Contents of the Supporting Information

General information	S3
Characterization of Compounds 4 and 5	S4
Characterization of Compounds 6 and 7	S5
Characterization of Compounds 8d	S6
Characterization of Compounds 11b	S7
Characterization of Compounds 11c	S8
Characterization of Compounds 11d	S9
Chromatograms of (–/+) 11a and of enantioenriched (+) 11a	S10
Chromatograms of (+/–) 12a and of enantioenriched (+) 12a	S10
¹ H NMR of Compound 4	S12
¹³ C NMR of Compound 4	S13
¹ H NMR of Compound 5	S14
¹³ C NMR of Compound 5	S15
¹ H NMR of Compound 6	S16
¹³ C NMR of Compound 6	S17
¹ H NMR of Compound 7	S18
¹³ C NMR of Compound 7	S19
¹ H NMR of Compound 8d	S20
¹³ C NMR of Compound 8d	S21
¹ H NMR of Compound 9a	S22
¹³ C NMR of Compound 9a	S23
¹ H NMR of Compound 11a at 25 °C	S24
¹ H NMR of Compound 11a at 70 °C	S25
¹³ C NMR of Compound 11a	S26
¹ H NMR of Compound 11b	S27
¹³ C NMR of Compound 11b	S28
¹ H NMR of Compound 11c	S29
¹³ C NMR of Compound 11c	S30
¹ H NMR of Compound 11d	S31
¹³ C NMR of Compound 11d	S32
¹ H NMR of tert-butyl benzyl[(1S)-1-(methoxymethyl)-2-methylpropyl]carbamate	S33

13C NMR of tert-butyl benzyl[(1S)-1-(methoxymethyl)-2-methylpropyl]carbamate	S34
1H NMR of tert-butyl benzyl[(1S)-1-(hydroxymethyl)-2-methylpropyl]carbamate	S35
13C NMR of tert-butyl benzyl[(1S)-1-(hydroxymethyl)-2-methylpropyl]carbamate	S36
1H NMR of Compound 12	S37
13C NMR of Compound 12	S38

SUPPORTING INFORMATION

[4+2] Cycloaddition of 2-Substituted 1,2-Dihydropyridines with Nitrosobenzene: Asymmetric Synthesis of *trans*-2-Substituted 3-Amino-1,2,3,6-Tetrahydropyridines

Alexandre Lemire, Daniel Beaudoin, Michel Grenon and André B. Charette*

Département de chimie, Université de Montréal, P.O. Box 6128, Station Downtown, Montréal, Québec, Canada H3C 3J7. E-Mail: andre.charette@umontreal.ca

General information. Unless otherwise stated, reactions were run under argon atmosphere with rigid exclusion of moisture from reagents and glassware using standard techniques for manipulating air-sensitive compounds.¹ All glassware were rinsed with a base bath, left to stand for 15 min., washed with water, then acetone and stored in the oven and/or were flame-dried under an argon atmosphere prior to use. *N,N*-Dimethylformamide, dichloromethane, diethyl ether, tetrahydrofuran and benzene were obtained by filtration through drying columns. Analytical thin-layer chromatography (TLC) was performed on precoated, glass-backed silica gel. Visualization of the developed chromatogram was performed by UV and aqueous potassium permanganate. Flash column chromatography was performed using 230-400 mesh silica. Melting points are uncorrected. Optical rotation data are reported as follows: $[\alpha]_D^{20}$ [observed rotation x volume (mL)]/[length (dm) x mass (g)], concentration (*c* in g/100 mL), and solvent. Chemical shifts for ¹H NMR spectra are recorded in parts per million from tetramethylsilane with the solvent resonance as the internal standard. Data are reported as follows: chemical shift, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, qn = quintet, sx = sextet, h = heptet, o = octet, m = multiplet and br = broad), coupling constant in Hz, integration. Chemical shifts for ¹³C NMR spectra are recorded in parts per million from tetramethylsilane using the central peak of the solvent resonance as the internal standard. All ¹³C NMR spectra were obtained with complete proton decoupling. When ambiguous, proton and carbon assignments were established using homonuclear decoupling, COSY, NOESY, HMQC, HMBC and DEPT experiments. High performance liquid chromatography data are reported as follows: column type, eluent, flow rate, and retention time (*t_r*).

