

COMMENTARY

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African Americans in evolutionary science: where we have been, and what's next

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Abstract

In 2017 National Science Foundation data revealed that in the United States the professional biological workforce was composed of ~69.5% “whites”, 21.3% “Asians”, and only 3% “African American or Blacks” (National Science Foundation, 2017, https://ncesdata.nsf.gov/doctoratework/2017/html/sdr2017_dst_03.html). There are problems with the categories themselves but without too deep an investigation of these, these percentages are representative of the demography of biology as a whole over the latter portion of the twentieth and beginning of the twenty-first century. However, evolutionary biologists would argue (and correctly so) that the representation of persons of African descent in our field is probably an order of magnitude lower (0.3%). This commentary focuses on the factors that are associated with underrepresentation of African Americans in evolutionary science careers.

Keywords: African Americans, Evolutionary science, Institutional racism, Aversive racism, Diversity, Inclusion

Background

As the first African American to have earned a PhD in evolutionary biology I have been concerned with this disparity for my entire career (Graves 2012). It has been my experience that most non-African descended people in this field are woefully unaware of the dynamics that drive this historical disparity. In this sense, evolutionary biologists are not different from the majority of non-African descended persons in this country that have little to no training or familiarity with the scholarly literature associated with the African American experience.

Thus in this commentary I intend to provide the reader with a brief description of the cultural experiences of persons of African ancestry in the United States and how these have played a role in maintaining their underrepresentation in evolutionary biology careers. This will be accomplished by also discussing the confluence between the history of evolutionary biology as a discipline and the social changes that allowed persons of African descent to pursue careers in higher education. The commentary continues with providing the reader a sense of the current state of underrepresentation within the field and will

provide some perspectives concerning ongoing issues that are maintaining this situation. Finally it will make recommendations concerning how evolutionary biologists might learn from anti-racist struggles that are going on in other sectors of our society to move towards a more diverse and inclusive discipline.

The central premise of this commentary is that racism in America as it is manifested in higher education (specifically evolutionary biology) creates a culturally non-inclusive environment that systematically disadvantages persons of non-European descent. The form of this disadvantage differs by the sociocultural positioning of individuals. Thus to change the patterns of underrepresentation within the discipline requires that the dominant social group (persons of European descent socially-defined as “white”) to address and act on how their position of privilege is subordinating “others.”

I will focus in this commentary on African Americans, as this is the group whose history I know best. In addition, there is much overlap between the African American experience and that of Afro-Caribbean, Afro-English, Afro-Canadians, and newly immigrated Africans with regards to their experiences of racial subordination and/or colonialism. Some of these themes are present in the struggles of other non-Europeans (Latinax, American Indian) in higher education.

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It is important to understand the differences as well as the similarities of the experiences of persons of African descent. Unfortunately, most non-African descended people tend to lump persons of African descent in the socially-defined category of “black.” For example, Barack Obama was widely hailed as the first “black” or African American president of the United States. This despite the fact that his father was of Kenyan descent, and virtually no Kenyans were ever transported to the Western world via the Trans-Atlantic Slave Trade (Rawley and Behrendt 2005). Barack Obama also had a mother who was of European descent, thus it is only America’s social custom of the “rule of hypodescent” or “one drop rule” that classifies him as “Black” in the European American mind. The data from the Trans-Atlantic slave database shows that far more enslaved Africans were transported to the Caribbean than to North America. For example, according to the Trans-Atlantic Slave Trade Database about 10 times more enslaved Africans were disembarked in the Caribbean compared to North America during the slave trade (only about 388,747 enslaved Africans compared to 2,318,252 British Caribbean and 1,120,216 French Caribbean were disembarked between 1501 and 1875 CE. Emory Center for Digital Scholarship 2019) Far fewer enslaved Africans were sent to Europe during the slave trade (only 8800). Thus, the Afro-English and Afro-French populations are mainly derived from later (Post WWI) migrations to England and France; while Afro-Canadian populations are derived from both enslaved Africans who escaped chattel slavery in the United States or fought with the British during the American Revolutionary War and were granted freedom (unlike the U.S. the British generally honored their promise to grant freedom to those who fought for them), or later migrations from the Caribbean and Africa to Canada. These groups clearly have different histories, as well as cultural influences. For example, many African Americans (such as myself) were raised in National Baptist Convention (NBC); Southern Christian Leadership (SCLC) style church communities; while many Afro-English and West Africans (former British colonies) would have been raised in Anglican Union style churches; and the Afro-French in primarily Catholic churches. Thus, in the same way that the cultural experiences of Europeans from different countries, wouldn’t be thought of being exactly the same; neither should persons of African descent be considered exactly the same. However, all African descended persons have some experience with the cultural construction of “blackness” and its many disadvantages in nations of majority European descended individuals, just as these same European descended individuals experience white privilege in primarily “white” societies (Roediger 2006).

