Probing the structure of long DNA molecules in solution using synchrotron radiation linear dichroism

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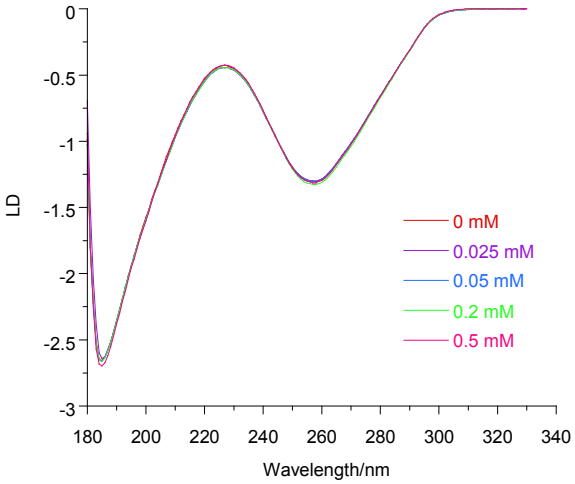
Supplementary Information

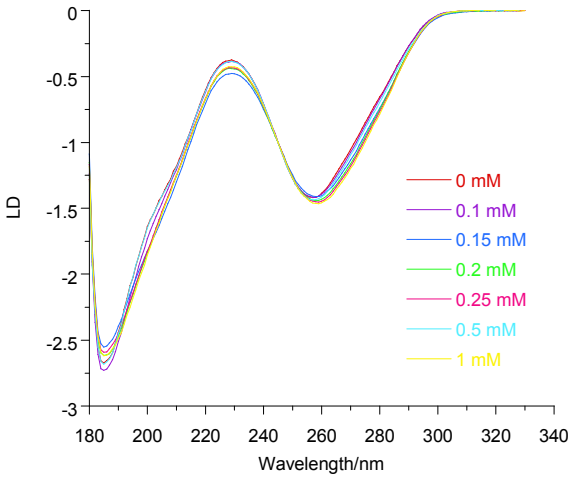
The data presented in Figures 1 and 3 of the main text are affected by the sample orientation as well as more subtle spectra changes. To enable the changes in spectra shape to be more obvious on inspection, the data of Figures 1 and 3 are rescaled to be

1 at 245 nm and replotted as Figures S1 and S2. The choice of 245 nm is based on it being a point with low absorbance for all the bases. Much the same effect is achieved if another wavelength such at 260 nm is chosen.

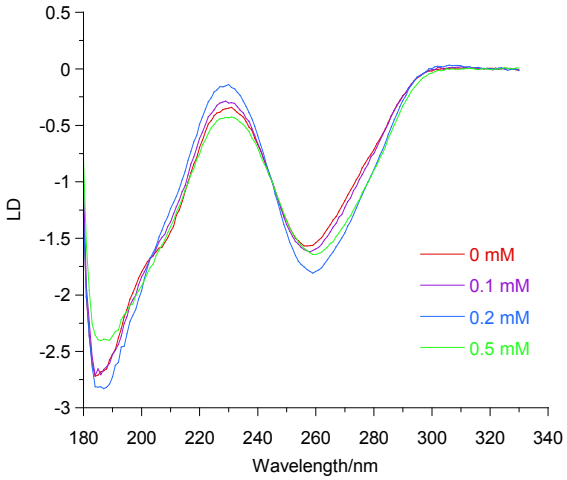
(a) 71% G-C: *M. luteus*



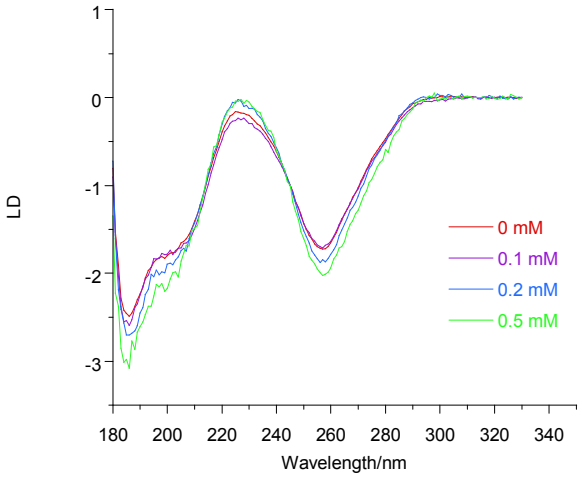
(b) 42% G-C: calf thymus



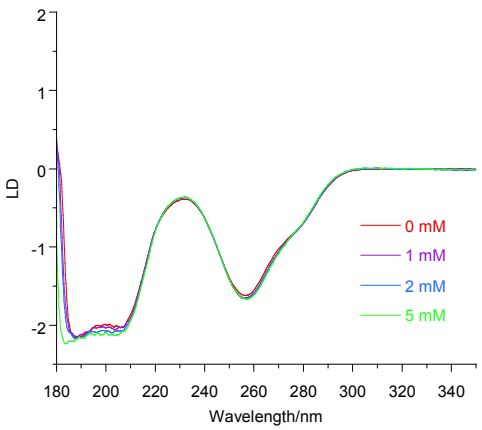
(c) 28.5% G-C: *C. perfringens*



(d) 0% G-C: poly[d(A)]-polyd(T)]



(e) 0% G-C: poly[(dA-dT)]$_2$



(f) 0% G-C: poly[d(A)]

