

Electronic Supplementary Information

Mutanobactin A from the human oral pathogen *Streptococcus mutans* is a cross-kingdom regulator of the yeast-mycelium transition

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General Experimental Procedures. NMR data were obtained on a Varian VNMR spectrometer (500 MHz for ^1H , 125 MHz for ^{13}C) with a triple resonance probe at 22 ± 0.5 °C. Electrospray-ionization mass spectrometry data were collected on an IonSpec (Varian, Inc.) 9.4 T FT-ICR instrument. ESI MS/MS analyses were performed on a LCT premier (Waters Corp.) time-of-flight instrument. Flash chromatography was performed on a Biotage Isolera One using a 100 g C_{18} column with a flow rate of 50 mL/min. HPLC separations were carried out on a Shimadzu system using a SCL-10A VP controller and Gemini $5\mu\text{m}$ C_{18} column (110Å, 250 x 21.2 mm) with a flow rate of 10 mL/min. All solvents were of ACS grade or better. Optical rotation measurement were performed on a Rudolph Research Autopol III automatic polarimeter; $[\alpha]_{\text{D}}$ values are given in $\text{deg}\cdot\text{cm}^2\cdot\text{g}^{-1}$.

Preparation and extraction of bacterial culture. A culture of *Streptococcus mutans* UA159 was prepared by inoculating 15 L of brain-heart infusion (BHI) broth with 100 mL of a stationary phase *S. mutans* UA159 culture. The culture was incubated under microaerobic conditions at 37 °C for 36 h. The culture was extracted three times with equal volumes of ethyl acetate, which was then evaporated *in vacuo* to generate the *S. mutans* UA159 extract.

Mutanobactin A (1): white solid; $[\alpha]_{\text{D}}^{25} = -8.0$ (*c* 0.001 in MeOH); λ_{max} (MeOH) 221 nm ($\epsilon/\text{dm}^3 \text{mol}^{-1} \text{cm}^{-1}$ 38 900); ^1H , ^{13}C , and ^{15}N NMR data, see Table S1; HRESIMS (FT-ICR) m/z $[\text{M-H}]^-$ 719.41713 (calcd. for $\text{C}_{36}\text{H}_{59}\text{N}_6\text{O}_7\text{S}$, 719.41714).

Table S1 NMR Spectroscopic Data (DMSO-*d*₆, 500 MHz for ¹H, 125 MHz for ¹³C) for mutanobactin A (**1**)

| position | δ_C , mult. ^a | δ_H (J in Hz) | δ_N ^b |
|----------|---------------------------------|-----------------------------|-------------------------|
| 1 | 50.4, CH | 4.43, ddd (3.7, 9.0, 11.0) | |
| 2a | 40.4, CH ₂ | 1.44, m | |
| 2b | | 1.81, ddd (3.9, 10.5, 13.8) | |
| 3 | 24.2, CH | 1.59, m | |
| 4 | 20.9, CH ₃ | 0.82, d (6.6) | |
| 5 | 23.5, CH ₃ | 0.92, d (6.7) | |
| 6 | 170.5, C | | |
| 7 | 48.0, CH | 4.52, quintet (6.8) | |
| 8 | 17.7, CH ₃ | 1.17, d (6.7) | |
| 9 | 169.7, C | | |
| 10 | 61.0, CH | 4.12, dd (3.7, 8.9) | |
| 11a | 29.6, CH ₂ | 1.72, m | |
| 11b | | 2.13, m | |
| 12 | 24.5, CH ₂ | 1.90, m | |
| 13a | 46.8, CH ₂ | 3.43, m | |
| 13b | | 3.65, ddd (4.5, 7.5, 9.8) | |
| 14 | 171.6, C | | |
| 15 | 58.8, CH | 3.57, dd (8.3, 10.0) | |
| 16 | 26.2, CH | 2.33, m | |
| 17 | 20.4, CH ₃ | 0.84, d (6.6) | |
| 18 | 18.8, CH ₃ | 0.77, d (6.8) | |
| 19 | 168.8, C | | |
| 20 | 52.2, CH | 4.87 ddd (2.6, 8.0, 9.0) | |
| 21a | 28.5, CH ₂ | 2.23, dd (2.6, 16.0) | |
| 21b | | 3.19, dd (9.0, 16.0) | |
| 22 | 170.4, C | | |
| 23a | 43.7, CH ₂ | 2.79, m | |
| 23b | | 3.28, m | |
| 24 | 41.0, CH | 3.25, m | |
| 25 | 61.7, CH | 3.87, d (9.8) | |
| 26 | 167.7, C | | |
| 27 | 203.8, C | | |
| 28a | 41.4, CH ₂ | 2.33, m | |
| 28b | | 2.44, dd (6.0, 16.6) | |
| 29 | 23.1, CH ₂ | 1.44, m | |
| 30 | 28.7, CH ₂ | 1.20, m | |
| 31 | 22.1, CH ₂ | 1.25, m | |
| 32 | 28.8, CH ₂ | 1.23, m | |
| 33 | 22.1, CH ₂ | 1.25, m | |
| 34 | 31.3, CH ₂ | 1.23, m | |
| 35 | 28.9, CH ₂ | 1.27, m | |
| 36 | 14.0, CH ₃ | 0.85, t (6.8) | |
| C1-NH | | 8.59, d (9.0) | 120.0 |
| C7-NH | | 7.77, d (6.5) | 112.0 |
| C10-NH | | | nd ^c |
| C15-NH | | 8.05, d (8.5) | 107.5 |
| C20-NH | | 7.23, d (8.0) | 116.0 |
| C23-NH | | 7.90, dd (5.3, 9.0) | 105.5 |

^aDetermined by HSQC experiment at 500 MHz.

^bDetermined by HMBC experiment at 500 MHz.

