Supplementary Material (ESI) for Organic & Biomolecular Chemistry

A temporary stereocentre approach for the asymmetric synthesis of chiral cyclopropane-carboxaldehydes

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Supporting Information

Contents: Additional experimental procedures and characterisation data

(*S*)-4-benzyl-3-propionyl-oxazolidin-2-one **7**[1] and 4-benzyl-5,5-dimethyl-oxazolidin-2-ones (*S*)-**16** and (*R*)-**16**[2] were prepared according to literature procedures.

(*S*)-4-benzyl-5,5-dimethyl-3-propionyloxazolidin-2-one 1[3]

n-BuLi (25.5 mmol) was added to a solution of oxazolidin-2-one **16** (5.0g, 24.4 mmol) in THF (100 mL), followed by addition of propionyl chloride (2.48g, 27.0 mmol) according to general procedure **A** to afford a crude product that was recrystallised to afford the title compound **1** (5.66g, 21.7 mmol) as a white crystalline solid in 89% yield; Mp 61-62 ^{o}C (Et_2O, hexane); $[\alpha]_D^{25}$ = -31.0 (*c* 0.87, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.32-7.17 (5H, m, Ar*H*), 4.49 (1H, dd, *J* = 9.5 Hz, 4.0 Hz, C*H*N), 3.12 (1H, dd, *J* = 14.5 Hz, 4.0 Hz, PhCH_AH$_B$), 2.89 (3H, obs. m, CH_2CH$_3$ and PhCH$_A$$H_B$), 1.35 (3H, s, C(C$H_3$)), 1.33 (3H, s, C(C$H_3$)), 1.17 (3H, t, *J* = 7.5 Hz, CH$_2$CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 174.7, 153.1, 137.4, 129.5, 129.1, 127.2, 82.6, 63.9, 35.8, 29.8, 29.0, 22.7, 8.8; IR (KBr, cm^{-1}): 1770 (C=O$_{ox}$), 1700 (C=O); HRMS (ES+): *m/z* calculated for $C_{15}H_{19}NO_3$: $[M+H]^+$ requires 262.1438; found 262.1442.

(*S*)-4-Benzyl-3-((*E*)-(2*S*,3*R*)-3-hydroxy-2-methyl-dodec-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3b

9-BBN-OTf (0.95 mmol) was added to a solution of oxazolidin-2-one **1** (230 mg, 0.88 mmol) in CH_2Cl_2 (16 mL) followed by addition of diisopropylethylamine (136 mg, 1.06 mmol) and (*E*)-dec-2-enal **2b** (149 mg, 0.96 mmol) according to general protocol **B** to afford a crude product that was purified by

chromatography to afford the title compound **3b** (296 mg, 0.71 mmol) as a yellow oil in 81% yield; $[\alpha]_D^{25}$ = -5.0 (*c* 0.59, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.44-7.09 (5H, m, Ar*H*), 5.67 (1H, dtd, *J* = 15.5, 7.0, 1.0 Hz, C*H*=CHCH$_2$), 5.39 (1H, ddt, 15.5, 6.0, 1.0 Hz, CH=C*H*CH$_2$), 4.46 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 4.30 (1H, m, C*H*OH), 3.83 (1H, qd, *J* = 7.0, 4.0 Hz, COC*H*), 2.99 (1H, dd, *J* = 14.0, 4.5 Hz, CH_AH$_B$Ph), 2.83 (1H, dd, *J* = 14.0, 9.0 Hz, CH$_A$CH_BPh), 2.53 (1H, broad s, O*H*), 1.96 (2H, app. q, *J* = 7.0 Hz, CH=CHCH_2), 1.32 (3H, s, C(CH_3)), 1.30 (3H, s, C(CH_3)), 1.29-1.13 (10H, m, (CH_2)$_5$), 1.07 (3H, d, *J* = 7.0 Hz, CHCH_3), 0.81 (3H, t, *J* = 7.0 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.1, 152.6, 137.7, 134.1, 129.3, 129.2, 129.1, 127.3, 82.7, 73.4, 63.8, 43.3, 35.9, 32.7, 32.2, 32.1, 29.7, 29.6, 29.5, 23.1, 14.5, 12.0; IR (film, cm^{-1}): 3517 (broad OH), 1778 (C=O$_{ox}$), 1698 (C=O); HRMS (ES+): *m/z* calculated for $C_{25}H_{37}NO_4$: $[M+H]^+$ requires 416.2801; found 416.2797.

(*S*)-4-Benzyl-3-[(*E*)-(2*S*,3*R*)-3-hydroxy-5-(4-methoxy-phenyl)-2-methyl-pent-4-enoyl]-5,5-dimethyl-oxazol-idin-2-one 3c

9-BBN-OTf (1.3 mmol) was added to a solution of oxazolidin-2-one **1** (311 mg, 1.19 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (183 mg, 1.42 mmol) and (*E*)-*para*-methoxycinnamaldehyde **2c** (212 mg, 1.31 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3c** (388 mg, 0.92 mmol) as a yellow oil in 77% yield; $[\alpha]_D^{25}$ = +125 (*c* 0.73, CH_3OH); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.34-7.23 (7H, m, Ar*H*), 6.84 (2H, d, *J* = 8.5 Hz, Ar*H*), 6.51 (1H, d, *J* = 16.0 Hz, C*H*=CHAr), 5.99 (1H, dd, 16.0, 6.0 Hz, CH=C*H*Ar), 4.52-4.44 (2H, obs. m, C*H*OH and C*H*N), 3.97 (1H, qd, *J* = 7.0, 4.0 Hz, COC*H*), 3.73 (3H, s, OCH_3), 3.00 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH$_B$Ph), 2.84 (1H, dd, *J* = 14.5, 9.0 Hz, CH$_A$CH_BPh), 2.65 (1H, d, *J* = 3.0 Hz, O*H*), 1.31 (3H, s, C(CH_3)), 1.23 (3H, s, C(CH_3)), 1.13 (3H, d, *J* = 7.0 Hz, CHCH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.1, 159.7, 152.8, 137.0, 131.7, 129.7, 129.5, 129.1, 128.2, 127.8, 126.7, 114.4, 82.7, 73.6, 63.7, 55.7, 43.4, 35.9, 28.7, 22.6, 12.2; IR (film, cm^{-1}):

3475 (broad OH), 1773 (C=O_{ox}), 1700 (C=O); HRMS (ES+): *m/z* calculated for $C_{25}H_{29}NO_5$: $[M+NH_4]^+$ requires 441.2384; found 441.2382.

(*S*)-4-Benzyl-3-[(*E*)-(2*S*,3*R*)-3-hydroxy-2-methyl-5-(2-nitro-phenyl)-pent-4-enoyl]-5,5-dimethyl-oxazolidin-2-one 3d

9-BBN-OTf (2.10 mmol) was added to a solution of oxazolidin-2-one **1** (500 mg, 1.91 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (296 mg, 2.30 mmol) and (*E*)-*ortho*-nitrocinnamaldehyde **2d** (373 mg, 2.10 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3d** (730 mg, 1.66 mmol) as a colorless oil in 87% yield; $[\alpha]_D^{25}$ = -8.0 (*c* 0.79, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.92 (1H, d, *J* = 8.0 Hz, o-C*H*ArNO_2), 7.61-7.19 (8H, m, Ar*H*), 7.12 (1H, dd, *J* = 16.0, 1.5 Hz, CH=C*H*Ar), 6.17 (1H, dd, *J* = 16.0, 5.5 Hz, C*H*=CHAr), 4.67 (1H, m, C*H*OH), 4.59 (1H, dd, *J* = 9.0, 5.0 Hz, C*H*N), 4.06 (1H, qd, *J* = 7.0, 4.0 Hz, C*H*CH_3), 3.08 (1H, dd, *J* = 14.0, 5.0 Hz, C$H_A$$H_B$Ph), 2.90-2.80 (2H, obs. m, CH_ACH_BPh and O*H*), 1.40 (3H, s, C(CH_3)), 1.37 (3H, s, C(CH_3)), 1.21 (3H, d, *J* = 7.0 Hz, C*H*CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.6, 153.0, 146.2, 136.9, 134.9, 133.6, 133.0, 129.5, 129.3, 129.1, 128.6, 127.4, 128.3, 124.9, 82.9, 72.9, 63.7, 43.1, 35.7, 28.8, 22.6, 12.0; IR (film, cm^{-1}): 3447 (broad OH), 1773 (C=O_{ox}), 1700 (C=O), 1552 (NO_2), 1352 (NO_2); HRMS (ES+): *m/z* calculated for $C_{24}H_{26}N_2O_6$: $[M+NH_4]^+$ requires 456.2129; found 456.2123.

