

Total Synthesis of (-)-Reveromycin B

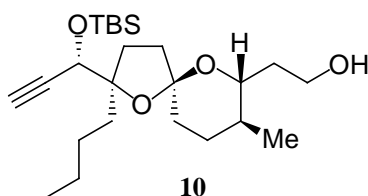
Supporting Information

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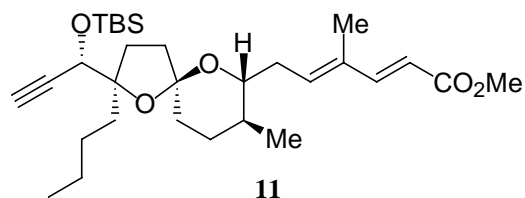
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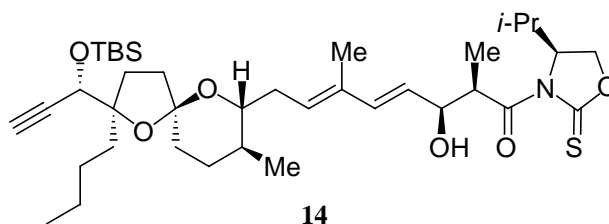
General. ^1H NMR (75.5 or 100 MHz) and proton decoupled ^{13}C NMR spectra (75.5 or 100 MHz) were recorded for deuteriochloroform or D_4 -methanol solutions with residual protonated solvent as internal standard on a Varian Unity 300 or UnityPlus 400 spectrometer. Microanalyses were carried out at the University of Otago, Dunedin, New Zealand. Optical rotations were recorded in a 10cm microcell on a JASCO DIP-1000 digital polarimeter. Infrared spectra were recorded using a Bio-Rad FTS165 FT-IR spectrometer. High resolution mass spectra (HR-MS) electrospray ionisation (ESI) were run on a Bruker 4.7T BiOAPEX FTMS mass spectrometer at Monash University, Clayton, Victoria.



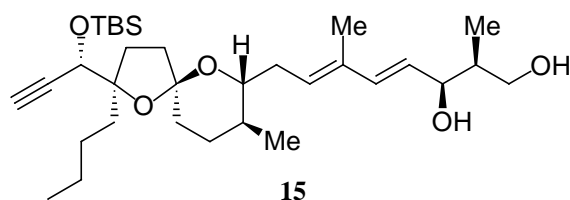
Alcohol (major) **10**: colorless oil, $R_f = 0.40$ (silica gel, 10% ethyl acetate/petrol); $[\alpha]_D^{20} = +36.4^\circ$ ($c = 0.650$, CH_2Cl_2); IR ν_{max} (film) 3448, 3316, 2955, 2859, 1464, 1252, 1093 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ 0.11 (s, 3H), 0.14 (s, 3H), 0.79 (d, $J = 6.3$ Hz, 3H), 0.84 (s, 9H), 0.87 (t, $J = 6.9$ Hz, 3H), 2.35 (d, $J = 1.8$ Hz, 1H), 2.95 (br s, 1H), 3.68-3.80 (m, 3H) 4.36 (d, $J = 1.8$ Hz, 1H); ^{13}C NMR (75.5 MHz, CDCl_3) δ -5.5, -4.6, 14.2, 17.6, 17.8, 23.2, 25.4, 25.6, 28.8, 31.5, 32.9, 33.8, 34.5, 34.9, 38.9, 61.2, 70.3, 72.9, 77.1, 84.3, 88.2, 106.8. Anal. calc. for $\text{C}_{24}\text{H}_{44}\text{O}_4\text{Si}$: C, 67.87; H, 10.44. Found: C, 67.95; H, 10.61.



