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Weekly Reading HW

HW Wk _____

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

Mountain Populations Offer Clues to Human Evolution

In the hearts of evolutionary biologists, mountains occupy a special place. It's not just their physical majesty – mountains also have an unmatched power to drive human evolution. Starting tens of thousands of years ago, people moved to high altitudes, and there they experienced natural selection that has reworked their biology. To discover how humans have adapted to mountainous environments, scientists are now examining the DNA of mountain-dwelling people.

When people from low elevations climb to higher ones, they start struggling for oxygen. At 12,000 feet, each breath delivers only 60 percent of the oxygen that the same breath would at sea level. Even a slow walk can be exhausting because the body can get so little fuel. In the face of this stress, people respond in several ways: they produce more hemoglobin, the molecule that ferries oxygen from the lungs, and their resting heart rate increases, as does their breath rate. These adjustments help raise the amount of oxygen in the blood, but it never regains its former level. Extra hemoglobin is not a good long-term solution to life at high altitudes, because it can lead to blood clots.

Scientists visiting some of those populations have discovered a number of biological adaptations in the inhabitants' bodies. In Tibet, for example, people have broader arteries and capillaries. In the Andes, they can dissolve more oxygen into their blood and have more hemoglobin. Life in the mountains is easier for people whose ancestors have lived there for millennia. They don't suffer from altitude sickness.

Evolutionary biologists surmised that natural selection produced these adaptations as each population settled at a high elevation. People with mutations that let them withstand low oxygen levels would be more likely to survive and have healthy children. Several teams of scientists have traveled to the mountains to gather DNA samples from people and search for traces of that evolution. Dr. Nielsen and his colleagues found variants of the EPAS1 gene that were much more common in Tibetans than in other ethnic groups in the region, who have lived for thousands of years at lower altitudes. This suggests that the gene was important to adapting to life at high altitudes.

However, EPAS1 was not the only gene that was found. Another group of scientists found the gene, BHLHE41, which was common in a different group of high-altitude dwelling people. However both genes turn out to have something in common: they work together in a network of genes that lets us cope with low oxygen levels. Dr. Nielsen's study suggests that evolution has stumbled across a way to retool this pathway to help people live at high altitudes. But it turns out there's more than one way to retool a pathway.

1. (RST.9-10.2) The main idea of the passage is that:
 - a. People who live in high altitudes have a mutation in the EPAS1 gene.
 - b. People who live in high altitudes have more hemoglobin in their blood.
 - c. People who live in high altitudes are a different species than those in low altitudes.
 - d. People who live in high altitudes developed adaptations to the low oxygen conditions.

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2. (RST.9-10.1) All of the following are physical adaptations of inhabitants of high altitudes, EXCEPT:
- a. Wider capillaries
 - b. Increase in hemoglobin
 - c. Increase lung capacity
 - d. Broader arteries
3. (RST.9-10.4) As it is used in the passage, the word *surmised* means:
- a. Imagined
 - b. Reasoned
 - c. Consented
 - d. Admitted
4. (RST.9-10.2) Which of the following statements would challenge the main idea of the passage?
- a. The BHLHE41 gene and EPAS1 gene cause the body to react the same way in high-altitude conditions.
 - b. The same EPAS1 variations are also found in people living in the Swiss Alps and Ural Mountains.
 - c. Another gene variation is found to help the body acquire oxygen in those living in high altitudes.
 - d. The EPAS1 variants common in Tibetans are also found in native low-altitude dwelling people.

5. (RST.9-10.1) How is the body affected by high altitude conditions?

6. (RST.9-10.1) Why are the EPAS1 variants evidence that natural selection has acted on humans?

Adapted from the article, "Mountain Populations Offer Clues to Human Evolution" by Carl Zimmer for The New York Times, on May 30, 2013.