

Supporting Information-Part I

How RNase HI (*Escherichia coli*) promoted site-selective hydrolysis works on RNA in duplex with carba-LNA and LNA substituted antisense strands in antisense strategy context

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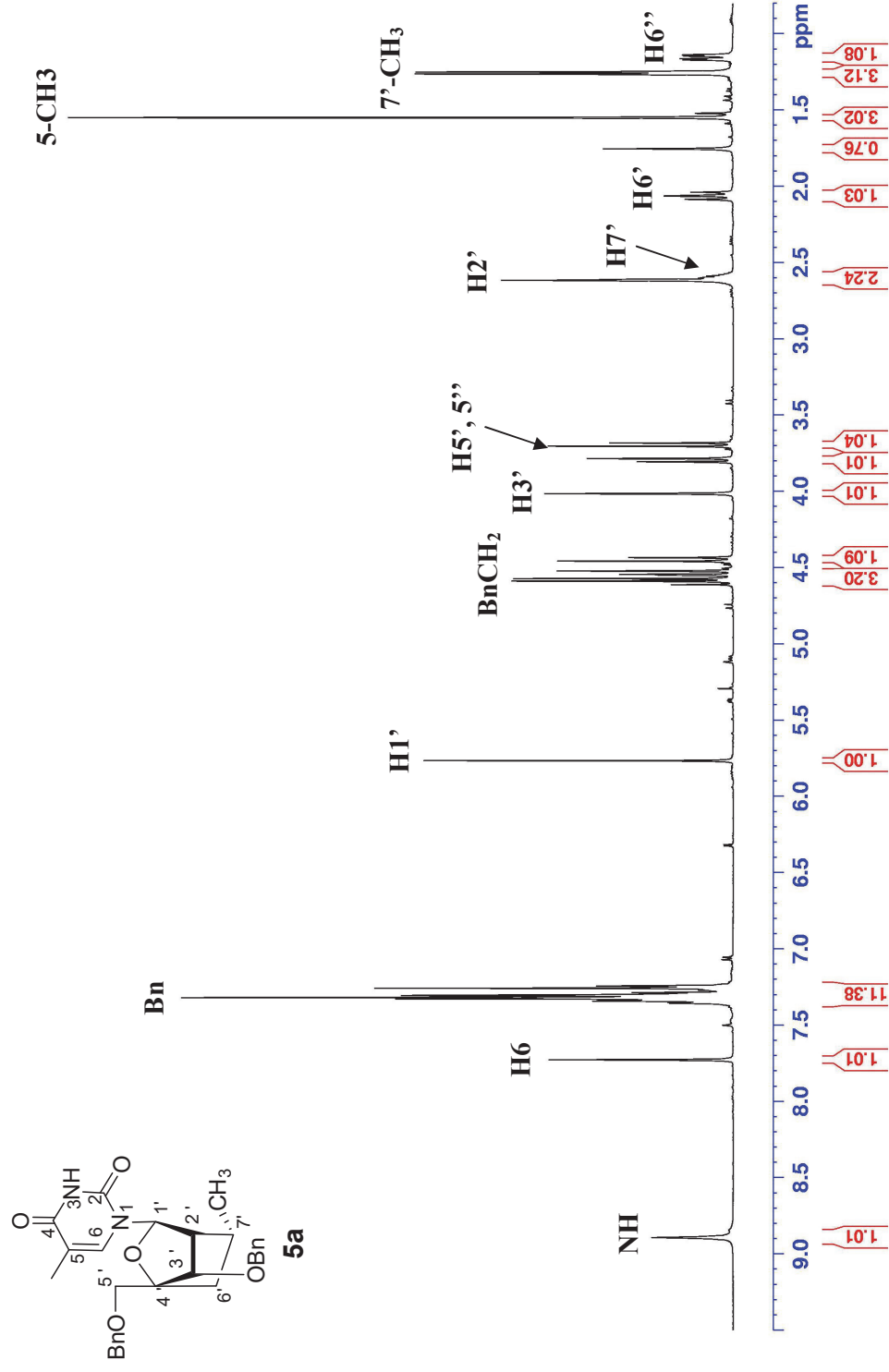


Figure SI.1 ^1H NMR spectrum of compound **5a**

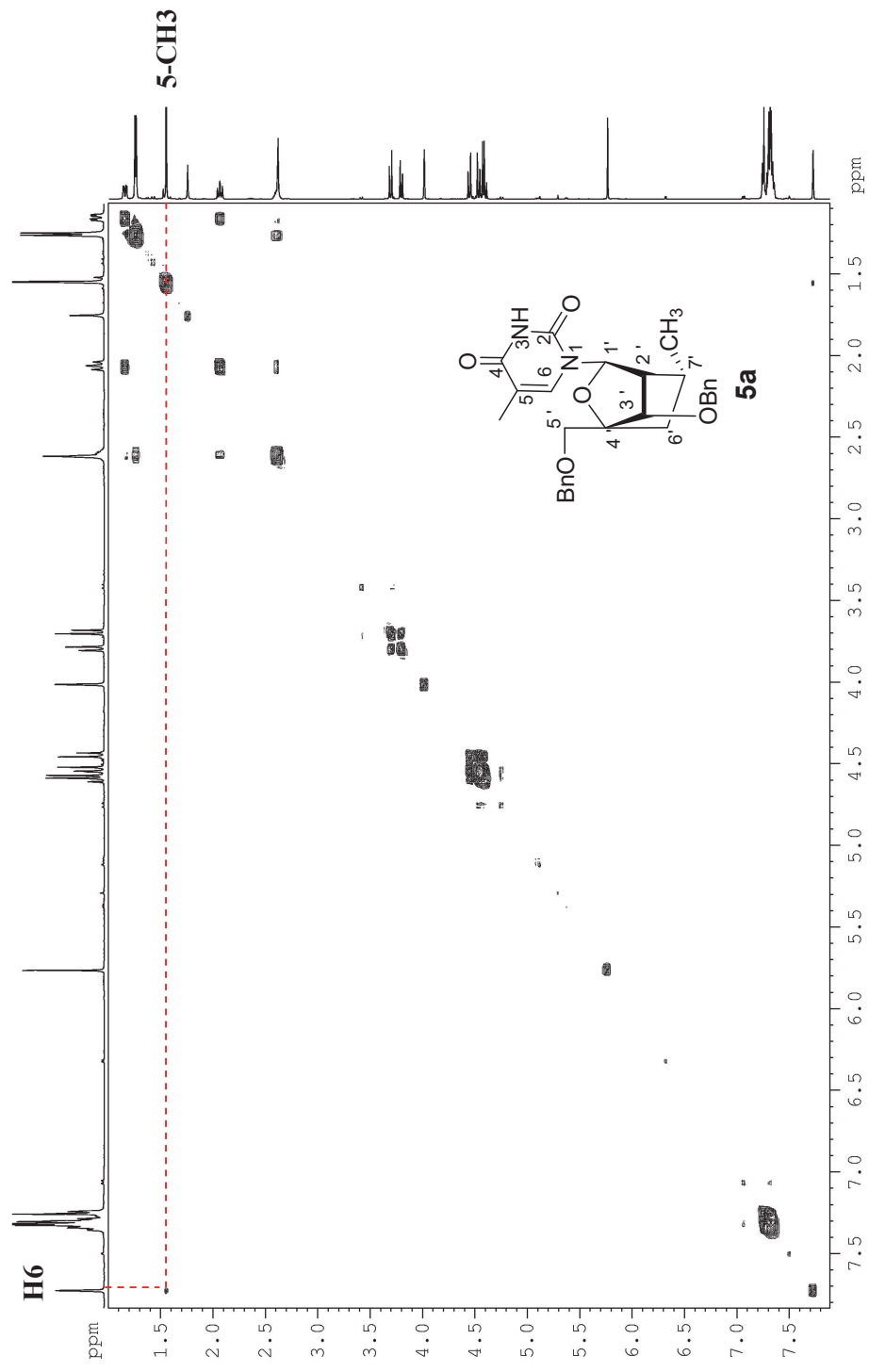


Figure S1.2 COSY spectrum of compound **5a**

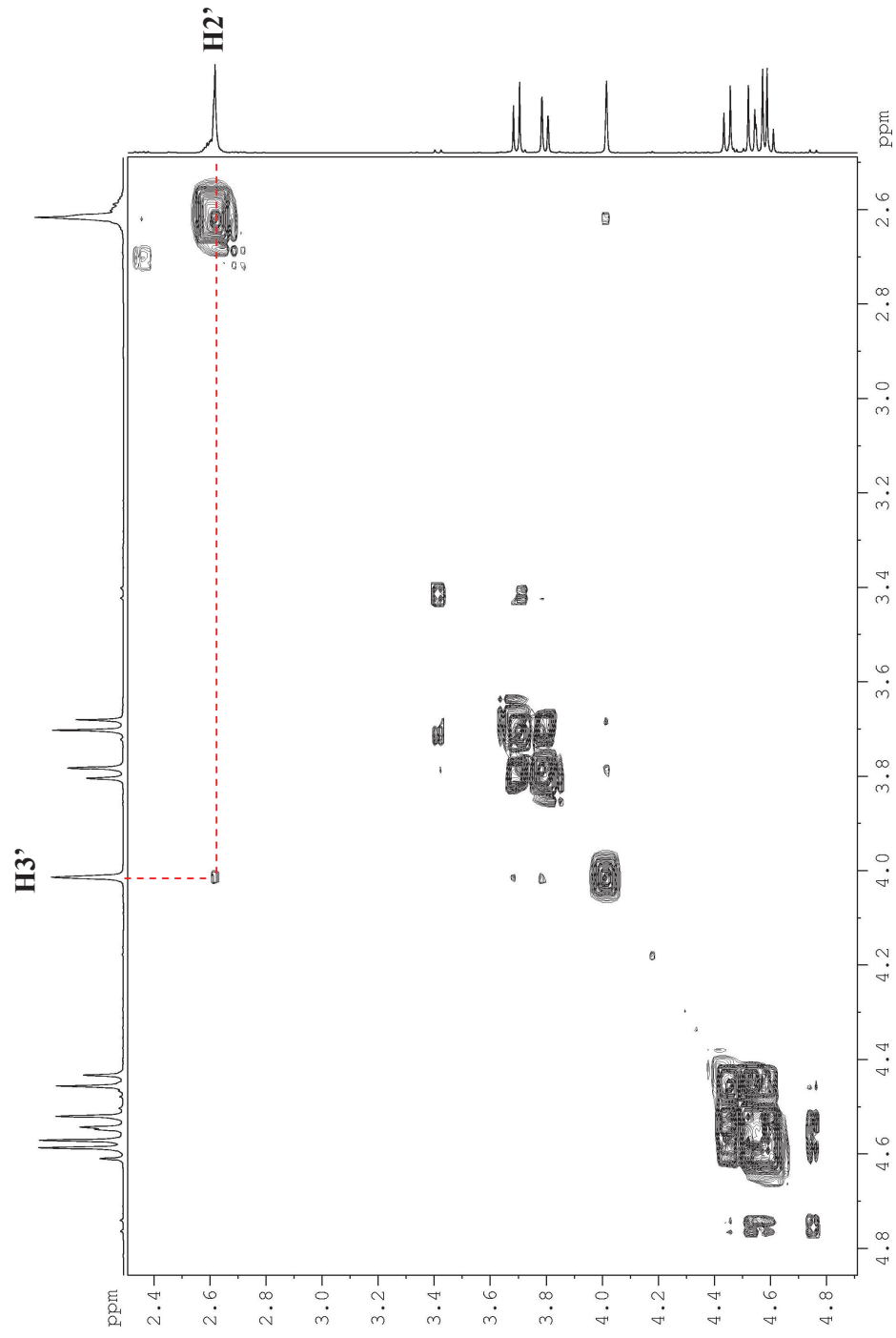
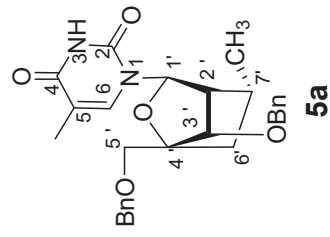


Figure SI.3 Expansion of COSY spectrum of compound 5a

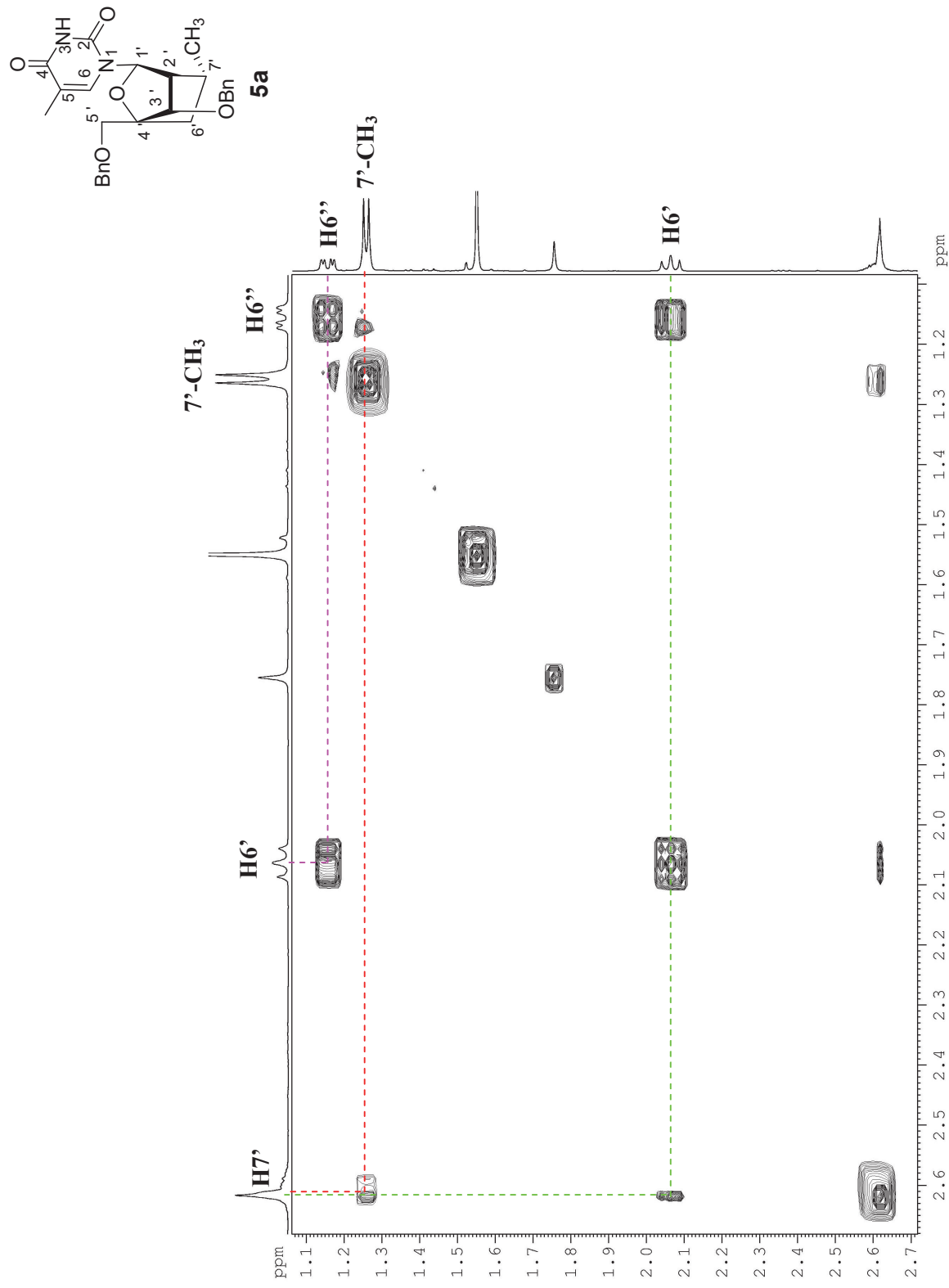


Figure SI.4 Expansion of COSY spectrum of compound 5a

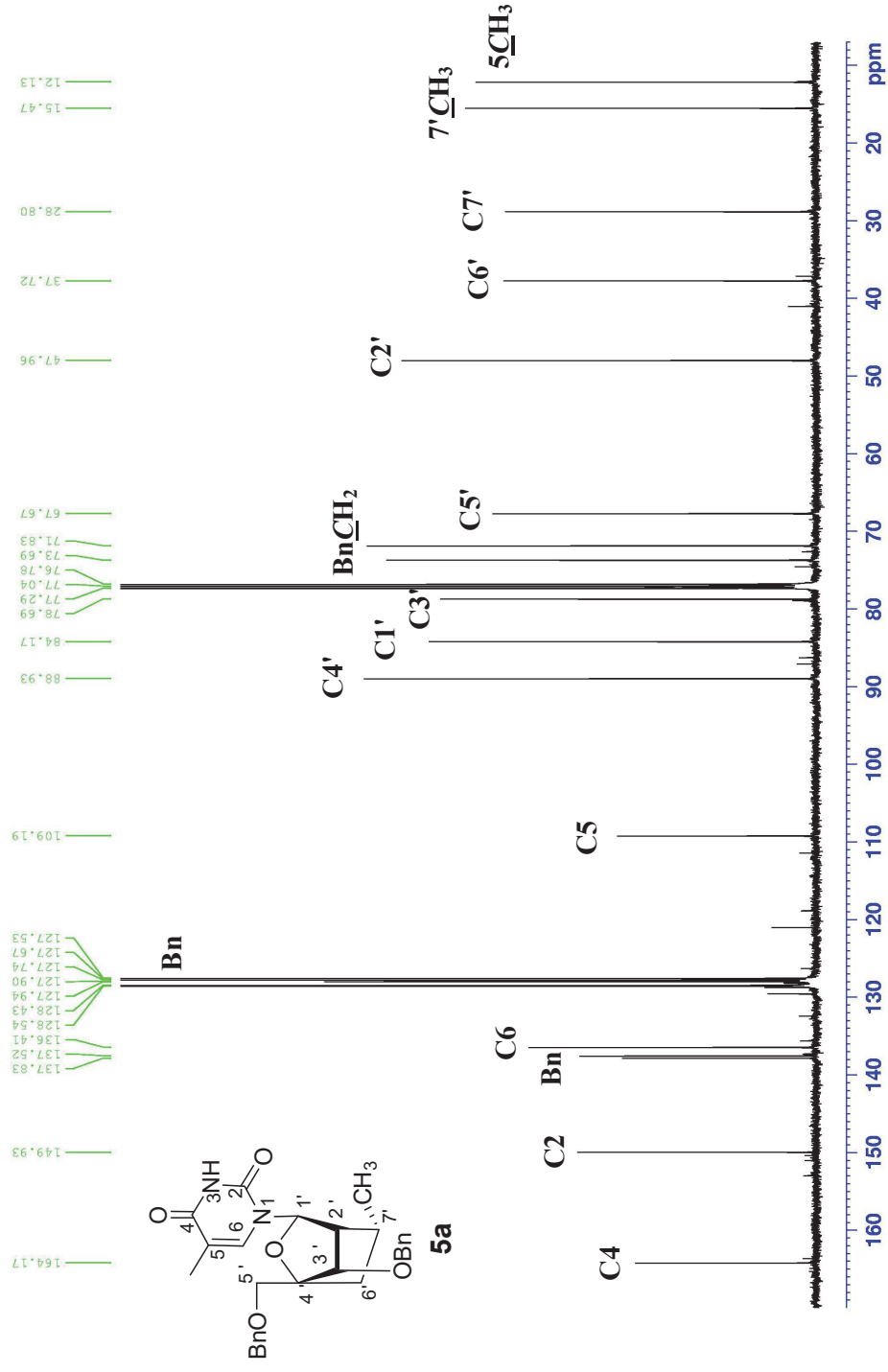


Figure SI.5 ¹³C NMR spectrum of compound **5a**

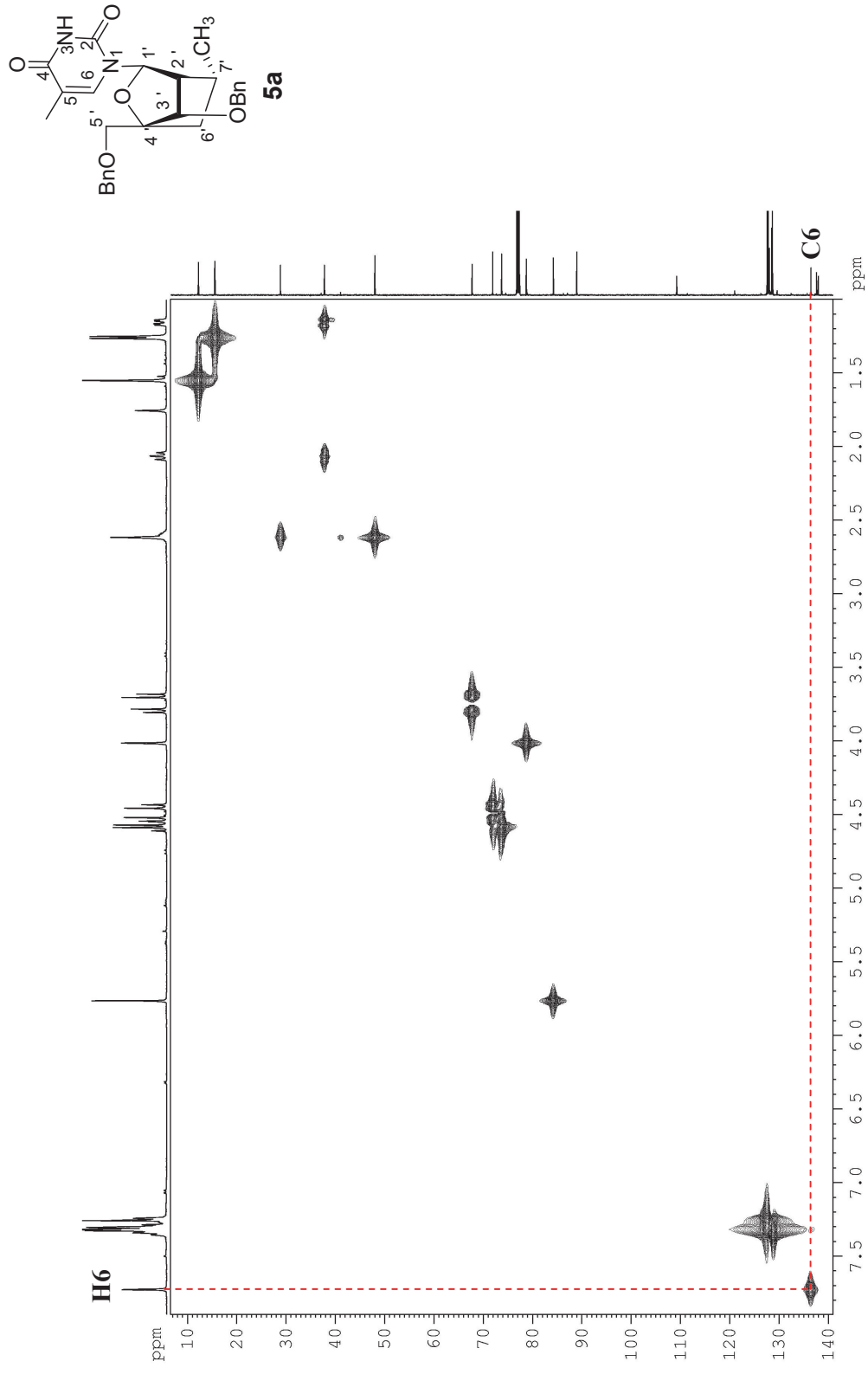


Figure SI.6 HMQC spectrum of compound **5a**

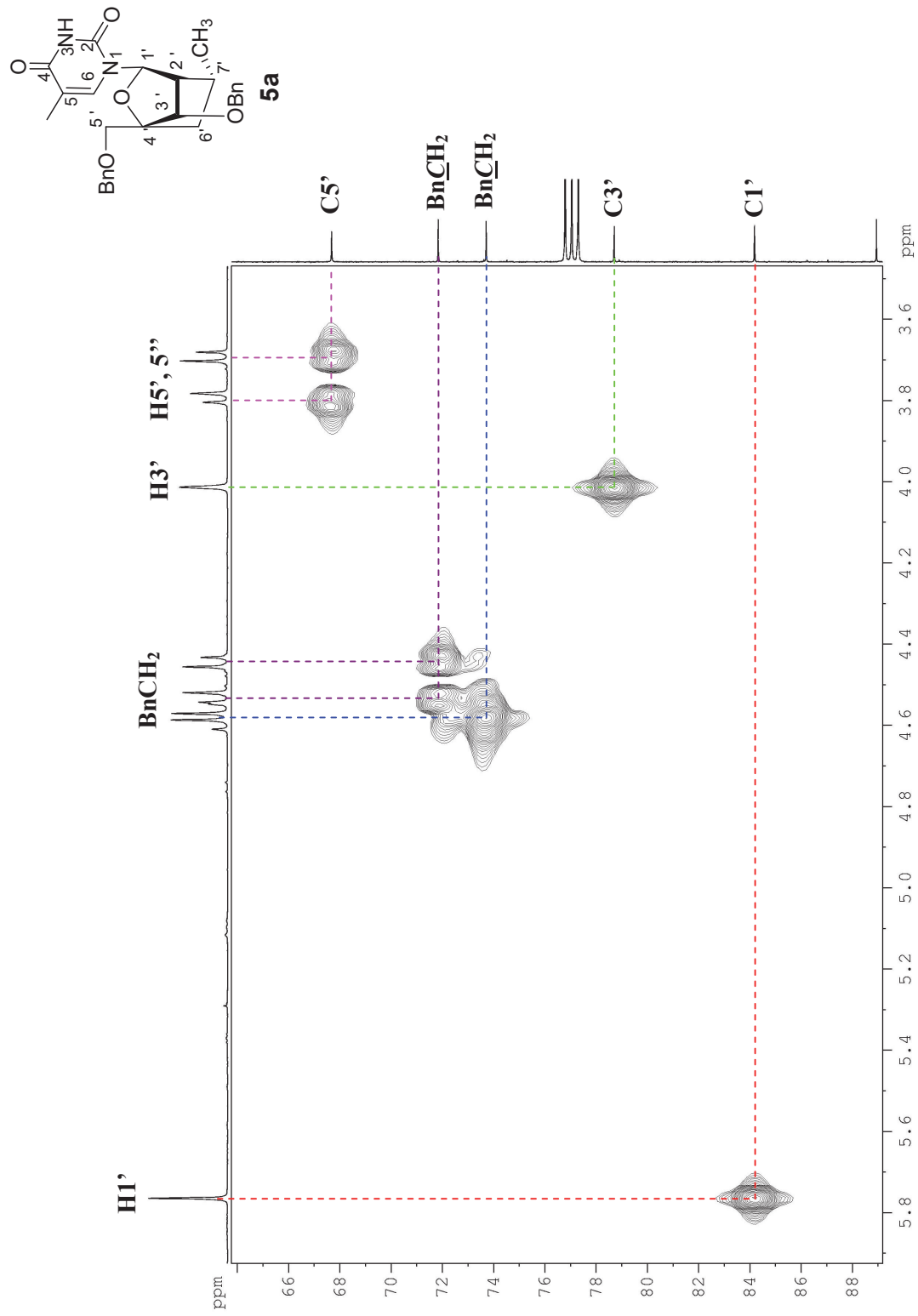


Figure SI.7 Expansion of HMQC spectrum of compound **5a**

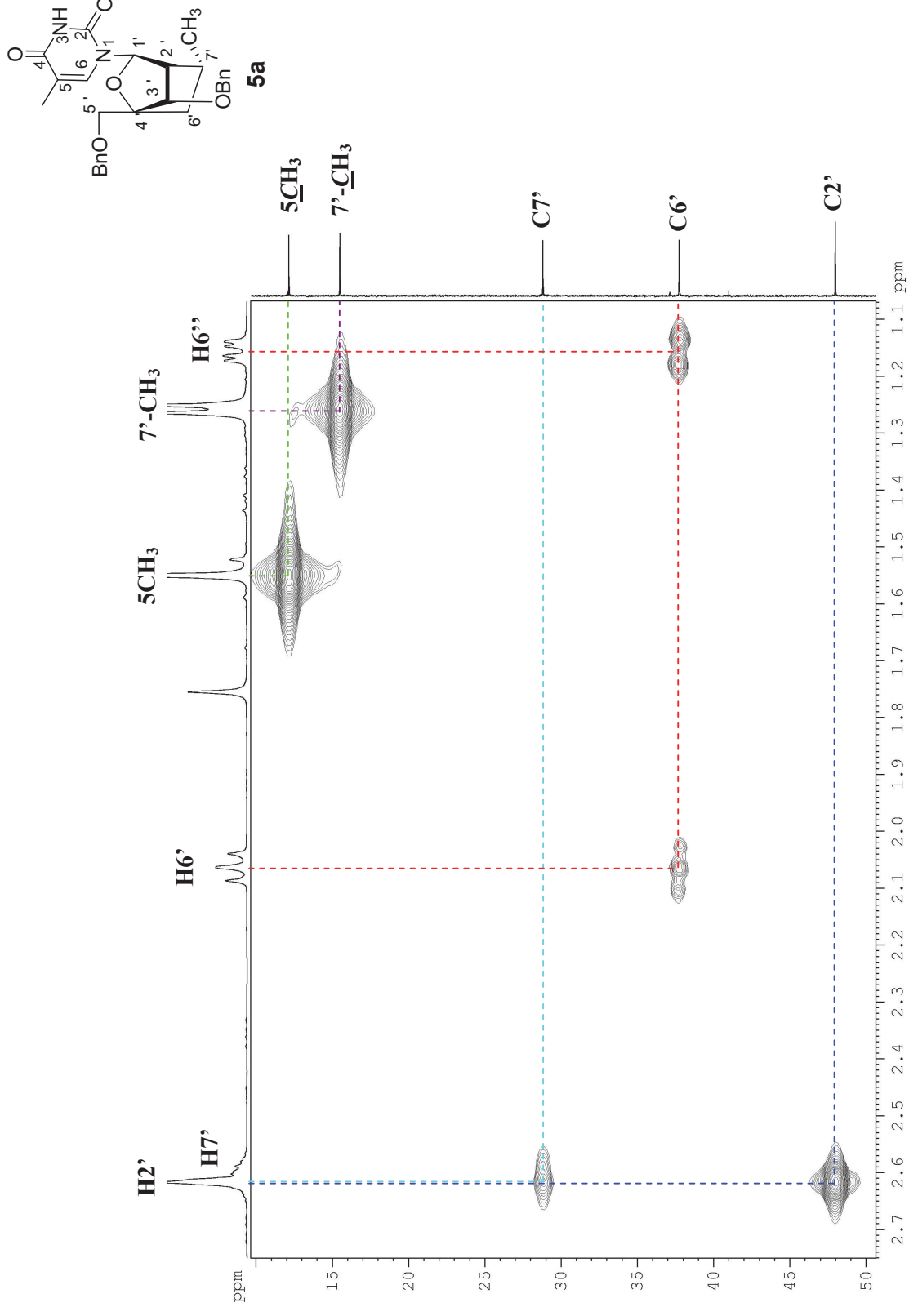


Figure SI.8 Expansion of HMQC spectrum of compound **5a**

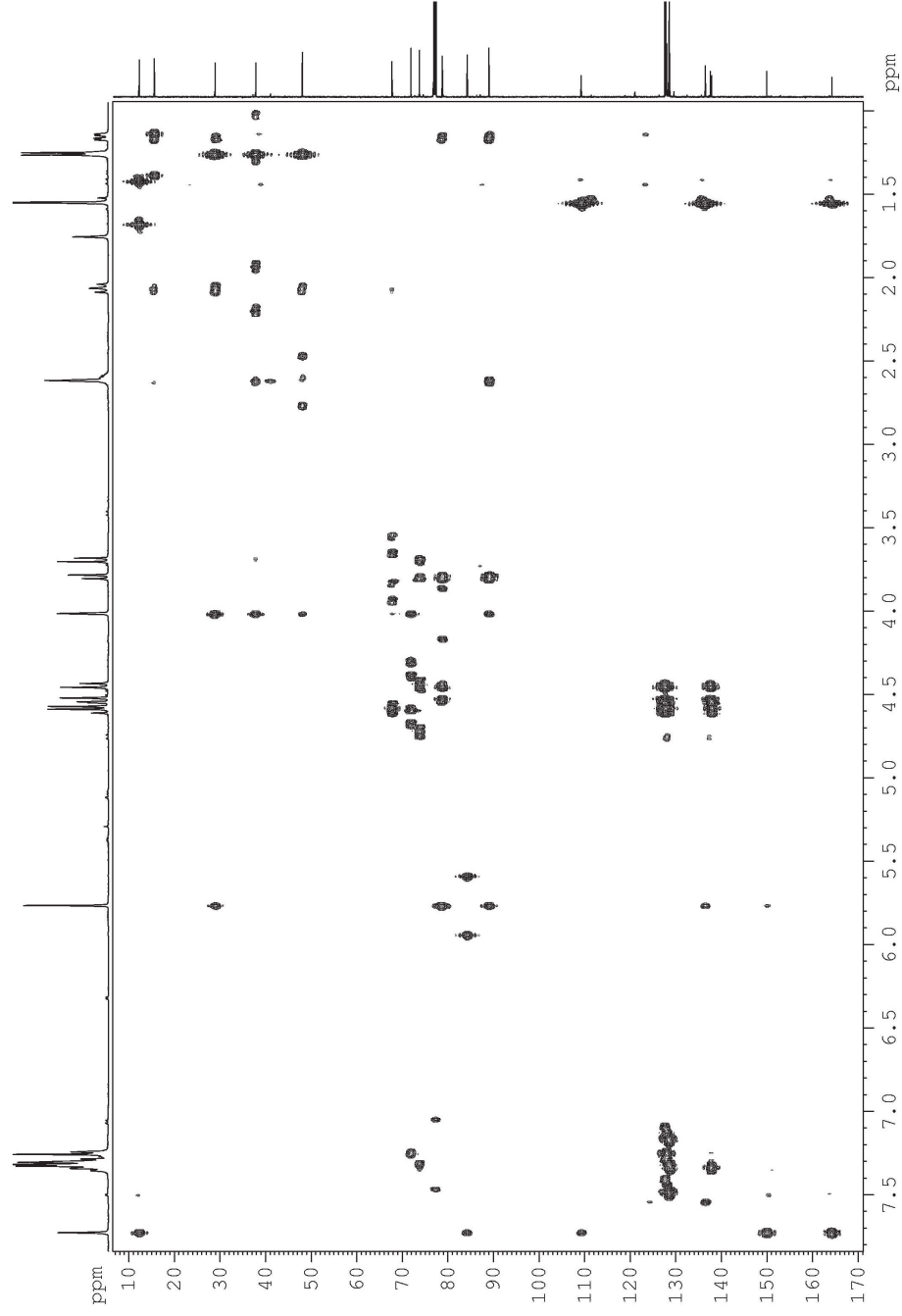
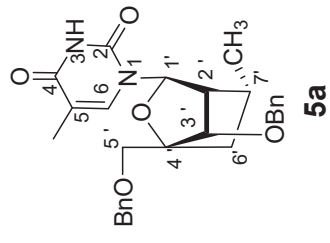


Figure S1.9 HMBC spectrum of compound **5a**

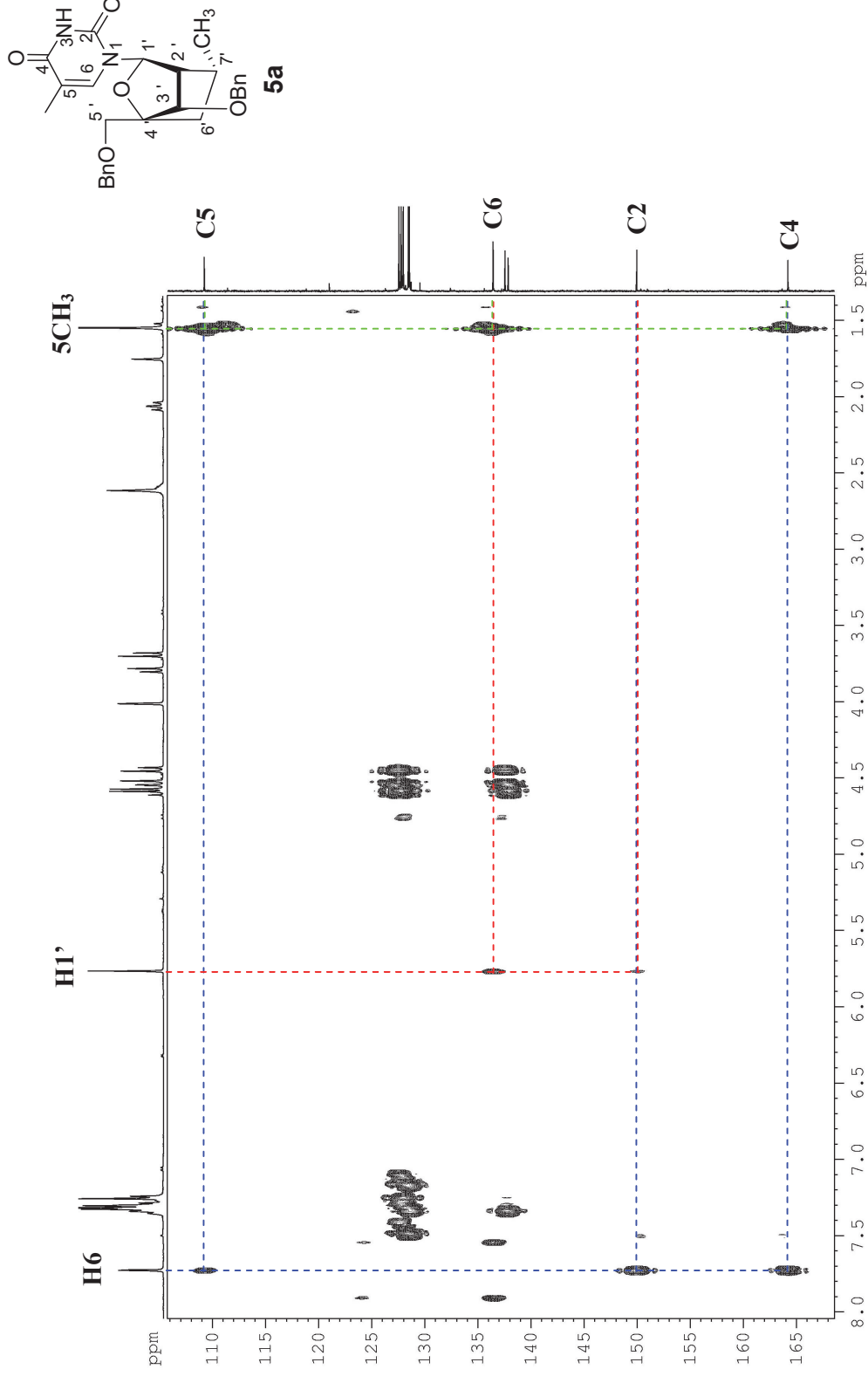


Figure SI.10 Expansion of HMBC spectrum of compound 5a

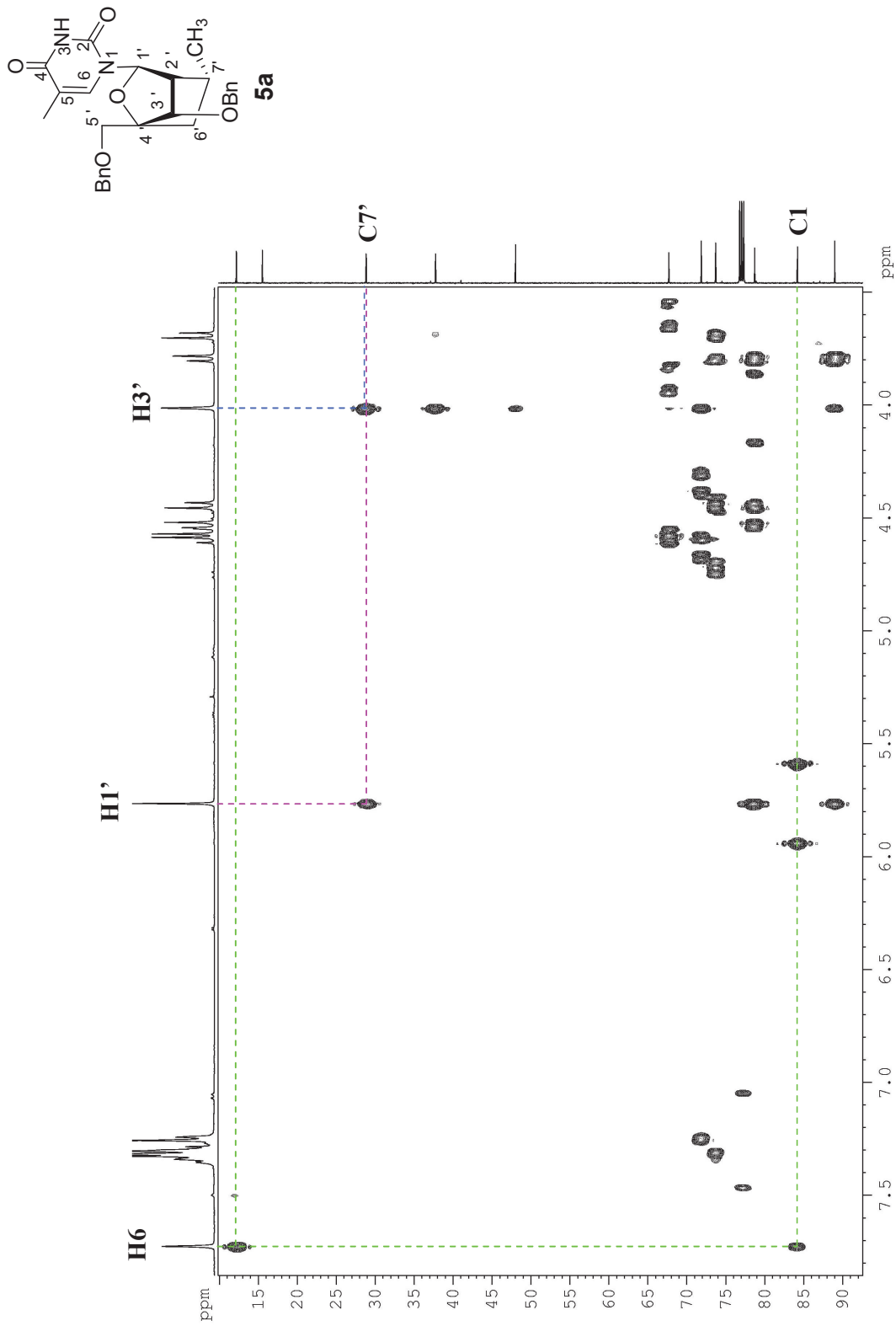


Figure SI.1.1 Expansion of HMBC spectrum of compound **5a**

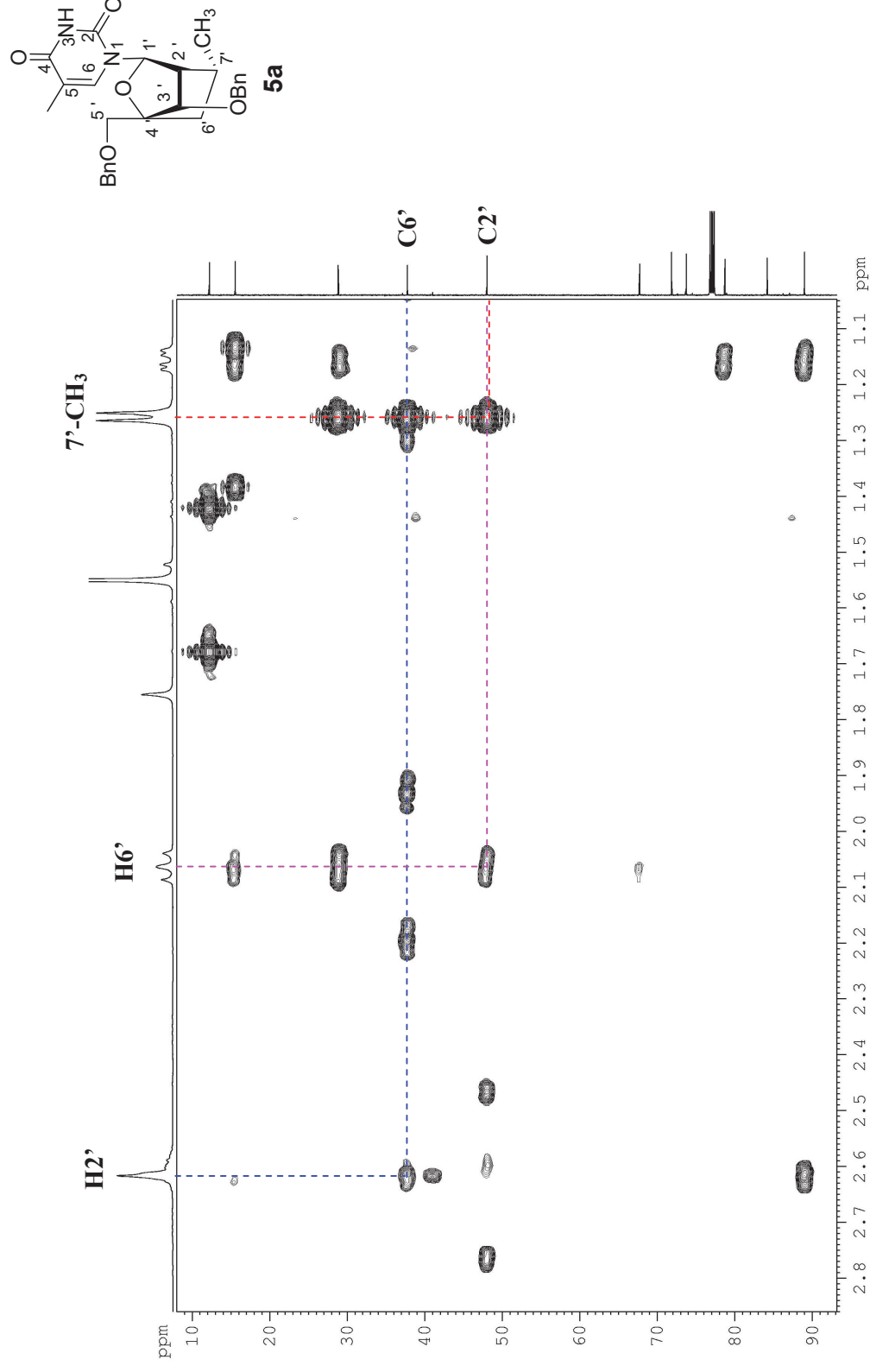


Figure SI.12 Expansion of HMBC spectrum of compound **5a**

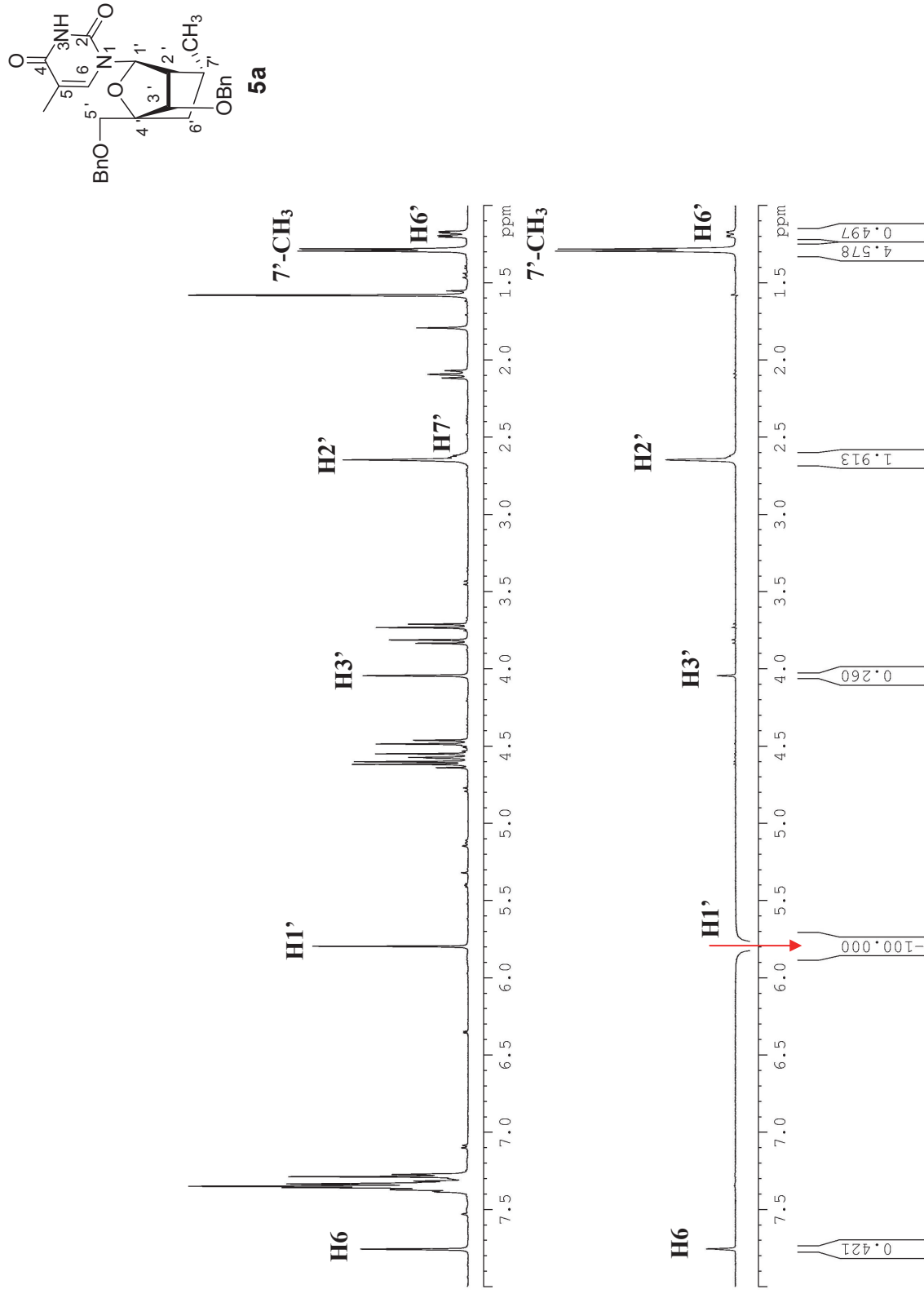


Figure SI.13 1D nOe spectrum of compound 5a

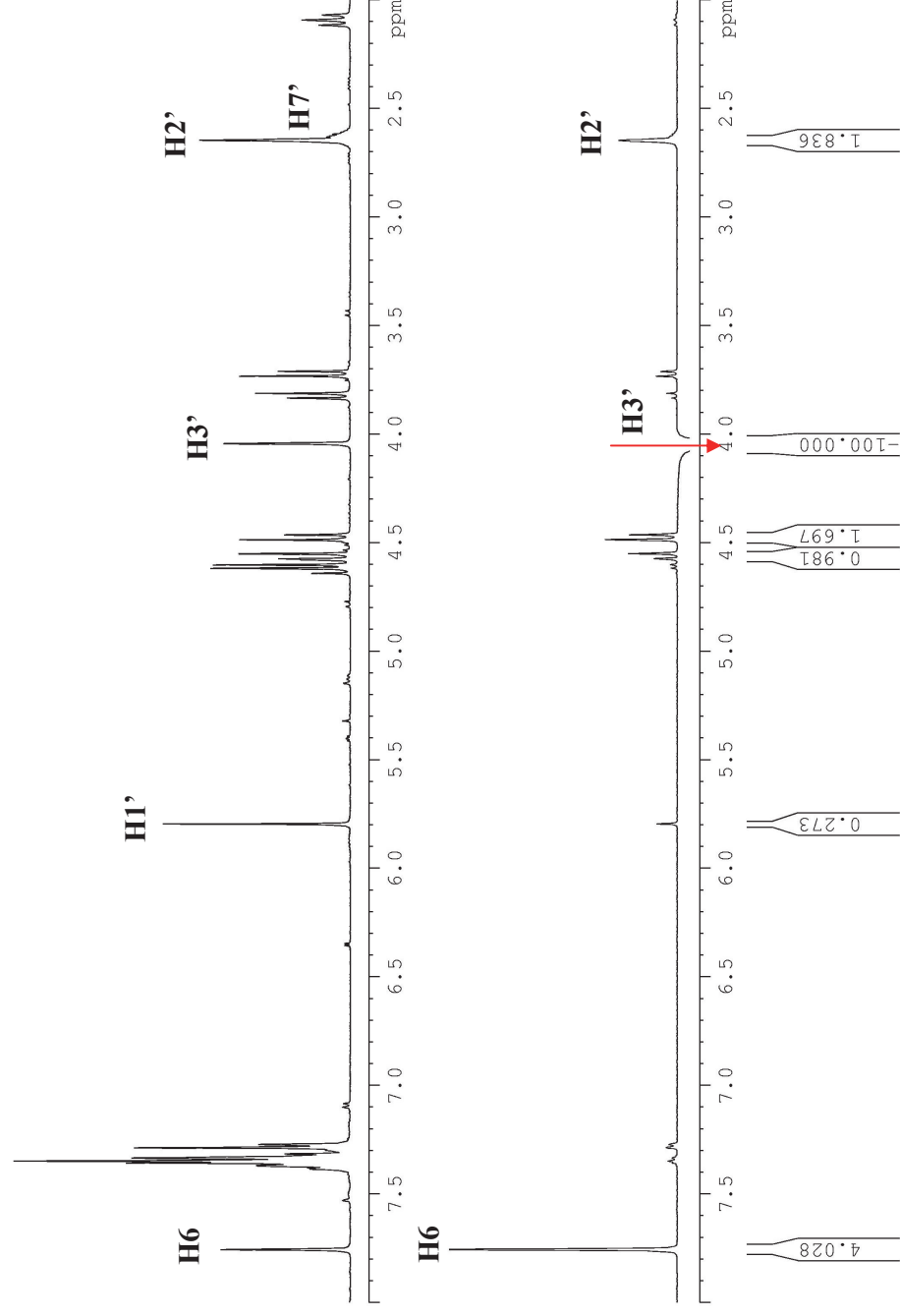
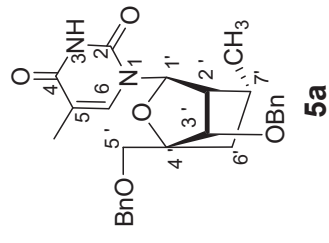