(*S*)-4-Benzyl-3-((*E*)-(2*S*,3*R*)-5-furan-2-yl-3-hydroxy-2-methyl-pent-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3e

9-BBN-OTf (1.15 mmol) was added to a solution of oxazolidin-2-one **1** (270 mg, 1.03 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (159 mg, 1.23 mmol) and (*E*)-3-(furan-2-yl)acrylaldehyde **2e** (138 mg, 1.13 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3e** (335 mg, 0.88 mmol) as a white solid in

85% yield; M.p. 135-137 °C (Et_2O, hexane); $[\alpha]_D^{25}$ = +122 (*c* 0.93, CH_3OH); ^1H NMR (300 MHz, $CDCl_3$): δ = 7.27-7.12 (6H, obs. m, Ar*H*), 6.42 (1H, dd, *J* = 16.0, 1.5 Hz, CH=C*H*Ar), 6.28 (1H, dd, *J* = 3.0, 2.0 Hz, Ar*H*), 6.15 (1H, d, 3.0 Hz, Ar*H*), 6.04 (1H, dd, *J* = 16.0, 5.5 Hz, C*H*=CHAr), 4.59-4.45 (2H, obs. m and dd, *J* = 9.0, 5.0 Hz, C*H*OH and C*H*N), 3.90 (1H, qd, *J* = 7.0, 4.0 Hz, COC*H*), 2.99 (1H, dd, *J* = 14.5, 5.0 Hz, CH_AH_BPh), 2.84 (1H, dd, *J* = 14.5, 9.0 Hz, CH_ACH_BPh), 2.75 (1H, d, *J* = 3.0 Hz, O*H*), 1.32 (3H, s, C(CH_3)), 1.26 (3H, s, C(CH_3)), 1.12 (3H, d, *J* = 7.0 Hz, CHCH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.6, 152.8, 152.7, 142.4, 137.0, 129.5, 129.1, 127.6, 127.3 120.2, 111.7, 108.7, 82.8, 72.7, 63.7, 43.8, 35.7, 28.5, 22.6, 12.0; IR (KBr, cm^{-1}): 3444 (broad OH), 1770 ($C=O_{ox}$), 1686 (C=O); HRMS (ES+): *m/z* calculated for $C_{22}H_{25}NO_5$: $[M+NH_4]^+$ requires 401.2071; found 401.2069.

(*S*)-4-Benzyl-3-((*E*)-(2*S*,3*R*)-3-hydroxy-2-methyl-hex-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3f

9-BBN-OTf (0.92 mmol) was added to a solution of oxazolidin-2-one **1** (220 mg, 0.84 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (130 mg, 1.01 mmol) and (*E*)-crotonaldehyde **2f** (64 mg, 0.92 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3f** (211 mg, 0.64 mmol) as a white solid in 76% yield; M.p. 81-84 °C (Et_2O, hexane); $[\alpha]_D^{25}$ = -14.0 (*c* 0.84, CH_2Cl_2); ^1H NMR (300 MHz, $CDCl_3$): δ = 7.39-7.17 (5H, m, Ar*H*), 5.74 (1H, dqd, *J* = 15.5, 7.0, 1.0 Hz, CH=C*H*CH_3), 5.48 (1H, ddd, *J* = 15.5, 6.5, 1.5 Hz, C*H*=$CHCH_3$) 4.60 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 4.53 (1H, m, C*H*OH), 3.91 (1H, qd, *J* = 7.0, 4.5 Hz, COC*H*), 3.05 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH_BPh), 2.90 (1H, dd, *J* = 14.5, 9.0 Hz, CH_ACH_BPh), 2.60 (1H, d, *J* = 2.5 Hz, O*H*), 1.70 (3H, d, *J* = 6.5 Hz, CH=CHCH_3), 1.39 (3H, s, C(CH_3)), 1.38 (3H, s, C(CH_3)), 1.15 (3H, d, *J* = 7.0 Hz, CHCH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.9, 152.9, 137.1, 130.6, 129.5, 129.1, 128.9, 127.3, 82.7, 73.6, 63.8, 43.2, 35.9, 28.7, 22.5, 18.2, 12.1; IR (KBr, cm^{-1}): 3508 (broad OH), 1775 ($C=O_{ox}$), 1696 (C=O); HRMS (ES+): *m/z* calculated for $C_{19}H_{25}NO_4$: $[M+H]^+$ requires 332.1856; found 332.1855.

(*S*)-4-Benzyl-3-((2*S*,3*R*)-3-hydroxy-2,5-dimethyl-hex-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3g

9-BBN-OTf (0.85 mmol) was added to a solution of oxazolidin-2-one **1** (200 mg, 0.77 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (118 mg, 0.91 mmol) and 3-methylcrotonaldehyde **2g** (71 mg, 0.85 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3g** (202 mg, 0.59 mmol) as a yellow oil in 76% yield; $[\alpha]_D^{25}$ = -15.0 (*c* 2.44, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.35-7.17 (5H, m, Ar*H*), 5.23 (1H, d, *J* = 9.0 Hz, *H*C=C(Me)$_2$), 4.60 (1H, m, C*H*OH), 4.52 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.93 (1H, qd, *J* = 7.0, 5.0 Hz, COC*H*), 3.05 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH$_B$Ph), 2.90 (1H, dd, *J* = 14.5, 9.0 Hz, CH$_A$CH_BPh), 2.35 (1H, broad s, O*H*), 1.72 (3H, s C=C(CH_3)(CH$_3$), 1.68 (3H, s, C=C(CH$_3$)(CH_3), 1.39 (3H, s, C(CH_3)), 1.37 (3H, s, C(CH_3)), 1.18 (3H, d, *J* = 7.0 Hz, CHCH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.7, 153.0, 137.2, 137.1, 129.5, 129.1, 127.3, 124.5, 82.6, 69.9, 63.8, 43.4, 35.9, 28.6, 26.4, 22.5, 18.8, 12.6; IR (film, cm^{-1}): 3485 (broad OH), 1778 (C=O$_{ox}$), 1695 (C=O); HRMS (ES+): *m/z* calculated for $C_{20}H_{27}NO_4$: $[M+H]^+$ requires 346.2013; found 346.2011.

(*S*)-4-Benzyl-3-((*Z*)-(2*S*,3*R*)-3-hydroxy-2-methyl-dec-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3h

Lindlar's catalyst (10 mol%) was added to a solution of aldol **17** (230 mg, 0.60 mmol) in dry methanol (10 mL), and the reaction mixture stirred under one atmosphere of hydrogen for one hour before being filtered through Celite using CH_2Cl_2 (3 x 10 mL) as eluent. The combined solvent was removed under reduced pressure to afford a crude product, that was purified by chromatography to afford the title compound **3h** (220 mg, 0.56 mmol) as a yellow oil in 95% yield; $[\alpha]_D^{25}$ = -27 (*c* 0.70, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.27-7.12 (5H, m, Ar*H*), 5.48 (1H, dtd, *J* = 11.0, 7.0, 1.0 Hz, CH=C*H*C$_5$H$_{11}$), 5.36 (1H, ddt, 11.0, 8.5, 1.5 Hz, C*H*=CHC$_5$H$_{11}$), 4.62 (1H, dd, *J* = 8.5, 5.0 Hz, C*H*OH), 4.45 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.89 (1H, qd, *J* = 7.0, 5.0 Hz, COC*H*), 3.00 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH$_B$Ph), 2.83 (1H, dd, *J* = 14.5, 9.0 Hz, CH$_A$CH_BPh), 2.28 (1H, broad s, O*H*), 2.01 (2H, m, CH=CHCH_2), 1.33-

1.17 (6H, $(CH_2)_3$, 1.32 (3H, s, C(CH_3)), 1.31 (3H, s, C(CH_3)), 1.12 (3H, d, J = 7.0 Hz, CHCH_3), 0.82 (3H, t, J = 7.0 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.6, 152.9, 137.1, 131.4, 129.6, 129.1, 128.9, 127.2, 82.6, 69.0, 64.0, 43.5, 35.9, 32.0, 29.6, 29.5, 28.2, 22.9, 22.6, 14.4, 12.7; IR (film, cm^{-1}): 3497 (broad OH), 1778 (C=O_{ox}), 1698 (C=O); HRMS (ES+): *m/z* calculated for $C_{23}H_{33}NO_4$: $[M+NH_4]^+$ requires 405.2748; found 405.2749.

