



The roots of change: Cultivating equity and change across generations from healthy roots

Beronda L. Montgomery ^{1,*†} and Joseph A. Whittaker ²

1 Departments of Biochemistry and Molecular Biology and Microbiology and Molecular Genetics, Michigan State University, East Lansing, Michigan 48824, USA

2 Division of Research and Economic Development, Jackson State University, Jackson, Mississippi 39217, USA

*Author for correspondence: montg133@msu.edu

†Senior author

Dear Editor,

Recent and ongoing challenges presented by the COVID-19 pandemic and reengagement with the pervasive issue of systemic racism in society and scientific communities have presented opportunities for many to reflect on their internal structures and practices related to equity. In the wake of these opportunities for reflection and action, many professional organizations and academic entities have issued collective public statements and commitments to climate assessment, cultural change, and structural transformation. For example, the American Society of Plant Biologists (ASPB) and ASPB leadership made public assurances to address issues of inequity and promises to dismantle organizational practices and structures that reify systemic biases and oppression (Callis et al., 2020). Advancing these commitments has not been without challenges, including the resistance that arises from challenging traditional practices, measures of success, and interpersonal negotiations that underlie lived commitments to change and the pursuit of equity.

Commitments made by disciplinary societies are important, as these organizations have critical responsibilities to address bias and racism in STEM for the benefit of all of their members. These societies play active roles in modeling lived commitments to equity, which include directly engaging with difficult topics related to systemic exclusion and bias and promoting culturally aware engagement of scientists in societal activities (Montgomery, 2016, 2020a, 2020c; Montgomery and Colón-Carmona, 2016). Indeed, although 2020 spurred new conversations and questions about ongoing assurances, many disciplinary societies and other organizations already had nominal obligations and established mechanisms and structures with expressed commitments to

equity, such as established diversity, equity, and inclusion (DEI) committees (Madzima and MacIntosh, 2021), mission statements, and strategic DEI goals. A practical response to the heightened attention to systemic racism and bias in 2020 might have been to query why existing structures and commitments had not served to address long-standing issues effectively. Instead, many organizations proposed new structures—often associated with new availability of funds—or, alternatively, added new layers to existing structures without adequate assessment of current structures and practices.

Following broad-ranging organizational statements and expressed commitments, financial commitments and funding opportunities emerged to support organizational efforts and interventions. For scientific communities, both the National Institutes of Health (NIH) and the National Science Foundation (NSF) announced major efforts to dismantle systemic racism and its negative impacts in STEM environments. The NIH established the UNITE initiative, whose purpose is “to identify and address structural racism within the NIH-supported and the greater scientific community” (<https://www.nih.gov/ending-structural-racism/unite>). The UNITE effort identifies five foci represented in its acronym: U, understanding stakeholder experiences; N, new research on health disparities and related health equity issues; I, improving the NIH culture; T, transparency, communication, and accountability; and E, extramural research ecosystem. The NIH also initiated the Faculty Institutional Recruitment for Sustainable Transformation (FIRST) program, which aims “to increase the representation of faculty from underrepresented groups in biomedical science” by supporting institutions in hiring cohorts of early-career faculty from diverse

backgrounds (<https://commonfund.nih.gov/first>). The NSF announced efforts that include the LEAding cultural change through Professional Societies (LEAPS) of Biology call for proposals to support Research Coordination Networks (RCNs), planning proposals, conferences designed to support collaboration among scientific societies and entities with demonstrated expertise or partnerships to pursue goals toward equity and inclusion (<https://www.nsf.gov/pubs/2021/nsf21049/nsf21049.jsp>).

