Skin Color

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Humans come in a bedazzling array of skin colors. Colors of skin vary continuously among groups—that is, the average color of one group is slightly lighter and darker than the next. Skin color varies continuously within groups and by individuals, meaning that one individual tends to be just slightly lighter or darker than the next lightest or darkest individual. Skin color varies by age and sex. As well, skin color varies within an individual: some of us get darker; we tan when we are exposed to sunlight (Jablonski 2012).

Imagine two individuals taking walks and boat rides across seas moving southward from spots in northern Europe or Asia. One individual might start in the Orkney Islands above Scotland and another near the town of Dikson in the former Soviet Union.

The individual who started at Dikson would eventually walk through India and find skin color gradually getting darker and darker. The individual from the Orkney Islands would eventually walk through and leave Europe around Greece, cross the Mediterranean sea, and then start walking through Libya and down through the center of Africa. Like the individual from Dikson, he/she would find the very same gradual changes in skin color. But this individual would have a longer walk. Passing over the equator in Zaire, skin colors would be found to slowly lighten as the distance from the equator increased. In fact, all of our trekkers would find much the same pattern. Skin colors gradually darkens as one approaches the equator and then gradually lightens as one moves away from the equator.

If race were a good means for explaining human variation in skin color, we would expect that individuals in each race would have roughly the same skin color and that individuals in different races would have different skin colors. Yet, our classroom exercise shows that the number of mistakes is greater than imagined. This is because of the reality that dark skin colors and light skin colors are found in many places and the reality that one skin tone continuously transforms into another.

In terms of *why* skin color varies, human skin color or pigmentation is a result mostly of the amount of melanin found in skin cells called keratinocytes. Melanin, in turn, is a product of cells called melanocytes that are found between the epidermis (the outer layer of skin) and the dermis (or inner layer). The important thing to know is that skin color is directly caused by the amount of melanin. Although other things do contribute to skin pigmentation, including the amount of hemoglobin and some other pigments, melanin is the key (Jablonski 2006, 2012).

Jablonski and Chaplin (2000) have mapped the distribution of ultraviolet radiation. Ultraviolet radiation is greatest near the equator, where the distance between the sun and the earth is least. Ultraviolet radiation is somewhat greater south of the equator than at the same northern latitudes and also increases with altitude. With their refined map, this research team found a strong correlation between ultraviolet radiation and skin color.

Solar radiation and melanin are things that humans can get too much or too little of. Skin

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color, combined with habitual activities and dress, regulates how much solar radiation penetrates the skin. The problem with too much melanin revolves around making vitamin D (Loomis 1967). Ultraviolet radiation stimulates the synthesis of vitamin D in the inner layers of skin. Vitamin D is critical to the regulation of calcium and the development of bones. Not enough vitamin D during childhood leads to rickets, a debilitating disease in which the legs become permanently bowed. Rickets may permanently affect the shape of the pelvis and make it much harder to walk and, most importantly, give birth. Women who have rickets are far less likely to give birth and far more likely to have died trying. Realizing this, it is easy to perceive that vitamin D synthesis is a life-and-death matter and that through evolution the body might finely tune itself to get enough vitamin D by allowing the skin to lighten and let in more solar radiation.

If the only problem to contend with were getting enough vitamin D we could expect all of us to be very light skinned. But we are not and so melanin must have its advantages. Folate is a B vitamin that is broken down by sunlight passing through skin. An hour of intense sunlight can cut skin folate levels in half in a pale-skinned person. Epidemiological studies have clearly found that folate is extremely important to preventing birth defects. Folate is also crucial to sperm development. Jablonski (2012) makes a compelling case that folate synthesis is the primary evolutionary mechanism by which dark skin is maintained in places where ultraviolet light is great.

The evolution of skin color involves an adaptive compromise. Dark skin works well to maintain folate levels and enable people to get sufficient vitamin D in areas with lots of ultraviolet radiation, and lighter skin works well in areas with less ultraviolet radiation because it allows more ultraviolet in to produce vitamin D while not so much as to degrade folate levels. Skin color appears to have been under strong selection—that is, having the right skin color is a life-and-death matter (Jablonski and Chaplin 2000).

Skin color also varies by age, sex, body part, and season. It turns out that all of these variations provide further support for the link between ultraviolet radiation, vitamins, and melanin. Babies need a lot of vitamin D to help make bones, and they have lighter skin than older children and adults. Women need more vitamin D than men to maintain their own bones and build their baby's bones during pregnancy and lactation, and they have lighter skin than men. And, via a healthy tan, we are able to produce more melanin in response to an increase in sun exposure. All of these examples show that we are finely tuned to regulate ultraviolet radiation.

In the future, we may refine our understanding of the mechanisms linking environments and evolution to skin color. That said, it is clear that skin color variation provides no support for the idea of biological races. What skin color exemplifies is a far more complex and dynamic story about how we adapted.

SEE ALSO: Color Consciousness; Eurocentricity

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