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ARTICLES

Anthropological Engagement with the Anthropocene

A Critical Review

Hannah Gibson and Sita Venkateswar

ABSTRACT: The Anthropocene refers to the planetary scale of anthropogenic influences on the composition and function of Earth ecosystems and life forms. Socio-political and geographic responses frame the uneven topographies of climate change, while efforts to adapt and mitigate its impact extend across social and natural sciences. This review of anthropology's evolving engagement with the Anthropocene contemplates multifarious approaches to research. The emergence of multispecies ethnographic research highlights entanglements of humans with other life forms. New ontological considerations are reflected in Kohn's "Anthropology of Life," ethnographic research that moves beyond an isolated focus on the human to consider other life processes and entities as research participants. Examples of critical engagement discussed include anthropology beyond disciplinary borders, queries writing in the Anthropocene, and anthropology of climate change. We demonstrate the diverse positions of anthropologists within this juncture in relation to our central trope of entanglements threaded through our discussion in this review.

KEYWORDS: Anthropocene, anthropology, climate change, entanglements, multispecies ethnography, transdisciplinary

Introduction

Poet D. H. Lawrence wrote, "I am part of the sun as my eye is part of me. That I am part of the earth my feet know perfectly, and my blood is part of the sea," creating a metaphor of connectedness and implicit oneness with the world. This quote signals the tension between the complex processes at work that govern our existence on Earth by inviting us to be reassured by our embodied entanglement within ecosystems, other than human entities, and microbial others. Reflective of the scope of what this review sets out to accomplish, our article explores these themes among others within the context of the Anthropocene.

The new geological interval, the Anthropocene (from Greek *Anthropos* meaning "human" and *cene* meaning "new") refers to the planetary scale of anthropogenic influences on the com-

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position and function of the Earth's ecosystems and all life forms. We set the scene by exploring how the Earth is composed as an integral whole, briefly outline the characteristics and planetary evidence gathered for the Anthropocene, then go on to interrogate the conceptual apparatus for such a coinage. The underlying implications of the name "Anthropocene" is reflective of the self-appointed dominant place humans hold above all other life on Earth, and as such draws attention to troubling dichotomies that have pervaded Western configurations of knowledge. Dualisms that separate, such as nature/culture, organic/inorganic, alive/dead, human/animal, illuminate how humans, particularly in the West, are disconnected from their surroundings. Paradoxically, to engage with the Anthropocene is also an invitation to dismantle the rifts that separate humans from other life forms.

Within this discursive arena, anthropologists bear witness and contribute stories of how societies around the world engage with their environment in their particular socio-cultural and geographical contexts. Although traditionally focused on human societies, many anthropologists now approach fieldwork as a site that is full of dynamic relationships, pathologies, and interactions that move beyond the concept of the human altogether, to examine the multifarious composition of life forms that make up our world. Such experimental methodological approaches underpin new ontological turns, expanding the criteria of what can be considered a research participant, alerting us to new considerations of subjectivity, and the relevance of engaging with the other-than-human. Illustrative examples from a wide variety of research profile changing ontological encounters suggest a continuum of evolving possibilities for how we can best position ourselves within the Anthropocene. Alongside new and experimental methodologies, a useful response to the Anthropocene epoch is the call for multi and transdisciplinary research by anthropologists and other scientists. In the midst of fears of unmitigated catastrophic effects of continued anthropogenic disruption of the functioning ecosystems, one comfort we can draw from the wide variety of literature reviewed is how the implications of the Anthropocene energizes many researchers to engage with it actively and responsibly. Reassured by dialogues of multispecies interactions, we find an articulation of hope produced through anthropological research as well as hope *for* the future of anthropology within the arena of the Anthropocene. The anthropological literature discussed in this review reveals complex yet compelling entanglements[1] at work in the world.

What Is the Anthropocene?

