

Supporting Information Available: Experimental procedures and spectral data for carbonates and carbamates **6**, **9a - d**, **19a-b**, and **16a - e** and substrates and products **4**, **5**, **7**, **10**, **11**, **12**, **14**, and **15** (16 pages). This material is contained in libraries on microfiche, immediately follows this article in the microfilm version of the journal, and can be ordered from the ACS; see any current masthead page for ordering information.

Supplemental Materials (Procedures and Processes)

Experimental section

Melting points were measured with a capillary apparatus and are uncorrected. Unless otherwise specified, characterization data was taken as follows. ^1H NMR spectra were taken in CDCl_3 with CHCl_3 (7.26 ppm) and/or tetramethylsilane (0.0 ppm) used as an internal standard. ^{13}C NMR spectra were taken in CDCl_3 with CDCl_3 (77.0 ppm) used as an internal standard.

All reactions were performed under a positive pressure of nitrogen. Solvent concentration was accomplished by rotary evaporation ca. 20 mm Hg with the bath temperature never exceeding 50°C. Commercial grade anhydrous solvents and reagents were used without further purification unless otherwise specified. Anhydrous toluene or THF (KF <0.01%, 0 ppm peroxides) was used for all allylations: water and peroxide levels were measured prior to all reactions (by KF titration and test strips). Column chromatographies were performed on grade 60 silica gel.

Section I. Carbonates and their precursors:

Allyl *t*-butyl carbonate (6): Allyl alcohol (149.5 g, 2.57 mol, 1.1 eq), di-*t*-butyl dicarbonate (510.0 g, 2.34 mol, 1.0 eq), tetra-*n*-butylammonium hydrogen sulfate (39.0 g, 0.11 mol, 0.05 eq) and 1000 mL of 30% w/w aqueous NaOH were mixed together in 1200 mL of methylene chloride at 0°C according to the procedure of Houlihan and coworkers.¹ After workup, the product was purified by vacuum distillation, bp

96°C at 70 mmHg, affording the product as a colorless oil, 250.3 g (68%): ^1H NMR (CDCl_3 , 300 MHz): δ 5.95 (m, 1H), 5.3 (appar qq, 2H), 4.55 (appar dt, 2H), 1.49 (s, 9H). ^{13}C NMR (CDCl_3 , 75 MHz): δ 153.1, 131.9, 118.3, 81.9, 67.4, 27.6. MS (DCI, NH_3): 176 ($\text{M}^+ \text{NH}_4^+$). Anal Calc'd for $\text{C}_8\text{H}_{14}\text{O}_3$: C, 60.73; H, 8.92. Found: C, 60.95; H, 8.96.

***trans* -3-(3-Quinolyl)-2-propen-1-ol (19a):** To a dry 3-necked, jacketed, 1000-mL, round-bottomed flask was charged sodium bis(2-methoxyethoxy)aluminum hydride (Red-AlTM, 65% wt. solution in toluene, 25.5 g, 81.97 mmol, 1.5 eq) and anhydrous toluene (120 mL). To this precooled (-10°C) and mechanically-stirred solution was added a THF (115 mL) solution of **18** (10.0 g, 54.6 mmol) via pressure-equalizing, dropping addition funnel, maintaining the internal temperature below 0°C . After the addition was complete (20 minutes) the mixture was stirred at 5°C for 15 minutes and then quenched by the slow addition of 2N H_2SO_4 (140 mL). The solution was then stirred for 2 hours after which time the acidic aqueous product solution was washed with toluene (2 x 125 mL). The acidic solution was then brought to pH 5 with 25% aq. NaOH and then to pH 8-9 with triethanolamine. The basic aqueous solution was then filtered through a pad of diatomaceous earth to remove a small amount of particulate matter. The filtrate was then extracted with toluene (2 x 300 mL). The combined organic layers were concentrated under reduced pressure to give exclusively **19a** as a yellow-white crystalline solid: 8.2 g, 81 %: ^1H NMR (300 MHz, CDCl_3): δ 8.94 (d, $J = 2$ Hz, 1H), 8.05 (dd, $J = 8, 1$ Hz, 1H), 7.97 (d, $J = 2$ Hz, 1H), 7.72 (d, $J = 2$ Hz, 1H), 7.65 (m, 1H), 7.48 (m, 1H), 6.72 (appar dd, 1H), 6.55 (dt, $J = 16, 6$ Hz, 1H), 4.39 (dd, $J = 6, 1$ Hz, 2H), 3.36 (broad s, 1H). ^{13}C NMR (75 MHz, $\text{DMSO}-d_6$): δ 149.3, 146.7, 133.6, 131.8, 130.0, 129.0, 128.7, 128.0, 127.4, 126.9, 125.0, 61.5. Anal. Calc'd for $\text{C}_{12}\text{H}_{11}\text{NO}$: C, 77.81; H, 5.99; N, 7.56. Found: C, 77.75; H, 5.83; N, 7.50.

***trans*-(3-(3-Quinolyl)-2-propenyl) *t*-butyl carbonate (9a):** *trans*-3-(3-Quinolyl)-2-propen-1-ol (**19a**) (100.0 g, 0.54 mol, 1.0 eq), di-*t*-butyl dicarbonate (176.7g, 0.81 mol, 1.5 eq), tetra-*n*-butylammonium hydrogen sulfate (6.6 g, 0.02 mol, 0.04 eq), and a solution of sodium hydroxide (69.0 g, 1.73 mol, 3.2 eq) of 276 mL of water were reacted in toluene (400 mL) according to the procedure described for the preparation of **6**. The crude product was purified by crystallization from heptane (800 mL) affording 140.0 g (91%) **9a** as beige needles: MP 55 - 56°C. ¹H NMR (300 MHz, CDCl₃): δ 9.00 (d, 1H), 8.08 (br dd, 2H), 7.80 (dd, 1H), 7.72-7.65 (m, 1H), 7.58-7.51 (m, 1H), 6.83 (br d, J = 16.2 Hz, 1H), 6.52 (dt, J = 16.2, 5.9 Hz, 1H), 4.80 (dd, J = 5.9, 1.1 Hz, 2H), 1.52 (s, 9H). ¹³C NMR (75 MHz, CDCl₃): δ 153.2, 149.1, 147.6, 132.9, 130.6, 129.4, 129.2, 129.0, 127.8, 126.9, 125.4, 82.4, 67.0, 27.7. Anal. Calc'd for C₁₇H₁₉NO₃: C, 71.56; H, 6.71; N, 4.91. Found: C, 71.59; H, 6.81; N, 4.80.

