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Diversity and inclusion activisms in animal behaviour and the ABS: a historical view from the U.S.A.

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This paper examines the context of science scholarship and research careers experienced by behavioural biologists from under-represented minority (URM) groups during the period starting in the late 1800s until the early decades of the Animal Behavior Society (ABS). For much of history, white European and American men have dominated the seats of scientific leadership, shaping narratives and controlling who asks scientific questions, how these questions are examined and what is significant. Yet, individuals from URM groups have navigated careers in animal behaviour and related fields, and along with some nonminority allied scientists, have often simultaneously advocated for diversity and inclusion among our ranks. The lasting impact of these scholar activists has been important not only to the discipline, but to science as a whole. This paper shines lights on missing narratives of URMs who were often excluded in academic histories, as well as emphasizing the importance of creating more inclusive spaces for future animal behaviour scholars. I highlight the contributions of American scientists in the U.S.A. who have contributed to the development of animal behaviour and related disciplines and have raised awareness about social justice and inclusivity in our field.

Despite the insistence that science is objective – and by extension, so are individual scientists –like other human endeavours, science is influenced by its practitioners and by the social milieu in which it exists. Western science, in particular, traditionally has ignored perspectives of under-represented groups and demonstrated considerable disparity and marginalization of opportunity. White European and North American men have largely controlled who asks questions, how these questions are examined, how data are interpreted and what is deemed scientifically important. National scientific organizations (e.g. the National Science Foundation and the National Institutes of Health, major federal funding institutions in the U.S.A.) currently advocate for greater diversity and inclusivity in the sciences. Increased visibility on institutional promotional materials seemingly demonstrates that there is currently greater participation of under-represented minority (URM) individuals across many science disciplines, although much still remains to be done to correct existing inequities. The influx of scientists from URM groups can foster consideration of different and novel perspectives based on the unique life experiences of the individuals entering these fields (see also Tang-Martínez, 2020, this issue).

URM scientists have navigated careers in animal behaviour and related fields, and with support from some nonminority allied scientists, have often pursued scientific careers while also simultaneously advocating for diversity and inclusion among our ranks. The lasting impact of these scholar activists has been important not only to the discipline, but to science as a whole. This paper shines lights on missing narratives of URMs who were often excluded or rendered invisible in academic histories. It also shines light on the importance of creating better and more inclusive spaces for future animal behaviour scholars. Here I highlight the contributions of American scientists in the U.S.A. who, in various ways, have contributed to the development of our discipline and/or who also have raised awareness about social justice and inclusivity in our field. I limit this review to the U.S.A. because that is what I know best from my own personal experiences, but also because the U.S.A. has a well-known legacy of slavery, persecution and genocide of non-European peoples – leading to a history of racism and discrimination that still tarnishes our current institutions (for a history of scholarship in our discipline in Latin America, see Jaffe, Correa, & Tang-Martínez, 2020).

PRE-ABS FOUNDING

Charles Henry Turner – Early Animal Behaviour Researcher

Charles Henry Turner (1867–1923), an African American, was actively studying animal behaviour long before it was recognized as

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an academic discipline. In 1907, he received his Ph.D. in zoology (magna cum laude) from the University of Chicago, under the advisement of Charles Child and Frank Lillie (Abramson, 2009; Turner, 1907). This was an unprecedented accomplishment not only because he was the first African American to earn a Ph.D. from this institution (Abramson, Fuller, & Jackson, 2003), but also because this was only 42 years after the end of slavery in the U.S.A. The pre-emancipation history of African Americans was predominantly defined by forced labour and Black Codes that legally mandated illiteracy. So it is amazing that by the end of the 19th century there was an African American who was publishing in leading scientific journals (Turner, 1892a, b, 1893, 1896, 1899a, b).

Turner was born in Cincinnati, Ohio, U.S.A. Despite coming from a humble background (his father was a custodian and his mother was a practical nurse), Turner was always excellent academically and graduated as valedictorian of his high school class (Abramson, 2009). He received his bachelor's and master's degrees from the University of Cincinnati, and was lauded as an excellent student and teacher (Abramson et al., 2003). After completing his Ph.D., and unable to obtain a faculty position at his alma mater or other universities – despite his excellent publishing record: five scientific publications by the time he earned his master's and 27 by the time he completed his doctorate (Abramson et al., 2003) – he eventually settled in St Louis, Missouri, U.S.A. in 1908, teaching at Sumner School, the first high school for Negroes west of the Mississippi River (Abramson, 2009; Lee, 2012; note Negroes was the commonly accepted name for African Americans at the time). There, he continued doing trailblazing research on insect behaviour and physiology during his spare time (Abramson, 2009, 2017).

