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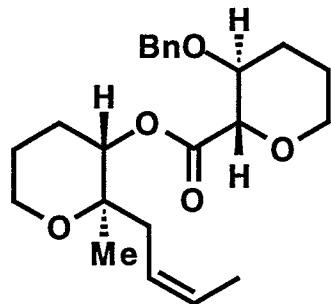
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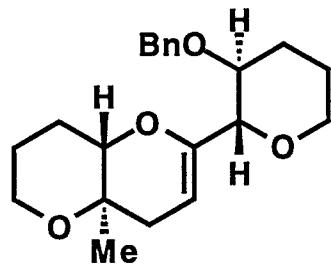
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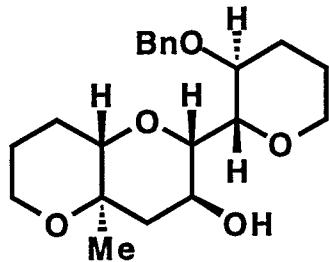


11

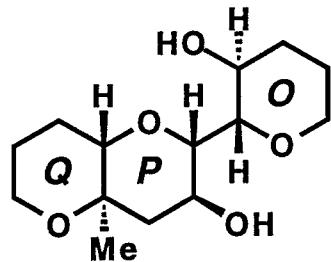
11: clear oil; $R_f = 0.45$ (silica, 40% ether in hexane); $[\alpha]_D^{22} = 49.0$ ($c = 1.0$, CHCl_3); FT-IR (thin film) ν_{max} 2942, 1745, 1454, 1375, 1275, 1202, 1175, 1088, 1007 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 7.31-7.21 (m, 5 H, Ph), 5.58-5.52 (m, 1 H, $\text{CH}=\text{CH}$), 5.46-5.40 (m, 1 H, $\text{CH}=\text{CH}$), 4.77 (dd, $J = 8.3$, 4.1 Hz, 1 H, $\text{C}(=\text{O})\text{OCH}$), 4.56 (d, $J = 11.7$ Hz, 1 H, OCHHPh), 4.49 (d, $J = 11.7$ Hz, 1 H, OCHHPh), 3.96-3.93 (m, 1 H, CH-O), 3.87 (d, $J = 7.7$ Hz, 1 H, $\text{C}(=\text{O})\text{CH-O}$), 3.70-3.54 (m, 3 H, CH-O , CH-O , CH-O), 3.47-3.42 (m, 1 H, CH-O), 2.23 (d, $J = 7.3$ Hz, 2 H, CH_2), 2.11-2.06 (m, 1 H, CHH), 2.01-1.94 (m, 1 H, CHH), 1.78-1.52 (m, 6 H, CH_2 , CH_2 , CH_2), 1.51-1.50 (m, 3 H, CH_3), 1.10 (s, 3 H, CH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 169.7, 138.0, 128.3, 127.7, 127.6, 126.5, 124.4, 79.6, 75.1, 74.1, 74.0, 70.9, 67.1, 60.7, 41.5, 35.1, 28.0, 24.4, 23.5, 23.4, 17.7, 12.9; HRMS (FAB) calcd. for $\text{C}_{23}\text{H}_{32}\text{O}_5$ ($\text{M}+\text{Cs}^+$): 521.1304, found 521.1311.

**12**

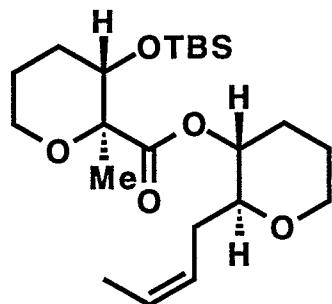
12: yellow oil; $R_f = 0.25$ (silica, 40% ether in hexane); $[\alpha]_D^{22} = -20.4$ ($c = 1.0$, CHCl_3); FT-IR (thin film) ν_{max} 2939, 2860, 1674, 1453, 1375, 1352, 1331, 1264, 1212, 1176, 1082, 1028 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 7.34-7.25 (m, 5 H, Ph), 4.90 (dd, $J = 5.4, 2.1$ Hz, 1 H, C=CH), 4.54 (d, $J = 11.6$ Hz, 1 H, OCH H Ph), 4.48 (d, $J = 11.6$ Hz, 1 H, OCH H Ph), 3.97-3.94 (m, 1 H, CH-O), 3.68-3.60 (m, 2 H, CH-O, CH-O), 3.58-3.53 (m, 1 H, CH-O), 3.47-3.43 (m, 2 H, CH-O, CH-O), 3.34 (ddd, $J = 11.4, 11.2, 3.3$ Hz, 1 H, CH-O), 2.24-2.20 (m, 1 H, CHH), 2.17 (d, $J = 16.3$ Hz, 1 H, CHH), 1.98 (dd, $J = 16.4, 5.4$ Hz, 1 H, CHH), 1.81-1.62 (m, 6 H, CH₂, CH₂, CH₂), 1.45-1.37 (m, 1 H, CHH), 1.21 (s, 3 H, CH₃); ^{13}C NMR (125 MHz, CDCl_3) δ 150.5, 138.5, 128.3, 127.9, 127.6, 101.5, 82.6, 77.6, 73.3, 71.2, 70.7, 68.3, 61.0, 37.4, 29.7, 25.6, 25.1, 24.3, 14.5; HRMS (FAB) calcd. for $\text{C}_{21}\text{H}_{28}\text{O}_4$ ($\text{M}+\text{Cs}^+$): 477.1042, found 477.1052.