White privilege is associated with the fact that the United States was founded as a colonial/settler nation by Western Europeans. The roots of its English speaking population began with the Jamestown Colony that imported its first enslaved Africans in 1619. Thus, of the 400 years since Anthony and Isabela (Tucker) were disembarked in Jamestown, 246 years of those allowed persons of African descent to be owned as chattel, the following 99 years were dominated by the Jim Crow system of 2nd class citizenship complete with organized state and private racial terror, and 51 years past Jim Crow (to this date) are the years in which the mass incarceration of persons of African and Latino descent is considered normal in the United States (Alexander 2012). I was born in Jim Crow and less than two generations have passed since its end. My birth certificate says “colored” under the category of race. My childhood memories include “Whites Only” signs on water fountains and bathrooms. I remember being denied service in restaurants. Mine was the first generation of African Americans to enter public school after the momentous Brown V. Board of Education decision of 1954.

Main text

Evolution as a discipline

During the same period in which African Americans were fighting for a legal end to Jim Crow, evolutionary biology became a coherent discipline. This occurred between 1936 and 1947 (Mayr 1982), with the founding of the Society for the Study of Evolution (SSE) occurring in 1946 (Smocovitis 1994). This was right after the end of WWII in which racial theories had been utilized to justify the slaughter of millions of people in both the European and Pacific theaters of the war. What is not as well realized is that these theories had their origin in the West and prominent evolutionary biologists and geneticists contributed to their rise (Graves 2005a). Worse still was that after the war Nazi race scientists such as Fritz Lenz, Hans Gunther, and Eugen Fischer were “rehabilitated” by their American and English colleagues and continued to support the “scientific” principles of eugenics (Graves 2005a). However, evolutionary biologists also played an important role in debunking biological racism, beginning with people like Th. Dobzhansky who wrote the popular book *Heredity, Race, and Society* along with Leslie Dunn published in 1946. Richard Lewontin’s classic study of genetic variation within and between the purported races of humans was an important contribution to anti-racism (Lewontin 1972). Stephan Jay Gould’s *The Mismeasure of Man* first published in 1981 is considered a major contribution to this cause. My own anti-racist work as an evolutionary biologist was deeply influenced by interactions with Lewontin and Gould.

However, when the SSE was founded, white supremacy was still a relatively unchallenged ideology in the United States. Smocovitis (1994) provides a list of the founding members of the SSE. Many of the names one would expect were signatories of the founding documents (Ernest Mayr, Th. Dobzhansky, Sewall Wright, Hampton Carson, George Gaylord Simpson). However, none of the founding individuals were African Americans or held faculty appointments at a Historically Black College or University (HBCU). At this time there were no African Americans who held research positions at any of the nation's major universities. The first African American to receive a PhD in biology was Alfred O. Coffin. His degree was awarded by Illinois Wesleyan University in Zoology in 1889. His research interests seemed to be in anthropology and he spent his professional career teaching mathematics, Romance languages, and anthropology at Alcorn A&M (a historically black university). Most historically black colleges and universities began after the Civil War ended in 1865. Cheyney University (PA) was the first HBCU and was founded in 1837. Two years before this, Oberlin College (my alma mater) was the first historically white institution (HWI) to admit African Americans. Most of the HBCUs were associated with Christian denominations, such as the various Baptist conventions, African Methodist Episcopal Church (AME), United Methodists, United Church of Christ, and some were supported by the Catholic Church (Fleming 2015). Of course, this is similar to the founding of the historically white colleges and universities (HWI). Many of the first HWIs were founded with money that came directly from the slave trade or the appropriation of land from the American Indians (Wilder 2013; Harris et al. 2019). Indeed, the development of medicine as an academic discipline in America was fueled by the unfettered access to the deceased bodies of African Americans, Irish, and American Indians. Medical experiments on living enslaved people were also more easily performed as enslaved people had no rights to their own bodies. The case of Dr. James Marion Sims (an Alabama slave holder and a founder of American gynecology) and his experiments on enslaved women is well documented (Owens 2017).

