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Authors: Álvaro Fernández-Llamazares, and Dana Lepofsky

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Ethnobiology Through Song

Álvaro Fernández-Llamazares^{1,2*} and Dana Lepofsky³

Abstract. Music is recognized as an essential constituent of the diversity of life on Earth and is enshrined in the concept of biocultural diversity. While research shows that song is an untapped library of biocultural memory, ethnobiologists have not yet explored the many areas in which studying songs and music through an ethnobiological lens could bring into focus the multi-dimensional relationships among humans and their biological worlds. The research articles in this special issue illustrate the importance of songs as both a repository of ethnobiological knowledge and as a means to construct, maintain, and mobilize peoples' intimate relations with their local ecologies. Although many traditional music-making systems are under risk of attrition, the extent to which traditional songs continue to be performed and celebrated in many Indigenous and local communities attests not just to the endurance and resilience of their cultures, but also to their deep cultural attachment to their lands as manifested through song. This special issue constitutes one significant step towards the recognition of music both as a timeless prism for looking at human-nature inter-relations, in all their complexities and magnificence, and as an essential form of biocultural heritage, worthy of documentation, conservation, and revitalization.

Keywords: biocultural diversity, ethnomusicology, knowledge revitalization, musical instruments, traditional music.

Dedicated to Kwaxistalla Wathl'thla Chief Adam Dick (1929–2018)

*"Music is our heartbeat exposed, lit up
and choreographed—so it reaches us and
touches us all at an ancestral level"—*
Ogwi'low'gwa (Kim Recalma-Clutesi,
Qualicum Nation)

Introduction

This special issue on Ethnobiology Through Song celebrates the age-old power of music to express and enforce the intricate relationships among humans, other beings, and their ecosystems. Music is, as Ogwi'low'gwa notes, our very heartbeat and part of our shared ancestry. It is so woven into our ancient fabric that fundamental aspects of music are understood cross-culturally (Mehr et al. 2018) and, in fact, are understood by other living beings

(Hutchins this issue; Lawergren 1988; Sievers et al. 2013). As a result, music facilitates communication beyond words among humans, and between humans and the non-human beings that inhabit their worlds (Loui et al. 2017; Mithen 2007). It has always been so (Krause 2012; Trehub et al. 2015a, 2015b).

This special issue was inspired by Kwaxistalla Wathl'thla Clan Chief Adam Dick—Ogwi'low'gwa's longtime partner—who was the keeper of hundreds of songs that told how his Kwakwaka'wakw people of the northern Northwest Coast of North America relate to the natural and supernatural worlds around them. In his role as *ninogaad* (specially trained cultural nobility), Kwaxistalla Wathl'thla knew and recounted songs about the intricate ebb and flow of the universe and people's place within that

¹ Helsinki Institute of Sustainability Science (HELSUS), Faculty of Biological and Environmental Sciences, PO Box 65 (Viikinkaari 1), University of Helsinki, FI-00014, Helsinki, Finland.

² Global Change and Conservation (GCC), Organismal and Evolutionary Biology Research Programme, Faculty of Biological and Environmental Sciences, University of Helsinki, Helsinki, Finland.

³ Department of Archaeology, Simon Fraser University, Canada.

* Corresponding author (alvaro.fernandez-llamazares@helsinki.fi)

flow. He sang of the seasons, the beings of the land and the sea, the movement of the stars, and the First Peoples to come to the earth. Like the rich song tradition carried by Kwaxistalla Wathl'thla, the collection of papers in this special issue also demonstrate the importance of songs in maintaining, sharing, and enhancing ethnobiological knowledge amongst Indigenous Peoples and local communities worldwide (Figure 1). By celebrating the power of song in this way, we honor Kwaxistalla Wathl'thla and all the keepers of ancient songs around the world.

Music as Biocultural Diversity

Given the age-old and global importance of song, it is no surprise that music has been a long-standing focus of scientific inquiry. Since Darwinian times, for instance, the evolutionary function of music has been a subject of caustic debate (e.g., Darwin 1871; Honing et al. 2015; Huron 2001). More recently, groundbreaking work from multiple scientific disciplines is unveiling the universal power of music and its far-reaching influence both on humans and non-humans. This influence ranges from music's undeniable healing effects (Leardi et al. 2007; MacDonald 2013; Pothoulaki et al. 2008) to its centrality in supporting expressions of emotion that transcend cultural divides (Savage et al. 2015; Sievers et al. 2013) to its ability to foster communication with non-human life forms (Sakakibara 2009; Simonett 2016).

Although elements of music and song are shared across cultures, songs and music are as diverse as the peoples, times, and places from where they emanated (Brown et al. 2013; Le Bomin et al. 2016; Rzeszutek et al. 2012; Trehub et al. 2015a, 2015b). Consequently, music is recognized as an essential constituent of the diversity of life on Earth (Grant 2012a; Savage et al. 2015). The diversity of the world's musical traditions is, thus, enshrined in the concept of biocultural diversity, which encompasses a wide array of inter-related biological, cultural, and linguistic manifestations that have most probably

coevolved (Cross 2003; Gavin et al. 2015; Hill et al. 2011, 2016; Maffi 2005). In fact, beginning with Plato and Aristotle, scholars have suggested that the origins of music stem from the practice of imitating or echoing sounds and rhythms emerging from the natural world (Doolittle 2008; Lawergren 1988; Montagu 2017). Not surprisingly, some of the earliest musical instruments were used to communicate with animals, either to call or repel them (Lawergren 1988).

Today, sounds of nature continue to inform, infuse, and inspire the music and singing of many different cultural groups across the world (Feld 1990; Levin and Süzükei 2010; Pegg 2001; Petrovic and Ljubinkovic 2011). Both verbal and non-verbal mimicry of natural sounds are common in songs used in shamanic communication with the spirits governing the natural world (Gutiérrez Choquevilca 2011; Hoppál 2002) or to attract animals during hunting (Sarvasy 2016; Welch 2015). Knowledge of the non-human natural world is not only encoded in the animal and plant sounds that are often replicated vocally, but also in the lyrical content of many traditional songs (Forth 2017; Hutchins this issue; Nabhan 2003; Sato et al. 2018). Detailed content analyses of song texts in many different cultural contexts have shown that music is an untapped library of rich ethnobiological knowledge and biocultural memory, embedding important social, physical, emotional, and spiritual ties to local ecologies (Herrero and Cardaño 2015; Mekbib 2009; Thornton et al. this issue; Trigger 2008).

Despite the many important contributions that music can make to our understanding of human-nature interrelations, the majority of research on the ethnobiological contexts in which songs are performed and transmitted comes from the field of ethnomusicology (e.g., Post 2019; Turpin et al. 2017). Ethnomusicologists have long recognized the important role that music plays in building cultural identities (Balzer 2016; Bracknell 2015;



Figure 1. “The Sweeper” is a central masked character in the Atla’gimma, the Spirits of the Forest dance complex. Clan Chief Kwaxsisstalla Wathl’thla (Adam Dick) held the rights to the Atla’gimma dance complex, and in 2010 “opened his Gildas” (box of treasures) for the 33rd Annual Society of Ethnobiology Conference (Victoria, BC, Canada). Through *dla’wil’killa* (Chiefly potlach prerogative) Kwaxsisstalla Wathl’thla demonstrated his adoption of ethnocologist Dr. Nancy Turner by bringing out his most treasured possession, the Spirits of the Forest, for conference participants to witness. This dance complex is a re-creation of a vision received by an ancestor, and through song, chants, and dance, tells of the intricate relationships between the natural and supernatural realms of humans and the forest beings. The 45-minute dance uses highly structured sequences of chants (*yillokin*), songs, and precise beats on a redcedar log drum (*icalalicu*). An important, yet covert part of this ceremony is Kwaxsisstalla Wathl’thla praising and thanking *icalalicu* for helping transport the sacred chants and songs into our earthly realm. (Photo: Robert Turner).

