Mini Review

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2026.64.010035

Racism in Biology: From "Scientific Labels" to "Ever-Changing Fallacies"

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ARTICLE INFO

Received: December 12, 2025

Published: January 08, 2026

Citation: Liu Zhaoyang. Racism in Biology: From "Scientific Labels" to "Ever-Changing Fallacies". Biomed J Sci & Tech Res 64(3)-2026. BJSTR. MS.ID.010035.

ABSTRACT

Racism, as a systematic social ideology, has historically sought "scientific justification" by leveraging biological theories, attempting to reduce complex socio-cultural contradictions to immutable biological essences. This paper examines the evolution of racist biological narratives in the history of biology, from Linnaeus's 18th-century racial classification, to the 20th-century eugenics movement, and further to contemporary pseudoscientific misinterpretations in the genomic era. By integrating empirical research from modern genetics (such as the greater genetic variation within groups than between them, and the "cline" pattern of human genetic distribution), it reveals that so-called "races" are not stable biological entities, and that socially constructed "racial" categories fundamentally conflict with biological groupings. The paper ultimately demonstrates that the "biologization" of racism is essentially an abuse of scientific discourse to mask social prejudices, with its ever-changing manifestations consistently serving to deny human equality.

Keywords: Racism; Biology; Genetics; Eugenics; Scientific Discourse

Introduction

Racism is a systematic form of prejudice and discrimination based on perceived "racial" differences, positing that certain "races" are inherently superior to others and using this claim to justify social inequality. Although modern social sciences universally recognize "race" as a socially constructed concept, racism has not disappeared—it continuously adapts its forms, particularly by seeking "scientific validation" through biological theories. From the 18th-century European colonial period, when human races were classified as "superior" or "inferior" through taxonomic attempts, to 20th-century Nazi Germany's genocide justified by the "Aryan racial superiority theory," and even to contemporary pseudoscientific claims that exploit genetic differences to promote "cognitive racial disparities," racism has persistently attempted to prove its legitimacy through biological discourse. However, advancements in biology have consistently refuted these claims: as a single species (Homo sapiens), humans exhibit far lower genetic diversity than many other mammalian populations, and the boundaries of so-called "races" are virtually non-existent at the molecular level. This paper adopts an interdisciplinary perspective, integrating the history of biology and contemporary science, to uncover how racism sustains its ideological vitality through ever-evolving biological narratives, and to clarify that its essence lies in the misuse of scientific authority to conceal social biases.

Historical Context: The Evolution of Racist Biological Narratives

The Enlightenment Era: "Scientific Classification" from Linnaeus to Blumenbach

The biologization of racism can be traced back to the 18th-century European Enlightenment. Swedish botanist Carl Linnaeus, in his 1735 work Systema Naturae, first incorporated humans (Homo sapiens) into the biological classification system. Based on geographic distribution and external features, he divided humans into four "subspecies": Europeans (white, H. sapiens europaeus, characterized as "active and rational"), Asians (yellow, H. sapiens asiaticus, described as "melancholic and greedy"), Africans (black, H. sapiens afer, labeled as "lazy and dull"), and Americans (red, H. sapiens americanus, portrayed as "timid and stupid"). While ostensibly scientific, this classification implicitly carried value judgments—Europeans were endowed with "rational superiority," while other groups were assigned negative traits. German anatomist Johann Friedrich Blumenbach further developed this classification system. In his 1775 book On the Natural

Variety of Mankind, he divided humans into five major races (Caucasian, Mongolian, Ethiopian, American, and Malay), using craniometric measurements (e.g., skull shape) to attempt to demonstrate "natural differences" among races. Blumenbach emphasized that all humans belonged to a single species, but his criteria (e.g., considering Caucasians the "most beautiful and primitive" type) still carried implicit Eurocentric biases. These early taxonomic studies provided the "scientific foundation" for later racial hierarchies—by associating external features (skin color, skull shape) with internal qualities (intelligence, morality), they constructed a seemingly objective narrative of "racial superiority and inferiority." Notably, even the foundational text of modern biology—Charles Darwin's On the Origin of Species (1859)—was not immune to such misappropriation. The original full title of the first edition, On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life, included the term "races" in a broad 19th-century context, referring to both biological groupings (including human populations) and general discussions of "class differences" in the scientific discourse of the time. However, Darwin's core argument focused on explaining species adaptation through natural selection, without constructing narratives of "racial superiority" in human societies.

