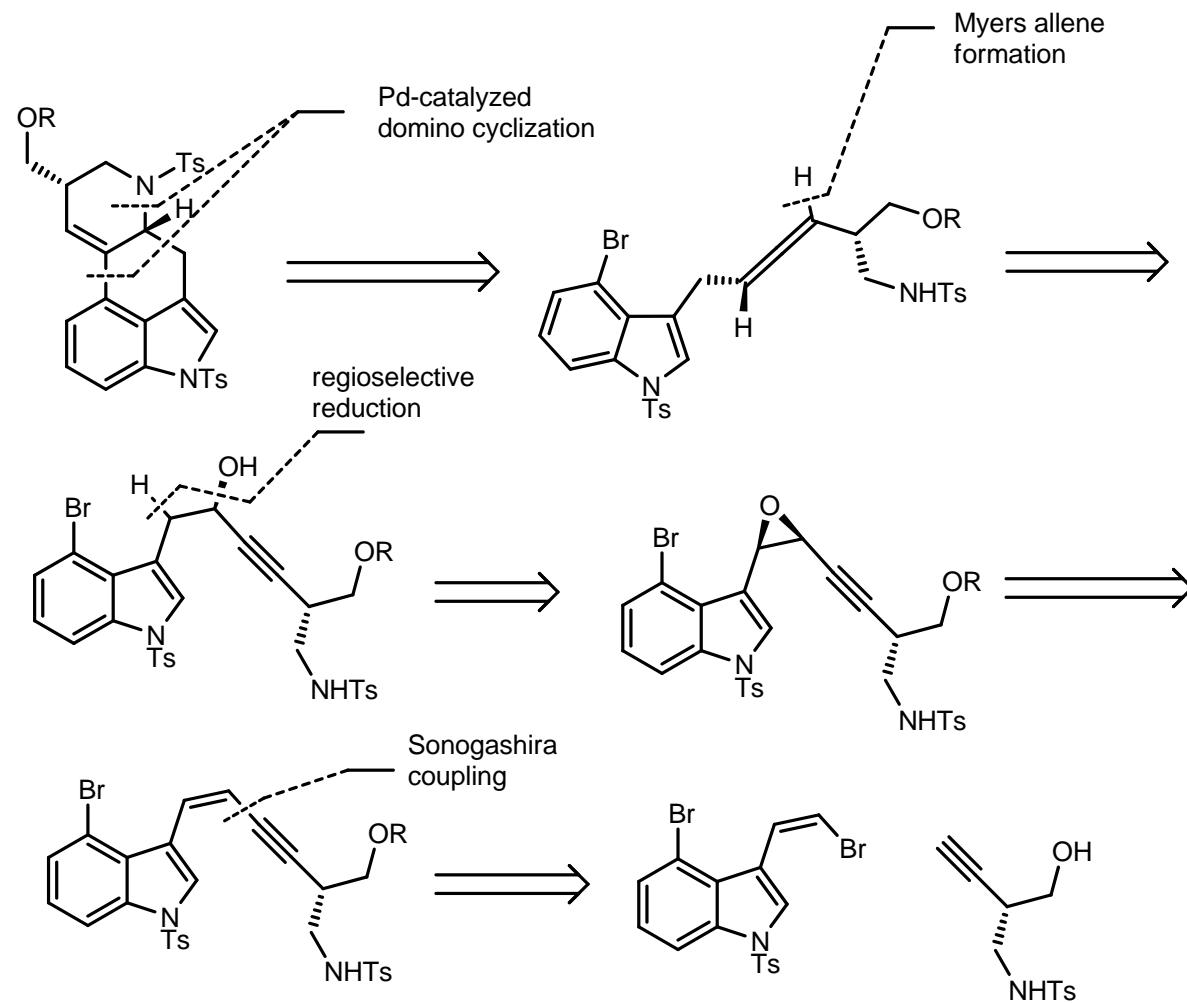
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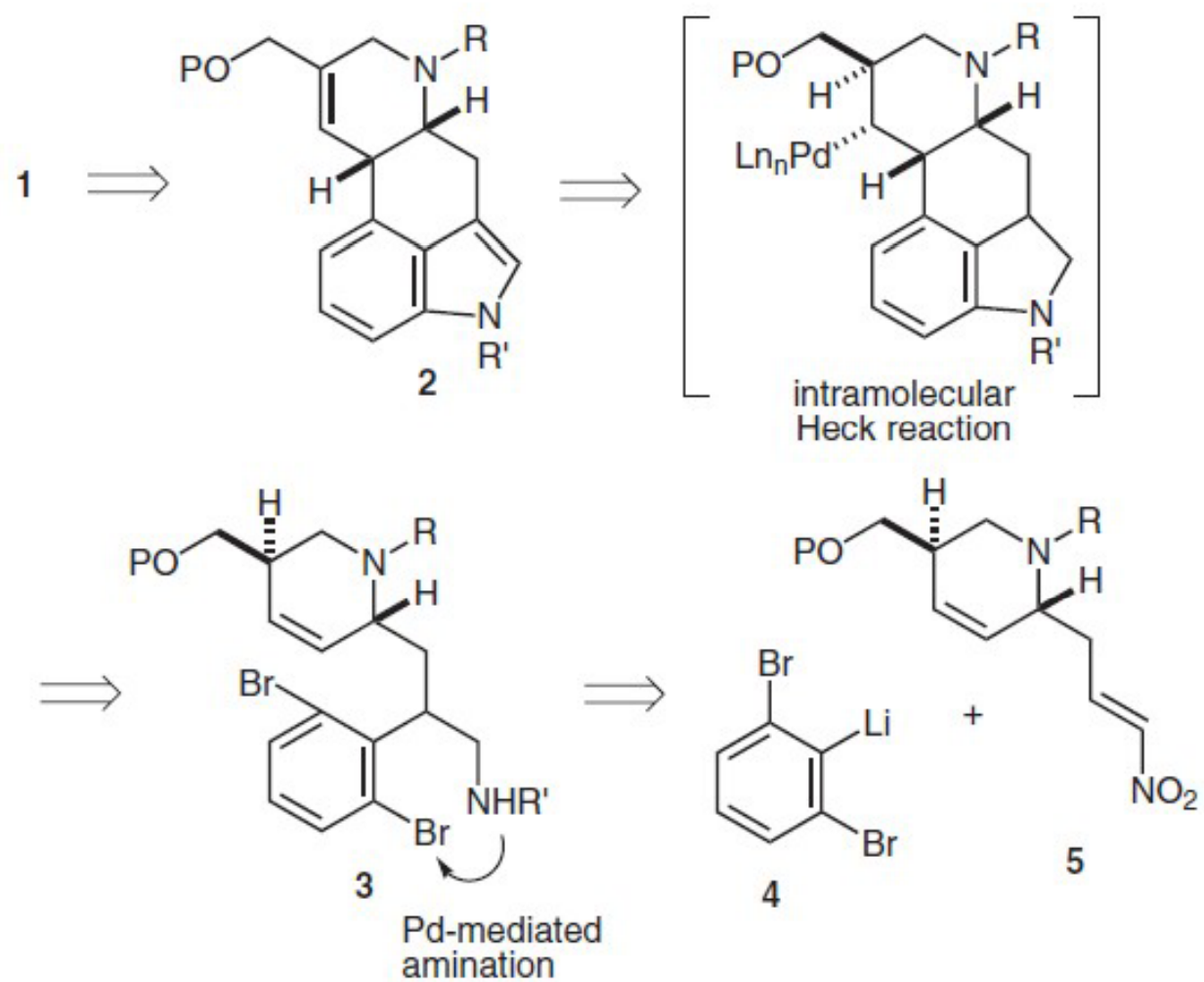
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