Today, no place on earth is untouched by human activity (Chin et al. 2013: 1). Despite our presence on Earth for a miniscule amount of time, we have, apparently, become powerful enough to modify the balance that has existed as a living partnership between Earth and all life. That a single species has been able to cause such a biogeochemical change in the composition and function of the Earth's fundamental processes is difficult to imagine. Yet in 2002, Paul Crutzen coined the name Anthropocene for the present geological interval where accelerated anthropogenic activities over the past 200 years have become a force of nature on their own. With the capacity to alter those processes and entities, both biotic and abiotic, upon which they depend, humans are now more than ever seen to determine the health of the Earth and all the entities they coexist with on this planet (Steffen et al. 2006: 1).

Zalasiewicz et al. (2011), Steffen et al. (2007) and Steffen et al. (2011) concur that the planetary impacts that researchers across disciplines are uncovering is significant enough to suggest we have moved out of the Holocene, a geological interval that began approximately 11,500 years ago. To formalize the Anthropocene as a new geologic epoch within the Geological Time Scale,

the International Commission on Stratigraphy (Zalasiewicz et al. 2011) has submitted a proposal for consideration.[2] However, according to Certini and Scalenghe (2014), and Gibbard and Walker (2014), there is debate within the scientific community as to whether the Anthropocene should be seen as an epoch all on its own, or as part of the Holocene.[3] While scientists debate the pros and cons of such nomenclature, it behooves us as contemporary anthropologists to extend our purview of consideration beyond the lives of people and remain alert to the ways in which the idea of the Anthropocene is used and its consequences to *all* life on earth. Bearing witness as an anthropologist, then, entails critical interrogation of the ways in which the conceptual terrain of the Anthropocene becomes a potent weapon wielded according to political circumstance.

Regardless of whether it gains legitimacy as a certified term to describe the human-induced changes we are experiencing in the world, it is a concept that is gaining purchase, within public domains (The Economist 2011; Stockholm Resilience Centre 2011; The Cosmo News 2014; Global Water System Project 2013), scientific lexicons (Ellis et al. 2013; Vince 2011), and within global scholarly and policy forums (TEDx Talks 2010; TEDx Talks 2011; Haus der Kulturen der Welt (HKW) 2013a, 2013b, 2014, 2015; Imperial College London 2013; International Forum on Globalization 2014; Sydney Environment Institute 2014; University of Edinburgh 2013). A quick scan of the 2014 AAA conference program signaled several competing panels focused on the Anthropocene during each day of the week-long annual conference!

Evidence of the Anthropocene

Feedback between land, ocean, and the atmosphere interconnect all ecosystems, meaning that no system within our biosphere exists in isolation. For example, what we term as global warming, or a human-generated cause of planetary increases in temperature, is understood as a result of the burning of fossil fuels (gas, oil, and coal) as well as the continued clearing of forests and agricultural activities (Nanda 2011: 2). The increases in ocean temperatures, changes to ocean acidification (Mimura et al. 2007), sit alongside concerns of anthropogenic syndromes in rivers such as sediment imbalance, chemical contamination, flood regulation, and fragmentation. These syndromes also have implications for some of the key functions of the Earth System, "such as sediment, water, nutrient and carbon balances, greenhouse gas emissions and aquatic biodiversity" (Meybeck 2003: 1935). The loss of rainforest biodiversity (Lewis, S. 2006: 196; Ghazoul and Sheil 2010) is also a tangible concern.

To conceptualize the world as one while remembering that the effects of climate change are variable and distributed unevenly around the world demands a careful balancing act.[4] It is clear from all the literature studied that just as the Earth is an integrated system (Steffen et al. 2006: 1), accordingly, consequences and evidence of anthropogenic influence upon the various ecosystems are interconnected. When one part feels the burden of deterioration or imbalance, it elicits a unique and often negative impact on others. Yet the causal links between environmental change and concerns such as the wellbeing of humans or other species is complex because often they can be indirect and difficult to discern. Much of the biological and chemical traces of existence left by humans are difficult to comprehend as a day-to-day concern and thus only an intangible and vague worry for many (Zalasiewicz et al. 2011: 837). Furthermore, with the emergence of global transboundary environmental issues such as ozone layer depletion, extensive air pollution as well as oil spills and nuclear testing, environmental problems cannot be understood as solely a local concern (Wapner 2012).[5] Equally, global concerns such as the concept of global warming can play out locally, entangled in webs of interference and negotiation by humans, as well as other ecosystems. The melting Himalayas are demonstrative of cascading

effects of climate change upon these mountains, water, biodiversity, and livelihoods (Xu et al. 2009).