Turner's professional activities and achievements

During his St Louis years, Turner designed methodology and experimental apparatuses that allowed for rigorous testing of hypotheses, including many controls that were subsequently adapted as mainstream animal behaviour research techniques (Abramson, 2003). His groundbreaking discoveries included that insects can hear, that honeybees have colour vision and recognize patterns, and that insects can learn and modify their behaviour based on previous experience – something that was not widely accepted prior to his experiments (Abramson, 2003). He also described the movement of ants returning to their nests, which was later dubbed 'tournoiement de Turner' by French colleagues (i.e. 'Turner whirling' or 'Turner turning'; Turner, 1906). Herbert Osborn (1937, p. 202) noted that Turner was '…perhaps the most outstanding member of his race in entomological work' – a reference to his exceptional work and a nod to the fact that a Negro scientist was an exception. His research was well known and respected by contemporaries such as W. M. Wheeler, John B. Watson, Margaret Washburn, E. L. Thorndike, T. C. Schneirla and Eugen Louis Bouiver (Abramson, 2003; Schneirla, 1929). Locally, he was elected to the St Louis Academy of Science in 1911 – an unheard of honour for an African American of his generation, at a time when racial segregation was still the norm. He represented the St Louis Academy at national and international conferences and published over 70 papers before his death (e.g. Abramson, 2003, 2017; Turner, 1892a, b).

Segregation of professional opportunities

Turner's scholarly accomplishments are particularly impressive because of the challenges he faced. He had little to no access to laboratories or research libraries (African Americans were not allowed to freely use public libraries at that time). Despite his training and excellence, the University of Cincinnati and the University of Chicago – his alma maters – refused to hire him because he was Negro (DuBois, 1939). During this period, white institutions rarely hired Black professors (Graves, 2019; Haber, 1970). Historically Black colleges and universities (HBCU) were the only higher-education institutions offering long-term career options for early Black scientists and these institutions were often cash-strapped (Graves, 2019). Part of the reason that Turner was lost in obscurity for so long was that he had no long-term university position. Instead his career was spent teaching at a segregated high school, which meant heavy teaching loads and low pay – both of which restricted his ability to do research (Abramson, 2003; Abramson et al., 2003). Consequently, he lacked infrastructural support and had no access to professional research spaces, limiting his collaborative opportunities and the ability to produce academic progeny.

Other URMs in the Sciences During Turner's Time

Individuals from other minoritized groups, including Indigenous or Native Americans, also suffered oppression and exclusion of opportunity in higher education and in the sciences. It has been challenging to find archives that document contributions of non-Black minorities in the sciences and animal behaviour during this period. It has been easier for me to describe histories of African American scientists because of my own proximity and knowledge of early African American experiences. There were institutions of higher education for Black people during this period – the late 1800s to the early 1900s; however, this was not the case for other URM groups.

Some HBCUs offered higher-education opportunities to Native Americans. As one example, Hampton Institute in Virginia (now Hampton University) was an agriculture and teacher's college for African Americans co-founded by white missionaries and Civil War Union veterans (Hampton University website: see references). From 1878 to 1923, Hampton Institute established a formal residential school for Native Americans (Maddux, 2002). This is notable because, from the late 1800s to the mid-1900s, formal education of Native Americans was predominantly provided by Christian missionaries or government-supported Indian Education Schools that focused on assimilating Native Americans (Davis, 2001; Krumm, 2005). The intent of many of these facilities and sponsoring organizations, such as the Women's National Indian Association, were to culturally disrupt Native American communities and educate Native American children in isolation so that they could be integrated into Western society.

Native students educated at Hampton Institute included Tichkematse or Squint Eyes (1857–1932, Cheyenne) and Dr Susan L. Picotte (1865–1915, Omaha, Ponca, IA) (Brudvig, 1996; Greene, 2004; Powell, 2004; Vaughn, 2017). Tichkematse, a highly lauded naturalist, worked for the Smithsonian Institution (U.S.A.) from 1879 to 1881, after spending one year at Hampton. He participated in many expeditions; contemporary accounts from the Smithsonian and the American Museum of Natural History celebrate his vertebrate specimen preparation skills, his drawings of life on the western plains and his assistance with anthropological expeditions (Greene, 2004). Picotte graduated at the top of her class (1886) before enrolling in the Woman's Medical College of Pennsylvania (Krumm, 2005; Meier, 2018). She was the first Native American to earn a medical degree (in 1889) (Vaughn, 2017).

The perception that Indigenous voices are absent from the sciences is often due to American or European institutions failing to acknowledge Indigenous contributions, rather than lack of participation. For example, natural history and botany have benefited from Indigenous guides and research assistants (e.g. Tichkematse: Greene, 2004). However, contributions of Indigenous peoples to research teams (including research carried out in Latin America) might receive mention in the acknowledgements, but almost never includes co-authorship (Huntington, 2000) or other formal

recognition. Because of this, Indigenous voices in what is considered science in the Western world have been absent for hundreds of years and are nominal today (Chief, 2018).

