

## **Description of Additional Supplementary Files**

File Name: Supplementary Data 1

Description: Description and sequence of plasmids used in this study.

File Name: Supplementary Data 2

Description: Cryo-EM data collection and model refinement statistics.

File Name: Supplementary Data 3

Description: Sequence of chimeric TnsAB protein sequences used in this study.

File Name: Supplementary Data 4

Description: Oligonucleotides used for amplicon sequencing in this study.

File Name: Supplementary Movie 1

Description: Conformational transitions revealed by Relion Multibody analysis defining two bodies. The first body included Cas8, the DNA-RNA duplex, and all Cas7 monomers; the second body included the TniQ dimer, Cas6, and the corresponding fragment of the crRNA interacting with Cas6.

File Name: Supplementary Movie 2

Description: CryoDRGN analysis of *PseQ*Cascade flexibility visualized through k-means clustering of the latent space. Morphing between the two most populated states after segmentations into 20 clusters is shown.