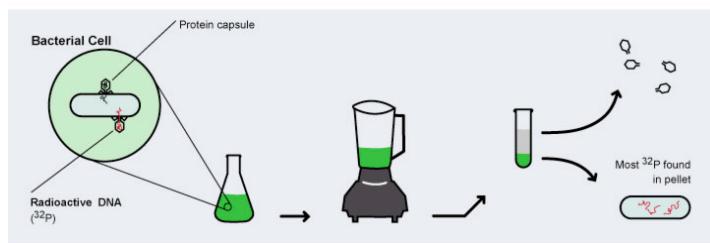
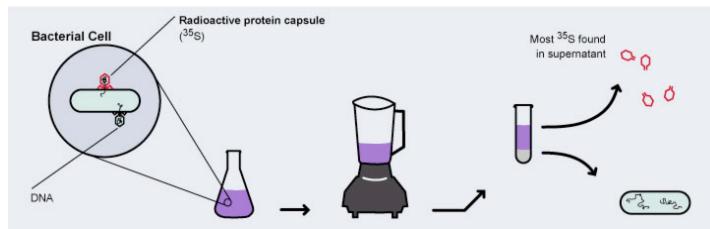


The Hershey-Chase Blender Experiment

- a simple and classic experiment!
- performed by Alfred Hershey and Martha Chase at Cold Spring Harbor Laboratory in New York in 1952
- published: AD Hershey and M Chase "Independent functions of viral protein and nucleic acid in growth of bacteriophage" *Journal of General Physiology* 36: 39-56 (May 1952)
- using *Escherichia coli* (*E. coli*) bacteria and T-group bacteriophages (phages or bacterial viruses)
- cultures of *E. coli* were grown in media that contained as the only source of sulfur, radioactive S-35 sulfur in sulfate form
- and cultures of *E. coli* were grown in media that contained as the only source of phosphorus, radioactive P-32 phosphorous in phosphate form
- such bacterial cells will have all their sulfur and phosphate, respectively, radioactive
- infect these radioactive bacteria with phages
- progeny phages will be radioactive
- phages radioactive with S-35 will have all the radioactivity confined to proteins, since sulfur occurs in two amino acids (cysteine and methionine) but not in DNA
- phages radioactive with P-32 will have all the radioactivity confined to DNA, since phosphorus occurs in DNA but not in protein
- now, new cultures of *E. coli* are infected with S-35 and P-32 phages, respectively
- allow a few minutes post-infection for phages to attach to bacteria and begin the infection process
- do low-speed centrifugation to separate any unattached phages and discard the supernatant (this step is not shown in figure)
- whirr for several minutes in blender
- the shearing forces of whirring in the blender break the virus particles away from the bacterial surface
- centrifuge to separate virus into supernatant and bacteria into pellet
- found:
- for S-35 radioactive preparation, the radioactivity is in the supernatant
- for P-32 radioactive preparation, the radioactivity is in the pellet

- conclusions:
 - viral DNA enters the bacterial cell during infection
 - viral protein does not enter the bacterial cell during infection
 - therefore, DNA must be the viral genetic material



"... Al Hershey had sent me a long letter summarizing the recently completed experiments by which he and Martha Chase established that a key feature of the infection of a bacterium by a phage was the injection of the viral DNA into the host bacterium. Their experiment was thus a powerful new proof that DNA is the primary genetic material."

The Double Helix by James Watson (page 72)