

The Cryo-EM Structure of a Viral Nucleosome

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The organization of genomic DNA into defined nucleosomes is considered as a universal and ancestral feature of all eukaryotes. This concept has been challenged by the identification of histone homologues in the giant virus family *Marseilleviridae*, which are classified as double-stranded DNA viruses (genomes size of 300 kb-2.8 Mb) that encode histones as fused doublets. We demonstrated that viral histone doublets are localized to cytoplasmic viral factories post-infection, essential for viral infectivity, and ultimately found in mature virions. Despite the limited sequence similarity, the cryo-EM structures of viral nucleosome-like particles showed strong similarities to eukaryotic nucleosomes. However, the unique connectors that link the histone doublets contribute to the observed instability of viral nucleosomes. This further expands the range of 'organisms' that require nucleosomes and suggests a specialized function of histones in the biology of these unusual viruses.

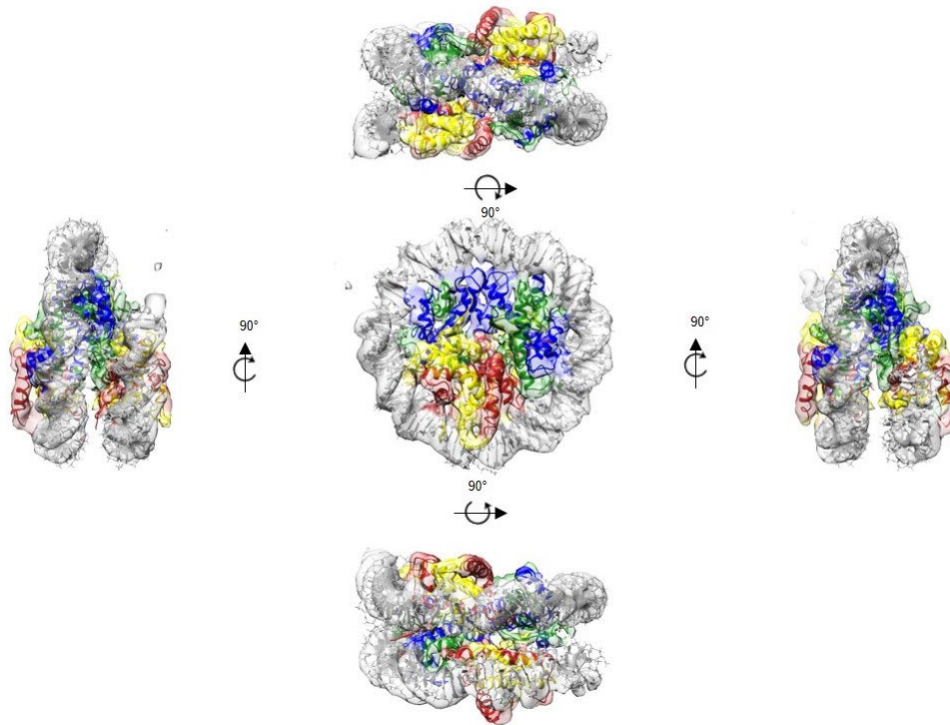


Figure 1. Overview of viral nucleosome-like structures formed by virus-encoded histone doublets.

References:

Liu, Y. *et al.* Virus-encoded histone doublets are essential and form nucleosome-like structures. *Cell*, 184, (2021).