Thus, initial conversations and activities led to some outcomes, such as the awarding of NIH and NSF funds related to UNITE, FIRST, and LEAPS efforts. ASPB is the lead organization for a collaborative RCN–LEAPS effort—RCN: LEAPS: Rooting Out Oppression Together and SHaring Our Outcomes Transparently (ROOT and SHOOT; Williams and Taylor, 2021). Simultaneously with these funding efforts and outcomes, there have been stumbles and ambivalence, and at worst resistance, to change in larger scientific communities. From controversy over the most effective ways to address the racist legacies of celebrated senior scientists, such as E. O. Wilson (Farina and Gibbons, 2022; McLemore, 2022; Yoder, 2022), to bungled responses to the calls for accountability and action related to skewed demographic make-up of invited keynote speakers and session leaders at meetings, such as the International Congress on Plant Molecular Biology (IPMB, Black, 2022; Dehesh, 2022), and equity-related organizational schisms in mathematics (Crowell, 2022), some scientific communities are struggling with navigating and living up to their widely expressed commitment to build equitable and anti-racist professional communities. Failure to acknowledge and address these struggles head-on will only delay needed progress and movement forward.

Proactively preparing for and responding to controversy and resistance to change

The major issue here is not that controversy arises, it is that communities are not prepared to deal with it directly. Successful oversight of organizational transformation requires anticipation of the disruption and push-back that occurs during massive change. Likewise, funding agencies have failed to adequately request and vet plans for doing so prior to awarding funds to organizations for transformation-related endeavors. As described by Madzima and MacIntosh (2021), “When formal training or structural overhauls are made mandatory by institutions, this often results in push-back from the non-marginalized individuals who do not recognize the critical need.” This resistance to change can come in many forms: passively ignoring the disconnect between commitments made in public statements and active exclusionary practices that carry on business as usual; non-transparent communication about the “winds of change” and behind-the-scenes protective actions to limit reputational damage; and personal confrontations of individuals, particularly those from marginalized and minoritized groups, who publicly press for change in action and commitments rather than challenging those individuals impeding change.

Personally targeted challenges or retaliatory action toward those pressing for change can frequently take the form of what scholar Koritha Mitchell (2018) terms “know-your-place aggression,” especially against minoritized and marginalized members of a community. Mitchell (2018) defined this form of aggression as a “flexible, dynamic array of forces that answer the achievements of marginalized groups such that their success brings aggression as often as praise.” The very real impact of know-your-place aggression ensures that minoritized and marginalized individuals are not “fully recognized as true colleagues” and should “stay in their place,” even as their presence can be frequently and very visibly pointed to as evidence that the space is structurally diverse (Montgomery, 2020b). To truly commit to building equitable cultures, “know-your-place” aggression must be rooted out of communities.

Addressing issues of dignity, trust, and respect in communities is critical in addition to directly eradicating retaliatory communication and behavior (Estrada et al., 2018; Montgomery, 2020a; Rowland et al., 2020). Many of these “know-your-place” acts of aggression are excused as individual “bad behavior” as we default to declaring that “change is slow” while traversing a long path toward justice. Acts of exclusion and defensive responses to being called out for retaliatory or aggressive acts can result in the aggrieved experiencing “dignity violation” as defined by Estrada et al. (2018). They aptly describe that “the very human experience of a dignity violation . . . is to experience a type of aggression” (Estrada et al., 2018). Thus, effective “change work” must center building and sustaining trust, and proactive planning to address the fissures that arise as we try to navigate existing systems with barriers and traditions that exist therein as we build the equitable systems we deserve. Additionally, we need to recognize that it can happen expeditiously, even in spaces traditionally slow to change, if we deem such work essential (Montgomery, 2021b).

Individual versus organizational responses and interventions

A frequent yet inadequate response to controversy and resistance is an outpouring of expressions of individual commitment and support from seemingly well-meaning individuals in a community. While individual expressions of commitment are important, the impact of these can be counteracted by private and protective organizational conversations with or about those resisting change. A focus on individual support (or resistance) cannot substitute for systemic, organizational-level acknowledgment, and interventions. The stance that individual action cannot substitute for collective response is widely accepted by those committed to environmental climate change, yet it is equally true of the cultural change needed to develop and sustain equitable communities. For cultural change to be successful, collective responses cannot be in word alone, but must be accompanied by “truth and reconciliation” practices as a part of building and sustaining equitable systems. Full truth

and reconciliation related to addressing inequity requires acknowledging hard truths and committing to the difficult work that aligns with the insights of Kiese Laymon (2020), who stated that “anti-Blackness [is] . . . an addiction broken only by honest reckoning, consistent practice, and welcoming of radical spirits.” We argue that this extends to many forms of oppression, bias, and prejudice.