Koch 2013), ensuring the continuance of distinct epistemic traditions (Nyota and Mapara 2008; Seeger 2016; Silvers 2015), and fostering a deep sense of place amongst many Indigenous Peoples and local communities (Richards 2007; Roseman 1998). With ethnomusicology often understood as “musical ethnography” (e.g., Moyle 2001; Wafer and Turpin 2017), we could argue that, with ethnobiology, it shares a relatively synchronic focus and a general toolbox of methods that could be harnessed to foster enriched interdisciplinary collaboration and dialogue. A similar point has been made in relation to soundscape ecology and how an increased focus on sound could open new avenues for ethnobiological research (Wright 2017).

The pioneering work of ethnomusicologist Steven Feld, documenting the rich layering sounds of the tropical rainforest as an essential part of Kaluli musical traditions in Papua New Guinea (Feld 1990), paved the way for a rich scholarly tradition examining the biocultural depth embodied in music throughout the world. Continuing with this incipient, yet rapidly growing body of research, this heartfelt collection aims to show how ethnobiology is transmitted through song. It highlights not only the role of music in the intergenerational transmission of ethnobiological knowledge and traditional ecological management practices, but also in cultivating a sense of place and fostering emotional connections with the land. In the following sections, we explore further some of the many areas in which studying songs and music through an ethnobiological lens can bring into focus the multi-dimensional relationships among humans and their biological worlds.

Songs as a Repository of Ethnobiological Knowledge

As several of the papers in this special issue demonstrate (e.g., Post this issue), songs are storehouses for ethnobiological knowledge and practice (see also Schniter 2014; Seeger 2016; Silvers 2015). In

Australia, for instance, songs are considered to be a central repository of Aboriginal knowledge, including about the relationships of people with non-human beings (Curran et al. this issue; Ellis 1985; Turpin and Laughren 2013). Songs have been described as mnemonic codes that hold information on the ecology of landscapes and species used by different human communities (Bracknell 2014; Ranspot this issue). They can also hold information on the management practices and moral principles to safeguard local ecosystems and particular plants or animals (Reyes-García and Fernández-Llamazares this issue; Turner et al. 2013a), such as the ancient Mayans practice of using song to transmit knowledge on how to maintain soil fertility (Capra et al. 2017; Wells and Mihok 2010). In many Indigenous cultures, certain words, terms, linguistic expressions, and phrases occur only in sung language and not in spoken discourse (e.g., Feld 1990; Miyashita and Shoe 2009; Turpin 2007). Because of this, songs are also an important repository of language (Crate this issue; Grant 2012a; Turpin and Stebbins 2010). Traditional songs can, thus, be understood as rich systems of embedded knowledge and a powerful expression of local cultural values and worldviews (Post 2019; Thornton et al. this issue; Walker 2003).

As repositories of knowledge, songs are a powerful venue through which Indigenous Peoples and local communities shared and continue to share knowledge inter-generationally (Koch 2013; Nyota and Mapara 2008). Sometimes this knowledge is of relevance to the entire community and is shared in public performances (e.g., Post this issue); in other instances, the knowledge is passed on only within the family (e.g., Thornton et al. this issue). In some cases, the songs must be repeated verbatim and, in others, although they are based on tradition, they can be improvised to particular contexts (e.g., Crate this issue). Adapting the knowledge and lessons embedded in traditional songs to today's changing environmental

conditions is centrally important to cultural continuity (e.g., Gillreath-Brown this issue). For example, some works have looked at the effects of climate change as manifested in song (e.g., Sakakibara 2009, 2017).

There are many examples of traditional songs worldwide that encode ethnobotanical information (e.g., Ahmed et al. 2019; Herrero and Cardaño 2015; Mekbib 2009; Saha et al. 2014). Such songs reveal a range of ethnobotanical relationships, including the symbolic and cultural values of plants (Kumar et al. 2005; Stewart 1984; Zahn et al. 2018) or observations about plants' seasonal cycles (e.g., Hart and Salick 2017). The depth and breadth of ethnobotanical knowledge encompassed within traditional songs is well illustrated by Nabhan's (2004) work with the O'odham people of the Sonora Desert. The O'odham's ancient

songs encapsulate a rich understanding of plant ecology that Western scientists have only just recently begun to understand.

Traditional songs are also a rich source of ethnozoological knowledge (Moyle 1986; Nabhan 2003; Sato et al. 2018; Si and Turpin 2015; Trigger 2008) and, in many different cultural contexts, birds are symbolically represented in songs (Anderson 2017; Forth 2017; Sugawara 2001). Many traditional songs encode knowledge about wild pollinators (Athayde et al. 2016; Fijn 2014; Hill et al. 2016), such as the prayers and songs performed while honey collecting in Southeast Asia and the Indian sub-continent (Buchmann and Nabhan 1996; Demps et al. 2012). In northern Thailand, the traditional songs of the Karen people (locally known as *hta*) underscore not only the Karen's detailed knowledge about bees, but also the commu-



Figure 2. Two Karen elders (Jorni Odochao and Di poo noo Papa) from the community of Hin Lad Nai (Thailand) play on the *kwa*, a musical instrument made from buffalo horn and wood. (Photo: Álvaro Fernández-Llamazares, reproduced with permission from the Hin Lad Nai community).

nity's cultural values, more broadly (Figure 2; Malmer et al. 2019).

In addition to songs, musical instruments are also repositories of vast ethnobio-logical knowledge (Gras et al. 2016; Rancier 2014; Widjaja 1980). This knowledge is embedded in the many stages of an instrument's life—from the ritual and mundane choices made about sourcing and harvesting of raw materials to the instrument's final crafting, use, and eventual discard (Gillreath-Brown this issue). Embedded in those choices are complex systems of ethnobiological knowledge and practice, sometimes held by many and sometimes only by specialists (Dawe 2015; George 1993; Impey 2006). While the ethnobiology of traditional instrument-making in many Indigenous and local communities is relatively well known (e.g., Gras et al. 2016; Jain 1965; Platt et al. 2009; Puri and Chaturvedi 2008), archaeologists are often not privy to the ethnobiological contexts in which such materials were harvested, crafted, or even used (Both 2008; McKillop 1996). In some cases, ethnographic records have been called upon to fill in these contextual details (e.g., Campos 2012; Gillreath-Brown and Peres 2017).

Ethnobiological Relations Embodied in Song

For many cultural groups, the land and the songs associated with it are connected intimately (Curran this issue; Koch 2013; Wafer and Turpin 2017). Music constructs and mobilizes close ties with the environment (Jackson and Levine 2002; Ranspot this issue; Sakakibara 2009; Xu et al. 2005), fosters a sense of place (Post this issue), and enables connections with other living beings (Hutchins this issue). In addition, by recounting connections to particular landscapes, people can convey to others the historical and spiritual meanings of places (Thornton et al. this issue). The power of song to connect to homelands is also important for people who are no longer able to, or choosing not to, live in their

traditional lands. For instance, even when he was away from his homeland, Kwaxsis-talla Wathl'thla could share song traditions that invoked the landmarks of his clan territory. At once, this asserted his clan rights and prerogatives, his enduring bond with the land, and the many powers, teachings, and oral traditions that are linked to this landscape—even across vast distances.

