Can Biology Class Reduce Racism?

By Amy Harmon

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COLORADO SPRINGS — Biology textbooks used in American high schools do not go near the sensitive question of whether genetics can explain why African-Americans are overrepresented as football players and why a disproportionate number of American scientists are white or Asian.

But in a study starting this month, a group of biology teachers from across the country will address it head-on. They are testing the idea that the science classroom may be the best place to provide a buffer against the unfounded genetic rationales for human difference that often become the basis for racial intolerance.

At a recent training in Colorado, the dozen teachers who had volunteered to participate in the experiment acknowledged the challenges of inserting the combustible topic of race and ancestry into straightforward lessons on the 19th-century pea-breeding experiments of Gregor Mendel and the basic function of the strands of DNA coiled in every cell.

The new approach represents a major deviation from the usual school genetics fare, which devotes little time to the extent of genetic differences across human populations, or how traits in every species are shaped by a complex mix of genes and environment.

It also challenges a prevailing belief among science educators that questions about race are best left to their counterparts in social studies.

That view stems from the history of today's racial categories, which arose long before the field of genetics and have been used to justify all manner of discriminatory policies. Race, a social concept bound up in culture and family, is not a topic of study in modern human population genetics, which typically uses concepts like "ancestry" or "population" to describe geographic genetic groupings.

But that has not stopped many Americans from believing that genes cause racial groups to have distinct skills, traits and abilities. And among some biology teachers, there has been a growing sense that avoiding any direct mention of race in their genetics curriculum may be backfiring.

"I know it's threatening," said Brian Donovan, a science education researcher at the nonprofit BSCS Science Learning who is leading the study. "The thing to remember is that kids are already making sense of race and biology, but with no guidance."

Human population geneticists have long that racial disparities found in society do not in themselves indicate corresponding genetic differences. A recent paper by leading researchers in the field invokes statistical models to argue that health disparities between black and white Americans are more readily explained by environmental effects such as racism than the DNA they inherited from ancestors.

Yet there is a rising concern that genetic misconceptions are playing into divisive American attitudes about race.

In a 2018 survey of 721 students from affluent, majority-white high schools, Dr. Donovan found that one in five agreed with statements like "Members of one racial group are more ambitious than members of another racial group because of genetics."

A similar percentage of white American adults attribute the black-white income gap to genetic differences, according to an estimate by a team of sociologists published this fall. Though rarely acknowledged in debates over affirmative action or polling responses, "belief in genetic causes of racial inequality remains widespread in the United States," wrote Ann Morning, of New York University, and her colleagues.

For his part, Dr. Donovan has argued that grade-school biology classes may offer the only opportunity to dispel unfounded genetic explanations for racial inequality on a mass scale. Middle schools and high schools are the first, and perhaps the only, place that most Americans are taught about genetics.

The new curriculum acknowledges there are minor genetic differences between geographic populations loosely correlated to today's racial categories. But the unit also conveys what geneticists have reiterated: People inherit their environment and culture with their genes, and it is a daunting task to disentangle them. A key part of the curriculum, Dr. Donovan said, is teaching students to "understand the limits of our knowledge.''

In the pilot study that helped Dr. Donovan secure a research grant from the National Science Foundation, students in eight classrooms exposed to a rudimentary version of the curriculum were less likely than others to endorse statements suggesting that racial groups have defining qualities that are determined by genes. The new study will measure the curriculum's effect on such attitudes by asking students to fill out surveys before and after the unit.

The training exercise, which a reporter attended on the condition that names would be withheld to avoid jeopardizing the study, showed what it might take to offer students, as one Colorado teacher put it, "something better than 'don't worry about it, we're 99.9 percent the same.'"

For the trainees, from five states and seven school districts, much of the opening morning was devoted to brainstorming how to check in with students, especially black students, who seem defensive or scared, sullen or silent, and how to recognize the unit's fraught nature.

"Something like 'These ideas are dangerous, and 'How do we have a safe conversation about unsafe ideas?'" one teacher said. "But I would have to practice it so I don't choke up like I am now.''

Before breaking for lunch, Dr. Donovan, a former middle school science teacher who studied under the Stanford population geneticist Noah Rosenberg while pursuing a science education Ph.D., had a message for them: "If you back out at the end of this," he said, "I'll understand."

Nature, Nurture, the Liberal Agenda

The lessons are structured around two fictional teenagers, Robin and Taylor, who both understand that the differences between the DNA in any two people make up about one-tenth of 1 percent of their genome. But they disagree about how those differences intersect with race.

