Supporting Information for

The Construction of 4-Hydroxy-2-Pyridinones. Total Synthesis of (+)-Sambutoxin.

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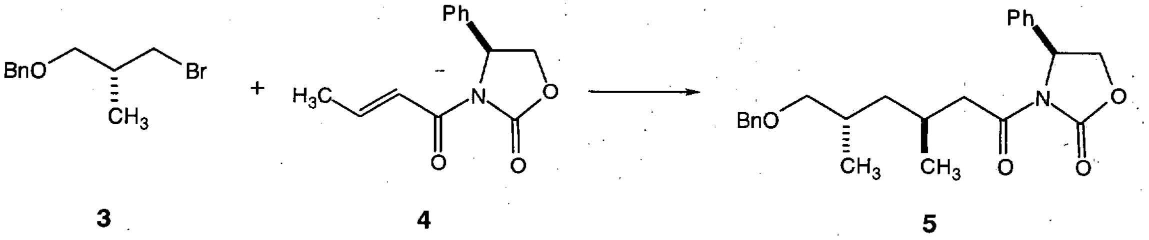
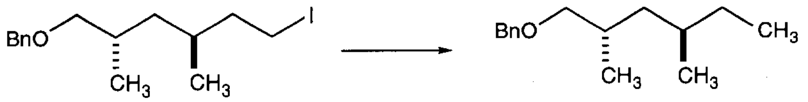
Experimental Procedures:



(4*S*, 3'*S*, 5'*S*)-3-(6'-Benzyloxy-3',5'-dimethylhexanoyl)-4-phenyloxazolidin-2-one (5)

To Mg (2.8 g, 114 mmol) in THF (10 mL) was added dibromoethane (100 μL) followed by bromide **3** (6.93 g, 28.5 mmol) in THF (30 mL) dropwise. The suspension was heated at reflux for 30 min then cooled and added to CuBr•DMS (5.9 g, 28.5 mmol) in THF (25 mL) at –78 °C. The suspension was warmed to –30 °C, stirred for 30 min and cooled to –78 °C.

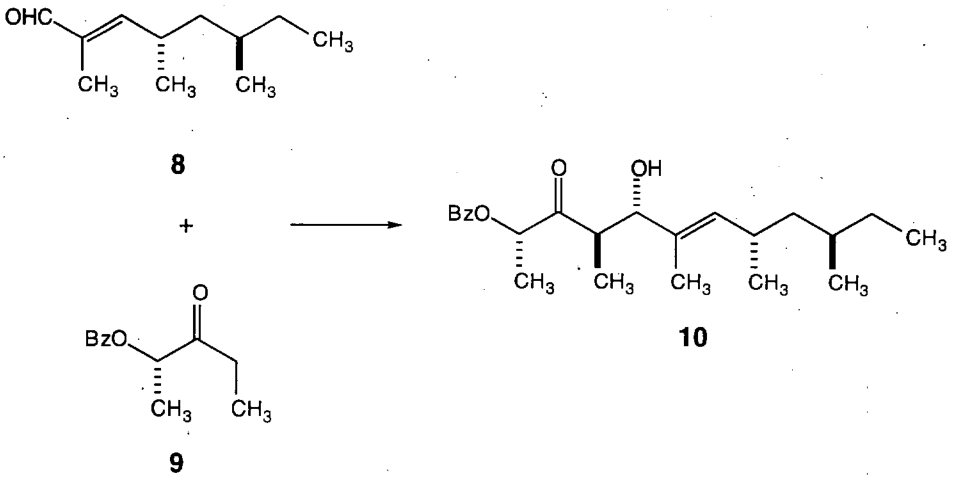
Oxazolidinone **4** (4.3 g, 19.0 mmol) in THF (40 mL) was added (solution became yellowish-brown). The suspension was stirred 3h at –78 °C, then was placed in a freezer (~–20 °C) overnight. Upon warming to 0 °C, the reaction was quenched with aq. NH_4Cl, and the bulk of the THF was removed *in vacuo*. The residue was diluted with H_2O and extracted with Et_2O (3x). The combined organic layers were washed with H_2O and brine, dried over $MgSO_4$, filtered and concentrated *in vacuo*. Purification by flash chromatography (160 g silica gel, 15% EtOAc in Hexanes) provided 5.55 g (75%) of **5** as a thick, yellow oil : $R_f = 0.32$ (20% EtOAc in Hexanes); $[\alpha]_D^{27}$ +23.8° (c 1.2; $CHCl_3$); IR (neat) 3088, 3063, 3032, 2960, 2928, 2872, 1954, 1778, 1707, 1494, 1454, 1383, 1321, 1197, 1103, 1060, 1001, 964, 738, 700 cm^{-1}; ^1H NMR ($CDCl_3$) δ 7.32 (m, 10 H), 5.43 (dd, J = 8.9, 3.8 Hz, 1H), 4.68 (t, J = 8.8 Hz, 1H), 4.47 (s, 2H), 4.27 (dd, J = 9.1, 3.8 Hz, 1H), 3.22 (AB part of ABX, J_{AB} = 9.0 Hz, J_{AX} = 6.6 Hz, J_{BX} = 6.0 Hz, $\Delta\nu_{AB}$ = 18.7 Hz, 2H), 2.94 (dd, J = 16.0, 5.3 Hz, 1H), 2.73 (dd, J = 16.4, 8.5 Hz, 1H), 2.10 (m, 1H), 1.82 (X part of ABX, m, 1H), 1.31 (ddd, J = 13.5, 9.4, 4.4 Hz, 1H), 1.04 (ddd, J = 13.8, 9.4, 4.7 Hz, 1H), 0.86 (d, J = 6.6 Hz, 3H), 0.85 (d, J = 6.6 Hz, 3H); ^{13}C NMR ($CDCl_3$) δ 172.1, 153.6, 139.2, 138.7, 129.1, 128.6, 128.3, 127.5, 127.4, 125.9, 76.2, 72.9, 69.8, 57.5, 43.2, 40.7, 30.7, 27.0, 19.1, 16.6; MS (CI, NH_3), *m/e* (relative intensity) 396 (8), 304 (10), 288 (8), 232 (58), 164 (57), 125 (7), 120 (28), 111 (29), 104 (24), 99 (12), 92 (14), 91 (100); HRMS *m/e* calcd $C_{24}H_{30}NO_4$ (M^+ +1) 396.2174, found 396.2170; Anal. Calcd for $C_{24}H_{29}NO_4$: C, 72.89; H, 7.39; N, 3.54. Found: C, 73.06; H, 7.38; N, 3.52.