Reagents: Unless otherwise stated, commercial reagents were used without purification. Triflic anhydride was distilled over a small amount of P₂O₅. Pyridine was distilled over calcium hydride. Chiral amide **3**, and dihydropyridines **8a-8c** were prepared as reported in literature.²

(1) Shriver, D. F.; Drezdson, M. A. *The manipulation of air-sensitive compounds*; 2nd Edition ed.; Wiley: New York, 1986.

(2) Charette, A. B.; Grenon, M.; Lemire, A.; Pourashraf, M.; Martel, J. J. *Am. Chem. Soc.* **2001**, 123, 11829-11830.

3-[(triisopropylsilyl)oxy]pyridine (4). 3-hydroxypyridine (5.7 g, 60 mmol) and imidazole (8.1 g, 120 mmol) were dissolved in DMF (60 mL) at 0-5 °C (ice bath cooling) followed by the dropwise addition of triisopropylsilyl chloride (11.6 mL, 10.5 g, 57 mmol) was added dropwise. The ice bath was removed and the mixture was warmed to room temperature. After stirring for 2 hours, water (300 mL) was added, the mixture was transferred to an extraction funnel and extracted with hexane/ether (1:1 v/v, 3X25 mL). The organic phase was dried with MgSO₄, filtered and concentrated under reduced pressure. Flash chromatography of the oily residue using EtOAc/hexanes afforded 14.3 g (95%) of **4** as a colorless oil: *R_f* 0.21 (10% EtOAc/hexane); ¹H NMR (CDCl₃, 300 MHz) δ 8.28 (dd, *J* = 2.3, 1.0 Hz, 1H), 8.20 (dd, *J* = 3.8, 2.1 Hz, 1H), 7.20-7.10 (m, 2H), 1.26 (m, 3H), 1.11 (d, *J* = 6.9 Hz, 18H); ¹³C NMR (CDCl₃, 75 MHz) δ 152.7, 142.6, 142.5, 126.6, 123.9, 17.9 (6C), 12.7 (3C); FTIR (neat) 3032, 1581, 1478, 1418, 1278, 909 cm⁻¹. HRMS (EI) calcd for C₁₄H₂₅NOSi (M⁺): 251.1705, found 251.1701.

N-[(1S)-1-(methoxymethyl)-2-methylpropyl]-N-[(1E)-phenyl[(2R)-2-phenyl-3-[(triisopropylsilyl)oxy]pyridin-1(2H)-yl]methylene]amine (5). Pyridine **4** (750 mg, 3.0 mmol) and the amide **3** (221 mg, 1.0 mmol) were dissolved in dichloromethane (5.0 mL) and the mixture was cooled to -40 °C. Triflic anhydride (190 μ L, 210 mg, 1.1 mmol) was added dropwise, the mixture was warmed to room temperature and stirred for 3 hours. In a separate flask, bromobenzene (470 mg, 3.0 mmol) was dissolved in ether (3.0 mL) and cooled to 0-5 °C (ice bath cooling). *n*-Butyllithium (1.6 mL of a 1.60 M solution in hexane, 2.5 mmol) was added dropwise and the solution was stirred for 15 minutes. Solid magnesium bromide diethyl etherate (645 mg, 2.5 mmol) was then added rapidly at 0 °C in one portion. The mixture was warmed to room temperature and stirred for an additional 15 minutes only, then transferred in a syringe. The pyridinium salt was cooled to -78 °C and the freshly prepared phenylmagnesium bromide was added dropwise over a period of 40 minutes. The mixture was stirred for an additional 4 hours and then the reaction was quenched by addition of a saturated solution of NH₄Cl. The mixture was transferred to a separatory funnel and extracted with ether (3X25 mL). The combined organic layers were dried with MgSO₄, filtered and concentrated under reduced pressure. Flash chromatography of the oily residue with EtOAc/hexane afforded 306 mg of **5** (57%) as an orange oil: *R_f* 0.32 (10% EtOAc/hexane); [α]_D²⁰ = -371 (c 2.89, CHCl₃); ¹H NMR (CDCl₃, 300 MHz) δ 7.61 (d, *J* = 7.1 Hz, 2H), 7.45-7.36 (m, 3H), 7.34-7.20 (m, 4H), 7.11 (br d, *J* = 5.3 Hz, 1H), 6.42 (br s, 1H), 5.80 (br s, 1H), 5.35 (d, *J* = 6.0 Hz, 1H), 4.89 (t, *J* = 6.8 Hz, 1H), 3.42 (dd, *J* = 8.8, 4.5 Hz, 1H), 3.11 (s, 3H), 3.10-3.00

