Supplementary Material

Table S1. Chemical shifts and coupling constants of dinucleotides and mononucleotides used as references

	ATP	Ap_5A	Ap_4A	Ap_3A	Ap_2A
H2	8.24	8.12	8.10	8.06	8.00
H8	8.51	8.40	8.34	8.25	8.14
H1'	6.12	6.02	5.99	5.97	5.92
H2'	4.78	~4.73	4.69	4.56	4.53
H3'	4.58	4.56	4.53	4.45	4.41
H4'	4.37	4.35	4.33	4.31	4.33
H5'	4.26	4.26	4.27	4.29	4.31
H5''	4.18	4.19	4.21	4.25	4.21
Pα	-10.45	-10.44	-10.42	-10.75	-10.39
Pβ	-21.86	-22.19	-22.20	-22.20	/
Pγ	-8.10	-22.13	/	/	/
C2	153.60	153.38	153.42	153.35	153.16
C8	140.66	140.48	140.34	139.84	139.81
C6	156.41	155.98	155.93	155.71	155.59
C4	149.96	149.58	149.47	148.96	148.87
C5	119.38	118.93	118.87	118.65	118.52
C1'	87.31	87.22	87.45	87.95	87.78
C2'	74.96	75.00	75.20	75.59	75.48
C3'	71.07	71.13	71.04	70.39	70.62
C4'	84.82	84.74	84.55	83.82	84.07
C5'	65.88	65.99	65.91	65.42	65.85
$J_{1'2'}$	6.1	6.0	5.8	4.7	5.2
$J_{2'3'}$	5.2	5.0	5.1	4.8	5.0
$J_{3'4'}$	3.5	3.2	3.6	4.8	4.4±0.5
$J_{4'5'}$	2.8	2.8	2.8	2.5±0.4	2.1±1
$J_{4'5''}$	3.0	3.3	3.3	3.1	2.7±1
$J_{4'P}$	2.3	1.9	2.1	2.6±0.4	n.d.
$J_{5'P}$	6.2	6.2	6.0	6.2±0.4	4.2±2
$J_{5''P}$	4.5	4.2	4.6	4.3	5.4±2
$J_{5'5''}$	11.7	11.6	11.7	11.6	11.6
$J_{C4'P}$	9.2	9.0	9.2	8.5	9.0
$J_{C5'P}$	5.1	5.5	4.8	4.0	4.0
Jββ	/	/	16.5	/	/
Jαβ	19.5	16.0	18.1	19.3	/
Jαβ'	/	/	0.3	/	/
J_{C6H2}	11.0	11.0	11.0	11.0	11.0
J_{C4H2}	12.0	12.3	12.3	12.0	12.0
J_{C4H8}	5.0	5.3	4.8	5.0	5.2
$J_{C4H1'}$	1.0	1.8	≤1	n.d.	1.8
J_{C5H8}	11.0	11.0	11.0	11.0	11.5
J_{C2H2}	202.8	202.2	203.7	202.2	202.2
J_{C8H8}	216.3	215.8	215.8	215.8	215.8
$J_{C8H1'}$	4.0	4.6	4.5	3.7	4.2

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	GTP	Gp_5G	Gp_4G	Gp_3G	Gp_2G
H8	8.10	8.04	8.02	7.96	7.90
H1'	5.90	5.84	5.82	5.79	5.75
H2'	4.80	4.79	4.75	4.63	4.59
H3'	4.57	4.55	4.52	4.44	4.41
H4'	4.33	4.32	4.29	4.26	4.25
H5'	4.24	4.25	4.24	4.23	4.23
H5"	4.18	4.20	4.20	4.23	4.15
Pα	-10.40	-10.58	-10.62	-10.83	-10.44
Pβ	-21.65	-22.20	-22.42	-22.44	/
Pγ	-7.45	-22.14	/	/	/
C2	154.70	153.23	153.17	153.08	154.31
C8	138.56	137.34	137.19	136.74	137.94
C6	159.80	158.29	158.17	157.97	159.27
C4	152.62	151.21	151.09	150.73	151.90
C5	117.03	115.56	115.49	115.34	116.65
C1'	87.36	86.22	86.29	86.70	87.97
C2'	74.20	72.86	72.97	73.31	74.64
C3'	71.06	69.93	69.84	69.29	70.65
C4'	84.73	83.55	83.35	82.68	83.92
C5'	65.90	64.84	64.69	64.22	65.71
$J_{1'2'}$	6.4	6.5	6.2	5.4	5.2
$J_{2'3'}$	5.2	5.2	5.0	4.8	5.1
$J_{3'4'}$	3.3	3.0	3.1	4.2	4.0±0.5
$J_{4'5'}$	3.5	3.5	3.5	n.d.	2.7±1
$J_{4'5"}$	3.5	3.5	3.8	n.d.	2.7±1
$J_{4'P}$	1.6	n.d.	n.d.	n.d.	n.d.
$J_{5'P}$	6.5	6.2	6.0	n.d.	5.4±2
$J_{5"P}$	4.5	5.0	5.0	n.d.	5.4±2
$J_{5'5"}$	11.5	11.5	11.5	n.d.	10.8
$J_{C4'P}$	9.1	8.9	9.4	9.0	9.5
$J_{C5'P}$	5.5	5.4	5.3	5.3	5.5
Jββ	/	n.d.	16.4	/	/
Jαβ	19.5	15.0	18.3	19.3	/
Jαβ'	/	n.d.	0.1	/	/
J_{C4H8}	5.5	5.2	4.8	5.1	5.1
$J_{C4H1'}$	2.5	2.8	2.4	2.4	2.3
J_{C5H8}	11.5	11.1	11.1	11.2	11.0
J_{C8H8}	215.8	216.1	216.1	217	215.8
$J_{C8H1'}$	4.7	4.3	4.1	4.1	4.1

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	Ap$_2$U	Ap$_3$U	Ap$_4$U	Gp$_2$C'	Gp$_2$C	Gp$_3$C
H2	8.18	8.20	8.21	/	/	/
H8	8.41	8.48	8.50	7.95	8.01	8.07
H1'	6.05	6.08	6.09	5.97	5.84	5.86
H2'	4.72	4.71	~4.76	4.71	~4.78	~4.80
H3'	4.48	4.51	4.56	4.45	4.46	4.49
H4'	4.35	4.35	4.36	4.29	4.31	4.31
H5'	4.23	4.25	4.26	4.28	4.24	4.20
H5''	4.18	4.19	4.19	4.18	4.15	4.20
Pα	-10.55or 49	-10.77	-10.51or 59	-10.48	-10.61	-10.90 or 78
Pβ	/	-22.27	-22.27	/	/	-22.42
Pγ	/	/	/	/	/	/
C2	153.55	153.68	153.67	154.37	153.24	154.52
C8	140.40	140.42	140.60	138.14	137.00	138.11
C6	156.21	156.28	156.36	159.29	158.24	159.42
C4	149.78	149.85	149.99	152.22	151.13	152.37
C5	119.18	119.22	119.32	116.81	115.68	116.78
C1'	87.44	87.36	87.21	87.75	86.40	87.22
C2'	74.92	75.42	75.10	74.22	72.87	74.50
C3'	71.07	71.27	71.28	70.97	69.88	71.32
C4'	84.52	84.64	84.93	84.21	83.21	84.58
C5'	65.99	65.98	66.05	66.05	64.83	65.95
$J_{1'2'}$	6.0	6.0	6.2	5.7	6.0	6.5
$J_{2'3'}$	5.3	5.0	5.2	5.3	5.3±0.5	5.0
$J_{3'4'}$	3.5	3.4	3.1	3.7±0.5	3.3±0.5	3.0
$J_{4'5'}$	n.d.	2.6±0.5	2.8±0.5	n.d.	n.d.	n.d.
$J_{4'5''}$	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{4'P}$	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{5'P}$	n.d.	6.4±0.5	6.3±0.5	n.d.	n.d.	n.d.
$J_{5''P}$	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{5'5''}$	n.d.	11.3±0.5	11.4±0.5	n.d.	n.d.	n.d.
$J_{C4'P}$	8.2	9.1	10.0±1	8.7	9.0	8.7
$J_{C5'P}$	4.6	5.0	5.0±1	5.0	4.0	4.5
Jββ	/	/	~18	/	/	/
Jαβ	20.5	19.0	~18	/	/	19.7/18.7
Jαβ'	/	/	/	/	/	/
J_{C6H2}	11.0	11.0	11.0	/	/	/
J_{C4H2}	12.2	11.6	12.0±0.4	/	/	/
J_{C4H8}	5.3	4.8	5.2±0.7	n.d.	5.0	5.0
$J_{C4H1'}$	2.3	2.3	2.3±1	n.d.	3.0	2.5
J_{C5H8}	11.5	11.5	11.5	11.0	11.0	11.0
J_{C2H2}	202.2	202.2	202.7	/	/	/
J_{C8H8}	215.8	215.8	215.8	216.8	215.7	216.1
$J_{C8H1'}$	4.3	4.3	4.1	3.4	4.0	4.1

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	UTP	Up_2U	Up_4U	Up_5U	Ap_2U	Ap_3U	Ap_4U
H5	5.95	5.91	5.96	5.95	5.64	5.70	5.81
H6	7.96	7.89	7.94	7.94	7.62	7.75	7.82
H1'	5.97	5.92	5.96	5.98	5.78	5.82	5.89
H2'	4.38	4.32	4.36	4.37	4.18	4.25	4.31
H3'	4.42	4.32	4.40	4.42	4.23	4.28	4.36
H4'	4.26	4.23	4.25	4.27	4.18	4.18	4.20
H5'	4.24	4.23	4.22	4.24	4.23	4.21	4.20
H5"	4.21	4.15	4.22	4.21	4.12	4.21	4.20
Pα	-10.51	-10.59	-10.66	-10.57	-10.55or 49	-10.72	-10.51or 59
Pβ	-21.72	/	-22.40	-22.09	/	-22.27	-22.27
Pγ	-7.41	/	/	-22.09	/	/	/
C2	152.62	152.44	152.61	152.68	152.06	152.17	152.51
C6	142.46	142.32	142.41	142.44	141.62	141.77	142.12
C4	167.00	166.84	166.93	166.98	166.36	166.42	166.76
C5	103.40	103.36	103.49	103.51	102.91	102.97	103.27
C1'	88.85	89.04	88.70	88.69	88.91	89.03	88.77
C2'	74.45	74.49	74.47	74.41	74.68	74.72	74.51
C3'	70.28	70.32	70.49	70.53	70.19	69.97	70.35
C4'	84.12	83.86	84.28	84.38	83.74	83.60	84.07
C5'	65.56	65.60	65.79	65.89	65.56	65.34	65.71
$J_{1'2'}$	5.3	4.5±0.5	5.4	5.6	5.0	4.5	5.1
$J_{2'3'}$	5.2	5.0±1	5.2	5.2	n.d.	4.8±0.5	5.1±0.5
$J_{3'4'}$	4.3	4.5±1	3.8	3.8	n.d.	4.8±0.5	n.d.
$J_{4'5'}$	n.d.	2.5±1	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{4'5''}$	n.d.	2.5±1	n.d.	2.8±1	2.5±1	n.d.	n.d.
$J_{4'P}$	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{5'P}$	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.
$J_{5''P}$	n.d.	5.0±2	n.d.	4.5±1	5.0±2	n.d.	n.d.
$J_{5'5''}$	n.d.	12.0	n.d.	11.1±1	11.7	n.d.	n.d.
$J_{C4'P}$	9.5	9.4	9.0	9.2	7.6	9.0	10.0±1
$J_{C5'P}$	5.0	5.2	5.0	5.2	4.3	5.0	4.2±1
Jββ	/	/	16.8	/	/	/	~18
Jαβ	20.0	/	18.4	16.3±1	20.5	19.0	~18
Jαβ'	/	/	0.15	/	/	/	/
J_{C2H6}	8.0	8.1	8.0	8.3	8.0	8.3	8.1
$J_{C2H1'}$	2.0	2.0	2.0	2.1	2.0	1.8	2.0
J_{C4H5}	1.6	1.6	1.4	1.7	1.5	1.8	1.3
J_{C4H6}	11.0	10.8	11.0	10.8	10.5	11.0	10.5
J_{C5H5}	179.0	178.8	178.8	178.9	178.1	178.1	179.0
J_{C5H6}	2.0	2.3	2.0	2.1	2.3	2.1	1.8
$J_{C6H1'}$	4.0	4.0	4.0	4.0	4.0	4.1	4.1
J_{C6H6}	185.0	184.7	184.9	185.6	185.6	185.6	184.9
J_{C6H5}	4.0	4.0	4.0	4.0	4.0	4.1	4.1
J_{H6-H5}	8.2	8.0	8.1	8.0	8.0	8.2	8.2

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	Gp_2C'	Gp_2C	Gp_3C	CMP
H5	6.92	5.88	5.91	6.11
H6	8.08	7.72	7.80	8.07
H1'	5.82	5.82	5.87	5.98
H2'	4.21	4.16	4.21	4.31
H3'	4.24	4.22	4.25	4.31
H4'	4.24	4.18	4.18	4.22
H5'	4.34	4.23	4.24	4.03
H5"	4.17	4.12	4.24	3.96
Pα	-10.48	-10.61	-10.90 or 78	4.11
Pβ	/	/	-22.42	/
Pγ	/	/	/	/
C2	157.24	156.81	158.00	158.55
C6	145.07	140.27	141.51	142.57
C4	163.53	165.27	166.46	166.92
C5	97.37	95.55	96.79	97.33
C1'	91.15	88.81	89.91	89.79
C2'	75.50	73.99	75.08	75.08
C3'	68.98	68.31	69.33	70.33
C4'	83.01	81.74	82.82	84.21
C5'	64.76	63.84	64.87	63.64
$J_{1'2'}$	2.7	4.0	3.5	3.6±0.5
$J_{2'3'}$	n.d.	n.d.	n.d.	n.d.
$J_{3'4'}$	n.d.	n.d.	n.d.	n.d.
$J_{4'5'}$	n.d.	n.d.	n.d.	2.7
$J_{4'5''}$	n.d.	n.d.	n.d.	2.9
$J_{4'P}$	n.d.	n.d.	n.d.	n.d.
$J_{5'P}$	n.d.	n.d.	n.d.	3.7
$J_{5''P}$	n.d.	n.d.	n.d.	5.1
$J_{5'5''}$	n.d.	n.d.	n.d.	11.9
$J_{C4'P}$	8.7	9.0	9.3	8.5
$J_{C5'P}$	3.7	4.0	4.5	4.0
Jββ	/	/	/	/
Jαβ	/	/	19.7/18.7	/
Jαβ'	/	/	/	/
J_{C2H6}	n.d.	6.0	6.3	6.5
$J_{C2H1'}$	n.d.	n.d.	1.3	1.8
J_{C4H5}	n.d.	1.6	1.8	2.0
J_{C4H6}	10.0	9.0	9.0	9.0
J_{C5H5}	182.0	177.7	173.9	175.6
J_{C5H6}	3.0	n.d.	2.2	3.0
$J_{C6H1'}$	2.5	3.6/3.8	3.5	4.0
J_{C6H6}	185.5	184.5	183.8	184.9
J_{C6H5}	5.5±1	3.6/3.8	3.5	4.0
J_{H6-H5}	7.6	7.6	7.8	7.6

n.m. not measured; n.d. not determined
If not mentioned otherwise, J_{HH}, J_{HP}±0.2 Hz, J_{CH}, J_{CP}, J_{PP}±0.5 Hz.
~ H2' overlap with HOD signal. The chemical shift is estimated.