^c nd: not detected

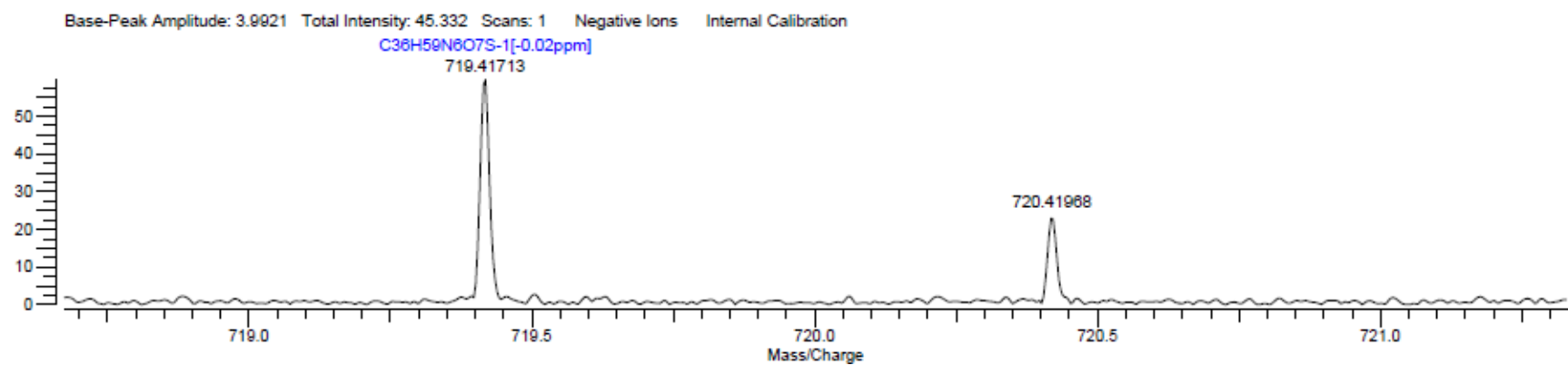


Fig. S1 HRESIMS (FT-ICR) data for mutanobactin A (**1**)

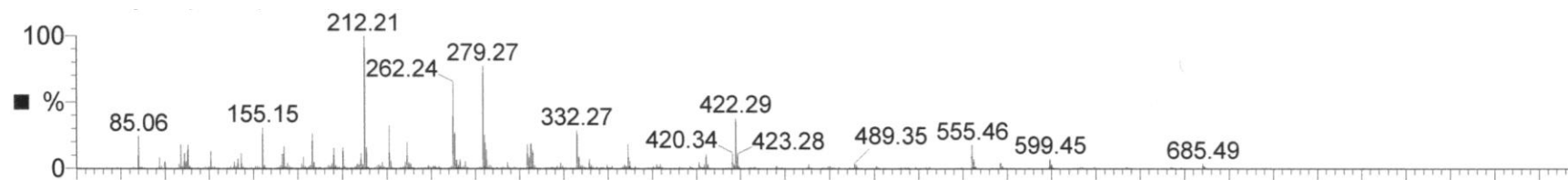


Fig. S2 ESI MS/MS data for mutanobactin A (1)

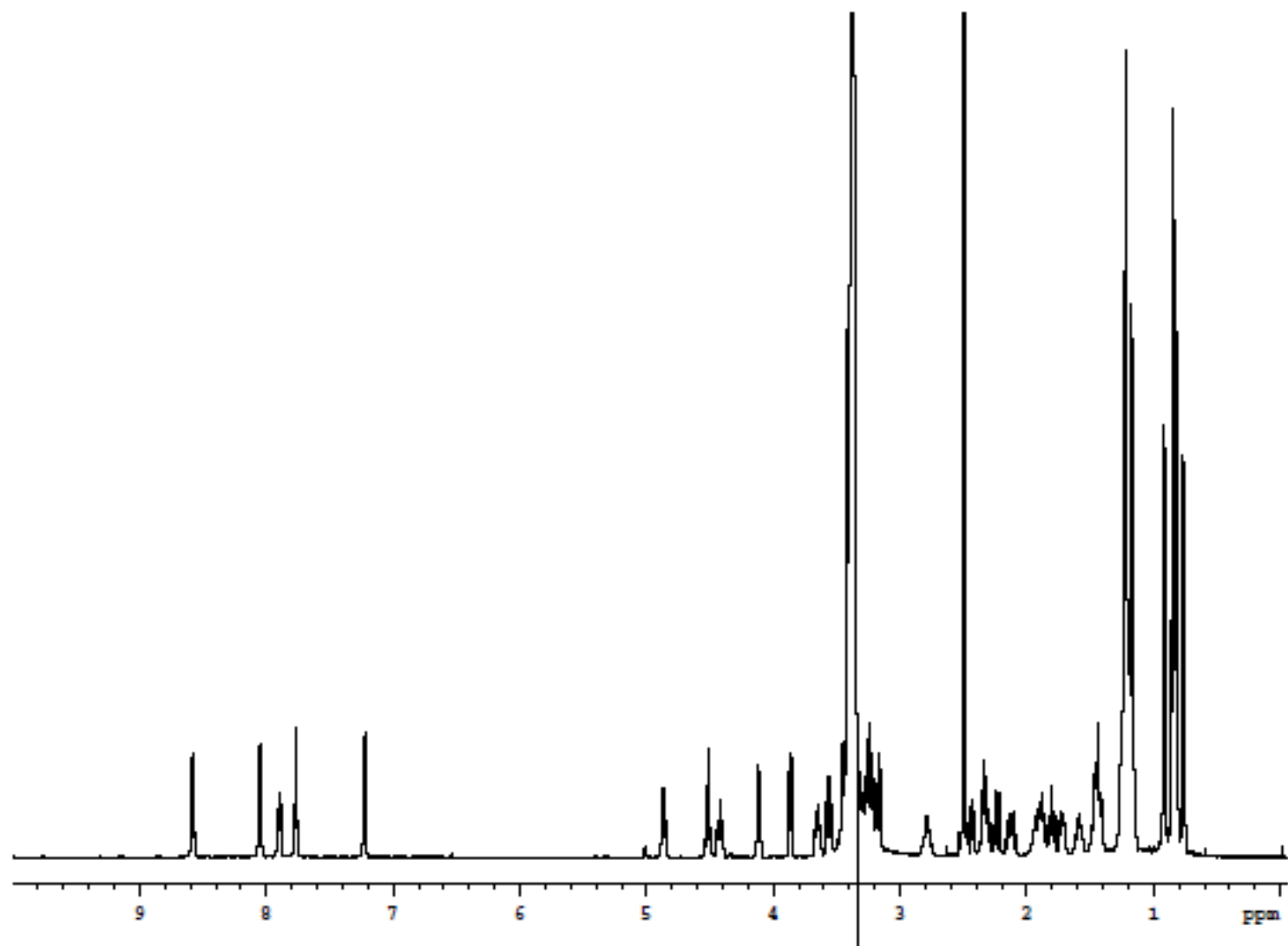


Fig. S3 ^1H NMR spectrum for mutanobactin A (1)

