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Towards Teaching a Humanistic Anatomy: Confronting Racism in Human Anatomy Courses

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Abstract
Historically, the study of human anatomy has had a very complex relationship with race and racism in the United States. Today, BIPOC students are disproportionately excluded from the health sciences, in part because anatomy courses play the role of "gatekeepers" for the health professions. Anatomy instructors–including biological anthropologists teaching anatomy–may passively support white supremacy in science and medicine by ignoring anatomy's problematic history and by teaching in outdated, exclusionary ways, rather than using anatomy courses as opportunities to provide insight into structural racism and support the success of students who identify as Black, Indigenous, and/or a Person of Color (BIPOC). The objectives of this work were to 1) uncover how latent racism in anatomy and anatomy education may be contributing to marginalized students' exclusion from health care careers, and 2) offer recommendations which will promote the success of BIPOC health sciences students and produce antiracist healthcare practitioners of all identities. Historical, anthropological, and critical pedagogical analysis of anatomy education was conducted. Paolo Freire's *Pedagogy of the Oppressed* (2018) was used as a theoretical framework for dissecting the ways in which the traditional pedagogy of anatomy may be particularly exclusionary for BIPOC students in the US. Pedagogical recommendations and recent case studies were collected from the academic literature. Anatomy instructors and medical schools are encouraged to develop a new, humanistic way of teaching anatomy, which requires extensive changes to the anatomy curriculum. Five categories of reform are recommended: improving pedagogical training for anatomy instructors, reconsidering course organization and modalities, emphasizing variation, implementing culturally-responsive teaching and improving culture, and including history in the anatomy curriculum.

Keywords
Anatomy; biological anthropology; antiracism; banking model of education

Introduction

In the US, many biological anthropologists' academic positions involve teaching health sciences students courses in human anatomy, which are in high demand. Anatomy courses have always been foundational to medical education, frequently playing the role of "gatekeepers" for the health sciences (Estai & Bunt, 2016; Forgey et al., 2020; Harris et al., 2004; Jordan et al., 2014; Papa & Vaccarezza, 2013; Shead et al., 2016; Sugand et al., 2010). Typically, between 30 and 60% of students in undergraduate anatomy courses receive below a "C" grade (Forgey et al., 2020; Harris et al., 2004; Hopper, 2011), which often prevents those students from continuing in their health science program or major (e.g., Sproat, 2018). With the US facing a dire shortage of qualified healthcare workers, many have begun investigating why so many students fail anatomy courses, and what could be done to increase student retention in the health sciences (Forgey et al., 2020; Harris et al., 2004; Hopper, 2011; Sproat, 2018). A variety of factors have been identified to impact anatomy grades, including previous science coursework, work and family responsibilities (Harris et al., 2004), and organizational skills (Hopper, 2011). All of these factors are likely affected by a combination of socio-economic status and race in the United States (Hammond, 2015), so it may be unsurprising that another study found that a large predictor for success in anatomy courses is race (Forgey et al., 2020). Therefore, one effect of the so-called rigor of anatomy courses is the disproportionate exclusion of students who identify as Black, Indigenous, and/or a Person of Color (hereafter, BIPOC) from the health sciences. Thus, marginalized students frequently lose the opportunity for

lucrative careers due to their grades in this single course, and biological anthropologists are often the ones enforcing this barrier.

Society suffers from this loss, both because lower retention of BIPOC students contributes to the shortage of healthcare workers, but also because institutions continue to produce mostly white healthcare workers who often retain bio-deterministic (Blakey, 2020b), essentialist beliefs about race (Benitez et al., 2017; Hoffman et al., 2016). Medical students continue to hold false beliefs about racial biology - for example, that Black people feel less pain or have thicker skin than white people (Hoffmann et al., 2018). Often originating from enslavement, these myths continue to influence treatment decisions (e.g., Green et al., 2007) and breed distrust between patients and providers (e.g., Blair et al., 2013), which only further exacerbates health inequalities and allows for more racially-essentialist thinking (Ansell, 2021; Budrys, 2010; Roberts, 2011). As recently as 2020, the *Journal of Internal Medicine* published a symposium in which the medical researchers conflated race, ethnicity, genotype, and disease risk (Gower & Fowler, 2020; Olsson & Goedecke, 2020; Yaghootkar et al., 2020). The studies implied that "African American" women are innately biologically different from the "norm," presumably, white Americans (Nguemeni Tiako & Stanford, 2020; Tsai et al., 2020). In this way, the cycle of healthcare discrimination and health disparities for communities of color continues (Ansell, 2021; Budrys, 2010; Roberts, 2011).