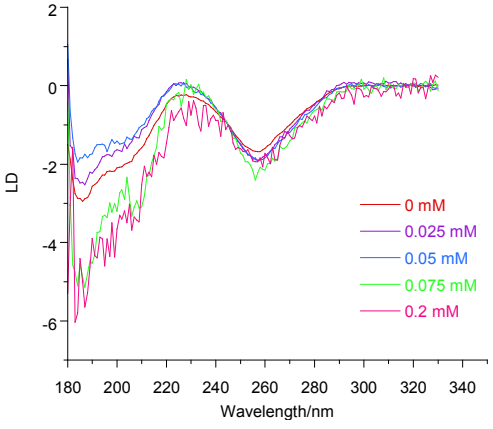
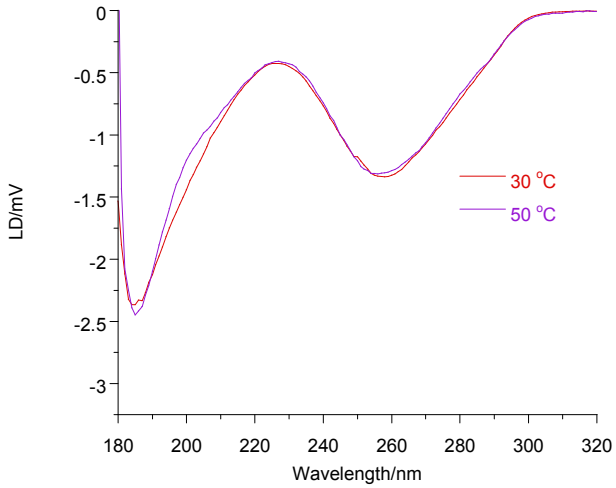
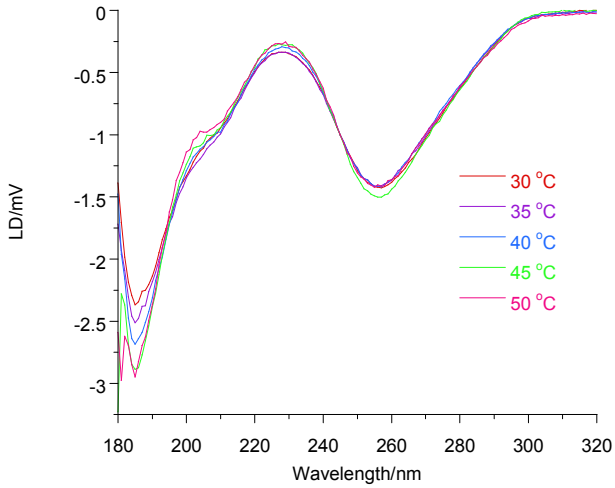


Figure S1. LD spectra of six DNA types normalised to 1 at 245 nm as a function of NaF concentration, as indicated on each figure. All DNA concentrations are 200 µM and measured in a 0.5 mm pathlength Couette flow cell spinning at ~3000 rpm at room temperature. Quartz cut-off for sample capillary is at 182 nm in these spectra. The data are presented in order of decreasing GC content, as indicated: (a) *M. luteus*, (b) calf thymus, (c) *C. perfringens*, (d) poly[d(A)]-polyd(T)], (e) poly[(dA-dT)]$_2$ and (f) poly[d(A)].

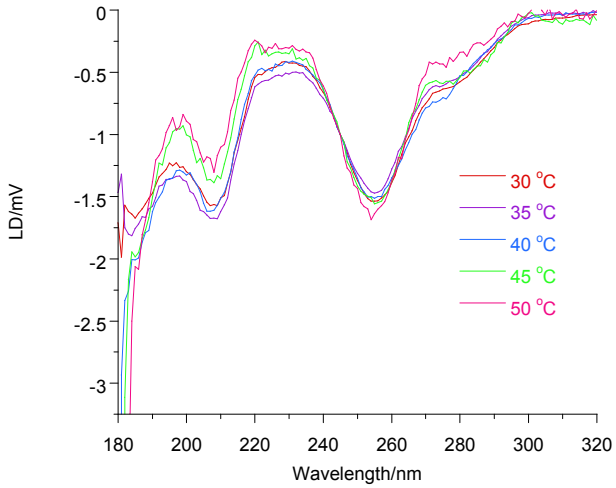
(a) *M. luteus*



(b) calf thymus



(c) poly[(dA-dT)]$_2$



(d) poly[d(A)]

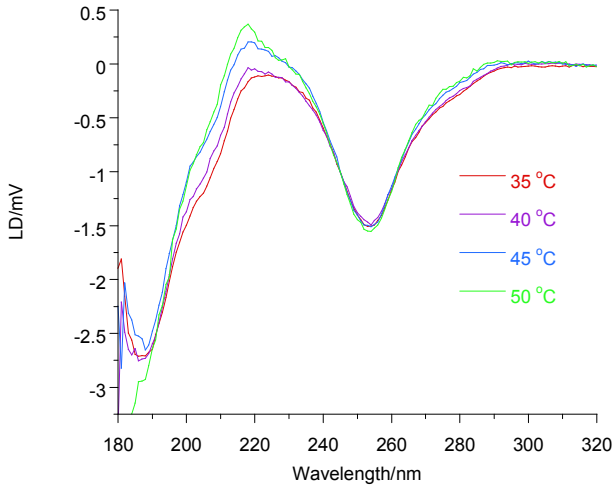


Figure S2. LD spectra of four DNA types normalised to 1 at 245 nm as a function of temperature (indicated on each figure) of (a) *M. luteus*, (b) calf thymus, (c) poly[(dA-dT)]$_2$ and (d) poly[d(A)] in a 0.5 mm pathlength Couette flow cell spinning at ~3000 rpm at room temperature. All DNA concentrations were 200 μM. Quartz cut-off for sample capillary is at 182 nm in these spectra.