It was only with the Higher Education Act of 1965, which created Tribal Colleges (some of which were previously Residential Schools), Hispanic-serving institutions and other minority-serving institutions, and also formally recognized HBCUs, that Native and Mexican American scholarship began to proliferate in the U.S.A., along with Asian studies and Black/African studies. Multicultural self-determination epistemologies strongly informed civil rights and social justice activism in higher education and in the sciences during this time. In short, there were not very many places safe enough for minority scientists to study and work prior to the 1960s. Plus, it is hard to gauge the exact numbers of URMs in the sciences, or in higher education prior to 1975, which was when the Survey of Earned Doctorates first began collecting data about race, ethnicity and sex of doctorate holders (NSF/NCSES, 2006). However, currently many Native American scientists are deeply engaged in social activism regarding diversity, inclusion and environmental justice. Of note are scholars who have been trailblazers in STEM: Drs Daniel Wildcat (Yuchi, Muscogee; environmental sciences), Robin Wall Kimmerer (Potawatomi; ecology, botany), Cynthia Lou Coleman (Osage; science communication, Native American ethnic studies), Gregory Cajete (Tewa from Santa Clara Pueblo; philosophy of Native science and Native American studies), Deborah McGregor (Anishinaabe; Indigenous women and environmental science, decolonizing science) and Peggy Hill (Cherokee, animal behaviour, ecology – discussed below). They have promoted the importance of intergenerational teaching and learning about the land, plants, animals, natural resources, ecosystem services and cycles – and how these foundational teachings are a part of their cultural upbringings (e.g. Cajete, 1994, 1999; Cajete & Little Bear, 2000; Chief, 2018; Kimmerer, 2013; McGregor, 2004, 2005; Nelson & McGregor, 2015; Wildcat, 2009). Each of them has demonstrated deep leadership in social and environmental justice in the sciences and have provided mentorship to my generation of URM scholars.

During earlier periods in the history of the U.S.A., Asian Americans also suffered discrimination and this likely is one reason for their paucity in animal behaviour and related disciplines. Laws from 1790 limited U.S. citizenship to free whites; this meant that all nonwhite immigrants (including Asians and Latin Americans), as well as Native and African Americans were not considered citizens and could not even apply for citizenship. Subsequent laws curtailed or prohibited Asian immigration into the U.S.A. (e.g. Chinese Exclusion Acts of 1882, 1902; Immigration Acts 1917, 1924). In 1920, the U.S. Supreme Court ruled that Asian immigrants already residing in the United States could be excluded from citizenship (although the 14th Amendment of 1868 granted citizenship to U.S.-born children of Asian immigrants). Then, the Japanese attack on Pearl Harbor during World War II led to the infamous forced removal of West Coast Japanese Americans into internment camps. Japanese Americans were classified as 'enemy aliens' (even though many were born in the U.S.A. and were American citizens) and were forced to leave all of their properties, businesses and belongings behind. In 1943, the U.S. Supreme Court's Korematsu decision ruled that internment of Japanese Americans was constitutional, and they remained prisoners until the end of the war and most never regained their lost properties (McKissack & Zarembka, 2004). Almost all Japanese Americans born in the decades immediately before and after WW II have parents or other relatives who were held in the internment camps (and in some cases were themselves imprisoned in the camps); they therefore live with a legacy of injustice in their past. Currently, U.S. federal agencies exclude Asian Americans from the list of URMs in STEM, because they comprise 21% of the U.S. Science and Engineering workforce, while making up approximately 6% of the U.S. population (NSF/NCSES, 2017). Nevertheless, Asian Americans are included in this history because their numbers in animal behaviour are still very low; although some have been very visible and highly successful (see below).

Science and Social Justice Activism

The experiences of people of colour (hereafter, POC) in the sciences from the late 19th and early 20th centuries demonstrated a commitment to excellence in scholarship, as well as a dedication to social reform, civil rights and social justice activism. Beyond their professional activities, both Turner and Picotte were involved in social reform and human rights advocacy on behalf of their communities. Turner was a leader in the St Louis civil rights movement (Abramson, 2003). He began publishing on these issues as early as 1897, and continued to advocate for racial equality throughout his life (Abramson, 2003; Turner, 1897, 1902). He was lauded by the National Association for the Advancement of Coloured People (NAACP) (Abramson et al., 2003), and believed that racial justice and the end of racism could be obtained through education. Picotte's social justice interests were crystalized while studying at Hampton Institute (Powell, 2004), and she was active in Native American civil rights. She dedicated herself to providing medical care on reservations and eventually founded her own hospital to care for people in her community (Davis, 2001; Krumm, 2005; Vaughn, 2017). She also lectured across the U.S. and Europe to underscore the plight of Indigenous Americans. Both Turner's scholar activism and Dr Picotte's humanitarian advocacy were no doubt birthed from the personal and professional exclusions they experienced.

In the past, as now, minority scholars who are underrepresented in their fields and often excluded from more financially secure professional opportunities, are frequently the ones who do the unpaid labour of confronting racism, sexism and prejudices in academia – an undertaking which can be risky careerwise (Few, Piercy, & Stremmel, 2007; June, 2015). Creating safe, inclusive and diverse science spaces is typically instigated by the real and immediate need to protect one's own welfare and livelihood, as well as by the desire to bring about broader social change. The connection of these scholars to their 'home' communities and their dedication to addressing social injustice seems to be a common experience. Correcting the historical record to bring to light the contributions of pioneering scholars and social activists, such as Turner, Tichketmase and Picotte, should also be a part of activism to bring about social transformation.

