Supporting Information

Alkaloid Synthesis using Chiral δ-Amino β-Ketoesters: (-)-Lasubine II.

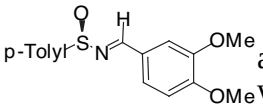
Franklin A. Davis*, and Bin Chao

Department of Chemistry, Temple University, Philadelphia, PA 19122

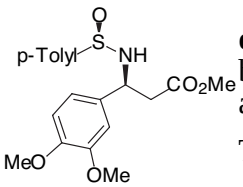
Experimental

General Procedure. Column chromatography was performed on silica gel, Merck grade 60 (230-400 mesh). TLC plates were visualized with UV, in an iodine chamber or with phosphomolybdic acid unless noted otherwise. Melting points were recorded on a Mel-Temp apparatus and are uncorrected. Optical rotations were measured on a Perkin-Elmer 341 polarimeter. IR spectra were recorded using NaCl plated or KBr discs, on a Mattson 4020 FTIR. ^{1}H NMR and ^{13}C NMR spectra were recorded on a General Electric Omega 500, operating at 500 and 125 MHz respectively. HRMS were performed in the Department of Chemistry, Drexel University, Philadelphia, PA using a Fissions ZAB HF double focusing mass spectrometer. Elemental analyses were performed in the Department of Chemistry, University of Pennsylvania, Philadelphia, PA.

Dichloromethane was distilled over calcium hydride under an inert atmosphere. THF and ether were freshly distilled under nitrogen from a purple solution of sodium and benzophenone ketyl. Unless stated otherwise, all reagents were purchased from commercial sources and used without additional purification.

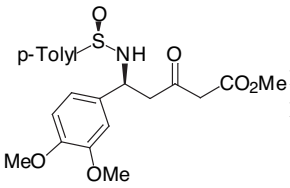


(*R*)-(+)-*N*-(3,4-dimethoxyphenyl)-*p*-toluenesulfinamide (4). In an oven dried single necked 25 mL round flask equipped with a magnetic stir bar was placed a solution of 3,4-dimethoxybenzaldehyde (3.21 g, 19.35 mmol) in CH_2Cl_2 (15 mL). Titanium (IV) ethoxide (20.1 mL, 87 mmol) was added to the solution followed by the (*R*)-(+)-*p*-toluenesulfinamide (**3**) (3.00 g, 19.35 mmol). The reaction mixture was stirred at room temperature for 1.5 h, quenched with sat. NH_4Cl (6 mL) and filtered through Celite. The phases were separated and the organic phase was washed with brine (2 mL), dried ($MgSO_4$) and concentrated. Flash chromatography (CH_2Cl_2) afforded 4.98 g, (95%) of (*R*)-(+)-**4**; mp 97 ^{0}C; $[\alpha]^{23}_{D}$ 9.0 (*c* 1.73, $CHCl_3$); IR (KBr) 1577, 1520, 1271, 1104, 1015 cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 2.31 (s, 3 H), 3.83 (s, 3 H), 3.84 (s, 3 H), 6.8 (d, J = 8.0 Hz, 1 H), 7.2-7.35 (m, 4 H), 7.57 (d, J = 8.1 Hz, 2 H), 8.6 (s, 1 H); ^{13}C NMR ($CDCl_3$) δ 22.03, 56.55, 56.65, 110.43, 111.24, 125.44, 126.15, 127.82, 130.46, 142.28, 142.87, 150.07, 153.67, 160.66. Anal. Cacld for $C_{16}H_{17}NO_3$: C, 63.34; H 5.65; N, 4.62. Found: C, 63.30; H, 5.57; N, 4.57.