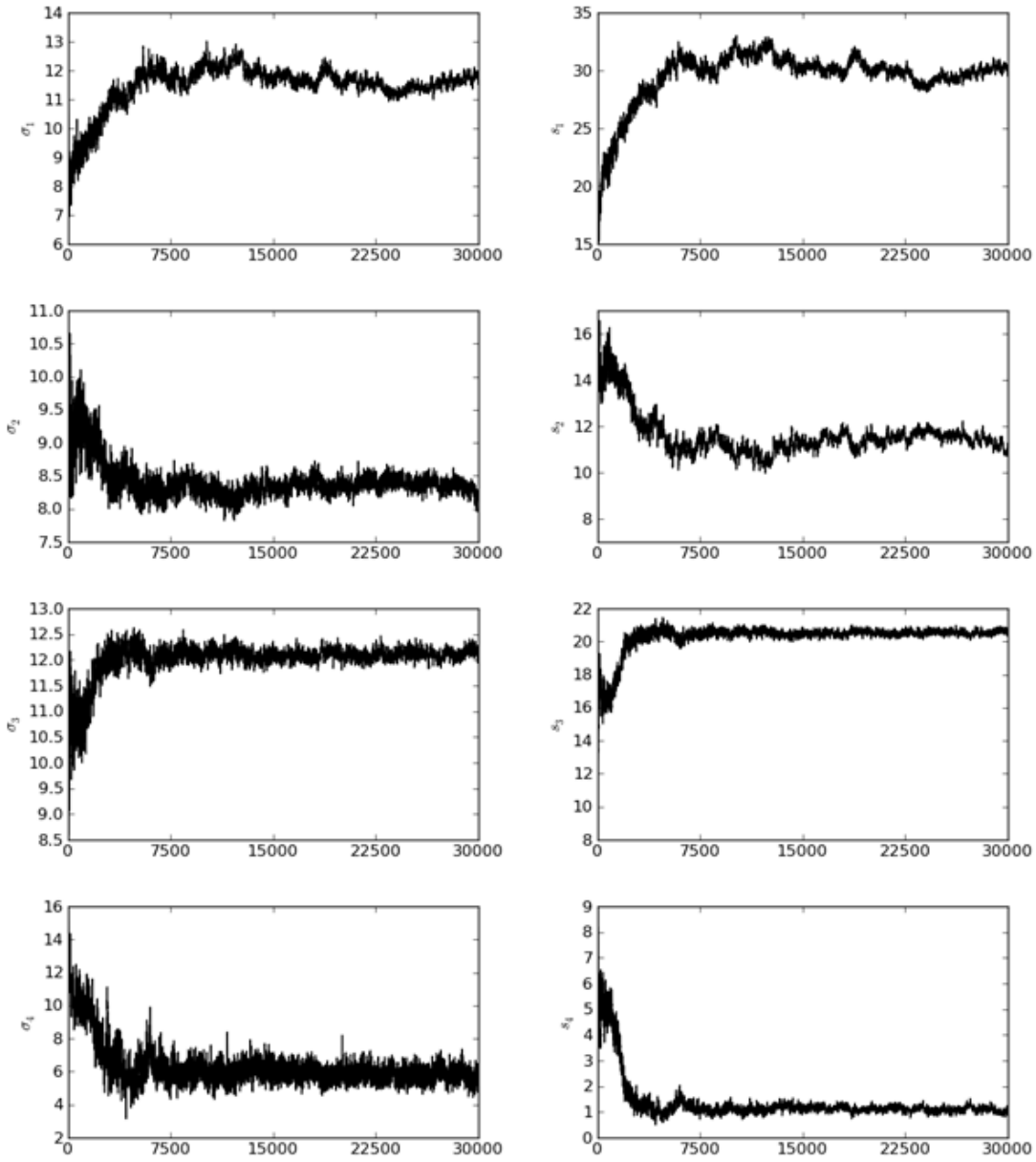


Figure S3: Markov chains from fitting data for poly(dA-dT) with no salt to 4 Gaussian chains as part of a global fit, i.e. for the data shown in Table 3. Note that

there is a time of 'burn-in' before the chains settle to values within a certain range. The mean and standard deviation (scaled in the case of s values) of these ranges are the values and errors given in Tables 2 and 3.