6

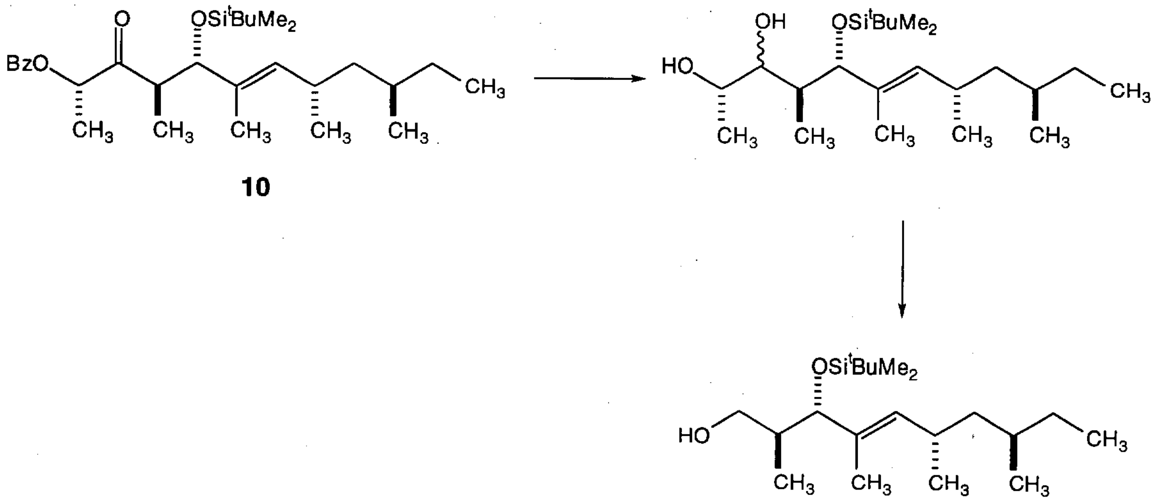
(2*S*,4*R*)-Benzyl 2,4-dimethylhexyl ether (6)

To a solution of primary iodide (501 mg, 1.45 mmol) in THF (5 mL) at 0 °C was added Super Hydride (4.5 mL of a 1M solution in THF, 4.5 mmol). After 15 min, the solution was warmed to 22 °C and stirred overnight. The solution was cooled to 0 °C, quenched with satd. aq. NH_4Cl, diluted with H_2O and extracted with Et_2O (2x). The combined organic layers were dried over $MgSO_4$, filtered and concentrated *in vacuo*. The crude material was diluted with Et_2O, cooled to 0 °C and treated with 1N NaOH followed by 30 % aq. H_2O_2. After 30 min, solution was warmed to 22 °C and stirred overnight. The layers were separated and the aqueous layer was extracted with Et_2O (2x). The combined organic layers were dried over $MgSO_4$, filtered and concentrated *in vacuo*. Purification by flash chromatography (8 g silica gel, 3% EtOAc in Hexanes) provided 314 mg (98%) of **6** as a yellow oil : $R_f = 0.28$ (5% EtOAc in Hexanes); $[\alpha]^{23}_{D}$ −13.4° (c 1.6; $CHCl_3$); IR (neat) 3088, 3065, 3030, 2959, 2920, 2852, 1946, 1867, 1805, 1745, 1494, 1456, 1375, 1259, 1203, 1103, 1028, 964, 806, 734, 696 cm^{-1}; ^1H NMR ($CDCl_3$) δ 7.27 (m, 5H), 4.43 (ABq, $J_{AB} = 12.1$ Hz, $\Delta\nu_{AB} = 7.0$ Hz, 2H), 3.19 (AB part of ABX, $J_{AB} = 9.0$ Hz, $J_{AX} = 7.2$ Hz, $J_{BX} = 6.0$ Hz, $\Delta\nu_{AB} = 36.7$ Hz, 2H), 1.79 (X part of ABX, m, 1H), 1.38–0.96 (m, 5H), 0.83 (d, $J = 6.6$ Hz, 3H), 0.79 (t, $J = 7.4$ Hz, 3H), 0.76 (d, $J = 6.6$ Hz, 3H); ^{13}C NMR ($CDCl_3$) δ 138.8, 128.3, 127.5, 127.3, 76.7, 72.9, 40.7, 31.6, 30.9, 30.4, 18.9, 17.0, 11.4; MS (CI, NH_3), *m/e* (relative intensity) 221 (27), 220 (9), 219 (25), 143 (33), 130 (12), 129 (85), 114 (13), 113 (10), 112 (78), 92 (47), 91 (100), 71 (10); HRMS *m/e* calcd $C_{15}H_{24}O$ (M^+) 220.1827, found 220.1820.



