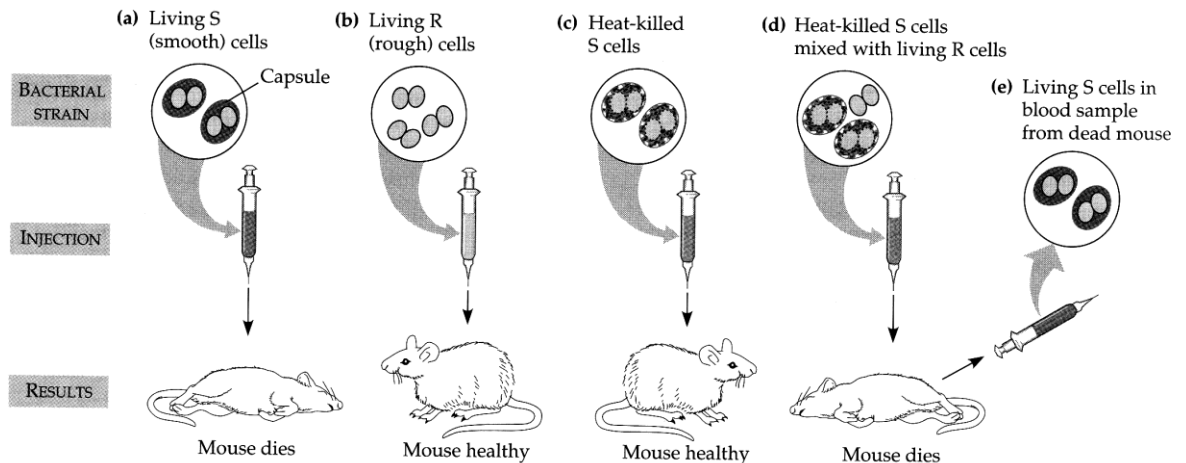


Discovering the genetic material

- Discovery of the existence of nucleic acids and DNA: late 19th and early 20th century.

- Which is the genetic material: DNA or protein? 2 series of experiments have proven that DNA is:

1., The bacterium transformation experiment (Griffith, 1928; Avery 1944)



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Figure: The bacterium transformation experiment. They experimented with two types of *Streptococcus Pneumoniae* (=Pneumococcus) bacteria: the R and S strain. The heat-killed S cells were able to transform the R cells, because the S cells' DNA, which is heat-resistant, could get into the R cells, providing new genetic information. The proteins were denatured in the heat-killed S cells, so proteins could not carry the genetic information.

2., The phage infection experiments (of Hershey and Chase, 1952)