Anthropologists-teaching-anatomy have an important role to play in educating the next generation of healthcare workers. This role can be to either silently prop up existing systems of power, or to help dismantle them. By not actively confronting injustice, anatomy education has allowed for the perpetuation of white supremacy and racism in medicine and science (Hoffman et al., 2016; Jackson, 1997; Marks, 2012; McGee, 2020; Villarosa, 2019). In the tradition of anthropologists and anatomists Franz Boas and W. Montague Cobb, today's anthropologists-teaching-anatomy have a responsibility to use the classroom to actively further antiracism (Lacy & Rome, 2017; Street, 1987), using both course content and pedagogical technique (Burkholder, 2011; McGee, 2020). Accordingly, the objectives of this article were to 1) uncover how latent racism in anatomy and anatomy education may be contributing to marginalized students' exclusion from health care careers, and 2) offer recommendations which will promote the success of health sciences students who identify as Black, Indigenous, and/or a Person of Color (BIPOC) and produce antiracist healthcare practitioners of all identities. To address the first objective, this article first describes how the latent racism in anatomy and anatomy education may be contributing to marginalized students' continuing exclusion from health care careers and to the retention of racist beliefs in all students. Then, to address the second objective, counter-techniques are presented for anatomy educators to carry forward in building an antiracist, humanistic anatomy. The recommendations take a multifaceted approach, with the dual aims of enabling BIPOC health sciences students to succeed in anatomy and producing antiracist healthcare practitioners of any identity.

It is important to recognize that this article has been informed by a large body of Black scholars across disciplines. This includes the work of Black biological anthropologists, such as Michael Blakey (1987, 1998, 2020a, 2020b, 2020c; Blakey & Rankin-Hill, 2009), Rachel Watkins (2012, 2018, 2020, 2021; Watkins & Muller, 2015), and Carolina de la Cova (2010, 2011, 2012, 2014, 2020). Outside of anthropology, Black scholars whose work has informed this essay include Dorothy Roberts (1999, 2011), Harriet Washington (2006), C. Riley Snorton (2017), Crystal Fleming (2018), Ibram X. Kendi (2016) and Isabel Wilkerson (2020). Zaretta Hammond's *Culturally Responsive Teaching and the Brain* (2015) has also been a particularly valuable resource for pedagogical concepts.

Objective 1: Racism and Exclusion in Anatomy and Anatomy Education

First, it must be acknowledged that anatomical science, medical education, and anthropology have a long history of strengthening and justifying white supremacy in the United States. Up until the mid-20th century, the majority of biologists, anatomists, anthropologists, sociologists, and geneticists were in the literal business of making race real (Marks, 2012). Anatomists and anthropologists were charged with the important societal duty of inventing innate, biological distinctions between colonizer and colonized, in order to justify brutality against and exploitation of BIPOC communities (Armelagos & Goodman, 1998; Blakey, 1998, 2020a, 2020b, 2020c; Kendi, 2016). As part of this endeavor, Indigenous people's remains were carted away by anthropologists for study at elite institutions in the Northeast (Martin, 1998) and used extensively in the scientific justification for racial hierarchies (Gould, 1978). After being viciously exploited for their labor during life, Black bodies were treated as an abundant resource for medical education, so much so that 19th century medical schools in the southern US advertised their availability of Black cadavers as a selling point to prospective students (Blakely & Harrington, 1997; Washington, 2006). The perverse irony is that, while anatomists strenuously claimed that non-white and