(2*S*,4*R*,5*S*,6*E*,8*S*,10*R*)-2-Benzyloxy-5-hydroxy-4,6,8,10-tetramethyldodec-6-ene-3-one (10)

To a solution of chlorodicyclohexylborane (3.64 g, 17.1 mmol) in Et_2O (50 mL) was added triethylamine (2.9 mL, 20.5 mmol). The solution was cooled to –78 °C and a solution of the benzoate **9** (2.36 g, 11.4 mmol) in Et_2O (24 mL) was added. The resulting suspension was stirred 10 min at –78 °C, 2h at 0 °C and recooled to –78 °C. A solution of freshly prepared aldehyde **8** (1.63 g) in Et_2O (24 mL) was added. After 1h at –78 °C, the solution was placed in the freezer overnight (~ –20 °C). The reaction was warmed to 0 °C and quenched with a mixture of MeOH (20 mL) and pH 7 buffer (40 mL) followed by 30% aq H_2O_2 (20 mL). After 1h at 0 °C, the layers were separated and the aqueous layer was extracted with CH_2Cl_2 (3x). Combined organic fractions were dried over $MgSO_4$, filtered and concentrated *in vacuo*. Purification by flash chromatography (160 g silica gel, 8% EtOAc in Hexanes) provided 2.57 g (78%) of aldol product **10** as a white solid : mp 83–84 °C; R_f = 0.26 (20% EtOAc in Hexanes); $[\alpha]_D^{23}$ +42.4° (c 1.1; $CHCl_3$); IR ($CHCl_3$) 3609, 3522, 2962, 2926, 2874, 1722, 1602, 1454, 1377, 1269, 1116, 995, 870, 760, 713 cm^{-1}; ^1H NMR ($CDCl_3$) δ 8.09 (m, 2H), 7.58 (tt, J = 7.4, 1.3 Hz, 1H), 7.45 (m, 2H), 5.46 (q, J = 7.0 Hz, 1H), 5.20 (br d, J = 9.4 Hz, 1H), 4.17 (d, J = 9.1 Hz, 1H), 3.04 (dq, J = 9.4, 7.2 Hz, 1H), 2.47 (m, 1H), 1.61 (d, J = 1.6 Hz, 3H), 1.58 (d, J = 6.9 Hz, 3H), 1.40–1.00 (m, 5H), 1.03 (d, J = 7.2 Hz, 3H), 0.91 (d, J = 6.6 Hz, 3H), 0.83 (t, J = 7.2 Hz, 3H), 0.83 (d, J = 6.6 Hz, 3H); ^{13}C NMR ($CDCl_3$) δ 211.0, 165.8, 137.2, 133.2, 132.1, 129.8, 129.6, 128.4, 80.4, 75.1, 45.4, 44.6, 32.0, 29.6, 28.9, 20.7, 19.5, 15.5, 14.5, 11.2, 10.5 ; MS (CI, NH_3), *m/e* (relative intensity) 357 (2), 206 (18), 177 (6), 111 (9), 106 (13), 105 (100), 97 (28); HRMS *m/e* calcd $C_{23}H_{33}O_3$ (M^+ –OH) 357.2430, found 357.2425; Anal. Calcd for $C_{23}H_{34}O_4$: C, 73.76; H, 9.15. Found: C, 73.88; H, 9.21.



10

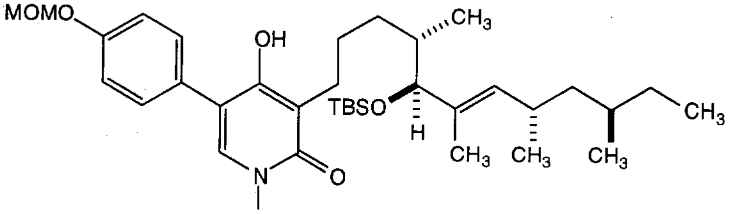
11

2*S*,4*S*,5*S*,6*E*,8*S*,10*R*)-5-(*tert*-Butyldimethylsilanyloxy)-3-hydroxy-4,6,8,10-tetramethyldodec-6-ene-2-ol (154) and (2*S*,3*S*,4*E*,6*S*,8*R*)-3-(*tert*-Butyldimethylsilanyloxy)-2,4,6,8-tetramethyldec-4-enol (<u>11</u>)