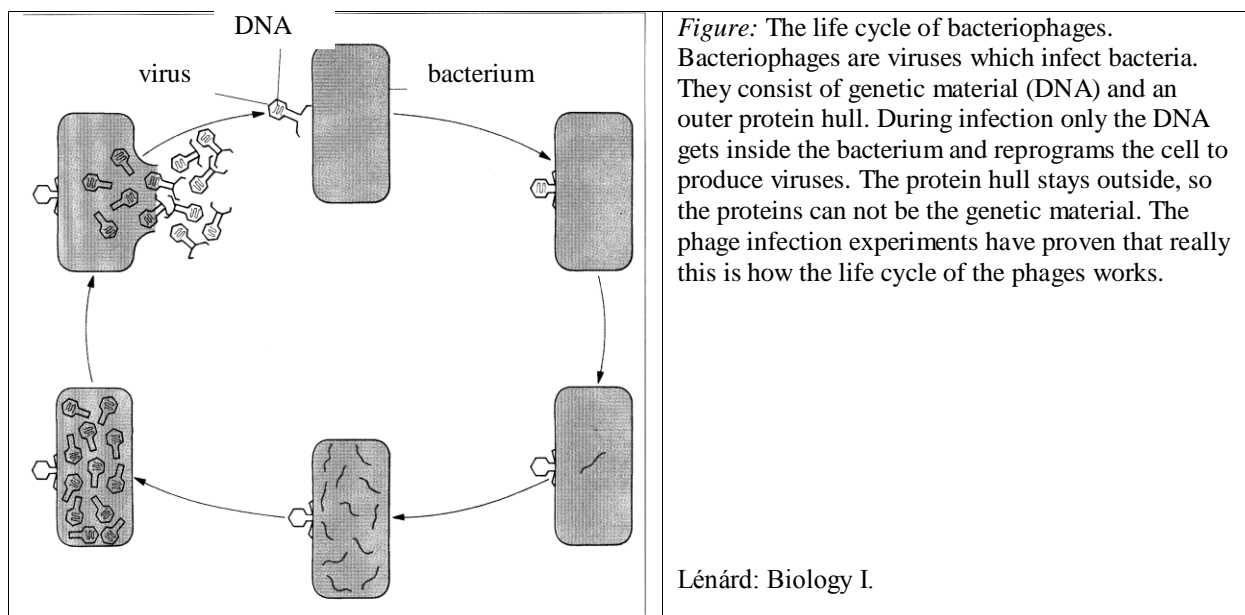
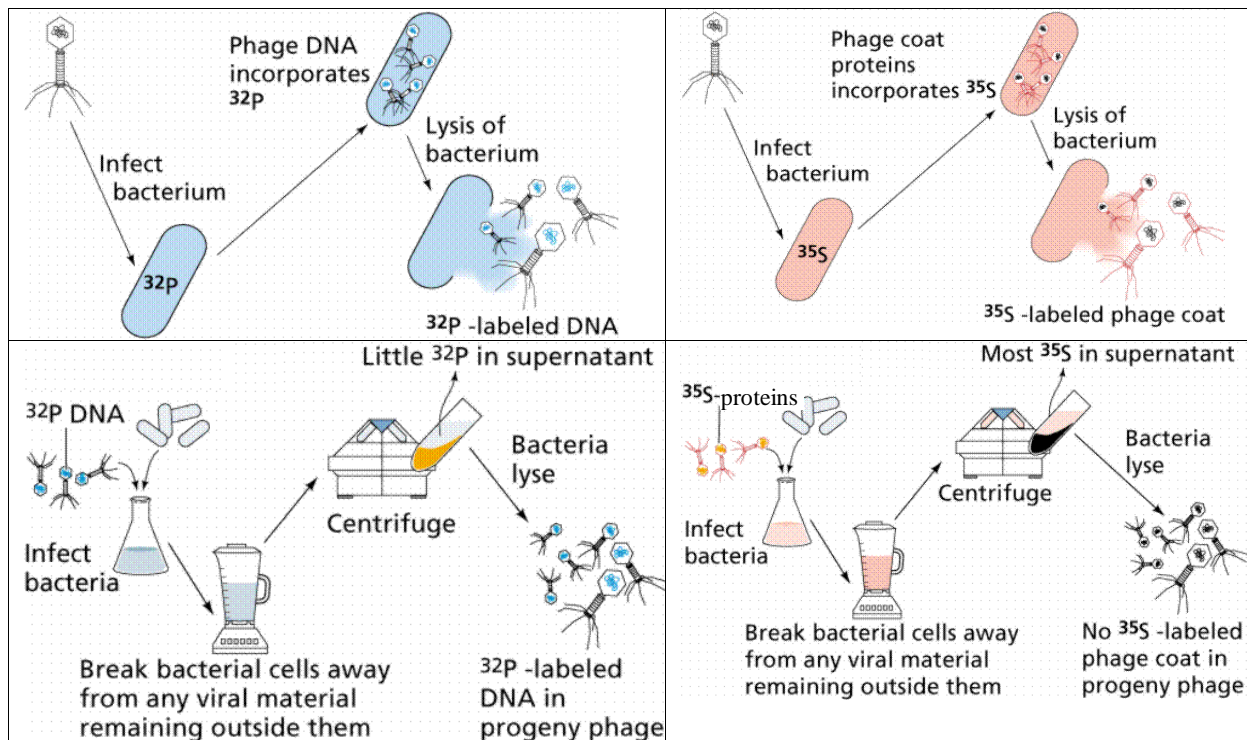


Figure: The life cycle of bacteriophages. Bacteriophages are viruses which infect bacteria. They consist of genetic material (DNA) and an outer protein hull. During infection only the DNA gets inside the bacterium and reprograms the cell to produce viruses. The protein hull stays outside, so the proteins can not be the genetic material. The phage infection experiments have proven that really this is how the life cycle of the phages works.

