APPENDIX 4

Spectra Relevant to Chapter 4:

Enantioselective Allylic Alkylations of Vinylogous β-Ketoester Derivatives: Total Synthesis of (+)-Carissone
Figure A4.1. $^1$H NMR spectrum (500 MHz, CDCl$_3$) of 275.
Figure A4.2. Infrared spectrum (neat film/NaCl) of 275.

Figure A4.3. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of 275.
Figure A4.4. $^1$H NMR spectrum (500 MHz, CDCl$_3$) of 276.
Figure A4.5. Infrared spectrum (neat film/NaCl) of 276.

Figure A4.6. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of 276.
Figure A4.7. $^1$H NMR spectrum (300 MHz, CDCl$_3$) of 277.
Figure A4.8. Infrared spectrum (neat film/NaCl) of 277.

Figure A4.9. $^{13}$C NMR spectrum (75 MHz, CDCl$_3$) of 277.
Figure A4.10. $^1$H NMR spectrum (300 MHz, CDCl$_3$) of 278.
Figure A4.11. Infrared spectrum (neat film/NaCl) of 278.

Figure A4.12. $^{13}$C NMR spectrum (75 MHz, CDCl$_3$) of 278.
Figure A4.13. $^1$H NMR spectrum (500 MHz, CDCl$_3$) of (+)-carissone (279).
Figure A4.14. Infrared spectrum (neat film/NaCl) of (+)-carissone (279).

Figure A4.15. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of (+)-carissone (279).
Figure A4.16, $^1$H NMR spectrum (500 MHz, CDCl$_3$) of 287.
Figure A4.17. $^1$H NMR spectrum (500 MHz, CDCl$_3$) of 288.
Appendix 4—Spectra Relevant to Chapter 4

Figure A4.18. Infrared spectrum (neat film/NaCl) of 288.

Figure A4.19. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of 288.
Figure A4.20. $^1$H NMR spectrum (300 MHz, CDCl$_3$) of 289.
Figure A4.21. $^1$H NMR spectrum (500 MHz, C$_6$D$_6$) of 290.
Figure A4.22. Infrared spectrum (neat film/NaCl) of 290.

Figure A4.23. $^{13}$C NMR spectrum (126 MHz, C$_6$D$_6$) of 290.
Figure A.2.4. $^1H$ NMR spectrum (500 MHz, CD$_6$D$_6$) of 292.
Figure A4.25. Infrared spectrum (neat film/NaCl) of 292.

Figure A4.26. $^{13}$C NMR spectrum (126 MHz, C$_6$D$_6$) of 292.
Figure A4.27. $^1$H NMR spectrum (500 MHz, $C_6D_6$) of 293.
Figure A4.28. Infrared spectrum (neat film/NaCl) of 293.

Figure A4.29. $^{13}$C NMR spectrum (126 MHz, $C_6D_6$) of 293.
Figure A.4.30. \( ^1H \) NMR spectrum (500 MHz, \( \text{C}_6\text{D}_6 \)) of 294.
Figure A4.31. Infrared spectrum (neat film/NaCl) of 294.

Figure A4.32. $^{13}$C NMR spectrum (126 MHz, $C_6D_6$) of 294.
Figure A.33. $^1H$ NMR spectrum (500 MHz, CDCl$_3$) of 295.
Appendix 4—Spectra Relevant to Chapter 4

Figure A4.34. Infrared spectrum (neat film/NaCl) of 295.

Figure A4.35. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of 295.
Figure A4.36. $^1$H NMR spectrum (500 MHz, CDCl$_3$) of 304.
Figure A4.37. Infrared spectrum (neat film/NaCl) of 304.

Figure A4.38. $^{13}$C NMR spectrum (126 MHz, CDCl$_3$) of 304.
Figure A4.39. $^1$H NMR spectrum (300 MHz, CDCl$_3$) of 307.
Figure A4.40. $^1H$ NMR spectrum (300 MHz, CDCl$_3$) of 308.
Figure A4.41. $^1$H NMR spectrum (500 MHz, C$_6$D$_6$) of the major diastereomer of 309.
Figure A4.42. Infrared spectrum (neat film/NaCl) of the major diastereomer of 309.

Figure A4.43. $^{13}$C NMR spectrum (126 MHz, C$_6$D$_6$) of the major diastereomer of 309.