Implications of the Name "Anthropocene"

The name "Anthropocene" evokes an anthropocentric bias that does more than call our attention to the widespread and extensive effects of human interference. It also reflects the dominant and separate status that the human has occupied in our relationship with not only the various ecosystems found in the biosphere but also all other species that inhabit Earth. The situation we find ourselves in now reflects the disconnection humans have with their surrounding environment, and those entities that are "otherwise"[6] to our own selves. This disconnection emerges from a deep-rooted contention that has posited Nature[7] as objective and separate to society (Lorimer 2012: 593), removed from humankind, and ultimately seen as something to overcome, own, exploit, or fear.

The separation between culture and nature that was traditionally constructed within Western knowledge is disrupted by one very simple yet profound idea exposed by Foucault (1970: 314), Haraway (1991: 176), and Latour (2005): what we consider to be truth about the natural world is not inherently found in nature, but is a product of our own cultural frameworks. Ultimately, although we cannot change or alter the physical makeup of nature, we have created the knowledge and conditions of it (Foucault 1970: 314). The Anthropocene has not been something for geologists to discover,[8] but a product of human thought and contemplation. It is a concept that "does not simply name geological facts, but is shaped by politics and governance" (Kersten 2013: 40). According to Dibley (2013), the Anthropocene can be understood as a counterdiscourse to globalization, a warning of its attendant risks and unintended consequences. The efforts of natural scientists (Rockström et al. 2009) to pinpoint the planetary boundaries or safe operating space that humanity can live within are indicative of attempts to mitigate damage caused by the global capitalist economy. Although interestingly, "this invocation of biophysical limits for social and economic development is seldom coupled with potent suggestions for social and political transformation" (Lövbrand et al. 2014: 8).

According to Lövbrand et al. (2014), the primacy of the natural sciences in engendering such powerful narratives of environmental destruction and human exploitation must be challenged. Instead of conceptualizing the Anthropocene as a juncture to which anthropologists and other human scientists can only respond, O'Brien and Barnett (2013), Hornborg and Malm (2014) alongside Lövbrand et al. (2014: 2), are recasting the Anthropocene "as an inherently social problem with different, and often unequal consequences for people around the world." The topic of human-induced variability in the functioning of Earth systems includes consideration of both the expansion of human numbers inhabiting the planet in addition to the exploitation of available natural resources (Wapner 2012). Recognized as a central contributor to environmental deterioration, Ehrlich and Ehrlich (2012: 558) argue that any consideration of climate change must take into account the human population element. Ehrlich and Ehrlich (2012: 557) contend that with the population exceeding seven billion, Earth systems become increasingly incapable of adequately supporting such growth indefinitely. When the growing concern about population growth is examined, there is a fundamental paradox. As Davor (2011: 922) writes, the greatest human impacts on the Earth's ecosystems is by the high carbon economies of the world minority rich countries degrading the physical, biological, and chemical conditions of the soil, oceans, and atmosphere (Millennium Ecosystem Assessment 2005) and "consuming the planet to excess" (Urry 2010).[9] Although it is estimated that the richest nations have only

15 percent of the total population, they make 50 percent of the world's GDP (Steffen et al. 2006: 5). In comparison, those in the majority poor suffer the burden of the consequences as well as economic inequality.

In disrupting the narratives offered by natural scientists, we do not discount their authority in their respective disciplines. Instead, we want to engage with the Anthropocene as an idea rather than an absolute. We are then able to be critical of what it implies, and what we might learn from that perspective. In a defiant act against the very idea of dualisms, we embrace the paradox the concept of the Anthropocene offers, namely that while reinforcing and reflecting the self-appointed dominant place humans arrogate, there is potential to break down divisions prevalent since the Enlightenment.[10] To do so, we present the Anthropocene as an opportunity, a vivid presentation of entanglements and processes linking us to the world around us, even if some of these, like ocean acidification and climate change, can be seen as adverse or unwanted effects of interconnected relationships (Dibley 2012).