(m, 2H), 1.72 (dh, $J = 4.0, 6.7$ Hz, 1H), 1.30-1.20 (m, 3H), 1.13 (d, $J = 7.0$ Hz, 9H), 1.12 (d, $J = 7.0$ Hz, 9H), 0.95 (d, $J = 6.8$ Hz, 3H), 0.78 (d, $J = 6.8$ Hz, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 157.0, 147.3, 142.3, 133.3, 129.0 (2C), 128.6 (2C), 128.4, 127.7 (4C), 127.0, 123.0, 100.8, 99.9, 75.9, 63.6, 59.2, 58.9, 30.7, 20.2, 18.1 (6C), 17.4, 12.8 (3C); FTIR (neat) 3062, 3031, 1633, 1587, 1464, 1334, 1263, 958, 696 cm^{-1} . LRMS (APCI) calcd for $\text{C}_{33}\text{H}_{48}\text{N}_2\text{O}_2\text{Si}$ ($\text{M} + \text{H}^+$): 533.8, found 533.3; Anal. calcd for $\text{C}_{33}\text{H}_{48}\text{N}_2\text{O}_2\text{Si}$: C, 74.39; H, 9.08; N, 5.26, found C, 74.28; H, 9.21; N, 5.24.

N-[(1S)-1-(methoxymethyl)-2-methylpropyl]-N-((1E)-phenyl[(2R,3S)-2-phenyl-3-[(triisopropylsilyl)oxy]piperidin-1-yl]methylenamine) (6). 1,2-Dihydropyridine derivative **5** (260 mg, 0.488 mmol) was dissolved in MeOH (5.0 mL) and Pd/C (525 mg of Pd 10%/C, 0.50 mmol) was added. The mixture was then purged three times with cycles of vacuum (water aspirator)-hydrogen atmosphere (1 bar). Hydrogen (1 bar) was then reintroduced in the flask and the mixture was stirred for 20 hours at room temperature. The mixture was then filtered over Celite®, rinsed with CH_2Cl_2 and concentrated under reduced pressure. Flash chromatography of the oily residue with EtOAc/hexane containing 1% NEt_3 (gradient 10-50%) afforded 68 mg (26%) of **6** as a colorless oil. R_f 0.10 (25% EtOAc/hexane); $[\alpha]_{\text{D}}^{20} = -103$ (c 2.94, CHCl_3); ^1H NMR (CDCl_3 , 400 MHz) δ 7.33 (d + t, $J = 7.2$ Hz, 3H), 7.30-7.24 (m, 4H), 7.21 (t, $J = 7.0$ Hz, 1H), 7.11 (br s, 2H), 5.14 (br s, 1H), 4.50 (br s, 1H), 3.91 (br d, $J = 10.2$ Hz, 1H), 3.35 (dd, $J = 9.5, 5.5$ Hz, 1H), 3.21 (s, 3H), 3.11 (dd, $J = 9.5, 6.8$ Hz, 1H), 2.99 (td, $J = 12.6, 2.8$ Hz, 1H), 2.84 (q, $J = 5.4$, 1H), 2.06 (qt, $J = 12.9, 4.1$ Hz, 1H), 1.74-1.63 (m, 2H), 1.54 (tq, $J = 13.3, 2.1$ Hz, 1H), 1.28 (br d, $J = 10.5$ Hz, 1H), 1.09 (d + m, $J = 7.5$ Hz, 21H), 0.84 (d, $J = 6.7$ Hz, 3H), 0.74 (d, $J = 6.8$ Hz, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 162.0, 141.1, 135.3, 128.5 (2C), 128.4 (2C), 128.1 (2C), 128.0, 127.3 (2C), 76.5, 69.4, 63.3, 61.7, 59.1, 42.2, 30.9, 28.1, 20.3, 19.3, 18.5 (3C), 18.4 (3C), 18.2, 12.6 (3C); FTIR (neat) 3060, 1615, 1596, 1463, 1115, 1029 cm^{-1} . LRMS (APCI) calcd for $\text{C}_{33}\text{H}_{53}\text{N}_2\text{O}_2\text{Si}$ ($\text{M} + \text{H}^+$): 537.4, found 537.4.