***cis*-3-(3-Quinolyl)-2-propen-1-ol (19b):** To a dry 3000-mL, 3-necked, jacketed flask, equipped with a thermocouple was charged alcohol **18** (76.0 g, 415.3 mmol), 5% Pd/CaCO₃-Pb (Lindlar Catalyst, 1.52 g) and 3,6-dithia-1,8-octanediol (0.76 g, 4.17 mmols, 0.01 equiv). Absolute ethanol (1125 mL) was charged and the mixture vigorously stirred at ambient temperature (19°C). The atmosphere above the mixture was evacuated and purged twice with hydrogen. Balloon pressure hydrogen gas (~ 0.3 psi) was placed above the reaction mixture and the progress of the reduction monitored by HPLC analysis. After 25 hours, the reaction mixture was filtered through a bed of diatomaceous earth and the cake was washed with ethanol (125 mL). The filtrates were concentrated under reduced pressure and the residue dissolved in methyl isobutyl ketone (MIBK, 400 mL). This solution was passed through a plug of fultrol filter aid and washed with 125 ml of MIBK. The combined filtrates were concentrated to a volume of 200 mL then diluted with MIBK (270 mL). The crystallizing solution was then slowly diluted with heptanes (270 mL) with stirring and subsequently cooled to 0°C. The product was isolated by vacuum filtration and washed with cold MIBK/heptane (3:4, 150 mL). The wet cake was dried in vacuo at 50°C for 6 hours, to give **19b**: (50.0g, hplc purity: 98.9%): m.p. 81-82°C. ¹H NMR (300 MHz, CDCl₃) δ 8.71 (d, J=2.2 Hz, 1H), 8.04

(dd, $J=8.4, 0.9$ Hz, 1H), 7.90 (d, $J=2.1$ Hz, 1H), 7.74 (m, 1H), 7.66 (m, 1H), 7.51 (m, 1H), 6.61 (br d, $J=11.8$ Hz, 1H), 6.13 (dt, $J=11.8, 6.5$ Hz, 1H), 4.81 (dd, $J=6.4, 1.7$ Hz, 2H), 3.62 (broad s, 1H). ^{13}C NMR (75 MHz, CDCl_3) δ 150.8, 146.5, 135.0, 134.4, 129.6, 129.5, 128.7, 127.8, 127.5, 126.9, 126.9, 59.0. Anal. Calc'd for $\text{C}_{12}\text{H}_{11}\text{NO}$: C, 77.81; H, 5.99; N, 7.56. Found: C, 77.89; H, 6.03; N, 7.49.

***cis*-(3-(3-Quinolyl)-2-propenyl) *t*-butyl carbonate (9b):** *cis*-Carbonate **9b** was prepared in the same manner as *trans*-carbonate **9a** according to the procedure of Houlihan¹ in 88% yield: M.P. 57-58°C. ^1H NMR (300 MHz, CDCl_3) δ 8.78 (d, $J=2.2$ Hz, 1H), 8.07 (m, apparent d, $J=8.5$ Hz, 1H), 7.93 (d, $J=2.0$ Hz, 1H), 7.78 (dd, $J=8.1, 1.0$ Hz, 1H), 7.68 (m, 1H), 7.52 (m, 1H), 6.76 (br d, $J=11.7$ Hz, 1H), 6.05 (dt, $J=11.8, 6.6$ Hz, 1H), 4.88 (dd, $J=6.6, 1.7$ Hz, 2H), 1.47 (s, 9H). ^{13}C NMR (75 MHz, CDCl_3) δ 153.1, 150.8, 147.0, 134.7, 129.5, 129.3, 129.1, 128.8, 127.8, 127.4, 126.9, 82.4, 63.3, 27.6. Anal. Calc'd for $\text{C}_{17}\text{H}_{19}\text{NO}_3$: C, 71.56; H, 6.71; N, 4.91. Found: C, 71.31; H, 6.62; N, 4.91.

(1-(3-Quinolyl)-2-propenyl) *t*-butyl carbonate (9c): A dry 3-necked, round-bottomed flask equipped with a nitrogen inlet adapter and overhead stirring was charged with 3-quinolinecarboxaldehyde (30.0 g, 191 mmol, 1 eq) in 120 mL THF at -15 °C. Vinyl magnesium chloride (1.9 M in THF, 100.6 mL, 1 eq) was added slowly to maintain the internal reaction temperature below -15 °C. After 15 min, HPLC indicated complete consumption of starting material. The alkoxide solution was transferred via cannula into another reaction vessel containing di-*t*-butyl dicarbonate (41.7 g, 191 mmol, 1 eq) and 100 mL THF at -15 °C. The temperature was maintained at -15 °C during the quench. Once the transfer was complete, the reaction mixture was stirred for 15 min and partitioned between 500 mL of MTBE and 125 mL of 10% NH_4Cl (aq) solution. The organic layer was concentrated to an oil, which solidified to a low-melting solid upon standing. Yield 52.8 g (97%): ^1H NMR (300 MHz, CDCl_3) δ : 8.93 (appar d, 1H), 8.15 (m, 2H), 7.84 (appar dd, 1H), 7.76 (appar dt, 1H), 7.58 (appar dt, 1H), 6.35 (m, 1H), 6.15 (m, 1H),

5.4 (m, 2H), 1.48 (s, 9H). ^{13}C NMR (75.5 MHz, CDCl_3) δ : 149.8, 147.9, 135.3, 134.3, 131.5, 129.8, 129.3, 128.0, 127.6, 127.0, 118.4, 90.4, 82.9, 77.1, 27.8. MS (DCI, NH_3): 286 ($\text{M}+\text{H}^+$). Anal Calc'd for $\text{C}_{17}\text{H}_{19}\text{NO}_3$: C, 71.56; H, 6.71; N, 4.91. Found C, 71.32; H, 6.75; N, 4.82.

***trans, trans*-Dimeric ether 9d**: mp 103-104 °C. ^1H NMR (300 MHz, CDCl_3) δ : 9.20 (m, 2H), 8.28 (m, 4H), 7.95 (m, appar dd, 2H), 7.84 (m, 2H), 7.71 (m, appar dt, 2H), 7.01 (d, $J=16.2$ Hz, 2H), 6.79 (dt, $J=16.2$, 5.4 Hz, 2H), 4.49 (dd, $J=1.5$, 5.4 Hz, 4H). ^{13}C NMR (75.5 MHz, CDCl_3) δ : 149.0, 147.2, 132.9, 129.6, 129.4, 129.0, 128.9, 128.5, 128.0, 127.8, 127.1, 70.8. MS (DCI, NH_3): 353 ($\text{M}+\text{H}^+$). Anal Calc'd for $\text{C}_{24}\text{H}_{20}\text{N}_2\text{O}$: C, 81.89; H, 5.73. Found C, 81.66; H, 5.65.