The Place of Anthropology

> We are embedded in various social, economic, and—especially—ecological contexts that are inseparably connected. (Kersten 2013: 39)

Within the context of the Anthropocene, one of the values of anthropological research is the capacity for researchers working within the discursive arena of climate change and the wider context of this juncture to offer alternative ways of understanding and approaching the topic (Moore 2010: 120). According to Hage (2012: 305), "the critical anthropologist is someone who is always on the lookout for minor and invisible spaces or realities that are lurking in the world around us." By bearing witness and collecting stories of how different societies around the world perceive and respond to climate change in their particular socio-cultural context, anthropologists contribute rich and diverse data that highlights different ways of living in a variety of physical environments. Specific to climate change, anthropological research that explores the particular impacts of this on biophysical and socio-economic processes that exist in different topographies contributes a wide variety of nuances existing in the Anthropocene landscape (Steffen et al. 2006: 203; Zaman 1993; Sheridan 2007; Rose 2009; Reinert 2012; Moore 2010; Snodgrass 2013). It is worth noting that effects of climate change on local landscapes can mean different things to different people, and as such, "we cannot develop prescriptions that hold true across contexts, i.e., we cannot decontextualize or disembed. We will be working out methods and strategies for achieving the committed life within our contexts and amongst those who are near to us" (Rose 2013a: 5).

In addition to such valuable research, emerging methodological, experimental work of both "Anthropology of Life" and Multispecies Ethnography are underpinned by the kinds of ontological turns, discussed below, which could be conceptually and practically thought of as polar opposites when compared with traditional approaches to anthropological research. Yet both trajectories of research and those based on more radical new ontological considerations cannot easily be separated, particularly because within the discursive space of the Anthropocene they complement one another. Indeed, they reside within a continuum of anthropological work that illuminates how worlds are made, reshaped, and understood. New experimental methodologies, although different on the surface from traditional concepts of participants are another way to bear witness. The anthropologists involved are simply expanding their horizons.

To set the scene for contemporary applied research, anthropologists Marino and Schweitzer (2009: 209 in Crate 2009) define global climate change as "changes in overall climate patterns

over a given space and time. Global climate change therefore, is a distinct phenomenon of global scale that has local effects." Increasingly, anthropologists are working with participants who share their experiences of living in transforming environments from region to region to help frame the local concerns and features of climate change within a wider context (Crate and Nuttall 2009). The value of this research is twofold; first, the aim of stories gathered is to give a voice to those who are witnesses to the way the world is changing. Second, more knowledge about how people choose or are thrust into responses to their changing environment provides researchers with ongoing sites of engagement with the Anthropocene. By connecting with people and their experiences we begin to understand there are different ways of inhabiting the world in a new, unpredictable era. For a comprehensive evaluation, Crate (2011) provides an excellent review of contemporary global climate studies currently undertaken within anthropology.

One research topic that is particularly popular within anthropology is focused on water, because in essence, no organism on earth can exist without it. When we think about the fluidity of water in its physical attributes, it flows though all living species from plants, humans and animals, land, river, ocean, and then through the hydrological cycle as a fundamental conduit of weather and climate (Krause and Strange 2013: 95). Yet its very capacity to permeate all life forms means that it is the foremost channel for pollution and adverse results of unstable ecosystems (Alley et al. 2002). If overly abundant it also poses great risks, as described by Zaman (1993: 985) in reference to recurring floods in Bangladesh, or the risks posed to islands closest to sea level. Work by Cruikshank (2005), Mauch and Zeller (2008), Harris (1998), Finan (2009), and Orlove (2002) all illustrate the rich literature available on the complexities of this topic.[11]

Helmreich (2009) has explored the world of the deep seas smallest inhabitants, marine microbes that exist in extreme conditions and have become an evolving focus of marine biological research. Orlove et al. (2008) discuss glacier retreat, with a helpful book investigating intersections of weather, climate, and culture. Through the various narratives and ways that people relate to and engage with water, an interesting assumption that emerges is that water can be simultaneously life-giving and life-threatening (Krause and Strang 2013: 96). Finan's (2009: 177) fieldwork looking at shrimp aquaculture livelihoods and sea level rise in coastal Bangladesh illustrates the magnitude of impact upon coastal populations experiencing rising sea levels with increased cyclone and storm activity due to higher water temperatures affecting nearly 100 million people.