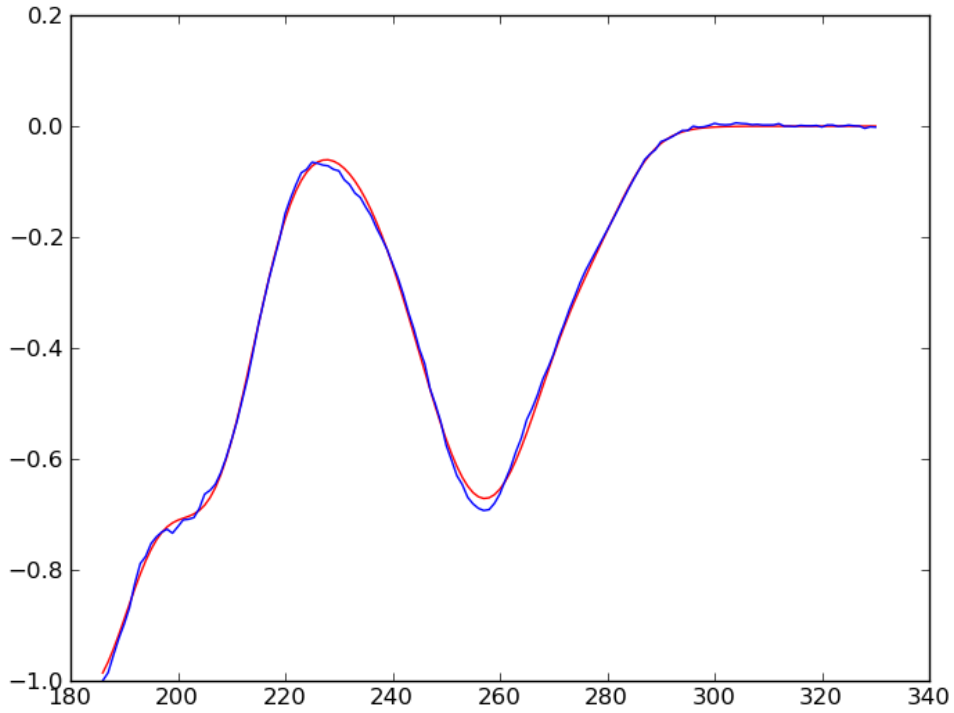


Figure S4: The final output fit (red) for poly(dA-dT) with no salt to 4 Gaussian chains as part of a global fit (see Table 3) along with the experimental data (blue). The horizontal axis is wavelength (nm) and the vertical axis is a scaled LD magnitude used for fitting.

Table S1: Fitting of 5 Gaussian peaks to data from Figure 2. Each spectrum was fitted independently of the others. Many of the peaks are close together or out of the spectral range, thus we concluded that up to four peaks were sufficient to fit the data.

DNA	Salt/mM	μ_1/nm	σ_1/nm	s_1	height 1
poly(dA)	0	183.6 ± 0.45	10.2 ± 1.0	$0.00542 \pm 5.5\ 10^{-4}$	$2.13\ 10^{-4}$
poly(dA)	0.025	174.4 ± 2.8	21.8 ± 2.4	0.008 ± 0.0012	$1.45\ 10^{-4}$
poly(dA)	0.05	166.7 ± 3.9	27.5 ± 2.8	$0.00624 \pm 9.5\ 10^{-4}$	$9.06\ 10^{-5}$

poly(dA)	0.075	170.0 ± 13.0	24.0 ± 8.7	$2.8\ 10^{-4} \pm 8.6\ 10^{-4}$	$4.73\ 10^{-6}$
poly(dA)	0.2	171.3 ± 4.0	11.7 ± 2.8	$0.00141 \pm 5.0\ 10^{-4}$	$4.78\ 10^{-5}$
poly(dA)	1	177.5 ± 6.7	4.7 ± 2.8	$0.00137 \pm 1.3\ 10^{-4}$	$1.16\ 10^{-4}$
poly(dA-dT) buffer	0	160.6 ± 5.1	22.0 ± 4.6	0.0064 ± 0.0022	$1.15\ 10^{-4}$
poly(dA-dT) buffer	5	169.0 ± 5.8	22.4 ± 2.2	0.0056 ± 0.0011	$1.01\ 10^{-4}$
poly(dA-dT) buffer	20	170.2 ± 1.5	11.19 ± 0.68	$0.00616 \pm 7.5\ 10^{-4}$	$2.2\ 10^{-4}$
poly(dA-dT)	0	180.3 ± 1.4	9.5 ± 0.72	0.0115 ± 0.0016	$4.82\ 10^{-4}$
poly(dA-dT)	0.1	171.9 ± 1.6	19.3 ± 1.2	0.0196 ± 0.0019	$4.06\ 10^{-4}$
poly(dA-dT)	0.2	183.72 ± 0.51	9.86 ± 0.56	$0.00519 \pm 3.4\ 10^{-4}$	$2.1\ 10^{-4}$
poly(dA-dT)	0.5	174.4 ± 2.8	14.2 ± 1.3	$0.00581 \pm 7.7\ 10^{-4}$	$1.63\ 10^{-4}$
C. perfringens	0	184.49 ± 0.3	11.36 ± 0.48	$0.01339 \pm 6.6\ 10^{-4}$	$4.7\ 10^{-4}$
C. perfringens	0.1	192.4 ± 6.1	20.7 ± 3.5	0.0052 ± 0.0017	$1.01\ 10^{-4}$
C. perfringens	0.2	185.12 ± 0.46	14.86 ± 0.81	$0.01647 \pm 9.3\ 10^{-4}$	$4.42\ 10^{-4}$
C. perfringens	0.5	182.7 ± 0.62	9.64 ± 0.35	$0.00965 \pm 8.3\ 10^{-4}$	$3.99\ 10^{-4}$
calf thymus	0	183.24 ± 0.26	9.77 ± 0.52	0.0306 ± 0.0032	0.00125
calf thymus	0.1	183.03 ± 0.44	8.85 ± 0.89	0.0321 ± 0.0077	0.00144
calf thymus	0.15	181.4 ± 0.78	11.58 ± 0.92	0.06 ± 0.012	0.00207
calf thymus	0.2	182.38 ± 0.5	16.24 ± 0.83	0.0998 ± 0.0058	0.00245
calf thymus	0.25	181.2 ± 1.4	9.5 ± 1.0	0.0324 ± 0.0067	0.00135
calf thymus	0.5	183.92 ± 0.31	10.74 ± 0.45	0.0475 ± 0.0048	0.00176
calf thymus	1	181.59 ± 0.65	12.85 ± 0.7	0.051 ± 0.0035	0.00158
M. Luteus	0	179.4 ± 1.2	9.4 ± 0.71	0.033 ± 0.006	0.0014
M. Luteus	0.025	179.12 ± 0.77	12.56 ± 0.58	0.0814 ± 0.0057	0.00258
M. Luteus	0.05	177.37 ± 0.75	17.77 ± 0.61	0.1313 ± 0.0054	0.00295
M. Luteus	0.2	176.7 ± 2.8	12.5 ± 2.8	0.036 ± 0.011	0.00114
M. Luteus	0.5	177.94 ± 0.51	15.95 ± 0.75	0.0921 ± 0.0057	0.0023