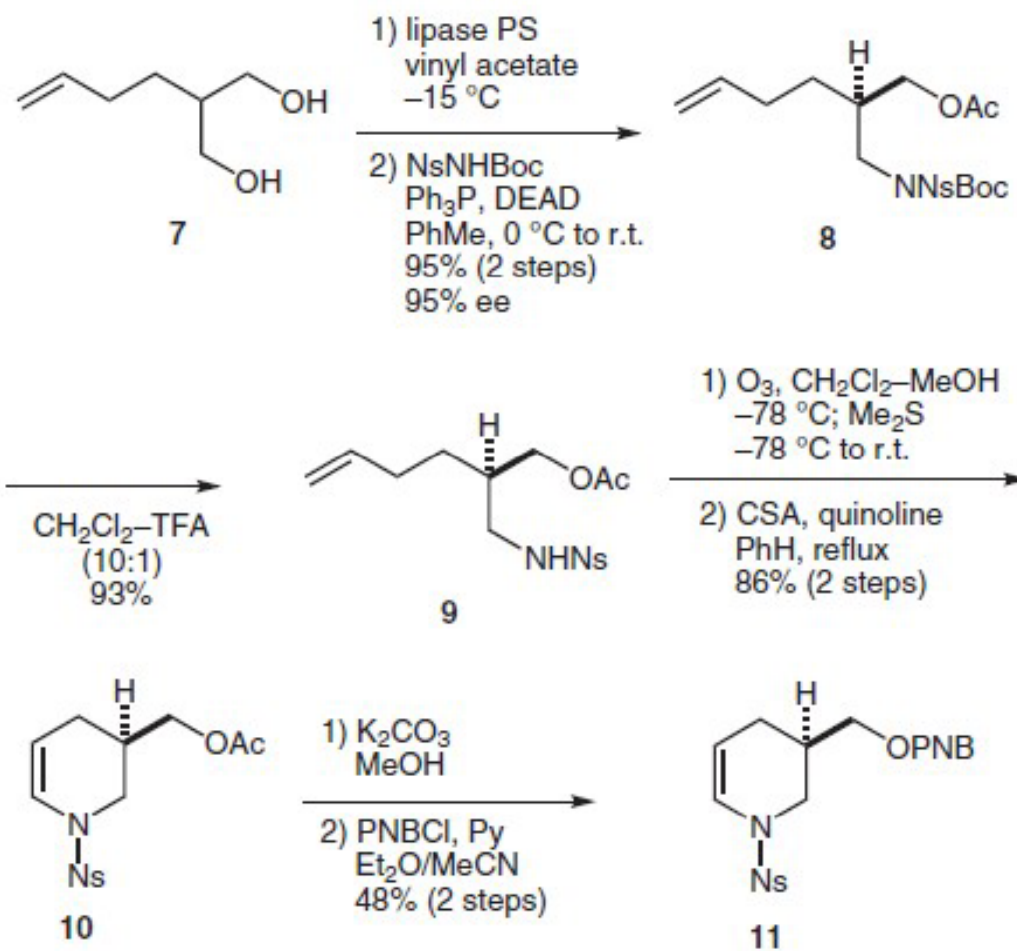
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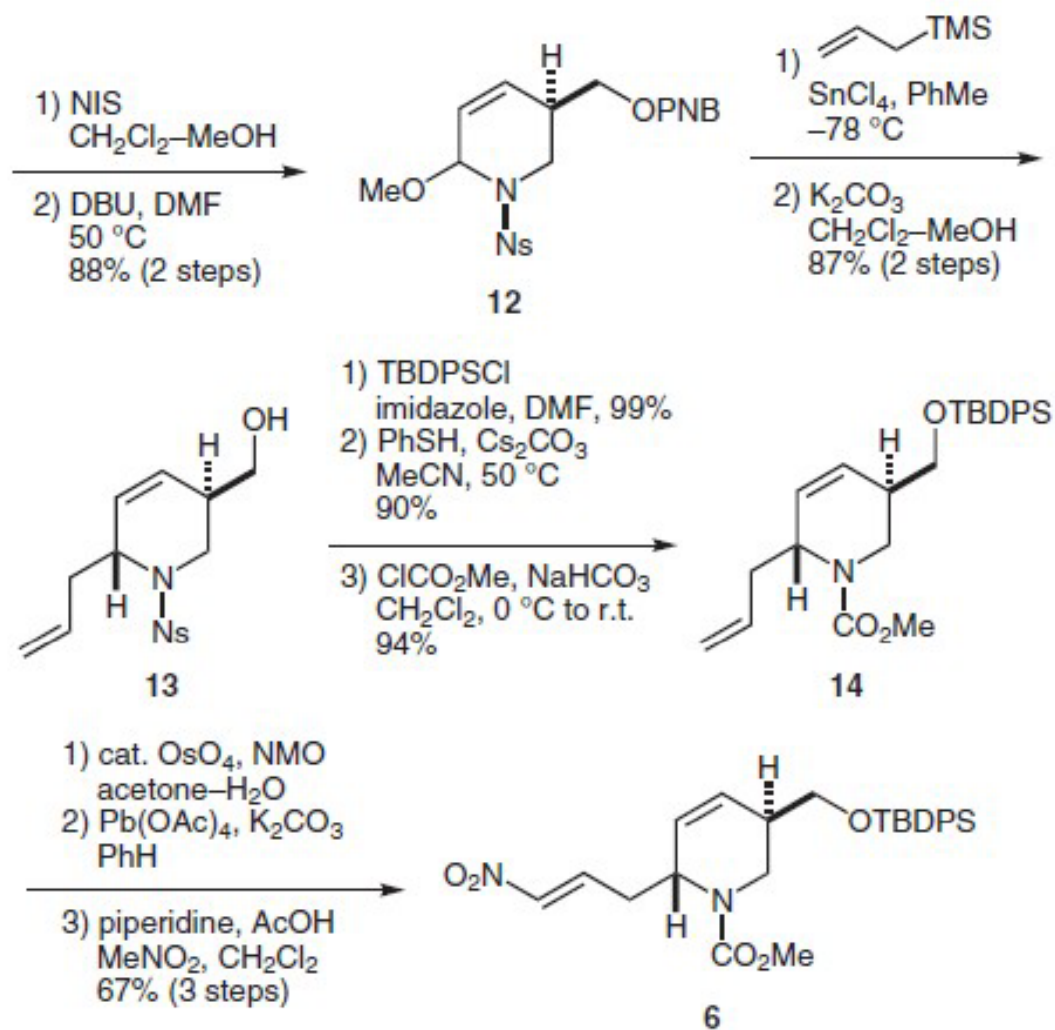
Tohru Fukuyama