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Table S2**.** Differences in chemical shifts (in ppm) between dinucleoside polyphosphates and the corresponding mononucleotide. ($\Delta\delta = \delta_{mononucleotide} - \delta_{dinucleotide}$)

No.	Dinucleotide	$\Delta\delta_{H2'(pu)}$	$\Delta\delta_{H3'(pu)}$	$\Delta\delta_{H2'(py)}$	$\Delta\delta_{H3'(py)}$
1	**Ap_2A**	0.25	0.17	/	/
2	**Ap_3A**	0.22	0.13	/	/
3	**Ap_4A**	0.09	0.05	/	/
4	**Ap_5A**	~0.05	0.02	/	/
5	**Ap_2U**	0.06	0.10	0.20	0.19
6	**Ap_3U**	0.07	0.07	0.13	0.14
7	**Ap_4U**	~0.02	0.02	0.07	0.06
8	**Up_2U**	/	/	0.06	0.10
9	**Up_4U**	/	/	0.02	0.02
10	**Up_5U**	/	/	0.01	0
11	**Gp_2G**	0.21	0.16	/	/
12	**Gp_3G**	0.17	0.13	/	/
13	**Gp_4G**	0.05	0.05	/	/
14	**Gp_5G**	0.01	0.02	/	/
15	**Gp_2C**	~0.02	0.11	0.15	0.09
16	**Gp_3C**	~0	0.08	0.10	0.06
17	**Gp_2C'**	0.09	0.12	0.10	0.07

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Table S3. Torsion angles of Ap_2A and Ap_4A (including standard deviation)

	Ap_2A (α–α)[a]	**Ap_2A (β–β)[a]**	**Ap_4A (α–α)[a]**	**Ap_4A (β–β)[a]**
α1	188.3 ± 20.7	222.2 ± 75.1	234.1 ± 87.3	229.8 ± 87.6
α2	188.6 ± 21.7	195.1 ± 81.0	-7.9 ± 62.6	274.7 ± 61.0
β1	182.4 ± 27.2	182.0 ± 30.6	180.7 ± 25.8	175.6 ± 36.0
β2	184.9 ± 25.9	190.2 ± 38.0	181.6 ± 81.1	130.1 ± 31.2
γ1	62.6 ± 13.9	57.4 ± 18.8	66.7 ± 46.4	50.4 ± 28.0
γ2	62.7 ± 14.3	57.3 ± 22.7	70.2 ± 19.9	43.7 ± 31.6
χ1	227.1 ± 17.0	258.7 ± 39.4	-74.0 ± 36.3	239.0 ± 42.5
χ2	227.1 ± 16.6	233.5 ± 56.0	-2.3 ± 47.5	241.2 ± 59.5

[a] The simulations started with a certain stacking mode (β–β or α–α), but this changed during the simulation (to an extended conformation or another mode of stacking), so the data is not an average for only one stacked conformation, but all the stacked forms and the extended form.

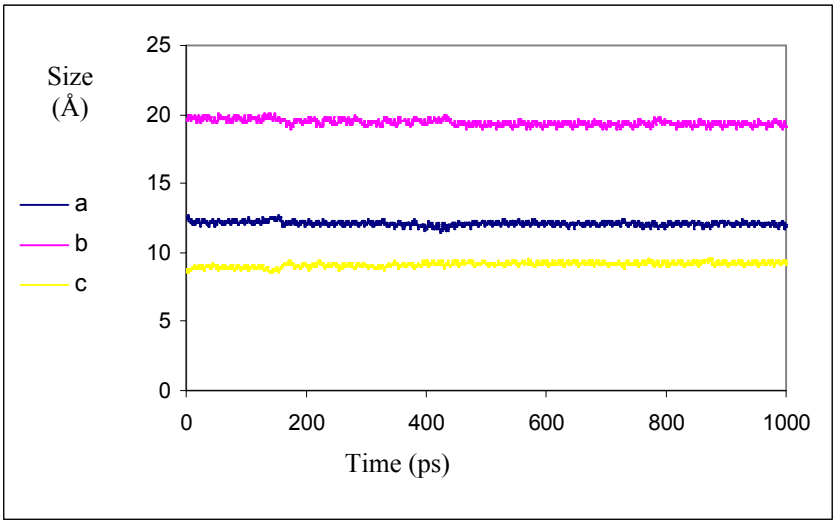

Fig. S1 . The change of the lattice parameters a, b, c of the Ap_4A unit cell during a 1 ns MD simulation.

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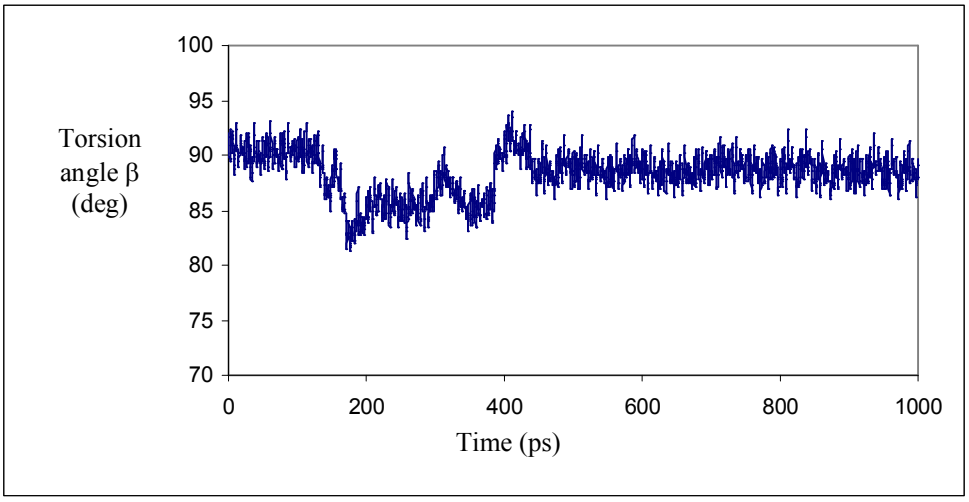
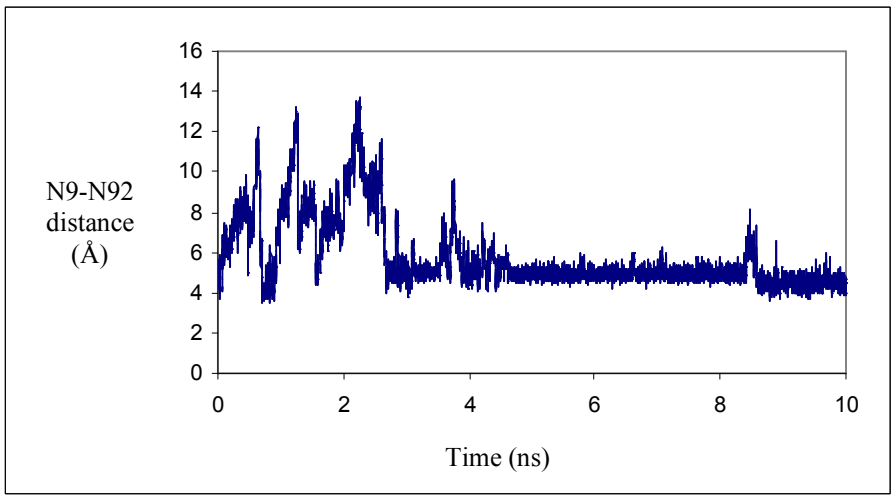


Fig. S2. The change of the angle β of the Ap_4A unit cell during a 1 ns MD simulation.

(a)



(b)

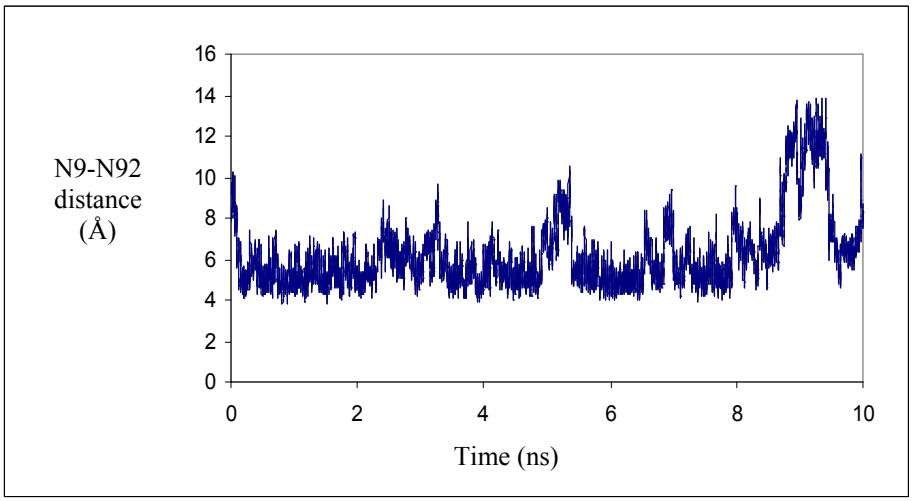


Fig. S3. The inter-base distance (N9-N92) (Fig. 9) as a function of time during 10 ns simualtions for (a) Ap_2A (b) Ap_4A

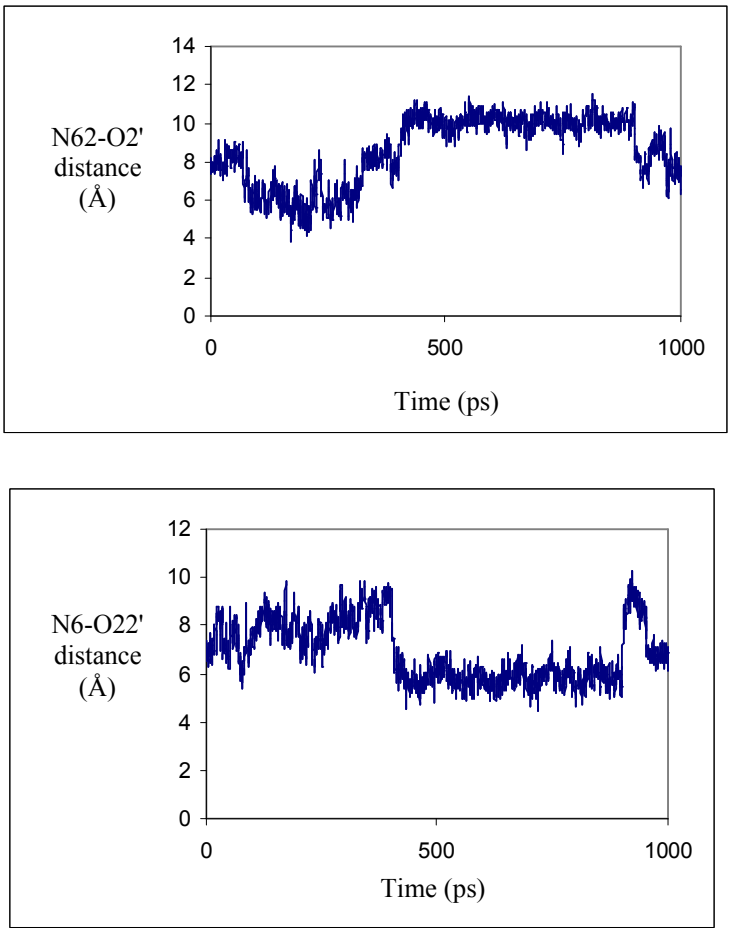


Fig. S4 . Distances N62-O2' and N6-O22' (Fig. 11) for Ap_2A in the β–β stacking form, during 1 ns simulation.

