

## GENEWATCH

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### NATURAL SELECTION, THE HUMAN GENOME, AND THE IDEA OF RACE

By Robert Pollack

Can there be a possible biological basis for categories of "race"? As we use the term in America today, race is a negative category: it defies definition because it lacks content. Race is not what a racist may say it is; it is simply whatever a racist thinks he or she is not. What can knowledge of the facts of natural selection and the human genome contribute to our understanding of such an idea?

To start at the beginning, such knowledge can give us a sense of the radical novelty of humanity as a single species in the context of the long history of the universe, and of life on our planet. Unlikely and exotic as it may seem, the best explanation for the facts of astronomy today is that the universe - all space and time itself - began at a point, all at once, some 13.7 billion years ago.



Recently, in terms of the history of the universe - about 4 billion years ago - something as improbable as anything we might imagine occurred here on Earth. In the salty seas, and apparently initially at random, clusters of atoms hooked up into long strings, and a very rare sequence of those strung-out clusters acquired the capacity to make a copy of itself, preserving the sequence of the subunits in the string. A self-copying string preserves the information in the sequence of that string, so long as the copies can make more copies of themselves in turn. One of these self-copying strings of chemical letters - DNA - has been copying itself ever since.

DNA is a chemical of great informational density, a text of great importance. As far as we know today, it is a new thing in the history of the universe, having appeared on our planet and nowhere else that we know of. Of course, self-copying by itself is not sufficient to explain why life emerged on our planet. The second requirement for life is that the different strings of subunits of the self-copying DNA carry meanings, and that one of these meanings be the capacity to assist the DNA in making more copies of itself. Any version

of DNA encoding a novel strategy for survival would be preserved. This second step - Darwin called it natural selection - can explain the history of life on Earth, from the first DNA-encoded organisms to all the species of creatures and plants alive on Earth today.

Our form of life, emergent by the same process of natural selection, has been around only a very short amount of time indeed. Think of each million years since the beginning of the universe as being a page in a book. Today that bookshelf of the universe would hold 30 volumes of 450 pages each. The first 21 volumes would have nothing in them about life. Both DNA sequencing and fossil evidence agree that the informational molecule DNA would have been born some time in volume 21, because archeobacteria, the first forms of life, would appear in the seas in volume 22.

Bacteria would continue to be the only shape life took for volumes 23 and 24 as well, though the ones emerging in volume 24 would change the planet's atmosphere to one rich in oxygen, by bacterial photosynthesis. Big-celled forms of life like paramecia and diatoms would appear for the first time in volume 25. Living things made of many big cells would appear in volume 27. Animals would remain in the seas where life had begun until the first tetrapods march on shore at the end of volume 29.

Dinosaurs would appear in the middle of volume 30. They would for the most part be wiped out by page 385. Only the last 65 pages of the last volume would have anything to say of significance about mammals. The last common ancestor of humans and chimpanzees would have lived and died only by page 440 of the most recent volume, 10 million years ago. From that ancestor many other ancestral hominid species would follow, each coming and going in the last ten pages.

On the last tenth of the last page of the last volume, humans emerge in Africa. And then, somewhere toward the last sentence so far, would be the emergence of language, texts, and thoughts of imagined and imaginary creatures. The period at the end of that sentence would hold the time since science emerged in our mental worlds as a social activity with the capacity to understand all this.

And so at last we come to race and racism. In this last eye blink of universal timekeeping, we find ourselves entranced by two notions that share the same persistence in our minds and the same imaginary quality: that a person is no more than what that person has inherited in her DNA, and that a person's race is merely the clearest example of that generality. The first is a delusion, because the facts of science assure that our mental worlds are not encoded in our genes. Any brain can imagine, learn, teach, remember or forget any idea, regardless of the ancestry of the person whose mind is emergent in that brain, and regardless of whether that idea does or does not reflect the facts of nature. Perhaps the most self-serving and punitive example of such a dreamt idea is the notion that "genes are destiny."

All that makes our genomes human - and all that makes us human in a biological sense - is that these six billion different genomes are capable of coming together with each other through sperm and egg to make another generation of people. The sieve of natural selection assures us that no matter the differences in our DNA sequences, all of us are here because our ancestors' DNA contained the capacity to encode the structures for fertile reproduction in their bodies. Everything else encoded in our genes that makes us different from one another is either in service to the necessity for fertility so that the species and its DNA will survive, or it is a difference that has been passed on because it does not get in the way of that fertility. The presumption of "race" in the American context runs up against a second fact about our history as a single species. Our species is African in origin; we are all the very recent descendants of Africans. The evidence for this comes from many quarters, but in our terms the DNA evidence is most interesting. Because Africa is the home of us all, today's hundreds of millions of Africans have the greatest genetic diversity of all human subpopulations. This is because those subpopulations who left Africa to cover the other continents left close relatives behind, and their descendents are the people who live in central Africa today. Of course the DNA sequences of people everywhere are also in flux as new DNA changes or mutations pass the test of natural selection and persist, whether by being of no consequence or, rarely, by being advantageous for the survival of offspring. Still, our species is very young, and the descent of all of today's many "ethnicities" and "races" from people who lived in Africa only tens of thousands of years ago is well-established.

