A Concise Stereoselective Synthesis of Preussin, 3-*epi*-Preussin, and Analogs

Myra Beaudoin Bertrand and John P. Wolfe*

Department of Chemistry, University of Michigan, 930 N. University Avenue, Ann Arbor, Michigan 48109-1055

Supporting Information

Experimental procedures and characterization data for new compounds in Schemes 2–4 and Tables 1–2 (89 pages).

General: All reactions were carried out under an argon or nitrogen atmosphere in oven- or flame-dried glassware. Palladium acetate and all phosphine ligands were purchased from Strem Chemical Co. and used without further purification. All aryl bromides were obtained from commercial sources (Aldrich Chemical CO or Acros Chemical CO) and were used as obtained. Toluene, ether, and THF were purified using a GlassContour solvent purification system. Ratios of regioisomers and/or diastereomers were determined by either ^{1}H NMR or capillary GC analysis of crude reaction mixtures. Yields refer to isolated yields of compounds estimated to be ≥95% pure as determined by ^{1}H NMR, and either capillary GC (known compounds), combustion analysis (new compounds). The yields reported in the supporting information describe the result of a single experiment, whereas the yields reported in Schemes 2–4, and Tables 1–2 are average yields of two or more experiments. Thus, the yields reported in the supporting information may differ from those shown in Schemes 2–4 and Tables 1–2.

Synthesis of (±)-Preussin (Scheme 2)

3-Hydroxytetradec-1-en-5-one (7). A flame-dried flask was cooled under a stream of nitrogen and charged with diisopropylamine (7.4 mL, 52.5 mmol) and tetrahydrofuran (300 mL). The resulting solution was cooled to -78 °C and *n*-butyllithium (20.8 mL, 52 mmol, 2.5 M in hexanes) was added dropwise. The reaction mixture was stirred at -78 °C for 30 min and then a solution of 2-undecanone (8.52g, 50 mmol) in tetrahydrofuran (30 mL) was added dropwise. The reaction mixture was stirred at -78 °C for 1h then a solution of acrolein (3.5 mL, 52.5 mmol) in tetrahydrofuran (30 mL) was then slowly added dropwise. The resulting mixture was stirred at -78 °C for 35 min and then warmed to rt. Saturated aqueous NH_4Cl (25 mL) and diethyl ether (200 mL) were added, the layers were separated and the aqueous layer was extracted with diethyl ether (3 x 150 mL). The combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo*. The crude product was purified by flash chromatography using 5% → 10% ethyl acetate/hexanes as the eluent to afford 8.88 g (78%) of the title compound as a colorless oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 5.89– 5.82 (m, 1 H), 5.32–5.27 (m, 1 H), 5.15–5.12 (m, 1 H), 4.60–4.55 (m, 1 H), 3.06 (s, br, 1 H), 2.68–2.59 (m, 2 H), 2.45– 2.40 (m, 2 H), 1.62–1.49 (m, 2 H), 1.33–1.20 (m, 12 H), 0.88 (t, J = 6.8 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 211.7, 139.0, 115.0, 68.6, 48.5, 43.7, 31.8, 29.39, 29.36, 29.2, 29.1, 23.6, 22.7, 14.1; IR (film) 3432, 1710 cm^{-1}. Anal calcd for $C_{14}H_{26}O_2$: C, 74.29; H, 11.58. Found: C, 74.25; H, 11.47.

3-Hydroxytetradec-1-en-5-one-*O*-benzyl oxime (**8**). A flame-dried flask was cooled under a stream of nitrogen and charged with **7** (11.9 g, 52.6 mmol), methanol (190 mL), 0-benzylhydroxylamine (10.1 g, 63.2 mmol) and pyridine (11 mL). The resulting mixture was refluxed until the starting material was consumed as judged by TLC analysis (ca. 1h). The mixture was cooled to rt and concentrated *in vacuo*. The resulting residue was diluted with water (100 mL) and dichloromethane (100 mL). The layers were separated and the aqueous layer was extracted with dichloromethane (3 x 100 mL). The combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo* using a rotary evaporator, with trace residual solvent removed under high vacuum for 30 min. The resulting oil was purified by flash chromatography using 5% → 10% ethyl acetate/hexanes as the eluent to afford 16.9 g (98%) of the title compound as a colorless oil. This compound was judged to be a 1:1 mixture of oxime isomers as judged by ^{1}H NMR and ^{13}C NMR. Data are for the mixture. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.37– 7.27 (m, 5 H), 5.90–5.81 (m, 1 H), 5.28–5.20 (m, 1 H), 5.12–5.04 (m, 3 H), 4.46–4.38 (m, 1 H), 2.71–2.65 (m, 0.5 H), 2.50–2.45 (m, 0.5 H), 2.40–2.28 (m, 2 H), 2.24–2.20 (m, 1 H), 1.54–1.41 (m,

2 H), 1.33–1.19 (m, 13 H), 0.88 (t, J = 7.1 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 160.6, 159.2, 140.3, 139.5, 138.0, 137.6, 128.38, 128.37, 128.14, 128.06, 127.82, 127.79, 114.8, 114.7, 75.7, 75.6, 70.7, 69.4, 41.0, 36.5, 35.3, 31.9, 29.6, 29.5, 29.48, 29.43, 29.36, 29.31, 29.27, 29.23, 26.3, 25.5, 22.7, 14.1 (4 sets of aliphatic carbons are incidentally equivalent); IR (film) 3414, 1631 cm^{-1}. Anal calcd for $C_{21}H_{33}NO_3$: C, 76.09; H, 10.03; N, 4.23. Found: C, 75.92; H, 10.02; N, 4.30.

3-Hydroxy-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester. A flame-dried flask was cooled under a stream of nitrogen and charged with **8** (16.6 g, 50 mmol) and diethyl ether (100 mL). The resulting solution was cooled to 0 °C and $LiAlH_4$ (200 mL, 200 mmol, 1 M in diethyl ether) was added dropwise via cannula. The resulting mixture was heated to reflux until the starting material was consumed as judged by TLC analysis (ca. 1h). The reaction mixture was cooled to 0 °C, slowly quenched with water (30 mL) and diluted with diethyl ether (100 mL). Aqueous NaOH (16 mL, 10 M) and water (16 mL) were added sequentially and an insoluble white precipitate formed. The organic supernatant was decanted to a clean Erlenmeyer flask and the precipitate was washed with diethyl ether. The combined organic extracts were dried over anhydrous Na_2SO_4 and filtered to afford a solution of 3-hydroxy-1-nonylpent-4-enylamine in diethyl ether (ca. 0.1 M). A portion of this solution was concentrated *in vacuo* and ^{1}H NMR analysis of this sample indicated that the product was obtained as a 54:46 mixture of syn:anti diastereomers.

A flame-dried flask was cooled under a stream of nitrogen and charged with a solution of 3-hydroxy-1-nonylpent-4-enylamine in diethyl ether (500 mL, 50 mmol, 0.1 M). Di-tert-butyl dicarbonate (16.4 g, 75 mmol) was added to the solution and the resulting mixture was stirred until the starting material was consumed as judged by TLC analysis (ca. 2h). Aqueous NaOH (200 mL, 1 M) was added and the resulting biphasic mixture was vigorously stirred for 8h. The layers were separated and the aqueous layer was extracted with diethyl ether (3 x 150 mL). The combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo*. The crude product was purified by flash chromatography using 10% → 20% ethyl acetate/hexanes as the eluent to afford 6.31 g (39%) of **9** and 7.62 g (46%) of **10** as colorless oils.

(±)–(1*R*,3*S*)-3-Hydroxy-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (**9**): ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.89–5.81 (m, 1 H), 5.27–5.22 (m, 1 H), 5.06–5.02 (m, 1 H), 4.56–4.46 (m, 1 H), 4.18–4.08 (m, 2 H), 3.81–3.69 (m, 1 H), 1.61–1.53 (m, 1H), 1.50– 1.16 (m, 26 H), 0.88 (t, J = 6.3 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.2, 140.3, 113.6, 79.8, 68.4, 47.4, 44.2, 35.6, 31.8, 29.45, 29.43, 29.3,

29.2, 28.3, 26.1, 22.6, 14.0; IR (film) 3342, 1690 cm^{-1}. Anal calcd for $C_{19}H_{37}NO_3$: C, 69.68; H, 11.39; N, 4.28. Found: C, 69.84; H, 11.46; N, 4.34.