**13**

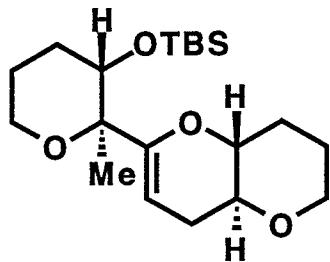
13: yellow oil; $R_f = 0.25$ (silica, 50% EtOAc in hexane); $[\alpha]_D^{22} = 56.5$ (c 1.0, CHCl_3); FT-IR (thin film) ν_{max} 3448, 2939, 2866, 1655, 1457, 1378, 1327, 1272, 1214, 1138, 1093, 1019 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 7.34-7.25 (m, 5 H, Ph), 4.60 (d, $J = 11.9$ Hz, 1 H, OCH H Ph), 4.47 (d, $J = 11.9$ Hz, 1 H, OCH H Ph), 4.01-3.91 (m, 2 H, CH-O, CH-O), 3.67-3.56 (m, 3 H, CH-O, CH-O, CH-O), 3.51 (dd, $J = 9.7, 1.5$ Hz, 1 H, CH-O), 3.43 (dd, $J = 9.3, 1.5$ Hz, 1 H, CH-O), 3.32 (ddd, $J = 11.8, 11.4, 2.5$ Hz, 1 H, CH-O), 3.03-3.00 (m, 1 H, CH-O), 2.27-2.24 (m, 1 H, CH H), 2.18 (dd, $J = 11.3, 5.1$ Hz, 1 H, CH H), 1.75-1.57 (m, 7 H, CH $_2$, CH $_2$, CH $_2$, OH), 1.50-1.37 (m, 2 H, CH $_2$), 1.19 (s, 3 H, CH $_3$); ^{13}C NMR (125 MHz, CDCl_3) δ 138.7, 128.3, 127.9, 127.7, 81.2, 80.8, 77.9, 72.7, 72.0, 71.0, 68.5, 64.2, 60.0, 29.9, 25.9, 25.2, 24.2, 15.3; HRMS (FAB) calcd. for $\text{C}_{21}\text{H}_{30}\text{O}_5$ ($\text{M}+\text{Na}^+$): 385.1991, found 385.2000.

**14**

14: white foam; $R_f = 0.20$ (silica, 100% EtOAc); $[\alpha]_D^{22} = -32$ ($c = 1.0$, CHCl_3); FT-IR (thin film) ν_{max} 3448, 2939, 2866, 1655, 1457, 1378, 1327, 1272, 1214, 1138, 1093, 1019 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 4.12-4.07 (m, 1 H, CH-O), 3.96-3.93 (m, 1 H, CH-O), 3.81 (ddd, $J = 10.1, 9.7, 4.8$, 1 H, CH-O), 3.67-3.57 (m, 3 H, CH-O, CH-O, CH-O), 3.48 (dd, $J = 9.3, 3.9$ Hz, 1 H, CH-O), 3.30 (ddd, $J = 11.4, 11.3, 3.1$ Hz, 1 H, CH-O), 3.17-3.13 (m, 1 H, CH-O), 3.09 (br s, 1 H, OH), 2.21-2.14 (m, 2 H, CH_2), 1.78-1.61 (m, 6 H, CH_2 , CH_2 , CHH , OH), 1.57-1.49 (m, 2 H, CH_2), 1.46-1.37 (m, 1 H, CHH), 1.20 (s, 3 H, CH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 82.2, 81.4, 80.7, 72.0, 68.5, 66.3, 65.2, 59.9, 46.0, 32.0, 25.8, 24.8, 24.1, 15.0; HRMS (FAB) calcd. for $\text{C}_{14}\text{H}_{24}\text{O}_5$ ($\text{M}+\text{Na}^+$): 295.1521, found 295.1525.