From the same reaction mixture was isolated 52 mg (36%) **N-[(1S)-1-(methoxymethyl)-2-methylpropyl]-N-((1E)-phenyl[(6R)-6-phenyl-5-[(triisopropylsilyl)oxy]-3,6-dihydropyridin-1(2H)-yl]methylenamine) (7).** R_f 0.36 (25% EtOAc/hexane); $[\alpha]_{\text{D}}^{20} = -179$ (c 5.26, CHCl_3); ^1H NMR (CDCl_3 , 300 MHz) δ 7.62 (d, $J = 7.2$ Hz, 2H), 7.41-7.21 (m, 6H), 7.15 (br d, $J = 7.1$ Hz, 2H), 6.15 (br s, 1H), 5.13 (dd, $J = 5.1, 1.9$ Hz, 1H), 3.44 (dd, $J = 9.3, 5.7$ Hz, 1H), 3.26 (s, 3H), 3.19 (dd, $J = 9.3, 7.0$ Hz, 1H), 3.06 (br s, 1H), 2.92 (td, $J = 6.8, 4.6$ Hz, 1H), 2.84 (ddd, $J = 13.6, 11.6, 4.1$ Hz, 1H), 2.22 (m, 1H), 1.83 (dt, $J = 16.2, 4.8$ Hz, 1H), 1.71 (dh, $J = 4.7, 6.7$ Hz, 1H), 1.23-1.15 (m, 3H), 1.05 (d, $J = 7.0$ Hz, 9H), 1.04 (d, 7.0 Hz, 9H), 0.91 (d, $J = 6.7$ Hz, 3H), 0.76 (d, $J = 6.8$ Hz, 3H); ^{13}C NMR (CDCl_3 , 75 MHz) δ 159.4, 149.5, 141.9, 135.1, 129.0 (2C), 128.3 (4C), 128.1, 127.8 (2C), 126.7, 102.9, 76.4, 63.0, 59.1, 56.7, 39.0, 30.7, 24.5, 20.3, 19.0 (6C), 17.5, 12.9 (3C); FTIR (neat) 3060, 1670, 1615, 1596, 1463, 1192, 971 cm^{-1} . LRMS (APCI) calcd for $\text{C}_{33}\text{H}_{51}\text{N}_2\text{O}_2\text{Si}$ ($\text{M} + \text{H}^+$): 535.4, found 535.4.

