Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Energetics of genome ejection from phage revealed by isothermal titration calorimetry MEERIM JEEMBAEVA, BENGT JONSSON, MARTIN CASTELNOVO, ALEX EVILEVITCH — It has been experimentally shown that ejection of double-stranded DNA from phage is driven by internal pressure reaching tens of atmospheres. This internal pressure is partially responsible for delivery of DNA into the host cell. While several theoretical models and simulations nicely describe the experimental data of internal forces either resisting active packaging or equivalently favoring spontaneous ejection, there are no *direct* energy measurements available that would help to verify how quantitative these theories are. We performed *direct* measurements of the enthalpy responsible for DNA ejection from phage λ, using *Isothermal Titration Calorimetry*. The phage capsids were "opened" *in vitro* by titrating λ into a solution with LamB receptor and the enthalpy of DNA ejection process was measured. In his way, enthalpy stored in λ was determined as a function of packaged DNA length comparing wild-type phage λ (48.5 kb) with a shorter λ-DNA length mutant (37.7 kb). The temperature dependence of the ejection enthalpy was also investigated. The values obtained were in good agreement with existing models and provide a better understanding of ds- DNA packaging and release mechanisms in motor-packaged viruses (e.g., tailed bacteriophages, Herpes Simplex, and adenoviruses).

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Date submitted: 28 Nov 2008 Electronic form version 1.4