white people had fundamentally different anatomies and biologies, they also regarded Black people's bodies as sufficient - or even ideal - for training their students on how to treat white patients (Blakely & Harrington, 1997; Blakey, 2020c; Riley Snorton, 2017). Living Black people have also been the constant subjects of medical experimentation, far beyond the famous Tuskegee syphilis experiments (Riley Snorton, 2017; Roberts, 1999, 2011; Washington, 2006). Thus, US medical education has an enduring tradition of treating non-white bodies as fundamentally different, naturally inferior, and valuable as only disposable objects.

In the 21st century lab and classroom, white supremacy is certainly less overt than it was 100 or 200 years ago. However, just because racism is not obvious does not mean that it does not exist (McIntosh, 1989). In fact, this obfuscation may be a form of "racist progress" that allows white supremacy to continue to flourish (Fleming, 2018), privileging white students and harming future non-white patients. I argue that conventional anatomy courses under-serve students and disproportionately exclude students who are poor, non-native-English-speaking, and non-white. The problems with anatomy pedagogy can be better understood by using Paolo Freire's *Pedagogy of the Oppressed* (2018) as an analytical framework. Here, three elements of Freire's critiques are highlighted, which particularly apply to anatomy education: the banking model, narration sickness, and alienation.

Freire's Banking Model

Under the banking model, the learning process is depicted as a one-way transaction in which the teacher owns knowledge, and must "deposit" this knowledge into the students, hence the banking metaphor (Freire, 2018). Accordingly, students are viewed as empty vessels, devoid of knowledge without the teacher's intervention. As such, there is a strict dichotomy between the teacher, who owns knowledge, and the student, who must receive knowledge (Freire, 2018). There is no possibility for knowledge synthesis, or independent inquiry, where students might discover true knowledge for themselves (Freire, 2018). In effect, banking-model teaching is a form of subjugation for the students (Freire, 2018), particularly when there are other forms of power differential between teacher and student (e.g., race, class, gender, age, etc.). This paternalistic way of viewing education persists in STEM fields (McGee, 2020), and particularly in anatomy.

Also implicit in a banking model pedagogy is the idea of one truth, which only the teacher can interpret: "the teacher talks about reality as if it were motionless, static, compartmentalized, and predictable" (Freire, 2018, p. 71). The most fundamental way this is established is in a statement often repeated by anatomy instructors on the first day of class, and which Netter also wrote in the introduction to his anatomical atlas: "anatomy does not change" (Netter, 2014). In anatomy, the instructor presents an objective set of facts about "*the* human body" (Hafferty & Franks, 1994), which are passed down from enlightened instructor to receptive student. Not dissimilar to how Galen's descriptions were upheld despite contradicting evidence (Malomo et al., 2006), variation is treated as aberrance, not part of the natural condition. Textbooks, illustrations, atlases, models, lectures, and class discussion all implicitly reinforce a default, normal, correct anatomy.

Not by accident, this default anatomy is male, cisgender, muscular, thin, and white. For example, among hundreds of illustrations (more than 500 plates) in Netter's reference atlas (2014), only one illustration depicts a dark-skinned person (Plate 182). Nearly all others depicted a light-skinned male. McKinley & Dean O'Loughlin's *Human Anatomy* (2008), a systems-based undergraduate anatomy textbook, is significantly better than Netter's atlas at representation. Yet still, the overwhelming majority of photos and illustrations still use someone presenting as a white man (see Louie & Wilkes, 2018 for a more thorough review of medical textbooks). The dearth of dark-skinned illustrations is a particularly egregious problem for dermatology, where skin color often affects disease presentation (Adelekun et al., 2021; Ebede & Papier, 2006). Moreover*, nearly all anatomical illustrations and photos show only thin bodies.* This is a particularly glaring omission, when nearly half of adults in the United States have obesity (Hales et al., 2017), and therefore, nearly half of today's student's future patients will have obesity as well. Being unprepared to encounter the diversity of surface anatomy which exists, particularly of overweight and obese people, is not just an oversight. It is, in fact, reflective of deep bias and injustice, as fatness is associated with Blackness, and through this association, with immorality and stupidity (Smalls, 2021; Strings, 2019).