N-[(1S)-1-(methoxymethyl)-2-methylpropyl]-N-[(1E)-phenyl[(2R)-2-propylpyridin-1(2H)-yl]methylene]amine (8d). Pyridine (0.600 mL, 588 mg, 7.50 mmol) and the amide **3** (552 mg, 2.50 mmol) were dissolved in dichloromethane (12.5 mL) and the mixture was cooled to -40°C . Triflic anhydride (0.500 mL, 840 mg, 3.0 mmol) was added dropwise, the mixture was warmed to room temperature and stirred for 3 hours. In a separate flask, 1-iodopropane (0.63 mL, 1.1 g, 6.5 mmol) was dissolved in ether (13 mL) and cooled to -78°C . In a separate flask, *t*-butyllithium (7.1 mL of a 1.82 M solution in pentane, 13 mmol) was charged and cooled to -78°C . The iodopropane solution was then transferred dropwise via canula to the *t*-butyllithium solution at -78°C . The afforded cloudy solution was stirred 30 minutes at -78°C then warmed to room temperature. After 15 minutes stirring, solid magnesium bromide diethyl etherate (1.68 g, 6.5 mmol) was then added rapidly in one portion. The mixture was stirred for 15 minutes, then the pyridinium salt flask was cooled to -78°C . The freshly prepared propylmagnesium bromide was added dropwise over a period of 30 minutes via canula. The mixture was stirred for an additional 8 hours at -78°C and then the reaction was quenched by addition of a saturated solution of NH_4Cl . The mixture was transferred to a separatory funnel, the phases were separated and the aqueous phase was extracted with dichloromethane (3X25 mL). The combined organic layers were dried with K_2CO_3 , filtered and concentrated under reduced pressure.³ Flash chromatography of the oily residue with EtOAc/hexane (0:100 to 5:95) afforded 589 mg of **8d** (72%) as an orange oil: R_f 0.42 (10% EtOAc/hexane); $[\alpha]_D^{20} = -832$ (c 1.79, C_6H_6); ^1H NMR (CDCl_3 , 300 MHz) δ 7.45-7.35 (m, 3H), 7.26 (br d, $J = 5.6$ Hz, 1H), 7.09 (br d, $J = 5.6$ Hz, 1H), 5.90 (dd + br s, $J = 9.2, 5.3$ Hz, 1H), 5.53 (dd, $J = 9.3, 5.8$ Hz, 1H), 5.36 (br s, 1H), 4.83 (t, $J = 6.0$ Hz, 1H), 3.47 (dd, $J = 9.3, 5.0$ Hz, 1H), 3.30 (dd, $J = 9.3, 7.1$ Hz, 1H), 3.28 (s, 3H), 2.96 (dt, $J = 7.2, 4.8$ Hz, 1H), 1.79-1.50 (m, 3H), 1.49-1.35 (m, 2H), 0.94 (t, $J = 7.3$ Hz, 3H), 0.85 (d, $J = 6.8$ Hz, 3H), 0.71 (d, $J = 6.8$ Hz, 3H); ^{13}C NMR (CDCl_3 , 100 MHz) δ 157.2, 133.4, 129.6, 129.1 (2C), 128.7 (2C), 128.6, 127.0, 120.7, 101.1, 76.2, 63.5, 59.2, 51.5, 35.4, 30.9, 20.3, 17.9, 17.7, 14.6; FTIR (neat) 3043, 1627, 1599, 1564, 1334, 1274, 1256, 1113 cm^{-1} . HRMS (MAB) calcd for $\text{C}_{21}\text{H}_{30}\text{N}_2\text{O}$ (M)⁺: 326.2358, found 326.2368.

(3) The regiomer ratio (**8d** : 4-propyl-1,4-dihydropyridine) was found to be 92:8 on analysis of the crude ^1H NMR).

