APPENDIX 5

Spectra Relevant to Chapter 3:

Unified Approach to Daucane and Sphenolobane

Bicyclo[5.3.0]decan core: Enantioselective Synthesis of

Four Daucane Sesquiterpenes and Related Molecules
Figure A5.1.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 70w.
Figure A5.1.2. Infrared spectrum (thin film/NaCl) of compound 70w.
Figure A5.2.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 53w.
Figure A5.2.2. Infrared spectrum (thin film/NaCl) of compound 53w.

Figure A5.2.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 53w.
Figure A5.3.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 72w.
Figure A5.3.2. Infrared spectrum (thin film/NaCl) of compound $72w$.

Figure A5.3.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound $72w$. 
Figure A5.4.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 230a.
Figure A5.4.2. Infrared spectrum (thin film/NaCl) of compound 230a.

Figure A5.4.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 230a.
Figure A5.5.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 230b.
Figure A5.5.2. Infrared spectrum (thin film/NaCl) of compound 230b.

Figure A5.5.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 230b.
Figure A5.6.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 223.
Figure A5.6.2. Infrared spectrum (thin film/NaCl) of compound 223.

Figure A5.6.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 223.
Figure A5.7.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 235.
Figure A5.7.2. Infrared spectrum (thin film/NaCl) of compound 235.

Figure A5.7.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 235.
Figure A5.8.1. $^1$H NMR (500 MHz, CD$_6$) of compound 249.
Figure A5.8.2. Infrared spectrum (thin film/NaCl) of compound 249.
Figure A5.9.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 250.
Figure A5.9.2. Infrared spectrum (thin film/NaCl) of compound 250.

Figure A5.9.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 250.
Figure A5.10. $^1$H NMR (500 MHz, CDCl$_3$) of compound 251.
Figure A5.10.2. Infrared spectrum (thin film/NaCl) of compound 251.

Figure A5.10.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 251.
Figure A5.11.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 252.
Figure A5.11.2. Infrared spectrum (thin film/NaCl) of compound 252.

Figure A5.11.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 252.
Figure A5.12.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 253.
Figure A5.12.2. Infrared spectrum (thin film/NaCl) of compound 253.
Figure A5.13.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 255.
Figure A5.13.2. Infrared spectrum (thin film/NaCl) of compound 255.

Figure A5.13.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 255.
Figure A5.13.4. NOESY NMR (500 MHz, CD<sub>6</sub>) of compound 255.
Figure A5.14.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 264.
Figure A5.14.2. Infrared spectrum (thin film/NaCl) of compound 264.

Figure A5.14.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 264.
Figure A5.15.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 256.
Figure A5.15.2. Infrared spectrum (thin film/NaCl) of compound 256.

Figure A5.15.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 256.
Figure A5.16.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 144b.
Figure A5.16.2. Infrared spectrum (thin film/NaCl) of compound 144b.

Figure A5.16.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 144b.
Figure A5.16.4. HSQC NMR (400 MHz, C₆D₆) of compound 144b.
Figure A5.17.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 257a.
Figure A5.17.2. Infrared spectrum (thin film/NaCl) of compound 257a.

Figure A5.17.3. $^{13}$C NMR (125 MHz, CD$_6$D$_6$) of compound 257a.
Figure A5.17.4. NOESY NMR (500 MHz, C₆D₆) of compound 257a.
Figure A5.18.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 257b.
Figure A5.18.2. Infrared spectrum (thin film/NaCl) of compound 257b.

Figure A5.18.3. $^{13}$C NMR (125 MHz, C₆D₆) of compound 257b.
Figure A5.18.4. NOESY NMR (500 MHz, C, D) of compound 257b.
Figure A5.19.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 259.
Figure A5.19.2. Infrared spectrum (thin film/NaCl) of compound 259.

Figure A5.19.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 259.
Figure A5.19.4. NOESY NMR (500 MHz, CDCl$_3$) of compound 259.
Figure A5.20.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 260.
Figure A5.20.2. Infrared spectrum (thin film/NaCl) of compound 260.

Figure A5.20.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 260.
Figure A5.21.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 262.
Figure A5.21.2. Infrared spectrum (thin film/NaCl) of compound 262.

Figure A5.21.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 262.
Figure A5.22.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 142.
Figure A5.22.2. Infrared spectrum (thin film/NaCl) of compound 142.

Figure A5.22.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 142.
Figure A5.22.4. HSQC NMR (500 MHz, CDCl₃) of compound 142.
Figure A5.23.1. $^1$H NMR (500 MHz, CDCl$_3$) of compound 261.
Figure A5.23.2. Infrared spectrum (thin film/NaCl) of compound 261.
Figure A5.24.1. $^1$H NMR (500 MHz, C$_6$D$_6$) of compound 143.
Figure A5.24.2. Infrared spectrum (thin film/NaCl) of compound 143.

Figure A5.24.3. $^{13}$C NMR (125 MHz, C$_6$D$_6$) of compound 143.
Figure A5.24.4. HSQC NMR (500 MHz, C₆D₆) of compound 143.
Figure A5.24.5, HSQC NMR (500 MHz, C$_6$D$_6$) of compound 143.
Figure A5.24.6. HMBC NMR (500 MHz, CD$_3$) of compound 143.
Figure A5.25.1. 1H NMR (500 MHz, CDCl₃) of compound 263.
Figure A5.25.2. Infrared spectrum (thin film/NaCl) of compound 263.

Figure A5.25.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 263.
\textbf{Figure A5.26.1.} $^1$H NMR (500 MHz, CDCl$_3$) of compound 145.
Figure A5.26.2. Infrared spectrum (thin film/NaCl) of compound 145.

Figure A5.26.3. $^{13}$C NMR (125 MHz, CDCl$_3$) of compound 145.