

## Is DNA Replication Conservative, Semiconservative or Dispersive?

Matthew Meselson and Franklin Stahl cultured *E. coli* for several generations in a medium containing nucleotide precursors labeled with a heavy isotope of nitrogen,  $^{15}\text{N}$ . They then transferred the bacteria to a medium with only  $^{14}\text{N}$ , a lighter isotope. They took one sample after the first DNA replication and another after the second replication. They extracted the DNA from the bacteria in the samples and centrifuged each DNA sample (Figure 1).

1. What is achieved by centrifugation?

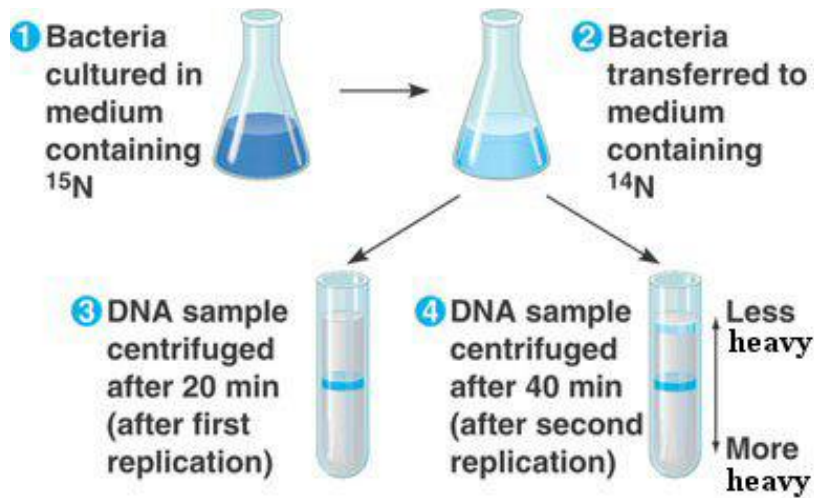


Figure 1 Experiment Protocol

Figure 2 outlines the three competing models of DNA replication. Parental DNA is dark blue; newly made DNA is light blue.

2. For each of the three models, describe the expected results from the experiment for the first and second DNA replication.

3. Use the information in Figure 3 to identify which model was ultimately confirmed by the results? Justify your response.

4. If Meselson and Stahl had first grown the cells in medium containing  $^{14}\text{N}$  before taking samples and then moved them into a medium containing  $^{15}\text{N}$  before taking samples, what would have been the result after each replication?