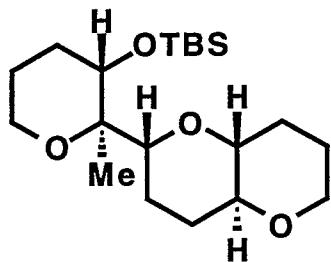
**20**

20: yellow foam; $R_f = 0.27$ (silica, 50% ether in hexane); $[\alpha]_D^{22} = 6.7$ (c 1.0, CHCl_3); FT-IR (thin film) ν_{max} 2953, 2856, 2364, 1745, 1463, 1363, 1256, 1098, 1022, 982, 874, 836, 774 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 5.59-5.52 (m, 1 H, $\text{CH}=\text{CH}$), 5.51-5.43 (m, 1 H, $\text{CH}=\text{CH}$), 4.60 (ddd, $J = 10.5, 9.5, 4.5$ Hz, 1 H, $\text{C}(=\text{O})\text{OCH}$), 4.06 (dd, $J = 4.0, 2.5$ Hz, 1 H, $\text{CH}-\text{O}$), 3.94-3.89 (m, 1 H, $\text{CH}-\text{O}$), 3.81-3.76 (m, 1 H, $\text{CH}-\text{O}$), 3.65 (ddd, $J = 11.5, 11.5, 3$ Hz, 1 H, $\text{CH}-\text{O}$), 3.38-3.33 (m, 2 H, $\text{CH}-\text{O}$, $\text{CH}-\text{O}$), 2.41-2.35 (m, 1 H, CHH), 2.20-2.11 (m, 2 H, CH_2), 2.02-1.92 (m, 1 H, CHH), 1.76-1.70 (m, 3 H, CH_2 , CHH), 1.69-1.63 (m, 1 H, CHH), 1.60-1.53 (m, 3 H, $\text{C}=\text{CCH}_3$), 1.50-1.41 (m, 1 H, CHH), 1.30 (s, 3 H, CH_3), 1.28-1.22 (m, 1 H, CHH), 0.90 (s, 9 H, $\text{SiC}(\text{CH}_3)_3$), 0.06 (s, 3 H, SiCH_3), 0.05 (s, 3 H, SiCH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 173.2, 126.1, 125.7, 80.0, 79.2, 72.5, 67.9, 67.7, 64.4, 29.6, 29.1, 28.7, 25.8, 25.1, 19.3, 18.2, 12.9, -4.5, -4.9; HRMS (FAB) calcd. for $\text{C}_{22}\text{H}_{40}\text{O}_5\text{Si}$ ($\text{M}+\text{Cs}^+$): 545.1699, found 545.1718.



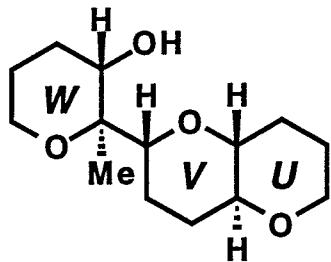
21

21: yellow oil; $R_f = 0.25$ (silica, 30% ether in hexane); $[\alpha]_D^{22} = 52.5$ ($c = 1.0$, CHCl_3); FT-IR (thin film) ν_{max} 2934, 2856, 2361, 2340, 1461, 1253, 1226, 1100, 1021, 837, 774 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 4.84 (dd, $J = 5.5, 2.5$ Hz, 1 H, C=CH), 3.97 (dd, $J = 8.5, 4$ Hz, 1 H, CH-O), 3.93-3.89 (m, 1 H, CH-O), 3.72-3.68 (m, 1 H, CH-O), 3.58 (ddd, $J = 12, 8.5, 3.5$ Hz, 1 H, CH-O), 3.45-3.39 (m, 2 H, CH-O, CH-O), 3.28 (ddd, $J = 9.5, 9.5, 6$ Hz, 1 H, CH-O), 2.26 (ddd, $J = 16.5, 5.5, 5.5$ Hz, 1 H, CHH), 2.22-2.18 (m, 1 H, CHH), 2.04 (ddd, $J = 16.5, 9.5, 2.5$ Hz, 1 H, CHH), 1.80-1.63 (m, 4 H, CH_2, CH_2), 1.61-1.44 (m, 3 H, CH_2, CHH), 1.25 (s, 3 H, CH_3), 0.85 (s, 9 H, $\text{SiC(CH}_3)_3$), 0.01 (s, 3 H, SiCH_3), 0.00 (s, 3 H, SiCH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 154.8, 95.1, 77.9, 74.9, 74.8, 68.5, 67.9, 61.5, 29.2, 28.4, 27.5, 25.8, 25.4, 22.9, 18.0, 17.6, -4.1, -4.9; HRMS (FAB) calcd. for $\text{C}_{20}\text{H}_{36}\text{O}_4\text{Si}$ ($\text{M}+\text{Na}^+$): 391.2281, found 391.2289.