Probably the most prominent African American biologist of the synthesis period, Ernest Everett Just died in 1941. Just was an embryologist trained at Dartmouth University and is best remembered for his contributions in embryology as outlined in his book: *The Biology of the Cell Surface* published in 1939. However, despite Just's reputation as an outstanding scientist he was never allowed to hold an appointment at a premier research university in the United States. There is some indication

that Just was thinking about evolutionary problems, as before his death he was working on a paper entitled: "Ethics and the struggle for existence" but he died before completing this manuscript (Manning 1983).

A brief history of African American higher education

The growth of the modern American research university was associated with the passage of the Morrill Land Grant Act of 1862. This was designed primarily as an engine to improve agricultural education as well as to "open college doors to farmer's sons and others who lacked the means to attend the colleges then existing (Duemer 2007). However the first Morrill Land Grant primarily benefited persons of European descent, as after the Civil War reconstruction and rigid segregation of higher education was reestablished in the former Confederate States. Therefore in 1890 a second Morrill Land Grant act was passed to provide for more equitable access to higher education in states that maintained segregated higher education (Neyland and Fahm 1990). The 1890 Morrill Act helped to bring into existence colleges such as Tuskegee Institute, Florida A&M, and North Carolina A&T. However, it is important to realize that the southern states never provided equitable support for the HBCUs and that their original mission was not designed to fully educate African Americans. In September of 1895, Booker T. Washington gave his famous "Atlanta Compromise" speech before the Cotton States and International Exposition in Atlanta, Georgia. This was written to palliate a primarily European American audience. In this speech, Washington offered the following guaranteed to the southern power structure: African Americans would not agitate for their constitutional right to vote; not retaliate against racism; tolerate segregation and not resist discrimination. In return, the southern states would provide free vocational education to African Americans. An addendum to the industrial educational model was that the HBCUs would not provide liberal arts education to their students. Thus schools, like North Carolina A&T really began as trade schools, not universities. It is not hard to see how the Washington (or Tuskegee) model retarded the growth of African Americans intellectuals. However, by the turn of the twentieth century, other African Americans leaders such as W.E.B. DuBois sharply criticized the Tuskegee model:

"Unless the American Negro today, led by trained university men of broad vision, sits down to work out by economics and mathematics, by physics and chemistry, by history and sociology, exactly how and where he is to earn a living and how he is to establish a reasonable life in the United States or elsewhere, unless this is done the university has

missed its field and function and the American Negro is doomed to be a suppressed and inferior caste in the United States for incalculable time.” W.E.B. Du Bois, *The Field and Function of the Negro College*, 1933.

Thus, for African Americans to begin producing scholars in the sciences, two things had to happen. First the dominance of the Tuskegee Model in the HBCU environment had to be eroded, and secondly, desegregation of HWI's had to progress to the point where African Americans could survive their institutionalized racism to achieve higher degrees. Data suggests that African Americans scientists began to trickle into faculty appointments at major research universities beginning in the early 1950s. Albert Wheeler was the first African American in the School of Public Health at the University of Michigan (appointed 1952); James Jay, Microbiology, Wayne State University, 1961; Percival Skinner, Anthropology, Columbia University in 1969; and George Jones, Molecular Biology, University of Michigan 1971 are examples. Both Jim Jay (deceased 2008) and George Jones had important influences on me as I struggled through graduate school at Michigan and then Wayne State. So far I have detected I am the first African American to receive a PhD in evolutionary biology (broadly defined). My degree was awarded in 1988. These facts concerning the pioneering years of African Americans in the life sciences are not generally known by this generation of African Americans entering evolutionary science careers.

Considering American history, these events should not be surprising. In 1944, only 48% of “white” Americans polled believed that “black” Americans were on average as intelligent as whites. This number increased to a high of 81% in 1964 but has declined ever since (Shuman et al. 1985). Virtually, every African American pioneer in science can tell horror stories associated with the “out of place” principle. As even the best trained human minds still reflectively stereotype, the “out of place principle” follows from stereotypes concerning what people believe about other people. As a graduate student at the University of Michigan, I had doors slammed in my face while attempting to enter science buildings. The reasoning of the people slamming the doors was that I had no business in the Museum of Zoology on a weekend (as everyone knows, there are no blacks in evolutionary biology). Or during my assistant professor/associate professor years, students at the research-1 campuses at which I held my appointments assuming that I was a football or basketball coach. Or my favorite is the day that European American undergraduates approached the university provost asking me

to be removed from teaching genetics due to my lack of qualifications. They considered me “unqualified” to teach genetics because I didn’t start the course with the material in chapter one of their textbook. This was the same day that the campus newspaper ran an article about my election as a Fellow of the American Association for the Advancement of Science (AAAS) for my pioneering research into the genetics and physiology of aging!