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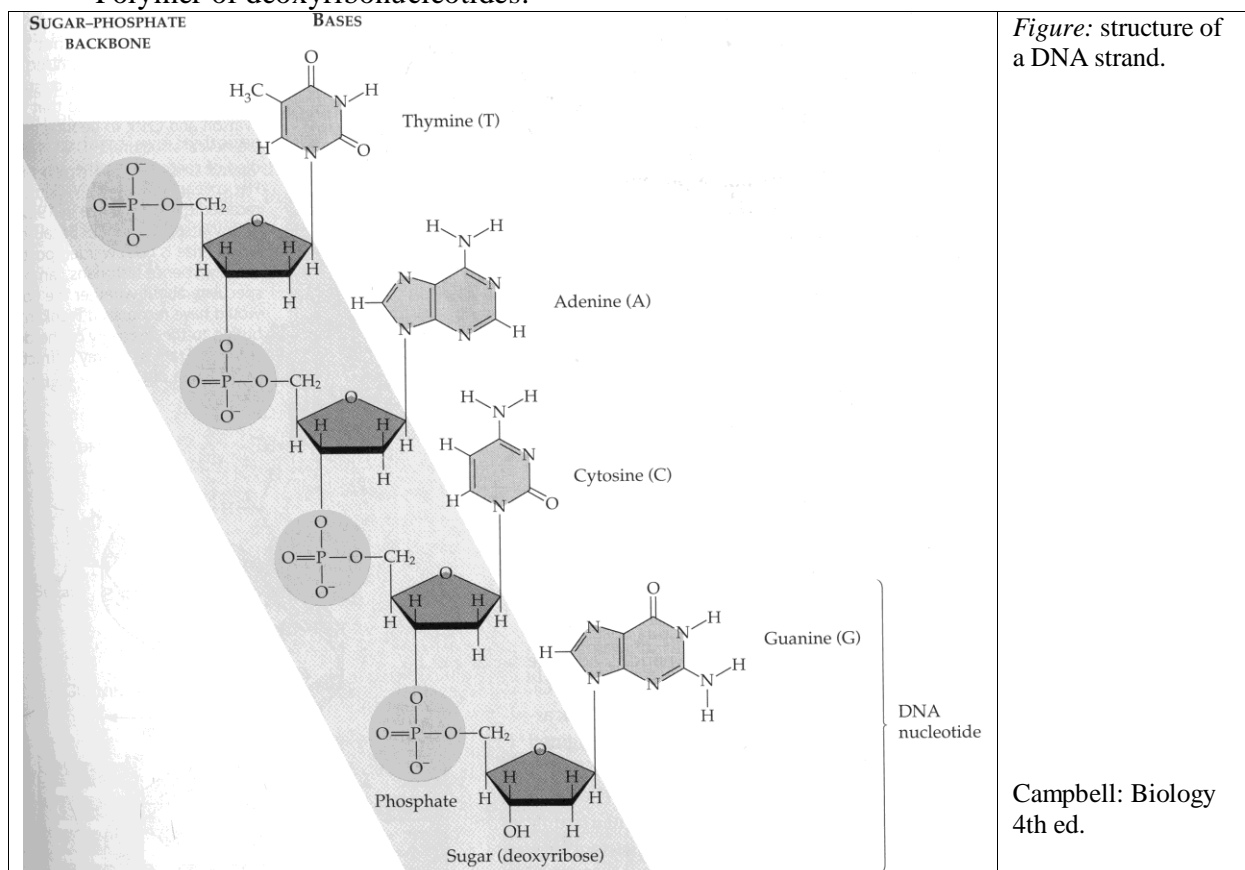


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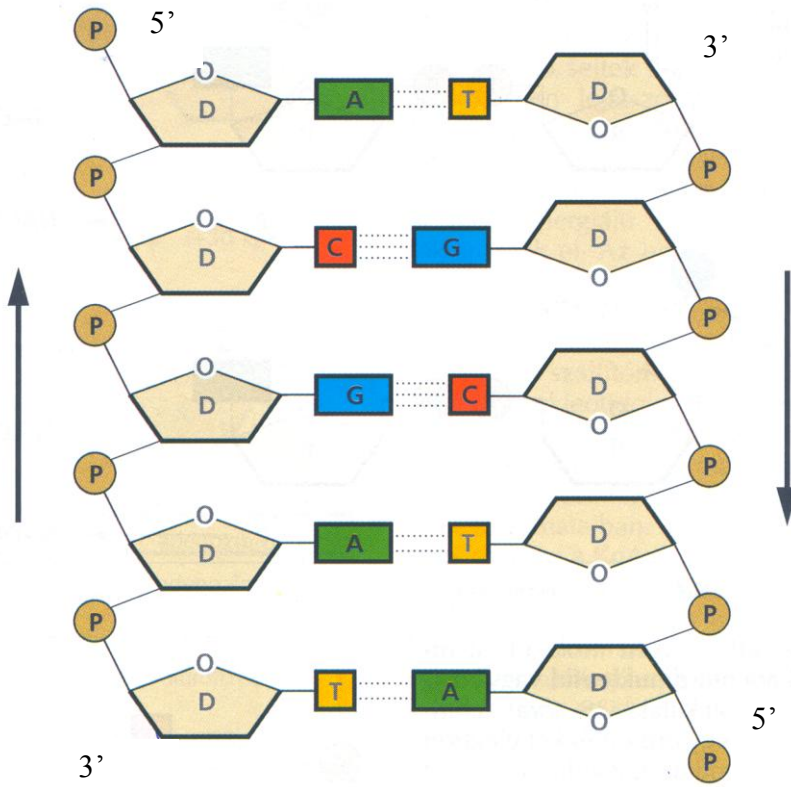
Figure: The Hershey-Chase experiments. These have proven that only the DNA of the virus gets inside the bacterium, the protein does not, so the DNA must be the genetic material. They used radioactive Phosphorus and Sulphur isotopes.

