

VIEWPOINT

Ecology and evolutionary biology must elevate BIPOC scholars

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Abstract

Black, Indigenous and people of colour (BIPOC) individuals are disproportionately impacted by the negative consequences of our ongoing environmental and climate crises, yet their valuable scientific voices are shockingly underrepresented within the fields of Ecology and Evolutionary Biology (EEB). As early-career BIPOC EEB researchers, we recognise the key role that our fields play in understanding and mitigating the effects of our ongoing global crises, and are concerned about the lack of diversity we see among our own EEB cohorts and mentors. We present this piece as a call to action for the EEB Academy, drawing on our own experiences and the literature to suggest steps the Academy must take to increase representation of and equity for BIPOC graduate scholars in EEB. We synthesise these steps into four actionable ideas: anti-racism education and practice, increased funding opportunities, integration of diverse cultural perspectives and a community-minded shift in PhDs. Importantly, this advice is specifically directed at those who wield power in the Academy (e.g. funding agencies, societies, institutions, departments and faculty), rather than BIPOC scholars already struggling against inequitable frameworks in EEB.

Keywords

Anti-racism, BIPOC, climate, ecology, EEB, evolution, outreach, two-eyed seeing, URM.

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Black, Indigenous and people of colour (BIPOC) communities are disproportionately affected by the impacts of anthropogenic stressors and climate change (IPCC, 2014). Already, for example, increased rates of extreme weather events and air pollution negatively affect the health of many Black Americans (Sarfaty *et al.* 2014) and threaten the food security of Northern Indigenous populations (Ford 2009). Such disproportionate effects are a consequence of existing societal inequalities, largely due to the intersection of racial inequality and socioeconomic disparity (Cutter and Finch, 2008). Furthermore, the vulnerability of individuals to the impacts of climate change is strongly linked to the strength of their political voices – and through voting suppression, incarceration and wealth inequality, BIPOC voices have, and continue to be, systematically silenced (Brooks *et al.* 2005; Richomme 2014).

Given the disproportionately large and negative effects of our ongoing environmental and climate crises on BIPOC communities, we and others (Halsey *et al.* 2020; Tseng *et al.*, 2020) are concerned by the lack of diversity we see and level of equity we experience as BIPOC graduate students in ecology and evolutionary biology programmes (EEB; see Supplementary Material for data). As EEB students, scientists, and technicians, we are at the forefront of developing knowledge that tackles issues of biodiversity, conservation and human health, among numerous other global problems. Graduate students, in particular, hold unique positions in society; we are responsible for producing primary EEB research and represent the pool of candidates from which advanced EEB educators emerge. Compelling evidence also indicates that the quality, quantity and impact of

research is positively correlated with racial diversity in research groups (Hong & Page 2004; Freeman & Huang 2014; Hofstra *et al.* 2020). In light of current ecological crises and widespread concerns regarding racial representation and equity in Academia, there is a clear and urgent need to leverage and include the voices of BIPOC scholars in EEB research (Fig. 1).

ACTIONABLE ITEMS FOR THE EEB ACADEMY

As BIPOC scholars, we face numerous barriers tied to systemic racism that can influence our recruitment, retention and success in EEB. These include, but are not limited to: discrimination (Eaton *et al.* 2020), financial barriers (Wanelik *et al.*, 2020) and feelings of isolation within EEB (O'Brien *et al.* 2020). As individuals, there are specific actions we can take to strengthen our personal resilience to these barriers within the EEB Academy; these actions have been previously addressed (Halsey *et al.* 2020; Tseng *et al.* 2020). Here, we build upon recommendations for individual action by focusing on steps that can be taken by larger organisational bodies (supervisors, departments, institutions, funding agencies and societies) – *i.e.* those that wield systemic power in the Academy – that are intended to elevate BIPOC scholars by increasing our representation and equity within EEB (Table 1).

Increase anti-racism education and accountability

Promoting BIPOC representation and equity in EEB requires that larger organisational bodies move beyond diversity

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[Correction added on 19 March 2021, after first online publication: Alignment of Table 1 has been modified.]