(*R*)-4-Benzyl-3-((*E*)-(2*R*,3*S*)-3-hydroxy-2-methyl-undec-4-enoyl)-5,5-dimethyl-oxazolidin-2-one 3i

9-BBN-OTf (0.85 mmol) was added to a solution of oxazolidin-2-one (*R*)-**1** (200 mg, 0.77 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (118 mg, 0.91 mmol) and (*E*)-non-2-enal **2i** (118 mg, 0.85 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **3i** (253 mg, 0.63 mmol) as a yellow oil in 82% yield; $[\alpha]_D^{25}$ = +8.0 (*c* 1.4, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.35-7.19 (5H, m, Ph), 5.73 (1H, dtd, J = 14.5, 7.0, 1.0 Hz, CH=C*H*CH_2), 5.44 (1H, ddt, J = 15.5, 6.5, 1.5 Hz, C*H*=CHC_6H_{13}), 4.53 (1H, dd, J = 9.0, 5.0 Hz, C*H*N), 4.37 (1H, m, C*H*OH), 3.89 (1H, qd, J = 7.0, 4.0 Hz, COC*H*), 3.06 (1H, dd, J = 14.5, 5.0 Hz, CH_AH_BPh), 2.83 (1H, dd, J = 14.5, 9.0 Hz, CH_ACH_BPh), 2.61 (1H, broad s, OH), 2.07-1.97 (2H, app. q, J = 7.0 Hz, CH=CHCH_2), 1.39 (3H, s, C(CH_3)), 1.38 (3H, s, C(CH_3)), 1.38-1.12 (8H, m, $(CH_2)_4$), 1.15 (3H, d, J = 7.0 Hz, CH_3CH), 0.88 (3H, t, J = 7.0 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.0, 152.5, 136.7, 133.7, 129.2, 129.1, 128.7, 127.0, 82.3, 73.0, 63.4, 43.0, 35.4, 32.3, 31.8, 29.2, 28.8, 27.3, 22.5, 22.1, 14.1, 11.7; IR (film, cm^{-1}): 3509 (broad O-H), 1777 (C=O_{ox}), 1699 (C=O); HRMS (ES+): *m/z* calculated for $C_{24}H_{35}NO_4$: $[M+NH_4]^+$ requires 419.5775; found 419.5778.

(*S*)-4-Benzyl-3-[(2*S*,3*R*)-3-((1*S*,2*S*)-2-heptyl-cyclopropyl)-3-hydroxy-2-methyl-propionyl]-5,5-dimethyl-oxazolidin-2-one 4b

Diethylzinc (2.55 mmol) and diiodomethane (680 mg, 2.55 mmol) were added to *syn*-aldol **3b** (210 mg, 0.51 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **4b** (194 mg, 0.45 mmol) as a yellow oil in 89% yield; $[\alpha]_D^{25}$ = +9.0 (*c* 0.59, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.30-7.12 (5H, m, Ar*H*), 4.46 (1H, dd, *J* = 9.5, 4.5 Hz, C*H*N), 3.92 (1H, qd, *J* = 7.0, 3.0 Hz, COC*H*), 3.15 (1H, dd, *J* = 8.5, 3.0 Hz, C*H*OH), 3.01 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH$_B$Ph), 2.82 (1H, dd, *J* = 14.5, 9.5 Hz, CH$_A$CH_BPh), 2.50 (1H, broad s, O*H*), 1.31 (3H, s, C(CH_3)), 1.30 (3H, s, C(CH_3)), 1.26-1.14 (12H, obs. m, alkyl-C_6H_{12}), 1.18 (3H, d, *J* = 7.0 Hz, CHCH_3), 0.81 (3H, t, *J* = 7.0 Hz, alkyl-CH_3), 0.68 (1H, app. dtd, *J* = 12.5, 8.5, 4.0 Hz, cyclopropyl-C*H*), 0.60 (1H, m, cyclopropyl-C*H*-alkyl), 0.46 (1H, app. dt, *J* = 8.5, 4.5 Hz, cyclopropyl-CH_AH$_B$), 0.28 (1H, app. dt, *J* = 8.0, 5.0 Hz, cyclopropyl-CH$_A$$H_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.3, 152.8, 137.1, 129.5, 129.1, 127.2, 82.6, 76.2, 63.9, 43.3, 35.8, 34.0, 32.3, 29.9, 29.8, 29.7, 28.9, 23.1, 22.6, 22.4, 17.0, 14.5, 11.6, 11.1; IR (film, cm^{-1}): 3515 (broad OH), 1777 (C=O$_{ox}$), 1697 (C=O); HRMS (ES+): *m/z* calculated for $C_{26}H_{39}NO_4$: $[M+H]^+$ requires 430.4952; found 430.2955.

(*S*)-4-Benzyl-3-{(2*S*,3*R*)-3-hydroxy-3-[(1*S*,2*S*)-2-(4-methoxy-phenyl)-cyclopropyl]-2-methyl-propionyl}-5,5-dimethyl-oxazolidin-2-one 4c

Diethylzinc (2.75 mmol) and diiodomethane (732 mg, 2.75 mmol) were added to *syn*-aldol **3c** (232 mg, 0.55 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **4c** (216 mg, 0.50 mmol) as a yellow oil in 90% yield; $[\alpha]_D^{25}$ = +58 (*c* 0.86, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.34-7.28 (5H, m, Ar*H*), 7.00 (2H, d, *J* = 8.5 Hz, MeOArC*H*), 6.80 (2H, d, *J* = 8.5 Hz, MeOArC*H*), 4.39 (1H, dd, *J* = 9.0, 4.0 Hz, C*H*N), 3.91 (1H, qd, *J* = 7.0, 4.5 Hz, COC*H*), 3.68 (3H, s, CH_3O), 3.36 (1H, m, C*H*OH), 3.01 (1H, dd, *J* = 14.5, 4.0 Hz, CH_AH$_B$Ph), 2.81 (1H, dd, *J* = 14.5, 9.0 Hz, CH$_A$CH_BPh), 2.47 (1H, broad s, O*H*), 1.78 (1H, app. dt, *J* = 9.0, 5.5 Hz, cyclopropyl-C*H*Ar), 1.28 (3H, s, C(CH_3)), 1.19 (1H, obs. m, cyclopropyl-

C*H*), 1.19 (3H, d, *J* = 7.0 Hz, CHC*H*$_3$), 1.12 (3H, s, C(C*H*$_3$)), 0.94 (1H, app. dt, *J* = 9.0, 5.0 Hz, cyclopropyl-C*H*$_A$H$_B$), 0.85 (1H, app. dt, *J* = 8.5, 5.0 Hz, cyclopropyl-CH$_A$*H*$_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.0, 156.2, 152.8, 137.1, 134.5 129.5, 129.1, 127.3, 120.1, 114.4, 82.6, 75.9, 63.8, 55.7, 43.6, 35.7, 28.5, 26.3, 22.6, 20.6, 13.9, 12.5; IR (film, cm^{-1}): 3452 (broad OH), 1772 (C=O$_{ox}$), 1700 (C=O); HRMS (ES+): *m/z* calculated for $C_{26}H_{31}NO_5$: $[M+NH_4]^+$ requires 455.2540; found 455.2540.

(*S*)-4-Benzyl-3-{(2*S*,3*R*)-3-hydroxy-2-methyl-3-[(1*S*,2*S*)-2-(2-nitro-phenyl)-cyclopropyl]-propionyl}-5,5-dimethyl-oxazolidin-2-one 4d

Diethylzinc (8 mmol) and diiodomethane (2.14 g, 8 mmol) were added to *syn*-aldol **3d** (700 mg, 1.60 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **4d** (655 mg, 1.45 mmol) as a white solid in 90% yield; M.p. 101-104 ^{o}C (Et_2O); $[\alpha]_D^{25}$ = +57 (*c* 0.86, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.81 (1H, d, *J* = 8.0 Hz, Ar*H*), 7.49 (1H, app. td, *J* = 8.0, 1.5 Hz, Ar*H*), 7.35-7.19 (6H, obs. m, Ar*H*), 7.16 (1H, d, *J* = 8.0 Hz, Ar*H*), 4.53 (1H, dd, *J* = 9.5, 4.5 Hz, C*H*N), 4.04 (1H, qd, *J* = 7.0, 3.5 Hz, COC*H*), 3.75 (1H, m, C*H*OH), 3.07 (1H, dd, *J* = 14.5, 4.5 Hz, C*H*$_A$H$_B$Ph), 2.90 (1H, dd, *J* = 14.5, 9.5 Hz, CH$_A$C*H*$_B$Ph), 2.43 (1H, d, *J* = 2.5 Hz, O*H*), 2.25 (1H, app. dt, *J* = 8.5, 5.5 Hz, cyclopropyl-C*H*Ar), 1.38 (3H, s, C(C*H*$_3$)), 1.33 (3H, s, C(C*H*$_3$)), 1.28 (3H, d, *J* = 7.0 Hz, CHC*H*$_3$), 1.23 (2H, obs. m, cyclopropyl-C*H*$_A$H$_B$ and cyclopropyl-C*H*), 0.75 (1H, app. dt, *J* = 8.5, 5.5 Hz, cyclopropyl-CH$_A$*H*$_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.2, 152.8, 151.1, 137.2, 137.0, 133.2, 129.5, 129.1, 128.2, 127.3, 127.0, 124.7, 82.7, 73.7, 63.7, 43.2, 35.9, 28.8, 25.5, 22.6, 17.4, 12.7, 12.3; IR (KBr, cm^{-1}): 3431 (broad OH), 1769 (C=O$_{ox}$), 1684 (C=O), 1528 (NO_2), 1370 (NO_2); HRMS (ES+): *m/z* calculated for $C_{25}H_{28}N_2O_6$: $[M+NH_4]^+$ requires 470.2286; found 470.2287.

