Syntheses of tricyclic diterpenes based on site-selective iodination and selective 6-*endo* radical cyclization

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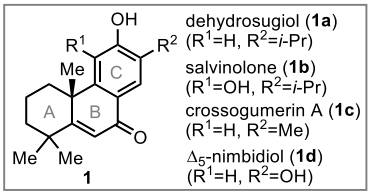
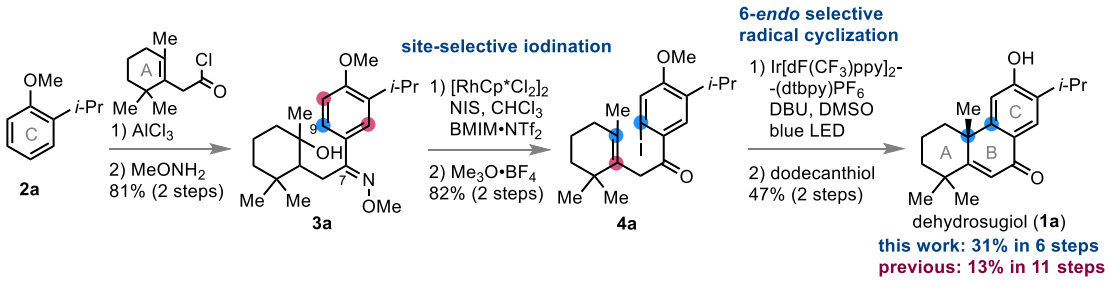
【 Introduction 】 Tricyclic abietane and podocarpane diterpenes (**1a-d**) consist of different substitution patterns on C ring and show diverse biological activities.[1)] Reported syntheses required many steps to enhance the oxidation level of B ring as well as the introduction of substituents on C ring after cationic polyene cyclization.[2)] Here we accomplished the short-step syntheses of highly oxidized tricyclic diterpenes (**1a-d**) featuring site-selective iodination and selective 6-*endo* radical cyclization as key steps.



【Results】 Friedel-Crafts acylation between substituted methoxybenzene **2a** and acid chloride **3a** followed by oxime formation gave oxime ether **3a** in 81% yield. Rh-catalyzed iodination in a mixture of ionic liquid and $CHCl_3$ proceeded site-selectively at C9 position. Oxime at C7 position promoted the iodination as the strong directing group. Dehydration of hydroxy group and deprotection of oxime ether were realized in one step with Meerwein reagent, giving cyclic precursor **4a** in 82% yield from oxime ether **3a**.

Radical cyclization of **4a** was investigated by photoredox catalysts under irradiation of blue light. Although 5-*exo* cyclization took place preferentially than 6-*endo* cyclization in most of investigated conditions, the combination of $Ir[dF(CF_3)ppy]_2(dtbpy)PF_6$ with DBU in DMSO realized preferential 6-*endo* cyclization. Finally, the synthesis of dehydrosugiol (**1a**) was accomplished by deprotection. Our synthetic route improved the total yield and the number of steps (31% in 6 steps) from so far reported synthesis (13% in 11 steps). In similar manner with synthesis route of **1a**, we also accomplished the syntheses of salvinolone (**1b**), crossogumerin A (**1c**) and Δ_5-nimbidiol (**1d**) in 6 steps.



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2) M. Tada *et al*., *Bioorg. Med. Chem*. **2001**, *9*, 347.