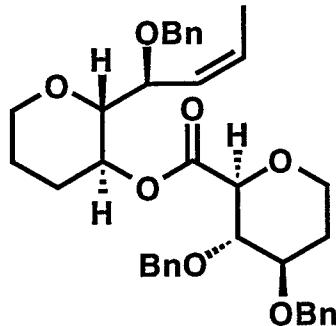
22

22: colorless oil; $R_f = 0.18$ (silica, 30% ether in hexane); $[\alpha]_D^{22} = 8.2$ ($c = 1.0$, CHCl_3); FT-IR (thin film) ν_{max} 2949, 2857, 1460, 1374, 1252, 1097, 1027, 863, 836 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 3.87-3.84 (m, 1 H, CH-O), 3.63-3.58 (m, 2 H, CH-O, CH-O), 3.50 (ddd, $J = 11.5, 11.5, 3$ Hz, 1 H, CH-O), 3.46-3.43 (m, 1 H, CH-O), 3.36 (ddd, $J = 11, 11, 3$ Hz, 1 H, CH-O), 3.02-2.93 (m, 2 H, CH-O, CH-O), 2.06-1.96 (m, 2 H, CH_2), 1.80-1.46 (m, 9 H, CH_2 , CH_2 , CH_2 , CH_2 , CHH), 1.45-1.36 (m, 1 H, CHH), 1.20 (s, 3 H, CH_3), 0.85 (s, 9 H, $\text{SiC(CH}_3)_3$), 0.02 (s, 6 H, SiCH_3 , SiCH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 81.1, 79.4, 78.3, 78.2, 69.2, 67.9, 60.7, 29.8, 29.5, 28.4, 25.8, 24.7, 23.6, 17.9, 12.7, -3.7, -4.9; HRMS (FAB) calcd. for $\text{C}_{20}\text{H}_{38}\text{O}_4\text{Si}$ ($\text{M}+\text{Cs}^+$): 503.1594, found 503.1602.

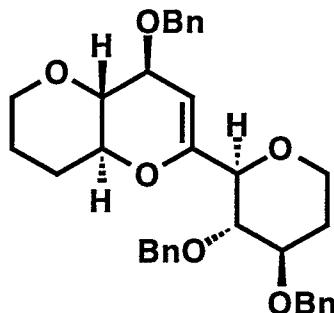


23

23: White foam; $R_f = 0.31$ (silica, 60% ether in hexane); $[\alpha]_D^{22} = -26.4$ (c 0.16, CHCl_3); FT-IR (thin film) ν_{max} 3516, 2938, 2865, 2360, 2341, 1458, 1376, 1094, 1023, 976 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 3.89-3.36 (m, 1 H, CH-O), 3.82 (s, 1 H, OH), 3.61 (dd, $J = 11, 5$ Hz, 1 H, CH-O), 3.57-3.53 (m, 1 H, CH-O), 3.49-3.43 (m, 1 H, CH-O), 3.39-3.45 (m, 2 H, CH-O, CH-O), 3.14 (ddd, $J = 9.0, 4.0, 2.0$ Hz, 1 H, CH-O), 2.95-2.90 (m, 1 H, CH-O), 2.02-1.91 (m, 2 H, CH_2), 1.90-1.80 (m, 2 H, CH_2), 1.70-1.65 (m, 2 H, CH_2), 1.38-1.20 (m, 6 H, CH_2), 1.15 (s, 3 H, CH_3); ^{13}C NMR (125 MHz, CDCl_3) δ 87.6, 78.9, 78.4, 75.0, 68.0, 60.4, 29.7, 29.1, 26.6, 25.6, 25.1, 24.0; HRMS (FAB) calcd. for $\text{C}_{14}\text{H}_{24}\text{O}_4$ ($\text{M}+\text{Na}^+$): 279.1572, found 279.1582.