***N,N*-Dicyclohexylcarbamate 16a**: To a suitable reaction vessel was charged alcohol **19a** (1.0 g, 5.4 mmol, 1 equiv) and THF (10 ml) and the resulting solution cooled to 0°C. Potassium *t*-butoxide (0.67 g, 5.9 mmol, 1.1 equiv) was then added followed by *N,N*-dicyclohexylcarbamoyl chloride (1.32 g, 5.4 mmol, 1.0 equiv). The mixture was stirred for 2 hrs at 0°C and then allowed to warm to rt. for 6 hr. The reaction mixture was quenched by the addition of MTBE (50 ml) and 10% NH_4Cl (25 ml). The organic layer was separated, dried over MgSO_4 , and concentrated to afford 2.0 g (95%) of **16a** as an oil. The material was determined to be >95% pure by NMR and used without further purification. ^1H NMR (300 MHz, CDCl_3): δ 9.08 (d, $J = 2.2$ Hz, 1H), 8.2-8.1 (m, 2H), 7.90-7.85 (m, 1H), 7.75-7.55 (m, 2H), 6.9-6.6 (m, 2H), 4.9 (dd, $J = 5.9$, 1.5 Hz, 2H), 1.96-1.60 (m, 16H), 1.4-1.1 (m, 6H). ^{13}C NMR (75 MHz, CDCl_3): δ 155.3, 149.1, 147.3, 132.4, 129.3, 129.1, 129.0, 128.9, 128.5, 127.7, 127.6, 126.7, 64.8, 55.3, 31.5, 26.1, 25.4. Anal. Calc'd for $\text{C}_{25}\text{H}_{32}\text{N}_2\text{O}_2$: C, 76.49; H, 8.22; N, 7.14. Found: C, 76.21; H, 8.44; N, 7.04.

***N,N*-Diphenylcarbamate 16b**: To a suitable reaction vessel was charged alcohol **19a** (5.0 g, 27 mmol, 1 equiv) and THF (50 ml) and the resulting solution cooled to 0°C. Potassium *t*-butoxide (3.6 g, 32 mmol) was added followed by *N,N*-diphenylcarbamoyl chloride (6.9 g, 29.7 mmol). The mixture was

stirred for 2 hrs at 0°C and then allowed to warm up to room temp. over a period of 6 hr. The reaction mixture was quenched by the addition of MTBE (100 ml) and 10% NH₄Cl (50 ml). The organic layer was separated, concentrated to ¼ volume and diluted with 75 mL of *n*-heptane. The product formed as a precipitate and was collected by filtration affording 8.3 g (80%) of **16b**. ¹H NMR (300 MHz, CDCl₃): δ 8.8(d, J = 2.2 Hz, 1H), 8.0-7.8(m, 2H), 7.64 -7.4(m, 3H), 7.3-7.1(m, 10H), 6.55-6.30(m, 2H), 4.62(dd, J = 5.8, 1.5 Hz, 2H) ¹³C NMR (75 MHz, CDCl₃): δ 154.3, 149.1, 147.3, 142.2, 132.5, 129.6, 129.2, 129.1, 128.9, 128.8, 128.7, 127.7, 126.8, 126.4, 126.1, 125.8, 65.9 Anal. Calc'd for C₂₅H₂₀N₂O₂: C, 78.93; H, 5.30; N, 7.36. Found: C, 79.21; H, 5.08; N, 7.09.

***N,N*-Diisopropylcarbamate 16c:** Compound **16c** was prepared according to the procedure described for related carbamate **16a** using reagents as follows: alcohol **19a** (2.00 g, 10.8 mmol, 1 equiv), potassium *t*-butoxide (1.34 g, 11.9 mmol, 1.15 equiv) and diisopropylcarbamoyl chloride (1.65 g, 11.9 mmol, 1.15 equiv). Isolation afforded 3.30 g (100%) of an orange oil which was used for alkylation experiments without further purification. ¹H NMR (300 MHz, CDCl₃): δ 8.8(d, J = 2.2 Hz, 1H), 7.9-7.8(m, 2H), 7.6-7.52(m, 1H), 7.48-7.26(m, 2H), 6.6-6.3(m, 2H), 4.62(dd, J = 5.8, 1.5 Hz, 2H), 3.5 (m, 2H), 1.05 (d, J = 6.9 Hz, 12H). ¹³C NMR (75 MHz, CDCl₃): δ 155.0, 149.0, 132.4, 129.2, 129.1, 129.0, 128.9, 128.5, 127.7, 127.6, 127.1, 126.7, 64.7, 45.4, 21.8. Anal. Calc'd for C₁₉H₂₄N₂O₂: C, 73.05; H, 7.74; N, 8.97. Found: C, 72.85; H, 7.73; N, 8.85.

Morpholinecarbamate 16d: Compound **16d** was prepared according to the procedure described for related carbamate **16a** using reagents as follows: alcohol **19a** (2.00 g, 10.8 mmol, 1 equiv), potassium *t*-butoxide (1.34 g, 11.9 mmol, 1.15 equiv) and morpholineacid chloride (1.95 g, 13 mmol, 1.2 equiv). The isolated crude oil was purified by column chromatography using heptane/ethyl acetate as the eluent. A total of 1.40 g of **16d** was obtained (44%): ¹H NMR (300 MHz, CDCl₃): δ 8.9(d, J = 2.2 Hz, 1H), 8.0-7.95(m, 2H), 7.7(dd, J = 8.1, 1.5 Hz, 1H), 7.52-7.40(m, 2H), 6.72-6.40(m, 2H), 4.75(dd, J = 5.9, 1.5 Hz,

2H), 3.62-3.52(m, 4H), 3.46-3.40(m, 4H). ^{13}C NMR (75 MHz, CDCl_3): δ 155.0, 149.0, 132.8, 130.0, 129.4, 129.0, 127.7, 126.9, 126.4, 66.4, 65.7, 44.1, 44.0, 43.9, 43.8. Anal. Calc'd for $\text{C}_{17}\text{H}_{18}\text{N}_2\text{O}_3$: C, 68.44; H, 6.08; N, 9.39. Found: C, 68.51; H, 6.26; N, 9.12.

Imidazolinecarbamate 16e: A suitable reaction vessel was charged with alcohol **19a** (5.0 g, 27 mmol) in CH_2Cl_2 (50 ml). 1,1'-Carbonyldiimidazole (4.82 g, 29.7 mmol) was added and the mixture stirred at r.t. for 8 hrs. The reaction was quenched by the addition of 10% NH_4Cl (25 ml) and the separated organic layer was concentrated to 1/4 volume. Heptane (50 ml) was added to precipitate the product, which was collected by filtration affording 7.2 g (96 %) of **16e**: ^1H NMR (300 MHz, CDCl_3): δ 9.05(d, J = 2.2 Hz, 1H), 8.0-7.9(m, 2H), 7.7-7.62(dd, J = 8.1, 1.5 Hz, 1H), 7.6-7.4(m, 3H), 7.15(s, 2H), 6.9-6.5(m, 2H), 5.0 (dd, J = 5.9, 1.5 Hz, 2H). ^{13}C NMR(75 MHz, CDCl_3): δ 154.7, 148.8, 147.4, 135.0, 133.1, 132.4, 131.1, 129.5, 128.9, 128.8, 127.8, 127.7, 127.0, 124.7, 121.7, 68.0. Anal. Calc'd for $\text{C}_{16}\text{H}_{13}\text{N}_3\text{O}_2$: C, 68.81; H, 4.69; N, 15.05. Found: C, 68.53; H, 4.32; N, 14.89.