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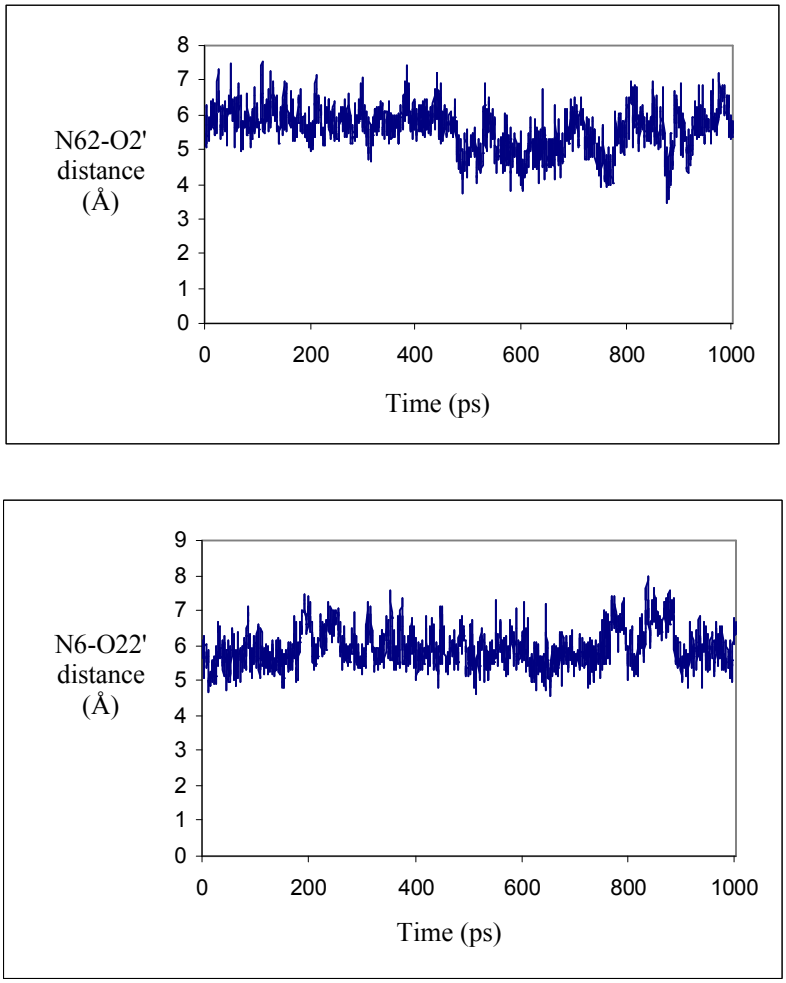
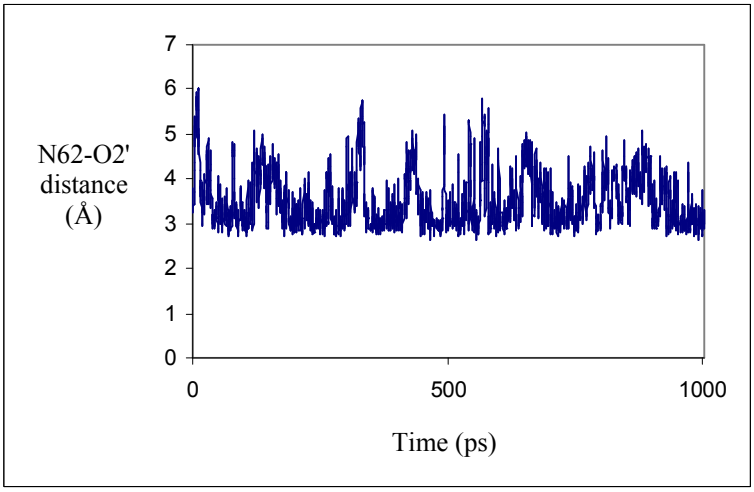


Fig. S5 . Distances N62-O2' and N6-O22' (Fig. 11) for Ap_4A in the β–β stacking form, during 1 ns simulation.



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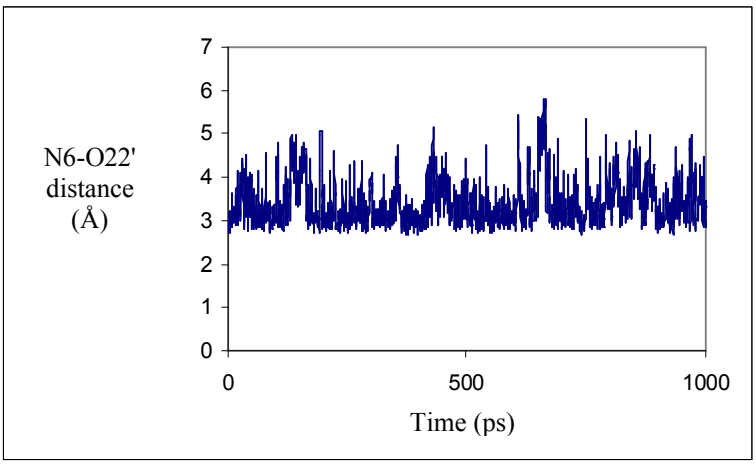
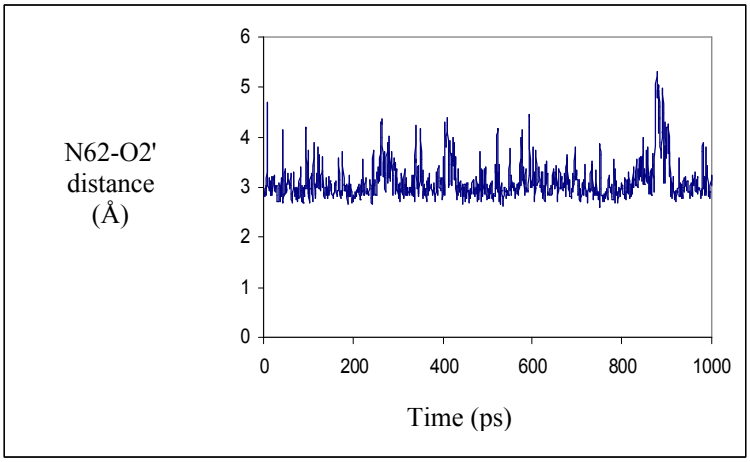


Fig. S6 . Distances N62-O2' and N6-O22' (Fig. 11) for Ap_2A in the α–α stacking form, during 1 ns simulation.



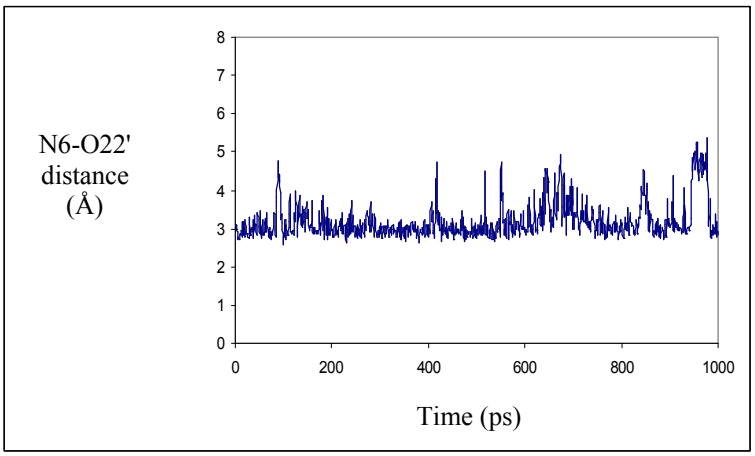


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Fig. S7. Distances N62-O2' and N6-O22' (Fig. 11) for Ap_4A in the α–α stacking form, during 1 ns simulation.

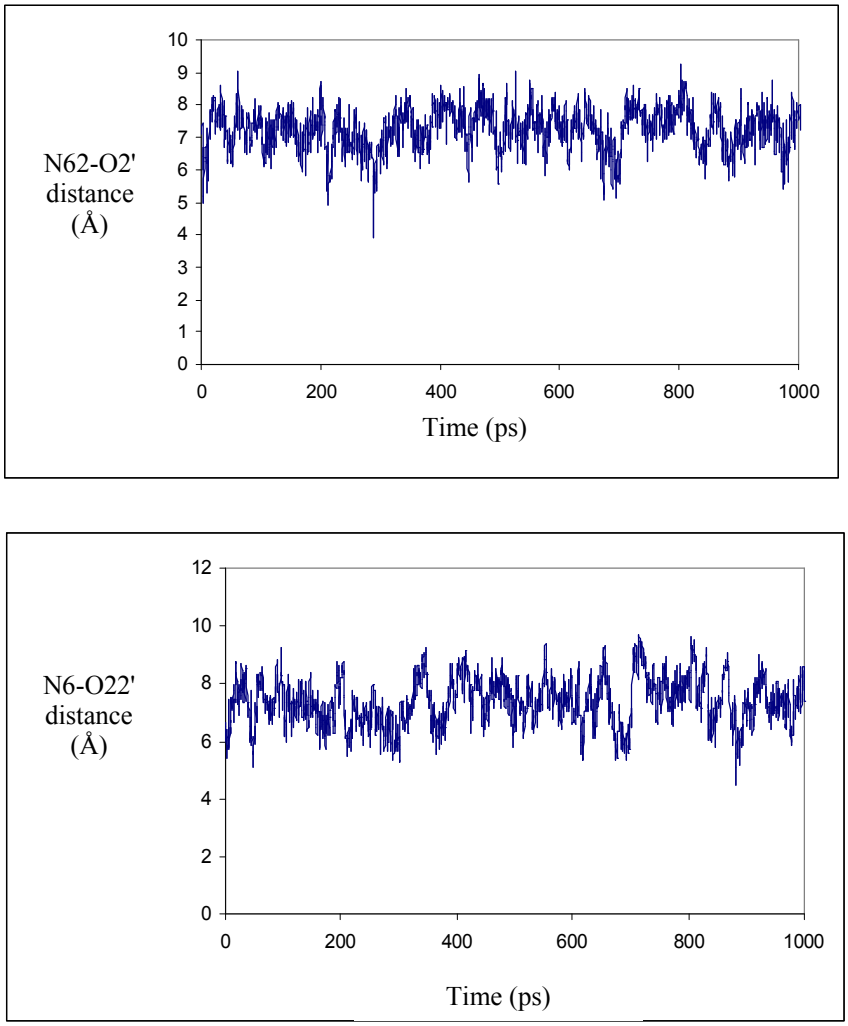
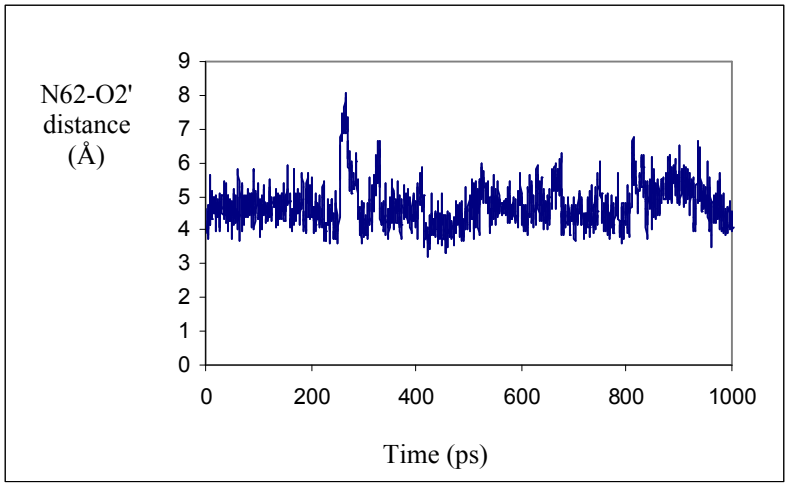


Fig. S8. Distances N62-O2' and N6-O22' (Fig. 11) for Ap_2A in the α–β stacking form, during 1 ns simulation.



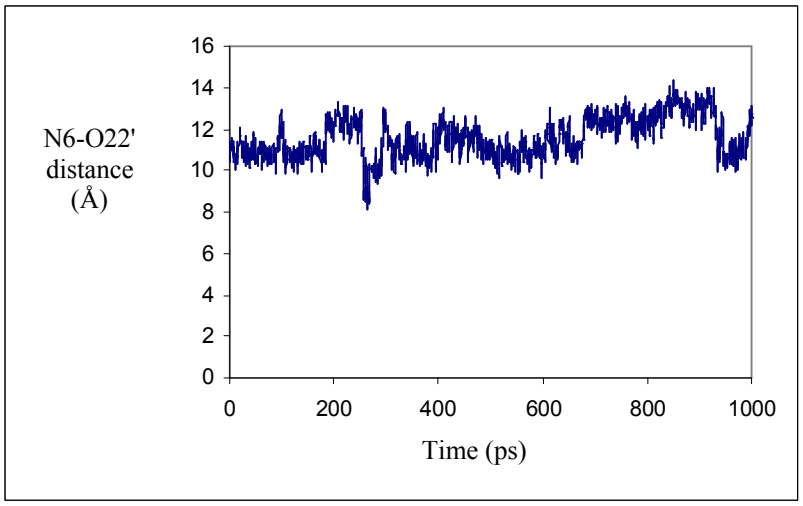


Fig. S9. Distances N62-O2' and N6-O22' (Fig. 11) for Ap_4A in the α–β stacking form, during 1 ns simulation.