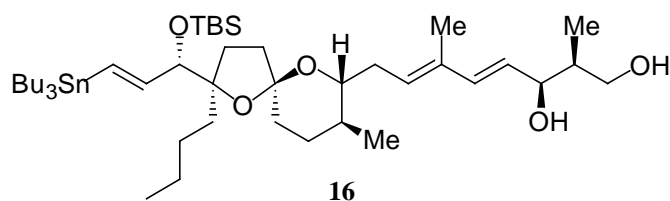
Ester **11**: yellow oil, $R_f = 0.37$ (silica gel, 5% ethyl acetate/petrol); $[\alpha]_D^{20} = -23.8^\circ$ ($c = 0.944$, CH_2Cl_2); IR ν_{max} (film) 3310, 2956, 2859, 1724, 1623 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ 0.08 (s, 3H), 0.14 (s, 3H), 0.82 (d, $J = 6.6$ Hz, 3H), 0.86 (s, 9H), 0.89 (t, $J = 6.6$ Hz, 3H), 1.77 (s, 3H), 2.35 (d, $J = 2.1$ Hz, 1H), 2.39 (m, 1H), 3.63-3.73 (m, 1H), 3.72 (s, 3H), 4.34 (d, $J = 2.1$ Hz, 1H), 5.78 (d, $J = 15.6$ Hz, 1H), 6.05 (t, $J = 6.9$ Hz, 1H), 7.35 (d, $J = 15.6$ Hz, 1H); ^{13}C NMR (75.5 MHz, CDCl_3) δ -5.3, -4.4, 12.3, 14.2, 17.7, 17.9, 23.2, 25.6, 29.1, 29.6, 31.3, 32.8, 32.9, 33.9, 34.2, 38.8, 51.3, 70.1, 72.9, 75.5, 84.3, 87.9, 107.0, 115.0, 133.7, 138.7, 149.8, 167.8; HR-MS (ESI) calc. for $\text{C}_{30}\text{H}_{50}\text{O}_5\text{SiNa}$ [$M+\text{Na}^+$]: 541.3325. Found: 541.3315.



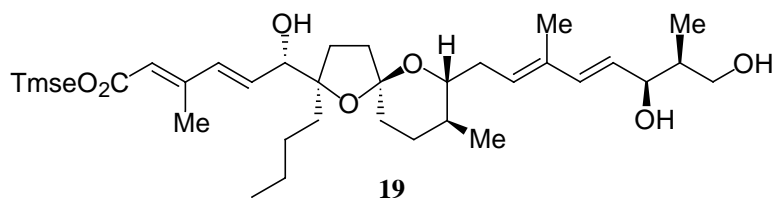
Aldol adduct **14**: colorless oil, $R_f = 0.50$ (silica gel, 20% ethyl acetate/petrol); $[\alpha]_D^{20} = +52.7^\circ$ ($c = 3.15$, CH_2Cl_2); IR ν_{max} (film) 3480, 3310, 2957, 2861, 1703, 1462 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ 0.10 (s, 3H), 0.16 (s, 3H), 0.80 (d, $J = 6.6$ Hz, 3H), 0.90 (t, $J = 6.9$ Hz, 3H), 0.88 (s, 9H), 1.19 (d, $J = 6.9$ Hz, 2H), 1.75 (s, 3H), 2.23-2.40 (m, 2H), 2.36 (d, $J = 2.1$ Hz, 1H), 2.53 (br s, 1H), 3.65 (dt, $J = 9.9, 4.8$ Hz, 1H), 4.39 (m, 2H), 4.63 (t, $J = 5.1$ Hz, 1H), 4.76 (dd, $J = 9.3, 5.4$ Hz, 1H), 5.05 (dd, $J = 6.9, 4.5$ Hz, 1H), 5.59 (dd, $J = 15.6, 6.6$ Hz, 1H), 5.66 (t, $J = 8.7$ Hz, 1H), 6.36 (d, $J = 15.6$ Hz, 1H); ^{13}C NMR (75.5 MHz, CDCl_3) δ -5.2, -4.3, 11.4, 12.6, 14.3, 14.8, 17.6, 18.0, 18.2, 23.3, 25.4, 25.7, 25.8, 29.0, 29.2, 29.6, 33.0, 33.7, 38.9, 42.8, 63.2, 67.3, 70.2, 72.9, 73.9, 75.6, 84.5, 87.8, 107.0, 125.0, 130.0, 133.8, 137.2, 176.7, 186.0; HR-MS (ESI) calc. for $\text{C}_{38}\text{H}_{63}\text{NO}_6\text{SSiNa}$ [$M+\text{Na}^+$]: 712.4043. Found: 712.4026. Anal. calc. for $\text{C}_{38}\text{H}_{63}\text{NO}_6\text{SSi}$: C, 66.14; H, 9.20; N, 2.03. Found: C, 65.98; H, 9.29; N, 1.98.