(±)–(1*R*,3*R*)-3-Hydroxy-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (10): ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.90–5.81 (m, 1 H), 5.25–5.20 (m, 1 H), 5.08–5.05 (m, 1 H), 4.58–4.44 (m, 1 H), 4.23–4.14 (m, 1 H), 3.72–3.54 (m, 1 H), 3.06–2.90 (m, 1 H), 1.72–1.53 (m, 2 H), 1.52–1.14 (m, 25 H), 0.85 (t, J = 6.6 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.9, 140.9, 114.3, 79.2, 70.9, 48.3, 43.1, 36.0, 31.8, 29.51, 29.46, 29.42, 29.2, 28.4, 25.7, 22.6, 14.0; IR (film) 3333, 1682 cm^{-1}. Anal calcd for $C_{19}H_{37}NO_3$: C, 69.68; H, 11.39; N, 4.28. Found: C, 69.79; H, 11.54; N, 4.31.

(±)–(1*R*,3*S*)-3-(*tert*-Butyldimethylsilyloxy)-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (5). A flame-dried flask was cooled under a steam of nitrogen and charged with **9** (6.0 g, 18.3 mmol), dimethylformamide (36 mL), imidazole (2.50 g, 36.6 mmol) and TBS-Cl (4.42 g, 29.3 mmol). The resulting mixture was stirred at rt until the starting material was consumed as judged by TLC analysis (ca. 24 h). The reaction mixture was diluted with water (50 mL) and ethyl acetate (50 mL). The layers were separated and the aqueous layer was extracted with ethyl acetate (3 x 50 mL). The combined organic layers were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo* using a rotary evaporator, with trace residual solvent removed under high vacuum for 30 min. The crude product was purified by flash chromatography using 5% ethyl acetate/hexanes as the eluent to afford 7.6 g (94%) of the title compound as a white solid, m.p. 64–66 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.84–5.75 (m, 1 H), 5.17–5.11 (m, 1 H), 5.05–5.01 (m, 1 H), 4.93 (s, br, 1 H), 4.30–4.22 (m, 1 H), 3.69–3.54 (m, 1 H), 1.74–1.62 (m, 1 H), 1.54–1.36 (m, 12 H), 1.34–1.15 (m, 14 H), 0.94–0.83 (m, 12 H), 0.10–0.01 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.4, 141.4, 114.1, 78.4, 71.8, 48.1, 42.0, 35.5, 31.9, 29.58, 29.55, 29.50, 29.3, 28.4, 25.9, 25.8, 22.6, 18.0, 14.1, -4.1, -5.1; IR (film) 3339, 1677 cm^{-1}. Anal calcd for $C_{25}H_{51}NO_3Si$: C, 67.97; H, 11.64; N, 3.17. Found: C, 68.09; H, 11.76; N, 3.18.

(±)–(2*S*,3*S*,5*R*)–2-Benzyl-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (11).[1] A flame-dried Schlenk tube equipped with a magnetic stirbar was cooled under a stream of nitrogen and charged with **5** (111 mg, 0.25 mmol), $Pd(OAc)_2$ (1.2 mg, 0.005 mmol, 2 mol %), dpe-phos (5.4 mg, 0.01 mmol, 4 mol %), NaO*t*Bu (56 mg, 0.575 mmol) and bromobenzene (32 μL, 0.3 mmol). The tube was purged with nitrogen and toluene was added using a syringe (1 mL). The

resulting mixture was heated to 90 °C with stirring for 5 hours until the starting material had been consumed as determined by GC analysis. The reaction mixture was cooled to room temperature and saturated aqueous NH_4Cl (1 mL) and ethyl acetate (1 mL) were added. The layers were separated, the aqueous layer was extracted with ethyl acetate (3 x 5 mL), and the combined organic layers were dried over Na_2SO_4, filtered, and concentrated *in vacuo*. The crude product was then purified by flash chromatography using 2.5% ethyl/hexanes as the eluent to afford 85.4 mg (66%) of the title compound as a colorless oil. This compound was found to exist as a 3:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35–7.13 (m, 5 H), 4.34– 4.22 (m, 1.25 H), 4.12–3.97 (m, 0.75 H), 3.74–3.50 (m, 1 H), 3.09–2.98 (m, 1 H), 2.88–2.73 (m, 0.25 H), 2.64–2.49 (m, 0.75 H), 2.36–2.13 (m, 1.75 H), 2.07–1.92 (m, 0.25 H), 1.74–1.58 (m, 1 H), 1.50–1.06 (m, 24 H), 1.00–0.84 (m, 12 H), 0.17– -0.08 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.9, 140.0, 129.8, 128.0, 125.6, 78.9, 71.3, 62.3, 55.6, 37.9, 37.2, 35.9, 31.9, 29.6, 29.5, 29.3, 28.0, 26.5, 25.8, 22.7, 18.1, 14.1, -4.8, -5.0.

(±)–Preussin (1).[2] A flame-dried flask was cooled under a steam of nitrogen and charged with **11** (200 mg, 0.39 mmol) and tetrahydrofuran (5 mL). The resulting solution was cooled to 0 °C and $LiAlH_4$ (2.4 mL, 2.4 mmol, 1 M in tetrahydrofuran) was added dropwise via syringe. The resulting mixture was refluxed until the starting material was consumed as judged by TLC analysis (ca. 13h). The reaction mixture was cooled to 0 °C, slowly quenched with water (1 mL) and diluted with diethyl ether (5 mL). Aqueous NaOH (1 mL, 10 M) and water (1 mL) were added sequentially and an insoluble white precipitate formed. The organic supernatant was decanted to a clean Erlenmeyer flask and the precipitate was washed with diethyl ether. The combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo*. The crude oil obtained was purified by flash chromatography using 10% methanol/dichloromethane as the eluent to afford 106.2 mg (85%) of the title compound as a colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.29–7.21 (m, 4 H), 7.20–7.12 (m, 1 H), 3.80–3.69 (m, 1 H), 2.90–2.76 (m, 2 H), 2.29 (s, 3 H), 2.26–2.19 (m, 1 H), 2.18–2.11 (m, 1 H), 2.10–2.02 (m, 1 H), 1.74–1.62 (m, 1 H), 1.41–1.34 (m, 1 H), 1.33–1.13 (m, 16 H), 0.85 (t, J = 7.0 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 139.5, 129.3, 128.3, 126.0, 73.6, 70.3, 65.8, 39.4, 38.6, 34.9, 33.6, 31.9, 29.9, 29.6, 29.5, 29.3, 26.3, 22.7, 14.1

Synthesis of (±)-3-*epi*-Preussin (Scheme 3)

(±)–(1*R*,3*R*)-3-(*tert*-Butyldimethylsilyloxy)-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (12). Syn amino-alcohol derivative **10** (3.27 g, 10 mmol) was converted to the title compound (4.0 g, 91 % yield) using a procedure analogous to that employed for the conversion of **9** to **5**. ^{1}H NMR (400 MHz, $CDCl_3$) δ 5.85–5.77 (m, 1 H), 5.18–5.14 (m, 1 H), 5.05–5.01 (m, 1 H), 4.51–4.41 (m, 1 H), 4.20–4.10 (m, 1 H), 3.60–3.46 (m, 1 H), 1.63–1.53 (m, 2 H), 1.40–1.32 (m, 11 H), 1.31–1.18 (m, 14 H), 0.95–0.79 (m, 12 H), 0.02 (d, J = 9.2 Hz, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.3, 141.1, 114.4, 78.6, 72.1, 48.2, 44.0, 36.0, 31.9, 29.56, 29.51, 29.49, 29.3, 28.4, 25.9, 25.7, 22.6, 18.1, 14.1, -4.3, -4.9; IR (film) 3362, 1703 cm^{-1}. Anal calcd for $C_{25}H_{51}NO_3Si$: C, 67.97; H, 11.64; N, 3.17. Found: C, 68.07; H, 11.79; N, 3.20.