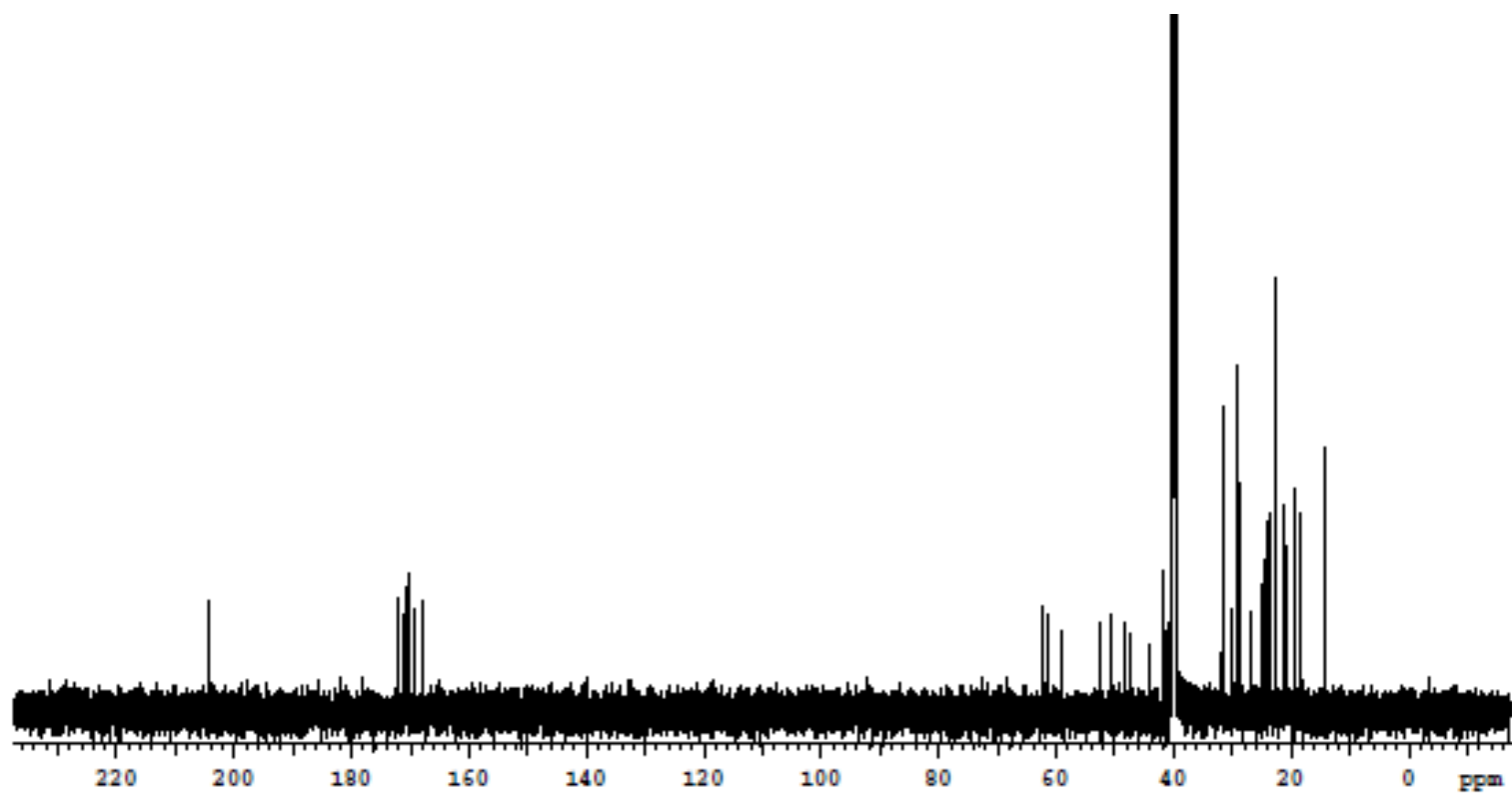


Fig. S4 ^{13}C NMR spectrum for mutanobactin A (**1**)