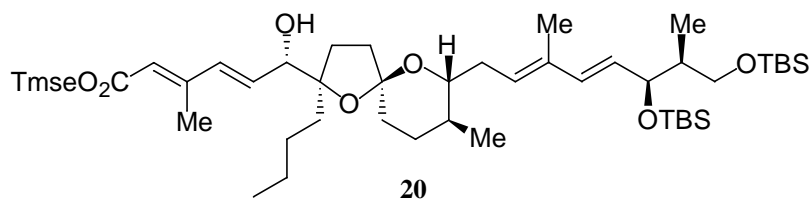
Diol **15**: pale yellow oil, $R_f = 0.50$ (silica gel, 40% ethyl acetate/petrol); $[\alpha]_D^{20} = -19.2^\circ$ ($c = 0.570$, CH_2Cl_2); IR ν_{max} (film) 3375, 3312, 2929, 2860, 1462, 1253 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 0.09 (s, 3H), 0.15 (s, 3H), 0.80 (d, $J = 6.4$ Hz, 3H), 0.86 (s, 9H), 0.89 (t, $J = 7.2$ Hz, 3H), 1.75 (s, 3H), 2.35 (d, $J = 2.0$ Hz, 1H), 2.34-2.36 (m, 1H), 3.61-3.68 (m, 2H), 3.71 (dd, $J = 10.4, 7.2$ Hz, 1H), 4.31 (dd, $J = 6.8, 3.2$ Hz, 1H), 4.38 (d, $J = 2.0$ Hz, 1H), 5.61 (dd, $J = 15.6, 7.2$ Hz, 1H), 5.65 (t, $J = 8.8$ Hz, 1H), 6.31 (d, $J = 15.6$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ -5.2, -4.3, 11.7, 12.7, 14.3, 17.7, 18.0, 23.3, 25.4, 25.7, 25.8, 29.2, 31.3, 32.1, 33.0, 33.8, 39.9, 40.2, 66.4, 70.2, 72.9, 75.6, 77.2, 84.4, 87.8, 107.1, 125.7, 130.0, 133.7, 137.0; HR-MS (ESI) calc. for $\text{C}_{32}\text{H}_{56}\text{O}_5\text{SiNa}$ [$M+\text{Na}^+$]: 571.3795. Found: 571.3792. Anal. calc. for $\text{C}_{32}\text{H}_{56}\text{O}_5\text{Si}$: C, 70.02; H, 10.28. Found: C, 70.19; H, 10.34.



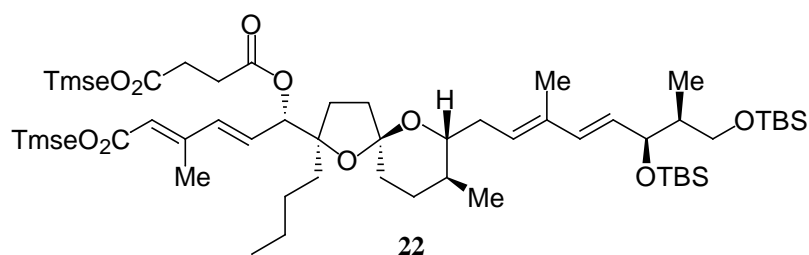
Stannane **16**: yellow oil, $R_f = 0.50$ (silica gel, 33% ethyl acetate/petrol); $[\alpha]_D^{20} = -40.6^\circ$ ($c = 0.180$, CH_2Cl_2); IR ν_{max} (film) 3369, 2956, 2928, 2873, 2858, 1463, 1253 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ -0.02 (s, 3H), 0.57 (s, 3H), 0.81 (d, $J = 6.3$ Hz, 3H), 0.88 (t, $J = 7.2$ Hz, 12H), 0.89 (s, 9H), 1.76 (s, 3H), 2.29 (m, 1H), 2.36-2.48 (m, 1H), 3.46-3.59 (m, 1H), 3.59-3.77 (m, 2H), 4.05 (d, $J = 3.3$ Hz, 1H), 4.32 (dd, $J = 6.6, 3.6$ Hz, 1H), 5.63 (dd, $J = 15.9, 7.2$ Hz, 1H), 5.66 (t, $J = 8.7$ Hz, 1H), 6.16 (m, 2H), 6.29 (d, $J = 15.9$ Hz, 1H); ^{13}C NMR (75.5 MHz, CDCl_3) δ -4.6, -3.7, 9.5, 11.6, 12.7, 13.7, 14.2, 17.8, 18.1, 23.5, 25.9, 27.3, 29.1, 29.2, 29.3, 29.7, 32.3, 32.8, 34.1, 34.4, 38.7, 40.3, 66.5, 75.6, 77.2, 82.5, 88.8, 106.6, 125.8, 127.9, 130.1, 133.6, 137.0, 148.9; HR-MS (ESI) calc. for $\text{C}_{44}\text{H}_{84}\text{O}_5\text{SiSnNa}$ [$M+\text{Na}^+$]: 863.5008. Found: 863.5001.