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Assignment of Ap_nAs coupling constants as compared to literature

The conformation of Ap_nAs n = 2-6 in solution was investigated by Mayo et al before.[1] We confirmed that there are upfield shifts (Δδ) of H8, H2, H1', H2' and H3' chemical shifts compared to the corresponding mononucleotides. These Δδ values become smaller for longer phosphate chains. We also confirmed that Ap_2A and Ap_3A have smaller $J_{1'2'}$ and larger $J_{3'4'}$ values as compared to longer Ap_nAs, *i.e.*, n = 4, 5. However, we found differences in the measured coupling constants of up to *ca.* 5 Hz as compared to literature values (Table S4). We disagree with the reported assignment of the coupling constants $^3J_{4'5'}$, $^3J_{4'5''}$ and $^3J_{P5'}$, $^3J_{P5''}$.[1] The coupling constants $^3J_{P5'}$ and $^3J_{P5''}$ are actually larger than $^3J_{4'5'}$, $^3J_{4'5''}$ based on Ap_4A J-resolved spectrum (Fig. S10) and ^{1}H-coupled ^{31}P NMR spectrum for Ap_3A (Fig. S11). This finding is consistent with literature assignment for mononucleotides.[2]

Table S4. Comparison of the J values (Hz) determined in this study (in bold) with literature data

	$J_{4'5'}$		$J_{4'5''}$		$J_{5'P}$		$J_{5''P}$	
Ap_2A	2.5	**2.1**	2.5	**2.7**	1.3	**4.2**	1.9	**5.4**
Ap_3A	7.5	**2.5**	3.8	**3.1**	2.5	**6.2**	4.4	**4.3**
Ap_4A	6.9	**2.8**	5.0	**3.3**	3.1	**6.0**	3.8	**4.6**
Ap_5A	6.3	**2.8**	3.8	**3.3**	3.1	**6.2**	3.8	**4.2**

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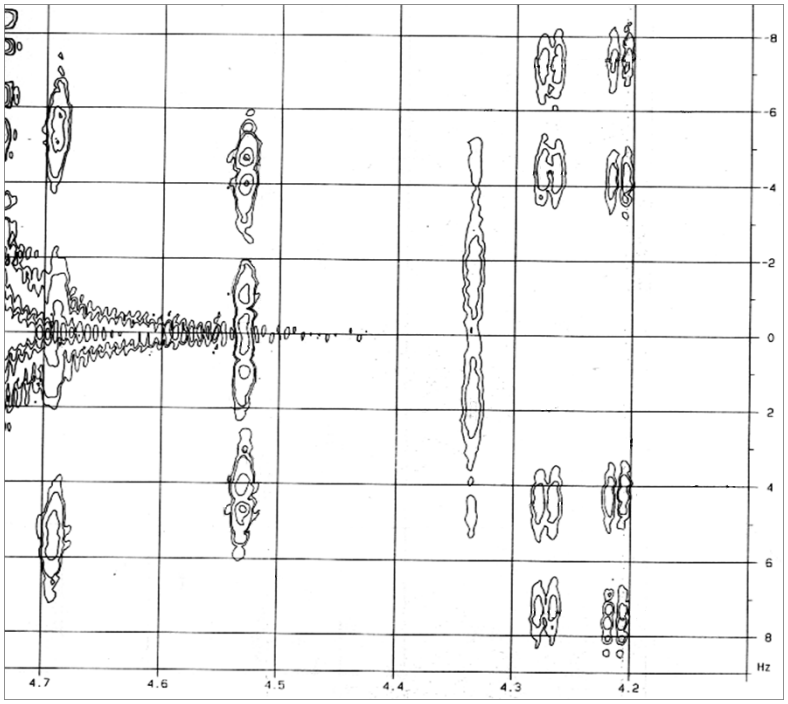

Fig. S10. 600 MHz J-resolved spectrum of Ap_4A. Sample concentration 7.4 mM in D_2O, pD 7.5, 300 K.

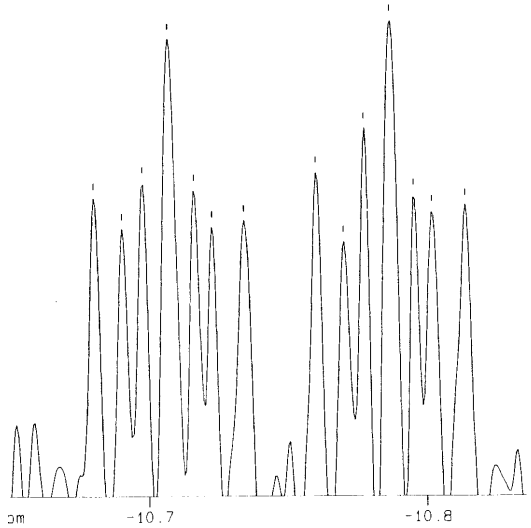

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Fig. S11. 243 MHz ^{31}P NMR spectrum without decoupling of Ap_3A .Sample concentration 7.3 mM in D_2O, pD 7.48, 300 K. constants that were obtained: J_{PP}, $J_{P5'}$, $J_{P5''}$, $J_{P4'}$.

.1 K. H. Mayo, O. M. Mvele and R. N. Puri, FEBS Lett., 1990, 265, 97-100.
.2 C. R. Cremo, Methods Enzymol., 2003, 360, 128-177.

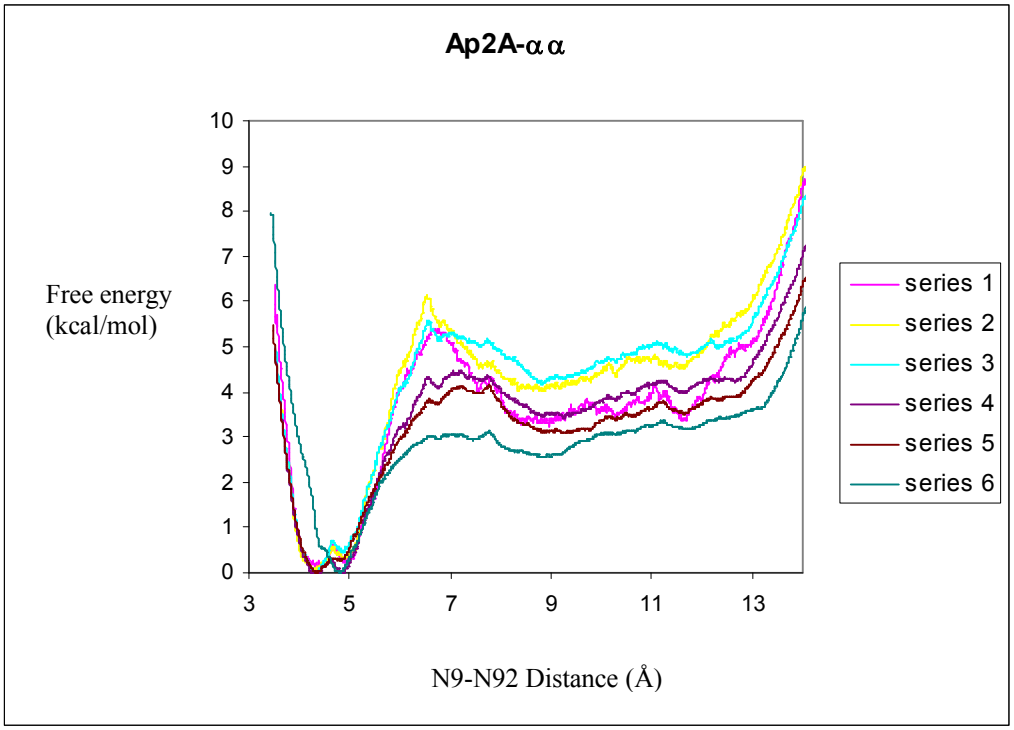

Fig. S12. Progressive PMF profiles of Ap_2A-αα.

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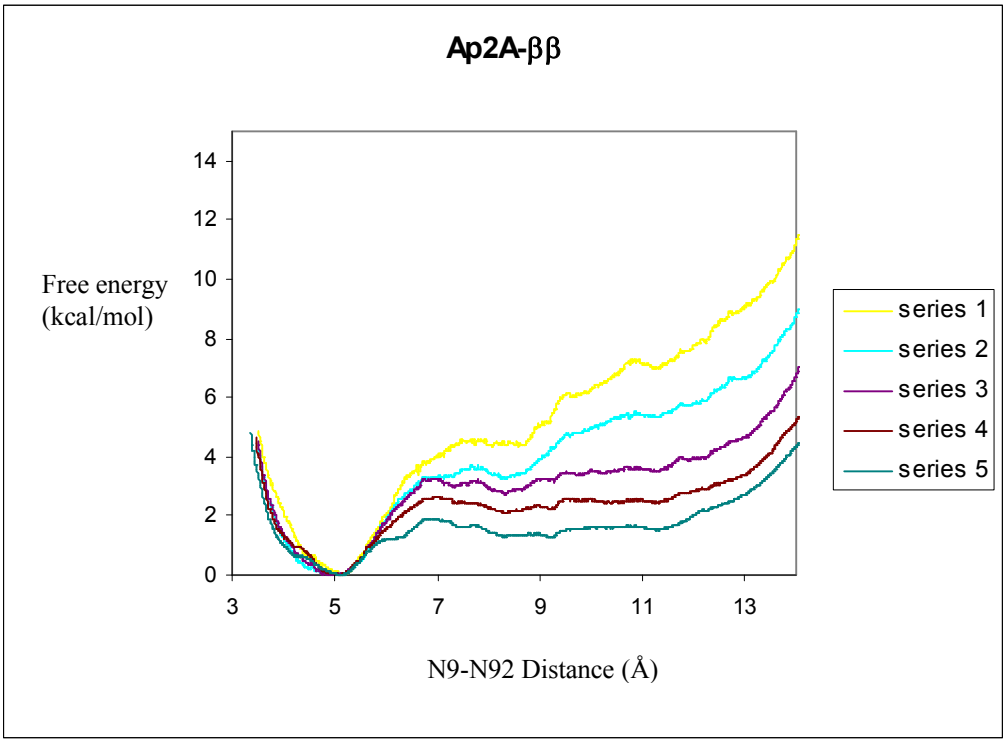


Fig. S13. Progressive PMF profiles of Ap_2A-ββ.

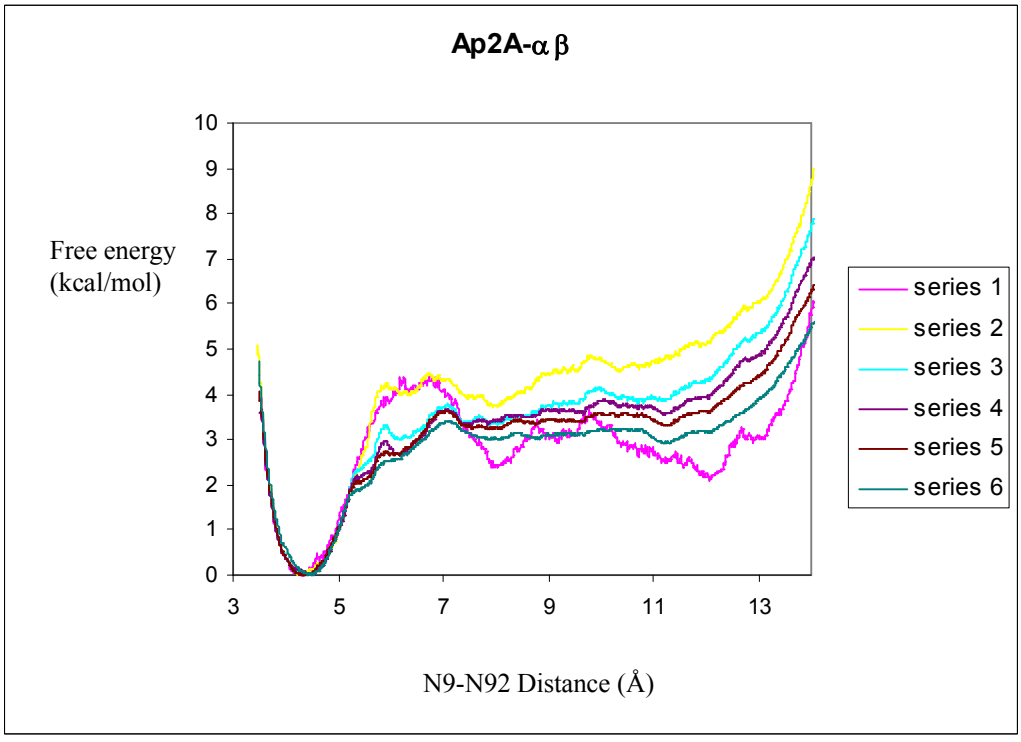


Fig. S14. Progressive PMF profiles of Ap_2A-αβ.

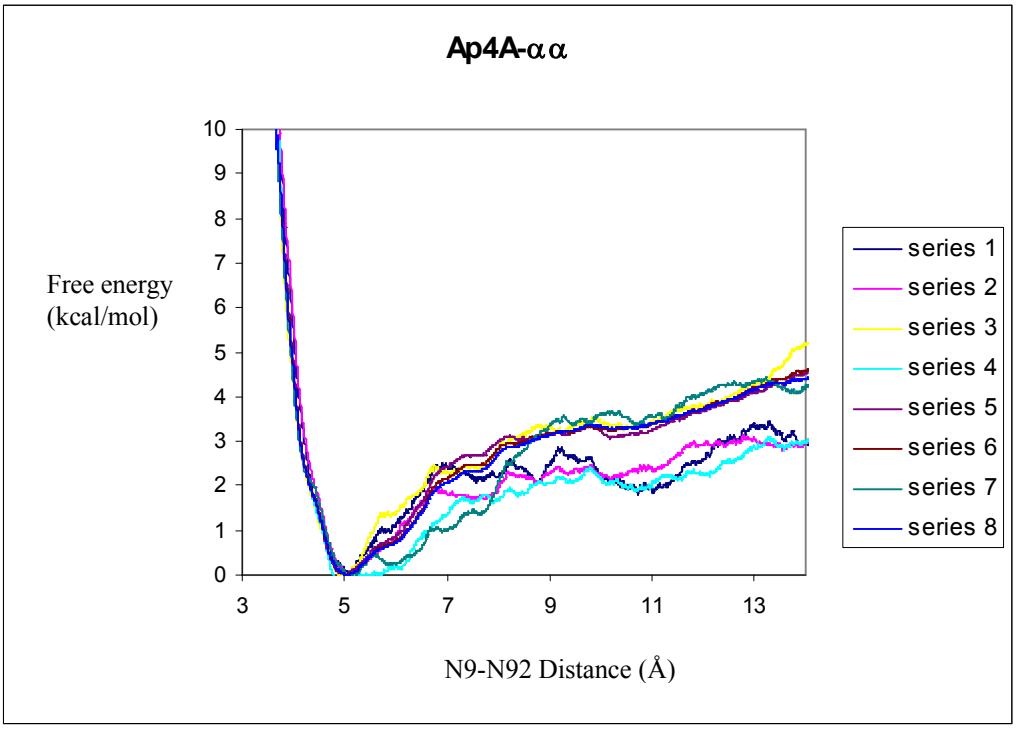


Fig. S15. Progressive PMF profiles of Ap_4A-αα.

