Human Biology
Questions for the Biology of Human Skin Color

Directions: Fill in each blank with the correct word or phrase from the word bank provided.

Word Bank

Melanin | evolution | MC1R | UV radiation | natural selection
Eumelanin | pheomelanin | folate | vitamin D | reflectometer
skin color | melanosomes | pigment | protect | genome
NASA | equator | dark | light | adaptations

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1. Human _____ is a visible marker of variability and evolved due to environmental conditions.
2. A key skin _____ is melanin, found inside tiny structures called _____.
3. The two types of melanin are _____ (brown-black) and _____ (reddish-yellow).
4. The more _____ a person has, the darker their skin.
5. Melanin helps _____ skin cells from damage caused by _____.
6. The pigment melanin forms supranuclear caps that act like little _____ to protect DNA in skin cells.
7. A device called a _____ measures how much light reflects off skin to help determine pigmentation levels.
8. The gene _____ helps switch the production from pheomelanin to eumelanin.
9. In African populations, the _____ of this gene shows little diversity, meaning dark skin has been strongly selected for.
10. Evidence suggests that all humans were _____ skinned when our species evolved in equatorial Africa.
11. Natural _____ is the process by which traits that increase survival and reproduction become more common.
12. UV radiation can destroy _____, a B vitamin important for fetal development and sperm health.

13. Dark skin protects against UV breakdown of this nutrient, which makes it an important factor in _____.
14. However, UVB rays are also needed for the synthesis of _____, important for bone health and immunity.
15. In northern latitudes, less UVB meant people with _____ skin could produce more vitamin D.
16. Populations living far from the _____ adapted biologically to lower UV exposure by developing lighter skin.
17. The data that helped map global UV exposure was collected by _____ satellites in the 1980s.
18. Lighter skin evolved independently in various populations through different genetic _____.
19. The _____ shows signs of natural selection when comparing genes across global populations.
20. Today, mismatches between skin color and environment can be addressed through cultural _____ such as using sunscreen or taking supplements.

Short Answer:

How does the evolution of human skin color demonstrate a balance between protecting against UV radiation and using it for beneficial purposes?

Answer Key: The Science of Human Skin Color

1. skin color
2. pigment
3. melanosomes
4. eumelanin

5. eumelanin
6. protect
7. UV radiation
8. parasols
9. reflectometer
10. MC1R
11. sequence
12. dark
13. selection
14. folate
15. evolution
16. vitamin D
17. light
18. equator
19. NASA
20. adaptations

Short Answer –

How does the evolution of human skin color demonstrate a balance between protecting against UV radiation and using it for beneficial purposes?

Human skin color evolved as a balance between the need to protect against harmful UV radiation, which can destroy folate and damage DNA, and the need to absorb some UVB radiation to produce vitamin D. In high UV areas (like near the equator), darker skin protects against folate loss and DNA damage. In lower UV areas (like the poles), lighter skin allows for sufficient vitamin D production. This balance reflects natural selection in response to varying solar environments.