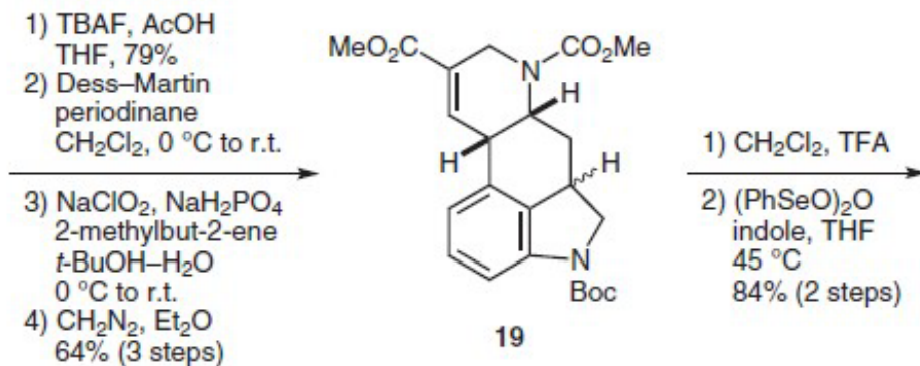
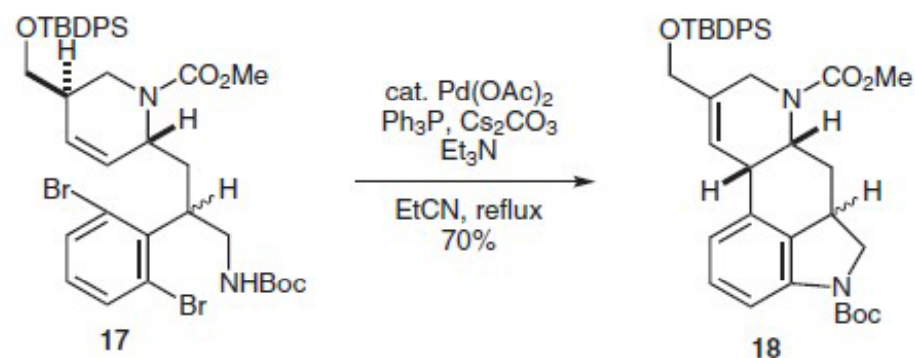
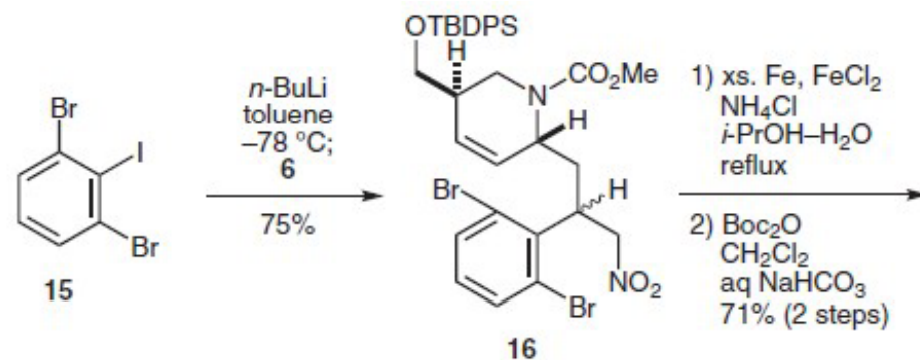
Tohru Fukuyama