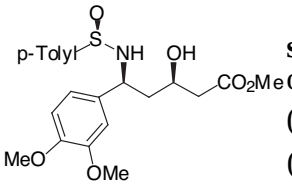
(*Rs*,*S*)-(-)-Methyl-*N*-(*p*-Toluenesulfinyl)-3-amino-3-(3,4-dimethoxyphenyl) propanoate. In an oven dried one-necked 200 mL round-bottomed flask fitted with a magnetic stir bar and an argon balloon was placed anhydrous ether (160 mL), NaHMDS (16.5 mL, 1.3 equiv., 1.0 M solution in THF) and cooled to –78 ^{O}C. Anhydrous methyl acetate (1.31 mL, 16.5 mmol, 1.3 equiv.) was added dropwise at –78 ^{O}C, and the reaction mixture was stirred for 50 min. A solution of sulfinamide (*R*)-(+)-**4** (4.37 g, 12.66 mmol) was added dropwise at -78 ^{O}C and the reaction mixtures was stirred for 4 h. At this time sat. NH_4Cl solution (6 mL) was added at -78 ^{O}C, the solution warmed to rt and extracted with ethyl acetate (2 x 50 mL). The combined organic phases were washed with brine (25 mL), dried ($NaSO_4$), and concentrated to give the crude product which was purified by flash chromatography (50% EtOAc/hexanes) to afford 3.49 g (80%) of (*Rs*,

S)-(+)-**5** in >99% de; mp 95 ^{0}C; $[\alpha]^{23}_D$ –93 (*c* 1.14, $CHCl_3$); IR (KBr) 1733, 1260, 1170, 1164, 1062, cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 2.4 (s, 3 H), 2.80 (d, J = 6.6 Hz, 2 H), 3.59 (s, 3 H), 3.86 (s, 3 H), 3.89 (s, 3 H), 4.80 (dd, J = 6.6, 11.7 Hz, 1 H), 4.96 (d, J = 4.8 Hz, 1 H), 6.84 (d, J = 8.8 Hz, 1H), 6.94 (m, 2H), 7.27 (d, J = 8.0 Hz, 2 H), 7.56 (d, J = 8.0 Hz, 2 H); ^{13}C NMR ($CDCl_3$) δ 21.99, 42.72, 52.49, 55.06, 56.53, 56.58, 111.22, 111.84, 120.17, 125.96, 130.25, 133.47, 142.09, 142.98, 149.47, 149.79, 171.96. Anal. Cacld for $C_{19}H_{23}NO_5$: C, 60.46; H 6.14; N, 3.71. Found: C, 60.42; H, 6.22; N, 3.73.



(*Rs*,*S*)-(-)-Methyl 3-oxo-5-*N*-(*p*-toluenesulfinyl)amino-5-(3,4-dimethoxyphenyl)-pentanoate (5). **From the β-amino acid**. In a 150 mL one-necked round-bottomed flask fitted with a magnetic stirring bar, rubber septum, and argon inlet was placed THF (120 mL), NaHMDS (1.0 M solution in THF, 48 mL, 48 mmol) and cooled to – 78 ^{o}C. Methyl acetate (3.8 mL, 48 mmol, 4.0 equiv.) was added slowly *via* syringe, and the reaction mixture was stirred at –78 ^{o}C for 1 h. A solution of (*Rs*,*R*)-(-)-methyl *N*-(*p*-toluenesulfinyl)-3-amino-3-(3,4-dimethoxy-phenyl)propanoate (4.14 g, 12 mmol) in THF (80 mL) was added. The reaction mixture was stirred for 4 h and quenched by addition of sat. NH_4Cl solution (20 mL) and H_2O (100 mL) at -78 ^{o}C. The reaction mixture was extracted with ethyl acetate (2 x 150 mL) and combined organic phases were dried (Na_2SO_4) and concentrated. Flash chromatography gave 4.69 g (93%) of (-)-**5**.