Section II: Allylation products and starting materials.

2',4''-O-bis(trimethylsilyl) erythromycin A 9-O-ketaloxime 4: The preparation of this compound from erythromycin A oxime has been published in the patent literature, although complete spectral details have not been given.² mp: 116-117°C. ^1H NMR (400 MHz, CDCl_3) δ : 5.04 (dd, J = 2.4, 10.6Hz, 1H), 4.86 (d, J = 4.8Hz, 1H), 4.41 (s, 1H), 4.40 (d, J = 7.2Hz, 1H), 4.21 - 4.26 (m, 2H), 4.05 (sept, J = 6Hz, 1H), 3.76 (m, 1H), 3.60 - 3.67 (m, 2H), 3.56 (d, J = 8.4Hz, 1H), 3.30 (s, 3H), 3.20 (appar d, 1H), 3.14 (s, 1H), 2.79 (appar pent, 1H), 2.69 (appar q, 1H), 2.55 (br m, 1H), 2.35 (d, J = 16Hz, 1H), 2.24 (s, 6H), 1.46 - 2.01 (m, 18H), 1.45 (s, 3H), 1.00 - 1.41 (m, 32H, contains all CH_3 doublets), 0.84 (t, J = 7.8Hz, 3H), 0.14 (s, 9H), 0.10 (s, 9H). ^{13}C NMR (100 MHz, CDCl_3) δ : 175.8, 171.0, 104.1, 102.7, 96.7, 81.5, 80.9, 79.4, 77.2, 76.9, 75.5, 74.2, 73.3, 73.1, 70.6, 67.7, 65.1, 64.9, 63.2, 49.6, 44.6, 40.9(br), 40.2, 38.3,

35.8, 34.2, 33.4, 33.2, 29.8, 27.0, 26.5, 25.3, 24.2, 22.8, 22.7, 22.0, 21.6, 21.1, 19.2, 18.3, 16.1, 15.4, 14.2, 10.6, 9.6, 1.0, 0.9. MS (DCI, NH₃): 1033 (M+H⁺). Anal Calc'd for C₅₂H₁₀₀N₂O₁₄Si₂: C, 60.43; H, 9.75; N, 2.71. Found C, 60.56; H, 9.78; N, 2.63.

2',4''-O-bis(trimethylsilyl)-6-O-allyl-erythromycin A 9-O-ketaloxime 5: To a suitable reaction vessel was charged 30.0 g (0.029 mol, 1 eq.) of oxime ketal **4**, 6.65 g of allyl *t*-butyl carbonate **6** (0.042 mol, 1.45 eq.) and 150 mL of THF.³ The reaction vessel was evacuated and purged with nitrogen gas three times before Pd(OAc)₂ (0.033 g, 0.15 mmol, 0.005 eq.) and Ph₃P (0.33 g, 1.25 mmol, 0.043 eq.) were charged to the vessel. The vessel was evacuated and purged with nitrogen gas twice more and the reaction mixture heated to reflux for 19 hours. When the reaction was complete as determined by HPLC, the solution was cooled to r.t. and 2.7 mL of a commercial bleach solution (5.25% NaOCl by weight) was added. After mixing at r.t. for 45 minutes, the slurry was reduced to dryness and dissolved in 120 mL of heptane at 60°C. The hot solution was filtered through a pad of diatomaceous earth and reduced to dryness affording about 31 g of a colorless solid (87% pure by HPLC). The product was purified by recrystallization from 300 mL 10:1 isopropyl alcohol : heptane and affording 23.9 g (77%) of **5** as a colorless solid (>99% pure by HPLC.): mp: 221-223 °C. ¹H NMR (400 MHz, CDCl₃) δ: 5.88 (m, 1H), 5.11 (m, 1H), 5.05-5.08 (m, 2H), 5.03 (m, 1H), 4.84 (d, J = 4.7 Hz, 1H), 4.43 (d, J = 6.9 Hz, 1H), 4.21-4.26 (m, 2H), 4.02-4.15 (m, 2H), 3.93 (dd, J = 2.2, 1.5 Hz, 1H), 3.89 (dd, J = 2.2, 1.5 Hz, 1H), 3.71-3.76 (m, 4H), 3.66 (m, 1H), 3.30 (s, 3H), 3.23 (s, 1H), 3.16 (d, J = 12.4 Hz, 1H), 3.12 – 3.18 (m, 1H), 2.88 (m, 1H), 2.70 (appar q, m, 1H), 2.53 (br m, 1H), 2.37 (appar d, 1H), 2.24 (br s, 6H), 1.92 – 2.03 (m, 3H), 1.44 – 1.90 (m, 11H), 1.43 (s, 3H), 1.14 – 1.28 (m, 23H), 1.08 (appar t, 6H), 0.98 (d, J = 7.2 Hz, 3H), 0.85 (t, J = 7.6 Hz, 3H), 0.15 (s, 9H), 0.10 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ: 175.5, 169.3, 137.0, 114.8, 103.9, 102.4, 96.4, 80.7, 79.7 (6-C), 78.3, 77.8, 76.7, 74.0 (12-C), 73.4, 73.2, 70.0 (11-C), 67.2, 65.3, 65.2, 65.1, 62.8, 49.6, 44.8, 40.9, 39.2, 37.2, 35.7, 34.5, 33.4, 33.2, 29.5, 26.3, 25.5, 25.2, 24.4, 24.3, 22.9,

22.1, 21.8, 21.5, 21.1, 19.3, 19.0, 16.1, 15.8, 14.8, 10.6, 9.6, 0.9, 0.7. MS (DCI, NH_3): 1073 ($\text{M}+\text{H}^+$).
 Anal Calc'd for $\text{C}_{55}\text{H}_{104}\text{N}_2\text{O}_{14}\text{Si}_2$: C, 61.53; H, 9.77; N, 2.61. Found C, 61.61; H, 9.73; N, 2.52.