(±)–(2*S*,3*R*,5*R*)–2-Benzyl-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (13). Silyl ether **12** (111 mg, 0.25 mmol) was converted to the title compound using a procedure analogous to that employed for the conversion of **5** to **11** to afford 71.6 mg (55%) of the title compound as a colorless oil. This compound was found to exist as a ~2:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35–7.12 (m, 5 H), 4.02–3.77 (m, 3 H), 3.09–3.01 (m, 0.3 H), 2.93–2.83 (m, 0.7 H), 2.44–2.36 (m, 1 H), 2.18–2.08 (m, 0.6 H), 2.03–1.91 (m, 1.4 H), 1.78–1.69 (m, 1 H), 1.51–1.38 (m, 9 H), 1.35–1.14 (m, 15 H), 0.88 (t, J = 7.0 Hz, 3 H), 0.75 (s, 9 H), -0.20– -0.28 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.3, 138.7, 129.3, 128.3, 126.2, 78.8, 73.2, 72.2, 69.7, 69.1, 57.2, 40.5, 39.7, 39.3, 38.9, 36.0, 31.9, 29.7, 29.5, 29.4, 29.3, 28.4, 26.1, 25.8, 25.6, 22.6, 17.7, 14.1, -5.18, -5.23. IR (film) 1697 cm^{-1}. Anal calcd for $C_{31}H_{55}NO_3Si$: C, 71.90; H, 10.70; N, 2.70. Found: C, 72.15; H, 10.75; N, 2.78.

(±)–3-*epi*-Preussin (**14**).[3] Protected pyrrolidine **13** (200 mg, 0.39 mmol) was converted to the title compound using a procedure analogous to that employed for the conversion of **11** to **1** to afford 105 mg (86%) of a colorless oil. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33–7.17 (m, 5 H), 4.02–3.95 (m, 1 H), 3.08–3.00 (m, 1 H), 2.59–2.50 (m, 1 H), 2.49–2.38 (m, 2 H), 2.35 (s, 3 H), 1.79–1.71 (m, 1 H), 1.70–1.59 (m, 2 H), 1.35–1.09 (m, 16 H), 0.87 (t, J = 7.0 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 138.9, 129.3, 128.6, 126.4, 77.3, 74.7, 64.9, 39.4, 39.14, 39.05, 33.8, 31.9, 30.0, 29.6, 29.5, 29.3, 26.4, 22.7, 14.1.

Asymmetric Synthesis of (+)–Preussin (Scheme 4)

(–)-(*R*)-N-Decylidene-2-methylpropanesulfinamide (15). A flame-dried flask was cooled under a stream of nitrogen and charged with decanal (1.7 mL, 9.1 mmol), titanium ethoxide (3.5 mL, 16.5 mmol) and tetrahydrofuran (33 mL). Solid (*R*)-*tert*-butanesulfinamide (1.0 g, 8.25 mmol) was added in one portion and the mixture was stirred at rt for 3 h. The reaction mixture was poured into a vigorously stirred solution of saturated aqueous NaCl (33 mL), the mixture was filtered through celite, and the celite was washed with ethyl acetate (100 mL). The aqueous phase was extracted with ethyl acetate (3 x 30 mL) and the combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo*. The crude material was purified by flash chromatography on silica gel to afford 1.91g (90%) of the title compound as a colorless oil: $[\alpha]^{23}_{D}$ –212.7° (*c* 1.0, $CHCl_3$); ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.06 (t, *J* = 5.0 Hz, 1 H), 2.53–2.49 (m, 2 H), 1.62 (p, *J* = 8.0 Hz, 2 H), 1.39–1.20 (m, 12 H), 1.19 (s, 9 H), 0.88 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 169.8, 56.4, 36.1, 31.8, 29.4, 29.3, 29.20, 29.18, 25.5, 22.6, 22.3, 14.1; IR (neat, cm^{-1}) 1623. Anal calcd for $C_{14}H_{29}NOS$: C, 64.81; H, 11.27; N, 5.40. Found: C, 64.93; H, 11.33; N, 5.36.

(–)-(R_S,4*R*)-4-(2-Methylpropane-2-sulfinylamino)tridecene (16). A flame-dried flask was cooled under a stream of nitrogen and charged with (–)-(*R*)-N-decylidene-2-methylpropanesulfinamide (900 mg, 3.47 mmol) and dichloromethane (35 mL). The flask was cooled to 0 °C and a solution of allylmagnesium bromide (5.2 mL, 5.2 mmol, 1.0 M in diethyl ether) was added slowly dropwise. The mixture was stirred at 0 °C for 30 min then a solution of saturated aqueous ammonium chloride (20 mL) was added. The mixture was warmed to rt, the layers were separated, and the aqueous layer was extracted with ethyl acetate (3 x 20 mL). The combined organic layers were dried over anhydrous sodium sulfate, filtered, and concentrated *in vacuo*. Analysis of the crude product by ^{1}H NMR indicated that a 10:1 mixture of diastereomers had formed. The crude material was purified by flash chromatography on silica gel to afford 824 mg (79%) of the title compound (a colorless oil) as a single pure diastereomer: $[\alpha]^{23}_{D}$ –53.0° (*c* 1.0, $CHCl_3$); ^{1}H NMR (500 MHz, $CDCl_3$) δ 5.83–5.73 (m, 1 H), 5.14 (d, *J* = 15.0 Hz, 2 H), 3.34–3.26 (m, 1 H), 3.19 (d, *J* = 7.5 Hz, 1 H), 2.44–2.39 (m, 1 H), 2.33–2.27 (m, 1 H), 1.51–1.45 (m, 2 H), 1.36–1.22 (m, 14 H), 1.20 (s, 9 H), 0.88 (t, *J* = 8.5 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 134.2, 118.8, 55.7, 54.8, 40.4, 34.9, 31.8, 29.50, 29.48, 29.4, 29.2, 25.4, 22.6, 14.1; IR (neat, cm^{-1}) 3216, 1640. Anal calcd for $C_{17}H_{35}NOS$: C, 67.72; H, 11.70; N, 4.65. Found: C, 67.43; H, 11.82; N, 4.62.

(+)-(1*R*)-1-Nonylpent-4-enylcarbamic acid *tert*-butyl ester (17). A round-bottom flask was charged with (–)-(R_S,4*R*)-4-(2-methylpropane-2-sulfinylamino)tridecene (1.25 g, 4.15 mmol) and methanol (5 mL). A solution of anhydrous hydrochloric acid (5 mL, 10 mmol, 2 M in diethyl ether) was added and the mixture was stirred at rt for 30 min, at which time TLC analysis indicated that the starting material had been completely consumed. The mixture was concentrated *in vacuo*, and the resulting material was dissolved in a mixture of dioxane (15 mL), water (5 mL), and 1 M aqueous NaOH (16 mL, 16 mmol). Solid di-*tert*-butyldicarbonate was added in one portion and the reaction mixture was stirred at rt for 2 h, at which time TLC analysis indicated the primary amine intermediate had been completely consumed. Tetrahydrofuran (7 mL) and additional 1 M NaOH (7 mL) were added and the resulting mixture was stirred at rt for 12 h. The reaction mixture was then extracted with ether (3 x 40 mL) and the combined organic extracts were dried over anhydrous Na_2SO_4, filtered, and concentrated *in vacuo*. The crude product was purified by flash chromatography on silica gel to afford the title compound (1.10 g, 89%) as a white solid, m.p. 41–42 °C: $[\alpha]^{23}_D$ +19.7° (*c* 1.0, $CHCl_3$); ^{1}H NMR (500 MHz, $CDCl_3$) δ 5.80–5.74 (m, 1 H), 5.09–5.05 (m, 2 H), 4.34–4.28 (m, br, 1 H), 3.62 (s, br, 1 H), 2.28–2.12 (m, 2 H), 1.43 (s, 9 H), 1.33–1.25 (m, 16 H), 0.88 (t, *J* = 6.5 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 155.6, 134.6, 117.5, 78.9, 50.1, 39.5, 34.7, 31.9, 29.6, 29.5, 29.3, 28.4, 25.9, 22.7, 14.1; IR (neat, cm^{-1}) 3345, 1690. Anal calcd for $C_{17}H_{35}NO_2$: C, 72.68; H, 11.86; N, 4.71. Found: C, 72.91; H, 11.92; N, 4.75.