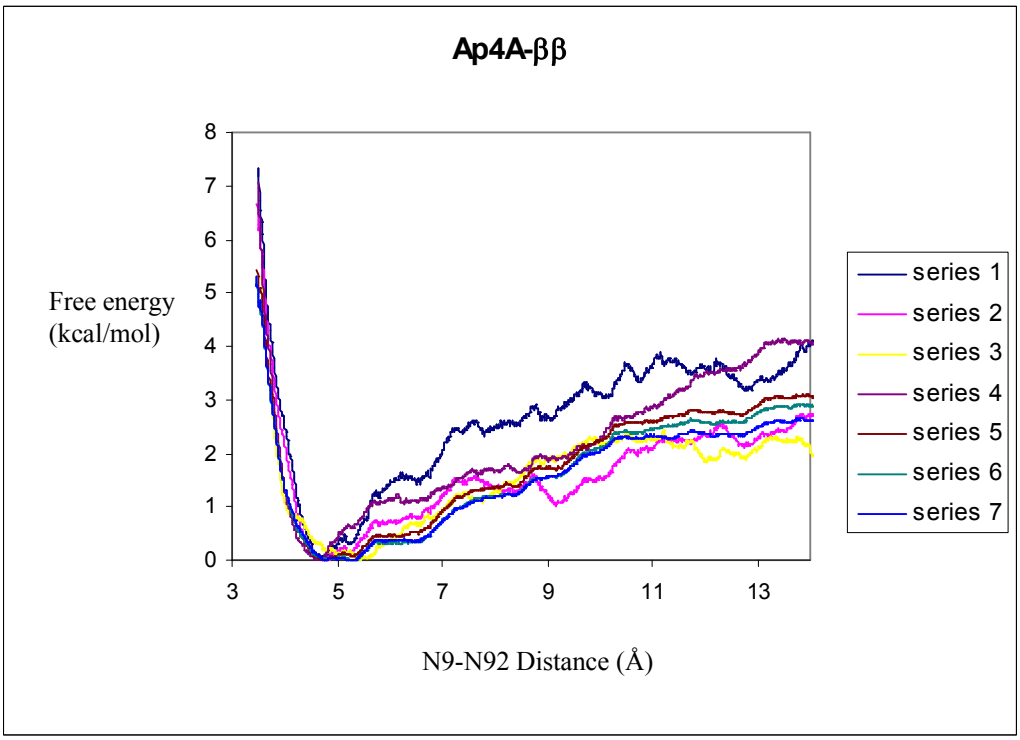


Fig. S16. Progressive PMF profiles of Ap_4A-ββ.

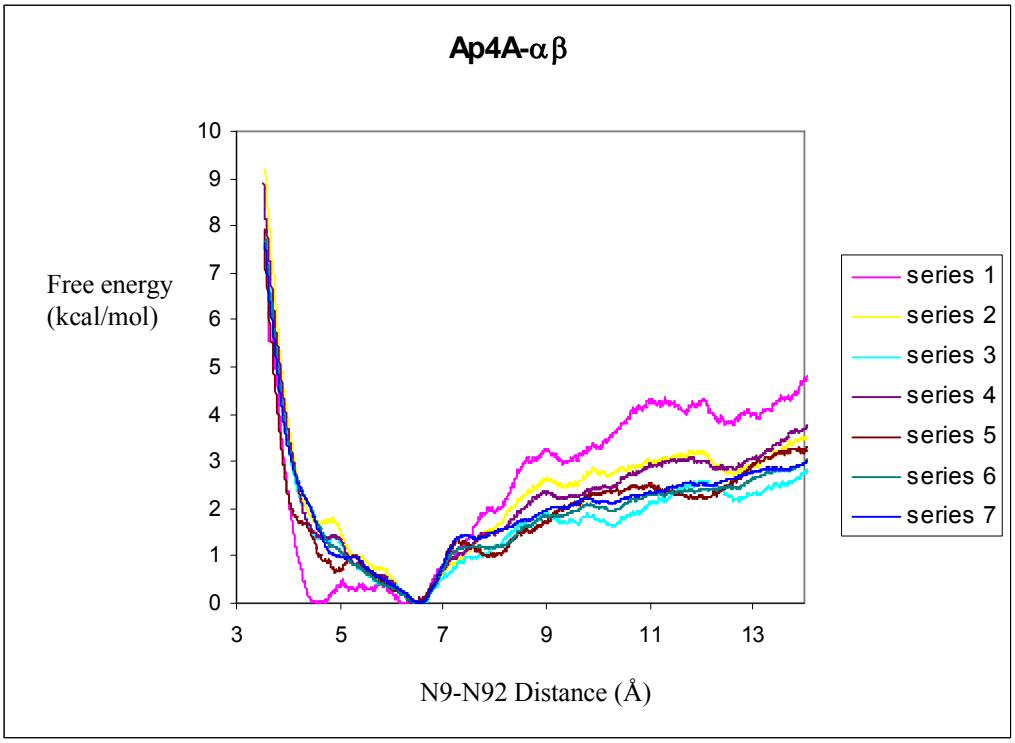


Fig. S17. Progressive PMF profiles of Ap_4A-αβ.

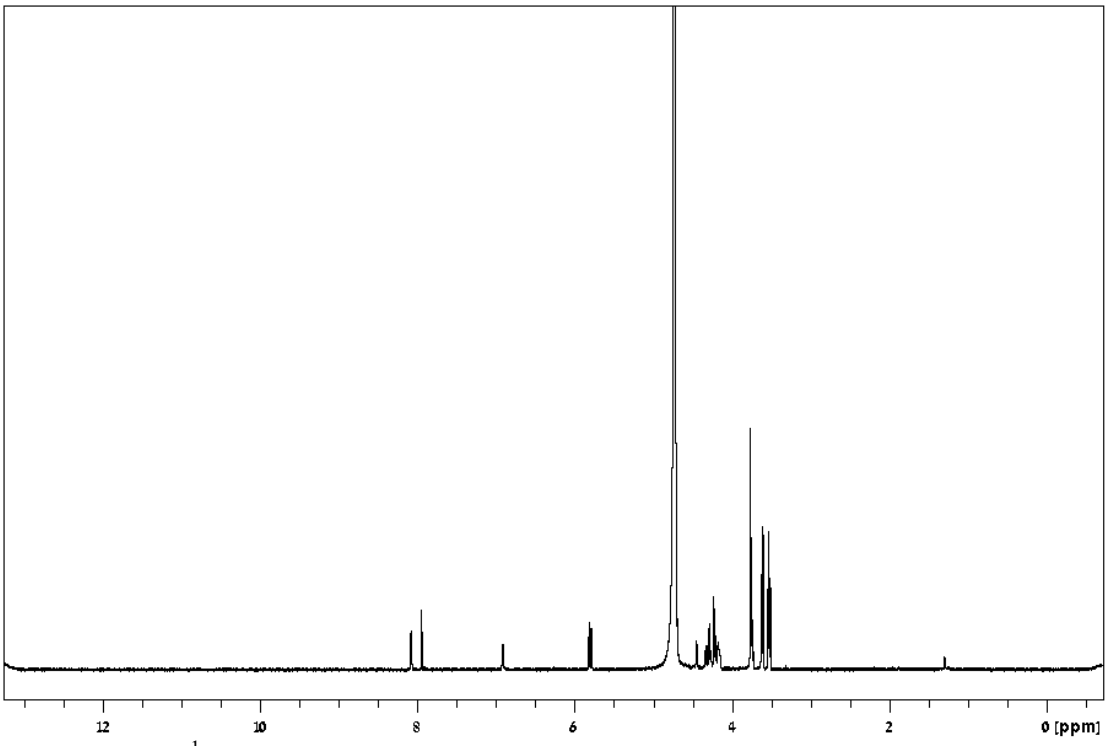
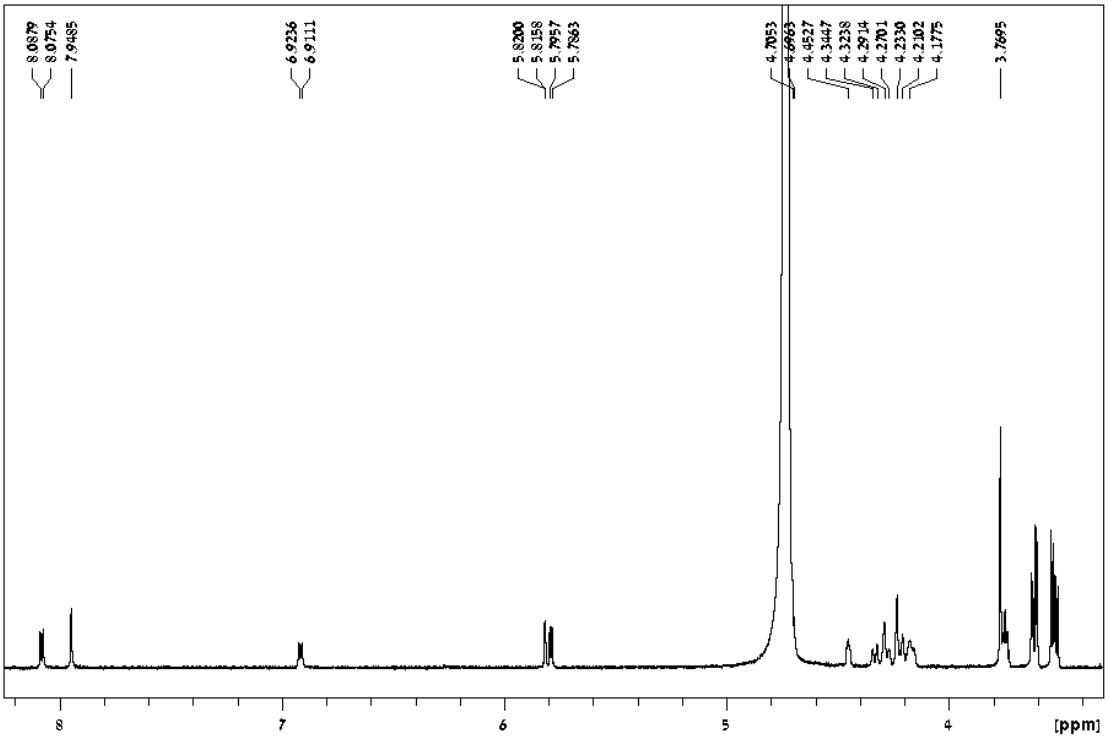
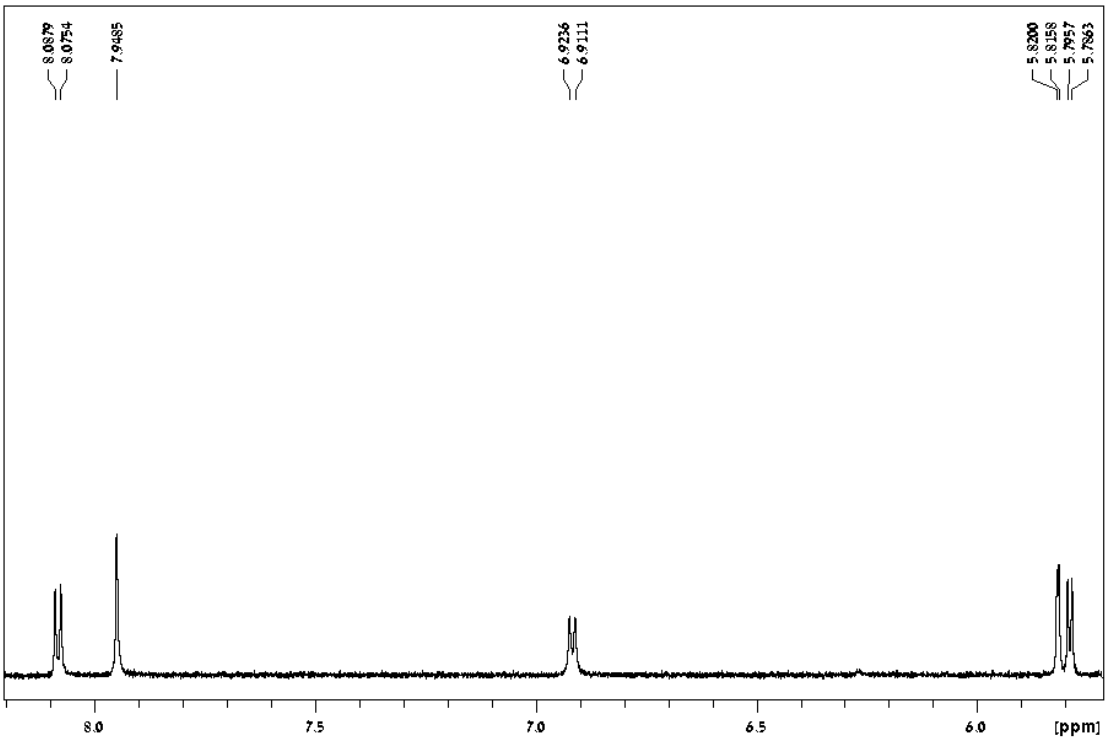


Fig. S18. ^{1}H NMR spectra of Gp_2C' (**17**) in D_2O at 600 MHz with glycerol as reference (3.5-3.8 ppm).





