CHIRAL ROUTES TO NATURALLY OCCURRING OXACYCLIC COMPOUNDS

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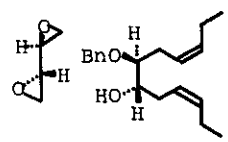
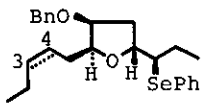
For the purpose of developing an efficient chiral route to the substituted tetrahydrofuran systems which constitute the characteristic subunits of various oxacyclic compounds, we selected (6S,7S,9R,10R)-6,9-epoxynonadec-18-ene-7,10-diol (7), a marine natural product, and (+)-citreoviral (12), a mycotoxin metabolite, as a target molecule.

The synthesis of 7 has been accomplished using (S,S)-1,2-3,4-diepoxybutane (1) as a chiral starting material. The C_2-symmetrical nature of 1 allowed easy access of the key γ,δ-unsaturated alcohol 2 which was converted to the marine product 7 by the following three major manipulations: (1) stereoselective electrophilic cyclization (2 → 3); (2) chemoselective diimide reduction (3 → 4); (3) chelation controlled Grignard reaction (5 → 6).

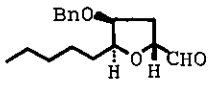
As for the synthesis of (+)-citreoviral (12), the synthesis was started by the newly developed asymmetric hydroxylation of the tiglic acid ester 8 to 9. Conversion of 9 into the epoxide 10 followed by treatment with 50% aqueous trifluoroacetic acid stereoselectively gave the tetrahydrofuran 11 which was transformed into (+)-citreoviral (12) by DIBAL reduction followed by regioselective Swern oxidation.



1 2



3 3,4-dehydro
4 3,4-dihydro



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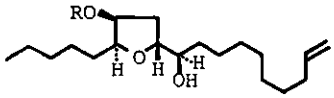
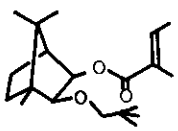


6 R=Bn
7 R=H



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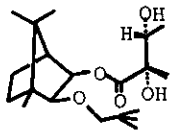

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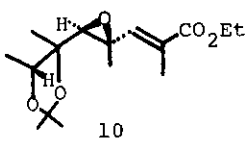

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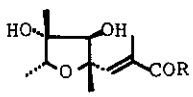

11 R=OEt
12 R=H