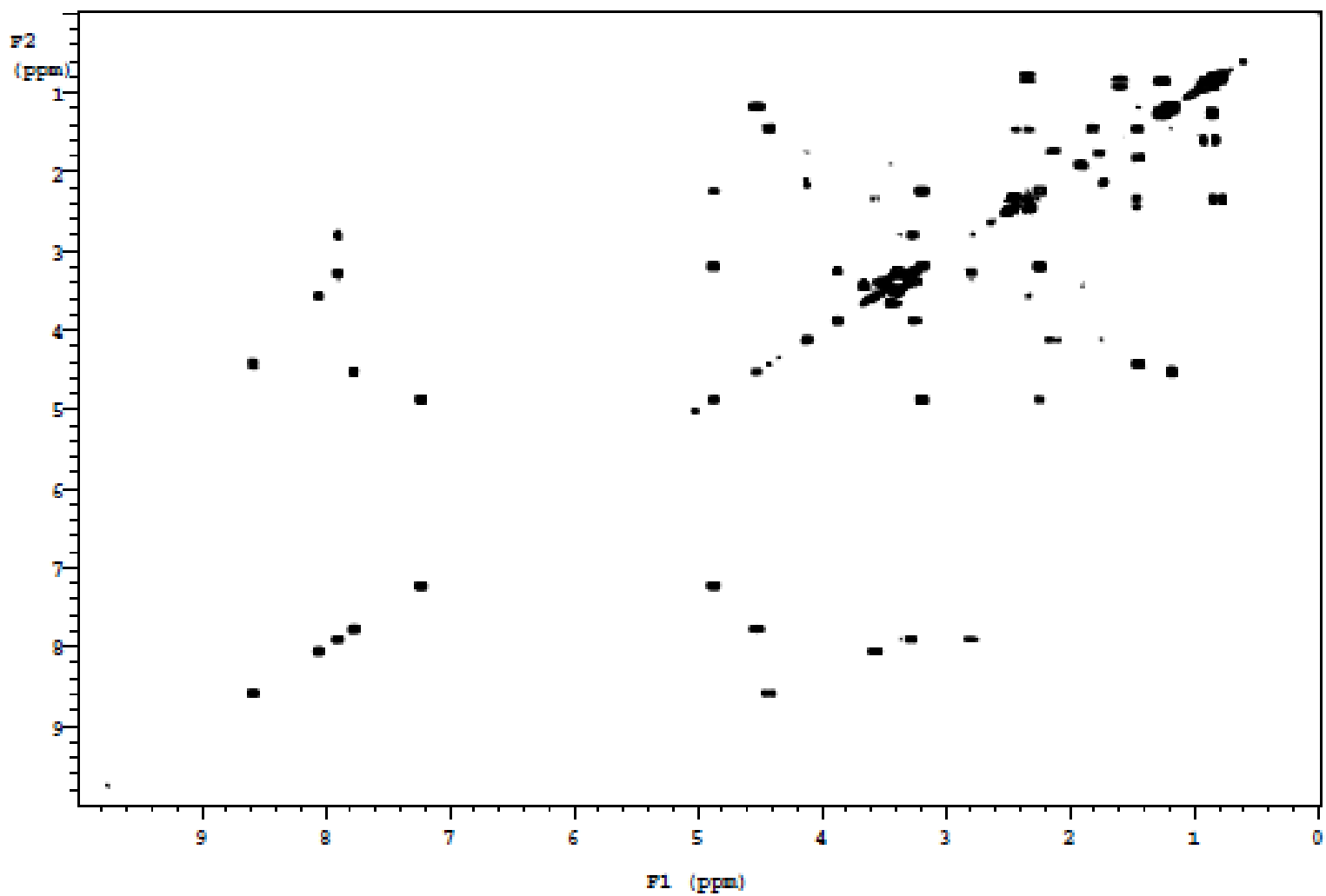


Fig. S5 ¹H-¹H COSY NMR spectrum for mutanobactin A (1)

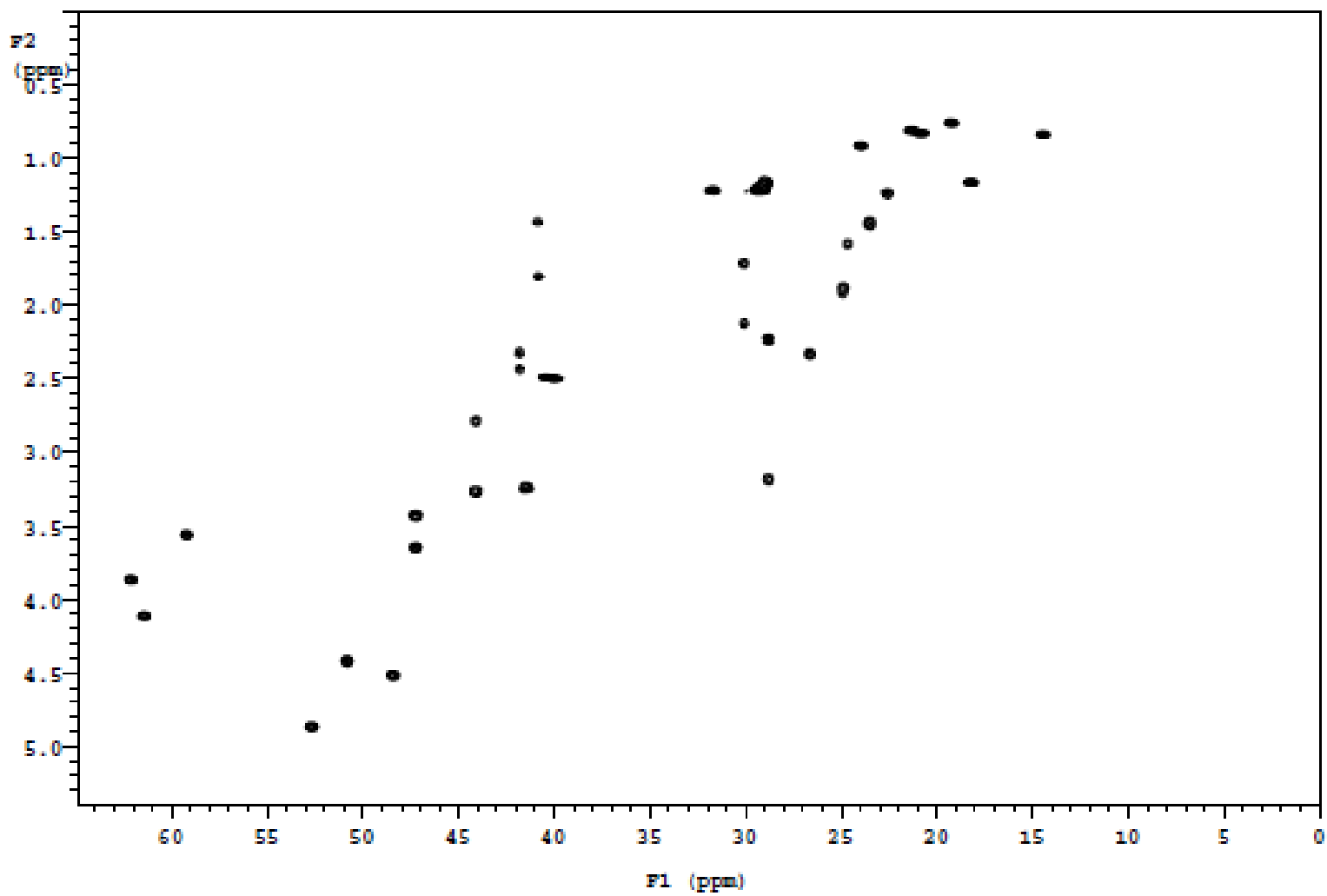


Fig. S6 ¹H-¹³C HSQC NMR spectrum for mutanobactin A (**1**)