THE FOUNDING OF ABS

Racial Climate During the 1960s

Segregation and limited opportunity to participate in the sciences were the realities of higher education in the U.S. leading up to the founding of the Animal Behavior Society (ABS) in 1964. In 1948, the American Society of Zoologists (ASZ) and the Ecological Society of America (ESA) jointly sponsored a meeting that officially recognized animal behaviour as a discipline (Schein, 1994). The two decades prior to the founding of the ABS are considered the gestational phase of the professional society (Schein, 1994), and the membership of the parent societies were not very diverse during that time and continued to not be so for the decades that followed – as indicated by their reports and calls to broaden participation (ESA Report, Perkins, 2006; Wilga, Nishiguchi, & Tsukimura, 2017). Among the 37 founders of ABS, none identified as POC. Nevertheless, there were members of the nascent society who were

proponents of social and racial justice: specifically, Ethel Tobach, ABS founder, and Dr Jerry Hirsch, former ABS president.

Unsung Heroes

The impact of early scientists like Turner, Picotte and other minority scientists such as Drs Ernest E. Just (1883–1941) and Roger A. Young (1889–1964), as well as minority-serving institutions or white advisors who mentored POC scholars cannot be overstated. For example, Frank Lillie (zoology/embryology, the University of Chicago) served as mentor to Turner, Just (cell biology/development) and Young (the first African American woman to earn a Ph.D. in zoology in 1940 from the University of Pennsylvania, she had been Lillie's student earlier in her career) – all pioneering African American scientists (Abramson, 2009; Manning, 1985, 1989; Turner, 1907). Such individuals – both known and unknown – held the door open for future generations of minority scholars and demonstrated leadership to the wider science community with regards to inclusion, equity and social justice.

Several scientists, some of whom were animal behaviourists and some not, influenced directly or indirectly, animal behaviour and the ABS. They deserve recognition as champions of diversity and inclusion in science – well before these issues had become socially salient and accepted.

Ethel Tobach

Ethel Tobach (1921–2015), an ABS founder, former assistant editor for the journal *Animal Behaviour*, and a fellow of the ABS (see also Tang-Martínez, 2020, this issue), was famous for her outspoken support and commitment to social and racial justice. Tobach's parents fled anti-Semitic attacks in the Ukraine, and she and her mother eventually immigrated to the U.S.A. In addition to being a respected animal behaviourist, Tobach was a social justice and peace activist throughout her life, with an emphasis on both gender and race. Her writings in this area included edited books such as *The Four Horsemen: Racism, Sexism, Militarism and Social Darwinism* (Tobach, Gianutsos, Topoff, & Gross, 1974) and *Challenging Racism and Sexism: Alternatives to Genetic Explanations* (Tobach & Rosoff, 1994a), as well as articles (e.g. Tobach & Rosoff, 1994b). Tobach's social activism was honoured with the Kurt Lewin Award from the Society for the Psychological Study of Social Issues in 1993 and the Gold Medal Award for Lifetime Achievement in Psychology in the Public Interest from the American Psychological Association in 2003. Tobach's passionate advocacy of racial justice almost certainly made her a role model for other scientists committed to social activism. And, her antiracism perspectives likely helped set the stage for greater inclusivity in ABS.

Jerry Hirsch

Jerry Hirsch (1922–2008), a founder of behavioural genetics, also was a pioneer in challenging the misuse of genetics to argue for racial differences and inferiority of certain racial groups. He was a fellow of ABS, and active in the society in various capacities, including as its president (1975–1976), and as an editor of *Animal Behaviour* (1968–1972). During the 1970s and 1980s, he participated in debates on genetics and race at various universities, and insisted that studies relating intelligence to race (i.e. IQ, genetics and the race controversy) were based on poor science and the misuse of the concept of heritability. His arguments always went straight to the heart of the scientific method – showing repeatedly the statistical, methodological and logical flaws inherent in studies claiming to demonstrate racial inferiority. In 1994, Hirsch headed a group of antiracism activists who brought an end to the use of racially biased SAT and ACT cutoff scores by the National Collegiate Athletic Association (Whalsten & McGuire, 2008).

Hirsch was an implacable foe of academic hereditarians and at times compared their goals to those of Hitler. Hirsch published so extensively on these topics that only a few notable contributions are mentioned here (e.g. Hirsch, 1968, 1975, 1978, 1986, 1991, 2004); he also guest edited a special issue of *Genetica* titled 'Uses and Abuses of Genetics' (Hirsch, 1997). Lastly, Hirsch, along with colleague James Anderson founded and directed the Institutional Racism Program at the University of Illinois (active from 1977 to 1986), which had the goal of training and mentoring minority scientists and preparing scientists and educators to understand and conduct research on racism, including scientific racism.

Howard A. Bern

A third unsung hero is someone most animal behaviourists probably have never heard of. Howard Bern (1920–2012) was an endocrinologist in the Department of Zoology (now Integrative Biology) at the University of California-Berkley who was an ardent advocate for equality and inclusivity in science long before the word 'diversity' had even come into vogue.