(*S*)-4-Benzyl-3-[(2*S*,3*R*)-3-((1*S*,2*S*)-2-furan-2-yl-cyclopropyl)-3-hydroxy-2-methyl-propionyl]-5,5-dimethyl-oxazolidin-2-one 4e

Diethylzinc (3.6 mmol) and diiodomethane (948 mg, 3.6 mmol) were added to *syn*-aldol **3e** (275 mg, 0.72 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude product that was purified by chromatography to afford the title compound **4e** (258 mg, 0.65 mmol) as a yellow oil in 92% yield; $[\alpha]_D^{25}$ = +56 (*c* 1.00, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.29-7.12 (6H, m, Ar*H*), 6.17 (1H, dd, *J* = 3.0, 2.0 Hz, Ar*H*), 5.90 (1H, d, *J* = 3.0 Hz, Ar*H*), 4.44 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.95 (1H, qd, *J* = 7.0, 4.0 Hz, COC*H*), 3.43 (1H, m, C*H*OH), 3.01 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH_BPh), 2.83 (1H, dd, *J* = 14.5, 9.0 Hz, CH_ACH_BPh), 2.48 (1H, broad s, O*H*), 1.85 (1H, m, cyclopropyl-C*H*Ar), 1.36 (1H, obs. m, cyclopropyl-C*H*), 1.31 (3H, s, C(CH_3)), 1.23 (3H, s, C(CH_3)), 1.21 (3H, d, *J* = 7.0 Hz, CHCH_3), 1.00-0.90 (2H, obs. m, cyclopropyl-CH_2); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.0, 156.1, 141.0, 137.1, 129.5, 129.3, 129.1, 127.3, 110.7, 104.3, 82.7, 74.7, 63.8, 43.6, 35.8, 28.7, 23.9, 22.6, 14.6, 12.4, 11.9; IR (film, cm^{-1}): 3502 (broad OH), 1774 ($C=O_{ox}$), 1696 (C=O); HRMS (ES+): *m/z* calculated for $C_{23}H_{27}NO_5$: $[M+NH_4]^+$ requires 415.2227; found 415.2226.

(*S*)-4-Benzyl-3-[(2*S*,3*R*)-3-hydroxy-2-methyl-3-((1*S*,2*S*)-2-methyl-cyclopropyl)-propionyl]-5,5-dimethyl-oxazolidin-2-one 4f

Diethylzinc (2.75 mmol) and diiodomethane (734 mg, 2.75 mmol) were added to *syn*-aldol **3f** (182 mg, 0.55 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **4f** (180 mg, 0.52 mmol) as a white solid in 95% yield; M.p. 98-101 ^{o}C (Et_2O, hexane); $[\alpha]_D^{25}$ = +6.0 (*c* 0.86, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.39-7.19 (5H, m, Ar*H*), 4.54 (1H, dd, *J* = 9.0, 4.0 Hz, C*H*N), 4.00 (1H, qd, *J* = 7.0, 3.5 Hz, COC*H*), 3.21 (1H, dd, *J* = 8.5, 3.5 Hz, C*H*OH), 3.09 (1H, dd, *J* = 14.5, 4.0 Hz, CH_AH_BPh), 2.91 (1H, dd, *J* = 14.5, 9.0 Hz, CH_AH_BPh), 2.47 (1H, broad s, O*H*), 1.39 (3H, s, C(CH_3)), 1.38 (3H, s, C(CH_3)), 1.26 (3H, d, *J* = 7.0 Hz, CHCH_3), 1.04 (3H, m, cyclopropyl-C*H*Me), 0.78-0.63 (2H, m, cyclopropyl-C*H*), 0.53 (1H, app. dt, *J* = 8.5, 4.5 Hz, cyclopropyl-CH_AH_B), 0.33 (1H, app. dt, *J* = 8.0, 5.0 Hz, cyclopropyl-

CH_AH_B); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.7, 152.5, 136.7, 129.1, 128.7, 126.9, 82.2, 76.6, 76.1, 63.5, 42.9, 35.4, 28.5, 23.1, 22.2, 18.3, 11.5, 10.9; IR (KBr, cm^{-1}): 3488 (broad OH), 1778 ($C=O_{ox}$), 1687 (C=O); HRMS (ES+): *m/z* calculated for $C_{20}H_{27}NO_4$: $[M+NH_4]^+$ requires 363.2278; found 363.2281.

(*S*)-4-Benzyl-3-[(2*S*,3*R*)-3-((*S*)-2,2-dimethyl-cyclopropyl)-3-hydroxy-2-methyl-propionyl]-5,5-dimethyl-oxazolidin-2-one 4g

Diethylzinc (2.4 mmol) and diiodomethane (690 mg, 2.4 mmol) were added to *syn*-aldol **3g** (168 mg, 0.48 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude product that was purified by chromatography to afford the title compound **4g** (165 mg, 0.46 mmol) as a white solid in 96% yield; M.p. 105-108 °C (Et_2O, hexane); $[\alpha]_D^{25}$ = +8.0 (*c* 0.66, CH_2Cl_2); ^1H NMR (300 MHz, $CDCl_3$): δ = 7.28-7.14 (5H, m, Ar*H*) 4.47 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.89 (1H, qd, *J* = 7.0, 3.5 Hz, COC*H*), 3.47 (1H, dd, *J* = 9.5, 3.5 Hz, C*H*OH), 3.03 (1H, dd, *J* = 14.0, 4.5 Hz, CH_AH_BPh), 2.83 (1H, dd, *J* = 14.0, 9.0 Hz, CH_ACH_BPh), 2.69 (1H, broad s, O*H*), 1.32 (3H, s, C(CH_3)), 1.31 (3H, s, C(CH_3)), 1.18 (3H, d, *J* = 7.0 Hz, CHCH_3), 1.01 (3H, s, cyclopropyl-C(CH_3)), 0.98 (3H, s, cyclopropyl-C(CH_3)), 0.77 (1H, app. td, *J* = 8.5, 5.5 Hz, cyclopropyl-C*H*), 0.51 (1H, dd, *J* = 8.5, 4.0 Hz, cyclopropyl-CH_AH_B), 0.25 (1H, app. t, *J* = 5 Hz, cyclopropyl-CH_AH_B); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.6, 152.8, 137.1, 129.5, 129.1, 127.3, 82.6, 73.1, 63.9, 43.2, 35.8, 28.8, 27.8, 27.6, 23.1, 22.0, 19.5, 18.9, 11.7; IR (KBr, cm^{-1}): 3515 (broad OH), 1781 ($C=O_{ox}$), 1685 (C=O); HRMS (ES+): *m/z* calculated for $C_{21}H_{29}NO_4$: $[M+NH_4]^+$requires 377.2435; found 377.2434.

(*S*)-4-Benzyl-3-[(2*S*,3*R*)-3-hydroxy-2-methyl-3-((1*S*,2*R*)-2-pentyl-cyclopropyl)-propionyl]-5,5-dimethyl-oxazolidin-2-one 4h

Diethylzinc (2.25 mmol) and diiodomethane (600 mg, 2.25 mmol) were added to *syn*-aldol **3h** (175 mg, 0.45 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that

was purified by chromatography to afford the title compound **4h** (170 mg, 0.445 mmol) as a yellow oil in 99% yield; $[\alpha]_D^{25}$ = -29 (*c* 0.69, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.34-7.19 (5H, m, Ar*H*), 4.53 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.95 (1H, qd, *J* = 7.0, 3.0 Hz, COC*H*), 3.55 (1H, app. dt, *J* = 9.0, 3.0 Hz, C*H*OH), 3.09 (1H, dd, *J* = 14.5, 4.5 Hz, CH_AH_BPh), 2.91 (1H, dd, *J* = 14.5, 9.0 Hz, CH_ACH_BPh), 2.74 (1H, d, *J* = 2.5 Hz, O*H*), 1.63-1.21 (8H, obs. m, $(CH_2)_4$, 1.40 (3H, s, C(CH_3)), 1.37 (3H, s, C(CH_3)), 1.29 (3H, d, *J* = 7.0 Hz, CHCH_3), 1.07-0.93 (2H, m, cyclopropyl-C*H*), 0.88 (3H, t, *J* = 7.0 Hz, alkyl-CH_3), 0.86-0.76 (2H, m, cyclopropyl-CH_2); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.9, 152.7, 137.1, 129.5, 129.1, 127.3, 82.6, 72.4, 70.0, 43.8, 35.8, 32.1, 30.2, 29.3, 28.8, 28.1, 22.6, 19.4, 16.7, 15.0, 11.6, 10.2; IR (film, cm^{-1}): 3522 (broad OH), 1779 ($C=O_{ox}$), 1703 (C=O); HRMS (ES+): *m/z* calculated for $C_{24}H_{35}NO_4$: $[M+H]^+$ requires 402.2639; found 402.2637.