Traditional music holds a significant place in the ways in which many cultural groups proclaim their collective history, which is often passed down over generations through oral transmission (Post 2007, 2019; Xu et al. 2005). Because traditional songs reflect a depth of embodied experience about intimate, long-term relationships with landscapes, animals, plants, and other non-human beings, they are carriers of biocultural memory (Harris 2004; Post 2007, 2019; Ranspot this issue). Because of this, traditional songs often provide information on historical relationships with the land and its resources that might not be recorded in other ways (Roseman 1998; Turner et al. 2013b). Among the Yi people of China, for example, their songs and recitations of genealogical trees include numerous references to the forest, the land, rivers, animals, and other non-human beings at each location in which ancestors once lived (Xu et al. 2005). On the northwest coast of North America, Kwaxsis-talla Wathl'thla's sharing of a Kwakwaka'wakw song about the history and ecology of clam gardens with academic researchers in 2002 opened the door to understanding this ancient form of Indigenous mariculture and prompted a surge of academic writings shaped by his cultural knowledge (Figure 3; Deur et al. 2015; Lepofsky et al. 2015; Recalma-Clutesi et al. 2019).

Songs can also trace Indigenous Peoples' experiences and relationships to the lands in which they have historically lived and traveled (Brown et al. 2013; Koch 2013; Post this issue). For example, the Temiar people of the Malaysian rainforest map and mediate their relationships with



Figure 3. Clan Chief Kwaxsisstalla Wathl'thla (Adam Dick) digging for clams and singing in one of the “clam gardens” (*lokiwey*) that he built and maintained as a child at Deep Harbour in the Broughton Archipelago, Northern British Columbia, Canada. He received specialized cultural training at this site, including clam garden construction techniques and ancient songs about the practice, as he was sequestered at this place avoiding forced removal to residential school. Kwaxsisstalla Wathl'thla's sharing of the ancient Kwakwaka'wakw *lokiwey* song opened the door to many avenues of scientific inquiry and enabled several community-based research projects on traditional mariculture on the Northwest Coast of North America. (Photos: Dana Lepofsky [L] and Randy Bouchard [R]).

the land and each other through song (Roseman 1998). Landforms and cultural keystone places become landmarks named and recorded in the songs they receive from the souls of the landscape—its plants and animals. In other words, the Temiar people “sing their maps: theoretically, in their epistemology of song composition and performance; melodically, in contours of pitch and phrasing; textually, in place names weighted with memory” (Roseman 1998:106). However, these song maps rarely entered colonial or postcolonial discourses on land ownership or rights. This is surprising, as many traditional songs not only evoke images of places of cultural attachment, but also feature place names that have social, political, and historical

significance (Feld 1990; Post 2019; Walsh et al. 2013).

Music is also used in connection to spiritual practices and cosmologies where communication between humans and non-humans is paramount (Hoppál 2002; Joy 2014, 2015; Porath 2015; Salmón 2012; Walker 2003). Many Indigenous groups perform music and chanting in shamanic ceremonies as a means to communicate with the spiritual world (e.g., Brabec de Mori 2013, 2015; Crate 2006; de Camargo Piedade 2013; Hill 2013). For example, in many Amazonian communities, the shamans chant to implore the spirits to facilitate the hunt or show gratitude towards them after a successful hunting trip (Huanca 2008; Reyes-García and

Fernández-Llamazares this issue; Seeger 2004, 2016). Many Amazonian ritual songs illustrate the powerful bonds of kinship and reciprocity that Indigenous Peoples have traditionally maintained with the spiritual world and help to cultivate a philosophy of wildlife stewardship. Such songs teach that maintaining harmonious relations with forest deities is critical to ensuring the availability of game (Brabec de Mori 2013; Fernández-Llamazares et al. 2017; Seeger 2004). Similar findings have been reported amongst the Yaqui and Seri people of the Sonora Desert, whose songs are seen as conversations with the non-human world (Salmón 2012).

Indigenous Peoples and local communities often use musical instruments in addition to, or instead of, singing and other vocalizations to communicate with other beings and other worlds (Hill 2013; Wright 2011). For example, flutes are extensively used in negotiation with master spirits across much of Amazonia (Daillant 2003; de Camargo Piedade 2013; Hill and Chaumeil 2011). Similarly, rattles are common across much of North America (Gillreath-Brown this issue). In many Indigenous cultures, drums activate powerful interactions between people and animal spirits (Hultkrantz 1991) and have, thus, become symbols of the inseparability among humans, animals, and the environment (Joy 2014, 2015; Pentikäinen 1998). Among the Iñupiat people, drumbeats facilitate communications with whales and are an essential part of Iñupiat whaling lifeways (Sakakibara 2009, 2017). Several studies have looked at the cultural basis of musical instrument making, where the knowledge of the primary materials for their construction is entangled in complex webs of relationality with the landscape (Dawe 2015; Ryan 2015).

Erosion and Revitalization of Traditional Music-making Systems

As several of the papers in this issue document, traditional songs, along with

other time-honored cultural practices, are at risk of attrition throughout the planet, primarily due to changes associated with globalization and environmental change (Baranovitch 2016; Grant 2016; Marett 2010; Sakakibara 2009; Wafer and Turpin 2007). Many traditional music-making systems are under increasing threat, as new musical genres take center stage among Indigenous and local communities from all over the world (Curran et al. this issue; Guy 2017; Marett 2010; McDermott et al. 2016; Ventsel and Peers 2017). In many communities, current social, economic, and cultural trends towards adopting Western lifestyles have weakened the networks for the intergenerational transmission of music, as young generations increasingly lean towards new forms of recreation and entertainment (Crate this issue; Grant 2016, 2017; Ryan 2015). Given that there is virtually no documentation for many of these unique musical traditions, many of them risk dying with the elder generation (e.g., Reyes-García and Fernández-Llamazares this issue). Furthermore, many traditional musical instruments are also on the verge of extinction, as a direct result of the loss of certain species that are essential for their construction (Ryan 2015; Sakakibara 2009; Yamada 2017) and through prohibition laws on harvesting such species (Gillreath-Brown this issue).

Parallel to the erosion of traditional music-making, many studies have shown that ethnobiological knowledge is rapidly fading in many parts of the world (Aswani et al. 2018; Reyes-García et al. 2013; Turner and Turner 2008; Turner et al. 2008), with the intimate bonds between Indigenous Peoples and their local ecosystems rapidly loosening (Fernandez-Llamazares et al. 2015; Papworth et al. 2009). Ethnobiologists and ethnomusicologists alike agree that there is a gradual disappearance of some of the traditional institutions that were used to transfer knowledge (be it musical or ethnobiological) from generation to generation (Grant 2017; Tang and Gavin 2016). Social

gatherings for knowledge transmission (e.g., storytelling and music performances) are spaces for community-building and inter-generational exchange (Crate this issue; Fernández-Llamazares and Cabeza 2018; Legrain 2016); as such, the loss of musical heritage is arguably concomitant to the loss of knowledge, collective identity, and social cohesion (Grant et al. 2012a, 2012b, 2015). It therefore seems that the parallel declines of traditional music, on the one hand, and ethnobiological knowledge, on the other, could be more directly related than previously thought.