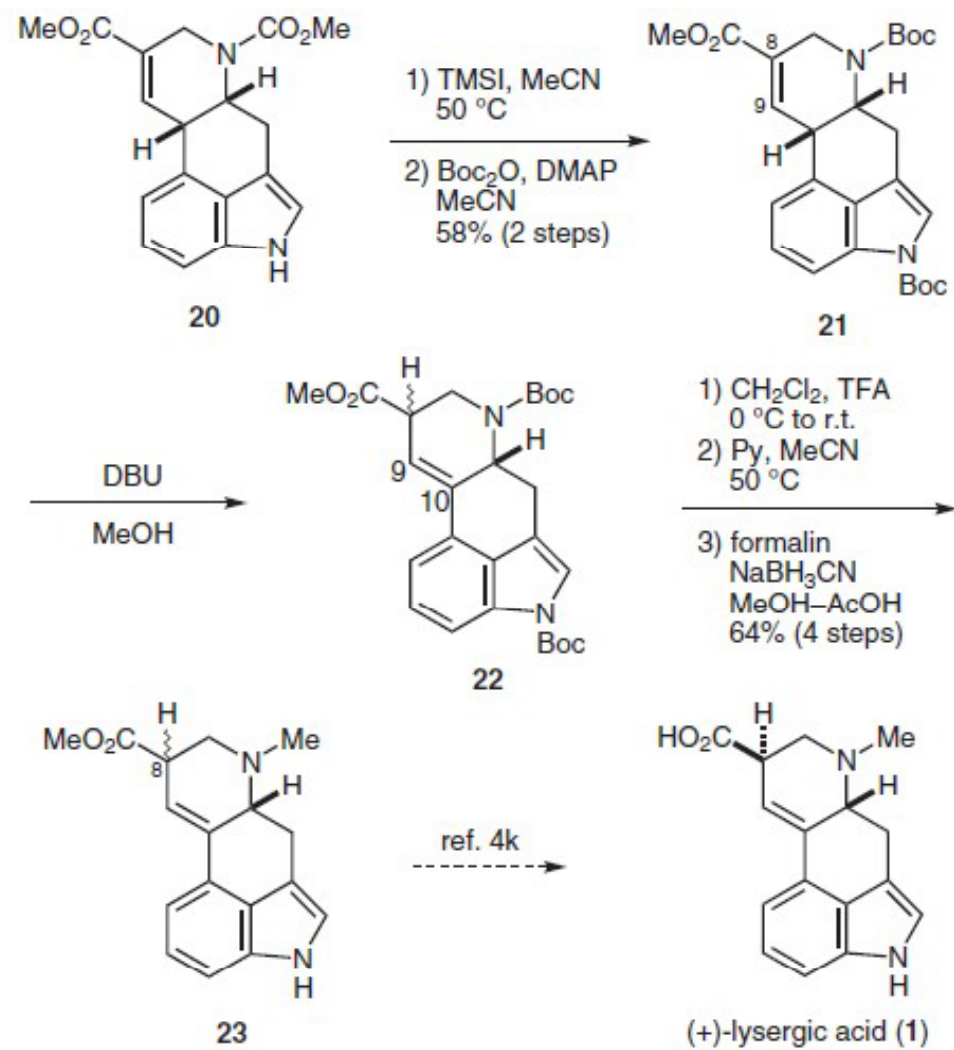
Tohru Fukuyama



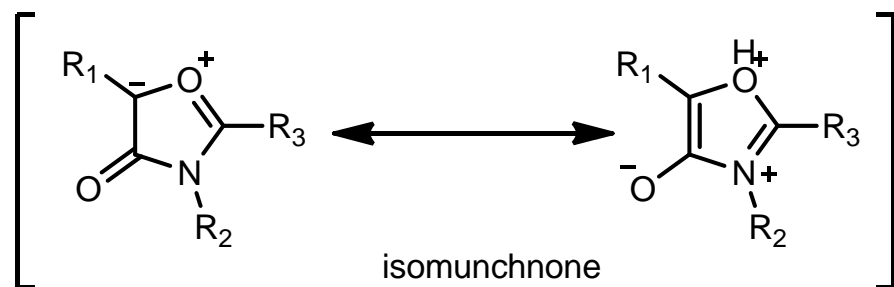
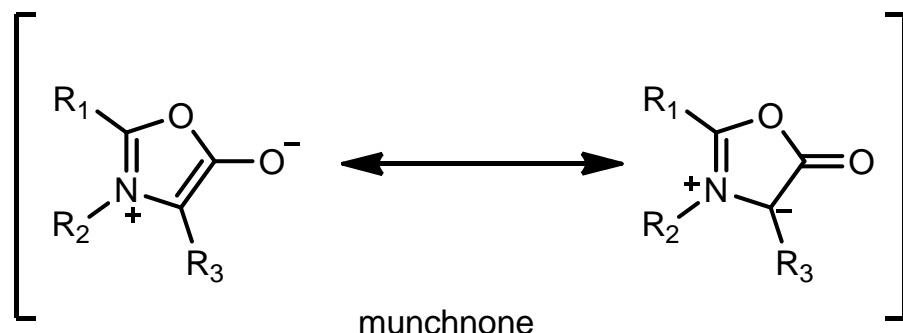
Tohru Fukuyama