To a solution of **10** (1.173 g, 2.40 mmol) in THF (10 mL) at – 78 °C was added $LiBH_4$ (210 mg, 9.60 mmol). The solution was stirred overnight, slowly warming to 22 °C. The reaction was cooled to 0 °C and quenched with H_2O (5 mL), and the resulting solution was transferred to an Erlenmeyer flask containing saturated aqueous NH_4Cl (12 mL) using small amounts of H_2O and CH_2Cl_2 to aid in the transfer. The mixture was stirred vigorously until gas evolution had ceased (about 2h). Upon dilution with H_2O (50 mL), the mixture was extracted with CH_2Cl_2 (2 x 100 mL). Organic layers were separated and concentrated *in vacuo*. A small portion of the diol mixture was purified for analytical data as a yellow oil : R_f = 0.31 (20% EtOAc in Hexanes); $[\alpha]_D^{23}$ –9.7° (c 0.5; $CHCl_3$); IR (neat) 3441, 2959, 2876, 1730, 1462, 1377, 1251, 1149, 1043, 873, 837, 777, 671 cm^{-1}; ^1H NMR ($CDCl_3$) δ 5.07 (dd, ”*J* = 9.5, 1.0 Hz, 1H), 3.87 (d, *J* = 9.1, 1H), 3.77 (m, 1H), 3.65 (dd, *J* = 8.4, 3.2 Hz, 1H), 2.46 (m, 1H), 1.64 (m, 1H), 1.56 (d, *J* = 1.3 Hz, 3H), 1.39–0.98 (m, 5H), 1.16 (d, *J* = 6.3 Hz, 3H), 0.91 (d, *J* = 6.6 Hz, 3H), 0.90 (s, 9H), 0.82 (d, *J* = 6.4 Hz, 3H), 0.82 (t, *J* = 7.3 Hz, 3H), 0.82 (d, *J* = 6.6 Hz, 3H), 0.63 (d, *J* = 7.0 Hz, 3H), 0.11 (s, 3H), 0.03 (s, 3H); ^{13}C NMR ($CDCl_3$) δ 136.7, 133.0, 86.9, 78.1, 68.6, 44.7, 38.4, 31.9, 29.5, 28.8, 25.8, 20.2, 19.6, 18.0, 16.0, 12.8, 11.2, 10.9, –4.0, –5.2; MS (CI, NH_3), *m/e* (relative intensity) 330 (2), 329 (10), 284 (51), 185 (43), 151 (43), 143 (21), 127 (23), 123 (23), 115 (20), 111 (9), 107 (8), 97 (52), 95 (47), 75 (66), 73 (66); HRMS *m/e* calcd $C_{18}H_{35}O_3Si$ ($M^+ - {}^tBu$) 329.2512, found 329.2522.

The crude diol was diluted with MeOH (5 mL), H_2O (5 mL) and THF (5 mL) and $NaIO_4$ (770 mg, 3.60 mmol) was added, followed by stirring overnight at 22 °C. The resulting suspension was diluted with H_2O (50 mL) and extracted with CH_2Cl_2 (2 x 100 mL). The combined organic layers were dried over $MgSO_4$, filtered and concentrated *in vacuo*. The crude aldehyde was diluted with MeOH (15 mL), cooled to 0 °C, and $NaBH_4$ (360 mg, 9.60 mmol) was added, followed by warming to 22 °C for 30 min. The reaction was quenched upon addition of H_2O (30 mL) at 0 °C. Upon extraction with CH_2Cl_2 (2 x 100 mL), the combined organic layers were dried over $MgSO_4$, filtered and concentrated *in vacuo*. Purification by flash chromatography (60 g silica gel, 10% EtOAc in Hexanes) provided 756 mg (92% overall for 3 steps) of alcohol **11** as a yellow oil : R_f = 0.50 (20% EtOAc in Hexanes); $[\alpha]_D^{22}$ +2.0° (c 1.6; $CHCl_3$); IR (neat) 3420, 2959, 2930, 2860, 1462, 1379, 1251, 1055, 874, 775, 669 cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 5.07 (d, *J* = 9.8 Hz, 1H), 3.80 (d, *J* = 8.8 Hz, 1H), 3.61 (m, 2H), 2.47 (m, 1H), 1.85 (m, 1H), 1.57 (d, *J* = 0.9 Hz, 3H), 1.44–0.96 (m, 5H), 0.91 (d, *J* = 6.6 Hz, 3H), 0.90 (s, 9H), 0.83 (t, *J* = 7.2 Hz, 3H), 0.83 (d, *J* = 6.3 Hz, 3H), 0.73 (d, *J* = 6.9 Hz, 3H), 0.09 (s, 3H), 0.01 (s, 3H); ^{13}C NMR ($CDCl_3$) δ 135.3, 133.6, 85.5, 67.4, 44.8, 38.2, 32.0, 29.5, 28.8, 25.9, 20.4, 19.6, 18.1, 14.2, 11.2, 11.1, –4.2, –5.1; MS (CI, NH_3), *m/e* (relative intensity) 285 (50), 284 (21), 283 (87), 212 (3), 199 (3), 193 (4), 185 (22), 173 (24), 151 (17), 127 (13), 123 (63), 119 (9), 115 (8), 109 (27), 97 (31), 95 (36), 75 (100), 73 (76); HRMS *m/e* calcd $C_{16}H_{33}O_2Si$ (M^+