Regardless of the many colonial and postcolonial attempts to obliterate and suppress the musical traditions of Indigenous Peoples and local communities (e.g., destruction and confiscation of hundreds of Sámi shamanic drums across much of Fennoscandia [Joy 2015]), the papers in this issue show that their songs and chants have been resilient through time (Brader 2011; Ranspot this issue). The extent to which traditional music continues to be performed and celebrated in many Indigenous and local communities attests not just to the endurance of their cultures, but also to their deep cultural attachment to their lands as manifested through song (Curran et al. this issue). Many applied projects and initiatives, from grassroots to international levels, have emerged aiming to safeguard these musical and epistemic traditions in the face of pervasive globalization (Beng 2008; Grant 2015, 2017; Persoon and Schefold 2017; Wafer and Turpin 2017).

In line with previous research on the maintenance of ethnobiological knowledge (e.g., Gómez-Baggethun and Reyes-García 2013; McCarter et al. 2014; Tang and Gavin 2016), many of these initiatives are not only focused on the documentation and preservation of songs as a mere compilation of folklore but, more broadly, on conserving and revitalizing the sociocultural contexts in which songs are created, performed, and transmitted (Grant 2012b; Stubington 1987). Grant (2014) has identified several

ways in which the field of language maintenance could inspire novel pathways to revitalizing endangered music genres. Similarly, greater collaboration between ethnobiologists and ethnomusicologists would support revitalization efforts for simultaneously safeguarding musical heritage, ethnobiological knowledge, and biocultural diversity (Reyes-García and Fernández-Llamazares this issue). Given the age-old power of music to connect living beings, it is a conservation imperative to preserve and honor ancient musical traditions and all they embody.

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References Cited

- Ahmed, M. M., R. Das, and S. K. Borthakur. 2019. Ethnobotanical Study of Plants Used in Muslim (Pangal / Meitei Pangal) Community Folk-Lore (Folk-Songs and Folk-Proverbs) in Manipur, India. *International Journal of Plant Science and Ecology* 5:1–10.
- Anderson, E. N. 2017. Birds in Maya Imagination: A Historical Ethno-Ornithology. *Journal of Ethnobiology* 37:621–636. DOI:10.2993/0278-0771-37.4.621.
- Aswani, S., A. Lemahieu, and W. H. H. Sauer. 2018. Global Trends of Local Ecological Knowledge and Future Implications. *PLoS ONE* 13:1–19. DOI:10.1371/journal.pone.0195440.

- Athayde, S., J. R. Stepp, and W. C. Ballester. 2016. Engaging Indigenous and Academic Knowledge on Bees in the Amazon: Implications for Environmental Management and Transdisciplinary Research. *Journal of Ethnobiology and Ethnomedicine* 12:26. DOI:10.1186/s13002-016-0093-z.
- Balzer, M. M. 2016. Music and Identity. *Anthropology and Archeology of Eurasia* 55:1–6. DOI:10.1080/10611959.2016.1274951.
- Baranovitch, N. 2016. Ecological Degradation and Endangered Ethnicities: China's Minority Environmental Discourses as Manifested in Popular Songs. *The Journal of Asian Studies* 75:181–205. DOI:10.1017/S0021911815001576.
- Beng, T. S. 2008. Activism in Southeast Asian Ethnomusicology: Empowering Youths to Revitalize Traditions and Bridge Cultural Barriers. *Musicological Annual* 44:69–83.
- Both, A. A. 2008. La música prehispánica: sonidos rituales a lo largo de la historia. *Arqueología Mexicana* 16:28e37.
- Brabec de Mori, B. 2013. Shipibo Laughing Songs and the Transformative Faculty: Performing or Becoming the Other. *Ethnomusicology Forum* 22:343–361. DOI:10.1080/17411912.2013.844528.
- Brabec de Mori, B. 2015. Sonic Substances and Silent Sounds: An Auditory Anthropology of Ritual Songs. *Tipiti: Journal of the Society for the Anthropology of Lowland South America* 13:25–43.
- Bracknell, C. 2014. Kooral Dwonk-katijiny (listening to the past): Aboriginal Language, Songs and History in South-western Australia. *Aboriginal History* 38:1–18.
- Bracknell, C. 2015. 'Say You're a Nyungarmusicologist': Indigenous Research and Endangered Song. *Musicology Australia* 37:199–217. DOI:10.1080/08145857.2015.1075260.
- Brader, A. 2011. *Songs of Resilience*. Cambridge Scholars Publishing, Newcastle upon Tyne, United Kingdom.
- Brown, S., P. E. Savage, A. M. Shan Ko, M. Stoneking, Y. C. Ko, J. H. Loo, and J. A. Trejaut. 2013. Correlations in the Population Structure of Music, Genes and Language. *Proceedings of the Royal Society B: Biological Sciences* 281:20132072. DOI:10.1098/rspb.2013.2072.
- Buchmann, S. L., and G. P. Nabhan. 1996. *The Forgotten Pollinators*. Island Press, Washington DC.
- Campos, F. Z. 2012. Traditional Chordophones of the Ifugao: A Look into the Potentials of Archaeomusicological Studies in the Philippines. *Musika Journal* 8:167–184.
- Capra, G. F., A. Ganga, and A. F. Moore. 2017. Songs for Our Soils. How Soil Themes Have Been Represented in Popular Song. *Soil Science and Plant Nutrition* 63:517–525. DOI:10.1080/00380768.2017.1369860.
- Crate, S. A. 2006. Ohuokhai: Sakhas' Unique Integration of Social Meaning and Sound. *Journal of American Folklore* 119:161–183.
- Cross, I. 2003. Music as a Biocultural Phenomenon. *Annals of the New York Academy of Sciences* 999:106–111. DOI:10.1196/annals.1284.010.
- Daillant, I. 2003. *Sens Dessus Dessous. Organization sociale et spatiale des Chimane d'Amazonie boliviane*. Société d'Éthnologie, Nanterre, France.
- Darwin, C. 1871. *The Descent of Man, and Selection in Relation to Sex*. John Murray, London, United Kingdom.
- Dawe, K. 2015. Materials Matter: Towards a Political Ecology of Musical Instrument Making. In *Current Directions in Ecomusicology: Music, Culture, Nature*, edited by S. A. Allen and K. Dawe, pp. 109–121. Taylor and Francis, New York, NY.
- De Camargo Piedade, A. T. 2013. Flutes, Songs and Dreams: Cycles of Creation and Musical Performance among the Wauja of the Upper Xingu (Brazil). *Ethnomusicology Forum* 22:306–322. DOI:10.1080/17411912.2013.844441.
- Demps, K., F. Zorondo-Rodríguez, C. García, and V. Reyes-García. 2012. Social Learning across the Life Cycle: Cultural Knowledge Acquisition for Honey Collection among the Jenu Kuruba, India. *Evolution and Human Behavior* 33:460–470. DOI:10.1016/j.evolhumbehav.2011.12.008.
- Deur, D., A. Dick, K. Recalma-Clutesi, and N. Turner. 2015. Kwakwaka'wakw "Clam Gardens": Motive and Agency in Traditional