DNA	Salt/mM	μ_2/nm	σ_2/nm	s_2	height 2
poly(dA)	0	150.0 ± 13.0	48.8 ± 7.2	0.004 ± 0.0012	$3.29\ 10^{-5}$
poly(dA)	0.025	208.01 ± 0.5	7.73 ± 0.81	$6.9\ 10^{-4} \pm 2.0\ 10^{-4}$	$3.58\ 10^{-5}$
poly(dA)	0.05	206.64 ± 0.43	8.46 ± 0.58	$6.0\ 10^{-4} \pm 1.0\ 10^{-4}$	$2.84\ 10^{-5}$
poly(dA)	0.075	177.5 ± 7.6	16.1 ± 5.0	$0.00245 \pm 4.7\ 10^{-4}$	$6.08\ 10^{-5}$
poly(dA)	0.2	126.0 ± 33.0	23.0 ± 22.0	$8.4\ 10^{-4} \pm 2.0\ 10^{-4}$	$1.46\ 10^{-5}$
poly(dA)	1	194.1 ± 2.0	19.1 ± 1.7	$9.0\ 10^{-4} \pm 1.6\ 10^{-4}$	$1.87\ 10^{-5}$
poly(dA-dT) buffer	0	174.4 ± 7.9	31.0 ± 11.0	0.0036 ± 0.0017	$4.71\ 10^{-5}$
poly(dA-dT) buffer	5	171.5 ± 8.3	32.1 ± 7.1	$0.00543 \pm 7.0\ 10^{-4}$	$6.74\ 10^{-5}$
poly(dA-dT) buffer	20	200.12 ± 0.84	15.26 ± 0.41	$0.00621 \pm 2.4\ 10^{-4}$	$1.62\ 10^{-4}$
poly(dA-dT)	0	209.4 ± 1.5	15.02 ± 0.91	$0.01498 \pm 7.8\ 10^{-4}$	$3.98\ 10^{-4}$
poly(dA-dT)	0.1	207.93 ± 0.2	7.08 ± 0.23	$0.00213 \pm 1.7\ 10^{-4}$	$1.2\ 10^{-4}$
poly(dA-dT)	0.2	205.88 ± 0.46	8.43 ± 0.29	$0.00261 \pm 2.0\ 10^{-4}$	$1.24\ 10^{-4}$
poly(dA-dT)	0.5	207.7 ± 1.8	11.7 ± 1.9	$0.00233 \pm 5.0\ 10^{-4}$	$7.93\ 10^{-5}$
C. perfringens	0	208.98 ± 0.51	9.21 ± 0.45	$0.0048 \pm 5.2\ 10^{-4}$	$2.08\ 10^{-4}$
C. perfringens	0.1	183.61 ± 0.86	13.9 ± 1.0	0.013 ± 0.0023	$3.73\ 10^{-4}$
C. perfringens	0.2	211.87 ± 0.58	8.21 ± 0.61	$0.00198 \pm 4.3\ 10^{-4}$	$9.61\ 10^{-5}$
C. perfringens	0.5	201.89 ± 0.71	15.34 ± 0.41	0.0177 ± 0.001	$4.59\ 10^{-4}$
calf thymus	0	204.96 ± 0.99	12.28 ± 0.48	$0.02053 \pm 9.7\ 10^{-4}$	$6.67\ 10^{-4}$

