

Research indicates our skin color is evolutionary gateway to vitamin D

April 24 2015, by Mark Roth, Pittsburgh Post-Gazette



Human skin structure. Credit: Wikipedia

All over the world, millions of people see skin color as a symbol of superiority or inferiority, whether they are conscious of it or not. Others see humanity's array of skin tones, from white to ocher to black, as a positive mark of our remarkable diversity. But Nina Jablonski sees skin color, first and foremost, as an evolutionary gateway to vitamin D.



Jablonski, the Evan Pugh professor of anthropology at Penn State University, has made a name for herself with her research on how human <u>skin color</u> evolved from the earliest humans to today's multiple hues. The short version: Our skin color is primarily designed to regulate how much sunlight we let into our bodies to produce vitamin D, which is important for bone health, safe pregnancies and a strong immune system. In a related way, it also keeps too much ultraviolet radiation from destroying folate in women's bodies, which can lead to certain birth defects.

In general, she has found, the skin color of ancient people matched up well with the amount of sunlight that bathed the regions in which they settled. Those in the tropics had darker skin; those in temperate zones had lighter skin. That worked fine for the thousands of years when people spent most of their time living and working outdoors, she said.

But then two things happened. First, modern technology allowed people to settle all over the world, creating mismatches between skin color and sunlight.

"You've got people from England moving to Australia; people from West Africa moving to Finland. You have this dramatic movement of people to environments to which they are poorly adapted from a solar perspective."

Another modern development, urbanization, means people are spending more and more time indoors.

From a health perspective, these trends have had a bigger effect on darker-skinned people, she said. Lighter-skinned people can adapt to sunny climates by using sunscreen to prevent skin cancer and folate problems and yet still get enough of the ultraviolet B radiation that triggers vitamin D production.



"If you're a darkly pigmented person living in a far northern place or living in a city and not getting much sun exposure, though, then we are not addressing the problem of likely vitamin D deficiency," Jablonski said.

Lisa Bodnar, a researcher at the University of Pittsburgh's Graduate School of Public Health, has found this trend in her studies of pregnant women.

Bodnar, who has a doctorate in nutrition, has found that women who have vitamin D deficiencies are more likely to deliver babies early or get the dangerous condition of preeclampsia, which causes a woman's blood pressure to spike and often leads to premature delivery of her child.

Even using the most conservative guidelines of how much vitamin D women should have, Bodnar said, nearly half of African-American mothers have vitamin D deficiencies, compared with just 10 percent of Caucasian mothers.

Adding to this picture is a study Jablonski and colleagues in South Africa have been conducting among residents of Cape Town.

Among darker-skinned South Africans, she said, the more time they spend indoors, the lower their vitamin D levels, and the weaker their immune systems.

The good news, she said, is that vitamin D supplements can reverse these trends.

Jablonski began her career studying fossils of primates and how they evolved into the first humans.

But she wasn't particularly focused on skin color until a colleague asked



her to give a public presentation on the topic and she had to delve into the issue more deeply.

Now, it is the subject she is best known for, including a TED Talk video that has been viewed nearly 740,000 times.

When early humans first began to walk upright, she said in an interview at her offices at Penn State, "they spent a lot of their time running away from predators," which meant they needed to find a way to efficiently dissipate body heat. They did that by shedding their fur and using sweat to help cool their bodies, she said. This, in turn, exposed them to the intense sunlight of the African savanna.

At first, she said, early humans would have had white skin. "But when our skin became functionally naked, we had to deal with this hot sun. Hair is an excellent sunscreen. If you get rid of most of your body hair, you have to compensate. This is when we see the evolution of permanent dark pigmentation in the human lineage."

The earliest humans emerged around 2 million years ago, she said. By 1.2 million years ago, they had become uniformly dark-skinned.

Even before that, though, some <u>early humans</u> had left Africa for less sunny climates in Europe and Asia. To get enough vitamin D, their skin needed to become lighter so more <u>ultraviolet radiation</u> would penetrate their bodies.

Yet in some places, those changes are relatively recent.

New research by Iain Mathieson at Harvard University, revealed at a recent meeting of the American Association of Physical Anthropologists, showed that early hunter-gatherers in what are now Spain, Hungary and Luxembourg still had dark skin 8,500 years ago,



according to Science magazine. Eight-hundred years later, one group in southern Sweden already had genes that coded for lighter skin, and then, farmers from the Near East who had lighter complexions moved into Europe, began intermarrying, and quickly spread genes for paler skin.

In some cases, Jablonski said, an ethnic group's skin color has changed more than once as it migrated.

An example are the forebears of Native Americans, who would have started out with lighter skin in northern Asia but became darker after moving to North and Central America. "In the last 15,000 years," she said, "they moved into high ultraviolet conditions, and we see increasing tanning abilities - different genes being turned on to deal with increased solar intensity."

That is why the whole idea of racial categories makes no sense to her.

"If a particular skin color has evolved two, three or five times independently, that classification you've just created is a bunch of nonsense. That skin color doesn't appear exclusively in a certain group, so it is terribly misleading to use skin color to partition people into groups."

In doing research for her 2012 book, "Living Color: The Biological and Social Meaning of Skin Color," she learned that the preference for lighter skin evolved for two different reasons over history.

In early agricultural societies, where most people were darker skinned, "if you were of higher status, you could afford to spend time indoors and your relatively lighter skin would be an indication of your higher socioeconomic status."

Later, when European nations became more powerful, their explorers



went to Africa and other tropical areas looking for cheap labor, "and they were astonished by the darkness of the people." Using allusions in the Bible to light as a symbol of good and darkness as a symbol of evil, she said, "that became part of their justification for treating darker people with a less than human status ... and this was the beginning of heinous racial prejudice and the justification for slavery."

Marcus Rediker, a Pitt historian who has written extensively about the slave trade, said that in some ways, slavery actually created the idea of white and black races.

When the African slave trade accelerated in the 1700s, the slave ship crews often were a motley collection of Europeans, Africans, Americans and others, and yet "when they got to the shores of Africa, all of those sailors were known as the 'white people,' even the ones of African descent." In a similar way, Africans from many different tribes were thrown together onto slave ships, "and when they were unloaded on the other side of the Atlantic, they were members of the 'Negro race.'"

That illustrates, he said, "how race is fundamentally connected to issues of social and economic power. I think what's happening now is people are challenging that coupling."

Jablonski is saddened by the way these racial classifications have persisted.

"I don't use mid-18th-century directional implements in my car; I have a GPS. Why are we following guidelines created by 18th-century thinkers who had their own personal, emotional biases? It is illogical and just plain stupid for us to persist in these categories."

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