

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Period: \_\_\_\_\_

Weekly Reading HW

HW Wk \_\_\_\_\_

*Directions: Read and annotate the passage below. Then answer the questions.*

### Scientists Unlock Mystery in Evolution of Pitchers

No one knows whether *Homo erectus*, the early ancestor of modern humans, threw the fastball. But he could have, according to a group of scientists who offer new evidence that the overhand throw used by baseball players and snowball hurlers of all ages, is an evolutionary adaptation dependent on several changes in anatomy. They first appeared around 1.8 million years ago, when humans were most likely beginning to hunt big game and needed to throw sharp objects hard and fast.

No other primate throws with anything comparable to human force. Chimpanzees, who are much, much stronger, pound for pound, than human beings, can only throw about 20 miles per hour. Clearly, the reason is not muscle strength, according to Neil Roach, one of the authors of the study. Dr. Roach analyzed the throwing motion of 20 college athletes, who hurled baseballs at a target about 100 feet away. They analyzed the structure of the shoulder and upper arm, the motion and the forces involved, and concluded that muscles alone cannot account for how hard and fast humans throw. The shoulder, arm, and the rest of the body involved in the throwing motion must be storing elastic energy. "It works just like a slingshot would. You're actually stretching the ligaments," said Dr. Roach.

Several developments in anatomy allowed humans to throw this way, including a waist that allows twisting and a relatively open shoulder. Looking at the fossil record, Dr. Roach put the moment at which these changes came together in one body at about 1.8 million years ago, when *Homo erectus* first appeared. "It's possible that *Homo erectus* could throw as fast as we do," Dr. Roach said. He most likely threw rocks or some sharp projectile in hunting, Dr. Roach said. *Homo sapiens*, our species, did not appear until about 200,000 years ago.

The ideas that human throwing ability is unique and that it was requisite in human evolution and hunting are old news. What is new is the idea of the shoulder functioning like a slingshot. "I think it's really a great paper," said David Carrier, a biologist. He said the paper provided "a strong biomechanical basis to say we're specialized for throwing." Dr. Carrier did disagree, however, on the throwing ability of *Homo erectus*. "I don't believe that *Homo erectus* had the broad shoulders that would have given him the ability" to throw the way humans do, he said.

- (RST.9-10.2) What is the main idea of the passage?
  - Human throwing ability is unmatched by any other animal.
  - Human throwing ability involves adaptations that evolved with *Homo erectus*.
  - Human throwing ability involves waist twisting and an open shoulder.
  - Human throwing ability generates more force than that of chimpanzees.
- (RST.9-10.1) Which of the following explains why other animals cannot throw as fast as humans?

a. Lack of muscles	c. Lack of practice
b. Inability to twist at the waist	d. Inability to grasp an object
- (RST.9-10.4) As it is used in the passage, the word *requisite* means:

a. Trivial	c. Private
b. Insignificant	d. Essential

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4. (RST.9-10.1) Dr. Carrier’s opinion of Dr. Roach’s work is best described as:
- a. Overly critical
  - b. Extremely enthusiastic
  - c. Somewhat supportive
  - d. Indifferent

5. (RST.9-10.1) Explain why humans have such unique throwing ability.

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6. (RST.9-10.1) Why does Dr. Roach believe *Homo erectus* could have been able to throw as fast as modern humans?

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*Adapted from the article, “Scientists Unlock Mystery in Evolution of Pitchers” by James Gorman for The New York Times, on June 26, 2013.*