(+)-(1*R*)-1-(2-Oxoethyl)decylcarbamic acid *tert*-butyl ester (18). A round-bottom flask was charged with (+)-(1*R*)-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (594 mg, 2.0 mmol) and dichloromethane (80 mL). The solution was cooled to –78 °C and ozone was bubbled through the mixture until a blue color persisted. Dry nitrogen was then bubbled through the solution until the blue color dissipated. Solid triphenylphosphine (1.05 g, 4.0 mmol) was added in one portion and the flask was warmed to rt and stirred for 2h. The reaction mixture was then concentrated *in vacuo* and the crude material was purified by flash chromatography on silica gel to afford the title compound (381 mg, 63%) as a colorless oil: $[\alpha]^{23}_D$ +30.8° (*c* 1.0, $CHCl_3$); ^{1}H NMR (500 MHz, $CDCl_3$) δ 9.70 (t, *J* = 2.5 Hz, 1 H), 4.71 (d, *J* = 9.0 Hz, 1 H), 4.00–3.93 (m, 1 H), 2.60–2.46 (m, 2 H), 1.48–1.43 (m, 2 H), 1.37 (s, 9 H), 1.26–1.20 (m, 14 H), 0.82 (t, *J* = 7.0 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 201.1, 155.3, 79.3,

49.1, 46.4, 35.0, 31.8, 29.4, 29.20, 29.16, 28.4, 25.9, 22.5, 14.0; IR (neat, cm^{-1}) 3343, 1716; MS (ESI): 322.2352 (322.2358 calculated for $C_{17}H_{33}NO_3$, M + Na^+).

(+)–(1*R*,3*S*)-3-Hydroxy-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (**9**). A flame-dried flask was charged with $CuBr_2$•Me_2S (1.30g, 6.3 mmol) and ether (23 mL). The resulting suspension was cooled to –20 °C and vinyllithium[4] (12.6 mL, 12.6 mmol, 1.0 M in ether) was added dropwise. The resulting dark-colored solution was cooled to –78 °C and a solution of (+)-(1*R*)-1-(2-oxoethyl)decylcarbamic acid *tert*-butyl ester (381 mg, 1.26 mmol) in ether (4 mL) was added dropwise. The resulting mixture was stirred at –78 °C for 2 h then methanol (4 mL) was added and the mixture was warmed to rt. Saturated aqueous ammonium chloride (30 mL) was added, the layers were separated, and the aqueous layer was extracted with ether (3 x 30 mL). The combined organic layers were dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo*. Analysis of the crude material by ^{1}H NMR revealed that the product had been formed as a 3:1 mixture of diastereomers. The crude product was purified by flash chromatography on silica gel to afford 230 mg (56%) of the title compound as a white solid, m.p. 49–50 °C, $[\alpha]^{23}_D$ +6.1° (*c* 1.0, $CHCl_3$). Spectral data were identical to the racemic compound **9** described above. This material was judged to be of 97% ee using the method described below.

The enantiomeric purity of **9** was determined through HPLC analysis of the O-benzoyl derivative, which was prepared as follows: A flame-dried flask cooled under a stream of nitrogen was charged with +-**9** (40 mg, 0.122 mmol), pyridine (2 mL) and cooled to 0 °C. Neat benzoyl chloride (90 μL, 0.78 mmol) was added dropwise. The resulting mixture was stirred at 0 °C until the starting material was consumed as judged by TLC analysis (ca. 1h). The reaction mixture was then diluted with water (3 mL) and ethyl acetate (5 mL). The layers were separated and the remaining aqueous phase was extracted with ethyl acetate (3 x 3 mL). The combined organic extracts were dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo* before being purified using 10% ethyl acetate/hexanes as the eluent to afford 47.5 mg (90 %) of a colorless oil. ^{1}H NMR (500 MHz, $CDCl_3$) δ 8.06 (d, *J* = 7.3 Hz, 2 H), 7.55 (t, *J* = 7.3 Hz, 1 H), 7.44 (t, *J* = 7.8 Hz, 2 H), 5.96–5.85 (m, 1 H), 5.63–5.55 (m, 1 H), 5.33 (d, *J* = 17.1 Hz, 1 H), 5.20 (d, *J* = 10.5 Hz, 1 H), 4.45 (s, br, 1 H), 3.80–3.61 (m, br, 1 H), 2.04–1.91 (m, 1 H), 1.85–1.75 (m, 1 H), 1.57–1.15 (m, 25 H), 0.88 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 206.1, 165.6, 155.2, 136.3, 132.9, 130.4, 129.6, 128.3, 116.8, 78.9, 72.6, 48.5, 47.6, 40.8, 39.5, 36.5, 35.4, 31.9, 29.6, 29.5, 29.3, 28.4, 25.8, 22.6, 14.1.

Assay for determination of enantiomeric excess (ee): The O-benzoyl derivative of +-9 (10 mg) was dissolved in isopropanol (50 μL) and hexanes (1 mL) and injected in an HPLC apparatus equipped with chiral column (R,R) WHELK-O 1 (Regis Tech.). The system permitting separation of enantiomers (RT = 5.825 min and 6.733min) was found to be 5 % isopropanol/hexanes, flow rate = 1 mL/min at wavelength of 231 nm. The HPLC analysis indicated the material was of 97 % ee.

(–)–(1*R*,3*S*)-3-(*tert*-Butyldimethylsilyloxy)-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (5). Treatment of (+)–(1*R*,3*S*)-3-hydroxy-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (180 mg, 0.55 mmol) with TBS-Cl (133 mg, 0.88 mmol) and imidazole (75 mg, 1.1 mmol) using a procedure analogous to that described above for the synthesis of racemic compound **5** afforded the nonracemic title compound (226 mg, 93%) as a colorless oil, $[\alpha]^{23}_{D}$ –1.3° (*c* 1.0, $CHCl_3$). Spectral data were identical to the racemic compound **5** described above.

(–)–(2*S*,3*S*,5*R*)–2-Benzyl-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (11).[1] Treatment of (–)–(1*R*,3*S*)-3-(*tert*-butyldimethylsilyloxy)-1-nonylpent-4-enylcarbamic acid *tert*-butyl ester (110 mg, 0.25 mmol) with bromobenzene (32 μL, 0.3 mmol) using a procedure analogous to that described above for the synthesis of racemic compound **11** afforded the nonracemic title compound (80.2 mg, 62 %) as a colorless oil, $[\alpha]^{23}_{D}$ –51.8° (*c* 1.1, $CHCl_3$) [lit.[1] $[\alpha]^{20}_{D}$ –48.6° (*c* 1.1, $CHCl_3$)]. Spectral data were identical to the racemic compound **11** described above. This material was judged to be of 96% ee using the method described below.

Assay for determination of enantiomeric excess (ee): Compound **11** (10 mg) was dissolved in isopropanol (50 μL) and hexanes (1 mL) and injected in an HPLC apparatus equipped with chiral column (R,R) WHELK-O 1 (Regis Tech.). The system permitting separation of enantiomers (RT = 8.350 min and 9.433 min) was found to be 2.5 % isopropanol/hexanes, flow rate = 0.5 mL/min at wavelength of 254 nm. The HPLC analysis indicated the material was of 96% ee.

(+)–Preussin (1).[2] Treatment of (–)–(2*S*,3*S*,5*R*)–2-benzyl-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (27 mg, 0.05 mmol) with $LiAlH_4$ (313 μL, 0.313

mmol) using a procedure analogous to that described above for the synthesis of racemic compound **1** afforded the nonracemic title compound (16 mg, 95 %) as a colorless oil, $[\alpha]^{23}_{D}$ +21.2° (*c* 1.0, $CHCl_3$) [lit.[5] $[\alpha]^{25}_{D}$ +22.0° (*c* 1.0, $CHCl_3$)]. Spectral data were identical to the racemic compound **1** described above.

Synthesis of *N*-boc-*O*-TBS Preussin and 3-epi-Preussin Analogs (Table 1).

(±)–(2*S*,3*S*,5*R*)–2-(4-Benzoylbenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (19). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 4-bromobenzophenone (157 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 208 mg (67%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81–7.66 (m, 4 H), 7.59–7.52 (m, 1 H), 7.49–7.42 (m, 2 H), 7.40–7.29 (m, 2 H), 4.34–4.18 (m, 1.4 H), 4.15–4.00 (m, 0.6 H), 3.74–3.50 (m, 1 H), 3.15–3.03 (m, 1 H), 2.89–2.75 (m, 0.4 H), 2.72–2.56 (m, 0.6 H), 2.34–2.12 (m, 1.6 H), 2.08–1.93 (m, 0.4 H), 1.67–1.55 (m, 1 H), 1.43–1.11 (m, 24 H), 0.95–0.82 (m, 12 H), 0.13–0.07 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 196.3, 154.7, 145.6, 138.0, 135.0, 132.0, 130.0, 129.8, 129.7, 128.1, 79.1, 71.3, 62.0, 61.5, 55.6, 38.7, 38.0, 37.1, 36.2, 31.8, 29.6, 29.5, 29.2, 28.1, 26.5, 25.8, 22.6, 18.1, 14.1, -4.7, -5.0. IR (film) 1693, 1661 cm^{-1}. Anal calcd for $C_{38}H_{59}NO_4Si$: C, 73.38; H, 9.56; N, 2.25. Found: C, 73.23; H, 9.67; N, 2.32.

