Table of Contents:

I. General Information

All reactions were carried out under inert gas atmosphere (nitrogen or argon) unless otherwise indicated. Re-sealable pressure tubes (13x100 mm) were purchased from Fischer Scientific (catalog number 14-959-35C) and were flame dried followed by cooling in a desiccator or under a stream of inert gas prior to use. All commercial reagents and anhydrous solvents were used as received from vendors (Fischer Scientific, Sigma Aldrich, TCI America, Combi Blocks and Enamine) without further purification. The used Iridium catalyst (*S*)-Ir-SEGPHOS and (*S*)-Ir-tol-BINAP was prepared according to literature known procedures.[1] Cs_2CO_3 was used as received from Rockwell Lithium. Preparative column chromatography employing Silicycle silica gel (40-63 µm) was performed according to the method of Still[2] or on a Teledyne Isco Combiflash Rf utilizing Silicycle HP columns using a mobile phase composed of either heptane/isopropyl acetate or dichloromethane/methanol. Reactions were monitored by a Shimadzu LCMS/UV system with LC-30AD solvent pump, 2020 MS, Sil-30AC autosampler, SPD-M30A UV detector, CTO-20A column oven, using a 2-98% acetonitrile/0.1% formic acid (or 0.001% ammonia) gradient over 2.5 minutes. Analytical thin-layer chromatography (TLC) was carried out using 0.25 mm commercial silica gel plates (Dynamic Absorbents F). Visualization was accomplished with UV light followed by dipping in CAM, p- Anisaldehyde (PAA), or $KMnO_4$ stain solution followed by heating.

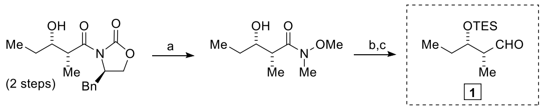
I. Spectroscopy, Spectrometry and Data Collection

Infrared spectra were recorded on a Perkin-Elmer 1600 spectrometer using a diamond ATR unit. High-resolution mass spectra (HRMS) were obtained on a Karatos MS9 and are reported as m/z (relative intensity). Accurate masses are reported for the molecular ion (M+H, M+Na), or a suitable fragment ion. Nuclear magnetic resonance (1H, 13C, 19F NMR) spectra were recorded with a Bruker BioSpin GmbG, Varian Gemini (400 MHz) or Varian INOVA (500 MHz) spectrometer equipped with a Bruker cryoprobe. The chemical shifts are given as parts per million (ppm) and were referenced to the residual solvent signal (DMSO: $\delta H = 2.50$ ppm, $\delta C = 39.52$ ppm, $CDCl_3$: $\delta H = 7.26$ ppm, $\delta C = 77.16$ ppm). Specific optical rotations were recorded on an Atago AP-300 automatic polarimeter at the sodium line (589 nm) in either $CHCl_3$ or MeOH. Solution concentrations are given in the units of 10^{-2} g mL^{-1}.

I. Summaries of Prior Syntheses

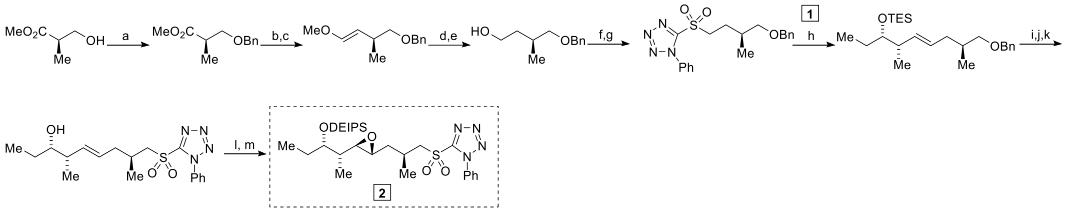
A. Kotake et al., Pladienolide B, *Angew. Chem. Int. Ed.*, **2007**, *46*, 4350.

Fragment 1



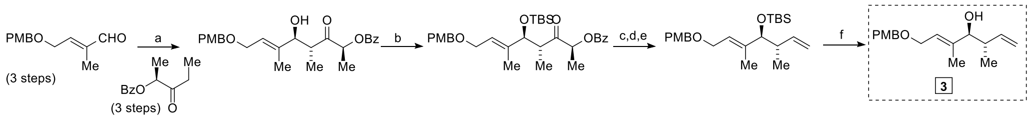
Reagents: (a) *N,O*-dimethylhydroxylamine hydrochloride, Me_3Al, CH_2Cl_2; (b) TBSOTf, 2,6-lutidine, CH_2Cl_2; (c) DIBAL, toluene.

Fragment 2



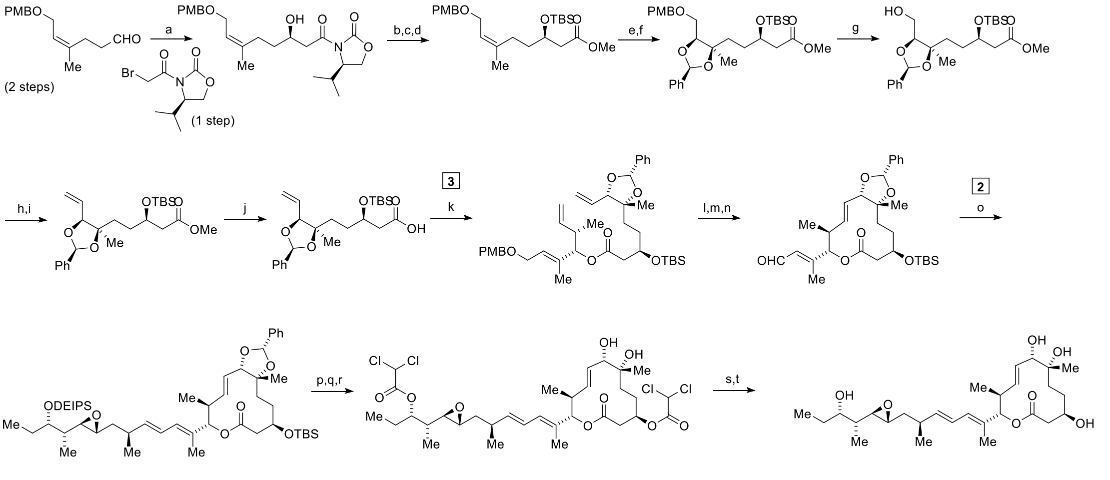
Reagents: (a) benzyl 2,2,2-trichloroacetimidate, trifluoromethanesulfonic acid, CH_2Cl_2-cyclohexnae; (b) DIBAL, toluene, MeOH; (c) (methoxymethyl)triphenylphosphonium chloride, *tert*-BuOK, THF; (d) formic acid, H_2O; (e) $NaBH_4$, MeOH; (f) 5-mercapto-1-phenyltetrazole, Ph_3P, DIAD, THF; (g) $(NH_4)_6Mo_7O_{24}$-$4H_2O$, H_2O_2, EtOH; (h) KHMDS, THF; (i) Li^0, 4,4'-di-*tert*-butuyl-biphenyl, THF; (j) 5-mercapto-1-phenyltetrazole, Ph_3P, DIAD, THF; (k) $MoO_7(NH_4)_6$-$4H_2O$, H_2O_2, EtOH; (l) 1,2:4,5-di-*O*-isopropylidene-D-erythro-2,3-hexodiuro-2,6-pyranose, oxone, K_2CO_3, MeCN/ 0.05 M $Na_2B_4O_7$ $10H_2O$ in 0.4 mM Na_2EDTA; (m) DEIPSCl, imidazole, DMF.

Fragment 3



Reagents: (a) Cy_2BCl, Me_2NEt, diethyl ether; (b) TBSOTf, 2,6-lutidine, CH_2Cl_2; (c) $LiBH_4$, THF; (d) $NaIO_4$, THF/H_2O; (e) methyltriphenylphosphonium iodide, nBuLi, THF; (f) 1N HCl, MeCN.

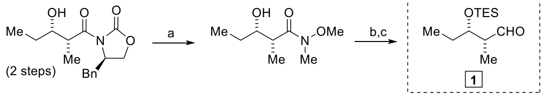
Pladienolide B



Reagents: (a) Sm^0, CH_2I_2, THF; (b) LiOH, H_2O_2, THF/H_2O; (c) TMS diazomethane, THF/MeOH; (d) TBSCl, imidazole, DMF; (e) AD-mix-a, methanesulfonamide, tBuOH/H_2O; (f) benzaldehyde-dimethyl acetal, PPTS, CH_2I_2; (g) DDQ, CH_2Cl_2,/H_2O; (h) DMP, CH_2Cl_2; (i) methyltriphenylphosphonium iodide, nBuLi; (j) LiOH, THF/MeOH/H_2O; (k) 2,4,6-trichlorobenzoyl chloride, Et_3N, THF, then DMAP, toluene; (l) 2nd-generation Hoveyda-Grubbs catalyst, BHT, toluene; (m) DDQ, CH_2Cl_2/pH 7 buffer; (n) DMP, CH_2Cl_2; (o) KHMDS, THF; (p) TBAF, THF; (q) dichloroacetic anhydride, Et_3N, DMAP, CH_2Cl_2; (r) PPTS, MeOH; (s) K_2CO_3, MeOH; (t) acetic anhydride, Et_3N, DMAP, CH_2Cl_2.

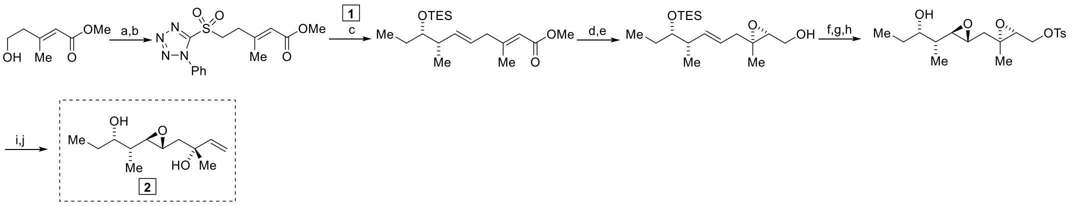
B. Kotake et al., Pladienolide D, *Angew. Chem. Int. Ed.*, **2007**, *46*, 4350.

Fragment 1



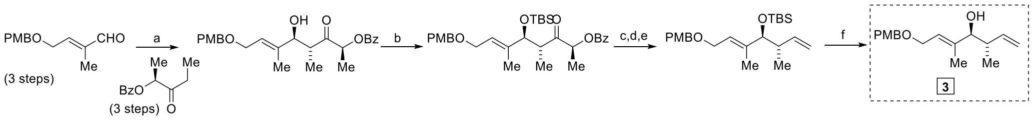
Reagents: (a) *N,O*-dimethylhydroxylamine hydrochloride, Me$_3$Al, CH$_2$Cl$_2$; (b) TBSOTf, 2,6-lutidine, CH$_2$Cl$_2$; (c) DIBAL, toluene.

Fragment 2



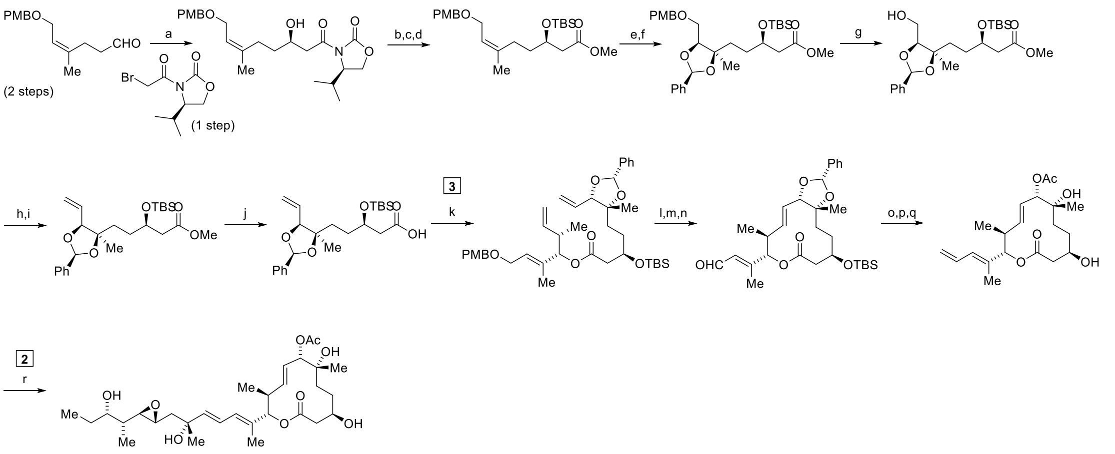
Reagents: (a) 5-mercapto-1-phenyltetrazole, Ph$_3$P, DIAD, THF; (b) MoO$_7$(NH$_4$)$_6$-4H$_2$O, H$_2$O$_2$, EtOH; (c) KHMDS, DME/THF; (d) DIBAL, toluene; (e) Ti(O*i*Pr)$_4$, (-)-DET, *t*BuOOH, 4A MS, CH$_2$Cl$_2$; (f) TsCl, Et$_3$N, DMAP, CH$_2$Cl$_2$; (g) 1N HCl, THF; (h) 1,2;4,5-di-*O*-isopropylidene-D-erythro-2,3-hexodiuro-2,6-pyranose, oxone, K$_2$CO$_3$, MeCN/aqueous Na$_2$EDTA (4 X 10^{-4} M); (i) KI, acetone-DMF; (j) Zn, CuI, EtOH/H$_2$O.

Fragment 3



Reagents: (a) Cy$_2$BCl, Me$_2$NEt, diethyl ether; (b) TBSOTf, 2,6-lutidine, CH$_2$Cl$_2$; (c) LiBH$_4$, THF; (d) NaIO$_4$, THF/H$_2$O; (e) methyltriphenylphosphonium iodide, nBuLi, THF; (f) 1N HCl, MeCN.

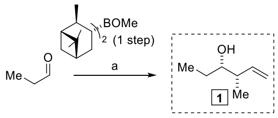
Pladienolide D



Reagents: (a) Sm^0, CH$_2$I$_2$, THF; (b) LiOH, H$_2$O$_2$, THF/H$_2$O; (c) TMS diazomethane, THF/MeOH; (d) TBSCl, imidazole, DMF; (e) AD-mix-a, methanesulfonamide, tBuOH/H$_2$O; (f) benzaldehyde-dimethyl acetal, PPTS, CH$_2$I$_2$; (g) DDQ, CH$_2$Cl$_2$,/H$_2$O; (h) DMP, CH$_2$Cl$_2$; (i) methyltriphenylphosphonium iodide, nBuLi; (j) LiOH, THF/MeOH/H$_2$O; (k) 2,4,6-trichlorobenzoyl chloride, Et$_3$N, THF, then DMAP, toluene; (l) 2nd-generation Hoveyda-Grubbs catalyst, BHT, toluene; (m) DDQ, CH$_2$Cl$_2$/pH 7 buffer; (n) DMP, CH$_2$Cl$_2$; (o) Tebbe reagent, pyridine, toluene; (p) PPTS, MeOH; (q) acetic anhydride, Et$_3$N, DMAP, CH$_2$Cl$_2$; (r) 2nd generation Grubbs catalyst, CH$_2$Cl$_2$.

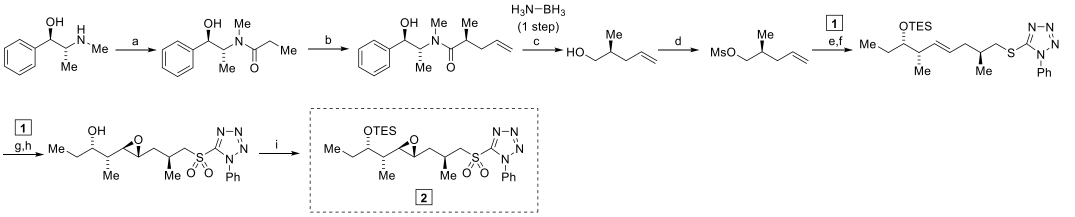
C. Ghosh et al., Pladienolide B, *Org. Lett.*, **2012**, *14*, 4730.

Fragment 1



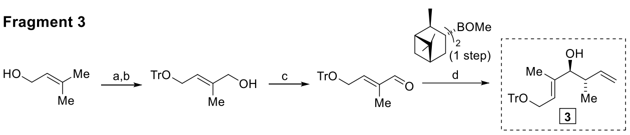
Reagents: (a) KO^{t}Bu, nBuLi, *cis*-2-butene, BF$_3$OEt$_2$, THF

Fragment 2



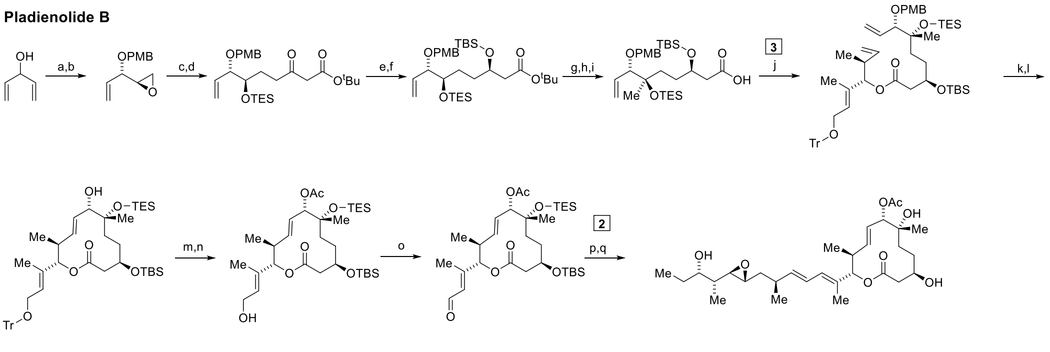
Reagents: (a) propionyl chloride, Et$_3$N, CH$_2$Cl$_2$; (b) LDA, LiCl, allyl iodide, THF; (c) nBuLi, THF; (d) MsCl, Et$_3$N, CH$_2$Cl$_2$; (e) 2nd generation grubbs catalyst, CuI, Et$_2$O; (f) 1-phenyl-1*H*-tetrazole-5-hiol, NaH, THF; (g) (NH$_4$)$_6$Mo$_7$O$_{24}$, H$_2$O$_2$, EtOH (h) 1,2;4,5-di-*O*-isopropylidene-D-erythro-2,3-hexodiuro-2,6-pyranose, oxone, K$_2$CO$_3$, 0.05 M Na$_2$B$_4$O$_7$ 10H$_2$O/0.4 mM Na$_2$EDTA, MeCN; (i) TESCl, imidazole, CH$_2$Cl$_2$.

Fragment 3



Reagents: (a) trityl chloride, Et$_3$N, DMAP, CH$_2$Cl$_2$; (b) SeO$_2$, *t*BuOOH, salicylic acid, CH$_2$Cl$_2$; (c) MnO$_2$, CH$_2$Cl$_2$; (d) KO*t*Bu, nBuLi, *trans*-2-butene, BF$_3$OEt$_2$, THF.

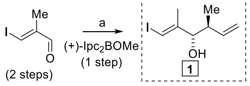
Pladienolide B



Reagents: (a) L-(+)-DIPT, Ti(O*i*Pr)$_4$, *t*BuOOH, CH$_2$Cl$_2$; (b) NaH, PMBBr, TBAI, THF: (c) NaH, nBuLi, *tert*-butyl acetoacetate, THF; (d) TESCl, imidazole, CH$_2$Cl$_2$; (e) NaBH$_4$, L-tartaric acid, THF; (f) TBSCl, imidazole, CH$_2$Cl$_2$; (g) IBX, THF, DMSO; (h) MeMgBr, THF; (i) TESOTf, Et$_3$N, CH$_2$Cl$_2$; (j) 2,4,6-trichlorobenzoyl chloride, Et$_3$N, THF, DMAP, toluene; (k) DDQ, CH$_2$Cl$_2$; (l) 2nd generation Grubbs catalyst, toluene; (m) acetic anhydride, pyridine; (n) DDQ, CH$_2$Cl$_2$; (o) IBX, THF, DMSO; (p)KHMDS, THF; (q) TBAF, THF.

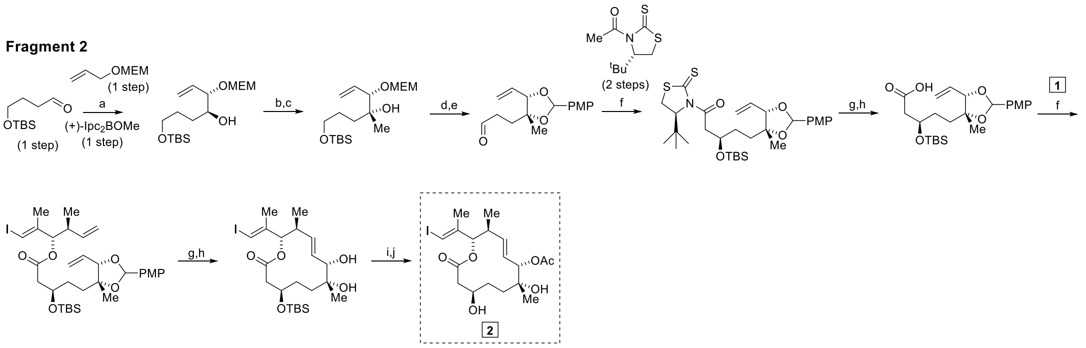
D. Burkart et al., FD-895, *Org. Lett.*, **2012**, *14*, 5396.

Fragment 1, Burkart et al., *Bioorg. Med. Chem. Lett.* **2007**, *17*, 5159



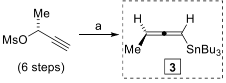
Reagents: (a) *n*BuLi, *t*BuOK, *trans*-2-butene, BF_3OEt_2, Et_2O, THF.

Fragment 2



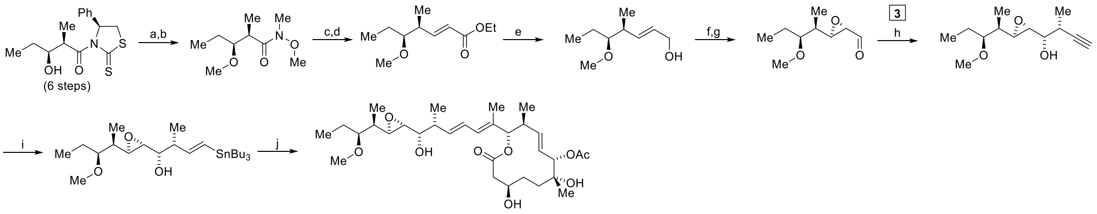
Reagents: (a) *s*BuLi, BF_3OEt_2, THF, then NaOH, H_2O_2, Et_2O; (b) DMP, CH_2Cl_2; (c) MeMgBr, THF; (d) *p*-anisaldehyde dimethylacetal, $ZnBr_2$, CH_2Cl_2; (e) DMP, $NaHCO_3$, CH_2Cl_2; (f) $PhBCl_2$, sparteine, CH_2Cl_2; (g) PPTS, MeOH; (h) 2nd generation Hoveyda-Grubbs catalyst, toluene; (i) acetic anhydride, pyridine; (j) HF•pyridine, CH_3CN.

Fragment 3



Reagents: (a) LDA, CuBr•DMS, $HSnBu_3$, THF.

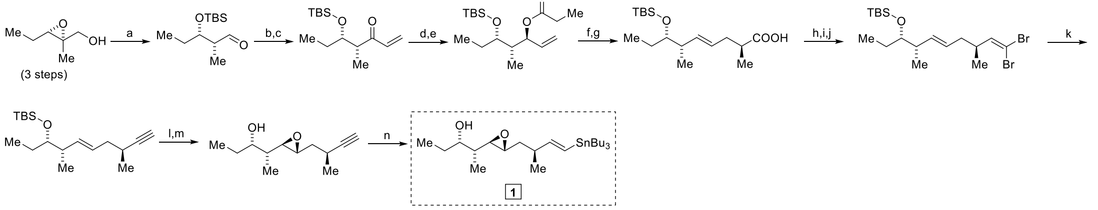
FD-895



Reagents: (a) *N,O*-dimethylhydroxylaminde hydrochloride, imidazole, CH_2Cl_2; (b) NaH, MeI, THF, DMF; (c) DIBAL-H, CH_2Cl_2; (d) NaH, ethyl 2-(diethoxyphosphoryl)acetate, THF; (e) DIBAL-H, CH_2Cl_2; (f) (-)-DET, Ti(O*i*Pr)$_4$, *t*BuOOH, CH_2Cl_2; (g) IBX, EtOAc; (h) $SnCl_4$, hexane; (i) $PdCl_2(PPh_3)_2$, Bu_3SnH, THF; (j) $Pd_2(dba)_3$, $AsPh_3$, LiCl, NMP.

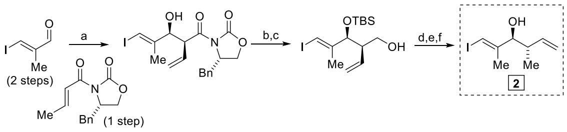
E. Chandrasekhar et al., Pladienolide B, *Org. Lett.*, **2013**, *15*, 3610.

Fragment 1



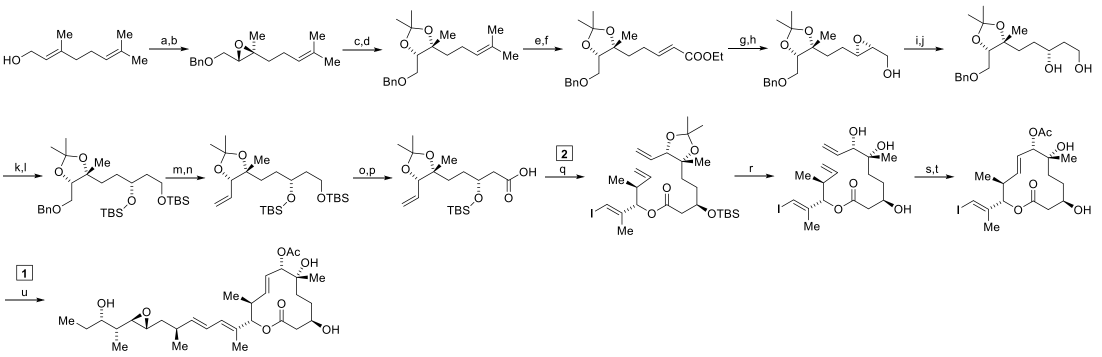
Reagents: (a) TBSOTf, DIPEA, CH_2Cl_2; (b) vinylmagnesium bromide, THF; (c) MnO_2, CH_2Cl_2; (d) (*S*)-2-methyl-CBS-oxazaborolidine, BH_3 SMe_2, THF; (e) $(C_2H_5CO)_2O$, Et_3N, CH_2Cl_2; (f) LDA, THF, then TBSCl, HMPA/THF; (g) K_2CO_3, MeOH; (h) $LiAlH_4$, Et_2O; (i) DMP, CH_2Cl_2; (j) CBr_4, Ph_3P, Et_3N, CH_2Cl_2; (k) *n*-BuLi, THF; (l) TBAF, THF; (m) 1,2,4,5-di-*O*-isoproppylidene-D-erythro-2,3-hexodiuro-2,6-pyranose, K_2CO_3, oxone, $Na_2B_4O_7$, CH_3CN; (n) nBu_3SnH, $Pd(PPh_3)_4$, THF.

Fragment 2



Reagents: (a) nBu_2BOTr, Et_3N, CH_2Cl_2; (b) TBSOTf, DIPEA, CH_2Cl_2; (c) $LiBH_4$, EtOH, THF; (d) Ts_2O, Et_3N, CH_2Cl_2; (e) $LiAlH_4$, Et_2O; (f) TBAF, THF.

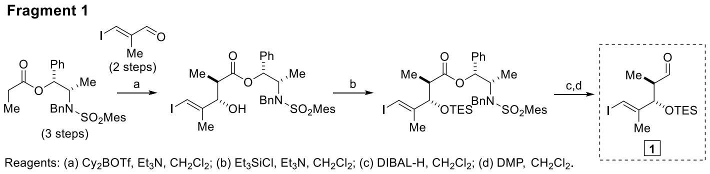
Pladienolide B



Reagents: (a) (+)-DET, Ti(O*i*Pr)$_4$, TBHP, 4A MS, CH_2Cl_2; (b) BnBr, NaH, THF; (c) $HClO_4$, THF/H_2O; (d) 2,2-DMP, CSA, CH_2Cl_2; (e) O_3, CH_2Cl_2; (f) $Ph_3P{=}CHCO_2Et$, C_6H_6; (g) DIBAL-H, CH_2Cl_2; (h) (-)-DET, Ti(O*i*Pr)$_4$, TBHP, 4A MS, CH_2Cl_2; (i) Red-Al, THF; (j) $NaIO_4$, THF/H_2O; (k) TBSCl, imidazole, DMAP, CH_2Cl_2; (l) H_2, Raney-Ni, MeOH; (m) DMP, CH_2Cl_2; (n) $CH_3P^+Ph_3Br^-$, *n*BuLi, THF; (o) HF pyridine, THF; (p) BAIB, TEMPO, CH_3CN/H_2O; (q) 2,4,6-trichlorobenzoyl chloride, Et_3N, DMAP, toluene; (r) PPTS, MeOH; (s) 2nd gerneration Hoveyda-Grubbs, MeOH; (t) acetic anhydride, pyridine. (u) $Pd_2(dba)_3$, Ph_3As, NMP, LiCl.

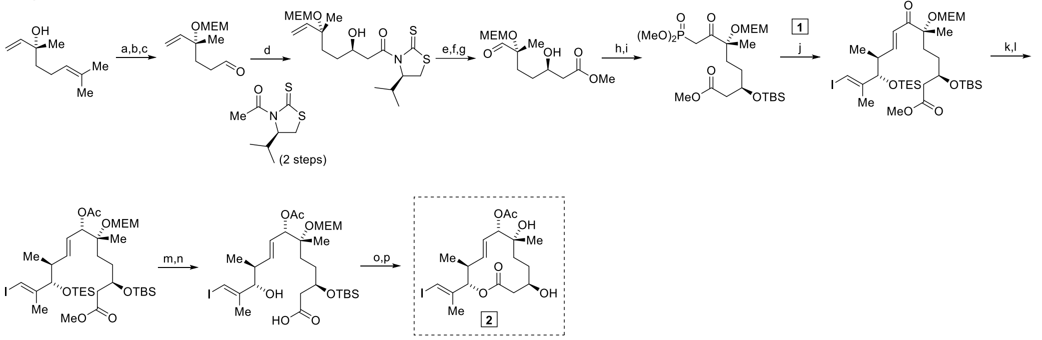
F. Maier et al., Pladienolide B, *Eur. J. Org. Chem.*, **2014**, 1025.

Fragment 1



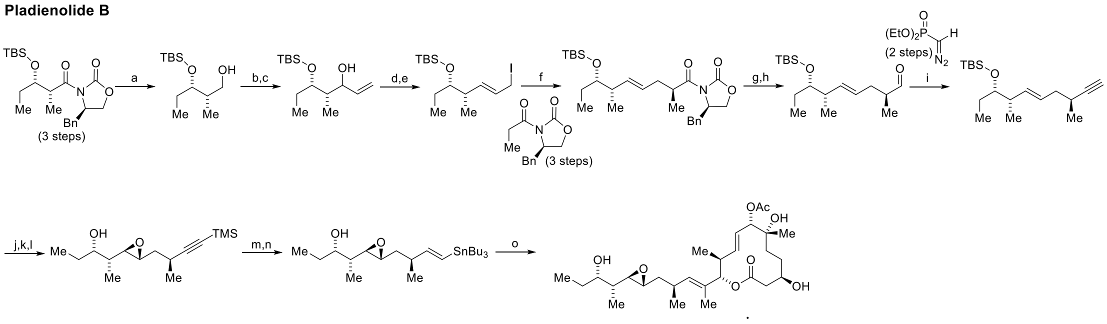
Reagents: (a) Cy$_2$BOTf, Et$_3$N, CH$_2$Cl$_2$; (b) Et$_3$SiCl, Et$_3$N, CH$_2$Cl$_2$; (c) DIBAL-H, CH$_2$Cl$_2$; (d) DMP, CH$_2$Cl$_2$.