He devoted his life to recruiting, mentoring and training URM scholars. For example, he organized minority students at the University of California-Berkeley to visit other universities, and those students assisted in identifying other promising students of colour and attempts to recruit them to become graduate students at Berkeley. Many of these students ended up working with or being mentored by Bern.

Zuleyma Tang-Martínez (Venezuelan American, first Latinx president of ABS (1993–1994), current ABS historian, and see below) was one such 'mentoree'. Bern was assigned as her academic counselor when she first arrived at Berkeley. She recounts that, while finishing her M.S. in cancer immunology, she was ready to quit graduate school and get a job outside of academia (Z. Tang-Martínez, personal communication). Bern insisted that she talk to him before making any decision and then proceeded to quiz her for several hours about her interests in biology. At the end, he said, 'Clearly, your real passion is animal behaviour', to which she replied, 'But that is not a career – one can't make a living just watching animals!' Bern pointed out that George Barlow (renowned animal behaviourist at Berkeley and a subsequent president of ABS during 1979–1980) was making a very good living – and convinced her to stay in graduate school and find an advisor for her Ph.D. in animal behaviour. He facilitated the transition by taking her into his laboratory for a year (so that she could maintain her teaching assistantship) while she worked through a list he provided of faculty at Berkeley who studied various aspects of behaviour. By the end of the year, she had found Steve Glickman (psychologist) and Roy Caldwell (zoologist) – and in her own words 'I have never looked back and have never regretted it – and had it not being for Howard, I would not be where I am today – I might never even have realized that what I really wanted to be was an animal behaviourist!' (Z. Tang-Martínez, personal communication). Bern and Tang-Martínez maintained a lifelong friendship and he instilled in her a commitment to social justice and inclusion in science. Interestingly, some of Tang-Martínez's students (myself included) now see ourselves as being part of Bern's continuing legacy.

Tang-Martínez went on to build a successful career as an animal behaviourist. She has received awards for teaching, research and service. For example, in 2010, she received the ABS Quest Award for 'a seminal contribution' to the field (Macedo, 2010), and in 2011, she was elected a fellow of the society (Margulis, 2011). Also in 2011, she was named as one of the 100 most influential Hispanics by *Hispanic Business* magazine, as well as one of the top eight most influential Hispanic academics in the U.S.A. (Shafferkoetter, 2011).

In addition to Tang-Martínez, Howard Bern trained many other URM scholars, and for many years, his laboratory at Berkeley was seen a refuge for students of colour. He also brought conversations about racism, fairness and diversity into mainstream science spaces – and insisted on implementing inclusionary policies in his own laboratory. Below, I give a sampling of URM scholars advised or mentored by Bern.

Lovell A. Jones (Molecular Endocrinologist, African American, Professor Emeritus M. D. Anderson Cancer Center in Houston, TX). Jones received his Ph.D. working in Bern's laboratory. He has received the Director's Award for Health Disparities, Excellence in Research, Policy, and Practice from the National Institute on Minority Health & Health Disparities (NIMHD) at the National Institute of Health (NIH); and he won the American Society for Biochemistry and Molecular Biology's Ruth Kirschstein Diversity in Science Award in 2012.

John Matsui (Behavioural Biologist, Japanese American, Assistant Dean, University of California-Berkeley). Matsui received his M.S. in animal behaviour under the supervision of Roy Caldwell, but also was informally mentored by Bern. He is Assistant Dean of Biological Sciences and director/co-founder of the Biology Scholars Program – a STEM access, equity and mentoring programme for first-generation students at Berkeley. He regards Bern as his most influential mentor and stated that Howard 'helped me find my 'north star' both personally and professionally. That I've chosen to express my passion for science by working with low-income/first-to-college STEM majors in my program is a direct outcome of his words and actions' (J. Matsui, personal communication).

Frank Talamantes (1943–2018, Endocrinologist, Mexican American). Talamantes completed his Ph.D. in Bern's laboratory and was a professor at the University of California-Santa Cruz. He was a founder and former president (1987–1990) of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), an organization dedicated to diversity and inclusivity in science. He received awards for research excellence, including the Transatlantic Medal Lecturer from the British Society of Endocrinology and the Berson Lectureship, which is the highest award given by the American Physiological Society. Additionally, he was honoured with an award from the American Association for Higher Education for outstanding contributions to education in the Hispanic community. In 1998, he was named as one of the '100 Most Influential Hispanics' by Hispanic Business magazine. 'Frank was an especially strong advocate for student development, particularly for students who came from underserved and underprivileged backgrounds. He tirelessly fought inequalities and injustices to inspire and motivate others' (Landefield, 2018, pp. 1–2).

