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Size regulation of ss RNA viruses

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Under the right circumstances, single-stranded RNA viruses self assemble spontaneously from aqueous solutions containing the subunit proteins and genome molecules. While a monodisperse size distribution is common for most icosasedral viruses, the size of the spherical viral shells can vary from one type of virus to another. We study the effect of genome length, genome concentration and protein concentration on the size of spherical viral capsids in the absence of spontaneous curvature and bending energy. We find that based on the size of genome, it could be advantageous to have relatively small spherical shells with higher curvature rather than bigger and thus flatter shells. Furthermore, we find that the small ratio of genome to protein concentration could, quite interestingly, result in larger spherical shells. Experimental data on the encapsidation of model genome supports these findings.