- Northwest Coast Mariculture. *Human Ecology* 43:201–212.
- Doolittle, E. 2008. Crickets in the Concert Hall: A History of Animals in Western Music. *Transcultural Music Review* 12:1–9.
- Ellis, C. 1985. *Aboriginal Music: Education for Living; Crosscultural Experiences from South Australia*. University of Queensland Press, St Lucia, Australia.
- Feld, S. 1990. *Sound and Sentiment: Birds, Weeping, Poetics, and Song in Kaluli Expression*. University of Pennsylvania Press, Philadelphia, PA.
- Fernández-Llamazares, Á., and M. Cabeza. 2018. Rediscovering the Potential of Indigenous Storytelling for Conservation Practice. *Conservation Letters* 11:e12398. DOI:10.1111/conl.12398.
- Fernández-Llamazares, Á., I. Díaz-Reviriego, A. C. Luz, M. Cabeza, A. Pyhälä, and V. Reyes-García. 2015. Rapid Ecosystem Change Challenges the Adaptive Capacity of Local Environmental Knowledge. *Global Environmental Change* 31:272–284. DOI:10.1016/j.gloenvcha.2015.02.001.
- Fernández-Llamazares, Á., I. Díaz-Reviriego, and V. Reyes-García. 2017. Defaunation through the Eyes of the Tsimane'. In *Hunter-Gatherers in a Changing World*, edited by V. Reyes-García and A. Pyhälä, pp. 77–90. Springer International Publishing, Cham, Switzerland.
- Fijn, N. 2014. Sugarbag Dreaming: The Significance of Bees to Yolngu in Arnhem Land, Australia. *Humanimalia* 6:41–61.
- Forth, G. 2017. What a Little Bird Tells Us About Symbolic Thought: The Russet-Capped Stubtail (*Tesia everetti*) in Nage Augury, Myth, and Metaphor. *Journal of Ethnobiology* 37:682–699. DOI:10.2993/0278-0771-37.4.682.
- Gavin, M. C., J. McCarter, A. Mead, F. Berkes, J. R. Stepp, D. Patterson, and R. Tang. 2015. Defining Biocultural Approaches to Conservation. *Trends in Ecology and Evolution* 30:140–145. DOI:10.1016/j.tree.2014.12.005.
- George, K. M. 1993. Music-making, Ritual, and Gender in a Southeast Asian Hill Society. *Ethnomusicology* 37:1–27.
- Gillreath-Brown, A., and T. M. Peres. 2017. Identifying Turtle Shell Rattles in the Archaeological Record of the Southeastern United States. *Ethnobiology Letters* 8:109–114. DOI:10.14237/ebl.8.1.2017.979.
- Gómez-Baggethun, E., and V. Reyes-García. 2013. Reinterpreting Change in Traditional Ecological Knowledge. *Human Ecology* 41:643–647. DOI:10.1007/s10745-013-9577-9.
- Grant, C. 2012a. Analogies and Links between Cultural and Biological Diversity. *Journal of Cultural Heritage Management and Sustainable Development* 2:153–163. DOI:10.1108/20441261211273644.
- Grant, C. 2012b. Rethinking Safeguarding: Objections and Responses to Protecting and Promoting Endangered Musical Heritage. *Ethnomusicology Forum* 21:31–51. DOI:10.1080/17411912.2012.641733.
- Grant, C. 2014. *Music Endangerment: How Language Maintenance Can Help*. Oxford University Press, New York, NY.
- Grant, C. 2015. Endangered Musical Heritage as a Wicked Problem. *International Journal of Heritage Studies* 21:629–641. DOI:10.1080/13527258.2014.976245.
- Grant, C. 2016. Socio-Economic Concerns of Young Musicians of Traditional Genres in Cambodia: Implications for Music Sustainability. *Ethnomusicology Forum* 25:306–325. DOI:10.1080/17411912.2016.1236696.
- Grant, C. 2017. Learning and Teaching Traditional Music in Cambodia: Challenges and Incentives. *International Journal of Music Education* 35:5–16. DOI:10.1177/0255761415619394.
- Gras, A., T. Garnatje, M. A. Bonet, E. Carrió, M. Mayans, M. Parada, M. Rigat, and J. Vallès. 2016. Beyond Food and Medicine, but Necessary for Life, Too: Other Folk Plant Uses in Several Territories of Catalonia and the Balearic Islands. *Journal of Ethnobiology and Ethnomedicine* 12:23. DOI:10.1186/s13002-016-0097-8.
- Gutiérrez Choquevilca, A. L. 2011. Sisyawayitii tarawayitii : sifflements serpentins et autres voix d'esprits dans le chamanisme quechua du haut Pastaza (Amazonie péruvienne). *Journal de la Société des Américanistes* 97:179–221.

- Guy, N. 2017. Imagination Flowing Down Taiwan's Tamsui River Towards an Ecomusicology of the Environmental Imagination. *Ethnomusicology* 53:218–248.
- Harris, R. 2004. *Singing the Village: Music, Memory and Ritual among the Sibe of Xinjiang*. Oxford University Press, Oxford, United Kingdom.
- Hart, R., and J. Salick. 2017. Dynamic Ecological Knowledge Systems Amid Changing Place and Climate: Mt. Yulong Rhododendrons. *Journal of Ethnobiology* 37:21–36.
- Herrero, B., and M. Cardaño. 2015. Ethnobotany in the Folksongs of Castilla y León (Spain). *Botanical Sciences* 93:249–260. DOI:10.17129/botsoci.88.
- Hill, J. D. 2013. Instruments of Power: Musicalising the Other in Lowland South America. *Ethnomusicology Forum* 22:323–342. DOI: 10.1080/17411912.2013.844440.
- Hill, J. D., and J. P. Chaumeil. 2011. *Burst of Breath: Indigenous Ritual Wind Instruments in Lowland South America*. University of Nebraska Press, Lincoln, NE.
- Hill, R., L. C. Cullen-Unsworth, L. D. Talbot, and S. McIntyre-Tamwoy. 2011. Empowering Indigenous Peoples' Biocultural Diversity through World Heritage Cultural Landscapes: A Case Study from the Australian Humid Tropical Forests. *International Journal of Heritage Studies* 17:571–591. DOI:10.1080/13527258.2011.618252.
- Hill, R., P. Kwapong, G. Nates-Parra, S. J. Breslow, D. Buchori, B. Howlett, G. Le Buhn, M. M. Maués, J. J. Quezada-Euán, and S. Saeed. 2016. Biocultural Diversity, Pollinators and Their Socio-cultural Values. In *IPBES Assessment Report on Pollinators, Pollination and Food Production*, edited by S. G. Potts, V. L. Imperatriz-Fonseca, and H. T. Ngo, pp. 275–360. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), Bonn, Germany.
- Honing, H, C. ten Cate, I. Peretz, and S. E. Trehub. 2015. Without it No Music: Cognition, Biology and Evolution of Musicality. *Philosophical Transactions of the Royal Society B: Biological Sciences* 370:201400088. DOI:10.1098/rstb.2014.0088.
- Hoppál, M. 2002. *Das Buch der Schamanen*. Econ Ullstein List, Munich, Germany.
- Huanca, T. 2008. *Tsimane' Oral Tradition, Landscape, and Identity in Tropical Forest*. Imprenta Wagui, La Paz, Bolivia.
- Hultkrantz, Å. 1991. The Drum in Shamanism: Some Reflections. *Scripta Instituti Donneriani Aboensis* 14. DOI:10.30674/scripta.67194.
- Huron, D. 2001. Is Music an Evolutionary Adaptation? *Annals of the New York Academy of Sciences* 930:43–61.
- Impey, A. 2006. Musical Constructions of Place: Linking Music to Environmental Action in the St Lucia Wetlands. *Southern African Journal of Environmental Education* 23:92–106.
- Jackson, J. B., and V. L. Levine. 2002. Singing for Garfish: Music and Woodland Communities in Eastern Oklahoma. *Ethnomusicology* 46:284–306.
- Jain, S. K. 1965. Wooden Musical Instruments of the Gonds of Central India. *Ethnomusicology* 9:39–42.
- Joy, F. 2014. What Influence Do the Old Sámi Noaidi Drums from Lapland Play in the Construction of New Shaman Drums by Sámi Persons Today? *Folklore* 56:117–158. DOI:10.7592/FEJF2014.56.joy.
- Joy, F. 2015. Sami Shamanism, Fishing Magic and Drum Symbolism. *Shaman* 23:11–46.
- Koch, G. 2013. *We Have the Song, so We Have the Land: Song and Ceremony as Proof of Ownership in Aboriginal and Torres Strait Islander Land Claims*. AIATSIS Research Publications. Canberra, Australia.
- Krause, B. 2012. *The Great Animal Orchestra. Finding the Origins of Music in the World's Wild Places*. Back Bay Books, New York, NY.
- Kumar, J., H. Soni, and R. Kumar. 2005. Aesthetic Values of Selected Floral Elements of Khatana and Waghai Forests of Dangs, Western Ghats. *Indian Journal of Traditional Knowledge* 4:275–286.
- Lawergren, B. 1988. The Origin of Musical Instruments and Sounds. *Anthropos* 83:31–45.