Tyrone Hayes (Endocrinologist, African American, Professor, University of California-Berkeley). Hayes received his Ph.D. at the University of California-Berkeley working with physiologist Paul Licht; however, Hayes stated that Bern played a significant role in his professional development and was an extremely important mentor (T. Hayes, personal communication). Hayes's research, showing that chemical contaminants in the environment have played a role in the global decline of amphibian populations, is world renowned. He also has emphasized the dangers of environmental racism and how it affects health disparities in minority and low-income communities. His honours include the Presidential Citation Award from the American Institute of Biological Sciences (AIBS) and the Jennifer Altman Award for Integrity in Science (Jennifer Altman Foundation).

ABS 1970s – Early 2000s

The 1970s and 1980s saw an increase in the ABS's efforts to recruit more URMs to the society and our discipline. Several ABS members have been particularly active in championing diversity and inclusion in the ABS, including women scientists. Devra Kleiman (1942–2010), was an important role model for women in behaviour and conservation. She was the first female scientist at the National Zoo (1972–2001) and served ABS in many capacities including as its first female president (1983–1984) (Paz-y-Miño-C & Shier, 2010; Smithsonian Institution Archives, 2010). She broke the glass ceiling for the many women presidents that soon followed, including: Jeanne Altmann (1985–1986), H. Jane Brockmann (1991–1992), Gail Michener (1992–1993) and Zuleyma Tang-Martínez (1993–1994) (Schein, 1994).

Zuleyma Tang-Martínez (see also above, and in Jaffe et al., 2020) began attending ABS meetings in 1976, and noted that there was only a handful of POC active in the society. She was the society's first visible minority president and, prior to stepping into the executive seat of the society, Tang-Martínez established the Diversity Fund (in 1992) to facilitate participation of under-represented graduate students at ABS meetings. The Diversity Fund Awards encourage participation and defray costs of attending the annual Animal Behavior Society Meetings by graduate students of colour and, in some cases, established professionals from URM groups (Margulis, 2013). During her presidential address (1993), Tang-Martínez used the platform to call attention to the lack of diversity in ABS. She emphasized that increasing diversity is not only a matter of social justice, but that it also would enrich our science by bringing new and different perspectives into our discipline. In the audience was Peggy Hill (ecology, insect behaviour, Cherokee); Hill was especially touched by that address and remarked 'I remember being shocked by that statement, most simply that someone would bring it up' (Ogden, 2017, p. 1). Witnessing the leadership of ABS taking an unapologetic stand for diversity made Hill feel more at home in the society, and she quickly became a critically important diversity and inclusion advocate in ABS (Ogden, 2017).

Nearly a decade later (in 2002), Emília Martins (evolutionary biology, behavioural phylogeny; second-generation Brazilian American; ABS president 2015–2016), Hill and Tang-Martínez – three women from under-represented identity groups – launched the Charles H. Turner Award for undergraduate students. The Turner Award is a programme that recruits and mentors next-generation URM students to animal behaviour and helps them cultivate their own sense of professional self in the society. The programme facilitates professional inclusiveness of younger scholars who come from visible and less visible minority groups (Ogden, 2017; D. Lee, personal observation). The Turner Award programme, which covers all expenses for selected undergraduates to attend ABS meetings, was initially supported by a National Science Foundation (NSF) grant, but since 2014, it has been completely funded by the ABS. The willingness to absorb all costs for this programme exemplifies the society's commitment to the goal of increasing diversity of its membership.

In addition to her role in establishing the Diversity Fund and her involvement in helping bring to fruition the Turner Program, Tang-Martínez's diversity-centred service also laid the foundation for another critically important ABS programme: the Latin American Travel Awards (established in 1998). These awards encourage greater participation of Latin American researchers by helping defray the costs of registration, housing and/or meals at ABS meetings. With the help of these funds, the annual meetings now boast increased participation of Latin American scientists and students.

URMs as role models and/or as activists

During the early history of the ABS (up to the early 2000s), several other URMs had significant impacts as role models and/or as activists.

Roy Scudder-Davis (African American; Ph.D. in 1983 from the University of Tennessee; advisor: Gordon Burghardt). He studies reptilian behaviour and is a professor of biology at Berea College (Kentucky, U.S.A.). He also serves on the faculty of the African and African American Studies Department at Berea.

Duane Jackson (African American, Ph.D. in 1990 from the University of Illinois; advisor: Jerry Hirsch). Trained as an insect behaviourist in comparative psychology; he joined the faculty of Morehouse College (a leading HBCU in Atlanta, GA, U.S.A.) in 1987. Jackson studies learning and behaviour in insects and has also published extensively on issues of racism, inclusion and pedagogy in education of URMs. Jackson introduced me and hundreds of other animal behaviourists to Charles H. Turner at the 2000 annual ABS meeting at Morehouse College, the first time that ABS met at an HBCU. As host of this meeting, Jackson gave an opening lecture about Turner. His speech served as the catalyst for the formation of the undergraduate diversity outreach programme named in Turner's honour (described previously). In addition, during the 2000 meeting, several former executive members of ABS met at Jackson's home and decided to create a Diversity Committee. (I was lucky to be in attendance as a graduate student); other participants included Devra Kleiman, Charles Snowdon (ABS president 1990–1991), Jerry Hirsch and Tang-Martínez, among others.