Figure SI.14 1D nOe spectrum of compound 5a

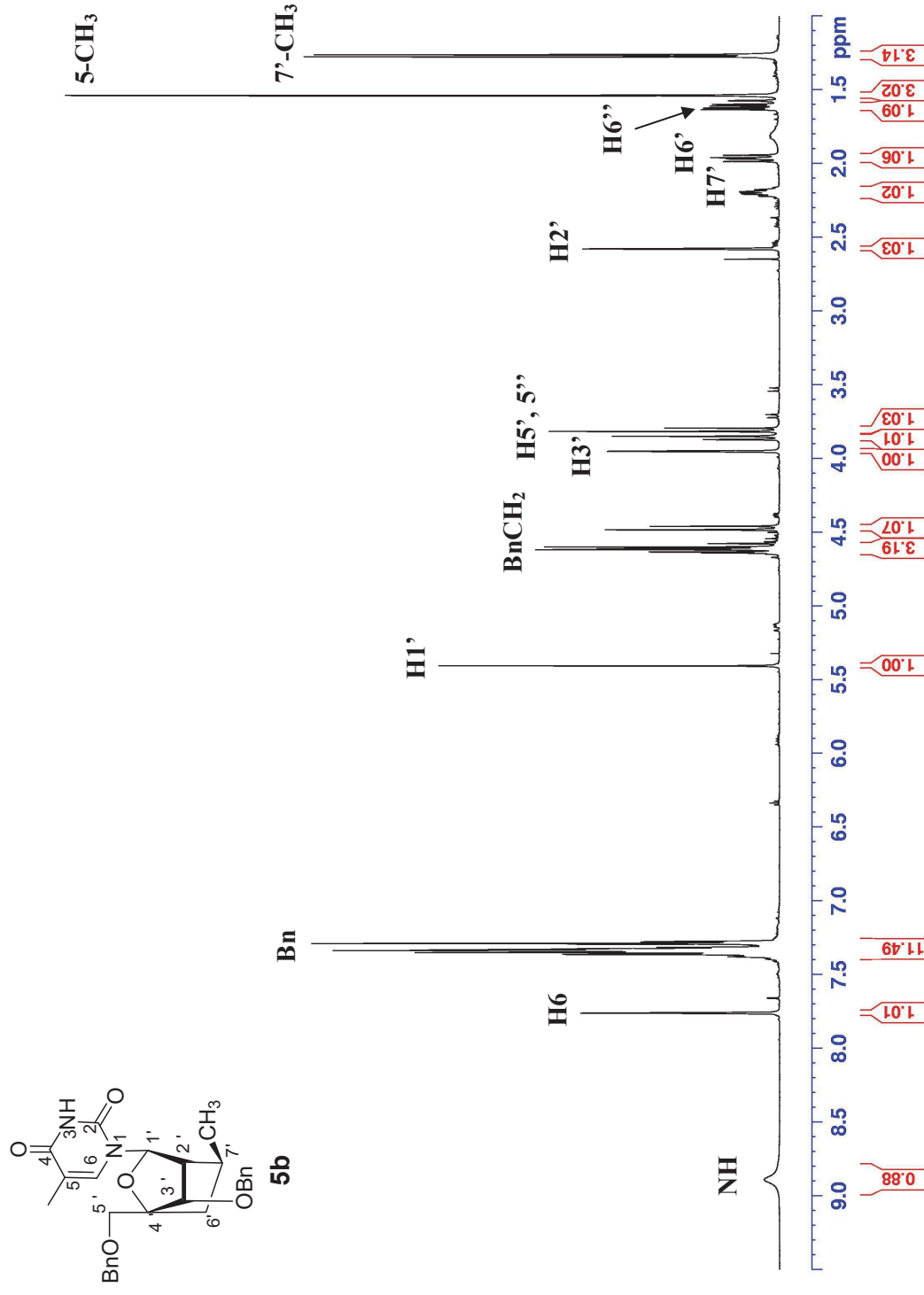


Figure SI.15 ^1H NMR spectrum of compound **5b**

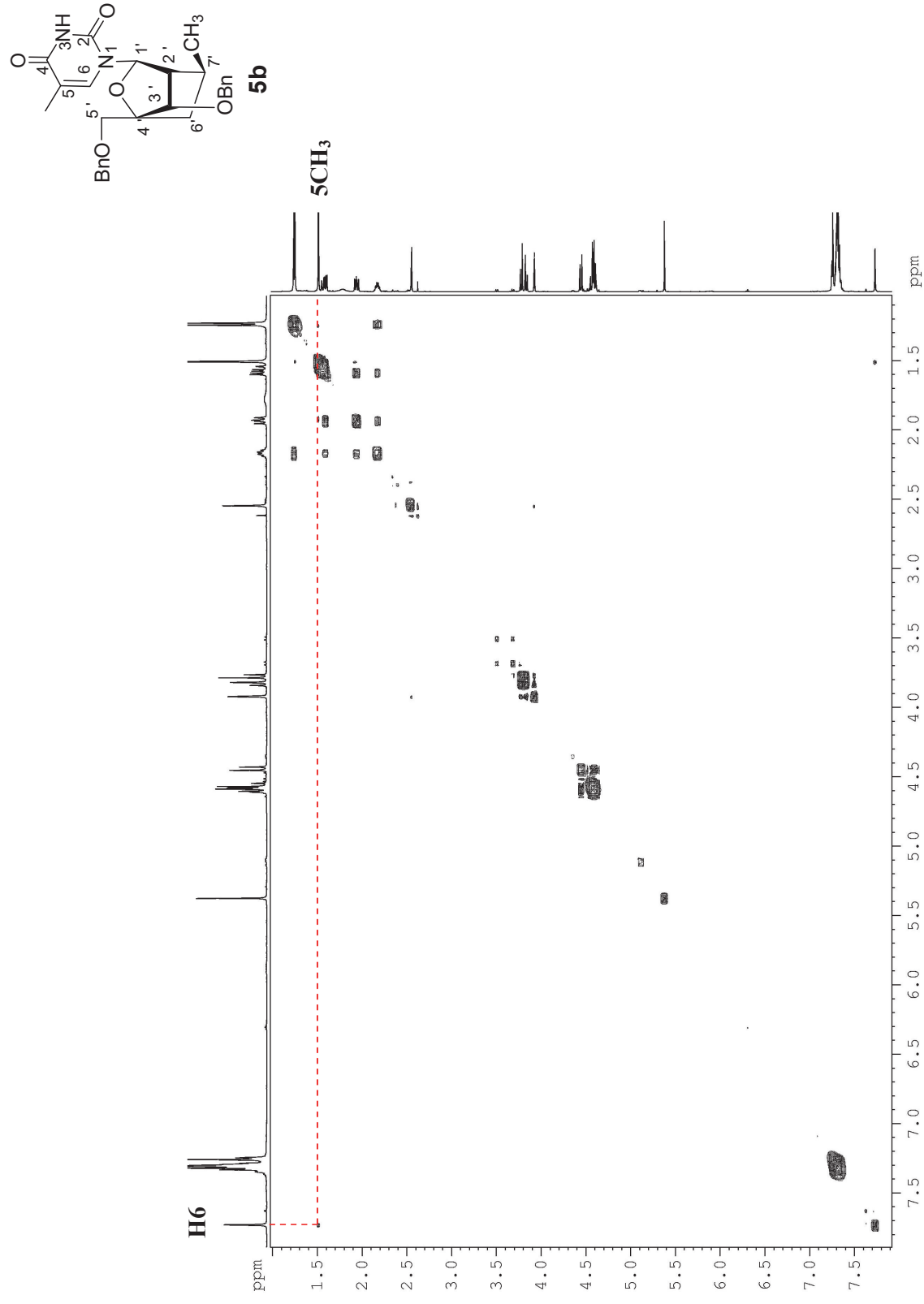


Figure SI.16 COSY spectrum of compound **5b**

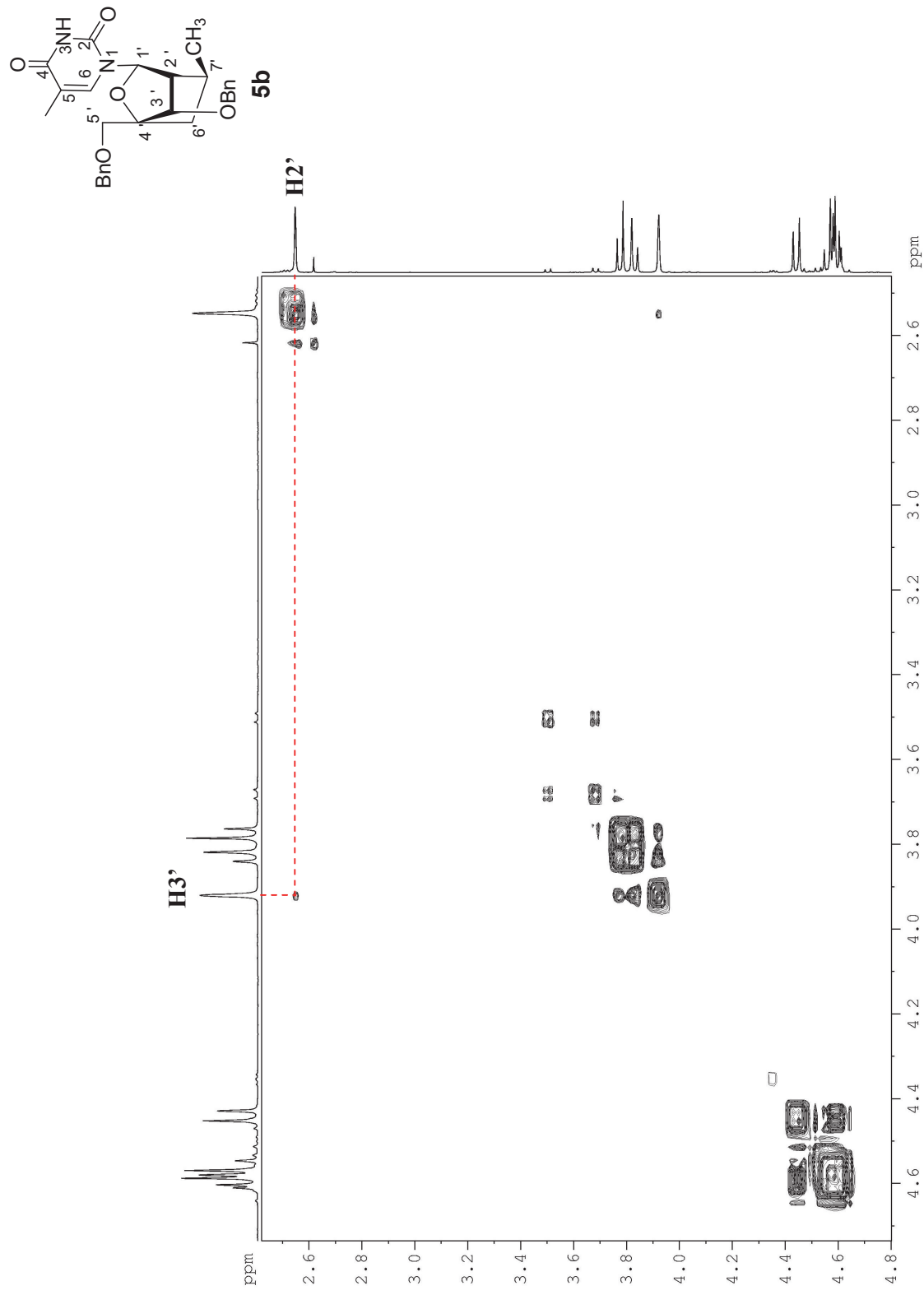


Figure SI.17 Expansion of COSY spectrum of compound 5b

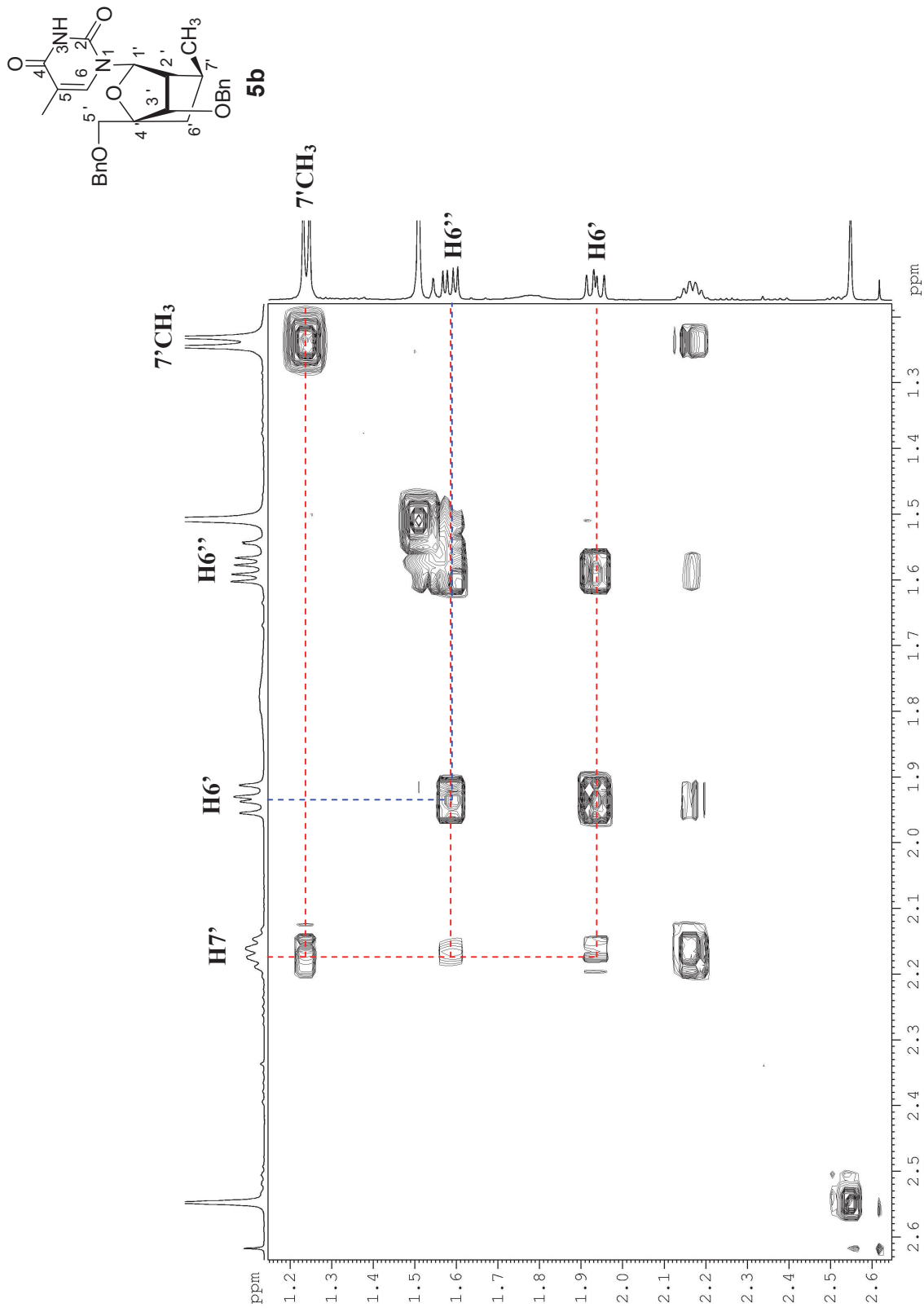


Figure SI.18 Expansion of COSY spectrum of compound **5b**

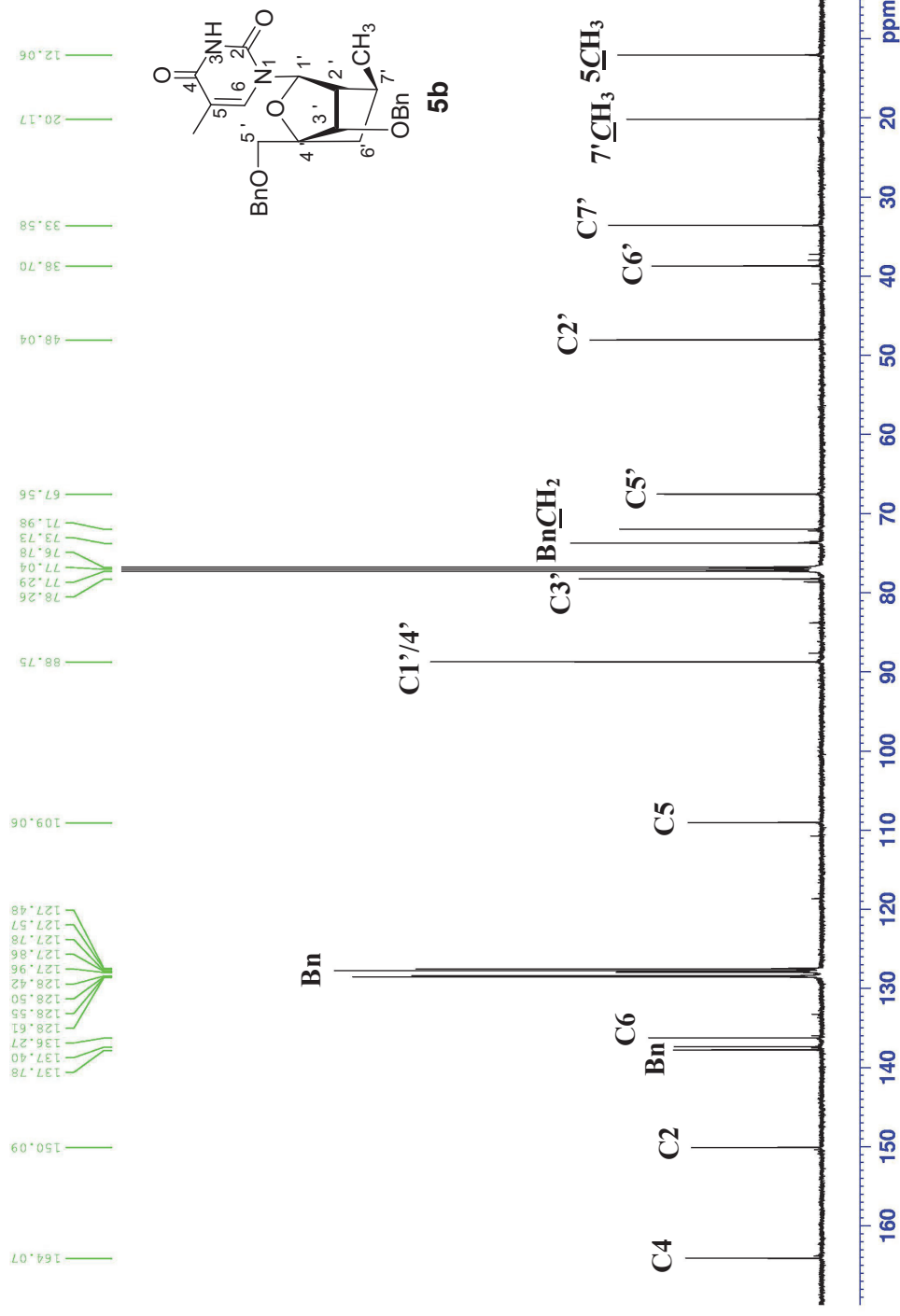


Figure S1.19 ¹³C NMR spectrum of compound **5b**

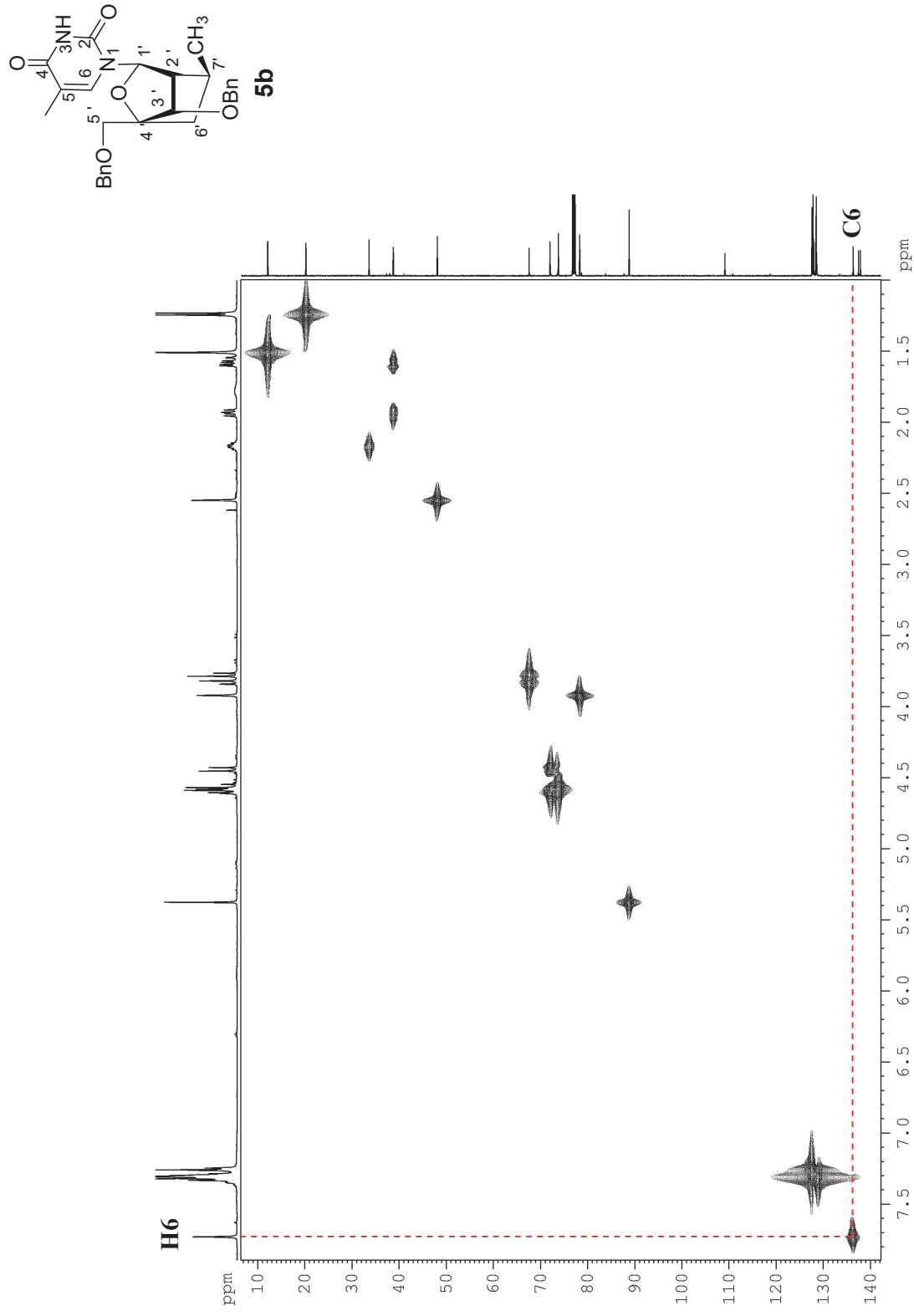


Figure SI.20 HMQC spectrum of compound **5b**

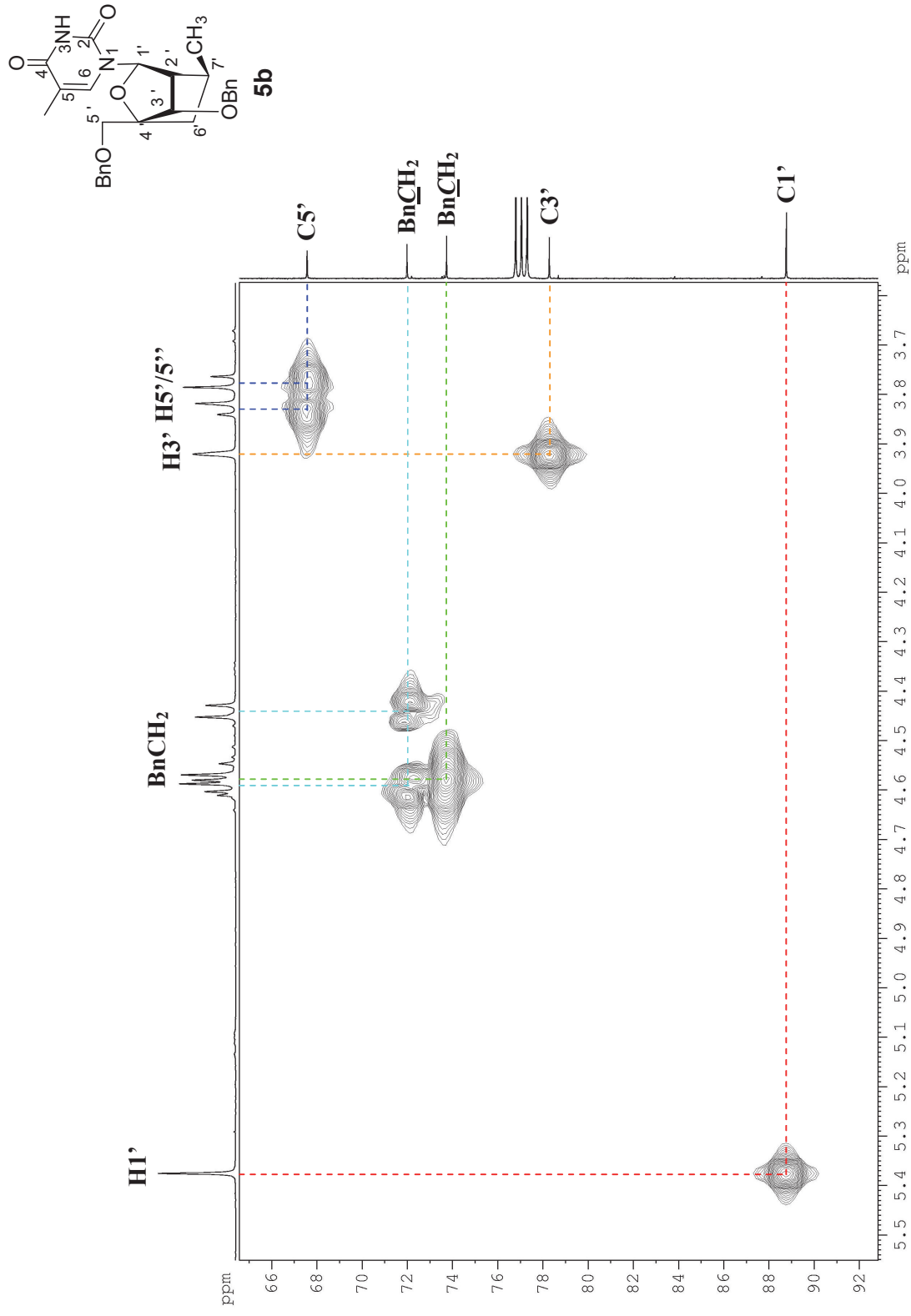


Figure SI.21 Expansion of HMQC spectrum of compound **5b**

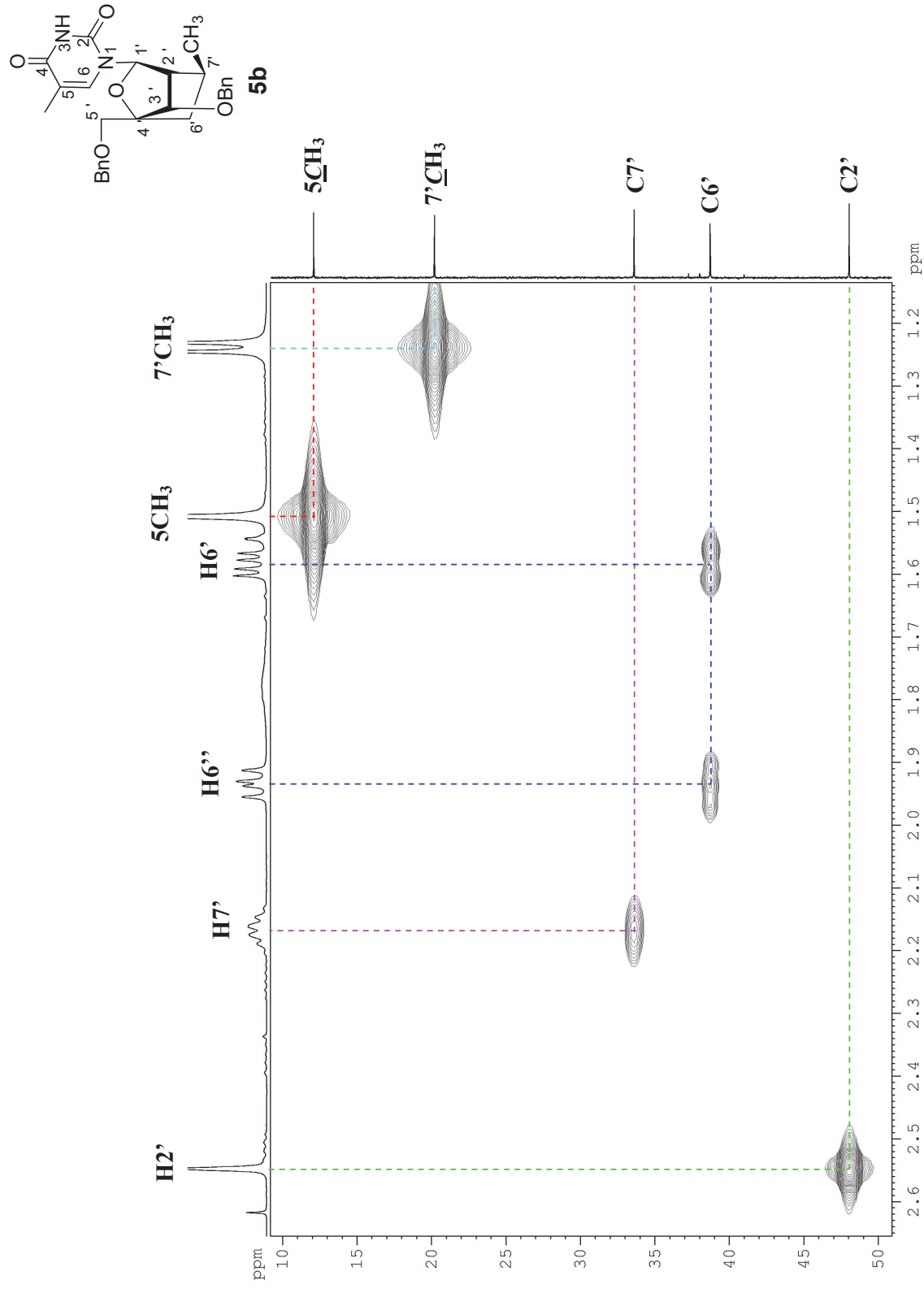


Figure SI.22 Expansion of HMOC spectrum of compound **5b**

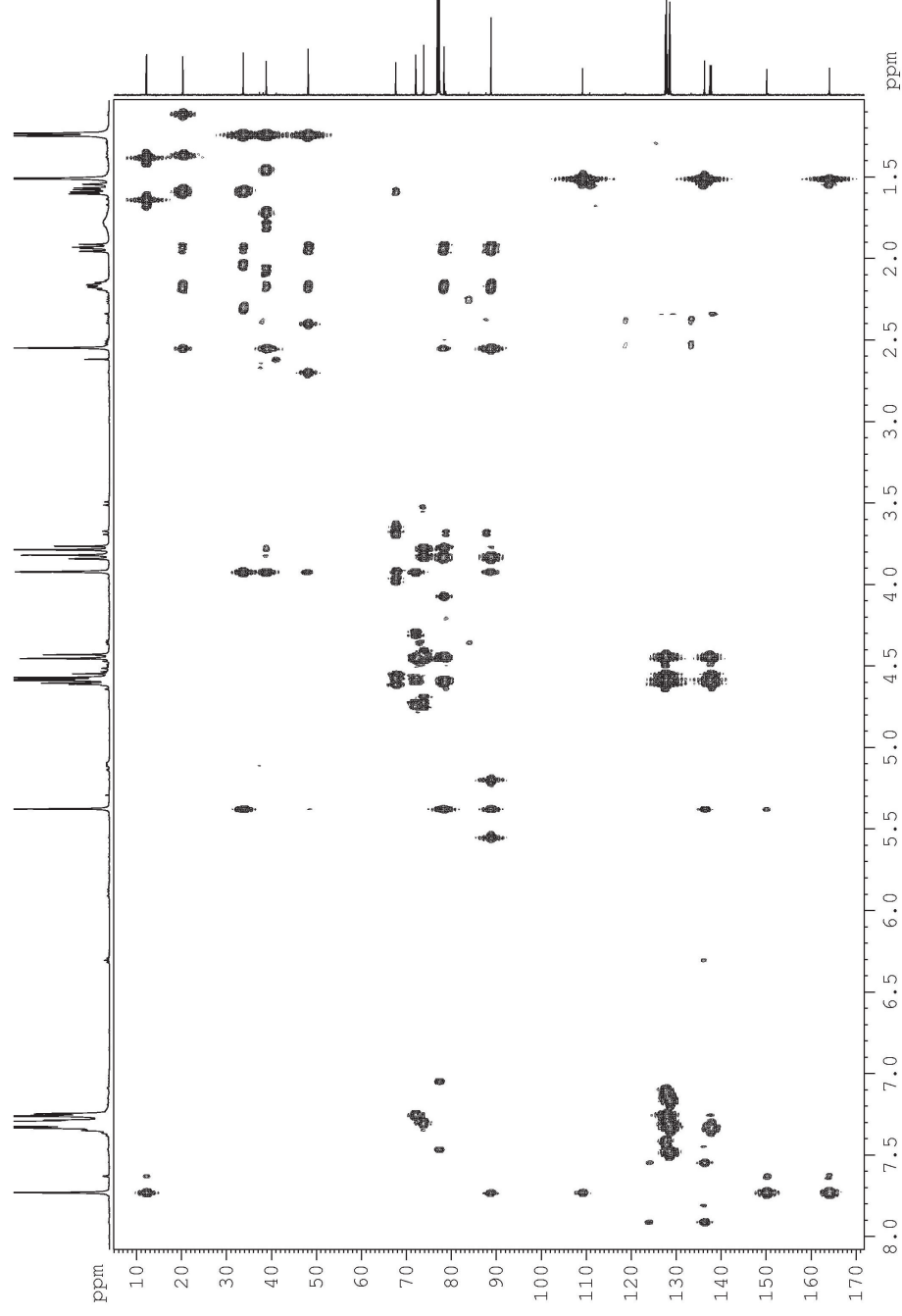
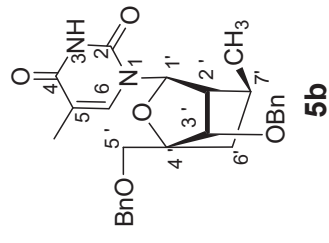


Figure SI.23 HMBC spectrum of compound **5b**

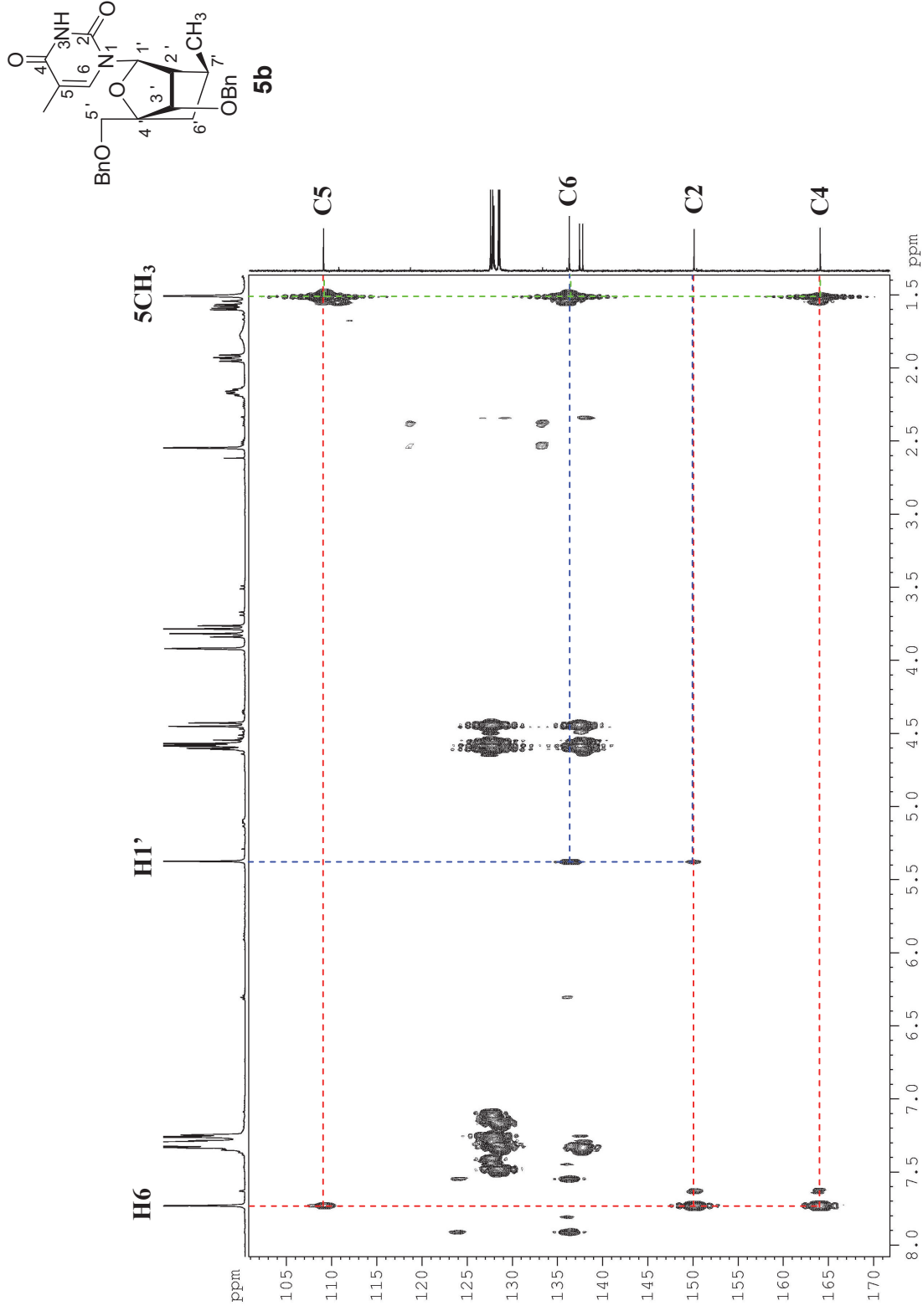


Figure SI.24 Expansion of HMBC spectrum of compound 5b

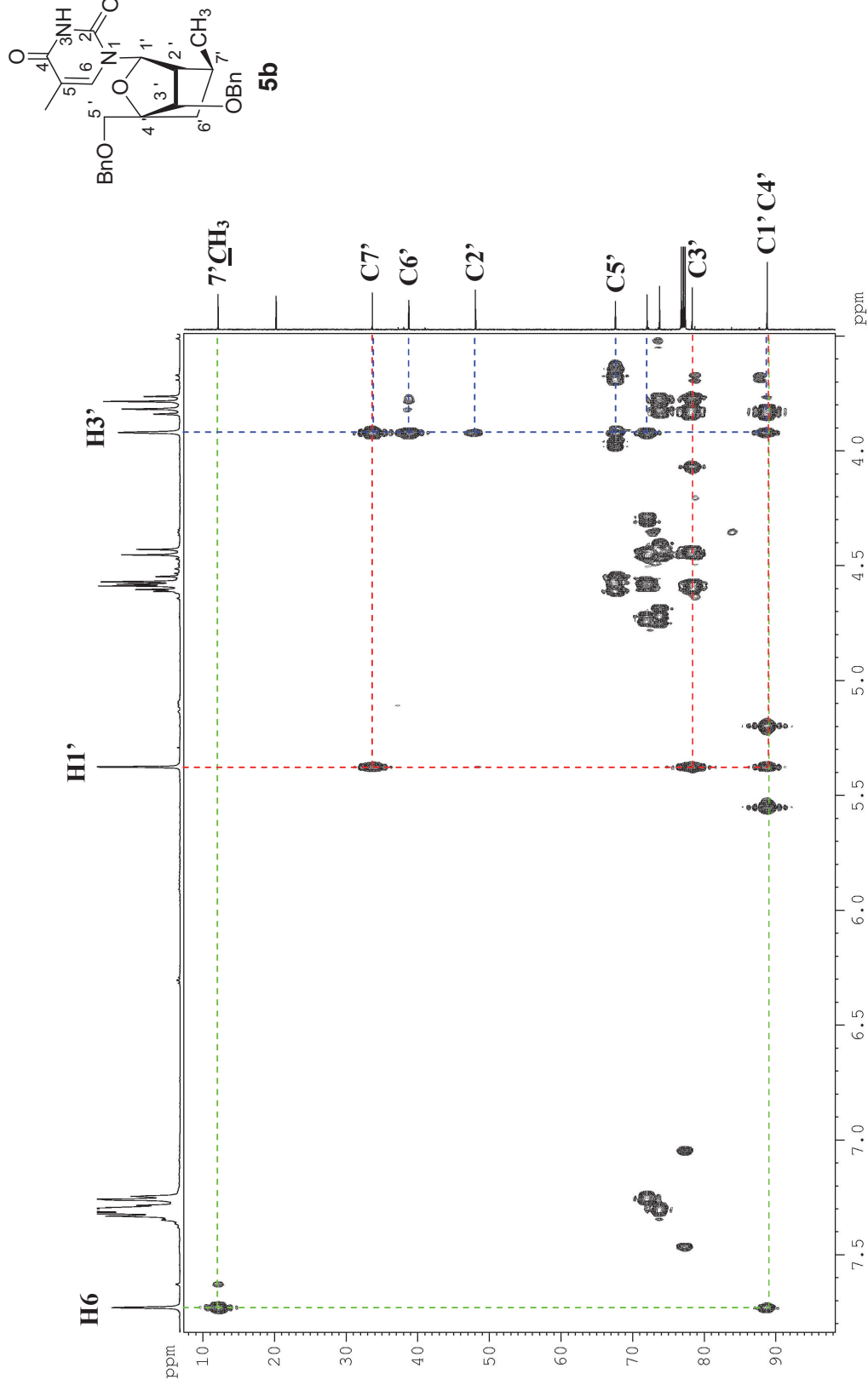


Figure SI.25 Expansion of HMBC spectrum of compound **5b**

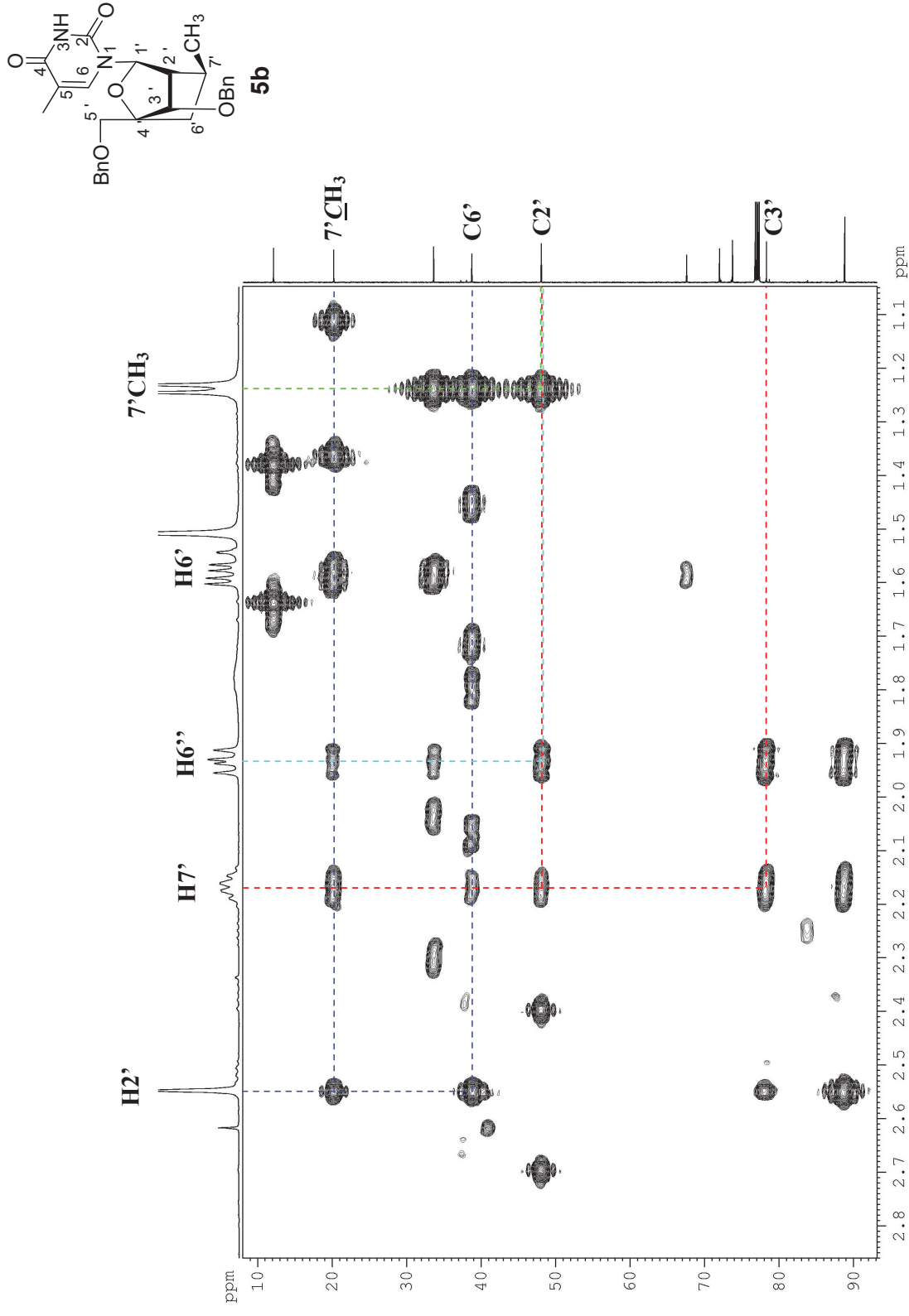


Figure SI.26 Expansion of HMBC spectrum of compound **5b**

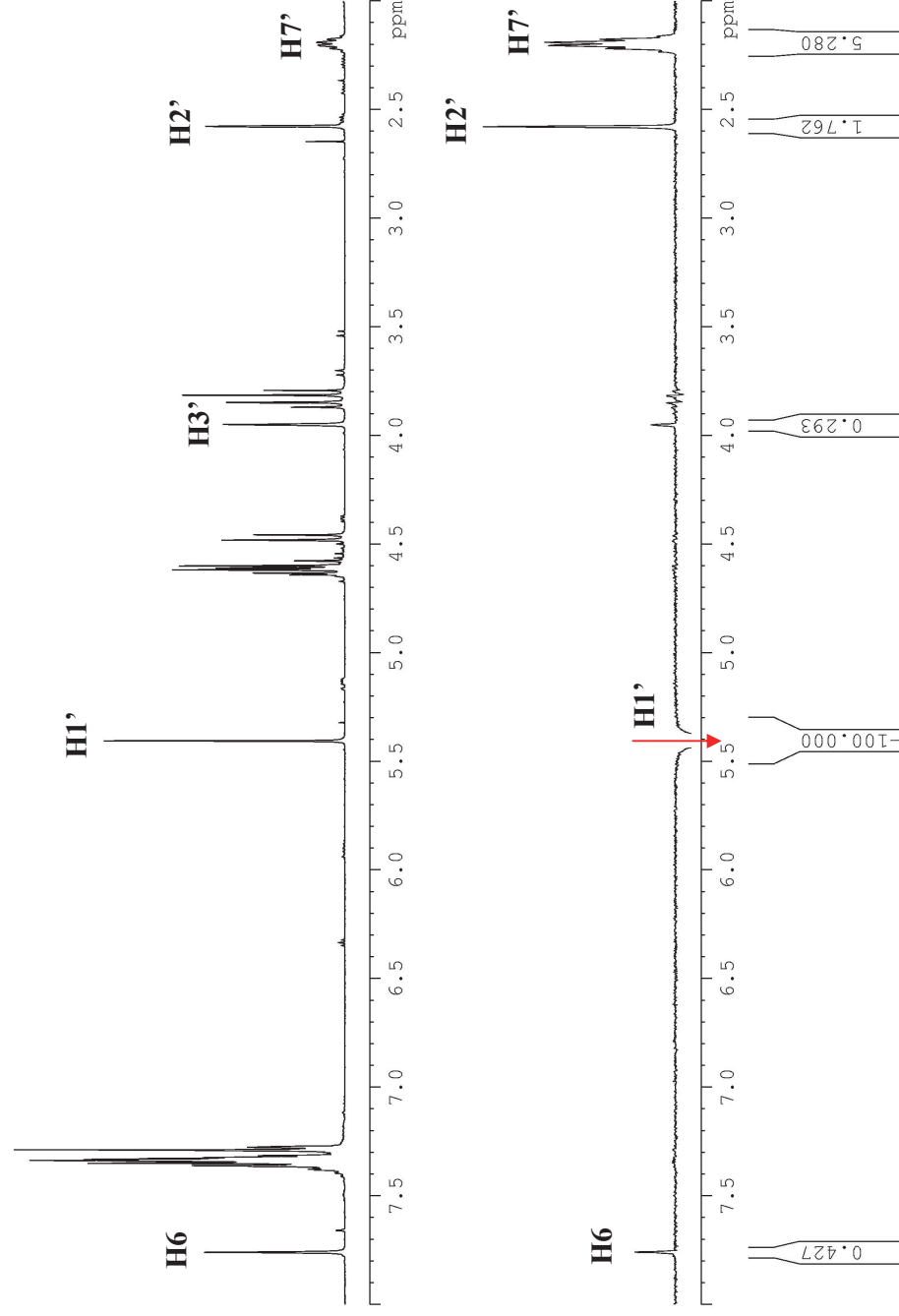
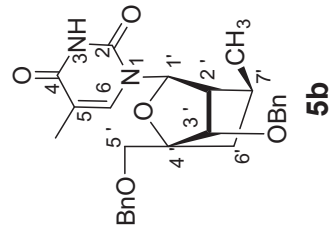


Figure SI.27 1D nOe spectrum of compound **5b**

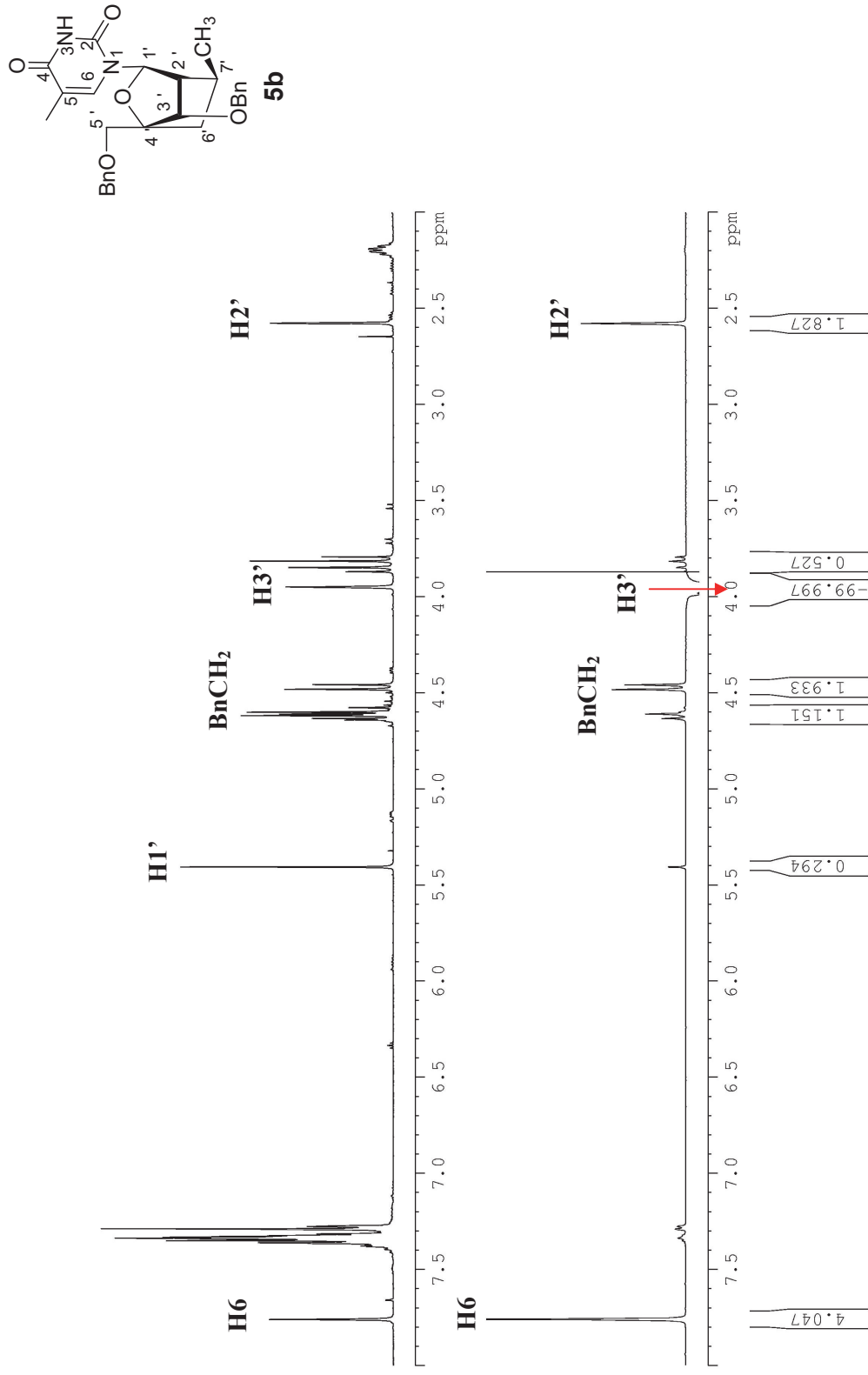
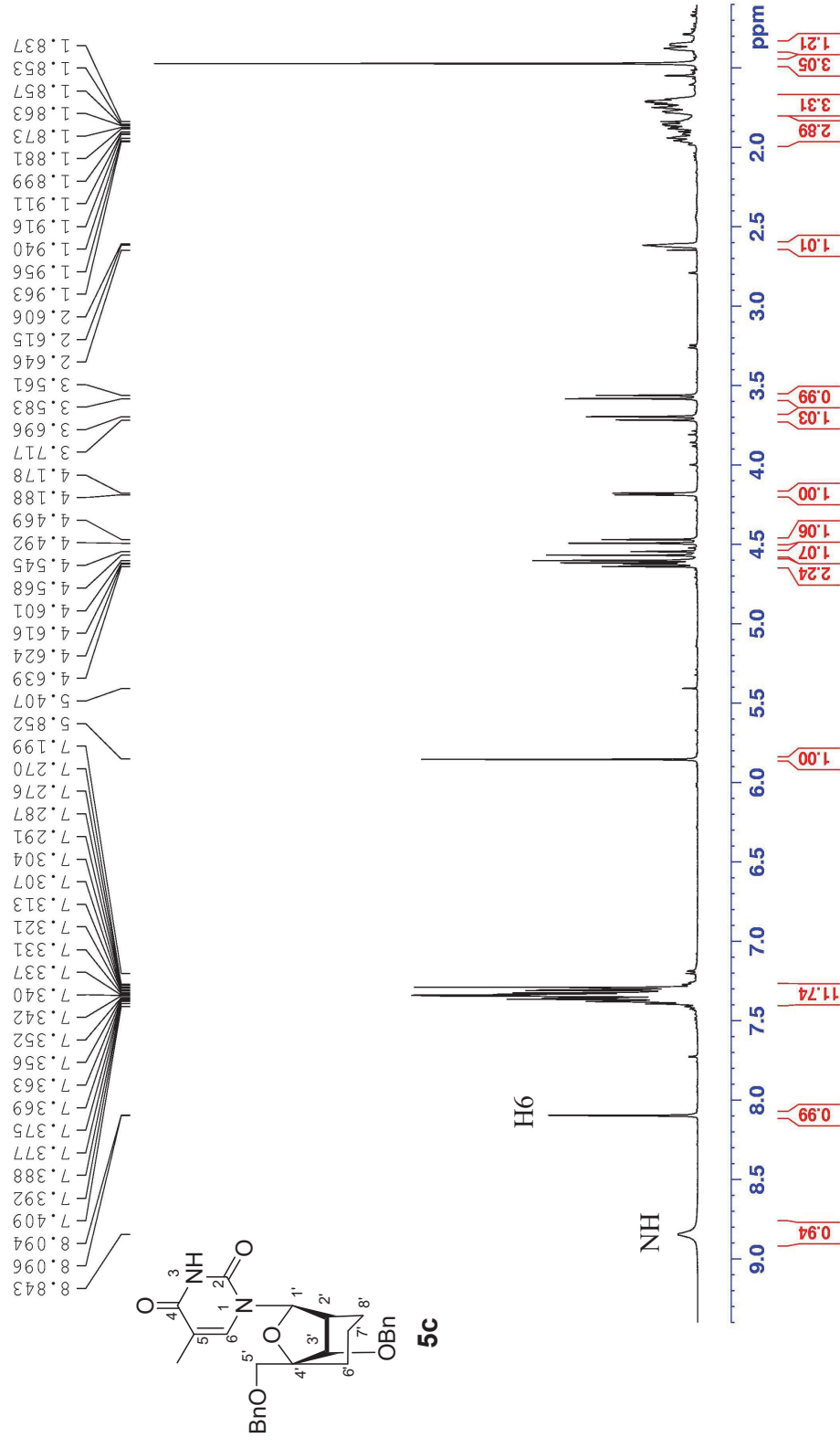


Figure SI.28 1D nOe spectrum of compound 5b



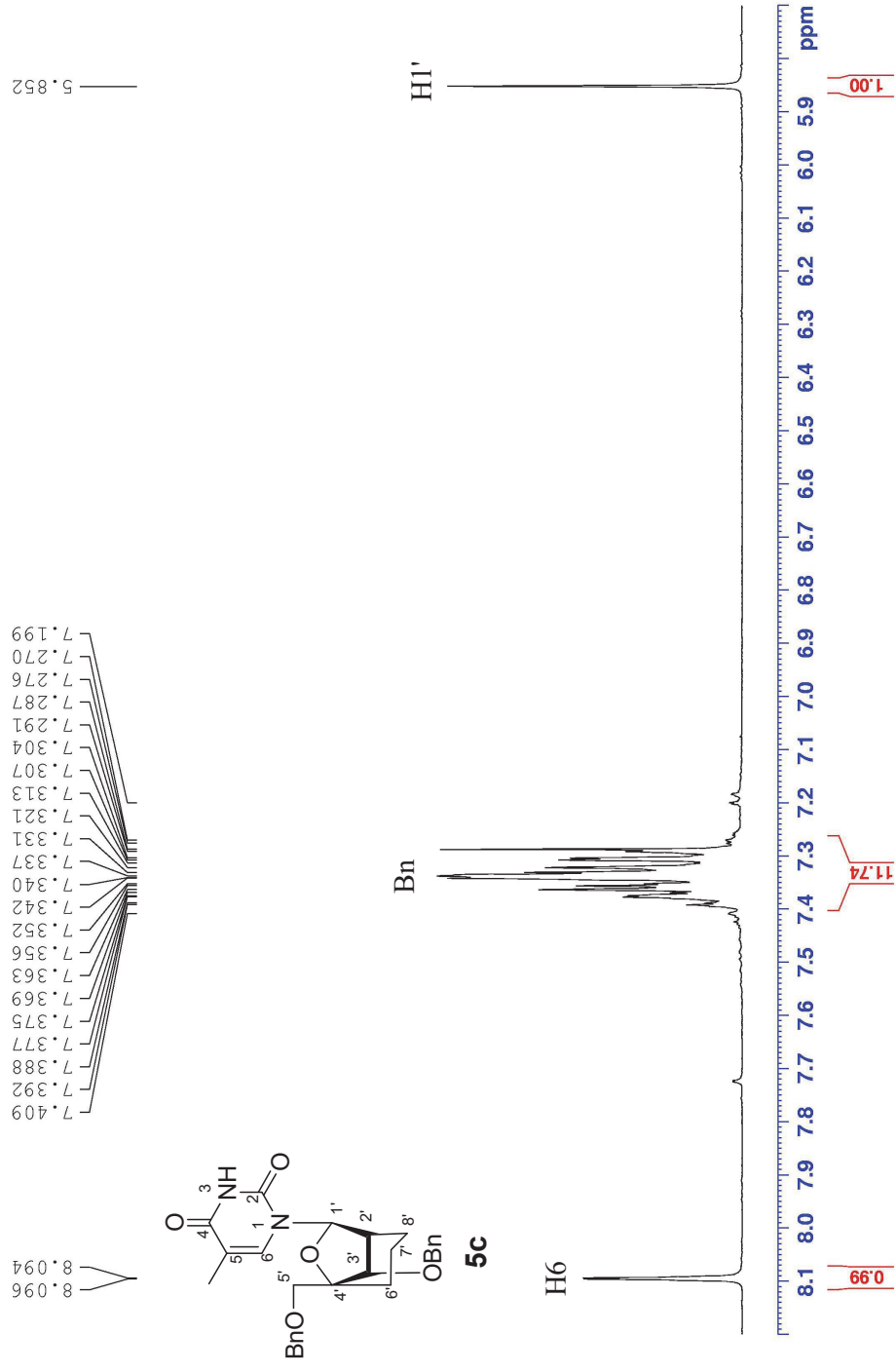


Figure SI.30 Expansion of ¹H NMR spectrum of compound **5c**

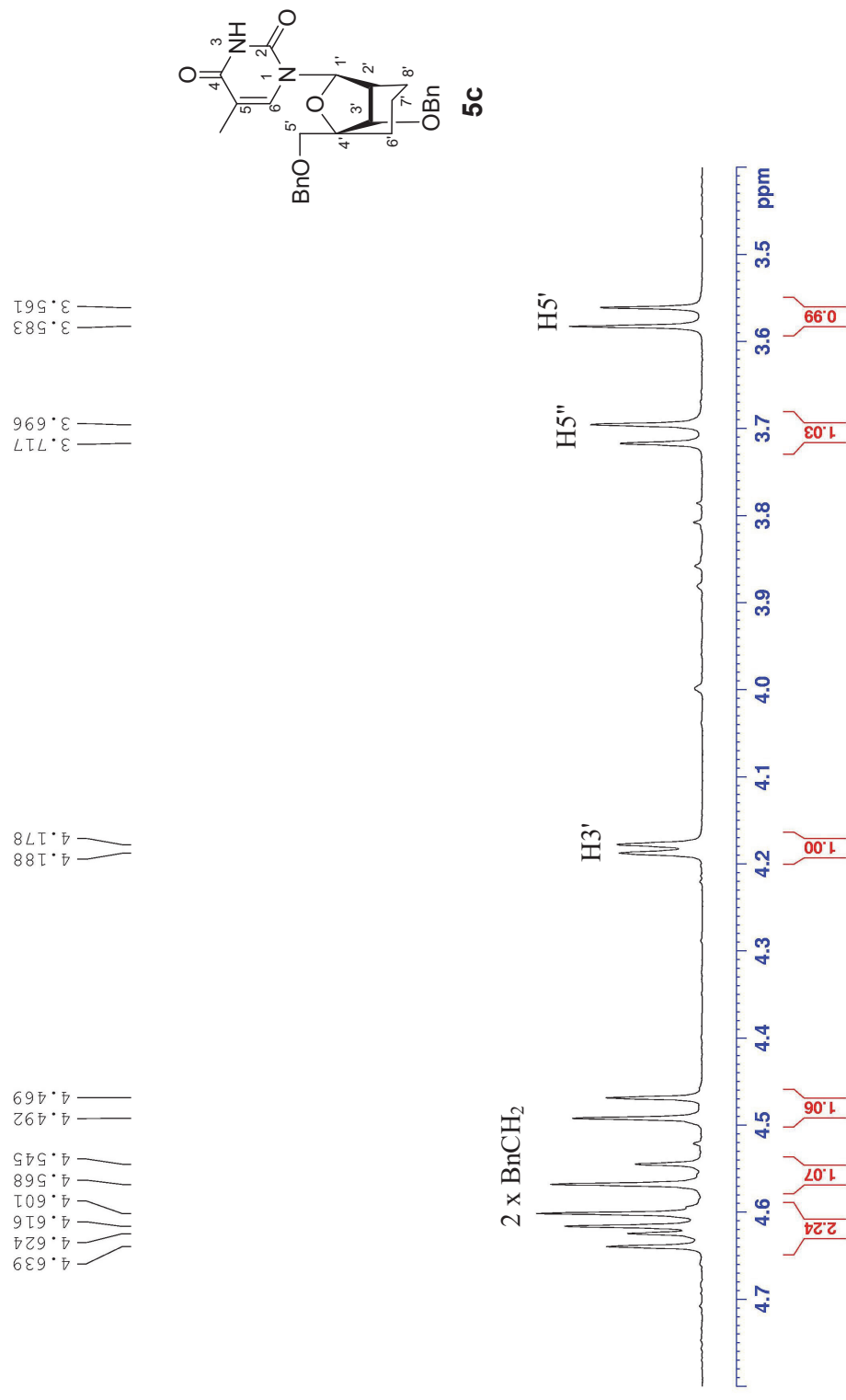


Figure SI.31 Expansion of ^1H NMR spectrum of compound **5c**

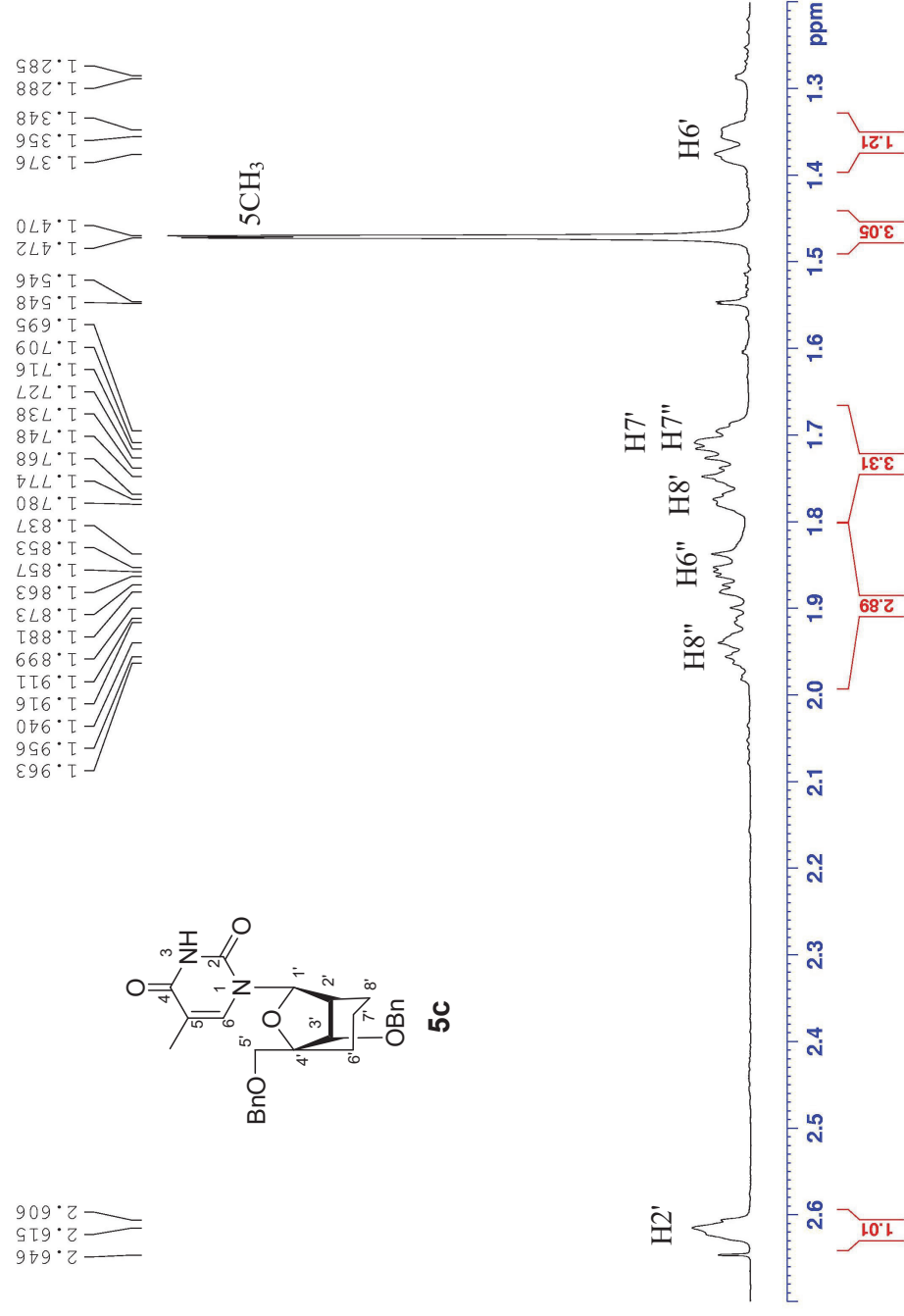


Figure SI.32 Expansion of ^1H NMR spectrum of compound **5c**

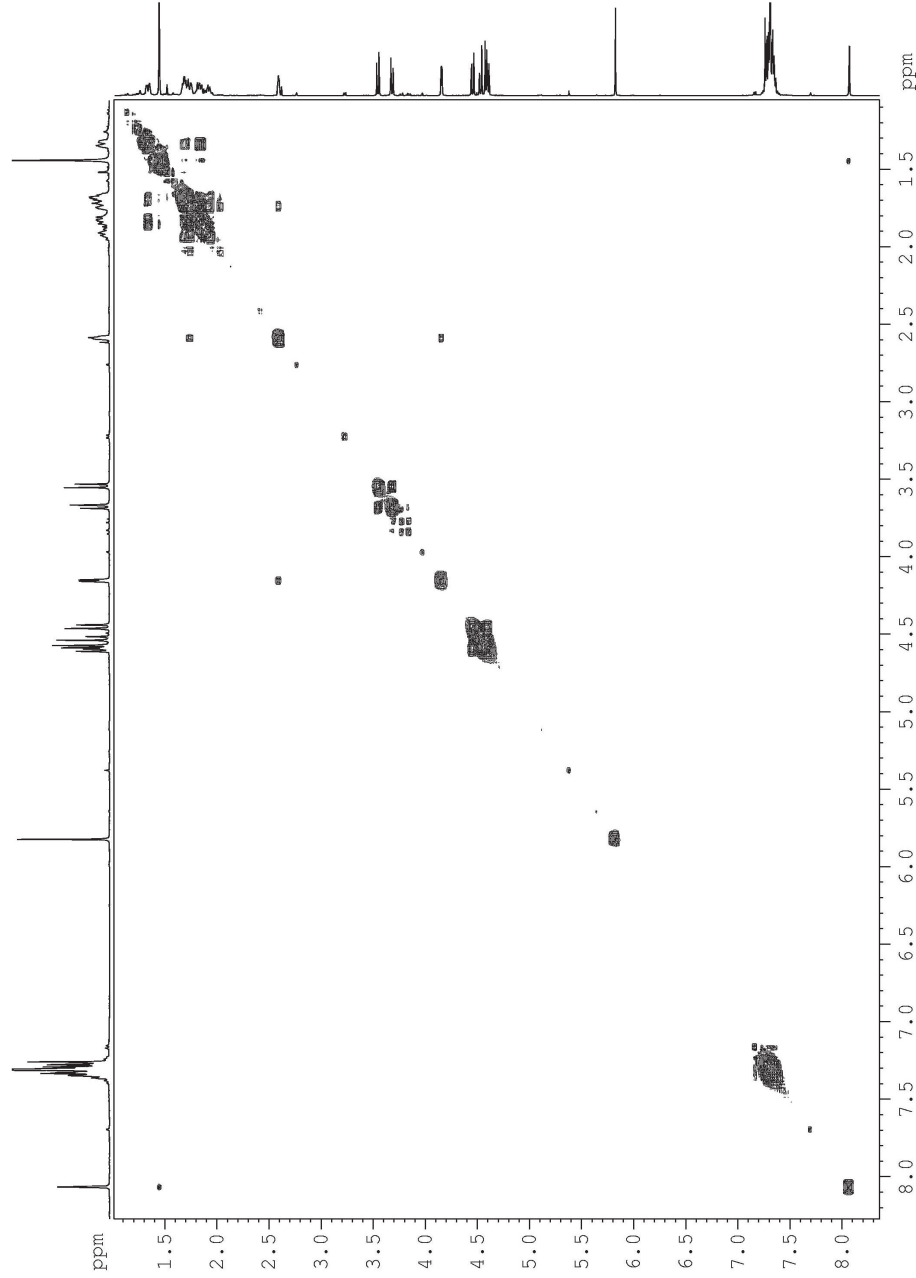
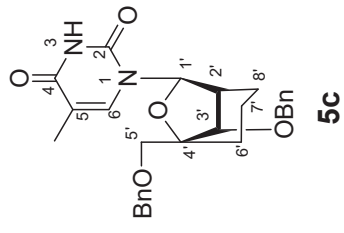


Figure SI.33 COSY spectrum of compound 5c

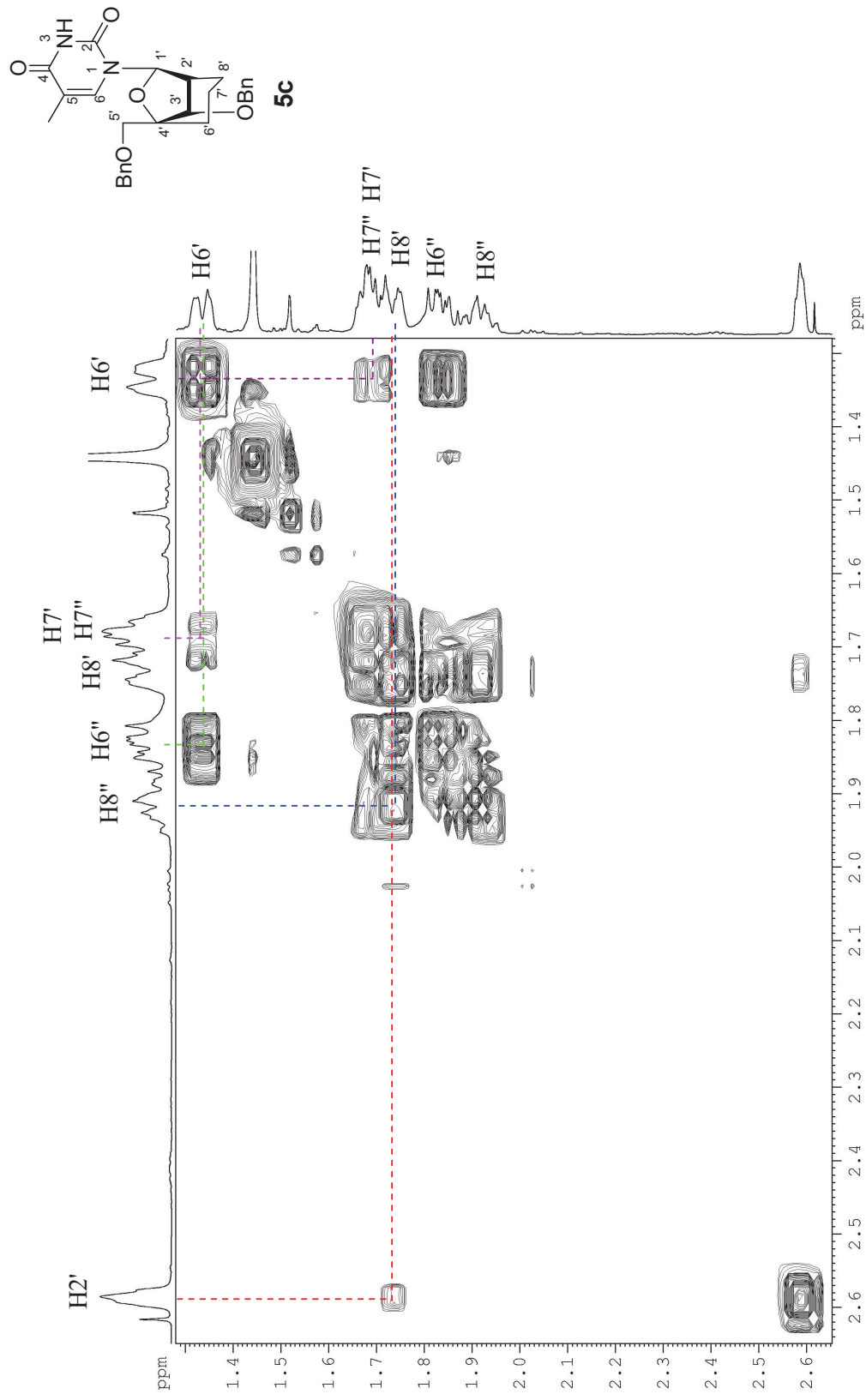


Figure SI.34 Expansion of COSY spectrum of compound **5c**

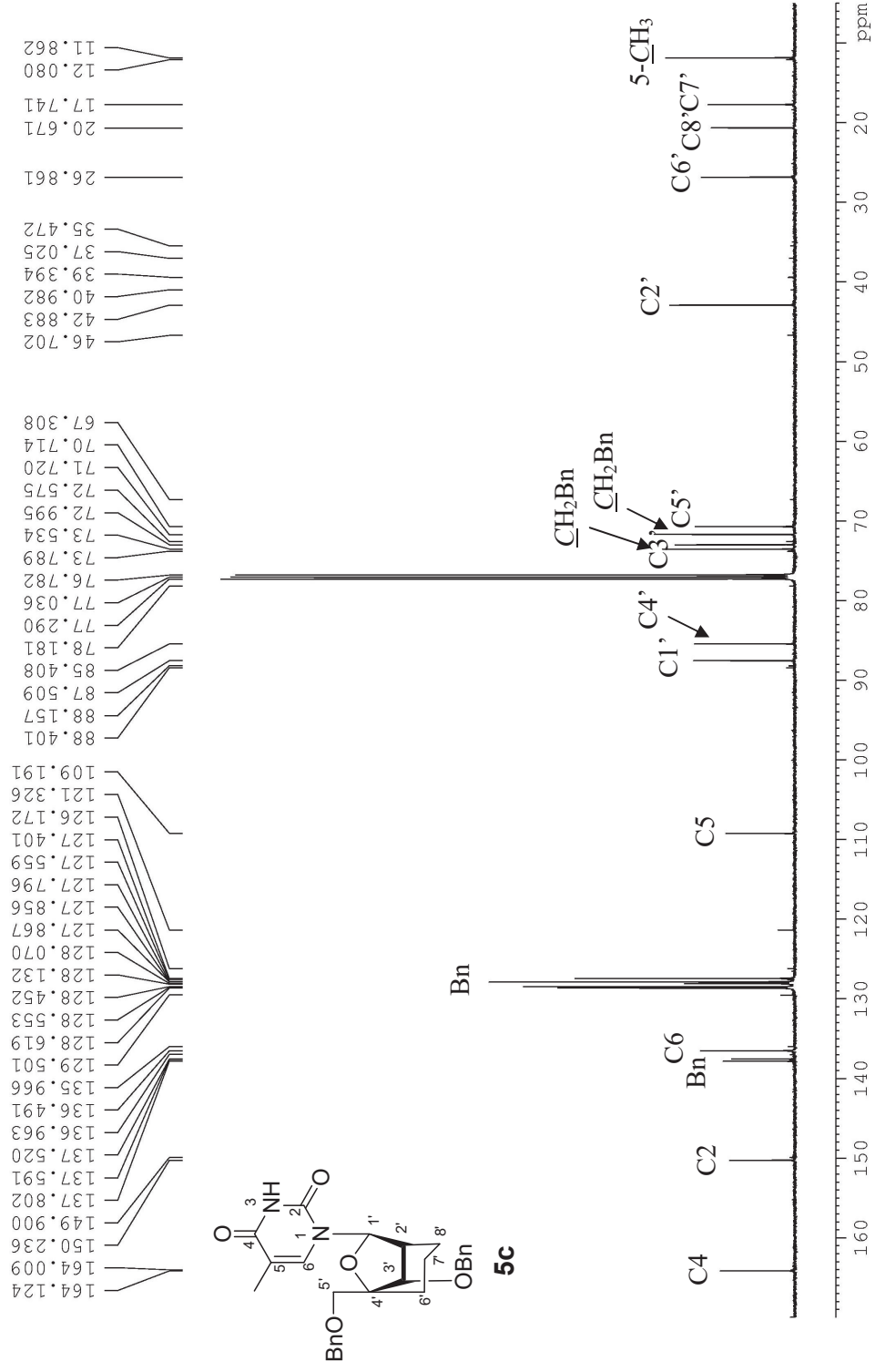


Figure SI.35 ¹³C NMR spectrum of compound 5c

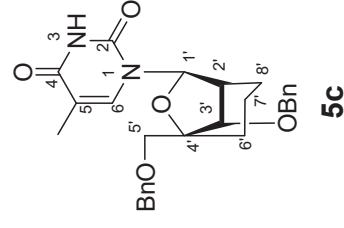
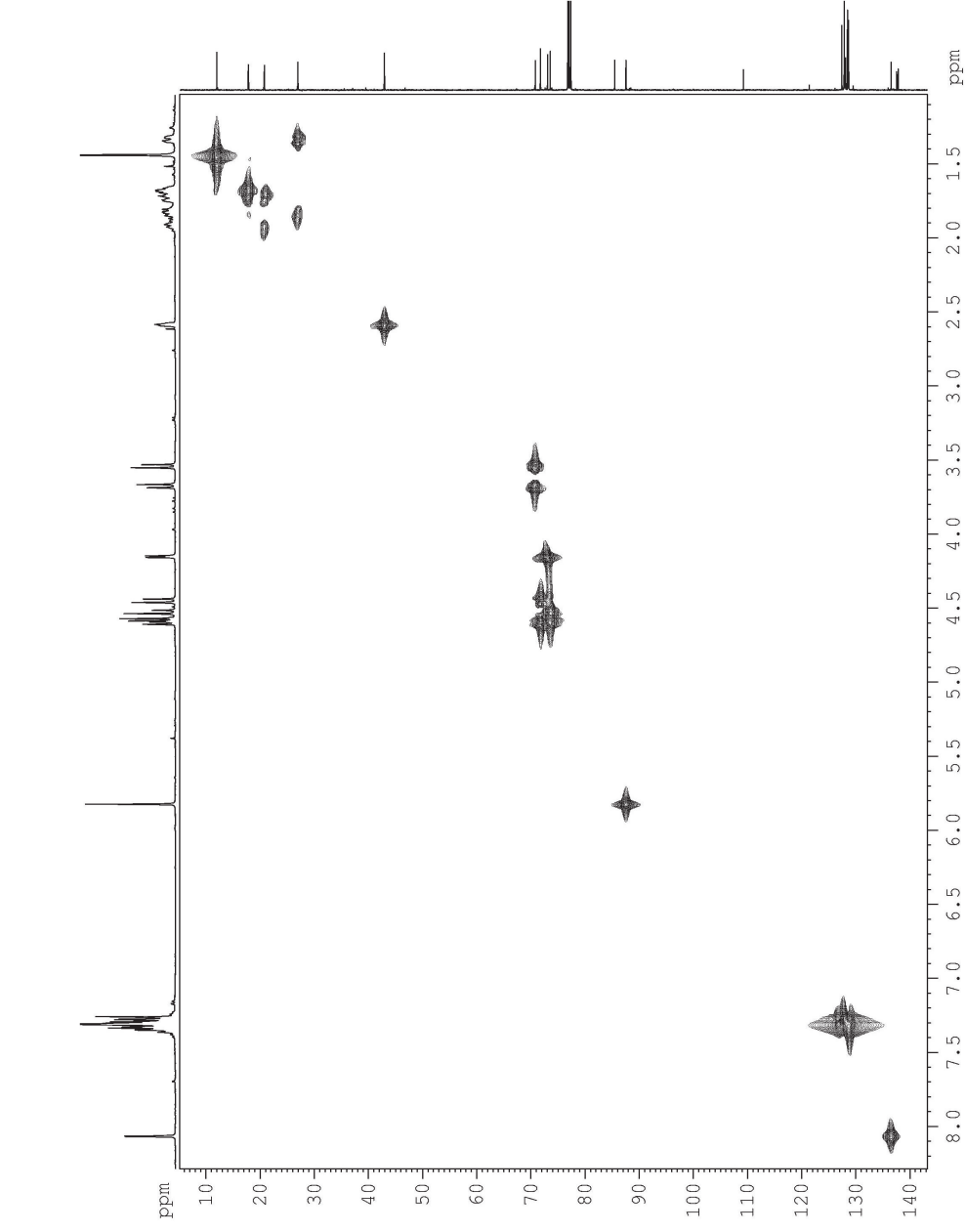


