Tracing Inheritance

How evidence connected inherited traits to DNA

FB.1.1 "Identify and communicate the contributions of famous scientists and their experiments that formed fundamental scientific principles (e.g., Robert Hooke, Schleiden/ Schwann/Virchow, Griffith, Avery/MacLeod/McCarty, Hershey/Chase…"

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each scientist's name, circle what the scientist tested or observed, and draw an arrow to the conclusion that evidence supported.

From Pea Plants to DNA

1. In a monastery garden, Gregor Mendel crossed pea plants with contrasting traits, such as tall and short stems. He counted offspring across generations and found predictable patterns. He proposed that inherited factors pass from parents to offspring, though he could not identify the material carrying them. Charles Darwin reached a different principle by studying variation in organisms, including finches collected during a voyage. He argued that individuals with useful inherited differences are more likely to survive and reproduce. Neither scientist knew what a gene was.

2. A surprising clue came from bacteria. Frederick Griffith mixed harmless living bacteria with heat-killed disease-causing bacteria. Some living bacteria became disease-causing, and he called the change transformation. Griffith did not identify the substance responsible. Oswald Avery, Colin MacLeod, and Maclyn McCarty later tested extracts from bacteria. When they destroyed DNA, transformation stopped; destroying proteins did not stop it. This supported DNA as the transforming material. Alfred Hershey and Martha Chase then used labeled viruses to show that viral DNA, not protein, entered bacteria during infection.

3. Knowing DNA carries information did not explain its shape. Rosalind Franklin used X-ray diffraction to collect evidence about DNA's structure. Her image, called Photo 51, showed a pattern consistent with a helix. James Watson and Francis Crick used this evidence and other findings to build a double-helix model with paired bases. Their model suggested how DNA could be copied: each strand could guide the formation of a matching strand. A series of different experiments had connected inherited patterns to a physical molecule and a way to copy it.

2 ANSWER WITH EVIDENCE

Use the passage

1. What did Darwin observe, and what principle did he develop from those observations?

2. What did Griffith's experiment leave unanswered, and how did Avery, MacLeod, and McCarty investigate it?

3. What did Hershey and Chase use in their experiment, and what did their result show?

4. How did Franklin's evidence contribute to Watson and Crick's model, and what did the model suggest?

3 YOUR TURN

Your own words

Write a three-sentence museum label connecting one investigation from paragraph 1 to one from paragraph 2 or 3. Name the scientists, describe evidence from each investigation, and explain what the later work clarified about inheritance.

ANSWER KEY

Tracing Inheritance

PART 1 · READ AND MARK

Underline each scientist's name, circle what the scientist tested or observed, and draw an arrow to the conclusion that evidence supported. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What did Darwin observe, and what principle did he develop from those observations?	**Darwin studied variation in organisms, including finches. He argued that individuals with useful inherited differences are more likely to survive and reproduce.**
2	What did Griffith's experiment leave unanswered, and how did Avery, MacLeod, and McCarty investigate it?	**Griffith did not identify what caused transformation. The later team tested bacterial extracts and found that destroying DNA stopped transformation, while destroying proteins did not.**
3	What did Hershey and Chase use in their experiment, and what did their result show?	**They used labeled viruses. Their results showed that viral DNA, not protein, entered bacteria during infection.**
4	How did Franklin's evidence contribute to Watson and Crick's model, and what did the model suggest?	**Franklin's X-ray diffraction image showed a pattern consistent with a helix. Watson and Crick used that evidence and other findings to build a double-helix model that suggested how DNA could be copied.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Mendel counted pea offspring and found predictable patterns of inherited traits. Avery, MacLeod, and McCarty tested bacterial extracts and found that destroying DNA stopped transformation. Mendel's work revealed inheritance patterns, while the later experiment identified DNA as the material responsible for transformation.

Accept accurate connections between any investigation in paragraph 1 and one in paragraph 2 or 3. The label should distinguish each scientist's evidence from the conclusion drawn from it.