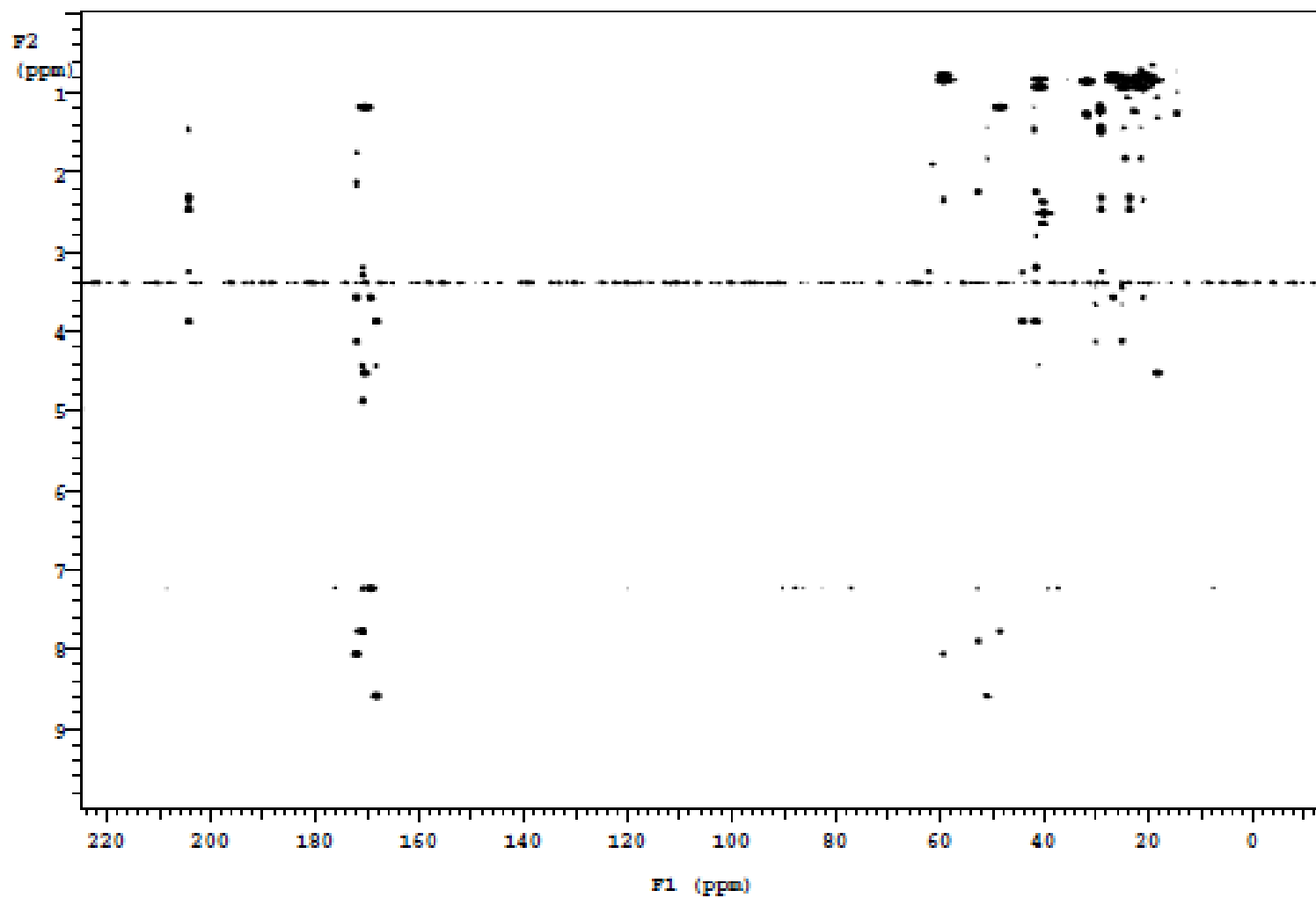


Fig. S7 ^1H - ^{13}C HMBC NMR spectrum for mutanobactin A (**1**)