Fragment 2



Reagents: (a) MEMCl, *i*Pr$_2$NEt, CH$_2$Cl$_2$; (b) K$_2$OsO$_2$(OH)$_4$, K$_3$Fe(CN)$_6$, K$_2$CO$_3$, MeSO$_2$NH$_2$, *t*BuOH/H$_2$O; (c) NaIO$_4$, THF/H$_2$O; (d) Sn(OTf)$_2$, *N*-ethylpiperidine, CH$_2$Cl$_2$; (e) TBSOTf, 2,6-lutidine, CH$_2$Cl$_2$; (f) imidazole, MeOH; (g) O$_3$, CH$_2$Cl$_2$; (h) MeP(O)(OMe)$_2$, nBuLi, THF; (i) DMP, CH$_2$Cl$_2$; (j) BaO, Et$_2$O/H$_2$O; (k) ZnCl$_2$, NaBH$_4$, Et$_2$O; (l) Ac$_2$O, Et$_3$N, DMAP, CH$_2$Cl$_2$; (m) Me$_3$SnOH, (ClCH$_2$)$_2$; (n) DDQ, MeCN/H$_2$O; (o) MNBA, DMAP, CH$_2$Cl$_2$; (p) AcOH, HCl.

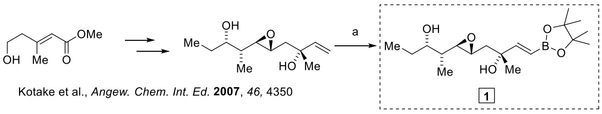
Pladienolide B



Reagents: (a) LiBH$_4$, Et$_2$O/MeOH; (b) DMP, NaHCO$_3$, CH$_2$Cl$_2$; (c) vinylmagnesium bromide, THF; (d) SOCl$_2$, Et$_2$O/hexane; (e) NaI, acetone; (f) NaN(SiMe$_3$)$_2$, THF; (g) LiBH$_4$, Et$_2$O/MeOH; (h) DMP, NaHCO$_3$, CH$_2$Cl$_2$; (i) KO*t*Bu, THF; (j) nBuLi, Me$_2$SiCl, THF; (k) PPTS, MeOH; (l) 1,2,3,4-di-*O*-isopropylidene-$_D$-erythro-2,3-hexodiuro-2,6-pyranose, Na$_2$B$_4$O$_7$ 10H$_2$O, Na$_2$EDTA, K$_2$CO$_3$, oxone, CH$_3$CN; (m) K$_2$CO$_3$, MeOH; (n) Bu$_3$SnH, Pd(PPh$_3$)$_2$Cl$_2$, THF; (o) Pd$_2$(dba)$_3$, Ph$_3$As, LiCL, NMP.

G. Keaney et al., 6-deoxypladienolide D, *Org. Lett.*, **2014**, *16,* 5560.

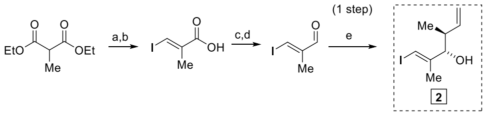
Fragment 1



Kotake et al., *Angew. Chem. Int. Ed.* **2007**, *46*, 4350

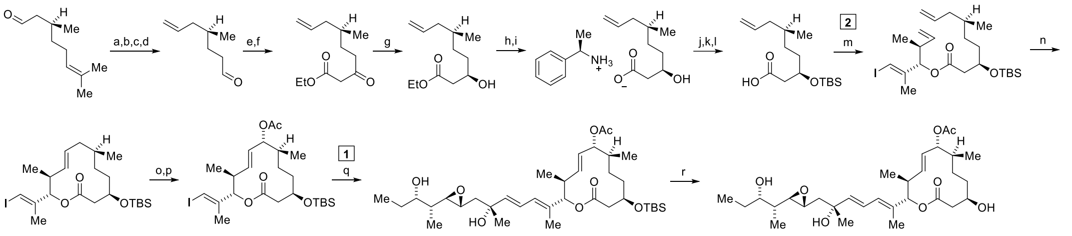
Reagents: (a) Zhan catalyst-1B, benzoquinone, DCE.

Fragment 2



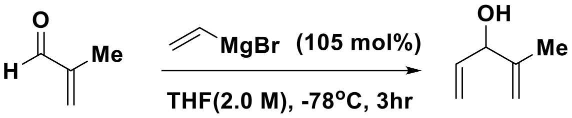
Reagents: (a) NaH, CHI$_3$, Et$_2$O; (b) aq KOH, EtOH/MeOH; (c) LiAlH$_4$, THF; (d) MnO$_2$, MTBE; (e) *t*BuOK, nBuLi, *trans*-2-butene, THF.

6-Deoxypladienolide D



Reagents: (a) Me$_3$SiCH$_2$MgCl, THF; (b) *t*BuOK, THF; (c) AD-Mix-β, MeSO$_2$NH$_2$, *t*BuOH/H$_2$O; (d) NaIO$_4$, CH$_3$CN/H$_2$O; (e) NaClO$_2$, NaH$_2$PO$_4$, 20methyl-2-butene, *t*BuOH/H$_2$O; (f) CDI, ethyl potassium malonate, MgCl$_2$, Et$_3$N, CH$_3$CN; (g) NaBH$_4$, (L)-tartaric acid, THF; (h) aq LiOH, THF/MeOH; (i) (*R*)-(+)-α–methyl-benzylamine, CH$_3$CN/MeOH; (j) aq HCl; (k) TBSCl, imidazole, DMF; (l) aq LiOH, THF/MeOH; (m) EDC, Et$_3$N, DMAP, CH$_2$Cl$_2$; (n) 2nd generation Hoveyda-Grubbs catalyst, benzoquinone, toluene; (o) SeO$_2$, 1,4-dioxane; (p) Ac$_2$O, Et$_3$N, DMAP, CH$_2$Cl$_2$; (q) Pd$_2$(dba)$_3$, Ph$_3$As, Ag$_2$O, THF; (r) TBAF, THF.

2-Methylpenta-1,4-dien-3-ol (1)



An oven-dried flask equipped with a magnetic stir bar was placed under an atmosphere of argon Methacrolein (31.5 mL, 0.38 mol, 100 mol%) and THF (190 mL, 2.0 M) were added and the resulting solution was cooled to 0 ºC. Vinyl magnesium bromide solution (1.0 M in THF, 400 mL, 105 mol%) was added dropwise. The reaction mixture was allowed to warm to ambient temperature and was stirred for 3 hours. The reaction mixture was cooled to 0 ºC and NH_4Cl (aq) was added followed by acidification with HCl aq (2.0 N). The biphasic mixture was transferred to a separatory funnel and the aqueous phase was extracted with diethyl ether (3 x 100 mL). The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting liquid was isolated by distillation under reduced pressure (60 mbar) to furnish the title compound (27.7g, 0.28 mol) in 75% yield as a colorless oil.

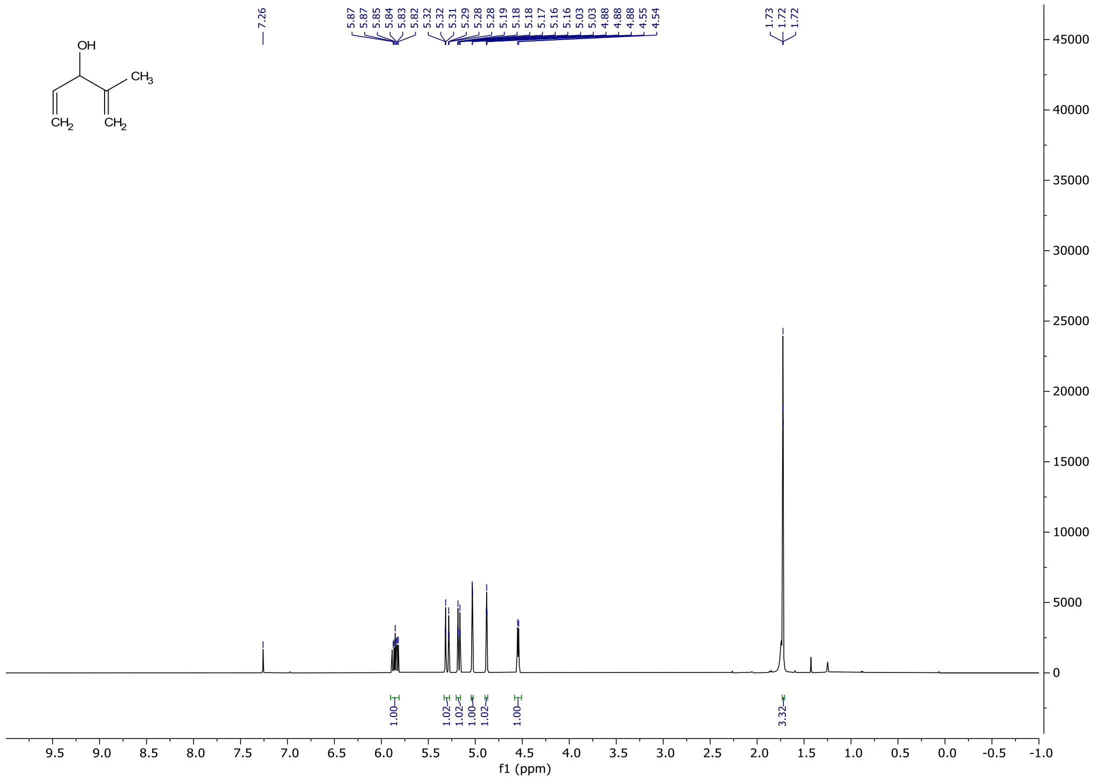
TLC (SiO_2): R_f= 0.36 (pentane/diethyl ether = 5:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.90 – 5.81 (m, 1H), 5.30 (dt, J = 17.1, 1.5 Hz, 1H), 5.17 (dt, J = 10.3, 1.4 Hz, 1H), 5.03 (d, J = 1.7 Hz, 1H), 4.88 (t, J = 1.7 Hz, 1H), 4.54 (d, J = 6.0 Hz, 1H), 1.72 (t, J = 1.1 Hz, 3H).

^{13}C NMR (125 MHz, $CDCl_3$): δ 146.1, 138.9, 115.7, 111.1, 18.1.

FTIR (neat): 3338, 1058, 989, 920, 898 668 cm^{-1}.

HRMS (CI) calcd. for $C_6H_{10}O$ $[M-H]^+$: 97.0659, found: 97.0652.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CH2
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5.87
5.85
5.84
5.83
5.82
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5.32
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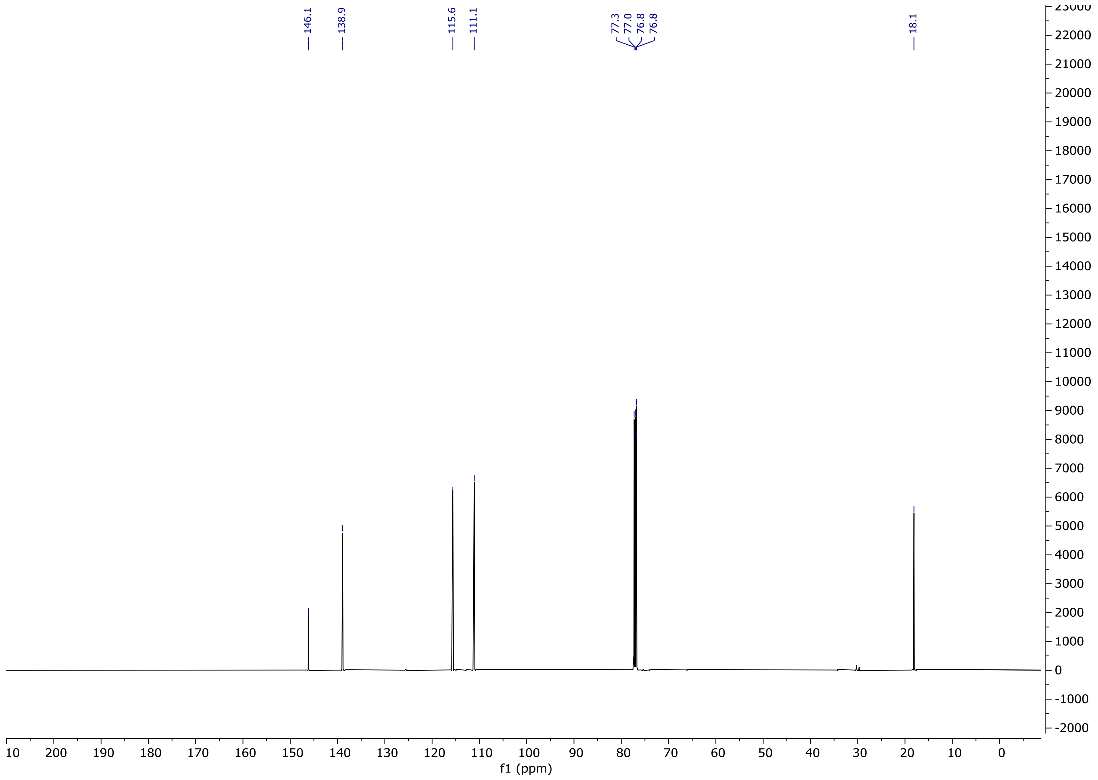
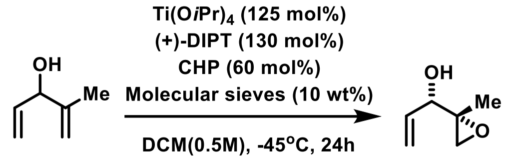
5.29
5.28
5.28
5.19
5.18
5.18
5.17
5.16
5.16
5.03
5.03
4.88
4.88
4.88
4.55
4.54
1.73
1.72
1.72
1.00
1.02
1.02
1.00
1.02
1.00
3.32
f1 (ppm)


146.1
138.9
115.6
111.1
77.3
77.0
76.8
76.8
18.1
f1 (ppm)

(*S*)-1-[(*R*)-2-methyloxiran-2-yl]prop-2-en-1-ol (2)



To a suspension of powdered 4Å molecular sieves (0.2 g, 10 wt%) in CH_2Cl_2 (400 mL, 0.5 M) were added L-(+)-diisopropyl tartrate (55.4 mL, 0.26 mol, 130 mol%) and Ti(O*i*Pr)$_4$ (75.4 mL, 0.25 mol, 125 mol%) at room temperature. The mixture was allowed to stir for 1 hr. Cumene hydroperoxide (80% solution, 22.6 mL, 0.12 mol, 60 mol%) was added and the reaction mixture was allowed to stir for 30 min. The reaction mixture was cooled to -45 ºC and a solution of 2-methylpenta-1,4-dien-3-ol (20.0 g, 0.20 mol, 100 mol%) in CH_2Cl_2 (100 mL) was slowly added. The reaction mixture was allowed to stir for 24 hr. NaOH aq (0.25 N) was added and the reaction mixture was allowed to stir for 1 hr at 0 °C. The biphasic mixture was transferred to a separatory funnel and the aqueous phase was extracted with diethyl ether (3 x 50 mL). The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 5:2 pentanes:diethyl ether). Subsequent distillation under reduced pressure (60 mbar) to furnish the title compound (7.19 g, 0.06 mol) in 31% yield, 95% ee, >20:1 dr as a clear oil.

TLC (SiO_2)**:** R_f = 0.14 (pentane/diethyl ether = 5:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.84 – 5.74 (m, 1H), 5.38 (dt, *J* = 17.3, 1.5 Hz, 1H), 5.25 (dt, *J* = 10.4, 1.3 Hz, 1H), 4.09 (d, *J* = 6.7 Hz, 1H), 2.90 (d, *J* = 4.8 Hz, 1H), 2.60 (d, *J* = 4.7 Hz, 1H), 2.36 (br, 1H), 1.33 (s, 3H).

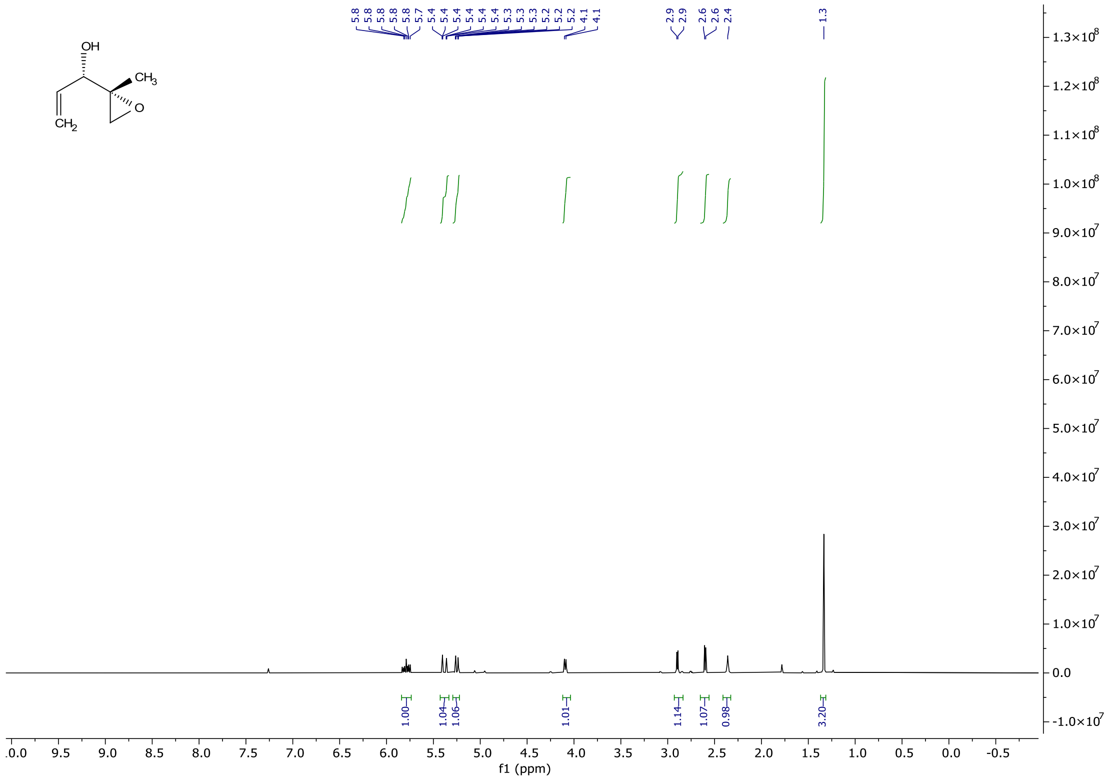
^{13}C NMR (125 MHz, $CDCl_3$): δ 135.9, 118.2, 73.0, 58.7, 50.1, 17.9.

FTIR (neat): 3410, 2985, 1392, 1366, 1256, 1132, 1106, 1071, 992, 928, 873, 827, 764, 747, 804, 702 cm^{-1}.

HRMS (ESI) calcd. for $C_6H_{12}O_2$ $[M+Na]^+$: 137.0573, found: 137.0572.

$[\alpha]^{28}_D$: +58.2 (*c* 1.00, $CHCl_3$).

HPLC: Enantiomeric excess was determined by HPLC analysis of the *tert*-butyldiphenylsilyl ether derivative of the product (**S1**) (two Chiralcel AD-H columns, hexanes:*i*-PrOH = 99:1, flow rate = 1.0 mL/min, = 254 nm), 6.93 min (major enantiomer), 7.50 (minor enantiomer), *ee* = 95%.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CH2
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5.8
5.8
5.8
5.8
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5.4
5.4
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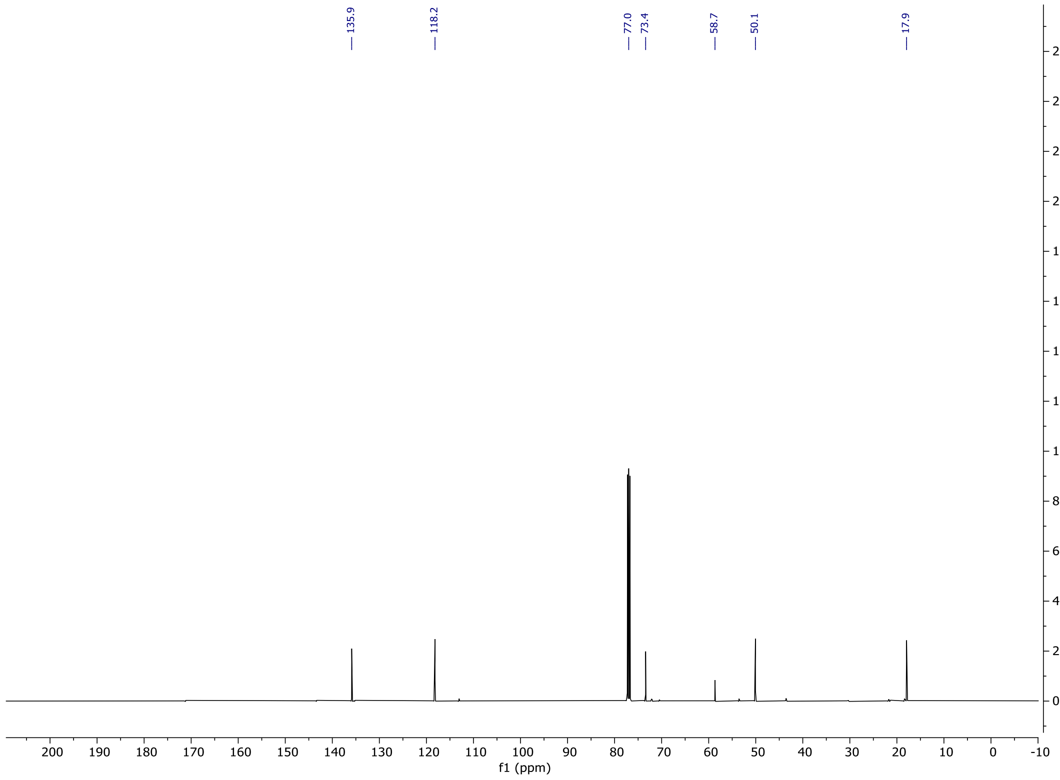
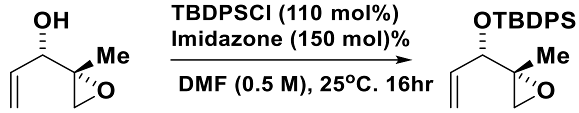
5.4
5.3
5.3
5.3
5.3
5.2
5.2
4.1
4.1
2.9
2.9
2.6
2.6
2.4
1.3
1.00
1.04
1.06
1.01
1.14
1.07
0.98
3.20
1.3×10^8
1.2×10^8
1.1×10^8
1.0×10^8
9.0×10^7
8.0×10^7
7.0×10^7
6.0×10^7
5.0×10^7
4.0×10^7
3.0×10^7
2.0×10^7
1.0×10^7
0.0
-1.0×10^7
.0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


135.9
118.2
77.0
73.4
58.7
50.1
17.9
26000
24000
22000
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

tert-Butyl(((S)-1-((R)-2-methyloxiran-2-yl)allyl)oxy)diphenylsilane



To a solution of epoxide **2** (11.4 mg, 0.1 mmol, 100 mol%) in DMF (0.2 mL, 0.5 M) was added TBDPSCl (30.2 mg, 0.11 mmol, 110 mol%) and imidazole (10.2 mg, 0.15 mmol, 150 mol%). The reaction was allowed to stir at room temperatrue for 16 h. Water was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 10:1 hexanes:ethyl acetate) to furnish the title compound (30.7mg, 0.087 mmol) in 87% yield as a colorless oil.

TLC (SiO_2): R_f= 0.68 (hexane:ethyl acetate = 5:1).

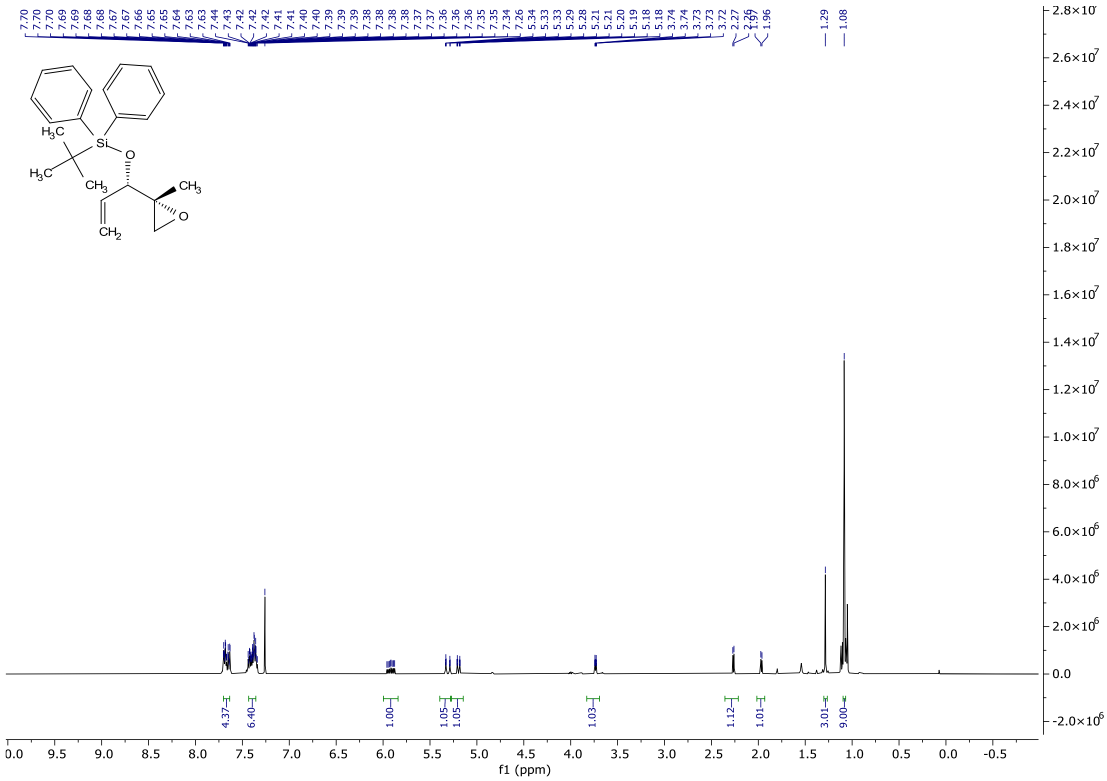
^{1}H NMR (400 MHz, $CDCl_3$): δ 7.70 – 7.64 (m, 4H), 7.43 – 7.36 (m, 6H), 5.92 (ddd, *J* = 17.3, 10.5, 5.3 Hz, 1H), 5.31 (dt, *J* = 17.2, 1.7 Hz, 1H), 5.20 (dt, *J* = 10.6, 1.6 Hz, 1H), 3.73 (dt, *J* = 5.3, 1.5 Hz, 1H), 2.27 (d, *J* = 4.9 Hz, 1H), 1.97 (d, *J* = 4.9 Hz, 1H), 1.29 (s, 3H), 1.08 (s, 9H).

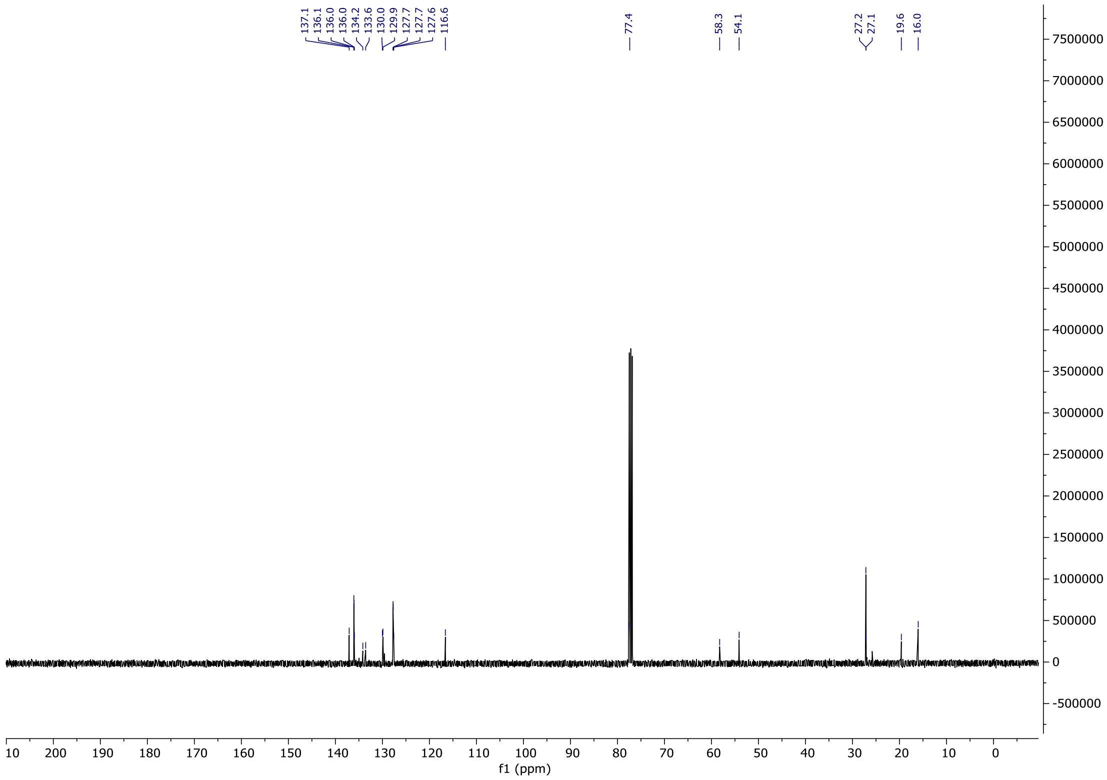
^{13}C NMR (101 MHz, $CDCl_3$): δ 137.1, 136.1, 136.0, 136.0, 134.2, 133.6, 130.0, 129.9, 127.7, 127.7, 127.6, 116.6, 77.4, 58.3, 54.1, 27.2, 27.1, 19.6, 16.01.

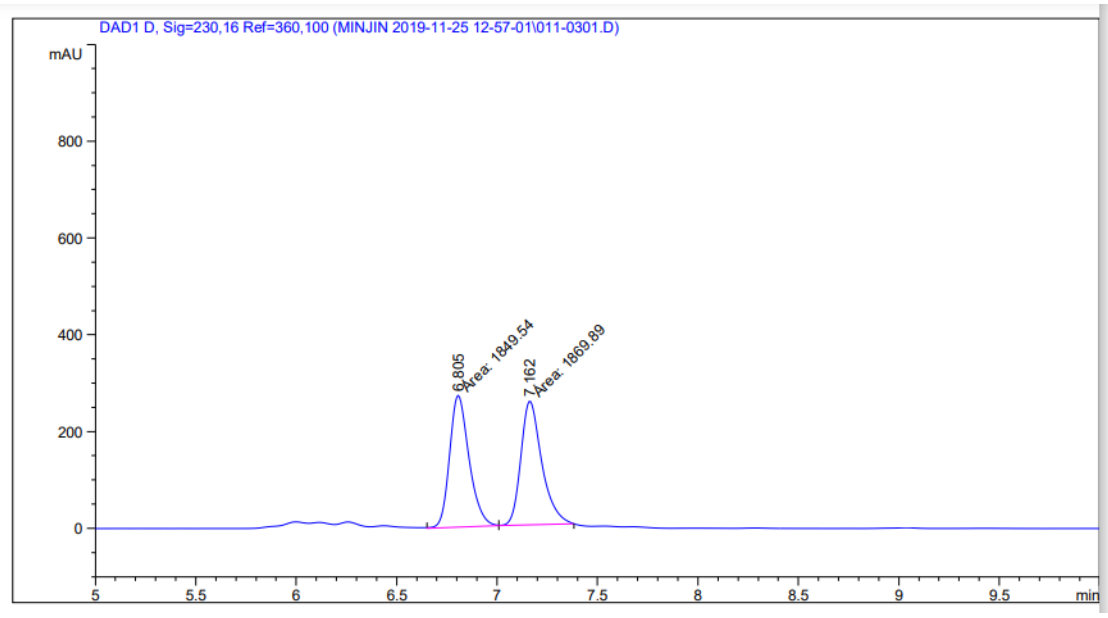
FTIR (neat): 2931, 2857, 1427, 1110, 821, 740, 700 cm^{-1}.