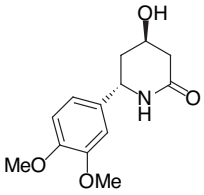
From the Sulfinimine. In a 500 mL of one-necked round-bottomed flask equipped with a magnetic stirring bar, rubber septum, and argon inlet was placed a solution of THF (100 mL) and NaHMDS (1.0 M solution in THF, 148.2 mL, 148.2 mmol, 6 equiv.) at –78 ^{o}C. Methyl acetate (7.85 mL, 98.8 mmol) in THF (20 mL) was added slowly, and the solution was stirred for 1 h. At this time anhydrous ether (20 mL) and sulfinimine (*R*)-(+)-**4** (7.48 g, 24.7 mmol, 1 equiv.) in THF (20 mL) were added. The reaction mixture was stirred at –78 ^{o}C for 3.5 h (followed by TLC) and quenched with sat. NH_4Cl (50 mL). The solution was washed with ethyl acetate (3 x 150 mL), the organic phases were combined, dried ($NaSO_4$), concentrated. Purification by flash chromatography (50% EtOAc/hexane) give 8.80 g (85%) of as an oil; $[\alpha]^{23}_D$ –38.3 (*c* 1.28, $CHCl_3$); IR (neat) 2956, 2370, 2254, 1718, 1517, 1262, 909 cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 2.40 (s, 3 H), 3.08 (d, J = 6.23 Hz, 2 H), 3.36 (s, 2 H), 3.67 (s, 3 H), 3.87 (s 3 H), 3.90 (s, 3 H), 4.78 (d, J = 4.77 Hz, 1 H), 4.88 (m, 1 H), 6.90-7.00 (m, 3 H), 7.29 (d, J = 8.0 Hz, 2 H), 7.57 (d, J = 8.0 Hz, 2 H); enol: 3.69, 3.88, 3.90; ^{13}C NMR ($CDCl_3$) δ 21.90, 49.95, 50.76, 52.87, 54.42, 56.47, 56.53, 111.45, 111.87, 120.31, 125.94, 130.13, 130.61, 141.93, 142.85, 149.35, 149.74, 167.77, 201.29; enol form: 44.16, 51.12, 55.82, 91.90. HRMS calcd. for $C_{21}H_{25}NO_6S$ 442.1300 (M+Na), found 442.1300.



(*Rs*,*3R*,*5S*)-(-)-Methyl 3-hydroxy 5-*N*-(*p*-toluene-sulfinyl)amino-5-(3,4-dimethoxyphenyl)pentanoate (6). In a 25 mL one-necked round-bottomed flask was placed **5** (0.290 g, 0.71 mmol) in THF (20 mL). The mixture was cooled and a –78 ^{o}C solution of $Zn(BH_4)_2$ in ether (6 mL, 2.3 mmol)[3] was added dropwise. The reaction mixture was stirred at –78 ^{o}C for 1 h and quenched with MeOH (1 mL) and NH_4Cl (5 mL). After warming to rt, the mixture was extracted with ethyl acetate (4 x 10 mL), the combined organic phase was dried ($NaSO_4$) and concentrated to give **6** (syn:anti = 50:6). Purification by flash chromatography (CH_2Cl_2:EtOAC = 7:3) gave 0.278 g, (87%) of **6** as an oil; $[\alpha]^{23}_D$ -70 (*c* 1.0, MeOH); IR (neat) 1732.94, 1515.96, 1456.17, 1261.37, 1160.11, 1028.00 cm^{-1}; ^{1}H NMR (CD_3OD) δ 1.81-1.93 (m, 2 H), 2.23-2.38 (m, 2 H), 2.38 (s, 3 H), 3.53 (s, 3 H), 3.70-3.73 (m, 1 H),

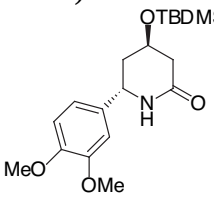
3.80 (s, 3 H), 3.83 (s, 3 H), 4.48-4.53 (dd, J = 6.23, 8.43 Hz, 1 H), 6.85-7.00 (m, 3 H), 7.30 (d, J = 8.0 Hz, 2 H), 7.50 (d, J = 8.0 Hz, 2 H); ^{13}C NMR (CD_3OD) δ 20.67, 42.75, 45.16, 49.20, 51.34, 55.81, 56.68, 66.32, 111.74, 112.22, 120.72, 125.91, 129.99, 135.28, 142.11, 142.17, 149.31, 149.89, 172.70. HRMS calcd. for $C_{21}H_{27}O_6NS$ 444.1466(M+Na), found 444.1457.

