

3D Rearrangement of Proteins in the Tail of Bacteriophage T4 on Infection of its Host

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The contractile tail of bacteriophage T4 undergoes major structural transitions when the virus attaches to the host cell surface. The baseplate at the distal end of the tail changes from a hexagonal to a star shape. This causes the sheath around the tail tube to contract and the tail tube to protrude from the baseplate and pierce the outer cell membrane and the cell wall, before reaching the inner cell membrane for subsequent viral DNA injection. Analogously, the T4 tail can be contracted by treatment with 3 M urea. The structure of the T4 contracted tail, including the head-tail joining region, has been determined by cryo-electron microscopy to 17 Å resolution. This 1200 Å-long, 20 MDa structure has been interpreted in terms of multiple copies of its approximately 20 component proteins. A comparison with the metastable hexagonal baseplate of the mature virus shows that the baseplate proteins move as rigid bodies relative to each other during the structural change.

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