**Unravelling of complex poxvirus structures using cryo-electron microscopy**

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Assembly of mature and infectious poxvirus requires multi-step process that involves coordination of viral proteins. Morphological descriptions of poxvirus particles at various stages of virion assembly largely owe to transmission electron microscopy of isolated virions or ultra-thin sections of cells infected with viruses. However, detailed molecular mechanism behind maturation process and the exact morphology of the virions remained enigmatic.

Thanks to recent technical breakthroughs in cryo-electron microscopy (cryo-EM), complex poxvirus structure is being studied in molecular detail. Using cryo-EM and electron tomography, we have shown that scaffold protein of vaccinia virus, prototypal poxvirus, self-assemble to govern the initiation and formation of immature poxvirus particles. Other research groups have recently demonstrated newly found coordination between the core proteins that guide the transformation from immature to mature viruses, based on cryo-EM and AI-based structure prediction schemes. Here I present basic principles of cryo-EM and how the new technology have been application on poxvirus research.