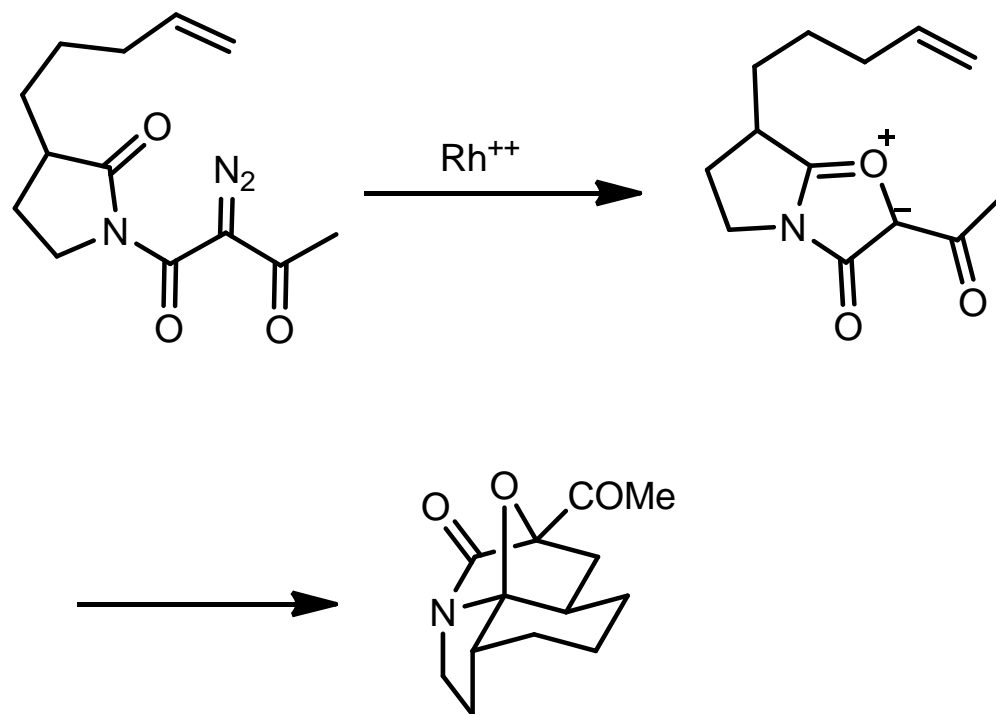
Tohru Fukuyama



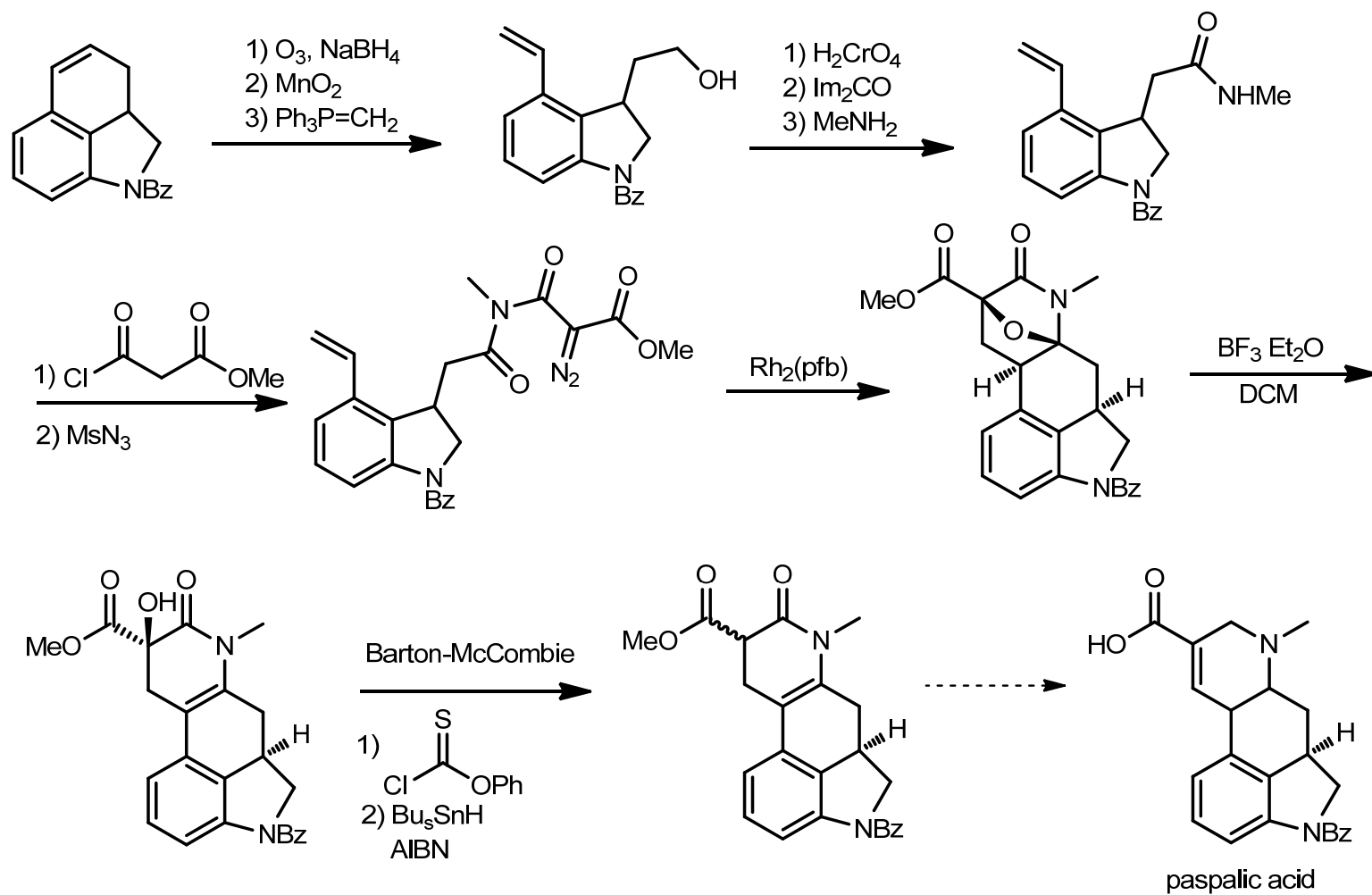
Albert Padwa's Isomunchnone



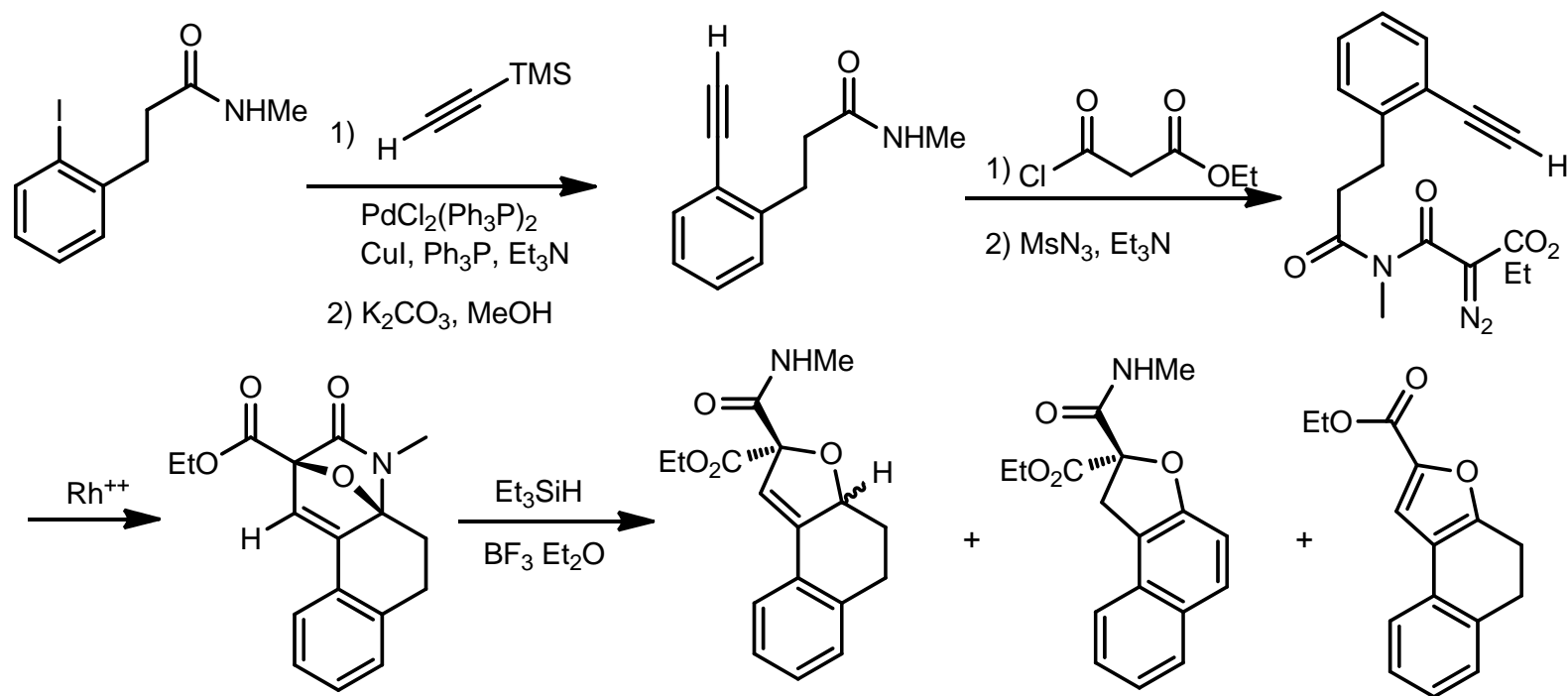
Albert Padwa's Isomunchnone



Albert Padwa's Isomunchnone

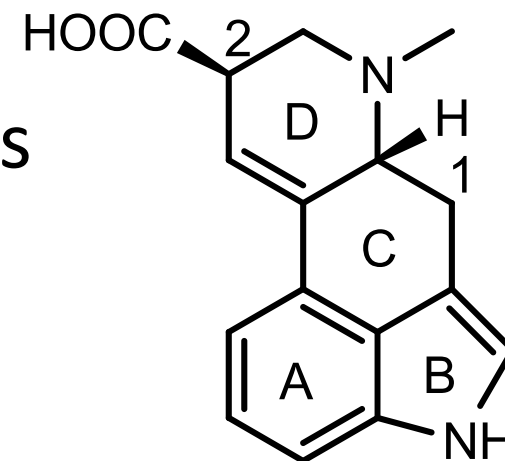


Albert Padwa's Isomunchnone



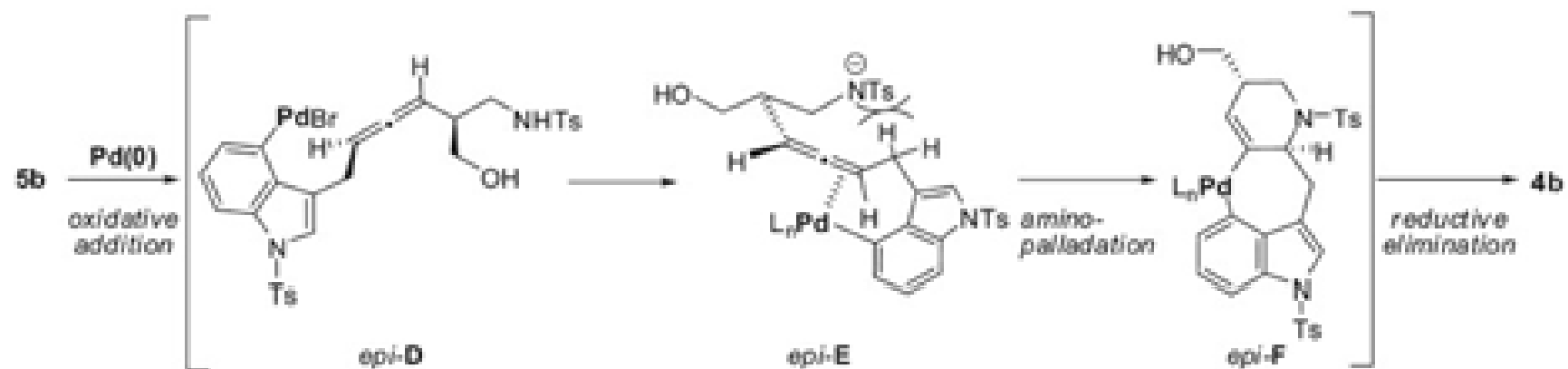