(*R*)-4-Benzyl-3-[(2*R*,3*S*)-3-((1*R*,2*R*)-2-hexyl-cyclopropyl)-3-hydroxy-2-methyl-propionyl]-5,5-dimethyl-oxazolidin-2-one 4i

Diethylzinc (2.4 mmol) and diiodomethane (690 mg, 2.4 mmol) were added to *syn*-aldol **3i** (192 mg, 0.48 mmol) in CH_2Cl_2 (5 mL) according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **4i** (185 mg, 0.44 mmol) as a yellow oil in 93% yield; $[\alpha]_D^{25}$ = -5.0 (*c* 0.89, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.29-7.11 (5H, m, Ph), 4.46 (1H, dd, *J* = 9.0, 4.0 Hz, C*H*N), 3.92 (1H, qd, *J* = 7.0, 3.0 Hz, COC*H*), 3.15 (1H, dd, *J* = 8.5, 3.0 Hz, C*H*OH), 3.03 (1H, dd, *J* = 14.5, 4.0 Hz, CH_AH_BPh), 2.83 (1H, dd, *J* = 14.5, 9.0 Hz, CH_ACH_BPh), 2.47 (1H, broad s, O*H*), 1.32 (3H, s, C(CH_3)), 1.30 (3H, s, C(CH_3)), 1.30-1.06 (12H, m, $(CH_2)_6$), 1.20 (3H, d, *J* = 7.0 Hz, CHCH_3), 0.81 (3H, t, *J* = 7.0 Hz, alkyl-CH_3), 0.68 (1H, m, cyclopropyl-C*H*), 0.60 (1H, m, cyclopropyl-C*H*), 0.46 (1H, app. dt, *J* = 8.5, 4.5 Hz, cyclopropyl-CH_AH_B), 0.29 (1H, app. dt, *J* = 8.5, 3.0 Hz, cyclopropyl-CH_AH_B); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 177.4, 152.8, 137.1, 129.5, 129.1, 127.3,

82.6, 76.2, 63.9, 43.2, 35.8, 34.0, 32.3, 29.8, 29.6, 28.9, 23.1, 22.7, 22.3, 17.0, 14.5, 11.6, 11.1; IR (film, cm^{-1}): 3531 (broad OH), 1779 ($C=O_{ox}$), 1699 (C=O); HRMS (EI): *m/z* calculated for $C_{25}H_{37}NO_4$: $[M]^+$ requires 415.2717, found 415.2720.

(*S*,*S*)-2-heptylcyclopropane-carboxaldehyde 5b[4]

LHMDS (0.35 mmol) was added to a solution of cyclopropyl-aldol **4b** (140 mg, 0.32 mmol) in toluene (5 mL) at 0 ^oC according to general protocol **D** to afford a crude reaction product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **16**) to afford the title compound **5b** (43 mg, 0.255 mmol) as a yellow oil in 73% yield; $[\alpha]_D^{25}$ = +45 (*c* 1.22, $CHCl_3$) ([Lit][2] $[\alpha]_D^{25}$ = +41.4); ^1H NMR (300 MHz, $CDCl_3$): δ = 9.00 (1H, d, *J* = 5.5 Hz, C*H*O), 1.62 (1H, m, OHCC*H*), 1.51-1.18 (13H, m, cyclopropyl-C*H* and $(CH_2)_6$), 0.95-0.82 (5H, m and t (*J* = 7.0 Hz), cyclopropyl-CH_2 and CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 201.4, 35.0, 32.2, 30.9, 29.6, 29.5, 29.4, 23.1, 23.0, 15.3, 14.5; IR (film, cm^{-1}): 1710 (C=O); HRMS (EI): *m/z* calculated for $C_{11}H_{20}O$: $[M-H]^+$ requires 167.1430; found 167.1427.

(1*S*,2*S*)-2-(4-methoxyphenyl)cyclopropane-carboxaldehyde 5c[5]

LHMDS (0.46 mmol) was added to cyclopropyl-aldol **4c** (185 mg, 0.42 mmol) in toluene (5 mL) at 5 ^oC according to general protocol **D** to afford a crude reaction product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **16**) to afford the title compound **5c** (47 mg, 0.26 mmol) as a yellow oil in 63% yield; $[\alpha]_D^{25}$ = +228 (*c* 0.36, CH_2Cl_2); ^1H NMR (300 MHz, $CDCl_3$): δ = 9.23 (1H, d, *J* = 4.5 Hz, C*H*O), 6.95 (2H, d, *J* = 8.5 Hz, Ar*H*), 6.76 (2H, d, *J* = 8.5 Hz, Ar*H*), 3.72 (3H, s, OCH_3), 2.53 (1H, ddd, *J* = 9.0, 7.0, 5.0 Hz, C*H*Ar), 2.02 (1H, m, OHCC*H*), 1.63 (1H, app. dt, *J* = 9.5, 5.0 Hz, cyclopropyl-CH_AH_B), 1.41 (1H, ddd, *J* = 9.5, 7.0, 5.0 Hz, cyclopropyl-CH_AH_B); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 200.2, 159.0, 131.3, 127.9, 114.4, 55.7, 34.1, 26.5, 16.6; IR (film, cm^{-1}): 1698 (C=O); HRMS (ES+): *m/z* calculated for $C_{11}H_{12}O_2$: $[M+H]^+$ requires 177.0910; found 177.0910.

(1*S*,2*S*)-2-(2-nitrophenyl)cyclopropane-carboxaldehyde 5d

LHMDS (1.22 mmol) was added to a solution of cyclopropyl-aldol **4d** (500 mg, 1.10 mmol) in toluene (5 mL) at 10 ^{o}C according to general protocol **D** to afford a crude reaction product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **16**) to afford the title compound **5d** (116 mg, 0.61 mmol) as a yellow oil in 55% yield; $[\alpha]_D^{25}$ = +109 (*c* 0.68, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 9.38 (1H, d, *J* = 4.5 Hz, C*H*O), 7.97 (1H, dd, *J* = 8.0, 1.0 Hz, Ar*H*), 7.57 (1H, app. dt, *J* = 8.0, 2.0 Hz, Ar*H*), 7.42 (1H, app. dt, *J* = 8.5, 1.5 Hz, Ar*H*), 7.28 (1H, app. d, *J* = 9.0 Hz, Ar*H*), 3.11 (1H, ddd, *J* = 8.5, 7.0, 4.0 Hz, C*H*Ar), 2.12 (1H, m, OHCC*H*), 1.79 (1H, app. dt, *J* = 9.5, 5.5 Hz, cyclopropyl-CH_AH$_B$) 1.51 (1H, ddd, *J* = 9.5, 8.5, 5.5 Hz, cyclopropyl-CH$_A$$H_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 194.4, 150.8, 134.2, 133.6, 129.5, 128.5, 125.3, 32.0, 24.1, 15.2; IR (film, cm^{-1}): 1708 (C=O), 1519 (NO_2), 1344 (NO_2); HRMS (EI): *m/z* calculated for $C_{10}H_9NO_3$: $[M]^+$ requires 191.0577; found 191.0572.

(1*S*,2*S*)-2-(furan-2-yl)cyclopropane-carboxaldehyde 5e

LHMDS (0.63 mmol) was added to a solution of cyclopropyl-aldol **4e** (227 mg, 0.57 mmol) in toluene (5 mL) at 0 ^{o}C according to general protocol **D** to afford a crude reaction product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **16**) to afford the title compound **5e** (55 mg, 0.40 mmol) as a yellow oil in 71% yield; $[\alpha]_D^{25}$ = +320 (*c* 0.50, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 9.30 (1H, d, *J* = 4.0 Hz, C*H*O), 7.20 (1H, dd, *J* = 2.0, 1.0 Hz, Ar*H*), 6.23 (1H, dd, *J* = 3.0, 3.0 Hz, Ar*H*), 6.04 (1H, m, Ar*H*), 2.55 (1H, ddd, *J* = 9.0, 7.0, 4.0 Hz, C*H*Ar), 2.22 (1H, app. ddt, *J* = 8.5, 5.5, 4.0 Hz, OHCC*H*), 1.59 (1H, m, cyclopropyl-CH_AH$_B$), 1.52 (1H, ddd, *J* = 8.5, 6.5, 5.0 Hz, cyclopropyl-CH$_A$$H_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 199.7, 152.8, 141.8, 111.0, 106.2, 31.7, 20.5, 15.0; IR (film, cm^{-1}): 1694 (C=O); HRMS (EI): *m/z* calculated for $C_8H_8O_2$: $[M]^+$ requires 136.0519; found 136.0517.