tert-Butyl (2R,3S)-3-anilino-2-(2-furyl)-3,6-dihydropyridine-1(2H)-carboxylate (11b). Nitrosobenzene (55 mg, 0.50 mmol) and dihydropyridine derivative **8b** (146 mg, 0.417 mmol) were charged in an oven-dried 10 mL round-bottomed flask, dissolved in benzene (3 mL) and the resultant golden-brown solution stirred for 1.5 hours at room temperature. In a separate flame-dried 50 mL round-bottomed flask, lithium aluminum hydride (190 mg, 5.00 mmol) was suspended in Et₂O (3 mL), cooled to 0-5 °C by means of an ice-water bath, followed by slow addition of aluminum chloride (3 mL of a 0.56 M solution in Et₂O, 1.67 mmol) and the light grey suspension was stirred for 15 minutes. The previously prepared solution of cycloadduct was diluted with Et₂O (3 mL) and slowly added to the freshly prepared alane suspension via a syringe. The resultant light-yellow suspension was then warmed to room temperature and stirred for 16 hours. The reaction was quenched by slow addition of the resultant suspension to a heavily-stirred biphasic solution of Et₂O (50 mL), saturated aqueous sodium-potassium tartrate (50 mL) and 2.0 M aqueous NaOH (2 mL). After 1 hour of vigorous stirring, two clear phases were obtained and separated. The aqueous phase was extracted with CH₂Cl₂ (3x25 mL), organic phases were combined, dried over potassium carbonate, filtered and concentrated under reduced pressure which afforded 182 mg of a yellow-orange oil. The oily residue and di-tert-butyl dicarbonate (364 mg, 1.67 mmol) were charged in a 25 mL round-bottomed flask, dissolved in THF (2.5 mL) and 2.0 M aqueous NaOH (2.5 mL) and the resultant mixture stirred for 5 hours. The reaction mixture was extracted with CH₂Cl₂ (4x10 mL), organic phases were combined, dried over sodium sulfate, filtered and concentrated under reduced pressure which afforded 530 mg of an orange oil. Flash chromatography of the oily residue was performed using EtOAc/hexane (gradient 0:100-25:75) which afforded 96 mg of **11b** (68%) as a colorless oil: R_f 0.40 (EtOAc/hexane, 20:80); $[\alpha]_D^{20} = 30.4^\circ$ (c 1.91, C₆H₆); ¹H NMR (C₆D₆, 400 MHz, 75 °C) δ 7.08 (ddt, J = 8.6, 7.4, 2.0 Hz, 2H), 7.05 (ddd, J = 1.8, 0.8, 0.4 Hz, 1H), 6.69 (tt, J = 7.3, 1.0 Hz, 1H), 6.53 (dtd, J = 8.6, 2.0, 0.9 Hz, 2H), 6.06 (dd, J = 3.2, 1.8 Hz, 1H), 6.03 (dt, J = 3.2, 1.0 Hz, 1H), 5.84 (s, 1H), 5.69 (m, 1H), 5.47 (dddd, J = 10.1, 4.1, 2.2, 0.8 Hz, 1H), 4.43 (br d, J = 19.1 Hz, 1H), 4.31 (d, J = 5.1 Hz, 1H), 3.57 (br s, 1H), 3.41 (dq, J = 19.0, 2.3 Hz, 1H), 1.31 (s, 9H); ¹³C NMR (C₆D₆, 100 MHz, 75 °C) δ 155.7, 153.8, 147.5, 142.3, 130.0 (2C), 128.7, 124.7, 118.9, 114.6 (2C), 110.7, 107.2, 80.2, 51.8, 50.5, 41.3, 28.6 (3C); FTIR (neat) 3370, 3043, 2975, 2926, 1694, 1660, 1602, 1504, 1415, 1365, 1168, 748 cm⁻¹; LRMS (APCI) calcd for C₂₀H₂₅N₂O₃ (M + H)⁺: 341.2, found 341.1; Anal. calcd for C₂₀H₂₄N₂O₃: C, 70.56; H, 7.11; N, 8.23, found C, 70.55; H, 7.20; N, 7.95.

From the same reaction mixture was isolated 85 mg **tert-butyl benzyl[(1S)-1-(methoxymethyl)-2-methylpropyl]carbamate** (66%).

From the same reaction mixture was isolated 22 mg **tert-butyl benzyl[(1S)-1-(hydroxymethyl)-2-methylpropyl]carbamate** (18%).

