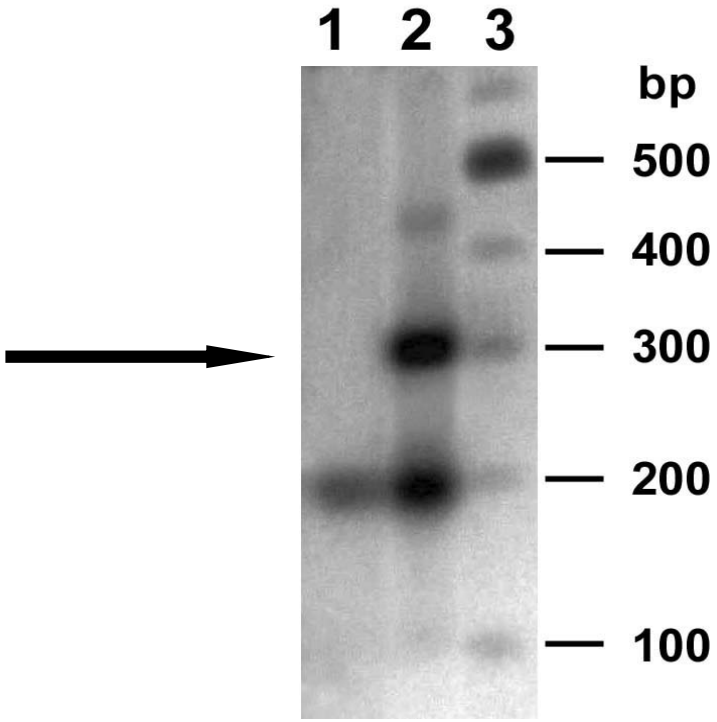
# Supplement

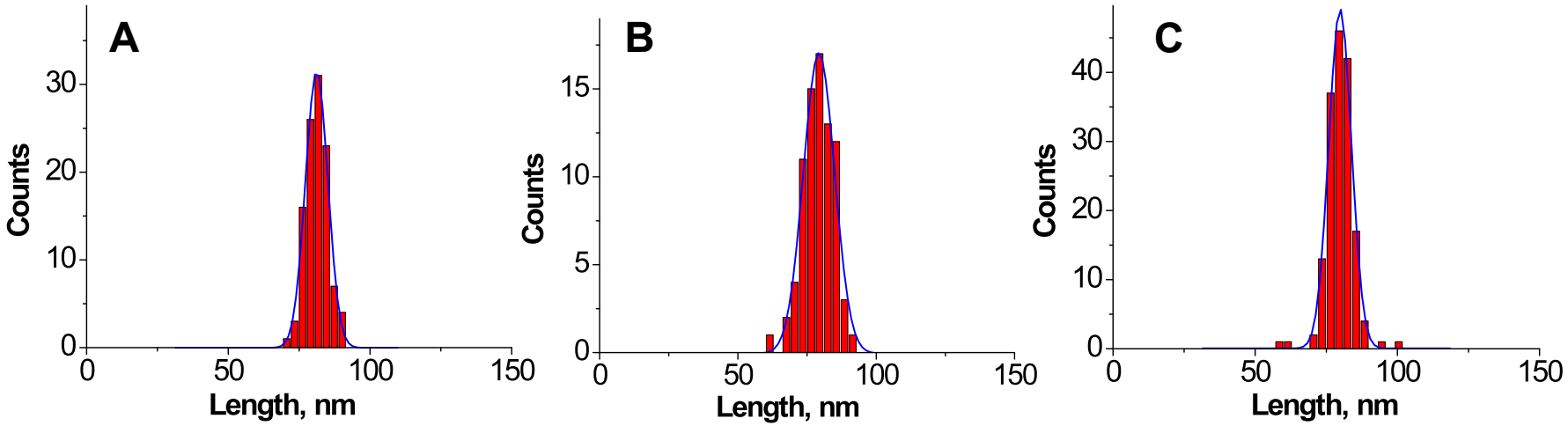



## Figure S1

3% agarose gel presents:
Lane1- 210bp dsDNA fragment,

Lane 2- 210bp dsDNA fragment ( fast migrating band) and ligated with 96-mer product ( slow migrated band), marked with the arrow,