- Leardi, S., R. Pietroletti, G. Angeloni, S. Necozione, G. Ranalletta, and B. Del Gusto. 2007. Randomized Clinical Trial Examining the Effect of Music Therapy in Stress Response to Day Surgery. *British Journal of Surgery* 94:943–947. DOI:10.1002/bjs.5914.
- Le Bomin, S., G. Lecointre, and E. Heyer. 2016. The Evolution of Musical Diversity: The Key Role of Vertical Transmission. *PLoS ONE* 11:1–17. DOI:10.1371/journal.pone.0151570.
- Legrain, L. 2016. Drunkards and Singers: A Mongolian Battle of Sounds. *Journal of Ethnology and Folkloristics* 10:65–80. DOI:10.1515/jef-2016-0011.
- Lepofsky, D., N. F. Smith, N. Cardinal, J. Harper, M. Morris, E. W. Gitla, R. Bouchard, D. I. D. Kennedy, A. K. Salomon, M. Puckett, and K. Rowell. 2015. Ancient Mariculture on the Northwest Coast of North America. *American Antiquity* 80:236–259. DOI:10.7183/0002-7316.80.2.236.
- Levin, T. and V. Süzükei. 2010. *Where Rivers and Mountains Sing: Sound, Music, and Nomadism in Tuva and Beyond*. Indiana University Press, Bloomington, IN.
- Loui, P., S. Patterson, M. E. Sachs, Y. Leung, T. Zeng, and E. Przsinda. 2017. White Matter Correlates of Musical Anhedonia: Implications for Evolution of Music. *Frontiers in Psychology* 8:1664. DOI:10.3389/fpsyg.2017.01664.
- MacDonald, R. A. R. 2013. Music, Health, and Well-Being: A Review. *International Journal of Qualitative Studies on Health and Well-Being* 8:20635. DOI:10.3402/qhw.v8i0.20635.
- Maffi, L. 2005. Linguistic, Cultural, and Biological Diversity. *Annual Review of Anthropology* 34:599–617. DOI:10.1146/annurev.anthro.34.081804.120437.
- Malmer, P., M. Tengö, Á. Fernández-Llamazares, E. Woodward, N. Crawhall, R. Hill, P. Trakansuphakon, S. Athayde, C. Cariño, D. Crimella, M. Farhan Ferrari, E. Pérez, R. Spencer, N. Trakansuphakon, A. Bickler, J. Cariño, E. Gonzalo, J. Lengois, T. Lungharwo, and B. Tahi. 2019. Dialogue across Indigenous, Local and Scientific Knowledge Systems Reflecting on the IPBES Assessment on Pollinators, Pollination and Food Production (21st to 25th January 2019, Chiang Mai and Chiang Rai, Thailand). SwedBio at Stockholm Resilience Centre, Stockholm, Sweden.
- Marett, A. 2010. Vanishing Songs: How Musical Extinctions Threaten the Planet. *Ethnomusicology Forum* 19:249–262. DOI:10.1080/17411912.2010.508238.
- McCarter, J., M. Gavin, S. Baereleo, and M. Lowe. 2014. The Challenges of Maintaining Indigenous Ecological Knowledge. *Ecology and Society* 19:39. DOI:10.5751/ES-06741-190339.
- McDermott, J. H., A. F. Schultz, E. A. Undurraga, and R. A. Godoy. 2016. Indifference to Dissonance in Native Amazonians Reveals Cultural Variation in Music Perception. *Nature* 535:547–550. DOI:10.1038/nature18635.
- McKillop, H. 1996. Prehistoric Maya Use of Native Palms: Archaeobotanical and Ethnobotanical Evidence. In *The Managed Mosaic: Ancient Maya Agriculture and Resource Use*, edited by S. L. Fedick, pp. 280–294. University of Utah Press, Salt Lake City, UT.
- Mehr, S. A., M. Singh, H. York, L. Glowacki, and M. M. Krasnow. 2018. Form and Function in Human Song. *Current Biology* 28:356–368. DOI:10.1016/j.cub.2017.12.042.
- Mekbib, F. 2009. Folksong Based Appraisal of Bioecocultural Heritage of Sorghum (*Sorghum bicolor* (L.) Moench): A New Approach in Ethnobiology. *Journal of Ethnobiology and Ethnomedicine* 5:19. DOI:10.1186/1746-4269-5-19.
- Mithen, S. J. 2007. *The Singing Neanderthals: The Origins of Music, Language, Mind, and Body*. Harvard University Press, Cambridge, MA.
- Miyashita, M., and S. C. Shoe. 2009. Blackfoot Lullabies and Language Revitalization. In *Indigenous Language Revitalization: Encouragement, Guidance & Lessons Learned*, edited by J. Reyhner and L. Lockard, pp. 183–190. Northern Arizona University, Flagstaff, AZ.
- Montagu, J. 2017. How Music and Instruments Began: A Brief Overview of the Origin and Entire Development of Music, from Its