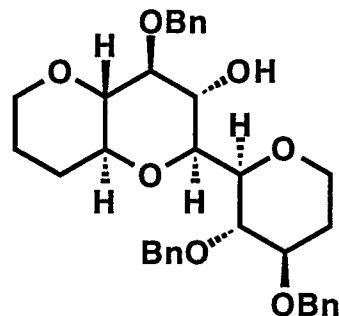
**26**

26: Yellow oil; $R_f = 0.58$ (silica, 20% EtOAc in hexane); $[\alpha]_D^{22} = 56.3$ (c 1.6, CHCl_3); FT-IR (thin film) ν_{max} 2926, 2858, 1749, 1496, 1455, 1364, 1272, 1208, 1091, 1025 cm^{-1} ; ^1H NMR (500 MHz, CDCl_3) δ 7.32-7.26 (m, 15 H, Ph), 5.77-5.72 (m, 0.3 H, $\text{CH}=\text{CH}$), 5.66-5.61 (m, 1 H, $\text{CH}=\text{CH}$), 5.14-5.06 (m, 0.7 H, $\text{CH}=\text{CH}$), 4.80 (d, $J = 11.2$ Hz, 0.3 H, OCHHPh), 4.79 (d, $J = 11.1$ Hz, 0.7 H, OCHHPh), 4.67 (d, $J = 11.1$ Hz, 0.7 H, OCHHPh), 4.65 (d, $J = 11.2$ Hz, 0.3 H, OCHHPh), 4.58 (s, 1.3 H, OCH_2Ph), 4.57 (s, 0.7 H, OCH_2Ph), 4.52 (d, $J = 11.8$ Hz, 0.7 Hz, OCHHPh), 4.48 (d, $J = 11.7$ Hz, 0.3 H, OCHHPh), 4.35 (br d, $J = 8.6$ Hz, 1 H, CH-O), 4.22 (d, $J = 11.8$ Hz, 0.7 H, OCHHPh), 4.20 (d, $J = 11.7$ Hz, 0.3 H, OCHHPh), 4.03-3.95 (m, 2 H, CH-O, CH-O), 3.84-3.75 (m, 3 H, CH-O, CH-O, CH-O), 3.65-3.61 (m, 1 H, CH-O), 3.45-3.37 (m, 1 H, CH-O), 3.33-3.27 (m, 2 H, CH-O, CH-O), 2.15-2.08 (m, 2 H, CH_2), 1.78-1.72 (m, 1 H, CHH), 1.74 (d, $J = 4.5$ Hz, 1.5 H, CH_3), 1.67-1.61 (m, 2 H, CH_2), 1.59 (dd, $J = 6.9, 1.6$ Hz, 1.5 H, CH_3), 1.41-1.36 (m, 1 H, CHH); ^{13}C NMR (125 MHz, CDCl_3 , multiple peaks due to mixture of isomers) δ 168.2, 138.2, 138.1, 130.4, 128.5, 128.4, 128.4, 128.3, 128.2, 128.1, 127.7, 127.6, 127.6, 127.3, 127.2, 81.7, 77.4, 77.1, 76.7, 73.9, 73.8, 71.3, 71.2, 70.3, 70.2, 69.9, 68.9, 68.1, 68.1, 63.7, 29.3, 29.2, 28.9, 24.7, 24.6, 17.9, 13.2; HRMS (FAB), calcd for $\text{C}_{36}\text{H}_{42}\text{O}_7$ ($\text{M} + \text{Cs}^+$): 719.1985, found 719.1958.

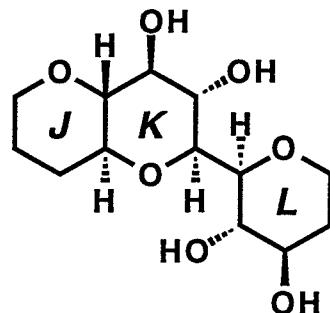


27

27: Yellow oil; $R_f = 0.58$ (silica, 60% ether in hexane); $[\alpha]_D^{22} = 7.5$ (c 0.36, CHCl_3); FT-IR (thin film) ν_{max} 3064, 3026, 2942, 2859, 1677, 1496, 1454, 1362, 1093, 1071 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 7.35-7.22 (m, 15 H, Ph), 4.98 (d, $J = 2.2$ Hz, 1 H, C=CH), 4.79 (d, $J = 10.8$ Hz, 1 H, OCH HPh), 4.72 (d, $J = 12.0$ Hz, 1 H, OCH HPh), 4.68 (d, $J = 11.7$ Hz, 1 H, OCH HPh), 4.64 (d, $J = 12.1$ Hz, 1 H, OCH HPh), 4.62 (d, $J = 11.7$ Hz, 1 Hz, OCH HPh), 4.55 (d, $J = 10.8$ Hz, 1 H, OCH HPh), 4.11 (dd, $J = 7.2, 2.2$ Hz, 1 H, CH-O), 4.00-3.96 (m, 1 H, CH-O), 3.93-3.90 (m, 1 H, CH-O), 3.62-3.53 (m, 2 H, CH-O, CH-O), 3.49-3.43 (m, 2 H, CH-O, CH-O), 3.40-3.30 (m, 3 H, CH-O, CH-O, CH-O), 2.05-2.01 (m, 2 H, CH_2), 1.75-1.63 (m, 4 H, CH_2 , CH_2); ^{13}C NMR (100 MHz, CDCl_3) δ 151.8, 138.7, 138.6, 128.4, 128.4, 128.3, 128.2, 127.7, 127.7, 127.4, 102.8, 80.7, 80.6, 79.2, 75.0, 74.6, 74.2, 71.7, 71.2, 67.5, 66.1, 31.5, 28.8, 25.0; HRMS (FAB), calcd for $\text{C}_{34}\text{H}_{38}\text{O}_6$ ($M + \text{Cs}^+$): 675.1723, found 675.1743.