calf thymus	0.1	201.2 ± 2.3	14.1 ± 1.1	0.0358 ± 0.0058	0.00101
calf thymus	0.15	204.9 ± 1.0	12.54 ± 0.49	0.0356 ± 0.0029	0.00113
calf thymus	0.2	210.87 ± 0.63	10.69 ± 0.44	0.0154 ± 0.0025	$5.77\ 10^{-4}$
calf thymus	0.25	197.12 ± 0.72	18.2 ± 0.46	0.0858 ± 0.0038	0.00188
calf thymus	0.5	189.4 ± 7.9	35.5 ± 5.3	0.0265 ± 0.0064	$2.97\ 10^{-4}$
calf thymus	1	211.0 ± 1.1	18.3 ± 1.2	0.0454 ± 0.0028	$9.9\ 10^{-4}$
M. Luteus	0	189.0 ± 1.1	19.0 ± 0.51	0.097 ± 0.0058	0.00204
M. Luteus	0.025	202.53 ± 0.93	13.86 ± 0.43	0.0348 ± 0.0028	0.001
M. Luteus	0.05	210.0 ± 1.1	12.2 ± 1.1	0.0152 ± 0.0044	$4.95\ 10^{-4}$
M. Luteus	0.2	183.2 ± 3.2	17.2 ± 1.3	0.0659 ± 0.0049	0.00153
M. Luteus	0.5	207.4 ± 1.3	12.38 ± 0.5	0.0139 ± 0.002	$4.49\ 10^{-4}$

DNA	Salt/mM	μ_3/nm	σ_3/nm	S_4	height 3
poly(dA)	0	205.77 ± 0.68	-8.42 ± 0.4	$0.00261 \pm 3.4\ 10^{-4}$	$1.24\ 10^{-4}$
poly(dA)	0.025	198.8 ± 5.1	42.8 ± 6.2	$-0.00285 \pm 7.9\ 10^{-4}$	$-2.66\ 10^{-5}$
poly(dA)	0.05	229.3 ± 5.6	32.8 ± 2.6	$-0.00173 \pm 3.5\ 10^{-4}$	$-2.11\ 10^{-5}$
poly(dA)	0.075	209.39 ± 0.48	5.87 ± 0.77	$4.5\ 10^{-4} \pm 1.4\ 10^{-4}$	$3.09\ 10^{-5}$
poly(dA)	0.2	200.1 ± 2.4	13.7 ± 1.4	$8.1\ 10^{-4} \pm 1.8\ 10^{-4}$	$2.37\ 10^{-5}$
poly(dA)	1	169.0 ± 17.0	27.2 ± 7.9	$-2.3\ 10^{-4} \pm 3.0\ 10^{-4}$	$-3.39\ 10^{-6}$
poly(dA-dT) buffer	0	207.45 ± 0.67	11.29 ± 0.75	$0.00201 \pm 4.1\ 10^{-4}$	$7.1\ 10^{-5}$
poly(dA-dT) buffer	5	207.87 ± 0.58	10.67 ± 0.5	$0.00164 \pm 2.4\ 10^{-4}$	$6.11\ 10^{-5}$
poly(dA-dT) buffer	20	213.18 ± 0.69	5.1 ± 0.91	$1.75\ 10^{-4} \pm 6.7\ 10^{-5}$	$1.37\ 10^{-5}$
poly(dA-dT)	0	220.53 ± 0.64	8.68 ± 0.43	$-0.00504 \pm 9.6\ 10^{-4}$	$-2.32\ 10^{-4}$
poly(dA-dT)	0.1	158.0 ± 12.0	66.5 ± 6.6	0.0041 ± 0.0013	$2.46\ 10^{-5}$
poly(dA-dT)	0.2	215.3 ± 8.7	45.9 ± 6.6	$-7.0\ 10^{-4} \pm 2.2\ 10^{-4}$	$-6.06\ 10^{-6}$
poly(dA-dT)	0.5	218.1 ± 3.0	8.6 ± 1.0	$-7.5\ 10^{-4} \pm 2.8\ 10^{-4}$	$-3.48\ 10^{-5}$
C. perfringens	0	240.5 ± 7.9	18.3 ± 4.5	$0.0015 \pm 4.3\ 10^{-4}$	$3.27\ 10^{-5}$
C. perfringens	0.1	210.97 ± 0.41	7.79 ± 0.35	$0.002 \pm 2.6\ 10^{-4}$	$1.02\ 10^{-4}$
C. perfringens	0.2	254.9 ± 5.0	25.7 ± 4.9	$-0.00277 \pm 9.2\ 10^{-4}$	$-4.29\ 10^{-5}$
C. perfringens	0.5	204.0 ± 11.0	33.6 ± 6.9	-0.0072 ± 0.001	$-8.55\ 10^{-5}$
calf thymus	0	194.8 ± 7.7	29.0 ± 11.0	-0.0036 ± 0.0026	$-4.89\ 10^{-5}$
calf thymus	0.1	293.5 ± 3.0	11.9 ± 2.4	-0.0069 ± 0.0039	$-2.3\ 10^{-4}$
calf thymus	0.15	165.0 ± 11.0	30.0 ± 12.0	0.015 ± 0.016	$1.99\ 10^{-4}$
calf thymus	0.2	224.1 ± 6.9	55.0 ± 16.0	$4.0\ 10^{-4} \pm 0.0021$	$2.84\ 10^{-6}$
calf thymus	0.25	194.8 ± 6.1	40.2 ± 3.8	-0.0373 ± 0.0064	$-3.71\ 10^{-4}$
calf thymus	0.5	207.86 ± 0.52	9.44 ± 0.38	0.0143 ± 0.0011	$6.06\ 10^{-4}$
calf thymus	1	223.6 ± 1.7	11.61 ± 0.74	-0.0134 ± 0.0023	$-4.61\ 10^{-4}$
M. Luteus	0	219.0 ± 23.0	89.0 ± 18.0	-0.0016 ± 0.0019	$-7.2\ 10^{-6}$
M. Luteus	0.025	88.0 ± 24.0	30.5 ± 5.3	0.001 ± 0.041	$1.41\ 10^{-5}$
M. Luteus	0.05	159.5 ± 8.7	66.3 ± 9.5	-0.024 ± 0.016	$-1.45\ 10^{-4}$
M. Luteus	0.2	203.9 ± 7.0	15.8 ± 4.2	0.0159 ± 0.0037	$4.02\ 10^{-4}$
M. Luteus	0.5	229.0 ± 14.0	24.1 ± 7.8	0.0022 ± 0.0021	$3.57\ 10^{-5}$