tert-Butyl (2R,3S)-3-anilino-2-methyl-3,6-dihydropyridine-1(2H)-carboxylate (11c). Nitrosobenzene (71 mg, 0.663 mmol) and dihydropyridine derivative **8c** (166 mg, 0.555 mmol) were charged in an oven-dried 10 mL round-bottomed flask, dissolved in benzene (4 mL) and the resultant golden-brown solution stirred for 2 hours at room temperature. In a separate flame-dried 50 mL round-bottomed flask, lithium aluminum hydride (253 mg, 6.66 mmol) was suspended in Et₂O (8 mL), cooled to 0-5 °C by means of an ice-water bath, followed by slow addition of aluminum chloride (6 mL of a 0.37 M solution in Et₂O, 2.22 mmol) and the light grey suspension was stirred for 15 minutes. The previously prepared solution of cycloadduct was diluted with Et₂O (6 mL) and slowly added to the freshly prepared alane suspension via a syringe. The resultant light-yellow suspension was then warmed to room temperature and stirred for 16 hours. The reaction was quenched by slow addition of the resultant suspension to a heavily-stirred biphasic solution of Et₂O (50 mL), saturated aqueous sodium-potassium tartrate (50 mL) and 2.0 M aqueous NaOH (1.5 mL). After 3 hours of vigorous stirring, two clear phases were obtained and separated. The aqueous phase was extracted with CH₂Cl₂ (4x25 mL), organic phases were combined, dried over potassium carbonate, filtered and concentrated under reduced pressure which afforded 263 mg of a yellow-orange oil. The oily residue and di-tert-butyl dicarbonate (484 mg, 2.22 mmol) were charged in a 25 mL round-bottomed flask, dissolved in THF (2.5 mL) and 2.0 M aqueous NaOH (2.5 mL) and the resultant mixture stirred for 60 minutes. The reaction mixture was extracted with CH₂Cl₂ (4x10 mL), organic phases were combined, dried over sodium sulfate, filtered and concentrated under reduced pressure which afforded 383 mg of an orange oil. Flash chromatography of the oily residue was performed using EtOAc/hexane (gradient 0:100-10:90) which afforded 114 mg of **11c** (71%) as white crystals: mp 69 °C; R_f 0.26 (EtOAc/hexane, 15:85); [α]_D²⁰ = +14.4° (c 2.13, C₆H₆); ¹H NMR (C₆D₆, 400 MHz, 70 °C) δ 7.12-7.03 (m, 2H), 6.69 (tt, J = 7.3, 1.9 Hz, 1H), 6.52 (dd, J = 8.6, 0.9 Hz, 2H), 5.59 (br m, 1H), 5.47 (dq, J = 10.0, 2.0 Hz, 1H), 4.64 (br q, J = 6.8 Hz, 1H), 4.43 (br d, J = 19.1 Hz, 1H), 3.49 (br s, 1H), 3.47 (d, J = 5.0 Hz, 1H), 3.29 (br d, J = 19.2 Hz, 1H), 1.31 (s, 9H), 0.93 (d, J = 7.0 Hz, 3H); ¹³C NMR (C₆D₆, 75 MHz, 70 °C) δ 155.6, 147.9, 129.9, 127.7, 124.5 (2C), 118.4, 114.5 (2C), 79.6, 53.0, 48.8, 40.0, 28.7 (3C), 15.9; FTIR (neat) 3366, 2974, 2930, 1694, 1658, 1603, 1504, 1417, 1364, 1312, 1174, 1110, 1024, 866, 749, 693 cm⁻¹; LRMS (APCI) calcd for C₁₇H₂₅N₂O₂ (M + H)⁺: 289.2, found 289.1; Anal. calcd for C₁₇H₂₄N₂O₂: C, 70.80; H, 8.39; N, 9.71, found C, 71.04; H, 8.77; N, 9.48.

ORTEP view of **11c**. Ellipsoids drawn at 30% probability level. Hydrogens represented by sphere of arbitrary size.

From the same reaction mixture was isolated 89 mg **tert-butyl benzyl[(1S)-1-(methoxymethyl)-2-methylpropyl]carbamate** (52%).

From the same reaction mixture was isolated 53 mg **tert-butyl benzyl[(1S)-1-(hydroxymethyl)-2-methylpropyl]carbamate** (32%).