HRMS (ESI) Calcd. for $C_{22}H_{28}O_2Si$ $[M+Na]^+$: 375.1756, found: 375.1752.

$[\alpha]^{26}_D$: -5.5 (*c* 1.00, $CHCl_3$).


7.70 7.70 7.69 7.69 7.68 7.68 7.67 7.66 7.65 7.65 7.64 7.63 7.63 7.44 7.43 7.42 7.42 7.42 7.41 7.41 7.40 7.39 7.39 7.39 7.38 7.38 7.38 7.38 7.37 7.37 7.36 7.36 7.36 7.35 7.35 7.34 7.26 5.34 5.33 5.33 5.29 5.28 5.21 5.21 5.20 5.19 5.18 3.74 3.74 3.73 3.73 3.72 2.27 2.26 1.97 1.96
1.29
1.08
H3C
H3C
CH3
Si
O
CH3
O
CH2
4.37
6.40
1.00
1.05
1.05
1.03
1.12
1.01
3.01
9.00
f1 (ppm)


137.1 136.1 136.0 136.0 134.2 133.6 130.0 129.9 127.7 127.7 127.6 116.6
77.4
58.3
54.1
27.2 27.1
19.6
16.0
f1 (ppm)



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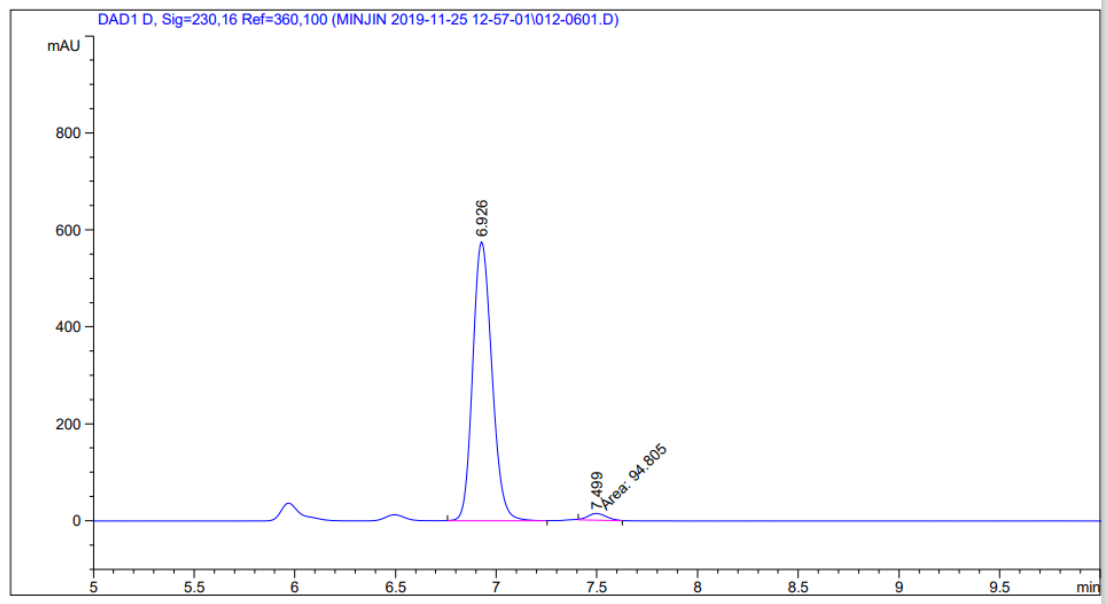
Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1   6.805 MM    0.1129 1849.53772  273.10748  49.7264
   2   7.162 MM    0.1215 1869.89270  256.59131  50.2736
```



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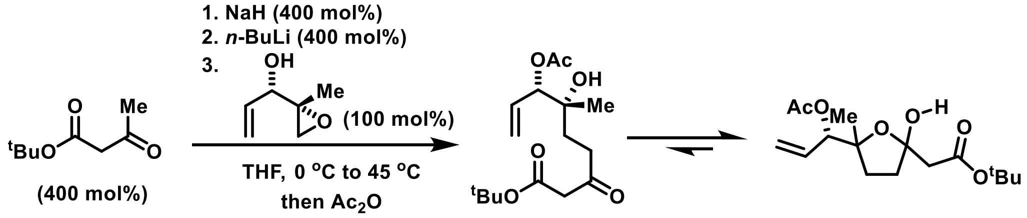
Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1   6.926 BB    0.1035 3827.39868  576.10651  97.5829
   2   7.499 MM    0.1109   94.80505   14.25133   2.4171
```

tert-Butyl (6*R*,7*S*)-7-acetoxy-6-hydroxy-6-methyl-3-oxonon-8-enoate (3)



To a round-bottomed flask under an argon atmosphere charged with *tert*-butyl acetoacetate (11.6 mL, 70 mmol, 400 mol%) was added THF (175 mL, 0.1 M). The solution was cooled to 0 ºC and NaH (60% in mineral oil, 2.80 g, 70 mmol, 400 mol%) was slowly added. The resulting suspension was stirred for 30 min, at which point *n*-BuLi (2.5 M in hexane, 28 mL, 70 mmol, 400 mol%) was added causing the solution to turn a light-yellow color. Epoxide **2** (2.0 g, 17.5 mmol, 100 mol%) was added and the reaction mixture was allowed to stir overnight at 40 ºC. Acetic anhydride (6.63 mL, 70 mmol, 400 mol%) was added at 0 ºC and the mixture was allowed to stir for 30 min. Water was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The liquid was subjected to flash chromatography (SiO_2: 10:3 hexanes:ethyl acetate) to furnish the title compound (4.76 g, 15.2 mmol) in 86% yield as a clear yellow oil.

TLC (SiO_2): R_f= 0.39 (hexanes/ethyl acetate = 5:1).

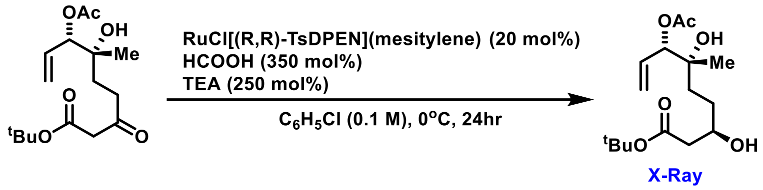
HRMS (ESI) calcd. for $C_{16}H_{26}O_6$ $[M+Na]^+$: 337.1622, found 337.1618.

FTIR (neat): 2977, 1740, 1699, 1368, 1639, 1456, 1321, 1231, 1152, 1110, 1019, 937, 883, 827, 763, 658cm^{-1}.

$[\alpha]^{28}_{D}$: -5.0 (*c* 1.0, $CHCl_3$).

NOTE: As compound 3 is an mixture of hydroxyl ketone and lactol, characterization by ^{1}H and ^{13}C NMR was conducted at the stage of compound 4

***tert*-butyl (3*R*,6*R*,7*S*)-7-acetoxy-3,6-dihydroxy-6-methylnon-8-enoate (4)**



To a round-bottomed flask under a nitrogen atmosphere equipped with a magnetic stirring devise charged with β-hydroxy ester **3** (0.70 g, 2.23 mmol, 100 mol%) was added RuCl(mesitylene)[(R,R)-TsDPEN] (0.28 mg, 0.45 mmol, 20 mol%) as a solution in chlorobenzene (22 mL, 0.1 M). A solution of formic acid (0.29 ml, 7.8 mmol, 350 mol%) and triethylamine (0.78 mL, 5.6 mmol, 250 mol%) was added at 0 ºC. The reaction mixture was allowed to stir for 24 hr. Water was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The liquid was subjected to flash chromatography (SiO_2: 1:1 – 1:2 hexanes:ethyl acetate) to furnish the title compound (0.50 g, 1.58 mmol) in 71% yield as a 4:1 mixture of diastereomers.

TLC (SiO_2): R_f = 0.19 (hexanes/ethyl acetate = 1:1).

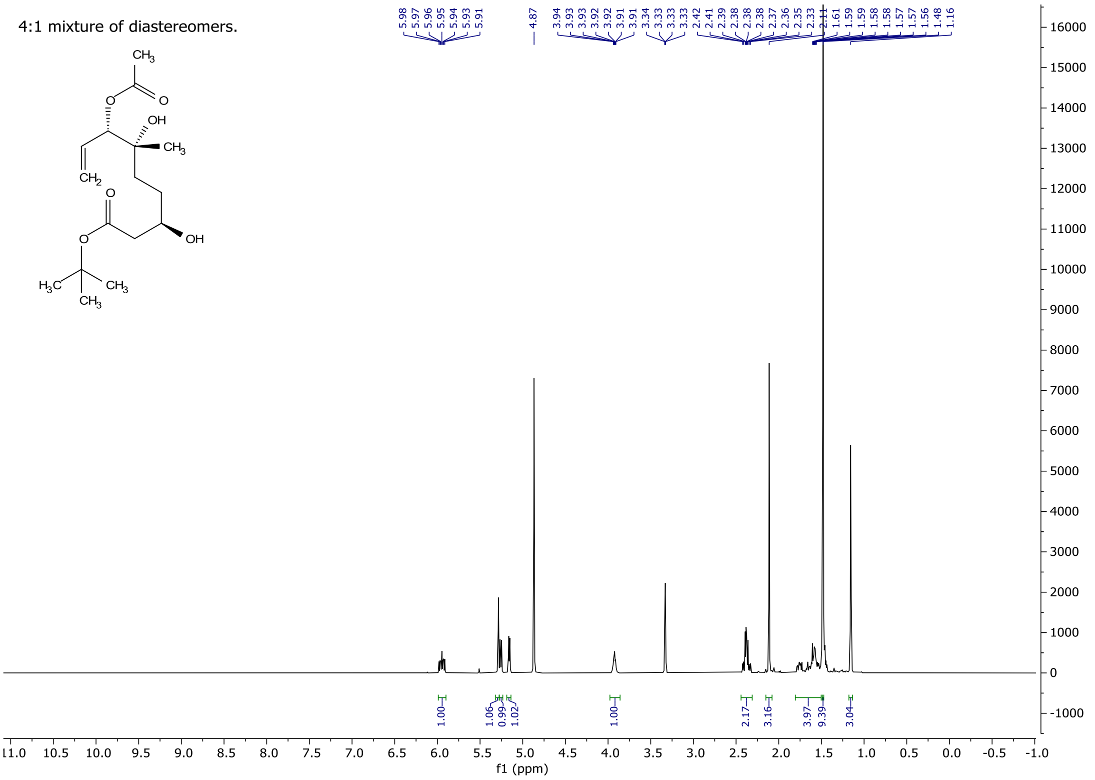
^{1}H NMR (500 MHz, CD_3OD): δ 5.95 (ddd, *J* = 17.2, 11.0, 6.3 Hz, 1H), 5.28 (d, *J* = 1.5 Hz, 1H), 5.27 – 5.23 (m, 1H), 5.16 (dd, *J* = 6.3, 1.3 Hz, 1H), 3.92 (ddd, *J* = 7.5, 5.1, 2.3 Hz, 1H), 2.44 – 2.31 (m, 2H), 2.11 (s, 3H), 1.58 (ddd, *J* = 10.2, 7.2, 5.2 Hz, 4H), 1.48 (s, 9H), 1.16 (s, 3H).

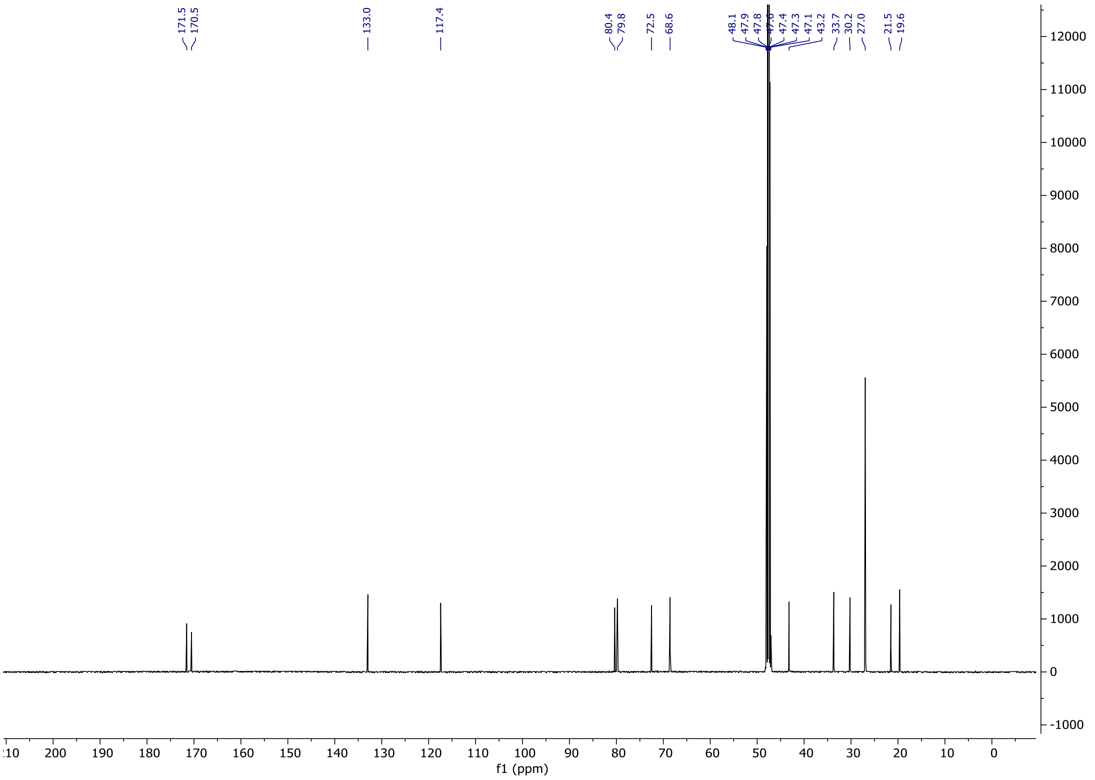
^{13}C NMR (125 MHz, CD_3OD): δ 171.6, 170.5, 133.0, 117.4, 80.4, 79.8, 72.5, 68.6, 43.2, 33.7, 30.2, 27.0, 21.5, 19.6.

HRMS (ESI) calcd. for $C_{16}H_{28}O_6$ $[M+Na]^+$: 339.1778, found 339.1783.

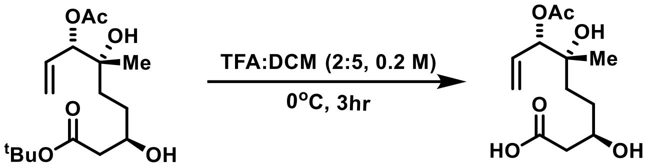
FTIR (neat): 3470, 2977, 1740, 1699, 1639, 1455, 1368, 1320, 1230, 1151, 1110, 1019, 937, 882, 827, 763, 658cm^{-1}.

$[\alpha]^{26}_D$: -12.0 (*c* 1.0, $CHCl_3$).


4:1 mixture of diastereomers.



(*3R,6R,7S*)-7-Acetoxy-3,6-dihydroxy-6-methylnon-8-enoic acid



To a solution of *tert*-butyl ester (0.48 g, 1. 52 mmol, 100 mol%) in CH_2Cl_2 (15 mL, 0.1 M) at 0 ºC was add TFA (4.3 mL). The reaction mixture was allowed to stir for 3 hr. The solvent was removed *in vacuo* and the residue was subjected to flash chromatography (SiO_2: 95:5 CH_2Cl_2: MeOH with 0.01% acetic acid) to furnish the title compound (0.26 g, 0.95 mmol) in 63% yield as a colorless oil.

TLC (SiO_2): R_f = 0.1 (dichloromethane/methanol = 5:1).

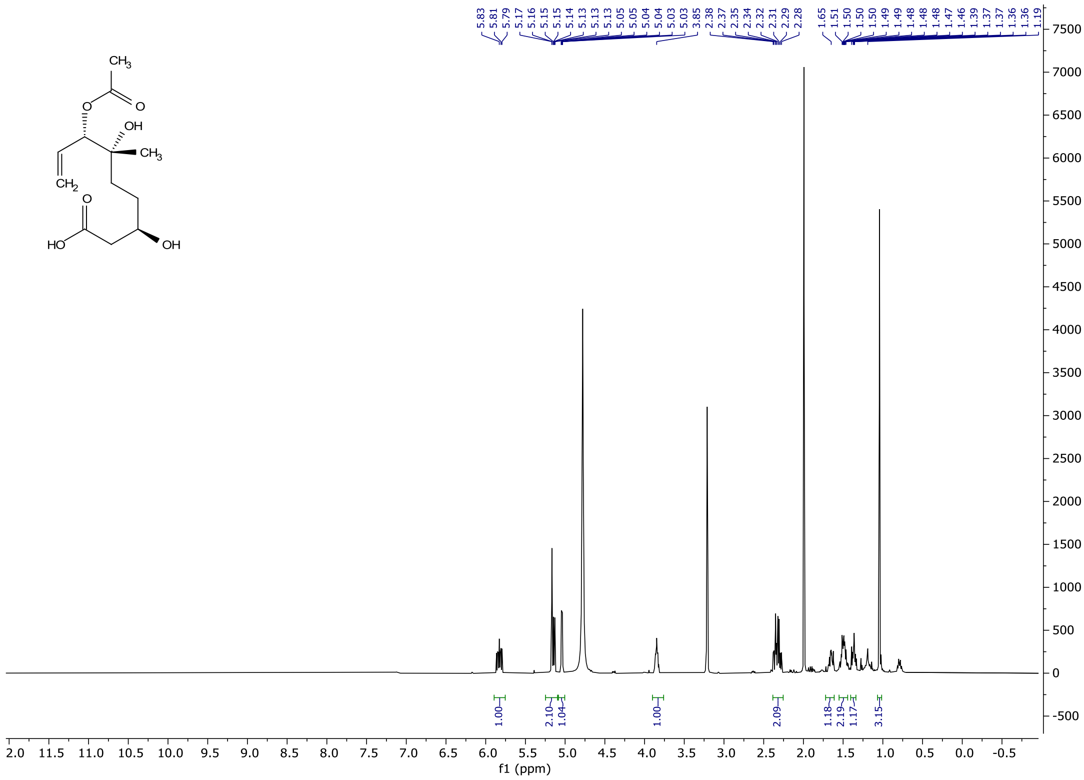
^{1}H NMR (500 MHz, CD_3OD): δ 5.89 – 5.75 (m, 1H), 5.25 – 5.10 (m, 2H), 5.04 (dt, *J* = 6.5, 1.3 Hz, 1H), 3.85 (s, 1H), 2.33 (qd, *J* = 15.3, 6.4 Hz, 2H), 1.72 – 1.61 (m, 1H), 1.55 – 1.44 (m, 2H), 1.40 – 1.34 (m, 1H), 1.04 (s, 3H).

^{13}C NMR (125 MHz, CD_3OD): δ 174.1, 170.6, 132.9, 117.4, 79.8, 72.5, 68.4, 41.7, 33.7, 30.2, 21.5, 19.6.

FTIR (neat): 3355, 2938, 1713, 1372, 1238, 1025, 989, 935, 735, 702 cm^{-1}.

HRMS (ESI) calcd. for $C_{12}H_{20}O_6$ [M+Na]$^+$: 283.1152, found 283.1147.

$[\alpha]^{26}_D$: -10.5 (*c* 1.0, $CHCl_3$).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CH2
O
HO
OH
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3.0
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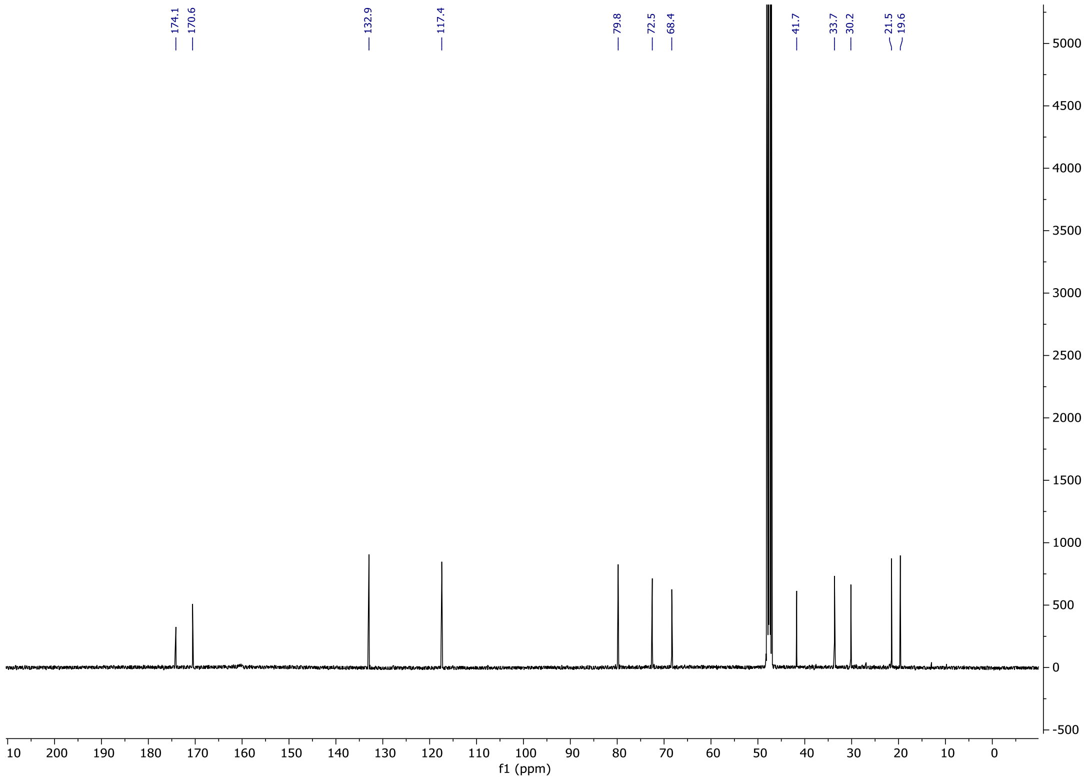
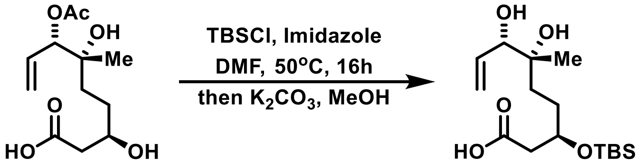
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


174.1
170.6
132.9
117.4
79.8
72.5
68.4
41.7
33.7
30.2
21.5
19.6
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
-500
10
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

(3*R*,6*R*,7*S*)-3-((*tert*-butyldimethylsilyl)oxy)-6,7-dihydroxy-6-methylnon-8-enoic acid (Fragment C)



To a solution of acid **S2** (0.16 g, 0.6 mmol) in DMF (3.0 mL, 0.2 M) was added TBSCl (0.27 g, 1.8 mmol, 300 mol%) and imidazole (0.41 g, 3.6 mmol, 600 mol%). The reaction mixture was allowed to stir at 50 ºC for 16 hr. Potassium carbonate (0.5 g, 3.6 mmol, 600 mol%) in MeOH (3.0 mL, 0.2 M) was added and the reaction mixture was allowed to stir at room temperature for 2 hr. A saturated solution of $NaHSO_4$ aq was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The residue was subjected to flash chromatography (SiO_2: 9:1 dichloromethane/methanol with 0.01% acetic acid) to furnish the title compound (0.13 g, 0.39 mmol) in 65% yield as a colorless oil.

TLC (SiO_2): R_f = 0.41 (dichloromethane/methanol = 9:1 with 0.01% acetic acid).

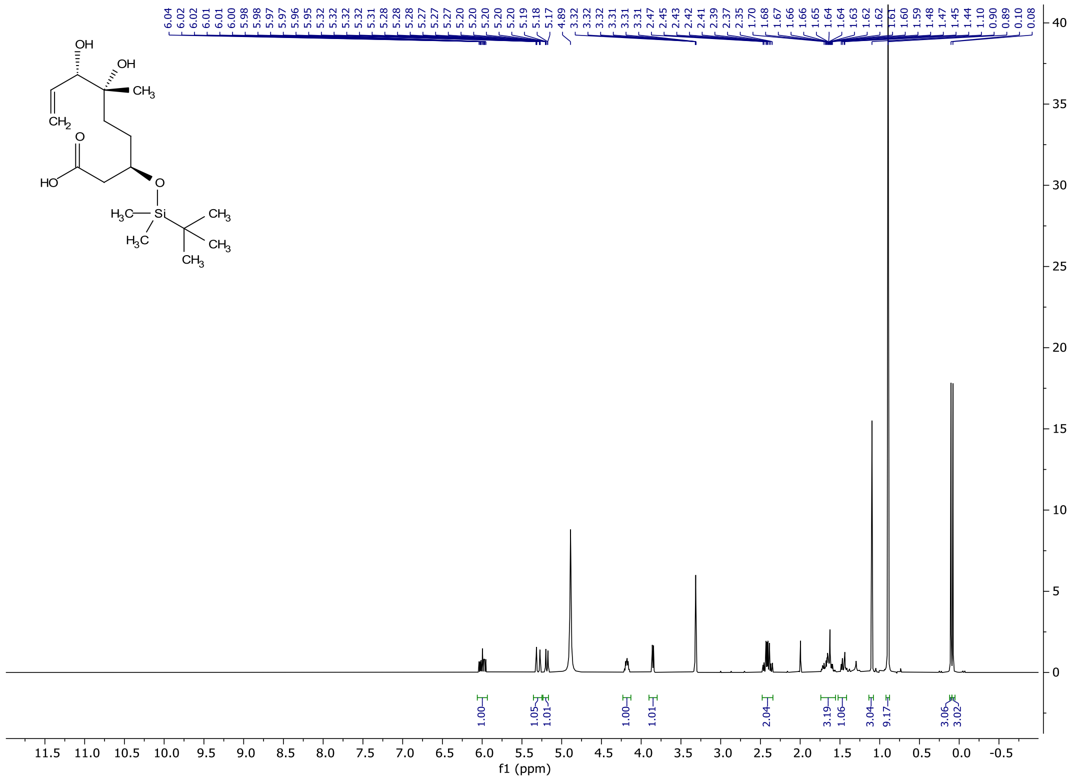
^{1}H NMR (400 MHz, CD_3OD): δ 6.06 – 5.93 (m, 1H), 5.36 – 5.25 (m, 1H), 5.24 – 5.17 (m, 1H), 4.23 – 4.13 (m, 1H), 3.85 (dt, *J* = 6.1, 1.4 Hz, 1H), 2.48 – 2.34 (m, 2H), 1.74 – 1.56 (m, 3H), 1.52 – 1.42 (m, 1H), 1.10 (s, 3H), 0.89 (d, *J* = 0.6 Hz, 9H), 0.10 (s, 3H), 0.08 (s, 3H).

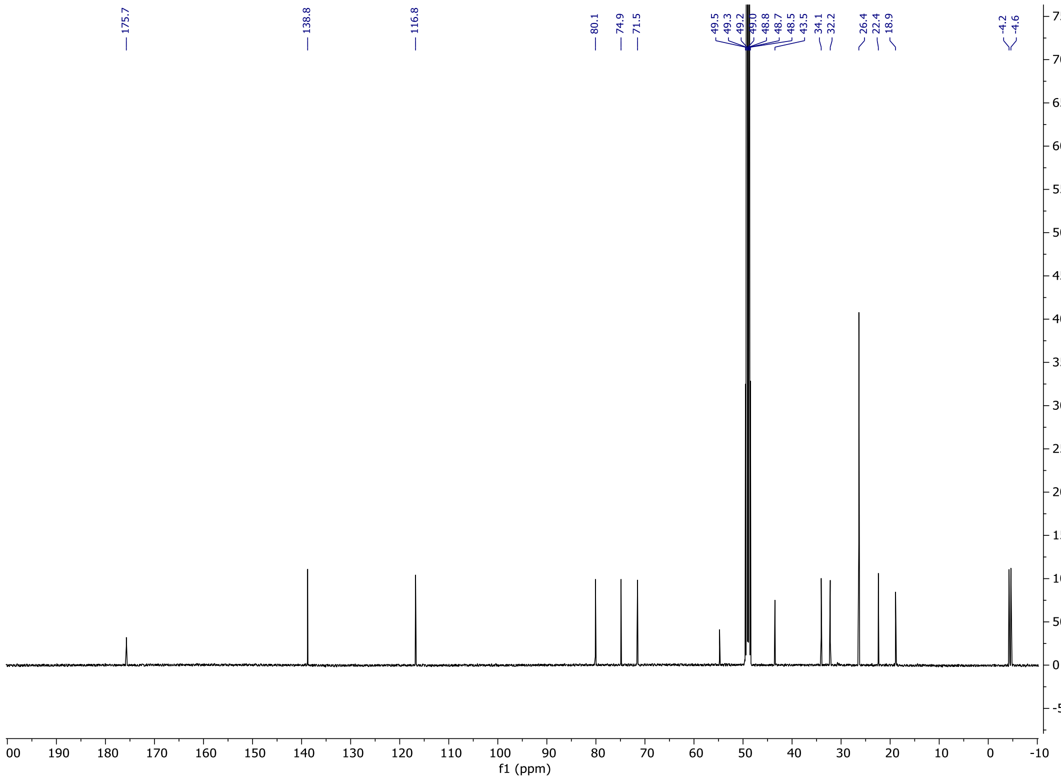
^{13}C NMR (100 MHz, CD_3OD): δ 175.7, 138.8, 116.8, 80.1, 74.9, 71.5, 54.8, 43.5, 34.1, 32.2, 26.4, 22.4, 18.9, -4.2, -4.6.

HRMS (ESI): calcd for $C_{16}H_{32}O_5Si$ $[M+Na]^+$ 355.1911, found 355.1914.

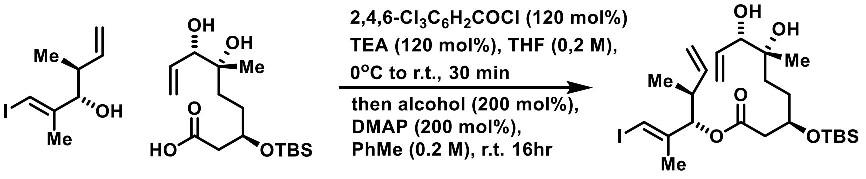
FTIR (neat): 2929, 2857, 1710, 1665, 1463, 1387, 1252, 1092, 997, 926, 889, 833, 810, 775, 735, 665 cm^{-1}.

$[\alpha]^{26}_D$: -20.0 (*c* 1.0, $CHCl_3$).


6.04 6.02 6.02 6.01 6.01 6.00 5.98 5.98 5.97 5.97 5.96 5.95 5.32 5.32 5.32 5.32 5.31 5.28 5.28 5.28 5.27 5.27 5.27 5.20 5.20 5.20 5.20 5.20 5.19 5.18 5.17 4.89 3.32 3.32 3.32 3.31 3.31 3.31 2.47 2.45 2.43 2.42 2.41 2.39 2.37 2.35 1.70 1.68 1.67 1.66 1.65 1.64 1.64 1.63 1.62 1.62 1.61 1.60 1.59 1.48 1.47 1.45 1.44 1.10 0.90 0.89 0.10 0.08
OH
OH
CH3
CH2
O
HO
O
H3C
Si
CH3
H3C
CH3
CH3
1.00
1.05
1.01
1.00
1.01
2.04
3.19
1.06
3.04
9.17
3.06
3.02
40 35 30 25 20 15 10 5 0
11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


175.7
138.8
116.8
80.1
74.9
71.5
49.5 49.3 49.2 49.0 48.8 48.7 48.5 43.5
34.1 32.2
26.4 22.4 18.9
-4.2 -4.6
7500 7000 6500 6000 5500 5000 4500 4000 3500 3000 2500 2000 1500 1000 500 0 -500
00 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Substrate for Ring Closing Metathesis (5)



To a stirred solution of **Fragment C** (0.13 g, 0.4 mmol) in dry THF (1.9 mL, 0.2M) at 0 ºC was added triethylamine (46 µL, 0.48 mmol, 120 mol%) followed by 2,4,6-trichlorobenzoyl chloride (75 µL, 0.48 mmol, 120 mol%). The mixture was allowed to stir for 30 min at room temperature. A solution of DMAP (98 mg, 0.8 mmol, 200 mol%) and **Fragment D** (0.20 g, 0.8 mmol, 200 mol%) in toluene was added and the reaction mixture was allowed to stir at room temperature for 16 h. The reaction mixture was directly deposited onto a column of silica gel and subjected to flash chromatography (SiO$_2$: 7:3 hexanes/ethyl acetate) to furnish the title compound (0.12 g, 0.21 mmol) in 53% yield as a colorless oil along with recovered **Fragment D**.