19th–20th Centuries: "Scientific Racism" from Social Darwinism to Eugenics

Darwin's theory of evolution in the 19th century, which originally challenged creationism, was distorted by racists into a new tool for "scientific racism." British sociologist Herbert Spencer extended the concept of "survival of the fittest" from natural selection to human society, proposing "social Darwinism"—the idea that differences in racial performance in survival competition reflected their levels of biological evolution. This theory was used to justify colonialism (European "conquest" of "inferior" races as natural law), slavery (blacks being "inferior" and thus needing domination), and gender discrimination (women being "less evolved"). In the early 20th century, the "eugenics" movement took racism to extremes. American eugenicist Charles Davenport, through biased family pedigree studies, claimed that certain races (e.g., African-Americans, Jews) carried "criminal genes" or "genes for intellectual degeneration," advocating policies like forced sterilization and immigration restrictions to "purify the human gene pool." Nazi Germany took eugenics and racism to their most horrific extremes, using the ideology of "Aryan racial superiority (Germans as the purest and highest race)" as its core belief. The regime systematically massacred Jews, Roma, Slavs, and other "inferior races," resulting in the genocide of approximately 6 million Jews. The "scientific racism" of this era, though cloaked in genetics and statistics, was fundamentally rooted in attributing social conflicts (e.g., class antagonism, economic crises) to biological "racial differences."

Contemporary Variations: The Resurgence of Pseudo-Science in the Genomic Era

In the late 20th century, breakthroughs in molecular biology and genomics completely debunked the biological basis of traditional racial classifications (discussed later), yet racist biological narratives have not disappeared. Instead, they have re-emerged in more covert forms. For example, some Western scholars have attempted to use genome-wide association studies (GWAS) to find "genetic markers for cognitive differences between races," despite these studies never controlling for critical variables like socioeconomic status or educational opportunities. Such findings are often simplified by the media as "scientific proof that a certain race is inherently smarter." Similarly, certain far-right groups exploit the objective fact of genetic variation among human populations (e.g., higher genetic diversity in African populations compared to Europeans) to distort the narrative as "biological inferiority of non-European races." The common thread in these discourses is the deliberate ignoring of the continuity of genetic variation and the influence of social constructs, reducing complex biological data to tools supporting "racial hierarchies."

Biological Facts: The Falsehood of Race as a Biological Entity

Race" is Not a Stable Biological Classification Unit

From a taxonomic perspective, modern biology categorizes Earth's organisms into hierarchical levels such as kingdom, phylum, class, order, family, genus, and species, yet "race" has never been recognized as a formal classification unit by the international scientific community. Humans (Homo sapiens) are a single species, and all living humans can interbreed freely and produce fertile offspring (a core criterion of species definition). There is no reproductive isolation—unlike, for example, lions (Panthera leo) and tigers (Panthera tigris) among felines, whose hybrid offspring (ligers or tigons) are typically infertile. Traditional external features used to define "races" (e.g., skin color, hair texture, nose shape) are polygenic phenotypic traits heavily influenced by environmental factors. For instance, melanin (determining skin color) is regulated by at least 15 genes, and its distribution is primarily linked to ultraviolet (UV) radiation intensity: populations near the equator, exposed to intense UV, evolved higher melanin concentrations to protect against DNA damage, while those at higher latitudes, with weaker UV, developed lower melanin levels to facilitate vitamin D synthesis. These adaptive differences are continuous and gradual (e.g., North Africans may have darker skin than Southern Europeans, who in turn are darker than Northern Europeans), making it impossible to draw clear "racial boundaries."