(*S*)-2,2-Dimethylcyclopropane-carboxaldehyde 5g[6]

LHMDS (0.36 mmol) was added to a stirred solution of cylopropyl-aldol **4g** (120 mg, 0.33mmol) in dry toluene-d8 (5 mL) at 10 ^{o}C under nitrogen over a period of 2 hours. The reaction mixture was then

worked up *via* dropwise addition of saturated aqueous ammonium chloride solution (5 drops), and the mixture allowed to warm to room temperature over a period of thirty minutes. The reaction mixture was dried (3Å molecular sieves), filtered, and the filtrate washed with toluene-d8 (1 mL), before the resultant mixture was distilled at atmospheric pressure (130 ^{o}C) to give the title compound **5g** as a solution in toluene-d8 in 61% yield and > 95% ee. $[\alpha]_D^{25}$ = +63 (*c* 1.22, toluene-d8); ^{1}H NMR (300 MHz, toluene-d8): 9.13 (1H, d, *J* = 5.0 Hz, C*H*O), 1.11 (1H, ddd, *J* = 8.0, 5.0, 5.0 Hz, OHCC*H*), 0.96 (1H, obs. m, cyclopropyl-CH_AH$_B$), 0.94 (3H, s, C(CH_3)), 0.75 (3H, s, C(CH_3)), 0.50 (1H, dd *J* = 8.0, 4.5 Hz, cyclopropyl-CH$_A$$H_B$); ^{13}C NMR (75 MHz, toluene-d8): δ = 197.6, 34.9, 25.8, 23.9, 21.3, 15.8. The yield of **5g** was calculated by adding a known amount of 2,5-dimethylfuran (0.2 mmol) to the solution of **5g** in toluene-d8, which allowed ^{1}H NMR spectroscopic analysis to be used to determine the concentration of **5g** *via* comparison of the relative intensity of its integrals with the integrals of 2,5-dimethylfuran.[7] The enantiomeric excess of **5g** was determined to be > 95% ee by derivatisation with (*R*,*R*)-*N*,*N'*-dimethyl-1,2-diphenylethane-1,2-diamine **23** which gave a single diastereoisomeric imidazolidine **28** in its crude 300 MHz ^{1}H NMR spectrum.[8]

(1*S*,2*R*)-2-pentylcyclopropane-carboxaldehyde 5h

LHMDS (0.44 mmol) was added to a stirred solution of cyclopropyl-aldol **4h** (160 mg, 0.4 mmol) in toluene (5 mL) at 0 ^{o}C according to general protocol **D** to afford a crude reaction product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **16**) to afford the title compound **5h** (33 mg, 0.24 mmol) as a yellow oil in 61% yield; $[\alpha]_D^{25}$ = -10 (*c* 1.01, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 9.35 (1H, d, *J* = 5.5 Hz, C*H*O), 1.62 (1H, m, OHCC*H*), 1.51-1.18 (13H, m, C*H* and (CH_2)$_4$), 0.95-0.82 (5H, m and t (*J* = 7.0 Hz), cyclopropyl-CH_2 and CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 200.8, 30.4, 29.5, 28.6, 27.2, 23.8, 21.6, 13.7, 13.0; IR (film, cm^{-1}): 1704 (C=O). HRMS(EI): *m/z* calculated for $C_9H_{16}O$: $[M+H]^+$ requires 141.1279; found 141.1277.

(*R*,*R*)-2-hexylcyclopropanecarbaldehyde 5i

KHMDS (1.4 mmol) was added to a solution of *syn*-aldol **28** (560 mg, 1.26 mmol) in dry THF (10 mL) and the resultant solution stirred under nitrogen at -40 ^{o}C, and stirred for 2 hours. The reaction was quenched *via* addition of saturated aqueous ammonium chloride solution (2 mL) and saturated sodium hydrogen carbonate solution (5 mL), extracted with ether (3 x 10 mL), washed with brine (10 mL), dried ($MgSO_4$), and the solvent removed under reduced pressure to give a crude product that was purified by chromatography (to remove oxazolidin-2-ones **1** and **26**) to afford the title compound **5i** (165 mg, 1.07 mmol) as a colorless oil in 85% yield; $[\alpha]_D^{25}$ = -26 (*c* 0.35, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 8.98 (1H, d, *J* = 5.5 Hz, C*H*O), 1.61 (1H, m, OHCC*H*), 1.51-1.20 (11H, m, cyclopropyl-C*H* and $(CH_2)_5$), 0.96-0.83 (5H, m, cyclopropyl-CH_2 and CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 201.2, 32.6, 31.7, 30.6, 29.0, 28.9, 22.7, 22.6, 14.9, 14.1; IR (film, cm^{-1}): 1713 (C=O); HRMS (ES+): *m/z* calculated for $C_{10}H_{18}O$: $[M+NH_4]^+$ requires 172.1696; found 172.1696.

(*S*)-4-benzyl-3-((2*S*,3*R*)-3-hydroxy-2-methyldodecanoyl)oxazolidin-2-one 9[9]

9-BBN-OTf (4 mmol) was added to a solution of oxazolidin-2-one **7** (847 mg, 3.63 mmol) in CH_2Cl_2 (40 mL) followed by addition of diisopropylethylamine (560 mg, 4.34 mmol) and decanal (620 mg, 4.00 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **9** (845 mg, 2.17 mmol) as a colourless oil in 60% yield; $[\alpha]_D^{25}$ = +52.7 (*c* 0.93, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.38-7.17 (5H, m, Ar*H*), 4.71 (1H, m, C*H*N), 4.21 (1H, dd, *J* = 14.0, 9.0 Hz, CH_AH_BO), 4.19 (1H, dd, *J* = 14.0, 3.5 Hz, CH_AH_BO), 3.99-3.90 (1H, m, C*H*OH), 3.76 (1H, qd, *J* = 6.8, 2.6 Hz, COC*H*), 3.25 (1H, dd, *J* = 13.6, 3.4 Hz, CH_AH_BPh), 2.84 (1H, d, *J* = 3.0 Hz, O*H*), 2.78 (1H, dd, *J* = 13.6, 9.0 Hz, CH_AH_BPh), 1.60-1.25 (16H, m, $(CH_2)_8$), 1.27 (3H, d, *J* = 6.8 Hz, CHCH_3), 0.87 (3H, t, *J* = 6.8 Hz, alkyl-CH_3); δC (75 MHz, $CDCl_3$): δ = 175.6, 153.0, 135.0, 129.4, 129.0, 127.4, 71.5, 66.2, 55.1, 42.1, 37.8, 34.7, 33.8, 31.9, 29.6, 29.3, 27.4, 26.0, 22.7, 14.1, 10.3; IR

(film, cm^{-1}): 3515 (broad OH), 1783 (C=O_{ox}), 1698 (C=O); HRMS (ES+): *m/z* calculated for $C_{23}H_{35}NO_4$: $[M+H]^+$ requires 390.2644; found 390.2648.

(*S*,*E*)-*N*-(1-hydroxy-3-phenylpropan-2-yl)-2-methyldodec-2-enamide 12

LHMDS (0.50 mmol, 1.0 M solution in THF) was added to a solution of aldol **9** (176 mg, 0.45 mmol) in THF (5 mL) at 0 °C, and the reaction stirred for 2 hours before quenching with saturated ammonium chloride solution (5 mL). The reaction mixture was extracted with CH_2Cl_2 (3 × 15 mL) and the combined organic extracts washed with brine (10 mL), dried ($MgSO_4$) and solvent removed under reduced pressure to afford the title compound **12** (143 mg, 0.41 mmol) as an inseparable mixture of *E*:*Z* diastereoisomers (ratio of 5:1) as a colourless oil in 92% yield: $[\alpha]_D^{25}$ = -30.1 (*c* 0.47, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$) for (*S*,*E*)-**12**: δ = 7.36-7.20 (5H, m, Ar*H*), 6.24 (1H, tq, *J* = 7.2, 1.5 Hz, C=C*H*), 5.91 (1H, d, *J* = 6.4 Hz, N*H*), 4.24-4.14 (1H, m, C*H*N), 3.75 (1H, dd, *J* = 10.9, 3.4 Hz, C$H_A$$H_B$O), 3.65 (1H, dd, *J* = 10.9, 5.7 Hz, CH$_A$$H_B$O), 2.97 (1H, dd, *J* = 13.6, 6.8 Hz, C$H_A$$H_B$Ph), 2.88 (1H, dd, *J* = 13.6, 7.5 Hz, CH$_A$$H_B$Ph), 2.45 (1H, br s, O*H*), 2.14-2.00 (2H, m, C=CHCH_2), 1.76 (1H, d, *J* = 1.5 Hz, C=CCH_3), 1.48-1.18 (14H, m, (CH_2)$_7$), 0.89 (3H, d, *J* = 6.8 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$) for (*S*,*E*)-**12**: δ = 170.3, 137.6, 137.3, 130.2, 129.2, 128.7, 126.8, 65.0, 53.4, 37.0, 31.9, 29.58, 29.53, 29.50, 29.37, 29.31, 28.7, 28.3, 14.1, 12.6; IR (film, cm^{-1}): 3336 (broad OH), 1616 (C=O); HRMS (ES+): *m/z* calculated for $C_{22}H_{35}NO_2$: $[M+H]^+$ requires 346.2746; found 346.2747.