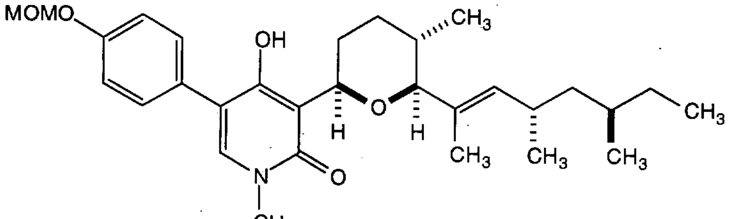
–^{t}Bu) 285.2250, found 285.2255; Anal. Calcd for $C_{20}H_{42}O_2Si$: C, 70.11; H, 12.35. Found: C, 70.15; H, 12.27.



16

(4'*S*,5'*S*,6'*E*,8'*S*,10*R*)-4-hydroxy-5-(4-methoxymethoxyphenyl)-3-[5'-(*tert*-butyl-dimethylsilanyloxy)-4',6',8',10'-tetramethyldodec-6'-enyl]-1-methyl-1*H*-pyridin-2-one (16)

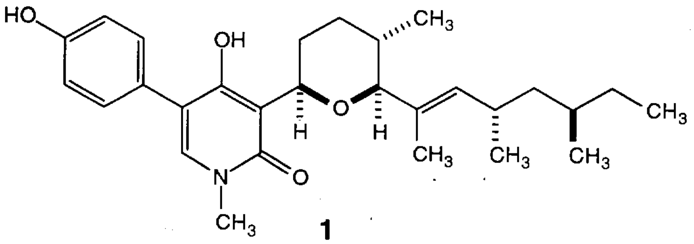
To a solution of **15** (72 mg, 0.083 mmol) in CH_2Cl_2 (4 mL) was added diazabicyloundecene (DBU) (0.12 mL, 0.80 mmol). Upon consumption of the starting material by tlc (1h), the solution was cooled to 0 °C and bromotrichloromethane (12 µL, 0.12 mmol) was added. After 30 min, the solution was concentrated *in vacuo*. Purification by flash chromatography (16 g silica gel, 15 % MeOH in 1:1 Et_2O / $CHCl_3$) provided 47 mg (92 %) of pyridinone **16** as a yellow oil: $R_f = 0.37$ (60% EtOAc in Hexanes); $[\alpha]_D^{22}$ +0.8° (c 1.2; $CHCl_3$); UV (MeOH) λ_{max} nm (ε) 240 (25,000); IR (neat) 3175, 2957, 2928, 2856, 1647, 1583, 1512, 1460, 1234, 1194, 1153, 1082, 1005, 835, 775 cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 7.28 (br d, $J = 8.7$ Hz, 2H), 7.13 (br d, $J = 8.7$ Hz, 2H), 7.06 (s, 1H), 5.36 (br s, 1H), 5.22 (s, 2H), 4.95 (br d, $J = 9.5$ Hz, 1H), 3.56–3.47 (m, 1H), 3.53 (s, 3H), 3.50 (s, 3H), 2.68–2.52 (m, 2H), 2.50–2.37 (m, 1H), 1.86–0.94 (m, 10H), 1.50 (d, $J = 1.2$ Hz, 3H), 0.88 (d, $J = 6.6$ Hz, 3H), 0.82 (t, $J = 7.5$ Hz, 3H), 0.81 (d, $J = 6.6$ Hz, 3H), 0.67 (d, $J = 6.7$ Hz, 3H), –0.01 (s, 3H), –0.06 (s, 3H); ^{13}C NMR ($CDCl_3$) δ 163.4, 157.9, 157.3, 134.6, 134.2, 134.2, 130.5, 126.4, 117.1, 113.1, 113.0, 94.3, 84.2, 56.1, 44.9, 37.2, 36.6, 32.7, 31.9, 29.4, 28.7, 25.9, 25.3, 24.4, 20.6, 19.7, 18.2, 15.8, 11.2, 10.9, –4.4, –5.0; MS (CI, CH_4), *m/e* (relative intensity) 613 (7), 557 (35), 556 (72), 482 (16), 481 (33), 330 (37), 285 (18), 284 (61), 283 (100), 275 (33), 274 (36), 185 (22); HRMS *m/e* calcd $C_{36}H_{59}NO_5Si$ (M^+) 613.4162, found 613.4153.