2',4''-O-bis(trimethylsilyl)-6,12-bis-O-allyl-erythromycin A 9-O-ketaloxime 7: Compound **4** (10.0 g, 9.68 mmol, 1.00 eq.), carbonate **6** (6.11 g, 38.7 mmol, 4.00 eq.), $\text{Pd}(\text{OAc})_2$ (22 mg, 0.098 mmol, 0.01 eq), and Ph_3P (0.10 g, 0.38 mmol, 0.04 eq.) were mixed together according to the procedure described above for the preparation of mono-allyl adduct **5** and heated to reflux in THF (50 mL) for 17 hrs. After an identical bleach treatment and filtration, the crude solid was recrystallized from 30 mL of CH_3CN affording 8.12 g of **7** as a colorless solid (75%).⁴ IR (KBr): 3414, 2966, 2936, 1734, 1453, 1381, 1250, 1160, 1123, 1097, 1053, 1007, 899, 841, and 750 cm^{-1} . ^1H NMR (500 MHz, CDCl_3) δ : 5.91 (m, 1H), 5.83 (m, 1H), 5.71 (m, 1H), 5.19 (appar dq, 1H), 5.03 - 5.13 (m, 3H), 4.83 (d, $J = 6\text{Hz}$, 1H), 4.56 (br m, 1H), 4.42 (d, $J = 7\text{Hz}$, 1H), 4.24 (m, 1H), 4.14 (m, 1H), 4.00 - 4.11 (m, 2H), 3.94 (m, 1H), 3.75 (appar d, $J = 5.5\text{Hz}$, 2H), 3.60 - 3.70 (m, 2H), 3.51 (br s, 1H), 3.30 (s, 3H), 3.16 (d, $J = 7\text{Hz}$, 2H), 2.80 - 3.00 (m, 2H), 2.51 (br m, 1H), 2.34 (d, $J = 10.5\text{Hz}$, 1H), 2.21 (br s, 6H), 1.90 - 2.00 (m, 2H), 1.60 - 1.84 (m, 6H), 1.47 - 1.55 (m, 7H), 1.43 (s, 3H), 1.20 - 1.27 (m, 7H), 1.14 - 1.20 (m, 18H), 1.10 (d, $J = 4.5\text{Hz}$, 3H), 1.08 (d, $J = 5\text{Hz}$, 6H), 0.86 (t, $J = 6\text{Hz}$, 3H), 0.14 (s, 9H), 0.08 (s, 9H). ^{13}C NMR (125 MHz, CDCl_3) δ : 174.9, 168.3, 136.9 (6-O- CH_2CH), 136.2 (12-O- CH_2CH), 115, 103.7, 102.6, 96.5, 80.8, 80.0 (6-C), 79.4 (12-C), 78.3, 74.5, 73.4, 73.1, 72.4 (11-C), 67.1, 66.3, 65.4, 65.2, 62.7, 49.6, 45.0, 40.9, 39.1, 37.9, 35.9, 34.5, 33.4, 29.5, 26.5, 25.7, 24.5, 23.1, 23.0, 22.2, 21.9, 21.6, 19.4, 19.2, 18.3, 16.0, 13.9, 10.5, 10.0, 1.1, 0.9. MS (ESI+): 1113 ($\text{M}+\text{H}^+$), 1135 ($\text{M}+\text{Na}^+$). Anal Calc'd for $\text{C}_{58}\text{H}_{108}\text{N}_2\text{O}_{14}\text{Si}_2$: C, 62.55; H, 9.77; N, 2.52. Found C, 62.74; H, 9.94; N, 2.42.

2',4''-O-bis(benzoyl)-erythromycin A 9-O-benzoyloxime (8): To a suitable reaction vessel was charged erythromycin oxime (300.0 g, 401 mmol, 1 eq), benzoic anhydride (335.3 g, 1482 mmol, 3.7 eq), *N,N*-dimethylaminopyridine (50.1 g, 410 mmol, 1.02 eq) and 1200 mL of THF at rt. Triethylamine

(169.1 mL, 1213 mmol, 3.0 eq) was added dropwise by pressure equalizing addition funnel over 15 min, the internal temperature rising to 32°C. The reaction mixture was heated to 40°C overnight when HPLC monitoring indicated complete reaction. After cooling to 5°C, *N,N*-dimethylethylenediamine (28.9 g, 328 mmol, 0.82 eq) was added to quench the remaining unreacted benzoic anhydride. After warming to rt and stirring for an additional 30 min, the reaction mixture was reduced to a thick paste *in vacuo*. The crude residue was taken up in 600 mL of isopropyl acetate and this solution was washed with 5% KH_2PO_4 solution (2 x 600 mL), 5% NaHCO_3 (600 mL), and 600 mL saturated brine. The organic layer was reduced to dryness *in vacuo* and this crude residue was dissolved in 1:4 acetone:heptane (1000 mL total volume) at 60°C. After cooling to rt and stirring for approximately 12 hours, product (**8**) was collected by filtration and afforded 356.0 g (83.7%) of the product as a colorless solid (in 2 crops). mp: 160-162°C. ^1H NMR (500 MHz, CDCl_3) δ : 8.00 - 8.06 (m, 6H), 7.51 - 7.61 (m, 3H), 7.46 - 7.47 (m, 6H), 5.08 - 5.16 (m, 2H), 5.02 (d, $J=4.8$ Hz, 1H), 4.93 (d, $J=8.6$ Hz, 1H), 4.90 (s, 1H), 4.38 - 4.45 (m, 2H), 3.82 - 3.88 (m, 4H), 3.52 (s, 3H), 3.46 (d, $J=6.8$ Hz, 1H), 3.22 (br m, 1H), 2.99 (br m, 1H), 2.75 - 2.82 (m, 2H), 2.46 (appar d, 1H), 2.35 (s, 6H), 1.84 - 1.94 (m, 2H), 1.70 - 1.76 (m, 2H), 1.54 - 1.58 (m, 2H), 1.39 (m, 4H), 1.31 (d, $J=6.8$ Hz, 3H), 1.06 - 1.30 (m, 17H), 0.90 (d, $J=6\text{Hz}$, 3H), 0.82 (t, $J=7.2$, 3H), 0.74 ($J=7.6$, 3H). ^{13}C NMR (100 MHz, CDCl_3) δ : 179.7, 175.4, 166.3, 165.7, 164.1, 134.6, 133.5, 133.3, 132.8, 131.9, 130.8, 130.0, 129.8, 129.7, 129.6, 129.1, 128.7, 128.5, 128.4, 127.9, 100.2, 95.7, 83.6, 79.1, 78.8, 77.2, 74.7, 74.3, 72.9, 72.2, 69.7, 67.6, 63.6, 63.4, 49.5, 44.4, 40.7, 38.9, 37.2, 35.2, 34.4, 31.7, 31.6, 26.3, 22.5, 21.1, 21.0, 18.3, 18.1, 16.3, 15.6, 14.7, 13.9, 10.4, 9.2. MS (APCI^+ , NH_3): 1061 ($\text{M}+\text{H}^+$), 1078 ($\text{M}+\text{NH}_4^+$). Anal Calc'd for $\text{C}_{58}\text{H}_{80}\text{N}_2\text{O}_{16}$: C, 65.64; H, 7.60; N, 2.64. Found C, 65.76; H, 7.55; N, 2.56.