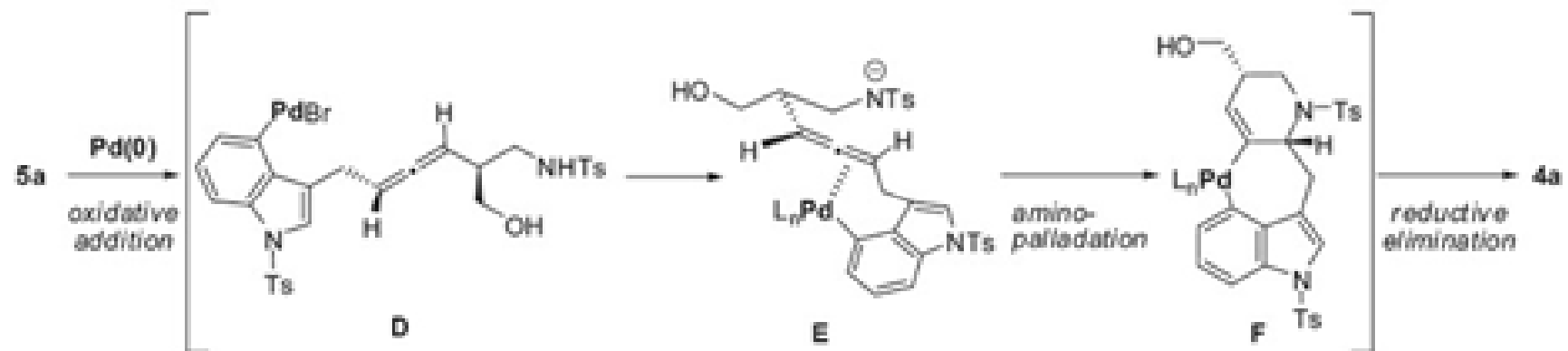
Summary

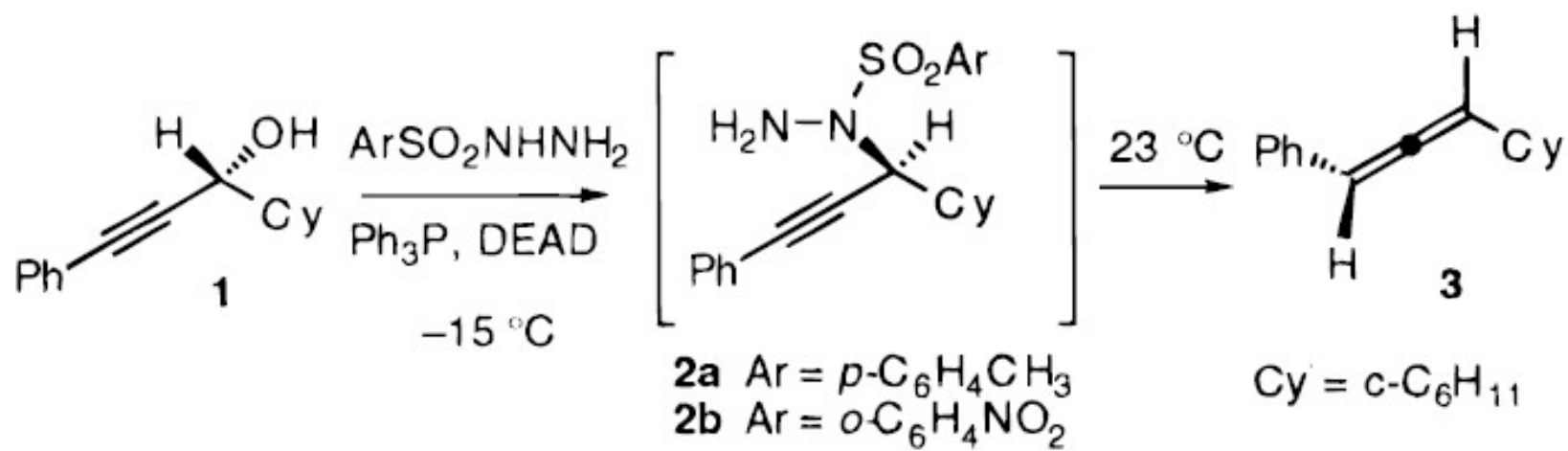
1. Chirality of C2 is obtained by epimerisation
2. Chirality of C1 is obtained by resolution, chiral starting substances or asymmetric cyclization
3. Old methods always use indoline while recent methods can tolerate indole ring during total synthesis process