tert-Butyl (2R,3S)-3-anilino-2-propyl-3,6-dihydropyridine-1(2H)-carboxylate (11d). Nitrosobenzene (82 mg, 0.75 mmol) and dihydropyridine derivative **8d** (204 mg, 0.626 mmol) were charged in an oven-dried 10 mL round-bottomed flask, dissolved in benzene (4.6 mL) and the resultant golden-brown solution stirred for 2 hours at room temperature. In a separate flame-dried 50 mL round-bottomed flask, lithium aluminum hydride (293 mg, 7.50 mmol) was suspended in Et₂O (9 mL), cooled to 0-5 °C by means of an ice-water bath, followed by slow addition of aluminum chloride (6 mL of a 0.42 M solution in Et₂O, 2.50 mmol) and the light grey suspension was stirred for 15 minutes. The previously prepared solution of cycloadduct was diluted with Et₂O (9 mL) and slowly added to the freshly prepared alane suspension via a syringe. The resultant light-yellow suspension was then warmed to room temperature and stirred for 16 hours. The reaction was quenched by slow addition of the resultant suspension to a heavily-stirred biphasic solution of Et₂O (60 mL), saturated aqueous sodium-potassium tartrate (60 mL) and 2.0 M aqueous NaOH (3 mL). After 1 hour of vigorous stirring, two clear phases were obtained and separated. The aqueous phase was extracted with CH₂Cl₂ (4x25 mL), organic phases were combined, dried over potassium carbonate, filtered and concentrated under reduced pressure which afforded 247 mg of a yellow-orange oil. The oily residue and di-tert-butyl dicarbonate (559 mg, 2.50 mmol) were charged in a 25 mL round-bottomed flask, dissolved in THF (2.5 mL) and 2.0 M aqueous NaOH (2.5 mL) and the resultant mixture stirred for 2 hours. The reaction mixture was extracted with CH₂Cl₂ (4x10 mL), organic phases were combined, dried over sodium sulfate, filtered and concentrated under reduced pressure which afforded 681 mg of an orange oil. Flash chromatography of the oily residue was performed using EtOAc/hexane (gradient 0:100-25:75), which afforded 109 mg of **11d** (55%) as colorless oil: *R*_f 0.31 (EtOAc/hexane, 25:75); $[\alpha]_D^{20} = -1.42^\circ$ (c 6.42, C₆H₆); ¹H NMR (C₆D₆, 400 MHz, 75 °C) δ 7.10 (td, *J* = 7.4, 1.1 Hz, 2H), 6.68 (t, *J* = 7.3 Hz, 1H), 6.44 (d, *J* = 7.7 Hz, 2H), 5.63 (m, 1H), 5.46 (ddd, *J* = 10.1, 3.9, 1.8 Hz, 1H), 4.52 (br s, 2H), 3.57 (br s, 1H), 3.51 (br s, 1H), 3.24 (d, *J* = 19.2 Hz, 1H), 1.50-1.32 (m, 2H), 1.31 (s, 9H), 1.29-1.23 (m, 1H), 1.15 (sx, *J* = 7.1 Hz, 1H), 0.86 (t, *J* = 7.3 Hz, 3H); ¹³C NMR (C₆D₆, 100 MHz, 75 °C) δ 155.9, 148.0, 129.9 (2C), 128.9, 125.0, 118.4, 114.5 (2C), 79.5, 52.7, 52.1, 40.0, 28.7 (3C), 20.3, 14.3; FTIR (neat) 3367, 3043, 2969, 2930, 1693, 1657, 1603, 1503, 1417, 1365, 1174, 748 cm⁻¹; LRMS (APCI) calcd for C₁₉H₂₉N₂O₂ (M + H)⁺: 3167.2, found 317.2; Anal. calcd for C₁₉H₂₈N₂O₂: C, 72.12; H, 8.92; N, 8.85, found C, 72.05; H, 8.94; N, 8.75.

From the same reaction mixture was isolated 102 mg **tert-butyl benzyl[(1S)-1-(methoxymethyl)-2-methylpropyl]carbamate** (53%).

From the same reaction mixture was isolated 90 mg **tert-butyl benzyl[(1S)-1-(hydroxymethyl)-2-methylpropyl]carbamate** (48%).

Chromatograms of (–/+) 11a and of enantioenriched (+) 11a

Racemic

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.744	HM	0.2562	3051.55444	198.51016	49.4487
2	10.928	HM	0.3764	1319.59375	138.11555	50.5513

Enantioenriched

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	7.752	HM	0.1912	22.23358	1.93811	0.9219
2	10.917	HM	0.3655	2389.47607	108.96236	99.0781

Chromatograms of (+/–) 12 and of enantioenriched (–) 12

Racemic

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.820	BB	0.3401	1692.68665	72.69264	49.6483
2	14.206	BB	0.4177	1706.52527	60.01832	50.3517

Enantioenriched

Peak #	RetTime [min]	Type	Width [min]	Area [mAU*s]	Height [mAU]	Area %
1	11.846	BB	0.3411	396.21063	16.32757	8.5705
2	14.285	BB	0.5051	4226.72314	127.38052	91.4295

^1H and ^{13}C spectra of selected compounds