The predicament of islands is explored extensively within anthropological research and literature. As stated earlier, islands are particularly vulnerable when we consider future concerns in the Anthropocene. Home to one-tenth of the world's population, islands cover one-tenth of the Earth's surface (Baldacchino 2006), and island communities are among the first to adversely experience the consequences of rising sea levels (Lazarus 2012: 285). Whole islands with low elevations to sea level, the Maldives, the Marshall Islands, Kiribati and Tuvalu, will be particularly vulnerable (Lazrus 2012: 288). Despite a generalized view of islands as isolated microcosms, their status of vulnerability, resilience, and capacity to adapt to any change is inexplicably connected to processes that extend beyond their demographic areas (Lazrus 2012: 289). Kelman and West (2009: 1) write, "the main way forward suggested for the future is better integration of top-down and bottom-up approaches to ensure that data and methods are based on local interests while acknowledging and integrating local and traditional knowledge with other forms of knowledge." In this view, Lazrus (2012: 285) acknowledges that global implementation of climate change policies limits any local decision making. Tsing (2005) critiques climate science with the same concerns, arguing that when the global scientific experts create strict climate models on a global scale, the local disappears. However, Moore's (2010: 126) work in the Bahamas, which intersects with detrimental impacts of climate change as well as the Ministry of Tourism, demonstrates that the "local" becomes what Moore describes as a "carefully designed

locality." This is accomplished through a promotion of the Bahamas as a climate conscious destination for tourists, where the vulnerability of nature becomes the selling point.

When we consider the multiple causes, from global consumer culture to the ways in which people relate to and behave toward their environment (Crate 2009: 146), we see global climate change inextricably linked to culture. Thus, when we look at implications of how we might best adapt and become resilient, there is no single or simplistic viewpoint. Indeed, as Crate and Nuttall (2009: 9) argue, prioritizing the process of adaptation within research and policy-making may not be a sufficient coping mechanism. Although they observe that resilience and adaptation are vital in resource and livelihood sustainability, to fully understand how communities build adaptive processes and capacities demands more research. Furthermore, it is important to note that for many people around the world, adapting to climate change is extremely difficult. This is particularly true in communities that are experiencing the most profound effects of climate change (Crate and Nuttall 2009: 10).

Exploring how anthropologists can engage in dialogues within academia and public forums is increasingly imperative.[12] It aligns with the question of what responsibilities researchers have toward their research participants, especially if they cannot mitigate the damage and continue to live in climate sensitive regions where the most change occurs (Crate and Nuttall 2009: 11).

Research that illuminates the loss of indigenous knowledge bases in any region is also relevant to this discussion. Traditional environmental knowledge (TEK), also referred to as local environmental/ecological knowledge, can be understood as "cultural knowledge, practice, and beliefs concerning the environment and people's relationship to other living and nonliving entities" (Lazrus 2012: 290). Crate (2009: 140) explores the Viliui Sakhas of north-eastern Siberia's overwhelming concerns regarding the local implications of global climate change and its threat to their subsistence. What is interesting in this work is that the elders whom Crate (2009: 140) interviewed said they could no longer "read" the weather, which implies a disconnection with a knowledge base that served them for generations. In extreme environments such as the Arctic, forecasting the weather or any changes is vital, yet more and more a challenge.