2',4''-O-bis(benzoyl)-6-O-PQ-erythromycin A 9-O-benzoyloxime (10**):**

Table 3, entry 3: To a suitable reaction vessel was charged erythromycin A oxime tribenzoate **8**) (41.1 g, 38.6 mmol, 1 eq) and *trans*-carbonate **9a** (12.6 g, 44.2 mmol, 1.15 eq) in 300 mL of toluene. The solvent was removed *in vacuo* and 300 mL of THF added (K.F. titration 0.01%). The catalyst

$\text{Pd}_2(\text{dba})_3$ (170 mg, 0.005 eq) and dppb (160 mg, 0.01 eq) were added and the reaction mixture degassed by evacuation and venting to nitrogen three times. The reaction was heated to reflux for 3 hours, cooled to rt and reduced to dryness *in vacuo*. The crude residue (49 g, 105% theory) was dissolved in 100 mL of CH_3CN at 60°C, filtered and reduced to dryness affording 46.8 g of **10** (99%) as a pale yellow foam (>96% purity by HPLC).

Table 3, entry 4: To a suitable reaction vessel was charged erythromycin A oxime tribenzoate (**8**) (1.06 g, 1.00 mmol, 1.00 eq) and *cis*-carbonate **9b** (0.31 g, 1.09 mmol) in 10 mL of THF. The solvent was removed *in vacuo* and 10 mL of THF added. The catalyst, $\text{Pd}_2(\text{dba})_3$ (9 mg, 0.01 eq) and dppb (9 mg, 0.02 eq), was added and the reaction mixture degassed by evacuation and venting to nitrogen three times. The reaction was heated to reflux. After 1 hour, the reaction was ~70% complete by HPLC, so an additional 0.08 g of **9b** (0.28 eq) was added and reflux continued overnight. The reaction mixture was cooled to rt and 1.0 g of fittrol filter aid added. After mixing 30 minutes, the reaction mixture was filtered through a plug of diatomaceous earth (20 mL THF rinse) and reduced to dryness affording 1.31 g (107% theory). The crude was purified by column chromatography on silica gel (elution with 1:2 acetone:heptane) yielding 1.10 g (89%) of **10** as a colorless solid.

Table 3, entry 5: To a suitable reaction vessel was charged erythromycin A oxime tribenzoate (**8**) (16.20 g, 15.3 mmol, 1 eq) and secondary-carbonate **9c** (5.00 g, 17.5 mmol, 1.14 eq) in 100 mL of toluene. The solvent was removed *in vacuo* and 50 mL of THF added. The catalyst, $\text{Pd}(\text{OAc})_2$ (34 mg, 0.01 eq) and dppb (195 mg, 0.03 eq), was added and the reaction mixture degassed by evacuation and venting to nitrogen three times. The reaction was then heated to reflux. After 4 hour, the reaction was complete by HPLC and the reaction mixture was cooled to rt and filtered through a plug of silica gel and reduced to dryness to afford 17.73 g of **10** as a pale yellow solid (95%, >95% pure by HPLC). ^1H NMR (400 MHz, CDCl_3) δ : 8.98 (d, J = 2Hz, 1H), 8.18 (J = 2Hz, 1H), 8.02 - 8.07 (m, 7H), 7.79 (dd, J = 1.2, 8.0 Hz, 1H), 7.57 - 7.65 (m, 4H), 7.41 - 7.53 (m, 7H), 6.49 (m, 1H), 6.19 (d, J = 16Hz, 1H), 5.30 (dd, J = 2.4, 7.0 Hz, 1H), 5.10 (m, 1H), 5.05 (s, 1H), 5.00 (m, 1H), 4.93 (d, J = 9.6 Hz, 1H), 4.49 (m, 1H), 4.33 (s,

1H), 4.14 (appar dd, 1H), 3.96 (m, 1H), 3.65 - 3.91 (m, 5H), 3.56 (s, 3H), 3.25 (s, 1H), 2.93 (m, 1H), 2.91 (m, 1H), 2.74 (appar q, 1H), 2.49 (appar d, 1H), 2.36 (s, 6H), 2.02 (m, 1H), 1.95 (m, 1H), 1.85 (m, 1H), 1.74 (appar dd, 1H), 1.57 (m, 1H), 1.54 (s, 3H), 1.31 - 1.45 (m, 3H), 1.11 - 1.28 (m, 12H), 1.14 (d, J = 6.8Hz, 3H), 1.10 (s, 3H), 0.95 (d, J = 6 Hz, 3H), 0.87 (t, J = 7.2Hz, 3H), 0.79 (d, J = 7.6 Hz, 3H). ¹³C NMR (100 MHz, CDCl₃) δ: 177.4, 175.0, 166.3, 165.7, 163.0, 150.6, 147.6, 133.5, 133.3, 132.8, 130.9, 130.2, 130.0, 129.7, 129.5, 129.4, 129.2, 129.1, 128.9, 128.8, 128.7, 128.5, 128.41, 128.39, 128.2, 127.9, 127.1, 126.4, 125.5, 99.8, 96.3, 79.2, 79.1, 78.71, 78.70, 77.2, 76.9, 74.0, 73.0, 72.6, 69.7, 67.9, 67.3, 64.9, 63.7, 63.6, 49.4, 44.2, 40.8, 37.8, 36.6, 35.2, 34.3, 31.6, 31.1, 29., 28.6, 25.4, 21.3, 21.21, 21.2, 21.0, 18.7, 18.4, 16.3, 15.9, 15.1, 10.5, 9.3. MS (DCI/NH₃): 1228 (M+H⁺). Anal Calc'd for C₇₀H₈₉N₃O₁₆: C, 68.44; H, 7.30; N, 3.42. Found C, 68.60; H, 7.30; N, 3.34.