Figure SI.36 HMQC spectrum of compound 5c

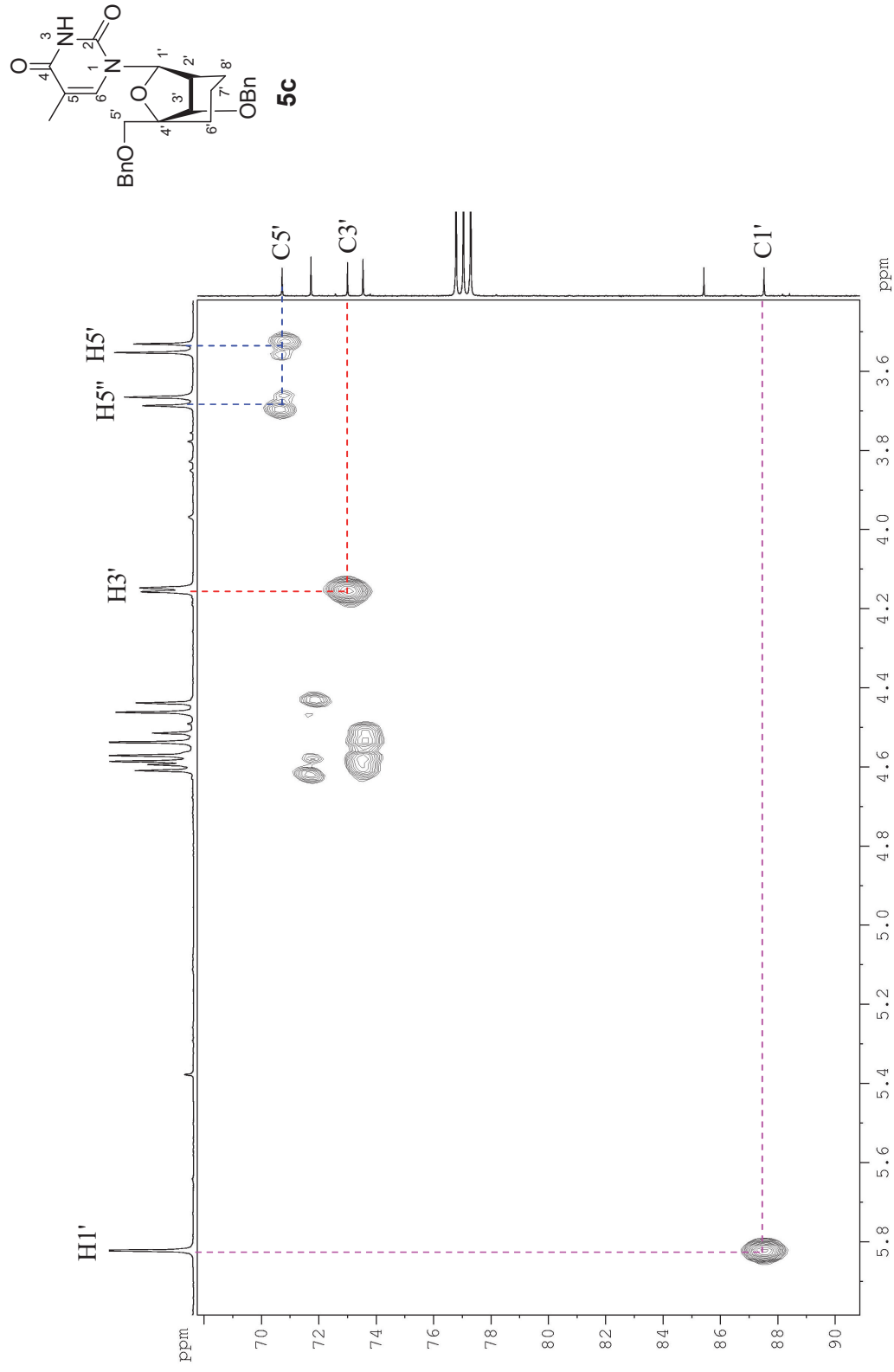


Figure SI.37 Expansion of HMQC spectrum of compound **5c**

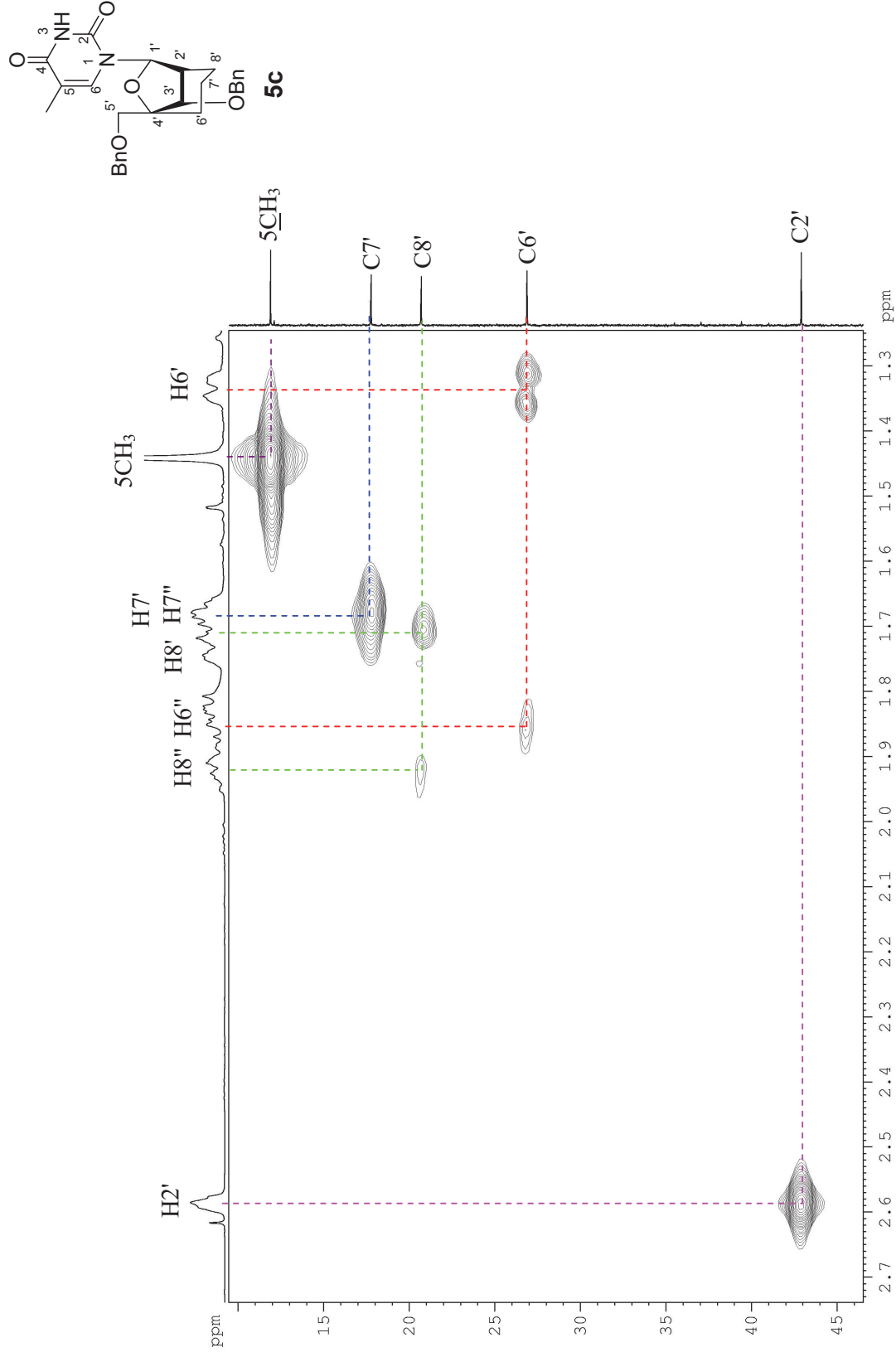


Figure SI.38 Expansion of HMQC spectrum of compound **5c**

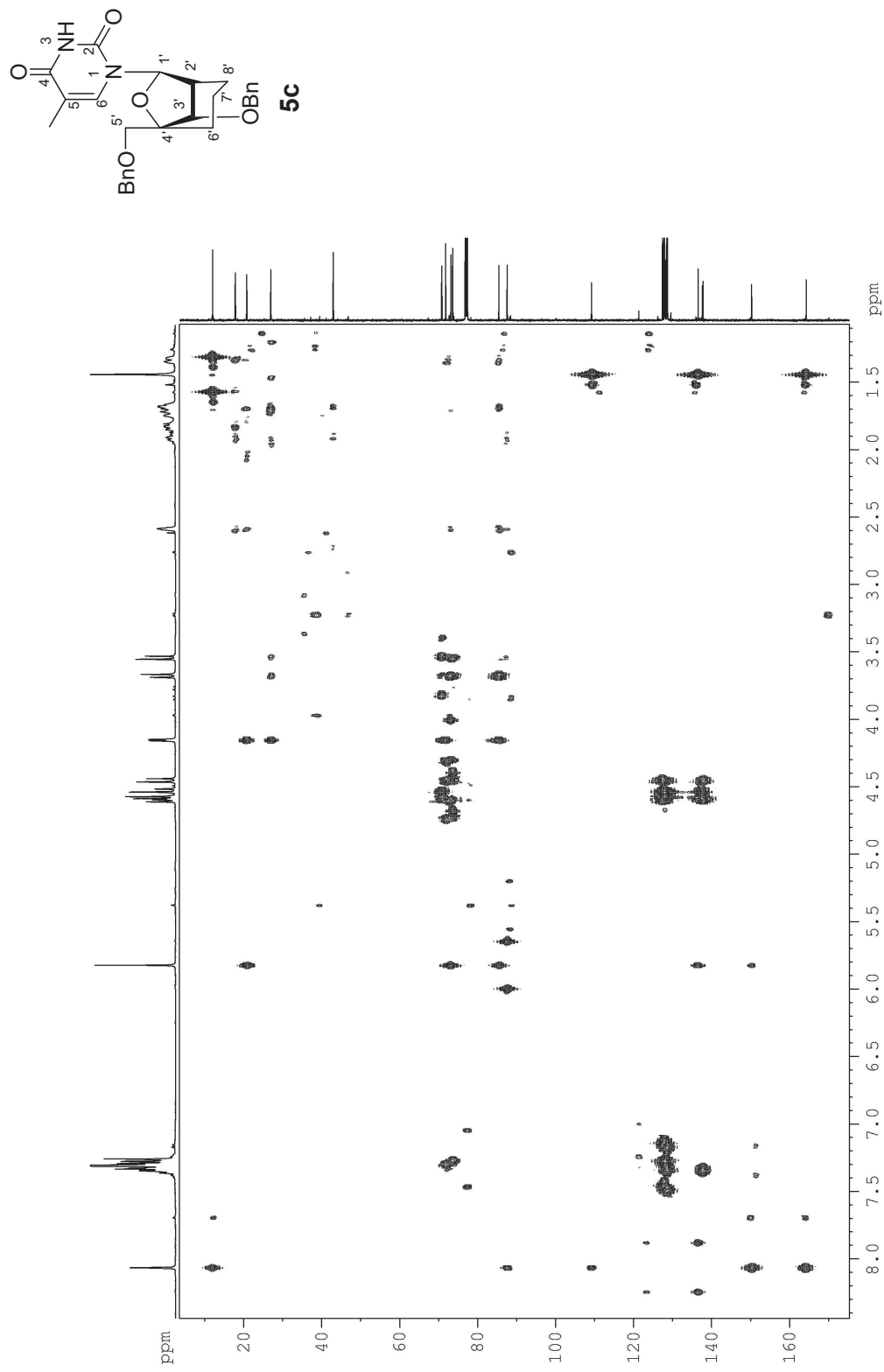


Figure SI.39 HMBC spectrum of compound **5c**

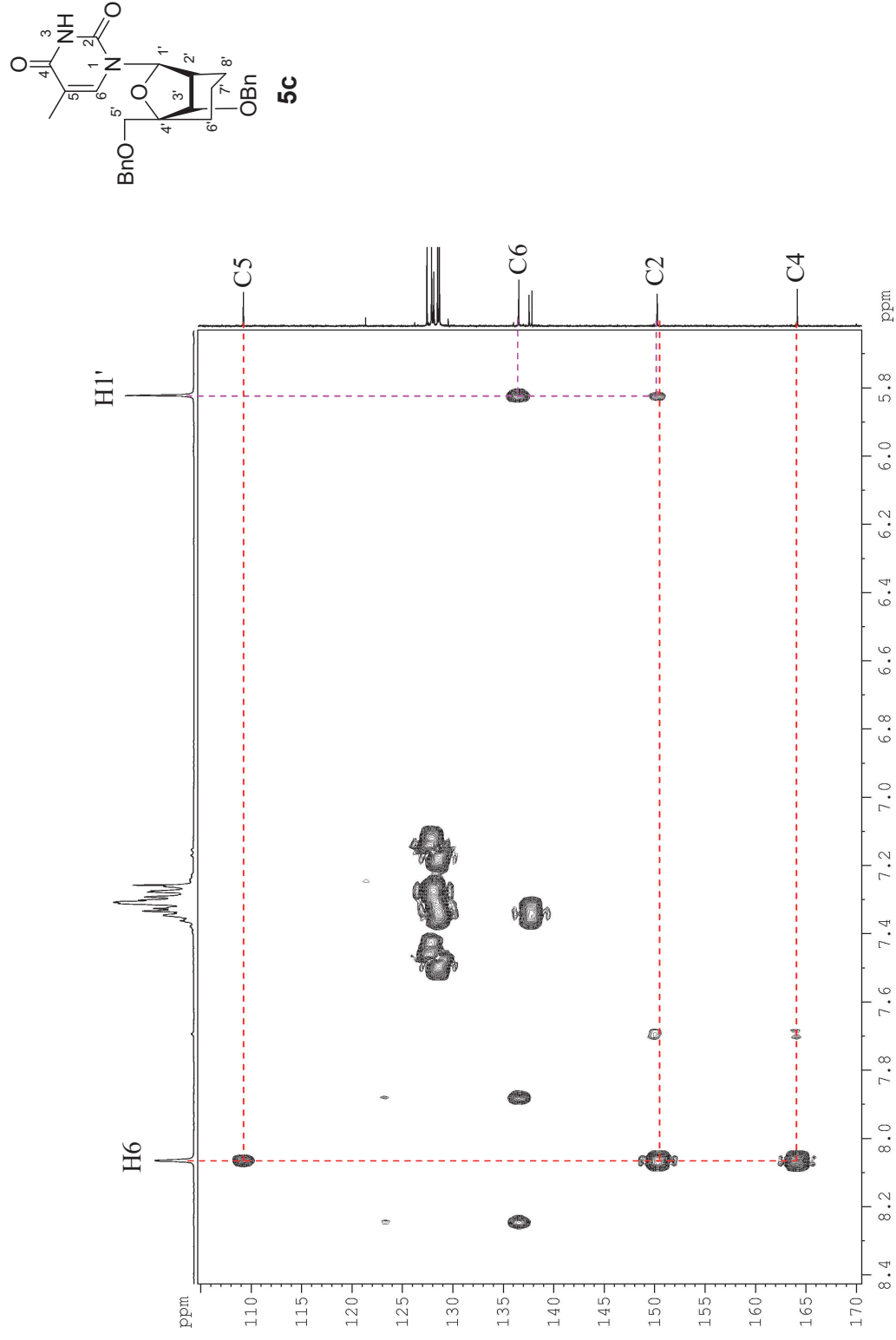


Figure SI.40 Expansion of HMBC spectrum of compound 5c

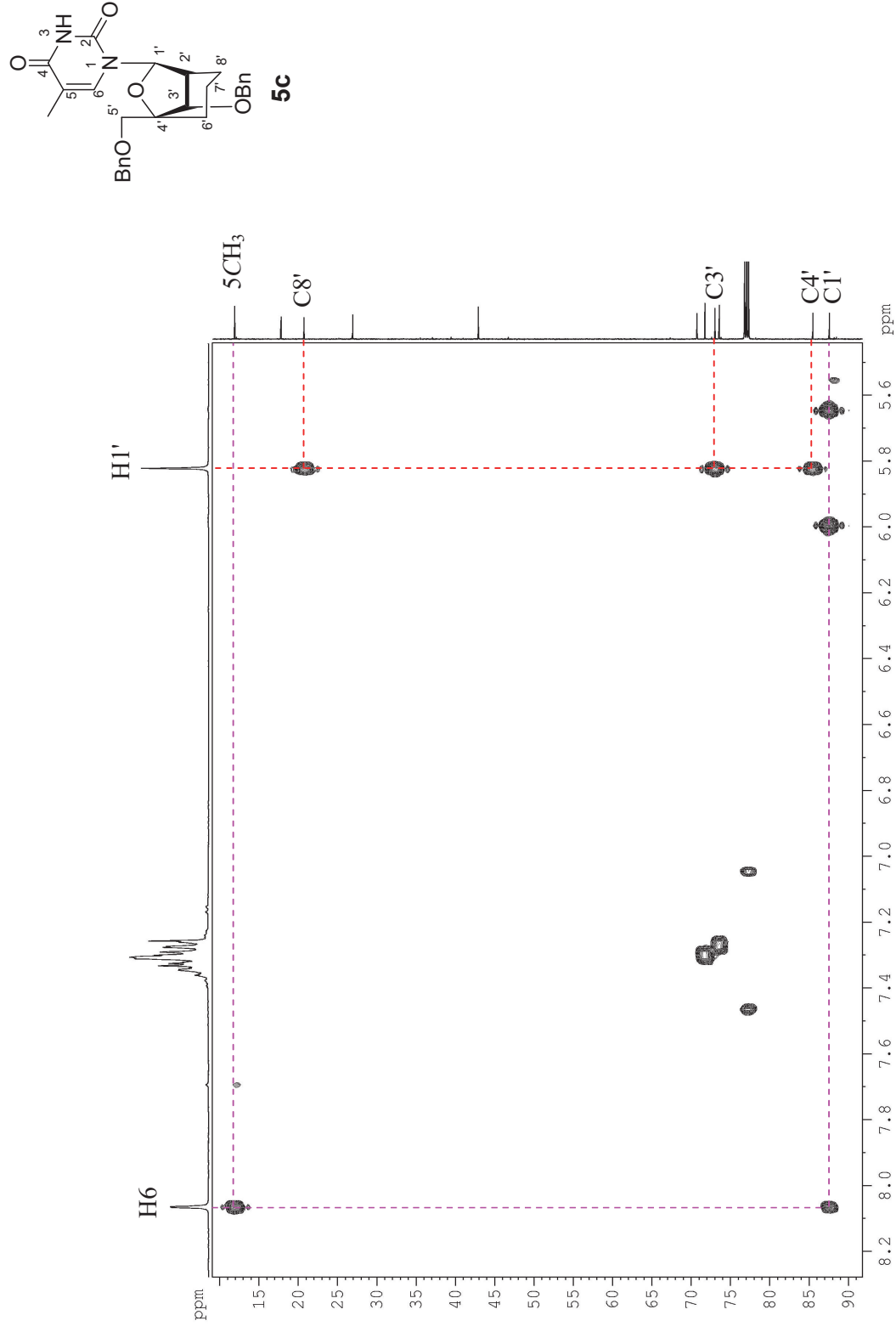


Figure SI.41 Expansion of HMBC spectrum of compound **5c**

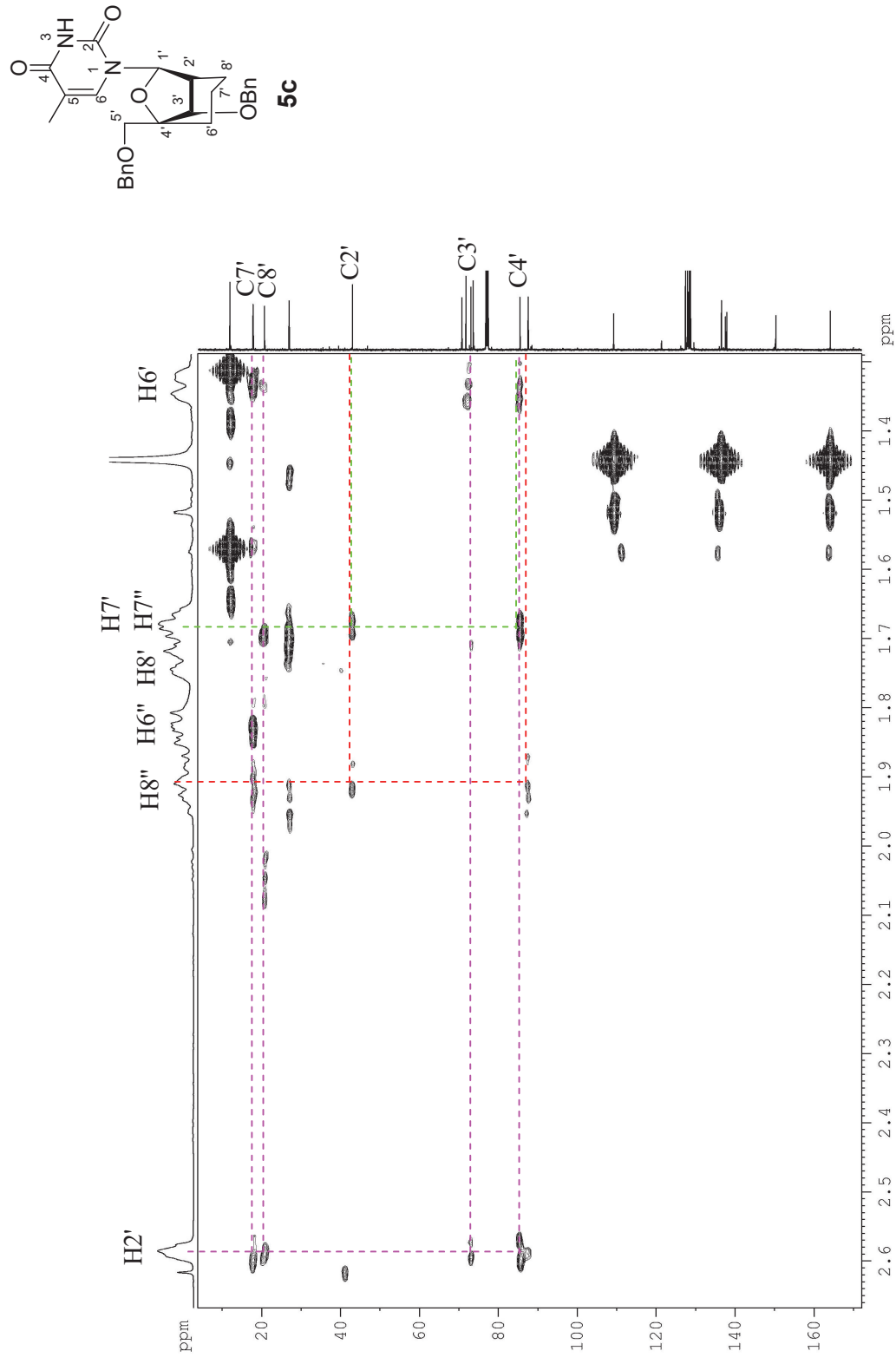


Figure SI.42 Expansion of HMBC spectrum of compound **5c**

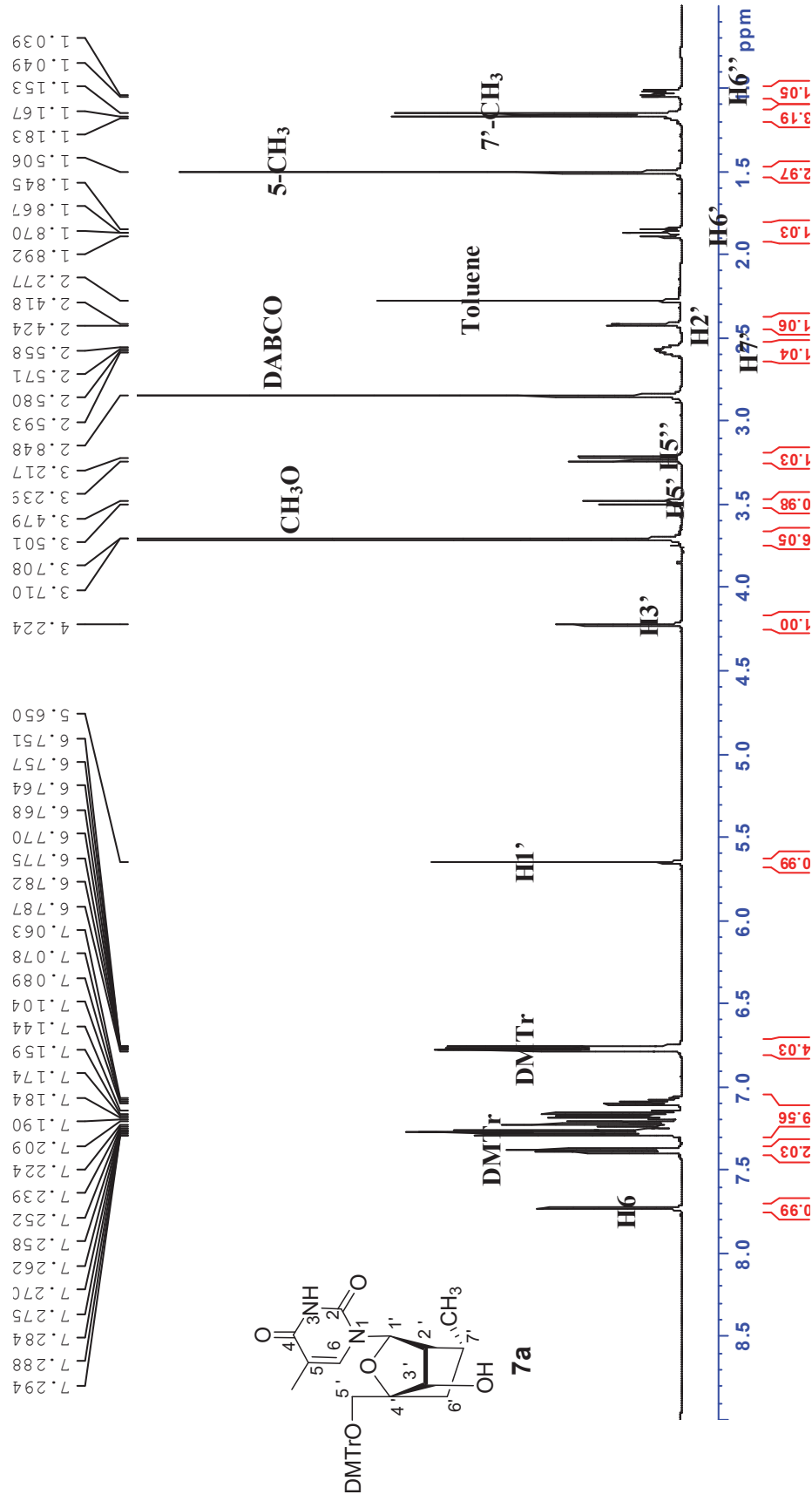


Figure SI.43 ¹H NMR spectrum of compound 7a

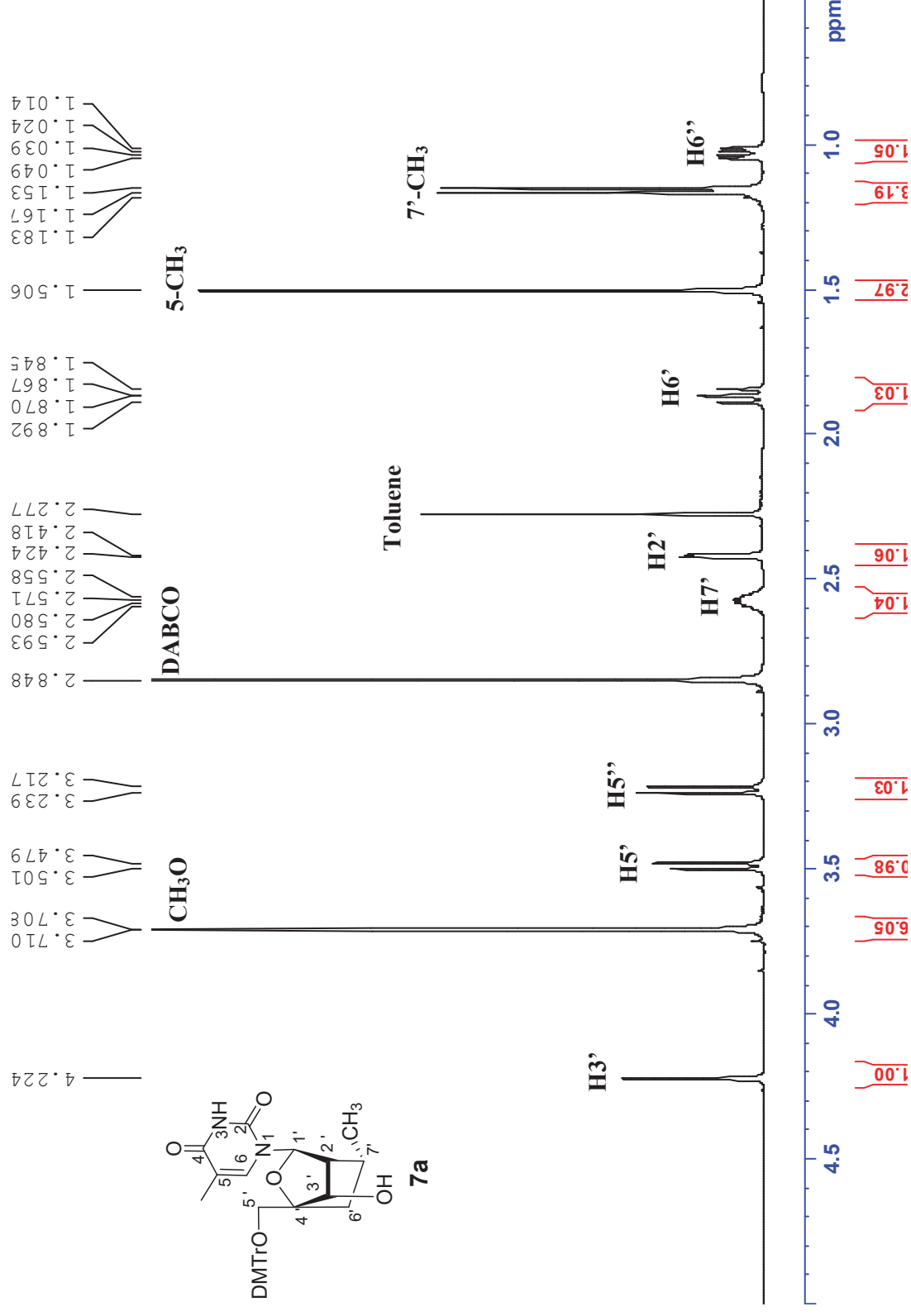
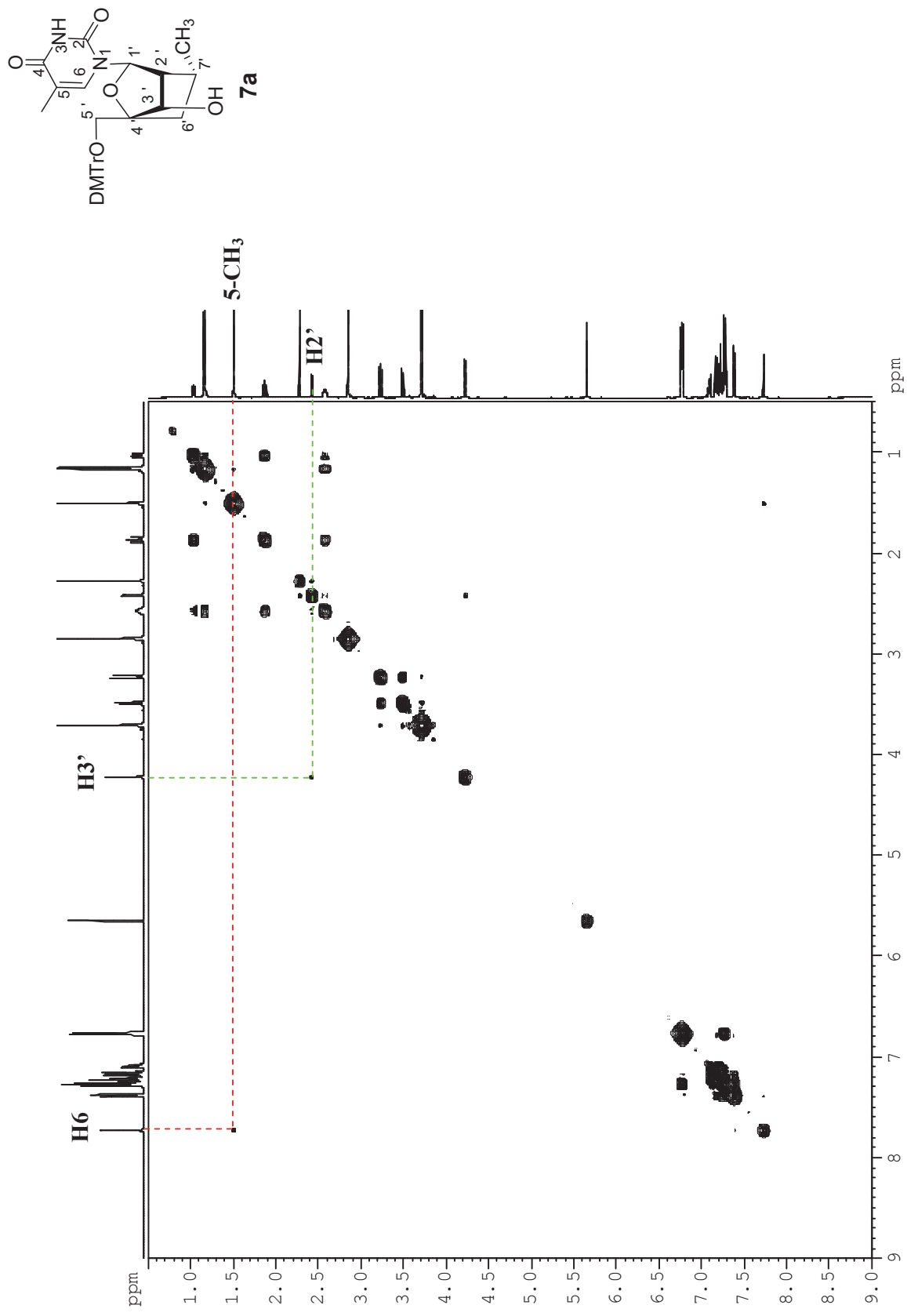