A tipping point?

It is possible that 1988 was an inflection point for persons of African descent in evolutionary biology. Shortly after my degree was awarded others followed (see Table 1.) Yet by 2017 we have no evidence that the numbers of African Americans have significantly increased in the field or are approaching equity (~10% of the US population identifies as African American, thus equitable numbers would be 10% of African Americans as professional evolutionary scientists.) However given that only 3% of professional scientists are African American, for evolutionary science even achieving the 3% parity with other fields could be considered progress. However the overall lack of progress in evolutionary science, begs explanation.

The first explanation proffered for the lack of progress generally goes: “African Americans are not interested in evolution...” Often this is associated with claims concerning either greater religiosity or “they are interested in going to medical school.” The greater religiosity of African Americans has been well studied (Chatters et al. 2009). In a 2014 Pew Center Research Survey, 61% of whites stated that they absolutely believed in God, while 20% stated they were fairly certain in the existence of God. These figures were 83% and 11% for blacks in this same survey. Alternatively, 11% of whites stated that they did not believe in God, versus 3% of blacks (Pew Research Center 2014).

Table 1 African American pioneers in evolutionary biology

Name	Institution	Years
Joseph L. Graves Jr.	Wayne State University	1988
Scott Edwards	University of California (Berkeley)	1992
Tyrone Hayes	Harvard University	1993
Collette St Mary	University of California (Santa Barbara)	1994
Paul Turner	Michigan State University	1995
Charles Richardson	Indiana University	1999

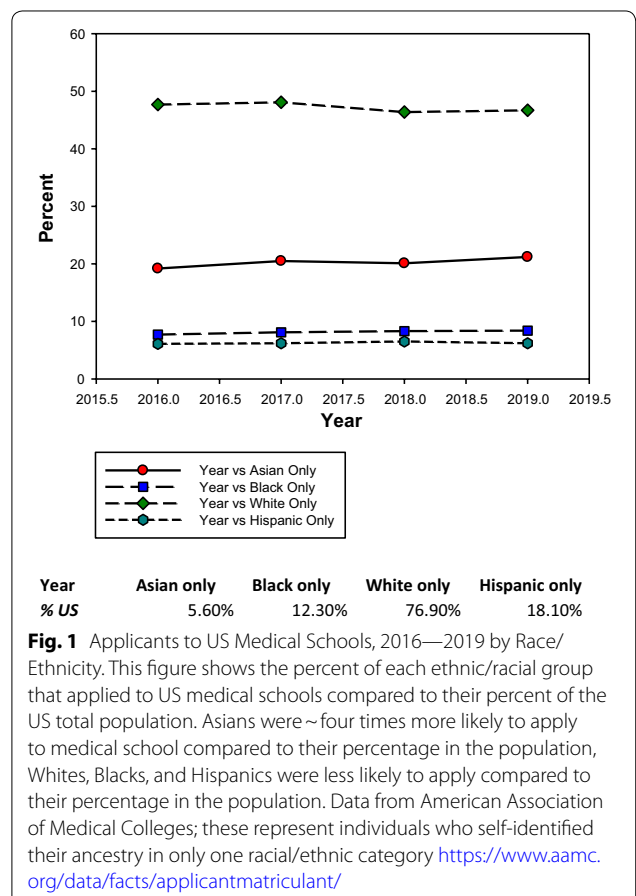
This may not be a comprehensive list. As the number of persons of African descent receiving PhD's in evolutionary biology or identifying themselves as evolutionary biologists began to increase in the 1990s

The figures for these questions are quite different for scientists. Over the last century, figures have held constant with ~40% of scientists surveyed believing in God, and ~60% not (Larsen and Witham 1999). I suspect that for evolutionary scientists the figures for the non-belief in God are higher than for general science professions. Darwin’s agnosticism on the existence of God is a well-known feature of his life (Desmond and Moore 1991). Jerry Coyne’s position on the incompatibility of evolution and religion is one that I shared earlier in my career (Coyne 2012). However I have since recanted. Such views certainly stand as an impediment to the successful recruitment of greater numbers of African American students to careers in evolutionary biology. For example, we found that the level of evolution acceptance was lower for African American students at North Carolina A&T State University (NCATSU is a HBCU) than for national figures (Bailey et al. 2011). However, more surprisingly in this study we found that evolution knowledge was negatively correlated with evolution acceptance. Studies of European American and combined race/ethnicity samples generally find that evolution acceptance is positively correlated with evolution knowledge (the more you understand evolution, the more you are likely to accept it as valid science). As high religiosity was negatively correlated with evolution acceptance in our study, we concluded that our students’ rejection of evolution was premised on their belief that evolution challenged their religious values.