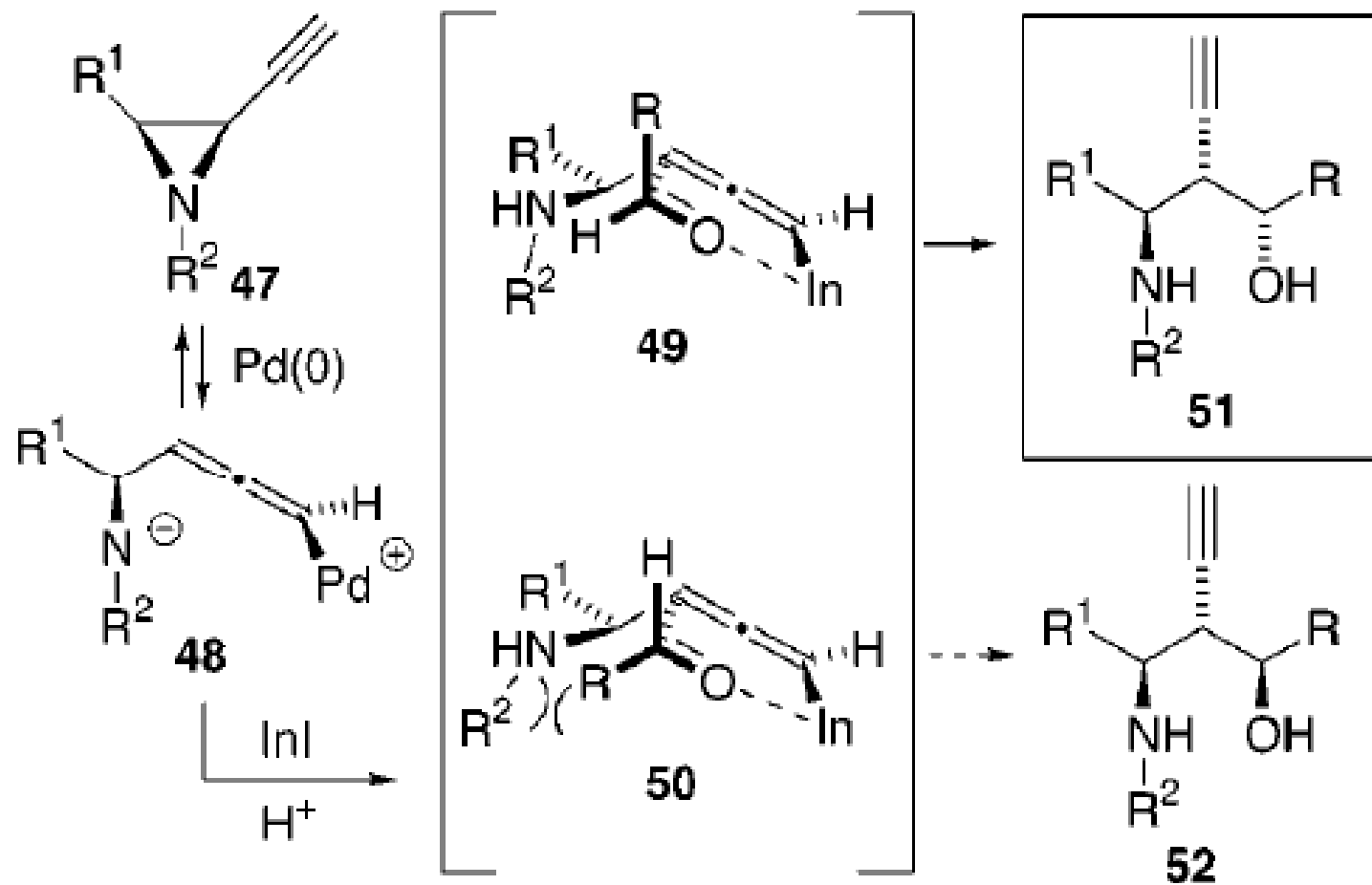


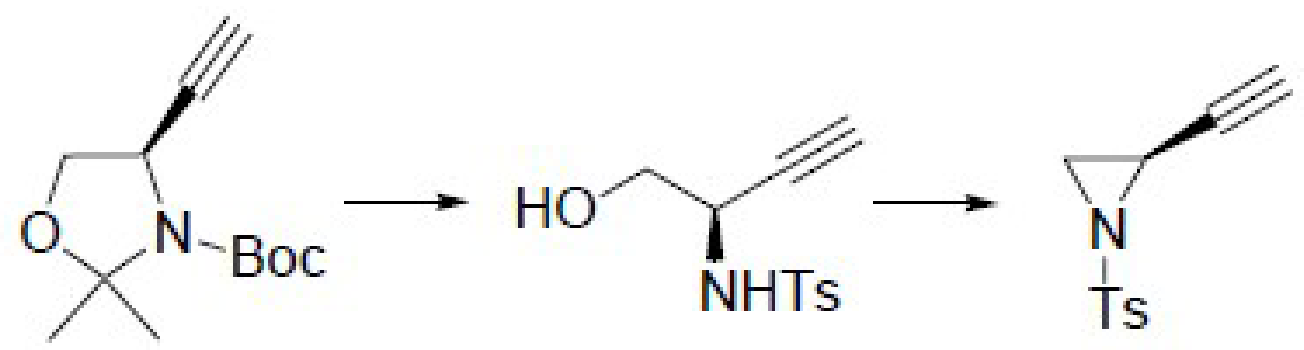
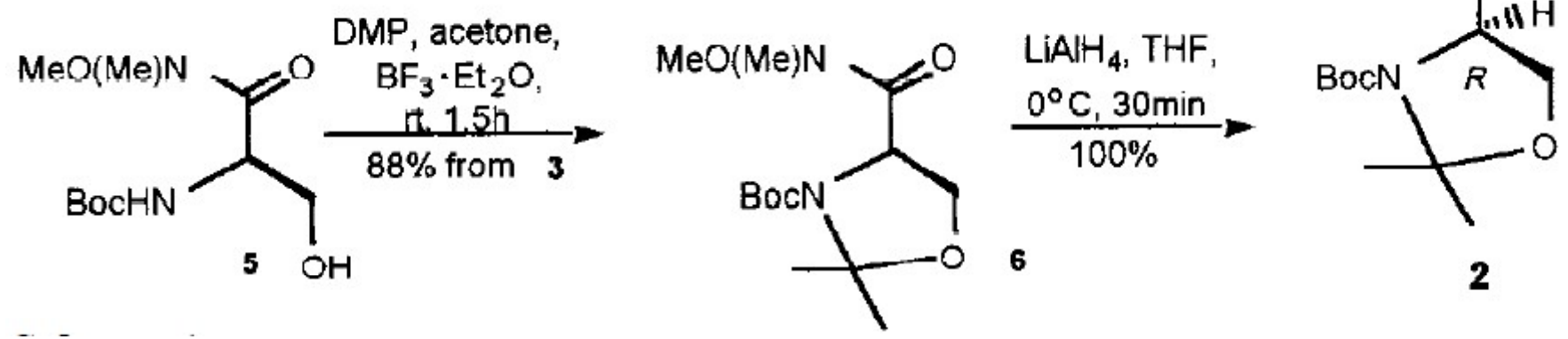
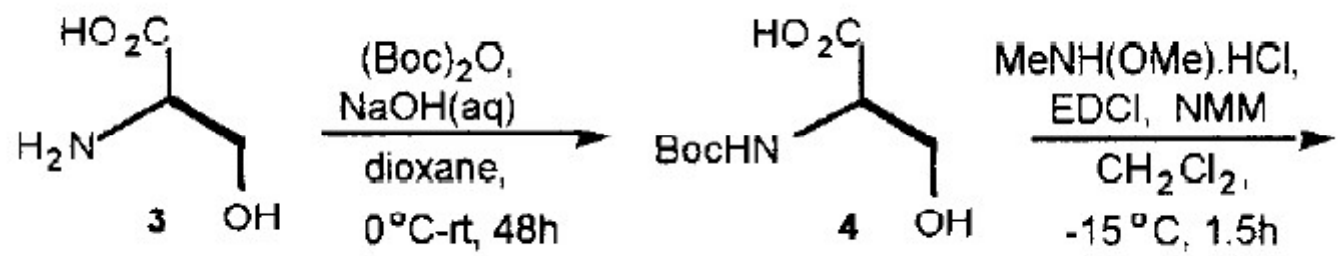
Acknowledgement

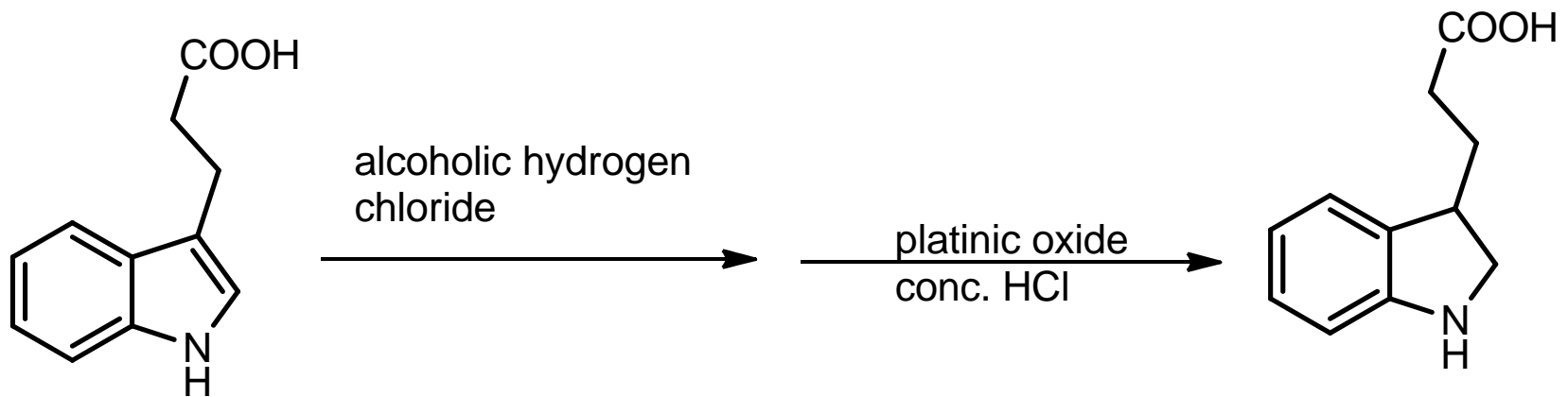


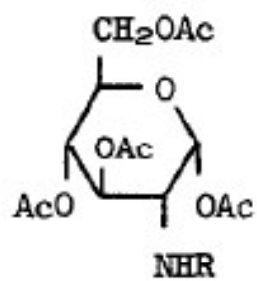
