**Natural nanotechnology: protein encapsidation and delivery within virus-derived protein cages**

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Many fundamental biological processes, such as intercellular communication, metabolism and infection, are regulated by biomolecular self-assembly. We use virus-like particles (VLPs) to investigate the molecular details of protein self-assembly with the goal of tuning the pathways and products of assembly to probe the influence of geometry and spatial stoichiometry on biological interactions. This over-arching aim has arisen from exploring the potential of VLPs as protein cages in diverse application areas including biocatalysis, diagnostics and therapeutic delivery. I will present recent work to control protein encapsidation with two platforms, Bluetongue virus (BTV) core-like particles and Murine Polyomavirus (MPyV) VLPs. Each has a unique set of characteristics that define their suitability to different applications from biocatalytic nanoreactors to receptor-mediated delivery vehicles for cell engineering. This work has led us to employ an array of biophysical techniques as we try to understand and use the precision of biomolecular assembly to create new tools for discovery in biology and biotechnology.