Narration Sickness & Alienation

If learning is viewed as a transaction, just like a deposit into a bank account, it stands to reason that volume is prioritized. Therefore, as a further consequence of a transactional approach, the banker-teacher will emphasize volume of information, especially terminology (Freire, 2018). This leads to narration sickness in the student,

wherein the words become meaningless noise, learned only by rote memorization for the purpose of regurgitation. Narration sickness is certainly a problem in traditional anatomy education. Because the instructor's focus is often on quantity and scope of terms learned (read: memorized), clinical relevance is neglected (Estai & Bunt, 2016; Ghosh, 2016). Also, instructors frequently prefer to structure their courses by regional anatomy, where students learn disjointed information strictly based on location in the body, over systems-based anatomy, based on functional relationships (Estai & Bunt, 2016). A regional approach de-emphasizes relevance and applicability, which obfuscates logical relationships among organs and further bloats the importance of blunt memorization (Estai & Bunt, 2016). Narration sickness makes the course needlessly difficult for all students, but this approach may particularly disadvantage BIPOC students for a combination of reasons (Hammond, 2015). BIPOC students are likely already experiencing the additional cognitive load of social threats (e.g., stereotype threat, microaggressions; Hammond, 2015). They may have different cultural frames of reference than the instructor, which interferes with the "scaffolding" of new knowledge (Hammond, 2015). Finally, BIPOC students are less likely to come from schooling systems which teach the fundamental study skills of independent learners, which might be able to overcome the immense burden of memorizing out-of-context anatomy terms (Hammond, 2015). Thus, these students are at particular risk of experiencing narration sickness in anatomy courses.

Freire points to alienation from real-world relevance as an aspect of the banking model (Freire, 2018). In anatomy education, our emphasis on memorizing the maximum amount of terms prevents students from relating what they are learning to their own bodies and lives. Students are seldom even encouraged to think about their own bodies and medical histories as a point of reference. Though students are learning about the human body, the material is dehumanized. This disconnect leads to alienation from the material, making it even harder for disadvantaged students to succeed.

In conjunction, anatomy courses also have a very particular culture (Hafferty, 1988). For one, these courses have rigid standards (Guo et al., 2020), driving competition and individualism. A less obvious but larger problem is the prevailing attitude towards death and dead bodies. As Hafferty (1988) described in detail (albeit over 30 years ago; but see Bhasin, 2022, for a more recent example), many medical students tell stories about "pranks" involving cadavers, or gross-out stories. These stories served (and likely still serve) the purpose of emotionally socializing other medical students; the norm is established that fear, disgust, or anxiety around cadavers are unacceptable, and that a humorous, fun-loving attitude is necessary to succeed in anatomy and medicine (Hafferty, 1988). While some "gallows humor" may be helpful for emotionally processing death and human remains, this jocular peer pressure is likely to further ostracize students who already feel excluded - making it all but impossible for them to learn effectively in such a hostile environment (Hammond, 2015). In addition, an undergraduate whose cultural, religious, or personal beliefs directly conflict with this cavalier attitude might assume they will not be able to succeed in medical school (Hafferty, 1988). The dehumanization of the human body that the students are taking apart also creates a detachment which continues into the patient-practitioner relationship (Guo et al., 2020). There is a clear through-line from the careless and often malicious dissection of the condemned, poor, and Black in the past (Blakely & Harrington, 1997; Federici, 2014; Hildebrandt, 2008; Malomo et al., 2006; Muller et al., 2017), to the cavalier attitudes of many of today's anatomists and health sciences students. Therefore, this cultural issue may not just exclude certain students, but also poison future patient-provider relationships.

