

Re: Review of The Extended Phenotype

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"Michael Ragland" <ragland37@webtv.net> wrote
Chapter two, "Genetic Determinism and Gene Selectionism", is by far the weakest chapter in the book. Essentially Dawkins argues that he is not a genetic determinist (he has often been so accused) because he admits that the environment interacts with genes to shape behavior. However, in the sense that Dawkins likes to postulate genes that incline (if not force) animals, including humans, towards specific behaviors, Dawkins obviously is a genetic determinist. It is true that the phrase "genetic determinist" often had (and has) connotations of racism and reactionary politics, and it is understandable that the non-racist, non-reactionary Dawkins would want to clear himself of unpleasant characterizations. However, there must be some descriptive term for Dawkins' belief that behaviors can be explained in terms of specific (albeit always conveniently unknown) genes that were selected for on the basis of influencing specific behaviors. If not "genetic determinism", then what?

Malcom:

The problem is that the liberal left is so focused on politics that they don't bother to define what a "genetic determinist" is in scientific terms.

Ragland:

That's because there is no "scientific definition" of genetic determinism.

Malcom:

If it means that the phenotype is wholly determined by the genes, with no environmental influence, no matter how extreme, then of course no one is a genetic determinist.

Ragland:

Yet there are some people who believe such ideas.

Malcom:

However if we just mean that, for many traits, everyday environmental influence can be ignored, then skin colour for Negroes, for instance, is genetically determined, but for white people less so, since whites

respond to sunshine by producing pigment.

Ragland:

Actually pigmentation is a result of both the environment and genes.

Here's an article on the subject:

Skin Color Adaptation

Human skin color is quite variable around the world. It ranges from a very dark brown among some Africans, Australians, and Melanesians to a near yellowish pink among some northwest Europeans. There are no people who actually have true black, white, red, or yellow skin.

These are commonly used terms that do not reflect biological reality.

Some of the variation in human skin coloration (Sub-Saharan African, Indian, Southern European, and Northwest European)

Skin color is due primarily to the presence of a pigment called melanin

Both light and dark complexioned people have this pigment.

However, two forms are produced—pheomelanin, which is red to yellow in color, and eumelanin, which is dark brown to black. People with light complexioned skin mostly produce pheomelanin, while those with dark colored skin mostly produce eumelanin. In addition, individuals differ in the number and size of melanin particles. The latter two variables are more important in determining skin color than the percentages of the different kinds of melanin. In lighter skin, color is also affected by red cells in blood flowing close to the skin. To a lesser extent, the color is affected by the presence of fat under the skin and carotene, a reddish-orange pigment in the skin.

Melanin is normally located in the epidermis, or outer skin layer.

It is produced at the base of the epidermis by specialized cells called melanocytes.

Cross section of human skin

(colors are not true to life in this illustration)

Nature has selected for people with darker skin in tropical latitudes, especially in nonforested regions, where ultraviolet radiation from the sun is usually the most intense. Melanin acts as a protective biological shield against ultraviolet radiation. By doing this, it helps to prevent sunburn damage that could result in DNA changes and, subsequently, melanoma—a cancer of the skin. Melanoma is a serious threat to life. In the United States, over 54,000 people get this disease every year and nearly 8,000 of them die from it. Those at highest risk are European Americans. They have a 10 times higher risk than African Americans.

Ultraviolet radiation reaching the earth usually increases in summer and decreases in winter. The skin's ability to tan in summertime is an acclimatization to this seasonal change. Tanning is primarily an increase in the number and size of melanin granules due to the

stimulation of ultraviolet exposure.

Irish boy who
is unable to tan

While skin tanning is often most noticeable on light complexioned people, even those with very dark brown skin can tan as a result of prolonged exposure to the sun. However, some northwest Europeans have lost the ability to tan as a result of relaxed natural selection.

Their skin burns and peels rather than tans. They are at a distinct disadvantage in tropical and subtropical environments. Not only do they suffer the discomfort of readily burning, but they are at a much higher risk for skin cancer.