(4*R*,6S)-(-)-4-hydroxy-6-(3,4-dimethoxyphenyl)-piperidine-2-one (7). In a 5 mL one-necked round-bottomed flask fitted with a magnetic stirring bar and a rubber septum was placed (-)-**6**



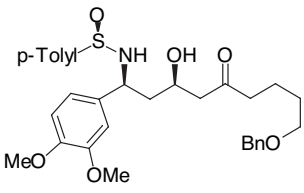
(1.0 g, 2.38 mmol) in MeOH (10 mL). The mixture was cooled to 0 ^{o}C and TFA (0.2 mL) was added. After 30 min at rt, the mixture was concentrated, and the residue was loaded on a small pad of silica gel and washed with EtOAc/hexanes (30%, 30 mL) to remove impurities, and then with MeOH (20 mL). The solution was concentrated, the residue was dissolved in THF (4 mL), a few drops of sat. $NaHCO_3$ was added, and the mixture was stirred for 3 h. The reaction mixture was concentrated, extracted with CH_2Cl_2 (20 mL), dried (Na_2SO_4) and concentrated to give 0.60 g (100%) of (-)-**7**; mp 174-175 ^{o}C; $[\alpha]^{23}_D$ -32.8 (*c* 0.58, MeOH); ^{1}H NMR ($CDCl_3$) δ 1.83 (m, 1 H), 2.05 (m, 1 H), 2.35 (m, 1 H), 2.63 (dd, J = 4.2, 17.7, 1 H), 3.29 (s, 1 H), 3.80 (s, 3 H), 3.82 (s, 3 H), 4.19 (m, 1 H), 4.71 (dd, J = 4.4, 9.9, 1 H), 6.84-6.92, (m, 3 H); ^{13}C NMR ($CDCl_3$) δ 38.66, 39.19, 53.12, 55.66, 55.84, 63.06, 110.67, 112.40, 119.26, 135.85, 149.39, 150.02, 173.28. HRMS calcd for $C_{13}H_{17}NO$ 274.1055 (M+Na), found 274.1066.

(4*R*,6*S*)-(-)-4-(*tert*-Butyldimethylsilyloxy)-6-(3,4-dimethoxyphenyl)piperidin-2-one (8). In a 5 mL one-necked round-bottomed flask fitted with a magnetic stirring bar, a rubber septum was placed (-)-**7** (0.12 g, 0.45 mmol) in DMF (0.2 mL). *t*-Butyldimethylsilyl chloride (0.087 g, 0.58 mmol) and imidazole (0.098 g, 0.58 mmol) were added. The mixture was stirred at rt for 8 h, diluted



with EtOAc (2 mL), washed with 1 N HCl (0.5 mL), sat.$NaHCO_3$ (0.5 mL), and H_2O (3 x 0.5 mL). The organic phase was dried ($MgSO_4$), concentrated, and purified by prep. TLC (20% MeOH/CH_2Cl_2) to give 0.074 g (88%) of **8** as an oil; $[\alpha]^{23}_D$ -8.75 (*c* 2.0, $CHCl_3$); ^{1}H NMR δ 0.10 (s, 3 H), 0.11 (s, 3 H), 0.9 (s, 9 H), 1.7-1.8 (m, 1 H), 2.03 (m, 1 H), 2.41-2.45 (m, 1 H), 2.58 (dd, J = 4.2, 18.0, 1 H), 3.80 (s, 3 H), 3.82 (s, 3 H), 4.28 (m, 1 H), 4.76 (m, 1 H), 5.95 (s, 1 H), 6.75-6.85 (m, 3 H); ^{13}C NMR δ 4.20, 4.17, 18.71, 26.41, 40.36, 40.73, 53.51, 56.63, 65.03, 109.80, 111.95, 119.25, 135.26, 149.47, 150.07, 171.76.
HRMS calcd. for $C_{19}H_{31}NO_4Si$, 388.1920 (M+Na), found 399.1905..

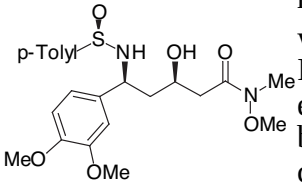
Preparation of (*R*$_S$,1*S*,3*R*)-(-)-1-*N*-(*p*-toluenesulfinyl)amino 1-(3,4-dimethoxyphenyl)-3-hydroxy-5-oxo-9-benzyloxynonane (9) from the acid. In a 10 mL one-necked round-bottomed flask equipped with a magnetic stirring bar, rubber septum, and an argon balloon was placed (-)-**5** (0.10 g, 0.24 mmol) and a solution of LiOH (0.0011 g, 0.26 mmol) in H_2O