- Discovery of the structure of DNA (Watson and Crick 1953)

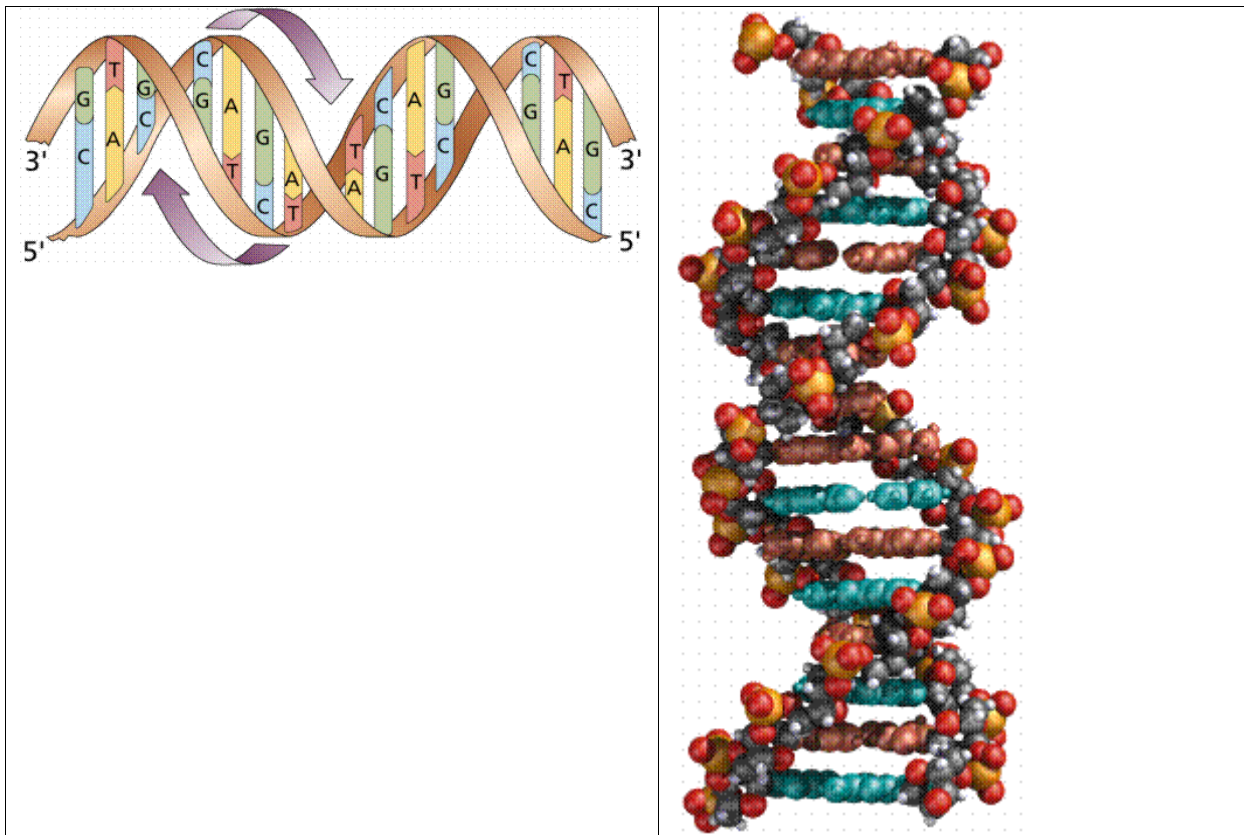
Polymer of deoxyribonucleotides:



Complementary base-pairing (relative number of purines and pyrimidines)
 X-ray crystallography has proven the double helix structure with antiparallel strands



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