Objective 2: Recommendations for a Humanistic, Antiracist Anatomy

Given the problems with anatomy teaching, a new way forward must be developed. Making anatomy antiracist will not simply consist of adding on course content about race, nor making the classroom superficially welcoming to non-white students (Blakeney, 2005). Ideally, it will involve overhauling ideas about how teaching works, centering the needs of all students in educational design, and making the classroom a place where social justice is served (Blakeney, 2005; Freire, 2018; Gay, 2018; Hammond, 2015). At the same time, there are practical considerations, such as time limitations of both students and instructors, as well as institutional barriers to reform. Below are five elements that I believe are essential to transforming anatomy courses into more inclusive spaces, all of which have already been recognized by a variety of scholars, and most of which could reasonably be implemented by an instructor without much institutional support. These are, improving pedagogical training (Balta et al., 2019; Hopper, 2011); reconsidering course organization and modalities (Estai & Bunt, 2016); emphasizing variation (Estai & Bunt, 2016; Papa & Vaccarezza, 2013); implementing culturally-responsive teaching and improving culture (Bilton et al., 2018; Guo et al., 2020); and including history (Hildebrandt, 2019; Jones et al., 2015).

Recommendation 1: Improve Pedagogical Training

In general, graduate students do not receive adequate pedagogical training, and future anatomy instructors are no exception. While great strides have been made in Europe, particularly in Sweden (Lindberg-Sand et al., 2008; Ödalen et al., 2019), in North America, structured pedagogical training is often not mandatory for graduate students, and plays only a minor role in hiring decisions for academic positions (Robinson et al., 2019; Tanner & Allen, 2017). The training that is available is highly variable across institutions and departments, and often takes the form of brief one-time events (Robinson et al., 2019; personal experience). Thus, many current and future faculty have not been exposed to basic pedagogical concepts, let alone the latest evidence-based practices, leaving them to mainly teach as they were taught (personal observation). Beyond these general shortcomings in higher education, anatomy instructors might need specialized training, given the large volume of complex material to be taught. For anthropologists-teaching-anatomy in particular, another hurdle may be that the instructor's perspective on anatomy might be quite different than the students' (e.g., the instructor having a strong interest in comparative evolution or developmental underpinnings of anatomy, versus the student having a stronger interest in more practical clinical or diagnostic applications). Thus, one way anatomy education could be dramatically improved is by formally training anatomy instructors in anatomy *education*, not just biological anthropology or human anatomy (Balta et al., 2019). Balta and colleagues (2019) implemented this by developing their "Anatomy Pedagogy" course, which used principles of universal design for learning (UDL), Teaching for Understanding, and Assessment as/for/of Learning to better prepare the next generation of anatomy educators. These fundamental pedagogical concepts would go far in improving many anatomy courses taught by anthropologists, and their course can readily be used as a framework for Anatomy Pedagogy courses at other institutions.

However, one drawback of this recommendation is that it does require institutional buy-in to create pedagogical programming where there is none, or to make training a requirement for the PhD, or to value pedagogical training in the hiring of new anatomy instructors. Although requiring rigorous pedagogical training can lead to "'professionalization' of teaching in higher education" (Ödalen et al., 2019), this can only occur if there is a larger cultural shift in academia towards valuing pedagogy, and institutional will to support such efforts. Faculty with more power (e.g., department chairs, graduate program directors) should push for pedagogy courses or degree requirements for pedagogical training, but their ability to effect change may still be limited by university, state, or federal rules. In the meantime, anatomy instructors can take the initiative to learn more about the science of teaching and learning in general (e.g., Hammond, 2015), and about anatomy education in particular, as they are already doing by reading this article. Even brief exposure to pedagogical concepts and reflection on teaching practices can lead to lasting impacts.

