Clues in DNA

Trace how experimental evidence shaped a scientific idea.

FB.1 "Students will relate the importance of significant historical biological experiments and their impact of these on research, development, and society..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each experimental result, circle the conclusion or model it supported, and number the dated milestones in time order.

From Bacteria to the Double Helix

1. In 1928, Frederick Griffith studied two strains of bacteria. Living harmless bacteria did not kill mice, but when he mixed them with heat-killed disease-causing bacteria, mice died. He recovered living disease-causing bacteria from the mice. Griffith concluded that something from the dead cells had changed the living cells. His experiment did not identify that material. It turned a surprising result into a research question: What carries instructions that cells can pass on?

2. In 1944, Oswald Avery, Colin MacLeod, and Maclyn McCarty tested substances from dead bacteria. Destroying DNA prevented the change Griffith had observed, while destroying protein did not. This supported the claim that DNA carried hereditary information. In 1952, Alfred Hershey and Martha Chase used viruses that infect bacteria. They tagged viral DNA and protein separately and found that DNA, not most protein, entered bacterial cells. Their different experiments strengthened the case for DNA.

3. A different question followed: What does DNA look like? Rosalind Franklin's X-ray diffraction work produced images that helped reveal DNA's helical structure. In 1953, James Watson and Francis Crick proposed a double-helix model using evidence that included Franklin's work. Today, DNA sequencing reads the order of DNA bases. During an outbreak, scientists can compare samples to investigate possible links between cases. A close DNA match is a clue, not proof of how a disease spread.

2 ANSWER WITH EVIDENCE

Use the passage

1. How did Griffith's result lead to the question Avery's team tested?

2. What did Hershey and Chase's result add to the case for DNA?

3. How did Franklin's work contribute to the 1953 model?

4. How does DNA sequencing help investigate an outbreak, and what can a close match not prove?

3 YOUR TURN

Your own words

Imagine a public-health team investigating a foodborne outbreak. In four sentences, trace two dated discoveries from the passage to the team's use of DNA sequencing, and explain one limit of that evidence.

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PART 1 · READ AND MARK

Underline each experimental result, circle the conclusion or model it supported, and number the dated milestones in time order. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How did Griffith's result lead to the question Avery's team tested?	**Griffith found that material from dead bacteria changed living bacteria. Avery's team tested which substance caused that change.**
2	What did Hershey and Chase's result add to the case for DNA?	**They found that viral DNA, not most viral protein, entered bacterial cells, adding evidence that DNA carries hereditary information.**
3	How did Franklin's work contribute to the 1953 model?	**Her X-ray diffraction work provided evidence of DNA's helical structure that helped Watson and Crick propose a double-helix model.**
4	How does DNA sequencing help investigate an outbreak, and what can a close match not prove?	**Scientists compare DNA sequences to investigate links between cases. A close match alone cannot prove how the disease spread.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Griffith's 1928 experiment showed that material from dead bacteria could change living bacteria. In 1944, Avery's team found that destroying DNA blocked this change, pointing to DNA as the material. The team can compare sequenced bacterial DNA from patients and food samples to look for close matches. A match suggests a possible link, but it cannot by itself show which food caused each infection.

Accept any two accurately dated discoveries from the passage if the response connects them to DNA knowledge, proposes a use for sequencing in the outbreak, and states that a match alone does not establish how infection spread.