- Earliest Stages. *Frontiers in Sociology* 2:8. DOI:10.3389/fsoc.2017.00008.
- Moyle, R. 1986. *Alyawarra Music. Songs and Society in a Central Australian Community*. Australian Institute of Aboriginal Studies, Canberra, Australia.
- Moyle, R. 2001. Observers Observed: Mutually Changing Perceptions at Balgo. *Journal of Intercultural Studies* 22:121–131.
- Nabhan, G. P. 2003. *Singing the Turtles to Sea*. University of California Press, Berkeley, CA.
- Nabhan, G. P. 2004. *Cross-Pollinations: The Marriage of Science and Poetry*. Milkweed Editions, Minneapolis, MN.
- Nyota, S., and J. Mapara. 2008. Shona Traditional Children's Games and Play: Songs as Indigenous Ways of Knowing. *Journal of Pan African Studies* 2:189–202.
- Papworth, S. K., J. Rist, L. Coad, and E. J. Milner-Gulland. 2009. Evidence for Shifting Baseline Syndrome in Conservation. *Conservation Letters* 2:93–100. DOI:10.1111/j.1755-263X.2009.00049.x.
- Pegg, C. 2001. *Mongolian Music, Dance, and Oral Narrative: Recovering Performance Traditions*. University of Washington Press, Seattle, WA.
- Pentikäinen, J. 1998. *Shamanism and Culture*. Etnika, Helsinki, Finland.
- Persoon, G. A., and R. Schefold. 2017. Frightened by the Eagle; Recording Songs and Music from the Island of Siberut, Mentawai Islands. *Wacana* 18:581–613. DOI:10.17510/wacana.v18i3.629.
- Petrovic, M., and N. Ljubinkovic. 2011. Imitation of Animal Sound Patterns in Serbian Folk Music. *Journal of Interdisciplinary Music Studies* 5:101–18. DOI:10.4407/jims.2011.11.001.
- Platt, S. G., C. G. Brantley, and T. R. Rainwater. 2009. Native American Ethnobotany of Cane (*Arundinaria* spp.) in the Southeastern United States: A Review. *Castanea* 74:271–285. DOI:10.2179/08-023r2.1.
- Porath, N. 2015. Physicalising the Spirit-Dimension by Song, Dance and 'Fakery' in Indigenous Mainland Riau, Indonesia. *Journal of Southeast Asian Studies* 46:368–390. DOI:10.1017/S0022463415000302.
- Post, J. C. 2007. 'I Take My *Dombra* and Sing to Remember My Homeland': Identity, Landscape and Music in Kazakh Communities of Western Mongolia. *Ethnomusicology Forum* 16:45–69.
- Post, J. C. 2019. Place Names and Kazakh Song Making in the Western Mongolian Steppes. In *Handbook of the Changing World Language Map*, edited by S. D. Brunn and R. Kehrein, pp. 1–22. Springer Nature Switzerland, Cham, Switzerland.
- Pothoulaki, M., R. A. R. Macdonald, P. Flowers, E. Stamataki, V. Filiopoulos, D. Stamatidis, and C. P. Stathakis. 2008. An Investigation of the Effects of Music on Anxiety and Pain Perception in Patients Undergoing Haemodialysis Treatment. *Journal of Health Psychology* 13:912–920. DOI:10.1177/1359105308095065.
- Puri, A, K., and A. Chaturvedi. 2008. Ethnobotanical Approach on Wild Plants for Manufacturing Musical Instruments by Gond and Korku Tribes of Vidarbha. *Indian Journal of Traditional Knowledge* 7:138–140.
- Rancier, M. 2014. The Musical Instrument as National Archive: A Case Study of the Kazakh Qyl-Qobyz. *Ethnomusicology* 58:379–404. DOI:10.5406/ethnomusicology.58.3.0379.
- Recalma-Clutesi, K., D. Deur, Clan Chief A. Dick Wathl'thla. 2019. Adam's Garden: The Power of Song in Recovering Knowledge of the Luxw'xi'wey. Paper presented at the Society for Ethnobiology Annual meeting, Vancouver B.C. May 10, 2019.
- Reyes-García, V., M. Guèze, A. C. Luz, J. Panque-Gálvez, M. J. Macía, M. Orta-Martínez, J. Pino, and X. Rubio-Campillo. 2013. Evidence of Traditional Knowledge Loss among a Contemporary Indigenous Society. *Evolution and Human Behavior* 34:249–257. DOI:10.1016/j.evolhumbehav.2013.03.002.
- Richards, F. 2007. *The Soundscapes of Australia: Music, Place and Spirituality*. Aldershot, Ashgate, Australia.
- Roseman, M. 1998. Singers of the Landscape: Song, History, and Property Rights in the Malaysian Rain Forest. *American Anthropologist* 100:106–121. DOI:10.1215/9780822383819-004.

- Ryan, R. 2015. "No tree–No leaf" Applying Resilience Theory to Eucalypt-Derived Musical Traditions. In *Current Directions in Ecomusicology: Music, Culture, Nature*, edited by S. A. Allen and K. Dawe, pp. 57–68. Taylor and Francis, New York, NY.
- Rzeszutek, T., P. E. Savage, and S. Brown. 2012. The Structure of Cross-Cultural Musical Diversity. *Proceedings of the Royal Society B: Biological Sciences* 279:1606–1612. DOI:10.1098/rspb.2011.1750.
- Saha, M. R., R. Rai, P. Kar, A. Sen, and D. De Sarker. 2014. Ethnobotany, Traditional Knowledge and Socioeconomic Importance of Native Drink among the Oraon Tribe of Malda District in India. *Journal of Intercultural Ethnopharmacology* 4:34–39. DOI:10.5455/jice.20141202060743.
- Sakakibara, C. 2009. 'No Whale, No Music': Iñupiaq Drumming and Global Warming. *Polar Record* 45:289–303. DOI:10.1017/S0032247408008164.
- Sakakibara, C. 2017. People of the Whales: Climate Change and Cultural Resilience Among Iñupiat of Arctic Alaska. *Geographical Review* 107:159–184. DOI:10.1111/j.1931-0846.2016.12219.x.
- Salmón, E. 2012. *Eating the Landscape: American Indian Stories of Food, Identity, and Resilience*. University of Arizona Press, Tucson, AZ.
- Sarvasy, H. 2016. Warblish: Verbal Mimicry of Birdsong. *Journal of Ethnobiology* 36:765–782. DOI:10.2993/0278-0771-36.4.765.
- Sato, A. Y., M. R. Price, and M. B. Vaughan. 2018. K huli: Uncovering Indigenous Ecological Knowledge to Conserve Endangered Hawaiian Land Snails. *Society and Natural Resources* 31:320–334. DOI:10.1080/08941920.2017.1413695.
- Savage, P. E., S. Brown, E. Sakai, and T. E. Currie. 2015. Statistical Universals Reveal the Structures and Functions of Human Music. *Proceedings of the National Academy of Sciences* 112:8987–8992. DOI:10.1073/pnas.1414495112.
- Schniter, E. 2014. Older Adults' Contributions to the Tsimane Forager-Farmer Economy. *Anthropology and Aging* 35:56–58.
- Seeger, A. 2004. *Why Suyá Sing: A Musical Anthropology of an Amazonian People*. University of Illinois Press, Chicago, IL.
- Seeger, A. 2016. Natural Species, Sounds, and Humans in Lowland South America. The Kisêdjê/Suyá, Their World, and the Nature of their Musical Experience. In *Current Directions in Ecomusicology: Music, Culture, Nature*, edited by A. S. Allen and K. Dawe, pp. 89–98. Taylor and Francis, New York, NY.
- Si, A., and M. Turpin. 2015. The Importance of Insects in Australian Aboriginal Society: A Dictionary Survey. *Ethnobiology Letters* 6:175–182. DOI:10.14237/ebl.6.1.2015.399.
- Sievers, B., L. Polansky, M. Casey, and T. Wheatley. 2013. Music and Movement Share a Dynamic Structure That Supports Universal Expressions of Emotion. *Proceedings of the National Academy of Sciences* 110:70–75. DOI:10.1073/pnas.1209023110.
- Silvers, M. B. 2015. Birdsong and a Song about a Bird: Popular Music and the Mediation of Traditional Ecological Knowledge in Northeastern Brazil. *Ethnomusicology* 59:380–397. DOI:10.5406/ethnomusicology.59.3.0380.
- Simonett, H. 2016. Of Human and Non-Human Birds: Indigenous Music Making and Sentient Ecology in Northwestern Mexico. In *Current Directions in Ecomusicology: Music, Culture, Nature*, edited by A. S. Allen and K. Dawe, pp. 99–108. Taylor and Francis, New York, NY.
- Stewart, H. 1984. *Cedar: Tree of Life to the Northwest Coast Indians*. Douglas & McIntyre, Vancouver, BC.
- Stubington, J. 1987. Preservation and Conservation of Australian Traditional Musics: An Environmental Analogy. *Musicology Australia* 10:2–10. DOI:10.1080/08145857.1987.10415175.
- Sugawara, K. 2001. Cognitive Space Concerning Habitual Thought and Practice toward Animals among the Central San (Gui and Gana): Deictic/Indirect Cognition and Prospective/Retrospective Intention. *African Study Monographs* 27:61–98.