TLC (SiO$_2$): R$_f$ = 0.50 (hexanes/ethyl acetate = 3:1).

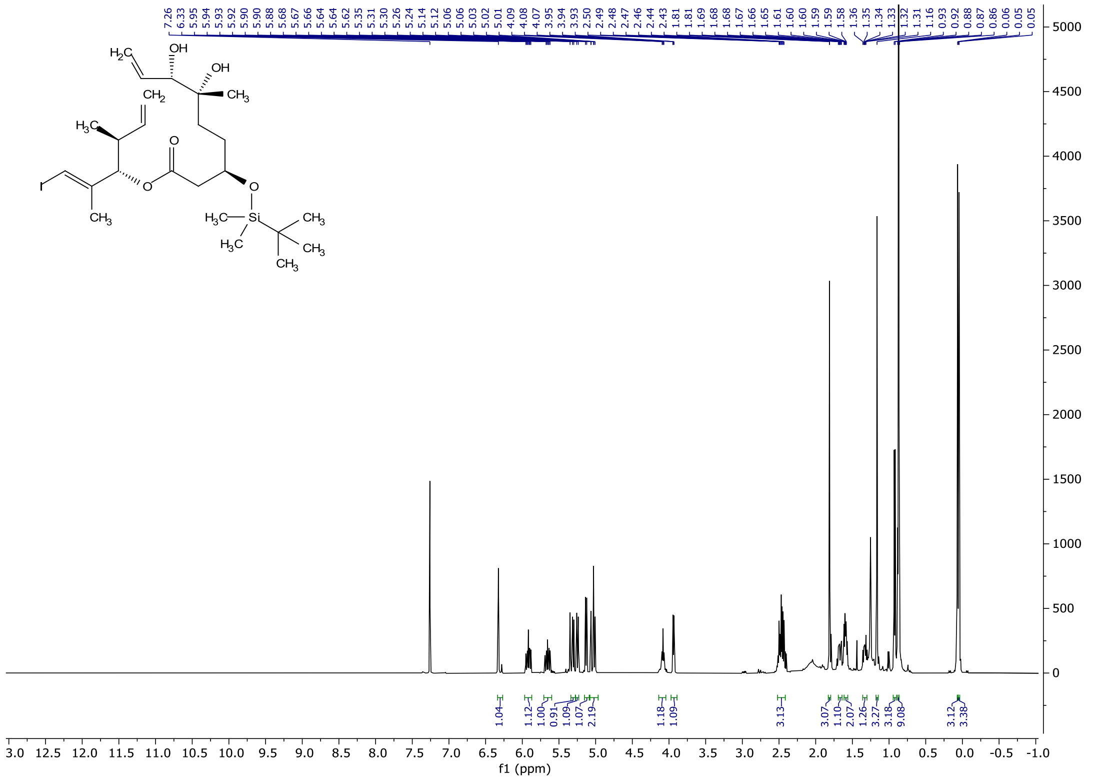
^{1}H NMR (400 MHz, CDCl$_3$): δ 6.33 (s, 1H), 5.92 (ddd, J = 17.1, 10.5, 6.5 Hz, 1H), 5.71 – 5.60 (m, 1H), 5.31 (d, J = 8.3 Hz, 1H), 5.25 (d, J = 10.5 Hz, 1H), 5.13 (d, J = 8.2 Hz, 1H), 5.08 – 4.97 (m, 2H), 4.08 (t, J = 5.9 Hz, 1H), 3.94 (d, J = 6.2 Hz, 1H), 2.52 – 2.41 (m, 3H), 1.81 (d, J = 1.1 Hz, 3H), 1.67 (dd, J = 11.8, 4.2 Hz, 1H), 1.59 (dd, J = 8.2, 2.6 Hz, 2H), 1.36 – 1.30 (m, 1H), 1.16 (s, 3H), 0.92 (d, J = 6.8 Hz, 3H), 0.87 (s, 9H), 0.06 (s, 3H), 0.05 (d, J = 3.8 Hz, 3H).

^{13}C NMR (125 MHz, CDCl$_3$): δ 170.5, 144.5, 139.4, 136.7, 117.7, 116.0, 81.9, 80.6, 79.7, 74.0, 69.5, 42.7, 40.3, 31.8, 30.7, 26.0, 23.5, 20.4, 18.2, 16.6, -4.4, -4.5.

HRMS (ESI) calcd. for $C_{24}H_{43}IO_5Si$ $[M+Na]^+$: 589.1817, found 589.1827.

FTIR (neat): 3511, 3417, 2953, 2929, 2856, 1737, 1462, 1376, 1251, 1168, 1094, 994, 920, 833, 775, 739, 701, 684, 664 cm^{-1}.

$[\alpha]^{26}_D$: -32.0 (*c* 1.0, CHCl$_3$).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6.33
5.95
5.94
5.93
5.92
5.90
5.90
5.88
5.68
5.67
5.66
5.64
5.64
5.62
5.35
5.31
5.30
5.26
5.24
5.14
5.12
5.06
5.06
5.03
5.02
5.01
4.09
4.08
4.07
3.95
3.94
3.93
2.50
2.49
2.48
2.47
2.46
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2.43
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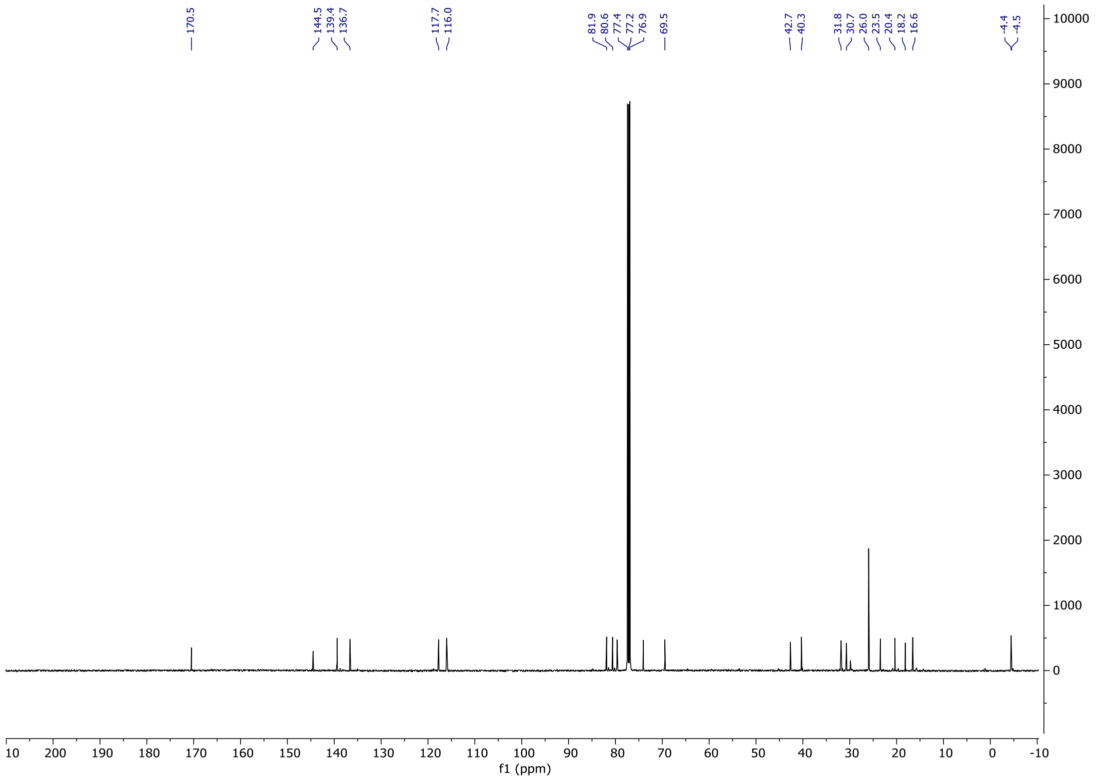
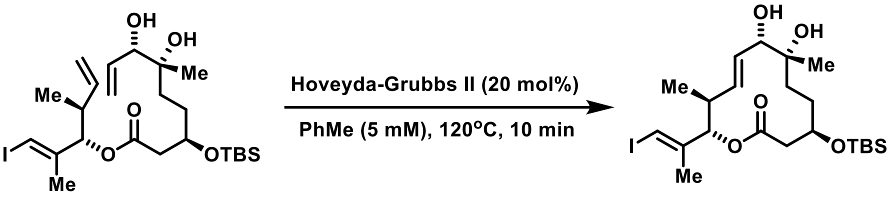
1.69
1.68
1.68
1.67
1.66
1.65
1.61
1.60
1.59
1.59
1.59
1.58
1.36
1.35
1.34
1.33
1.32
1.31
1.16
0.93
0.92
0.88
0.87
0.86
0.06
0.05
0.05
H2C
OH
OH
CH3
CH2
H3C
O
I
O
O
CH3
H3C
Si
CH3
H3C
CH3
CH3
1.04
1.12
1.00
0.91
1.09
1.07
2.19
1.18
1.09
3.13
3.07
1.10
2.07
1.26
3.27
3.18
9.08
3.12
3.38
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
3.0 12.5 12.0 11.5 11.0 10.5 10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)


170.5
144.5
139.4
136.7
117.7
116.0
81.9
80.6
77.4
77.2
76.9
69.5
42.7
40.3
31.8
30.7
26.0
23.5
20.4
18.2
16.6
-4.4
-4.5
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Macrolactone *en route* to Fragment A



To a solution of diol **5** (28 mg, 49 µmol) in degassed toluene (8mL) was added Hoveyda-Grubbs 2nd generation catalyst (6.2 mg, 9.8 µmol, 20 mol%) in degassed toluene (2 mL) over 1 min at 120 ºC. The mixture was allowed to stir for 10 min and cooled immediately to 0 ºC by use of an ice bath. The reaction mixture was concentrated *in vacuo*, directly deposited on a column of silica gel and subjected to flash chromatography (SiO_2: 7:3 hexanes/ethyl acetate) to furnish the title compound (13.5 mg, 25 µmol) in 51% yield as a colorless oil.

TLC (SiO_2): R_f= 0.34 (hexanes/ethyl acetate = 3:2).

^{1}H NMR (400 MHz, $CDCl_3$): δ 6.45 (s, 1H), 5.72 (dd, *J* = 15.1, 9.7 Hz, 1H), 5.43 (dd, *J* = 15.2, 9.9 Hz, 1H), 5.11 (d, *J* = 10.7 Hz, 1H), 3.83 (q, *J* = 4.1 Hz, 1H), 3.79 (d, *J* = 9.8 Hz, 1H), 2.55 – 2.36 (m, 4H), 1.79 (d, *J* = 1.2 Hz, 3H), 1.59 (s, 1H), 1.45 – 1.37 (m, 3H), 1.29 (s, 3H), 0.90 (d, *J* = 5.3 Hz, 12H), 0.08 (s, 3H), 0.06 (s, 3H).

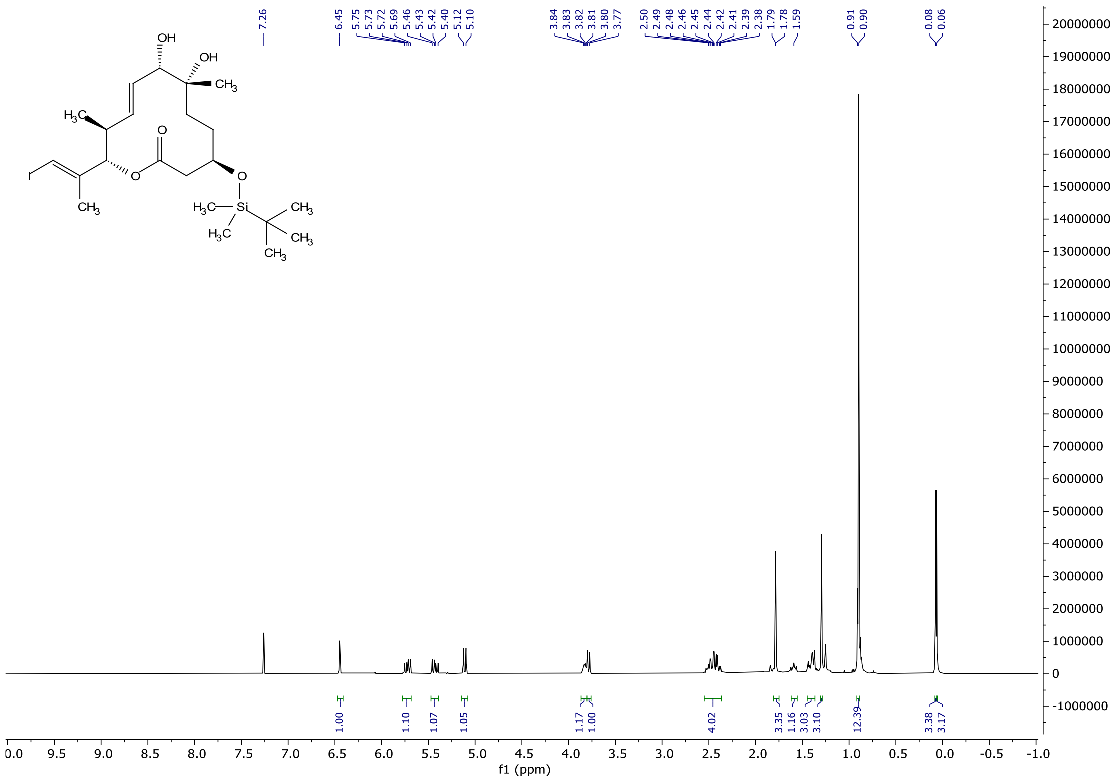
^{13}C NMR (101 MHz, $CDCl_3$): δ 168.8, 143.9, 137.1, 130.3, 83.8, 80.3, 77.4, 73.7, 70.7, 40.6, 40.6, 36.1, 30.4, 26.0, 24.4, 19.2, 18.3, 16.6, -4.7.

HRMS (ESI) calcd. for $C_{22}H_{39}IO_5Si$ $[M+Na]^+$: 561.1504 found 561.1513.

FTIR (neat): 3415, 2953, 2928, 2856, 1738, 1462, 1252, 1166, 1085, 979, 810, 775, 753, 667 cm^{-1}.

$[\alpha]^{26}_D$: -11.5 (*c* 0.1, $CHCl_3$).

The spectral data were identical to that previously reported.[1]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5.73
5.72
5.69
5.46
5.43
5.42
5.40
5.12
5.10
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3.83
3.82
3.81
3.80
3.77
2.50
2.49
2.48
2.46
2.45
2.44
2.42
2.41
2.39
2.38
1.79
1.78
1.59
0.91
0.90
0.08
0.06
1.00
1.10
1.07
1.05
1.17
1.00
4.02
3.35
1.16
3.03
3.10
12.39
3.38
3.17
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CH3
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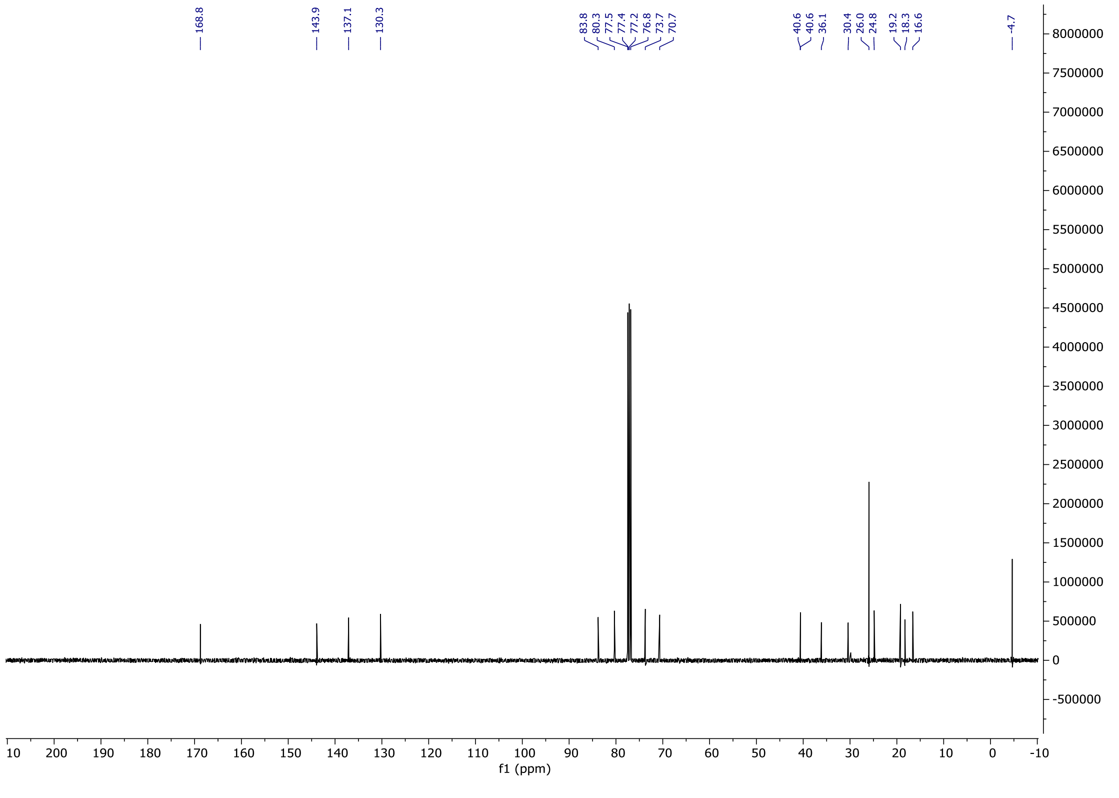
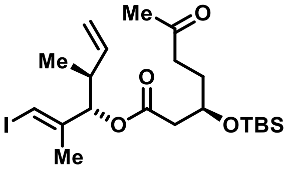
17000000
16000000
15000000
14000000
13000000
12000000
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)


168.8
143.9
137.1
130.3
83.8
80.3
77.5
77.4
77.2
76.8
73.7
70.7
40.6
40.6
36.1
30.4
26.0
24.8
19.2
18.3
16.6
-4.7
8000000
7500000
7000000
6500000
6000000
5500000
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
-500000
10
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

RCM Byproduct (9)



TLC (SiO_2): R_f = 0.56 (hexanes/ethyl acetate = 4:1).

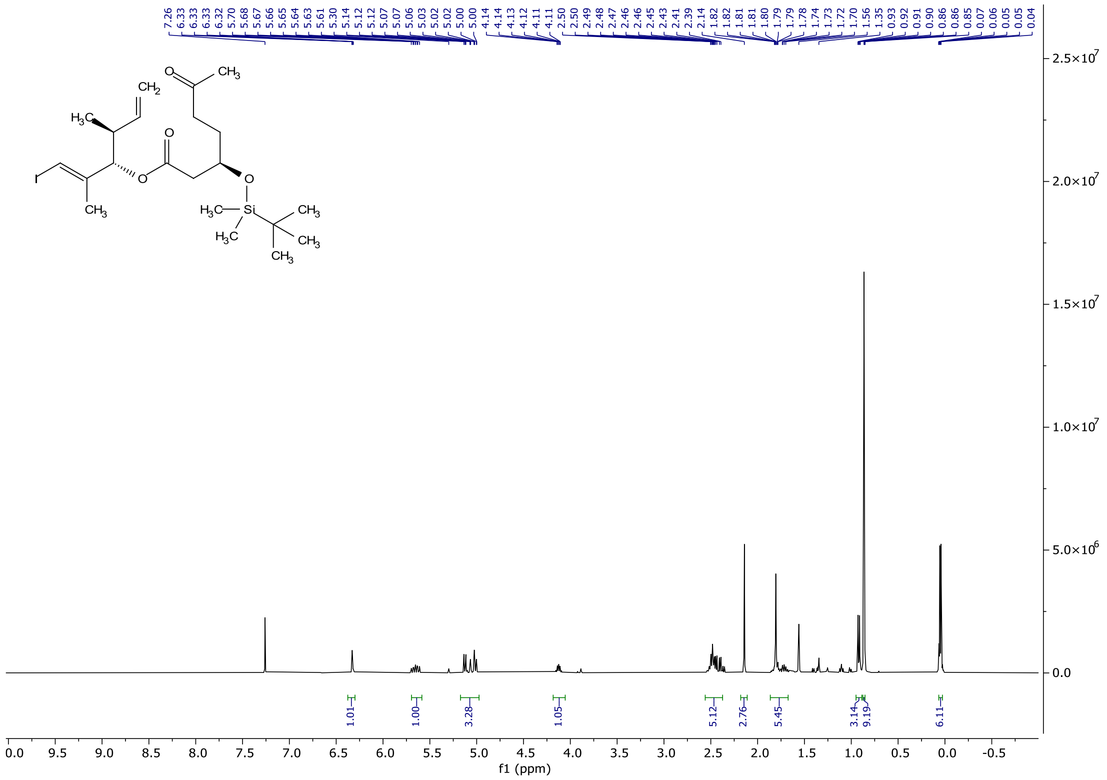
^{1}H NMR (400 MHz, $CDCl_3$): δ 6.38 – 6.30 (m, 1H), 5.70 – 5.59 (m, 1H), 5.17 – 4.97 (m, 3H), 4.18 – 4.05 (m, 1H), 2.56 – 2.37 (m, 5H), 2.14 (s, 3H), 1.86 – 1.67 (m, 5H), 0.95 – 0.89 (m, 3H), 0.86 (s, 9H), 0.07 – 0.03 (m, 6H).

^{13}C NMR (100 MHz, $CDCl_3$): δ 208.4, 170.2, 144.5, 139.4, 116.0, 82.0, 80.7, 68.2, 42.6, 40.3, 39.1, 31.0, 30.1, 25.9, 20.3, 18.1, 16.6, -4.6.

HRMS (ESI) calcd. for $C_{21}H_{37}IO_4Si$ $[M+Na]^+$: 531.1403, found 531.1403.

FTIR (neat): 2954, 2928, 1736, 1718, 1251, 1089, 994, 834, 776, 683 cm^{-1}.

$[\alpha]^{26}_D$: -26.5 (*c* 1.0, $CHCl_3$).


7.26
6.33
6.33
6.32
5.70
5.68
5.67
5.66
5.65
5.64
5.63
5.61
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5.14
5.12
5.12
5.07
5.07
5.06
5.03
5.02
5.02
5.00
5.00
4.14
4.14
4.13
4.12
4.11
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2.46
2.46
2.45
2.43
2.41
2.39
2.14
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1.82
1.81
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1.79
1.79
1.78
1.74
1.73
1.72
1.70
1.56
1.35
0.93
0.92
0.91
0.90
0.86
0.86
0.85
0.07
0.06
0.05
0.05
0.04
O
CH3
CH2
H3C
O
O
O
Si
H3C
H3C
CH3
CH3
CH3
CH3
I
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1.00
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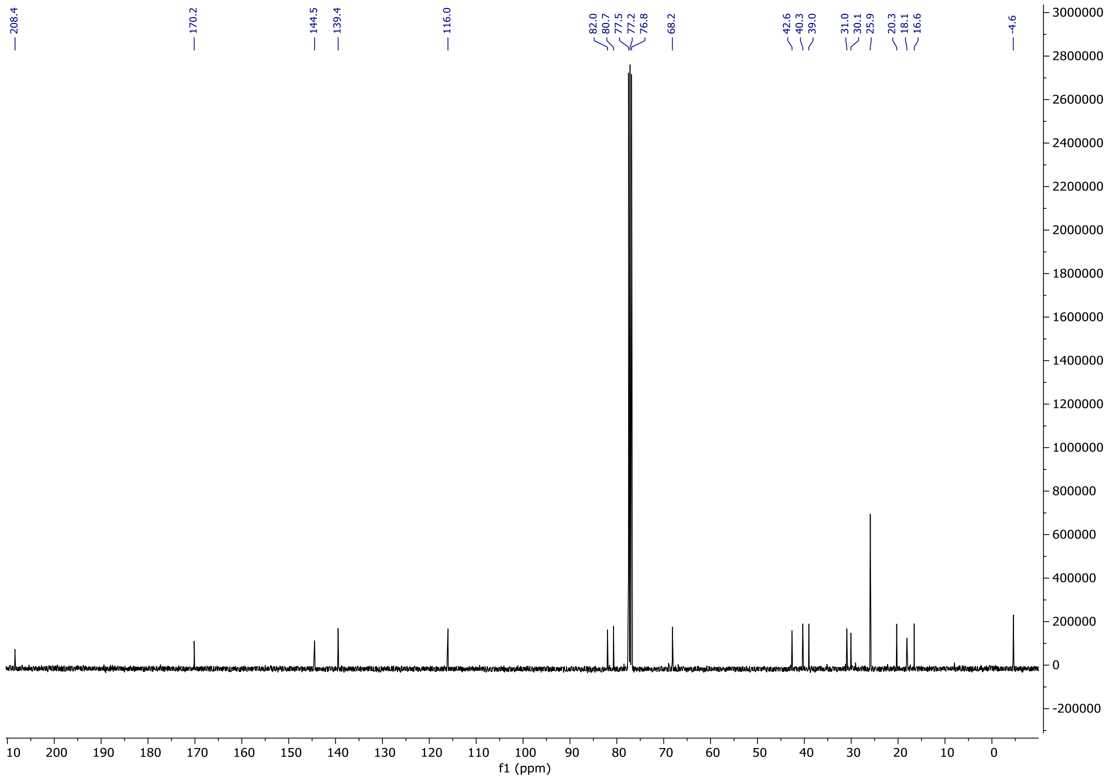
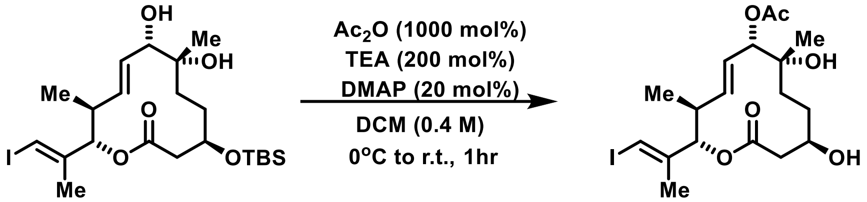
1.05
5.12
2.76
5.45
3.14
9.19
6.11
2.5×10^7
2.0×10^7
1.5×10^7
1.0×10^7
5.0×10^6
0.0
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


208.4
170.2
144.5
139.4
116.0
82.0
80.7
77.5
77.2
76.8
68.2
42.6
40.3
39.0
31.0
30.1
25.9
20.3
18.1
16.6
-4.6
3000000
2800000
2600000
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000
10
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

Fragment A



To a solution of alcohol diol (13.5 mg, 25 µmol, 100 mol%) in CH_2Cl_2 (63 µL, 0.4 M) was added triethylamine (7 µL, 50 µmol, 200 mol%) and DMAP (0.6 mg, 5 µmol, 20 mol%). The reaction mixture was cooled to 0 ℃. Acetic anhydride (23 µL, 250 µmol, 1000 mol%) was added and the reaction mixture was allowed to stir at 0 ℃ for 1 hr. HCl aq (1.5 N) was added and the reaction mixture was allowed to stir at room temperature for 3 h. Water was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The residue was subjected to flash chromatography (SiO_2: 5:1 hexanes/ethyl acetate) to furnish the title compound (7.8 mg, 18 µmol) in 67% yield as a colorless oil.

TLC (SiO_2) R_f = 0.21 (hexanes/ethyl acetate = 3:2).

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.48 (s, 1H), 5.68 (dd, *J* = 15.2, 9.5 Hz, 1H), 5.58 (dd, *J* = 15.2, 9.6 Hz, 1H), 5.30 (d, *J* = 10.7 Hz, 1H), 5.06 (d, *J* = 9.5 Hz, 1H), 3.76 (dd, *J* = 11.0, 3.5 Hz, 1H), 2.68 – 2.46 (m, 3H), 2.09 (s, 3H), 1.82 (d, *J* = 1.1 Hz, 3H), 1.74 – 1.65 (m, 1H), 1.52 (d, *J* = 3.2 Hz, 1H), 1.38 (td, *J* = 13.1, 12.3, 4.0 Hz, 2H), 1.21 (s, 3H), 0.90 (d, *J* = 6.8 Hz, 3H).

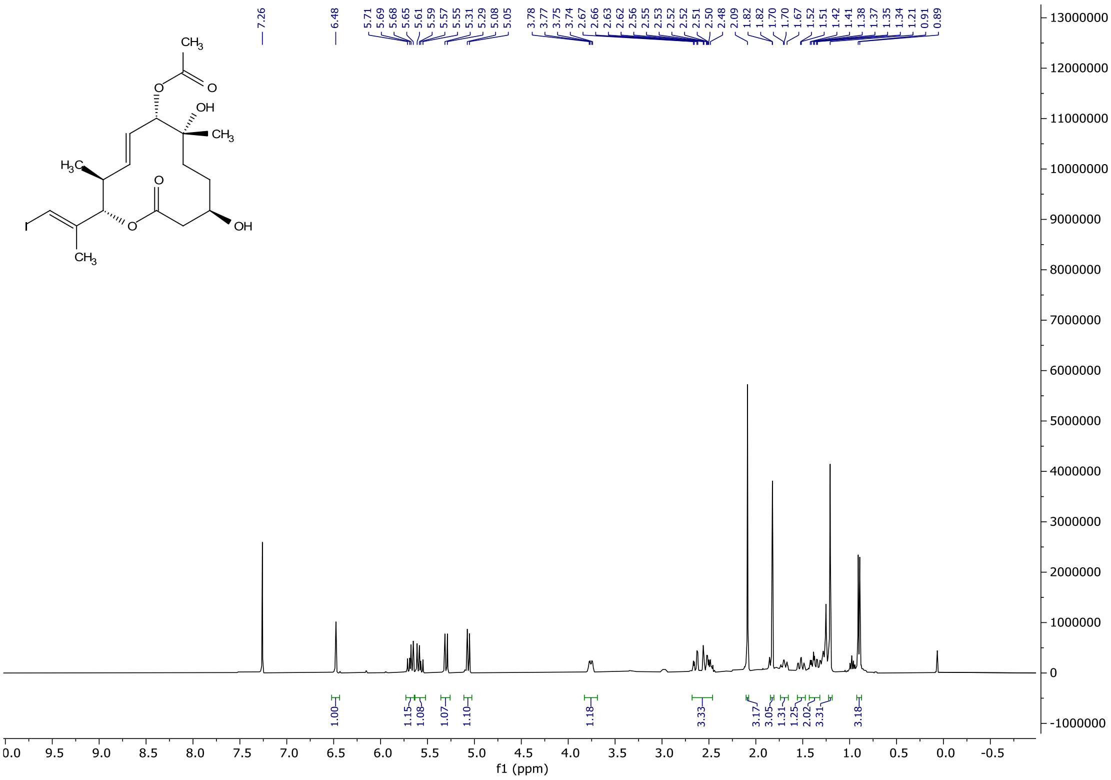
^{13}C NMR (101 MHz, $CDCl_3$) δ 171.9, 169.7, 143.5, 139.8, 126.3, 84.3, 80.4, 78.9, 73.5, 69.3, 41.1, 38.4, 35.3, 29.9, 24.8, 21.4, 19.2, 16.4.

HRMS (ESI) Calcd. for $C_{18}H_{27}IO_6$ $[M+Na]^+$: 489.0750, found 489.0741

FTIR (neat): 3454, 2958, 2926, 1732, 1456, 1368, 1239, 1167, 1102, 1050, 1021, 979, 912, 735, 674 cm^{-1}.

