

Towards an Understanding of the Nature of Racial Prejudice

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Abstract— We discuss a possible biological explanation of the phenomenon of color-prejudice that hinges on the relative advantages and disadvantages in the expression of the strongly dominant gene(s) for melanin under ice-age conditions at different locations on the Earth. An understanding of the genesis of this prejudice could hopefully eradicate or ameliorate its worst manifestations in modern society.

Keywords: race — color prejudice — genetics — ice ages — human evolution

At the close of a century of enlightenment, it may seem strange that racial prejudice, particularly color prejudice, remains one of the strongest untamed human emotions. The prejudice surfaces in an unseemly manner whenever there is a breakdown of educational constraints or inhibitions. While we all agree that discrimination based on skin color is unacceptable in a civilized multicultural society, a proper understanding of the underlying prejudice would surely be of value in combating its worst manifestations.

It is an irrefutable fact that human evolution over the past 2 million years has led to the emergence of two disparate groups of people, one fair skinned, the other dark skinned. The former group now occupies countries in northern latitudes that were on the borders of glaciers during ice ages, and the latter mainly occupy temperate and equatorial regions. The difference in appearance between these groups hinges on a variable efficiency in the production of the pigment melanin. Melanin is produced in a special group of cells known as the melanocytes that are located at the base of the epidermis, and although the density of such cells remains more or less invariable, the efficiency of melanin expression is highly variable. A multiplicity of genes appears to be involved in melanin production, and the overall situation for melanin expression is strongly dominant in humans. Conversely the situation for non-expression of melanin by the melanocytes is highly recessive. Without strong natural selection for preserving the battery of relevant genes in tact, the darker colors of humans would be expected to fade into lighter hues.

The present-day situation for maintaining selective pressures for melanin expression rests on a razor's edge between two competing effects. On the one

hand, melanin as a pigment protects the base of the skin from being damaged by ultraviolet radiation from the Sun which in extreme instances leads to carcinomas of the skin. On the other hand, an adequate penetration through the skin of ultraviolet radiation with wavelength of 3130A is needed for the production of vitamin D (Kobayashi & Yasumura, 1973). While the latter requirement is not too relevant in the present day with high levels of nutrition generally, it would have been a strong selective factor for survival in harsher prehistoric times. With lower levels of dietary acquisition of vitamin D, the lack of an adequate absorption of sunlight would lead to the crippling disease of rickets. In this disease severe bone deformities result from the lack of vitamin D, a substance that plays a crucial role in the absorption of calcium from food. The correct level of pigment expression depends on the available ultraviolet flux at any given location at a given time. The balance is between rickets causing skeletal deformities (osteomalacia) with a consequent lower fecundity, and excessive sunburn radiation leading to skin cancers with attendant high levels of mortality.

The higher incidence of skin cancers in lighter skinned Caucasian migrants in the tropics is well attested. Likewise a high incidence of rickets has been recorded in black and Asian populations living in northern latitude countries before the large-scale introduction of vitamin supplements into staple foods. At the beginning of the century, rickets was reported to affect 90% of black infants in New York (Hess & Unger, 1917). Even as recently as the 1970's, high rates of incidence of rickets have been recorded in children of Asian immigrants living in Britain, as for instance in a Glasgow based study (Dunningan *et al.*, 1962; Ford *et al.*, 1972). The intensity of sunlight available to Asian immigrants in countries like the United Kingdom is obviously mismatched to their expressed pigment level, although nowadays this defect is generally compensated by routine food fortifications and vitamin D supplements (Dept. of Health and Social Security Report No. 19, 1979). Needless to say, such dietary supplements were unavailable in prehistoric times.