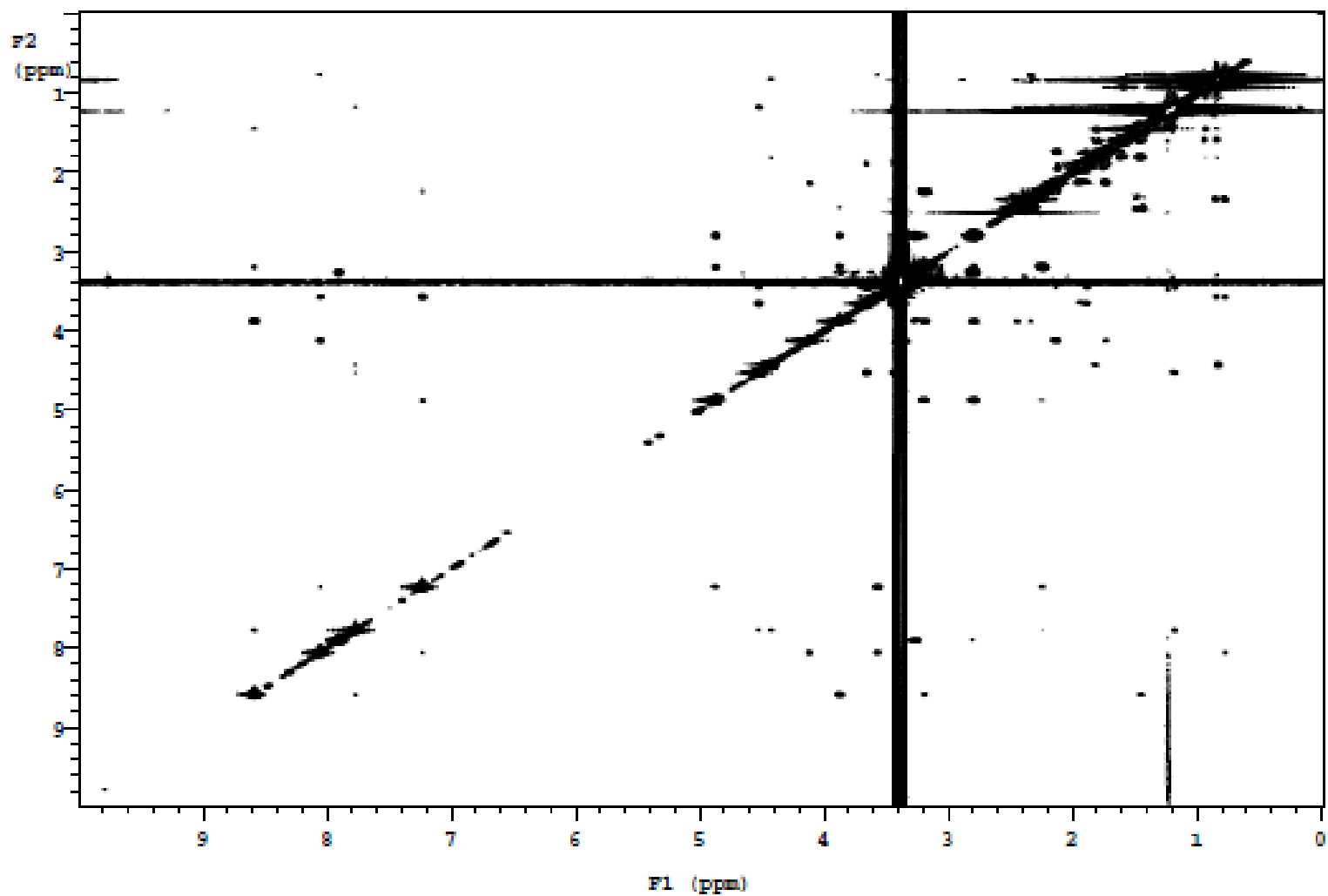


Fig. S8 ^1H - ^1H NOESY NMR spectrum for mutanobactin A (**1**)

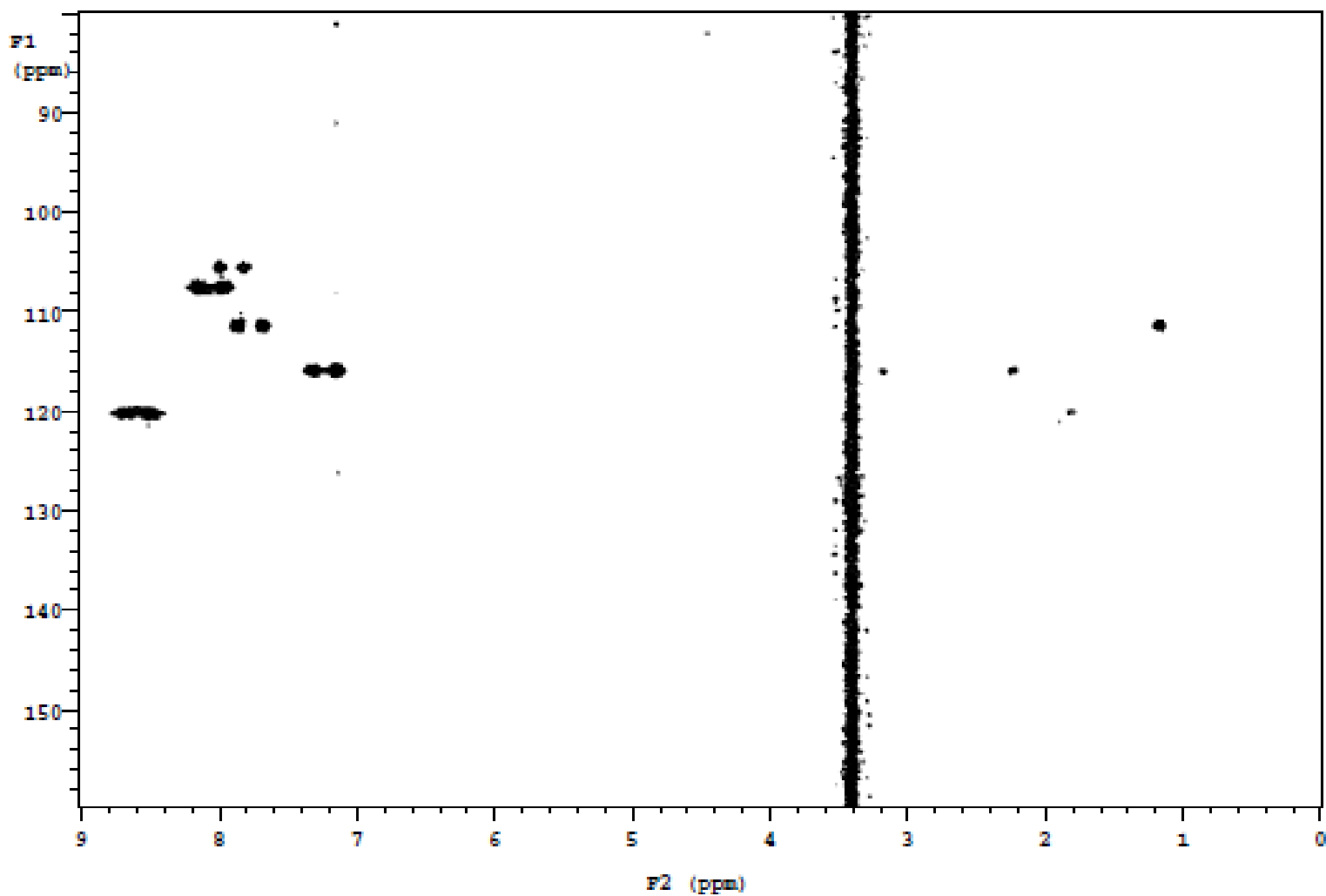


Fig. S9 ^1H - ^{15}N HMBC NMR spectrum for mutanobactin A (**1**)

28MAY2008 in DMSO-d6 6/8/10

Selective band center. 4.86 (ppm), width. 30.6 (Hz)
Selective band center. 4.51 (ppm), width. 31.7 (Hz)
Selective band center. 4.42 (ppm), width. 32.8 (Hz)
Selective band center. 4.11 (ppm), width. 36.0 (Hz)
Selective band center. 3.86 (ppm), width. 28.3 (Hz)