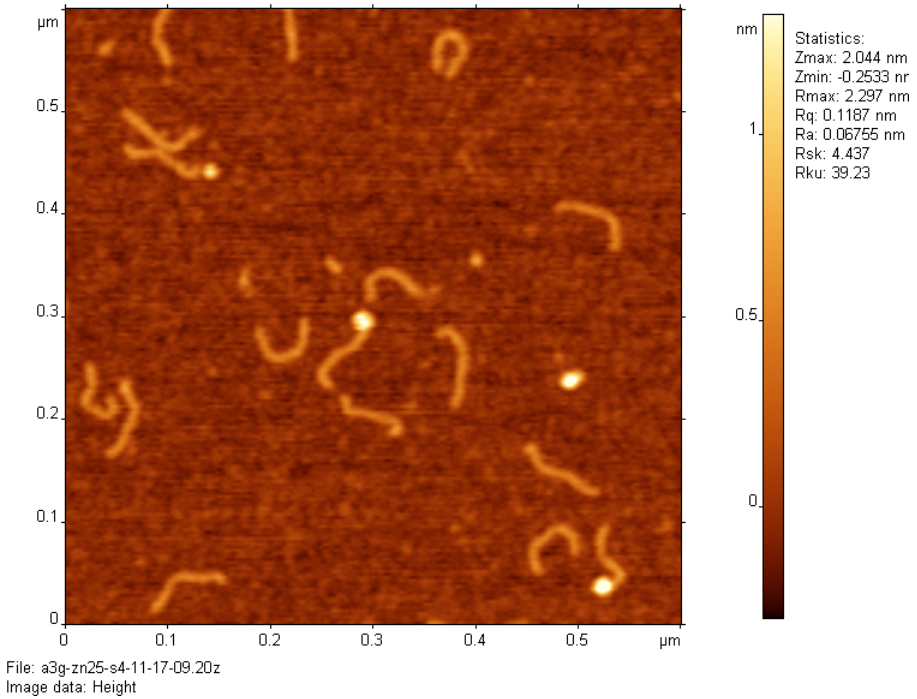
Lane 3- ds DNA marker ( New England Biolab)




## Figure S2 A,B,C

The distribution of contour lengths for DNA for samples prepared in the presence of 5mM $Mg^{2+}$. (A) The lengths of the double stranded regions of free DNA; 81.2 ± 3.9 nm. (B) The lengths of double stranded DNA in the complex with A3G; the DNA length was measured from a free end to the middle of the blob on another end ; 79.3 ± 5.6 nm. (C) The lengths of the DNA in the complex with A3G-H248 mutant protein measured similar as above; 79.9 ± 4.1 nm.