- Tang, R., and M. C. Gavin. 2016. A Classification of Threats to Traditional Ecological Knowledge and Conservation Responses. *Conservation and Society* 14:57. DOI:10.4103/0972-4923.182799.
- Trehub, S. E., I. Peretz, C. ten Cate, and H. Honing. 2015a. Without It No Music: Cognition, Biology and Evolution of Musicality. *Philosophical Transactions of the Royal Society B: Biological Sciences* 370:20140088.
- Trehub, S. E., J. Becker, and I. Morley. 2015b. Cross-cultural Perspectives on Music and Musicality. *Philosophical Transactions of the Royal Society B: Biological Sciences* 370:20140096. DOI:10.1098/rstb.2014.0096.
- Trigger, D. S. 2008. Indigeneity, Ferality, and What 'Belongs' in the Australian Bush: Aboriginal Responses to 'Introduced' Animals and Plants in a Settler-Descendant Society. *The Journal of the Royal Anthropological Institute* 14:628–646.
- Turner, N. J., D. Deur, and D. Lepofsky. 2013a. Plant Management Systems of British Columbia's First Peoples. *BC Studies* 179:107–133. DOI:10.14288/bcs.v0i179.184112.g184174.
- Turner, N. J., K. Recalma-Clutesi, and D. Deur. 2013b. *Back to the Clam Gardens*. Ecotrust Magazine, Portland, OR.
- Turner, N. J., R. Gregory, C. Brooks, L. Failing, and T. Satterfield. 2008. From Invisibility to Transparency: Identifying the Implications of Invisible Losses to First Nations Communities. *Ecology and Society* 13:7.
- Turner, N. J., and K. L. Turner. 2008. 'Where Our Women Used to Get the Food': Cumulative Effects and Loss of Ethnobotanical Knowledge and Practice; Case Study from Coastal British Columbia. *Botany* 86:103–115. DOI:10.1139/B07-020.
- Turpin, M. 2007. The Poetics of Central Australian Song. *Australian Aboriginal Studies* 2:100–115.
- Turpin, M., and M. Laughren. 2013. Edge Effects in Warlpiri Yawulyu Songs: Resyllabification, Epenthesis and Final Vowel Modification. *Australian Journal of Linguistics* 33:399–425. DOI:10.1080/07268602.2013.857569.
- Turpin, M., R. Moyle, and E. K. Bonney. 2017. Alyawarr Women's Rain Songs. In *A Distinctive Voice in the Antipodes: Essays in Honour of Stephen A. Wild*, edited by K. Gillespie, S. Treloyn, and D. Niles, pp. 117–145. Australian National University Press, Canberra, Australia.
- Turpin, M. and T. Stebbins. 2010. The Language of Song: Some Recent Approaches in Description and Analysis. *Australian Journal of Linguistics* 30:1–17. DOI:10.1080/07268600903133998.
- Ventsel, A., and E. Peers. 2017. Rapping the Changes in North-East Siberia: Hip Hop, Urbanization, and Sakha Ethnicity. In *Hip Hop at Europe's Edge: Music, Agency, and Social Changed*, edited by M. Miszczynski and A. Helbig, pp. 228–241. Indiana University Press, Bloomington, IN.
- Wafer, J., and M. Turpin. 2017. *Recirculating Songs: Revitalising the Singing Practices of Indigenous Australia*. The Australian National University, Canberra, Australia.
- Walker, M. 2003. Music as Knowledge in Shamanism and Other Healing Traditions of Siberia. *Arctic Anthropology* 40:40–48.
- Walsh, F. J., P. V. Dobson, and J. C. Douglas. 2013. Anperirrentye: A Framework for Enhanced Application of Indigenous Ecological Knowledge in Natural Resource Management. *Ecology and Society* 18:18. DOI:10.5751/ES-05501-180318.
- Welch, J. R. 2015. Learning to Hunt by Tending the Fire: Xavante Youth, Ethnoecology, and Ceremony in Central Brazil. *Journal of Ethnobiology* 35:183–208. DOI:10.2993/0278-0771-35.1.183.
- Wells, E. C., and L. D. Mihok. 2010. Ancient Maya Perceptions of Soil, Land, and Earth. In *Soil and Culture*, edited by E. R. Landa, and C. Feller, pp. 311–327. Springer, Dordrecht, The Netherlands.
- Widjaja, E. 1980. The Angklung and Other West Javanese Bamboo Musical Instruments. In *Bamboo Research in Asia: Proceedings of a Workshop held in Singapore (28-30 May 1980)*, edited by G. Lessard and A. Chouinard, pp. 201–204. International Development Research Centre, Ottawa, ON.

- Wright, C. 2017. Towards an Interdisciplinary Focus on Sound in Ethnobiology Research. *Ethnobiology Letters* 8:58–60. DOI:10.14237/ebl.8.1.2017.788.
- Wright, R. M. 2011. Arawakan Flute Cults of Lowland South America: The Domestication of Predation and the Production of Agentivity. In *Burst of Breath: Indigenous Ritual Wind Instruments in Lowland South America*, edited by J. Hill and J. P. Chau-meil, pp. 325–353. University of Nebraska Press, Lincoln, NE.
- Xu, J., E. T. Ma, D. Tashi, Y. Fu, Z. Lu, and D. Melick. 2005. Integrating Sacred Knowledge for Conservation: Cultures and Landscapes in Southwest China. *Ecology and Society* 10:7. DOI:10.18584/iipj.2015.6.3.3.
- Yamada, K. 2017. Shamisen Skin on the Verge of Extinction: Musical Sustainability and Non-Scalability of Cultural Loss. *Ethnomusicology Forum* 26:373–396. DOI:10.1080/17411912.2018.1423575.
- Zahn, M. J., M. I. Palmer, and N. J. Turner. 2018. ‘Everything We Do, It’s Cedar’: First Nation and Ecologically-Based Forester Land Management Philosophies in Coastal British Columbia. *Journal of Ethnobiology* 38:314–332. DOI:10.2993/0278-0771-38.2.314.