In his work with floodplain dwellers of the Brazilian Amazon, Harris (2008: 66) argues for a dwelling perspective of seasonality, seen in how his participants continually respond and practically engage with their specific surroundings. This concept of "being" in relation to one's environment is adopted from Ingold's (2000) dwelling perspective that aims to displace the separation between humans and their environment by posing the idea of landscape as a continually unfolding story, in which we are constantly perceiving and immersed. Thus in any environment we adapt to the changes, adverse or not, and engage with all species, allowing us to have what Ingold (1993) terms as a resonance with all the fluctuations of the landscape before us. From this perspective the social activities of Harris' (2008) participants are not an expression of their response to their environment but "the full and active involvement of the sense in people's perception of their surroundings" (Harris 2008: 66) . This demonstrates how such research displaces overarching dichotomies by engaging with other worldviews, which is a fundamental part of the anthropological inquiry.

New Theoretical Considerations and Research

At this juncture in the review, we will examine other bodies of literature that challenge dichotomies more directly while still residing within the continuum of anthropological engagement and inquiry. First, as we continue to consider the idea of the Anthropocene as an opportunity to break down Westernized dichotomies of culture/nature, we thread our way back to our central

focus on entanglements. To do this, we briefly touch on a select number of ontological discourses[13] that disrupt the idea of binaries such as human/nonhuman, self/other, culture/nature, questioning their construction and relevance to research. In particular, multispecies ethnography within anthropology is reflective of such strands of thought and discussions of entanglement of species and world processes.

Natureculture

Many who seek to challenge the dominant dichotomies do so by exploring alternative versions that differ from dominant biological understandings of evolution and the historical relationships between *Homo sapiens* and other species (Birke and Parisi 1999: 55). In her concept of natureculture, and continued work with companion species, Haraway (2003) demonstrates the ontological impossibility of separating a human body from relations with the rest of the world. By locating the materialities of interspecies interactions, which in this case includes microbial, digestive, genetic, and ecological, Haraway traces the different ways we "become" as we connect with all of these elements. This concept opens up dialogue about human/animal/nature because it highlights that humanism does not equal purity but is mixed up in relations between species that are not separate. By blurring what we consider culture and nature, we stop taking for granted what has been previously set out as fact by humans. When we extend the subjectivity of the human to include a fusion with nonhuman entities, the human being as traditionally conceived is thoroughly disputed. A dialogue commences interrogating the intimate experiences found in the boundaries between culture/nature, human/nonhuman, organic/inorganic. From this vantage point, we can see ourselves as fully implicated in the world and as cohabiters with others (Haraway 1991: 181).

Posthumanism

One relevant theoretical approach that has found momentum as a response to the crisis of troubling dualisms is that of posthumanism. Although the discourse emerged during the 1990s, its roots can be found within earlier writings (Wolfe 2010: xii). It is not a perspective that is antihuman, signaling the end of humanism, but promotes a change in the way humans are conceptualized by considering the place of nonhumans. Essentially, it does not take for granted the underlying hierarchy of humans that have been a part of Western configurations of knowledge (Wolfe 2010: xxv). Furthermore, a posthumanistic approach considers nonspecific[14] modes of being, knowing, and engaging with the world and all that resides within it (Worsham 2013: 52). Braidotti (2013: 38) argues for alternative ways of forming subjectivity based on otherness and diversity as opposed to assuming one thing is correct and true.

Process of Becoming Animal

Other attempts to move away from binaries are found in the philosophy of Gilles Deleuze and Felix Guattari (1987) with their concept of "becoming animal." Braidotti (2013: 66) describes it as an "axis of transformation [entailing] the displacement of anthropocentrism and the recognition of trans-species solidarity on the basis of our environmental roots, that is to say embodied, embedded, and in symbiosis with other species." Thus, it is not a concrete state of "being" but a process of becoming. For example, consider that a rider on a horse has to some extent "become" like a horse in order to interact, connect, and think with the horse, just as we can say that an animal may "become human." The main message here is twofold. Instead of contemplating the relationship of individual species, such as plant pollen and the bee, we may see the process of

interconnected sharing, and collective becoming. Second, the process of becoming for Deleuze and Guattari remains asymptotic, meaning that one can never fully attain or "become." Thus, a focus on the process of becoming, as opposed to "being," illuminates the multiplicities rather than unitary alliances (Birke and Parisi 1999: 64; Braidotti 2013: 67). The advantages of embracing this thinking is that species hierarchy is displaced such that animals are no longer there for humans, with implications for ethical considerations of how we might live alongside animals and conceive of our relationships with them.