However, this need not stand as impediment to the recruitment and retention of African Americans (or other highly religious) individuals into science. I have found that most of my highly religious Christian students have never really discussed the foundation of their theological views. As a confirmed Episcopalian, these are conversations I have learned how to conduct in ways that do not automatically shut down critical reasoning. Indeed, there is variation within Christian denominations with regards to their willingness to accept evolution as compatible with their faith. In general, doctrinally conservative Christians reject evolution (Berkman and Plutzer 2010). For example, the Southern Baptist Convention (formed as the Pro-segregation Baptist Church in the 1920s) and the National Baptist Convention (predominately African American membership) both reject evolution as compatible with their faith; on the other hand, the Catholic Church accepts evolution as compatible with their faith (Martin 2010). Notably there is variation within the individuals who subscribe to major denominations concerning their acceptance of evolution. For example, for Doctrinally Conservative Protestants, surveyed from 1994 to 2004, those who felt that: humans developed from earlier species of animals 76% felt that

this statement was definitely false or probably false, while 24% felt it was probably true or true. Similar values were recorded for Black Protestants, 66% and 35% respectively, for mainline Protestant denominations, the values were 45% and 55%; while for Roman Catholics, the values were 42% and 58% (Berkman and Plutzer 2010). Thus while a given church’s official position is to accept or reject evolutionary science, individuals within denominations tend to make up their own minds concerning evolution. I have found that exposing my highly religious students to the fact that there is variation within Christian thought concerning evolution helps them be able to engage it critically while not feeling that they are abandoning their faith.

The claim: “African Americans students are not interested in evolution because they want to go to medical school” is one of the most unfounded explanations for underrepresentation that I have ever heard. The actual data on applicants to US medical schools shows a very different picture (see Fig. 1). The only group that seems to be more interested in applying to medical school compared to their percentage of the US population is Asian Americans. In our own survey (small) of highly



motivated students who attended the Annual Biomedical Conference for Minority Students (ABRCMS) and Society for the Advancement of Chicanos and Native Americans (SACNAS) in 2013, we found that more African Americans and Latinos, were interested in attending graduate school in biology, than medical school (grad school biology: 60.5%, 64% compared to medical school: 21%, 7% respectively.) Of those interested in graduate school, only 4%, 9% respectively were interested in evolution as a career (Mead et al. 2015). This paper also demonstrated that concerning graduate school interest, that the presence of role models in the particular discipline was thought highly important for African Americans and Mexican Americans; but not so much for Puerto Ricans.

Role models again?

There has been considerable study of the significance of role models for underrepresented minority (URM) students in science (Chemers et al. 2011). If so, there is virtually no way, other than by chance alone, for a URM student to know that there are URM scientists in evolution. For example, very few universities have African American faculty members in departments of Ecology/Evolutionary biology. There are very few African American evolutionary biologists, other than me, whose appointments are at Historically Black Universities (HBCUs). Indeed, when I first arrived at NCATSU in 2005, the upper division evolution course was rarely taught. From conversations with faculty at other HBCU campuses I found that this was quite common.

As far as I know, there are few documentary films specifically addressing evolutionary biology, that feature African American scientists. For example, I appeared in a 1993 segment of KCET (public television)'s series: *Life and Times*. My ten minutes of the episode was specifically focused on my evolution of aging work. Later in the 2003 documentary, *Race: The Power of an Illusion*, by California News Reel, I was interviewed along with two other prominent evolutionary biologists (Richard Lewontin, Stephan Jay Gould) and in the film I was labeled as an "evolutionary biologist." However, this film rarely gets shown in biology class rooms. In the 2019 documentary, *Decoding Watson*, I am also identified as an evolutionary biologist. Yet these films are exceptions.