Figure SI.45 Expansion of ¹H NMR spectrum of compound 7a



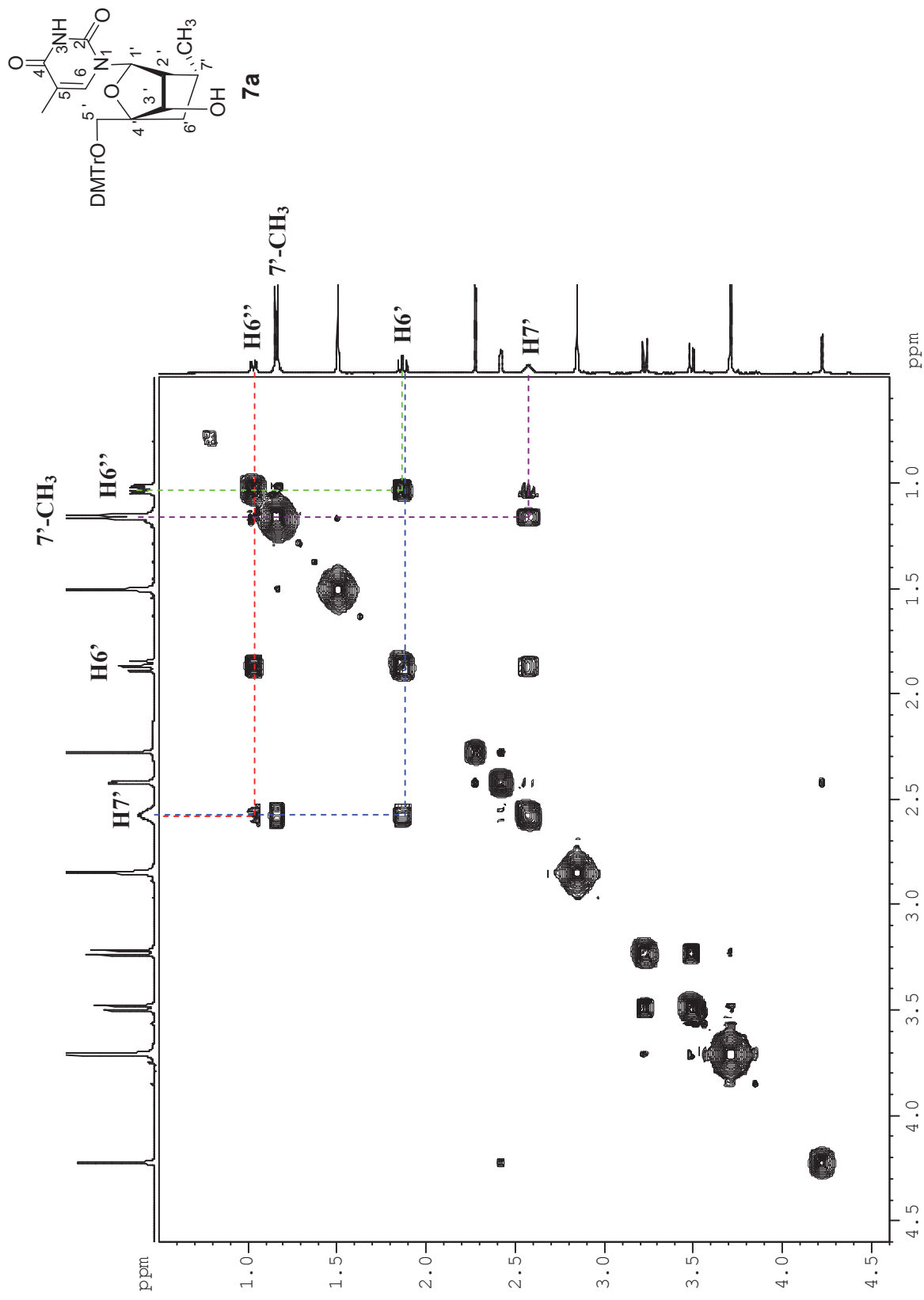


Figure SI.47 Expansion of COSY spectrum of compound **7a**

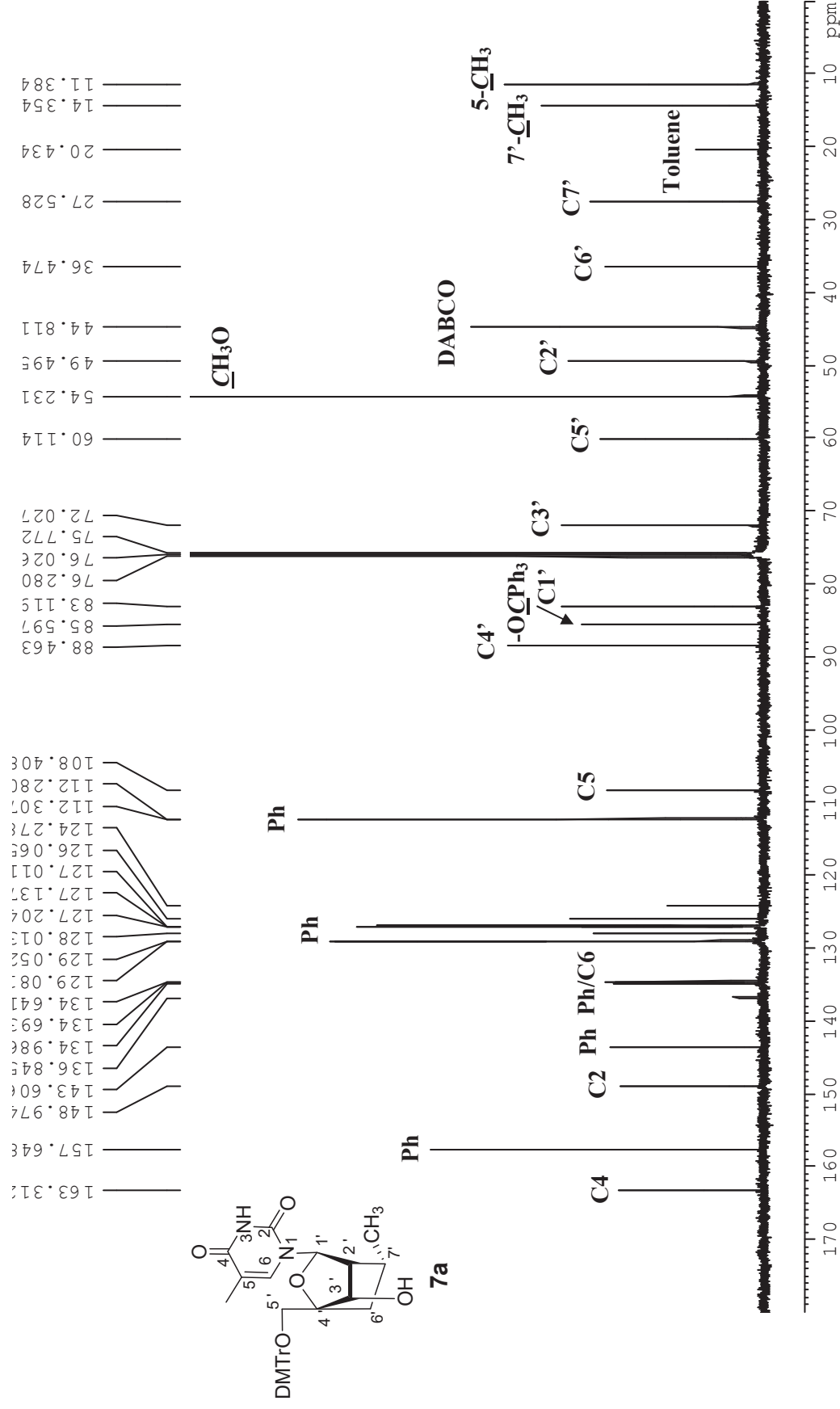


Figure SI.48 ¹³C NMR spectrum of compound 7a

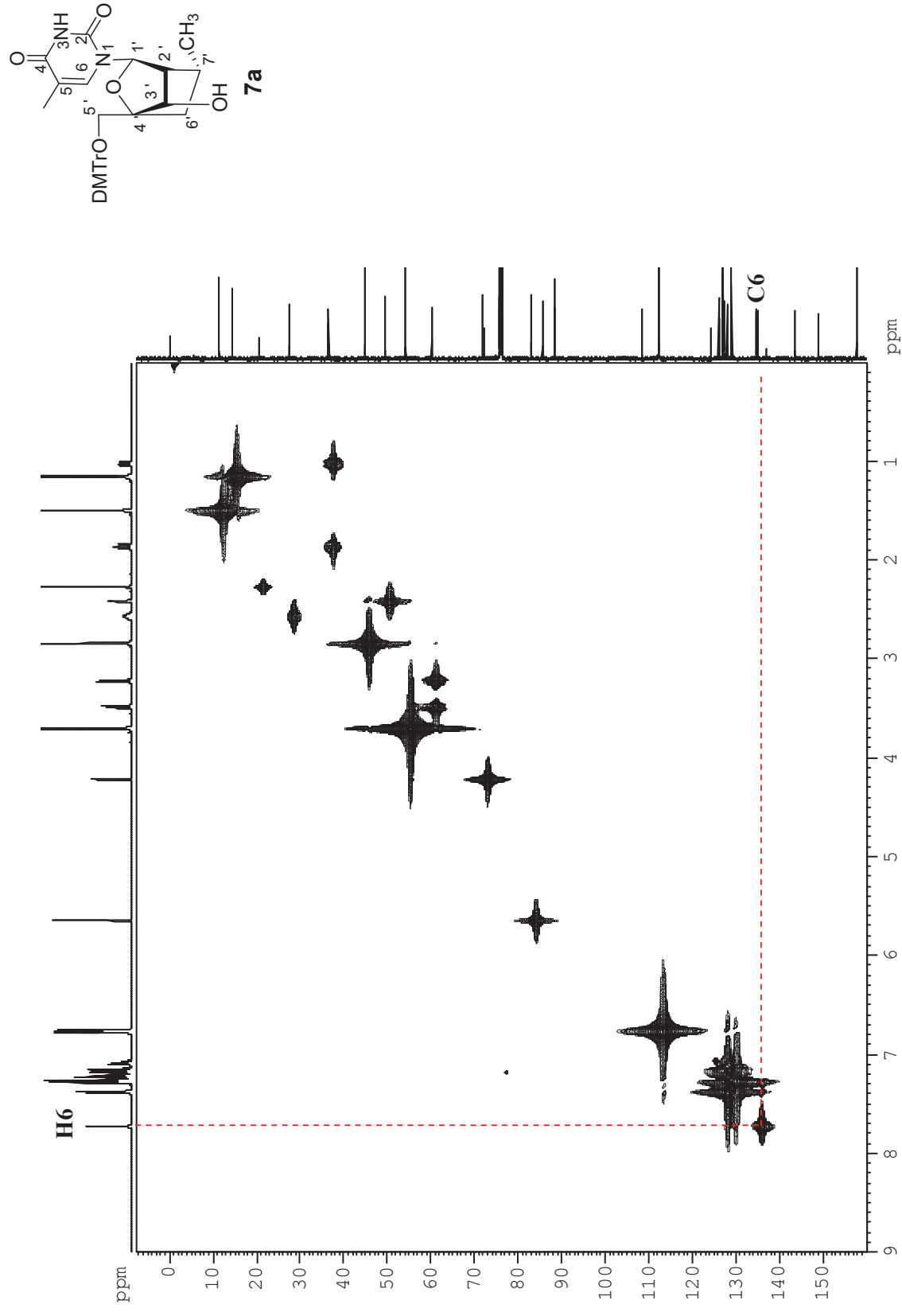


Figure SI.49 HMQC spectrum of compound 7a

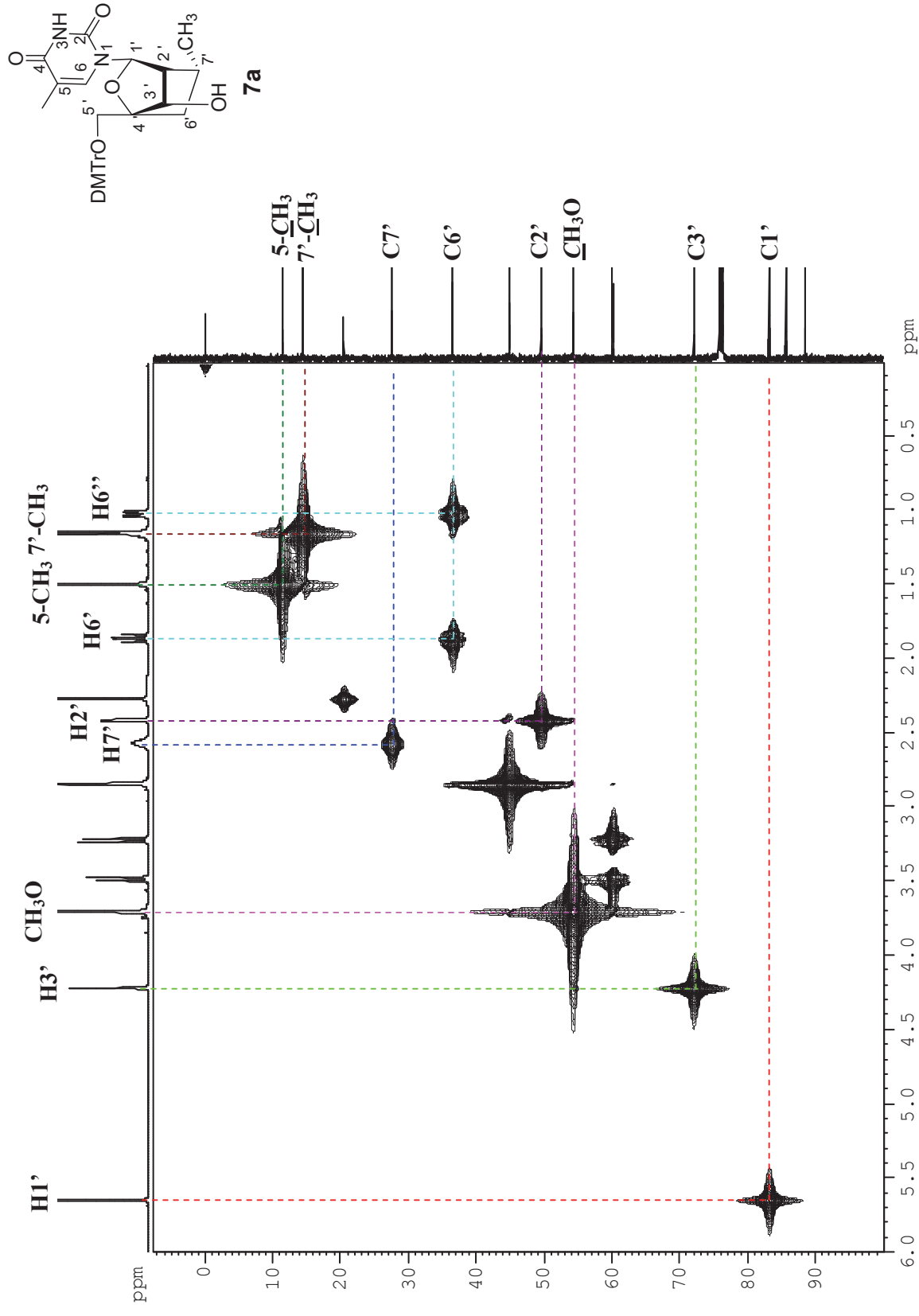


Figure SI.50 Expansion of HMQC spectrum of compound **7a**

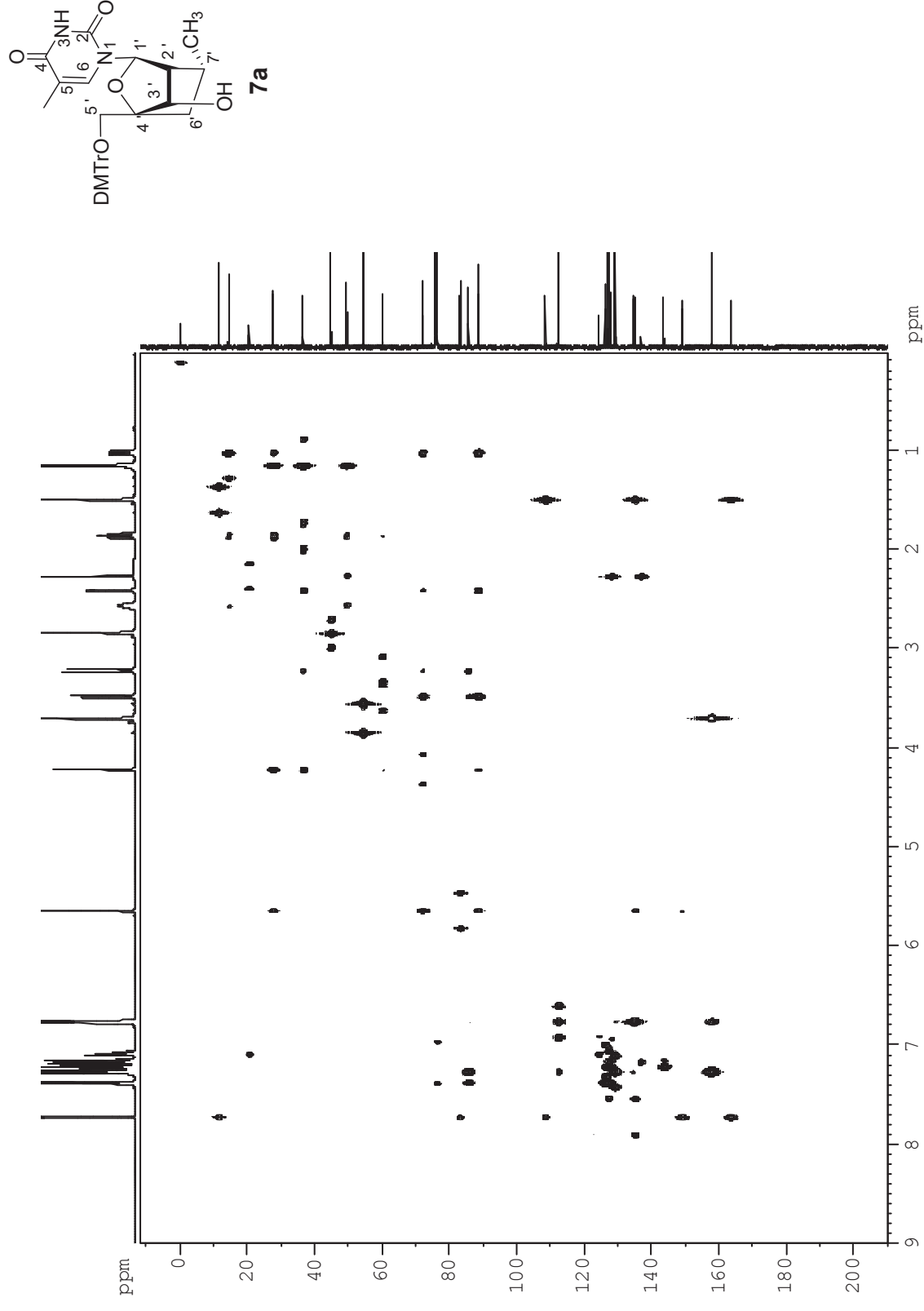


Figure SI.51 HMBC spectrum of compound **7a**

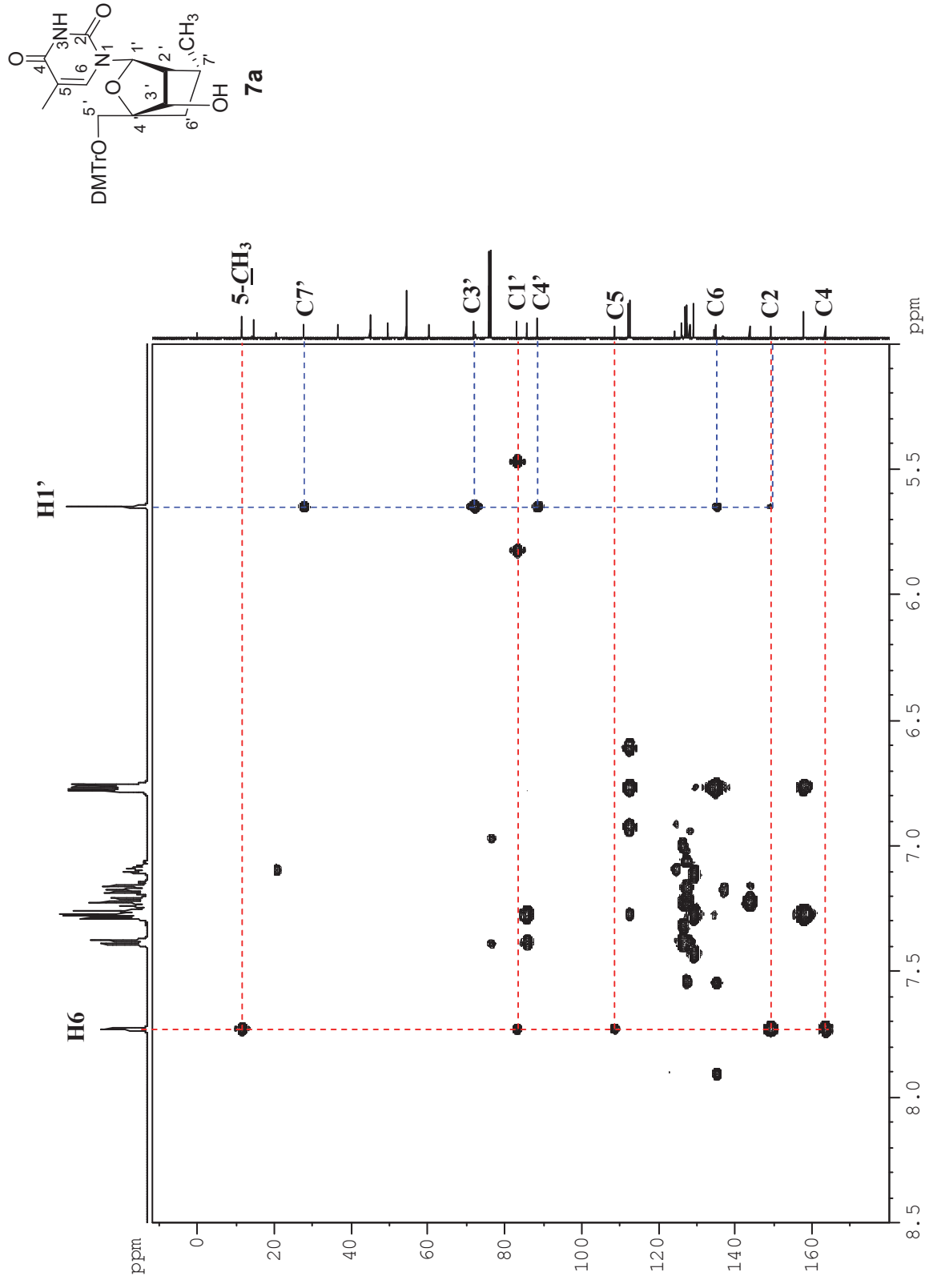


Figure SI.52 Expansion of HMBC spectrum of compound **7a**

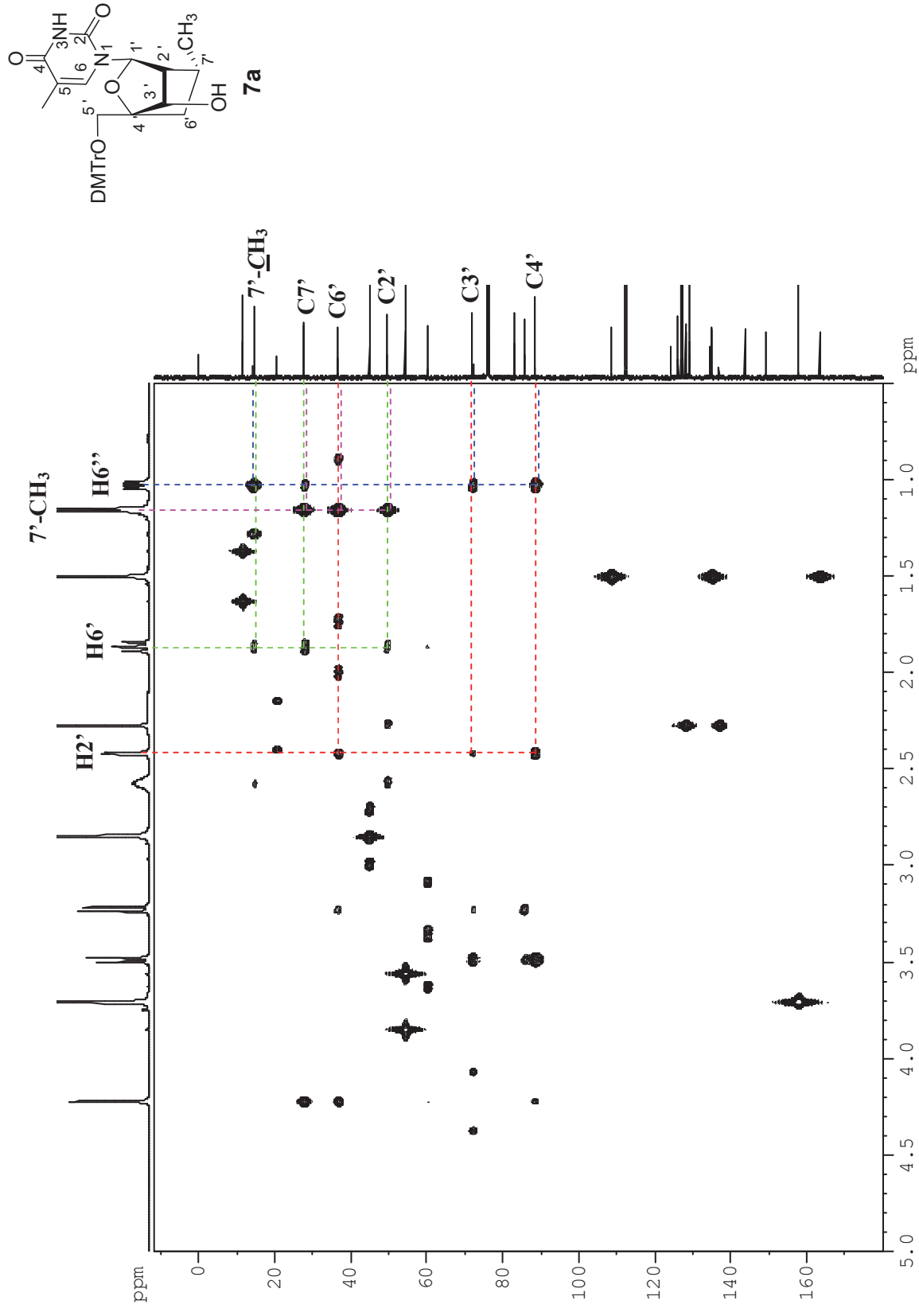


Figure SI.53 Expansion of HMBC spectrum of compound **7a**

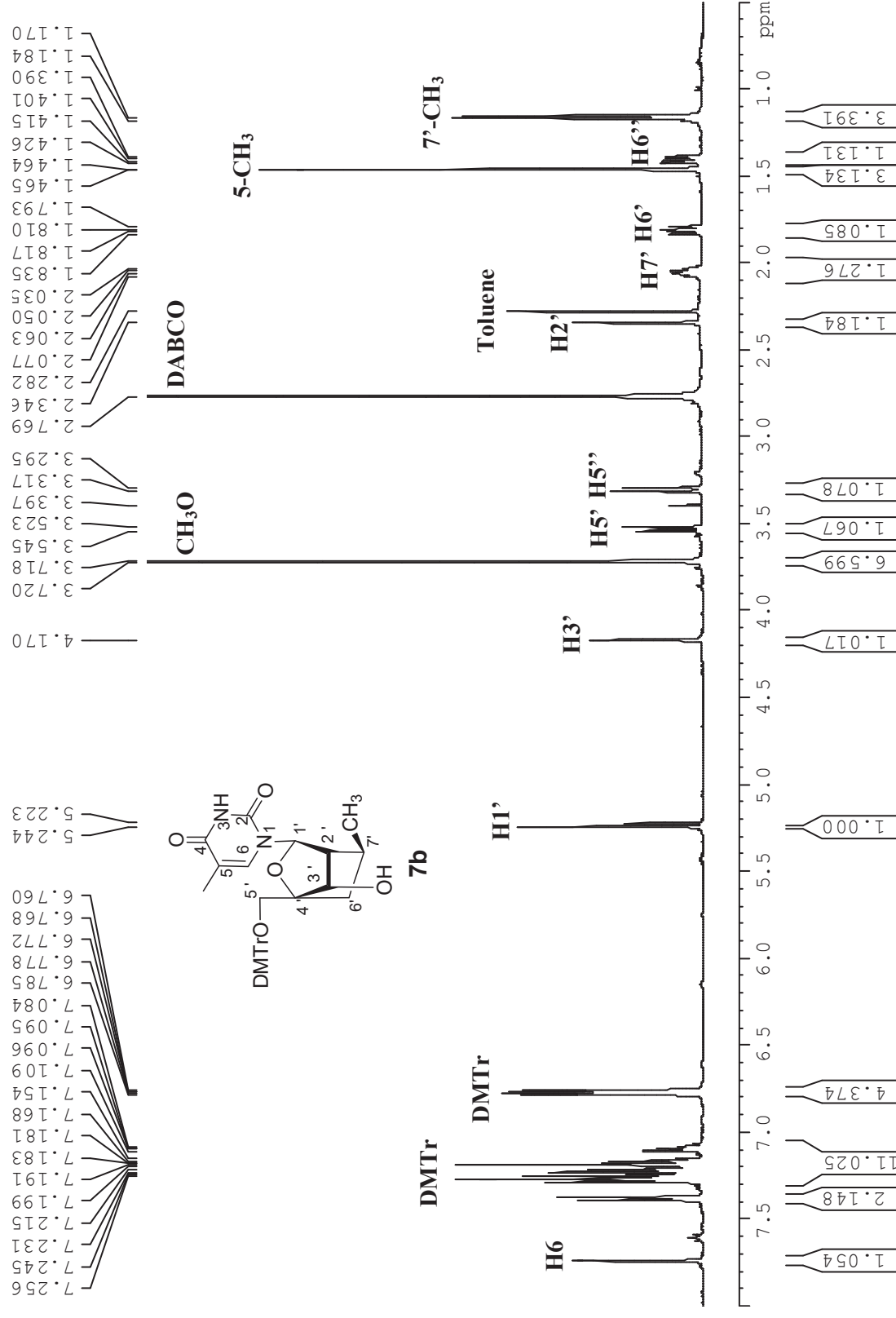


Figure SI.54 ¹H NMR spectrum of compound 7b

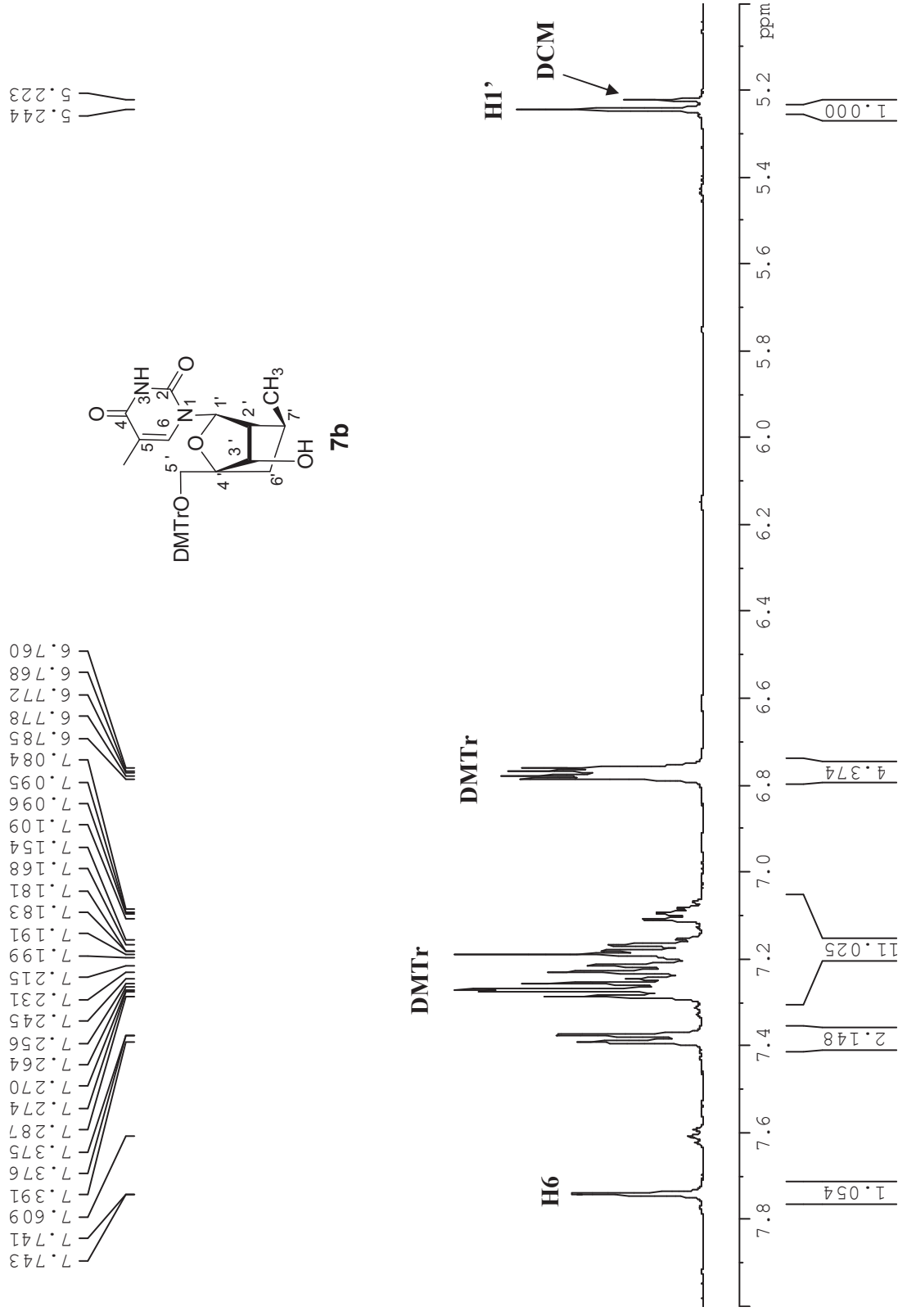


Figure SI.55 Expansion of ¹H NMR spectrum of compound 7b

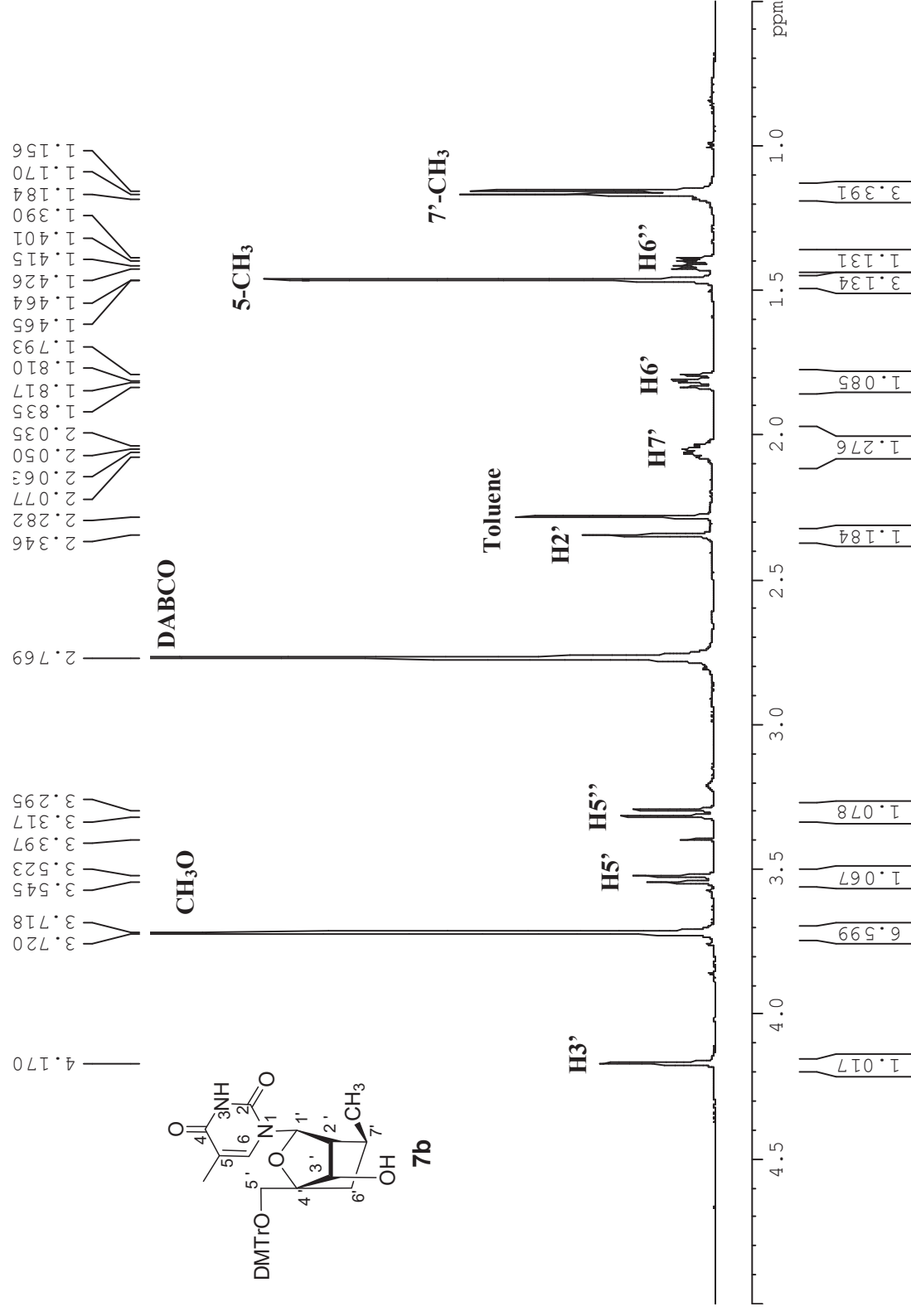


Figure SI.56 Expansion of ¹H NMR spectrum of compound 7b

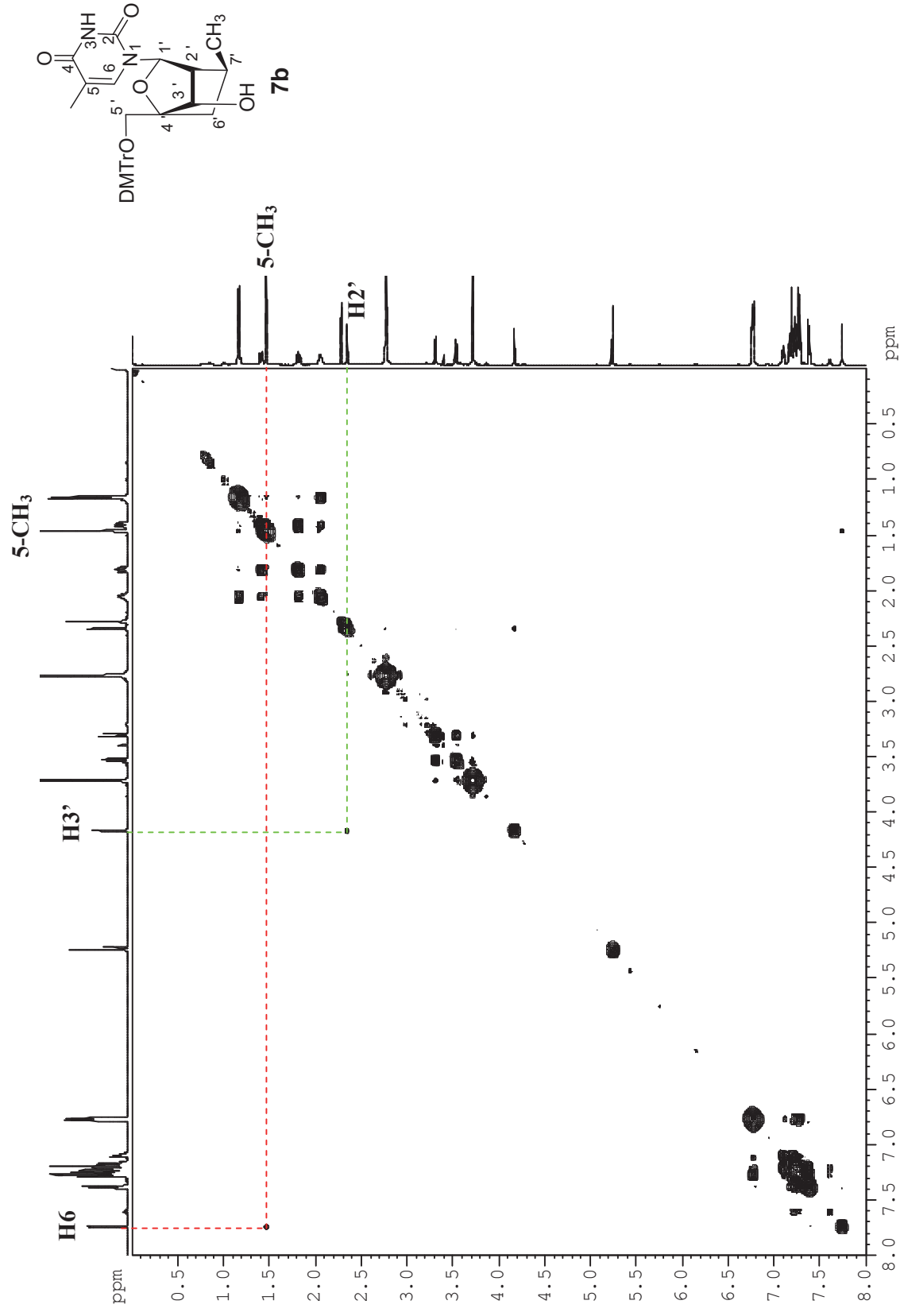


Figure SI.57 COSY spectrum of compound **7b**

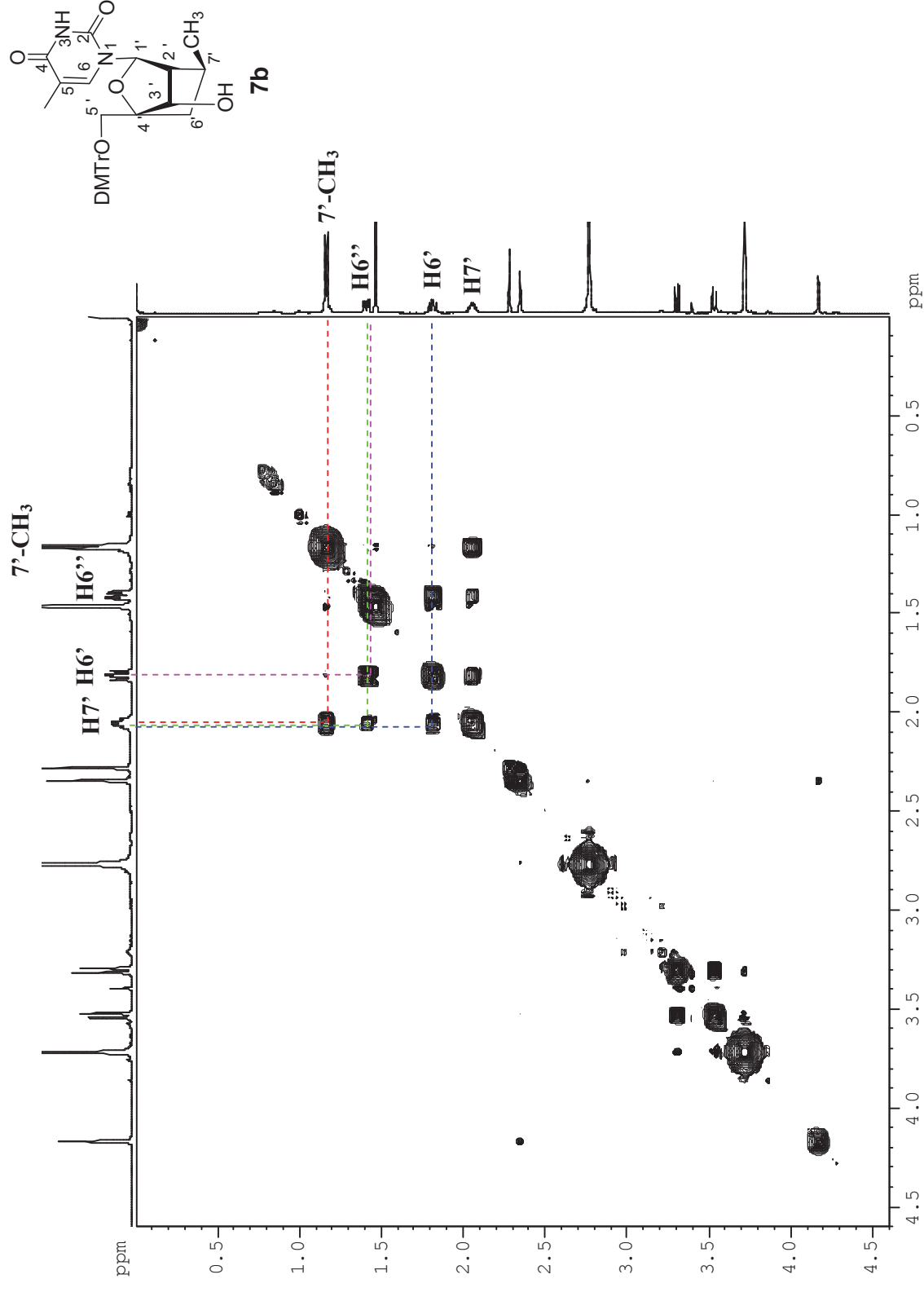


Figure SI.58 Expansion of COSY spectrum of compound 7b

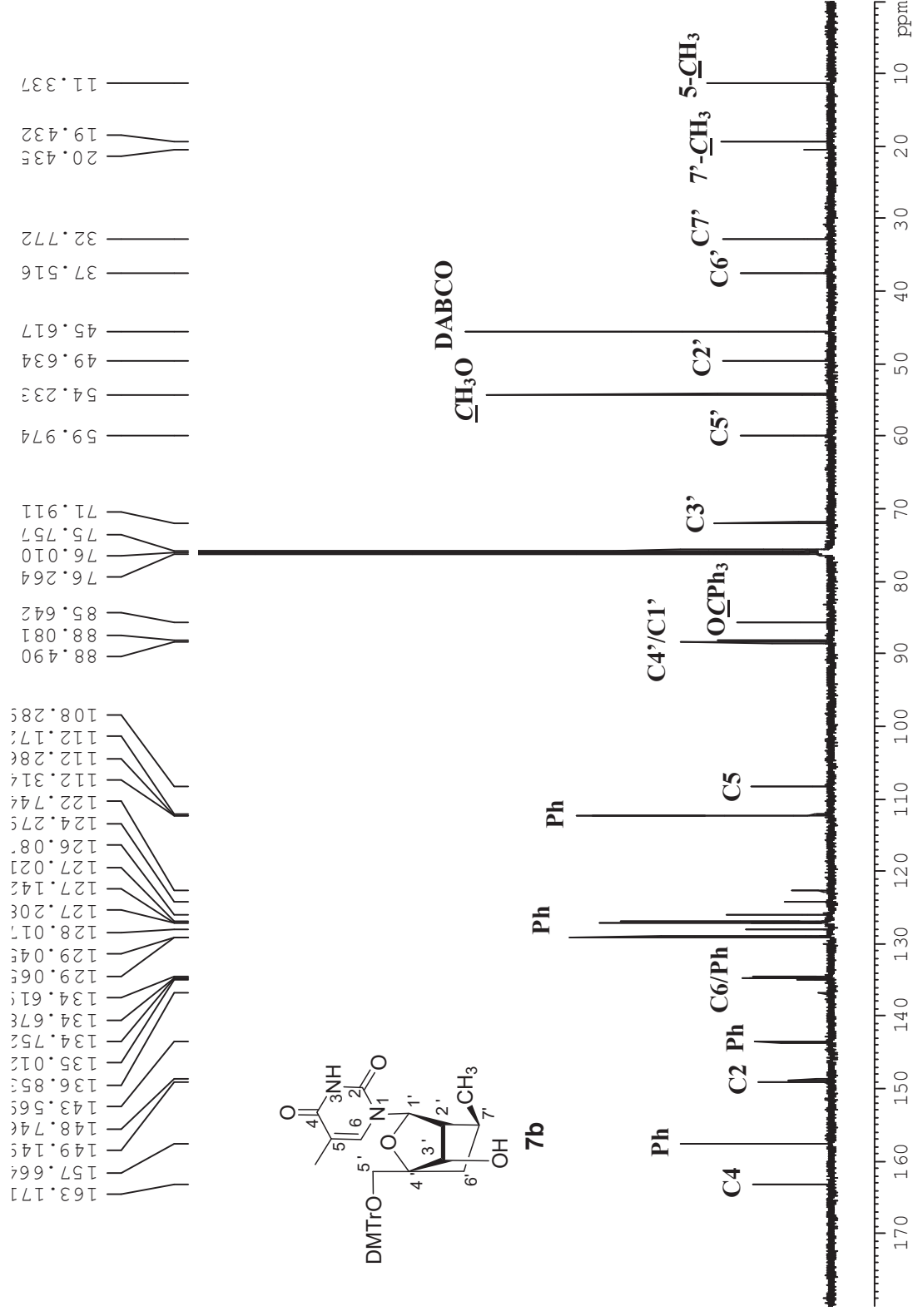


Figure SI.59 ¹³C NMR spectrum of compound 7b

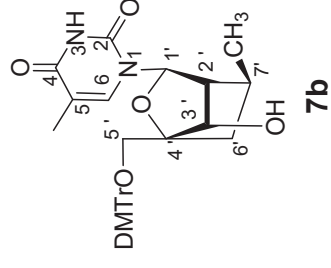
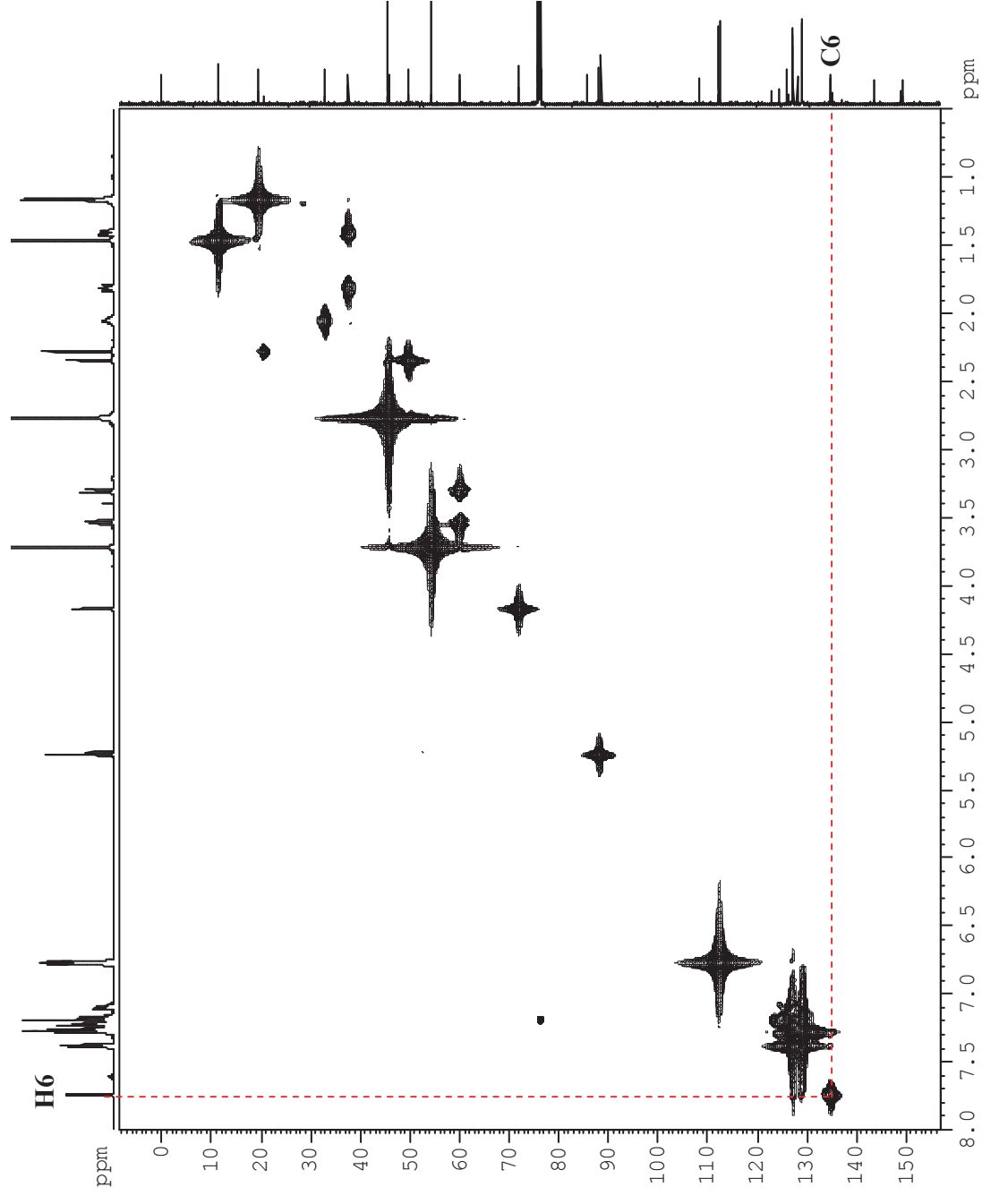
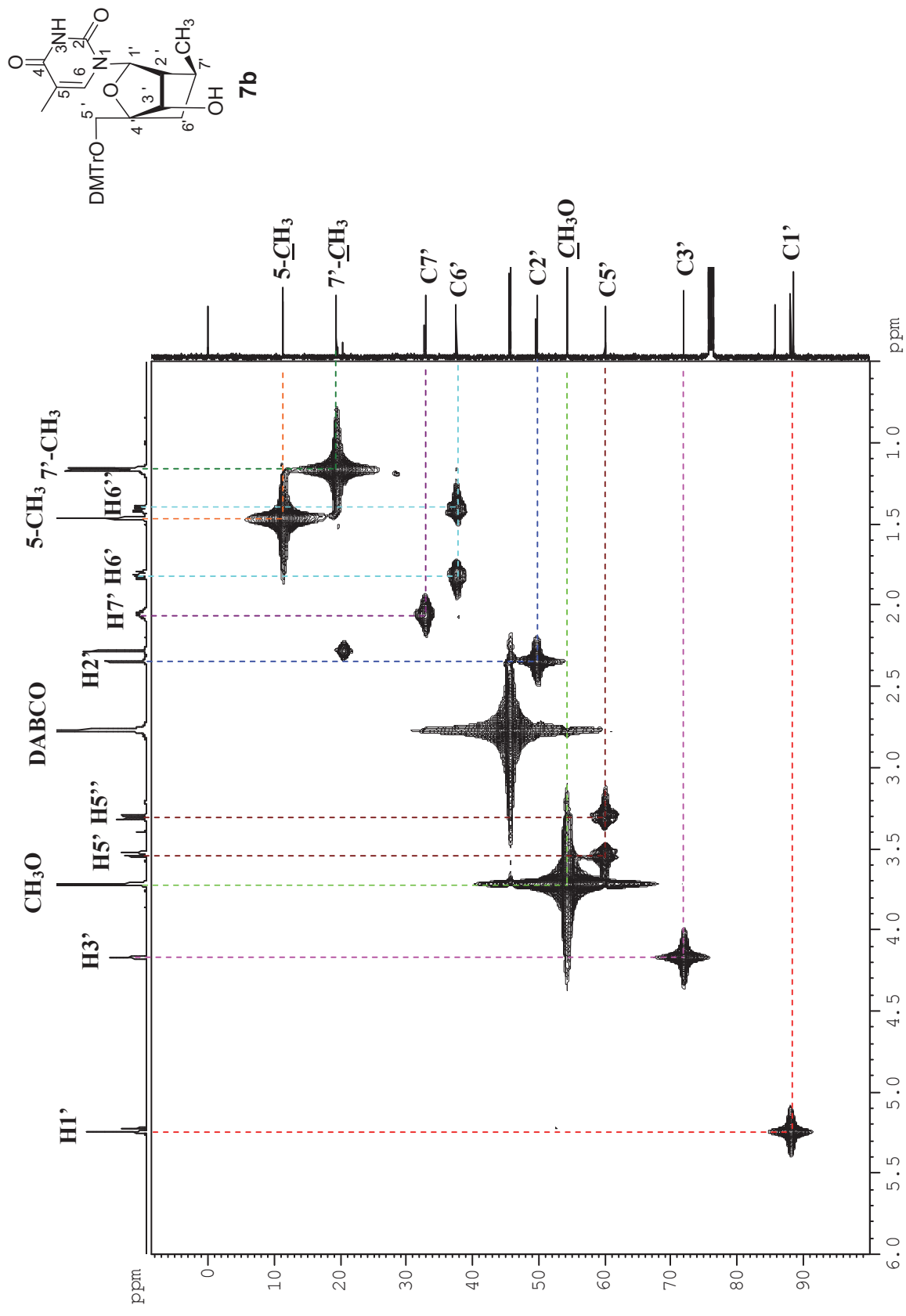


Figure SI.60 HMQC spectrum of compound 7b



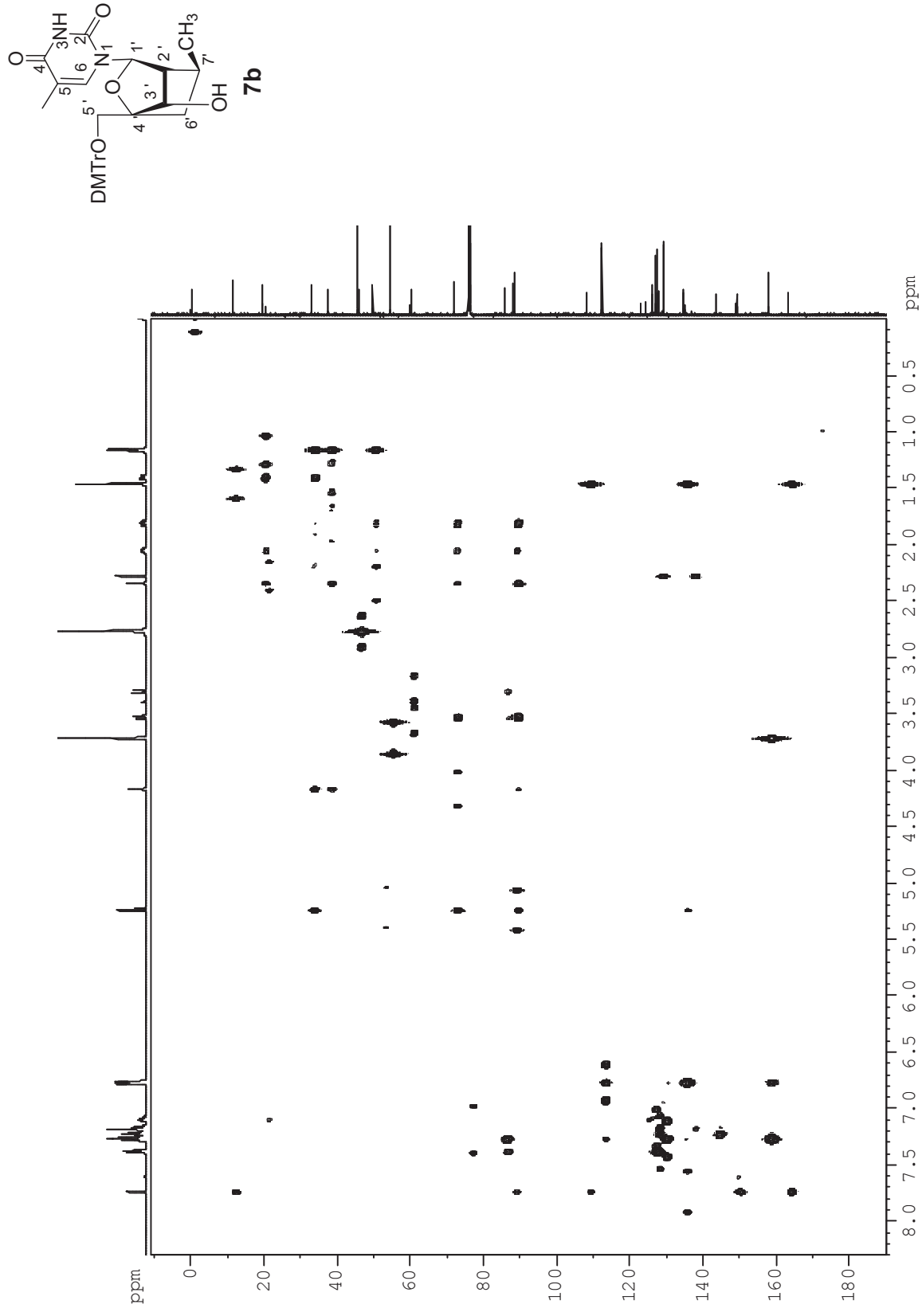


Figure SI.62 HMBC spectrum of compound 7b

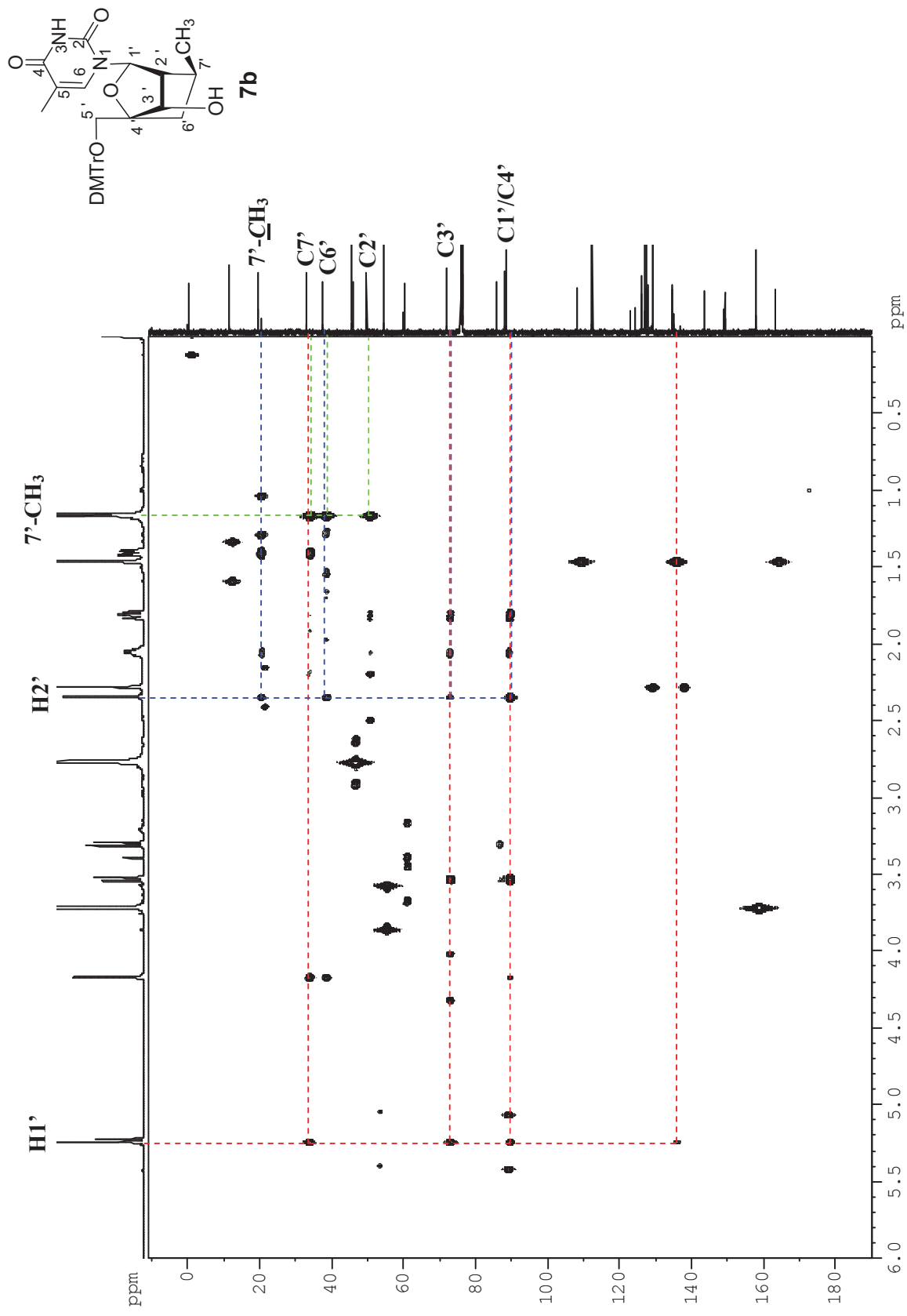


Figure SI.63 Expansion of HMBC spectrum of compound **7b**

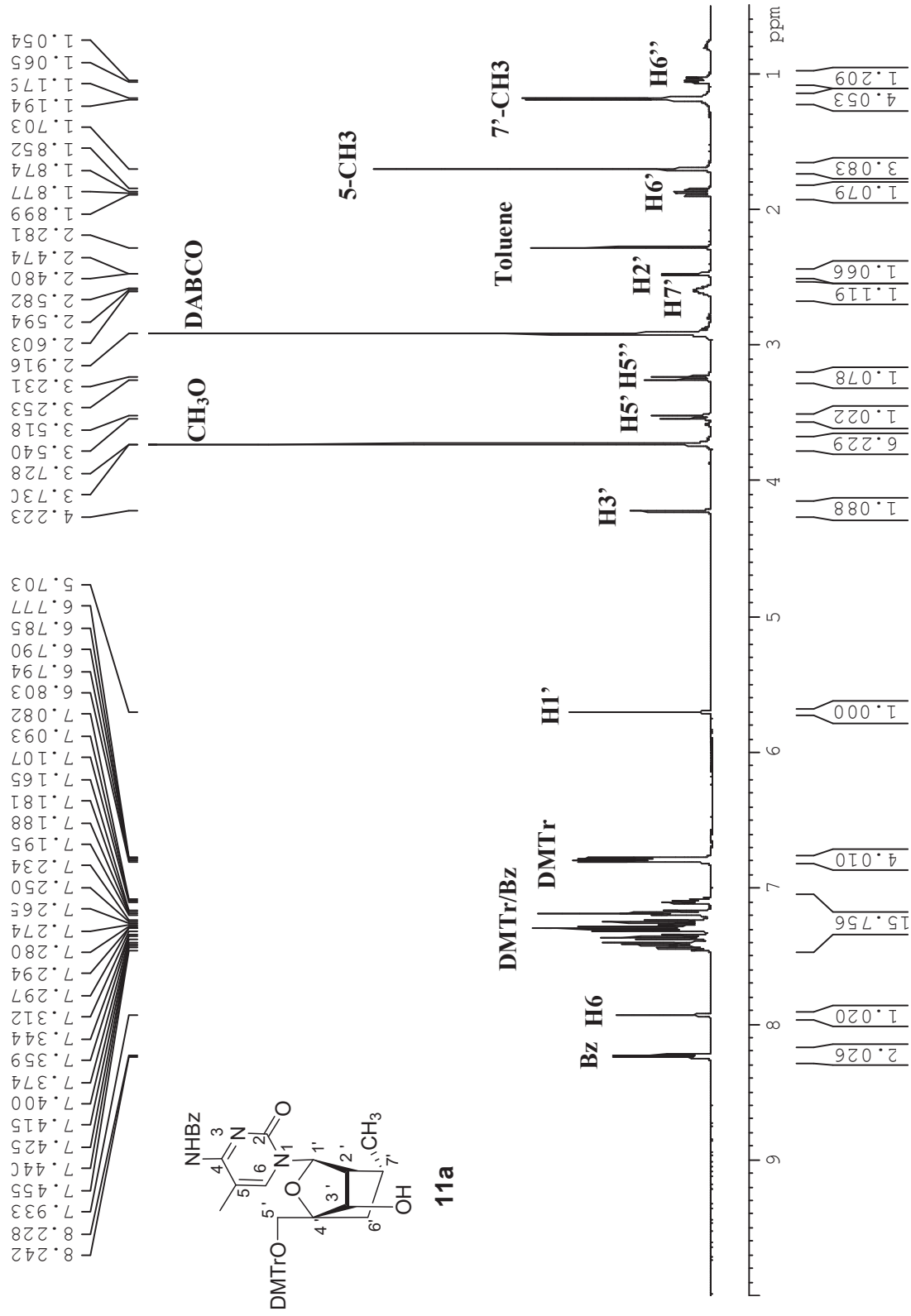


Figure SI.64 ¹H NMR spectrum of compound 11a

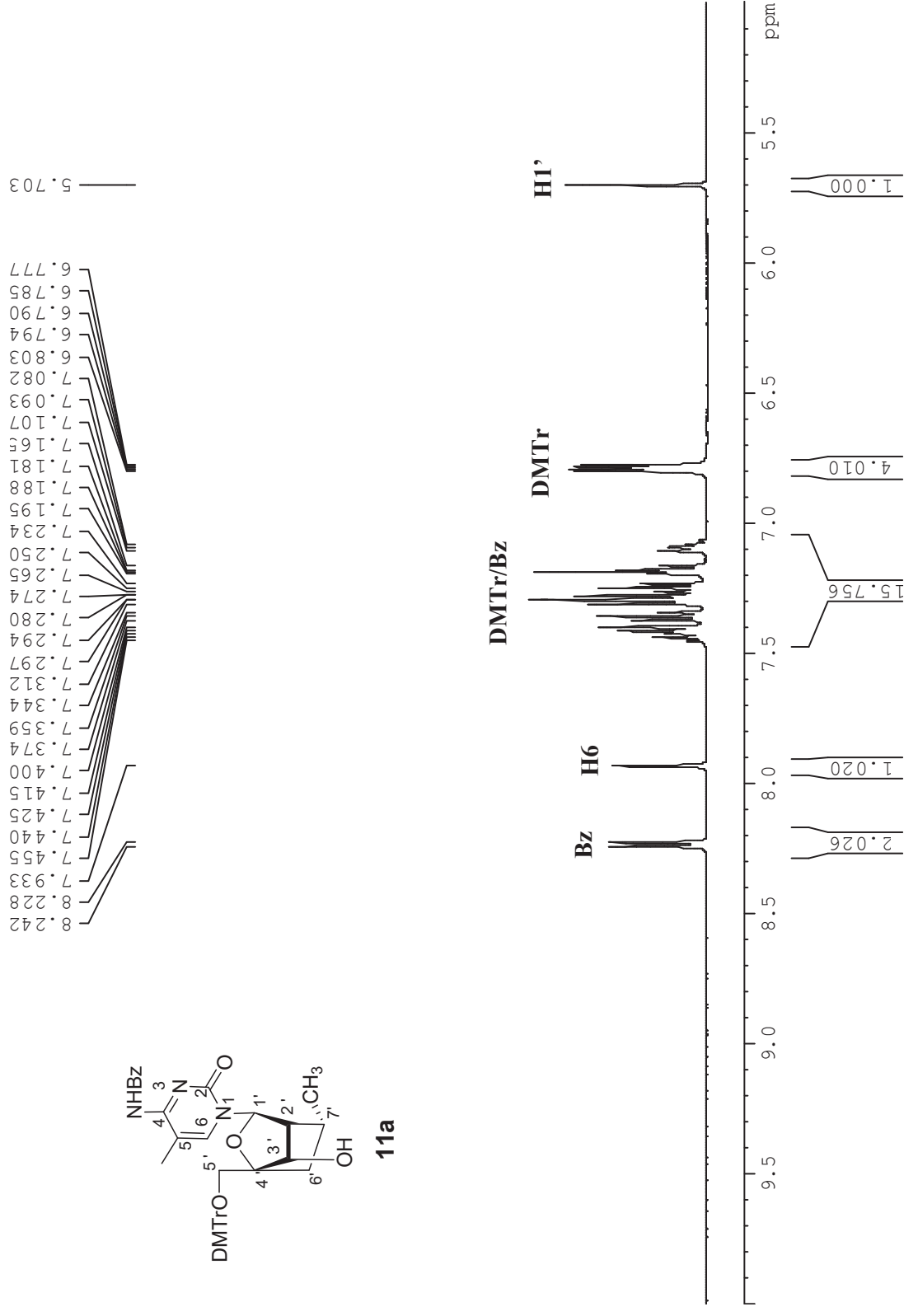


Figure SI.65 Expansion of ¹H NMR spectrum of compound 11a

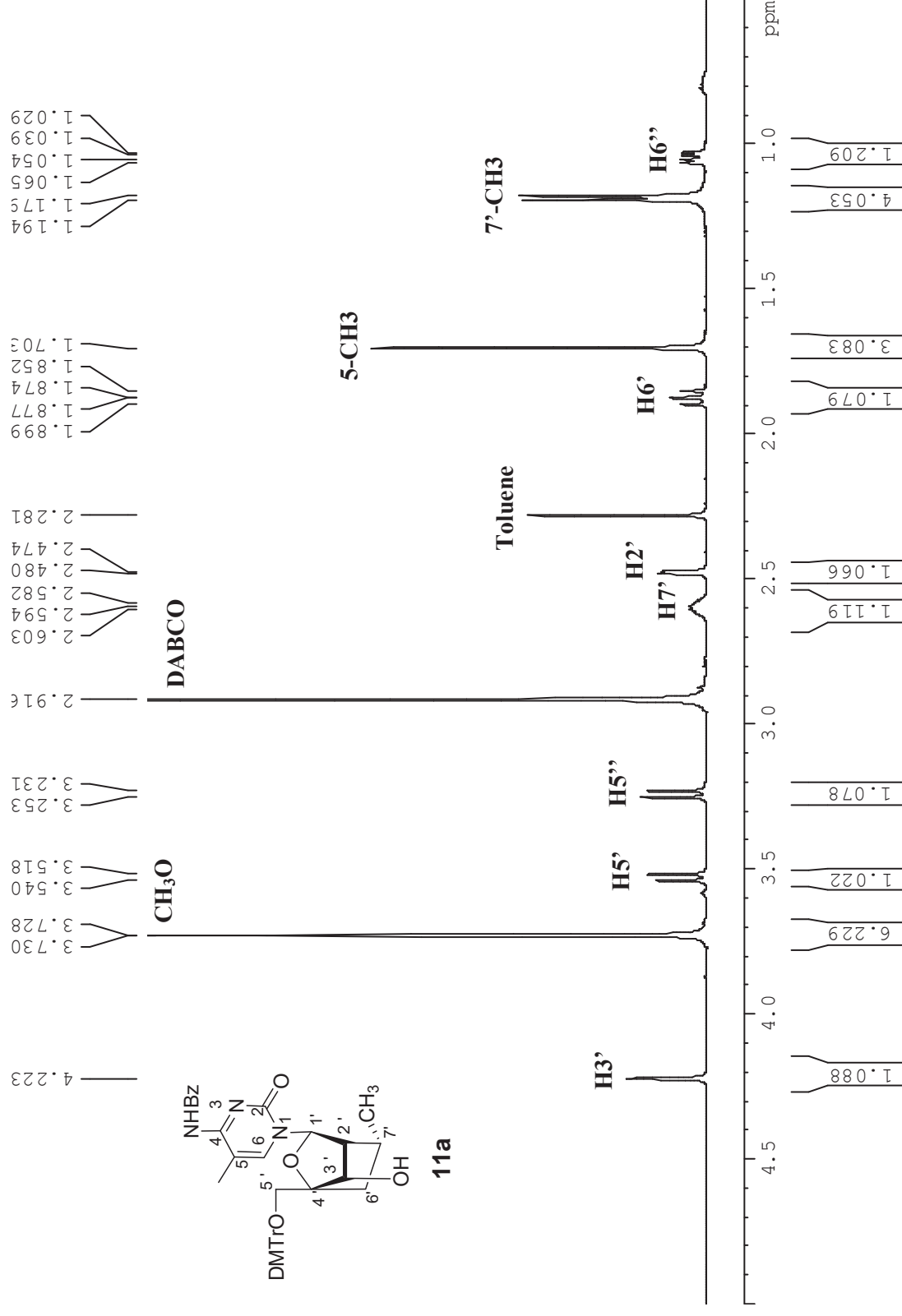


Figure SI.66 Expansion of ¹H NMR spectrum of compound 11a

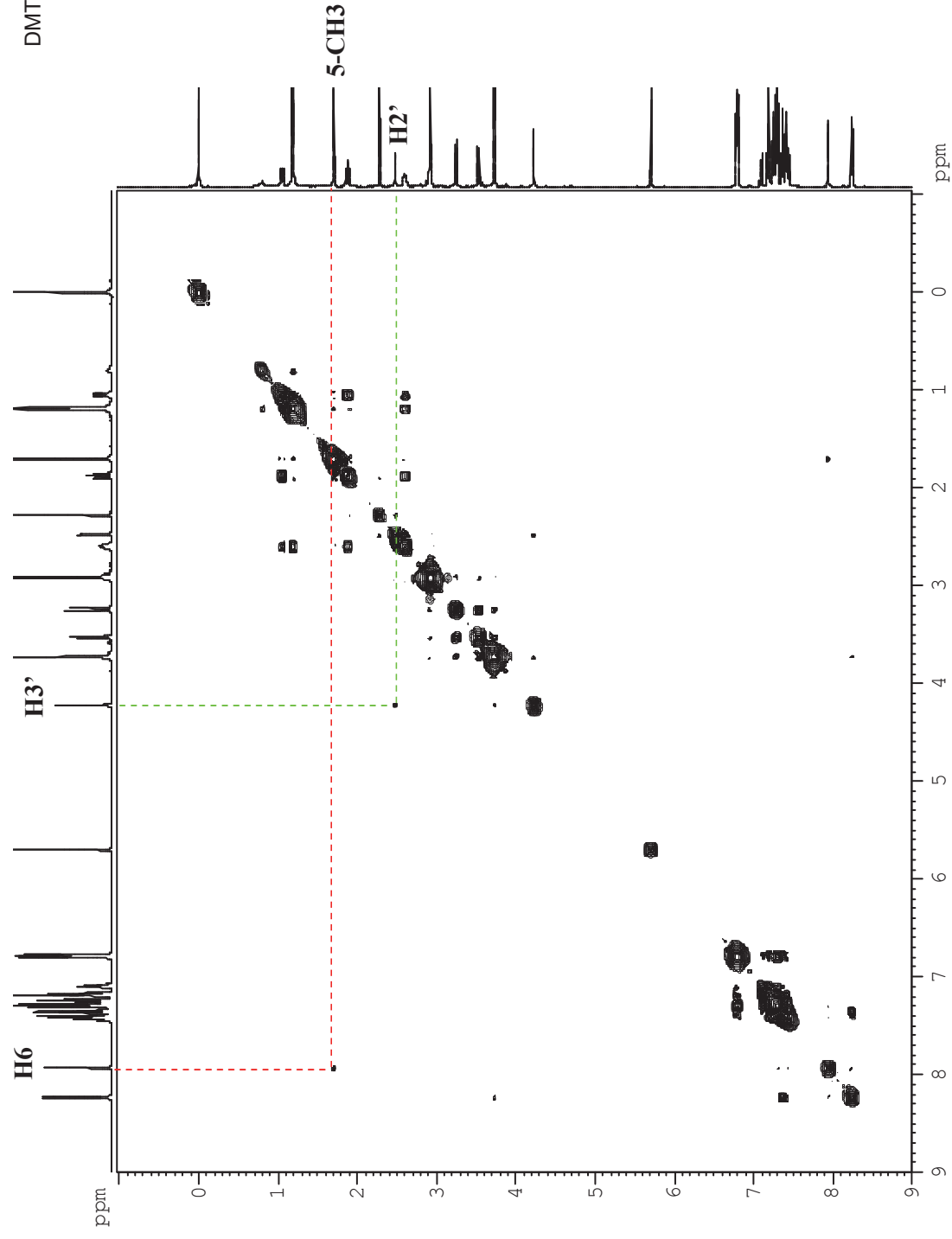
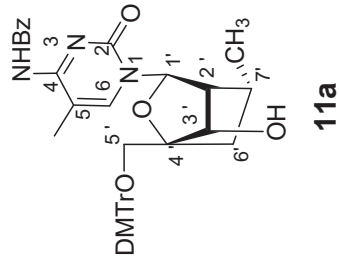


Figure SI.67 COSY spectrum of compound 11a

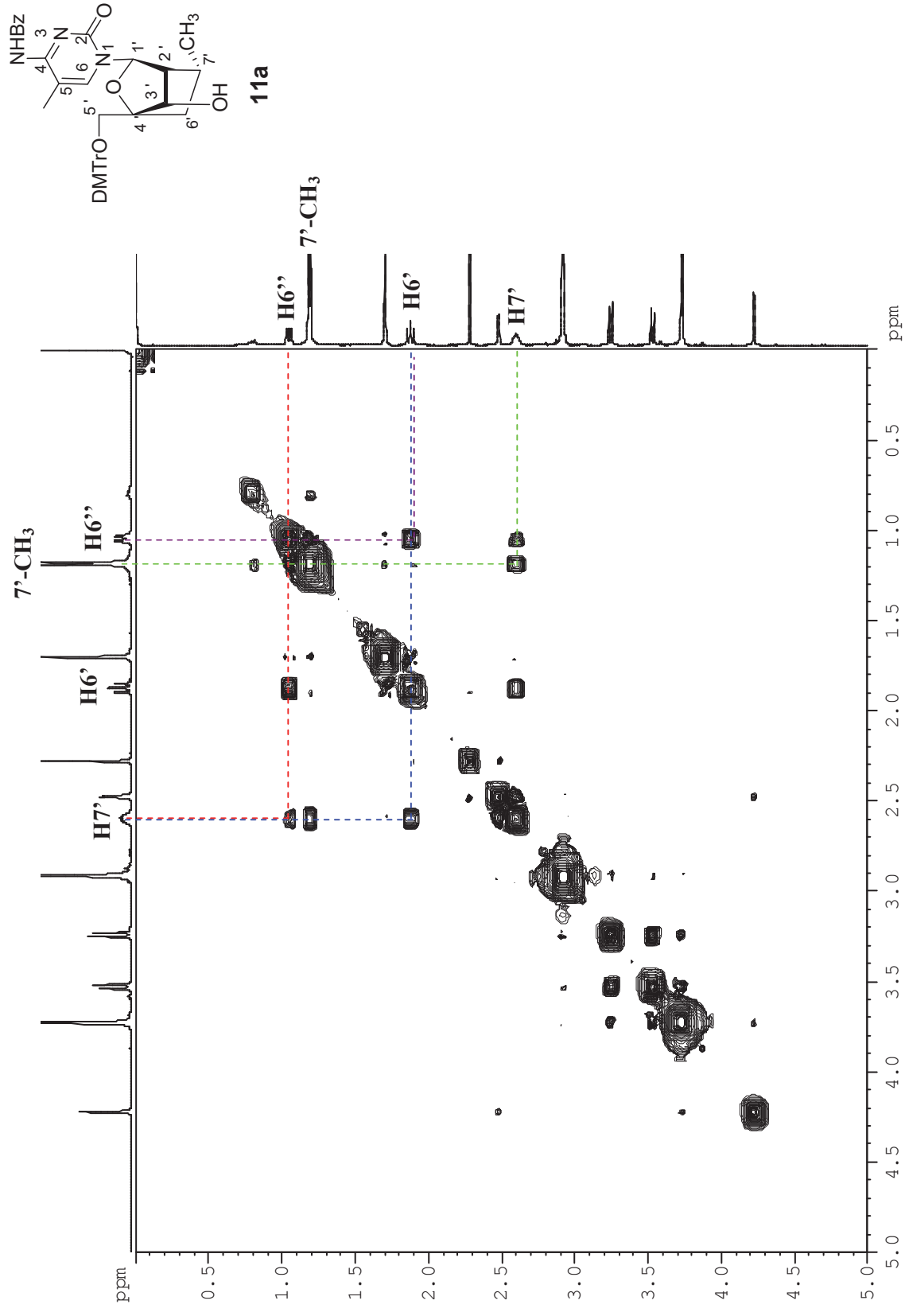


Figure SI.68 Expansion of COSY spectrum of compound 11a

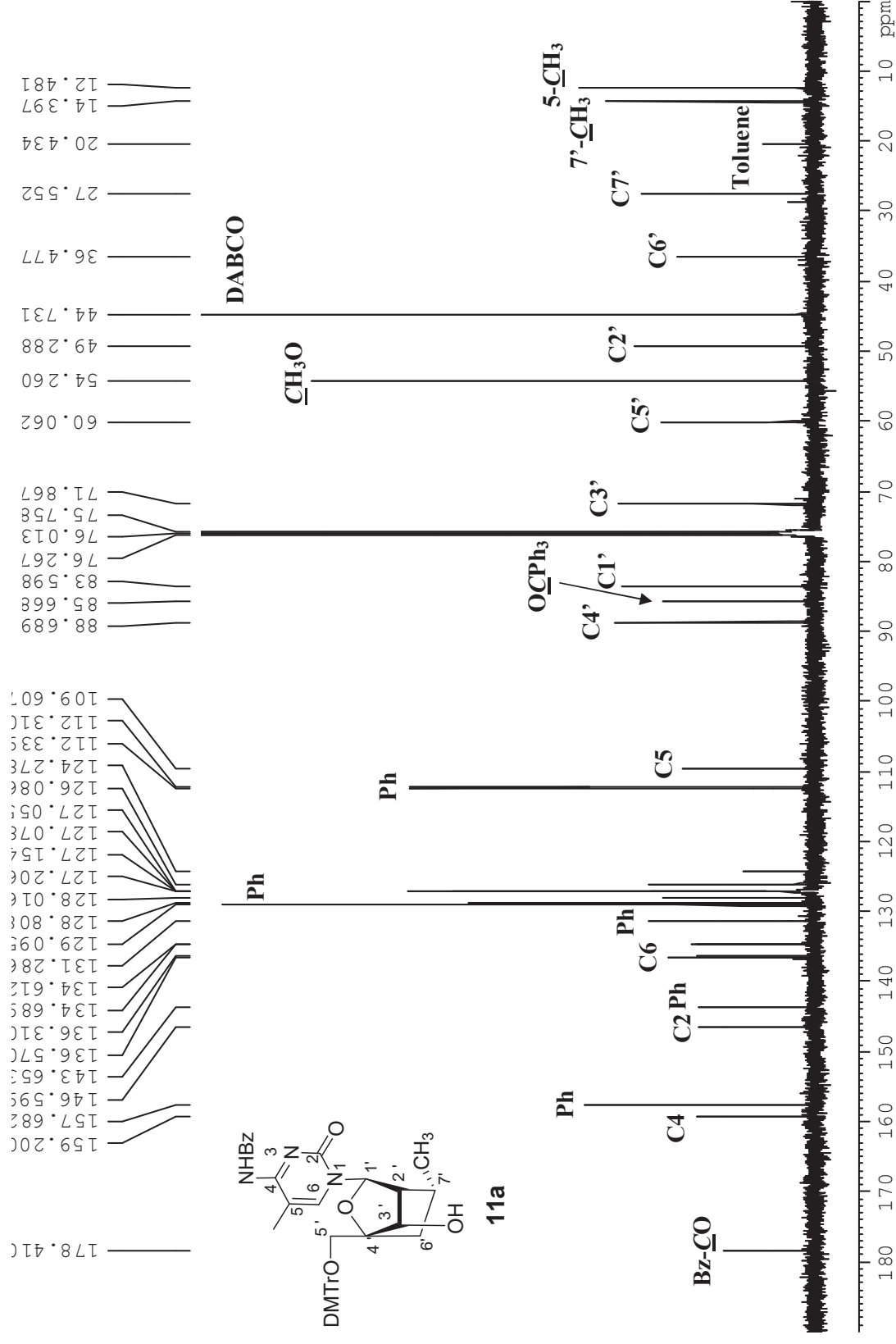


Figure SI.69 ^{13}C NMR spectrum of compound **11a**

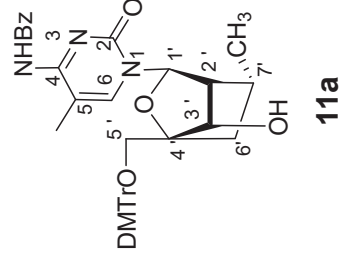
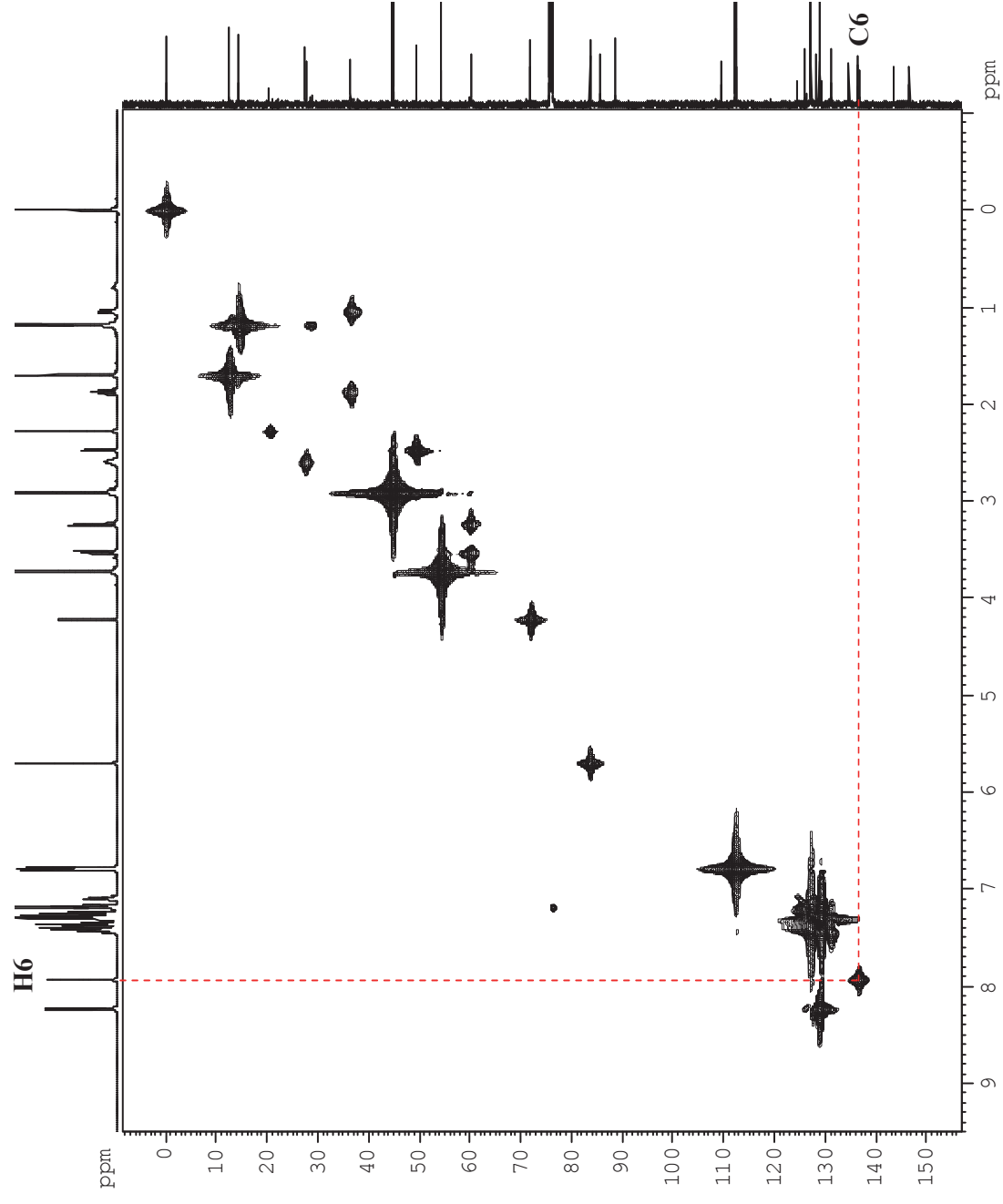


Figure SI.70 HMQC spectrum of compound 11a

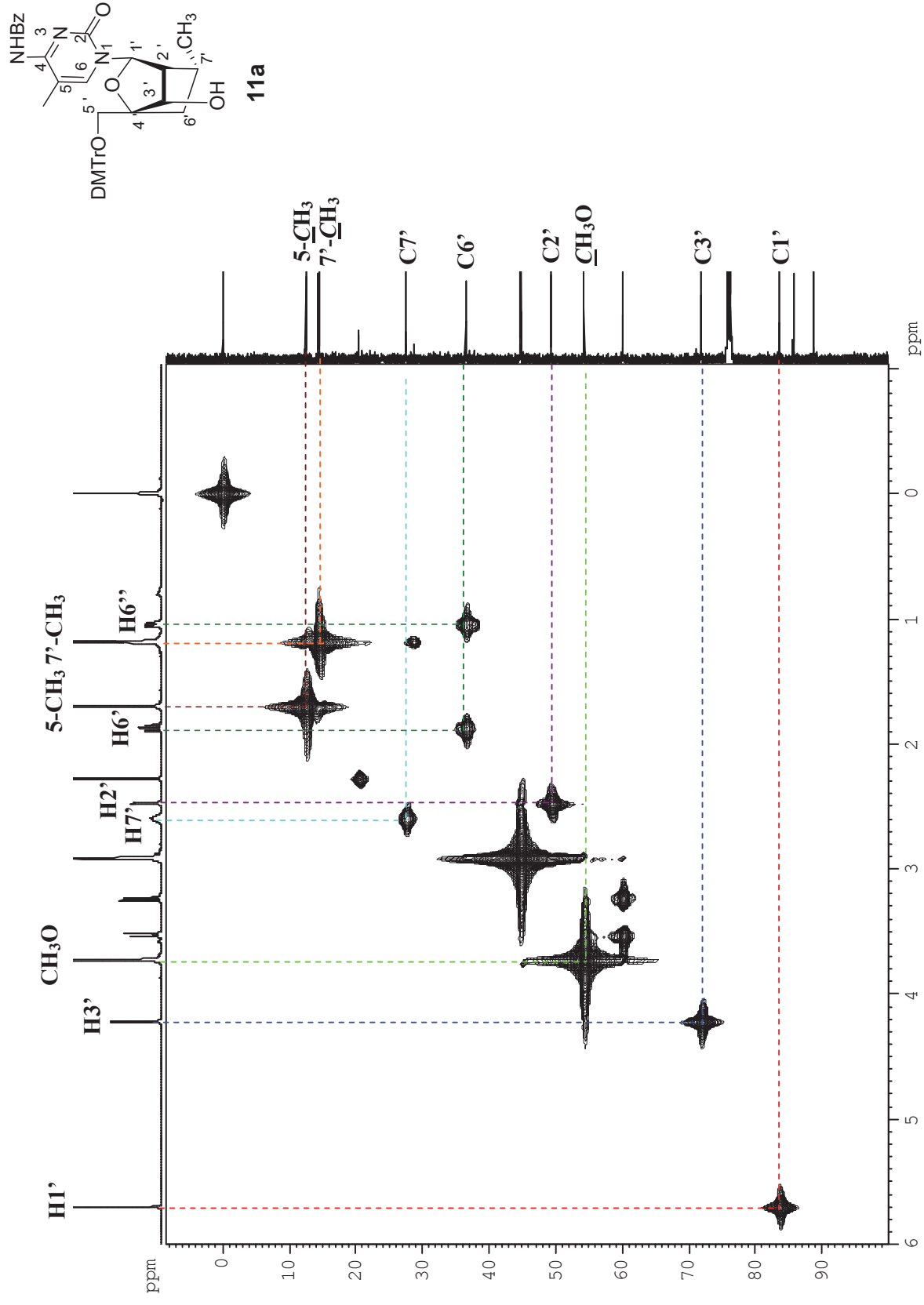


Figure SI.71 Expansion of HMQC spectrum of compound **11a**

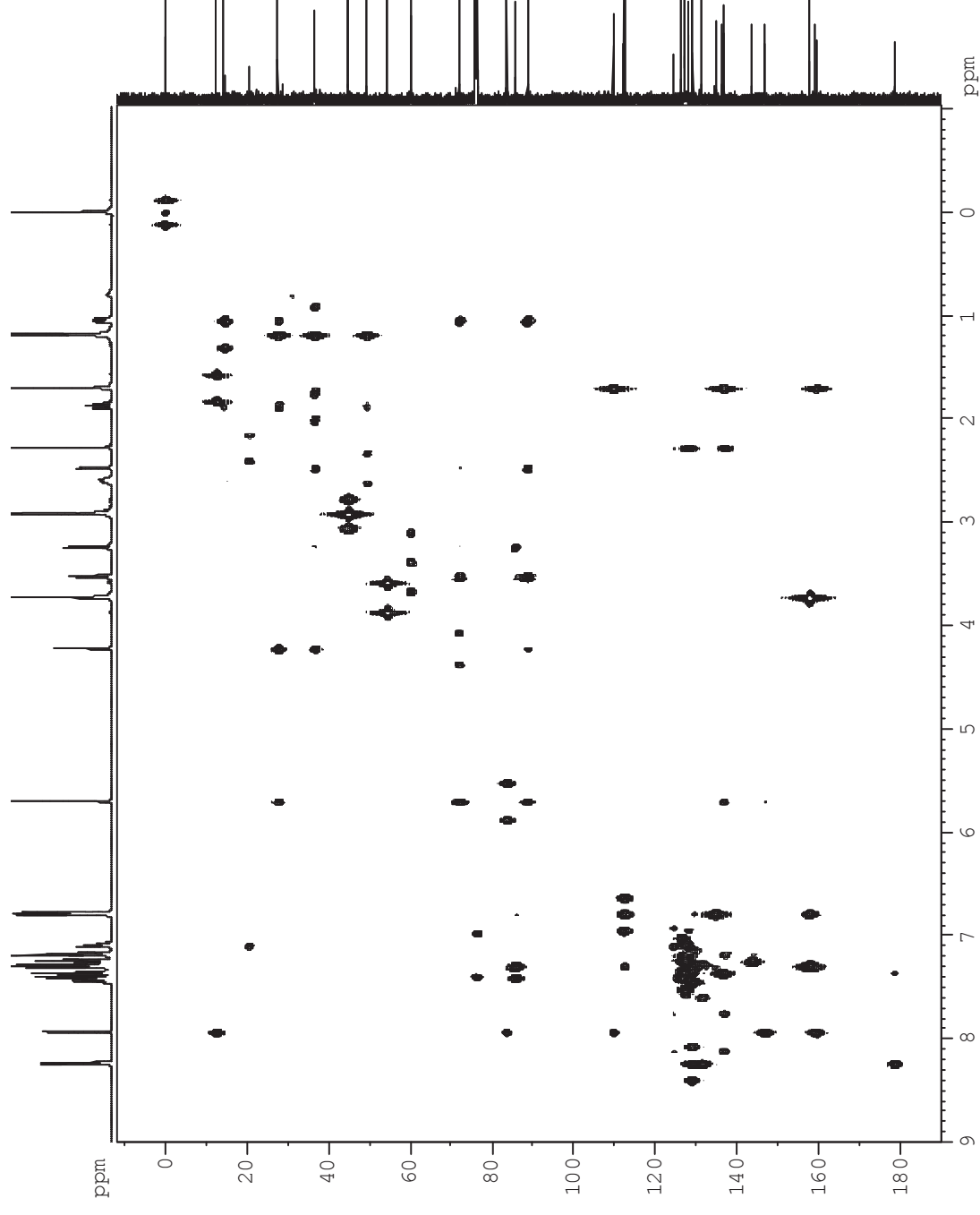
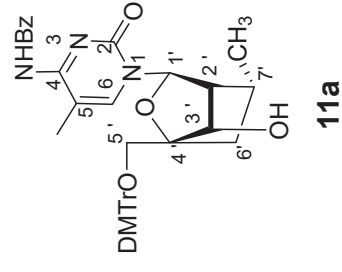