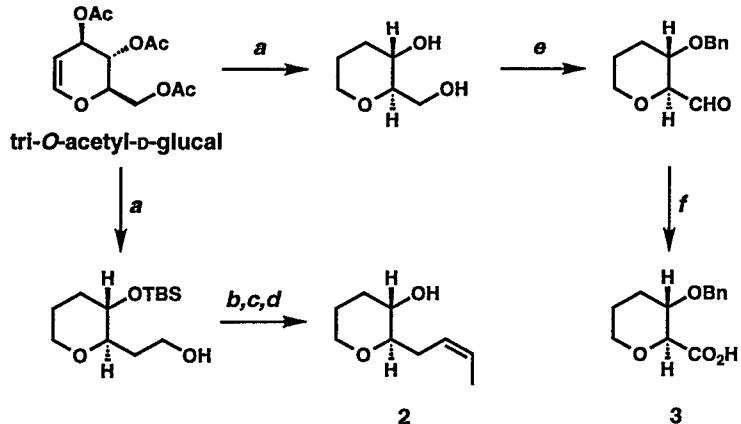
**28**

28: Yellow oil; $R_f = 0.42$ (silica, 60% ether in hexane); $[\alpha]_D^{22} = -2.4$ (c 0.42, CHCl_3); FT-IR (thin film) ν_{max} 3492, 2926, 2855, 1496, 1454, 1360, 1127, 1094, 1024 cm^{-1} ; ^1H NMR (400 MHz, CDCl_3) δ 7.35-7.24 (m, 15 H, Ph), 4.99 (d, $J = 11.7$ Hz, 1 H, OCHHPh), 4.92 (d, $J = 11.3$ Hz, 1 H, OCHHPh), 4.70-4.60 (m, 4 H, OCH_2Ph , OCH_2Ph), 4.00 (dd, $J = 11.0$, 4.0 Hz, 1 H, CH-O), 3.95-3.90 (m, 1 H, CH-O), 3.79-3.74 (m, 1 H, CH-O), 3.70-3.59 (m, 2 H, CH-O, CH-O), 3.54 (dd, $J = 9.8$, 1.5 Hz, 1 H, CH-O), 3.47-3.43 (m, 1 H, CH-O), 3.41-3.29 (m, 3 H, CH-O, CH-O, CH-O), 3.12 (dd, $J = 9.1$, 9.1 Hz, 1 H, CH-O), 2.85-2.79 (m, 1 H, CH-O), 2.18 (br d, $J = 2.3$ Hz, 1 H, OH), 2.07-2.02 (m, 1 H, CHH), 1.90-1.87 (m, 1 H, CHH), 1.74-1.57 (m, 4 H, CH_2 , CH_2); ^{13}C NMR (100 MHz, CDCl_3) δ 138.6, 128.5, 128.4, 128.0, 127.7, 127.7, 127.6, 84.3, 82.3, 81.5, 77.6, 76.5, 76.4, 75.8, 75.0, 74.4, 71.5, 68.7, 67.5, 66.2, 31.5, 28.8, 25.2; HRMS (FAB) calcd. for $\text{C}_{34}\text{H}_{40}\text{O}_7$ ($\text{M}+\text{H}^+$): 561.2852, found 561.2832.