As we continue questioning what constitutes "the human," Feinberg et al. (2013: 1) argue that we also come to question what we consider "animal." This discussion is of particular relevance to current animal-human relationship research expanding the category by including life forms and microbes that are not traditionally considered research participants or subjects. Reminiscent of Deleuze and Guattari (1987), Haraway (2003), and Latour (1993; 2004), researchers engaged in this new dialogue connect directly to the narrative of "being," replacing fixed categories of the subject with terminologies that reflect fluidity and multiplicity (Feinberg et al. 2013: 2).

Anthropology of Life and Multispecies Ethnography

> At the intersection between the sciences of nature and the sciences of culture, a new model is afoot, the key characteristic of which is multi-species love. (Tsing 2010: 201)

What follows is a discussion on experimental methodologies that are closely entangled with evolving ontological considerations, which ultimately helps illuminate the relevance of both within the Anthropocene. One exciting emerging point of entry into research that is considerate of all species is found in Kohn's (2007) "Anthropology of Life." During his fieldwork among the Runa in an Amazonian village in upper Ecuador, Kohn (2007; 2013) explores transspecies relationships, meaning the processes and relationships in existence between species. As Kohn (2007: 5) argues, methods traditionally used in social or cultural anthropology are honed and aimed at understanding features thought to be distinct to human society such as language, culture, and history. The premise does not transport well to research that is not human-centered leading Kohn (2007) to propose "anthropology of life," ethnography that moves beyond an isolated focus of the human and takes into consideration other life forms as research participants. To do this, the anthropologist works with "an embodied and emergentist understanding of semiosis," where significance or meaning from sign processes is not only exclusive to humans (Kohn 2007: 3). Instead of displacing them, Kohn (2007: 4) moves beyond the concept of the human as a confined entity by looking at the entanglement they have with other life forms.

Interspecies research as visible in the work of Kohn as the example of a new kind of approach to both writing and research called multispecies ethnography "centers on how a multitude of organisms' livelihoods shape and are shaped by political, economic, and cultural forces" (Kirksey and Helmreich 2010: 545). The benefit is a move away from the marginal roles animals/other organisms have had within ethnography to explore the part they do have instead of assuming an inferior one. It is within this multispecies ethnographic genre that animals, microbes, fungi, and plants stop existing for humans to use but are contemplated as worthy of consideration in their own right. Such experimental methodologies resonate with new ontological turns, moving beyond the margins of traditional anthropology by engaging with ontologies that speak to the manifold composition of life forms that make up our world.

As an increasingly popular approach, multispecies ethnography aims to achieve two things, first to confer voice or agency to nonhumans who have traditionally remained in the margins

of research. Second, multispecies work pushes us to reconsider the categories of order and analysis that have reinforced dichotomies that privilege human knowledge over other "beings." Researchers who are committed to multispecies ethnographical study acknowledge the integral part those other than human can play in understanding how to move forward within the Anthropocene (Tsing 2014). Such a relational frame of understanding between humans and nonhumans is a reactive move against and as a result of Western culture/nature dualisms that do not represent the entanglements of life forms at play (Halbmayer 2012: 9; Braidotti 2013).

Such a mode of research requires working in the natureculture borderlands, in the zones where the boundary between culture and nature has broken down (Kirkey and Helmreich 2010: 546). A response to troubling dualisms as already discussed, working in the natureculture borderlands also involves "attending to the remaking of anthropos as well as its companion and stranger species on planet Earth" (Kirkey and Helmreich 2010: 549). This multispecies interface is influenced by the work of Haraway (2003), who as mentioned above, champions the term "natureculture," to depict the way in which mutual ecologies form, meaning that awareness and exploration is done both at the level of the biotic landscape in which animals and humans live together alongside examination of how social relationships are made and acted out across species (Fuentes 2010: 601). These fresh perspectives on life forms, personhood, nature, and human-animal relations can be found within ethnographic research carried out in North America (Ingold 1980), South America (Descola 1994; 2005; Fuentes 2010; Fausto 2007), Asia (Tsing 2005), and The Bahamas (Moore 2012).

