Genetic study demonstrates that racial classification by skin color has no scientific basis

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A new study, published in the journal *Science* ("Loci associated with skin pigmentation identified in African populations," 12 October 2017), elucidates the genetic mechanisms controlling human skin color and demonstrates that racial conceptions regarding skin color and its supposed marking of distinct groupings of human beings have no scientific foundation.

The traditional view has been that early humans had dark skin as an evolutionary adaptation to protect themselves from the dangerous ultraviolet radiation of the harsh African sun. As humans spread to other continents and higher latitudes, where solar input was less intense, lighter skin developed to permit greater production of vitamin D, an essential nutrient, which is produced in the skin using sunlight. However, the actual geographic distribution of populations with varying skin tones does not neatly fit this simple scenario. The new research, while not denying this mechanism, reveals a much more complicated picture.

Until recently, while the basic factor leading to variation in skin tone due to differing concentrations and kinds of the pigment melanin was known, there was very little understanding of the biological basis of how an individual's skin color was determined, and most of that was based on studies of European populations, providing only a very narrow view of the total range of variation. As the birthplace of humanity, Africa has the most diverse human gene pool (populations there having had the longest time for genetic variation to develop) and is, therefore, likely to provide useful data on genetic variation, including that influencing skin color.

The data used in the new research, conducted by a team of nearly 50 co-authors from more than a dozen different institutions in the US and several African countries, was derived from a study of 2,092 volunteers in Tanzania, Ethiopia and Botswana, of diverse ethnic and genetic backgrounds. Their skin color was measured and the genomes of 1,570 people were analyzed in detail. This resulted in the identification of six genetic regions (genes) that are, in combination, significantly associated with determination of an individual's skin color, collectively accounting for 29 percent of the observed variation. Each of the gene loci has variants (alleles) associated with different skin tones, ranging from relatively lighter to darker. The results were then compared with existing genetic data from West African, Eurasian, and Australo-Melanesian populations.

The fact that 71 percent of the variation is unaccounted for by the genes identified so far strongly suggests that the genetic determination of skin color is even more complicated than the current research has disclosed. Significantly, most of the variants, for both light and dark skin, were found to have originated in Africa. It is also important to note that the identified genes are located on several different chromosomes, indicating that their transmission is not closely linked in reproduction.

The actions of the various genes were tested by introducing them into lab mice and zebrafish, and observing the results.

The finding that skin color is controlled by multiple genes, each with a range of variants, demonstrates conclusively that any individual's coloration is the result of a complex mix of multiple factors, dialectically interacting with each other. Each person's exterior appearance (phenotype) is the expression of a

balance resulting from the combination of this genetic color palate (genotype). Furthermore, this may not simply be an additive process. As with so many other biological characteristics, some gene variants, singly or in combination, may be dominant in their expression over others, known as recessive, making the outcome even more complex.

In addition to clarifying the genetic mechanisms controlling skin color, the analysis also provides insights into the evolutionary history of these mechanisms. According to the study, at least some of the variants are quite old, having evolved hundreds of thousands of years ago. With regard to variants associated with lighter skin color, seven are at least 270,000 years old and four are over 900,000 years old. One of the latter is found both in Europeans and San hunter-gathers of Botswana.

Among the significant implications of this finding is that these variants either coincide with or substantially predate the appearance of modern humans, which occurred 200,000 to 300,000 years ago. In other words, a complex variation in skin color has been part of human evolution for a very long time.

Another finding is that at least some skin color genes have changed significantly over time. Three of the variants that produce the darkest skin appear to have evolved from lighter color versions. Another variant, which originated relatively recently among people in Europe and the Middle East, has spread into Africa, possibly in association with migrations of early agriculturalists.

It is likely that the wide range of skin color variation originally evolved as small early human populations adapted to a myriad of local environments, influenced by many different selective factors. Subsequent population movements, spanning hundreds of thousands of years, including interbreeding between modern humans, Neanderthals and perhaps other local populations, mixed and remixed the genetic pool, creating an array of physical characters that often were only partly reflective of the environmental settings where they wound up.

As one of the study's authors, Sarah Tishkoff, points out, chimpanzees, our closest living evolutionary relatives, are light-skinned below their body hair. So, it is likely that early hominins were similarly light-colored and that darker skin developed later, once they moved from forested areas onto the savannah.

The multiplicity of genetic controls over skin color means that there are no fixed categories based on this essentially superficial characteristic. The myriad array of skin tones that currently exists across the globe merely reflects a moment in the constantly changing variation that has typified human evolution over millions of years.

As with numerous other scientific studies, this latest research confirms, yet again, that the concept of race among humans is a social construct without any objective biological basis. Those who view skin color as a marker of distinct racial groupings, associated with other characteristics such as intelligence, choose, consciously or unconsciously, to ignore the vast range of variation that exists among contemporary humans. The study published in *Science* demonstrates forcefully that the genetic control over the color of a person's skin is extremely complex and, therefore, not susceptible to simplistic classification.

That is not to say, however, that racism has no objective basis, although it is social and not biological. In capitalist society, racial, ethnic, religious, and linguistic distinctions have been and continue to be a weapon in the hands of the ruling class to keep workers divided in the face of class-based oppression.