A Modified Synthesis of (+)-selaginedorffone B via Carbonyl Generation and an Electrophotocatalytic Olefination Facilitated by Distonic Radical Cations

The synthesis of (+)-selaginedorffone B includes the formation of a carbonyl from a hydroxyl group directly bonded to the cyclic system before the oxygen is replaced with a carbon to create a substituted cyclic alkene. These two sequential reactions may be replaced in a modified synthesis by using a catalytic pairing of a nitroxide and nitric acid to form the carbonyl and by employing an electrophoto-catalytic system to enable the olefination reaction.

Biomimetic total synthesis of the reported structure of (+)-selaginedorffone B
Sourav Kundu, Debgopal Jana, Nilangshu Mandal, Ayan Mondal, Ranjit Murmu, Nanda Kishore Roy, Ayan Datta and Alakesh Bisai, *Chem. Sci.*, 2024, 15, DOI: 10.1039/d4sc04103h

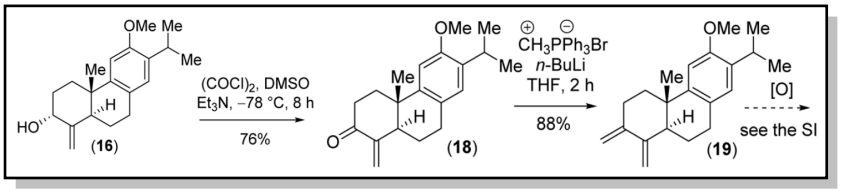

Fig 1: Carbonyl formation and olefination from Kundu and coworkers' total synthesis of (+)-Selaginedorffone B

As demonstrated by Sharma and coworkers, the cyclic hydroxyl group of compound (**16**) may be oxidized to a carbonyl through the use of a catalytic pairing of a nitroxide and nitric acid. This transformation is possible due to the selectivity and high yield observed for ketone products **(Fig 2)** and the plausibility of the system's implementation on a cyclic hydroxyl group. Due to the nature of the catalytic system's independence toward the hydroxyl groups' R groups **(Fig 3)** there should be no likely mechanistic differences, which supports its implementation. Secondly, the resultant cyclic carbonyl may be olefinated to a carbon-carbon double bond via the use of Steiniger and coworkers' electrophotocatalytic technique. This reaction is also possible due to the catalytic system's mechanistic independence toward the R groups present, its selectivity for ketone functional groups and the symmetry of the olefin C_2H_4, which increases the probability of selectively olefinating the desired carbonyl. Additionally, the C_2H_4 olefin lacks E/Z stereoselectivity due to such symmetry which eliminates the necessity for separating geometrical isomers following the reaction.

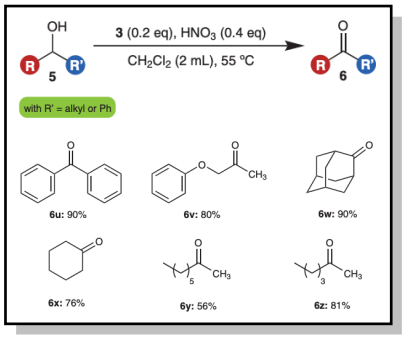

Fig 2: Hydroxide oxidation to ketones as reported by Sharma and coworkers.

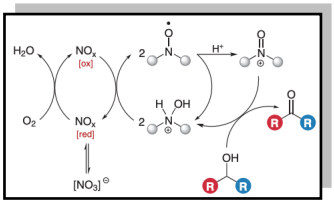

Fig 3: Sharma and coworkers' catalytic mechanism

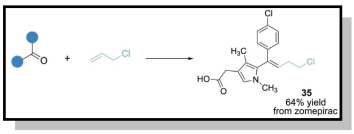

Fig 4: Steiniger and cowokers' olefination used to synthesize zomepirac.