Evolutionary biology textbooks do not generally identify the race/ethnicity of those whose work is featured within. In some cases, race/ethnicity can be inferred by the person's name, but this is generally not possible for African Americans. Searching the indexes of three popular evolution textbooks for African Americans who work could be featured in such texts, I only found one mention of Scott Edwards (no picture associated; Bergstrom and Dugatkin 2016; Herron and Freeman 2014; Futuyma

1998). Some of my early life history work is displayed in Figure 2.21 of Stearns and Medzhitov's *Evolutionary Medicine*, published in 2016. However this is cited via a review paper, not by my publications (Stearns and Medzhitov 2016). There may be many other examples like this, in which the work of African American evolutionary biologists appears in textbooks, but the take home message is that there is no way that a student could know that the contribution came from a URM scientist. So while we know that role models are important in URM student choices of careers, there is no evidence that significant numbers of African American students have any way of knowing that there are African Americans who have made important contributions in evolutionary science. Thus a useful tool that might help make progress in this regard is the production of materials (articles, books, profiles in textbooks, podcasts, social media, films, etc.) that highlight the contributions of URM scientists in evolution. Locally, the most important tool for providing your students role models is the hiring of African American (and other URM) into faculty positions. While the numbers are still small, they have grown sufficiently so that with some intention departments can locate potential candidates. The key however is "intention." Intention usually is accompanied by a university commitment (with accompanied financial resources) dedicated to a diverse and inclusive faculty. Thus, diversifying the faculty will not occur through "business" as usual techniques that are genuinely biased towards replicating the existing demography of the professoriate. Examples of intentional hiring towards diversity require that you do some work to determine who is in the pipeline. This can be achieved by attending professional meetings that are likely to attract URM graduate students, post-doctoral researchers, and faculty members, such as Annual Biomedical Research Conference for Minority Students (ABRCMS) and Society for the Advancement of Chicanos and Native Americans in Science (SACNAS). Also working to develop real relationships with Historically Black Universities (HBCU's), Hispanic-Serving Institutions (HSI's), American Tribal Colleges, and Minority Serving Institutions (MSI's). By knowing who is in the pipeline, this better allows you to write job descriptions in areas that are likely to draw the attention of "diverse" candidates.

Becoming the anti-racist discipline

The title of this subsection is shamelessly borrowed by Joseph Barndt's book "*Becoming the Anti-Racist Church*" (Barndt 2011). I have found that discussing institutional racism with persons of European descent in America, is sort of like sitting down in the dentist's chair without anesthetic. In Barndt's case, he at least had the advantage of Christianity's core belief systems being aligned

with anti-racist ideas in theory, if not in practice. However, this is not the case of the enterprise of science, and its institutions (e.g. professional societies, university academic units, etc.) There is nothing in science that requires that it take a moral stand on any issue, although I will argue that we would be better people and scientists if we did take such stands. At the onset of this discussion I am going to make the claim that institutional racism is alive and well in the United States (and most of the western world). Institutional racism can be found in all facets of American life. The American university has been in the main a tool of white supremacy, from its slave holding origins to the modern research university of the twenty-first century. In the early days of the American university, the relationship between its scholarship and white supremacy was “owned” and unchallenged. Over the course of the nation’s growth, this association is less “owned” and most faculty members within the academy would decry such a relationship. For example, in the course of my life time the character of America’s racism has changed. At the time of my birth, biological racism was the predominant mode of thinking within European American communities. Biological racism posits both the existence of biological races and inherent inborn differences between them (Graves 2005a, b). Biological racism in the United States was backed by law until the Civil Rights Act of 1964. Some American scientists such as Carleton Coon played an active role in supporting biological racism, while others, such as Dobzhansky, Lewontin, and Gould fought against it (Graves 2005a; Jackson 2001).

However in the latter portion of my life, biological racism has been supplanted by aversive/symbolic racism. Aversive racism (color-blind) is an ideology that allows people of the dominant socially defined race to claim that racism is no longer the central factor determining the life chances of those of the subordinated race (in the United States, this is primarily dark-skinned individuals of African descent). This position argues that instead of the ongoing institutional and individual racism of American society, nonracial factors such as market dynamics, naturally occurring phenomena, and the cultural attitudes of racial/ethnic minorities themselves are the main causal factors of their social subordination (Pearson et al. 2009). Barndt found in his book that the European American audience he was writing to, displayed more racism of the aversive than biological type. Although I know of no studies that explicitly examine the prevalence of aversive racism in scientists, let alone evolutionary scientists, there is no reason to believe that scientists differ in this trait from the rest of their university colleagues or from the non-African American community (Scheurich and Young 2002).