Ken Yasukawa (Japanese American; Ph.D. in 1977 from Indiana University; advisors: Val Nolan, Jr, and John Emlen; ABS president 2004–2005, ABS fellow 2013; Animal Behaviour journal editor). Yasukawa is world renowned for his studies on the behavioural ecology of red-winged blackbirds. He was an early advocate for greater inclusion in the ABS and has served on the Diversity Committee. He is currently professor emeritus at Beloit College (Wisconsin, U.S.A.).

Ronald (Ron) Hoy (Chinese American; Ph.D. in 1969 from Stanford University; advisor: Donald Kennedy). His research in neuroethology of insect communication is highly respected and well known in the field of animal behaviour. He is currently a distinguished professor in the Department of Behavior and Neurobiology at Cornell University in Ithaca, New York.

Luis Baptista (1941–2000; Portuguese and Chinese Heritage; Ph.D. in 1968 from the University of California-Berkeley; advisor: Ned Johnson). Baptista was a widely respected expert on birdsong and behaviour. He was famous for his ability to recognize individual birds in the field by their songs. He spent about half of his career at Occidental College in Los Angeles, California and, subsequently, was Curator of Birds and Mammals at the California Academy of Sciences, where he was still active at the time of his death.

Andy Sih (Chinese American; Ph.D. in 1980 from the University of California-Santa Barbara; advisor: William Murdoch). He was the first Asian American president of ABS (1999–2000) and is one of the most highly influential behavioural researchers of this generation. His animal personality research has influenced the academic careers of early 21st century behavioural ecology, conservation and animal behaviour researchers, myself included. He has won two prestigious research career awards from the ABS and was elected a fellow in 2007. Sih is a professor at the University of California-Davis.

Current Status: The Discipline and ABS

With the exception of students who may have attended minority-serving institutions, many Black, Latinx and Native American professional scientists of today did not have the luxury of being mentored by science professors who looked or sounded like us or came from similar neighbourhoods, or had similar educational trajectories. Notwithstanding, the situation for scientists from under-represented groups in animal behaviour has improved remarkably in recent years, although there still is a scarcity of such scholars in our discipline, compared to our numbers in American society as a whole.

Positive changes have come, at least in part, because in the last 30 years, professional science societies have addressed the paucity of nonwhite scholars among their ranks, with some inspiring results. For example, the Entomological Society of America, the Ecological Society, and the Society for Integrative and Comparative Biology all now boast more diverse membership than they had 10 years ago (Perkins, 2006; Wilga, Nishiguchi, & Tsukimura, 2017).

In the specific case of ABS, since 2002, 10–12 Turner Program Fellows attend meetings each year (with many more undergraduates attending on their own). Many of these Turner Fellows have gone on to graduate school, several have obtained M.S. or Ph.D. degrees, and some now regularly attend ABS meetings and help facilitate the annual Turner Program.

As evidenced by the calls to action of various societies, as well as the ABS, the memberships of these societies recognize and value the importance of diversity and inclusion. With the traction gained from various diversity-directed programmes, many societies are expanding their efforts to less visible minorities to include LGBTQ scholars, those with disabilities (both visible and invisible), as well as those from disadvantaged economic or educational backgrounds.

I am one of the many beneficiaries of such URM diversity programmes (I study rodent ethology, am African American, my advisor was Zuleyma Tang-Martínez, and I am currently an assistant professor at Southern Illinois University Edwardsville). My membership and participation in ABS, like that of my peers, is in part due to the efforts of activist scholars mentioned previously, who acted as role models, who supported us, and helped smooth the way. These 'peers' – the younger generation of POC who are in animal behaviour or in overlapping disciplines are listed below in alphabetical order.

(1) Maydianne Andrade (sexual behaviour and sexual selection in spiders; first-generation Jamaican Canadian; advisors: Steve Emlen and Paul Sherman, currently at the University of Toronto Scarsborough (UTSC); first African Canadian to earn the ABS Young Investigator Award, and UTSC vice dean for Faculty Affairs & Equity).

(2) Sheela Athreya (paleoanthropology; Asian American; advisor: Erik Trinkaus).

(3) Rebecca Calisi-Rodríguez (behavioural endocrinology; Mexican American; advisor: George Bentley; the University of California-Davis).

(4) Prosanta Chakrabarty (evolutionary biology in fish; Asian American; advisor: Bill Fink; Louisiana State University).

(5) Karletta Chief (environmental sciences; Diné (Navajo); advisor: Paul Ty Ferré; the University of Arizona).

(6) Samuel Díaz-Muñoz (social phenomena in viruses, Puerto Rican; advisor: Eileen Lacey; the University of California-Davis).

(7) Damian Elias (spider social behaviour; Mexican American; advisor: Ron Hoy; the University of California-Berkeley; current chair of the ABS Diversity Committee).

(8) Vanessa Ezenwa (behavioural ecology and infectious diseases; second-generation Nigerian American; advisor: Daniel Rubenstein; the University of Georgia).