Olefination of carbonyls with alkenes enabled by electrophotocatalytic generation of distonic radical cations
Keri A. Steiniger, Tristan H. Lambert, Sci. Adv.9,eadg3026 (2023) DOI:10.1126/sciadv.adg3026

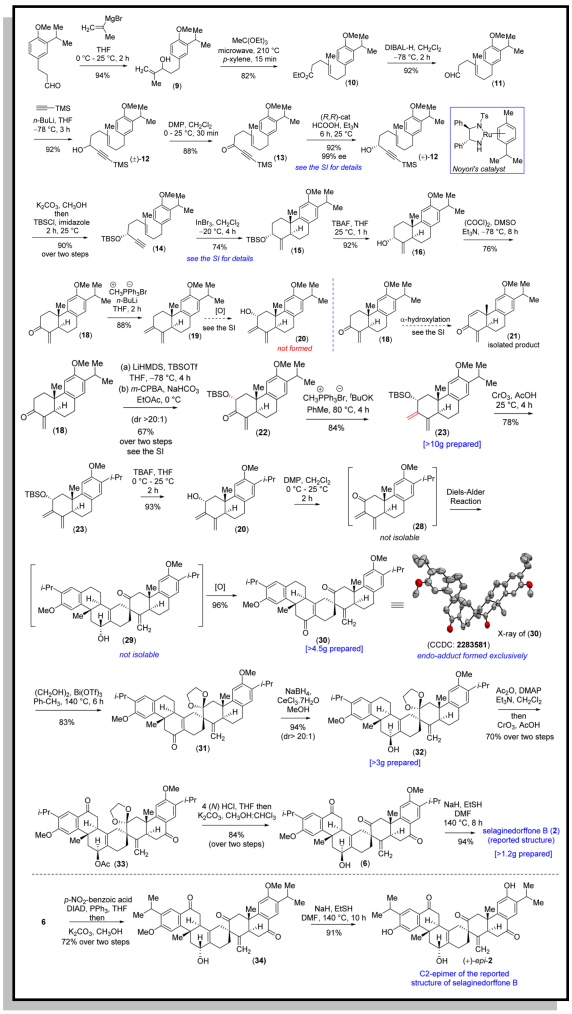

Fig 6: Total synthesis of (+)-Selaginedorffone B as reportedby Kundu and coworkers.

Oxidation of the hydroxyl group may be accomplished by using nitroxide 3 (as illustrated in fig 5), which contains a radical which causes an observed increase in reaction efficiency. The following conversion from **(18)** to **(19)** is attained first through the formation of a diazo compound in an electrochemical cell, which may then be followed by the addition of the C_2H_4 olefin that should then be reacted under electrophotocatalytic conditions to produce the desired substrate **(19)**. The solvent system employed in these two replacement reactions should not affect the distribution of products; instead, the safety of this total synthesis may be improved by avoiding the use of t-BuLi and THF and low temperature conditions which require dry ice. Because of these advantages and the reactions' feasibility, these reactions should be considered for implementation.

Oxidation of Alcohols to Aldehydes and Ketones Using a Catalytic Pairing of a Nitroxide and Nitric Acid
Sharma, Manisha, Arturo León Sandoval and Nicholas E. Leadbeater. SynOpen 07 (2023): 718 - 722.

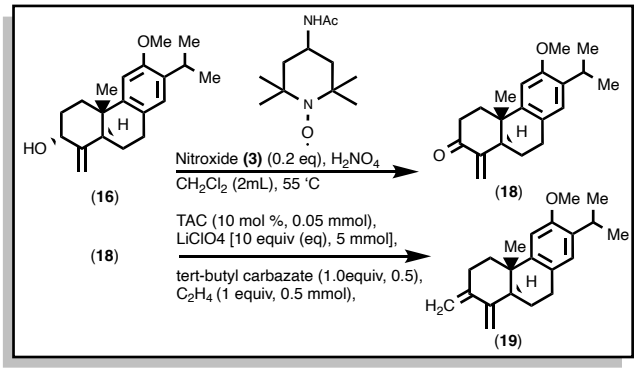

Fig 5: Proposed replacement reactions for the synthesis of (+)-Selaginedorffone B