If this is so, it can influence the way faculty members interact with URM students in ways that they do not recognize. For example Goff et al. 2008 showed that aversive racism (or that fear of engaging in aversive racism) reduced the willingness of persons of European descent to engage in conversation with persons who were not of European descent. Another example of how this can negatively influence behavior is the recent study suggesting implicit bias against African Americans in NIH RO1 grant reviews (Ginther et al. 2012). A study has recently been published demonstrating that STEM faculty who believe that student ability is fixed, show greater racial achievement disparity in their courses (Canning et al. 2019).

In addition to this problem, evolutionary biologists have not done enough to address the teaching of the relationship between the concepts of race, racism, and human variation in the K-12 and university curriculum. In 1992, Lieberman et al. found that 67% of biology professors surveyed accepted that biological races existed in the human species. In 2008, Morning reviewed biology texts from between 1952 and 2002 and found that they routinely accepted the existence of biological races within our species, without explaining by what criteria these races were defined. Donovan 2015 found that there was little evidence that high school biology texts challenged stereotypical racial beliefs. In contrast, Herron and Freeman’s 5th edition of *Evolutionary Analysis* (2014) does a very good (if not complete) job of addressing human evolution and its relationship to modern human diversity. The problem here is that most students are exposed to the sort of instruction described by Donovan (2015), and not enough are exposed to Herron and Freeman (2014). This is an opportunity that evolutionary biologists could exploit for reducing stereotypical beliefs within university students.

Aversive racism is a comfortable belief in that it excuses an individual’s own subconscious racism by supplying an easy palliative (society at large or the victims themselves are responsible for their conditions). It also excuses those who benefit from aversive racism from any responsibility for taking any action to alleviate social subordination. Aversive racists may decry the crude biologic racism that they observe in their neighbors but never see racism within themselves. For example, a study of aversive racism demonstrated that individuals of European descent who endorsed Barack Obama for president, were more likely to describe certain job types as more suitable for “whites” compared to “blacks” (Effron et al. 2009). In general, aversive racism increased during the Obama presidency, which may have accounted for the election of Donald Trump (Crandall et al. 2018).

Barndt in his book described the stages that persons of European descent must go through to get over their racism. He likened it to the way patients who are suffering from traumatic grief move towards healing.

1. Denial
2. Anger
3. Bargaining
4. Depression
5. Acceptance

Denial is just as it sounds: “racism is no longer a factor in determining life chances in American society”, or more relevant to science: “while racism might exist outside the academy, it does not play a role in how we evaluate candidates for admission to our graduate programs, or post-doctoral/faculty appointments”. Anger, the next stage of the process: “how dare you call me a racist!” Or from the point of view of the university: “How dare you say that our policies maintain institutional racism!” My guess that many of you reading this commentary are currently experiencing stage 1 or 2. Bargaining: “Well isn’t true that white people also had to struggle to make it in America?” Or in the academy: “Our Asian students come from just as deprived backgrounds as African American students, why are they doing so well?” Depression: “Okay, I admit that I have racist tendencies, I can’t help being a bad person.” Or in the academy: “I understand that institutional racism is an issue here, but it’s just so entrenched and so big I can’t do anything about.” Finally, acceptance: “Okay, I get it now, there are some things I can do to reduce racism in my community.” Or in the academy: “I get it, Confederate statutes are harmful to my African American and other students. I am going to do everything I can to get them removed from this campus!”

Conclusions

In 1903, the eminent African American scholar, W.E.B. DuBois wrote that the problem of the twentieth century was the color line (DuBois 1903). Well into the twenty-first century the color line is still a prominent problem in American social life. The way forward requires that persons of European descent recognize their unearned white privilege. Sociologists have demonstrated that white privilege exists in buying and selling a house, neighborhood locations, getting a job, advancement within a job, securing a first class education, and seeking and receiving the best medical care. Ironically, this may be extremely difficult for scientists to believe. In my experience, most non-African American scientists have little to no understanding of the role that institutional racism has played in structuring social opportunity in the United States (Denial). This despite that fact that there is a voluminous

scholarly literature on this subject (Desmond and Emirbayer 2010). This situation is made even more complex by the growing numbers of scientists holding academic appointments whose cultural origins are from outside of the United States (e.g. East Asia, Middle East, India) who also have no formal training in American history and also bring racist/caste prejudices associated with skin color with them to the United States (Dikotter 2015). Thus, for us to make real progress within the academy, it is primarily academicians of European descent who must recognize how white privilege operates in their institution and then commit themselves to acting to eliminate it (Acceptance).