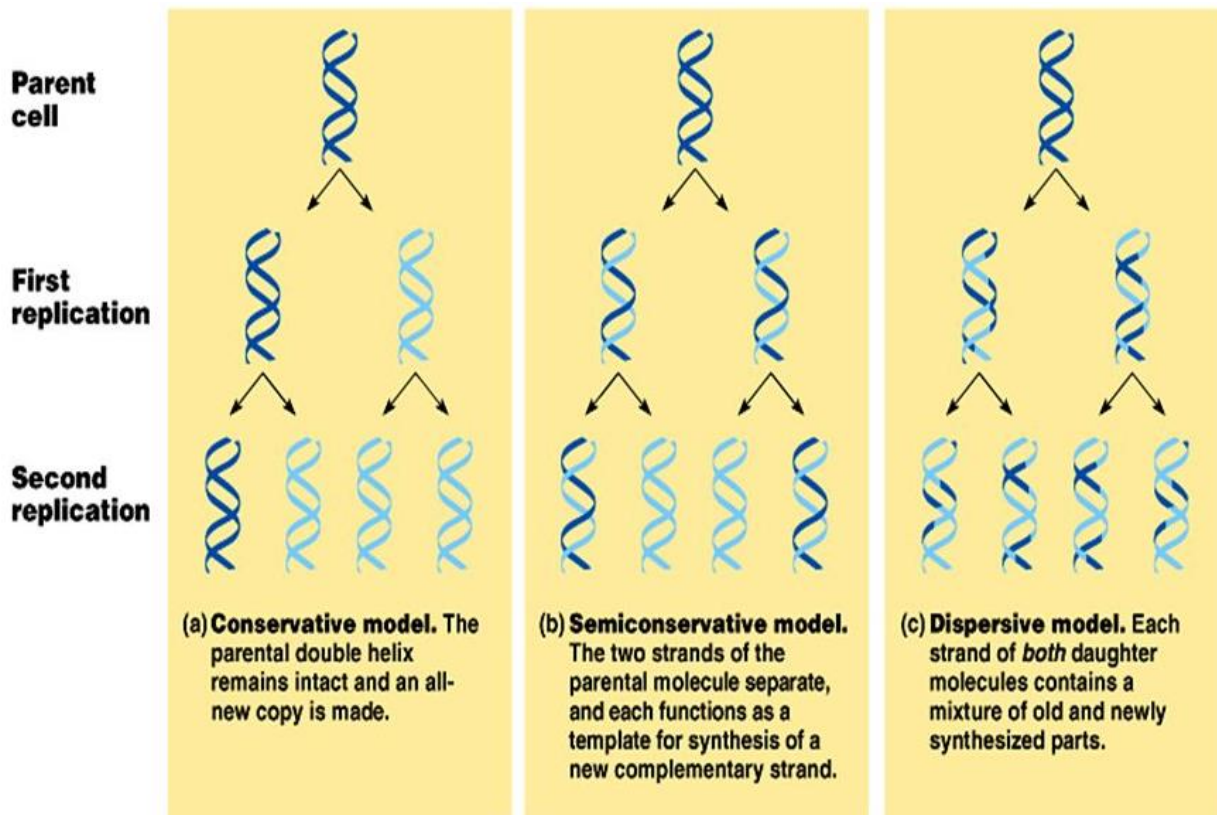


Figure 2 Three Proposed Models of DNA Replication

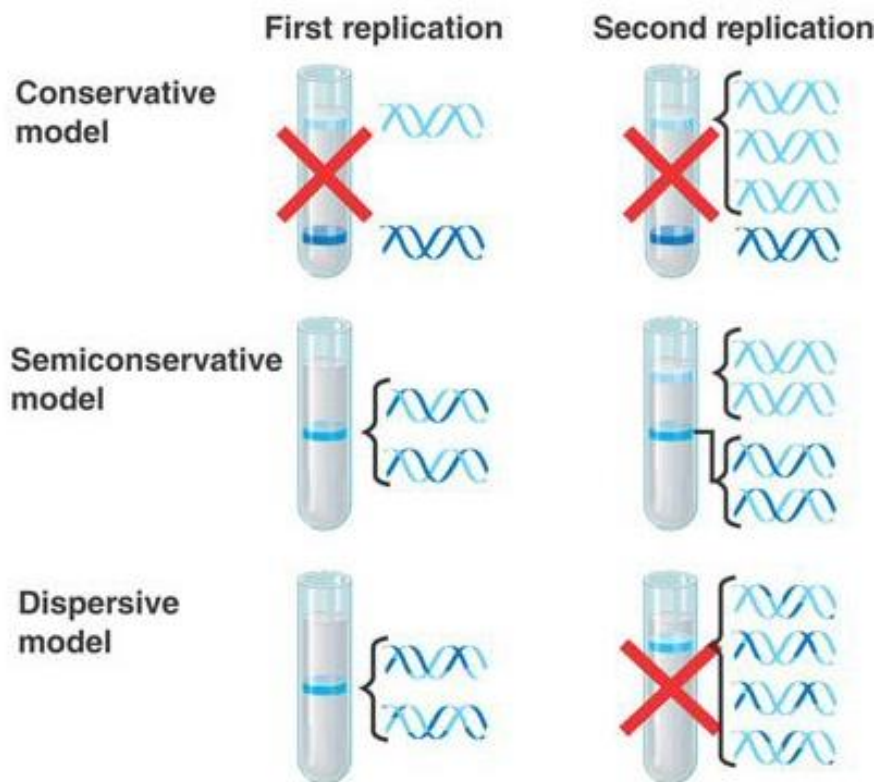


Figure 3 Predicted Results of DNA Replication