It would be harmful if melanin acted as a complete shield. A certain amount of shortwave ultraviolet radiation (UVB) must penetrate the outer skin layer in order for the body to produce vitamin D3. Approximately 90% of this vitamin in people normally is synthesized in the skin with the help of ultraviolet radiation. The remaining 10% comes from foods such as fatty fish. Vitamin D3 is needed for the intestines to absorb calcium and phosphorus from food for bone growth and repair. Calcium is also necessary in adults to maintain normal heart action, blood clotting, and a stable nervous system. However, too much ultraviolet radiation penetrating the skin may cause the break down of folic acid (or folate—one of the B vitamins) in the body, which can cause anemia. Pregnant women who are deficient in folic acid are at a higher risk of having babies with neural tube defects. Because folic acid is needed for DNA replication in dividing cells, its absence can have an effect on many body processes, including the production of sperm cells. It may be that the ability to produce melanin was selected for in our early human ancestors because it helped preserve the body's folic acid supply in addition to reducing the chances of developing skin cancer.

People who live in far northern latitudes, where solar radiation is relatively weak most of the year have an advantage if their skin has little shielding pigmentation. Nature selects for less melanin when ultraviolet radiation is weak. In such an environment, very dark skin is a disadvantage because it can prevent people from producing enough vitamin D3, potentially resulting in rickets disease in children and osteoporosis in adults. Women who had prolonged vitamin D3 deficiencies as girls have a higher incidence of pelvic deformities that prevent normal delivery of babies.

The Inuit people of the American Subarctic are an exception. They have moderately heavy skin pigmentation despite the far northern latitude at which they live. While this is a disadvantage for D3 production, they apparently made up for it by eating fish and sea mammal blubber that are high in D3. In addition, the Inuit have been in the far north for only about 5,000 years. This may not have been enough time for significantly lower melanin production to have been selected

for by nature.

In the United States and other developed nations, milk is now usually fortified with vitamins D3 and A in order to prevent developmental problems such as those described above. However, the popularity of soft drinks and other alternatives to milk among children along with a decrease in the amount of time spent outdoors under the sun has led to a considerable rise in the rate of rickets disease.

There is also a strong correlation between the amount of sunlight that children are exposed to and whether or not they will develop multiple sclerosis as adults. Most cases of this degenerative neural disorder are in the temperate regions of the world where the sunlight is rarely intense. Children growing up in tropical and subtropical regions hardly ever develop MS regardless of where their ancestors came from. This protection apparently continues for those who move to far northern or far southern regions after 16 years of age.

What processes are responsible for this protection from MS and its possible relationship to skin color are unknown.

New research by Nina Jablonski and George Chaplin has led to the discovery that women generally produce 3–4% less melanin in their skin than do men in all populations of the world. They suggest that this is probably due to the fact that women have far higher calcium requirements during their reproductive years. Mate selection preference and other cultural practices may also be partly responsible for this gender difference in skin coloration.

Skin Color Distribution Around the World

Before the mass human migrations of the last 500 years, dark skin color was mostly concentrated near the equator and light color progressively increased further away, as illustrated in the map below. In fact, the majority of dark pigmented people lived within 20° of the equator. Most of the lighter pigmented people lived in the northern hemisphere north of 20° latitude.

(Data for native populations collected by R. Biasutti prior to 1940.)

Such a non-random distribution pattern of human skin color was predicted by Wilhelm Gloger, a 19th century naturalist. In 1833, he observed that heavily pigmented animals are to be found mostly in hot climates where there is intense sunshine. Conversely, those in cold climates closer to the poles commonly have light pigmentation. The relative intensity of solar radiation is largely responsible for this distribution pattern.

There are exceptions to Gloger's rule in the animal kingdom. In some cases, these are due to the fact that the survival value of having a camouflaged body can be more important than the selective pressures of ultraviolet radiation. Among humans, mate selection preferences may

counter some of the evolutionary trend in skin color predicted by Gloger. The Inuit case described earlier suggests that diet may also be a significant factor in some societies. In the United States today, milk is regularly fortified with vitamin D to reduce the likelihood of children having calcium deficiencies. Despite this effort, some segments of the population still have high rates of calcium deficiency—especially African Americans and the elderly.