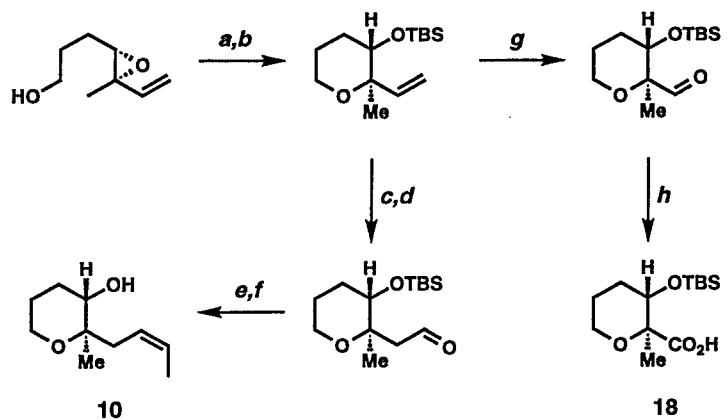
29

29: Yellow oil; $R_f = 0.50$ (silica, 20% methanol in CH_2Cl_2); $[\alpha]_D^{22} = 43.9$ (c 0.56, MeOH); FT-IR (thin film) ν_{max} 3359, 2926, 2856, 1086, 1026 cm^{-1} ; ^1H NMR (500 MHz, CD_3OD) δ 3.89-3.94 (m, 2 H, CH-O, CH-O), 3.59-3.32 (m, 7 H, CH-O, CH-O, CH-O, CH-O, CH-O, CH-O, CH-O), 3.29-3.32 (m, 1 H, CH-O), 3.09 (ddd, $J = 11.0, 9.0, 4.5$ Hz, 1 H, CH-O), 2.84 (dd, $J = 12.5, 12.5$ Hz, 1 H, CH-O), 2.02-2.08 (m, 1 H, CHH), 1.93-1.87 (m, 1 H, CHH), 1.74-1.45 (m, 4 H, CH₂, CH₂); ^{13}C NMR (125 MHz, CD_3OD) δ 82.9, 78.3, 77.9, 77.4, 76.7, 74.3, 72.1, 70.9, 68.7, 66.9, 35.1, 30.1, 26.4; HRMS (FAB) calcd. for $\text{C}_{18}\text{H}_{22}\text{O}_7$ ($\text{M}+\text{Na}^+$): 313.1263, found 313.1264.

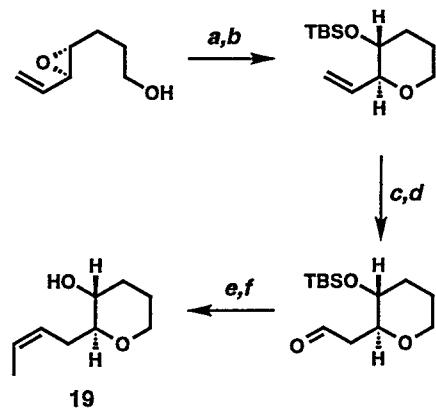


Scheme 5. Synthesis of alcohol **2** and acid **3**. Reagents and conditions:

(a) *J. Am. Chem. Soc.* 1990, 112, 3040; (b) $(COCl)_2$ (1.5 equiv), DMSO (2.0 equiv), Et_3N (4.0 equiv), CH_2Cl_2 , -78 °C, 2 h; (c) $Ph_3P^+CH_2CH_3Br^-$ (1.4 equiv), NaHMDS (1.2 equiv), THF, -78 °C, 1 h, 83% (2 steps); (d) TBAF (1.0 equiv), THF, 25 °C, 2 h, 91%; (e) *J. Org. Chem.* 1996, 61, 3003; (f) $NaClO_2$ (1.5 equiv), NaH_2PO_4 (2.0 equiv), 2-methyl-2-butene (2.0 equiv), $t\text{-BuOH-H}_2\text{O-THF}$ (5:2:1), 0 °C, 1 h, 90%.

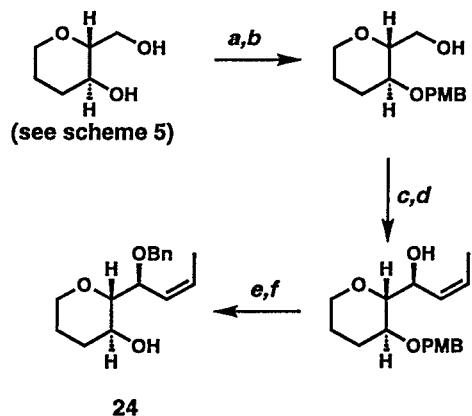
**Scheme 6.** Synthesis of alcohol **10** and acid **18**. Reagents and conditions:

(a) CSA (0.3 equiv), CH_2Cl_2 , 0 °C, 3 h, 94%; (b) TBSOTf (1.5 equiv), 2,6-lutidine (2.5 equiv), 0 °C, 0.5 h, 97%; (c) 9-BBN (2.2 equiv), THF, 0 °C, 2 h; then 3N NaOH (7 equiv), H_2O_2 (7 equiv), 88%; (d) $(\text{COCl})_2$ (2.5 equiv), DMSO (3.0 equiv), Et_3N (5 equiv), CH_2Cl_2 , -78 °C, 2 h; (e) $\text{Ph}_3\text{P}^+\text{CH}_2\text{CH}_3\text{Br}^-$ (3.0 equiv), NaHMDS (2.5 equiv), THF, 0 °C, 0.5 h, 92% (2 steps); (f) TBAF (1.5 equiv), THF, 25 °C, 8 h, 94%; (g) O_3 , CH_2Cl_2 , -78 °C, 20 min; then Ph_3P (3.0 equiv), 25 °C, 4 h, 79%; (h) NaClO_2 (1.5 equiv), NaH_2PO_4 (2.0 equiv), 2-methyl-2-butene (2.0 equiv), $t\text{-BuOH-H}_2\text{O-THF}$ (5:2:1), 0 °C, 1 h, 90%.



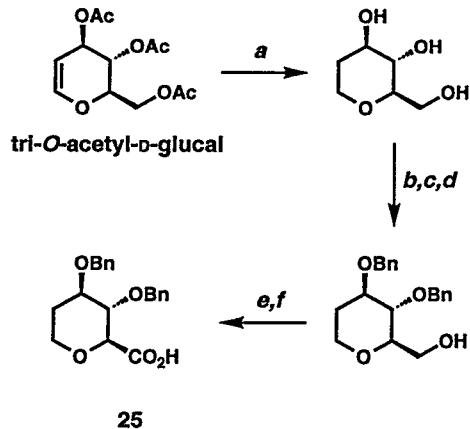
Scheme 7. Synthesis of alcohol **19**. Reagents and conditions:

(a) CSA (0.4 equiv), CH_2Cl_2 , 0 °C, 2 h; (b) TBSOTf (1.4 equiv), 2,6-lutidine (3 equiv), 0 °C, 1 h, 81% (2 steps); (c) 9-BBN (2.2 equiv), THF, 0 °C, 2 h; then 3N NaOH (7 equiv), H_2O_2 (7 equiv), 88%; (d) $(\text{COCl})_2$ (2.5 equiv), DMSO (3.0 equiv), Et_3N (5 equiv), CH_2Cl_2 , -78 °C, 2 h; (e) $\text{Ph}_3\text{P}^+\text{CH}_2\text{CH}_3\text{Br}^-$ (3.0 equiv), NaHMDS (2.5 equiv), THF, 0 °C, 0.5 h, 94% (2 steps); (f) TBAF (1.5 equiv), THF, 25 °C, 8 h, 92%.



Scheme 8. Synthesis of alcohol **24**. Reagents and conditions:

(a) Anisaldehyde dimethyl acetal (2.0 equiv), CSA (0.5 equiv),
CH₃CN, 25 °C, 12 h, 100%; (b) DIBAL-H (1.0 equiv), CH₂Cl₂, -78 °C,
1 h, 85%; (c) (COCl)₂ (1.5 equiv), DMSO (2.0 equiv), Et₃N (4.0 equiv),
CH₂Cl₂, -78 °C, 2 h; (d) CH₃CH=CHMgBr (1.5 equiv), THF,
-78 °C, 1.5 h, 52% (2 steps, plus 36% undesired isomer); (e)
BnBr (2.0 equiv), NaH (3.0 equiv), DMF, 0 → 25 °C, 2 h, 88%;
(f) DDQ (1.0 equiv), CH₂Cl₂-H₂O (20:1), 25 °C, 1 h, 100%.



Scheme 9. Synthesis of acid 25. Reagents and conditions:

(a) *Agric. Biol. Chem.* 1990, 54, 2989; (b) TrCl (1.5 equiv), pyr., Δ , 12 h, 72%; (c) BnBr (2.5 equiv), NaH (2.1 equiv), TBAI (0.1 equiv), THF , Δ , 6 h, 85%; (d) TsOH (0.3 equiv), $\text{MeOH-CH}_2\text{Cl}_2$ (3:2), 25 °C, 12 h, 96%; (e) $(\text{COCl})_2$ (1.5 equiv), DMSO (2.0 equiv), Et_3N (4.0 equiv), CH_2Cl_2 , -78 °C, 2 h; (f) NaClO_2 (3.0 equiv), NaH_2PO_4 (1.05 equiv), 2-methyl-2-butene (4.2 equiv), $t\text{-BuOH-H}_2\text{O}$ (4:1), 0 °C, 2 h, 80% (2 steps).