Figure 1 Black, Indigenous, and people of colour scholars do not experience fair representation or equity in Ecology and Evolutionary Biology.

statements and commit to active anti-racism work. This is an essential first step, as diversity initiatives are unlikely to lead to equity in higher education if BIPOC students are recruited into racially hostile environments (Puritty *et al.* 2017). We assert that it is the responsibility of Academy leaders to commit to ongoing anti-racism education and overcome their own conscious and unconscious racial biases.

In our experience, much of the racial hostility we face as BIPOC scholars comes in the form of inundating racial microaggressions: subtle, commonplace and discriminatory comments or actions (Johnson & Joseph-Salisbury 2018). For example, we have often been forced into uncomfortable conversations with superiors who freely, although unintentionally, expressed harmful sentiments including, “white men have it really hard these days”. These comments minimise our experience in white-dominated spaces, where we have often felt that our scientific opinions, views or even presence in a room were ignored, particularly by white men in power. Experiences like these are neither uncommon nor trivial for BIPOC scholars, and can be avoided through stronger institutional cultures of anti-racism.

Anti-racism education could start with institutional or organisational equity, diversity and inclusion (EDI) workshops and seminars (Walton & Cohen 2011; Bezrukova *et al.* 2012). However, it is important to note these first steps must be done conscientiously, using skilled trainers (Roberson *et al.* 2013), and avoiding ineffective single-session “check-off-the-box” approaches (Bezrukova *et al.* 2012). Rather, proven EDI training methods must be implemented in tandem with other equity strategies (*see below*) in an ongoing, constructive manner (Bezrukova *et al.* 2012). In addition to group training, individuals should continue anti-racism work through ongoing self-education (*see Supplementary Material for anti-racism resources*).

It is imperative that the Academy follows through by holding itself accountable for anti-racism work. For example, funding agencies or tenure committees may require that faculty applicants define challenges to EDI in their field, and explain steps the applicant has taken to remove these barriers (*e.g.* Natural Sciences and Engineering Research Council, n. d.), and that researchers adhere to regularly updated codes of conduct. When implemented effectively, anti-racism education and accountability will lead to more inclusive academic culture and enhance other strategies that promote BIPOC representation and equity in EEB.

Make EEB financially accessible and attractive

A key method for making graduate programs more accessible and attractive to BIPOC scholars is through increased funding opportunities. BIPOC students are more likely than their white peers to come from financially disadvantaged backgrounds (Estrada *et al.* 2016), and low graduate student stipends may discourage promising BIPOC scholars from pursuing graduate studies in EEB (Brazziel & Brazziel 2001). Although increased funding is a common intervention, it can be effective. Targeted funding increases access and achievement rates of low-income BIPOC students (Zacharias *et al.* 2016; Ononye & Bong 2018), and is strongly linked to the successful recruitment and retention of BIPOC graduate students in particular (Rogers and Molina, 2006).

Funding opportunities for BIPOC scholars can come from all levels of the Academy. Supervisors, departments and institutions should ensure graduate students are well-funded through base stipends. Departments, institutions, funding agencies and societies should create BIPOC-focused funding to support their access to and achievement within EEB. Furthermore, we recommend that EEB experiences critical to the development of successful EEB graduate students (*e.g.* field and research assistantships) be funded, rather than unpaid or underpaid, to combat the difficulty many of us face in affording critical ecological experiences in our early careers (Fournier & Bond 2015).

For the benefits of BIPOC-focused funding to be realised, however, there must be mindful planning. In our experience, missed funding opportunities often stemmed from a lack of publicity surrounding funding, as well as a paucity of mentorship and support in the application process. Funding opportunities must be intentionally advertised to BIPOC students to increase application rates (*e.g.* through social media or BIPOC student societies). Supervisors, departments and funding body representatives must also take active mentorship roles through the application process. Importantly, funding bodies should include intersectional structures that specifically target BIPOC scholars, given that white individuals belonging to underrepresented groups can still be favoured over BIPOC individuals when criteria are broadly inclusive (Hunt *et al.* 2012).