2',4''-O-bis(benzoyl)-6-O-allyl-erythromycin A 9-O-benzoyloxime (11): In a suitable reaction vessel was placed oxime tribenzoate **8** (5.00 g, 4.71 mmol, 1 eq) in 50 mL of toluene. The solvent was removed by distillation *in vacuo* and replaced with 50 mL of anhydrous THF. The THF was similarly removed by distillation and replaced with 50 mL of fresh anhydrous THF.⁵ To this solution was added carbonate **6** (0.82 g, 5.19 mmol, 1.10 eq) and the reaction vessel evacuated and purged with nitrogen three times (KF<0.01%). Pd₂(dba)₃ (86 mg, 0.02 eq) and dppb (80 mg, 0.04 eq) were added and the vessel was evacuated and purged with nitrogen twice more. The reaction mixture was heated to reflux for 3 hrs. After cooling to rt, 1.0 g of filtrol filtering aid was added and the suspension stirred for 30 minutes prior to filtering through a plug of diatomaceous earth (with a 50 mL THF rinse). The solution was reduced to dryness affording 5.31 g (~100%) of crude **11**. The crude solid was dissolved in 100 mL of 70°C heptane and filtered through a plug of diatomaceous earth and again reduced to dryness. The resultant solid was purified by crystallization from 30 mL of 1:1 Et₂O:hexane affording 3.78 g (73%) of **11** as a colorless solid. A second crop (0.95 g, 18%) was obtained by further cooling the liquors to -10°C. Total isolation 4.73 g (91%): mp: 197-198°C. ¹H NMR (500 MHz, CDCl₃) δ: 8.01 - 8.08 (m, 6H), 7.53 - 7.77 (m, 3H), 4.73 g (91%): mp: 197-198°C. ¹H NMR (500 MHz, CDCl₃) δ: 8.01 - 8.08 (m, 6H), 7.53 - 7.77 (m, 3H),

7.40 - 7.51 (m, 6H), 5.70 - 5.80 (m, 2H), 5.21 (m, appar dd, 1H), 5.09 (m, 1H), 5.01 - 5.06 (m, 2H), 4.93 - 5.01 (m, 2H), 4.92 (m, appar d, 1H), 4.81 (m, appar dd, 1H), 4.45 (m, 1H), 3.91 (m, 2H), 3.77 (m, 2H), 3.61 - 3.67 (m, 3H), 3.55 (s, 3H), 3.26 (br s, 1H), 2.98 (m, appar td, 1H), 2.87 (m, 1H), 2.72 (m, appar q, 1H), 2.32 (d, J=8Hz, 1H), 2.28 (s, 6H), 1.94 (m, 2H), 1.75 (m, 3H), 1.05 - 1.60 (m, 23H), 0.92 (d, J=6Hz, 3H), 0.81 (d, J=7.2Hz, 3H), 0.75 (d, J=7.6Hz, 3H). ^{13}C NMR (125 MHz, CDCl_3) δ : 177.6, 174.8, 166.3, 165.7, 163.3, 134.7, 133.5, 133.1, 132.8, 131.0, 130.0, 129.8, 129.7, 129.4, 128.7, 128.5, 128.4, 117.1, 99.7, 96.2, 79.1, 78.8, 78.5, 76.7, 74.1, 73.0, 72.6, 69.5, 67.3, 65.7, 63.7, 63.6, 49.4, 44.2, 40.8, 37.6, 36.5, 35.3, 34.3, 31.6, 28.6, 21.3, 21.21, 21.19, 21.1, 18.9, 18.4, 16.3, 15.9, 15.1, 10.3, 9.3. MS (APCI⁺, NH_3): 1101 ($\text{M}+\text{H}^+$), 1118 ($\text{M}+\text{NH}_4^+$). Anal Calc'd for $\text{C}_{61}\text{H}_{84}\text{N}_2\text{O}_{16}$: C, 66.52; H, 7.69; N, 2.54. Found C, 66.52; H, 7.72; N, 2.52.

2',4''-O-bis(trimethylsilyl)-6-O-PQ-erythromycin A 9-O-ketaloxime 12: Erythromycin A oxime ketal derivative² **4** (10.3g, 10.0 mmol, 1.0 eq) and carbonate **9a** (3.4g, 12.0 mmol, 1.2 eq) were dissolved in toluene (100 mL). The toluene was removed by rotary evaporation. A second portion of toluene (100 mL) was added, and 50 mL removed by rotary evaporation. The toluene solution was transferred to a flask containing $\text{Pd}_2(\text{dba})_3$ (92 mg, 0.1 mmol, 0.01 eq) and dppb (171 mg, 0.4 mmol, 0.04 eq) and the solution heated to 70°C. After 3 hours, the reaction was complete. After cooling to rt, 1.0 g of filtrol filtering aid⁶ was added and the suspension stirred for 30 minutes prior to filtering through diatomaceous earth. The solvent was removed by distillation to produce 11.1 g of a yellow solid (92%, 90% pure by HPLC). A small portion of this material was purified by chromatography (heptane/acetone = 2/1) in order to provide an analytical sample for characterization (as the monohydrate). ^1H NMR (400 MHz, CDCl_3): 9.06 (appar d, 1H), 8.30 (appar d, 1H), 8.04 (appar d, 1H), 7.78 (appar dd, 1H), 7.61 (appar ddd, 1H), 7.48 (appar ddd, 1H), 6.62-6.50 (m, 2H), 5.19 (appar dd, 1H), 4.80 (appar d, 1H), 4.56-4.39 (m, 2H), 4.28-4.24 (m, 2H), 4.13-4.01 (m, 2H), 3.83-3.65 (m, 5H), 3.30-3.15 (m, 6H), 2.91-2.82 (m, 1H), 2.75-2.70 (m, 1H), 2.65-2.51 (m, 1H), 2.35-2.20 (m, 7H), 2.10-1.02 (m, 50H), 0.89-0.82 (m, 4H), 0.16 (s, 9H), 0.12 (s, 9H).

^{13}C NMR (100 MHz, CDCl_3): 175.8, 169.3, 150.5, 147.4, 132.4, 131.6, 130.8, 129.2, 128.7, 128.4, 128.0, 126.5, 126.3, 103.9, 102.4, 96.5, 80.7, 79.9, 78.5, 77.6, 77.0, 73.9, 73.4, 73.1, 70.0, 67.2, 65.2, 65.1, 64.4, 62.8, 49.5, 44.9, 40.8, 39.6, 37.3, 35.6, 34.3, 33.5, 33.4, 26.3, 25.5, 24.3, 24.2, 22.9, 22.7, 22.0, 21.8, 21.6, 21.2, 19.4, 18.9, 16.1, 15.6, 14.7, 10.9, 9.5, 0.9, 0.7. Anal. Calc'd. for $\text{C}_{64}\text{H}_{109}\text{N}_3\text{O}_{14}\text{Si}_2\cdot\text{H}_2\text{O}$: C, 63.07; H, 9.18; N, 3.45. Found: C, 63.02; H, 9.07; N, 3.33.