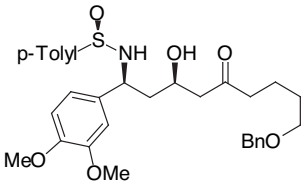
(0.2 mL). The reaction mixture was stirred at rt for 1 h, concentrated and dried by azeotropic evaporation with benzene (3 x 3 mL). The residue was dissolved in THF (0.5 mL), cooled to -40 ^{o}C, and a precooled solution of 4-(benzyloxy)butyllithium (10 equiv.)[5] was added. The reaction mixture was warmed to 0 ^{o}C, stirred for 30 min (followed by TLC) and quenched by addition with a 0 ^{o}C solution of sat. NH_4Cl (20 mL). The reaction mixture was washed with EtOAc (3 x 10 mL), and the organic phase was washed with 20% NaOH (2 x 5 mL), brine (2 x 5 mL), concentrated, and dried (Na_2SO_4). Purification by prep TLC (EtOAc:CH_2Cl_2 = 7:2) gave 0.026 g (20%) of **9** as an oil; $[\alpha]^{23}_D$ –28.3 (*c* 2.9, MeOH); IR (neat) 1705, 1516, 1260, 1029 cm^{-1}; ^{1}H NMR ($CDCl_3$) δ 1.47-1.75 (m, 6 H), 1.80-2.00 (m, 2 H), 2.24-2.51 (m, 2 H), 2.39 (s, 3 H), 3.43, (t, J = 6.24, 5.86 Hz, 2 H), 3.64-3.80 (m, 1 H), 3.88 (s, 3 H), 3.91 (s, 3 H), 4.08-4.23 (m, 1 H), 4.46 (s, 2 H), 4.65-4.74 (m, 1 H), 5.38 (s, 1 H), 6.88 (d, J = 8.07 Hz, 1 H), 6.91-7.03 (m, 2

H), 7.21-7.36 (m, 7 H), 7.55 (d, J = 8.43 Hz, 2 H); ^{13}C NMR ($CDCl_3$) δ 20.91, 21.66, 29.99, 43.82, 45.08, 49.96, 56.57, 57.62, 58.17, 67.83, 70.52, 73.57, 111.16, 111.84, 120.44, 125.80, 128.21, 128.29, 129.12, 130.12, 135.25, 139.12, 141.88, 143.50, 149.29, 149.86, 211.88; HRMS calcd. for $C_{31}H_{39}O_6NS$, 576.2382 (M+Na), found 576.2395.

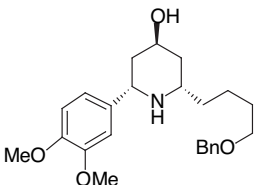
(*Rs*,*3R*,*5S*)-(-)-Methoxy-*N*-methyl-3-hydroxy-5-(3,4-dimethoxyphenyl)-5-*N*-(*p*-toluenesulfinyl)pentanamide (10). In a 100 mL one-necked round-bottomed flask equipped with stirring bar and rubber septum was placed *N*,*O*-dimethylhydroxylamine hydrochloride (1.85 g, 19.00 mmol) in THF (20 mL). The solution was cooled to – 78 °C and *n*-BuLi (15.05 mL, 2.5 M in hexanes, 38.50 mmol) was added via syringe. The reaction mixture was stirred for 15 min after removing the cooling bath, cooled to -78 °C and (-)-5 (1.600 g, 3.80 mmol) was added. After 1 h the reaction was quenched at -78 ºC by addition of sat. NH_4Cl (5 mL) and warmed to rt. The reaction mixture was washed with ethyl acetate (3 x 20 mL), the combined organic phases were washed with brine (2 mL), dried ($MgSO_4$) and concentrated. Purification by flash chromatography (EtOAc/CH_2Cl_2/CH_3OH 7:2:1) gave 1.573 g (92%) of **10** as an oil; $[\alpha]^{23}_D$ -58.6 (*c* 0.7, $CHCl_3$); IR 1661, 1519, 1455.17, 1260 cm $^{-1}$; ^{1}H NMR (CD_3OD) δ 1.81-1.99 (m, 2 H), 2.19-2.45 (m, 1 H), 2.37 (s, 3 H), 2.50-2.64 (m, 1 H), 3.09 (s, 3 H), 3.32 (s, 1 H), 3.61 (s, 3 H), 3.79 (s, 3 H), 3.83 (s, 3 H), 4.52 (dd, J = 6.24, 8.44 Hz, 1 H), 6.87-7.05 (m, 3 H), 7.32 (d, J = 8.0 Hz, 2 H), 7.5 (d, J = 8.0 Hz, 2 H); ^{13}CNMR δ 20.57, 31.38, 40.03, 45.21, 55.76, 56.54, 56.68, 61.03, 66.28, 111.76, 112.21, 120.73, 125.88, 129.94, 135.33, 142.09, 142.16, 149.31, 149.91, 173.19. HRMS calcd. for $C_{22}H_{30}O_6N_2S$ 473.1704 (M+Na), found 473.1712.