$[\alpha]^{26}_D$: -39.0 (*c* 0.5, $CHCl_3$).

The spectral data were identical to that previously reported.[1]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CH3
H3C
O
I
O
OH
CH3
7.26
6.48
5.71
5.69
5.68
5.65
5.61
5.59
5.57
5.55
5.31
5.29
5.08
5.05
3.78
3.77
3.75
3.74
2.67
2.66
2.63
2.62
2.56
2.55
2.53
2.52
2.52
2.51
2.50
2.48
2.09
1.82
1.82
1.70
1.70
1.67
1.52
1.51
1.42
1.41
1.38
1.37
1.35
1.34
1.21
0.91
0.89
1.00
1.15
1.08
1.07
1.10
1.18
3.33
3.17
3.05
1.31
1.25
2.02
3.31
3.18
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)
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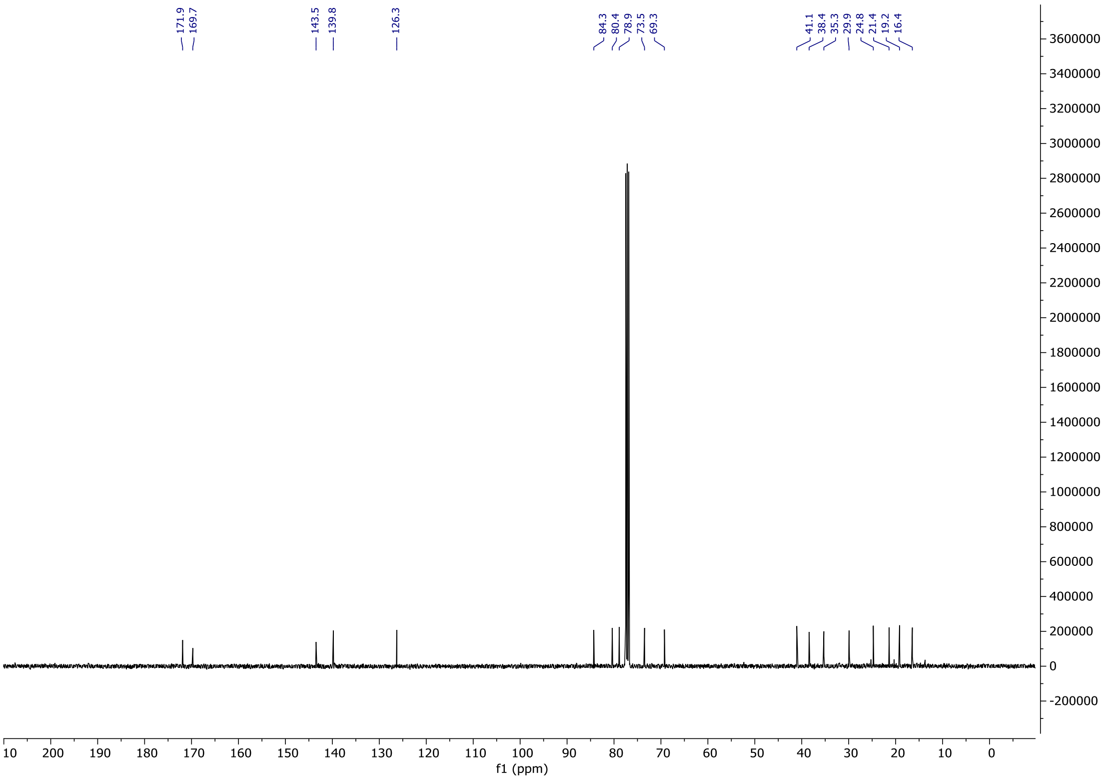
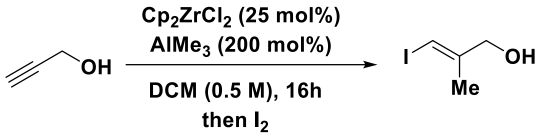
12000000
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000


171.9
169.7
143.5
139.8
126.3
84.3
80.4
78.9
73.5
69.3
41.1
38.4
35.3
29.9
24.8
21.4
19.2
16.4
10
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)
3600000
3400000
3200000
3000000
2800000
2600000
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000

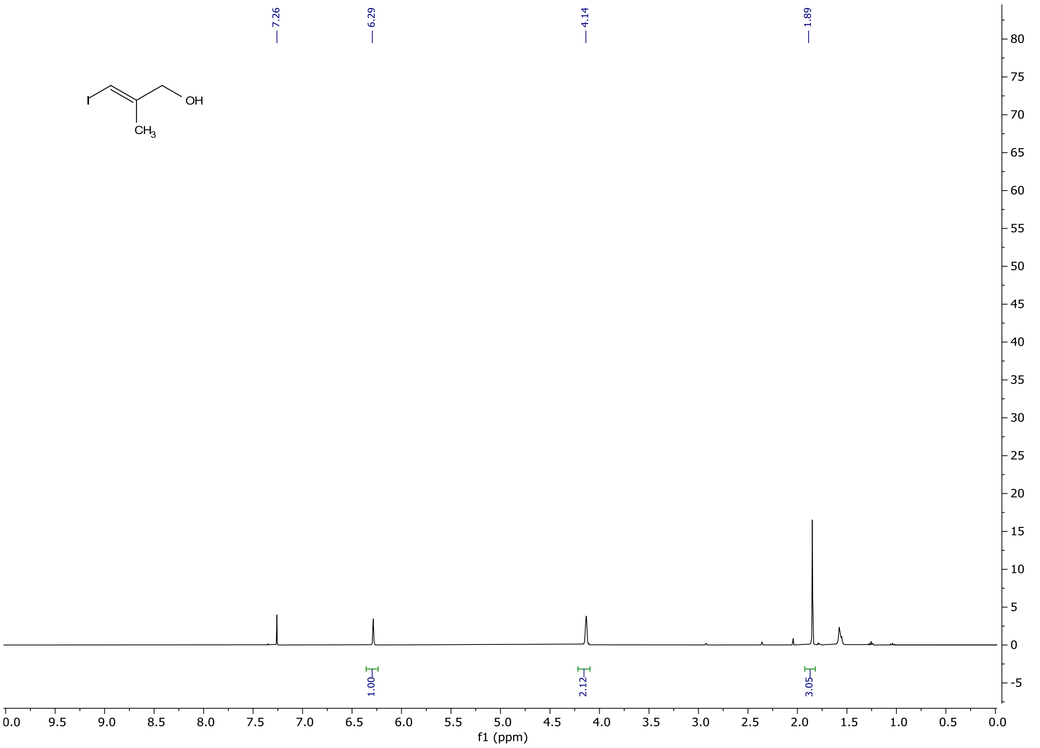
(*E*)-3-Iodo-2-methylprop-2-en-1-ol (10)



To an oven-dried 500 mL Schlenk flask charged with Cp_2ZrCl_2 (3.9 g, 13.4 mmol, 25 mol%) and dry CH_2Cl_2 (100 mL) was added $AlMe_3$ (2 M in heptane, 106 mmol, 200 mol%). The reaction mixture was allowed to cool to 0 °C. Propargyl alcohol (3.1 mL, 54 mmol, 100 mol%) in CH_2Cl_2 (40 mL) was added dropwise over 30 min and the reaction mixture was allowed to stir for 16 hr at room temperature. The mixture was placed to -30°C bath and iodine (16.3 g, 64 mmol, 120 mol%) in THF (50 mL) was added. The reaction mixture was allowed to stir for 10 min. The saturated solution of $NaHCO_3$ aq was carefully added and the mixture was allowed to warm to room temperature. The biphasic mixture was transferred to a separatory funnel and the aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 3:2 hexanes/ethyl acetate) to furnish the title compound (5.6 g, 28 mmol) in 53% yield as a colorless oil.

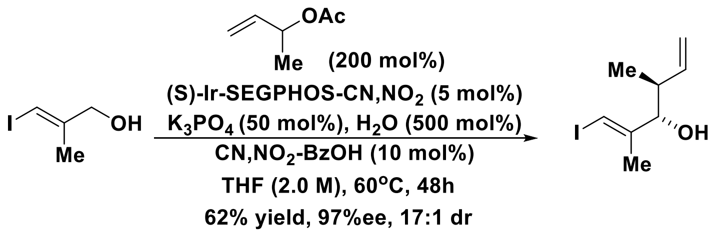
TLC (SiO_2): R_f = 0.25 (hexanes/diethyl ether = 7:3).

^{1}H NMR (400 MHz, $CDCl_3$) δ 6.29, 4.14, 1.89.



The spectral data were identical to those reported.[2]

(E)-(3S, 4S)-1-Iodo-2, 4-dimethylhexa-1, 5-dien-3-ol (Fragment D)



To an oven-dried sealed tube equipped with a magnetic stir bar was placed under an atmosphere of argon was charged with (*E*)-3-iodo-2-methylprop-2-en-1-ol **10** (22 µL, 0.2 mmol, 100 mol %) in THF (0.1 mL, 2.0 M). (*S*)-SEGPHOS-Ir-CN, NO_2 (10.3 mg, 0.01 mmol, 5 mol %), K_3PO_4 (21.5 mg, 0.10 mmol, 50 mol %), H_2O (18 µL, 1.0 mmol, 500 mol %) and but-3-en-2-ylacetate 1 (45.6 mg, 0.40 mmol, 200 mol %) were added. The reaction vessel was sealed and the reaction mixture was allowed to stir at 60 °C for 48 hr. The reaction mixture was concentrated *in vacuo*. The resulting mixture was subjected to flash chromatography (SiO_2; ethyl acetate/hexanes = 1: 20) to furnish the **Fragment D** (31 mg, 0.124 mmol) in 62% yield (17:1 dr, 97% ee).

TLC (SiO_2): R_f= 0.35 (hexanes/ethyl acetate = 20:1).

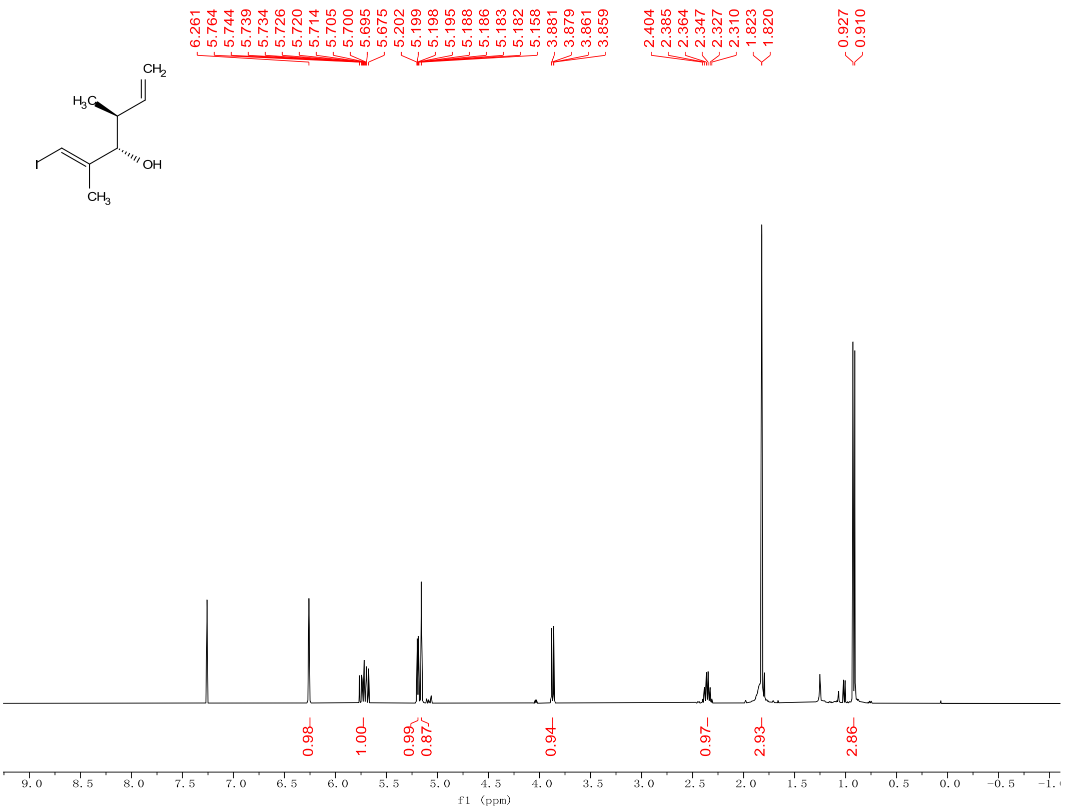
^{1}H NMR (400 MHz, $CDCl_3$): δ 6.26 (s, 1H), 5.78 – 5.66 (m, 1H), 5.21 – 5.18 (m, 1H), 5.16 (s, 1H), 3.87 (dd, *J* = 8.1, 0.7 Hz, 1H), 2.41 – 2.30 (m, 1H), 1.82 (d, *J* = 1.1 Hz, 3H), 0.92 (d, *J* = 6.8 Hz, 3H).

^{13}C NMR (100 MHz, $CDCl_3$): δ 148.0, 139.9, 117.2, 80.1, 42.2, 19.3, 16.5.

HRMS (ESI) calcd. for $C_8H_{13}IO$ $[M+Na]^+$: 274.9909, found 274.9918.

HPLC: Enantiomeric excess was determined by HPLC analysis of the product (Chiralcel OJ-H column, hexanes: *i*-PrOH = 97:3, 1.0 mL/min, 210 nm), t_{minor} = 6.12 min, t_{major} = 6.46 min; *ee* = 97%.

The spectroscopic properties of this compound were consistent with the data available in literature.[3]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OH
I
CH3
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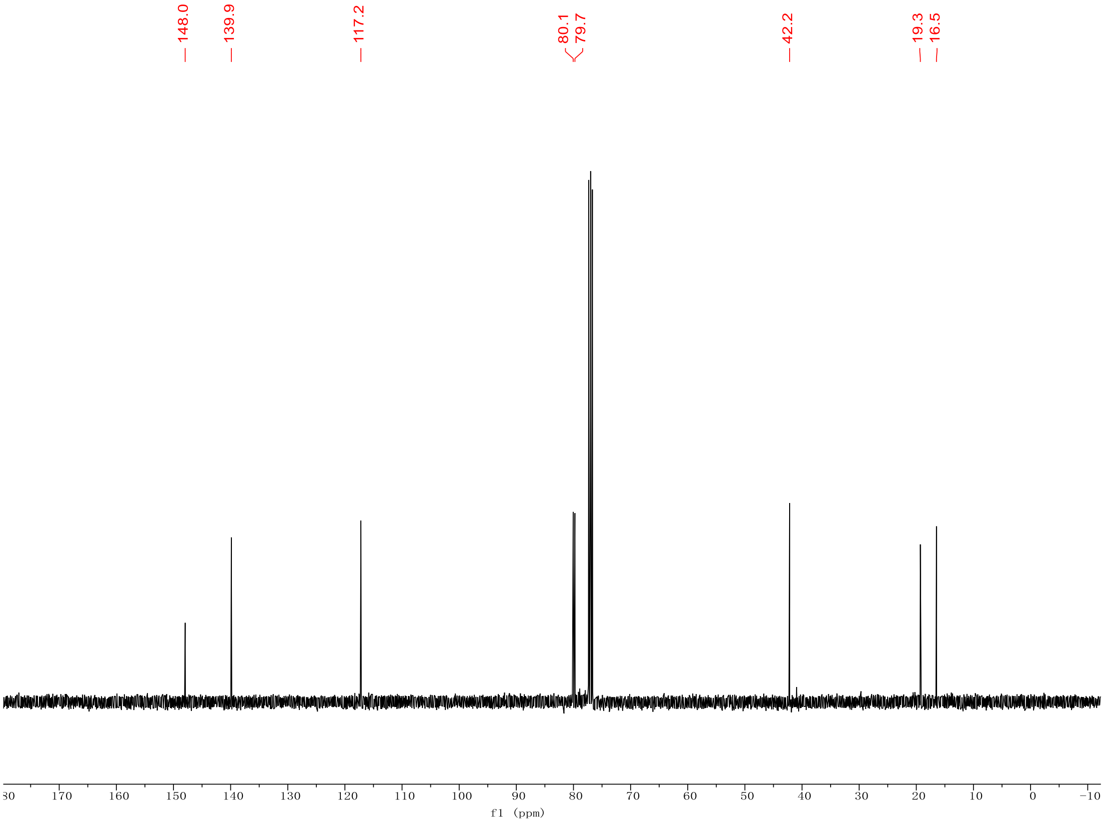
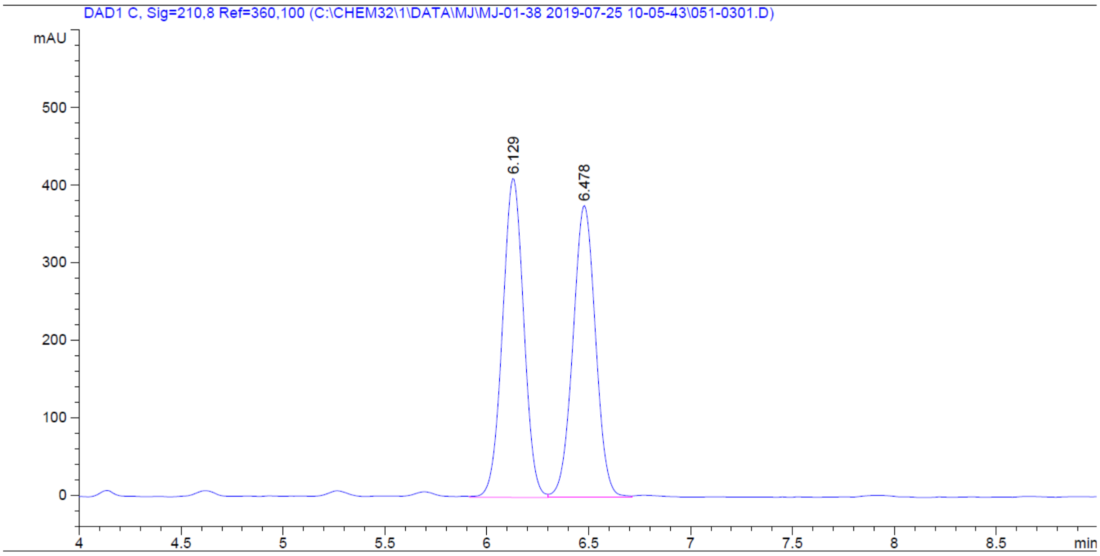
5.764
5.744
5.739
5.734
5.726
5.720
5.714
5.705
5.700
5.695
5.675
5.202
5.199
5.198
5.195
5.188
5.186
5.183
5.182
5.158
3.881
3.879
3.861
3.859
2.404
2.385
2.364
2.347
2.327
2.310
1.823
1.820
0.927
0.910
0.98
1.00
0.99
0.87
0.94
0.97
2.93
2.86
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
f1 (ppm)


148.0
139.9
117.2
80.1
79.7
42.2
19.3
16.5
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)



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   2   6.478 VV    0.1200 2906.84863  376.65897  49.3300

Totals :                  5892.65918  788.38538
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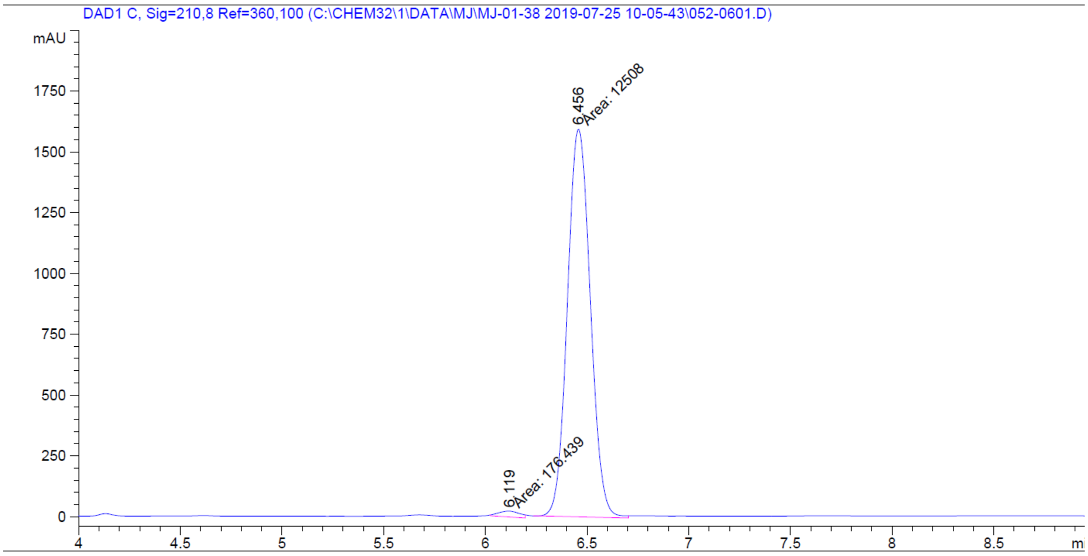

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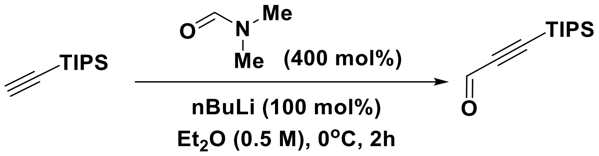
Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1   6.119 MM    0.1210  176.43901   24.30532   1.3910
   2   6.456 MM    0.1306 1.25080e4 1595.84363  98.6090