Patterns of Genetic Variation: Greater Differences Within Groups than Between them

In 2002, a study by Noah Rosenberg and colleagues at Stanford University analyzed DNA microsatellite markers from 1,056 individuals across 52 global populations. They found that dividing humans into 5–6 geographic clusters (e.g., Africa, Europe, East Asia, Native

Americans, Oceania) could explain only about 3%–5% of genetic variation. However, further subdividing populations within the same geographic cluster (e.g., Italians vs. Swedes in Europe) revealed genetic differences comparable to those between clusters. More importantly, the genetic difference between any two randomly selected individuals is approximately 0.1% (i.e., 99.9% of the genome is identical), and this variation is randomly distributed across so-called "racial" groups. For example, the genetic difference between a West African and a Northern European may be smaller than that between two West Africans, or the difference between a Han Chinese and a Japanese person may exceed that between a Han Chinese and a French person. A 2016 study published in Nature, analyzing 1,000 genomes globally, showed that human genetic variation follows a "cline" (gradual change) pattern: the frequency of certain traits (e.g., malaria-adapted hemoglobin gene variants) changes continuously with geographic latitude or altitude, rather than abrupt breaks at "racial boundaries." This pattern directly contradicts the assumption that "races are discrete biological categories." If races were real, we would expect specific genes to be 100% present in one "race" and entirely absent in another. Yet, almost all genes considered "typical" of a race (e.g., the SLC24A5 gene linked to dark skin) are found in multiple "racial" groups, albeit at varying frequencies.

Social Construction vs. Biological Groups

The concept of "race" as a social construct has changed over time and across cultures. For example, 19th-century U.S. laws defined "Black" as anyone with "any African ancestry" (the "one-drop rule"), leading to individuals with light skin but African ancestry being classified as "inferior races." In contrast, South Africa's apartheid-era "colored" category included mixed-race Africans, Indians, and some East Asians, with criteria combining skin color, language, and occupation. In contrast, biological groupings (e.g., "genetic clusters" based on effective population size or gene flow history) rely entirely on objective metrics like shared haplotypes (continuous DNA sequences) or neutral mutation frequencies, independent of cultural labels. The fundamental difference lies in the fact that socially constructed "races" are tools of politics and power, whereas biological groups are products of natural selection.

The Essence of Racism: Using Scientific Discourse to Conceal Social Prejudice

The ever-changing nature of racism in biology reflects its ideological adaptability: from Linnaeus's taxonomy to Blumenbach's craniometry, from social Darwinism's survival competition to eugenics' genetic purification, and to contemporary pseudo-scientific interpretations of genomics, racism has consistently sought "scientific validation." However, biological research consistently reveals a fundamental truth: humans are a highly similar single species, and so-called "races" are neither stable biological entities nor do their genetic patterns support narratives of "hierarchical superiority." The persistence of racism highlights the deep structures of power inequality and prejudice in human society—it needs constant disguise as "science" to maintain its legitimacy [1-6].

Conclusion

The "ever-changing" manifestations of racism in biology reflect the flexibility of its ideology: from Linnaeus's classification to Blumenbach's measurements, from social Darwinism to eugenics, and to contemporary genomic pseudoscience, racism has consistently attempted to prove its legitimacy through "scientific labels." However, biology has consistently demonstrated that humans are a highly homogeneous single species, with so-called "races" neither stable biological entities nor supported by genetic patterns of "superiority or inferiority." The enduring existence of racism underscores the deep-rooted structures of power imbalance and prejudice in human society—it relies on disguising itself as "science" to sustain its legitimacy. To dismantle racism, we need not only critical analyses of power relations from the social sciences but also the persistent advocacy of the biological scientific community: using authentic scientific evidence to affirm that human dignity and equality are grounded in the 99.9% genetic similarity we all share.

Conflict of Interest

None.

Acknowledgment

During the preparation of this manuscript, I utilized Tencent Hunyuan's large language model "Yuanbao" and the free version of GPT-5 to optimize the text, including grammar correction, sentence structure adjustment, and terminology standardization.

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ISSN: 2574-1241

DOI: 10.26717/BJSTR.2026.64.010035

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Submission Link: https://biomedres.us/submit-manuscript.php