When disruptions and disagreements about the path to equity arise, in addition to individual actions, the response of communities is often to seek fast apologies and to move on and rapidly “get back to normal.” By way of analogy, plants that have experienced trauma, including trees that are wounded, have definitive processes to clean up the damage and to either heal or close off irreparable damage (Purcell, 2020). There are many lessons for communities from wound healing in plants in regard to not rushing to cover damage but rather to go through the necessary steps of awareness, cleaning, and healing openly and in a reasonable time (Montgomery, 2022).

Promoting equity through mitigating aggressions and promoting “intentional inclusion”

Acts of omission and exclusion are often dismissed as microaggressions, defined as the routine and sometimes subtle insults, slights, or invalidations experienced by those historically underrepresented or excluded from communities (Torres-Harding and Turner, 2015). The term microaggressions was first defined by Black psychiatrist Chester Pierce (1974) as “Black-white racial interactions [that] are characterized by white put-downs, done in an automatic, preconscious, or unconscious fashion.” As Prescod-Weinstein (2022) reminds us, microaggressions are not “micro” due to having a small impact, but as representative of “every day, individual manifestation of the larger structural phenomenon” of racism. Additionally, in the common act of seeking to issue quick apologies and move on, we miss what the occurrence of repetitive microaggressions may be telling us about the state of communities demonstrating a pursuit of “better inequality” rather than a true march toward authentic equity.

Better inequality refers to actions or responses that result in surface improvements in equitable treatment, while ignoring the persisting underlying structures and practices that sustain systems of exclusion and oppression (Montgomery, 2020d). To avoid the pursuit of better inequality, communities must be truthful about the state of their organizations with regard to equity and inclusion. In addressing needed change, it is critically important to focus on the roles of macroaggressions (obvious or overt acts of bias, discrimination, or racism), microaggressions (subtle but frequent interpersonal slights or cues indicating bias, discrimination, or racism), macroaffirmations (obvious acts of inclusion and respect indicating commitment to equity), and microaffirmations (subtle

but frequent interpersonal behaviors or cues indicating commitment to equity) in establishing systems and cultures that are experienced as traditional exclusionary meritocracies or that promote advancement toward aspirational equity-seeking cultures (Figure 1; Estrada et al., 2018).

Typically, traditional organizational cultures have high levels of aggression and low levels of affirmation. Such systems often have policies that persist in exclusionary structures based on the hierarchical and loyalty driven engagement of traditionally successful scholars as organizational leaders and stewards. Also, policies and practices frequently support traditional agendas and metrics with status quo or self-reinforcing procedures and leadership structures. Additionally, such communities prize competition and individual success models over collaborative engagement and advancement.

Contemporary organizations often pursue the aforementioned “better inequality,” in which there are public statements of commitment to change and equity (high macroaffirmation) but limited or variable translation of these espoused commitments into positive, consistent change (low microaffirmation), and low levels of macroaggression but high levels of microaggressions (Figure 1; Estrada et al., 2018). Organizations may be evolving from traditional to contemporary in the wake of 2020, when public statements of commitment to DEI abounded. Many organizations have broadly initiated or reaffirmed the work of DEI committees and task forces. There has been a surge in attention to the visible representation of minoritized individuals that serves the dual purpose of “doing” diversity work and public advertising of the minoritized members’ presence. However, there has often been less attention to or success in committing to proactive, non-coerced inclusion of these individuals in leadership positions or roles that recognize their work as scientists first. The pursuit of external funding, prestige, and career-advancing visibility and recognition for diversity initiatives and training (e.g. role as PI on grants for DEI efforts) may have increased, yet many of these efforts are led by individuals who were already in place while organizations failed to significantly advance in regard to equity.