Figure SI.72 HMBC spectrum of compound **11a**

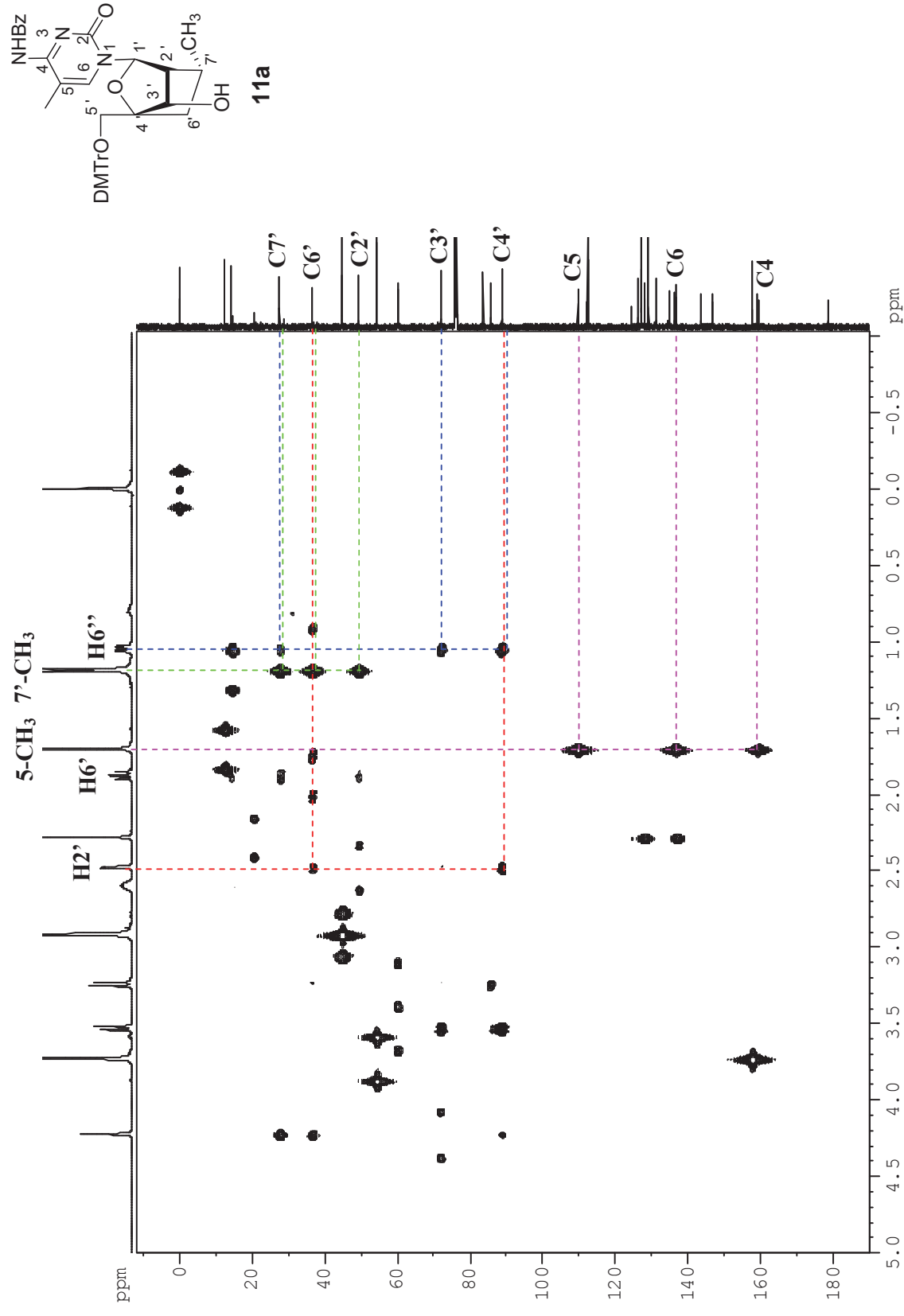


Figure SI.73 Expansion of HMBC spectrum of compound **11a**

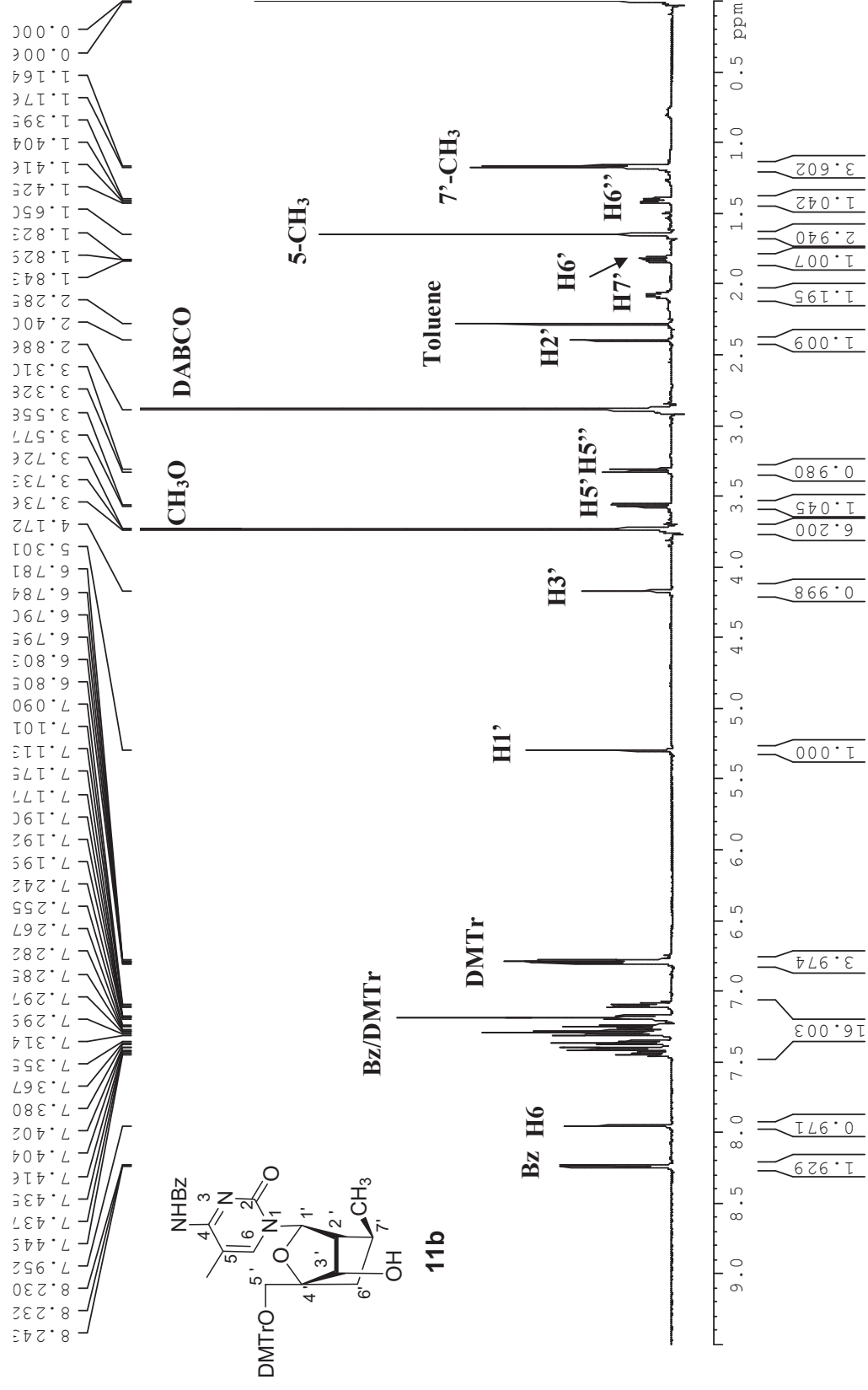


Figure SI.74 ¹H NMR spectrum of compound 11b

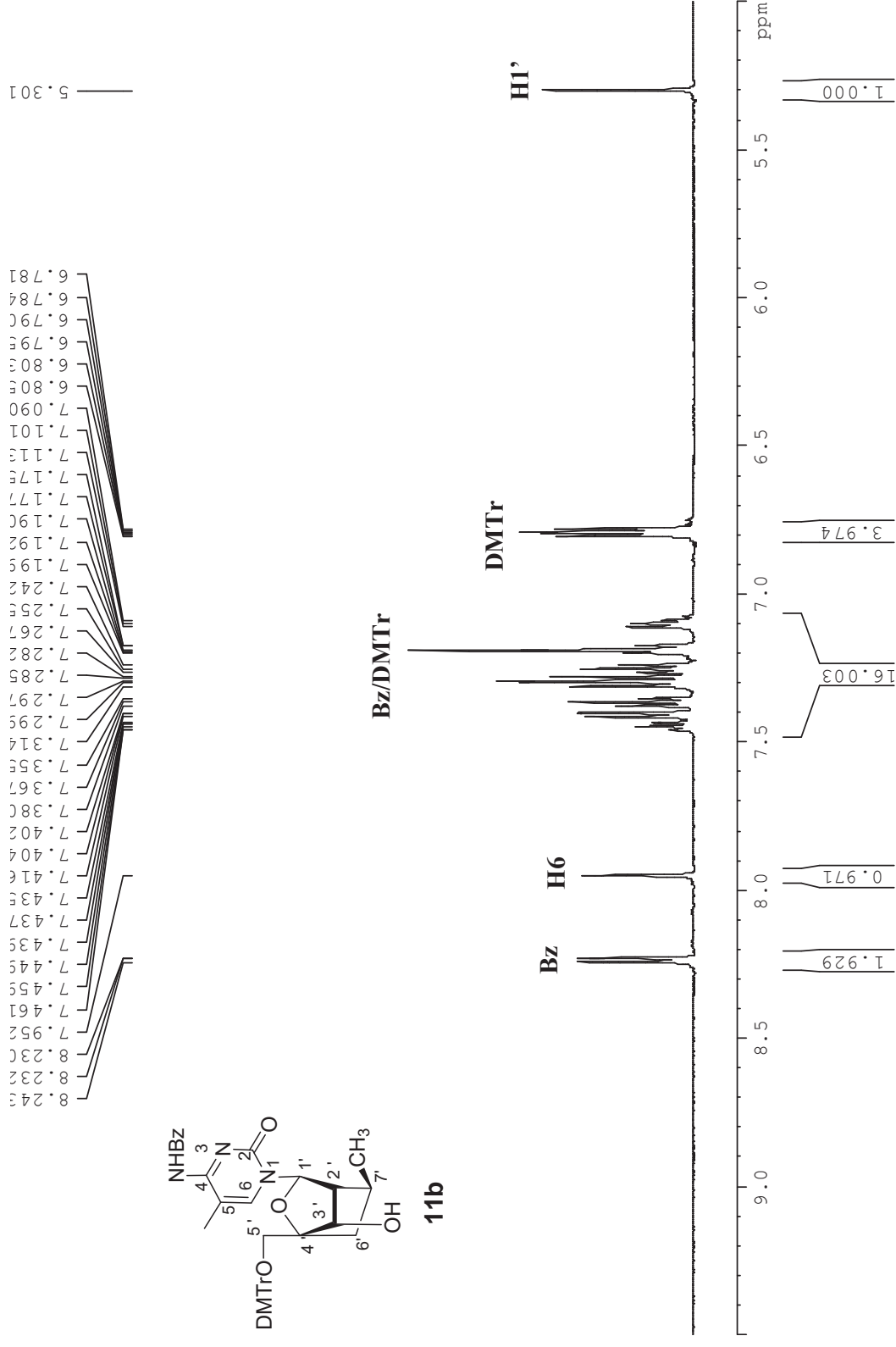


Figure SI.75 Expansion of ¹H NMR spectrum of compound 11b

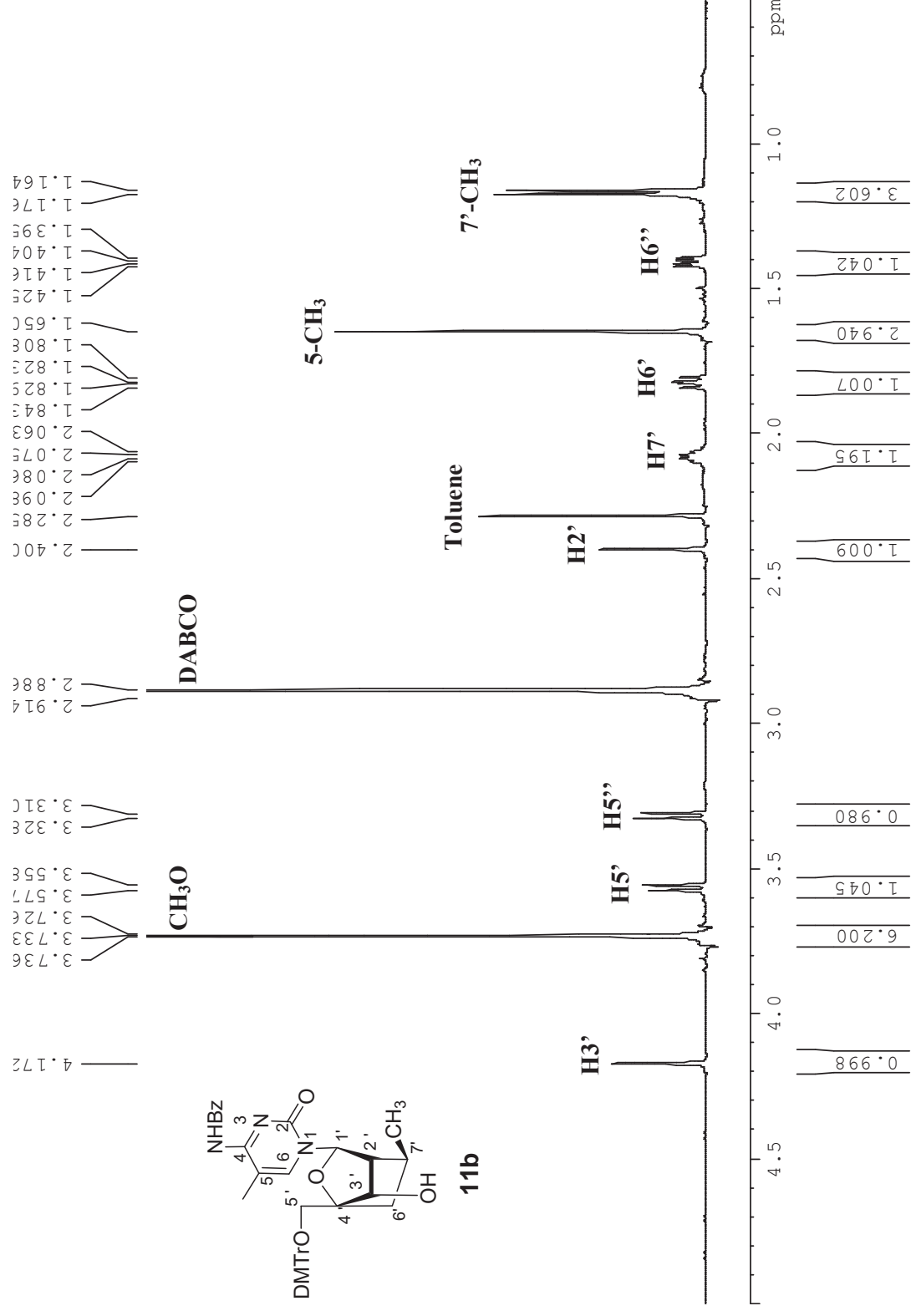


Figure SI.76 Expansion of ¹H NMR spectrum of compound 11b

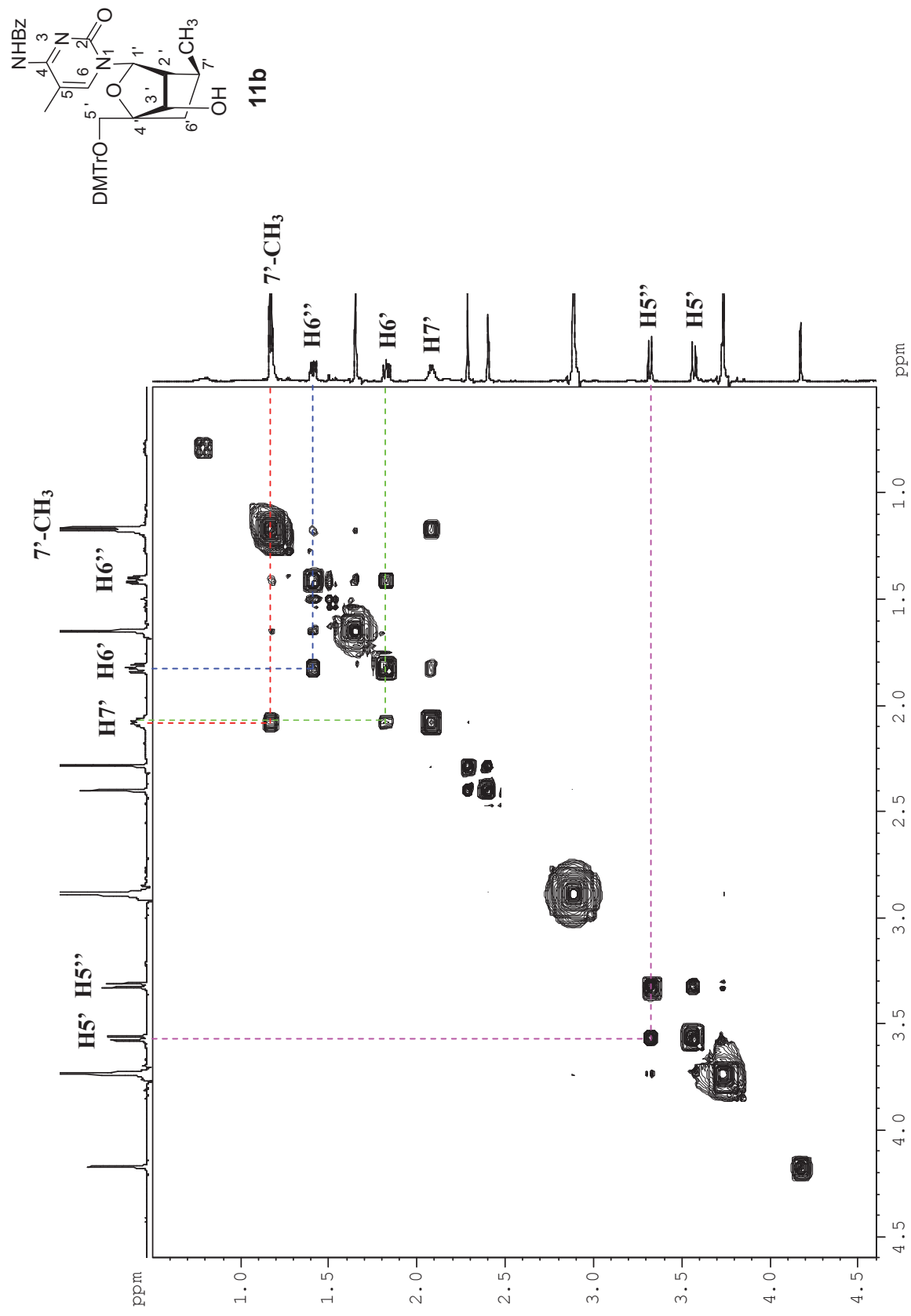


Figure SI.78 Expansion of COSY spectrum of compound **11b**

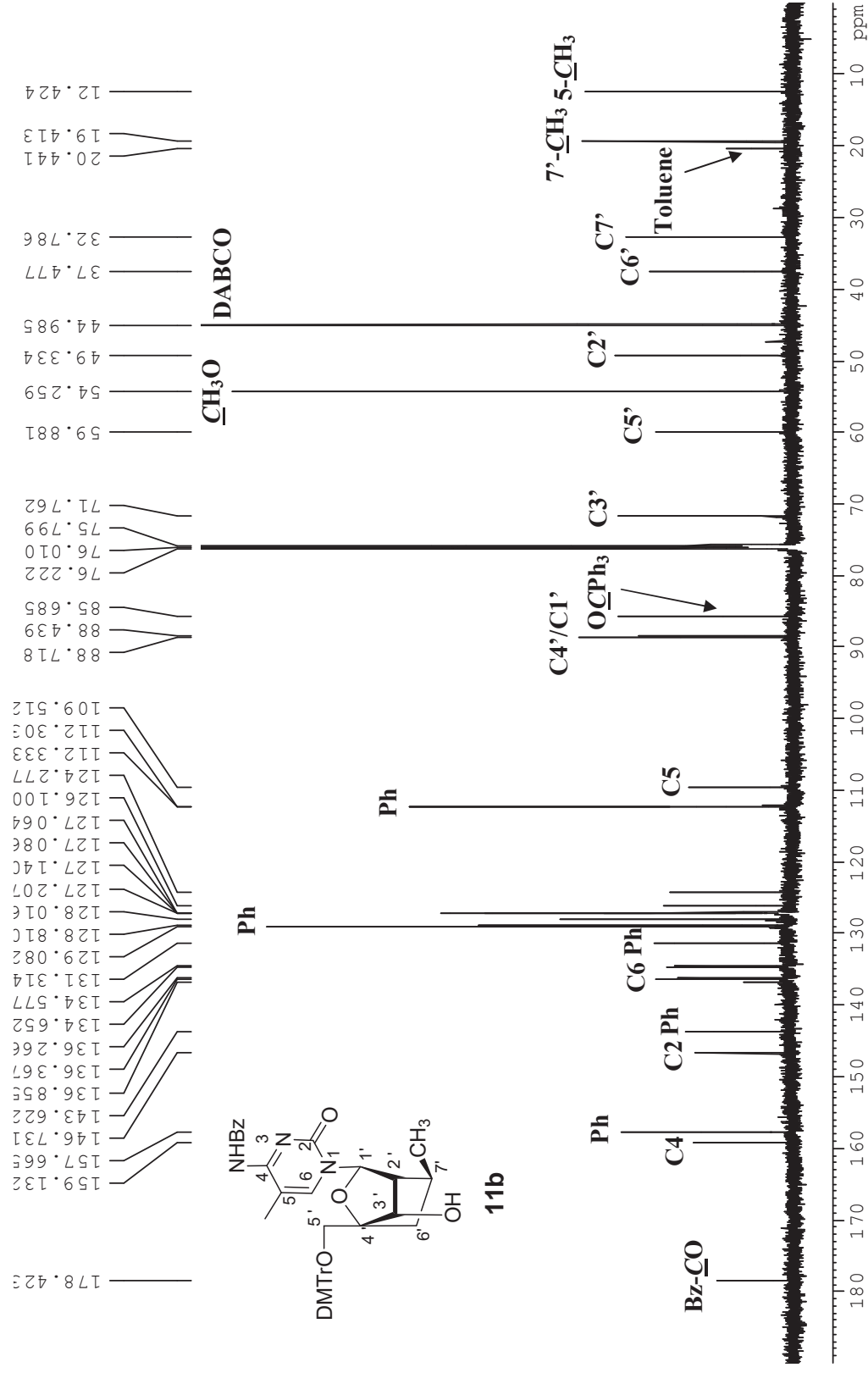


Figure SI.79 ¹³C NMR spectrum of compound 11b

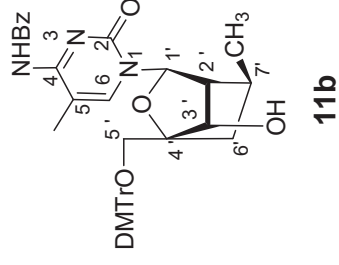
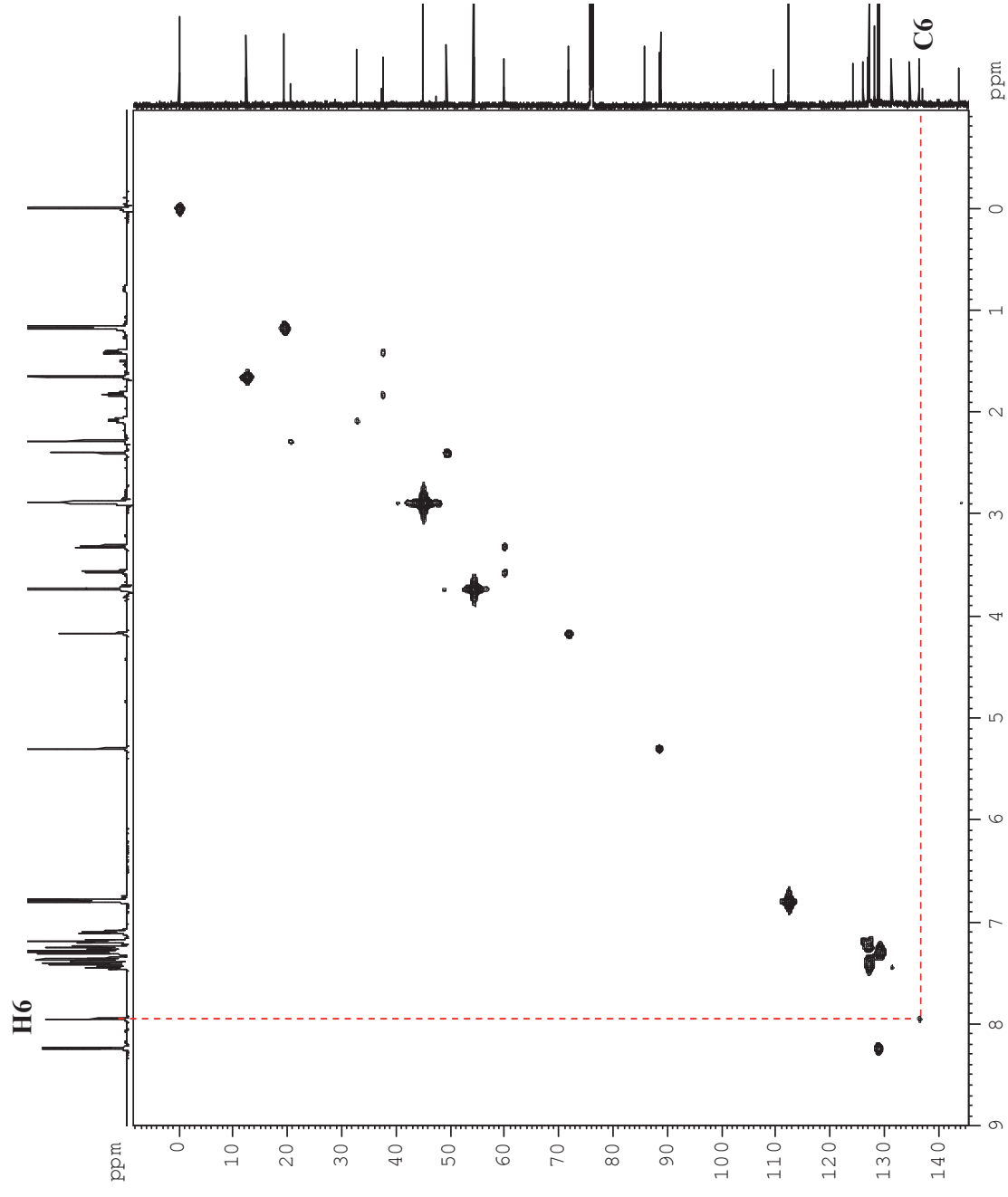


Figure SI.80 HMQC spectrum of compound 11b

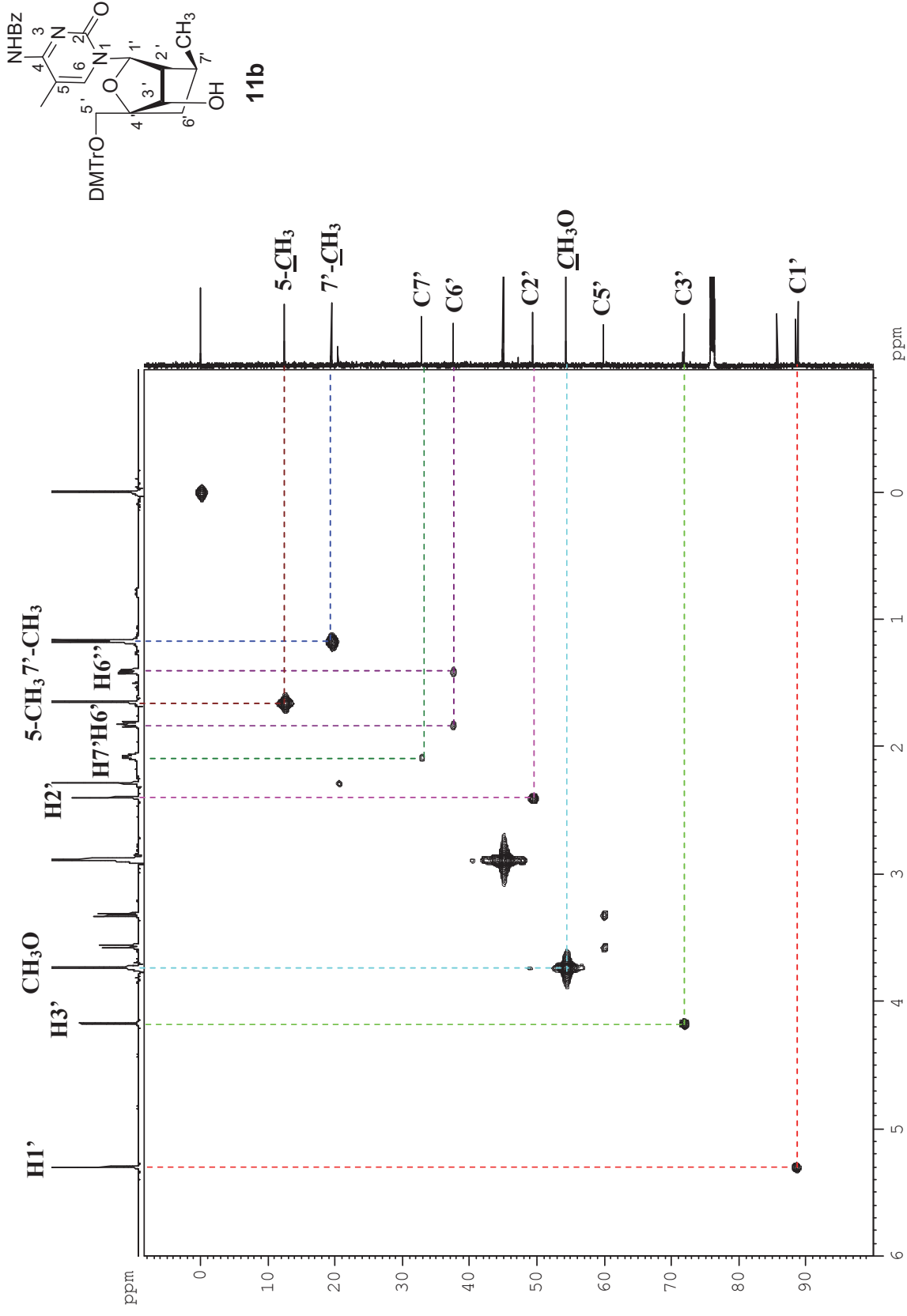


Figure SI.81 Expansion of HMQC spectrum of compound 11b

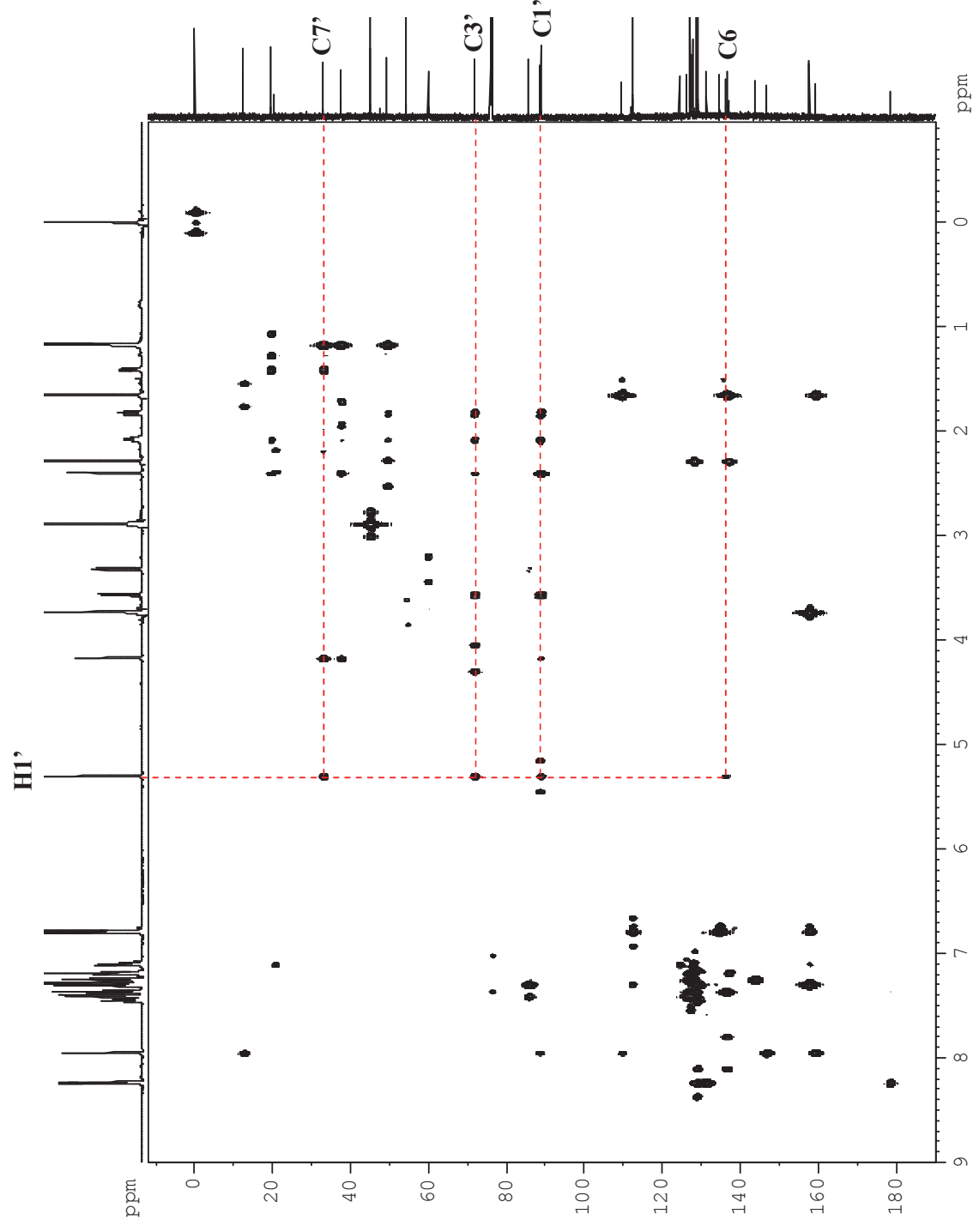
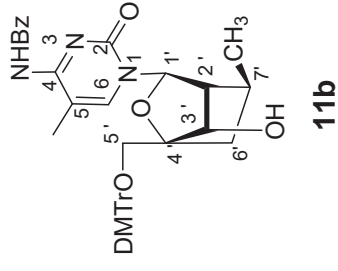


Figure SI.82 HMBC spectrum of compound **11b**

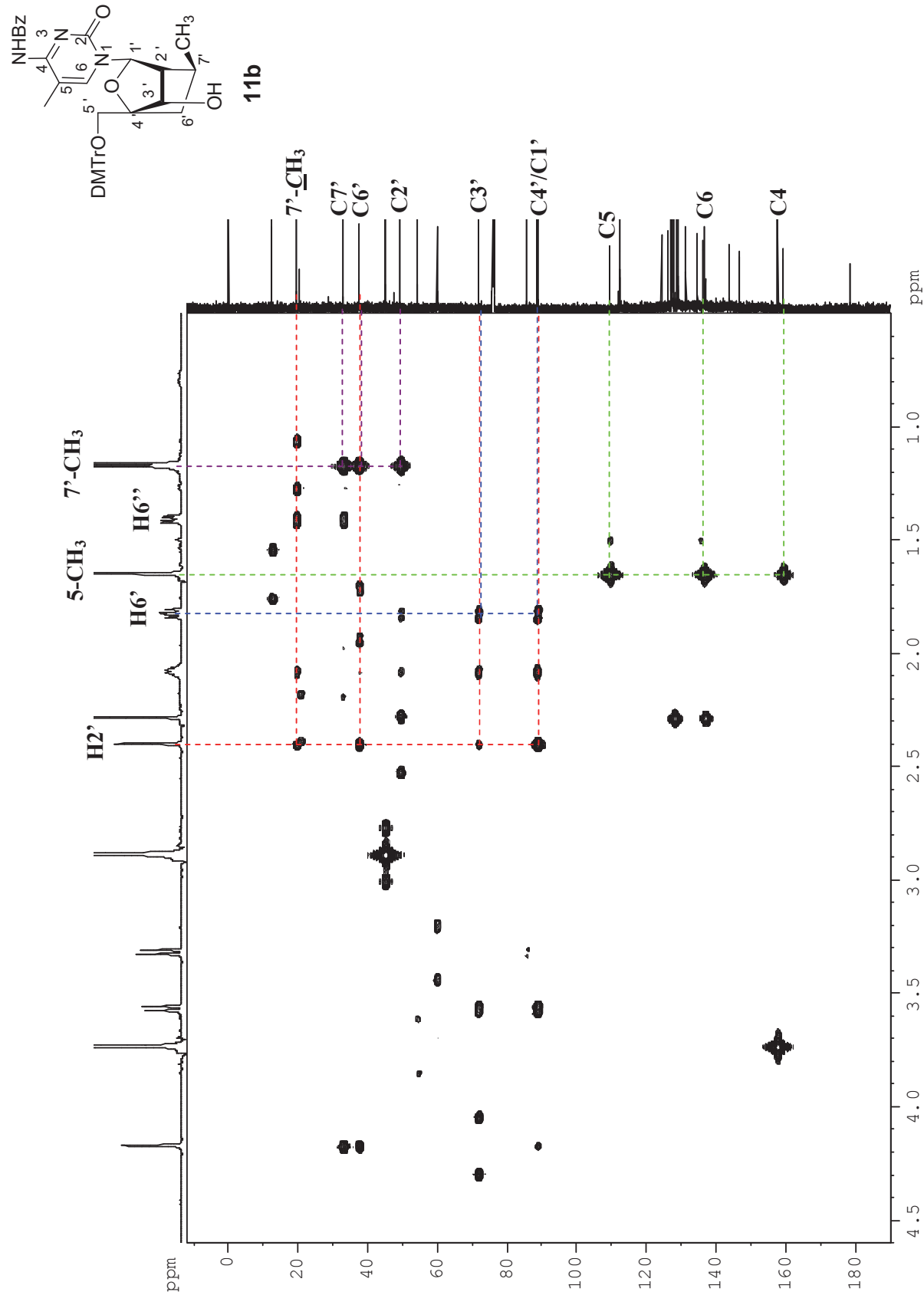


Figure SI.83 Expansion of HMBC spectrum of compound 11b

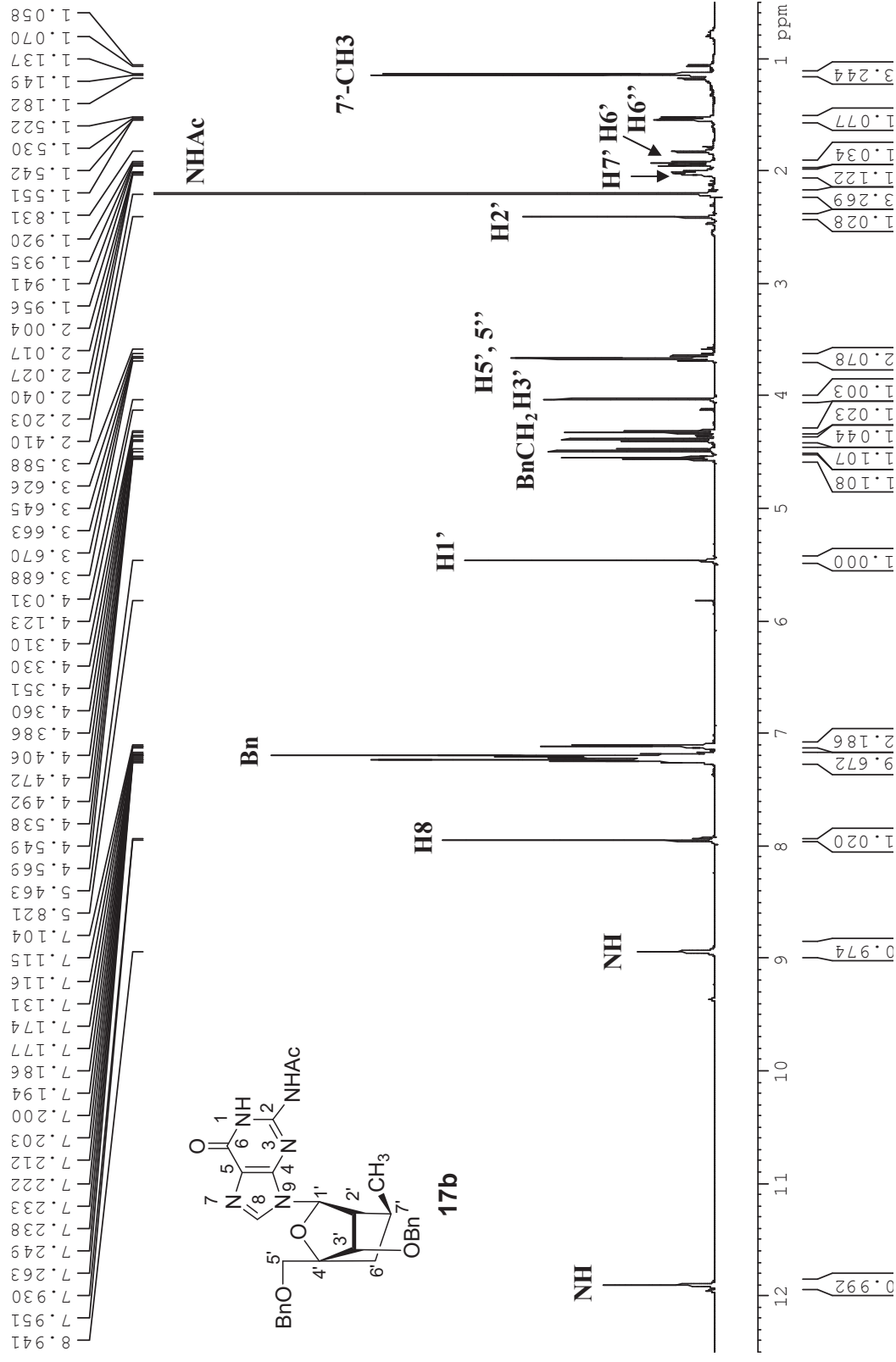


Figure SI.84 ¹H NMR spectrum of compound 17b

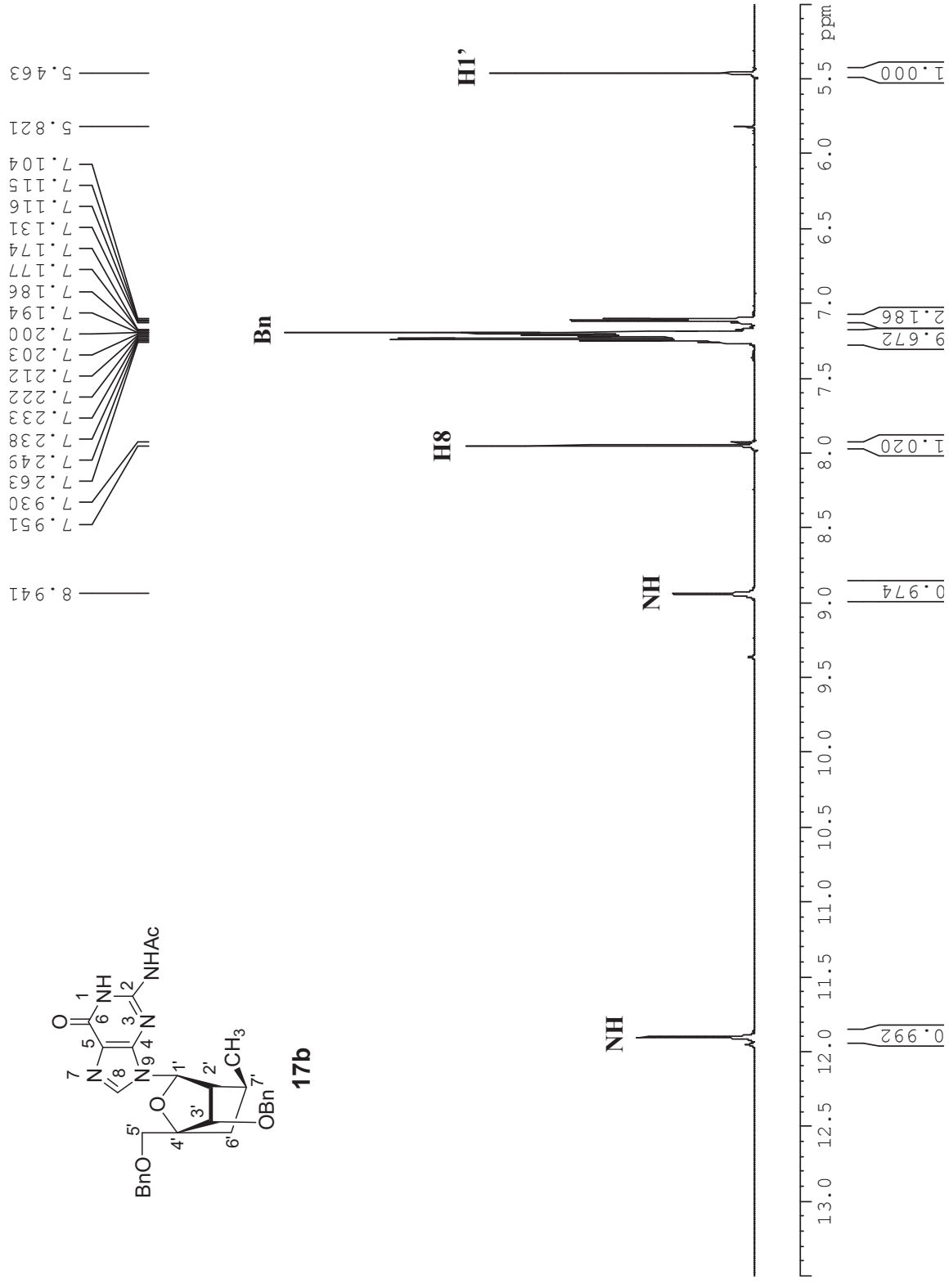


Figure SI.85 Expansion of ¹H NMR spectrum of compound 17b

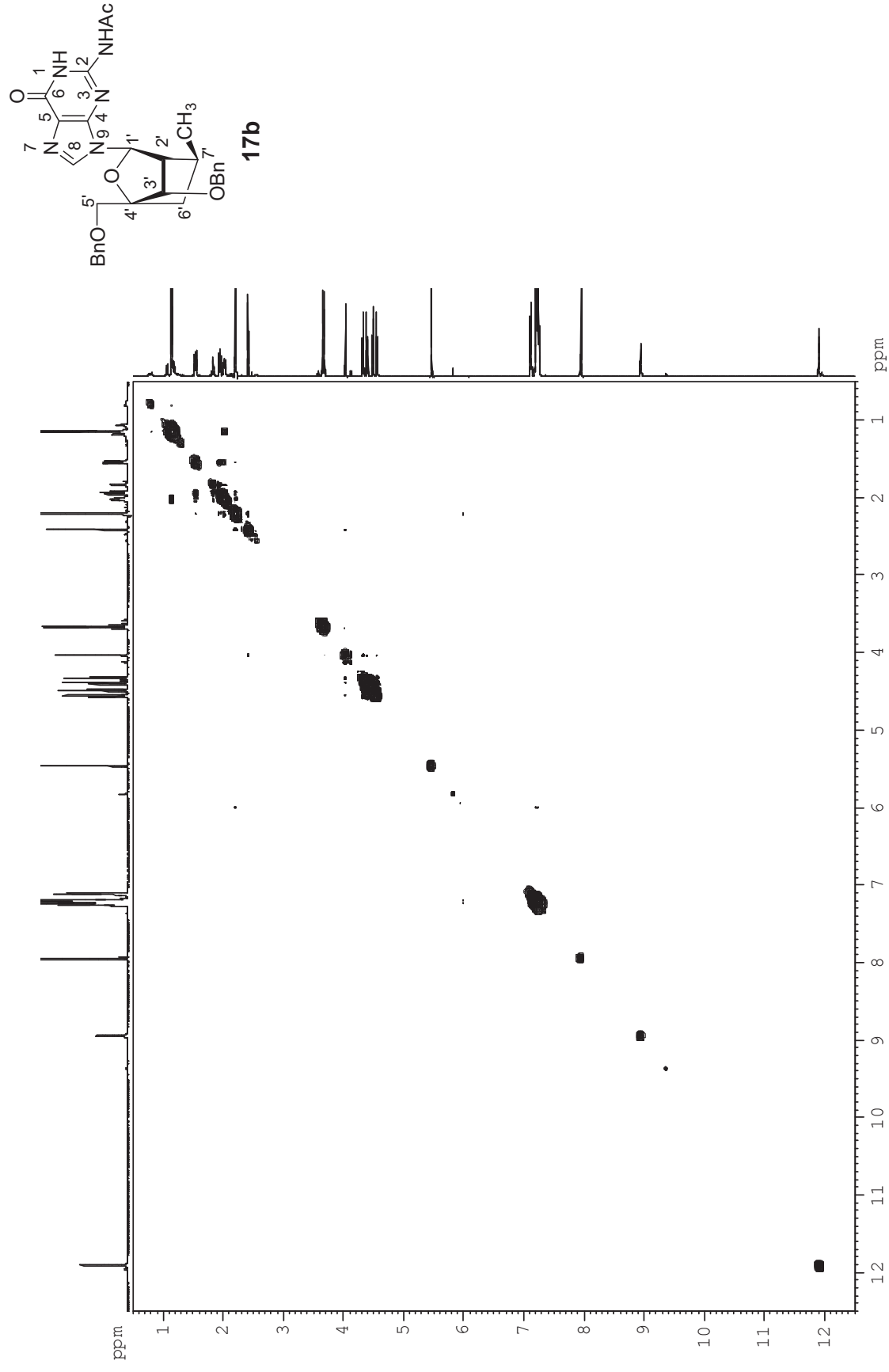


Figure SI.87 COSY spectrum of compound 17b

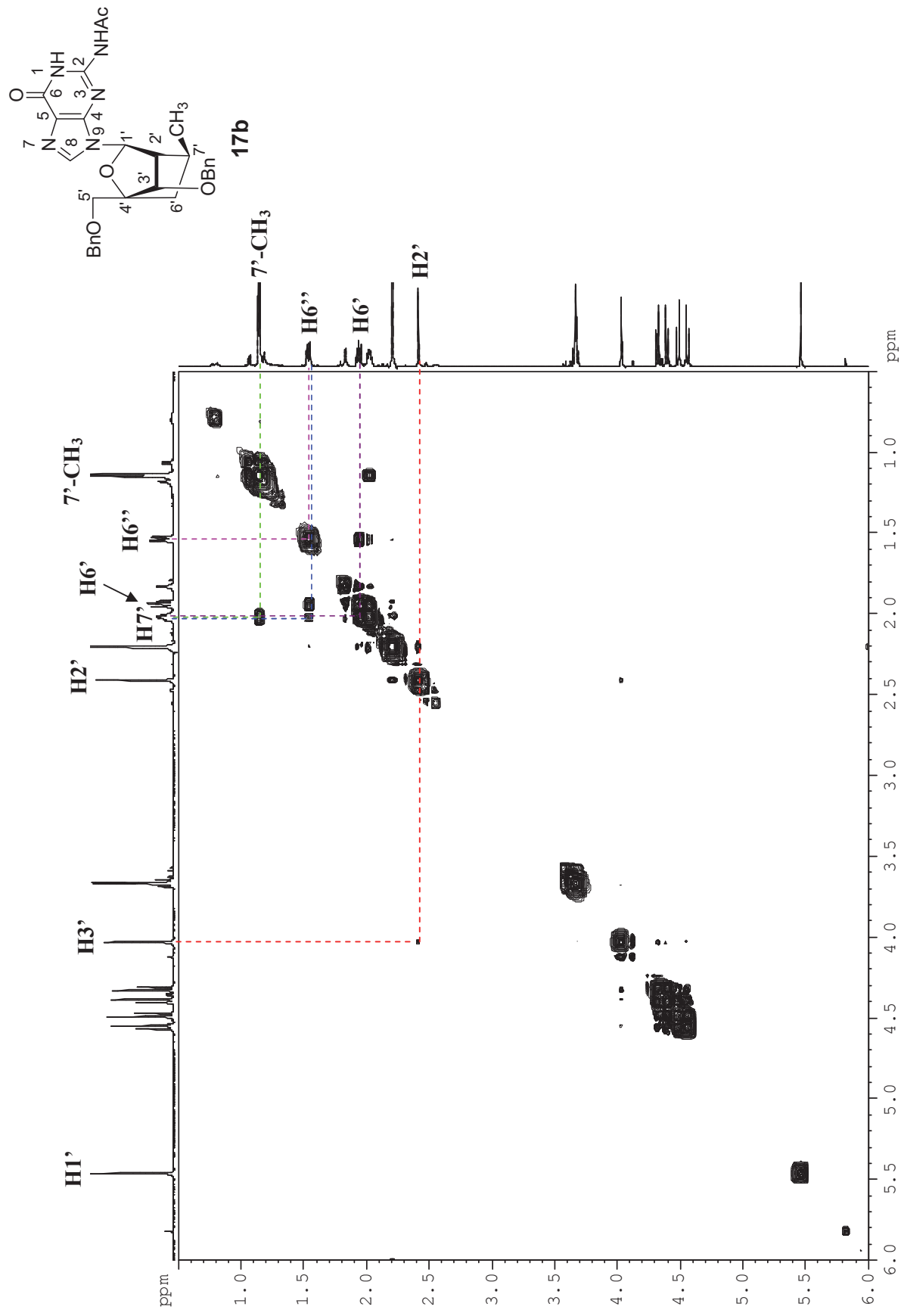


Figure SI.88 Expansion of COSY spectrum of compound 17b

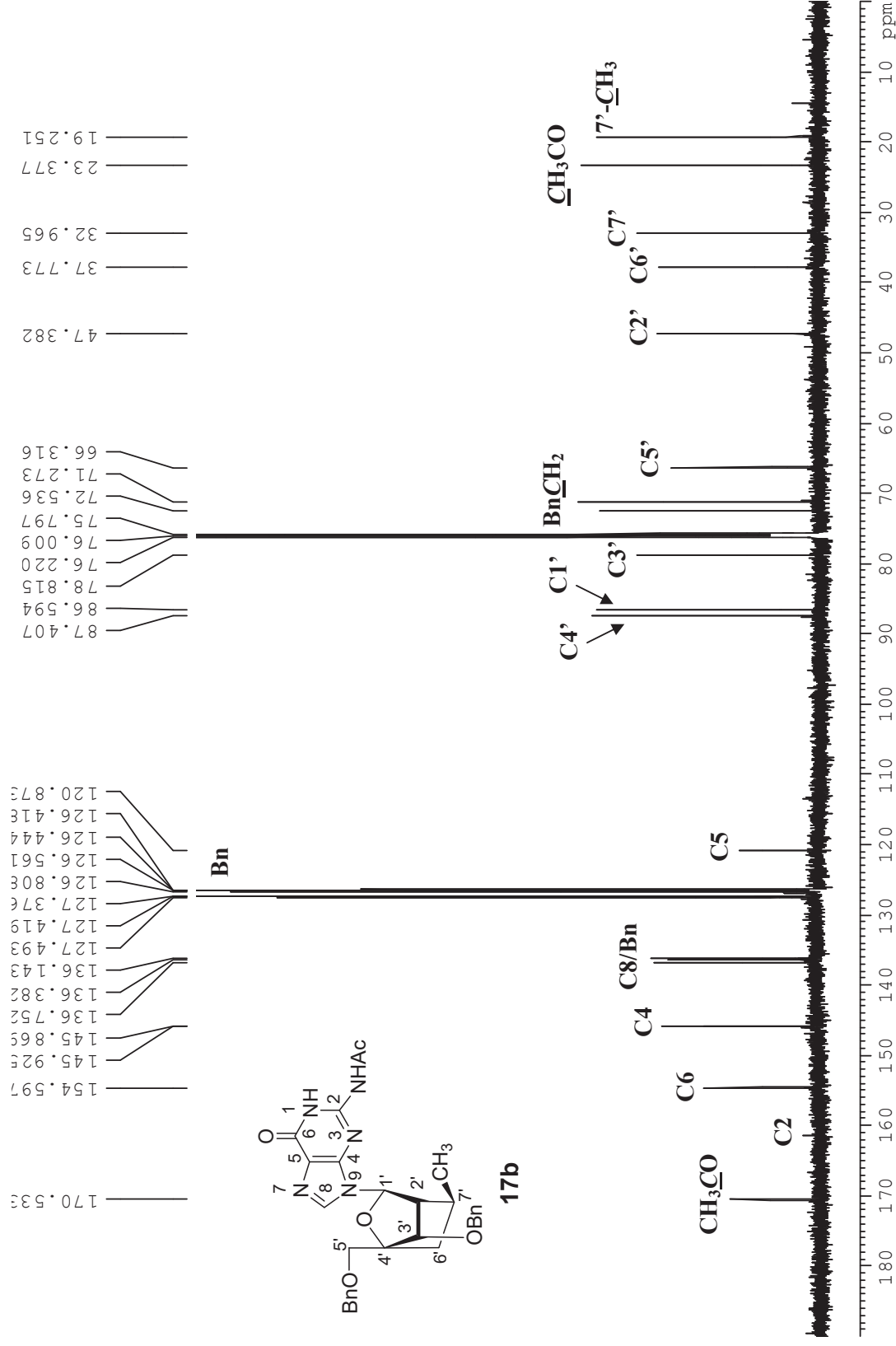


Figure SI.89 ¹³C NMR spectrum of compound **17b**

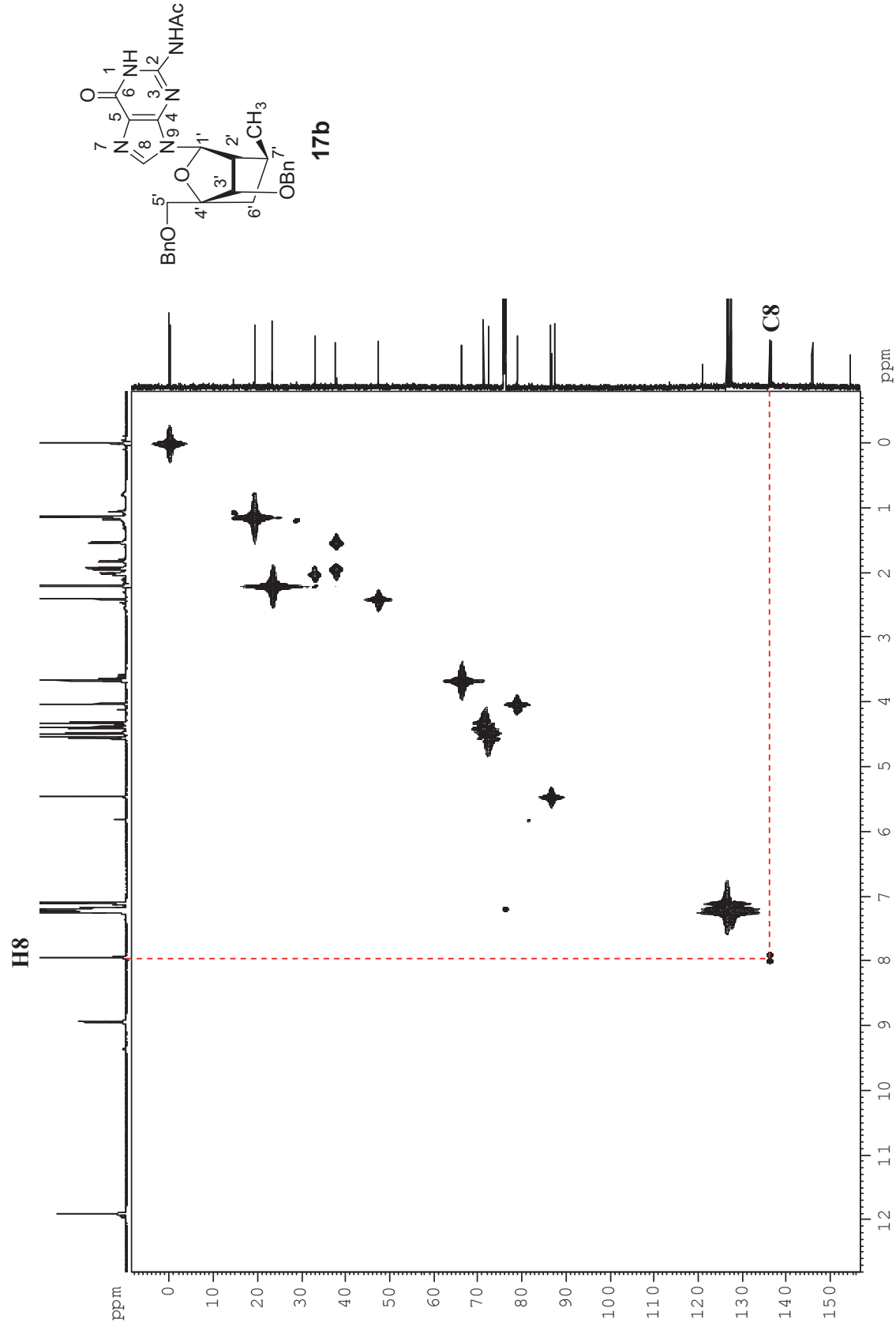


Figure SI.90 HMQC spectrum of compound 17b

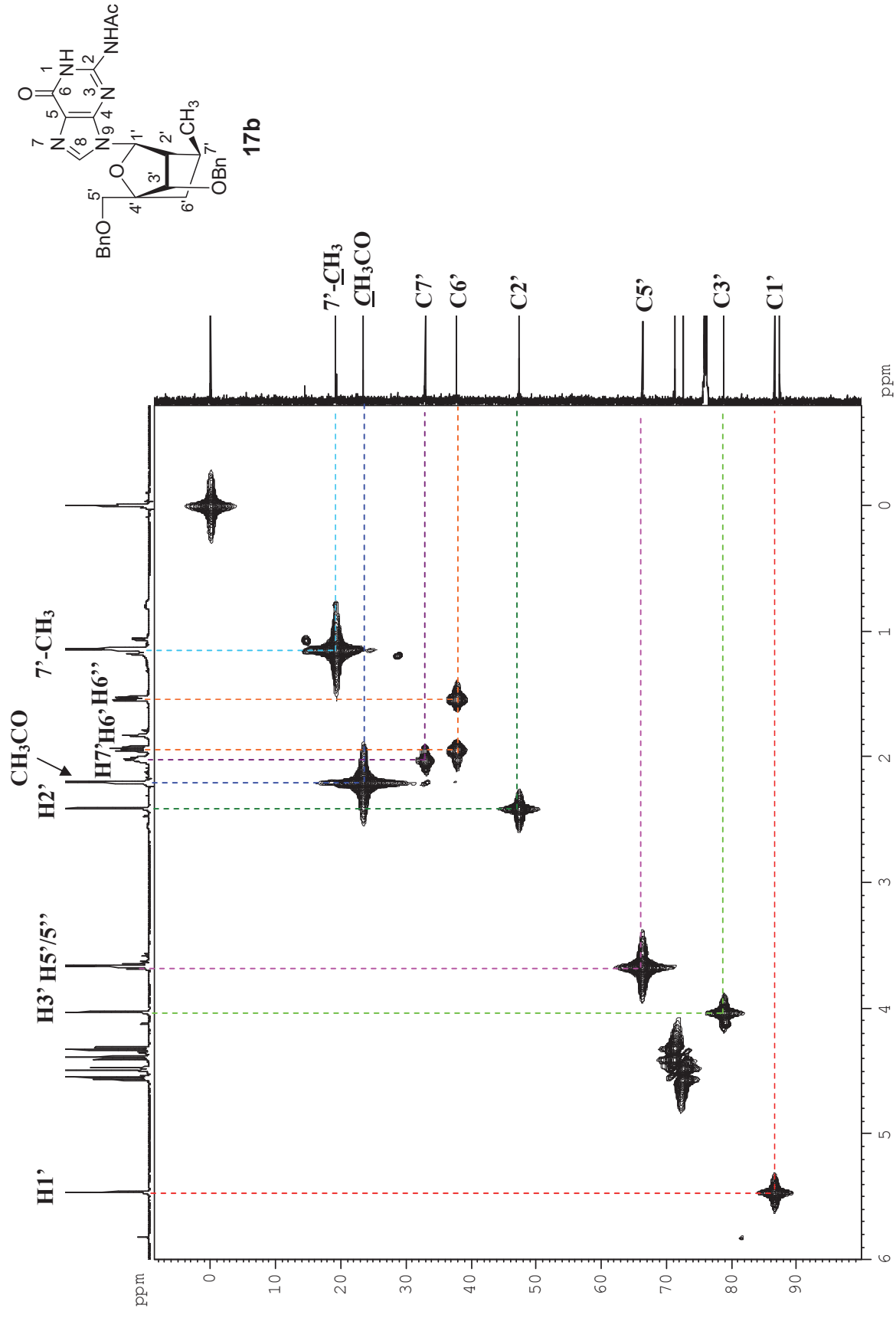


Figure SI.91 Expansion of HMQC spectrum of compound **17b**

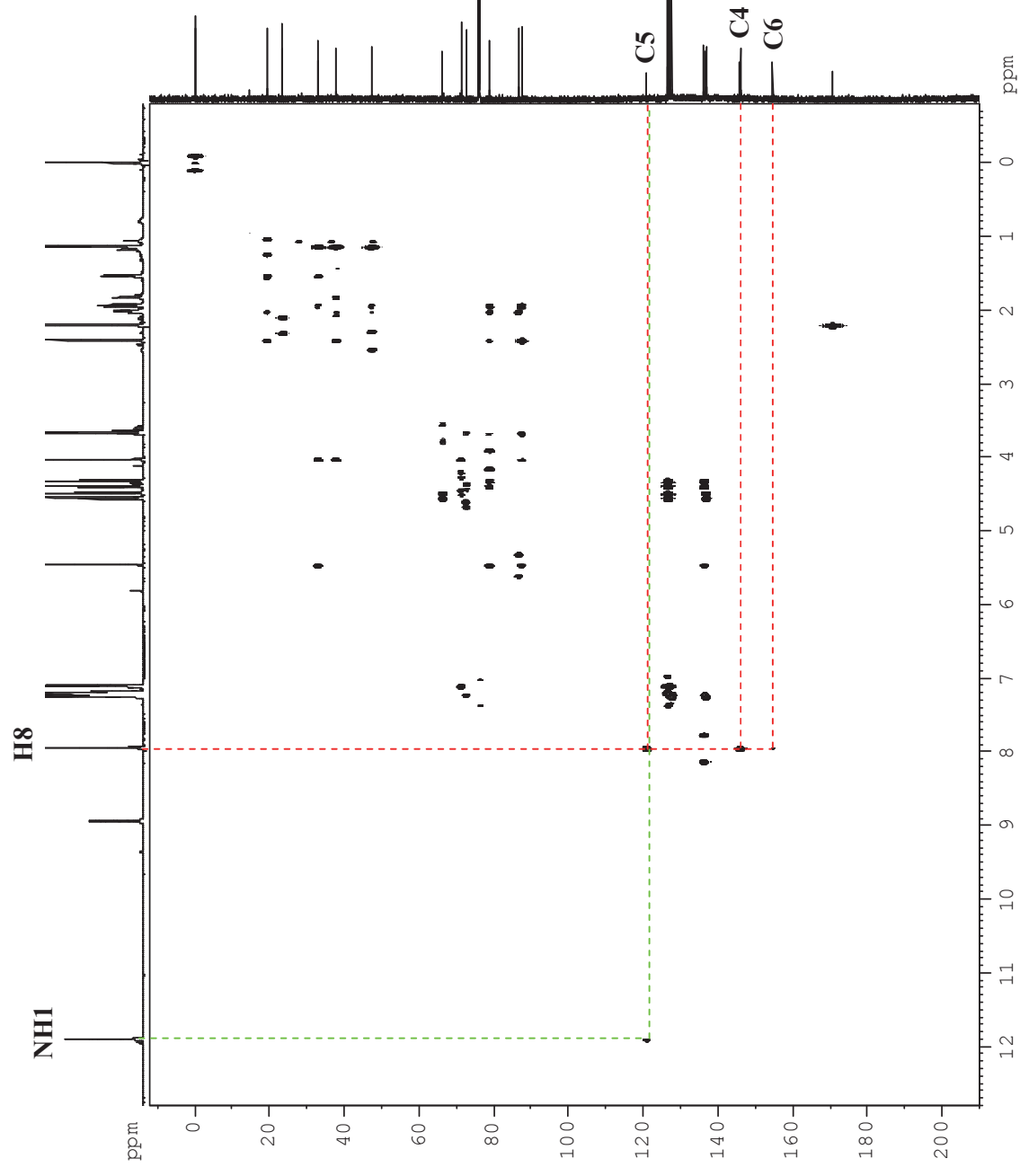
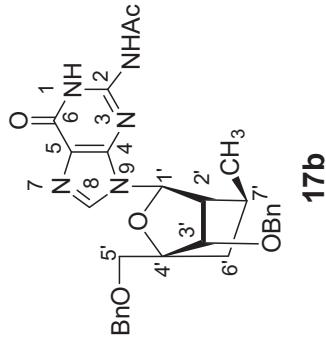


Figure SI.92 HMBC spectrum of compound 17b

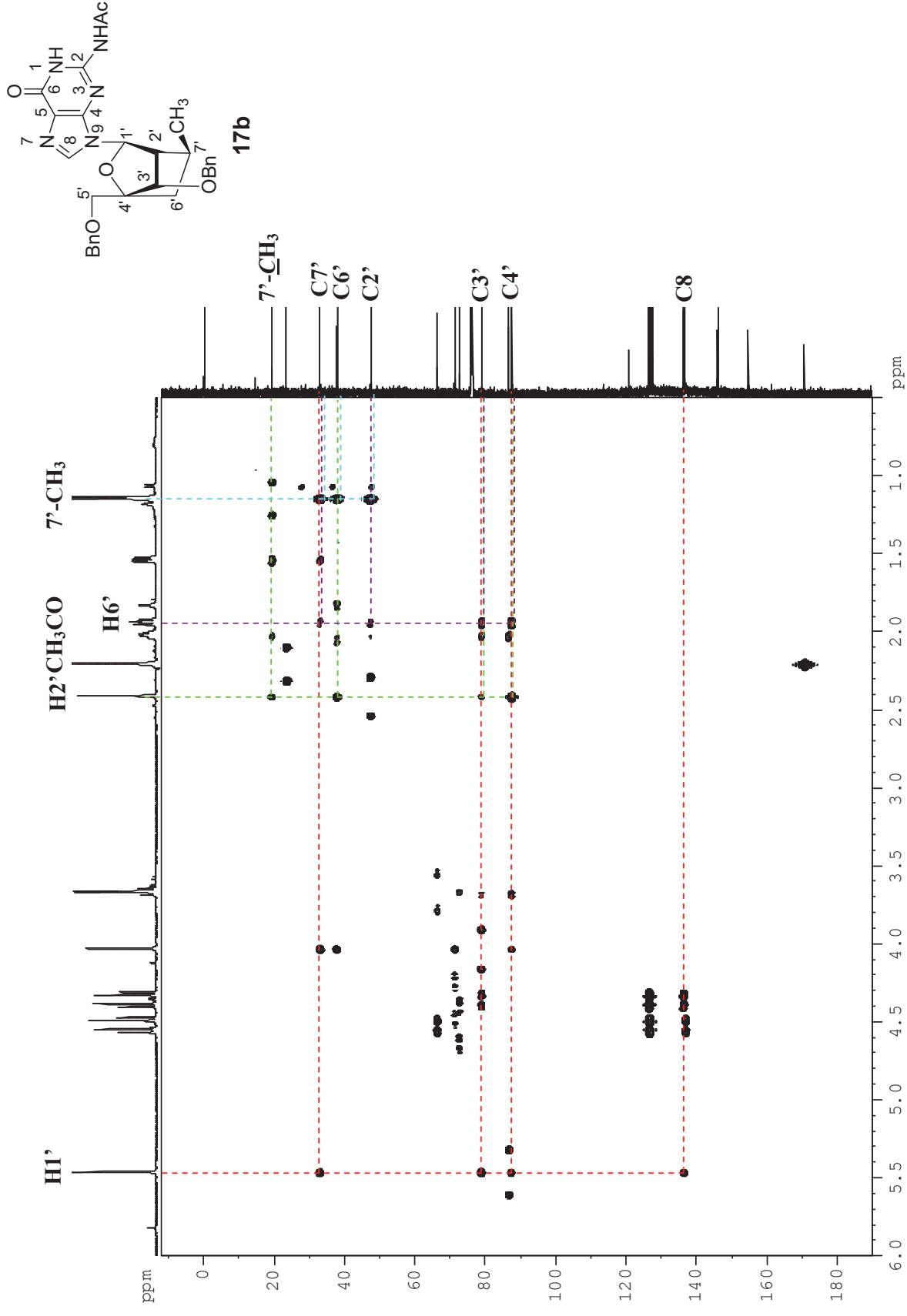


Figure SI.93 Expansion of HMBC spectrum of compound **17b**

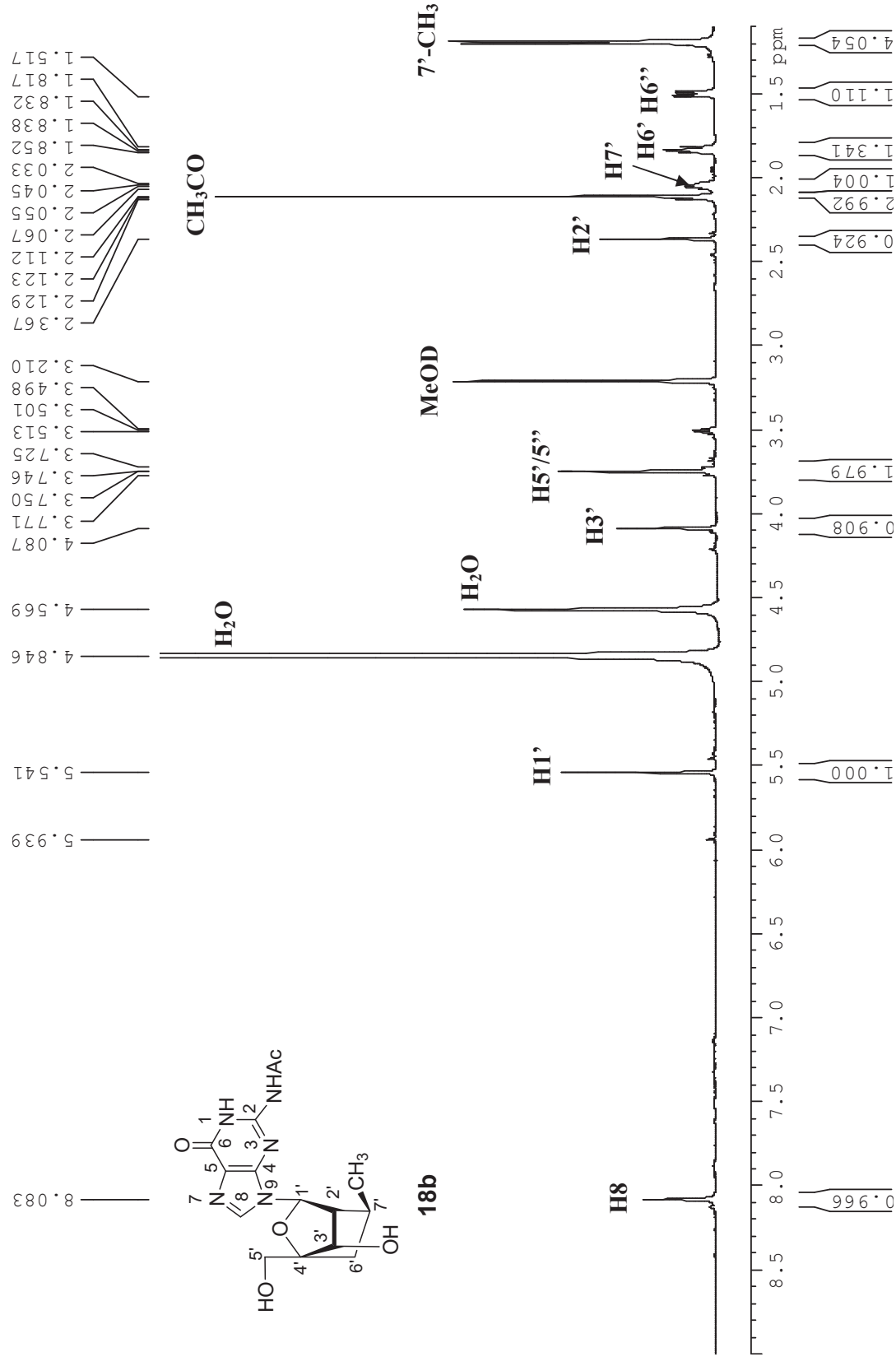


Figure SI.94 ¹H NMR spectrum of compound 18b

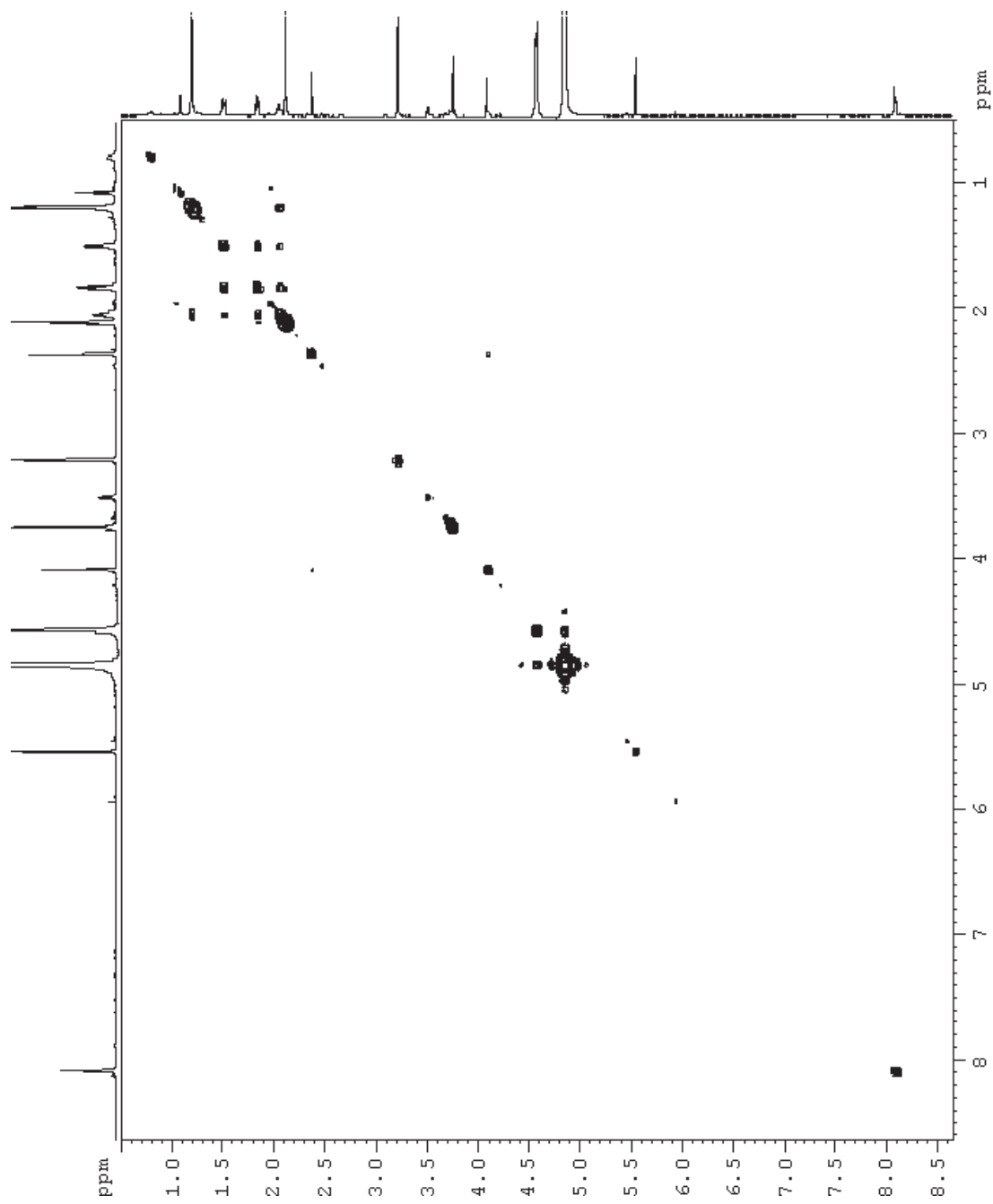
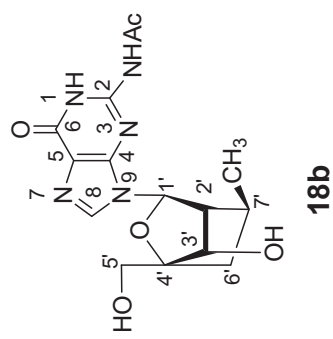