Diversify scientific perspectives

Although Western paradigms dominate how we see science, individuals navigate science based on varying cultural and philosophical foundations that profoundly influence the outcomes of their research (Cech *et al.* 2017; Reid *et al.* 2020). In EEB, one key example of a non-Western cultural foundation is *Etuaptmumk* (Mi'kmaw for “Two-Eyed Seeing”), an important framework used to promote the coexistence of Western and Indigenous paradigms (Barlett *et al.* 2012). Already, implementation of *Etuaptmumk* has led to more comprehensive ecological research, particularly when dealing with conservation issues that disproportionately affect vulnerable Indigenous communities (Reid *et al.* 2020). For example, integrating Western and Indigenous knowledge systems has led to more complex and historically informed assessments of ecosystem change (Mantyka-Pringle *et al.* 2017), the development of sustainable land use practices (Mistry & Berardi

Table 1 Recommendations for supervisors, departments, institutions and societies for increasing BIPOC representation and equity in ecology and evolutionary biology graduate programmes

	Anti-racism education and accountability	Financial accessibility	Diversifying scientific perspectives	Community-oriented graduate roles
Supervisors	<p>Attend consistent and continuous EDI training.</p> <p>Commit to ongoing learning of anti-racism, following best-practice guidelines (e.g. see anti-racist reading resources in Appendix).</p> <p>Learn from, and amplify the voices of BIPOC scholars, including peers, collaborators, and students.</p>	<p>Connect BIPOC graduate students to funding sources (both general and BIPOC-focused) and assist them with funding applications.</p> <p>Ensure graduate students are well funded, at minimum, at a living wage for their region.</p> <p>Compensate students for their work (i.e. no volunteer positions). This should preferably be a stipend but may also include institutional credit (e.g. experiential learning or directed study courses).</p> <p>Provide BIPOC-focused funding (e.g. scholarships, bursaries). Advertise funding opportunities and provide support through the application process (e.g. host funding application tutorials).</p> <p>Ensure graduate student stipends are well funded, at minimum, at a living wage for their region.</p> <p>Ensure that experiences critical to development of successful EEB graduate students (e.g. summer projects, fieldwork, internships) are adequately funded.</p> <p>Provide and advertise BIPOC-focused funding (e.g. scholarships, bursaries).</p> <p>Ensure that funding policies are institution wide and equitable (e.g., graduate students stipends should be living wage at minimum).</p>	<p>Seek out graduate students from non-traditional pools (e.g. BIPOC, from non-Western countries).</p> <p>Incorporate different perspectives within EEB research through collaboration with BIPOC colleagues and communities (e.g. Two-Eyed Seeing).</p>	<p>Make an effort to involve lab groups in community science events or model community-oriented behaviour by creating outreach events and community connections.</p> <p>Encourage students to engage in compensated community work (e.g. science outreach for BIPOC youth).</p>
Departments	<p>Require research groups and individuals to participate in EDI training. Involve both staff and admin. Offer department-specific training to tackle EEB-related issues.</p> <p>Include anti-racism work as a selection criteria when hiring faculty (e.g. require that prospective applicants define challenges to EDI in their field, and explain steps they have taken to remove these barriers).</p> <p>Establish a trusted, compensated authority for students to approach with concerns. This individual can be responsible for taking note of recurring instances of conflict within the department.</p> <p>Provide comprehensive EDI training. Ensure training sessions are accessible by providing options for dates and times.</p> <p>Enstate and continually update an enforceable anti-racism code of conduct, as advised by a specialist.</p>	<p>Promote EEB BIPOC engagement events (e.g. Twitter visibility events such as #BlackBirdersWeek).</p> <p>Highlight BIPOC research in the department by amplifying their voices. Amplification can be done by making recognition posts that are displayed on the Department's social media or in newsletters.</p> <p>Diversify faculty to include BIPOC and other underrepresented groups.</p> <p>Hire BIPOC cultural councillors for students, who assist BIPOC students in navigating Academia from cultural or spiritual perspectives (e.g. Elders in Residence).</p> <p>Provide funding for BIPOC student societies and for cultural celebrations on campus.</p>	<p>Reward student-led community outreach projects, particularly for marginalized (e.g. BIPOC) communities, through funding, recognition and/or monetary awards.</p> <p>Allow paid community outreach opportunities as an alternative to teaching assistantships.</p>	<p>Reward student led community work and science outreach projects, particularly for marginalized (e.g., BIPOC) communities, through funding, recognition and/or monetary awards.</p> <p>Facilitate outreach by providing resources and community connections.</p>
Institutions				