Totals :                  1.26844e4 1620.14895
```

3-(triisopropylsilyl)propiolaldehyde (12)



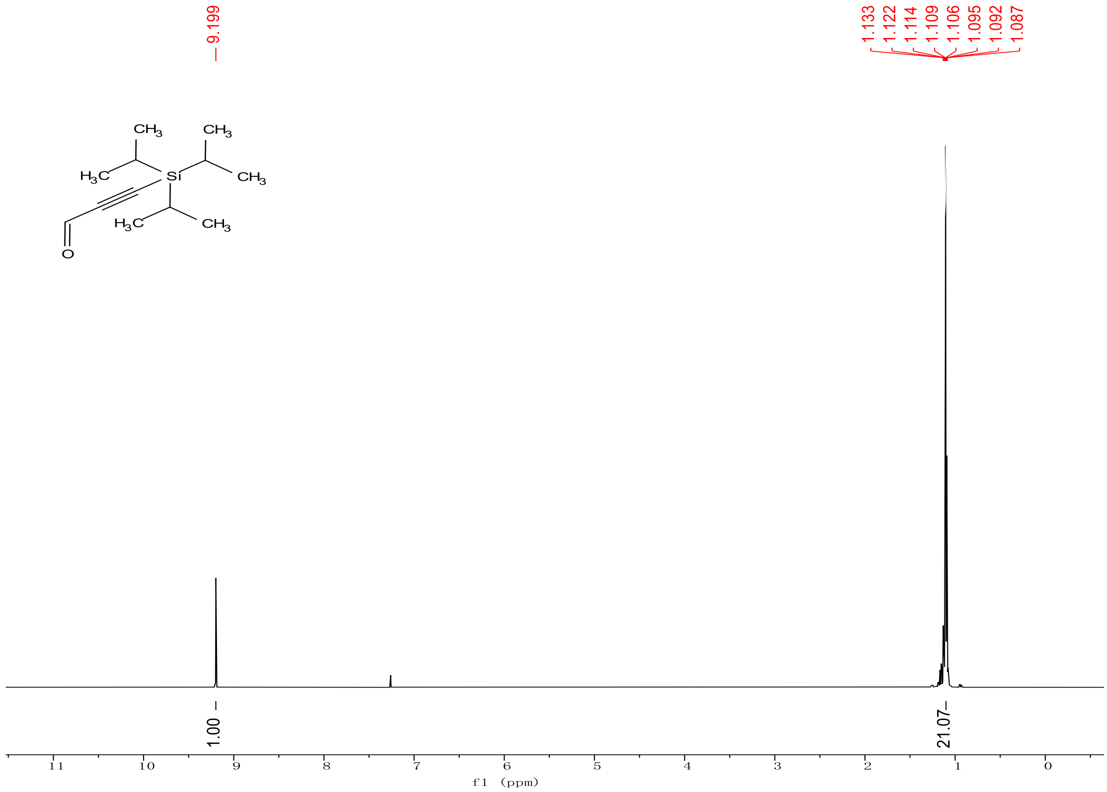
To a round-bottomed flask under an argon atmosphere charged with ethynyltriisopropylsilane (1,16 mL, 5.00 mmol, 100 mol%) was added anhydrous Et_2O (5 mL). The solution was cooled to 0 ºC and n-butyllithium (2.00 mL, 5.00 mmol, 100 mol %) was slowly added. The reaction mixture was allowed to stir for 30 min and dimethylformamide (1.55 mL, 20.0 mmol, 400 mol %) in anhydrous Et_2O (5 mL) was added dropwise. The reaction mixture was allowed to stir for 1 hr. HCl aq (1.0 N) was carefully added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 15:1 hexanes:ethyl acetate) to furnish the title compound (1049 mg, 4.986 mmol) in 99% yield as a colorless oil.

TLC (SiO_2) R_f= 0.58 (hexanes/ethyl acetate = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$) δ 9.20 (s, 1H), 1.13 – 1.09 (m, 21H).

^{13}C NMR (101 MHz, $CDCl_3$) δ 176.7, 104.6, 100.9, 18.6, 11.1.

The spectral data were identical to those reported.[4]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1.106
1.095
1.092
1.087
CH3
CH3
H3C
Si
CH3
H3C
CH3
O
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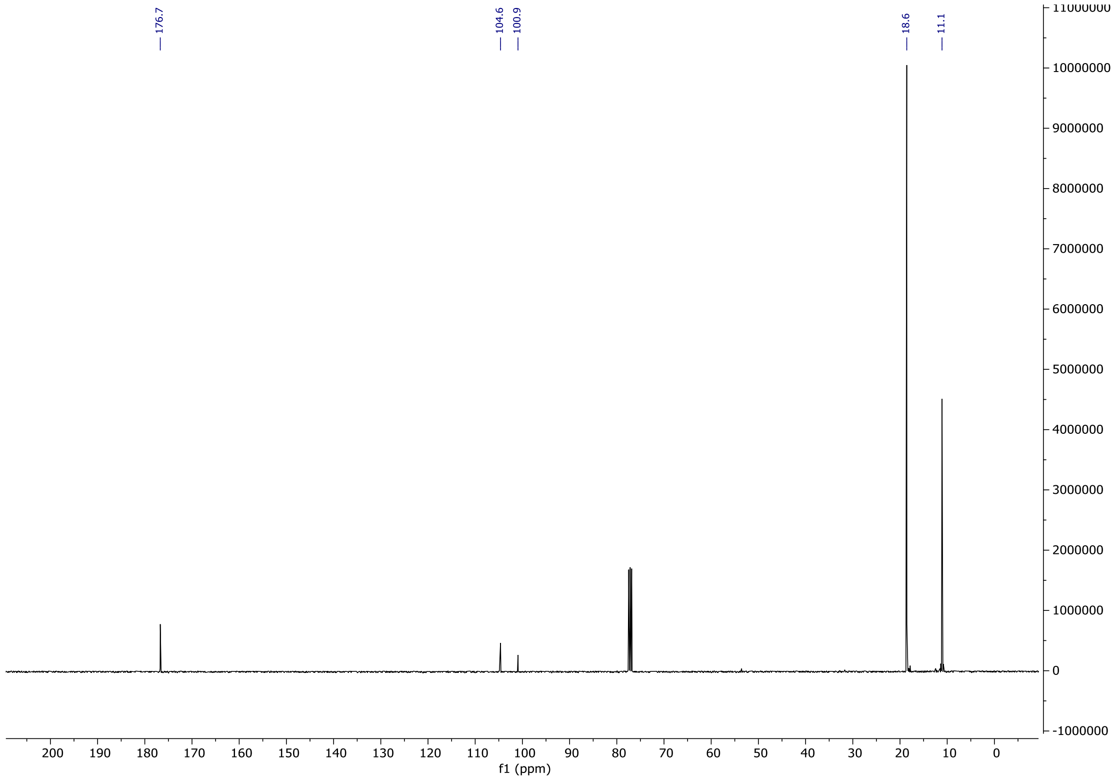
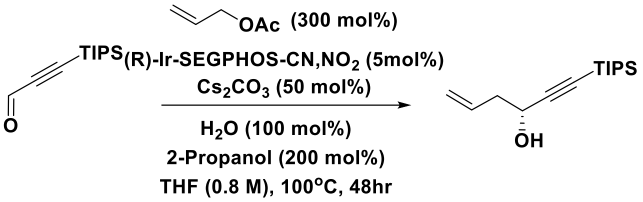
21.07
11
10
9
8
7
6
5
4
3
2
1
0
f1 (ppm)


176.7
104.6
100.9
18.6
11.1
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

(*R*)-1-(Triisopropylsilyl)hex-5-en-1-yn-3-ol (13)



To an oven-dried pressure tube equipped with a magnetic stir bar was placed under an atmosphere of argon was charged with Cs_2CO_3 (33 mg, 0.10 mmol, 50 mol %) and (*R*)-SEGPHOS-Ir-CN, NO_2 (10.3 mg, 0.01 mmol, 5 mol %) in THF (0.25 mL, 0.8 M). 2-propanol (0.031 mL, 0.40 mmol, 200 mol %), allyl acetate (0.065 mL, 0.60 mmol, 300 mol %), water (0.0036 mL, 0.20 mmol, 100 mol %) and aldehyde **12** (0.047 mL, 0.2 mmol, 100 mol %) were added. The reaction vessel was sealed and the reaction mixture was allowed to stir at 100 °C for 48 hr. The reaction mixture was concentrated *in vacuo*. The resulting mixture was subjected to flash chromatography (SiO_2: 20:1 hexanes/ethyl acetate) to furnish the title compound in 73 % yield (36.8 mg, 0.146 mmol) as a pale oil.

TLC (SiO_2) R_f= 0.29 (hexanes/ethyl acetate = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.99 – 5.84 (m, 1H), 5.25 – 5.14 (m, 2H), 4.44 (t, *J* = 6.0 Hz, 1H), 2.49 (dq, *J* = 4.5, 1.5 Hz, 2H), 1.07 (d, *J* = 2.5 Hz, 21H).

HRMS (EI) m/z: calcd for $C_{15}H_{28}OSi$ [M^+] 252.1909, found 252.1894.

$[\alpha]^{26}_D$: +26.2 (*c* 1.0, $CHCl_3$); Lit.(**ent-13**) [4] **$[\alpha]^{26}_D$**: -26.1 (*c* 1.0, $CHCl_3$).

The spectral data were identical to those reported.[4]


5.9
5.9
5.9
5.9
5.2
5.2
5.2
5.2
5.2
5.2
5.2
5.2
5.2
5.2
4.5
4.4
4.4
2.5
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2.5
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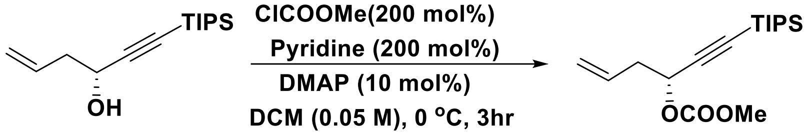
2.5
1.1
1.1
1.1
1.1
CH3
CH3
H3C
Si
CH3
H2C
H3C
CH3
HO
1.0×10^8
9.0×10^7
8.0×10^7
7.0×10^7
6.0×10^7
5.0×10^7
4.0×10^7
3.0×10^7
2.0×10^7
1.0×10^7
0.0
1.00
2.08
1.00
2.05
21.16
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)

(*R*)-Methyl [1-(triisopropylsilyl) hex-5-en-1-yn-3-yl carbonate



To a solution of (*R*)-1-(triisopropylsilyl) hex-5-en-1-yn-3-ol **13** (0.25 g, 1.0 mmol, 100 mol %) in CH_2Cl_2 (20 mL) was added pyridine (0.16 mL, 2.0 mmol, 200 mol %) and DMAP (12.2 mg, 0.1 mmol, 10 mol %). Methyl chloroformate (0.15 mL, 2 mmol, 200 mol %) in CH_2Cl_2 (2 mL) was slowly added at 0 °C. The reaction mixture was allowed to stir for 3 hr. HCl aq (0.3 N) was carefully added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 10:1 hexanes:ethyl acetate) to furnish the title compound (280 mg, 0.9 mmol) in 90% yield as a colorless oil.

TLC (SiO_2): R_f = 0.4 (hexanes/ethyl acetate = 20:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.84 (ddt, *J* = 17.2, 10.2, 7.0 Hz, 1H), 5.28 (t, *J* = 6.5 Hz, 1H), 5.23 – 5.11 (m, 2H), 3.79 (s, 3H), 2.58 (t, *J* = 6.7 Hz, 2H), 1.06 (s, 21H).

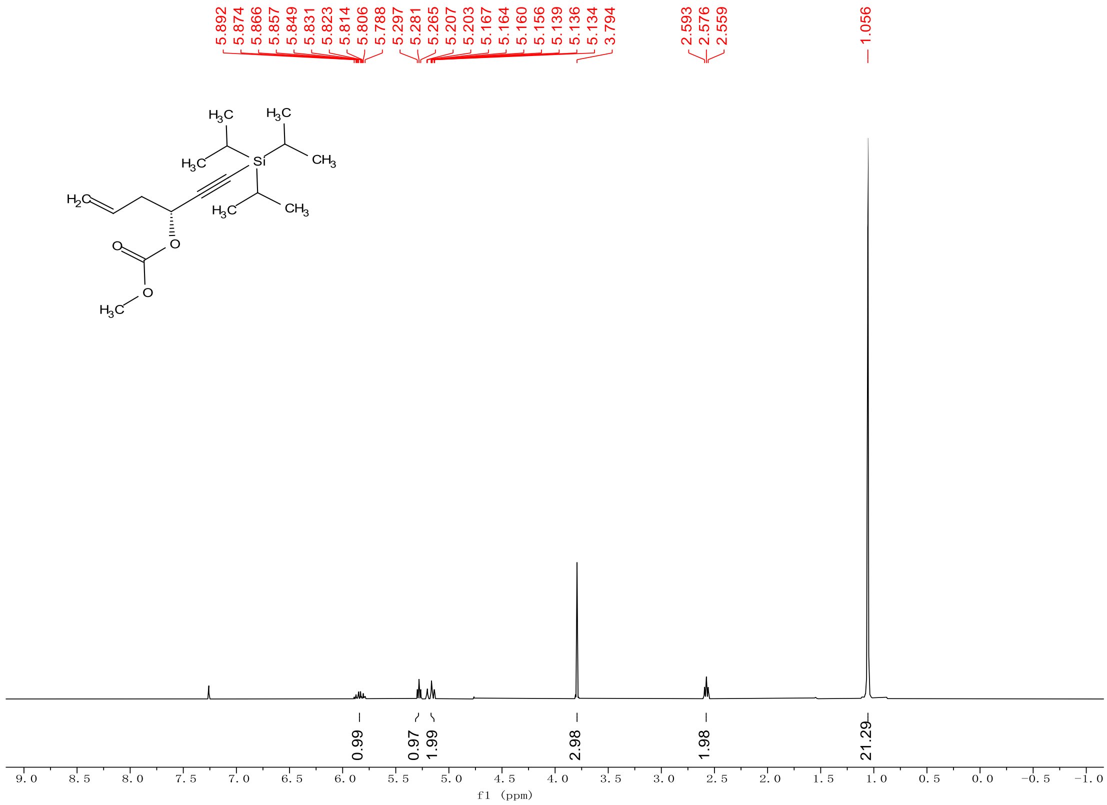
^{13}C NMR (101 MHz, $CDCl_3$): δ 154.8, 131.9, 119.0, 103.2, 88.3, 67.8, 54.9, 39.5, 18.5, 11.0.

HRMS (ESI) calcd for $C_{17}H_{30}O_3Si$ [M+Na$^+$] : 333.1856, found 333.1868.

FTIR (neat): 2944, 2866, 1751, 1441, 1254, 987, 882, 790, 676 cm^{-1}.

$[\alpha]^{26}_D$: +21.4 (*c* 0.14, $CHCl_3$).

HPLC: Enantiomeric excess was determined by HPLC analysis of the product (two Chiralcel AD-H columns, hexanes: *i*-PrOH = 99.5:0.5, 0.5 mL/min, 210 nm), t_{minor} = 7.53 min, t_{major} = 7.88 min; *ee* = 93%.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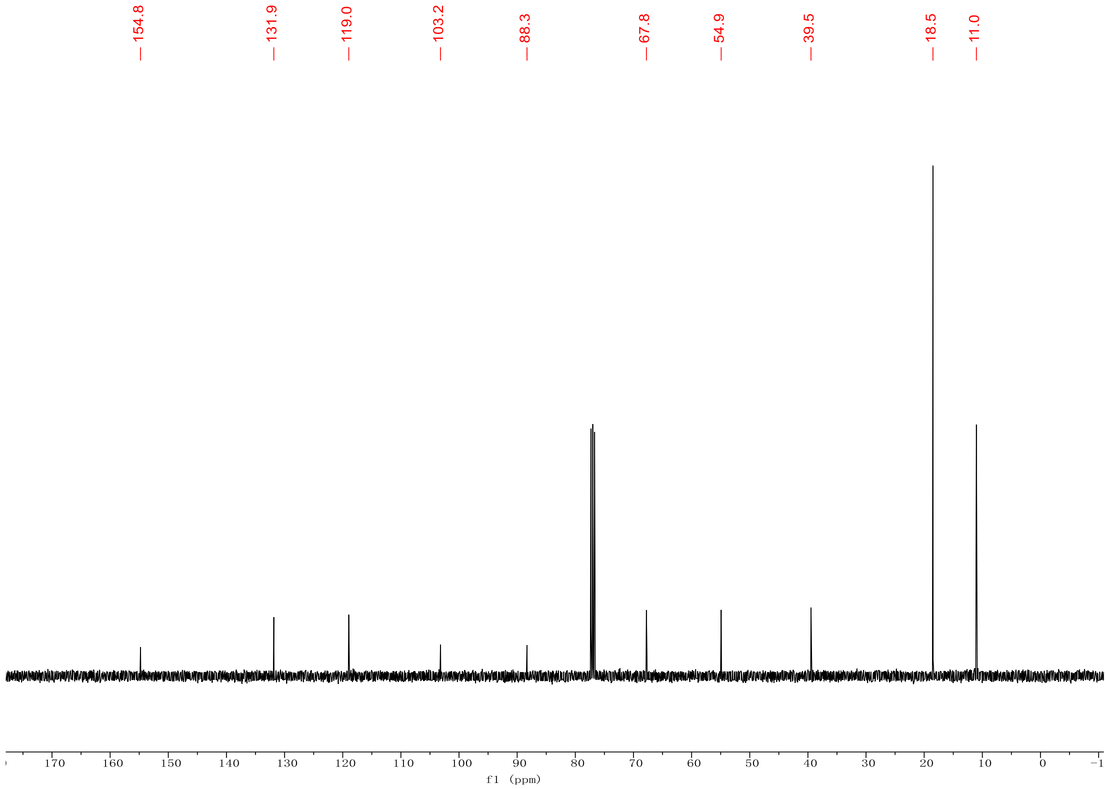
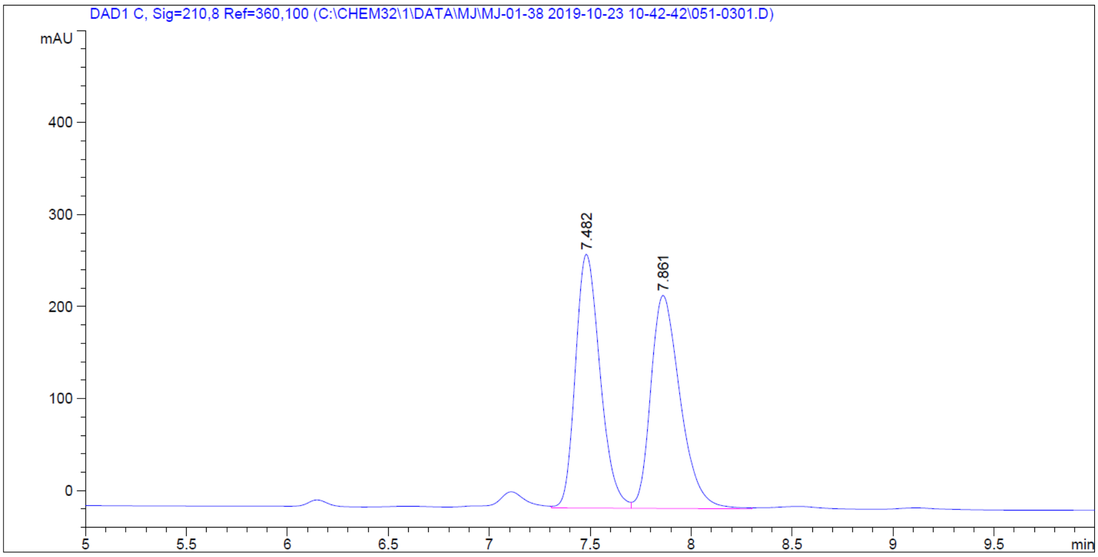
5.281
5.265
5.207
5.203
5.167
5.164
5.160
5.156
5.139
5.136
5.134
3.794
2.593
2.576
2.559
1.056
H3C
H3C
CH3
Si
H2C
H3C
CH3
O
O
O
H3C
0.99
0.97
1.99
2.98
1.98
21.29
9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 −0.5 −1.0
f1 (ppm)


154.8
131.9
119.0
103.2
88.3
67.8
54.9
39.5
18.5
11.0
170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 −1
f1 (ppm)



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Peak RetTime Type  Width     Area      Height     Area
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Totals :                  4696.55054  507.46385
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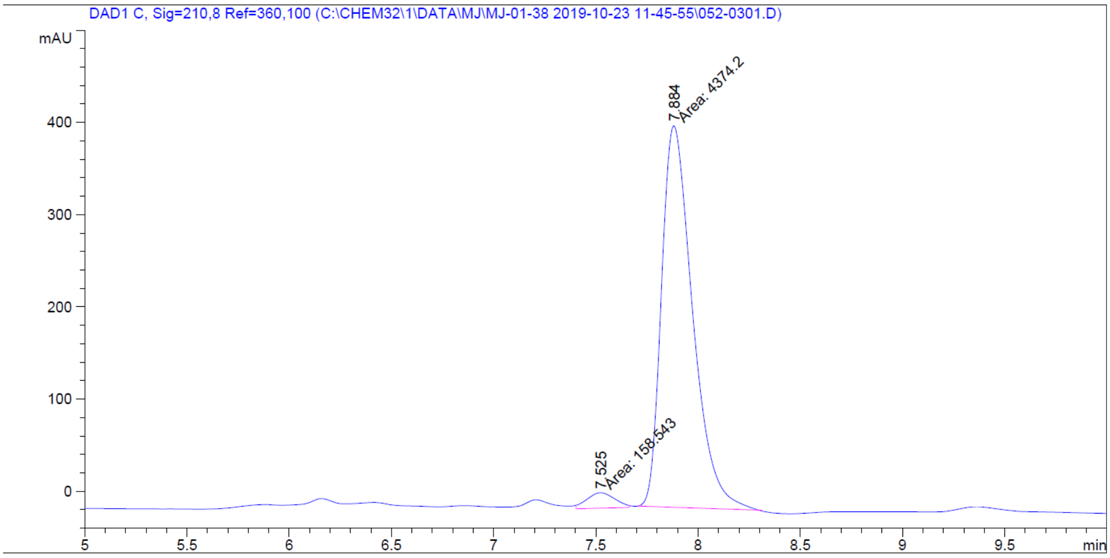

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  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
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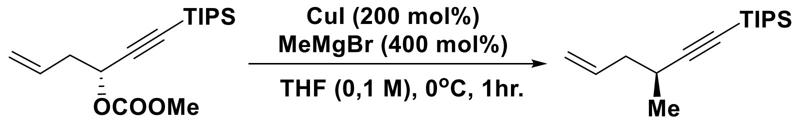
   2   7.884 MM    0.1761 4374.19775  414.07422  96.5023

Totals :                  4532.74075  430.86154
```

(*S*)-Triisopropyl(3-methylhex-5-en-1-yn-1-yl) silane (Fragment F)



To a round-bottomed flask under an argon atmosphere charged with copper iodide (0.19 g, 1.0 mmol, 200 mol %) was added THF (4.0 mL). The suspension was allowed to cool to 0 ºC, and MeMgBr (0.66 mL of a 3.0 M ethereal solution, 2.0 mmol, 400 mol %) was added via syringe. The reaction mixture was allowed to stir for 15 min. (*R*)-Methyl [1-(triisopropylsilyl) hex-5-en-1-yn-3-yl] carbonate (155 mg, 0.5 mmol, 100 mol %) in THF (1.0 mL) was slowly added. The reaction mixture was allowed to stir for 1 h at 0 ºC. NH_4Cl aq was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: hexanes) to furnish the title compound (97.7 mg, 0.39 mmol) in 78% yield as a colorless oil.

TLC (SiO_2) R_f= 0.9 (hexanes).

^{1}H NMR (400 MHz, $CDCl_3$) δ 5.88 (ddt, *J* = 17.2, 10.2, 7.0 Hz, 1H), 5.13 – 5.00 (m, 2H), 2.54 (h, *J* = 6.8 Hz, 1H), 2.21 (td, *J* = 6.9, 1.4 Hz, 2H), 1.18 (d, *J* = 6.9 Hz, 3H), 1.06 (d, *J* = 4.7 Hz, 21H).

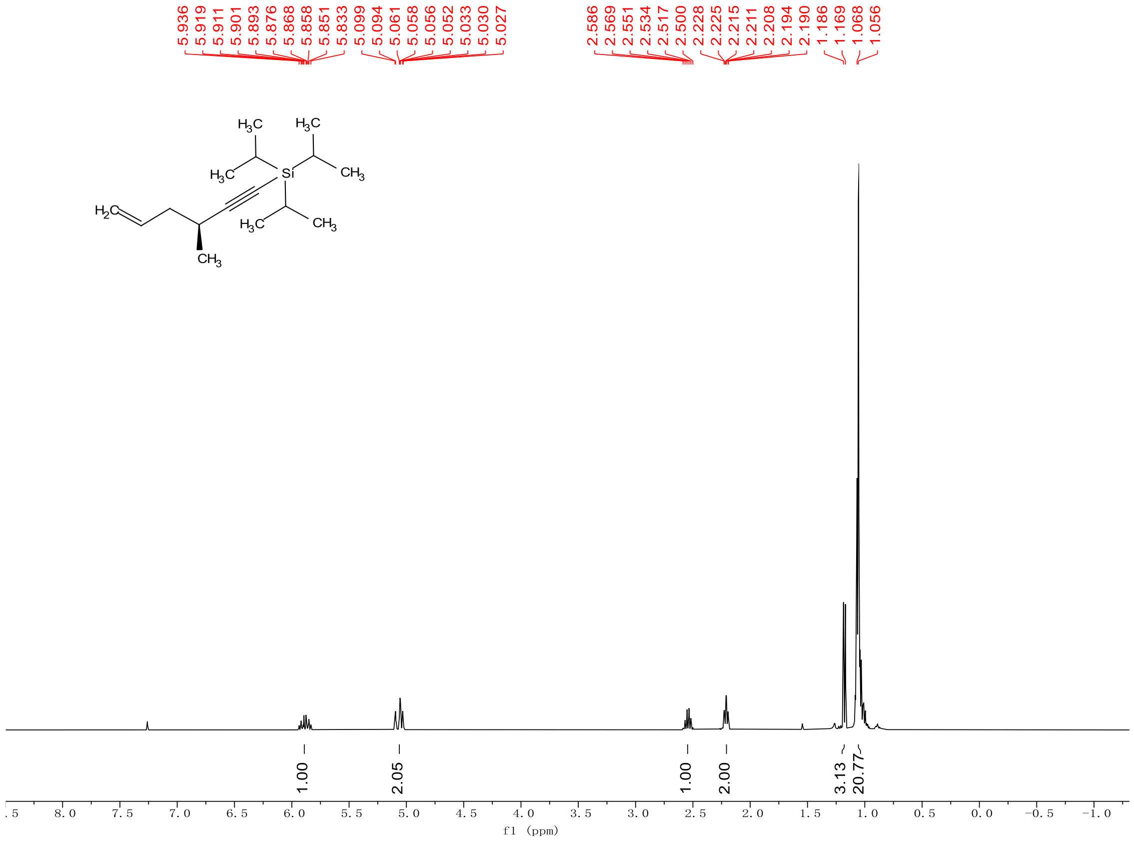
^{13}C NMR (101 MHz, $CDCl_3$) δ 136.0, 116.5, 113.1, 41.3, 26.9, 20.8, 18.6, 11.3.

HRMS (ESI) m/z: $[M-C_3H_7]^+$ calcd for $C_{16}H_{30}Si$ 207.1564, found 207.1570.

FTIR (neat): 2943, 2865, 2164, 1643, 1461, 1326, 1243, 1461, 1326, 994, 882, 660 cm^{-1}.

$[\alpha]^{26}_D$: +12.0 (*c* 0.25, $CHCl_3$).

HPLC: Enantiomeric excess was determined by HPLC analysis of the derivative of the product (two Chiralcel OD-H columns, hexanes:*i*-PrOH = 99:1, flow rate = 1.0 mL/min, λ = 210 nm), 19.1 min (minor enantiomer), 20.2 (major enantiomer), *ee* = 91%.



5.936
5.919
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5.901
5.893
5.876
5.868
5.858
5.851
5.833
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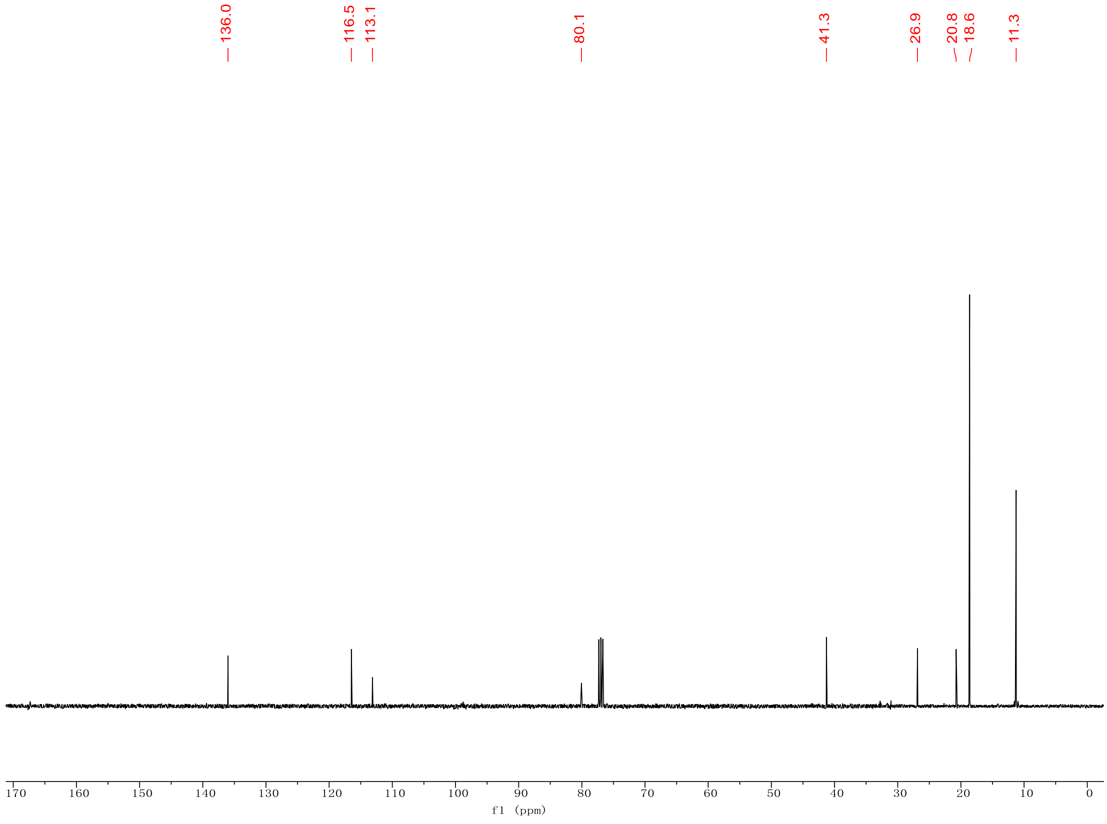
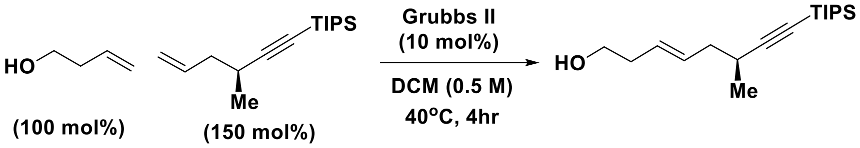
5.094
5.061
5.058
5.056
5.052
5.033
5.030
5.027
2.586
2.569
2.551
2.534
2.517
2.500
2.228
2.225
2.215
2.211
2.208
2.194
2.190
1.186
1.169
1.068
1.056
H3C
H3C
Si
CH3
H3C
H2C
H3C
CH3
CH3
1.00
2.05
1.00
2.00
3.13
20.77
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)



136.0
116.5
113.1
80.1
41.3
26.9
20.8
18.6
11.3
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

(*S*,*E*)-6-Methyl-8-(triisopropylsilyl)oct-3-en-7-yn-1-ol



To a round-bottomed flask equipped with a magnetic stirring devise under an argon atmosphere charged with second generation Grubb's catalyst (8.5 mg, 0.01 mmol, 10 mol%) was added CH_2Cl_2 (0.20 mL, 0.5 M). (*S*)-Tri-isopropyl (3-methylhex-5-en-1-yn-1-yl) silane (38 mg, 0.15 mmol, 150 mol%) and 3-buten-1-ol (8.5 L, 0.1 mmol, 100 mol%) were added. The reaction mixture was allowed to stir at 40 ºC for 4 hr. The reaction was allowed to reach ambient temperature and was concentrated *in vacuo.* The resultant residue was subjected to flash column chromatography (SiO_2: 5:1 hexanes/ethyl acetate) to furnish the title compound (25.7 mg, 0.087 mmol) in 87% yield as a colorless oil.

TLC (SiO_2): R_f= 0.27 (hexanes/ethyl acetate = 5:1).

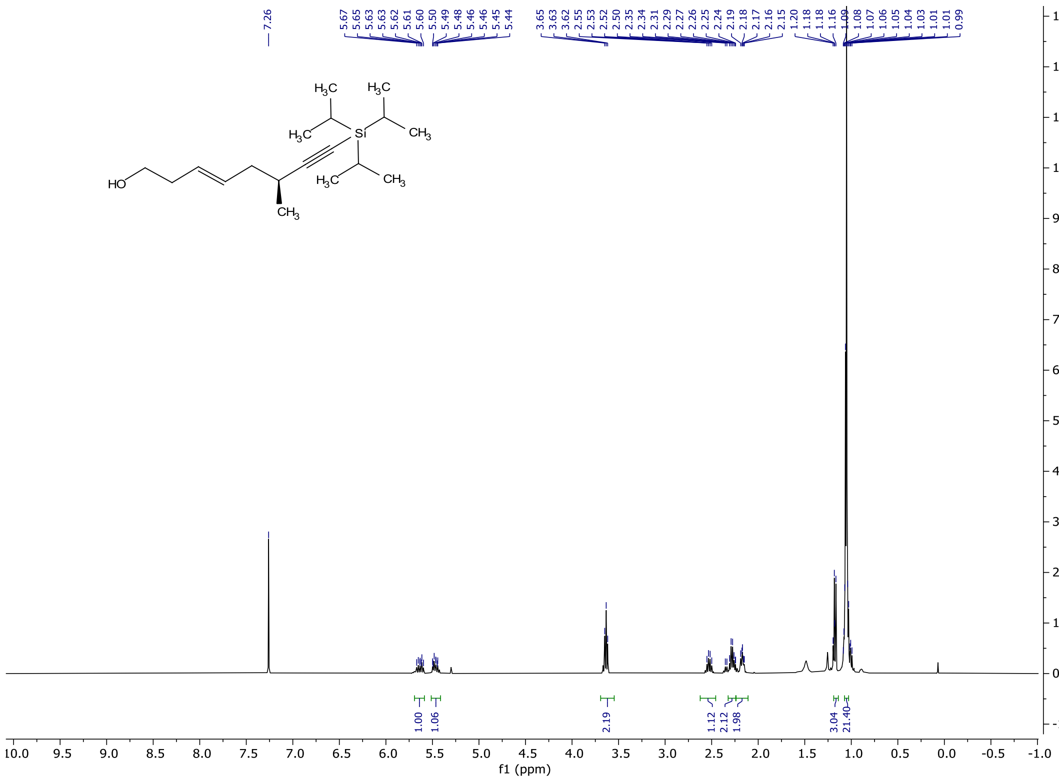
^{1}H NMR (400 MHz, $CDCl_3$): δ 5.63 (dt, *J* = 15.5, 6.9 Hz, 1H), 5.51 – 5.41 (m, 1H), 3.63 (t, *J* = 6.4 Hz, 2H), 2.53 (q, *J* = 6.9 Hz, 1H), 2.28 (p, *J* = 6.6 Hz, 2H), 2.24 – 2.11 (m, 2H), 1.17 (d, *J* = 6.9 Hz, 3H), 1.06 (d, *J* = 4.9 Hz, 21H).

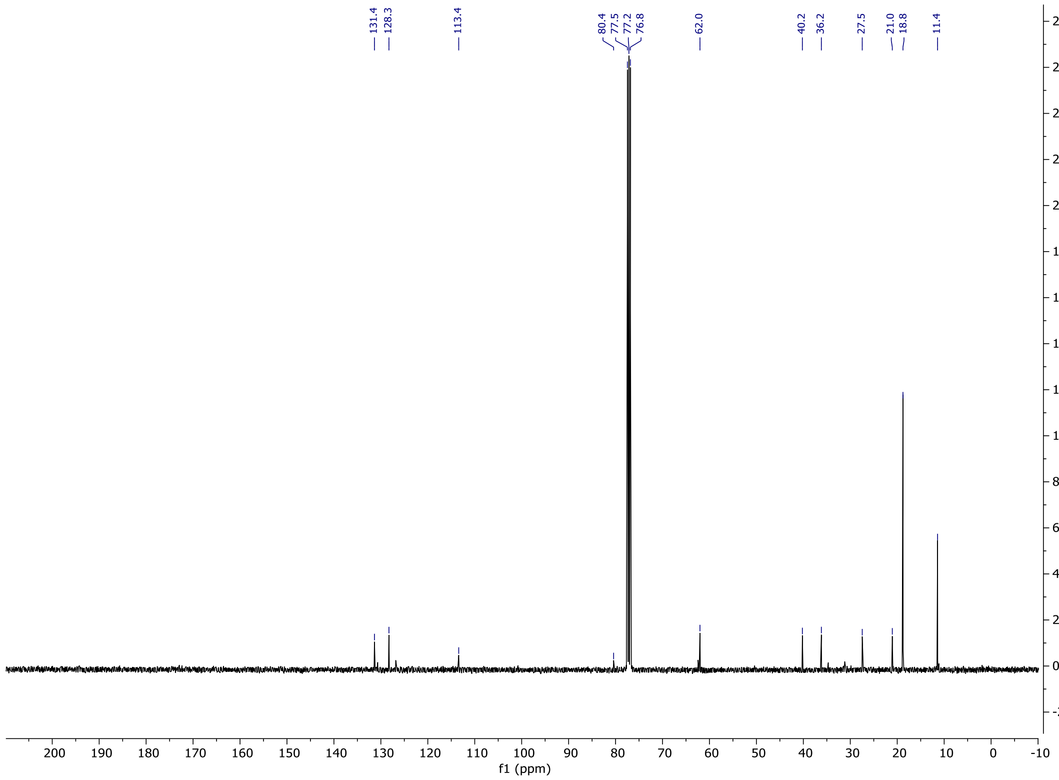
^{13}C NMR (100 MHz, $CDCl_3$): δ 131.4, 128.3, 113.4, 80.4, 62.0, 40.21 36.2, 27.5, 21.1, 18.8, 11.4.

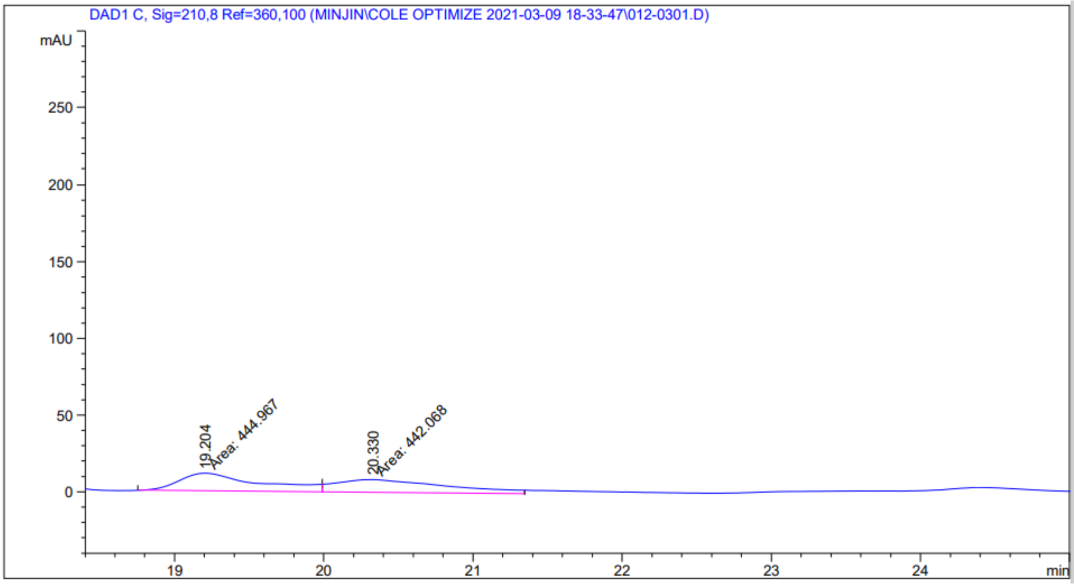
HRMS (ESI) m/z: Calcd. for $C_{18}H_{34}OSi$ $[M+Na]^+$: 317.2277, found 317.2277.

FTIR (neat): 3335, 2941, 2891, 2864, 1463, 1045, 968, 883, 675, 661 cm^{-1}.

$[\alpha]^{26}_D$ +13.0 (*c* 0.5, $CHCl_3$).