		μ_4/nm	σ_4/nm	s_4	height 4
poly(dA)	0	256.73 ± 0.21	11.74 ± 0.26	$0.00395 \pm 1.0\ 10^{-4}$	$1.34\ 10^{-4}$
poly(dA)	0.025	257.09 ± 0.25	13.73 ± 0.4	$0.00288 \pm 1.9\ 10^{-4}$	$8.37\ 10^{-5}$

poly(dA)	0.05	255.84 ± 0.55	5.16 ± 0.76	$1.38\ 10^{-4} \pm 4.0\ 10^{-5}$	$1.06\ 10^{-5}$
poly(dA)	0.075	255.5 ± 1.1	9.25 ± 0.91	$5.0\ 10^{-4} \pm 1.6\ 10^{-4}$	$2.16\ 10^{-5}$
poly(dA)	0.2	258.2 ± 1.0	13.7 ± 1.2	$3.88\ 10^{-4} \pm 6.6\ 10^{-5}$	$1.13\ 10^{-5}$
poly(dA)	1	255.3 ± 1.5	11.7 ± 2.2	$1.38\ 10^{-4} \pm 5.9\ 10^{-5}$	$4.71\ 10^{-6}$
poly(dA-dT) buffer	0	279.9 ± 1.2	8.09 ± 0.69	$6.2\ 10^{-4} \pm 1.6\ 10^{-4}$	$3.04\ 10^{-5}$
poly(dA-dT) buffer	5	258.55 ± 0.69	11.64 ± 0.61	$0.00243 \pm 2.1\ 10^{-4}$	$8.32\ 10^{-5}$
poly(dA-dT) buffer	20	258.98 ± 0.31	11.89 ± 0.23	$0.003405 \pm 8.7\ 10^{-5}$	$1.14\ 10^{-4}$
poly(dA-dT)	0	256.58 ± 0.28	10.34 ± 0.36	$0.00895 \pm 3.9\ 10^{-4}$	$3.45\ 10^{-4}$
poly(dA-dT)	0.1	256.93 ± 0.18	11.74 ± 0.23	$0.00607 \pm 1.5\ 10^{-4}$	$2.06\ 10^{-4}$
poly(dA-dT)	0.2	256.92 ± 0.24	11.57 ± 0.26	$0.00416 \pm 1.2\ 10^{-4}$	$1.43\ 10^{-4}$
poly(dA-dT)	0.5	256.71 ± 0.32	10.46 ± 0.32	$0.00221 \pm 8.0\ 10^{-5}$	$8.43\ 10^{-5}$
C. perfringens	0	257.41 ± 0.46	12.14 ± 0.61	$0.00763 \pm 3.8\ 10^{-4}$	$2.51\ 10^{-4}$
C. perfringens	0.1	256.77 ± 0.33	12.18 ± 0.29	$0.00827 \pm 2.7\ 10^{-4}$	$2.71\ 10^{-4}$
C. perfringens	0.2	257.64 ± 0.35	12.98 ± 0.43	$0.01031 \pm 8.2\ 10^{-4}$	$3.17\ 10^{-4}$
C. perfringens	0.5	258.92 ± 0.27	15.2 ± 0.54	0.0155 ± 0.0011	$4.08\ 10^{-4}$
calf thymus	0	256.29 ± 0.46	13.94 ± 0.39	$0.02486 \pm 9.1\ 10^{-4}$	$7.12\ 10^{-4}$
calf thymus	0.1	252.61 ± 0.49	11.81 ± 0.34	0.0184 ± 0.0015	$6.21\ 10^{-4}$
calf thymus	0.15	258.11 ± 0.28	15.61 ± 0.27	0.052 ± 0.0011	0.00133
calf thymus	0.2	257.63 ± 0.42	15.0 ± 0.34	0.0499 ± 0.0016	0.00133
calf thymus	0.25	256.86 ± 0.44	14.9 ± 0.26	0.053 ± 0.0017	0.00142
calf thymus	0.5	256.23 ± 0.39	12.62 ± 0.39	0.0328 ± 0.0018	0.00104
calf thymus	1	258.18 ± 0.75	13.71 ± 0.71	0.0345 ± 0.0021	0.001
M. Luteus	0	256.5 ± 0.34	15.28 ± 0.29	0.0584 ± 0.0014	0.00152
M. Luteus	0.025	256.93 ± 0.17	16.14 ± 0.18	$0.05481 \pm 6.4\ 10^{-4}$	0.00136
M. Luteus	0.05	256.51 ± 0.42	16.4 ± 0.44	0.0536 ± 0.0018	0.00131
M. Luteus	0.2	256.6 ± 0.25	15.19 ± 0.39	0.0487 ± 0.0015	0.00128
M. Luteus	0.5	256.93 ± 0.51	15.74 ± 0.34	0.0406 ± 0.0015	0.00103