(continued)

Table 1 (continued)

	Anti-racism education and accountability	Financial accessibility	Diversifying scientific perspectives	Community-oriented graduate roles
Funding Agencies	<p>Include anti-racism work as a selection criteria for grants (e.g. require that prospective faculty applicants define challenges to EDI in their field and explain steps they have taken to remove these barriers).</p> <p>Provide anti-bias training to selection committee members.</p>	<p>Make funding details transparent and accessible to new students. Establish clear expectations for pay amount and timing before the beginning of a program to allow for low-income students to establish financial plans.</p> <p>Provide BIPOC-focused funding (e.g. scholarships, bursaries). Advertise funding opportunities and provide support through the application process. Have representatives available to answer questions and/or provide feedback on applications.</p> <p>Advertise funding opportunities for BIPOC early-career researchers to target demographics.</p>	<p>Foster long-term relationships with BIPOC community members (e.g. local Indigenous community leaders) to encourage future collaboration.</p> <p>Specifically fund research that implements Two-Eyed Seeing or international BIPOC collaborations.</p>	<p>Reward student led community work and science outreach projects, particularly for marginalized (e.g. BIPOC) communities, through funding and/or recognition.</p>
Societies	<p>Host anti-racism conference sessions or panels that centre and uplift BIPOC voices.</p> <p>Ensure society codes of conduct include anti-racism practices (e.g. measures against improper conduct).</p>	<p>Provide and advertise BIPOC-focused funding (e.g. microgrants, travel grants for student conference attendance). Connect BIPOC to external funding opportunities.</p> <p>Provide free membership to BIPOC and other underrepresented groups.</p>	<p>Require funding applicants to explain how their research incorporates diverse scientific perspectives.</p> <p>Promote EEB BIPOC engagement events (e.g. Twitter visibility events such as #BlackBirdersWeek).</p> <p>Make space for science culture discussions at conferences, specifically addressing BIPOC and other underrepresented groups. For example, aim to have at least one "science and society" related session per conference.</p> <p>Diversify leadership to include BIPOC and other underrepresented groups.</p>	<p>Increase the weighting of community leadership within scoring frameworks for funding applications in order to highlight the importance of community work.</p> <p>Reward student-led community work and science outreach projects, particularly for marginalized (e.g. BIPOC) communities, through funding and/or recognition.</p>

2016) and earlier detection of wildlife population decline (Tomaselli *et al.* 2018). *Etuaptmumk* has also led to greater retention and success of Indigenous students in science (Hogue 2018; Michie *et al.* 2018). Ecologists interested in implementing *Etuaptmumk* should take the appropriate steps to ensure that they are respectfully working alongside Indigenous communities at each research stage (see Adams *et al.* 2014; Wong *et al.* 2020). Importantly, given the hostile colonial history of Western education systems (Wright 1991; Battiste *et al.* 2002; Gray & Beresford 2008), respect is key. Building relationships with Indigenous communities and gaining the trust of Elders require time, mindfulness and consistent adherence to Indigenous protocols for conducting research and working within their communities (Adams *et al.*, 2014; Ban *et al.* 2018).