Taylor thinks that there are genetic differences between people but that those differences are not associated with race.

Robin thinks that the genetic differences within a racial group are small and that most genetic differences exist between people of different races.

The truth is that neither has a completely accurate view.

As human populations spread around the globe, with people living in relative isolation for millenniums, some differences emerged. But the genetic variation between groups in, say, Africa and Europe are much smaller than the differences within each group.

Taylor, who had downplayed the significance of race, eventually had to admit there were some proportionally small differences between population groups. And Robin had to acknowledge having vastly overemphasized the amount of DNA differences between races.

But the two fictional teenagers still clashed over the opening question. Robin believed that there are genes for athletic or intellectual abilities, and that they are the best explanation for racial disparities in the National Football League and in the worlds of math and science. Taylor said genes had nothing to do with it.

Again, neither was completely right.

In their typical classes, the teachers said, they highlight traits driven by single genes — the texture of peas, or a disease like cystic fibrosis. It is an effective way to convey both how traits are transmitted from one generation to another, and how alterations in DNA can produce striking consequences.

But such traits are relatively rare. In Dr. Donovan's curriculum, students are taught that thousands of variations in DNA influence a more common trait like height or IQ. Only a small fraction of the trait differences between individuals in the same ancestry group has been linked to particular genes.

Unknown factors and the social and physical environment — including health, nutrition, opportunity and deliberate practice — also influence trait development. And students are given data about how racism has produced profoundly different environments for black and white Americans.

For Robin, the lessons said, grasping the complexity of it all made it impossible to argue that there was a gene, or even a few genes, specifically for athletics or intelligence, or that the cumulative effect of many genes could make a definitive difference.

And yet, on whiteboards, teachers listed comments and questions they anticipated from real students, including one that recurred in various forms.

"Isn't this just a liberal agenda?"

Dr. Donovan told teachers that the curriculum also counters the viewpoint represented by Taylor — that ability is affected only by "how you're raised, the opportunities you have, the choices you make and the

effort you put in." Recent studies, they are told, show that genetic variants play some role in shaping differences between individuals of the same population group.

Teachers participating in the training said that student beliefs about racial genetic differences at their schools surface in offhand pronouncements about who can dance and who is smart. They also lurk, some suggested, behind the expressions of intolerance that have recently marked many American schools. And what students learn about human genetic variation, teachers said, can lead to misguided conclusions: "They know DNA causes differences in skin color," said a teacher from Washington State, "and they make the logical jump that DNA causes 'race.'"

Class time in which to dispel confusion is limited. "It's always like 'O.K., but now we're going to start the lesson on peas,'" said a Kansas teacher. Pent-up curiosity, said one from Indiana, routinely arises in year-end surveys: "I'm wondering if you know any resources where I could learn more about the genetics behind race," one of her juniors wrote last spring.

'Sensitive Nature of the Research'

Science teachers have had no shortage of reasons in recent decades to cede conversations on race to the humanities.

There was, for one thing, the need to repudiate the first half of the 20th century, during which science textbooks were replete with racial stereotypes and uncritical references to eugenics.

And 21st-century geneticists looking for clues to human evolution and medicine in the DNA of people from around the world took pains to note that they were not studying "race."

"We basically decided, no, race is still a social construction, it's not a biological thing," Ken Miller, an author of the widely used Prentice Hall biology textbook, told the science magazine Undark of the decision to omit mention of race.

And not everyone is eager to reinsert it. Several school districts have rejected Dr. Donovan's application to participate in the study, even when teachers have expressed interest.

David McLeod

"I am denying the research request based on the sensitive nature of the research," the research supervisor for one Colorado district wrote in an email.

But Jaclyn Reeves-Pepin, executive director of the National Association of Biology Teachers, said efforts to avoid lending scientific credibility to unfounded perceptions of genetic difference may themselves be sowing confusion.

"If I was a student asking about race and my teacher said, 'Race is a social construct, we're not going to talk about it in science class,' well — that's not an explanation of what students are observing in their world," Ms. Reeves-Pepin said. In advance of the group's annual meeting this fall, a session featuring Dr.

Donovan's curriculum received the highest score from a review panel of biology teachers of all 200 submissions, she said.

As in any experiment, the subjects will need to be informed of the risks and benefits before they consent to participate.

The benefits, a group of Midwestern 12th graders who will begin the unit this month were told, include "a research-based curriculum designed to teach complex genetics." For the risks, the students were warned that they may feel some discomfort in science class.