		μ_5/nm	σ_5/nm	s_5	height 1
poly(dA)	0	277.94 ± 0.77	6.29 ± 0.66	$3.05\ 10^{-4} \pm 5.8\ 10^{-5}$	$1.93\ 10^{-5}$
poly(dA)	0.025	325.0 ± 16.0	19.0 ± 20.0	$2.0\ 10^{-5} \pm 1.9\ 10^{-4}$	$4.12\ 10^{-7}$
poly(dA)	0.05	257.37 ± 0.41	15.58 ± 0.46	$0.00266 \pm 1.6\ 10^{-4}$	$6.8\ 10^{-5}$
poly(dA)	0.075	268.4 ± 4.6	12.5 ± 2.1	$4.2\ 10^{-4} \pm 1.6\ 10^{-4}$	$1.32\ 10^{-5}$
poly(dA)	0.2	268.0 ± 12.0	29.1 ± 7.2	$1.53\ 10^{-4} \pm 8.5\ 10^{-5}$	$2.1\ 10^{-6}$
poly(dA)	1	254.0 ± 9.7	27.1 ± 6.2	$3.83\ 10^{-4} \pm 7.8\ 10^{-5}$	$5.63\ 10^{-6}$
poly(dA-dT) buffer	0	259.38 ± 0.76	12.12 ± 0.84	$0.00241 \pm 2.4\ 10^{-4}$	$7.94\ 10^{-5}$
poly(dA-dT) buffer	5	279.2 ± 1.1	8.92 ± 0.52	$8.4\ 10^{-4} \pm 1.5\ 10^{-4}$	$3.75\ 10^{-5}$
poly(dA-dT) buffer	20	279.76 ± 0.44	8.43 ± 0.28	$9.84\ 10^{-4} \pm 8.2\ 10^{-5}$	$4.66\ 10^{-5}$
poly(dA-dT)	0	276.13 ± 0.94	7.64 ± 0.49	$0.00149 \pm 2.7\ 10^{-4}$	$7.78\ 10^{-5}$
poly(dA-dT)	0.1	278.65 ± 0.72	6.74 ± 0.57	$5.13\ 10^{-4} \pm 8.4\ 10^{-5}$	$3.04\ 10^{-5}$
poly(dA-dT)	0.2	277.82 ± 0.84	6.51 ± 0.69	$3.45\ 10^{-4} \pm 7.9\ 10^{-5}$	$2.11\ 10^{-5}$
poly(dA-dT)	0.5	276.36 ± 0.84	7.69 ± 0.47	$4.31\ 10^{-4} \pm 6.6\ 10^{-5}$	$2.24\ 10^{-5}$
C. perfringens	0	278.78 ± 0.78	8.5 ± 0.47	$0.00167 \pm 3.2\ 10^{-4}$	$7.83\ 10^{-5}$
C. perfringens	0.1	277.71 ± 0.63	8.92 ± 0.33	$0.00193 \pm 2.2\ 10^{-4}$	$8.64\ 10^{-5}$
C. perfringens	0.2	278.91 ± 0.66	9.12 ± 0.55	$0.0022 \pm 4.5\ 10^{-4}$	$9.63\ 10^{-5}$
C. perfringens	0.5	280.76 ± 0.5	7.58 ± 0.54	$0.0013 \pm 2.9\ 10^{-4}$	$6.87\ 10^{-5}$

calf thymus	0	280.3 ± 1.0	9.29 ± 0.59	0.00394 ± 8.4 10^{-4}	1.69 10^{-4}
calf thymus	0.1	272.4 ± 3.3	18.1 ± 1.3	0.0281 ± 0.0034	6.19 10^{-4}
calf thymus	0.15	282.05 ± 0.51	8.11 ± 0.57	0.00433 ± 8.2 10^{-4}	2.13 10^{-4}
calf thymus	0.2	280.75 ± 0.74	8.79 ± 0.59	0.0059 ± 0.0013	2.66 10^{-4}
calf thymus	0.25	280.29 ± 0.67	9.52 ± 0.55	0.0078 ± 0.0013	3.26 10^{-4}
calf thymus	0.5	278.43 ± 0.82	10.0 ± 0.41	0.009 ± 0.0012	3.6 10^{-4}
calf thymus	1	280.0 ± 1.1	9.13 ± 0.61	0.0066 ± 0.0018	2.86 10^{-4}
M. Luteus	0	281.47 ± 0.72	9.46 ± 0.54	0.0078 ± 0.0013	3.27 10^{-4}
M. Luteus	0.025	282.39 ± 0.42	8.44 ± 0.4	0.00455 ± 5.0 10^{-4}	2.15 10^{-4}
M. Luteus	0.05	282.37 ± 0.81	8.88 ± 0.86	0.0047 ± 0.0012	2.12 10^{-4}
M. Luteus	0.2	281.28 ± 0.6	9.35 ± 0.45	0.0064 ± 0.001	2.74 10^{-4}
M. Luteus	0.5	282.08 ± 0.77	8.58 ± 0.64	0.004 ± 8.6 10^{-4}	1.86 10^{-4}