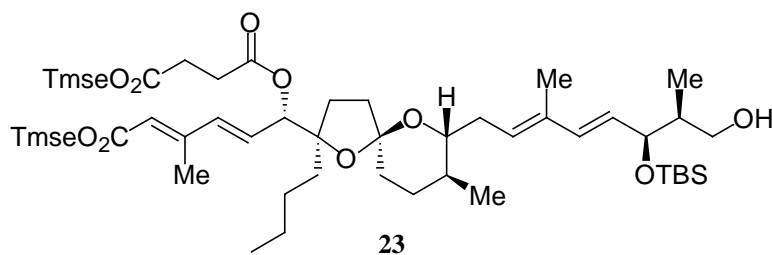
Triol **19**: yellow oil, $R_f = 0.33$ (silica gel, 40% ethyl acetate/petrol); $[\alpha]_D^{20} = -41.8^\circ$ ($c = 1.29$, CH_2Cl_2); IR ν_{max} (film) 3400, 2954, 2874, 1710, 1613, 1152 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ 0.04 (s, 9H), 0.88 (t, $J = 3.0$ Hz, 3H), 0.91 (d, $J = 3.3$ Hz, 3H), 0.98-1.04 (m, 2H), 1.75 (s, 3H), 2.01 (m, 1H), 2.27 (s, 3H), 3.50-3.74 (m, 3H), 4.18-4.23 (m, 2H), 4.20 (s, 1H), 4.31 (m, 1H), 5.60 (t, $J = 6.6$ Hz, 1H), 5.64 (dd, $J = 15.6, 3.9$ Hz, 1H), 5.77 (s, 1H), 5.99 (dd, $J = 15.6, 6.3$ Hz, 1H), 6.31 (d, $J = 15.6$ Hz, 1H), 6.40 (d, $J = 15.6$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ -1.5, 11.8, 12.7, 13.8, 14.1, 17.3, 17.6, 23.1, 25.3, 26.8, 27.8, 28.9, 31.5, 33.6, 37.1, 39.3, 40.1, 61.9, 66.1, 76.2, 76.5, 76.9, 90.9, 106.9, 119.6, 126.2, 128.6, 134.3, 134.6, 135.0, 136.4, 151.4, 167.2; HR-MS (ESI) calc. for $\text{C}_{35}\text{H}_{60}\text{O}_7\text{SiNa}$ [$M+\text{Na}^+$]: 643.4006. Found: 643.4006.