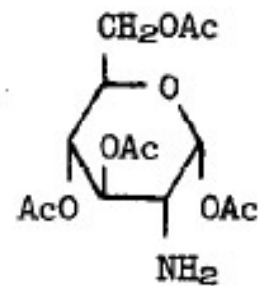
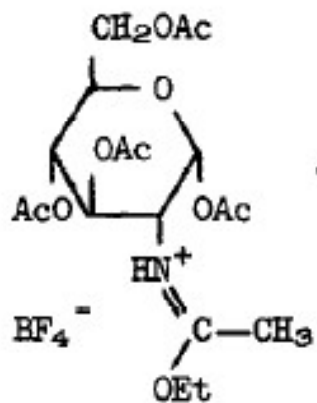
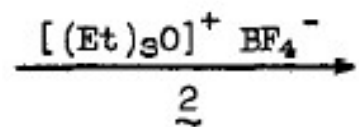
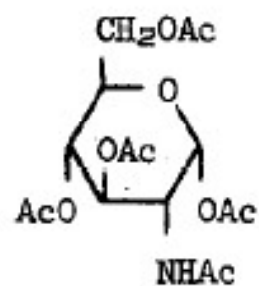












5, R = Bz

6, R = O=[N+]([O-])c1ccc([N+](=O)[O-])cc1