19

(1''*E*,2'*R*,3''*S*,5'*S*,5''*R*,6'*S*)-4-hydroxy-5-(4-methoxymethoxyphenyl)-1-methyl-3-[(5'-methyl-6'-(1'',3'',5''-trimethylheptenyl)-tetrahydropyran-2'-yl]-1*H*-pyridin-2-one (<u>19</u>)

To the starting alcohol **17** (10.3 mg, 0.021 mmol) was added $Pd(OAc)_2$ and K_2CO_3. The flask was placed under an Ar atmosphere and CH_3CN (1 mL) was added (which had been degassed using a freeze / pump / thaw cycle). After 9.5h, the suspension was filtered through a column of Celite and silica gel and concentrated *in vacuo*. Purification by preparative tlc (1 plate, 2 elutions, 3% MeOH in $CHCl_3$) provided 4.5 mg (44%) of tetrahydropyran **19** as a yellow oil: R_f = 0.76 (10% MeOH in $CHCl_3$); $[\alpha]_D^{25}$ +102° (c 0.4; $CHCl_3$); IR ($CHCl_3$) 3504, 3225, 2957, 2924, 1655, 1610, 1562, 1512, 1458, 1377, 1348, 1234, 1153, 1057, 1005, 922, 835, 756 cm^{-1}; ^1H NMR ($CDCl_3$, 500 MHz) δ 9.97 (s, 1H), 7.34 (br d, *J* = 8.4 Hz, 2H), 7.11 (s, 1H), 7.06 (br d, *J* = 8.4 Hz, 2H), 5.22–5.17 (m, 1H), 5.19 (s, 2H), 5.02 (dd, *J* = 11.3, 2.1 Hz, 1H), 3.52 (d, *J* = 10.2 Hz, 1H), 3.50 (s, 3H), 3.48 (s, 3H), 2.52–2.42 (m, 1H), 2.09 (dq, *J* = 10.2, 2.8 Hz, 1H), 1.91 (dq, *J* = 13.0, 3.2 Hz, 1H), 1.78–1.56 (m, 2H), 1.62 (s, 3H), 1.43 (qd, *J* = 13.0, 3.5 Hz, 1H), 1.38–1.16 (m, 4H), 1.09–0.98 (m, 2H), 0.90 (d, *J* = 6.7 Hz, 3H), 0.83 (t, *J* = 7.2 Hz, 3H), 0.83 (d, *J* = 6.3 Hz, 3H), 0.74 (d, *J* = 6.3 Hz, 3H); ^{13}C NMR ($CDCl_3$) δ 161.8, 161.3, 156.6, 137.9, 135.9, 130.3, 130.2, 127.6, 116.1, 114.6, 110.2, 94.4, 92.6, 77.8, 56.0, 44.7, 36.9, 32.3, 32.1, 31.9, 30.6, 29.6, 28.9, 20.6, 19.6, 17.6, 11.6, 11.2; MS (CI, CH_4), *m/e* (relative intensity) 498 (12), 497 (28), 398 (41), 330 (21), 316 (41), 303 (26), 302 (31), 289 (27), 288 (59), 287 (100), 275 (47), 274 (23), 256 (21), 242 (30), 109 (53), 97 (28), 95 (29), 81 (24); HRMS *m/e* calcd $C_{30}H_{44}NO_5$ (M^+ +1) 497.3219, found 497.3224.