The equitable organizational contexts to which we aspire (or should aspire) have low levels of aggression and high levels of affirmation at all levels (Figure 1; Estrada et al., 2018). Such organizations have lived commitments aligned with actions demonstrating impactful DEI engagement, as well as proactive and equitable inclusion of members from diverse backgrounds. In meaningful efforts to move from contemporary to equity-seeking status, organizations seek and integrate expertise-driven cultural assessment and efforts related to equity, make long-term allocation of resources to support interventions toward equitable goals, and proactively include appropriate expertise and practices to address conflict and disruptions. Equity-seeking organizations are often more agile in their ability and commitment to learn and change. Also, these organizations are much more likely to have or

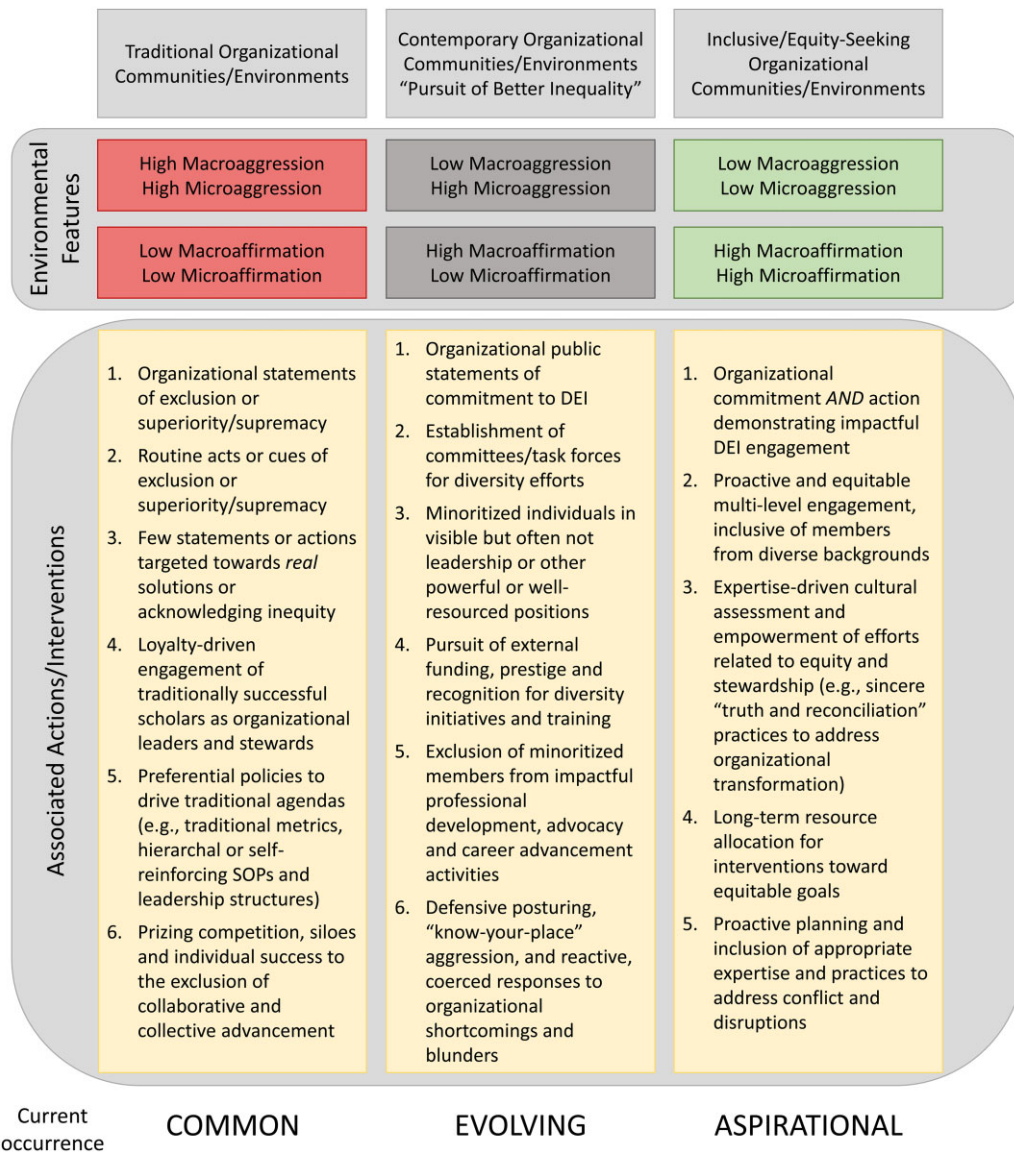


Figure 1 Organizational contexts from traditional to equitable communities/environments. Distinction in context/type depends on environmental features of macroaggressions (obvious acts of bias, discrimination, or racism), microaggressions (subtle or frequent interpersonal slights or cues indicating bias, discrimination, or racism), macroaffirmations (obvious acts of inclusion and respect indicating commitment to equity), and microaffirmations (subtle or frequent interpersonal behaviors or cues indicating commitment to equity). Traditional organizational communities/environments that are common have high levels of aggression (macro and micro) and low levels of affirmation (macro and micro), contemporary organizational communities/environments that are evolving and emerging have low macroaggression and high microaggression, while exhibiting high levels of macroaffirmation but low levels of microaffirmation, and aspirational inclusive or equity-seeking organizational communities/environments have low levels of aggression (macro and micro) and high levels of affirmation (macro and micro). Actions associated with each type of environment are listed below. SOP, standard operating procedures. Adapted from Estrada et al. (2018).

aspire to leadership that propels advancement and organizational transformation, including prioritizing groundskeeping over gatekeeping leadership practices (Montgomery, 2020a).

The stakes are high to ensure that contemporary, evolving organizations continue to progress toward inclusive, equity-seeking communities rather than stagnating or retrenching toward tradition. (Montgomery 2020c, 2021a) argued previously that plant scientists can use their scientific knowledge as motivation to address issues of relevance to professional interactions as scientists, including