(±)–(2*S*,3*R*,5*R*)–2-(4-Benzoylbenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (20). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **13** except 4-bromobenzophenone (157 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 194.8 mg (63%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis and contained a small amount (ca 3–5%) of an inseparable aromatic impurity; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75–7.67 (m, 4 H), 7.56–7.48 (m, 1 H), 7.45–7.38 (m, 2 H), 7.34–7.21 (m, 2 H), 4.02–3.74 (m, 3 H), 3.13–3.00 (m, 0.4 H), 2.96–2.81 (m, 0.6 H), 2.56–2.45 (m, 1 H), 2.18–2.03 (m, 0.4 H), 2.02–1.88 (m, 1.6 H), 1.85–1.66 (m, 1 H), 1.49–1.33 (m, 10 H), 1.31–1.10 (m, 14 H), 0.83 (t, *J* = 6.6 Hz, 3 H), 0.75–0.69 (m, 9 H), -0.17–-0.27 (m, 6 H); ^{13}C

NMR (100 MHz, $CDCl_3$) δ 196.1, 195.5, 159.9, 155.2, 143.7, 137.9, 137.6, 135.6, 132.1, 131.8, 131.6, 130.2, 129.8, 129.6, 129.2, 128.1, 128.0, 122.0, 79.4, 79.0, 73.3, 72.4, 69.3, 68.8, 57.2, 40.4, 39.6, 39.2, 38.8, 36.0, 38.0, 31.8, 29.6, 29.4, 29.2, 28.8, 28.3, 25.5, 22.5, 17.7, 14.0, -5.1, -5.2. IR (film) 1694, 1660 cm^{-1}. Anal calcd for $C_{38}H_{59}NO_4Si$: C, 73.38; H, 9.56; N, 2.25. Found: C, 73.68; H, 9.48; N, 2.16.

(±)–(2*S*,3*S*,5*R*)–2-(4-Methoxybenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (21). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 4-bromoanisole (76 μL, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 149.7 mg (55%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^1H NMR analysis; data are for the mixture. ^1H NMR (400 MHz, $CDCl_3$) δ 7.20–7.04 (m, 2 H), 6.84–6.75 (m, 2 H), 4.30–4.18 (m, 1 H), 4.17–4.08 (m, 0.4 H), 4.01–3.90 (m, 0.6 H), 3.77 (s, 3 H), 3.70–3.46 (m, 1 H), 2.99–2.89 (m, 1 H), 2.78–2.62 (m, 0.4 H), 2.56–2.41 (m, 0.6 H), 2.32–2.09 (m, 1.6 H), 2.01–1.86 (m, 0.4 H), 1.63–1.50 (m, 1 H), 1.48–1.02 (m, 24 H), 0.97–0.79 (m, 12 H), 0.13– -0.08 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 157.8, 154.9, 132.1, 130.7, 113.5, 78.9, 71.4, 62.4, 61.7, 55.6, 55.3, 38.7, 38.0, 37.2, 34.9, 31.9, 29.7, 29.5, 29.3, 28.1, 26.5, 25.8, 22.7, 18.1, 14.1, -4.7, -5.0. IR (film) 1692 cm^{-1}. Anal calcd for $C_{32}H_{57}NO_4Si$: C, 70.15; H, 10.49; N, 2.56. Found: C, 70.08; H, 10.30; N, 2.52.

(±)–(2*S*,3*S*,5*R*)–2-(4-Methoxybenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (22). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **13** except 4-bromoanisole (76 μL, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 131.2 mg (48%) of the title compound as a colorless oil. This compound was found to exist as a ~1.5:1 mixture of rotamers as judged by ^1H NMR analysis; data are for the mixture. ^1H NMR (500 MHz, $CDCl_3$) δ 7.19–7.03 (m, 2 H), 6.86–6.78 (m, 2 H), 4.00–3.96 (m, 1 H), 3.95–3.85 (m, 1 H), 3.84–3.73 (m, 4 H), 3.04–2.93 (m, 0.35 H), 2.86–2.76 (m, 0.65 H), 2.40–2.31 (m, 1 H), 2.17–2.05 (m, 0.65 H), 2.00–1.86 (m, 1 H), 1.85–1.77 (m, 0.35 H), 1.76–1.67 (m, 1 H), 1.53–1.37 (m, 10 H), 1.35–1.12 (m, 14 H), 0.88 (t, J = 6.3 Hz, 3 H), 0.75 (s, 9 H), -0.17– -0.26 (m, 6 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 158.1, 155.4, 130.9, 130.2, 113.8, 78.8, 73.2, 72.3, 69.8, 69.2, 57.2, 55.3, 39.5, 38.9, 38.7, 36.0, 31.9, 29.7, 29.5, 29.3, 28.5, 26.1, 25.9, 25.6, 22.7, 17.8, 14.1, -5.08, -5.13. IR (film) 1694 cm^{-1}. Anal calcd for $C_{32}H_{57}NO_4Si$: C, 70.15; H, 10.49; N, 2.56. Found: C, 70.01; H, 10.64; N, 2.53.

(±)–(2*S*,3*S*,5*R*)–2-(4-Trifluoromethylbenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (23). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 4-bromobenzotrifluoride (85 μL, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 201.3 mg (69%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.56–7.43 (m, 2 H), 7.41–7.25 (m, 2 H), 4.32–4.15 (m, 1.4 H), 4.06–3.93 (m, 0.6 H), 3.72–3.45 (m, 1 H), 3.10–3.00 (m, 1 H), 2.86–2.72 (m, 0.4 H), 2.65–2.51 (m, 0.6 H), 2.36–2.11 (m, 1.6 H), 2.05–1.90 (m, 0.4 H), 1.65–1.54 (m, 1 H), 1.45–1.00 (m, 24 H), 0.99–0.78 (m, 12 H), 0.14– -0.11 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.8, 144.4, 130.1, 128.1 (q, J = 25.0 Hz), 124.9, 124.4 (q, J = 271.8 Hz), 79.2, 71.3, 62.2, 61.3, 56.5, 55.7, 38.8, 38.0, 37.3, 36.0, 31.9, 29.6, 29.5, 29.3, 28.3, 28.0, 26.5, 25.8, 22.7, 18.1, 14.1, -4.7, -5.0; IR (film) 1695 cm^{-1}. Anal calcd for $C_{32}H_{54}F_3NO_3Si$: C, 65.60; H, 9.29; N, 2.39. Found: C, 65.57; H, 9.40; N, 2.37.

(±)–(2*S*,3*R*,5*R*)–2-(4-Trifluoromethylbenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (24). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **13** except 4-bromobenzotrifluoride (85 μL, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 152 mg (52%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.58–7.50 (m, 2 H), 7.38–7.24 (m, 2 H), 4.03–3.77 (m, 3 H), 3.13–3.04 (m, 0.4 H), 2.89–2.79 (m, 0.6 H), 2.58–2.51 (m, 1 H), 2.17–2.07 (m, 0.6 H), 2.09–1.90 (m, 1.4 H), 1.80–1.70 (m, 1 H), 1.55–1.11 (m, 24 H), 0.88 (t, J = 6.6 Hz, 3 H), 0.75 (s, 9 H), -0.13– -0.27 (m, 6 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 155.3, 142.9, 129.7, 128.7 (q, J = 32.2 Hz), 125.2, 124.3 (q, J = 272.0 Hz), 79.1, 73.6, 72.4, 69.3, 68.7, 57.4, 57.1, 40.3, 39.3, 39.0, 36.3, 31.9, 29.7, 29.5, 29.3, 28.4, 26.2, 25.9, 25.5, 22.7, 17.8, 14.1, -5.0, -5.2; IR (film) 1694 cm^{-1}. Anal calcd for $C_{32}H_{54}F_3NO_3Si$: C, 65.60; H, 9.29; N, 2.39. Found: C, 65.78; H, 9.48; N, 2.48.