Preparation of (*R*$_S$,*1S*,*3R*)-(-)-1-*N*-(*p*-toluenesulfinyl)amino 1-(3,4-dimethoxyphenyl)-3-hydroxy-5-oxo-9-benzyloxynonane (9) from the Weinreb amide. In a 10 mL one-necked round-bottomed flask fitted with a magnetic stir bar, rubber septum, and an argon balloon was placed Mg turnings (0.540 g, 22.2 mmol) in THF (6 mL). 1,2 -Dibromoethane (66 mL) was added and the mixture was stirred for 1 h at rt. The $MgBr_2$/THF solution was removed via a syringe and Mg solid was washed with THF (2 x 3 mL) to remove residual $MgBr_2$. A portion of a solution of 4 (benzyloxy)-1-bromobutane[4] (2.2 mL, 11.62 mmol) in THF (7 mL). When the reaction was initiated it was cooled to 0 °C, and the remainder of 4-(benzyloxy)-1-bromobutane was added and stirred at rt for 2 h. In a separated 50 mL single necked flask equipped with a rubber septum under argon was placed the Weinreb's amide **10** (0.603 g, 1.34 mmol) in THF (1 mL), and the Grignard reagent was added to this solution. The mixture was stirred at rt for 1 h and quenched with sat. NH_4Cl (2 mL). The reaction mixture was extracted with ethyl acetate (5 x 5 mL), the organic phase was separated, dried (Na_2SO_4), and concentrated. Purification by flash chromatography (EtOAc/CH_2Cl_2/MeOH = 7:2:1) afforded 0.445 g (60%) **9** as an oil .

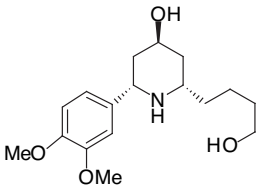


(*2S*,*4S*,*6S*)-(-)-2-(4-benzyloxy-butyl)-6-(3,4-dimethoxy-phenyl)-piperidin-4-ol (12). In a 20 mL of one-necked round-bottomed flask fitted with a magnetic stirring bar, rubber septum, and argon balloon was placed **9** (0.300 g, 0.54 mmol) in THF (10 mL). The mixture was cooled to 0 °C and 10 drops of 4 N HCl were added. After stirring at 0 °C for 15 min, the reaction mixture was quenched with 28% NH_4OH (2 mL) and washed with CH_2Cl_2 (5 x 5 mL). The organic phases were combined, dried (Na_2SO_4), and concentrated The residue was dissolved in THF (4 mL) and a suspension of sodium methoxide (0.410 g, 7.60 mmol) and $LiAlH_4$ (1 N in THF, 3.8 mL, 3.8 mmol) was added at -78 °C. After stirring at -78 °C for 1 h, at - 40 °C for 1 h, at -20 °C for 1 h, and at 0 °C for 8 h the reaction was quenched with sat. aq. Na_2SO_4 (1.00 mL). The solution was passed through a pad of Celite, the filtrate was