(*S*)-4-Benzyl-3-((2*S*,3*R*)-3-hydroxy-2-methyl-dodecanoyl)-5,5-dimethyl-oxazolidin-2-one 13

9-BBN-OTf (1.14 mol) was added to a solution of oxazolidin-2-one **1** (270 mg, 1.03 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (159 mg, 1.23 mmol) and decanal (177 mg, 1.13 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **13** (236 mg, 0.56 mmol) as a yellow oil in 55% yield; $[\alpha]_D^{25}$ = -13.0 (*c* 2.65, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.32-7.17 (5*H*, m, Ar*H*), 4.52 (1H, dd, *J* = 9.0, 4.5 Hz,

C*H*N), 3.87 (1H, m, C*H*OH), 3.73 (1H, qd, *J* = 7.0, 3.0 Hz, COC*H*), 3.04 (1H, dd, *J* = 14.5, 4.5 Hz, CH_ACH$_B$Ph), 2.88 (1H, dd, *J* = 14.5, 9.0 Hz, CH$_A$$H_B$Ph), 2.75 (1H, broad s, O*H*), 1.64-1.18 (16H, m, (CH_2)$_8$, 1.38 (3H, s, C(CH_3)), 1.36 (3H, s, C(CH_3)), 1.14 (3H, d, *J* = 7.0 Hz, CHCH_3), 0.85 (3H, t, *J* = 7.0 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 178.1, 152.7, 137.0, 129.5, 129.1, 127.3, 82.7, 72.0, 63.7, 42.6, 35.9, 34.1, 32.3, 30.0, 29.9, 29.7, 28.9, 26.4, 23.1, 22.6, 14.5, 11.0; IR (film, cm^{-1}): 3521 (broad OH), 1779 (C=O$_{ox}$), 1683 (C=O); HRMS (ES+): *m/z* calculated for $C_{25}H_{39}NO_4$: $[M+H]^+$ requires 418.2952; found 418.2949.

(*S*)-4-Benzyl-3-((2*S*,3*S*)-3-hydroxy-2-methyl-dec-4-ynoyl)-5,5-dimethyl-oxazolidin-2-one 17

9-BBN-OTf (1.05 mmol) was added to a solution of oxazolidin-2-one **1** (245 mg, 0.94 mmol) in CH_2Cl_2 (20 mL) followed by addition of diisopropylethylamine (145 mg, 1.12 mmol) and oct-2-ynal (127 mg, 1.02 mmol) according to general protocol **B** to afford a crude product that was purified by chromatography to afford the title compound **17** (300 mg, 0.78 mmol) as a yellow oil in 83% yield; $[\alpha]_D^{25}$ = -7.0 (*c* 0.75, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.27-7.12 (5H, m, Ar*H*), 4.60 (1H, m, C*H*OH), 4.47 (1H, dd, *J* = 9.0, 4.5 Hz, C*H*N), 3.85 (1H, qd, *J* = 7.0, 4.5 Hz, COC*H*), 2.99 (1H, dd, *J* = 14.0, 4.5 Hz, CH_AH$_B$Ph), 2.84 (1H, dd, *J* = 14.0, 9.0 Hz, CH$_A$$H_B$Ph), 2.60 (1H, d, *J* = 4.0 Hz, O*H*), 2.12 (2H, m, C≡CCH_2), 1.48-1.19 (6H, m, (CH$_2$)$_3$), 1.33 (3H, s, C(CH_3)), 1.31 (3H, s, C(CH_3)), 1.25 (3H, d, *J* = 7.0 Hz, CHCH_3), 0.82 (3H, t, *J* = 7.0 Hz, alkyl-CH_3); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 176.2, 152.6, 137.0, 129.6, 129.0, 127.3, 87.0, 82.8, 78.9, 64.0, 63.8, 44.6, 36.0, 31.4, 26.8, 27.4, 26.5, 22.6, 19.1, 14.3, 12.9; IR (film, cm^{-1}): 3494 (broad OH), 1778 (C=O$_{ox}$), 1698 (C=O); HRMS (ES+): *m/z* calculated for $C_{23}H_{31}NO_4$: $[M+H]^+$requires 386.2326; found 386.2330.

(*S*)-4-Benzyl-3-(2-chloroacetyl)-5,5-dimethyl-oxazolidin-2-one 18[10]

n-BuLi (3.70 mmol) was added to oxazolidin-2-one **16** (728 mg, 3.55 mmol) in THF (20 mL), followed by addition of chloroacetyl chloride (395 mg, 3.56 mmol) according to general procedure **A** to afford a

crude reaction product that was purified by recrystallisation to afford the title compound **18** (871 mg, 3.10 mmol) as a white crystalline solid in 88% yield. M.p. 69-70 °C (hexane/ether); $[\alpha]_D^{25}$ = - 37 (*c* 1.00, $CHCl_3$)]; ^{1}H NMR ($CDCl_3$, 300 MHz): δ = 7.13-7.28 (5H, br. m, Ar*H*), 4.70 (1H, d (as part of AB quartet, CH_AH$_B$Cl), 4.58 (1H, d (as part of AB quartet), *J* = 15.8 Hz, CH$_A$$H_B$Cl), 4.44 (1H, dd, *J* = 9.5, 4.0 Hz, C*H*N), 3.15 (1H, dd, *J* = 14.0, 4.0 Hz, CH_AH$_B$Ph), 2.83 (1H, dd, *J* = 14.0, 9.5 Hz, CH$_A$$H_B$Ph), 1.33 (3H, s, C(C$H_3$)), 1.31 (3H, s, C(C$H_3$)); ^{13}C NMR ($CDCl_3$, 75.5 MHz): δ = 166.7, 152.7, 136.8, 129.4, 129.2, 127.4, 84.0, 64.4, 44.3, 35.4, 29.1, 22.8; IR (KBr, cm^{-1}): 1806 (C=O$_{ox}$), 1715 (C=O); HRMS (ES+): *m/z* calculated for $C_{14}H_{16}ClNO_3$: $[M+H]^+$ requires 282.0891; found 282.0888.

(*S*)-4-benzyl-3-((2*S*,3*R*,*E*)-2-chloro-3-hydroxyhex-4-enoyl)-5,5-dimethyloxazolidin-2-one 19

Dibutylboryl trifluoromethanesulfonate (2.3 mmol, 1.0 M in CH_2Cl_2) was added to a stirred solution of *S*-4-benzyl-3-(2-chloroacetyl)-5,5-dimethyloxazolidin-2-one **18** (610 mg, 2.17 mmol) in CH_2Cl_2 (20 mL) under nitrogen at -78 ^{o}C. Diisopropylethylamine (335 mg, 2.60 mmol) was then added in one portion and the reaction mixture stirred for 30 minutes before warming to room temperature and stirring for 90 minutes. The reaction mixture was then recooled to -78 ^{o}C followed by dropwise addition of crotonaldehyde (167 mg, 2.38 mmol). The resulting reaction mixture was allowed to warm to room temperature overnight before being quenched with Na_2PO_4/NaH_2PO_4 (pH 7 buffer solution, 10 mL), methanol (10mL), and hydrogen peroxide solution (20 mL). The crude reaction mixture was then concentrated under reduced pressure, the resulting residue dissolved in CH_2Cl_2 and the organic layer washed with sodium hydrogen carbonate solution, brine and dried ($MgSO_4$). The solvent was removed under reduced pressure and the resulting crude product purified by chromatography to afford the title compound **19** (632 mg, 1.80 mmol) as a yellow crystalline solid in 83% yield. M.p. = 96-98 ^{o}C; $[\alpha]_D^{25}$ = - 20.0 (*c* 1.20, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.30-7.10 (5H, m, Ar*H*), 5.80 (1H, ddq, *J* = 15.5, 6.5, 1.0 Hz, C*H*=CHCH$_3$), 5.66 (1H, d, *J* = 5.5 Hz, C*H*Cl), 5.47 (1H, dqd, *J* = 15.5, 6.5, 1.0 Hz,

CH=C*H*CH_3), 4.51–4.40 (2H, m, C*H*OH and C*H*N), 3.09 (1H, dd, *J* = 14.5, 4.0 Hz, C$H_A$$H_B$Ph), 2.85 (1H, dd, *J* = 14.5, 9.5 Hz, $CH_A$$H_B$Ph) 2.61 (1H, br d, *J* = 4.0 Hz, O*H*), 1.65 (3H, d, *J* = 6.5 Hz, CH=CHCH_3), 1.34 (3H, s, C(CH_3)), 1.29 (3H, s, C(CH_3)); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 168.5, 152.3, 136.7, 131.8, 129.5, 129.2, 128.1, 127.4, 83.4, 73.4, 64.4, 59.6, 35.3, 28.8, 22.6, 18.2; IR (KBr, cm^{-1}): 3451 (broad OH) 1772 (C=O), 1652 (C=O_{ox}); HRMS (ES+): *m/z* calculated for $C_{18}H_{22}ClNO_4$: $[M+Na]^+$ requires 374.1135; found 374.1147.