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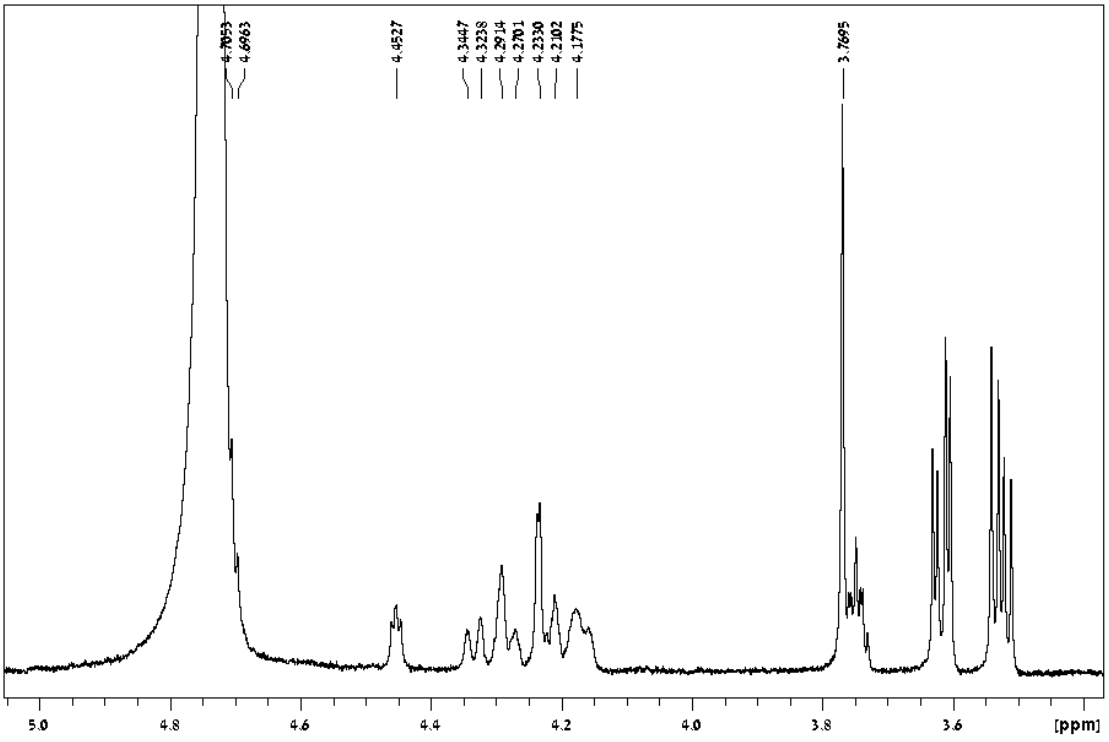


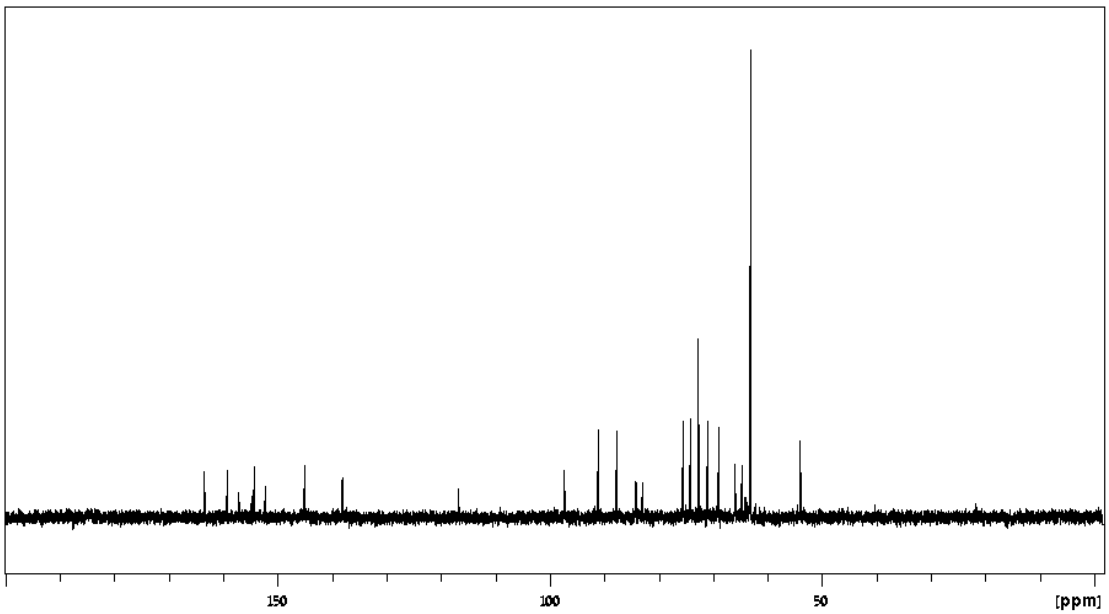
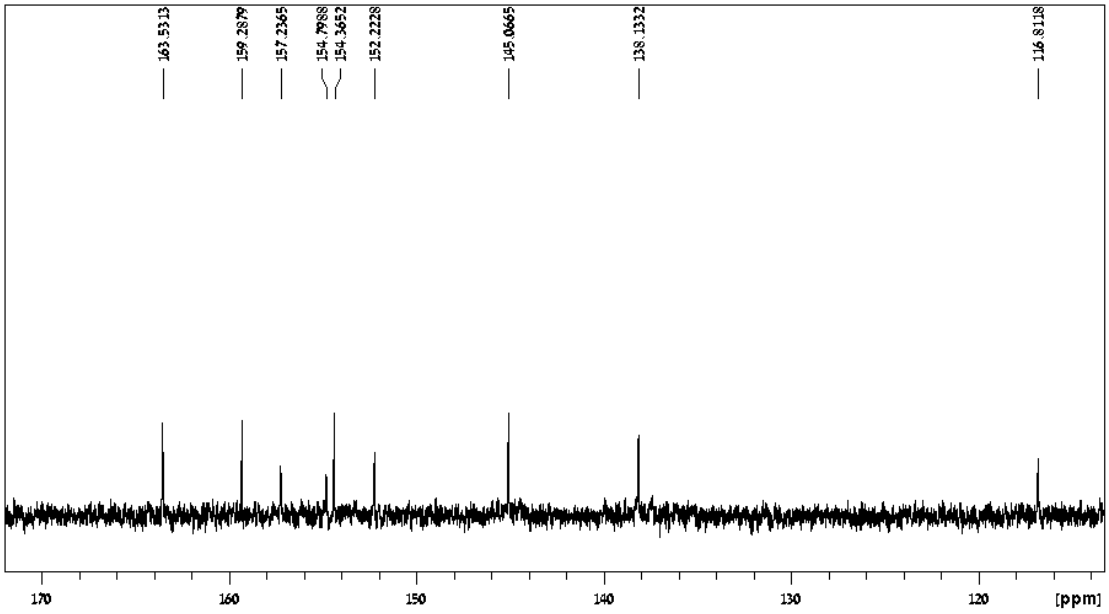
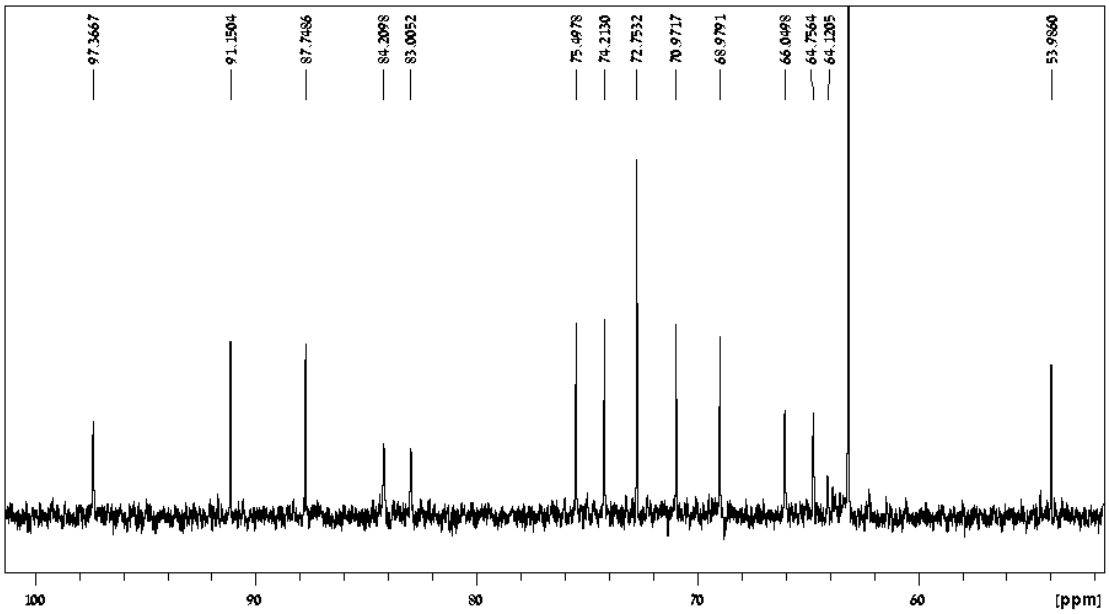


Fig. S19. ^{13}C NMR spectra of Gp_2C' (**17**) in D_2O at 151 MHz.





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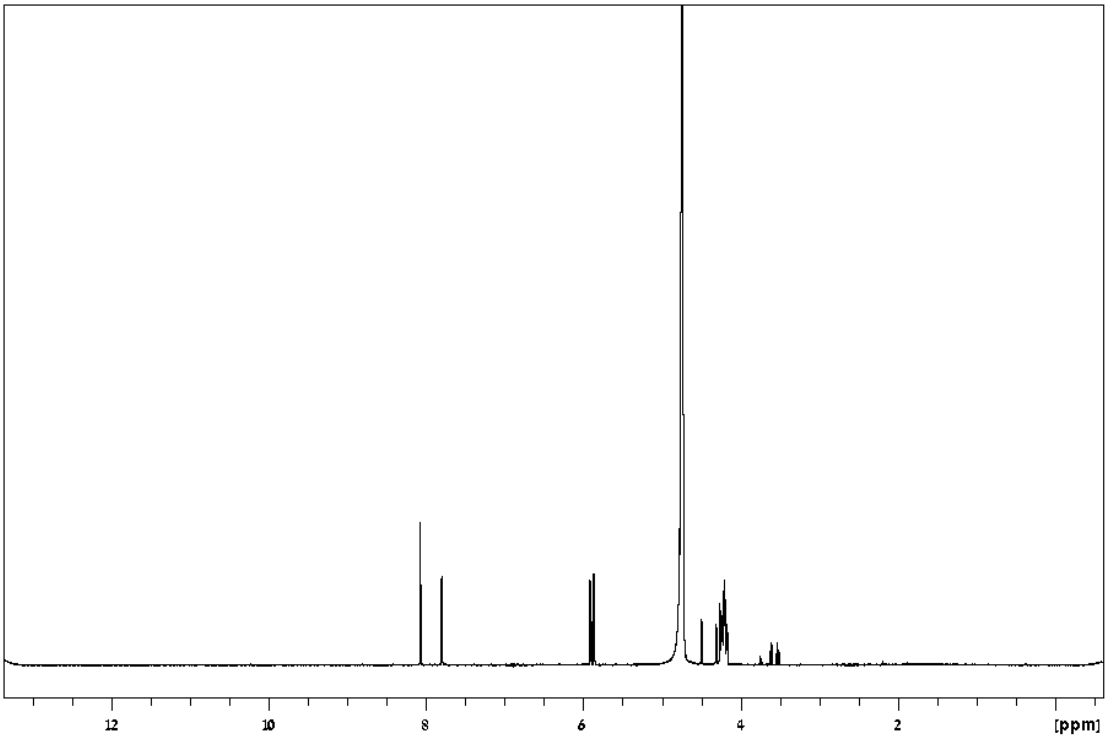
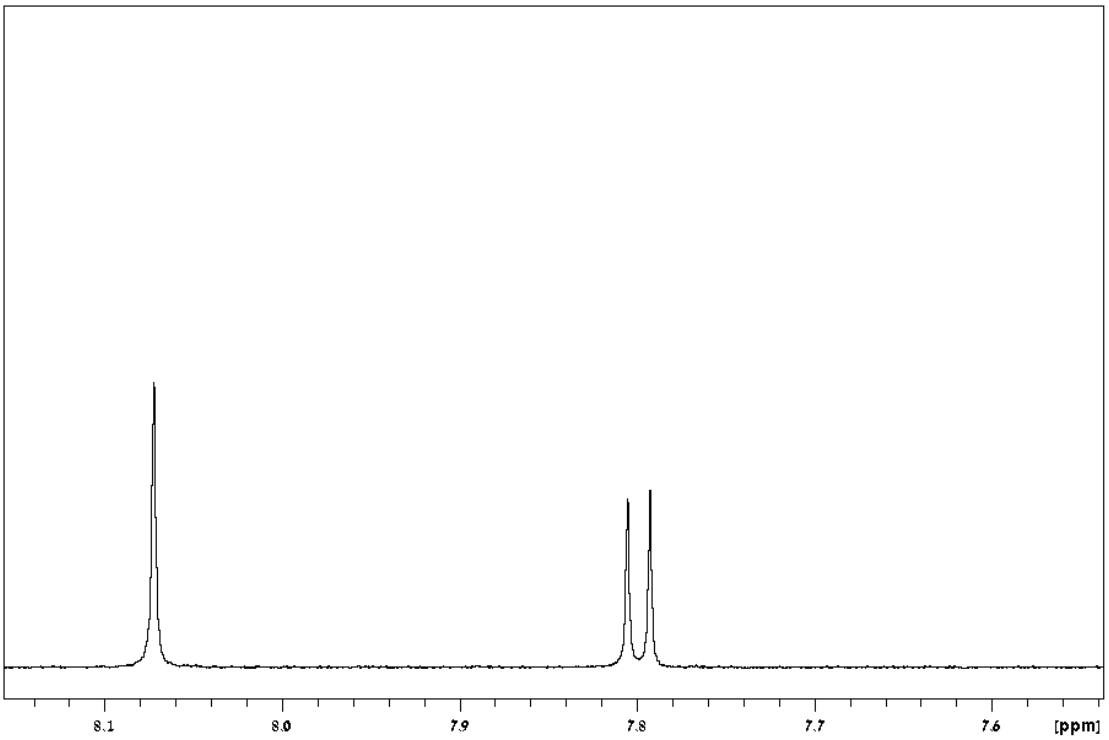


Fig. S20. ^{1}H NMR spectra of Gp_3C (**16**) in D_2O at 600 MHz with glycerol as reference (3.5-3.8 ppm).