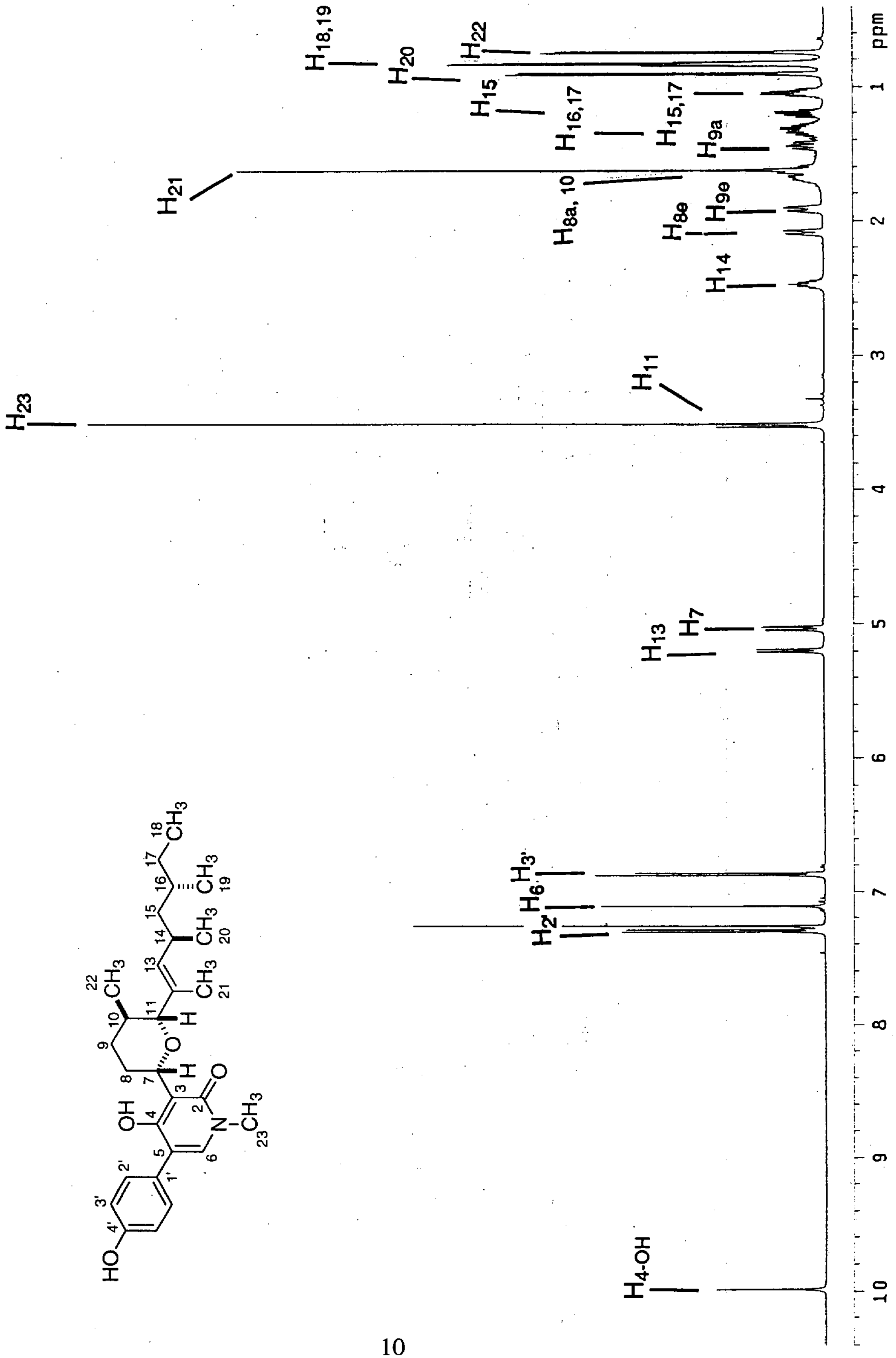


1

(1''*E*, 2'*R*,3''*S*,5'*S*,5''*R*,6'*S*)-4-hydroxy-5-(4-hydroxyphenyl)-1-methyl-3-[(5'-methyl-6'-(1'',3'',5''-trimethylhept-1-enyl)-tetrahydropyran-2'-yl]-1*H*-pyridin-2-one ((+)-sambutoxin) (1)

To a solution of **19** (12.7 mg, 0.026 mmol) in acetone (~2 mL) was added 1 drop of 10% HCl. After 30 min, excess NaI was added. After stirring 8h, the solution was quenched with aqueous K_2CO_3 and diluted with EtOAc. The aqueous layer was extracted several times with EtOAc, and combined organic layers were dried over $MgSO_4$, filtered and concentrated *in vacuo*. Purification by preparative tlc (1 plate, 2 elutions, 2% MeOH in $CHCl_3$) provided 9.5 mg (82%) of (+)-sambutoxin **1** as an ivory colored solid: $R_f = 0.44$ (5% MeOH in $CHCl_3$); $[\alpha]_D^{22}$ +143° (c 0.6; MeOH); $[\alpha]_D^{24}$ +123° (c 0.1; MeOH); UV (MeOH) λ_{max} nm (ε) 254 (14,000), 233 (13,000), 215 (30,000); IR (neat) 3406, 3204, 2957, 2922, 2872, 1649, 1613, 1558, 1514, 1454, 1377, 1269, 1233, 1172, 1043, 1007, 835, 756 cm^{-1}; ^1H NMR ($CDCl_3$) δ 10.03 (s, 1H), 7.29 (br d, $J = 8.5$ Hz, 2H), 7.12 (s, 1H), 6.90 (br d, $J = 8.4$ Hz, 2H), 5.19 (dd, $J = 9.5$, 1.1 Hz, 1H), 5.04 (d, $J = 10.2$ Hz, 1H), 3.52 (d, $J = 9.9$ Hz, 1H), 3.52 (s, 3H), 2.52–2.42 (m, 1H), 2.12–2.06 (m, 1H), 1.90 (dq, $J = 13.4$, 3.5 Hz, 1H), 1.76–1.56 (m, 2H), 1.62 (d, $J = 1.4$ Hz, 3H), 1.42 (qd, $J = 12.7$, 3.2 Hz, 1H), 1.38–1.16 (m, 4H), 1.09–0.98 (m, 2H), 0.90 (d, $J = 6.3$ Hz, 3H), 0.83 (t, $J = 7.2$ Hz, 3H), 0.83 (d, $J = 6.3$ Hz, 3H), 0.74 (d, $J = 6.7$ Hz, 3H); ^{13}C NMR ($CDCl_3$) δ 162.3, 161.3, 155.7, 138.0, 135.9, 130.4, 130.2, 125.8, 115.3, 110.4, 92.6, 77.8, 44.7, 37.2, 32.3, 32.1, 32.0, 30.7, 29.6, 28.9, 20.7, 19.6, 17.6, 11.6, 11.2; MS (CI, CH_4), *m/e* (relative intensity) 454 (9), 453 (22), 354 (15), 272 (14), 259 (12), 244 (22), 243 (66), 242 (16), 231 (14), 230 (12), 109 (8); HRMS *m/e* calcd $C_{28}H_{39}NO_4$ (M^+) 453.2879, found 453.2864.