Figure SI.95 COSY spectrum of compound 18b

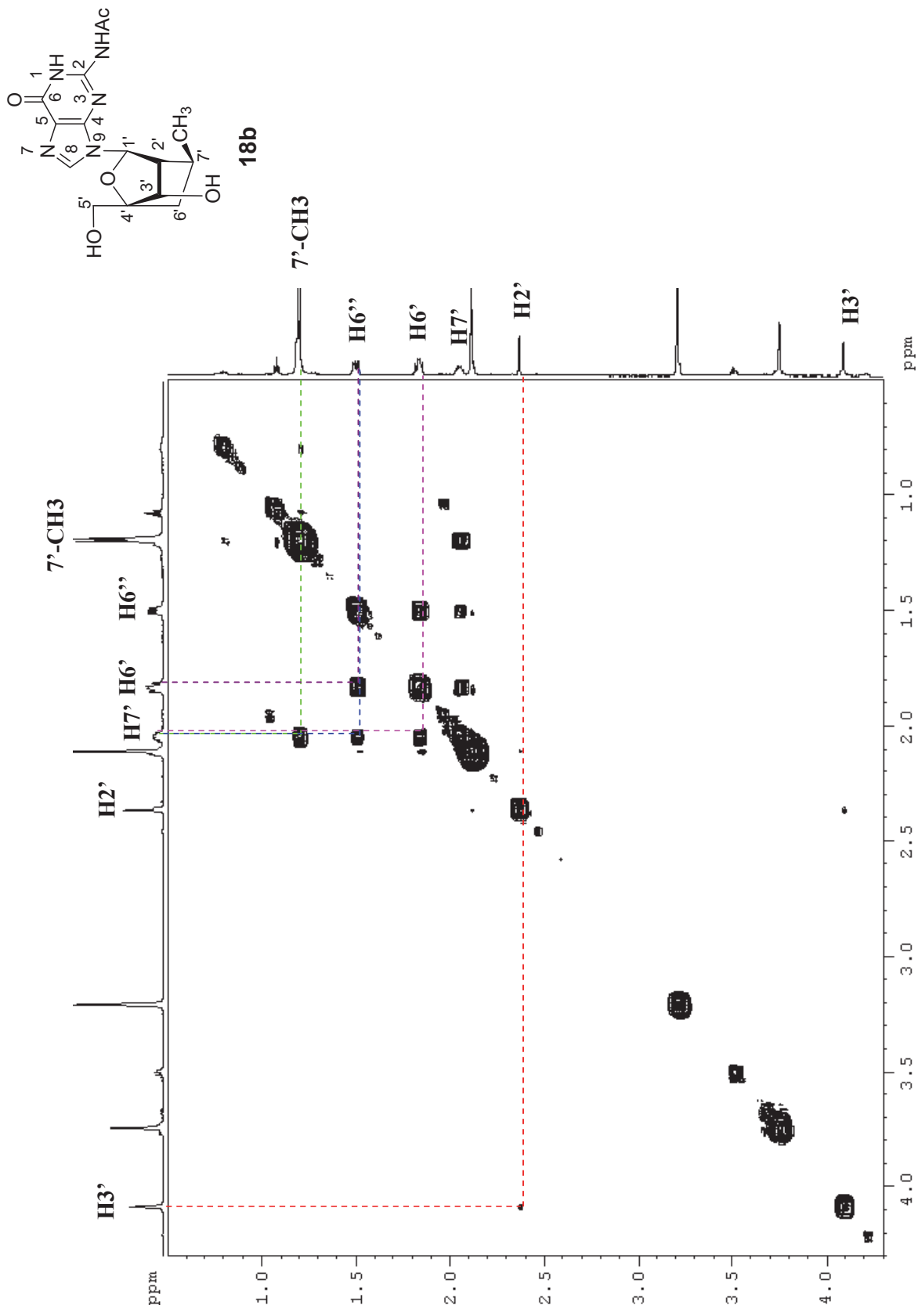


Figure SI.96 Expansion of COSY spectrum of compound 18b

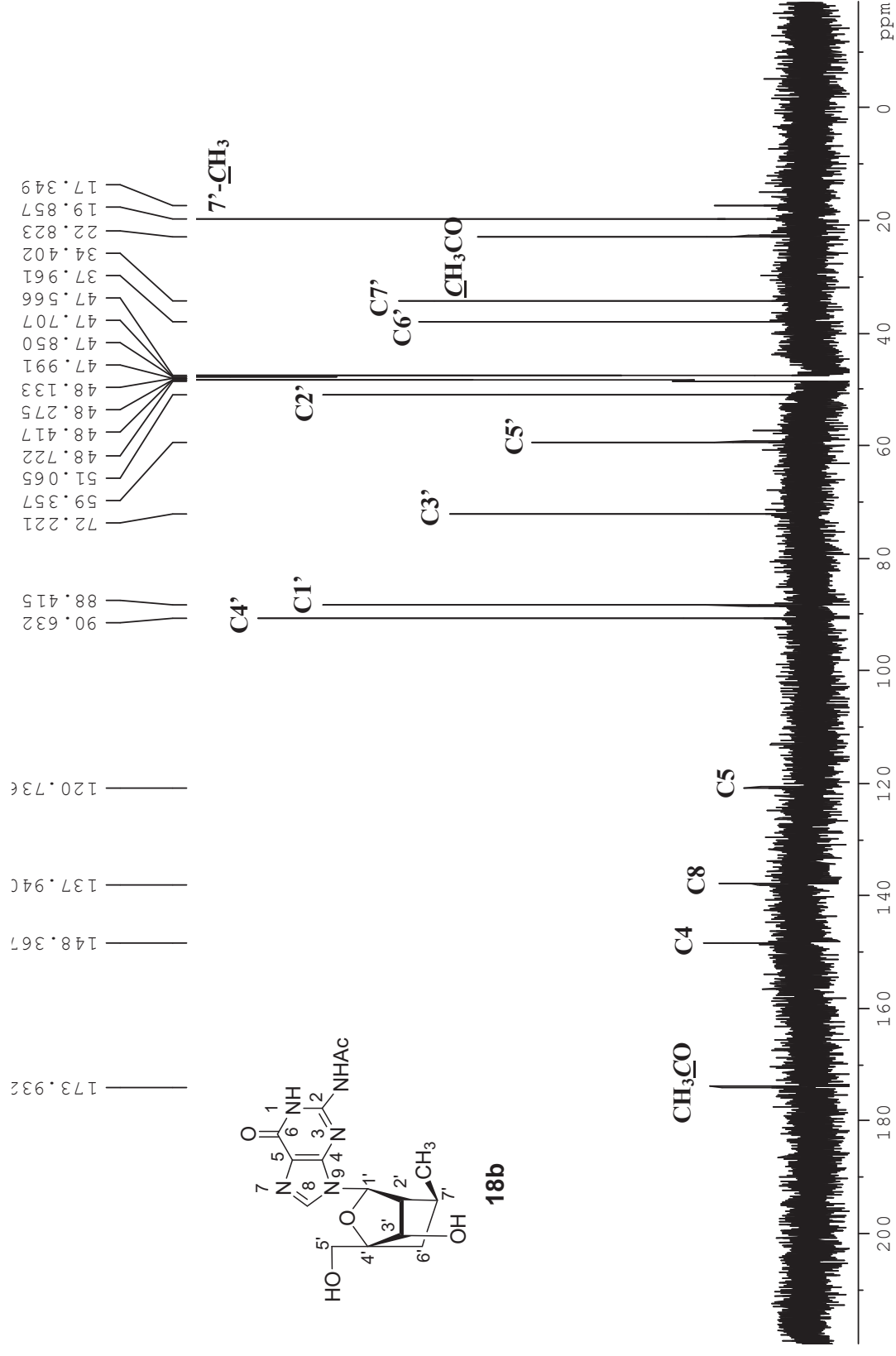


Figure SI.97 ¹³C NMR spectrum of compound 18b

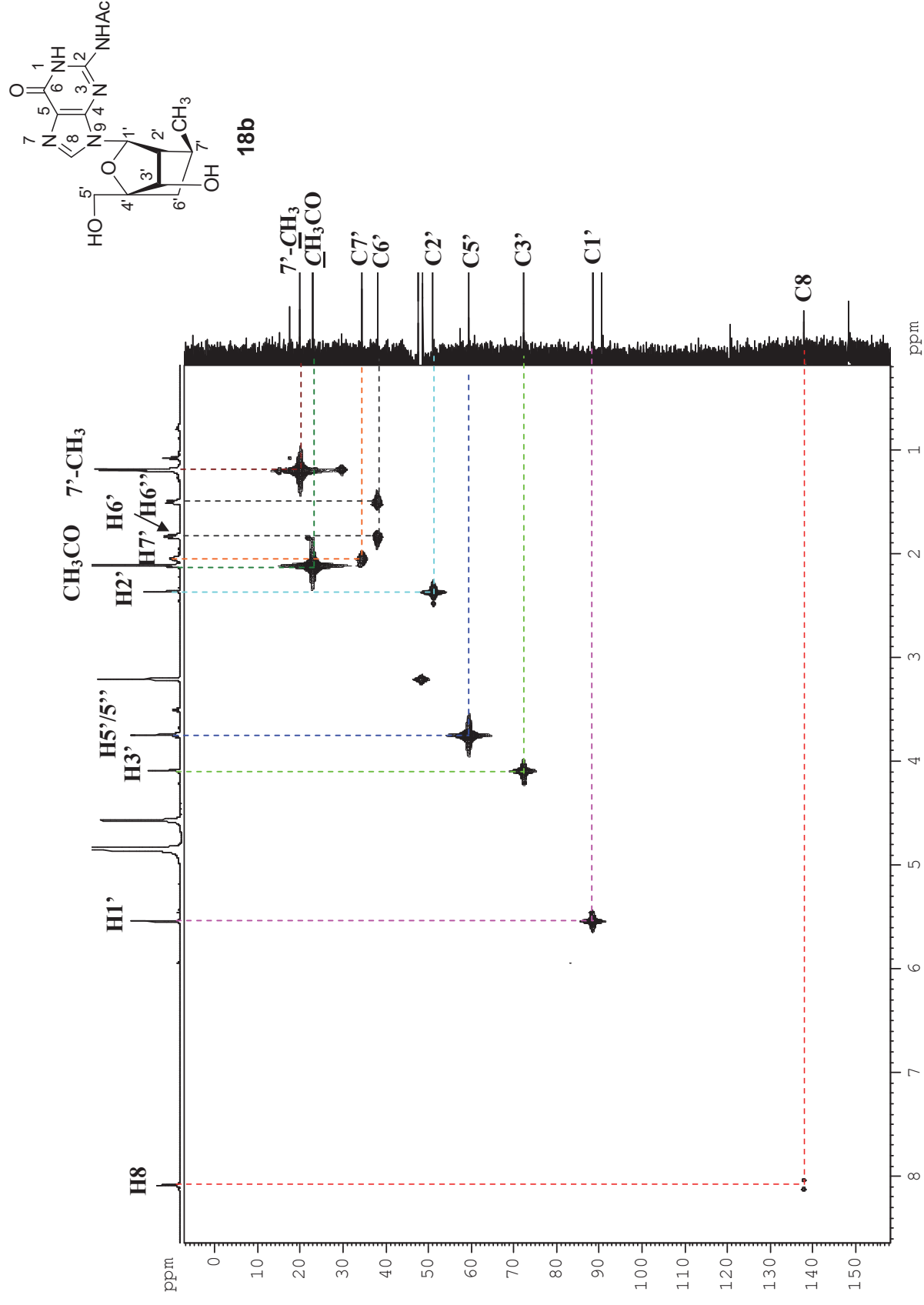


Figure SI.98 HMQC spectrum of compound 18b

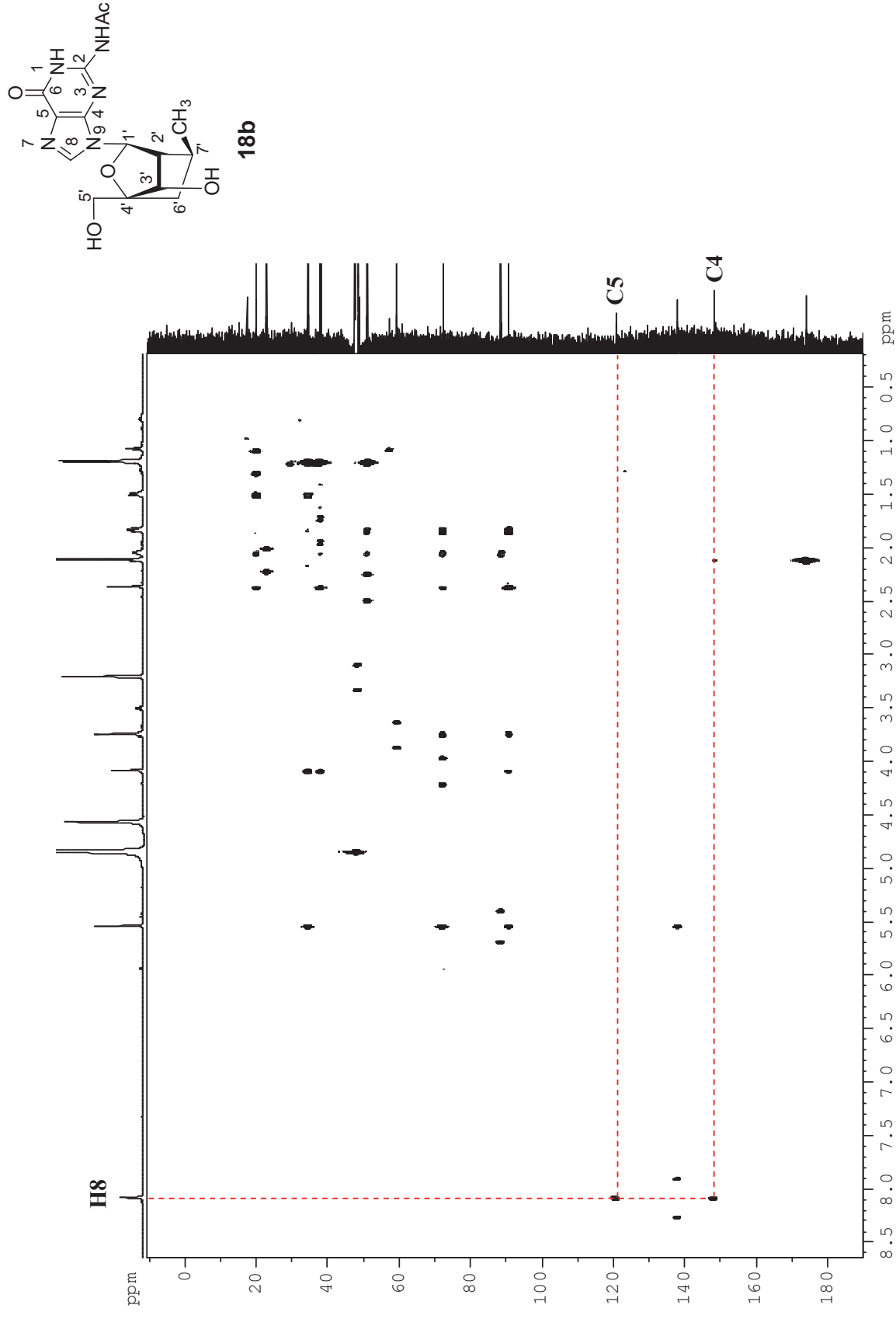


Figure SI.99 HMBC spectrum of compound **18b**

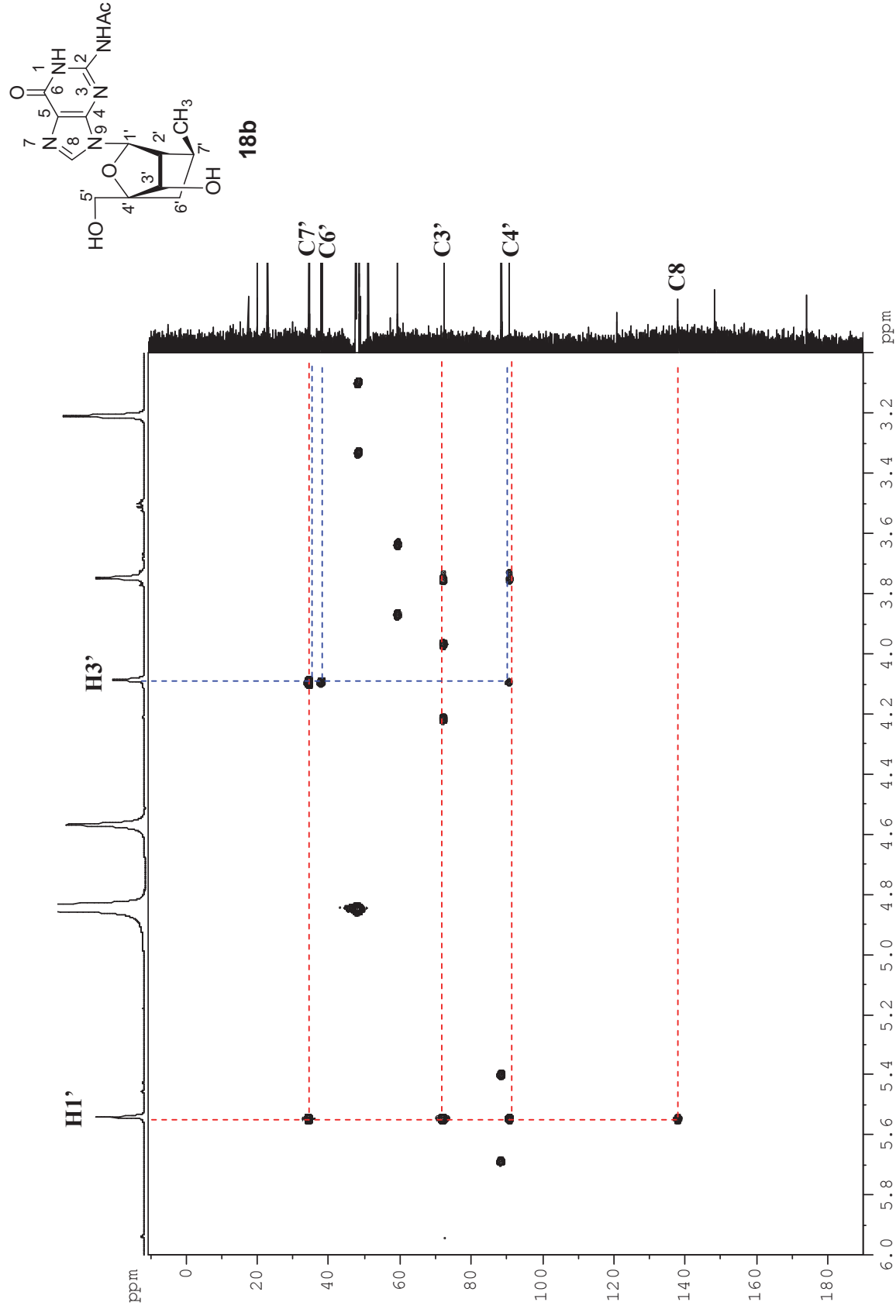


Figure SI.100 Expansion of HMBC spectrum of compound **18b**

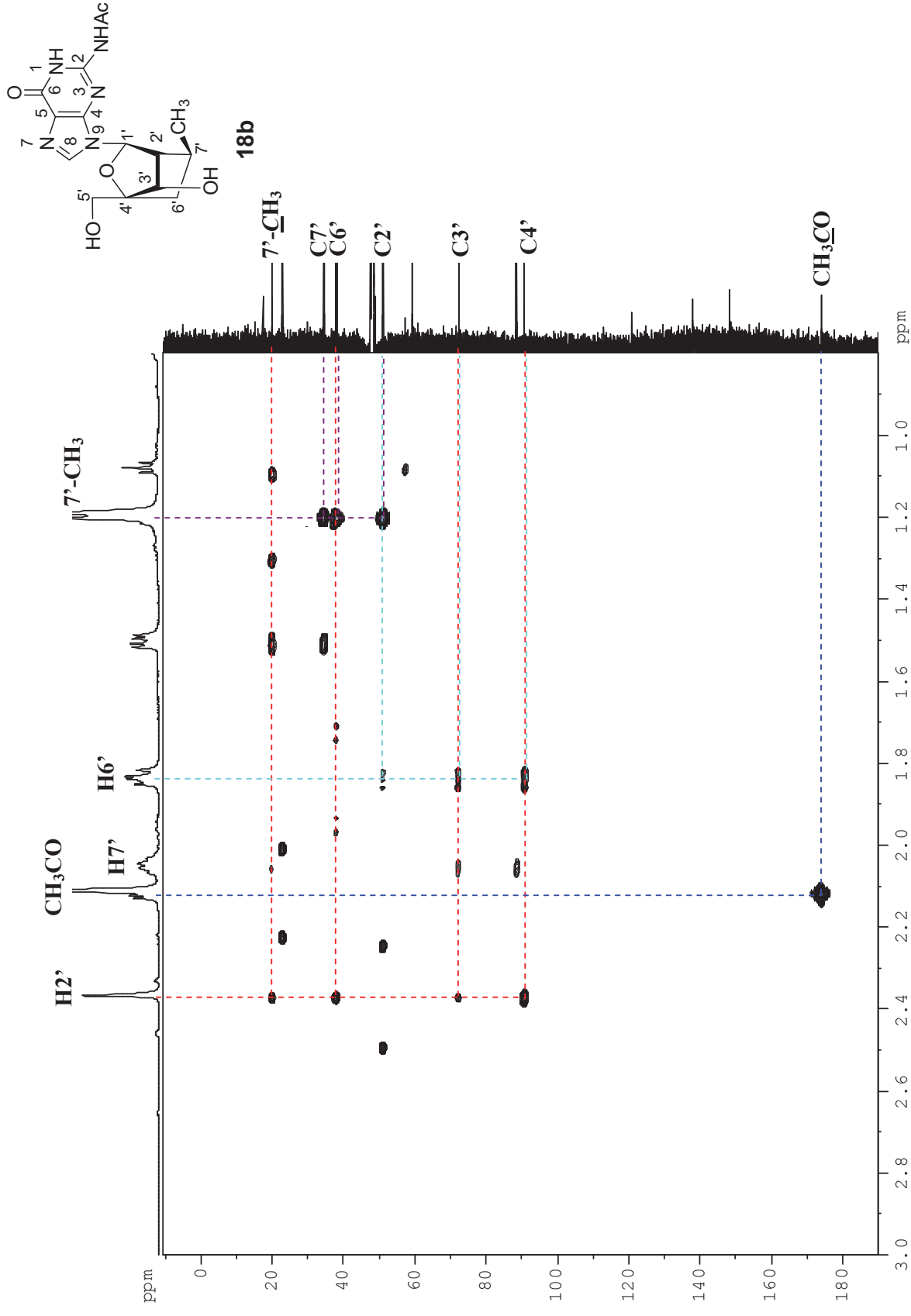


Figure SI.101 Expansion of HMBC spectrum of compound **18b**

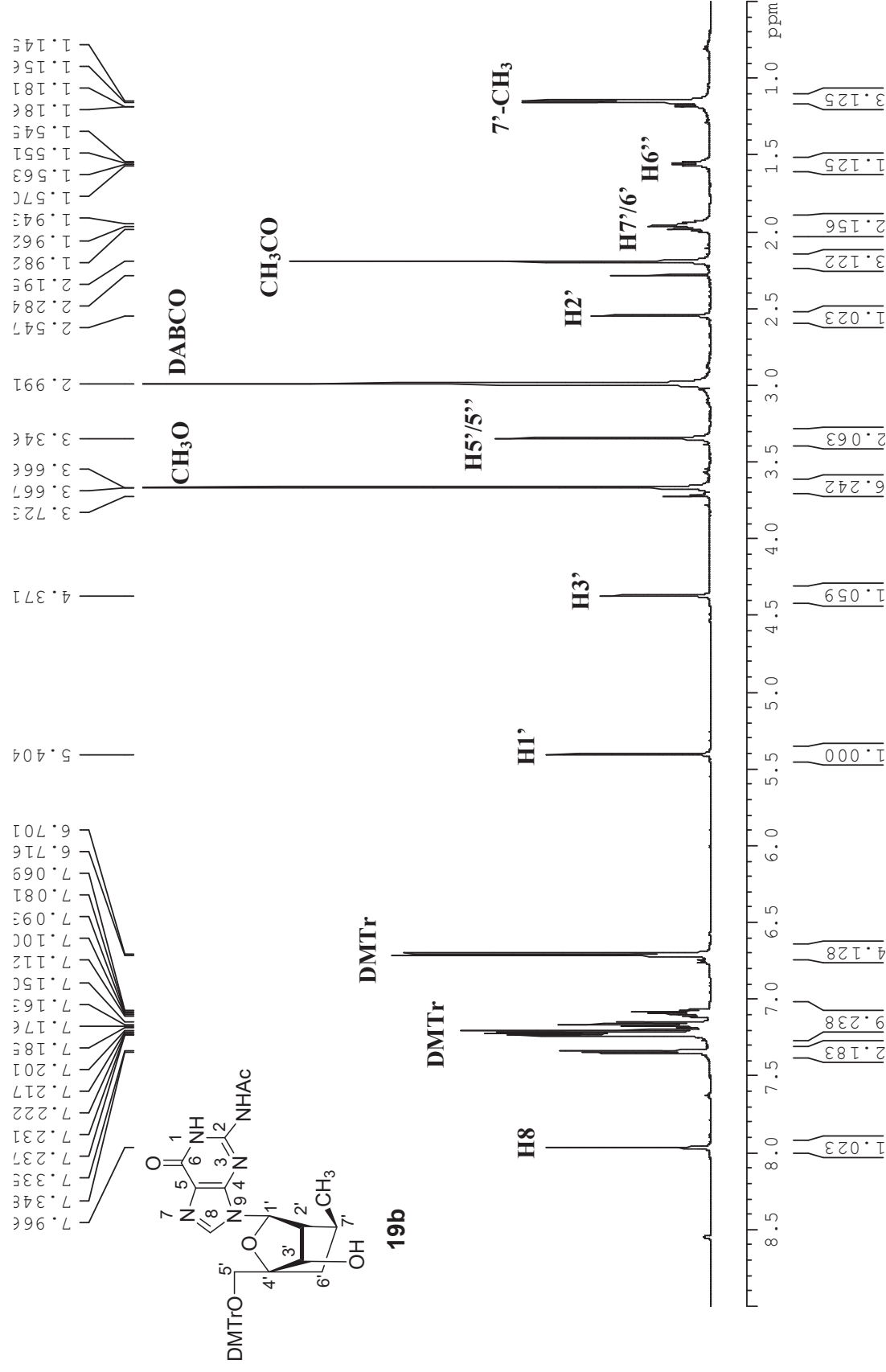
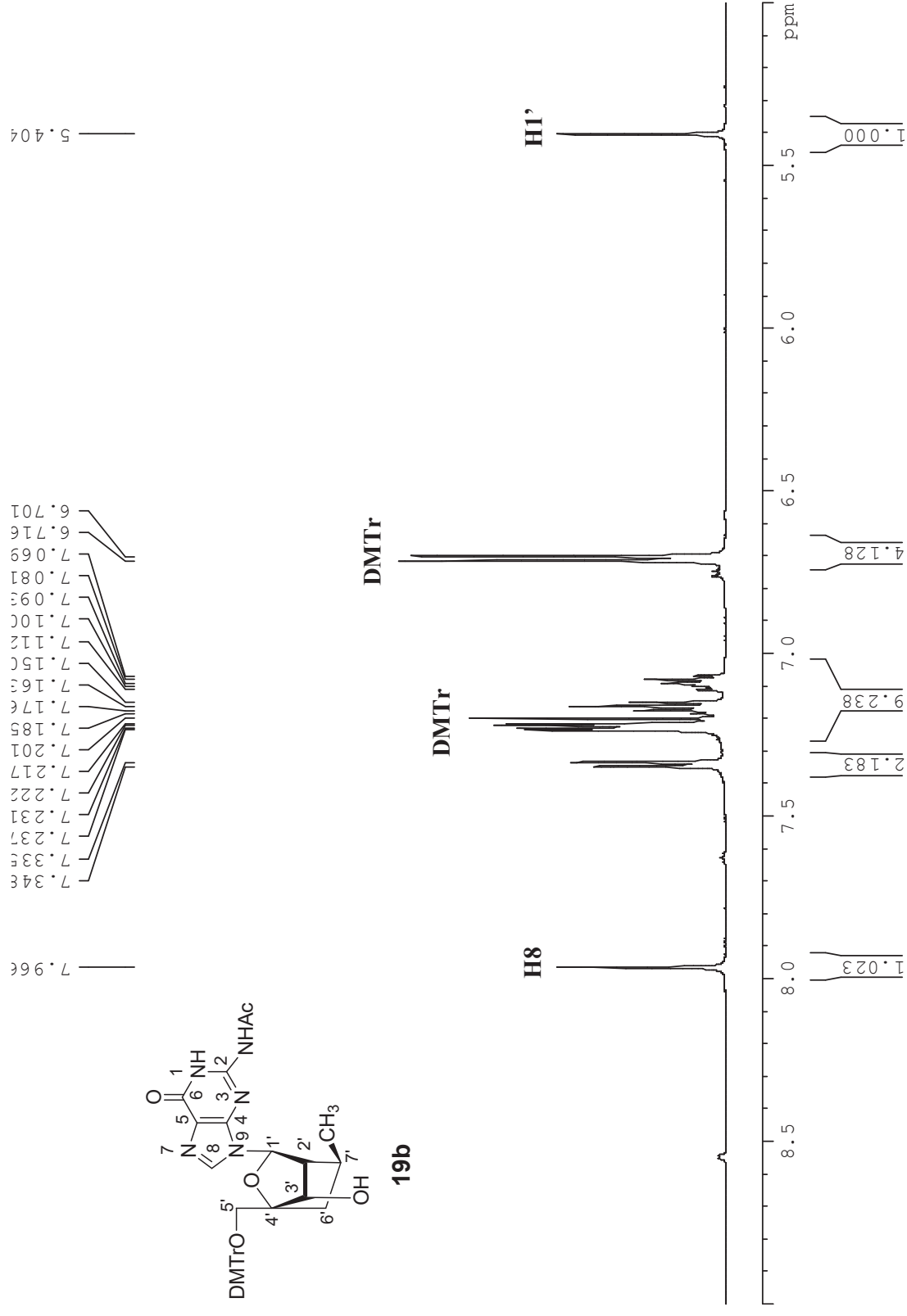