Alcohol **20**: colorless oil, $R_f = 0.34$ (silica gel, 5% ethyl acetate/petrol); $[\alpha]_D^{20} = -26.5^\circ$ ($c = 2.87$, CH_2Cl_2); IR ν_{max} (film) 3468, 2954, 2859, 1712, 1640, 1462, 1251 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ -0.02 (s, 3H), 0.01 (s, 6H), 0.02 (s, 3H), 0.04 (s, 9H), 0.83 (d, $J = 6.8$ Hz, 3H), 0.86 (t, $J = 6.8$ Hz, 3H), 0.87 (s, 9H), 0.88 (s, 9H), 0.98-1.03 (m, 2H), 1.71 (s, 3H), 2.04 (m, 1H), 2.26 (s, 3H), 2.25-2.31 (m, 1H), 2.38 (m, 1H), 3.38 (dd, $J = 9.6, 6.4$ Hz, 1H), 3.55-3.59 (m, 2H), 3.71 (s, 1H), 4.18-4.24 (m, 2H), 4.22 (s, 1H), 5.50 (t, $J = 7.6$ Hz, 1H), 5.50 (dd, $J = 15.6, 7.2$ Hz, 1H), 5.77 (s, 1H), 5.96 (dd, $J = 15.6, 6.8$ Hz, 1H), 6.12 (d, $J = 15.6$ Hz, 1H), 6.41 (d, $J = 15.6$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ -5.4, -5.3, -5.0, -4.0, -1.5, 11.3, 12.8, 13.9, 14.2, 17.3, 17.6, 18.2, 18.3, 23.2, 25.4, 25.9, 26.0, 27.0, 29.0, 31.6, 33.3, 34.6, 37.8, 39.4, 43.0, 61.9, 65.1, 73.8, 76.4, 76.8, 91.4, 107.0, 119.7, 126.7, 129.1, 134.1, 134.6, 134.8, 135.2, 151.4, 167.3. Anal. calc. for $\text{C}_{47}\text{H}_{88}\text{O}_7\text{Si}_3$: C, 66.45; H, 10.44. Found: C, 66.49; H, 10.36.

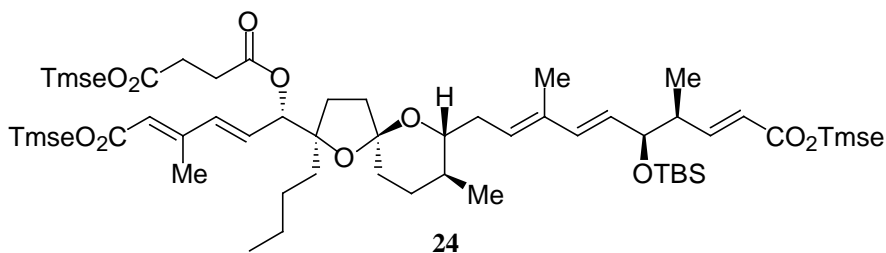


Succinate **22**: colorless oil, $R_f = 0.43$ (silica gel, 5% ethyl acetate/petrol); $[\alpha]_D^{20} = -46.6^\circ$ ($c = 2.37$, CH_2Cl_2); IR ν_{max} (film) 2954, 2930, 2859, 1739, 1713, 1615, 1251 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ -0.04 (s, 3H), 0.004 (s, 6H), 0.01 (s, 3H), 0.02 (s, 9H), 0.04 (s, 9H), 0.82 (d, $J = 6.3$ Hz, 3H), 0.85 (t, $J = 6.9$ Hz, 3H), 0.86 (s, 9H), 0.87 (s, 9H), 0.94-1.02 (m, 4H), 1.70 (s, 3H), 1.99 (m, 1H), 2.27 (s, 3H), 2.34 (t, $J = 6.6$ Hz, 1H), 2.43 (m, 1H), 2.59-2.69 (m, 4H), 3.35 (dd, $J = 9.6, 6.9$ Hz, 1H), 3.44-3.50 (m, 1H), 3.58 (dd, $J = 9.6, 6.0$ Hz, 1H), 4.14-4.22 (m, 5H), 5.46 (dd, $J = 15.6, 7.5$ Hz, 1H), 5.52 (s, 1H), 5.98 (t, $J = 7.2$ Hz, 1H), 5.74 (m, 1H), 6.17 (d, $J = 15.6$ Hz, 1H), 6.19 (m, 2H); ^{13}C NMR (100 MHz, CDCl_3) δ -5.4, -5.3, -5.0, -3.9, -1.5, -1.4, 11.4, 12.7, 13.8, 14.2, 17.3, 17.4, 17.8, 18.2, 18.3, 23.2, 25.4, 25.91, 25.95, 29.3, 31.6, 31.8, 33.5, 34.1, 34.6, 38.6, 43.1, 61.8, 63.0, 65.2, 74.2, 76.3, 79.0, 87.1, 107.2, 120.0, 127.7, 128.7, 131.3, 134.3, 134.9, 135.0, 151.2, 167.2, 170.9, 172.2; HR-MS (ESI) calc. for $\text{C}_{56}\text{H}_{104}\text{O}_{10}\text{Si}_4\text{Na}$ [$M+\text{Na}^+$]: 1071.6604. Found: 1071.6568.