More broadly, diversifying scientific perspectives can occur through the inclusion of scholars from different cultural backgrounds, increased engagement with BIPOC communities and welcoming and celebrating non-colonial views or methods. Recent initiatives following these guidelines include the creation of BIPOC-focused networks such as EEB PoC (El-Sabaawi *et al.* 2020) or #EntoPoC (Goodman n. d.), as well as popular Twitter events including #BlackBirdersWeek and #BlackMarineScienceWeek. For many of these initiatives, BIPOC faculty and graduate students appear to lead the charge, and thus it is imperative that institutions, departments, societies and non-BIPOC allies support them. In addition to leading to more impactful and nuanced research (Reid *et al.* 2020), cultivating culturally sensitive and diverse atmospheres creates a stronger sense of belonging for BIPOC graduate students (O'Brien *et al.* 2020).

Re-evaluate traditional graduate roles and responsibilities

Finally, the Academy should consider re-evaluating the traditional roles and responsibilities of graduate students, particularly for PhD students. Academia is often perceived as a route to an individualistic career, providing rewards of status and power within the Academy. However, students from BIPOC backgrounds can have stronger community-oriented cultures and career interests than their white peers (O'Brien *et al.*, 2020; Smith *et al.* 2014; Puritty *et al.* 2017). In the current “publish or perish” climate of Academia, we leave little room for scholars to cultivate a sense of community. Creating more space in a graduate programs for community work, whether through integrative projects (*e.g.* community sustainability work), public outreach or participation in student societies, may attract and retain more BIPOC talent (Puritty *et al.* 2017), while simultaneously being a healthy change to the current graduate expectations (Nature 2019). These changes can have downstream impact as well: community mentorship from BIPOC PhD scholars themselves can encourage the next generation of BIPOC students to enter EEB (O'Brien *et al.* 2020).

To facilitate a community-oriented cultural shift, departments should broaden teaching positions to include community outreach. Supervisors should also strive to connect their labs with community-based science events, such as Science Literacy Week (NSERC, n. d.). Importantly, community

outreach should not go unrewarded. In order to lessen the burden of equity-related labour, which often falls on marginalised scholars (Social Sciences Feminist Network Research Interest Group, 2017), compensation and career-building recognition must be provided for those who choose to engage. Funding agencies can also highlight the importance of community work by increasing its weighting within scoring frameworks.

Our Diversity of Nature (DoN) programme (Massey *et al.* 2020) is one example of graduate student-led community work. Here, we lead a yearly, cost-free EEB field camp, as well as year-round in-school workshops targeting local BIPOC secondary students. Our vision for DoN is to tackle two key barriers we faced as aspiring BIPOC scientists: access to affordable ecological experiences (Armstrong *et al.* 2007) and mentorship (O'Brien *et al.* 2020). Simultaneously, as facilitators of the programme, we acquire valuable teaching and mentorship experience, and leverage our skills in a meaningful way. DoN is funded by bodies within every level of the EEB Academy, and this support was key for realising our programme. We hope our model may inspire conversations about possible outreach initiatives between other BIPOC graduate students and leaders within the Academy.

FINAL REMARKS

In science, the novelty, quantity and impact of discoveries directly benefit from racial diversity. At the same time, the scientific community also has a moral obligation to include the voices of who are most affected by our ongoing global crises. Racially diverse communities and broader society will both be the beneficiaries of efforts to achieve racial equity, and we assert that this push must ultimately come from those who wield power in the Academy. The immediacy and immensity of the world's ecological and environmental problems demand that EEB elevate BIPOC scholars.

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AUTHORSHIP

MDM and SA conceived the idea for this project. MDM and SA led the drafting of the manuscript and all authors contributed to drafting the manuscript. CA created the table. MDM and SA wrote the Supplementary Material; SA collected the data and MDM created the figures within. All authors edited the final manuscript and collaboratively discussed their perspectives throughout writing the manuscript.

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/ele.13716>.

DATA AVAILABILITY STATEMENT

No new data were used in this manuscript; all data used are publicly available from the US Survey of Earned Doctorates Data Tables (Data available from the National Science Foundation: <https://ncses.nsf.gov/pubs/nsf20301/>).

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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