

Supplementary Materials

Portal motor velocity and internal force resisting viral DNA packaging in bacteriophage $\phi 29$

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Effect of the $\phi 29$ DNA terminal protein (gp3) on the initiation of packaging

The native $\phi 29$ genome has a terminal protein (gp3) covalently bound to each 5' end that plays a role in DNA replication and packaging specificity (1-3). In measurements in which packaging was initiated in the optical tweezers assay with both left and right end restriction fragments of the native DNA-gp3, we found that the initial extensions of the DNA tethers were highly variable (Fig. S1A&B). This variability is most likely due to gp3-mediated formation of DNA loops (3) and suggests that packaging initiates at these junctions. In the present work, however, this variability interferes with accurate measurement of the packaged DNA length. We found that digestion of gp3 with proteinase K (Fig. S1C&D), or alternatively initiating packaging with a non-gp3 DNA substrate, eliminated this variability.

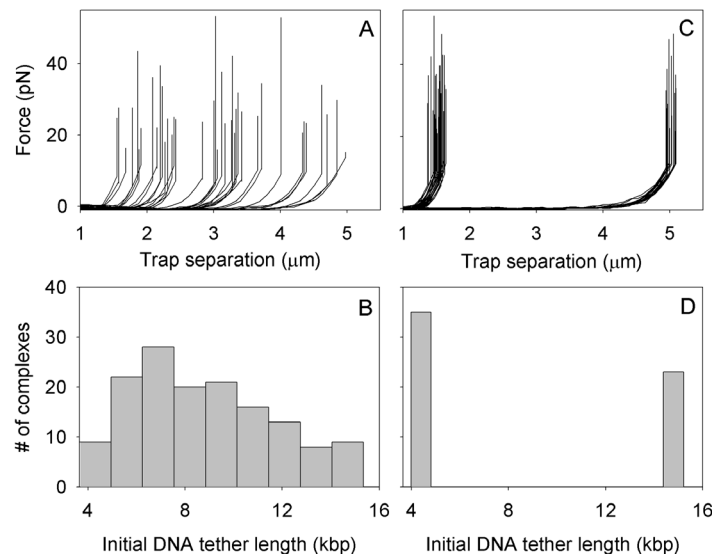


Fig. S1. Initiation of DNA packaging with tethered $\phi 29$ DNA-gp3 *SpeI* restriction fragments (a 14.9 kbp left end and 4.4 kbp right end). **(A)** Multiple measurements of force vs. trap separation showing initiation events. The trap separation was increased until the force rose to 5-10 pN whereupon the separation was fixed. The subsequent rise in force is due to the shortening of the tether due to DNA packaging. Only measurements on actively packaging complexes are shown. **(B)** Histogram of the initial DNA tether lengths for N=146 complexes with the gp3 DNA fragments. **(C & D)** Corresponding measurements for N=58 complexes after digestion of gp3 with proteinase K.

References

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