Figure 16
^{1}H NMR Spectrum of Authentic (-)-Sambutoxin

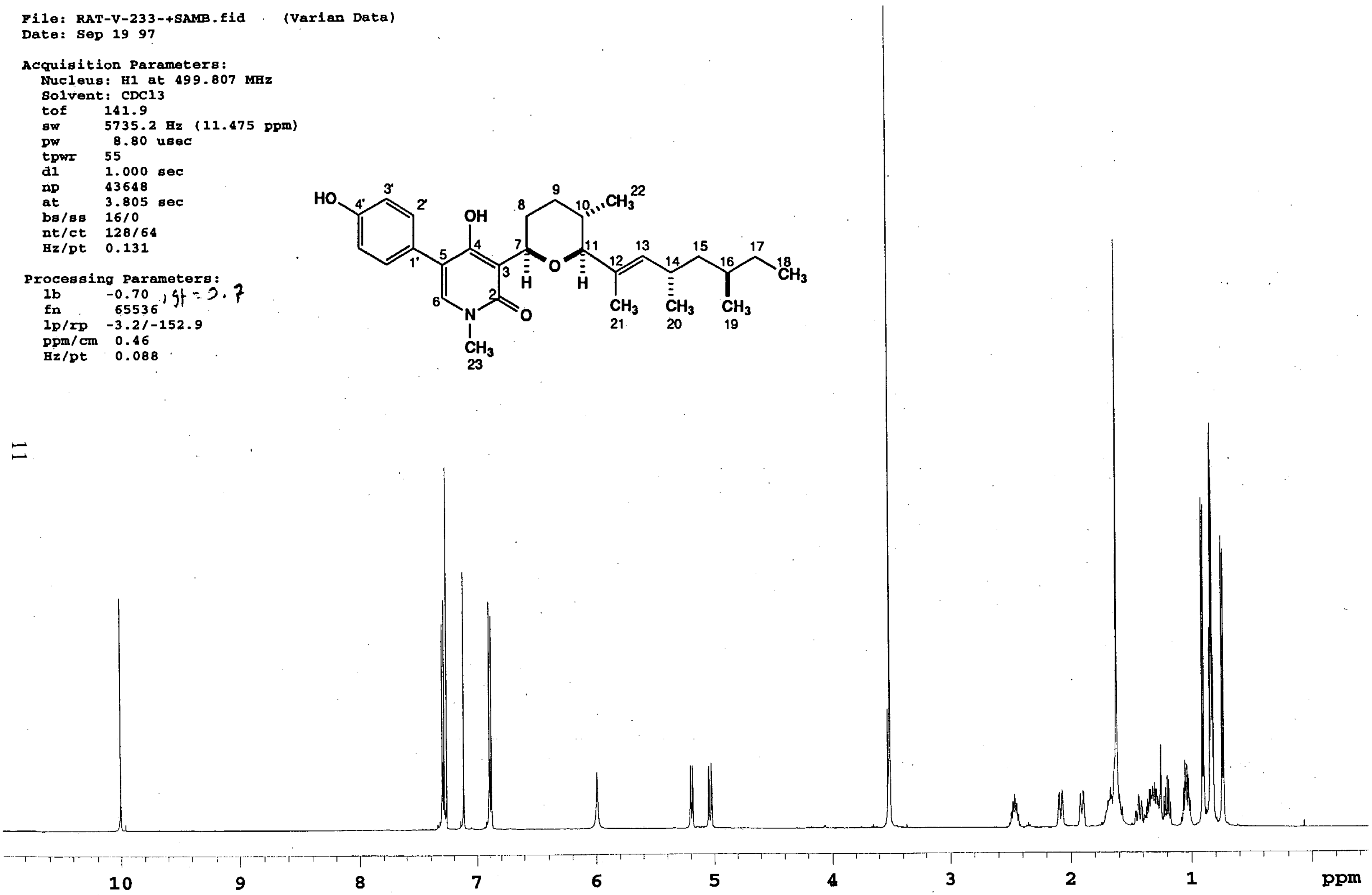


```
RAT-V-233  (+)-sambutoxin

File: RAT-V-233-+SAMB.fid    (Varian Data)
Date: Sep 19 97

Acquisition Parameters:
  Nucleus: H1 at 499.807 MHz
  Solvent: CDCl3
  tof     141.9
  sw      5735.2 Hz (11.475 ppm)
  pw       8.80 usec
  tpwr    55
  d1      1.000 sec
  np      43648
  at      3.805 sec
  bs/ss   16/0
  nt/ct   128/64
  Hz/pt   0.131

Processing Parameters:
  lb      -0.70 , gf = 0.7
  fn       65536
  lp/rp   -3.2/-152.9
  ppm/cm   0.46
  Hz/pt    0.088
```



```
mixsamb - sambutoxin mixed with RAT-V-233


File: mixsamb.fid     (Varian Data)
Date: May 22 97

Acquisition Parameters:
  Nucleus: H1 at 499.807 MHz
  Solvent: CDCl3
  tof     141.9
  sw      5735.2 Hz (11.475 ppm)
  pw       8.80 usec
  tpwr    55
  d1      1.000 sec
  np      43456
  at      3.789 sec
  bs/ss   16/0
  nt/ct   256/256
  Hz/pt   0.132

Processing Parameters:
  lb       0.50
  fn       65536
  lp/rp   5.8/113.5
  ppm/cm  0.46
  Hz/pt   0.088
```