issues of systemic racism and the persistent impacts of inequity and bias. In so doing, communities can acknowledge that growth is a complicated orchestrated process in biological organisms and organizations alike without giving ourselves “off ramps” from the expedient and relentless pursuit of progress toward building and maintaining equity-seeking cultures. To do so, we must truly address the work that must be done across generations, in addition to across demographics, as well as confront old versus new perspectives and modes of action.

Lessons plants offer for cultivating equity and change in community

What lessons may we draw from plants as we seek to root out bias and oppression and cultivate healthy roots that anchor us in our commitments to equity-seeking communities? Plant root systems and the ways in which they function offer powerful lessons for balancing intergenerational interactions during growth and transformation. They anchor plants in the soil but also actively take up water and nutrients critical to the health and growth of the plant. Root systems have mature and young roots, each with critical roles in overall functioning and long-term plant well-being. Mature roots add stability, but younger roots actively bring in nutrients needed for new growth and sustainability due to their higher nutrient uptake capacity (e.g. Cushman, 1984; Yanai, 1994; Gao et al., 1998).

Diversity in biological ecosystems is also linked to healthy communities with increased stability, resistance, and productivity (Adetiloye, 2004; Li et al., 2007, 2014; Tilman et al., 2014; Wang et al., 2014; Isbell et al., 2015). Yet, a recognized need to re-establish the composition of individuals comprising the diversity of ecosystems sometimes requires “intentional disturbance or disruption,” actions that we often resist in our scientific communities (Montgomery, 2021a). Madzima and MacIntosh (2021) previously called upon the plant science community to consider the need for “intentional inclusion,” including the importance of determining and responding to “the needs of the affected groups before an activity is planned or actions are taken, and to focus on that group and not be distracted by the feelings and assumptions of non-marginalized individuals.” Yet, we continue to see the plant science community and others make frequent mistakes in enacting equitable practices in leadership, community events, and more. Plants continue to offer us lessons that we must apply consistently and urgently.