7.26
5.67 5.65 5.63 5.63 5.62 5.61 5.60 5.50 5.49 5.48 5.46 5.46 5.45 5.44
3.65 3.63 3.62 2.55 2.53 2.52 2.50 2.35 2.34 2.31 2.29 2.27 2.26 2.25 2.24 2.19 2.18 2.17 2.16 2.15
1.20 1.18 1.18 1.16 1.09 1.08 1.07 1.06 1.05 1.04 1.03 1.01 1.01 0.99
H3C
H3C
H3C
Si
CH3
HO
H3C
CH3
CH3
1.00
1.06
2.19
1.12
2.12
1.98
3.04
21.40
13000000
12000000
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000
10.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5 -1.0
f1 (ppm)


131.4
128.3
113.4
80.4
77.5
77.2
76.8
62.0
40.2
36.2
27.5
21.0
18.8
11.4
2800000
2600000
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000
200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)



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Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1  19.204 MF    0.6399  444.96750   11.58880  50.1634
   2  20.330 FM    0.8747  442.06824    8.42277  49.8366

Totals :                   887.03574   20.01156
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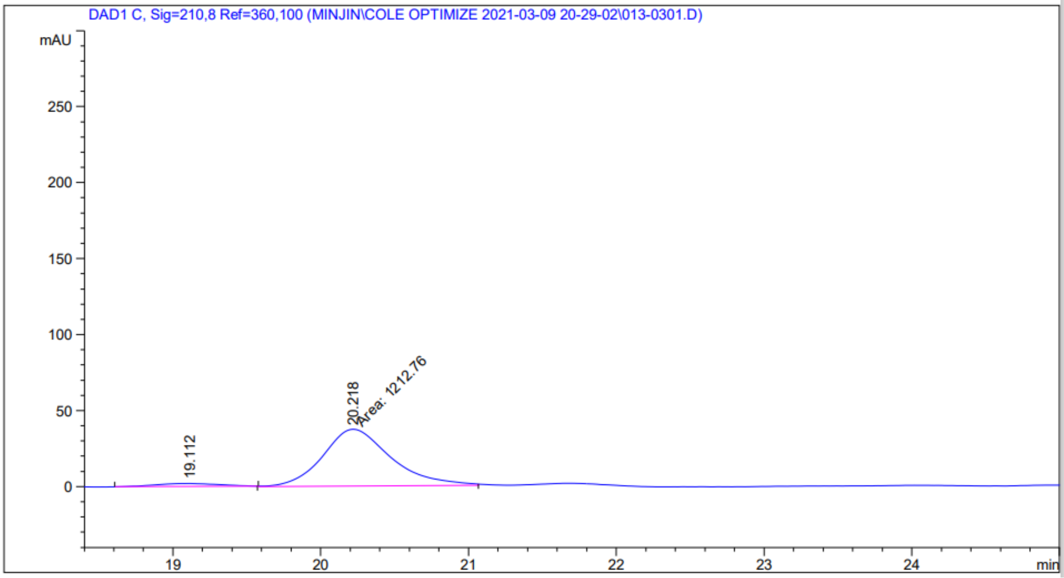

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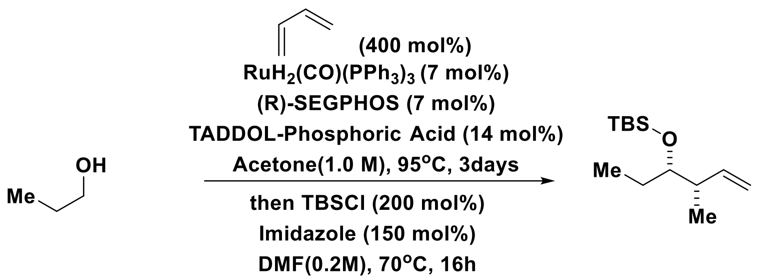
Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]        %
----|-------|----|-------|----------|----------|--------|
   1  19.112 BV    0.3664   60.23192    1.98292   4.7315
   2  20.218 MM    0.5393 1212.76416   37.48124  95.2685