To their credit, the SSE, American Society of Naturalists (ASN), and Society of Systematic Biologists (SSB) have begun to recognize this as an issue. For example, the three societies recently adopted an anti-harassment policy (SSE Safe Meeting Website 2019). Included in the harassment policy is racial discrimination. This of course is limited in that it only applies to the behavior of individuals at scientific meetings. In addition, a new list serv has been initiated to track individuals who wish to self-identify as a member of a “diverse” category (Diversify EEB website 2019). However I would argue that the diversity/inclusion efforts of the NSF Science Technology Center, Biocomputational Evolution in Action (BEACON) stand as one of the best models of how we may make real progress towards meaningful racial/ethnic demographic change within evolutionary science as a discipline (BEACON Website 2019). This was made possible, in part, by the fact that senior African American and Latino scientists were included in the leadership of BEACON from the start. As a science technology center, BEACON provided funding to teams of investigators to develop preliminary data to pursue larger research grants. Each budget request was evaluated on eight criteria, including how the research activity contributed to the diversity goals of BEACON. As a member of BEACON’s executive committee I can state that projects that did not address the diversity criterion were not scored as highly as those that did. Furthermore BEACON supported its diversity mission in visible ways such as a paid staff position that was charged with the oversight of its diversity efforts. This is the kind of commitment that makes it clear to all involved in the work that your organization is committed to making progress in its diversity inclusion mission. BEACON’s stated diversity goal was to exceed national norms for diversity at all levels of the center. In its 2018 report to the National Science Foundation (https://www3.beacon-center.org/wp-content/uploads/2018/10/BEACON-2018-Annual-Report_FOR-WEB.pdf) it showed 24% of its participants as “black”, and 5% Hispanic/Latino. The total of all individuals reporting as

URMs was 37% exceeding the national norm by 20.1% (Brown and Pierre Brown Clarke and Pierre 2019). The NSF national norms are derived from all biological science subdisciplines, not just evolution. At present we do have reliable data concerning the numbers of self-identified African Americans participating in evolutionary biology (PhD, graduate and undergraduate research students). Gathering this data by subdiscipline would be helpful for developing better strategies for intervention.

One of the most interesting things that Barndt found in his study of diversity/inclusion in the church was that congregations that had achieved the most in this regard, had apparent and active leadership from historically underserved minorities in their leadership. This mirrors my own experience with diversity/inclusion programs in science. However the accomplishments we made in BEACON would have been impossible if the rest of the senior leadership had not bought into the necessity of including diversity/inclusion as part of our core mission.

In the case of BEACON, the capacity of the senior leadership to buy in, may simply have resulted from the character of those individuals. In other words, leadership buy-in is not something that one can guarantee will happen. I have often found that it is necessary to cultivate that buy-in. Often, education and training is required. For example, for co-PIs in a diversity/inclusion training grant I am involved in, we all committed to attending an intensive Racial Equity and Inclusion training workshop (Racial Equity Institute Website 2019). Thus investigators who are really committed to changing the demography of this field need to invest time in training themselves to help accomplish this. University administrators who are invested in seeing the demography of this field change, must be willing to reward the efforts of faculty members who put their efforts into this work. This is crucial, in that often times, URM and women faculty play take on disproportion amount of this duty, and they should be rewarded for this work in promotion and tenure decisions.

If this profession is really serious about increasing the participation of African Americans in this field, it must first examine its own cultural and implicit biases. In this regard, other subdisciplines within the biological sciences have done a better job. To get a sense of the direction that we should be moving I suggest that model the accomplishments of the biomedically focused National Research Mentor Network (<https://nrmnet.net/#undergradPopUp>). I specifically point out the efforts of the Enhancing the Diversity of the NIH-funded Workforce group (<https://www.nigms.nih.gov/training/dpc>).

Finally, I have often explained to my European American colleagues across my career that I love this work, but I do not love that you want me to become “you” to do

it. By definition, African- and European Americans have different social and cultural experiences. Real progress will be made towards diversity and inclusion in evolutionary science, when kowtowing to Eurocentrism is no longer the criterion for participation in it.

Abbreviations

ABRCMS: Annual Biomedical Conference for Minority Students; BEACON: Biocomputational Evolution in Action; HBCU: historically black colleges and universities; HSI: Hispanic Serving Institutions; HWI: Historically White Institutions; MSI: Minority Serving Institutions; SACNAS: Society for the Advancement of Chicanos and Native Americans in Science.

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