NEWS: In the April 2001 issue of the journal *Pediatrics*, there is a report concerning malnutrition among children in the state of Georgia that indicates there is a high frequency of rickets disease, especially among African American children. This previously rare condition, which is caused by vitamin D3 deficiency, is making a comeback. There are now about 200,000 cases of it in Georgia. The study suggests that the dramatic increase in frequency is mainly due to three things: drinking milk substitutes that do not contain vitamin D3, the failure to supplement breast milk, and insufficient exposure to sunlight. The popularity of carbonated soft drinks may also contribute to the problem because they usually contain phosphoric acid which can hinder bone growth.

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Malcom:

With the exception of a few Negroes like Michael Jackson, with very unusual environmental influences, all will be darker than all Europeans.

Ragland:

Yes, even though African Americans and other African immigrants in northern countries live they haven't been there evolutionarily for a long time. Take the case of the Inuit: "The Inuit people of the American Subarctic are an exception. They have moderately heavy skin pigmentation despite the far northern latitude at which they live.

While this is a disadvantage for D3 production, they apparently made up for it by eating fish and sea mammal blubber that are high in D3. In addition, the Inuit have been in the far north for only about 5,000 years. This may not have been enough time for significantly lower melanin production to have been selected for by nature."

Malcom:

Now skin colour is so easily and objectively measured that no one can deny how the system works.

Ragland:

Actually, there is no such thing as "white" skin, "black" skin, "yellow skin". Those are social constructs which don't reflect biological reality.

Malcom:

Behavioural characteristics are much more difficult to measure, and much more politically sensitive. However an environmental determinist claims

that any negative characteristics of Negro behaviour are necessarily and wholly caused by the environment alone, because the political implications of claiming otherwise are not acceptable. This is an ideological and anti-scientific position, though for specific aspects of behaviour the environmental determinist may turn out to be right. "Genetic determinist" is often used of anyone who is not an extreme environmental determinist, for these politically-sensitive traits. In fact even the ideology is suspect. For instance if poor Negro school performance is caused largely by their high rate of single parenting, there is a strong argument that nothing should be done to reverse the consequences of these lifestyle choices. On the other hand if the poor performance is due to genetics, then an "equal opportunities" policy would leave few or no Negroes in positions of responsibility, which may not be socially desirable, so some form of affirmative action may be called for.

Ragland:

You sound like an old crusty conservative prejudiced fart. I can assure you when it comes to an area like human intelligence it is going to be a long time before we have scientific validation for genetic mechanisms involved in it. But there is a danger of acquiring partial and flawed knowledge on the so-called genetic markers for intelligence in the future and inappropriately using DNA testing on students and marginalized and disenfranchised groups in society. I may sound like a liberal left weenie to you but I suggest you look at the past history of eugenics/genetics. And if you sympathize with that history all I can say is you're not alone.

Malcolm:

(Just for the record, I don't deny that any given behavior could in principle be influenced by specific genes — I just think that such claims should only be made on the basis of experimental evidence concerning the genes and behaviors in question.

Ragland:

How generous of you! I don't think such claims should only be made on the basis of experimental evidence. I think such scientific research needs to be scientifically validated, especially before it is turned into public policy. Now if scientists want to report their experimental findings in journals and other media that's fair but it shouldn't be stipulated that in principle such and such behavior could be influenced by these genes. They need to publish their research and keep their mouths shut such and such behavior could be influenced by these genes....based on experimental evidence. Now when they go beyond experimental research on a particular area and gradually acquire more and more knowledge to the point they can scientifically prove such and such a behavior is influenced by these genes...then I have less of a problem when it comes to making public policy but still a major problem.

MR:

Simply assuming that genes for behaviors must exist is as intellectually

bankrupt as assuming that life on other planets must exist.)