(*S*)-4-benzyl-3-((*S*,*E*)-3-hydroxyhex-4-enoyl)-5,5-dimethyloxazolidin-2-one 20

Zinc dust (234 mg, 3.65 mmol) was added in one portion to a stirred mixture of aldol **19** (314 mg, 0.89 mmol), solid NH_4Cl (191 mg, 3.60 mmol) in methanol (20 mL). The resulting reaction mixture was stirred under nitrogen for 3 hours, then Et_2O (100 mL) added and the reaction mixture filtered through a pad of Celite. The solvent was then removed under reduced pressure to afford a crude reaction product that was purified by chromatography to afford the title compound **20** (210 mg, 0.66 mmol) as a colourless oil in 74% yield; $[\alpha]_D^{25}$ = -51.5 (*c* 1.23, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.28-7.11 (5H, m, Ar*H*), 5.68 (1H, ddq, *J* = 15.5, 6.5, 1.0 Hz, C*H*=CHCH_3), 5.47 (1H, dqd, *J* = 15.5, 6.5, 1.0 Hz, CH=C*H*CH_3), 4.50-4.39 (2H, m, C*H*OH and C*H*N), 3.1-3.0 (3H, m, CH_2CHOH and C$H_A$$H_B$Ph), 2.8 (1H, dd, *J* = 14.5, 6.5 Hz, $CH_A$$H_B$Ph), 1.63 (3H, dt, *J* = 6.5 Hz, CH=CHCH_3), 1.32 (3H, s, C(CH_3)), 1.30 (3H, s, C(CH_3)); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 172.8, 153.0, 137.2, 132.1, 129.4, 129.2, 127.8, 127.3, 82.9, 69.1, 63.8, 53.8, 43.3, 35.9, 28.8, 18.1; IR (KBr, cm^{-1}): 3502 (broad OH), 1777 (C=O), 1695 (C=O_{ox}); HRMS (ES+): *m/z* calculated for $C_{18}H_{23}NO_4$: $[M+Na]^+$ requires 340.1524; found 374.1514.

(*S*,*E*)-methyl-3-hydroxyhex-4-enoate 21[11]

Sodium methoxide (0.5M in methanol, 1.54 mL, 0.77 mmol) was added in one portion to a stirred solution of aldol **20** (242 mg, 0.76 mmol) in CH_2Cl_2 (10 mL). The resulting reaction mixture was stirred for 5 minutes, quenched with saturated ammonium chloride solution (5 mL) and the resulting organic

layer washed with $NaHCO_3$, brine, dried ($MgSO_4$) and the solvent removed under reduced pressure to afford a crude product that was purified by chromatography to afford the title compound **21** (78 mg, 0.54 mmol) as a colourless oil in 71% yield; $[\alpha]_D^{25}$ = -22.2 (*c* 0.72, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 5.70 (1H, ddq, *J* = 15.0, 6.0, 1.0 Hz, C*H*=CHCH$_3$), 5.43 (1H, dqd, *J* = 15.0, 6.0, 1.0 Hz, CH=C*H*CH$_3$), 4.42 (1H, m, C*H*OH), 3.62 (3H, s, OC*H*$_3$), 2.78 (1H, br. s, CHO*H*), 2.47 (2H, m, C*H*$_2$), 1.63 (3H, d, *J* = 6.5 Hz, CH=CHC*H*$_3$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 173.1, 132.2, 127.9, 69.3, 52.1, 41.8, 18.0; IR (KBr, cm^{-1}): 3431 (broad OH), 1734 (C=O); HRMS (ES+): *m/z* calculated for $C_7H_{12}O_3$: $[M+Na]^+$ requires 167.0684; found 167.0683.

(*S*)-methyl-3-hydroxy-3-((1*S*,2*S*)-2-methylcyclopropyl)propanoate 22[12]

Diethylzinc (1.9 mmol) and diiodomethane (510 mg, 1.9 mmol) were added to *syn*-aldol **21** (56 mg, 0.39 mmol) in CH_2Cl_2 (5 mL) at 0 ^{o}C according to general protocol **C** to afford a crude reaction product that was purified by chromatography to afford the title compound **22** (58 mg, 0.37 mmol) as a yellow oil in 95% yield. $[\alpha]_D^{25}$ = +6.0 (*c* 0.60, $CHCl_3$); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 3.65 (3H, s, OC*H*$_3$), 3.25 (1H, m, C*H*OH), 2.56 (1H, m, C*H*$_A$H$_B$), 2.54 (1H, d, m, CH$_A$*H*$_B$), 0.96 (3H, d, *J* = 5.5 Hz, CHC*H*$_3$), 0.57 (2H, m, cyclopropyl-C*H*), 0.49 (1H, m, cyclopropyl-C*H*$_A$H$_B$), 0.25 (1H, m, cyclopropyl-CH$_A$C*H*$_B$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 171.9, 71.2, 50.7, 40.5, 24.6, 17.2, 10.5, 9.6; IR (KBr, cm^{-1}): 3435 (broad OH), 1739 (C=O); HRMS (ES+): *m/z* calculated for $C_8H_{14}O_3$: $[M+Na]^+$ requires 181.0840; found 181.0834.

(*R*)-3-(3-methylbutanoyl)-4-benzyl-5,5-dimethyloxazolidin-2-one 26

n-BuLi (12.5 mmol) was added to a solution of oxazolidin-2-one **16** (2.5 g, 12.2 mmol) in THF (50 mL) at -78 ^{o}C, followed by addition of isovaleryl chloride (1.62g, 13.5 mmol) according to general procedure **A** to afford a crude reaction product that was purified by chromatography to afford the title compound

26 (2.64 g, 9.1 mmol) as a yellow oil in 75% yield; $[\alpha]_D^{25}$ = +34 (*c* 0.59, CH_2Cl_2); ^{1}H NMR (300 MHz, $CDCl_3$): δ = 7.31-7.17 (5H, m, Ar*H*), 4.50 (1H, dd, *J* = 9.5, 4.0 Hz, C*H*N), 3.11 (1H, dd, *J* = 14.5, 4.0 Hz, PhCH_AH_B), 2.85 (1H, obs. dd, *J* = 14.5, 9.5 Hz, PhCH_AH_B), 2.78 (2H, app. d, *J* = 6.5 Hz, CH_2), 2.13 (1H, m, C*H*$(CH_3)_2$), 1.34 (3H, s, C(CH_3)), 1.33 (3H, s, C(CH_3)), 0.94 (6H, app. d, *J* = 7.0 Hz, CH(CH_3)$_2$); ^{13}C NMR (75 MHz, $CDCl_3$): δ = 173.3, 153.1, 137.4, 129.5, 129.1, 127.2, 82.5, 63.9, 44.6, 44.5, 35.8, 28.9, 25.6, 22.9, 22.7; IR (film, cm^{-1}): 1779 (C=O_{ox}), 1700 (C=O); HRMS (ES+): *m/z* calculated for $C_{17}H_{23}NO_3$: $[M+H]^+$ requires 290.1751; found 290.1749.

References

1 J. R. Gage, D. A. Evans, *Org. Synth.*, 1990, **68**, 83.

2 S. D. Bull, S. G. Davies, S. Jones, M. E. C. Polywka, R. S. Prasad, H. J. Sanganee, *Synlett*, 1998, 519.

3 H. J. Sanganee, S. G. Davies, *Tetrahedron: Asymmetry*, 1995, **6**, 671.

4 J. R. Al Dulayymi, M. S. Baird, K. Jones, *Tetrahedron,* 2004, **60**, 341.

5 S. R. Nagarajan, H. F. Lu, A. F. Gasiecki, I. K. Khanna, M. D. Parikh, B. N. Desai, T. E. Rogers, M. Clare, B. B. Chen, M. A. Russell, J. L. Keene, T. Duffin, V. W. Engleman, M. B. Finn, S. K. Freeman, J. A. Klover, G. A. Nickols, M. A. Nickols, K. E. Shannon, C. A. Steininger, W. F. Westlin, M. M. Westlina, M. L. Williams, *Biorg. Med. Chem.,* 2007, **15**, 3390.

6 H. E. Zimmerman, R. T. Klun, *Tetrahedron,* 1978, **34**, 1775.

7 S. W. Gerritz, A. M. Sefler, *J. Comb. Chem.*, 2000, **2**, 39.

8 P. Mangeney, A. Alexakis, J. F. Normant, *Tetrahedron Lett.*, 1988, **29**, 2677.

9 S. Sasmal, A. Geyer, M. E. Maier, *J. Org. Chem.*, 2002, **67**, 6260.

10 R. Green, M. Cheeseman, S. Duffill, A. Merritt, S. D. Bull, *Tetrahedron Lett.*, 2005, **46**, 7931.

11 E. M. Carreira, R. A. Singer, W. Lee, *J. Am. Chem. Soc*., 1994, **116**, 8837.

12 M. F. Laroche, D. Becotti, J. Cossy, *Org. Lett.,* 2005, **7**, 171.