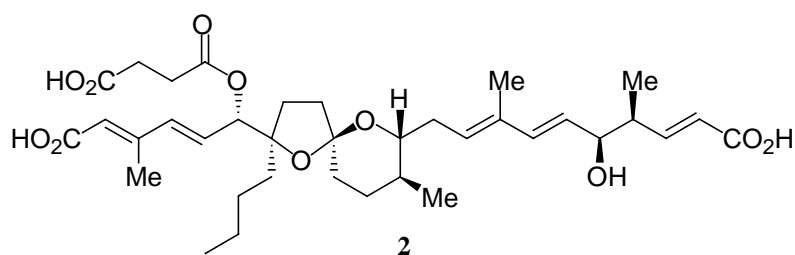


Alcohol **23**: pale yellow oil, $R_f = 0.21$ (silica gel, 10% ethyl acetate/petrol); $[\alpha]_D^{20} = -53.8^\circ$ ($c = 1.83$, CH_2Cl_2); IR ν_{max} (film) 3535, 2955, 2861, 1738, 1712, 1462 cm^{-1} ; ^1H NMR (300 MHz, CDCl_3) δ 0.01 (s, 3H), 0.03 (s, 9H), 0.04 (s, 9H), 0.06 (s, 3H), 0.75 (d, $J = 6.9$ Hz, 3H), 0.86 (t, $J = 7.8$ Hz, 3H), 0.87 (s, 9H), 0.95-1.03 (m, 4H), 1.73 (s, 3H), 2.17-2.27 (m, 1H), 2.26 (s, 3H), 2.47-2.56 (m, 1H), 2.59-2.70 (m, 4H), 3.08 (br s, 1H), 3.39-3.45 (m, 2H), 3.57-3.67 (dd, $J = 10.8, 8.7$ Hz, 1H), 4.14-4.22 (m, 4H), 4.24 (m, 1H), 5.51 (dd, $J = 15.6, 7.8$ Hz, 1H), 5.52 (br s, 1H), 5.71 (m, 2H), 6.17 (m, 2H), 6.29 (d, $J = 15.6$ Hz, 1H);

^{13}C NMR (100 MHz, CDCl_3) δ -5.1, -4.0, -1.6, -1.5, 12.5, 12.6, 13.8, 14.2, 17.2, 17.4, 17.9, 18.0, 23.2, 25.3, 25.8, 29.2, 29.26, 29.29, 31.7, 31.8, 34.1, 34.4, 38.8, 41.4, 61.9, 63.0, 65.9, 76.6, 78.2, 79.2, 87.2, 107.2, 119.9, 125.9, 129.2, 131.2, 133.9, 134.9, 136.8, 151.1, 167.2, 171.0, 172.2; HR-MS (ESI) calc. for $\text{C}_{50}\text{H}_{90}\text{O}_{10}\text{Si}_3\text{Na}$ [$M+\text{Na}^+$]: 957.5739. Found: 957.5741. Anal. calc. for $\text{C}_{50}\text{H}_{90}\text{O}_{10}\text{Si}_3$: C, 64.19; H, 9.70. Found: C, 64.21; H, 9.63.