Throughout human evolution over a time span of 2 million years, the Earth was locked in a semi-permanent Ice Age (Hoyle, 1981). Warmer interglacial remissions lasting for a brief 10,000 years or so were interspersed at average intervals of about 100,000 years throughout a glaciated Pleistocene epoch. The last glacial episode ended abruptly about 10,000 years ago, possibly due to the impact of a small cometary body. During the ice ages, the average temperature of the Earth's surface was about 10 degrees Celsius colder than today, and ice sheets were about three times as extensive as they are in the present day. Ice age conditions were dry and dusty, with low evaporation and precipitation rates; possibly some 30 times lower on the average than at the present time. White skinned Nordic tribes living close to the edge of rugged windswept ice sheets under gray skies would have been eking out a precarious existence, grabbing whatever food could be gathered and utilizing every photon of ultraviolet from the sun in order to stay alive and free of rickets. For

them survival was crucially contingent upon having their genes for melanin suppressed. For people living in the tropics, however, the drier ice-age conditions with less cloud cover than at present would have made for a remorseless flood of ultraviolet radiation to be incident on their skins. Survival for them was contingent on the fullest expression of their melanin genes, being as black as they possibly could.

In the course of random migrations, the white populations living at the edge of ice sheets would have been at risk through random mating with people possessing darker skins. Black-white mating would have tended to produce offspring with darker skins and thus more prone to rickets. Fewer of these malformed children would reach reproductive age, so black-white mating posed a real extinction threat to the white races. Under such circumstances the emergence of mating prohibitions and color prejudice would be a natural outcome. The prejudice would become deeply ingrained in social traditions, language, mythology and religion. Thus the depiction of Satan as a black figure cannot be regarded as accidental, nor the association of evil generally with blackness.

These considerations can be stated in a wider, more general form. Where any community is called on to maintain itself under hostile physical conditions, the gene structure of the community will become gradually changed so as to give maximum adaptation to the conditions in question. This will preclude any peaceful mixing of two communities that have become separately tuned to different sets of conditions. The effect is to produce strong prejudices against any group of immigrants into a larger group that has become well matched genetically to its environment.

The above arguments do not immediately apply to all forms of racial prejudice, however. There are many bitter conflicts between groups of people of similar color, even between racially identical tribes. Anti-Semitism that culminated in the tragic Holocaust is perhaps the most striking example of same-color prejudice in recent times. In this instance one cannot rule out the possibility that anti-Semitism is a relic of color prejudice that survived from the time when a darker skinned ancestral Jewish tribe of Judah took possession of the promised land. In other instances racial prejudice could be attributed to xenophobia, an aversion to the intrusion of foreign customs, religions and traditions. One might think that this latter type of prejudice is basically of a simpler form and would be overcome through coexistence. The same will not be true for a prejudice that might be thought of as being genetically mediated.

Prejudice of this kind, of which color-prejudice of the present day is an example, are of great antiquity and are therefore very deep-rooted. They may go back in time for periods exceeding ten thousand years, ten times longer than the time scales giving rise to religious beliefs, and a hundred times longer than the time scales associated with empires and dynasties. Since it is the latter, which give rise to rules, regulations and laws, it is apparent that seeking to change beliefs of great antiquity by adjustments of law alone is likely to prove ineffective. Only by understanding the logical source of a deep-rooted, social-

ly obtrusive prejudice such as color prejudice, does it seem possible to change it in a peaceful way.

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References

- Dunningan, M. G., Paton, J. P. J., Haase, S., McNicol, G. W., Gardner, M. D. and Smith, C. M. (1962). Late rickets and osteomalacia in the Pakistani community in Glasgow. *Scottish Medical Journal*, 7, 159.
- Ford, J. A., Colhoun, E. M., McIntosh, W. B. and Dunningan, M. G. (1972). Rickets and osteomalacia in the Glasgow Pakistani community. *British Medical Journal*, 2, 677.
- Her Majesty's Stationary Office (1979). Department of Health and Social Security Report on Health and Social Subjects: *Rickets and Osteomalacia*, No. 19.
- Hess, A. F. and Unger, L. J. (1917). Prophylactic therapy for rickets in a negro community. *Journal of the American Medical Association*, 69, 1583.
- Hoyle, F. (1981). *Ice*. London: Hutchinson.
- Kobayashi, T. and Yasumura, M., J. (1973). Studies on the ultraviolet irradiation of provitamin D and its related compounds. *Nutritional Science and Vitaminology*, 19, 123.