(±)–(2*S*,3*S*,5*R*)–2-(Naphthalen-2-ylmethyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (25). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 2-bromonaphthalene (125 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 187.9 mg (66%) of the title

compound as a pale orange oil. This compound was found to exist as a 3:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82–7.71 (m, 3 H), 7.69–7.59 (m, 1 H), 7.51–7.31 (m, 3 H), 4.36–4.23 (m, 1.25 H), 4.18–4.02 (m, 0.75 H), 3.76–3.50 (m, 1 H), 3.24–3.14 (m, 1 H), 3.06–2.88 (m, 0.25 H), 2.81–2.64 (m, 0.75 H), 2.38–2.11 (m, 1.75 H), 2.03–1.90 (m, 0.25 H), 1.71–1.58 (m, 1 H), 1.47–1.12 (m, 20 H), 1.05–0.79 (m, 16 H), 0.16– -0.14 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.9, 137.6, 133.5, 132.0, 128.6, 128.0, 127.4, 127.3, 125.6, 124.9, 78.8, 71.4, 62.4, 61.6, 55.7, 38.7, 38.0, 37.2, 36.2, 31.9, 29.6, 29.5, 29.3, 28.3, 27.8, 26.5, 25.8, 22.7, 18.1, 14.1, -4.7, -5.0 (two aromatic carbons are incidentally equivalent); IR (film) 1693 cm^{-1}. Anal calcd for $C_{35}H_{57}NO_3Si$: C, 74.02; H, 10.12; N, 2.47. Found: C, 73.89; H, 10.28; N, 2.55.

(±)–(2*S*,3*S*,5*R*)–2-(2-Methylbenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (26). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 2-bromotoluene (66 μL, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 148.3 mg (56%) of the title compound as a pale yellow oil. This compound was found to exist as a 9:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.15–7.03 (m, 4 H), 4.31–4.20 (m, 1 H), 4.10–3.99 (m, 0.9 H), 3.88–3.78 (m, 0.1 H), 3.71–3.57 (m, 1 H), 3.29–3.12 (m, 1 H), 2.56–2.46 (m, 0.1 H), 2.40–2.19 (m, 5.8 H), 2.10–2.00 (m, 0.1 H), 1.72–1.61 (m, 1 H), 1.46–1.19 (m, 20 H), 1.09–0.82 (m, 16 H), 0.16– -0.04 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.9, 138.1, 136.4, 130.7, 129.9, 125.8, 125.7, 78.7, 71.2, 60.0, 55.7, 38.0, 37.7, 33.3, 31.9, 29.8, 29.7, 29.5, 29.3, 27.7, 26.7, 25.8, 25.7, 22.7, 19.6, 18.0, 14.1, -4.8, -5.1; IR (film) 1693 cm^{-1}. Anal calcd for $C_{32}H_{57}NO_3Si$: C, 72.26; H, 10.80; N, 2.63. Found: C, 72.07; H, 10.65; N, 2.62.

(±)–(2*S*,3*S*,5*R*)–2-(4-Cyanobenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (27). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 4-bromobenzonitrile (110 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 175 mg (65%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.63–7.48 (m, 2 H), 7.43–7.23 (m, 2 H), 4.34–4.21 (m, 1 H), 4.20–4.11 (m, 0.4 H), 4.05–3.92 (m, 0.6 H), 3.74–3.45 (m, 1 H), 3.05 (dd, *J* = 5.1, 13.7, 1 H), 2.81–2.67 (m, 0.4 H), 2.66–2.51 (m, 0.6 H), 2.36–2.10 (m, 1.6 H), 2.06–1.86 (m, 0.4 H), 1.75–1.50 (m, 1 H), 1.49–1.04 (m, 24 H), 0.96–0.76 (m, 12 H), 0.14– -0.11 (m, 6 H); ^{13}C NMR

(125 MHz, $CDCl_3$) δ 154.7, 146.1, 131.8, 130.6, 119.2, 109.4, 79.3, 71.3, 70.9, 62.0, 61.3, 55.6, 38.7, 37.9, 37.2, 36.5, 31.9, 29.7, 29.5, 29.3, 28.1, 26.5, 25.8, 22.6, 18.0, 14.1, -4.7, -5.0; IR (film) 1694 cm^{-1}. Anal calcd for $C_{32}H_{54}N_2O_3Si$: C, 70.80; H, 10.03; N, 5.16. Found: C, 70.99; H, 9.90; N, 5.34.

(±)–(2*S*,3*S*,5*R*)–2-(3-pyridyl-2-ylmethyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (28). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 3-bromopyridine (60 _L, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 150.8 mg (58%) of the title compound as a colorless oil. This compound was found to exist as a ~ 1.5:1 mixture of rotamers as judged by ^1H NMR analysis; data are for the mixture. ^1H NMR (400 MHz, $CDCl_3$) δ 8.47–8.34 (m, 2 H), 7.64–7.41 (m, 1 H), 7.20–7.10 (m, 1 H), 4.30–4.20 (m, 1 H), 4.19–4.11 (m, 0.35 H), 4.02–3.90 (m, 0.65 H), 3.69–3.44 (m, 1 H), 3.02–2.92 (m, 1 H), 2.77–2.64 (m, 0.35 H), 2.57–2.44 (m, 0.65 H), 2.34–2.08 (m, 1.65 H), 2.02–1.90 (m, 0.35 H), 1.60–1.47 (m, 1 H), 1.44–1.04 (m, 24 H), 0.94–0.77 (m, 12 H), 0.13– -0.13 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.7, 151.1, 147.0, 137.1, 135.4, 122.9, 79.2, 71.2, 62.0, 61.1, 55.6, 38.8, 37.9, 37.2, 33.3, 31.8, 29.6, 29.5, 29.2, 28.0, 26.4, 25.8, 22.6, 18.0, 14.0, -4.8, -5.1; IR (film) 1694 cm^{-1}. Anal calcd for $C_{30}H_{54}N_2O_3Si$: C, 69.45; H, 10.49; N, 5.40. Found: C, 69.50; H, 10.45; N, 5.34.

(±)–(2*S*,3*S*,5*R*)–2-(*N*-benzyl-5-indolyl-2-ylmethyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (29). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except *N*-benzyl-5-bromoindole (172 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 135.9 mg (42%) of the title compound as a colorless oil. This compound was found to exist as a 1.5:1 mixture of rotamers as judged by ^1H NMR analysis; data are for the mixture. ^1H NMR (400 MHz, $CDCl_3$) δ 7.53–7.40 (m, 1 H), 7.30–7.20 (m, 3 H), 7.18–6.96 (m, 5 H), 6.48–6.43 (m, 1 H), 5.30 (s, 2 H), 4.31–4.21 (m, 1 H), 4.10–3.99 (m, 1 H), 3.79–3.50 (m, 1 H), 3.16–3.06 (m, 1 H), 2.95–2.77 (m, 0.4 H), 2.69–2.53 (m, 0.6 H), 2.34–2.12 (m, 1.6 H), 2.08–1.86 (m, 0.4 H), 1.70–1.58 (m, 1 H), 1.46–1.13 (m, 18 H), 1.03–0.81 (m, 18 H), 0.13– -0.14 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 155.0, 137.9, 135.0, 130.8, 128.9, 128.6, 128.1, 127.4, 126.6, 124.0, 121.7, 109.1, 101.2, 78.6, 71.4, 62.8, 55.6, 50.0, 38.0, 37.3, 35.8, 35.2, 31.9, 29.73, 29.67, 29.5, 29.3, 28.5, 27.9, 26.6, 25.9, 25.7, 22.7, 18.1, 14.1, -4.7, -5.0; IR (film) 1689 cm^{-1}. Anal calcd for $C_{40}H_{62}N_2O_3Si$: C, 74.25; H, 9.66; N, 4.33. Found: C, 73.87; H, 9.90; N, 4.31.

