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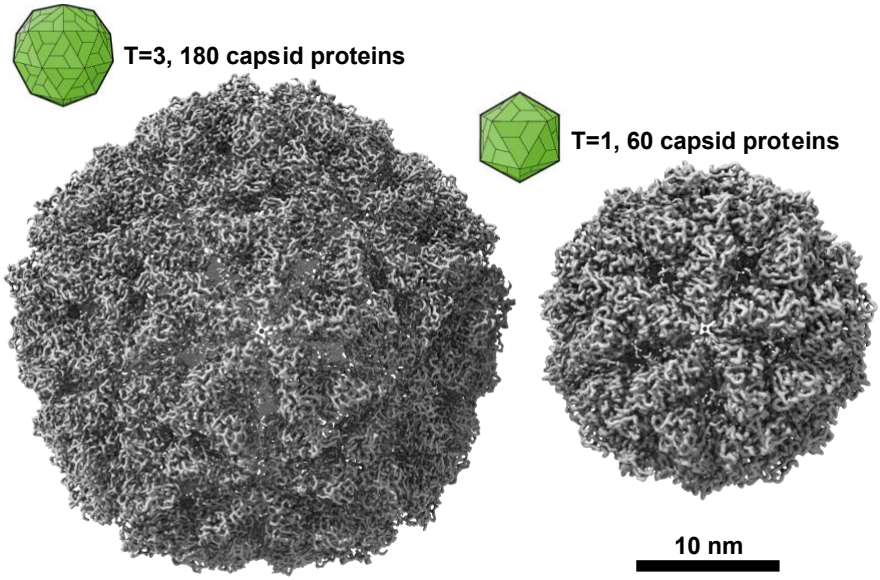
# Assembly mechanisms of an algal bloom-regulating virus

Viruses are the most abundant biological entities in the oceans. Further, marine viruses are estimated to cause $10^{23}$ viral infections per second and kill ~20% of the microorganism biomass every day. Marine viruses therefore greatly influence the composition of marine communities and is one of the biggest forces behind biogeochemical cycles.

The Okamoto lab is studying the structure of marine diatom viruses, including the ssDNA bacilladnavirus CtenDNAV-II. The CtenDNAV-II capsid is capable of forming (at least) two particle forms; a large particle consisting of 180 capsid proteins (Munke 2022) and a small particle consisting of 60 capsid proteins (*unpublished*). Both capsids are composed of the same capsid protein, and we are now interested in understanding the mechanisms behind the formation of the two particle forms. In addition, Kimura and Tomaru (2015) have observed rod-shaped virus-like particles in bacilladnavirus infected cells and suggested that they might be precursors to the mature virus. Another related and open question regarding this virus is the genome packing mechanism. The ssDNA genome of CtenDNAV-II forms a spooled structure inside the capsid (Munke 2022), an observation previously only found in viruses that pack their genome within a preformed capsid.

The student project will involve protein expression and purification, and virus-like particle assembly and stability studies. Depending of the length of the project and interest of the student, it may also involve single-particle cryo-EM and binding studies.




**References**

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Kimura, K and Tomaru, Y. Discovery of Two Novel Viruses Expands the Diversity of Single-Stranded DNA and Single-Stranded RNA Viruses Infecting a Cosmopolitan Marine Diatom, J Virol (2015)