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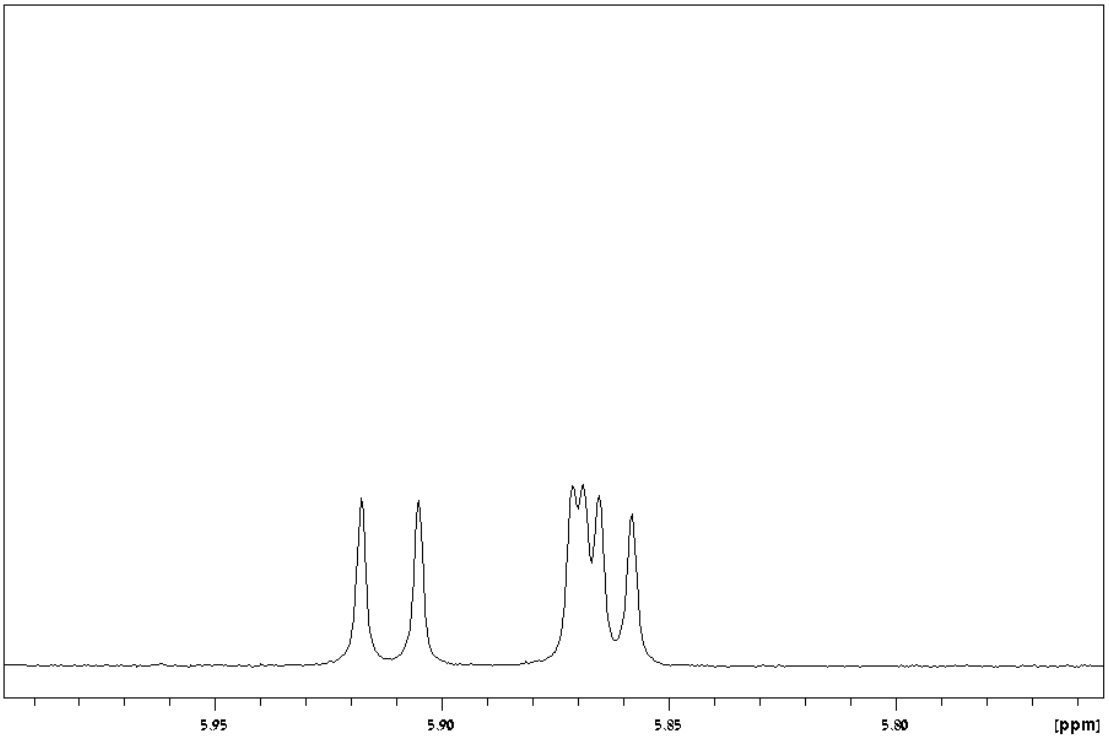

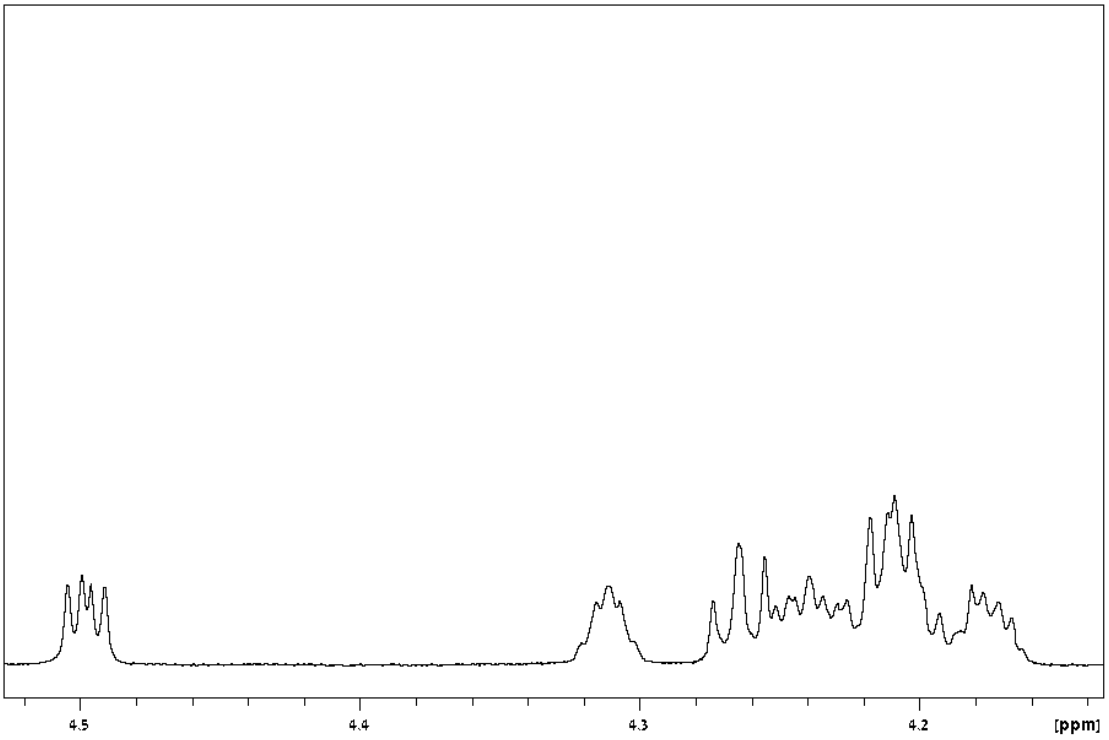

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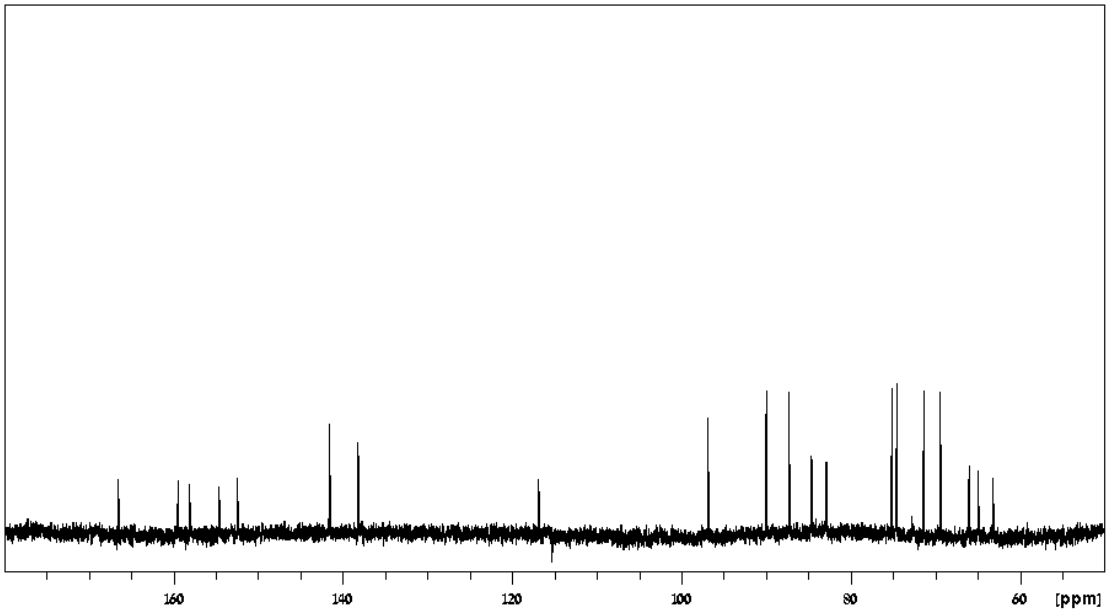
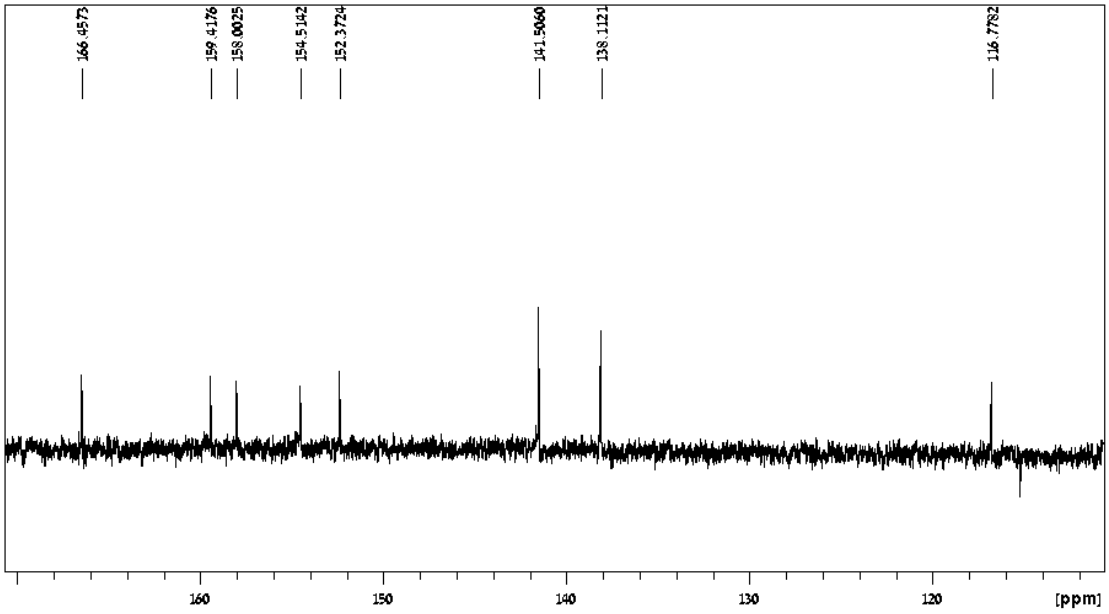


Fig. S21. ^{13}C NMR spectra of Gp_3C (**16**) in D_2O at 151 MHz.