(±)–(2*S*,3*S*,5*R*)–2-(4-Chlorobenzyl)-3-(*tert*-butyldimethylsilyloxy)-5-nonylpyrrolidine-1-carboxylic acid *tert*-butyl ester (30). This compound was prepared on a 0.5 mmol scale using a procedure analogous to that employed for the synthesis of **11** except 4-bromochlorobenzene (115 mg, 0.6 mmol) was used in place of bromobenzene. This procedure afforded 195.4 mg (71%) of the title compound as a pale orange oil. This compound was found to exist as a ~ 1.5:1 mixture of rotamers as judged by ^{1}H NMR analysis; data are for the mixture. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.32–7.09 (m, 4 H), 4.33–4.22 (m, 1 H), 4.21–4.11 (m, 0.35 H), 4.05–3.93 (m, 0.65 H), 3.73–3.51 (m, 1 H), 3.04–2.94 (m, 1 H), 2.79–2.65 (m, 0.35 H), 2.60–2.46 (m, 0.65 H), 2.36–2.13 (m, 1.65 H), 2.04–1.94 (m, 0.35 H), 1.66–1.49 (m, 1 H), 1.48–1.08 (m, 24 H), 0.99–0.81 (m, 12 H), 0.17– -0.08 (m, 6 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 154.8, 138.5, 131.4, 131.2, 128.0, 79.1, 71.3, 62.2, 61.5, 55.6, 38.7, 38.0, 37.2, 35.4, 31.9, 29.6, 29.5, 29.3, 28.0, 26.5, 25.8, 25.7, 25.5, 22.6, 18.0, 14.1, -4.7, -5.0; IR (film) 1694 cm^{-1}. Anal calcd for $C_{31}H_{54}ClNO_3Si$: C, 67.41; H, 9.85; N, 6.42. Found: C, 67.25; H, 9.82; N, 2.54.

Synthesis of Deprotected Preussin and 3-*epi*-Preussin Analogs (Table 2)

(±)–(2*S*,3*S*,5*R*)–2-(4-Benzoylbenzyl)-3-hydroxy-5-nonylpyrrolidine (31). A flame-dried flask cooled under a steam of nitrogen was charged with **19** (62.2 mg, 0.1 mmol) and tetrahydrofuran (1 mL). Formic acid (1 mL, 26.5 mmol) was added dropwise and the resulting mixture was stirred at 60 °C until the starting material was consumed as judged by TLC analysis (ca. 5h). The reaction mixture was then cooled to 0 °C, an aqueous solution of formaldehyde (100 μL, 1.2 mmol, 37 wt. %) was added dropwise, and the mixture was stirred at 0 °C for 1h. The reaction mixture was then heated to 60 °C with stirring for 12h. The crude mixture was cooled to rt and was concentrated *in vacuo* using a rotary evaporator, with trace residual solvent removed under high vacuum for 30 min. The resulting residue was then dissolved in tetrahydrofuran (1 mL). Solid K_2CO_3 (150 mg, 1.1 mmol) was added and the resulting suspension was cooled to 0 °C. A solution of TBAF (1 mL, 1 mmol, 1 M in tetrahydrofuran) was then added dropwise and the reaction was stirred at rt until the silyl protecting group was completely removed as judged by crude ^{1}H NMR analysis of an aliquot from the reaction mixture (ca. 5h). The crude mixture was concentrated *in vacuo* using a rotary evaporator, with trace residual solvent removed under high vacuum for 30 min. The crude material was purified by flash chromatography using 5% MeOH/CH_2Cl_2 as the eluent to afford 36 mg (85%) of the title compound as a light brown solid, m.p. 50–52 °C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79 (d, J = 8.1 Hz, 2 H), 7.74 (t, J = 8.1 Hz, 2 H),

7.60–7.56 (m, 1 H), 7.48 (t, *J* = 7.6 Hz, 2 H), 7.42 (d, *J* = 8.1 Hz, 2 H), 3.84–3.78 (m, 1 H), 3.02–2.95 (m, 1 H), 2.94–2.89 (m, 1 H), 2.39–2.30 (m, 4 H), 2.29–2.20 (m, 1 H), 2.19–2.13 (m, 1 H), 2.08–1.95 (s, br, 1 H), 1.77–1.68 (m, 1 H), 1.48–1.42 (m, 1 H), 1.38–1.17 (m, 15 H), 0.88 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 196.5, 144.6, 137.8, 135.5, 132.2, 130.3, 130.0, 129.3, 128.2, 73.2, 70.4, 65.7, 39.4, 38.6, 34.9, 33.8, 31.9, 29.9, 29.6, 29.5, 29.3, 26.2, 22.7, 14.1; IR (film) 3411, 1656 cm^{-1}; MS (ESI): 422.3058 (422.3059 calculated for $C_{28}H_{39}NO_2$, M + H$^+$).

(±)–(2*S*,3*R*,5*R*)–2-(4-Benzoylbenzyl)-3-hydroxy-5-nonylpyrrolidine (32). This compound was prepared on a 0.1 mmol scale using a procedure analogous to that employed for the synthesis of **31**. Substrate **20** (62.2 mg, 0.1 mmol) was transformed to the title compound to afford 36.2 mg (86%) of a light brown solid, m.p. 62–64 °C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.79–7.72 (m, 4 H), 7.57 (t, *J* = 7.6 Hz, 1 H), 7.47 (t, *J* = 7.8 Hz, 2 H), 7.37 (d, *J* = 8.1 Hz, 2 H), 4.02–3.97 (m, 1 H), 3.05 (dd, *J* = 4.9, 13.7 Hz, 1 H), 2.74–2.67 (m, 1 H), 2.57–2.46 (m, 2 H), 2.34 (s, 3 H), 1.81–1.75 (m, 1 H), 1.72–1.57 (m, 2 H), 1.35–1.11 (m, 16 H), 0.87 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 196.4, 144.3, 137.7, 135.5, 132.3, 130.3, 129.9, 129.3, 128.2, 76.8, 74.5, 64.8, 39.5, 39.4, 39.3, 33.8, 31.8, 29.9, 29.58, 29.53, 29.3, 26.3, 22.6, 14.1; IR (film) 3422, 1658 cm^{-1}; MS (ESI): 422.3057 (422.3059 calculated for $C_{28}H_{39}NO_2$, M + H$^+$).

(±)–(2*S*,3*S*,5*R*)–2-(4-Methoxybenzyl)-3-hydroxy-5-nonylpyrrolidine (33). A flame-dried flask was cooled under a stream of nitrogen and charged with **21** (100 mg, 0.2 mmol) and tetrahydrofuran (1 mL). The resulting solution was cooled to 0 °C and $LiAlH_4$ (2 mL, 2 mmol, 1 M in tetrahydrofuran) was added dropwise via syringe. The resulting mixture was stirred at 60 °C until the starting material was consumed as judged by TLC analysis (ca. 16h). The reaction mixture was diluted with dry ether (2 mL), cooled to 0 °C and slowly quenched with an aqueous saturated solution of Na_2SO_4 (0.3 mL). The heterogeneous mixture was diluted with additional ether (2 mL) and was filtered through a small pad of celite. The filter was washed with additional ether and the combined organic filtrates were dried over Na_2SO_4, filtered and concentrated *in vacuo*. The crude oil obtained was purified by flash chromatography using 5% MeOH/CH_2Cl_2 as the eluent to afford 62.8 mg (87%) of the title compound as a white solid, m.p. 47-49 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.21 (d, *J* = 8.6 Hz, 2 H), 6.83 (d, *J* = 8.6 Hz, 2H), 3.83–3.76 (m, 4 H), 2.83–2.76 (m, 2 H), 2.33 (s, 3 H), 2.26–2.06 (m, 3 H), 1.94–1.74 (m, 1 H), 1.76–1.55 (m, 2 H), 1.45–1.38 (m, 1 H), 1.37–1.16 (m, 14 H), 0.88 (t, *J* = 6.6 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.0, 131.1, 130.2, 113.8, 73.9, 70.3, 66.0, 55.2, 39.2, 38.5, 34.6, 32.5, 31.9,

29.8, 29.6, 29.5, 29.3, 26.3, 22.7, 14.1; IR (film) 3412 cm^{-1}; MS (ESI): 348.2902 (348.2903 calculated for $C_{22}H_{37}NO_2$, M + H^+).

