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Virus Particle Maturation followed by SAX. John E. Johnson, Kelly Lee, Hiro Tsuruta, The Scripps Research Institute, 10550 N. Torrey Pines Rd, La Jolla, CA.

The complex protein capsids of many viruses exhibit dramatic reorganizations at critical stages in their life-cycle. Here, time-resolved solution X-ray scattering was used to investigate two stages of dynamic, large-scale conformational maturation steps of the 420 subunit, 13 MDa, icosahedrally symmetric HK97 bacteriophage capsid. The first transition was triggered by lowering the pH to 4. The analysis demonstrated that the population shift from Prohead-II to Expansion Intermediate I, EI-I (60 Å larger than Prohead-II) occurs in minutes, but does not reveal the time required for individual transitions that occur stochastically. Any intermediate forms that may be traversed during this conversion are unstable and do not constitute an appreciable population of the ensemble of particles. The second stage studied is the maturation from E-I to the final mature form triggered by raising the pH to 7. This transition is dependent on chemical cross-link formation between subunits. Like the first transition, no intermediates were found indicating that a quorum of cross-links needs to form before the transition occurs and then it proceeds without detectable intermediates.