Conclusions

While we often struggle to make the leap from recognizing the accepted importance of diversity in biological ecosystems to acknowledging that diversity—in race, ethnicity, national origin, gender, sexual orientation, disability, religion, and so on—is equally important to the communities of humans who conduct research on these ecosystems (Montgomery, 2020c), enacting a commitment to equity presents additional challenges. It may be helpful to acknowledge the cognitive dissonance and conflict that may arise for some from challenging the systems that they have successfully traversed and that have affirmed their status and, in some cases, identities. Commitment to the collective requires recognizing that you can both acknowledge personal success and privilege in an imperfect system and contribute to the needed change that supports the collective community more equitably—both can (and must) coexist. Further, we must demand that our communities

consistently strive for much more than increased awareness of the need to pursue more equitable environments because, as Imani Perry (2019) has taught us, “awareness is not a virtue in and of itself, not without a moral imperative”. To be deeply rooted only in increased awareness will lead only to better inequality. We need to cultivate collective moral commitment as well as the obligation to apply our energies and resources to challenge ourselves to truly grow using evidence and innovation, as well as drawing on external expertise and knowledge to evolve our commitments and collective engagement in establishing and sustaining equity-seeking spaces.

Funding

The authors’ work on equity in leadership is supported by the National Institutes of Health’s Innovative Programs to Enhance Research Training (NIH IPERT; grant no. NIH/NIGMS R25 GM135022-01 to J.A.W.) and by the Michigan State University Foundation (to B.L.M.).

Conflict of interest statement. None declared.

References

- Adetiloye PO** (2004) Effect of plant populations on the productivity of plantain and cassava intercropping. *Moor J Agric Res* **5**: 26–32
- Black S** (2022) A follow-up regarding IPMB2022. *Plant Sci Today*. <https://blog.aspb.org/a-follow-up-regarding-ipmb2022/>
- Callis J, Last R, McCann M, Taylor C** (2020) Silence suffocates us all. *Plant Sci Today*. <https://blog.aspb.org/silence-suffocates-us-all/>
- Cushman JH** (1984) Numerical study of some age-dependent parameters in root nutrient uptake. *Plant Soil* **79**: 123–141
- Crowell R** (2022) New math research group reflects a schism in the field. *Scient Am*. <https://www.scientificamerican.com/article/new-math-research-group-reflects-a-schism-in-the-field/>
- Dehesh K** (2022) Apologies to Thelma Madzima and the entire community from Katie Dehesh, ASPB President. *ASPB Plant Sci Today*. <https://blog.aspb.org/apologies-to-thelma-madzima-and-the-entire-community-from-katie-dehesh-aspb-president/>
- Estrada M, Eroy-Reveles A, Matsui J** (2018) The influence of affirming kindness and community on broadening participation in STEM career pathways. *Soc Issues Policy Rev* **12**: 258–297
- Farina S, Gibbons M** (2022) “The last refuge of scoundrels”: New evidence of E. O. Wilson’s intimacy with scientific racism. *Science for the People*. <https://magazine.scienceforthepeople.org/online/the-last-refuge-of-scoundrels/>
- Gao S, Pan WL, Koenig RT** (1998) Integrated root system age in relation to plant nutrient uptake activity. *Agron J* **90**: 505–510
- Isbell F, Craven D, Connolly J, Loreau M, Schmid B, Beierkuhnlein C, Bezemer TM, Bonin C, Bruelheide H, de Luca E, et al.** (2015) Biodiversity increases the resistance of ecosystem productivity to climate extremes. *Nature* **526**: 574–577
- Laymon K** (2020) *How to Slowly Kill Yourself and Others in America*. Scribner, New York, NY.
- Li L, Li S-M, Sun J-H, Zhou L-L, Bao X-G, Zhang H-G, Zhang F-S** (2007) Diversity enhances agricultural productivity via rhizosphere phosphorus facilitation on phosphorus-deficient soils. *Proc Natl Acad Sci USA* **104**: 11192–11196
- Li L, Tilman D, Lambers H, Zhang F-S** (2014) Plant diversity and overyielding: Insights from belowground facilitation of intercropping in agriculture. *New Phytol* **203**: 63–69