Totals :                  1272.99608   39.46416
```

tert-Butyldimethyl[((3*S*,4*S*)-4-methylhex-5-en-3-yl)oxy]silane (Fragment E)



To a resealable pressure tube equipped with a magnetic stir devise under an argon atmosphere charged with $RuH_2(CO)(PPh_3)_3$ (78 mg, 0.084 mmol, 7 mol%), (*R*)-SEGPHOS (51 mg, 0.084 mmol, 7 mol%), TADDOL-phosphoric acid (117 mg, 0.17 mmol, 14 mol%) was added propanol (90 µL, 1.20 mmol, 100 mol%) and acetone (1.2 mL). The reaction mixture was allowed to cool to -78 °C. Butadiene (0.42 mL, 4.8 mmol, 400 mol%) was quickly added and the reaction vessel was quickly capped. The reaction mixture was placed in an oil bath at 95 °C for 3 days. The reaction mixture was allowed to cool to ambient temperature. TBSCl (181 mg, 1.20 mmol, 200 mol%) and imidazole (204 mg, 3.0 mmol, 105 mol%) were added and the reaction mixture was diluted with DMF (6 mL). The reaction resulting mixture was allowed to stir at 70 °C for an additional 15 hr. A saturated solution of $CuSO_4$ aq was added and the reaction mixture was transferred to a separatory funnel. The phases were separated, and the aqueous phase extracted with ether (20 mL × 3). The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The residue was subjected to flash column chromatography (SiO_2; hexanes) to furnish the **Fragment E** (161.7 mg, 0.71 mmol, syn:anti = 4.7:1, 98% *ee*) as a colorless oil in 59% yield.

TLC (SiO_2): R_f= 0.63 (hexanes).

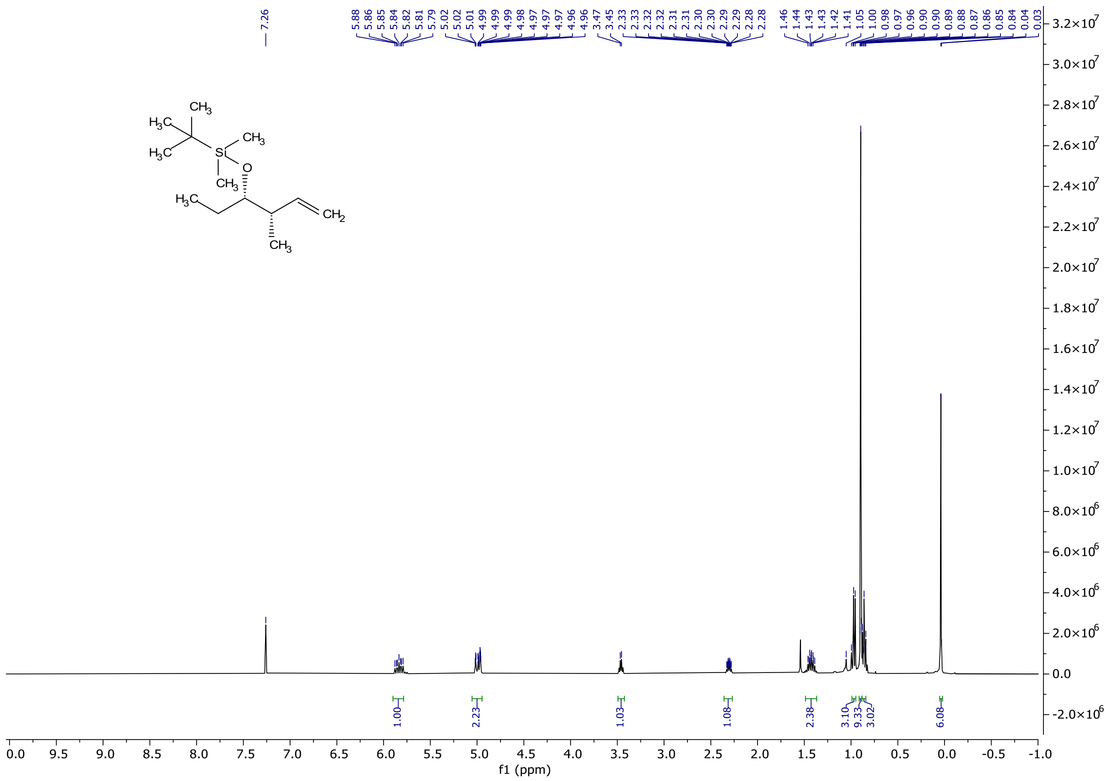
^{1}H NMR (400 MHz, $CDCl_3$): δ 5.83 (ddd, *J* = 17.5, 10.4, 7.3 Hz, 1H), 5.05 – 4.95 (m, 2H), 3.46 (d, *J* = 5.5 Hz, 1H), 2.31 (dddd, *J* = 6.9, 5.4, 4.1, 1.2 Hz, 1H), 1.49 – 1.37 (m, 2H), 0.96 (d, *J* = 6.8 Hz, 3H), 0.90 (s, 9H), 0.86 (t, *J* = 7.4 Hz, 3H), 0.04 (s, 6H).

^{13}C NMR (100 MHz, $CDCl_3$): δ 141.9, 113.8, 77.4, 42.5, 26.7, 26.1, 26.1, 15.2, 9.6, -4.2, -4.3.

HRMS (ESI) m/z: Calcd. for $C_{13}H_{28}OSi$ $[M-H]^+$: 227.1831, found 227.1832

FTIR (neat): 2959, 2929, 1462, 1252, 1005, 884, 772 cm^{-1}.

$[\alpha]^{26}_D$: -21.0 (*c* 1.0, CH_2Cl_2). Lit (**ent-Fragment E**).[5] **$[\alpha]^{25}_D$:** +20.6 (*c* 1.1, CH_2Cl_2).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5.85
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5.82
5.81
5.79
5.02
5.01
4.99
4.99
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4.97
4.97
4.97
4.96
4.96
3.47
3.45
2.33
2.33
2.32
2.32
2.31
2.31
2.30
2.30
2.29
2.29
2.28
2.28
1.46
1.44
1.43
1.43
1.42
1.41
1.05
1.00
0.98
0.97
0.96
0.90
0.90
0.89
0.88
0.87
0.86
0.85
0.84
0.04
0.03
1.00
2.23
1.03
1.08
2.38
3.10
9.33
3.02
6.08
CH_3
H_3C
H_3C
Si
CH_3
O
CH_3
H_3C
CH_2
CH_3
3.2×10^7
3.0×10^7
2.8×10^7
2.6×10^7
2.4×10^7
2.2×10^7
2.0×10^7
1.8×10^7
1.6×10^7
1.4×10^7
1.2×10^7
1.0×10^7
8.0×10^6
6.0×10^6
4.0×10^6
2.0×10^6
0.0
-2.0×10^6
0.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
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2.5
2.0
1.5
1.0
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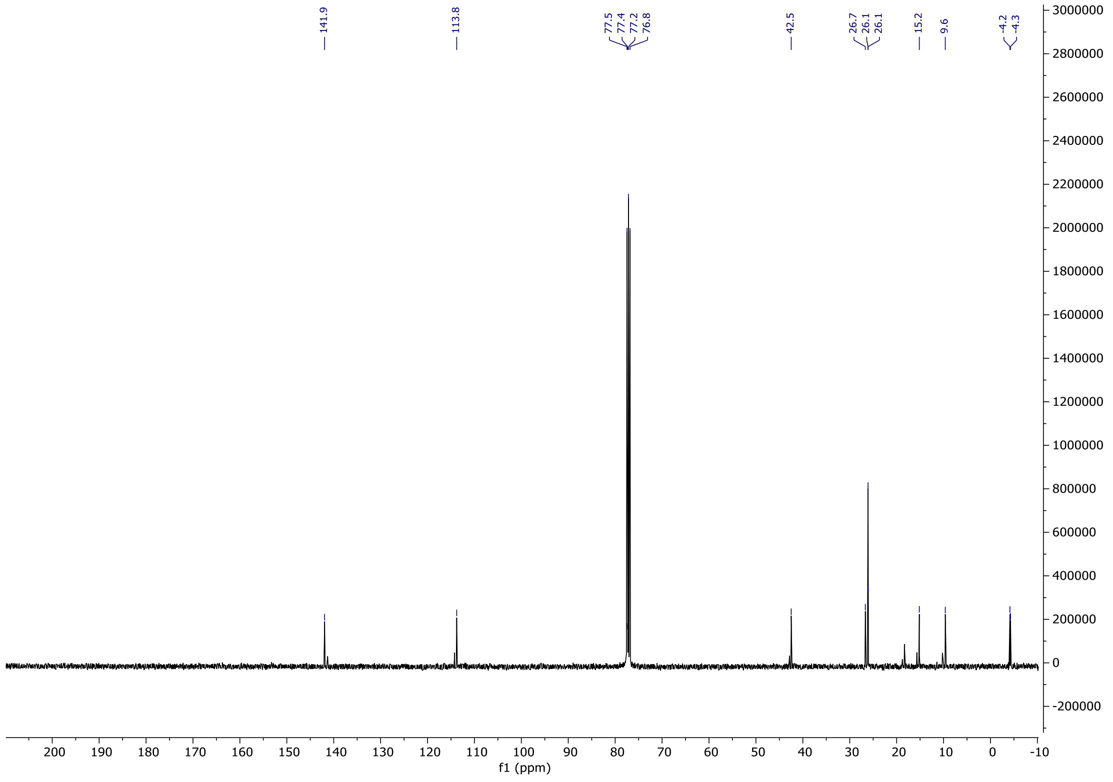
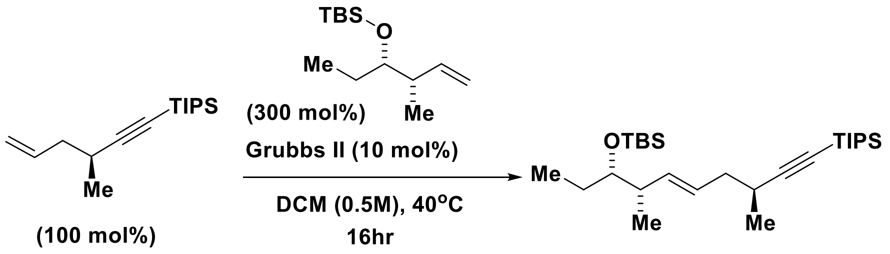
0.0
-0.5
-1.0
f1 (ppm)


141.9
113.8
77.5
77.4
77.2
76.8
42.5
26.7
26.1
26.1
15.2
9.6
-4.2
-4.3
3000000
2800000
2600000
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

Cross metathesis product



To a round-bottomed flask equipped with a magnetic stirring devise under an argon atmosphere charged with second generation Grubbs catalyst (8.5 mg, 0.01 mmol, 10 mol%) was added CH_2Cl_2 (0.20 mL, 0.5 M). **Fragment F** (25.1 mg, 0.1 mmol, 100 mol%) and **Fragment E** (68.6 mg, 0.3 mmol, 300 mol%) were added. The reaction mixture was allowed to stir at 40 °C for 18 hr. The reaction was allowed to reach ambient temperature and was concentrated *in vacuo.* The resultant residue was subjected to flash chromatography (SiO_2: hexanes) to furnish the title compound (20.3 mg, 0.045 mmol) as a colorless oil in 71% yield.

TLC (SiO_2): R_f= 0.6 (hexanes).

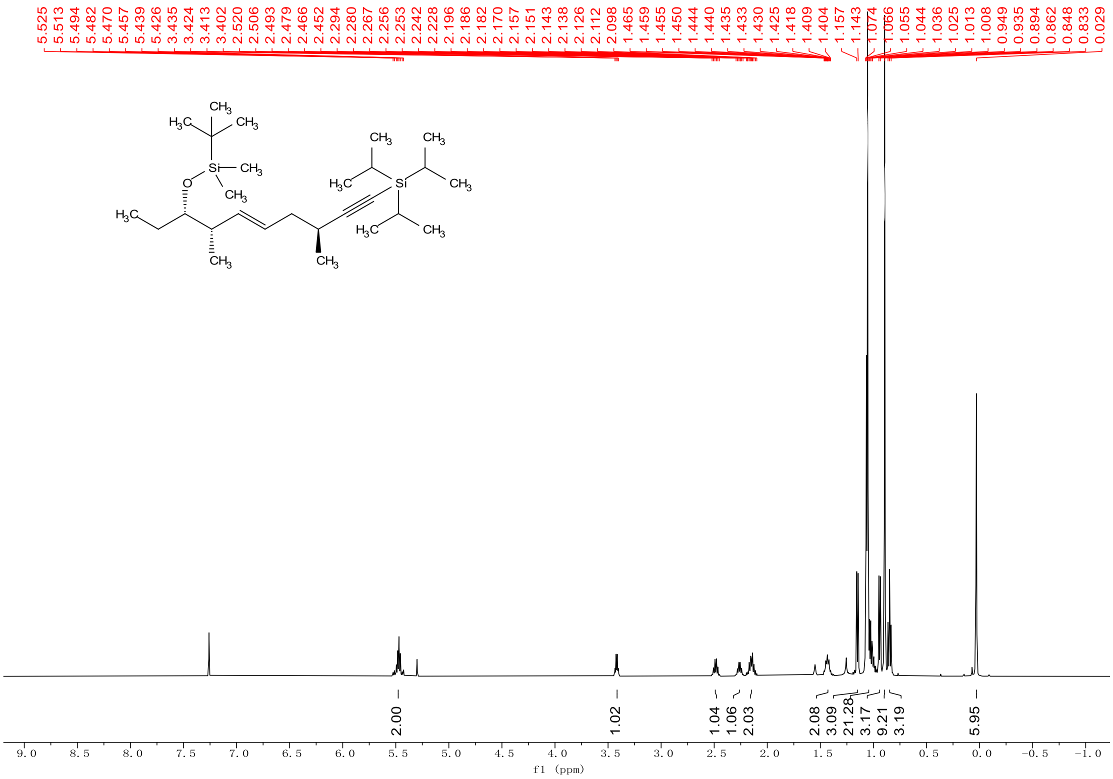
^{1}H NMR (500 MHz, $CDCl_3$): δ 5.54 – 5.41 (m, 2H), 3.42 (q, *J* = 5.5 Hz, 1H), 2.49 (h, *J* = 6.9 Hz, 1H), 2.31 – 2.22 (m, 1H), 2.21 – 2.09 (m, 2H), 1.43 (dtd, *J* = 13.1, 7.3, 2.9 Hz, 2H), 1.15 (d, *J* = 6.9 Hz, 3H), 1.08 – 1.01 (m, 21H), 0.94 (d, *J* = 6.8 Hz, 3H), 0.89 (s, 9H), 0.85 (t, *J* = 7.4 Hz, 3H), 0.03 (s, 6H).

^{13}C NMR (126 MHz, $CDCl_3$): δ 135.4, 126.8, 113.7, 79.8, 41.3, 40.2, 27.3, 26.6, 26.0, 20.8, 18.6, 18.2, 15.8, 11.3, 9.3, -4.3, -4.4.

HRMS (ESI) m/z: $[M+Na]^+$ calcd for $C_{27}H_{54}NaOSi_2$ 473.3605, found 473.3613.

FTIR (neat): 2929, 2865, 2162, 1461, 1253, 1015, 834, 772, 663 cm^{-1}.

$[\alpha]^{26}_D$: -5.0 (*c* 0.1, $CHCl_3$).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5.482
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5.457
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5.426
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2.520
2.506
2.493
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2.294
2.280
2.267
2.256
2.253
2.242
2.228
2.196
2.186
2.182
2.170
2.157
2.151
2.143
2.138
2.126
2.112
2.098
1.465
1.459
1.455
1.450
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1.435
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1.025
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0.935
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0.833
0.029
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H3C
CH3
Si
CH3
O
CH3
H3C
CH3
CH3
CH3
H3C
Si
CH3
H3C
CH3
CH3
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2.00
1.02
1.04
1.06
2.03
2.08
3.09
21.28
3.17
9.21
3.19
5.95
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
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2.0
1.5
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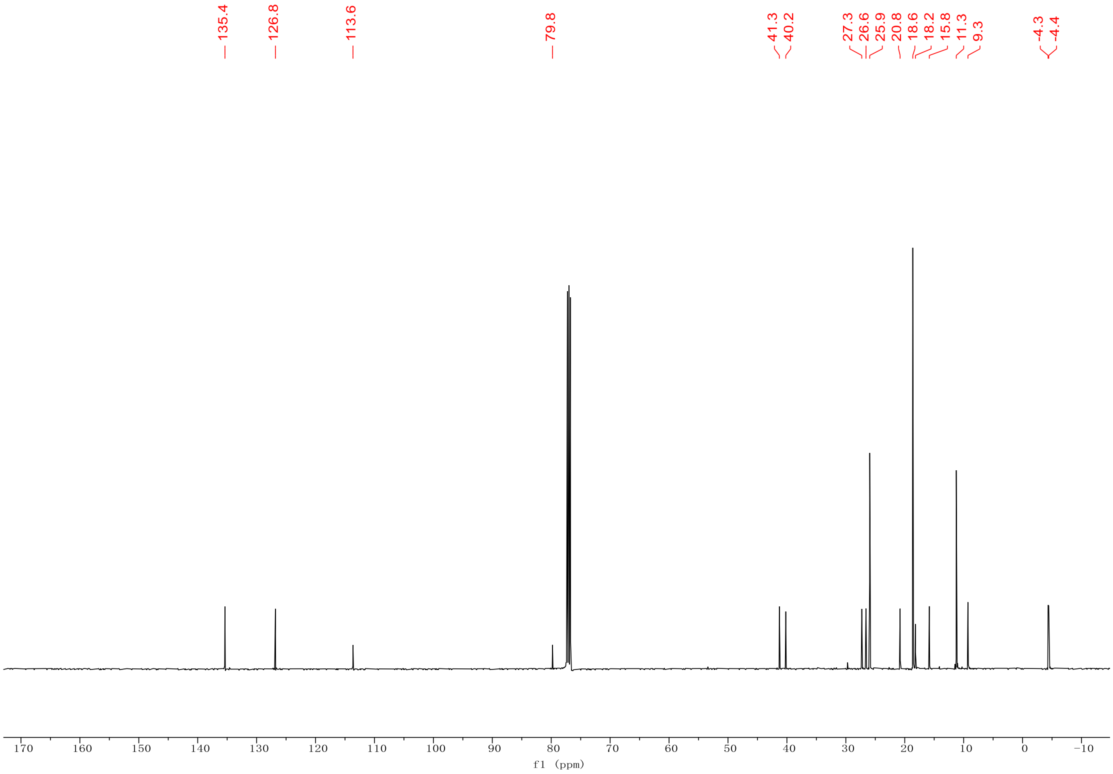
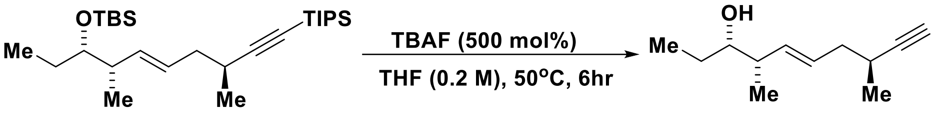
-1.0
f1 (ppm)


135.4
126.8
113.6
79.8
41.3
40.2
27.3
26.6
25.9
20.8
18.6
18.2
15.8
11.3
9.3
-4.3
-4.4
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

(E)-(3S,4S,8S)-4,8-Dimethyldec-5-en-9-yn-3-ol (14)



To a solution of silyl protected compound (28mg, 62 μmol, 100 mol%) in dry THF (0.3 mL, 0.2 M) was added TBAF (1.0 M in THF, 0.31 mL, 500 mol%) at 0 °C. The reaction mixture was allowed to stir at 50 °C for 6 hr. NH_4Cl aq was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 9:1 hexanes:ethyl acetate) to furnish the title compound **14** (8.9 mg, 50 μmol) in 80% yield as a colorless oil.

TLC (SiO_2): R_f= 0.22 (hexanes/ethyl acetate = 9:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 5.59 – 5.42 (m, 2H), 3.39 (dt, *J* = 8.8, 4.5 Hz, 1H), 2.57 – 2.45 (m, 1H), 2.29 (td, *J* = 7.0, 5.0 Hz, 1H), 2.24 – 2.13 (m, 2H), 2.10 – 2.04 (m, 1H), 1.55 – 1.46 (m, 2H), 1.20 – 1.17 (m, 3H), 1.01 (d, *J* = 6.8 Hz, 3H), 0.96 (t, *J* = 7.4 Hz, 3H).

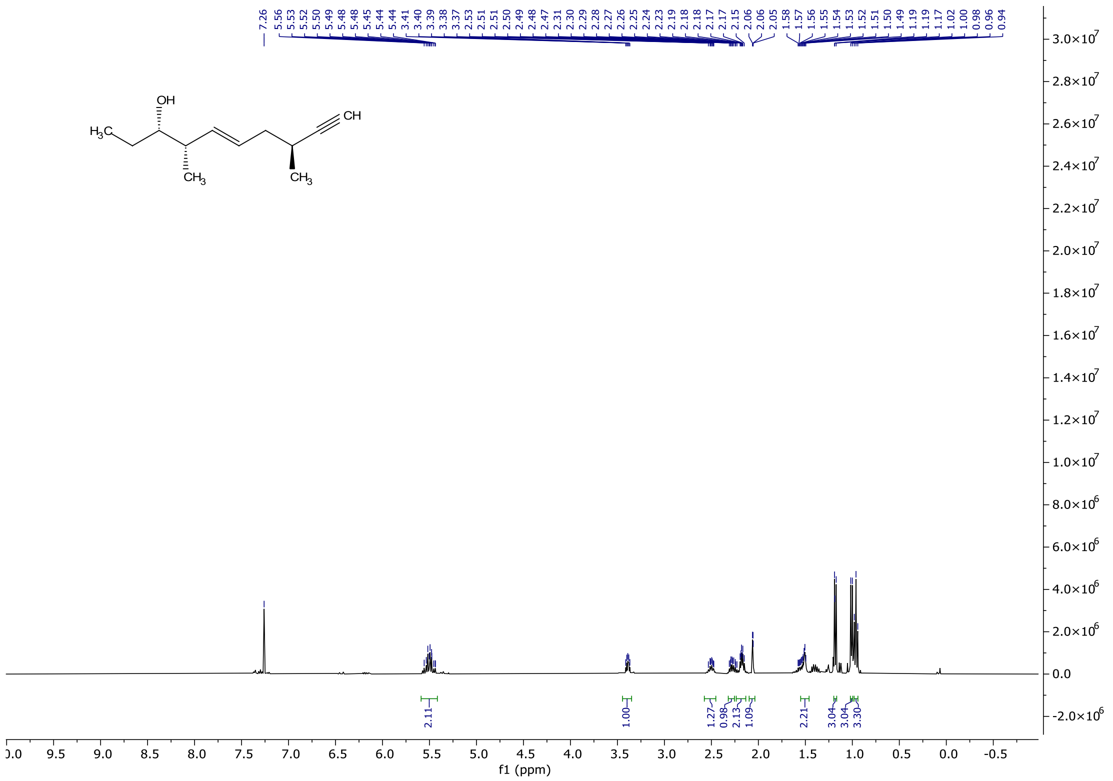
^{13}C NMR (100 MHz, $CDCl_3$): δ 135.5, 128.2, 88.8, 76.4, 68.9, 42.1, 39.9, 26.9, 26.3, 20.6, 14.4, 10.6.

HRMS (ESI) Calcd. for $C_{12}H_{20}O$ $[M+Na]^+$: 203.1412, found 203.1410.

FTIR (neat): 3308, 2967, 2931, 2875, 1455, 1328, 1097, 970, 748, 694 cm^{-1}.

$[\alpha]^{26}_D$: +6.0 (*c* 1.0, $CHCl_3$).

The spectral data were identical to those reported.[6]


7.26
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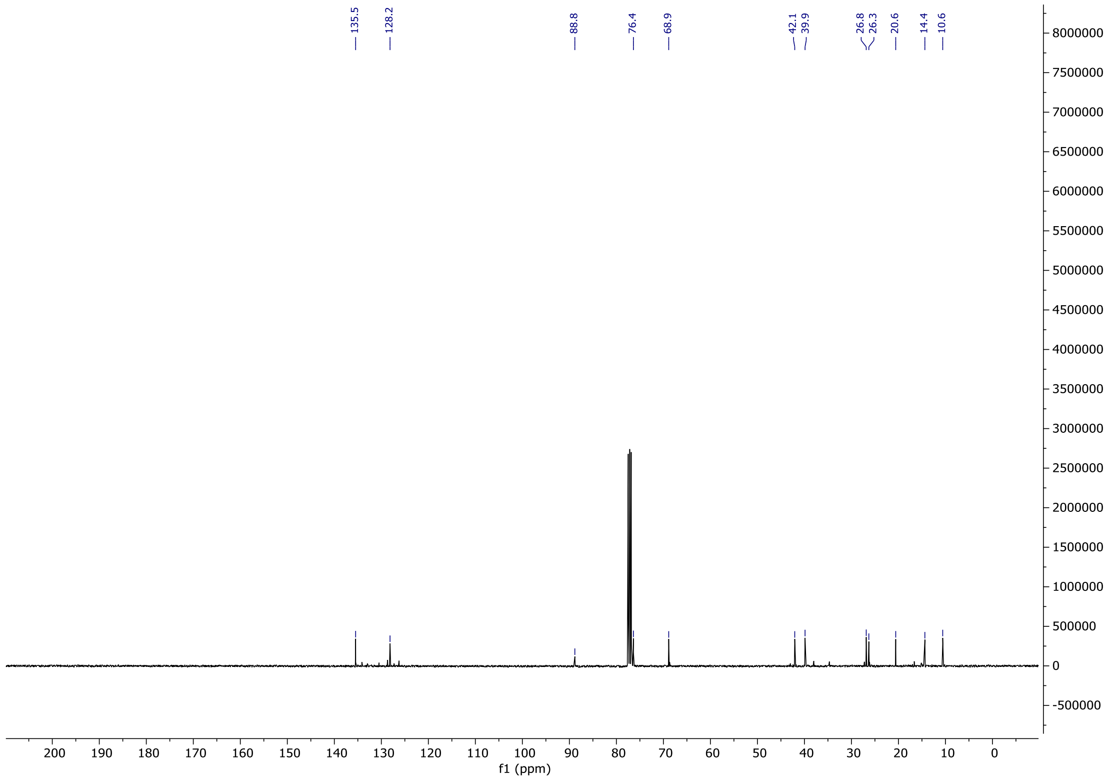
1.53
1.52
1.51
1.50
1.49
1.19
1.19
1.17
1.02
1.00
0.98
0.96
0.94
OH
H3C
CH
CH3
CH3
2.11
1.00
1.27
0.98
2.13
1.09
2.21
3.04
3.04
3.30
f1 (ppm)
3.0×10^7
2.8×10^7
2.6×10^7
2.4×10^7
2.2×10^7
2.0×10^7
1.8×10^7
1.6×10^7
1.4×10^7
1.2×10^7
1.0×10^7
8.0×10^6
6.0×10^6
4.0×10^6
2.0×10^6
0.0
-2.0×10^6


135.5
128.2
88.8
76.4
68.9
42.1
39.9
26.8
26.3
20.6
14.4
10.6
f1 (ppm)
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7500000
7000000
6500000
6000000
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1000000
500000
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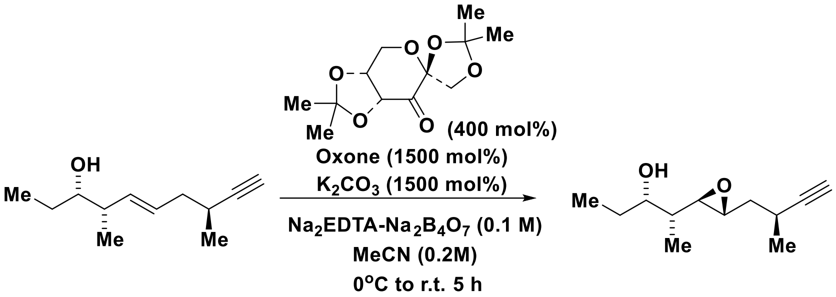
-500000

Product of Shi epoxidation



To a solution of **14** (20 mg, 0.12 mmol, 100 mol%) in MeCN (0.56 mL, 0.2 M) and 0.28 mL of 0.4 mM Na_2EDTA-0.05 M $Na_2B_4O_7$ solution was added 1,2:4,5-di-O-isopropylidene-D-erythro-2,3-hexodiuro-2,6-pyranose (Shi's catalyst, 114 mg, 0.48 mmol, 400 mol%). The reaction mixture was allowed to cool to 0 °C and a mixture of oxone® (510 mg, 1.8 mmol, 1500 mol%) and K_2CO_3 (230 mg, 1.8 mmol, 1500 mol%) were added in several portions over 4 hr. The reaction mixture was allowed to stir at room temperature for 1 hr. Water was added and the biphasic mixture was transferred to a separatory funnel. The aqeuous phase was extracted with ethyl acetate. The combined organic layers were dried (Na_2SO_4), filtered and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 5:1 hexanes:ethyl acetate) to furnish the title compound (24.4 mg, 0.043 mmol) in 72 % yield as a colorless oil.

TLC (SiO_2): R_f= 0.25 (hexanes/ethyl acetate = 4:1).

^{1}H NMR (400 MHz, $CDCl_3$): δ 3.63 (td, *J* = 6.6, 3.5 Hz, 1H), 2.97 (td, *J* = 5.9, 2.3 Hz, 1H), 2.79 (dd, *J* = 7.2, 2.3 Hz, 1H), 2.67 (d, *J* = 6.5 Hz, 1H), 2.10 (d, *J* = 2.4 Hz, 1H), 1.68 – 1.63 (m, 2H), 1.56 – 1.49 (m, 3H), 1.25 (d, *J* = 6.9 Hz, 3H), 1.02 – 0.95 (m, 6H).

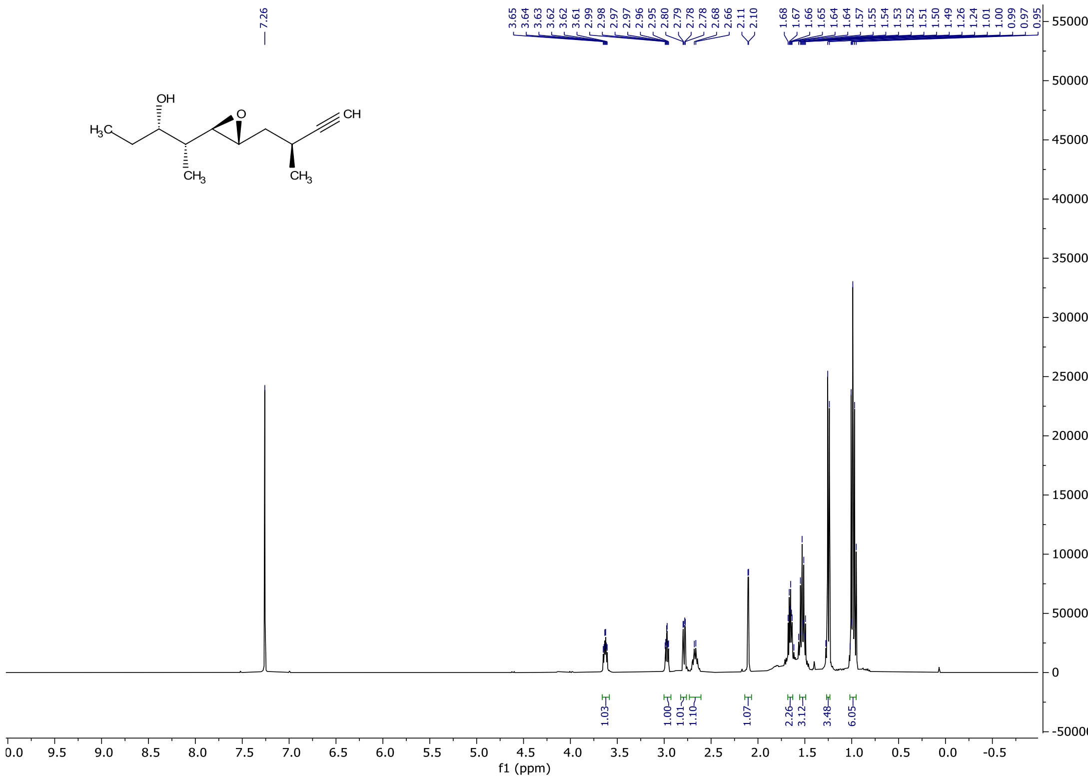
^{13}C NMR (100 MHz, $CDCl_3$): δ 77.4, 74.7, 69.4, 61.9, 56.3, 40.3, 39.6, 27.4, 23.7, 21.5, 10.7, 10.5.

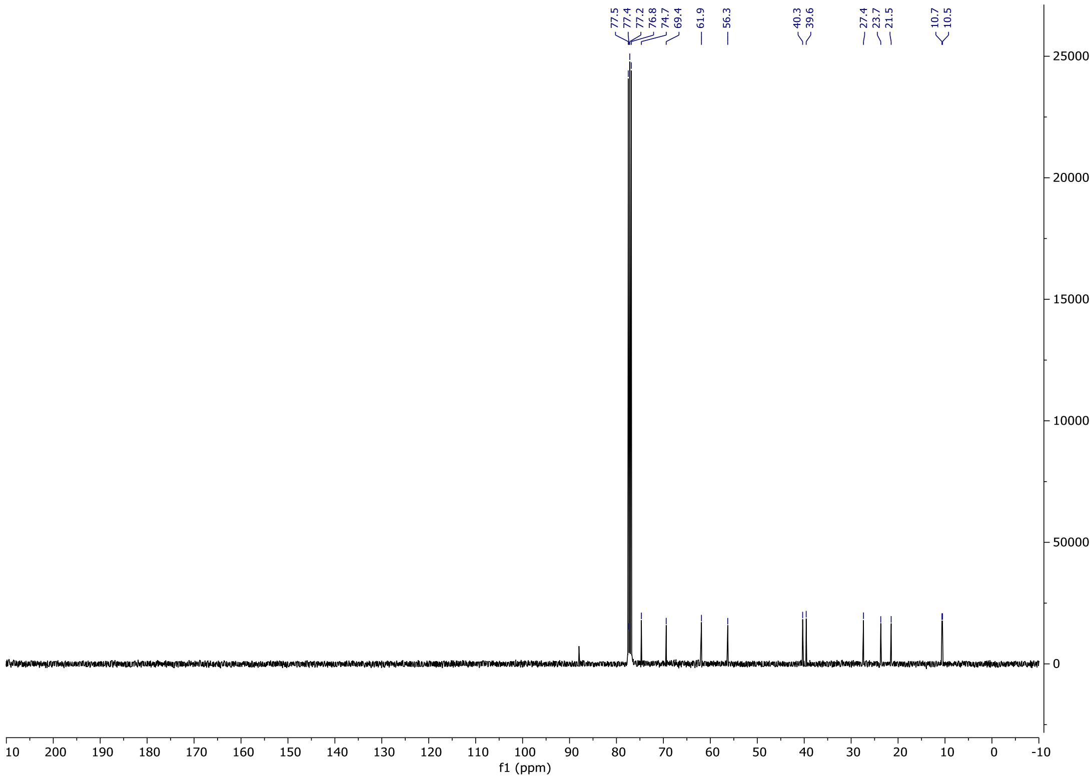
HRMS (ESI) Calcd. for $C_{12}H_{20}O_2$ $[M+Na]^+$: 219.1361, found 219.1353.

FTIR (neat): 2963, 2922, 1452, 1376, 1220, 1066, 967, 862, 717, 682, 663, 656 cm^{-1}.

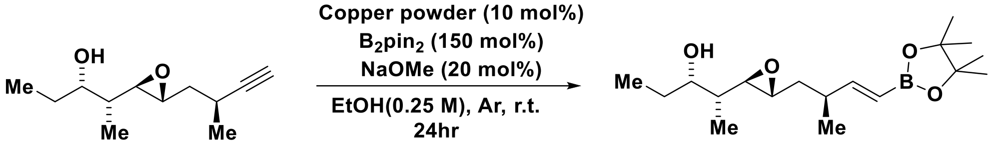
$[\alpha]^{26}_D$: +2.5 (*c* 1.0, $CHCl_3$).

The spectral data were identical to those reported.[6]


7.26
3.65 3.64 3.63 3.62 3.62 3.61 2.99 2.98 2.97 2.97 2.96 2.95 2.80 2.79 2.78 2.68 2.66 2.11 2.10
1.68 1.67 1.66 1.65 1.64 1.64 1.57 1.55 1.54 1.53 1.52 1.51 1.50 1.49 1.26 1.24 1.01 1.00 0.99 0.97 0.95
OH
H_3C
O
CH
CH_3
CH_3
1.03
1.00
1.01
1.10
1.07
2.26
3.12
3.48
6.05
5500000
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
-500000
0.0 9.5 9.0 8.5 8.0 7.5 7.0 6.5 6.0 5.5 5.0 4.5 4.0 3.5 3.0 2.5 2.0 1.5 1.0 0.5 0.0 -0.5
f1 (ppm)


77.5 77.4 77.2 76.8 74.7 69.4
61.9
56.3
40.3 39.6
27.4 23.7 21.5
10.7 10.5
2500000
2000000
1500000
1000000
500000
0
10 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 -10
f1 (ppm)

Fragment B



To a stirred solution of alkyne (15.2 mg, 72 µmol, 100 mol%) in ethanol (0.3 mL, 0.25 M) was added copper powder (0.5 mg, 7.2 µmol, 10 mol%), B_2pin_2 (28 mg, 108 µmol, 150 mol%), and sodium methylate (0.8 mg, 14.4 µmol, 20 mol%). The reaction mixture was allowed to stir at room temperature for 24 hr. The reaction mixture was concentrated *in vacuo* and the resultant residue was subjected to flash column chromatography (SiO_2: 5:1 hexnaes/ethyl acetate) to furnish the **Fragment B** (14.8 mg, 45 µmol) in 60% yield as a colorless oil.

TLC (SiO_2): R_f = 0.15 (hexanes/ethyl acetate = 4:1).

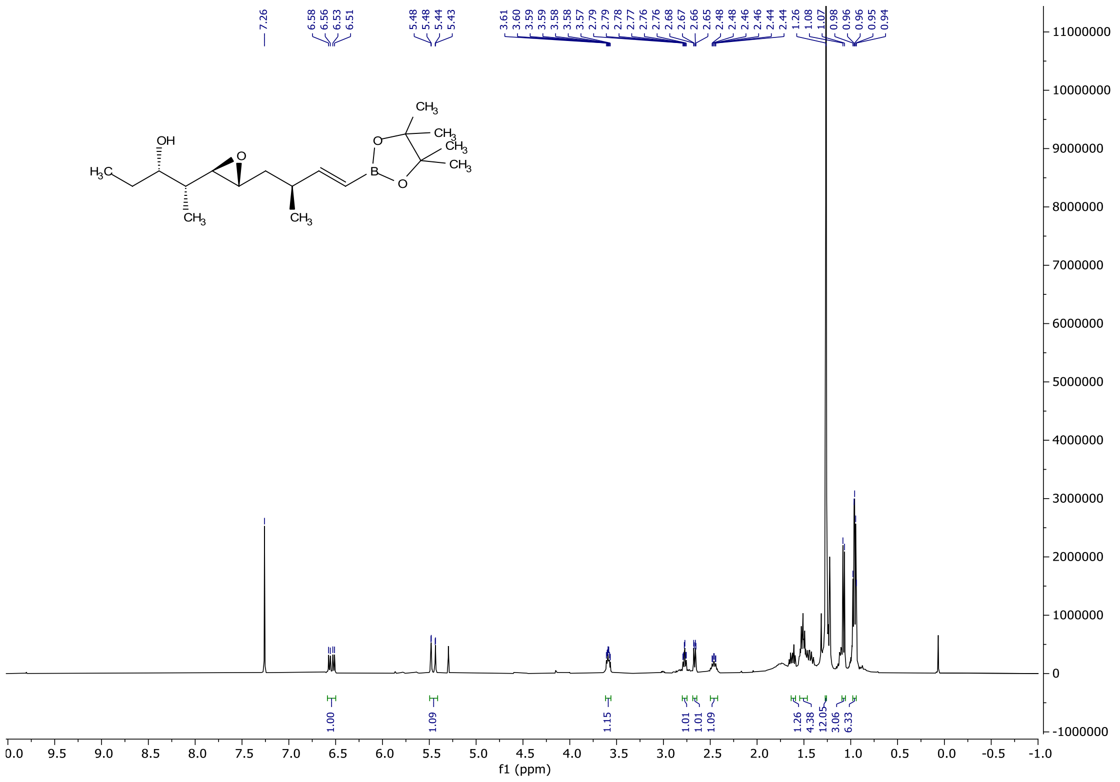
^{1}H NMR (400 MHz, $CDCl_3$): δ 6.54 (dd, *J* = 18.0, 7.3 Hz, 1H), 5.46 (dd, *J* = 18.0, 1.2 Hz, 1H), 3.62 – 3.56 (m, 1H), 2.77 (td, *J* = 6.0, 2.3 Hz, 1H), 2.66 (dd, *J* = 7.3, 2.3 Hz, 1H), 2.50 – 2.42 (m, 1H), 1.64 – 1.59 (m, 1H), 1.55 – 1.46 (m, 4H), 1.26 (s, 12H), 1.07 (d, *J* = 6.8 Hz, 3H), 0.96 (dd, *J* = 7.2, 4.7 Hz, 6H).

^{13}C NMR (100 MHz, $CDCl_3$): δ 158.3, 83.3, 77.4, 74.8, 62.1, 56.9, 40.4, 39.0, 37.7, 27.4, 24.9, 20.3, 10.7, 10.7.

HRMS (ESI) Calcd. for $C_{18}H_{33}BO_4$ $[M+Na]^+$: 347.2370, found 347.2361.

FTIR (neat): 2974, 2928, 1637, 1363, 1323, 1143, 969, 849, 657 cm^{-1}.

$[\alpha]^{26}_D$: +16.0 (*c* 1.0, $CHCl_3$).


7.26
6.58
6.56
6.53
6.51
5.48
5.48
5.44
5.43
3.61
3.60
3.59
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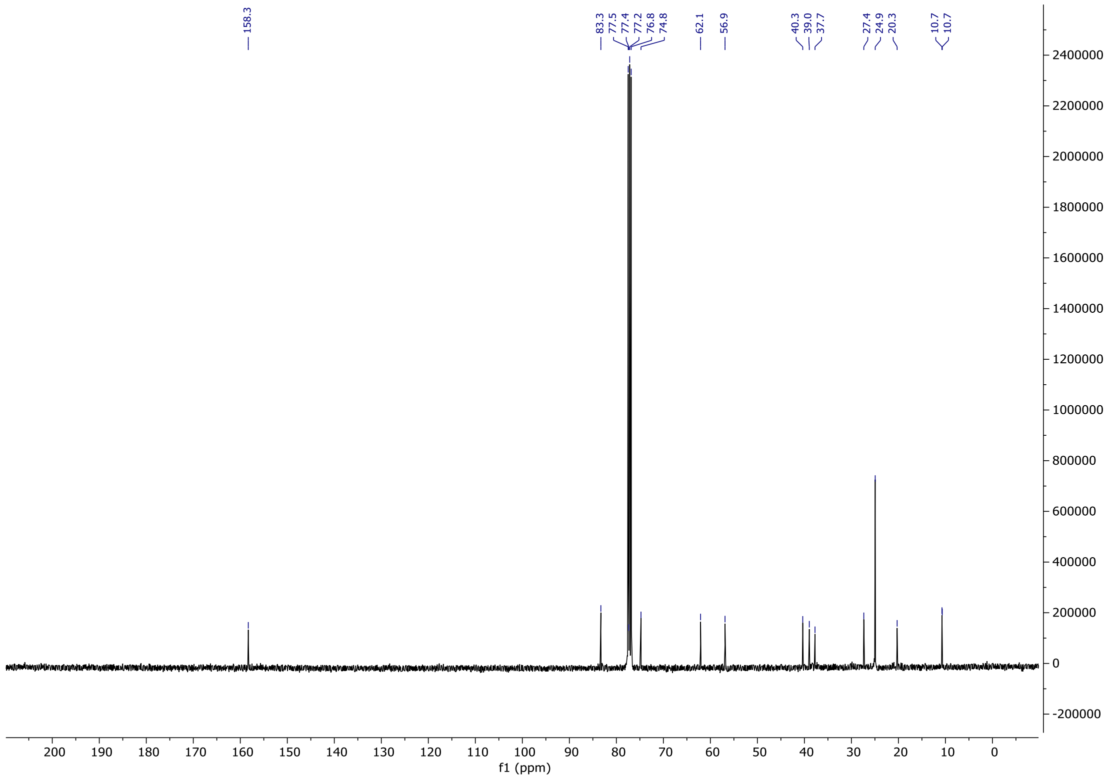
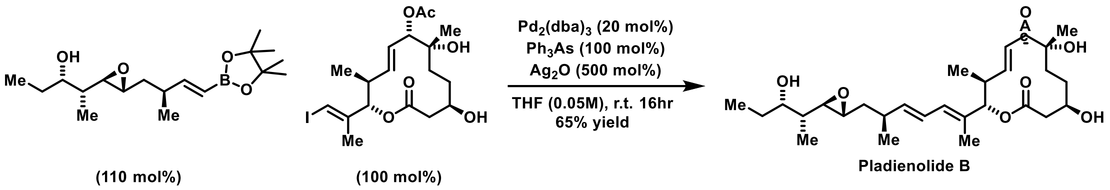
3.58
3.58
3.57
2.79
2.79
2.78
2.77
2.76
2.76
2.68
2.67
2.66
2.65
2.48
2.48
2.46
2.46
2.44
2.44
1.26
1.08
1.07
0.98
0.96
0.96
0.95
0.94
OH
O
H_3C
CH_3
CH_3
O
B
O
CH_3
CH_3
CH_3
CH_3
1.00
1.09
1.15
1.01
1.01
1.09
1.26
4.38
12.05
3.06
6.33
11000000
10000000
9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
-1000000
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
f1 (ppm)


158.3
83.3
77.5
77.4
77.2
76.8
74.8
62.1
56.9
40.3
39.0
37.7
27.4
24.9
20.3
10.7
10.7
2400000
2200000
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
-200000
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
f1 (ppm)

Pladienolide B



To a solution of **Fragment A** (7.3 mg, 15.6 µmol, 100 mol%) in THF (0.3 mL, 0.05 M) at room temperature was added **Fragment B** (5.5 mg, 17 µmol, 110 mol%), silver oxide (18.1 mg, 78 µmol, 500 mol%), triphenylarsine (4.8 mg, 15.6 µmol, 100 mol%) and tris(dibenzylideneacetone)dipalladium(0) (2.9 mg, 3.1 µmol, 20 mol%). The reaction mixture was allowed to stir at room temperature for 16 hr. The reaction mixture was filtered through celite, washed with CH_2Cl_2, and concentrated *in vacuo*. The resulting oil was subjected to flash chromatography (SiO_2: 1:1 – 3:7 hexanes/ethyl acetate) to furnish **Pladienolide B** (5.5 mg, 10 µmol) as a colorless oil in 65% yield.

TLC (SiO_2): R_f= 0.12 (hexanes/ethyl acetate = 3:7).

^{1}H NMR (400 MHz, CD_3OD): δ 6.33 (dd, *J* = 15.0, 10.8 Hz, 1H), 6.14 – 6.07 (m, 1H), 5.75 – 5.68 (m, 1H), 5.68 – 5.62 (m, 1H), 5.56 (dd, *J* = 15.2, 9.7 Hz, 1H), 5.05 (d, *J* = 10.0 Hz, 2H), 3.78 (dt, *J* = 6.4, 3.6 Hz, 1H), 3.51 (dt, *J* = 8.8, 4.6 Hz, 1H), 2.72 (td, *J* = 5.9, 2.3 Hz, 1H), 2.66 (dd, *J* = 8.2, 2.3 Hz, 1H), 2.58 (dd, *J* = 10.3, 6.6 Hz, 1H), 2.52 (d, *J* = 3.9 Hz, 2H), 2.51 – 2.41 (m, 1H), 2.06 (s, 3H), 1.75 (d, *J* = 1.3 Hz, 3H), 1.64 (td, *J* = 9.6, 8.2, 4.0 Hz, 2H), 1.60 – 1.55 (m, 1H), 1.55 – 1.50 (m, 1H), 1.46 (dt, *J* = 14.0, 5.1 Hz, 2H), 1.42 – 1.34 (m, 2H), 1.29 (s, 1H), 1.19 (s, 3H), 1.08 (d, *J* = 6.7 Hz, 3H), 0.95 (d, *J* = 7.3 Hz, 3H), 0.93 – 0.89 (m, 3H), 0.88 (d, *J* = 6.7 Hz, 3H).

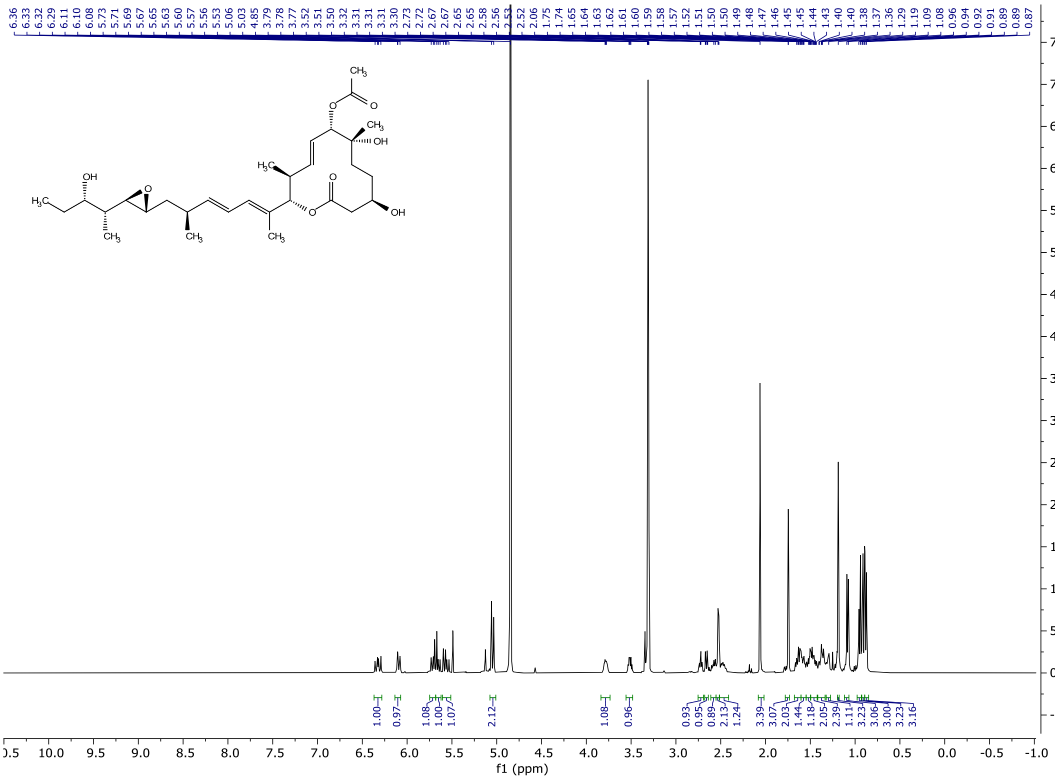
^{13}C NMR (100 MHz, CD_3OD): δ 172.2, 171.8, 142.4, 141.7, 132.5, 132.2, 127.1, 125.9, 84.3, 80.3, 75.3, 74.1, 70.4, 63.0, 58.5, 42.8, 41.8, 40.7, 40.1, 37.5, 36.7, 30.5, 28.6, 24.2, 21.7, 21.1, 16.9, 11.9, 10.9, 10.8.

HRMS (ESI) Calcd. for $C_{30}H_{48}O_8$ $[M+Na]^+$: 559.3247, found 559.3243.

FTIR (neat): 3435, 2961, 2929, 2874, 1734, 1557, 1456, 1370, 1238, 1175, 1020, 966, 910 cm^{-1}.

$[\alpha]^{26}_D$: +7.5 (*c* 0.5, MeOH). Lit.[7] **$[\alpha]^{27}_D$**: +7.90 (*c* 1.1, MeOH).

The spectral data were identical to those reported.[3,6,7]


6.36
6.33
6.32
6.29
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5.69
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5.63
5.60
5.57
5.56
5.53
5.06
5.03
4.85
3.79
3.78
3.77
3.52
3.51
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1.40
1.38
1.37
1.36
1.29
1.19
1.09
1.08
0.96
0.94
0.92
0.91
0.89
0.89
0.87
CH3
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O
CH3
OH
H3C
OH
O
H3C
O
O
OH
CH3
CH3
CH3
1.00
0.97
1.08
1.00
1.07
2.12
1.08
0.96
0.93
0.95
0.89
2.13
1.24
3.39
3.07
2.03
1.44
1.18
2.05
2.39
1.11
3.23
3.06
3.00
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5500000
5000000
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3000000
2500000
2000000
1500000
1000000
500000
0
-500000
0.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
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2.0
1.5
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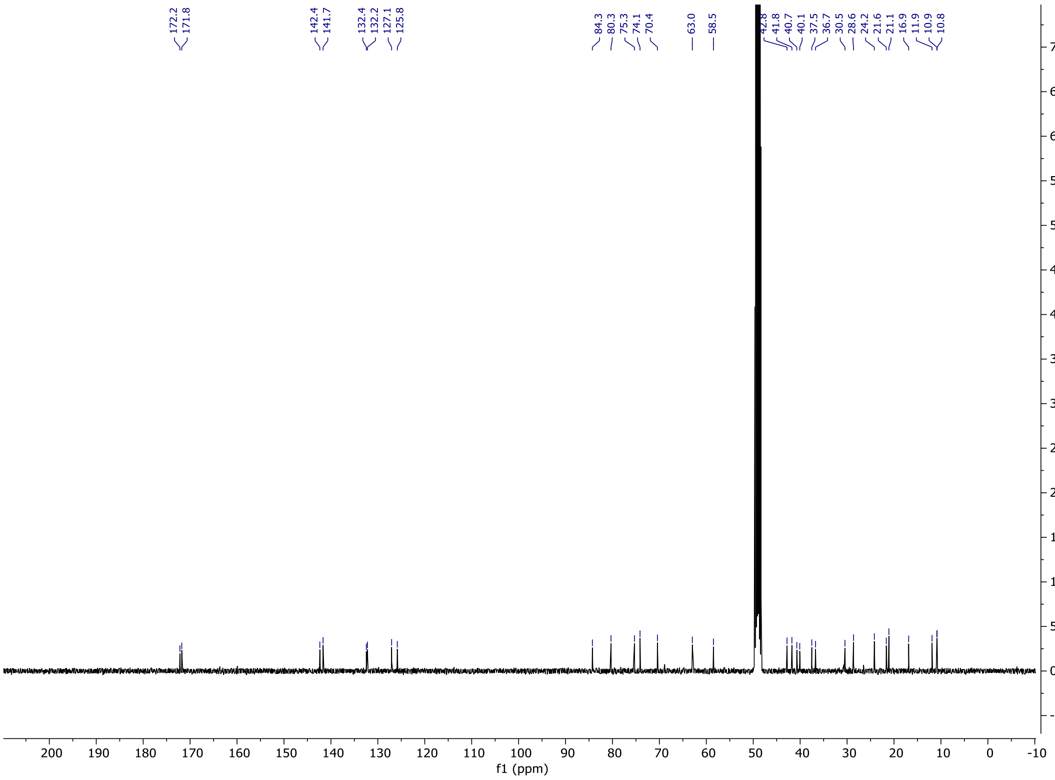
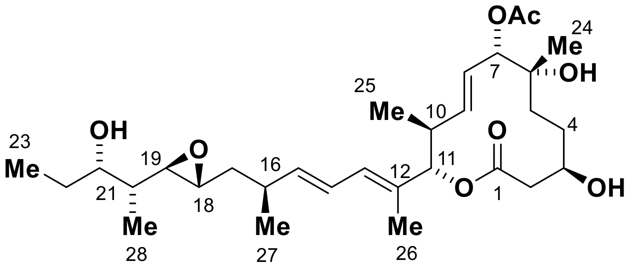
0.0
-0.5
-1.0
f1 (ppm)


172.2
171.8
142.4
141.7
132.4
132.2
127.1
125.8
84.3
80.3
75.3
74.1
70.4
63.0
58.5
42.8
41.8
40.7
40.1
37.5
36.7
30.5
28.6
24.2
21.6
21.1
16.9
11.9
10.9
10.8
7000000
6500000
6000000
5500000
5000000
4500000
4000000
3500000
3000000
2500000
2000000
1500000
1000000
500000
0
-500000
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
f1 (ppm)

^{13}C NMR of Synthetic Pladienolide B (by Krische) Comparison with Natural Compound (by Sakai)[8] and Synthetic Pladienolide B (by Kotake)[7]

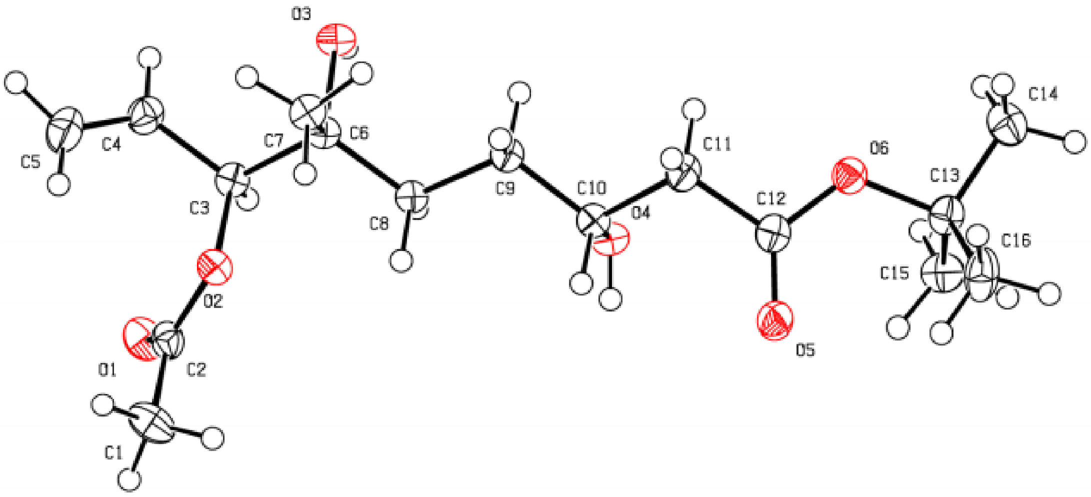


Carbon #	Natural	Synthetic (by Kotake)	Synthetic (by Krische)
1	171.8	171.8	171.8
2	40.1	40.1	40.1
3	70.4	70.4	70.4
4	30.5	30.4	30.5
5	37.5	37.5	37.5
6	74.1	74.1	74.1
7	80.3	80.3	80.3
8	127.1	127.0	127.1
9	141.7	141.6	141.7
10	41.8	41.7	41.8
11	84.3	84.3	84.3
12	132.2	132.2	132.2
13	132.4	132.4	132.5
14	125.8	125.8	125.9
15	142.4	132.3	142.4
16	36.7	36.7	36.7
17	40.7	40.7	40.7
18	58.4	58.5	58.5
19	63.0	63.0	63.0
20	42.8	42.8	42.8
21	75.3	75.3	75.3
22	28.6	28.6	28.6
23	10.8	10.8	10.8
24	24.2	24.2	24.2
25	16.9	16.9	16.9
26	11.9	11.9	11.9
27	21.6	21.7	21.7
28	10.9	10.9	10.9
7-COCH$_3$	172.2	172.2	172.2
	21.1	21.1	21.1

Single Crystal Diffraction Data for Compound 4

Empirical formula	C16 H28 O6	
Formula weight	316.38	
Temperature	100 K	
Wavelength	1.54184 Å	
Crystal system	monoclinic	
Space group	P 1 21 1	
Unit cell dimensions	a = 10.16343(18) Å	a= 90°.
	b = 6.7312(2) Å	b= 91.4769(16)°.
	c = 13.4561(3) Å	g = 90°.
Volume	920.24(4) Å^3	
Z	2	
Density (calculated)	1.142 Mg/m^3	
Absorption coefficient	0.713 mm^{-1}	
F(000)	344	
Crystal size	0.37 x 0.093 x 0.081 mm^3	
Theta range for data collection	3.285 to 73.376°.	
Index ranges	-12<=h<=12, -7<=k<=8, -16<=l<=16	
Reflections collected	12472	
Independent reflections	3452 [R(int) = 0.0368]	
Completeness to theta = 67.684°	100.0 %	
Absorption correction	Numerical and multi-scan	
Max. and min. transmission	1.00 and 0.714	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3452 / 1 / 214	
Goodness-of-fit on F^2	1.045	
Final R indices [I>2sigma(I)]	R1 = 0.0396, wR2 = 0.1062	
R indices (all data)	R1 = 0.0400, wR2 = 0.1067	
Absolute structure parameter	-0.06(12)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.190 and -0.237 e.Å^{-3}	

View of 4 showing the atom labeling scheme.



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