2',4''-O-bis(trimethylsilyl)-9-O-(prop-2-enyl)-erythromycin A oxime 14 To a suitable reaction vessel was charged 2',4''-O-bis(trimethylsilyl)-erythromycin A oxime (**13**)² (14.40 g, 16.1 mmol, 1 eq), carbonate **6** (2.93 g, 18.5 mmol, 1.15 eq) and 100 mL of anhydrous THF. The solution was reduced to dryness *in vacuo* and 75 ml of fresh THF charged. The reaction mixture was evacuated and vented with nitrogen three times. $\text{Pd}(\text{OAc})_2$ (36 mg, 0.01 eq) and dppb (275 mg, 0.04 eq) were charged to the flask and it was degassed once more. The reaction mixture was heated to reflux overnight. The reaction was deemed complete by TLC and cooled to rt. To the reaction mixture was added 3.6 mL of a commercial bleach solution (5.25% w/w) and the mixture allowed to stir for approximately 30 minutes. The crude suspension was filtered through a plug of filtrol and reduced to dryness. The crude product was purified by column chromatography on silica gel (elution with 1:1 iPrOAc/Heptane) affording 14.13 g (94%) of **14** as an off-white solid. ^1H NMR (400 MHz, CDCl_3) δ : 5.95 (m, 1H), 5.30 (m, appar dq, 1H), 5.21 (m, appar dq, 1H), 5.07 (dd, $J=2.4, 10.4\text{Hz}$, 1H), 4.89 (d, $J=4.8\text{Hz}$, 1H), 4.51 (appar dt, 2H), 4.40 (d, $J=7.2\text{Hz}$, 1H), 4.30 (s, 1H), 4.16 - 4.20 (m, 1H), 4.21 - 4.25 (m, 1H), 3.75 (m, 1H), 3.68 (s, 1H), 3.64 (m, 1H), 3.56 (d, $J=8.0\text{Hz}$, 1H), 3.31 (s, 3H), 3.01 - 3.15 (m, 3H), 2.83 (m, 1H), 2.71 (m, 1H), 2.56 (m, 1H), 2.36 (d, $J=15\text{Hz}$, 1H), 2.23 (br s, 6H), 1.87 - 1.96 (m, 3H), 1.10 - 1.76 (m, 24H), 1.00 - 1.09 (m, 6H), 0.81 - 0.89 (m, 6H), 0.10 - 0.20 (m, 18H). ^{13}C NMR (100 MHz, CDCl_3) δ : 175.7, 171.2, 133.9, 117.7, 102.5, 96.4, 81.4, 80.8, 79.2, 76.8, 75.4, 74.5, 74.2, 73.2, 73.1, 70.5, 67.5, 65.1, 64.9, 49.6, 44.6, 40.9, 40.0, 38.4, 35.8, 33.0, 29.6, 26.9, 26.5, 22.1, 21.7, 21.2, 19.3, 18.4, 16.2, 15.7, 14.3, 10.7, 9.6, 0.9, 0.8. MS (ESI⁺): 933

(M+H)⁺, 955 (M+Na)⁺ Anal Calc'd for C₄₆H₈₈N₂O₁₃Si₂: C, 59.19; H, 9.50; N, 3.00. Found C, 59.39; H, 9.71; N, 2.85.

2',4''-O-bis(trimethylsilyl)-6,9-bis-O-(prop-2-enyl)-erythromycin A oxime (15): To a suitable reaction vessel was charged 2',4''-O-bis(trimethylsilyl)-erythromycin A oxime (**13**)² (4.46 g, 5.0 mmol, 1 eq), carbonate **6** (2.63 g, 16.6 mmol, 3.3 eq) and 50 mL of anhydrous THF. The solution was reduced to dryness *in vacuo* and 20 ml of fresh THF charged. The reaction mixture was evacuated and vented with nitrogen three times. Pd₂(dba)₃ (46mg, 0.01 eq) and dppb (85 mg, 0.02 eq) were charged to the flask and it was similarly degassed once more. The reaction mixture was heated to reflux for 1.5 hours then deemed complete by TLC and cooled to rt. The crude reaction mixture was reduced to dryness and purified by column chromatography on silica gel (elution with 1:8 EtOAc/Heptane) affording 3.85 g (94%) of **15** as a colorless solid: ¹H NMR (400 MHz, CDCl₃) δ: 5.91 (m, 2H), 5.27 (m, appar q, 1H), 5.22 (m, appar q, 1H), 5.18 (m, appar td, 1H), 5.07 (m, 1H), 5.06 (m, 1H), 4.87 (m, 1H), 4.50 - 4.59 (m, 3H), 4.25 (s, 1H), 4.24 (m, 1H), 4.09 (m, appar dd, 1H), 3.88 (m, appar dd, 1H), 3.70 - 3.80 (m, 5H), 3.30 (s, 3H), 3.05 - 3.08 (m, 3H), 2.92 (m, 1H), 2.63 (m, appar q, 1H), 2.51 (m, 1H), 2.35 (m, 1H), 2.22 (s, 6H), 1.98 (m, 1H), 1.60 - 0.80 (m, 37H including the following identifiable peaks: 1.44 (s, 3H), 1.22 (d, J=5Hz, 3H), 1.06 (d, J=7.5Hz, 3H), 0.97 (d, J=6Hz, 3H)), and 0.14 (s, 9H), 0.09 (s, 9H). ¹³C NMR (100 MHz, CDCl₃) δ: 175.6, 169.4, 136.7, 134.5, 117.0, 115.3, 102.3, 96.4, 80.7, 79.6, 78.4, 78.0, 76.5, 74.3, 74.1, 73.4, 73.1, 69.8, 67.1, 65.6, 65.22, 65.2, 49.5, 44.7, 40.9, 38.9, 37.2, 35.7, 33.0, 29.4, 26.2, 22.5, 22.1, 21.8, 21.3, 21.1, 19.3, 19.0, 16.1, 15.9, 14.9, 10.5, 9.7, 0.9, 0.7. MS (ESI⁺): 973.6 (M+H)⁺ Anal . Calc'd for C₄₉H₉₂N₂O₁₃Si₂: C, 60.46; H, 9.53; N, 2.88. Found C, 60.73; H, 9.59; N, 2.74.

¹ Houlihan, F.; Bouchard, F.; Fréchet, J. M. J.; Willson, C. G. Can. J. Chem. 1985, 63, 153.

² Or, Y. S.; Clark, R. F.; Wang, S.; Chu, D. T. W.; Nilius, A. M.; Flamm, R. K.; Mitten, M.; Ewing, P.; Alder, J.; Ma, Z. J. Med. Chem. 2000, 43(6), 1045. (b) Or, Y. S.; Ma, Z.; Clark, R. F.; Chu D. T.; Plattner, J. J.; Griesgraber, G. U. S. Patent 5,866,549, 1999.

³ The water content of the reaction was measured at 0.03% by Karl-Fischer titration.

⁴ Assignment of 6,12 regiochemistry is based upon 1). ¹³C shifts of appropriate carbons and 2) COSY experiment showing presence of OH at 11 position. The second allyl group does not show long range correlation to either C-11 or C-12.

⁵ This process is unnecessary if the starting material is sufficiently dry to begin with.

⁶ This protocol aids in the removal of palladium.