Malcom:

The behaviour is caused by the nervous system, which is to a very great extent genetically specified. The exception may be that subset of human behaviour which we attribute to "free will". So if a bee flaps her wings in response to rising temperatures in the hive, we can assume that there is a gene or set of genes which has evolved under selective pressure for that behaviour.

Ragland:

I don't think the author was making the case there aren't biological factors involved in behaviors. I think he was taking a shot at Dawkins assumption "genes" cause behaviors when actually the biology is much more complex and such "genes" do interact with other "genes" and collectively with the environment.

Malcom:

Actually finding the genes, and determining how they exact their influence, is of course a wholly different matter and a very hard thing to do. With the exception of the knee-jerk reflex, no animal behaviour is completely understood.

Ragland:

That's exactly my point. We need to have a fuller and more holistic understanding of the genome before the genie is let out of the bottle. The genie has already managed to struggle a quarter of the way out of the bottle and if we're not careful there will eventually be massive loss of genetic privacy, insurance and employment discrimination and the creation of a genetic underclass. Of course, those in the power elite whose own shit smells like roses welcome these developments and the majority may go along with it..having no recourse.

MR:

The 1999 rerelease concludes with an afterword by the philosopher Dennett. Whether this a good addition depends on your point of view. Personally, while respecting ancient philosophers like Plato, I don't find modern philosophers very insightful. As with theology, almost all of the interesting questions of philosophy have long since been appropriated by science.

Malcom:

I think that the current academic climate is very hostile to philosophy. Certainly it is hard to name a single work of philosophy produced in the twentieth century that will still be a household name at the end of the twenty-first, unless you count works by political dictators.
[moderator's note: Popper? Russell? Godel? Wilkins? Need I go on? I could add Dewey, Goodman, and a host of others in various areas of endeavor. – JAH]

Malcolm:

However I don't think that science has appropriated most of the questions. Philosophers and theologians are interested in very basic physics – what is the nature of the universe – and in human behaviour – what is our place in the universe. They are not too bothered about how atoms line up in crystals nor in the immune system. Now basic physics and human behaviour are precisely the areas where normal scientific methods break down. You can try to study language as any other behaviour, but you will get nowhere, and you might even realise that what you are doing in writing a paper on language is applying language to itself, not necessarily a legitimate procedure. I know a lot less about fundamental physics, except that it also has huge theoretical problems, and absolutely basic questions, such as "why is there something rather than nothing?", "why are physical laws constant?", "why are there three dimensions of space and one of time?" etc are not even close to being answered.

Ragland:

Bizarrely enough I agree with you here. I don't think science has appropriated all the questions. I think you will find many scientists who feel the same way. Ironically, however, science (in particular genetic engineering) has the potential to change our nature and dramatically alter our evolution. In other words the questions about human nature we've been asking for thousands of years will ultimately be altered, if not answered.

MR:

In regard to Dennett's afterword, my respect for philosophy is not particularly raised by Dennett's constant confusing of the results of the research program of molecular genetics with those of traditional evolutionary biology. Despite Dennett's assertions, Dawkins' ideas have had essentially no influence on such molecular fields as HIV research. I'm not saying that HIV research (for example) couldn't benefit from Dawkins' ideas, just that they are not being used -- count the few citations to Dawkins in molecular biology papers if you disagree. Ideas can be too basic to be cited. For instance we know that HIV has a very high mutation rate, and so evolutionary biology is essential to understanding how the different variants of the disease spread, but it is unlikely that anyone would bother to attribute this understanding to an original author, just as Hooke isn't cited when someone weighs a chimpanzee on a spring balance. It just forms part of the backdrop of everyday scientific knowledge.

Although I have been quite critical of the book, I have to admit that it was probably the most thought-provoking book I've read in quite some time. A book well worth reading.

Malcolm:

Dawkins is an excellent writer. I think the problem with the "Extended Phenotype" is that it is too technical to be a good popular book, and too popular to be a good contribution to the primary literature.

Ragland:

I haven't read the book. He has his own niche.

"It's uncertain whether intelligence has any long term survival value.

Bacteria do quite well without it."

Stephen Hawking