Figure SI.102 ¹H NMR spectrum of compound 19b



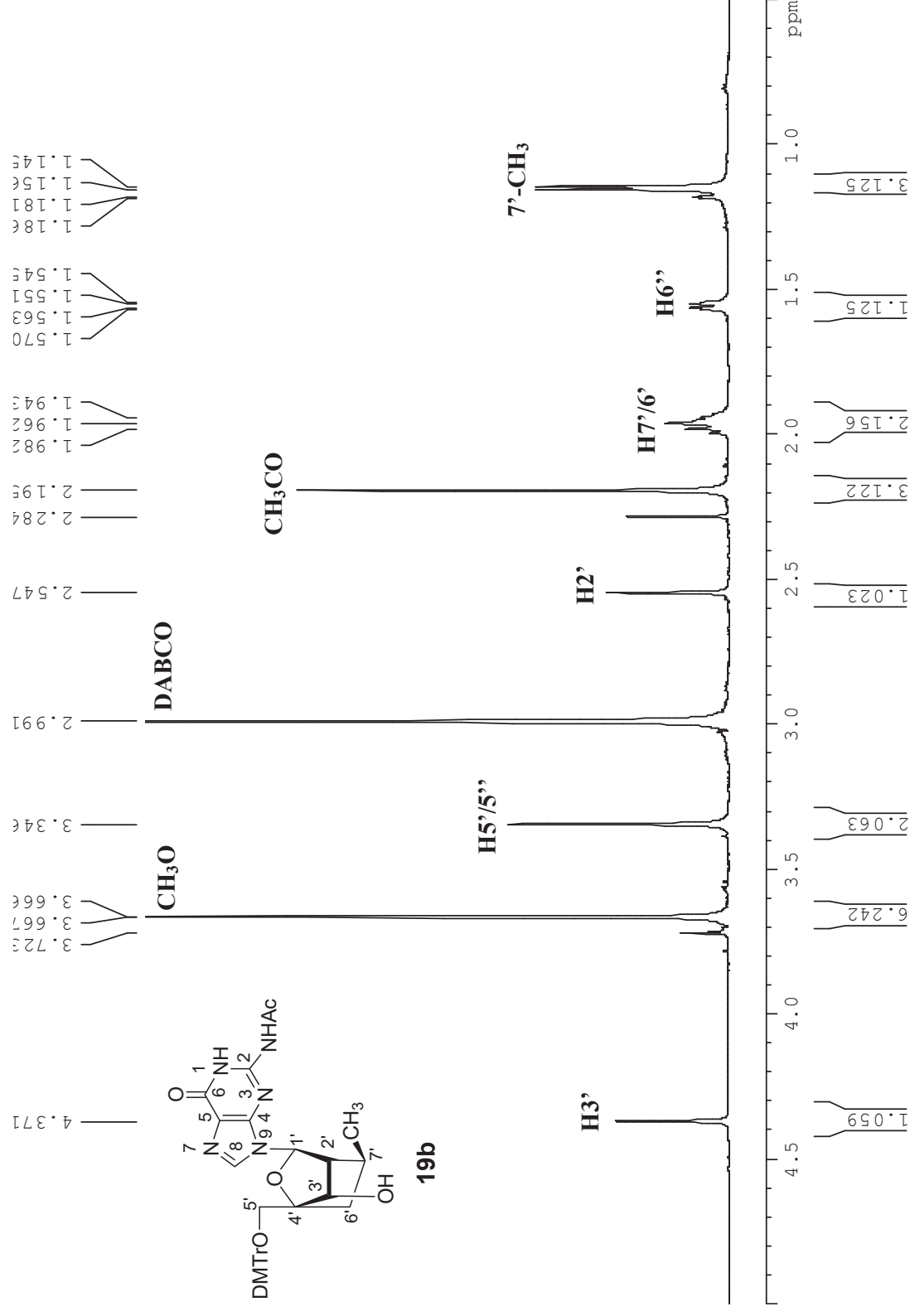


Figure SI.104 Expansion of ¹H NMR spectrum of compound 19b

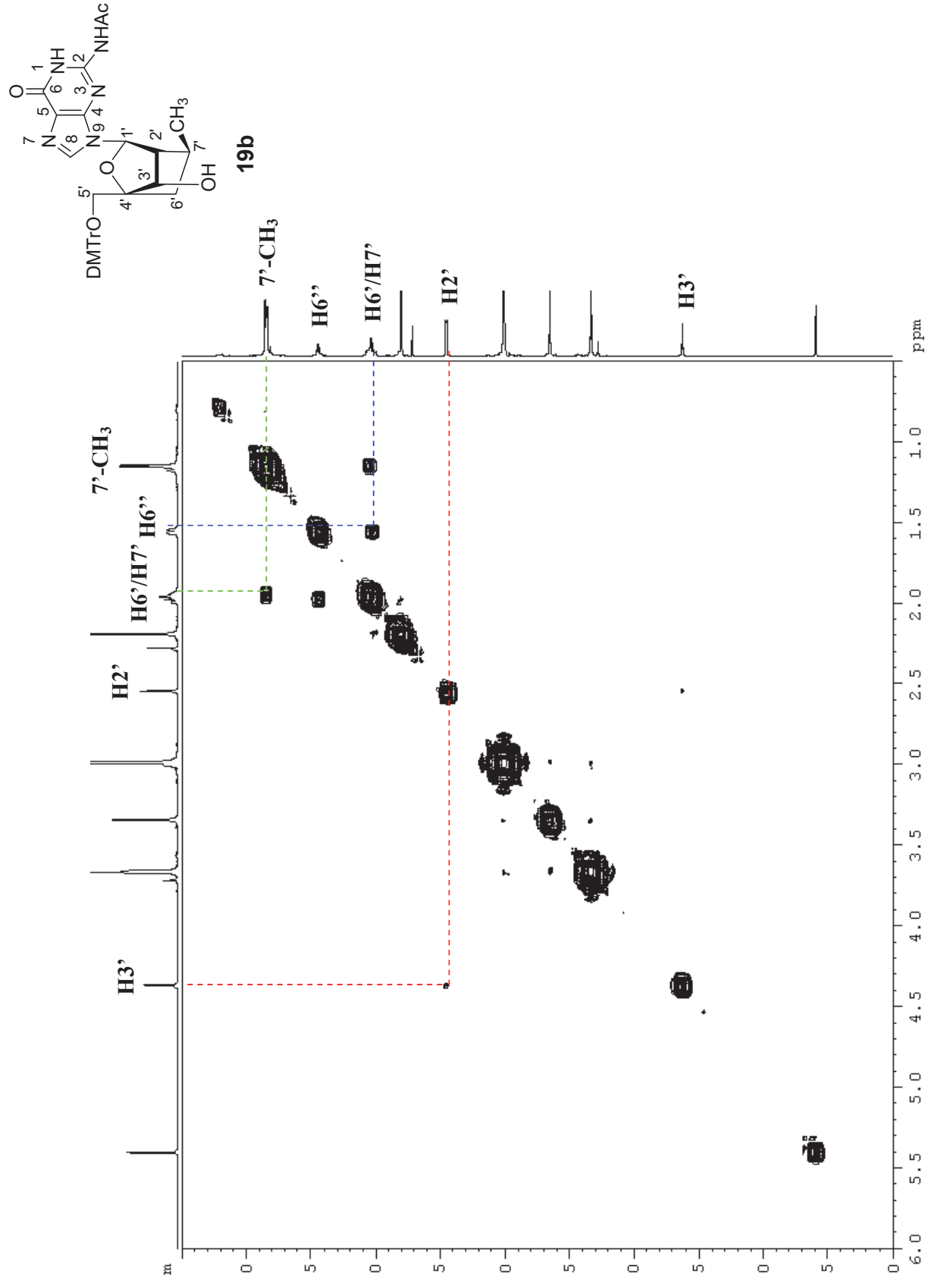


Figure SI.105 COSY spectrum of compound 19b

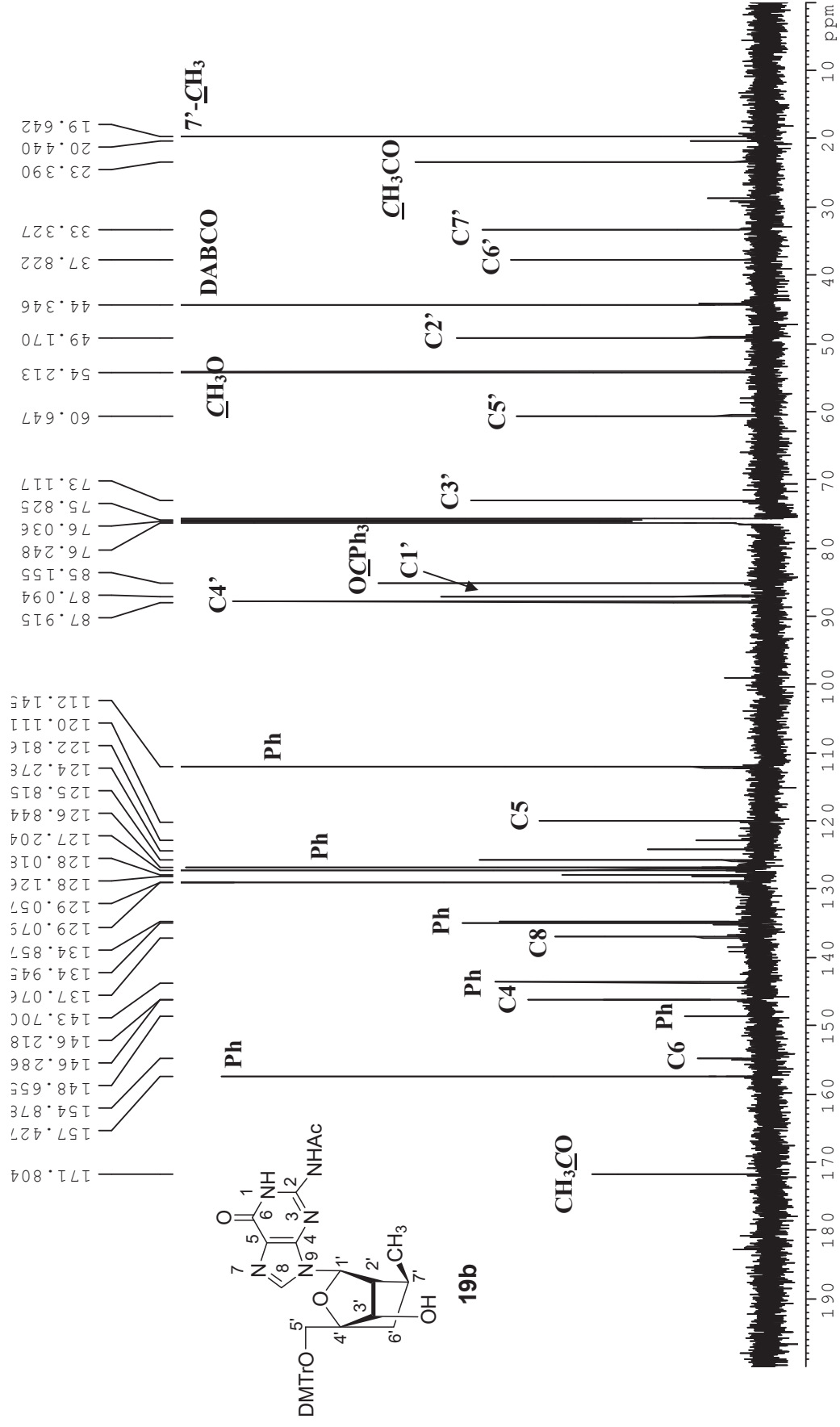


Figure SI.106 ¹³C NMR spectrum of compound 19b

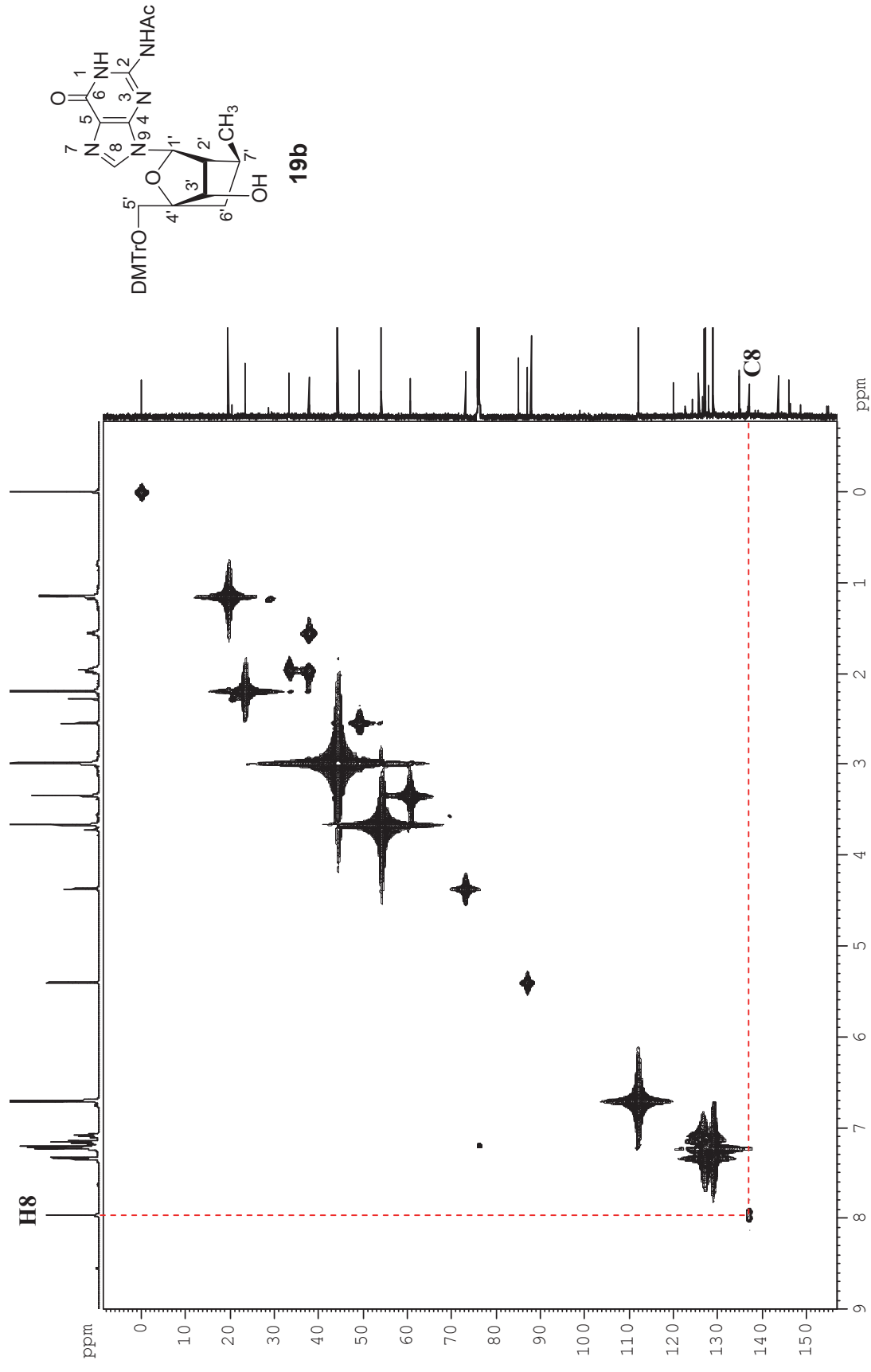


Figure SI.107 HMQC spectrum of compound 19b

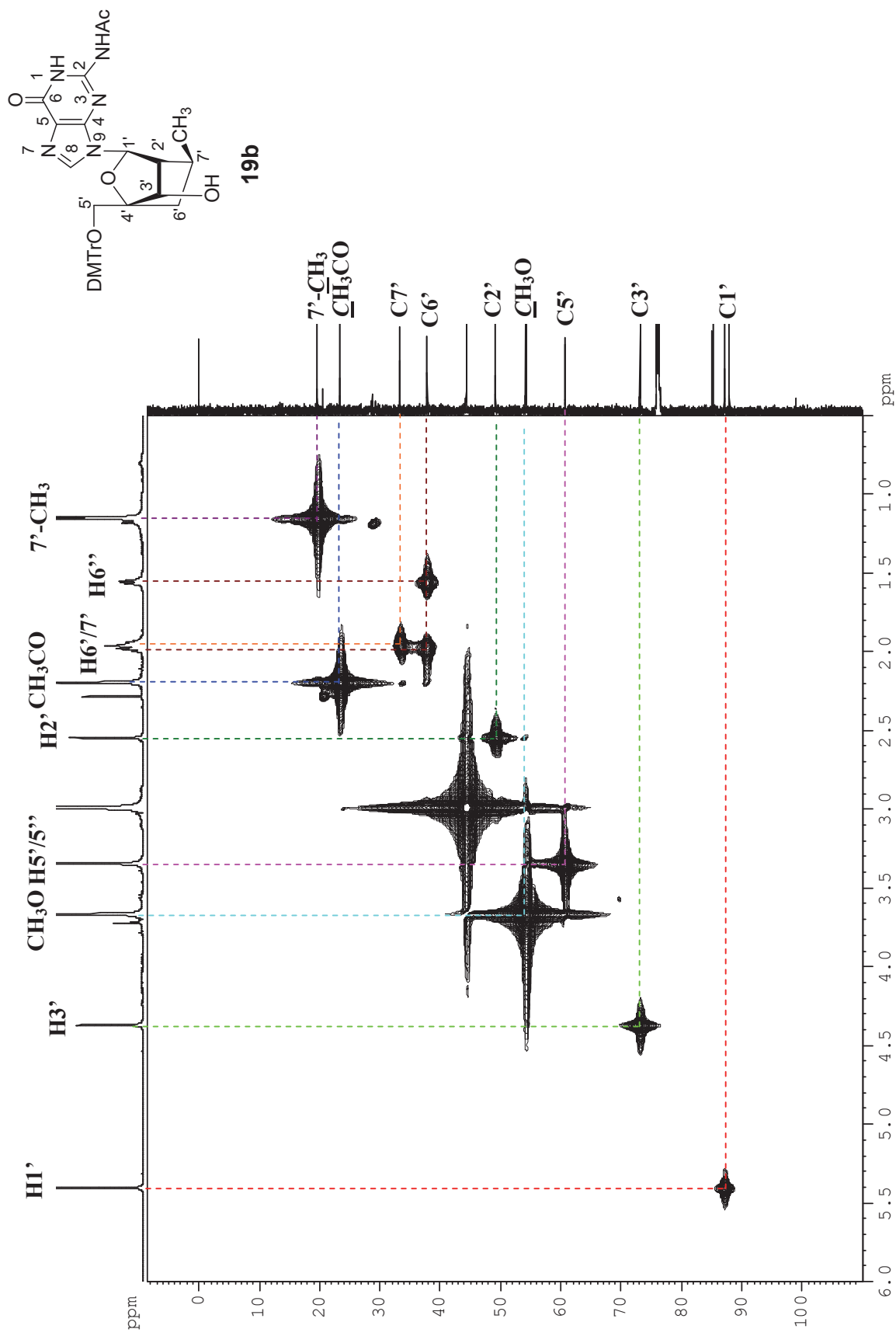


Figure SI.108 Expansion of HMQC spectrum of compound **19b**

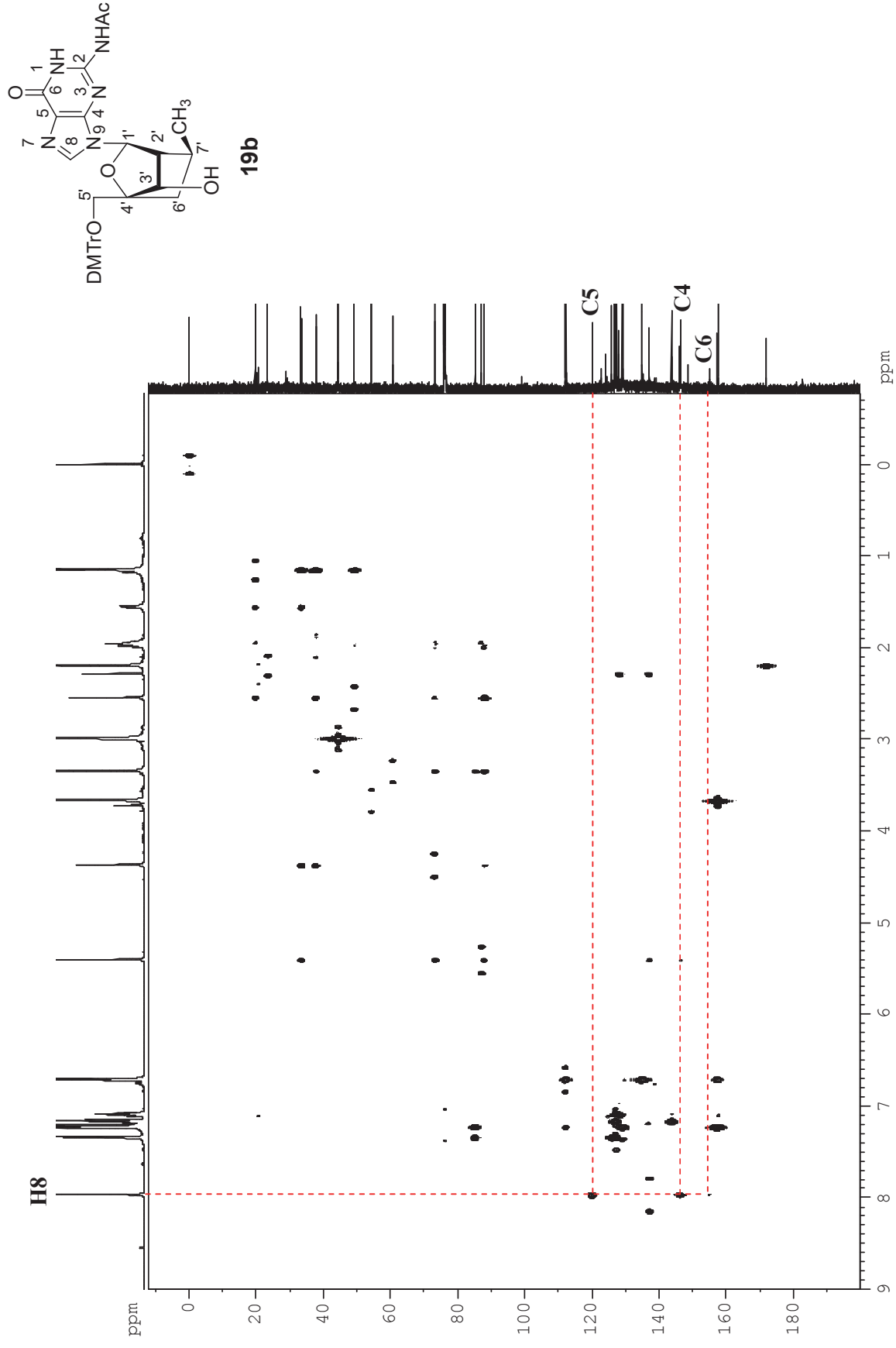


Figure SI.109 HMBC spectrum of compound **19b**

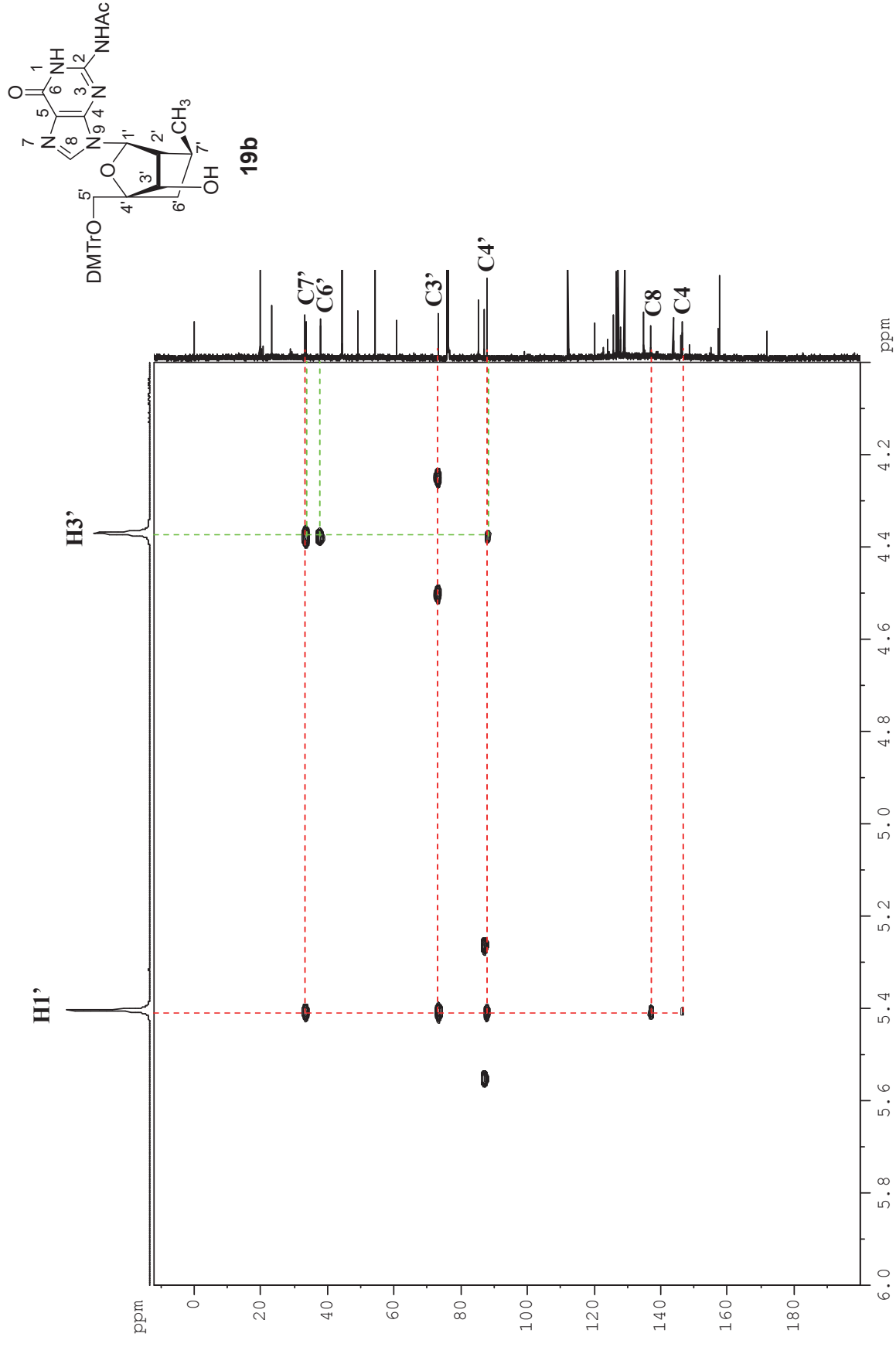


Figure SI.110 Expansion of HMBC spectrum of compound **19b**

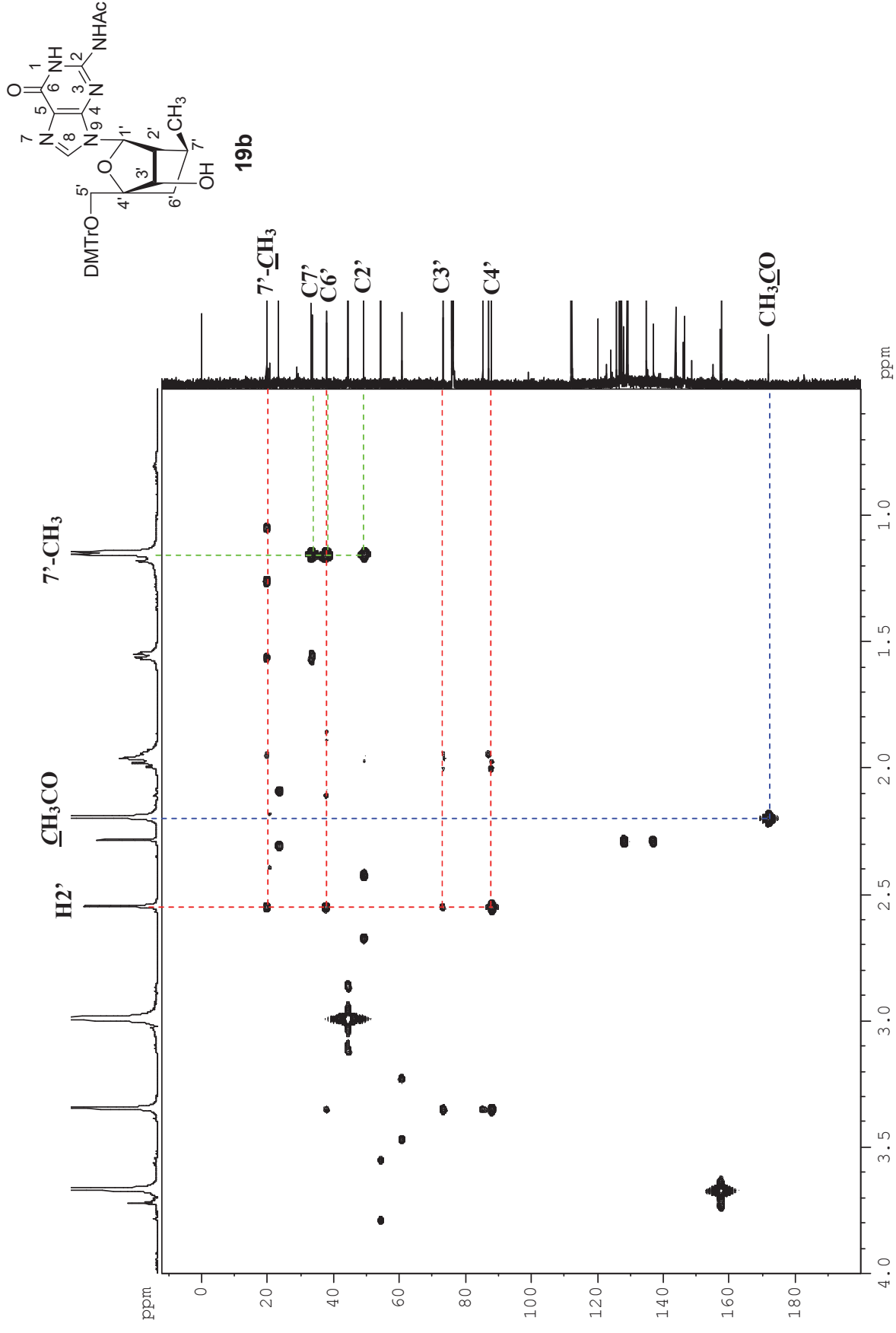


Figure SI.111 Expansion of HMBC spectrum of compound **19b**

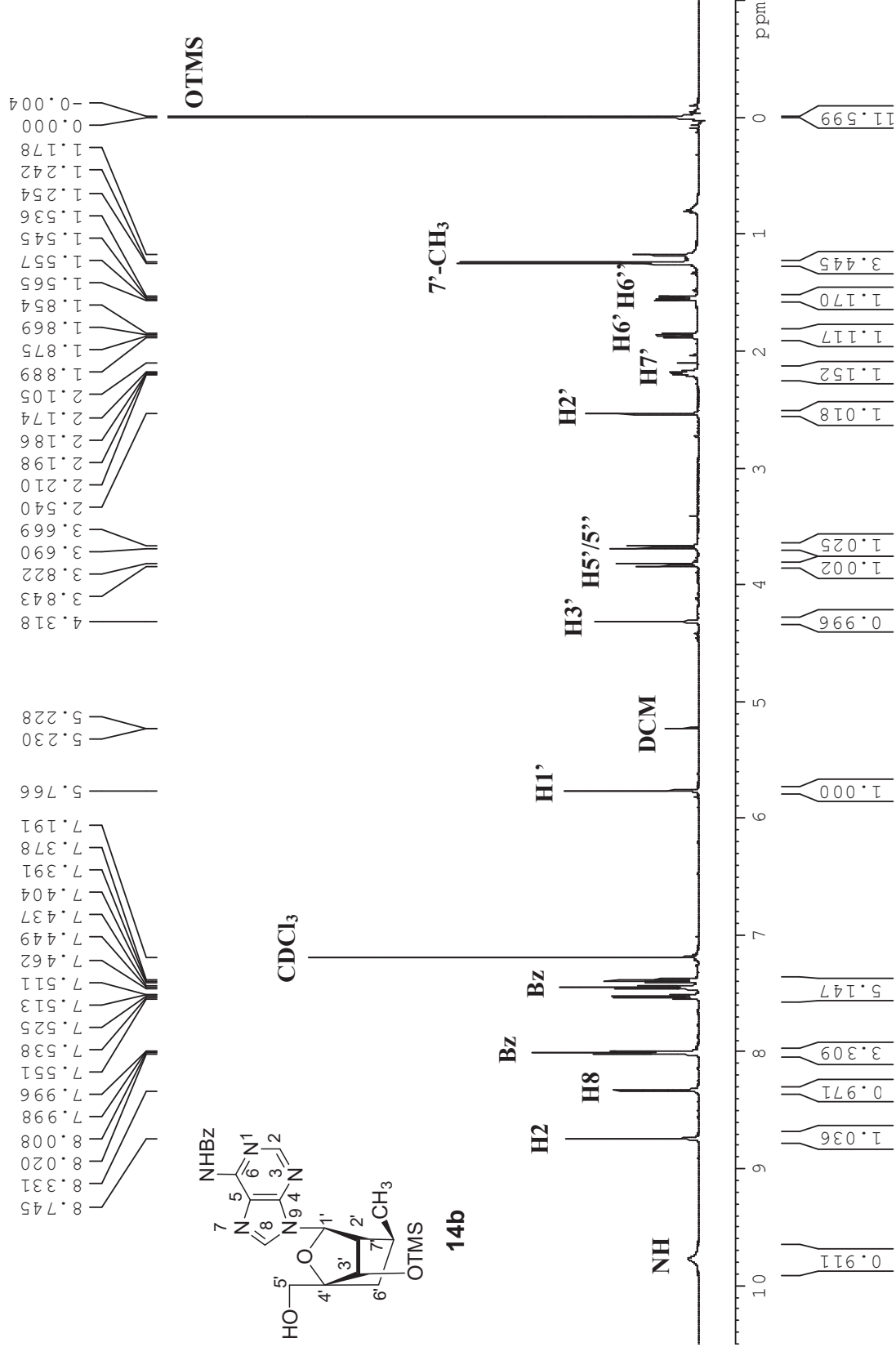


Figure SL112 ¹H NMR spectrum of compound 14b

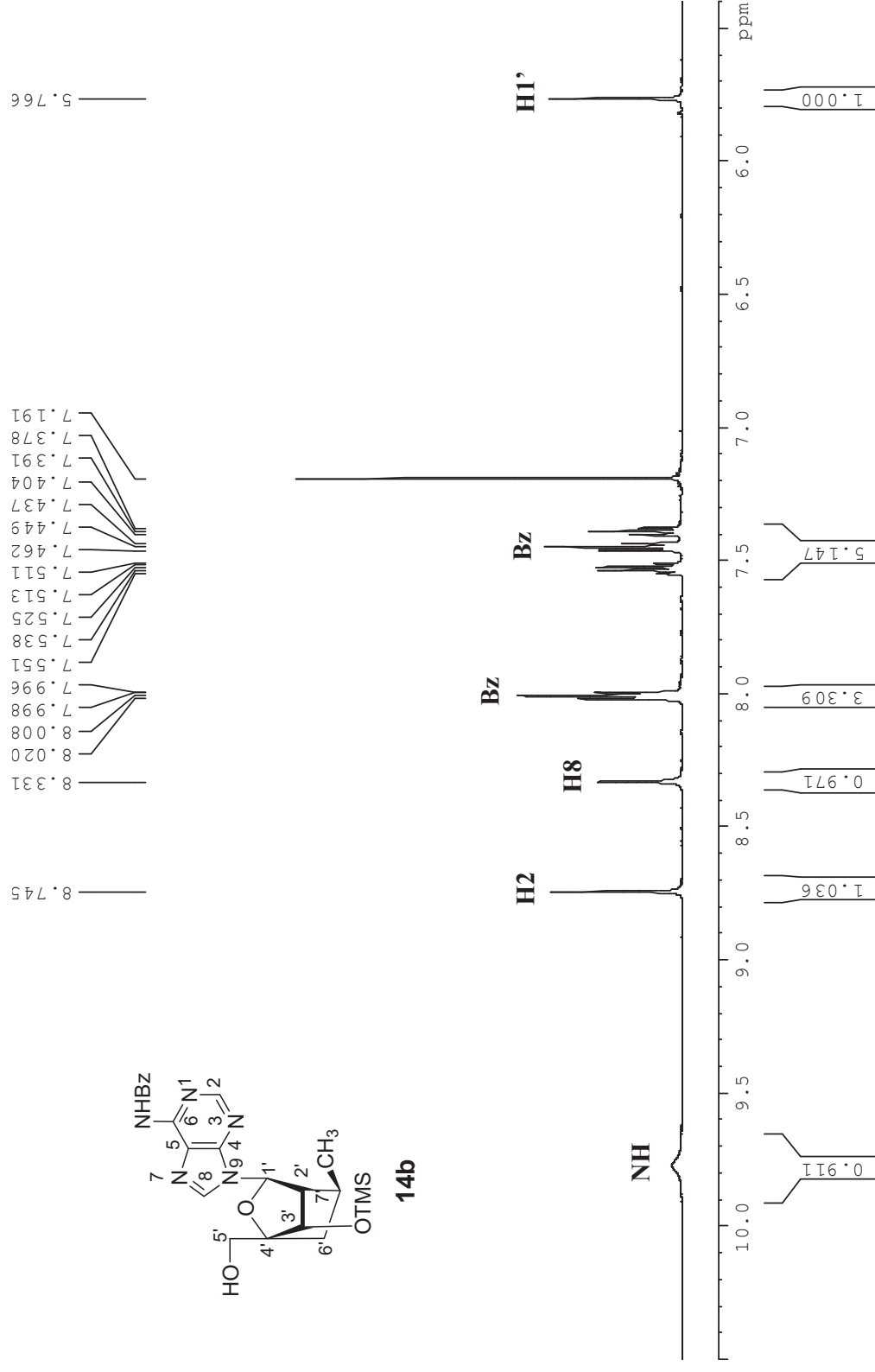


Figure SI.113 Expansion of ¹H NMR spectrum of compound 14b

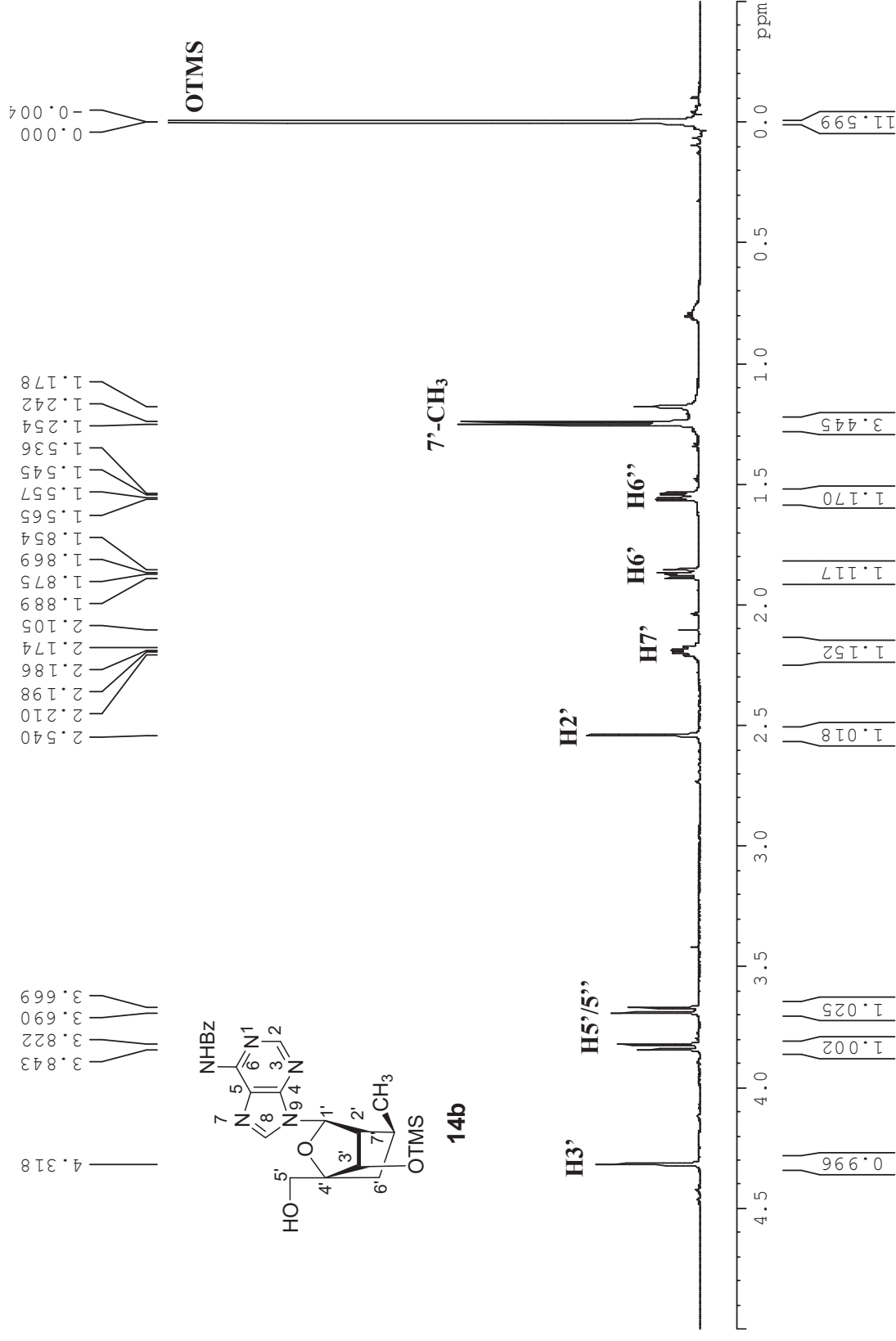


Figure SI.114 Expansion of ¹H NMR spectrum of compound **14b**

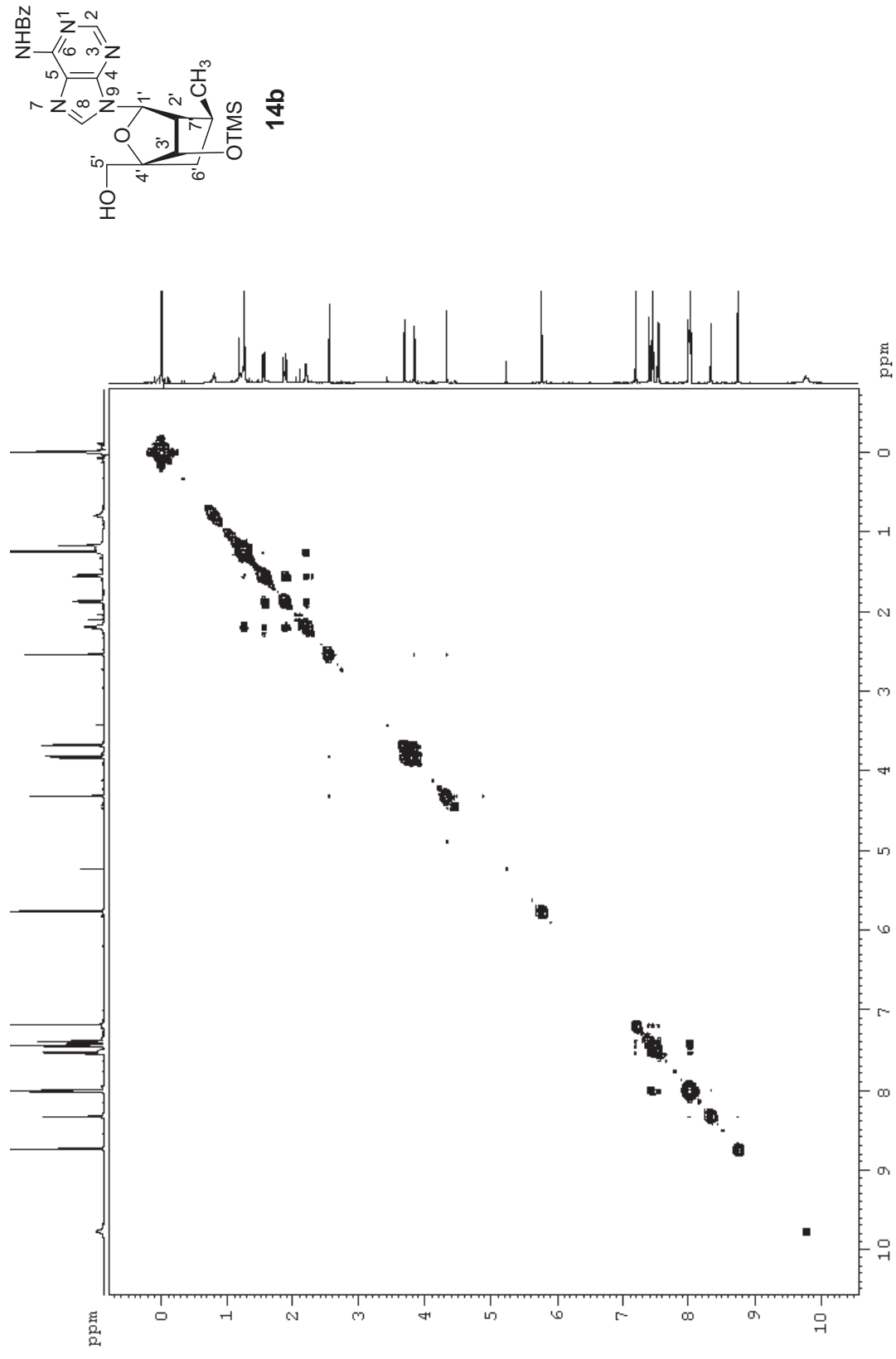


Figure SI.115 COSY spectrum of compound **14b**

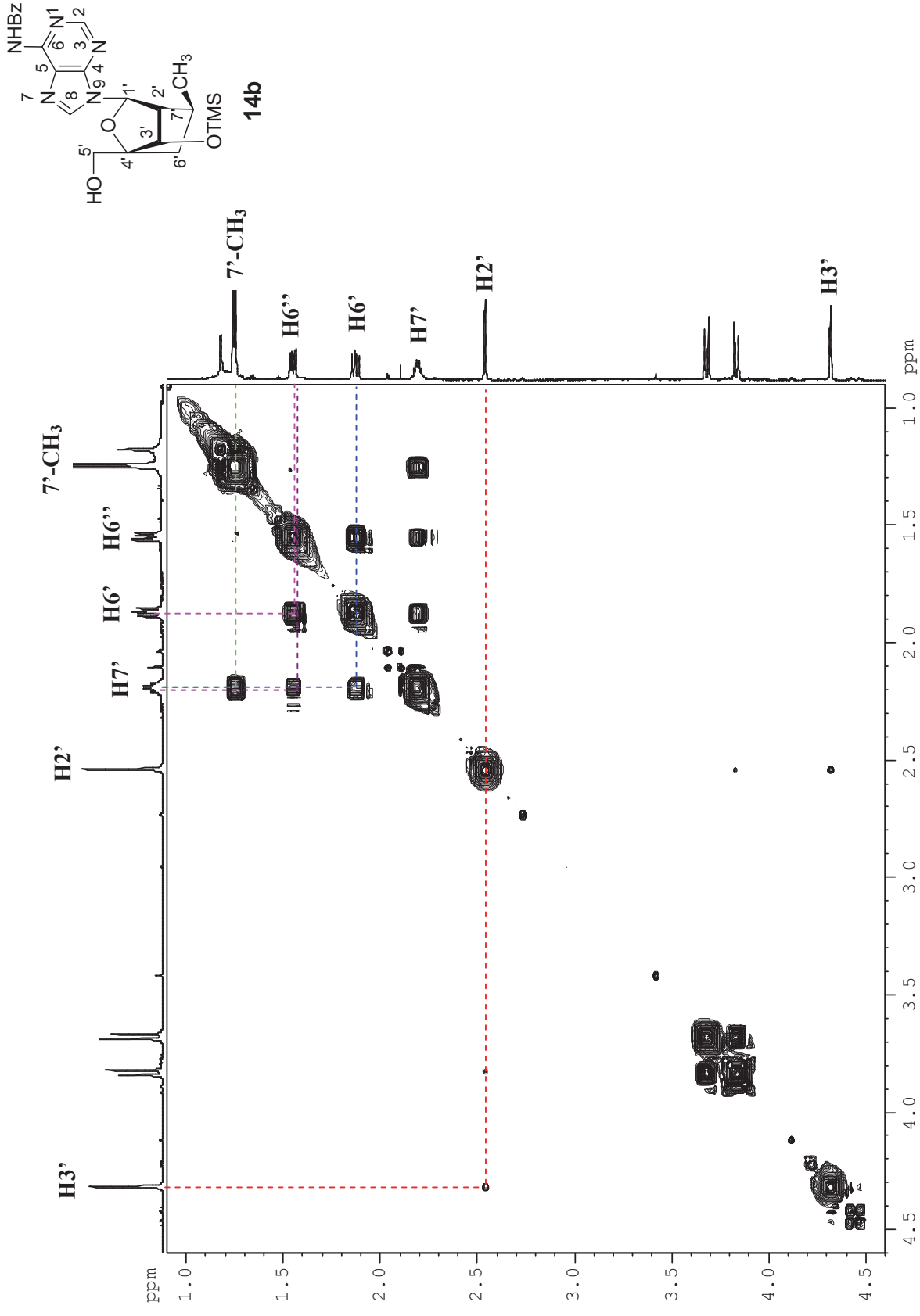


Figure SL.116 Expansion of COSY spectrum of compound **14b**

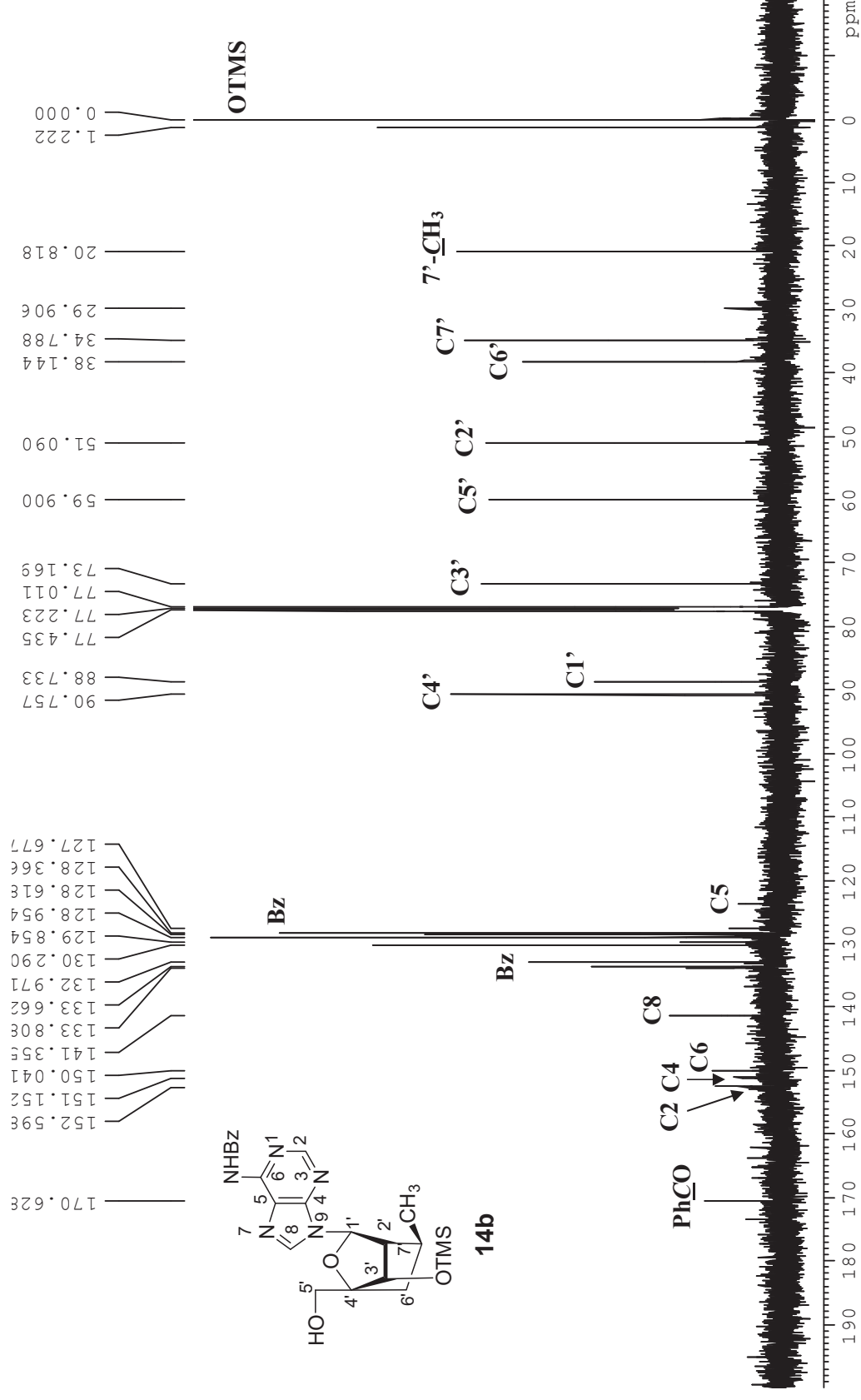


Figure SI.117 ¹³C NMR spectrum of compound 14b

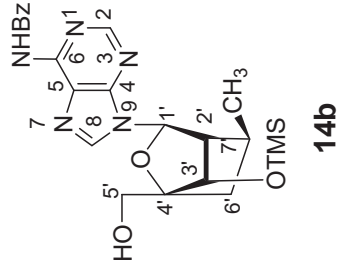
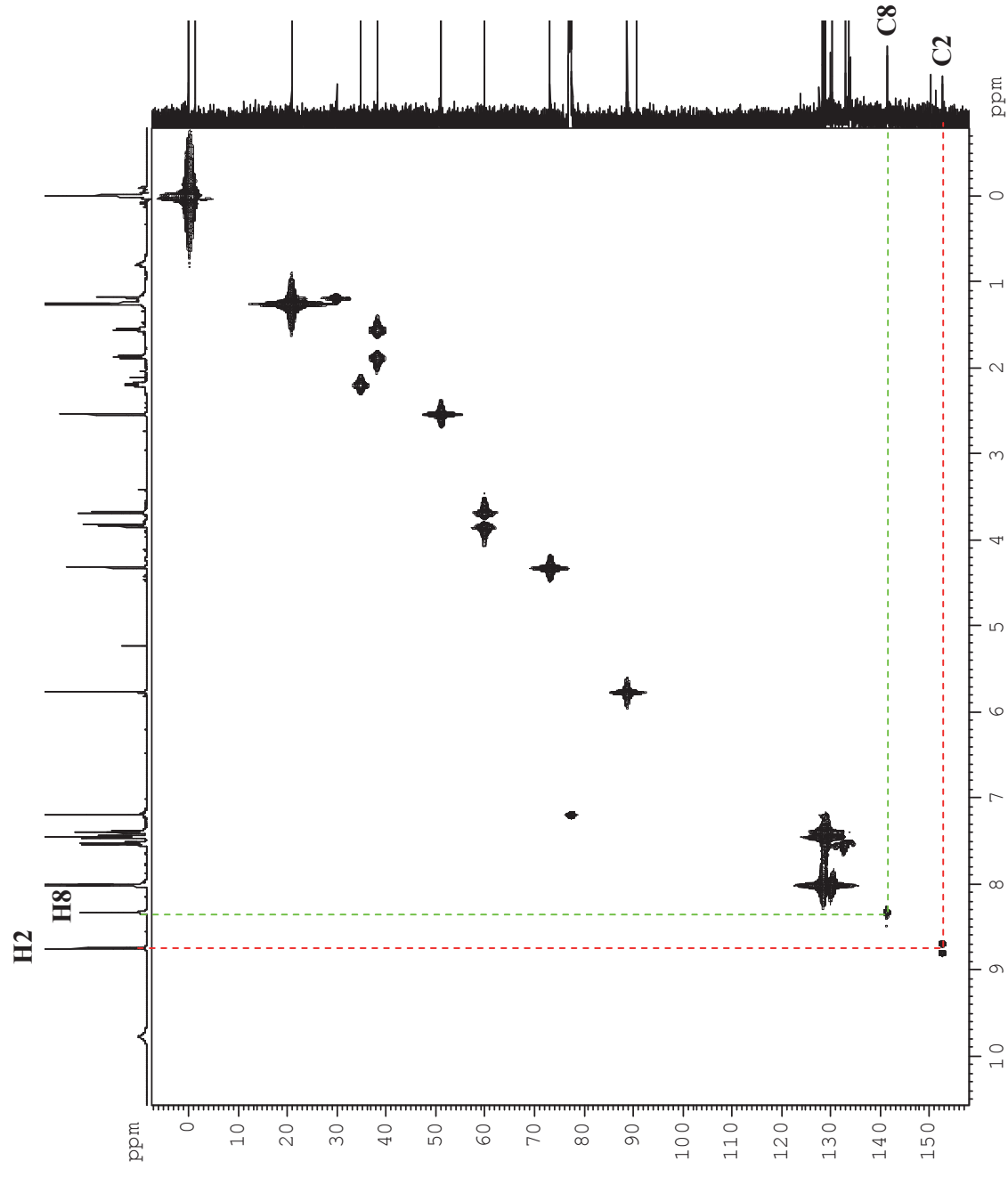


Figure SI.118 HMQC spectrum of compound 14b

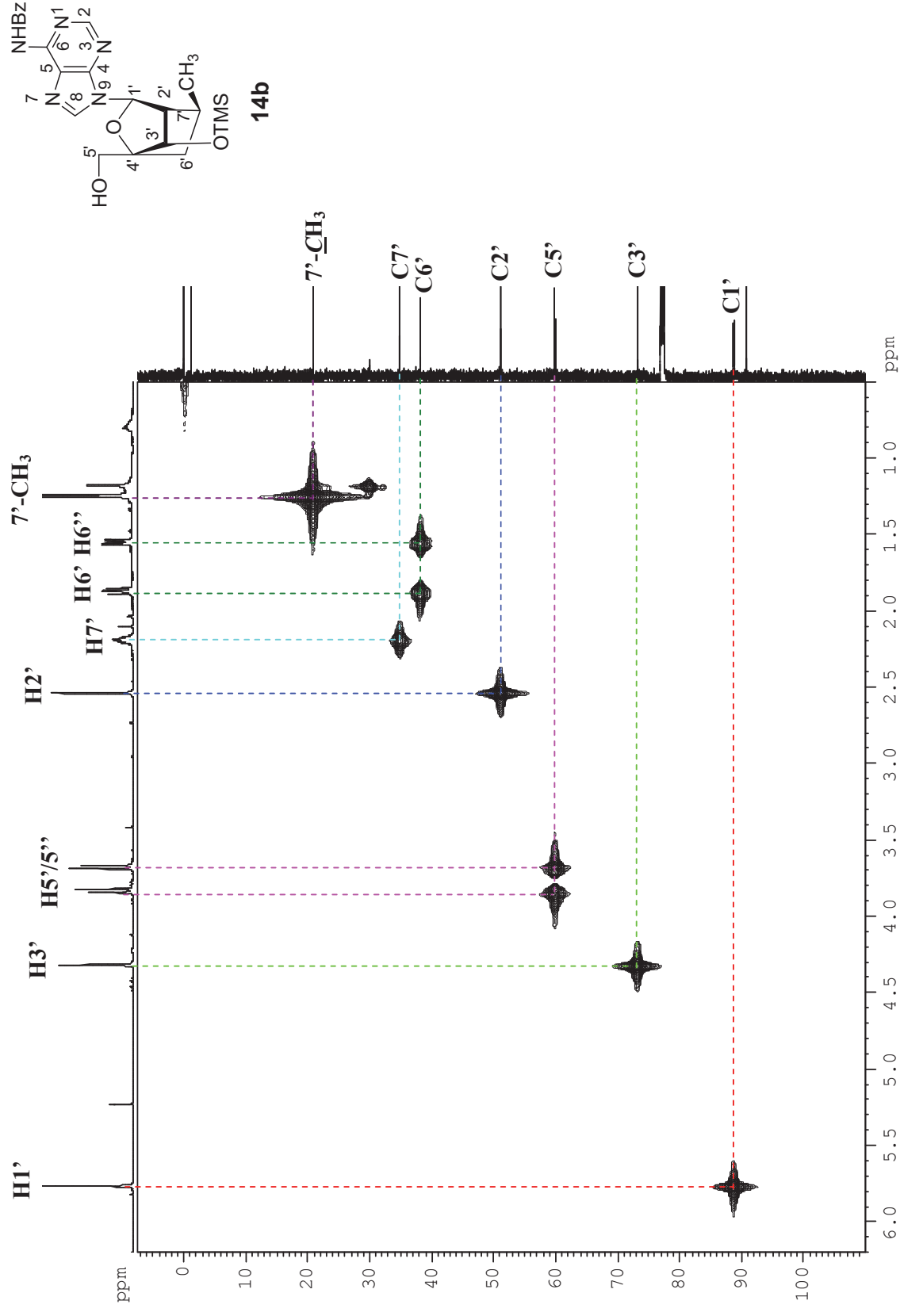


Figure SL.119 Expansion of HMQC spectrum of compound 14b

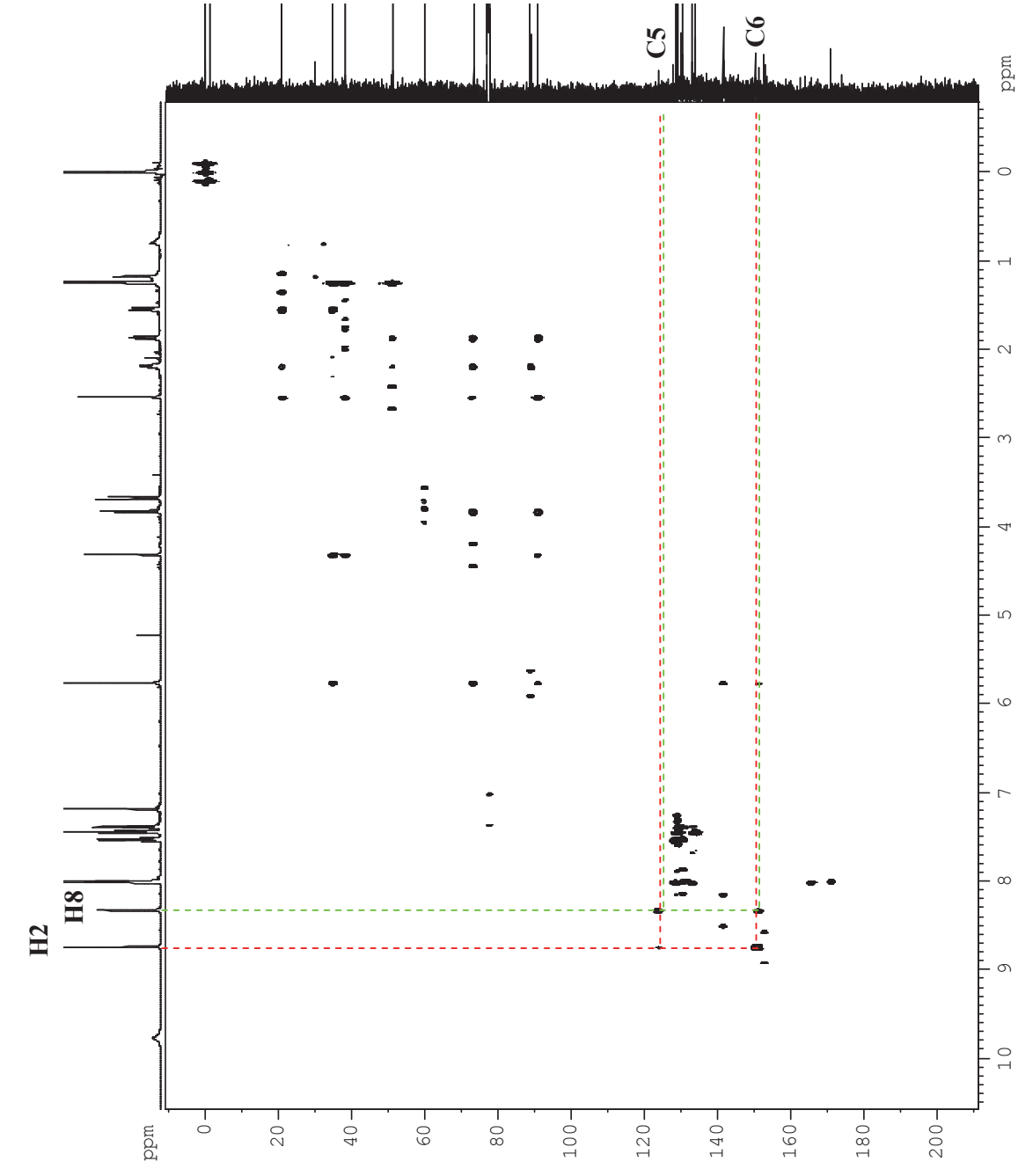


Figure SI.120 HMBC spectrum of compound **14b**

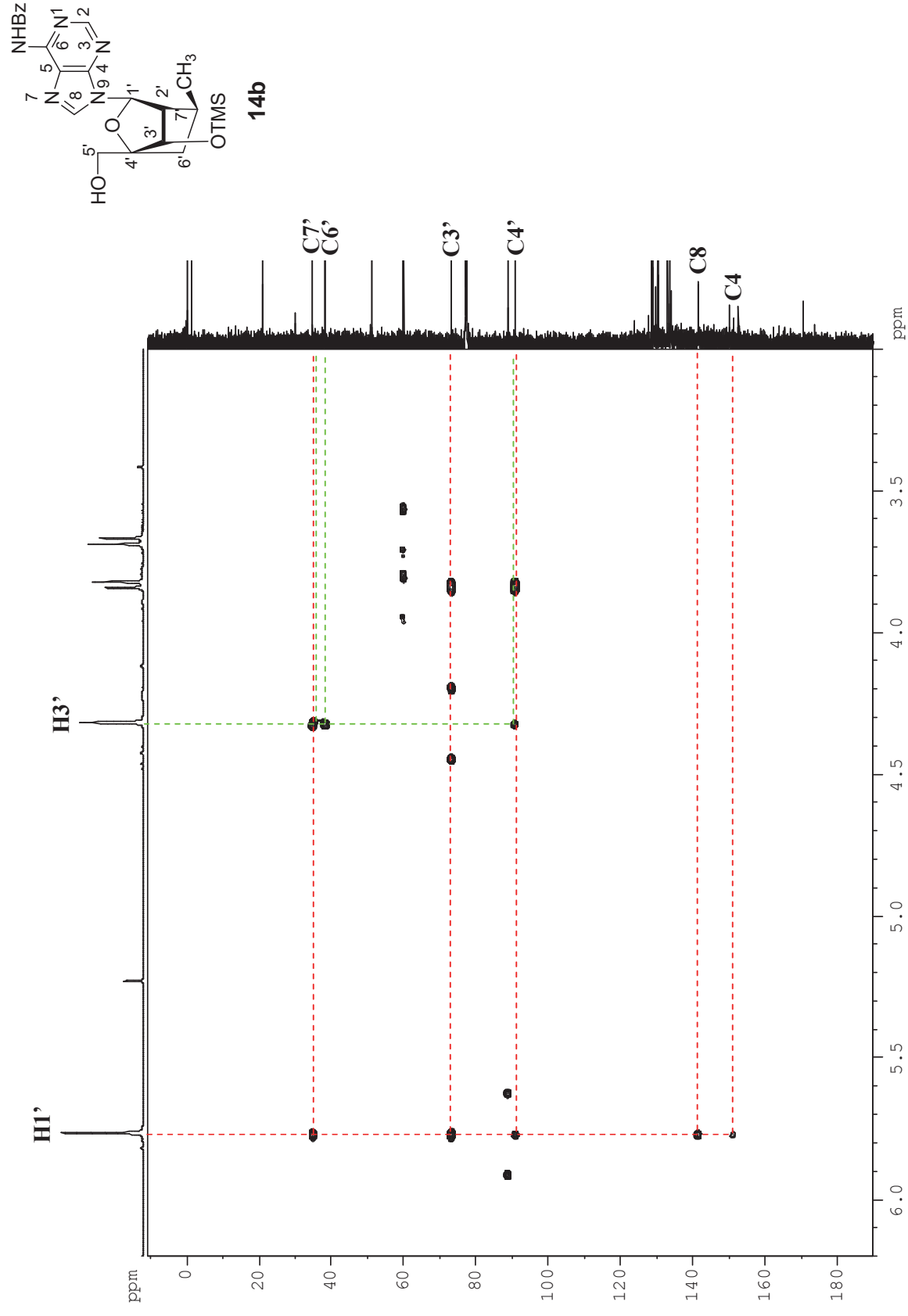


Figure SL.121 Expansion of HMBC spectrum of compound **14b**

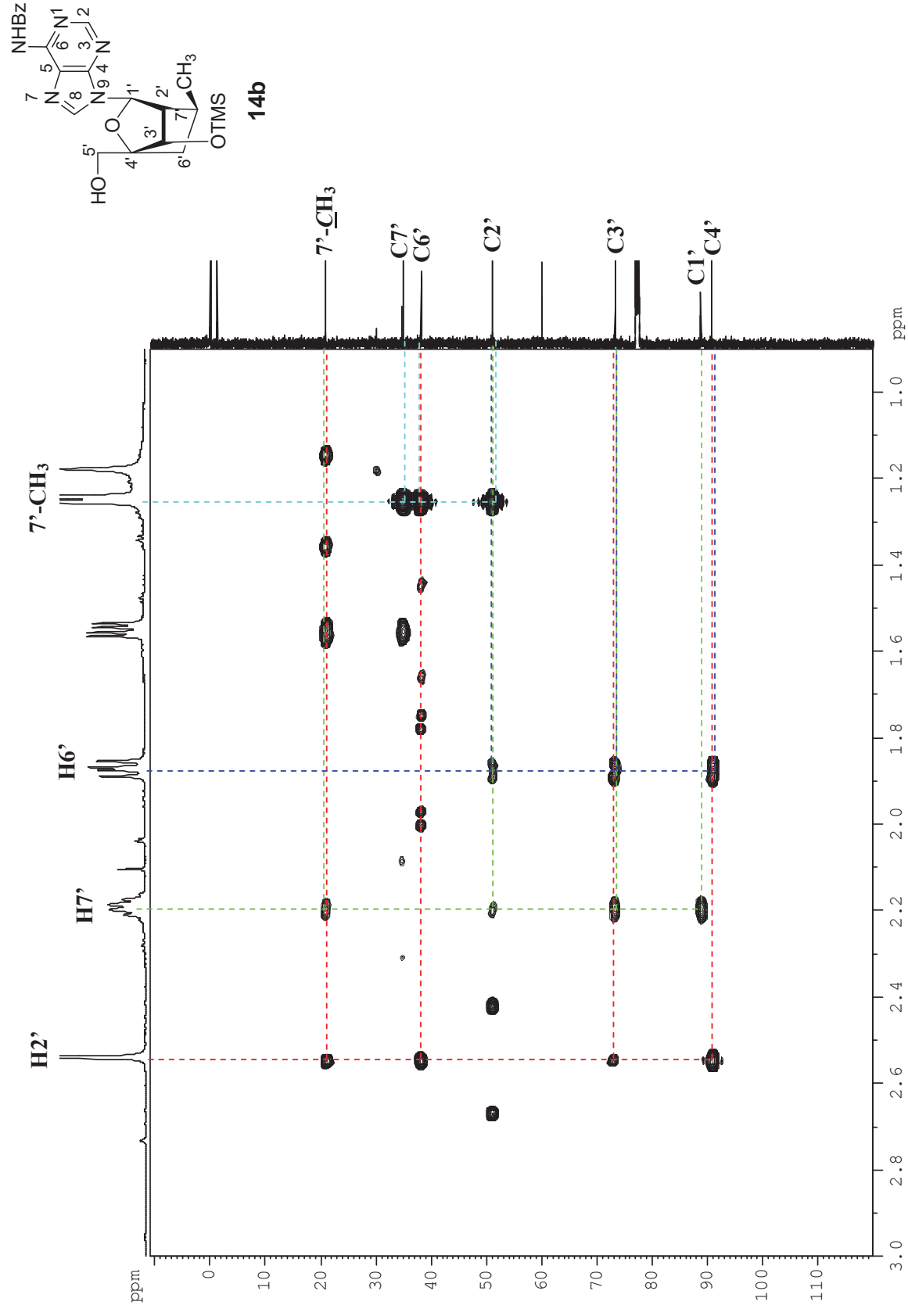


Figure SI.122 Expansion of HMBC spectrum of compound **14b**

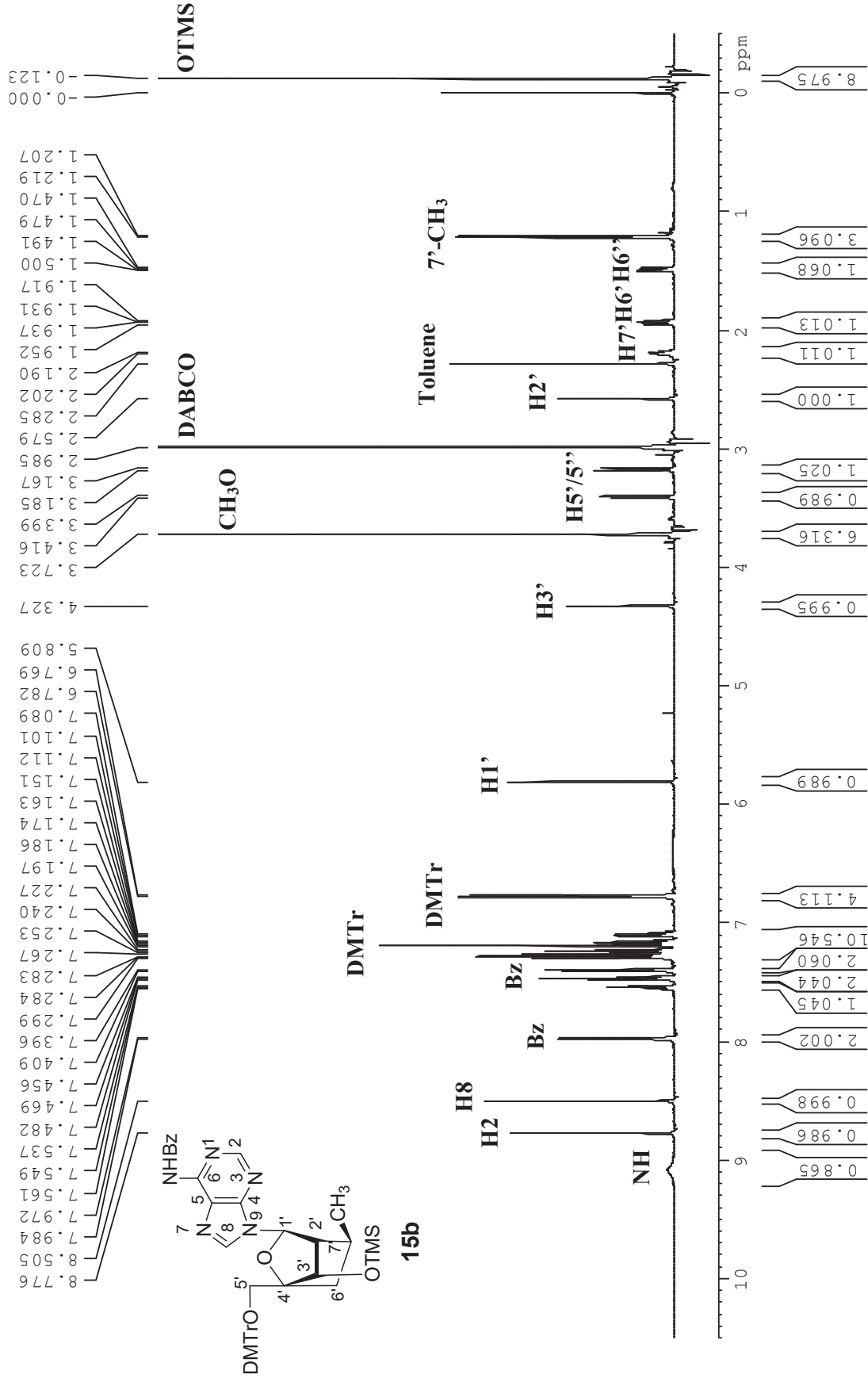


Figure SI.123 ¹H NMR spectrum of compound 15b

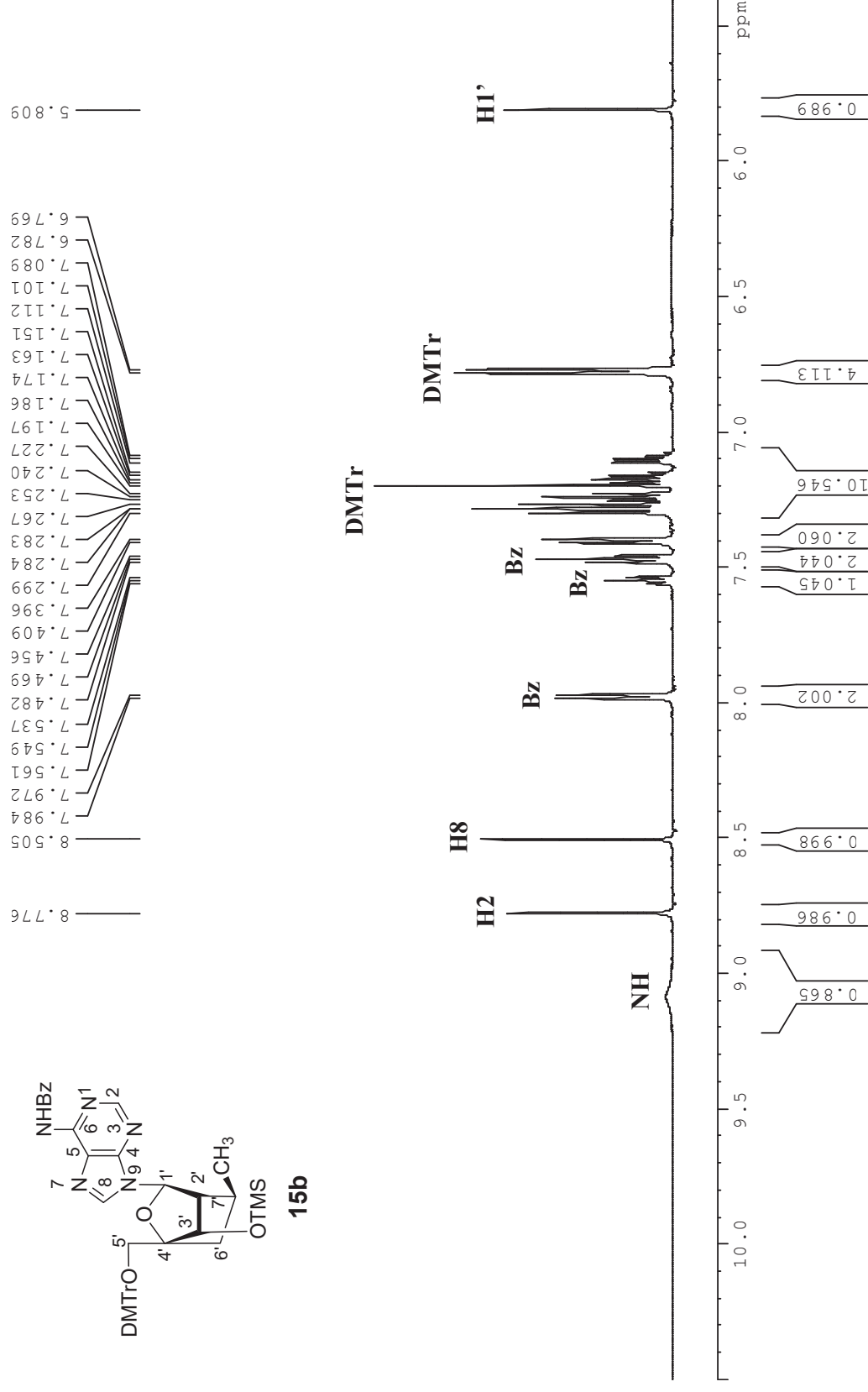


Figure SI.124 Expansion of ¹H NMR spectrum of compound 15b

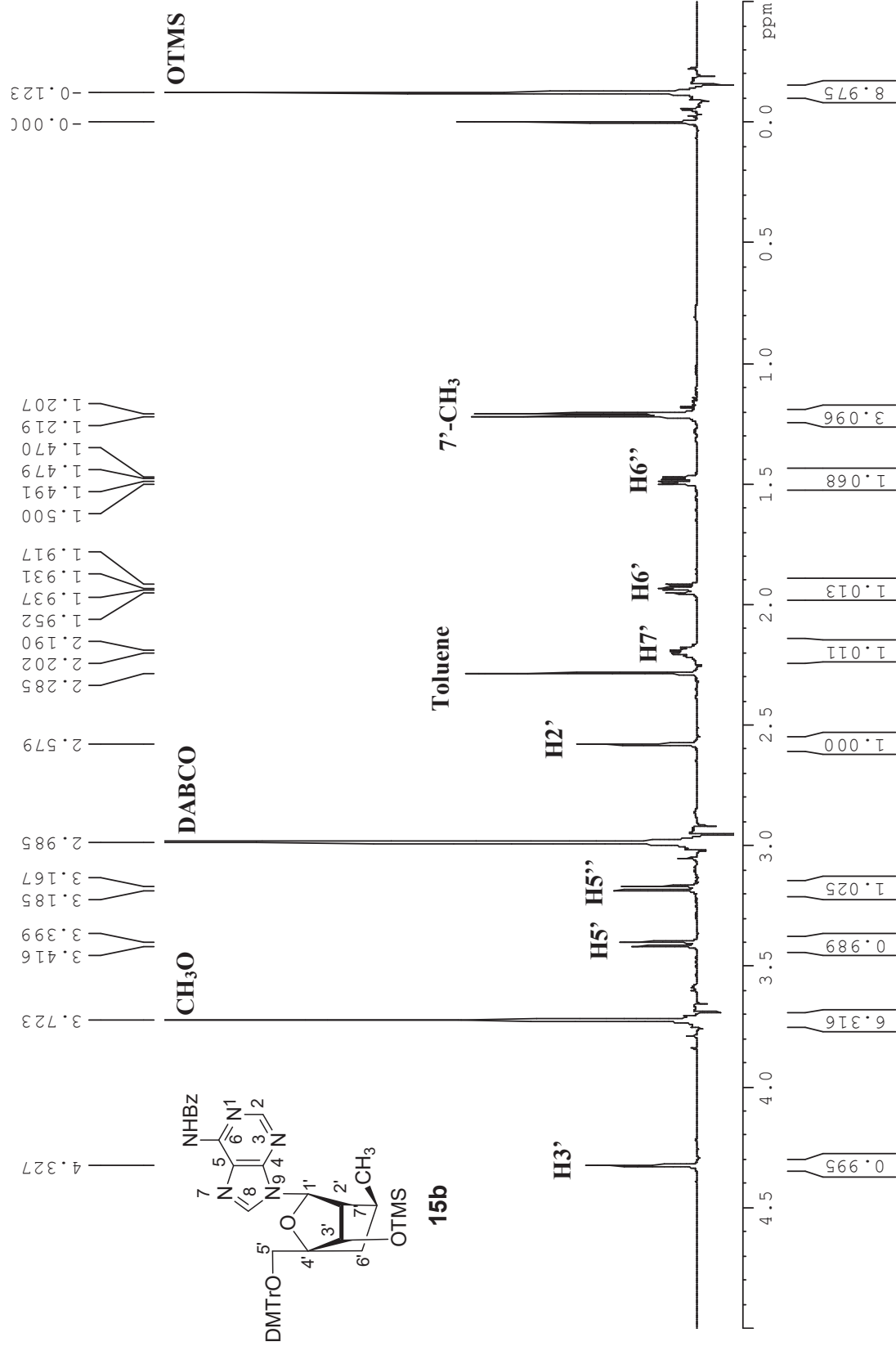


Figure SI.125 Expansion of ¹H NMR spectrum of compound 15b

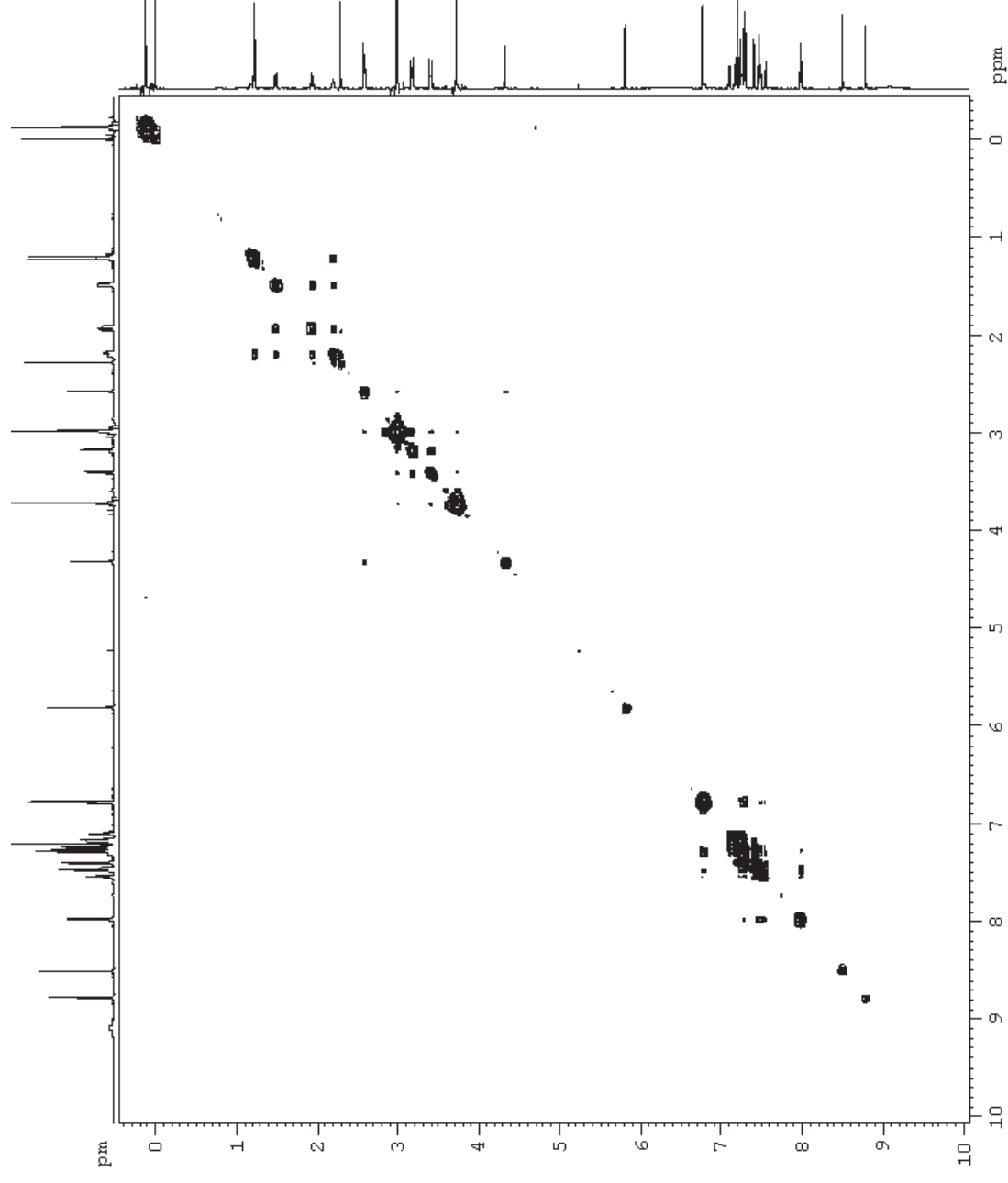
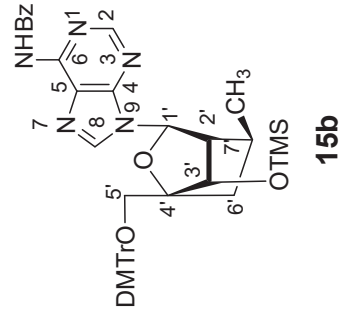


Figure SI.126 COSY spectrum of compound **15b**

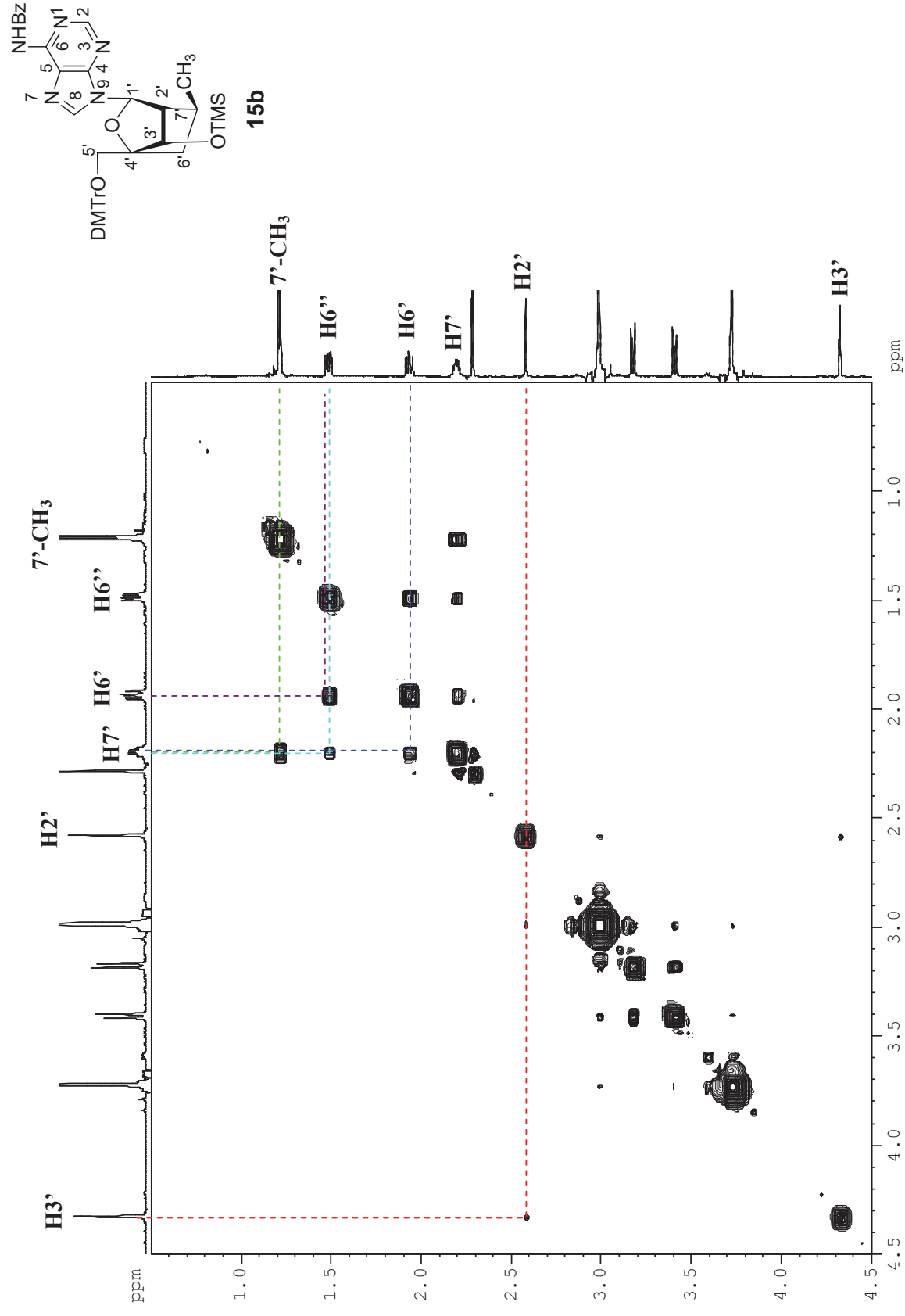


Figure SI.127 Expansion of COSY spectrum of compound 15b

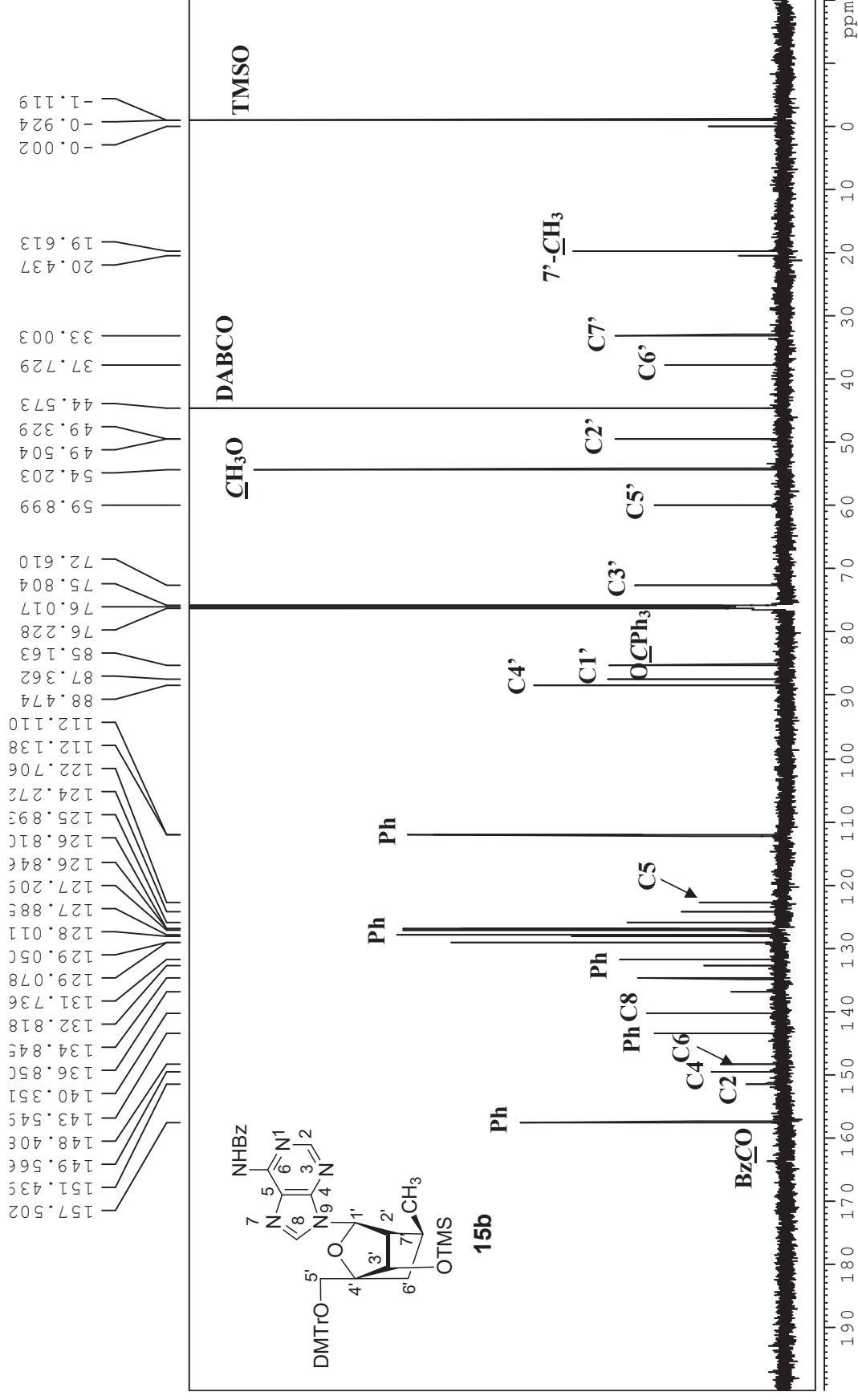


Figure SI.128 ¹³C NMR spectrum of compound 15b

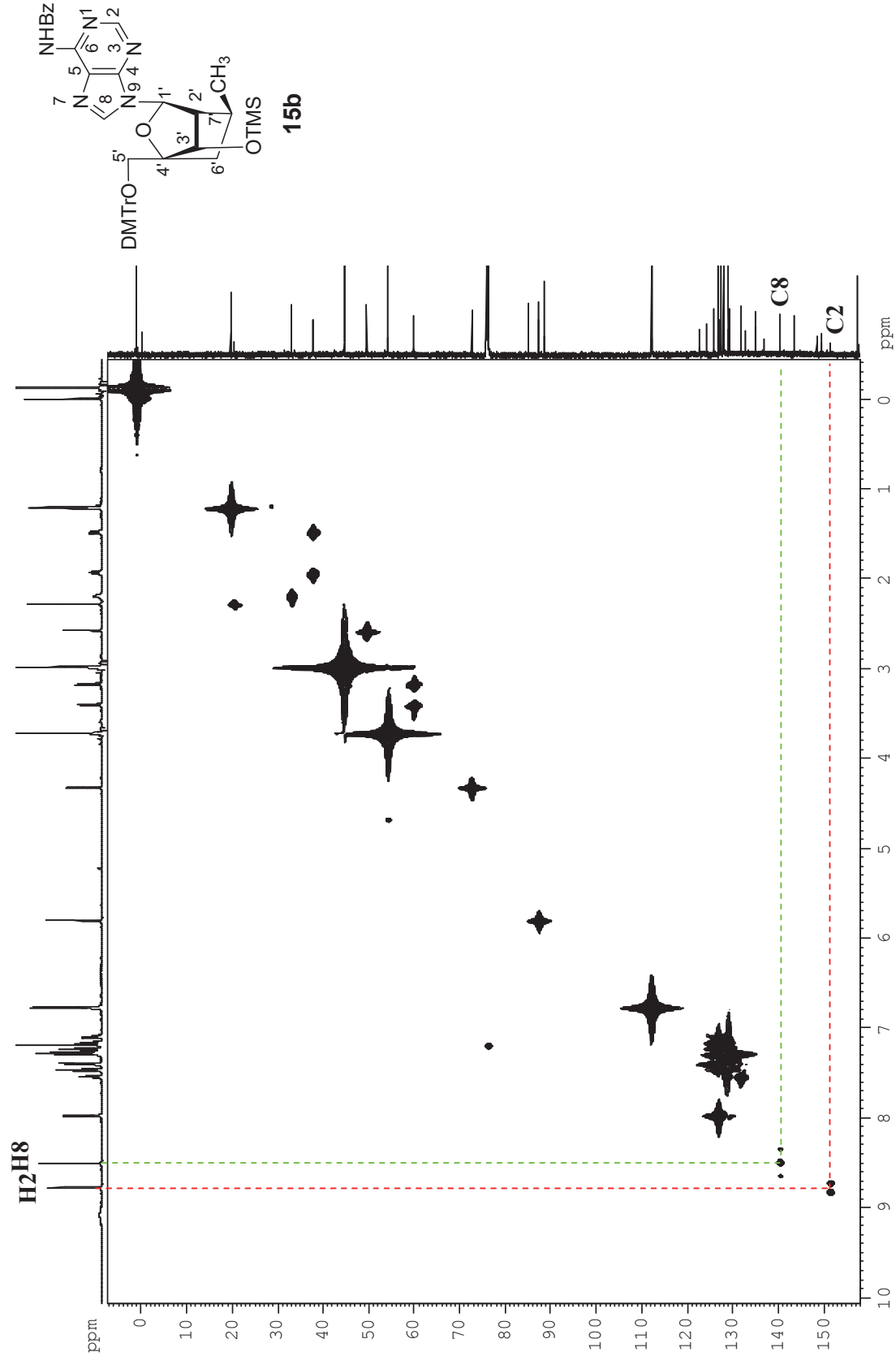


Figure SI.129 HMQC spectrum of compound 15b

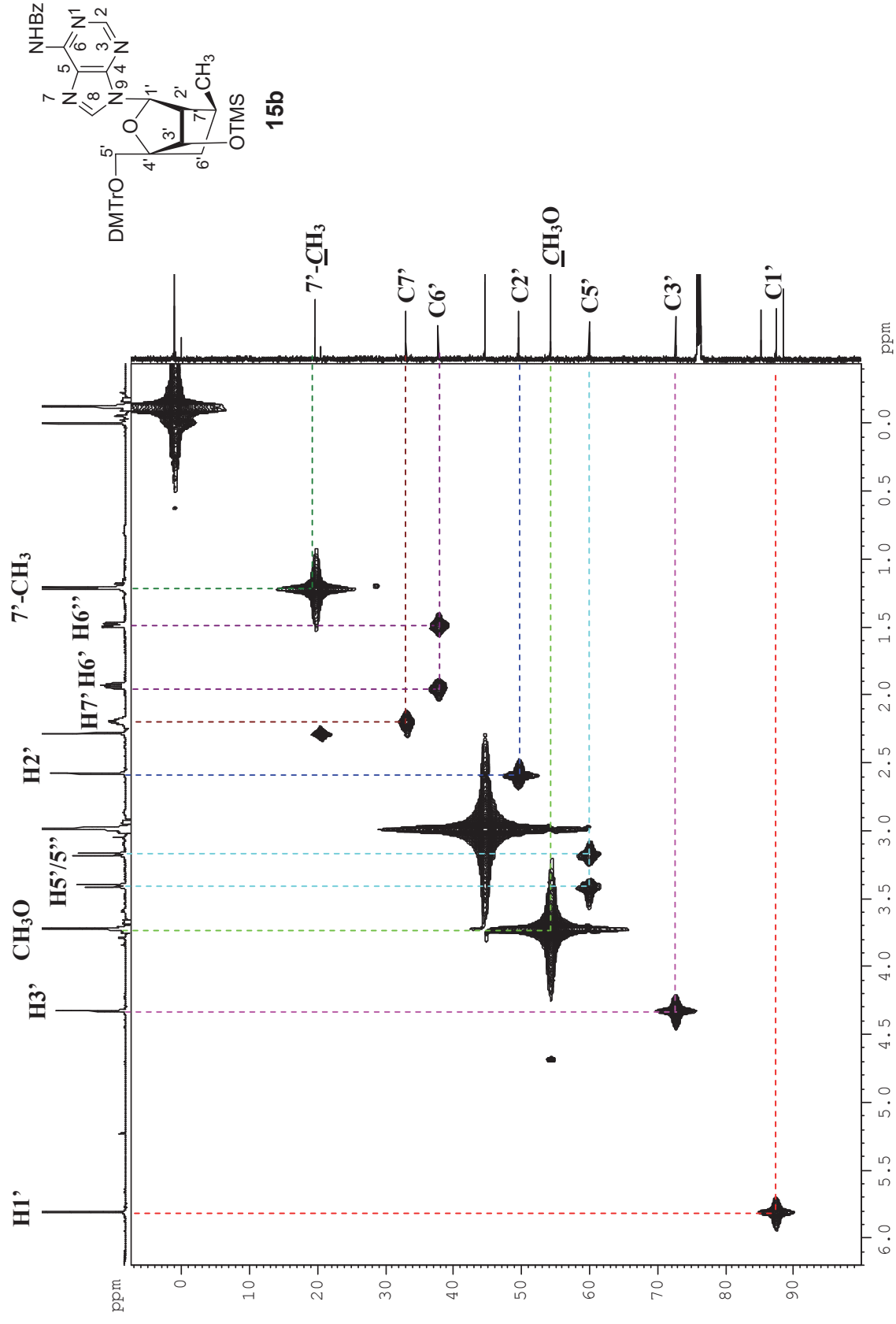


Figure SL.130 Expansion of HMQC spectrum of compound **15b**

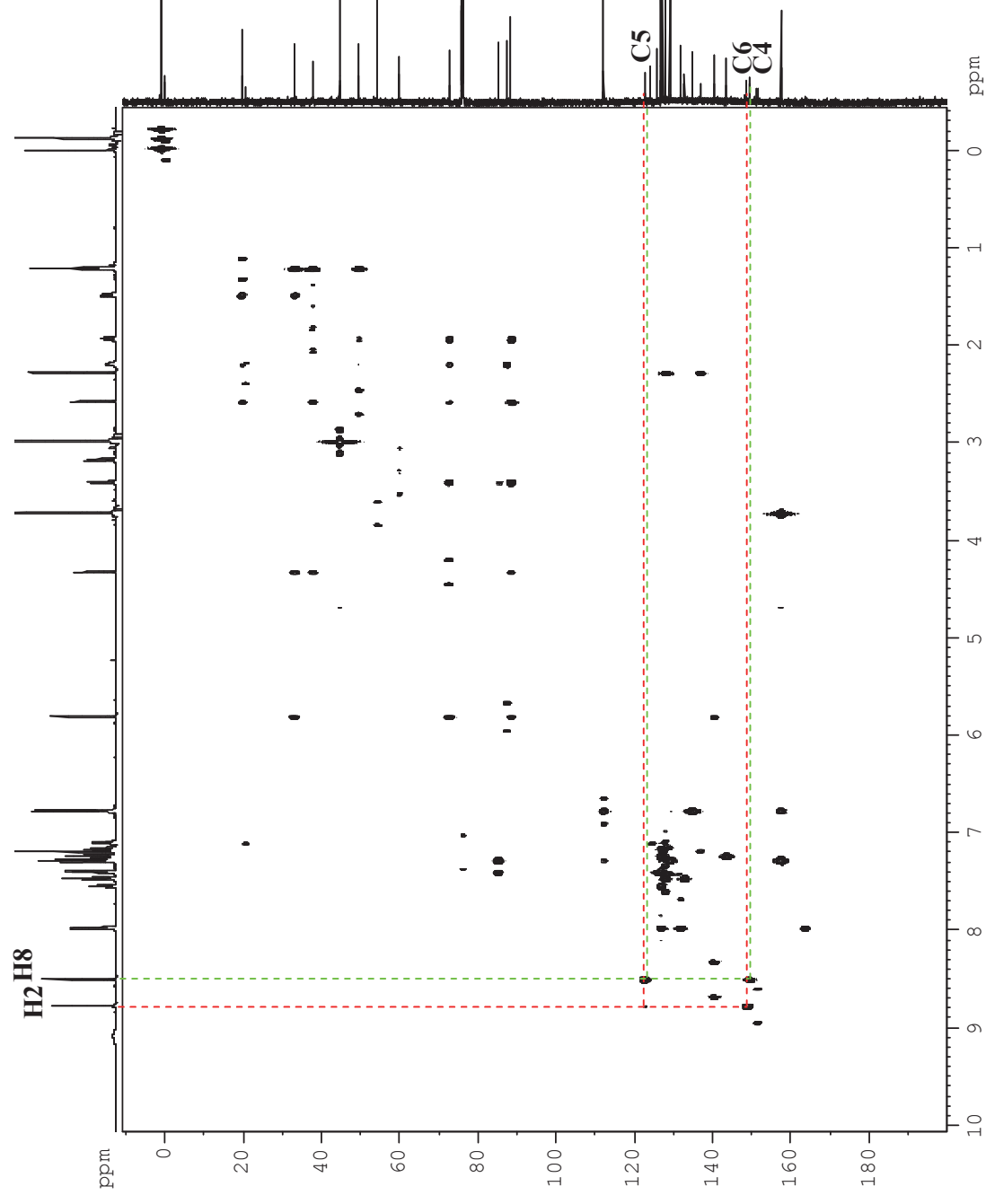
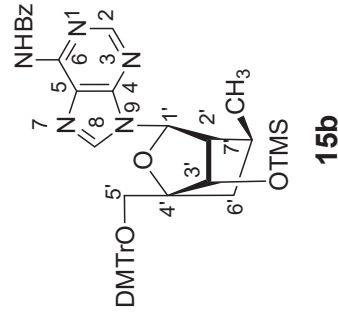