(9) Nyeema Harris (carnivore and urban ecology; African American; advisor: Rob Dunn; the University of Michigan).
(10) Tracy A. Heath (evolutionary biology; Filipino American; advisor: David Hillis; Iowa State University).
(11) Daniel Howard (insect behaviour; Cherokee; advisor: Peggy Hill; currently at the University of New Hampshire).
(12) Manual Leal (evolution and behaviour of lizards; Puerto Rican; advisor: Jonathan Losos, also mentored by Tang-Martínez; the University of Missouri-Columbia).
(13) Kathryn Milligin-Myhre (microbiology, host–microbe interactions; Inupiaq; advisor: Laura Knoll; the University of Alaska Anchorage).
(14) Robin Nelson (biological anthropology; second-generation Caribbean American; advisor: A. Roberto Frisancho; Santa Clara University, CA).
(15) Christopher Schell (urban biology and canid behaviour; African American; advisors: Rachel Santymire and Jill Mateo; the University of Washington-Tacoma).
(16) Delia Shelton (environment impacts on complex behaviours in groups; African American; advisor: Emília Martins; the University of Tennessee).
(17) Michelle Tong (rodent learning and memory, Asian American; advisor: Thomas A. Cleland; Earlham College, IN).
(18) Albert Uy (sexual selection in birds; first-generation Filipino American; advisor: Gerry Borgia; the University of Rochester, NY).
(19) Cynthia Wei (honey bee behaviour; Asian American; advisor: Fred Dyer; National Socio-Environmental Synthesis Centre, MD).
(20) Corey Welch (evolutionary biology; Northern Cheyenne; advisors: Jim Kenagy and Scott V. Edwards, also mentored by John Matsui; Iowa State University).
(21) Erika Wildy (behaviour and chemical communication in amphibians; African American; advisor: Andrew Blaustein; California State University-East Bay).
(22) Brett Woods (mammalogy; African American; advisor: Kenneth Armitage; High Point University, NC).

Thus, thanks, in significant measure, to the leadership of the pioneering URM science scholars and diversity activists, we currently have many more behaviour and behaviour-adjacent younger URM faculty who have obtained positions at institutions of higher learning and established careers. Not surprisingly, most of the individuals featured above continue advocating for equity in STEM and are passionate promoters and activists for broader participation and inclusion in the sciences. In addition, Latinx immigrant animal behaviourists who have established their research careers in the U.S.A. are also relevant to this discussion. They are not included further in this history because Jaffe et al. (2020) discuss this particular population separately and in great detail.

Also inspiring is the number of young URM scientists who are now in the 'pipeline'. Many of them are currently graduate students or postdoctoral associates. Although the list is too long to mention here, they represent the next generation of scholars who will likely carry on the legacy of excellence in research as well as in social justice activism.

CONCLUSIONS

It is interesting that, with some exceptions, so many of the current cohort of URM scholars listed above had other POC or academics with adjacency to minoritized experiences (e.g. Jewish American scientists, white women) as advisors. They, as well as others (i.e. non-POC and non-Jewish white men) who valued equity, diversity and inclusion trailblazed by helping to train the new generation of URMs in animal behaviour and related fields. In both medicine and in ecological, behavioural and evolutionary sciences, it seems that individuals who had cultural experiences with injustices, a commitment to equality, *and* in some cases also proximity to whiteness/majority status were among the leaders able to raise attention and be heard when these issues arose. With time and perseverance, as in some cases teaching primarily by example, they were able to bring conversations or policies about fairness, diversity, justice and ethics to mainstream science.

As a result, increasing numbers of URM scientists have entered animal behaviour and other relevant scientific fields. Nevertheless, there continues to be great disparity in our participation in the sciences and much remains to be done. As throughout the history recounted here, younger scholars of today continue to advocate for broader participation, more attention to diverse perspectives and equal opportunities. Yet many of us find it overwhelming to often be the 'the first' – in many cases we are the first in our families to attend college, the first to choose a career in basic sciences, the first to obtain a Ph.D., and the first to become faculty at an institution of higher education – all this while we also strive to be activist scholars while maintaining a successful research programme. On top of this, we still frequently are not only the first, but also the only URM faculty in our departments – an achievement that can bring unnerving and unwelcome hypervisibility, akin to walking a tightrope with crowds watching to see if we will fall or make it safely to the other side. These are the challenges and obstacles still faced by URM scientists even today – thus, we are still obliged to be trailblazers in 2020.

One can also ask what benefit the pioneers and trailblazers discussed here had on animal behaviour and adjacent disciplines? Perhaps it is too early to say and only in retrospect, once parity is reached, will we be able to definitively answer this question. For now, it seems safe to surmise that different perspectives (i.e. from URMs and others – see Tang-Martínez, 2020) expose hidden and not so hidden exclusionary practices and environments in the sciences. They also can expose research blind spots – from specific questions that are not being considered and alternative interpretations of data, to methodological innovations (tools, techniques and hacks to collect data), to engagement (who does science, who gets credit for expertise, public outreach, and collaborations) as well as ethical approaches to doing science (labour and fair compensation of trainees, staff scientists and field and laboratory research assistants) – these are the important contributions of scholar activists.

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