ABSTRACT

The thesis entitled "Stereoselective total synthesis of *γ*-butyrolactone natural products and (3*R*,4*S*)-isostreptenol III" is presenting the first stereoselective total synthesis of natural products (−)-Inohanalactone, (+)-Pseudonocardide A, (+)-Pseudonocardide C and 3-*epi*-*ent*-Pseudonocardide D from starting materials D-ribose. This thesis includes the first stereoselective total synthesis and structure revision of reported (3*R*,4*S*)-isostreptenol III.

Chapter 1 describes the first stereoselective total synthesis of (−)-Inohanalactone. The salient features of this synthesis are highly *Z*-selective Wittig olefination and chemoselective oxidation of 1,4-diol to the *γ*-butyrolactone. The synthesis was accomplished from readily available 2,3-*O*-isopropylidene-L-erythrose derived from D-ribose in eight steps with 32% overall yield.

Chapter 2 describes the divergent chiron approach for the first total synthesis of (+)-pseudonocardide A, (+)-pseudonocardide C and epimer of *ent*-pseudonocardide D starting from D-ribose. The significant aspects of these syntheses are highly *Z*-selective Wittig olefination, one pot formation of *γ*-butyrolactone and *γ*-butenolides [1,4] O-to-O silyl migration followed by lactonization and intramolecular oxa-Michael reaction.

Chapter 3 describes the first total synthesis and structure revision of (3*R*,4*S*)-isostreptenol III. The structure of isolated 3*R*,4*S*-isostreptenol III was revised to 3*R*,4*R*-isostreptenol III. The salient features of this synthesis are stereoselective installation of hydroxymethyl group, highly diastereoselective Wittig olefination and regioselective epoxide opening. The synthesis was accomplished from a common intermediate readily prepared from D-ribose.