Figure SL131 HMBC spectrum of compound 15b

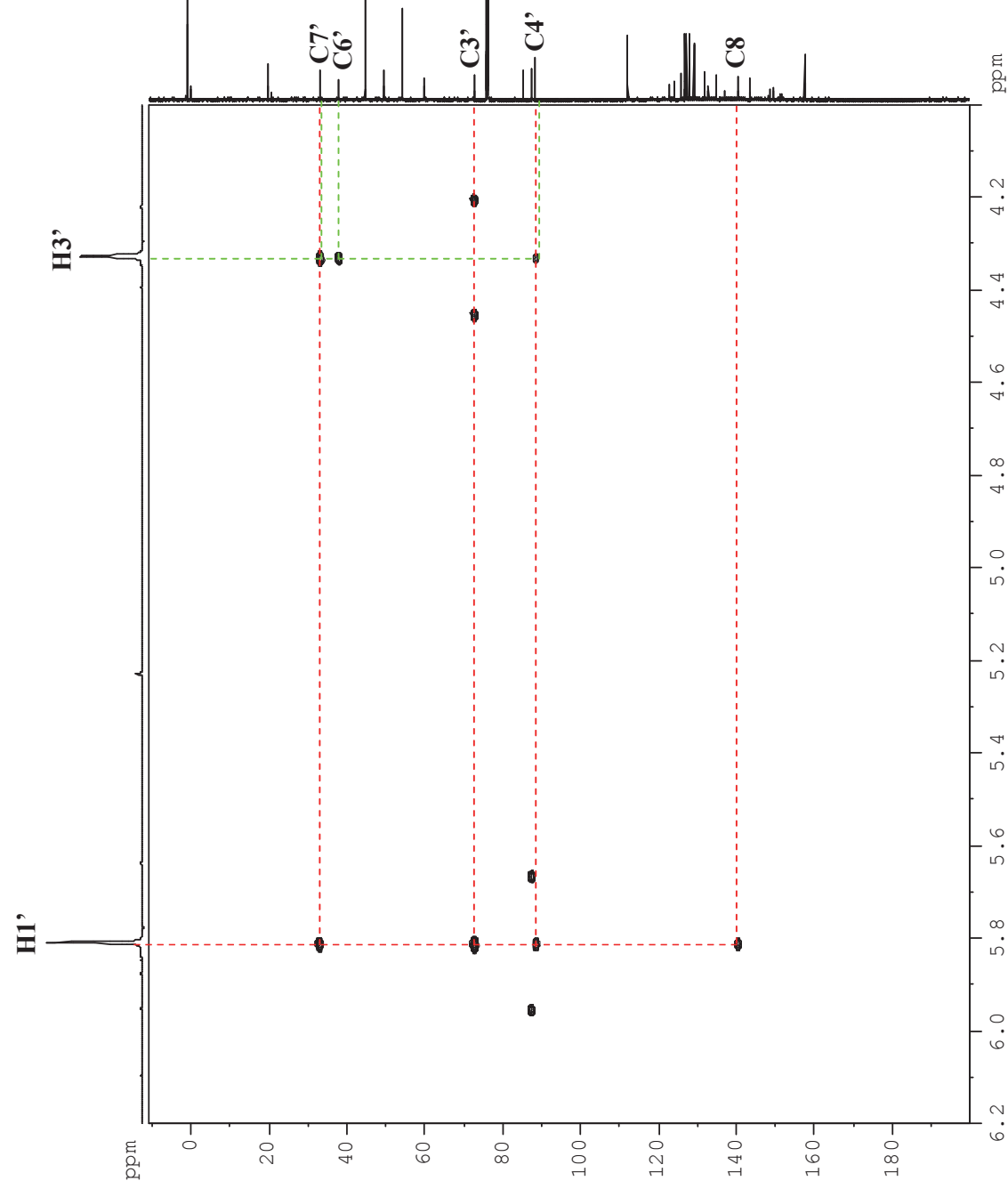
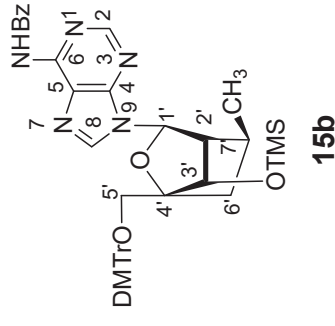


Figure SI.132 Expansion of HMBC spectrum of compound **15b**

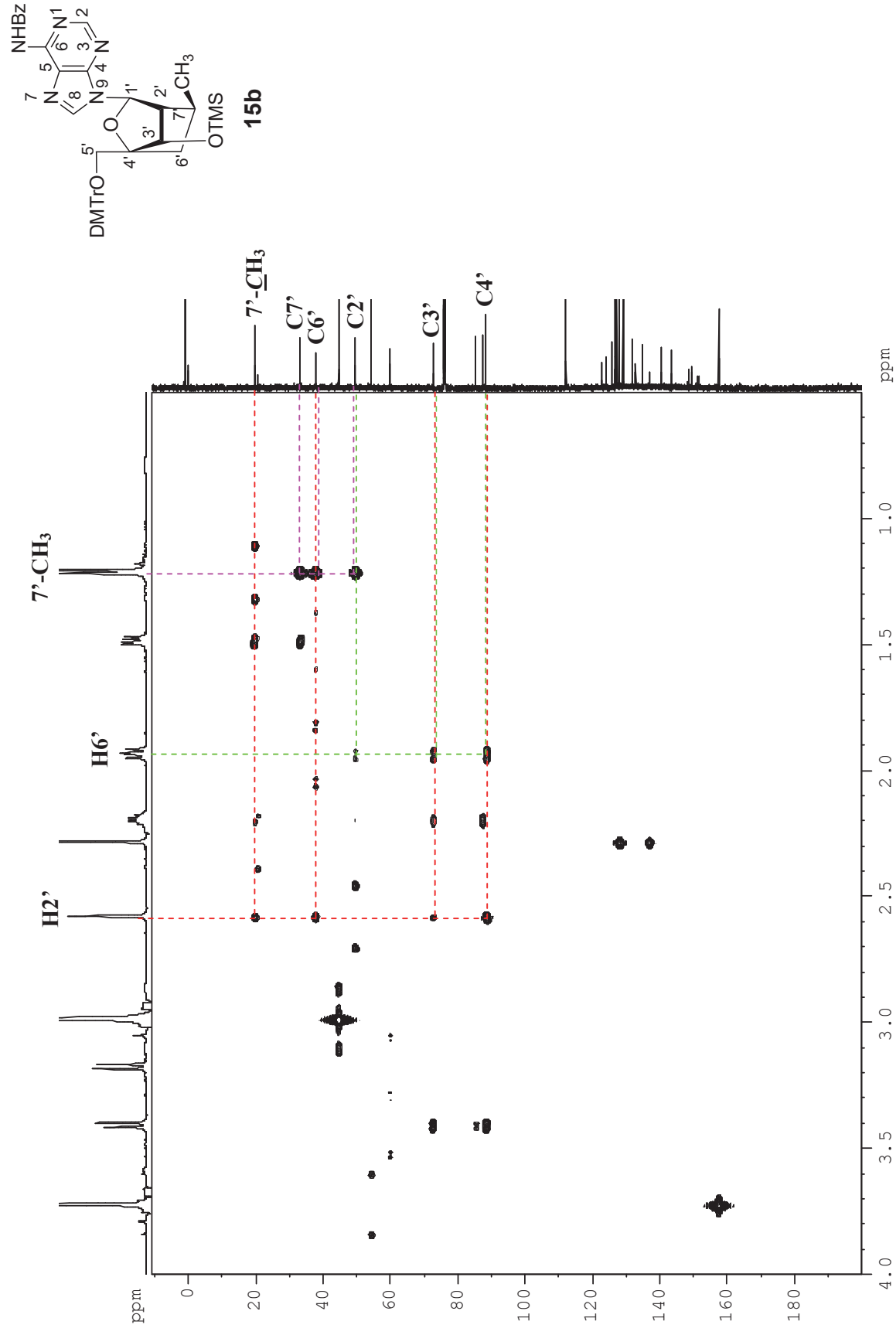


Figure SI.133 Expansion of HMBC spectrum of compound **15b**

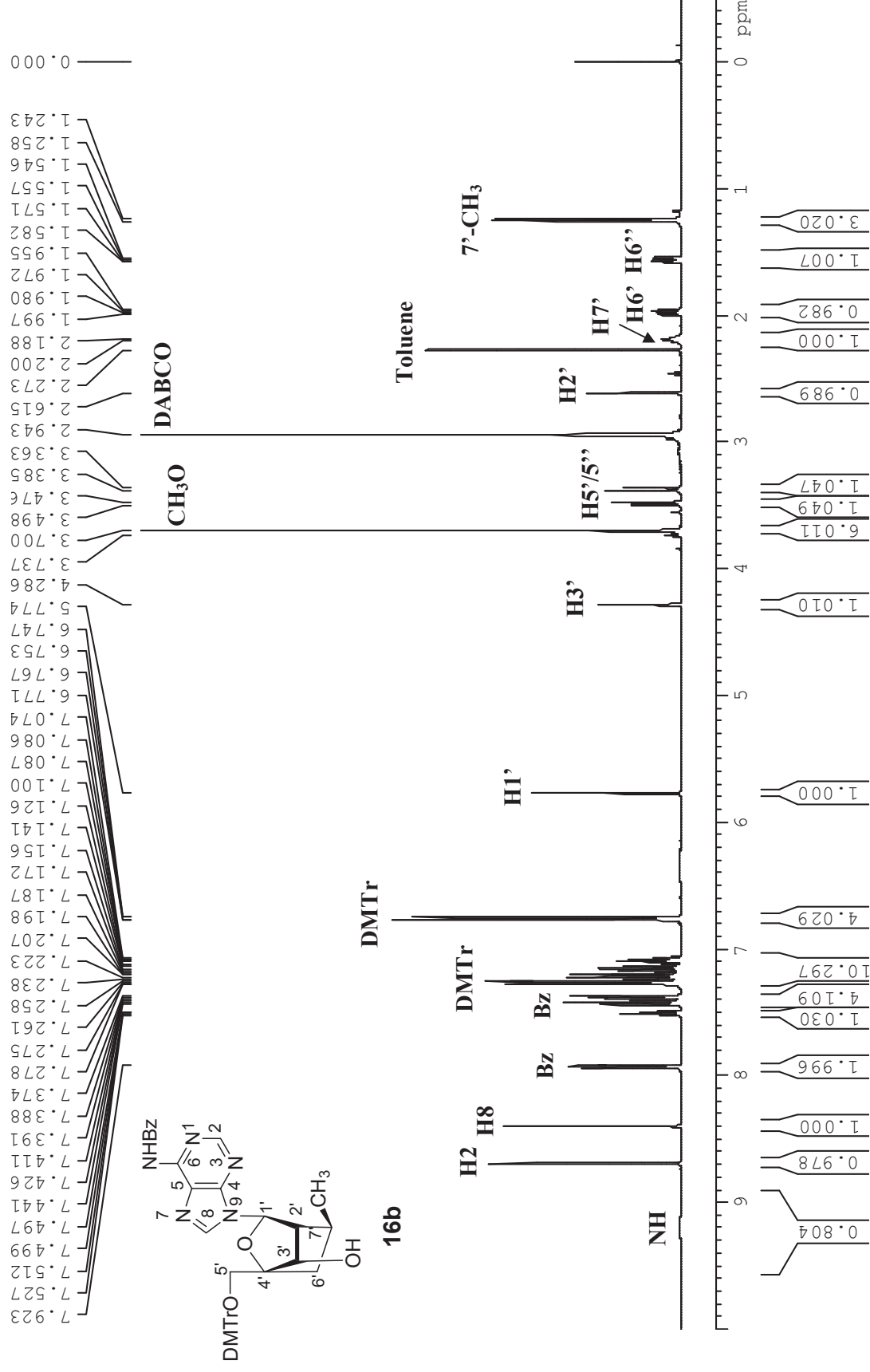


Figure SI.134 ¹H NMR spectrum of compound 16b

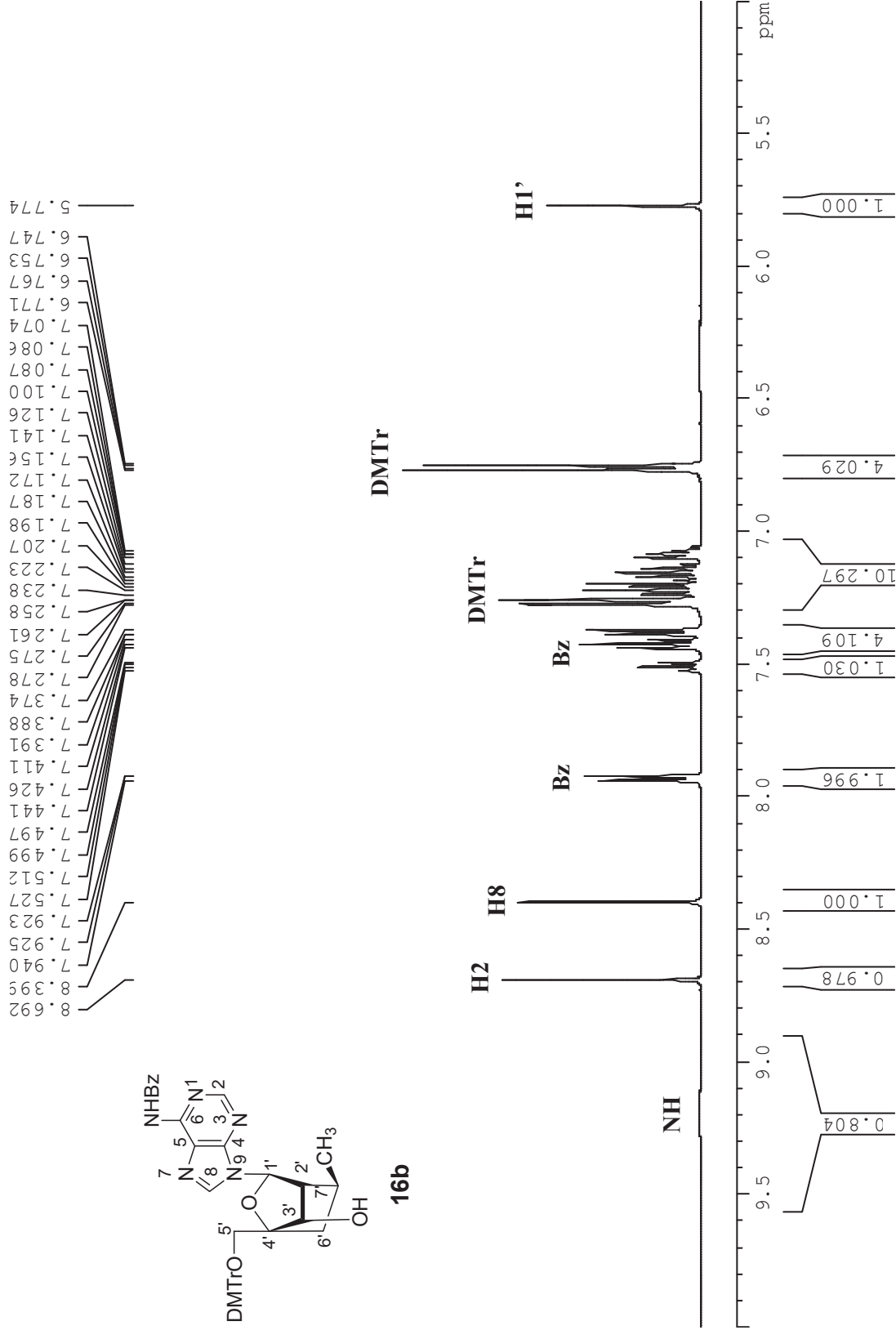


Figure SI.135 Expansion of ¹H NMR spectrum of compound 16b

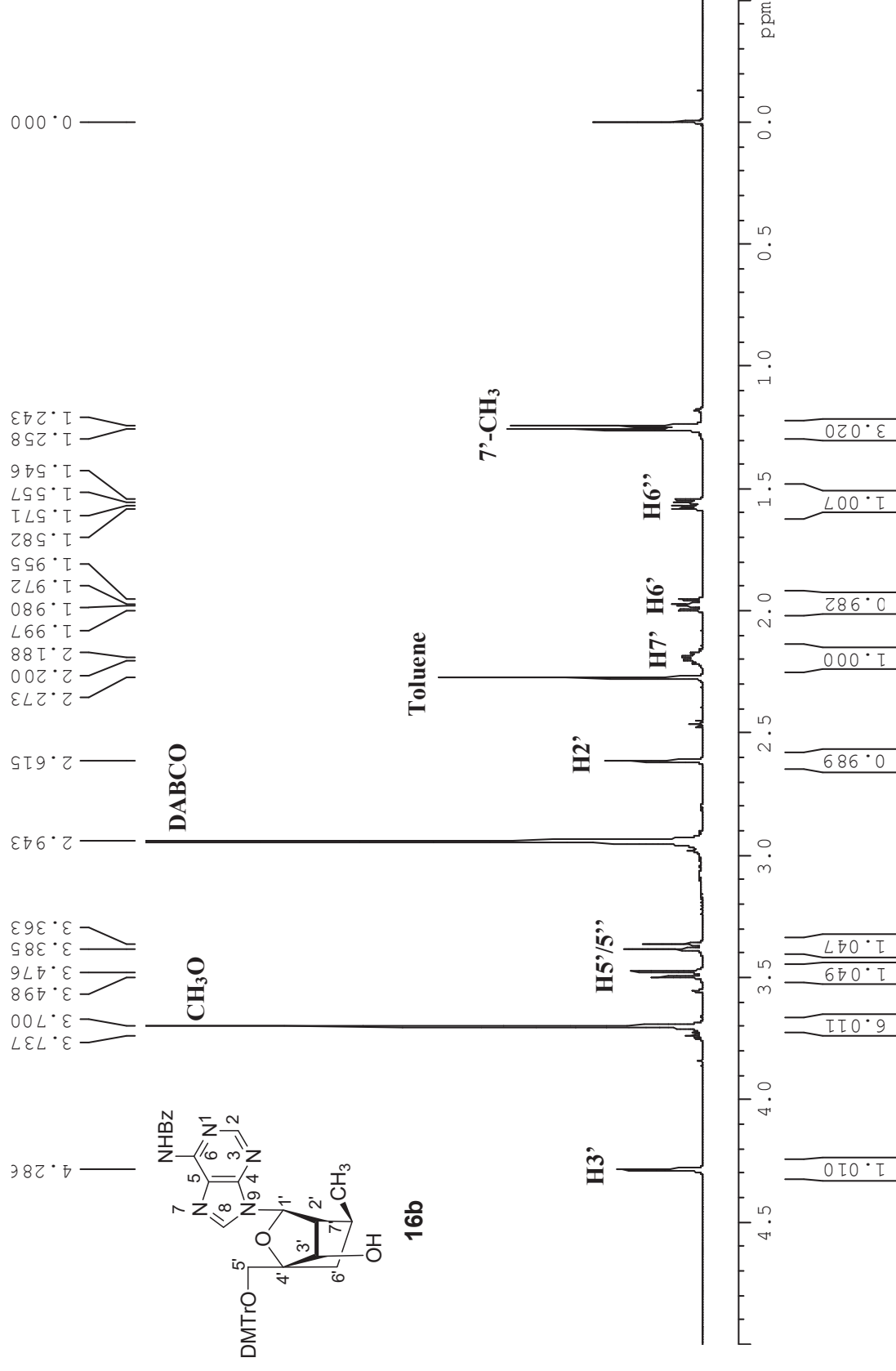


Figure SI.136 Expansion of ¹H NMR spectrum of compound 16b

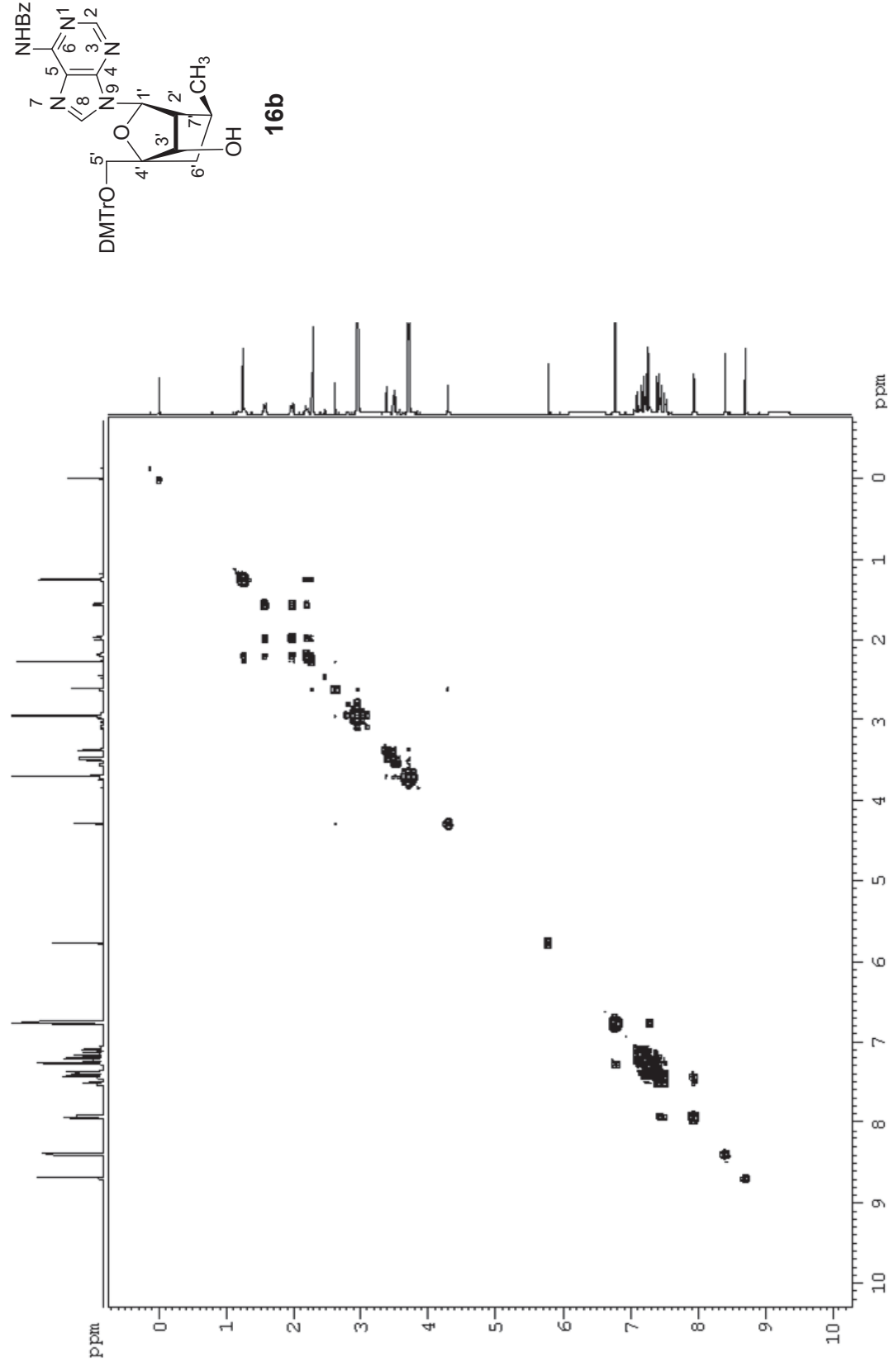


Figure SI.137 COSY spectrum of compound 16b

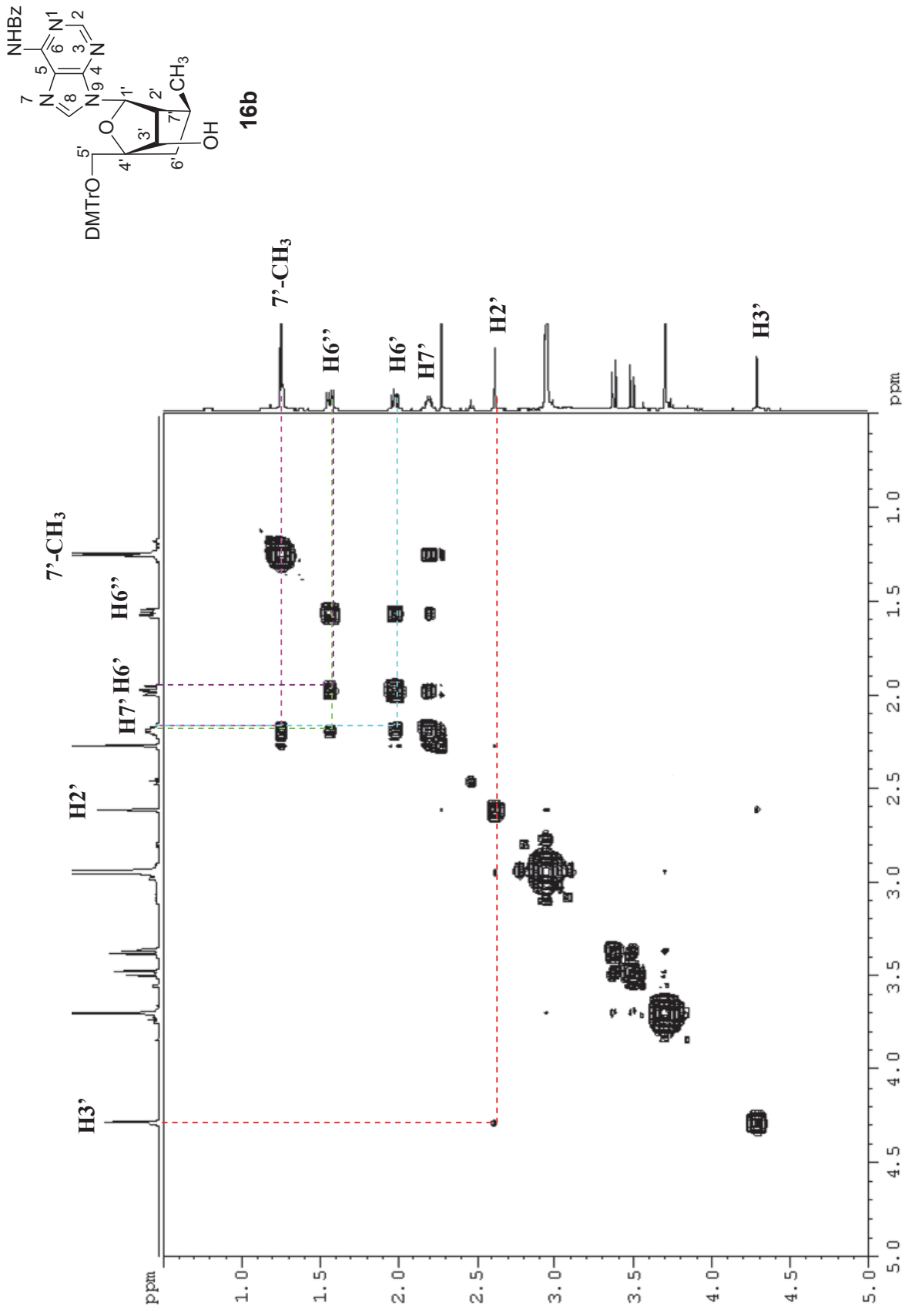
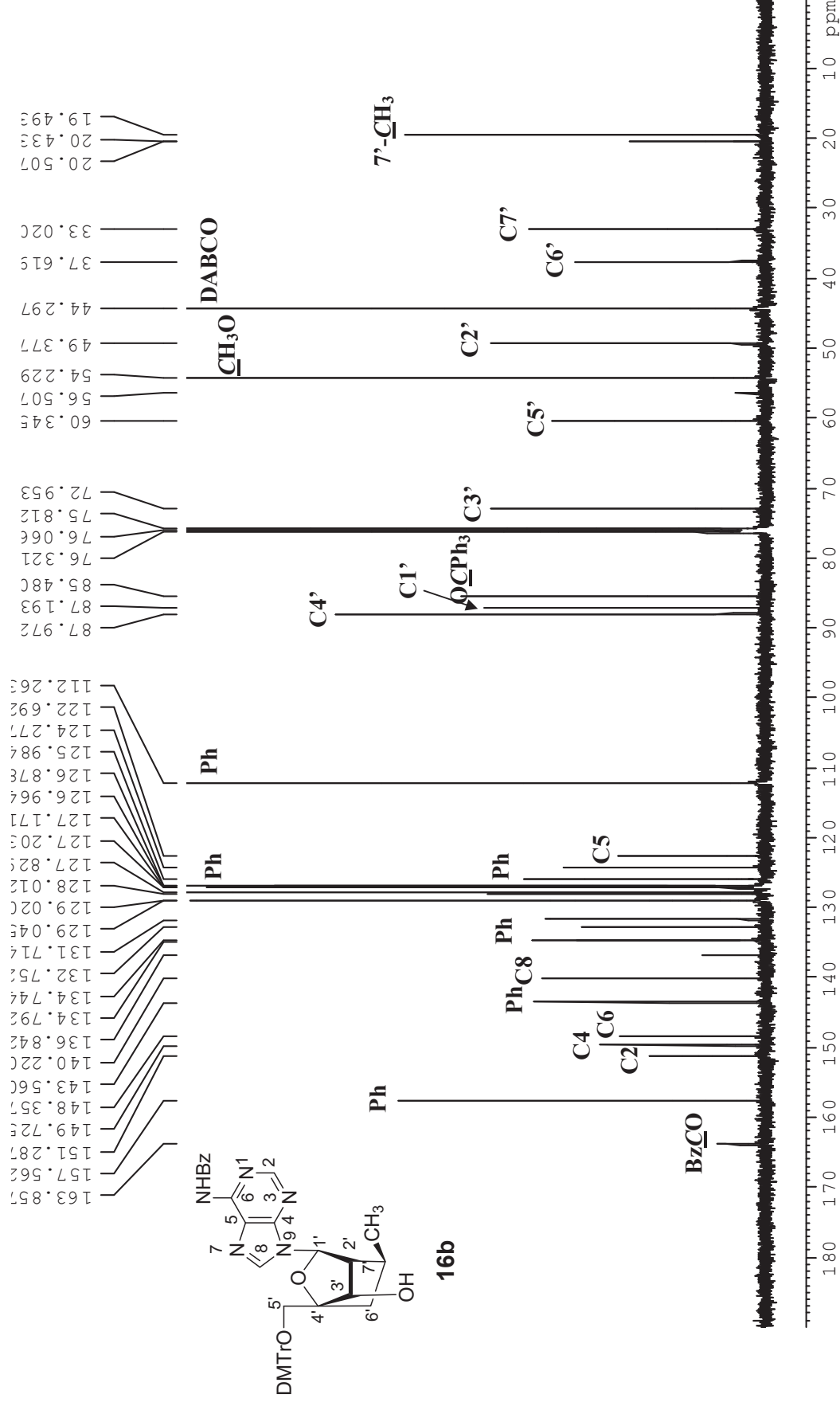


Figure SI.138 Expansion of COSY spectrum of compound 16b



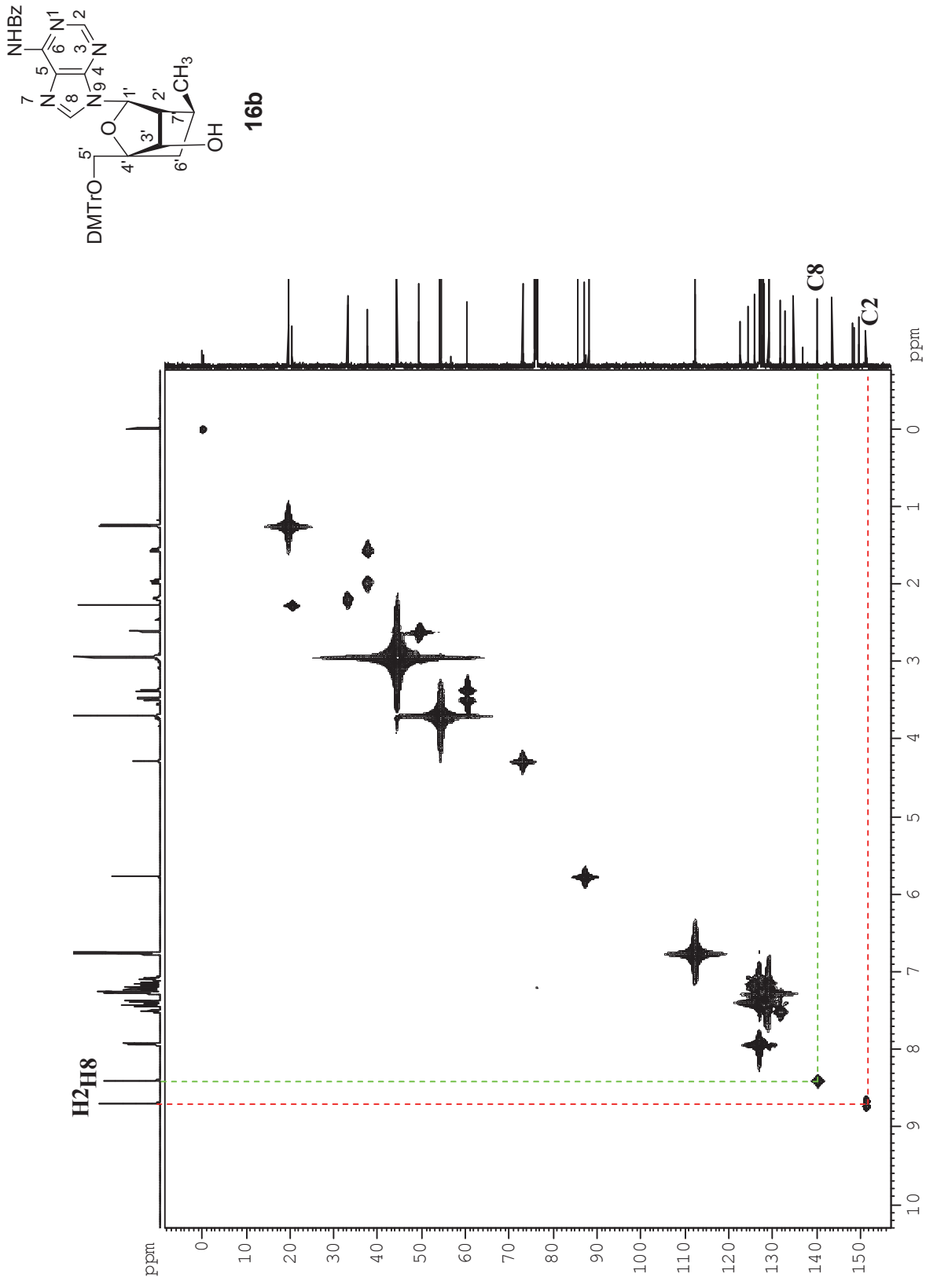


Figure SI.140 HMQC spectrum of compound 16b

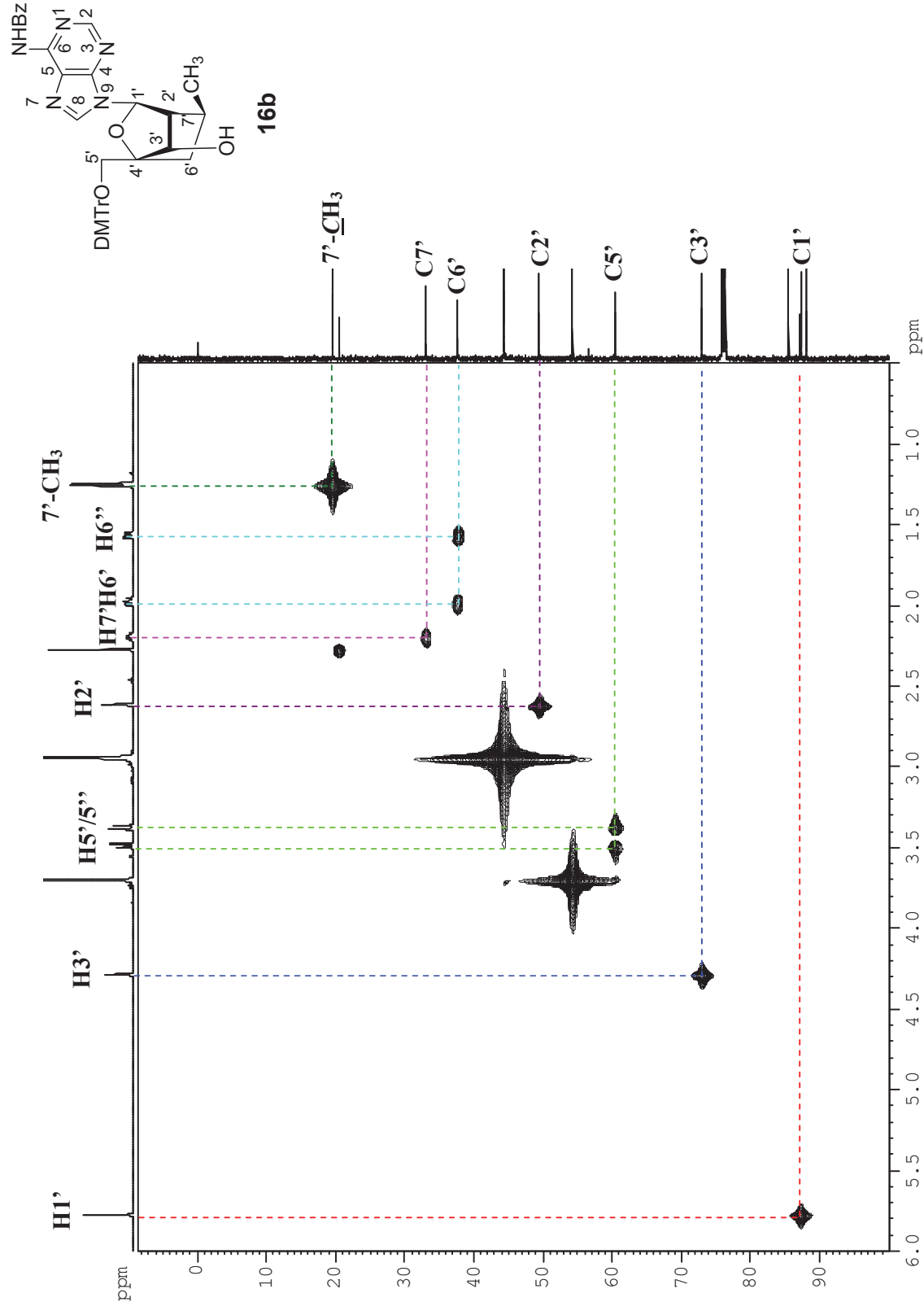


Figure SI.141 Expansion of HMQC spectrum of compound **16b**

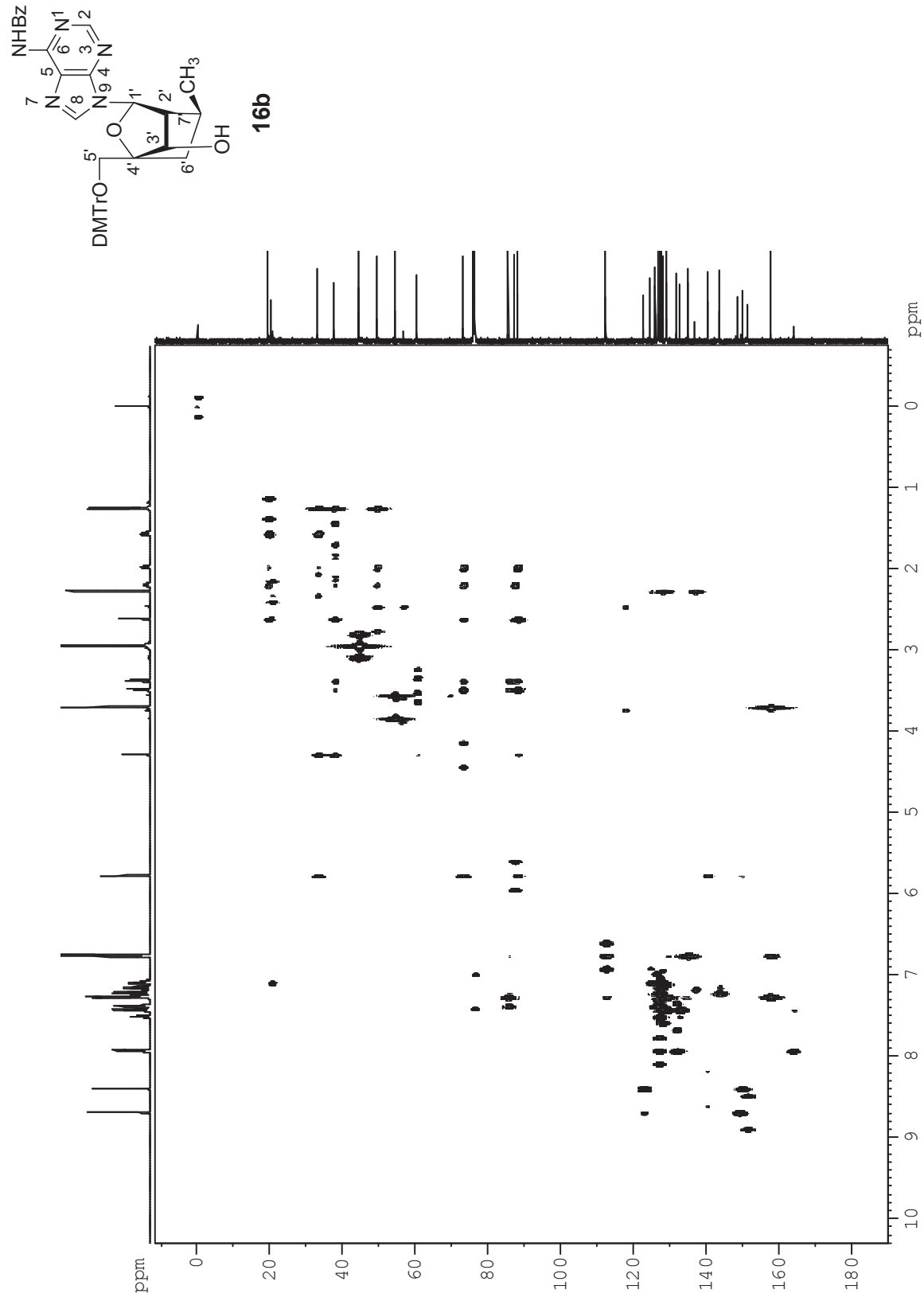


Figure SI.142 HMBC spectrum of compound 16b

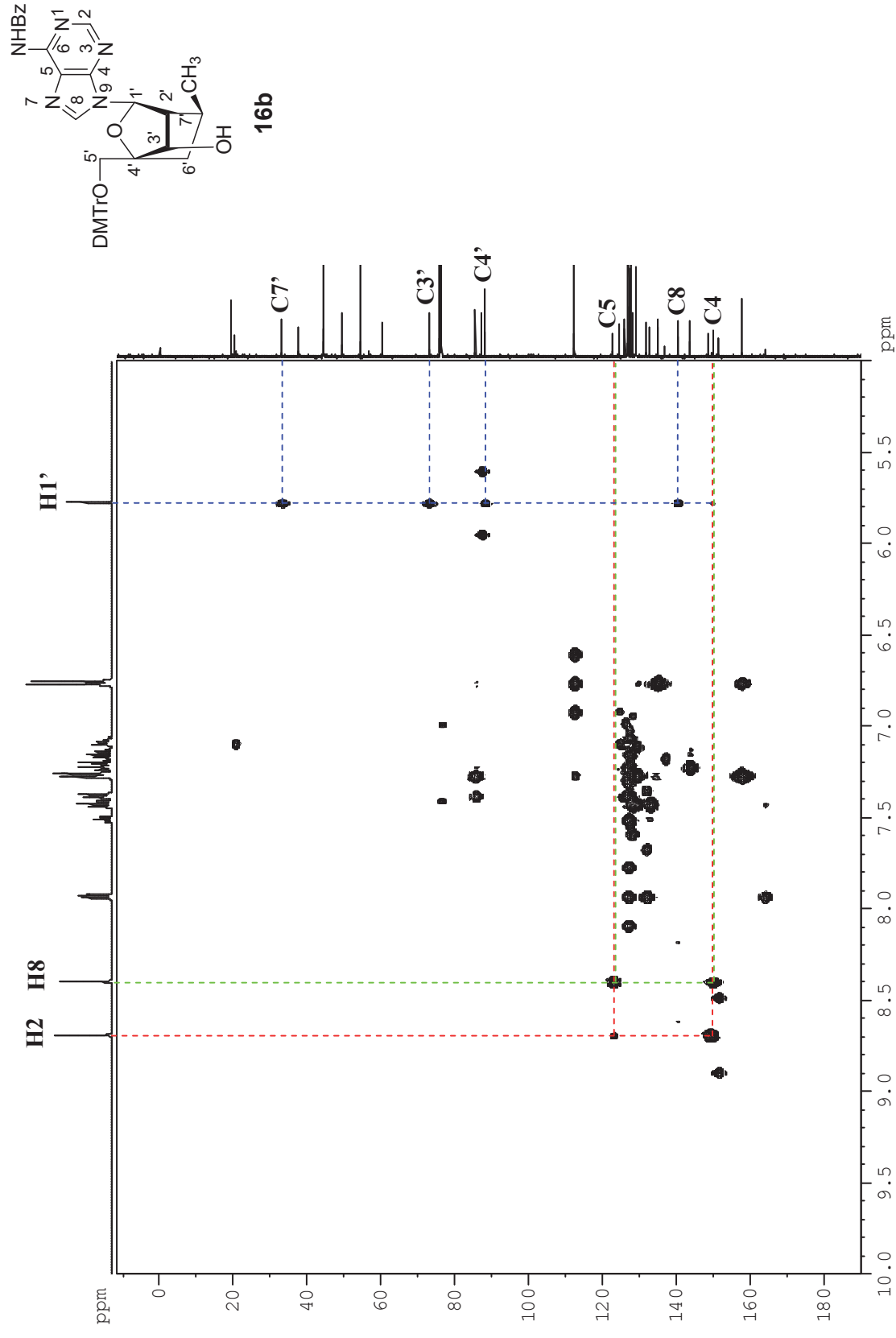


Figure SI.143 Expansion of HMBC spectrum of compound 16b

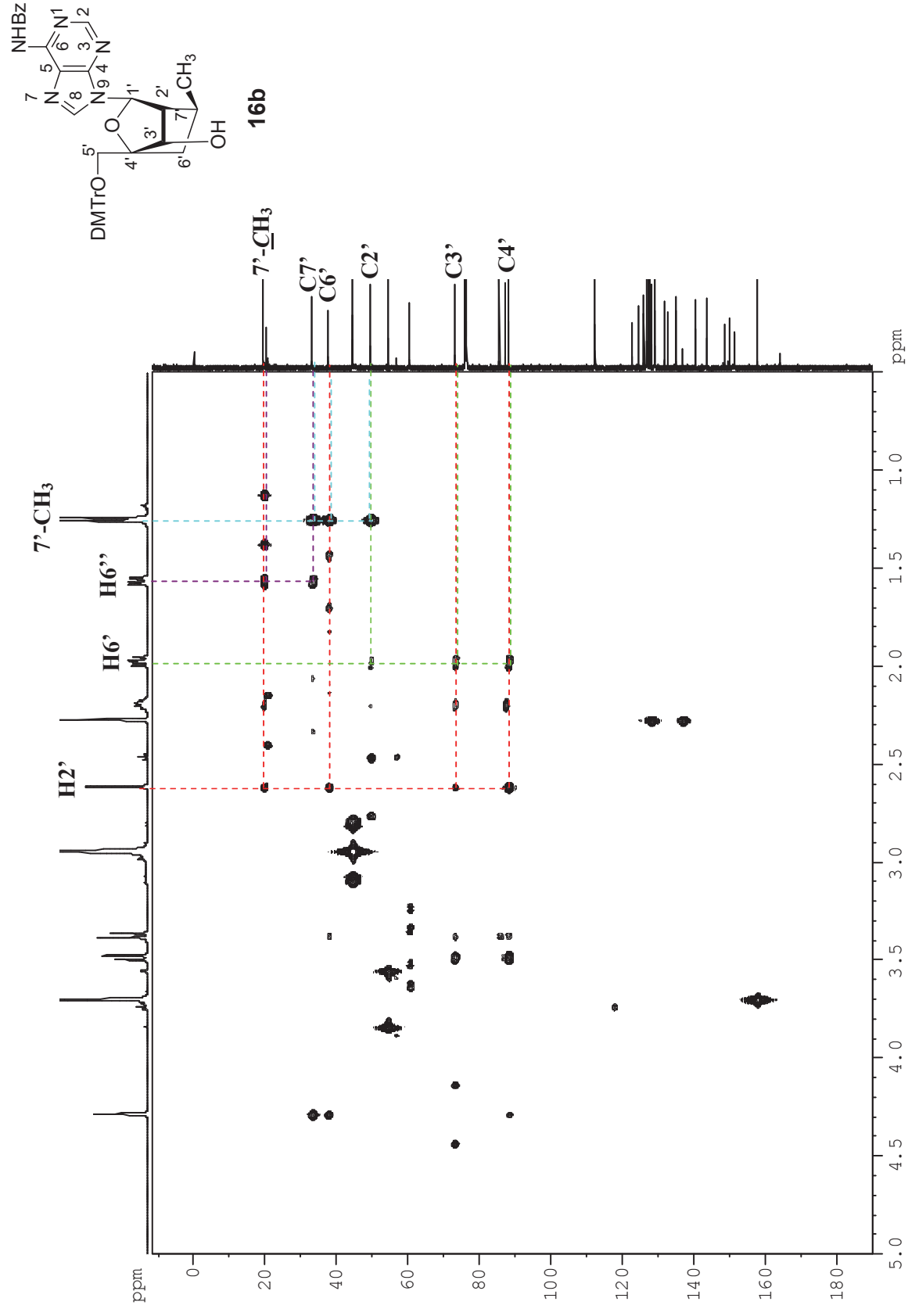


Figure SI.144 Expansion of HMBC spectrum of compound **16b**

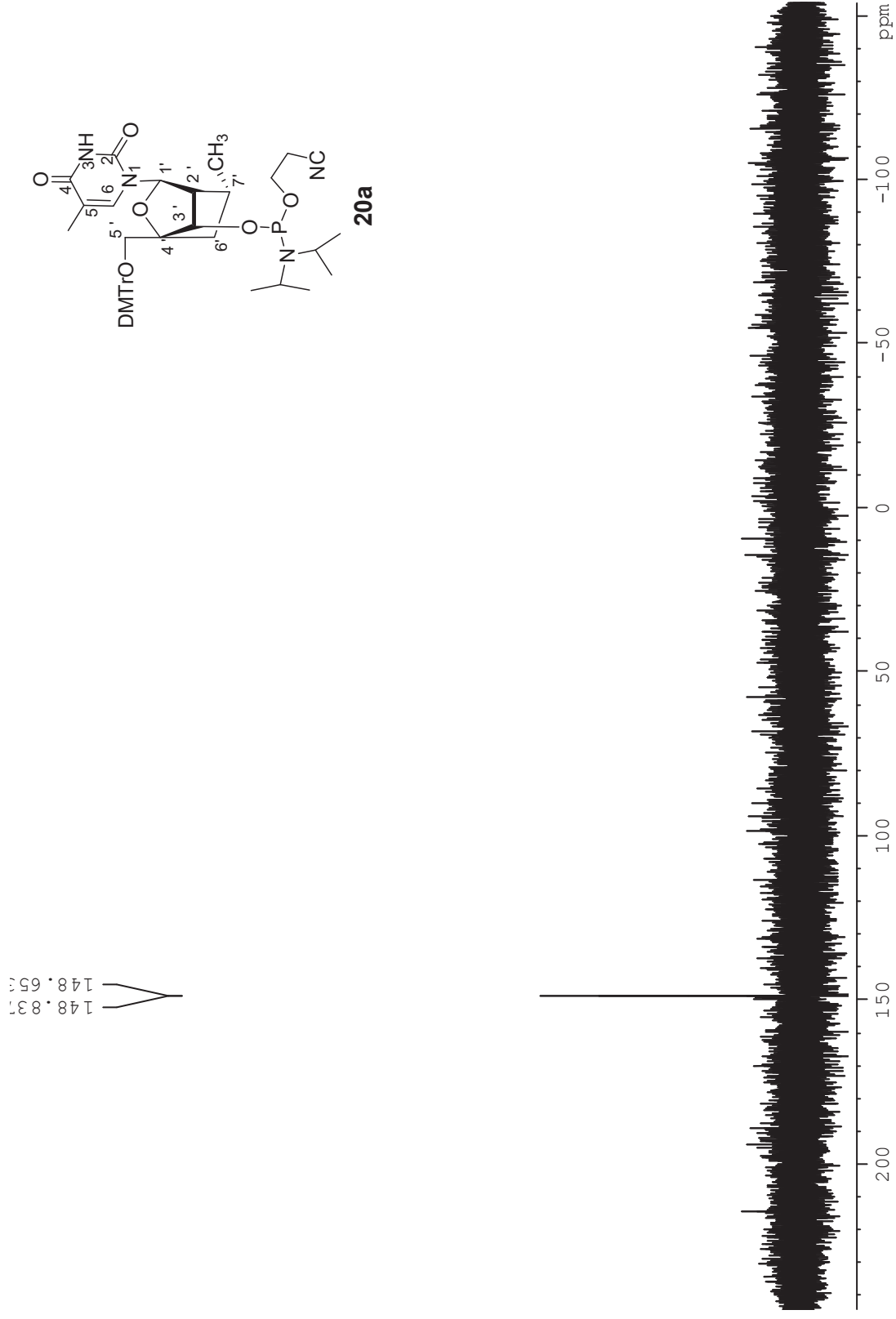


Figure SI.145 ^{31}P NMR spectrum of compound **20a**

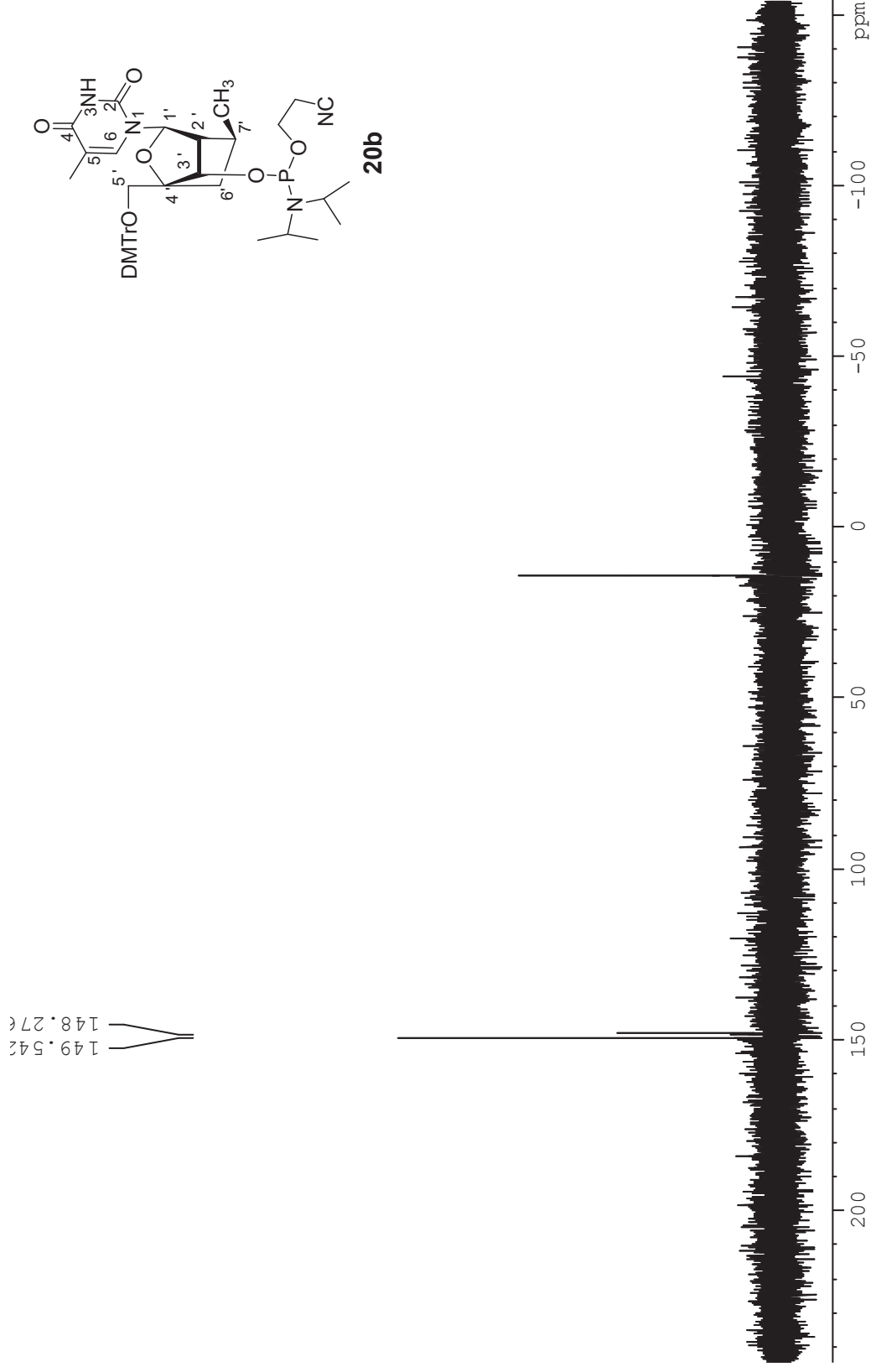


Figure SI.146 ^{31}P NMR spectrum of compound **20b**

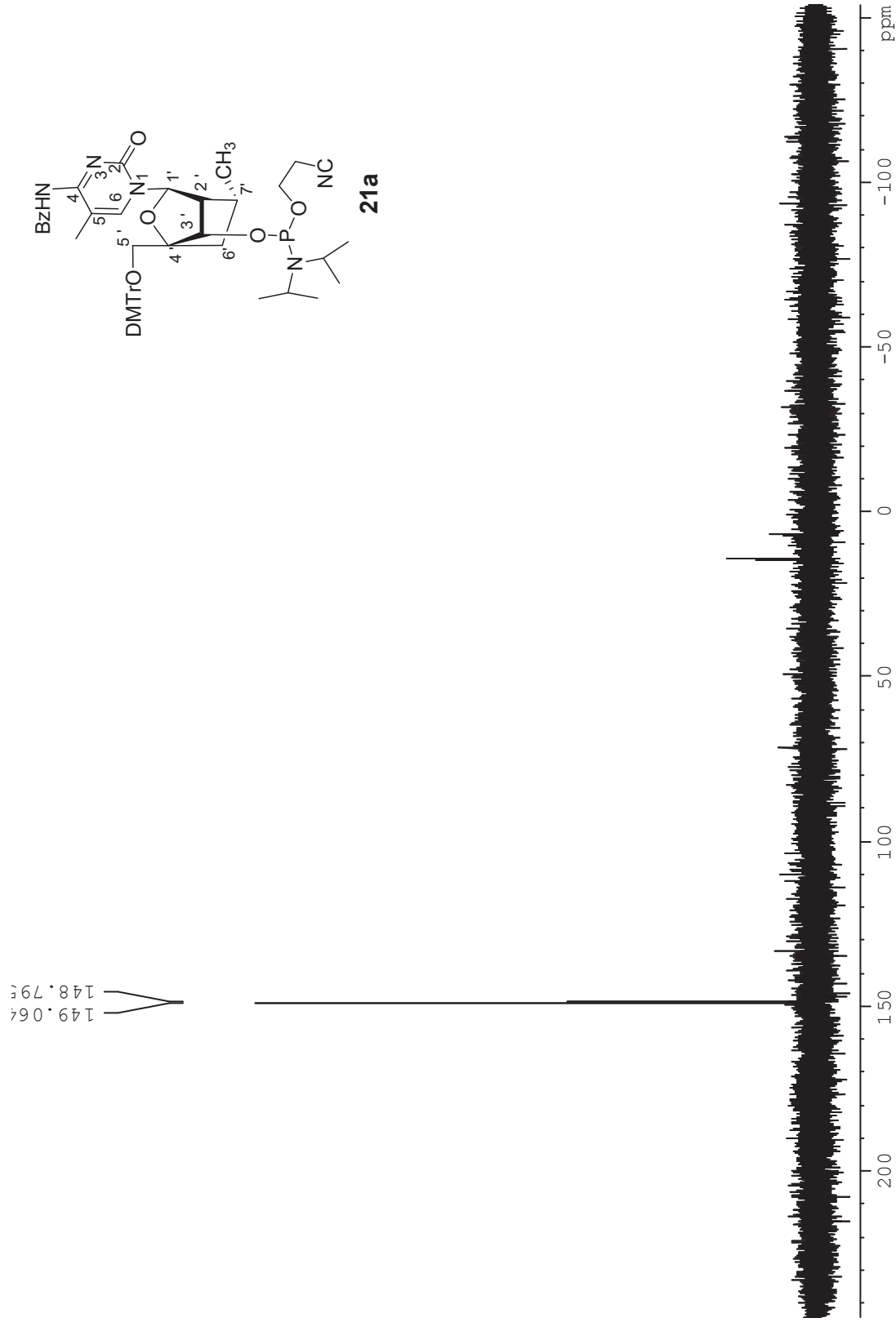


Figure SI.147 ^{31}P NMR spectrum of compound **21a**

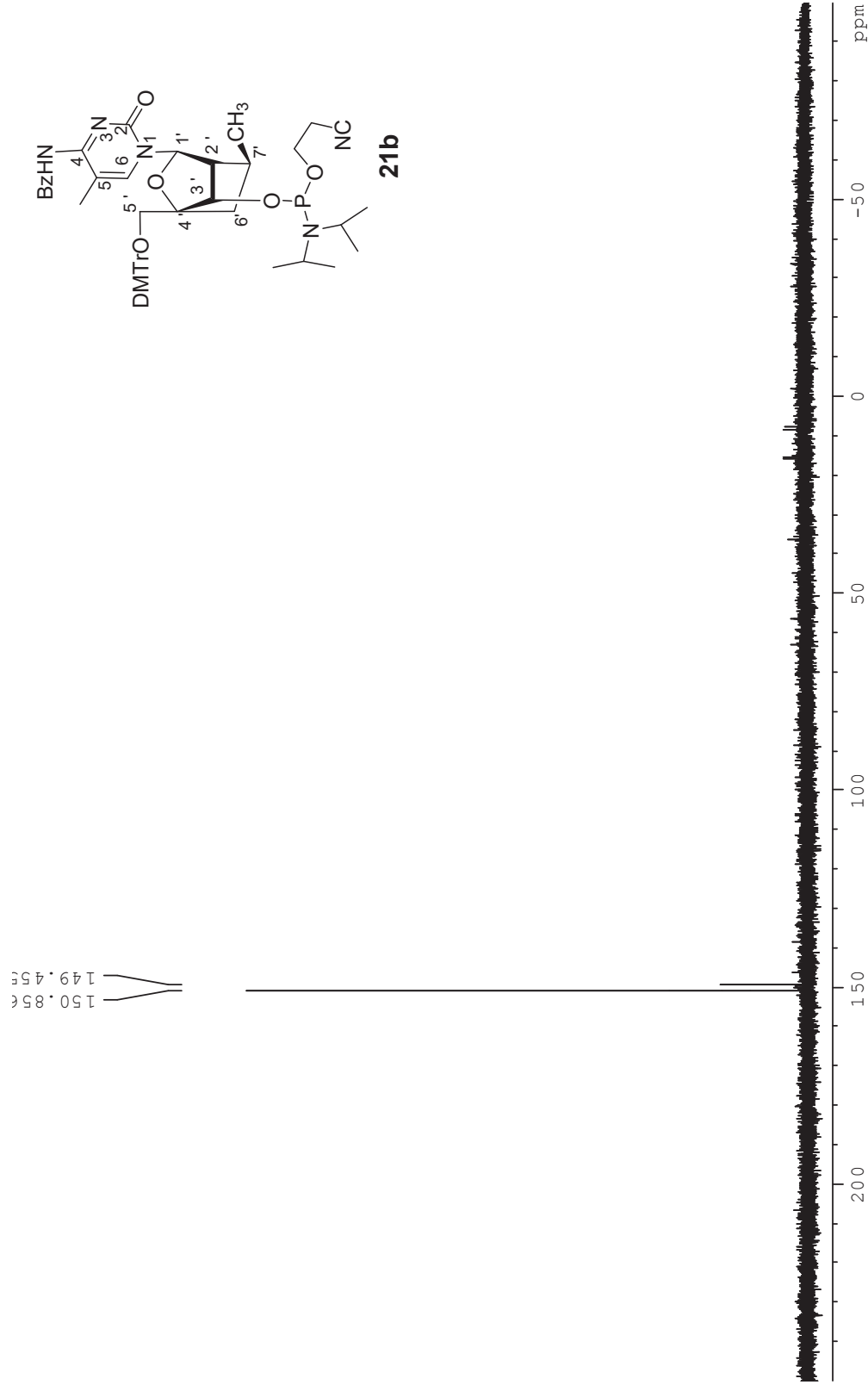


Figure SI.148 ³¹P NMR spectrum of compound **21b**

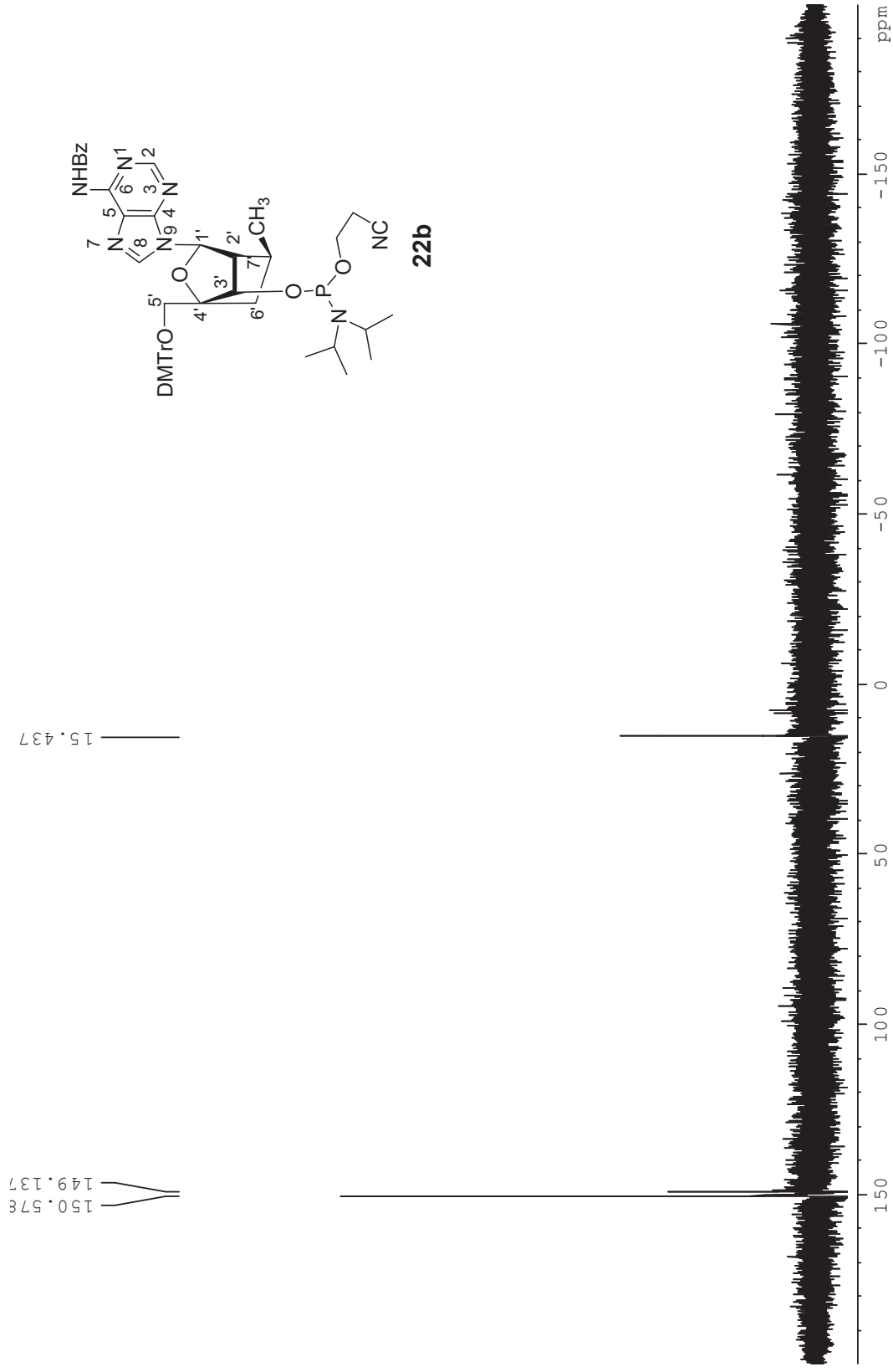


Figure SI.149 ^{31}P NMR spectrum of compound **22b**

151.111
148.724

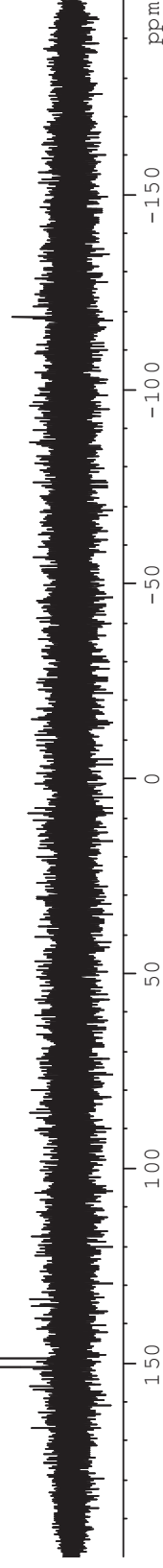
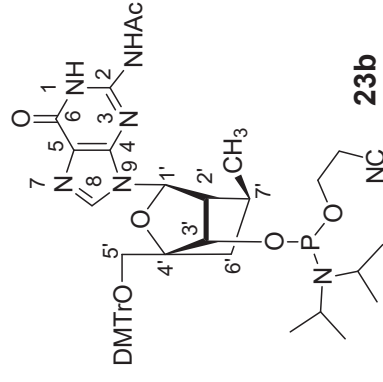


Figure SI.150 ^{31}P NMR spectrum of compound **23b**