- Madzima TF, MacIntosh GC** (2021) Equity, diversity, and inclusion efforts in professional societies: Intention versus reaction. *Plant Cell* **33**: 3189–3193
- McLemore MR** (2022) The complicated legacy of E. O. Wilson. *Sci Am* <https://www.scientificamerican.com/article/the-complicated-legacy-of-e-o-wilson/?amp;text=The>
- Mitchell K** (2018) Identifying white mediocrity and know-your-place aggression: A form of self-care. *Afr Am Rev* **51**: 253–262
- Montgomery BL** (2016) Cultivating a focus on diversity as a community. *ASBMB Today* **15**: 42–43
- Montgomery BL** (2020a) Academic leadership: Gatekeeping or groundskeeping? *J Values Based Leadership* **13**: 135–151
- Montgomery BL** (2020b) “I am not your savior”: Consistently honoring the intrinsic value of Black women’s intellectual labor and cultural capital in STEM. *In* NM Joseph, ed, *Understanding the Intersections of Race, Gender, and Gifted Education: An Anthology by and about Talented Black Girls and Women in STEM*. Information Age Publishing, Charlotte, NC, pp 107–129
- Montgomery BL** (2020c) Planting equity: Using what we know to cultivate growth as a plant biology community. *Plant Cell* **32**: 3372–3375
- Montgomery BL** (2020d) The Pursuit of a ‘Better’ Inequality? <http://www.berondamontgomery.com/reflect/the-pursuit-of-a-better-inequality/>
- Montgomery BL** (2021a) *Lessons from Plants*. Harvard University Press, Boston, MA
- Montgomery BL** (2021b) Make equity essential to expedite change in academia. *Nat Microbiol* **6**: 7–8
- Montgomery BL** (2022) Trees don’t rush to heal from trauma and neither should we. *Psyche*. <https://psyche.co/ideas/trees-dont-rush-to-heal-from-trauma-and-neither-should-we>
- Montgomery BL, Colón-Carmona A** (2016) Planting seeds for a reflective harvest: The role of ASPB in enhancing diversity in plant biology. *ASPB News* **43**: 21–22
- Perry I** (2019) *Breathe: A Letter to My Sons*. Beacon Press, Boston, MA
- Pierce CM** (1974) Psychiatric problems of the Black minority. *In* S Arieti, ed, *American Handbook of Psychiatry*. Basic Books, New York, NY, pp 512–523
- Prescod-Weinstein C** (2022) The term “microaggression” was coined by barrier breaking Black psychiatrist Chester Pierce, and he didn’t mean the impact was small. He meant that it was an every day, individual manifestation of the larger structural phenomenon. #BlackHistoryMonth. Available online at <https://twitter.com/IBJIYONGI/status/1494450058036711425>
- Purcell L** (2020) Tree wounds and healing. *Got Nature? Blog*. <https://www.purdue.edu/fnr/extension/tree-wounds-and-healing/>
- Rowland D, Casimir S, Pivcevic P** (2020) Covid-19 pandemic: Now is the time for emergent leadership. *LSE Bus Rev*. <https://blogs.lse.ac.uk/businessreview/2020/04/30/covid-19-pandemic-now-is-the-time-for-emergent-leadership/>
- Tilman D, Isbell F, Cowles JM** (2014) Biodiversity and ecosystem functioning. *Annu Rev Ecol Evol Syst* **45**: 471–493
- Torres-Harding S, Turner T** (2015) Assessing racial microaggression distress in a diverse sample. *Eval Health Prof* **38**: 464–490
- Wang Z-G, Jin X, Bao X-G, Li X-F, Zhao J-H, Sun J-H, Christie P, Li L** (2014) Intercropping enhances productivity and maintains the most soil fertility properties relative to sole cropping. *PLoS ONE* **9**: e113984
- Williams M, Taylor C** (2021) ASPB and partners awarded \$2 million NSF grant to advance diversity, equity, and inclusion in the plant sciences. <https://blog.aspb.org/aspb-and-partners-awarded-2-million-nsf-grant-to-advance-diversity-equity-and-inclusion-in-the-plant-sciences/>
- Yanai RD** (1994) A steady-state model of nutrient uptake accounting for newly grown roots. *Soil Sci Soc Am J* **58**: 1562–1571
- Yoder J** (2022) By association. *Mol Ecol*. <https://www.molularecologist.com/2022/01/27/by-association/>