Recommendation 2: Reconsider Course Organization and Modalities

Many anatomy educators vehemently defend dissection as a "gold-standard" teaching method, for good reason (Estai & Bunt, 2016; Ghosh, 2016; Jordan et al., 2016; Papa & Vaccarezza, 2013). Hands-on dissection continues to be an excellent way of experiencing anatomy, particularly for those going on to surgical careers (Estai & Bunt, 2016). Dissection labs feature interactive small-group work, which supports diverse learners (Hammond, 2015). However, anatomy labs still leave something to be desired - truly synthesizing knowledge in the way it will be used in the students' future careers. It is vital that anatomy instructors use a great variety of modalities to reach all students, rather than dogmatically teaching only one way (Estai & Bunt, 2016; Sugand et al., 2010).

Along these lines, one improvement would be switching to systems-based, clinically-relevant, problem-based anatomy lessons. Making the material clinically relevant and using clinical examples must be priorities for anatomy instructors (Ghosh, 2016). In conjunction, clinically-relevant material can be more easily built into problem-based lessons (Estai & Bunt, 2016; Jordan et al., 2016). In fact, Freire was an advocate of what he called "problem-posing education" as an antidote to the banking model (Freire, 2018). Whereas the banking model alienates students from knowledge, using problems as lessons necessitates context. When the information has clear authentic applicability to the real-world, the students are motivated and critical co-investigators, rather than passive receptacles (Freire, 2018). Medical educators have long made similar claims about case-based and problem-based learning (Barrows, 1986; Dolmans et al., 2005), and many medical schools supplement dissection with problem-based learning tutorials, in which students must actively discuss in small groups (Barrows, 1986; Schmidt et al., 2009). These case-based or problem-based lessons can range from simply lecturing about an example to the students themselves iteratively investigating a clinical problem (Barrows, 1986); some advocate for more open, less structured problems (Barrows, 1986; Dolmans et al., 2005), while others argue that this wastes precious medical school curriculum time (Srinivasan et al., 2007). Although there is not yet decisive

evidence for improved outcomes in anatomy courses with this approach (Dolmans et al., 2005; Papa & Vaccarezza, 2013; Sugand et al., 2010), emphasis on contextual, peer-to-peer learning makes the classroom more inclusive and antiracist by encouraging a sense of community and leveraging different types of learning (Hammond, 2015). Therefore, these techniques are what humanistic educators should strive for, despite a current lack of definitive research.

However, anatomy course content itself may not be the primary reason many students fail anatomy. Instead, many undergraduate students lack foundational learning, studying, and organizational skills which are integral to advanced academic success. If inclusion and equity are a priority for an anatomy instructor, they should consider adding course content which addresses student preparedness head-on, rather than simply letting students "sink or swim." For example, Hopper (2011) describes how they offered a one-hour-a-week supplement course to Anatomy and Physiology I. This course began with teaching basic "soft" skills for success in anatomy, such as organization and time management. Over time, the course went on to incorporate more specific study tools and self-assessment. Students in the supplement course withdrew from anatomy at a much lower rate, and had much higher final grades, compared to students who only took the main A&P course (Hopper, 2011). As this case study demonstrates, it is vital to not regard organizational and study skills as incidental, because many students have not had the opportunity to acquire the skills for independent learning (Hammond, 2015), or might lack access to pre-existing academic support structures (Hopper, 2011). This is particularly true for BIPOC students, for a variety of reasons (Hammond, 2015). In addition, instruction to build students into independent, self-directed learners might be vital for the success of problem-based learning initiatives discussed above, where students must engage in high amounts of self-regulated learning (English & Kitsantas, 2013).

Recommendation 3: Emphasize Variation

Anatomy courses must focus more on anatomical variation and dismantle the typological view. In the dissection lab, realistic human variation is easy to see; students can walk from table to table and see great diversity (Estai & Bunt, 2016; Papa & Vaccarezza, 2013). However, many anatomy classes, especially undergraduate ones, do not have access to cadavers. Without a range of cadavers, students' groundwork anatomical knowledge is limited by the examples they see in PowerPoint lectures, plastic models, and textbooks. Computer-based learning may either assist in including variation or reinforce the idea of a hegemonic anatomy, based on the exact tool used (Estai & Bunt, 2016; Papa & Vaccarezza, 2013). Therefore, the onus is on the instructor to 1) seek out variation in illustrations, particularly in skin color, and 2) bring students' attention to variation, especially variation that exists independent of racial categorization.