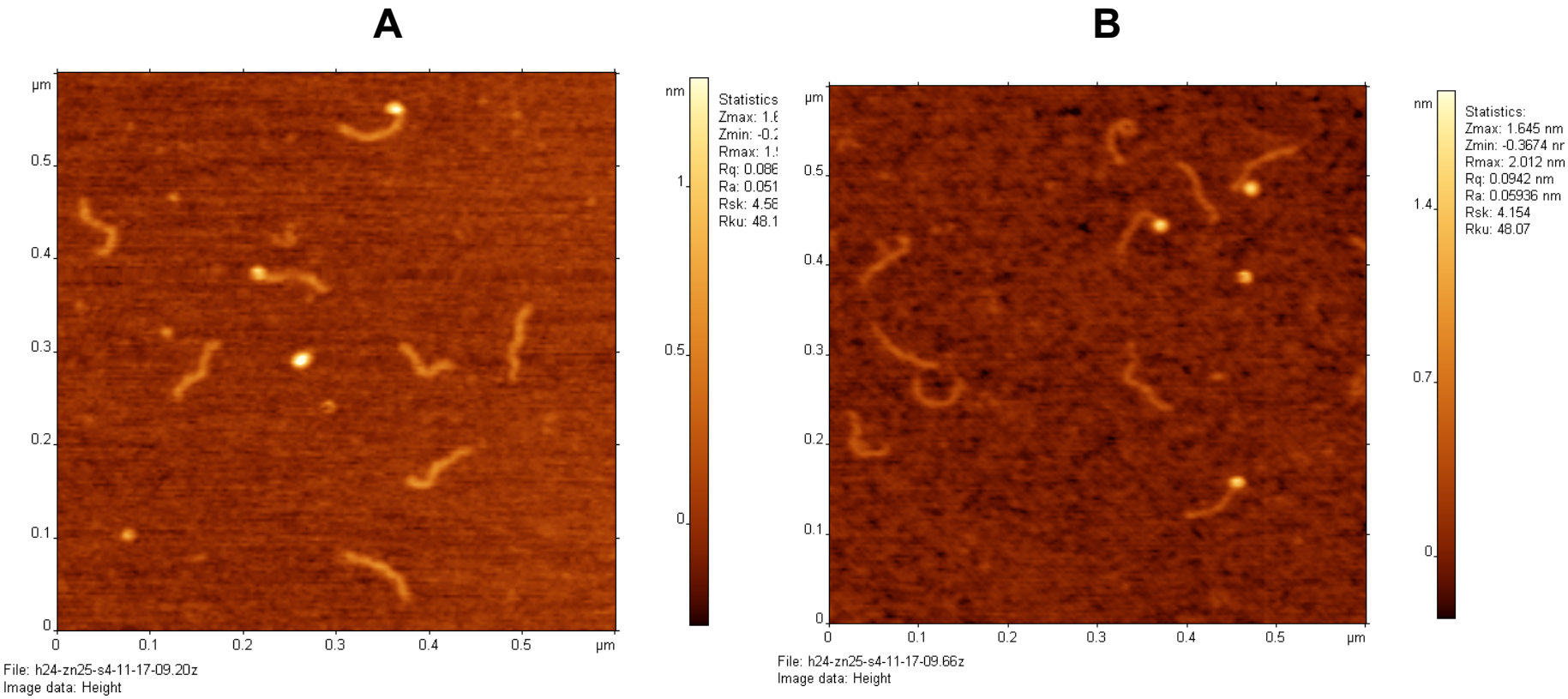
A3G- wild type




# Figure S3

AFM image of A3G wild type protein and DNA complexes formed in the presence of 25µM $Zn^{2+}$, image size 600nm.

Mutant




## Figure S4

AFM images of A3G-H248 mutant protein and DNA complexes formed in the presence of 25µM $Zn^{2+}$, image size 600nm.

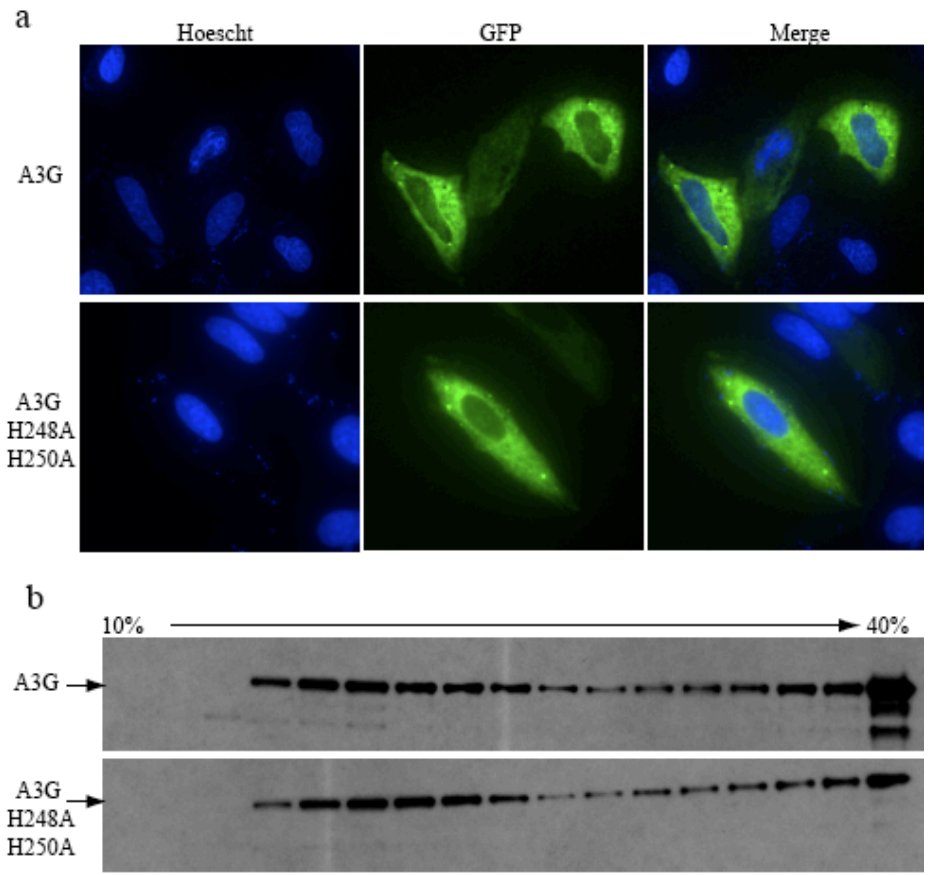



Figure S5. A3G and the mutant protein, A3G H248A/H250A, have similar localization and ultracentrifugation gradient profiles. (A) Localization of A3G and A3G H248A/H250A tagged with GFP. Nuclei are indicated in blue by Hoescht staining and proteins are fused with a GFP tag, displayed in green. (B) GFP-tagged proteins were expressed in Hela cells, loaded and spun on 10-40% glycerol gradients, fractionated and analyzed by western blot for GFP. Relatively low molecular mass complexes (LMM) fractionate closer to the 10% glycerol concentration while high molecular mass complexes (HMM) migrate farther into the gradient.

Table S1.
*Independent t-test for A3G volume with $Mg^{2+}$ (A) and A3G volume without divalent cations (B):*

| Data | Mean | Variance | Number of events |
|---|---|---|---|
| A | 159.41974 | 7572.81128 | 106 |
| B | 139.24257 | 3855.79613 | 106 |

t = -1.9432
p = 0.05333

At the 0.05 level, the two means are NOT significantly different.