Tri-Tmse ester **24**: colorless oil, $R_f = 0.43$ (silica gel, 10% Et_2O /petrol); $[\alpha]_D^{20} = -40.6^\circ$ ($c = 1.51$, CH_2Cl_2); IR ν_{max} (film) 2955, 2931, 1737, 1716, 1615, 1251, 1154 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ -0.03 (s, 3H), 0.02 (s, 3H), 0.03 (s, 9H), 0.04 (s, 18H), 0.83 (d, $J = 6.4$ Hz, 3H), 0.87 (s, 9H), 0.89 (t, $J = 6.4$ Hz, 3H), 0.97 (d, $J = 8.0$ Hz, 3H), 0.96-1.03 (m, 6H), 1.69 (s, 3H), 1.95 (m, 1H), 2.28 (d, $J = 0.4$ Hz, 3H), 2.30 (m, 1H), 2.43 (m, 1H), 2.61-2.70 (m, 4H), 3.46 (m, 1H), 4.10 (dd, $J = 7.6, 4.0$ Hz, 1H), 4.15-4.23 (m, 6H), 5.20 (br s, 1H), 5.38 (dd, $J = 15.6, 7.6$ Hz, 1H), 5.65 (dd, $J = 6.8, 6.8$ Hz, 1H), 5.75 (dd, $J = 15.6, 1.2$ Hz, 1H), 5.76 (br s, 1H), 6.20 (m, 2H), 6.22 (d, $J = 16.0$ Hz, 1H), 7.01 (dd, $J = 15.6, 7.2$ Hz, 1H); ^{13}C NMR (100 MHz, CDCl_3) δ -5.0, -4.0, -1.5, -1.48, -1.46, 12.7, 13.8, 13.9, 14.2, 17.2, 17.3, 17.4, 17.8, 18.2, 23.2, 25.3, 25.9, 29.2, 29.3, 31.7, 31.8, 33.7, 34.0, 34.6, 38.7, 43.7, 61.9, 62.2, 63.0, 72.2, 76.3, 77.1, 79.1, 87.1, 107.2, 120.0, 120.9, 126.8, 128.8, 131.3, 134.0, 134.9, 136.4, 151.2, 151.6, 166.9, 167.2, 170.9, 172.2; HR-MS (ESI) calc. for $\text{C}_{57}\text{H}_{102}\text{O}_{11}\text{Si}_4\text{Na}$ [$M+\text{Na}^+$]: 1097.6397. Found: 1097.6389.



(-)-Reveromycin B (**2**): white powder, $R_f = 0.35$ (silica gel, 15% $\text{MeOH}/\text{CH}_2\text{Cl}_2$); $[\alpha]_D^{20}$

= -45.3° ($c = 0.12$, MeOH); IR ν_{\max} (film) 3410, 2957, 2931, 1722, 1614, 1254, 1162 cm^{-1} ; UV λ_{\max} (MeOH) 238 nm ($\epsilon 3.45 \times 10^4 \text{ L mol}^{-1} \text{ cm}^{-1}$); ^1H NMR (400 MHz, CD_3OD) δ 0.88 (d, $J = 6.4$ Hz, 3H), 0.91 (t, $J = 6.8$ Hz, 3H), 1.00 (d, $J = 6.8$ Hz, 3H), 1.73 (s, 3H), 2.14-2.26 (m, 1H), 2.22 (s, 3H), 2.48-2.61 (m, 2H), 2.62-2.70 (m, 4H) 3.44 (ddd, $J = 10.8, 8.8, 2.0$ Hz, 1H), 4.07 (dd, $J = 7.6, 5.6$ Hz, 1H), 5.46 (dd, $J = 15.6, 7.6$ Hz, 1H), 5.56 (d, $J = 3.2$ Hz, 1H), 5.76 (dd, $J = 6.8, 6.8$ Hz, 1H), 5.78 (br s, 1H), 5.78 (d, $J = 15.6$ Hz, 1H), 6.22 (dd, $J = 16.0, 3.6$ Hz, 1H), 6.27 (d, $J = 16.0$ Hz, 1H), 6.38 (d, $J = 15.6$ Hz, 1H), 6.96 (dd, $J = 15.6, 7.6$ Hz, 1H); ^{13}C NMR (100 MHz, CD_3OD) δ 12.7, 14.0, 14.5, 15.1, 18.2, 24.4, 26.6, 30.3, 30.4, 30.8, 32.9, 35.2, 35.6, 35.7, 39.8, 44.0, 77.2, 78.4, 80.4, 88.8, 108.6, 121.7, 122.9, 127.2, 130.8, 132.4, 135.2, 136.1, 138.6, 151.9, 152.5, 170.6, 170.7, 173.2, 176.2; HR-MS (ESI) calc. for $\text{C}_{36}\text{H}_{52}\text{O}_{11}\text{Na}$ [$M+\text{Na}^+$]: 683.3407. Found: 683.3404.