One technique for highlighting variation could be "living anatomy," in which students are instructed to identify structures on their own or on another student's body (Estai & Bunt, 2016). Living anatomy techniques include peer physical examination, body painting, ultrasound, and simulated patients (Estai & Bunt, 2016). Using living anatomy is one way of combating alienation and detachment in the anatomy education process (Hafferty, 1988). Body painting in particular can be a good tool, as it is interactive, visual, kinesthetic, and self-reflective (Estai & Bunt, 2016). However, both peer physical examination and body painting may be complicated by the student's gender, religious beliefs, and/or body type, so these activities must be approached sensitively, and may not work with every student population (Estai & Bunt, 2016).

Recommendation 4: Implement Culturally-Responsive Teaching and Improve Classroom Culture

It is imperative that anatomy instructors understand and respond to their specific students' needs. Just as there is no "one true anatomy," there is not one perfect way of *teaching* anatomy, in all settings, with all populations (Gay, 2018). Culturally-responsive teaching is the best framework for interrogating and responding to students' particular needs (Gay, 2018; Hammond, 2015). As one example, Bilton and colleagues (2018) developed a truly innovative way of integrating their students' culture into not just what they teach, but how they teach. At an Australian university with a high Indigenous population, the instructors used the 8 Aboriginal Ways of Learning to design a lesson where students worked in groups to create symbolic representations of anatomical concepts around the university (Bilton et al., 2018). This approach is exactly what anatomy instructors in the US need to do for their Black, Latinx, Asian, and Indigenous student populations: building lessons that make sense from our students' cultural perspectives, rather than what just feels "natural" to instructors (Gay, 2018; Hammond, 2015). It is a vital component of humanistic anatomy, because changing courses to be more culturally responsive will not just make students feel more accepted, it will help students cognitively process the material (Hammond,

2015). For example, if there are many Spanish speakers in a student population, these students should be encouraged to break down Latin terms using their pre-existing knowledge. If students come from storytelling cultures, they might benefit from performing or presenting information as narrative. If many students come from collectivist cultures, group learning can be emphasized in the course, by using group projects, collaborative quizzes, labor-based grading, or group studying. Rather than focusing on surface culture, culturally-responsive teaching requires understanding students' "deep culture", the way in which certain values may differ (Hammond, 2015).

In addition, students cannot learn effectively when they feel under threat, including the threat of not belonging (Hammond, 2015). Therefore, while culturally-responsive techniques may help make anatomy knowledge more accessible, it is equally important to develop a new culture and attitude within anatomy education. First, we should also replace the dogmatic view of anatomy inherited from Galen with a view of anatomical science as contingent, imperfect, and capable of changing (Jones et al., 2015). The culture of detachment and jocularity must also be changed (Hafferty, 1988; Hafferty & Franks, 1994). Guo and colleagues (2020) describe how they encouraged humanistic values within their dissection-based anatomy courses. This was achieved through ceremonies honoring the body donors, and by viewing the cadaver as a "silent mentor," rather than just an inanimate object of study (Guo et al., 2020). While this ceremony was well received by students in Guangzhou, it may not be appropriate for all anatomy students everywhere (Gay, 2018). Anatomy instructors must educate themselves about their students, and then reflect on how best to change attitudes towards the cadaver and future patients in that particular student population (Gay, 2018; Hammond, 2015).

Recommendation 5: Include History

Finally, history needs to be a part of the anatomy curriculum (Hildebrandt, 2010, 2019; Jones, 1998; Jones et al., 2015). The history of medicine and anatomy gives the student a much clearer picture of ethics and the fallibility of science and medicine (Jones et al., 2015), and this is particularly true regarding race. It is important to openly reckon with the problematic history of anatomy and white supremacy (Mc Murtrie, 2020; St Clair & Kishimoto, 2010), and celebrate, rather than suppress, Black scholarship (Blakey & Watkins, 2021). If students must grapple with the history of dissection (Blakely & Harrington, 1997; Hildebrandt, 2008) before entering the dissection lab, they will be more likely to view dissection as a privilege and treat the cadaver with respect (Guo et al., 2020; Hildebrandt, 2010). These students then have the opportunity to become more compassionate, respectful practitioners (Guo et al., 2020; Hafferty & Franks, 1994).