File: hmg/rb2/ncprp/data/2/12/ncprp/28m108_14.tocsv.dms.500mhz.000310.prd.fid

Pulse Sequence: TOCSY1D

Temp. 22.0 C / 295.1 K
Operator: rbc

Relax. delay 1.000 sec
Pulse 90.0 degree
Acq. time 2.045 sec
Width 5020.1 Hz

64 repetitions
OBSRVR El, 499.8792453 MHz
DATA PROCESSING
Line broadening 2.0 Hz
FT size 32768
Total time 18 min

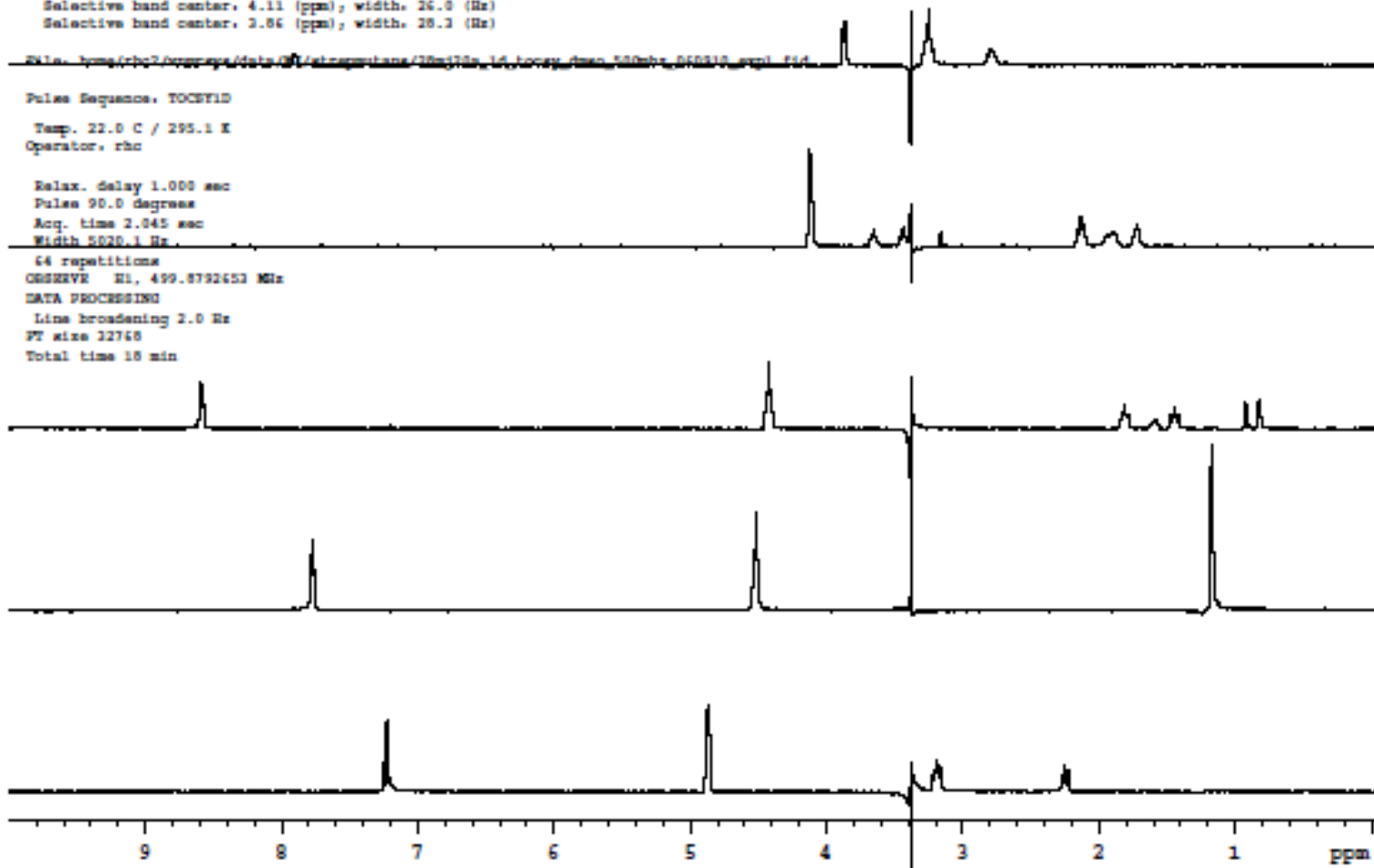


Fig. S10 1D ^1H - ^1H TOCSY NMR spectra for mutanobactin A (**1**) (panel 1 of 3)