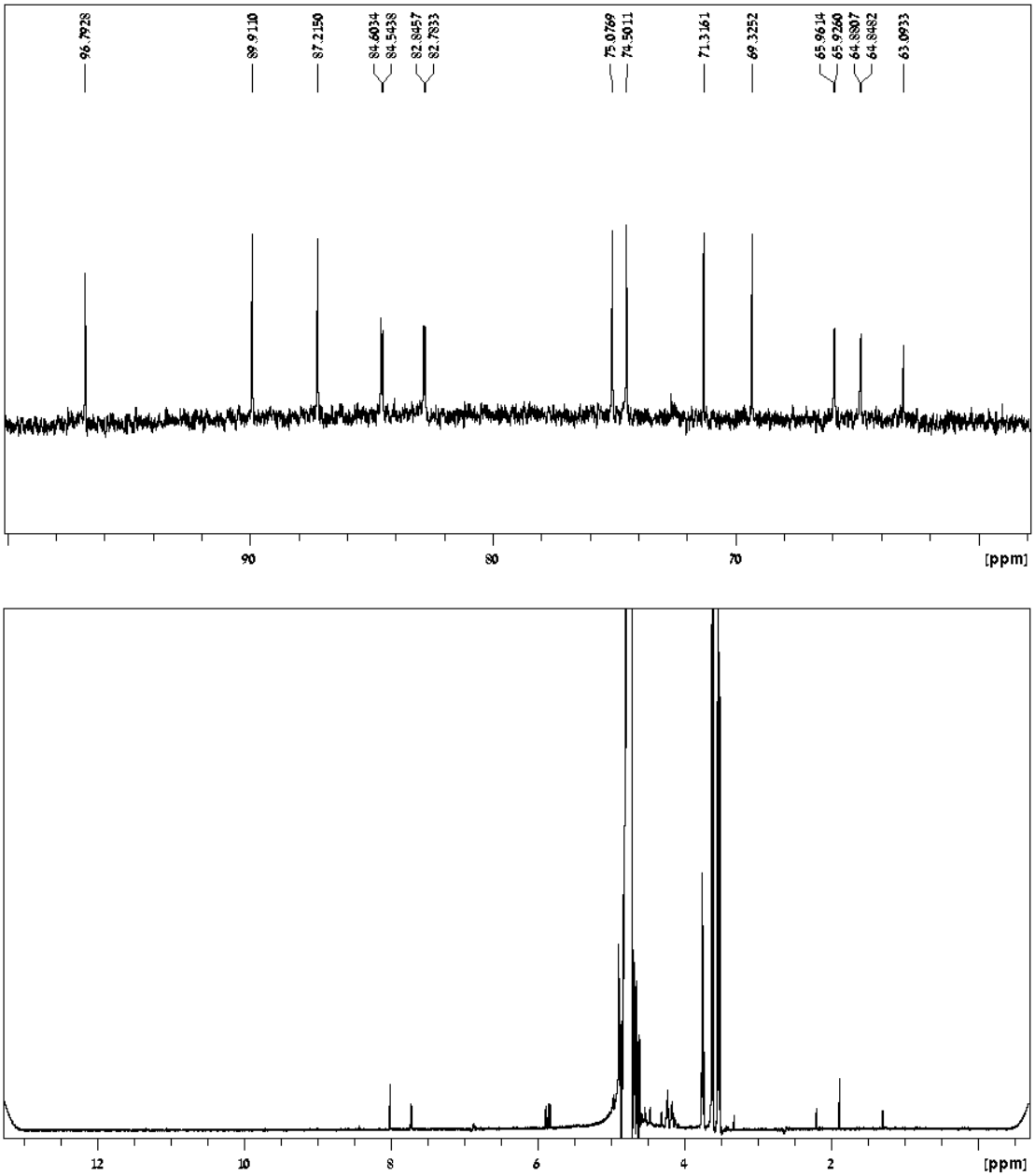
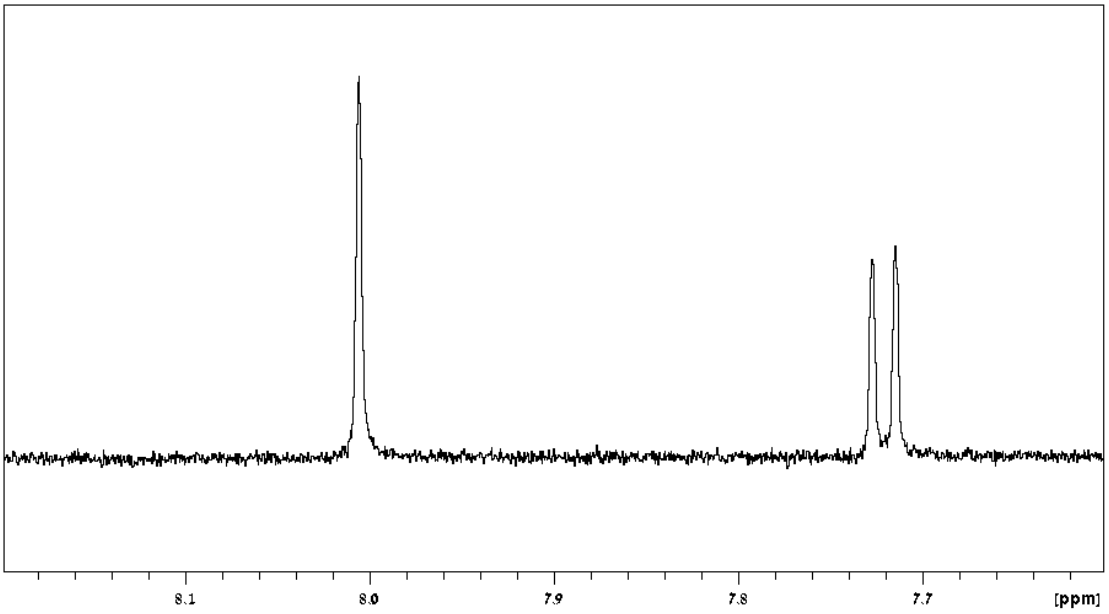
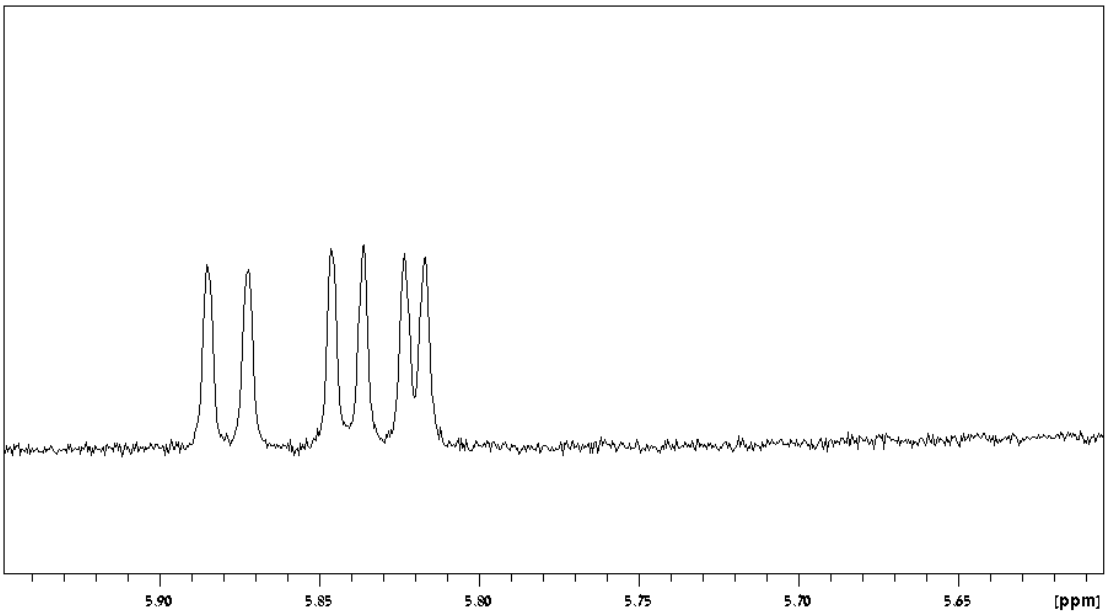


Fig. S22. ^{1}H NMR spectra of Gp_2C (**15**) in D_2O at 600 MHz with glycerol as reference (3.5-3.8 ppm).





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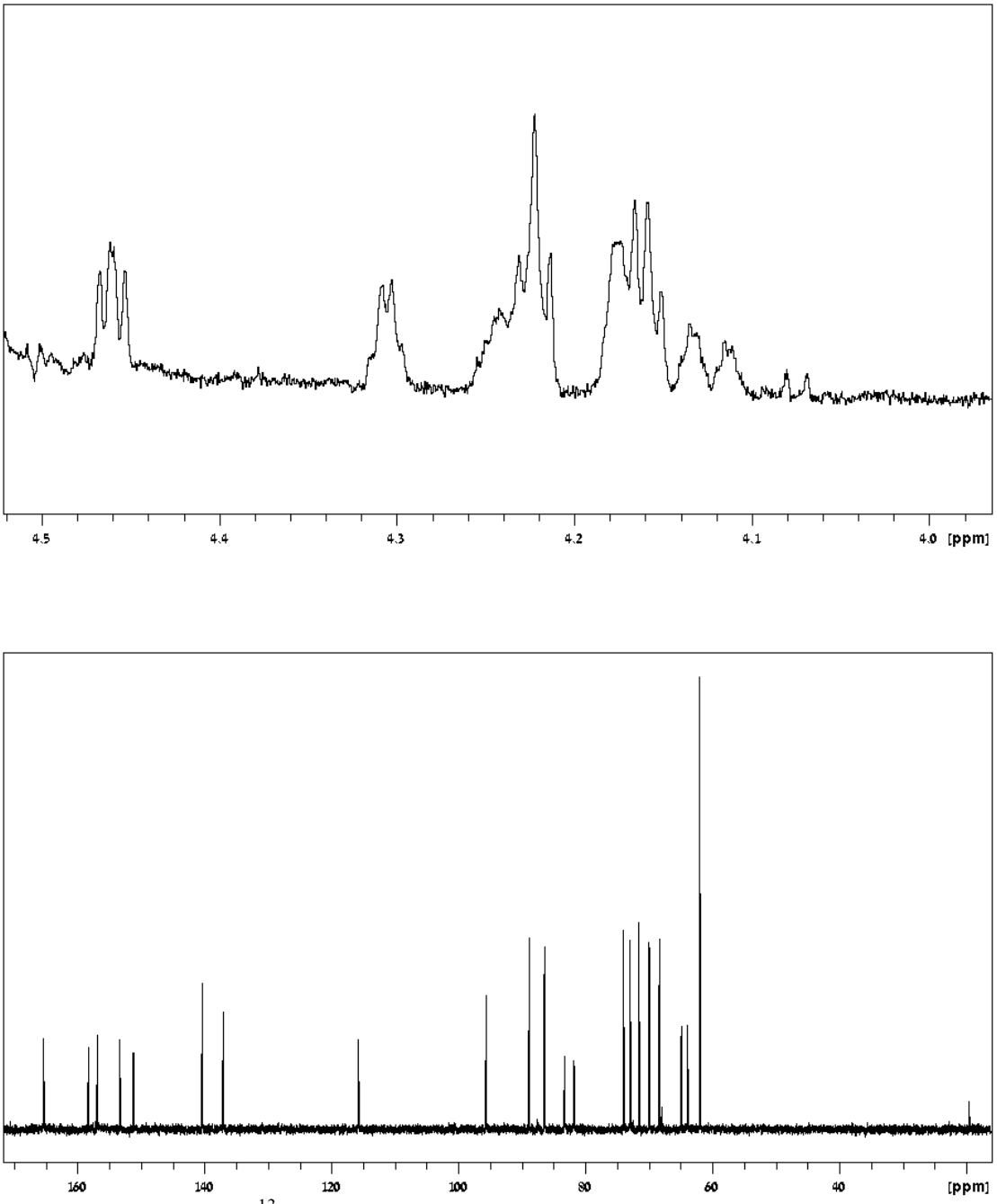
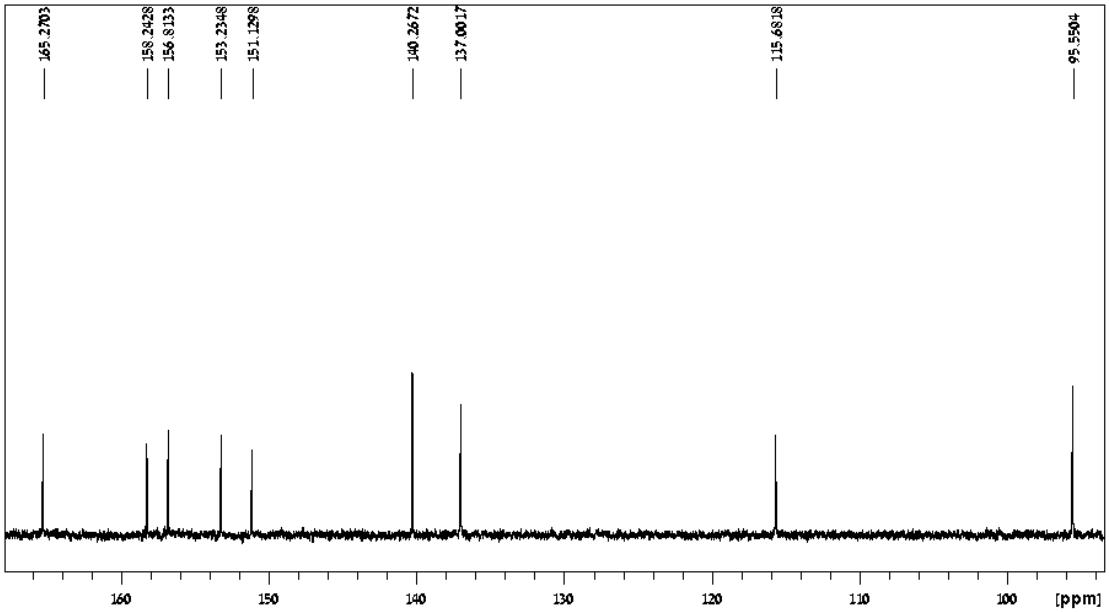
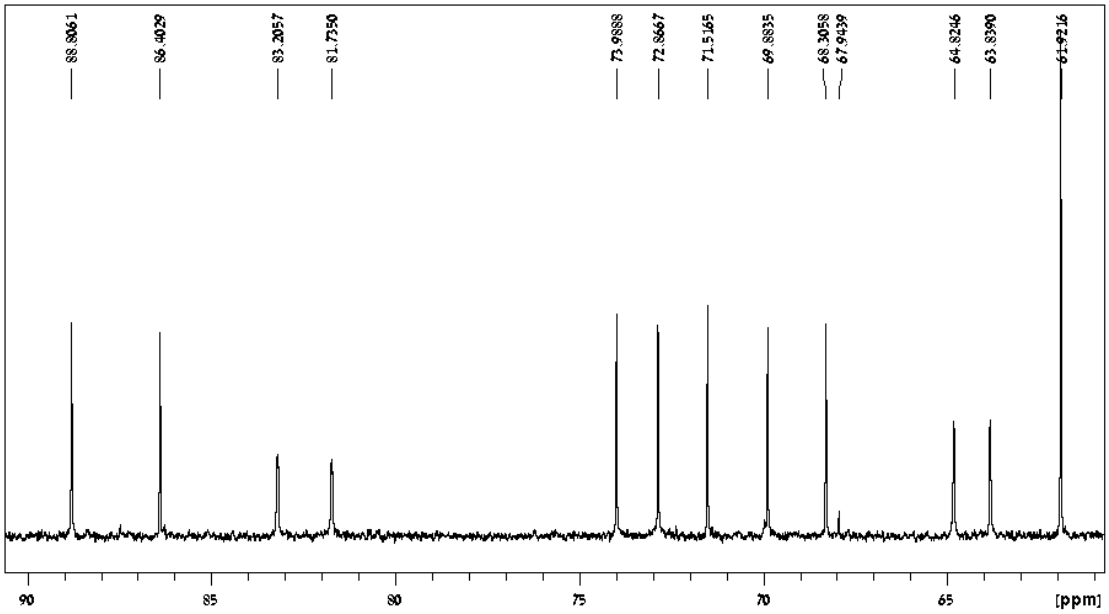


Fig. S23. ^{13}C NMR spectra of Gp_2C (**15**) in D_2O at 151 MHz.





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