History can also give the anatomy instructor a different perspective, by learning from the antiracist anthropologists and anatomists of the past. Though white supremacy was the scientific consensus for many decades, the racial worldview did not go unopposed (Blakey, 1998, 2020c; Blakey & Watkins, 2021; Burkholder, 2006; Glick, 1982; Kendi, 2016; Muller et al., 2017). Notably, Franz Boas and W. Montague Cobb both conducted antiracist research and advocacy that rejected a bio-deterministic view (Blakey & Watkins, 2021; Sussman, 2014; Watkins, 2020, 2021). Boas is well known for his studies of New York immigrant families, which dismantled one of the cornerstones of racial typological thinking, to his own surprise (Boas, 1912; Sussman, 2014). Most importantly, Boas went on to train an entire generation of antiracist anthropologists, while also communicating with non-academic audiences and advocating for antiracist education (Burkholder, 2006; Sussman, 2014). In contrast with Boas, W. Montague Cobb is not as widely recognized for his leadership in combating scientific racism, particularly in a medical school setting at a historically-Black university, Howard (Blakey & Watkins, 2021; Watkins, 2021; Watkins & Muller, 2015). Building on the traditions of radical Black scholarship including W. E. B. Du Bois, Frederick Douglass, and Antenor Firmin, Cobb published prolifically about the intersection of human biology and society, and the effects of racism on Black people's bodies (Blakey & Watkins, 2021). Similar to many biological anthropologists today, Cobb mostly trained medical and dental students, rather than anatomists and anthropologists; through them, he left a legacy of structural competency in Howard University's anatomy department that continues to this day (Blakey & Watkins, 2021). Like Cobb, today's anthropologists-teaching-anatomy instructors must vehemently advocate for integrating more antiracist, anti-typological thinking into the health science curriculum.

Conclusion: Towards a Humanistic Anatomy

Each anatomist and biological anthropologist should ask themselves: who do they want to be as anatomy instructors? Currently, many anatomy instructors are perceived as aloof gatekeepers, keeping un-deserving students out of certain career paths. Many students – especially many BIPOC students – might dread their

anatomy classes, or even fear their anatomy professors; this anxiety makes it all the more likely that these students will fail. In addition, anatomy courses reinforce typological, bio-deterministic thinking, and fail to prepare students for the diversity they will see in the exam room. Teaching about the human body can either contribute to the disproportionate suffering and death of Black people, Indigenous people, and other people of color in the United States (Ansell, 2021), or can work to combat it. As anatomy instructors, it is impossible to be apolitical actors; the consequences of our gatekeeping are not abstract, esoteric, or academic.

By following the recommendations outlined above, anatomy instructors could become "warm demanders" (Hammond, 2015), helping students to achieve their full potential and contributing towards a more just society. To achieve this, anatomy courses do not need to be made easier, or watered-down; this will not benefit anyone in the long term. Some changes may require institutional support or culture change, which will be hard to come by; others may only need small changes to a few PowerPoint slides. Ideally, instructors can begin by critically considering what their students need to learn and how best to teach it, in full historical, ethical, and political context - that is to say, *humanistically* (Wulff, 2019). Instructors, departments, and institutions can then make small intentional changes and gradually build up to larger structural ones. If improvements are made, tomorrow's healthcare students will be more diverse, and they will be much better equipped to address the severe racism in our medical system (Ansell, 2021; Washington, 2006). Instead of continuing to "play defense" against bio-deterministic research (e.g., Gower & Fowler, 2020), biological anthropologists can move forward, using science as a tool for justice in the way that Boas and Cobb pioneered.

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