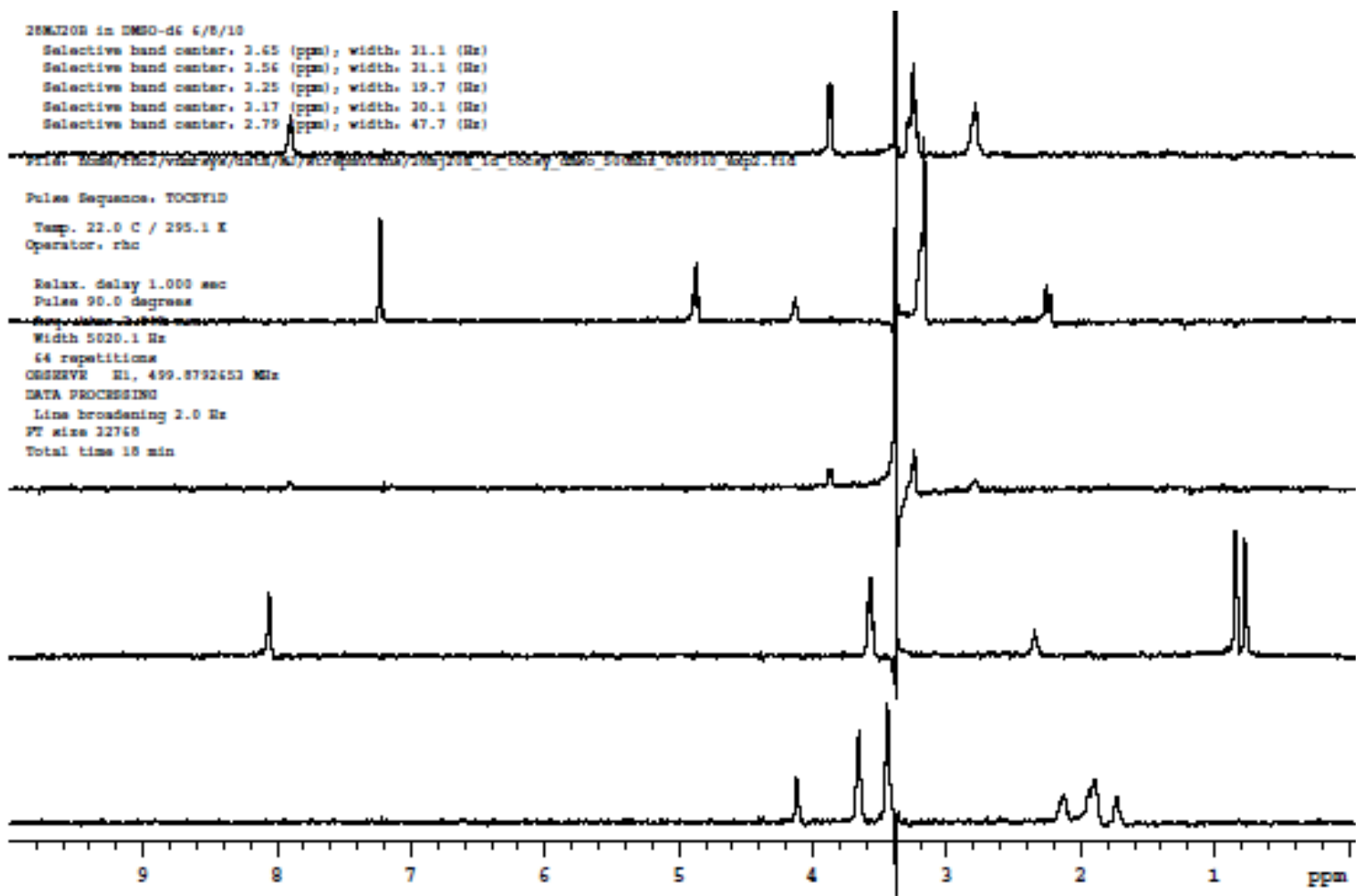


Fig. S10 1D ^1H - ^1H TOCSY NMR spectra for mutanobactin A (**1**) (panel 2 of 3)

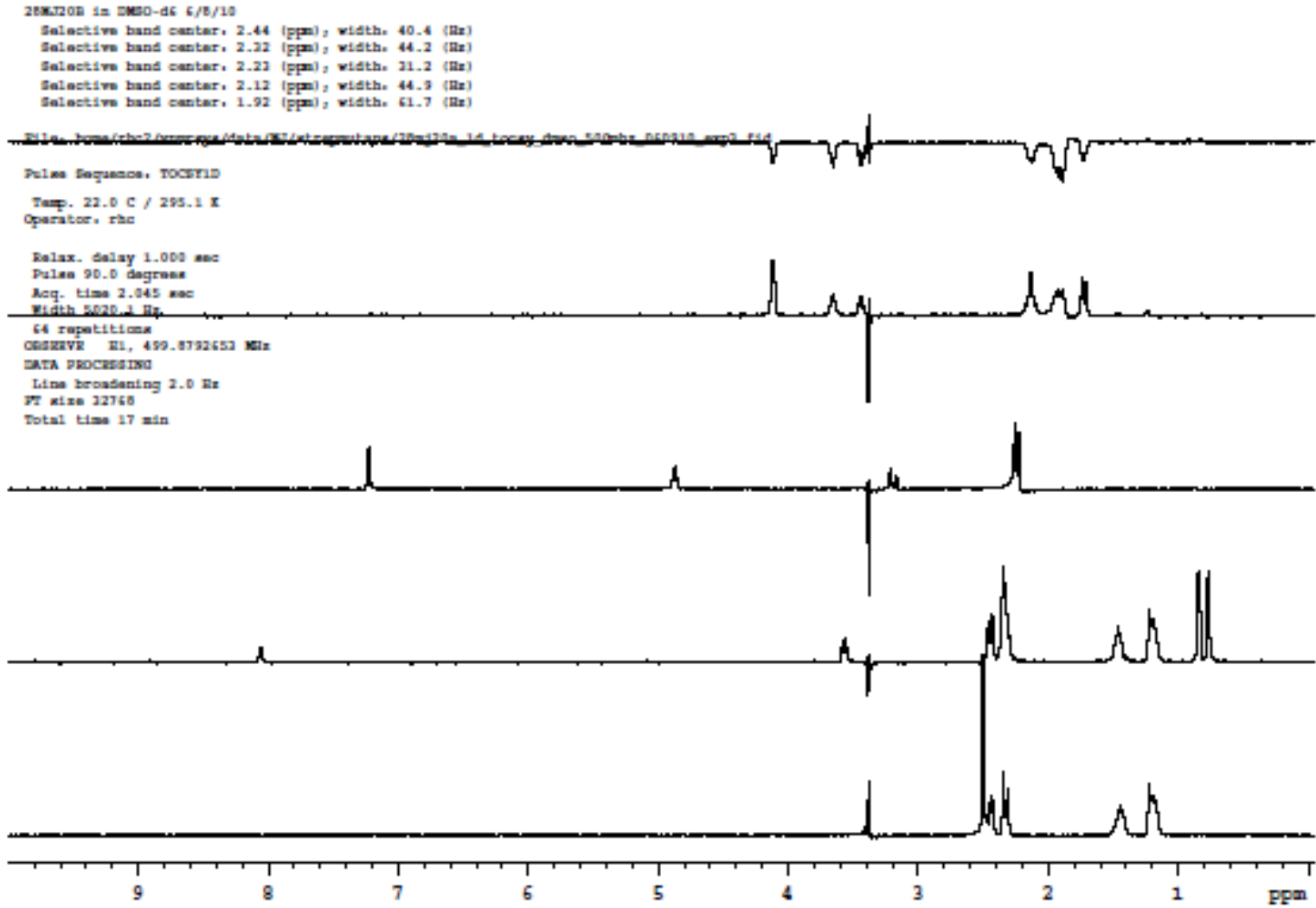


Fig. S10 1D ^1H - ^1H TOCSY NMR spectra for mutanobactin A (**1**) (panel 3 of 3)