(±)–(2*S*,3*R*,5*R*)–2-(4-Methoxybenzyl)-3-hydroxy-5-nonylpyrrolidine (34). This compound was prepared on a 0.2 mmol scale using a procedure analogous to that employed for the synthesis of **33** except that removal of the silyl group required the use of TBAF after LAH reduction (see **31** for protocol, K_2CO_3 was not used). Substrate **22** (110 mg, 0.2 mmol) was transformed to the title compound to afford 63.2 mg (88%) of a white solid, m.p. 49-50 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.18 (d, *J* = 8.5 Hz, 2 H), 6.85 (d, *J* = 8.5 Hz, 2 H), 4.03–3.96 (m, 1 H), 3.79 (s, 3 H), 3.05–2.97 (m, 1 H), 2.55–2.41 (m, 2 H), 2.40–2.32 (m, 4 H), 1.80–1.73 (m, 1 H), 1.72–1.59 (m, 2 H), 1.35–1.11 (m, 15 H), 0.96 (s, 1H), 0.88 (t, *J* = 6.6 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 158.1, 130.7, 130.2, 114.0, 74.8, 64.9, 55.2, 39.1, 39.0, 38.3, 33.9, 31.9, 30.0, 29.59, 29.55, 29.3, 26.4, 22.7, 14.1 (two aliphatic carbons are incidentally equivalent); IR (film) 3392 cm^{-1}; MS (ESI): 348.2906 (348.2903 calculated for $C_{22}H_{37}NO_2$, M + H^+).

(±)–(2*S*,3*S*,5*R*)–2-(4-Trifluoromethylbenzyl)-3-hydroxy-5-nonylpyrrolidine (35). This compound was prepared on a 0.1 mmol scale using a procedure analogous to that employed for the synthesis of **31**. Substrate **23** (59 mg, 0.1 mmol) was transformed to the title compound to afford 31.5 mg (82%) of a white solid, m.p. 45–47 °C. ^{1}H NMR (500 MHz, $CDCl_3$) δ 7.53 (d, *J* = 8.2 Hz, 2 H), 7.41 (d, *J* = 8.2 Hz, 2 H), 3.80–3.72 (m, 1 H), 3.00–2.92 (m, 1 H), 2.88 (dd, *J* = 4.4, 13.2 Hz, 1 H), 2.34 (s, 3 H), 2.30–2.11 (m, 3 H), 2.03–1.90 (m, 1 H), 1.78–1.67 (m, 1 H), 1.44 (dd, *J* = 5.6, 13.4 Hz, 1 H), 1.37–1.17 (m, 15 H), 0.88 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (125 MHz, $CDCl_3$) δ 143.6, 129.8, 128.4 (q, *J* = 32.2 Hz), 125.2, 124.3 (q, *J* = 272.0 Hz), 73.3, 70.3, 65.7, 39.3, 38.5, 34.9, 33.6, 31.9, 29.9, 29.61, 29.55, 29.3, 26.2, 22.7, 14.1; IR (film) 3401 cm^{-1}; MS (ESI): 386.2671 (386.2671 calculated for $C_{22}H_{34}F_3NO$, M + H^+).

(±)–(2*S*,3*R*,5*R*)–2-(4-Trifluoromethylbenzyl)-3-hydroxy-5-nonylpyrrolidine (36). This compound was prepared on a 0.1 mmol scale using a procedure analogous to that employed for the synthesis of **31**. Substrate **24** (59 mg, 0.1 mmol) was transformed to the title compound to afford 30.8 mg (80%) of a white solid, m.p. 48-49 °C. ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.54 (d, *J* = 8.0 Hz, 2 H), 7.37 (d, *J* = 8.0 Hz, 2 H), 4.00–3.90 (m, 1 H), 3.00 (dd, *J* = 4.5, 13.5 Hz, 1 H), 2.75–2.62 (m, 1 H), 2.57–2.42 (m, 2 H), 2.32 (s, 3 H), 1.83–1.52 (m, 3 H), 1.48–1.06 (m, 16 H), 0.88 (t, *J* = 6.2 Hz, 3 H); ^{13}C NMR (100 MHz,

$CDCl_3$) δ 143.3, 129.7, 128.5 (q, *J* = 32.4 Hz), 125.2, 124.3 (q, *J* = 272.0 Hz), 76.7, 74.5, 64.7, 39.6, 39.3, 39.1, 33.9, 31.9, 30.0, 29.6, 29.5, 29.3, 26.3, 22.7, 14.1; IR (film) 3369, 2927, 1326, 1126, 843 cm^{-1}; MS (ESI): 386.2673 (386.2671 calculated for $C_{22}H_{34}F_3NO$, M + H^+).

Asymmetric aldol reaction of 2-undecanone with acrolein. A flame-dried flask was cooled under a steam of nitrogen and charged with (-)-DIPCl (514 mg, 1.6 mmol), and CH_2Cl_2 (6 mL). A thermocouple was inserted to the solution through a rubber septum and the mixture was cooled to an internal temperature of –78 °C. Triethylamine (280 μL, 2 mmol) was added followed by a solution of 2-undecanone (207 μL, 1 mmol) in CH_2Cl_2 (1 mL). The resulting was mixture was stirred at -78 °C for 1.5h, then a solution of acrolein (100 μL, 1.5 mmol) in CH_2Cl_2 (3 mL) was added slowly dropwise and the reaction mixture was stirred at –78 °C for an additional 2.5h then warmed to 0 °C with stirring for 1h. The disappearance of starting material was verified by TLC analysis. The reaction mixture was diluted with Et_2O and quenched with a buffer solution (10 mL, pH = 7). The layers were separated and the aqueous phase was extracted with Et_2O (3 x 15 mL). The organic extracts were combined and concentrated *in vacuo* in a flask equipped with a magnetic stir bar. The crude oil obtained was diluted with MeOH (7 mL), a buffer solution (1 mL, pH = 7) and the mixture was cooled to 0 °C. An aqueous solution of H_2O_2 (2 mL, 30 wt. %) was slowly added and the mixture was stirred at rt for 3h. The reaction was then diluted with water (10 mL) and extracted with CH_2Cl_2 (3 x 15 mL). The extracts were washed with saturated aqueous $NaHCO_3$ solution and $FeSO_4$ saturated aqueous solution (3x, until the green color persisted). The organic phase was dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo* before being purified using 20 % Et_2O/Hexanes as the eluent to afford 169.5 mg (78 %) of nonracemic **7** as a colorless oil. This material was characterized by ^1H NMR analysis prior to derivatization to assay enantiopurity; NMR data were identical to those given above.

Benzoylation of nonracemic 7. A flame-dried flask was cooled under a steam of nitrogen and charged with nonracemic **7** (165 mg, 0.73 mmol), and pyridine (7 mL). The mixture was cooled to 0 °C and benzoyl chloride (340 μL, 2.92 mmol) was added dropwise via syringe. The resulting mixture was stirred at 0 °C until the starting material was consumed as judged by TLC analysis (ca. 1h). The reaction mixture was then diluted with water (10 mL) and ethyl acetate (15 mL). The layers were separated and the aqueous phase was extracted with ethyl acetate (3 x 10 mL). The combined organic extracts were dried over anhydrous Na_2SO_4, filtered and concentrated *in vacuo* before being purified by flash chromatography using 5% ethyl acetate/hexanes as the eluent to afford 174.8 mg (73 %) of O-

benzoyl-**7** as a colorless oil. This optical purity of this material was judged to be 48% ee by HPLC analysis using the method described below. ^{1}H NMR (400 MHz, $CDCl_3$) δ 8.02 (d, *J* = 7.0 Hz, 2 H), 7.56 (t, *J* = 7.2 Hz, 1 H), 7.43 (t, *J* = 7.8 Hz, 2 H), 6.00–5.90 (m, 2 H), 5.41–5.34 (m, 1 H), 5.26–5.20 (m, 1 H), 3.02–2.94 (m, 1 H), 2.82–2.74 (m, 1 H), 2.45 (t, *J* = 7.4 Hz, 2 H), 1.62–1.51 (m, 2 H), 1.33–1.18 (m, 12 H), 0.87 (t, *J* = 6.8 Hz, 3 H); ^{13}C NMR (100 MHz, $CDCl_3$) δ 207.2, 165.4, 135.4, 133.0, 130.1, 129.6, 128.4, 117.1, 71.1, 47.0, 43.5, 31.8, 29.38, 29.36, 29.2, 29.1, 23.6, 22.6, 14.1.

Assay for determination of enantiomeric excess of nonracemic 7 prepared through asymmetric aldol reaction of undecanone with acrolein: The *O*-benzoyl derivative of **7** (20 mg) was dissolved in hexanes (2 mL) and injected in an HPLC apparatus equipped with chiral column (*R*,*R*) WHELK-O 1 (Regis Tech.). The system permitting separation of enantiomers (RT = 8.200 min and 8.850 min) was found to be 5 % isopropanol/hexanes, flow rate = 1 mL/min at wavelengths 220 nm and 254 nm. The ee then measured was 48 %.

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