The many different versions of a stretch of chromosomal human DNA still found today in East African populations, have been studied in other populations as markers of first African subpopulations to have left the ancestral homeland for the one or another of the lands reached by a series of migrations that began no later than 60,000 years ago. These DNA fragments confirm archeological evidence that the most recent human migration to arrive at its final destination was the one that settled at the southern tip of the Americas about 10,000 years ago.

The first humans we would recognize as our ancestors, if we met them today, were Africans with dark skin. From these first ancestors, humans migrated throughout Africa and then to the Middle East, Europe, Asia, Oceania, Russia and North America, finally reaching the southern tip of South America 10,000 years ago. Once the planet had been colonized by African emigrants, the itch to move on did not go away - nor has it even today. The difference between those first migrations and later immigrations and invasions is that in the last 10,000 years, no migration would have been likely to settle in territory not already occupied in part by descendants of an earlier migration. The resulting wars and conquests form the narrative of what we are pleased to call modern civilization.

Our common African patrimony makes the insult of American racism more stupid, but not less dangerous, than any other dehumanization. The series of European "discoveries" of the Americas in the past millennium were simply secondary migrations to, and conquests of, the lands first occupied by the original African settlers of North and South America - by descendants of the original African settlers of Europe. That some of these "conquerors" enslaved Africans of their day, that these Africans arrived on the shores of the Americas in that fashion, and that the founders of our country then enshrined the legal non-personhood of their descendants in our Constitution's very first Article, makes this compelled migration only more poignant and ironic. The law stated that:

"... Representatives and direct Taxes shall be apportioned among the several States which may be included within this Union, according to their respective Numbers, which shall be determined by adding to the whole Number of free Persons, including those bound to Service for a Term of Years, and excluding Indians not taxed, three fifths of all other Persons." (My emphasis)

"Indians not taxed" were at that time members of unsubjected nations. However inconvenient their presence was to notions of the manifest destiny of Europeans on this continent, they were powerful and free enough to be understood to be people in their own right. "Other persons," however, were not people. People can either be ignored, or taxed and given the vote; "other persons" could not vote, could not become voters, had no rights, and could be bought and sold. They had political reality and political utility, however. For purposes of counting the number of seats in the US House of Representatives, each "other person" would be counted as three-fifths of a vote, allowing for more white Congressmen from the South.

The recent election of our first President of acknowledged and recent African ancestry has not closed this sorry history, but it has transformed its irony into simple failure. We have no national monument to "other persons" per se, while in the past few years we have seen a National Institutes of Health initiative to examine human DNA for evidence of race. This NIH project intends to find the versions of some genes of everybody in one race - or "ancestry," a euphemism for race in this context - which are never found in the genomes of people not of that race, so that the complexity of a real person, with all her uniqueness of character, history and potential for change, may be reduced to the presence or absence of such a DNA sequence. Enough is known of human genetic diversity to make this an unlikely outcome in any event. DNA differences responsible for skin color differences - the gold standard of American definitions of "race" - turn out to be subject to very strong and rapid natural selection.

Here is how one scholar of the evolution of human skin and skin color put it in a recent review:

"Dark skin evolved *pari passu* with the loss of body hair and was the original state for the genus *Homo*. Melanin pigmentation is adaptive and has been maintained by natural selection. Because of its evolutionary lability, skin color phenotype is useless as a unique marker of genetic identity." <sup>3</sup>

Our shared African ancestors were dark-skinned because our species had emerged from hairless variants of an ancestral species, and naked apes like us were most likely to survive under the UV-rich rays of a tropical sun with the pigment melanin robustly produced by cells under their skin. As our African ancestors migrated away from the equator to more northern latitudes, the sun's rays were no longer so much of a selective agent, and lighter-skinned variants of human DNA conferred the advantage of permitting enough UV light to reach the blood under the skin, so that a person would be less likely to suffer the consequences of a Vitamin D deficiency. When these light-skinned early Europeans and Asians returned by further migration to the equatorial regions of Asia and the Pacific Islands, their descendants once again emerged as dark-skinned.

DNA samples from an individual cannot be used for any purpose related to the skin-pigmentation notion of "race," because the DNA differences associated with pigmentation will only reflect the range of skin colors of one's most recent ancestors. Worse, when the categories of a "race" are attached to the DNA differences responsible for intensity of melanin production, the result will be a biologically useless but politically powerful justification for the presumption that the DNA sequence signaling dark skin is also a signal for

racist suppositions of what a person will necessarily be when this DNA says he or she is "not like one of us."

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