Table S2. *Independent t-test for A3G- volume with $Zn^{2+}$ (C ) and A3G volume with $Mg^{2+}$ (D):*

| Data | Mean | Variance | Number of events |
|---|---|---|---|
| C | 163.46501 | 9412.40136 | 72 |
| D | 169.9122 | 9694.5733 | 72 |

t = 0.39577
p = 0.69287

At the 0.05 level, the two means are NOT significantly different

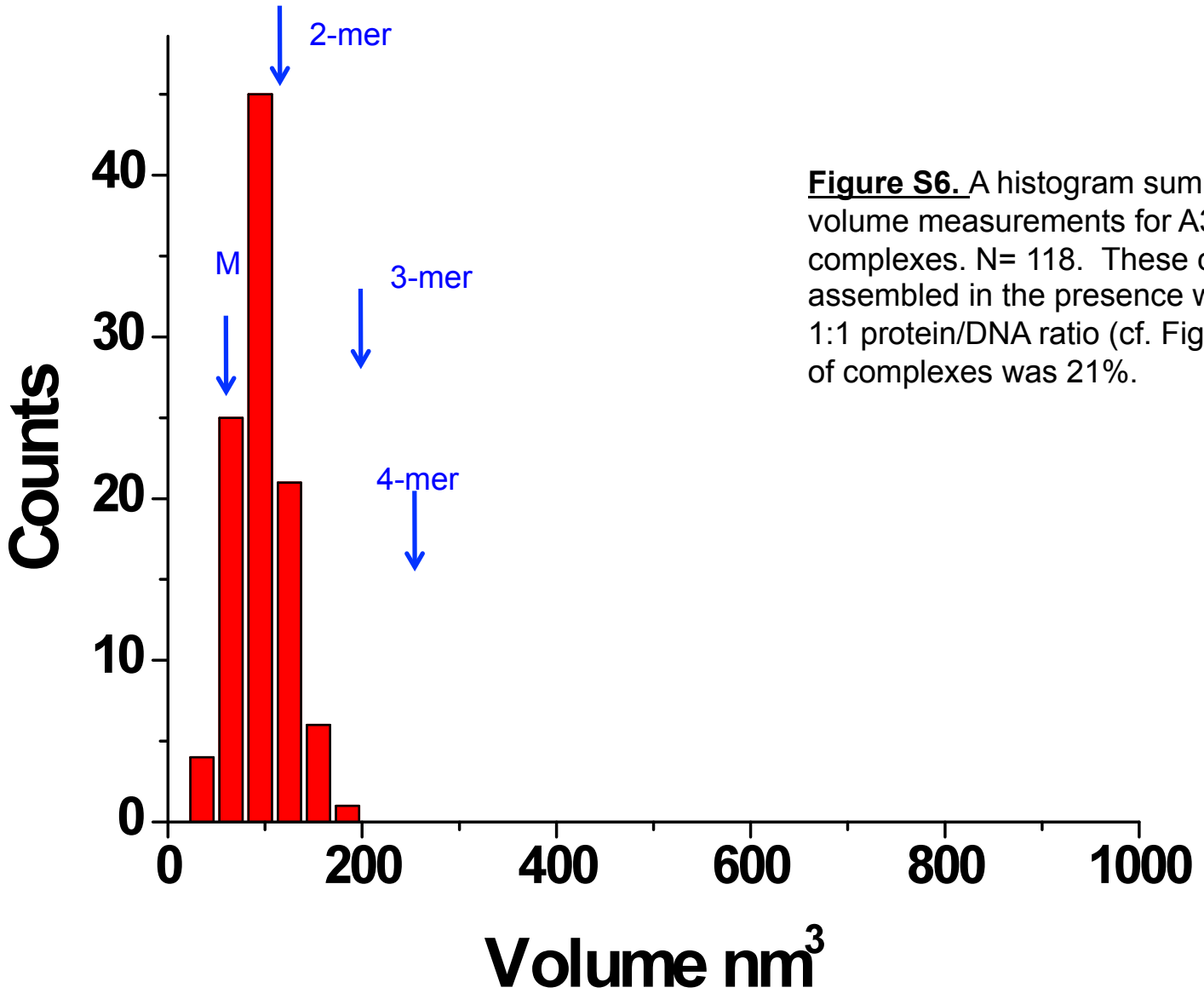



**Figure S6.** A histogram summarizing the volume measurements for A3G-ssDNA complexes. N= 118. These complexes were assembled in the presence with $Mg^{2+}$ using 1:1 protein/DNA ratio (cf. Fig. 3B). The yield of complexes was 21%.