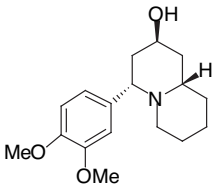


dried (Na_2SO_4), concentrated, and purified by the preparative TLC on aluminum oxide (CH_2Cl_2/MeOH 50:1) to give 0.16 g (72%) of **12** as an oil; $[\alpha]^{23}_D$ - 30 (*c* 0.20, MeOH); ^{1}H NMR ($CDCl_3$) δ 1.17-1.90 (m, 10 H), 3.04-3.18 (m, 1 H), 3.46, (t, J = 6.60, 6.23 Hz, 2 H), 3.86, (s, 3 H), 3.89 (s, 3 H), 4.04 (dd, J = 11.73, 2.56 Hz, 1 H), 4.24 (m, 1 H), 4.78 (s, 2 H), 6.82 (d, J= 8.07 Hz, 1 H), 6.89-6.98 (m, 2 H), 7.23-7.37 (m, 5 H); ^{13}C NMR ($CDCl_3$) δ 23.21, 30.55, 37.45, 39.82, 42.40, 51.88, 51.94, 56.33, 56.58, 66.67, 70.89, 73.57, 110.80, 111.76, 119.42, 128.18, 128.29, 129.00, 138.46, 139.25, 148.74, 149.59. HRMS calcd. for $C_{24}H_{33}O_4N$ 400.2488 (M+H), found 400.2505.

(*2S*,*4R*,*6S*)-(-)-2-(3,4-Dimethoxyphenyl)-6-(4-hydroxybutyl) piperidin-4-ol (13). In a 5 mL one-necked round-bottomed flask fitted with a magnetic stirring bar, a rubber septum, and a hydrogen balloon was placed **12** (0.240 g, 0.60 mmol) in THF (4 mL) and MeOH (4 mL). Pd/C (10%, 0.040 g) and a few drops of TFA were added, and the reaction mixture was stirred at rt for 8 h. The solution was filtered through Celite, concentrated and to the residue was added THF (2 mL) and 4 N NaOH (0.2 mL). After stirring for 15 min. the reaction mixture was washed with CH_2Cl_2 (5 x 5 mL), the organic phase was dried (Na_2SO_4) and concentrated. Purification by prep. TLC on aluminum oxide (CH_2Cl_2:MeOH 25:1) afforded 0.17 g (90%) diol 13 as an oil; $[\alpha]^{23}_D$ -52 (*c* 0.25, MeOH); ^{1}H NMR (CD_3OD) δ 1.22-1.61 (m, 7 H), 1.70-1.92 (m, 3 H), 3.14 (m, 1 H), 3.54 (t, J = 6.60, 6.23 Hz, 2 H), 3.79 (s, 3 H), 3.82, (s, 3 H), 4.07 (dd, J = 12.10, 2.93 Hz, 1 H), 4.18 (m, 1 H), 6.86-6.94 (m, 2 H), 7.03 (d, J = 8.01 Hz, 1 H). Spectral properties were in agreement with literature values reported for a racemic sample.[2]



(-)-Lasubin ll (2). In a 50 mL one-necked round-bottomed flask fitted with a magnetic stirring bar, a rubber septum, and an argon balloon was placed diol **13** (0.100 g, 0.320 mmol) in pyridine (3 mL). The mixture was cooled to – 78 °C *p*-toluenesulfonyl chloride (0.191 g, 1.00 mmol) was added, the reaction mixture was stirred at – 20 °C for 2 h and at 0 °C for 8 h. At this time ice was added to the solution which was washed with EtOAc (3 x 3 mL). The organic phases were combined, washed with 0.2 M NaOH (1 mL), dried (Na_2SO_4) and concentrated. Purification by preparative TLC on aluminum oxide (CH_2Cl_2/MeOH = 20:1) give 0.066 g (71%) of **2** as an oil; $[\alpha]^{23}_D$ -47.5 (*c* 3.7, MeOH) [lit.[1] $[\alpha]^{23}_D$ -41.0 (c 3.7, MeOH) ee > 90%)]; ^{1}H NMR (CD_3OD) δ 1.02-1.93 (m, 12 H), 2.38 (m, 1 H), 2.68 (d, J =10.74 Hz, 1 H), 3.33 (dd, J = 12.21, 2.93 Hz, 1 H), 3.88 (s, 3 H), 3.86 (s, 3 H), 4.15 (br s, 1 H), 6.71-7.0 (m, 3 H). Spectral properties were in agreement with literature values.[1]



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