The special issue of Cultural Anthropology (2010) entitled "The Emergence of Multispecies Ethnography" and *The Multispecies Salon* (Kirksey 2014) provide a collection of essays that reveal the variety and scope of multispecies ethnographic writing, exemplifying the diverse entanglements of organisms in political, economic and cultural spheres. Those "others" that are used by humans as symbols, food, or remain a part of the landscape, are brought to the forefront of our awareness.[15]

Fuentes (2006: 2010), a primatologist and biological anthropologist writes about the subfield of ethnoprimatology that examines the relationship between primates and humans. Although Fuentes' (2010: 601) area of specialty focuses on the interactions and relationships shared by primates and humans, he situates his ideas as a way to conceptualize all nonhuman organisms as coevolving and coproducing worlds of meaning as well as influencing one another's behavior, ecological landscapes, and physiological senses. Fuentes (2010: 601) argues that in understanding the facets of mutual ecologies, social scientists can explain the way humans impact the lives of animals and vice versa. Malone et al. (2012: 8) writes, "in these endeavors the distinction between 'human worlds' and 'nature' is discarded and multispecies entanglements become central aspects of anthropogenic ecologies."

Drawing on Haraway's discussion of interspecies relationships, Tsing (2010: 192; 2012: 141) introduces an unconventional companion species, namely the mushroom. Her intention is to engage the reader with the idea of a multispecies landscape, urging that "mushroom collecting brings us somewhere else—to the unruly edges and seams of imperial space, where we cannot ignore the interspecies interdependencies that give us life on earth." In exploring this topic, Tsing places the mushroom as a protagonist, and part of a multispecies history of the world, skillfully illuminating the inter- and intra-relations if we examine the place of fungi.[16] This includes its place in history from making minerals from surrounding soil, enriching not just the soil but the plants and trees that co-inhabit the earth.

Yet, understanding species interdependence is vastly different to the scientific assumptions of human autonomy and nature as a domain to control. Consider foragers, who, according to Tsing (2012: 142), nurture landscapes in recognition of multiple species,whereby "familiar places

engender forms of identification and companionship that contrast to hyper-domestication and private property as we know it." Domestication here is understood as the control and ownership of other species by humans. Such rich ecological diversity is not separate to our species, but what makes living on Earth possible. We are but one of a multitude of other species, animate and inanimate that relate to one another. Even with wider acceptance that anthropogenic activities have been detrimental to the health of ecosystems and species that live within them, it falls short of the interdependency described by Tsing (2012) and others when it comes to confronting the impact of humans. Tsing (2010: 192) critiques the way advancements in agriculture and horticulture have crippled traditional multispecies cohabitation and resilience:

> We replace fungally supplied nutrients with fertilizers obtained from the mining and chemical industries, with their trails of pollution and exploitation. We breed our crops by isolating them in chemical stews, crippling them, like caged and beakless chickens. We maim and simplify crop plants until they no longer know how to participate in multispecies worlds. One of the many extinctions that result from all this planning is the cosmopolitanism of the underground city. And almost no one notices, because so few humans even know of the existence of that city. (Tsing 2010: 192)

She sees the demise of the natural world as a symptom of our progress, be it in agriculture, horticulture, and urbanization. This can be a danger of misrepresentation, extending across many landscapes, whereby the social is assumed to be distinct from the settings in which it exists, creating a defamiliarization from what is constituted as nature. Tsing's fieldwork in and around the forests of Meratus, Indonesia, taught her that forests are more than just an area of trees but that they are inherently social, entrusted with a comingling of personal identity and local community history. Yet Tsing (2005: xi) argues that "almost all scholarship and policy continues to portray forests as wild, natural spaces outside society."

Before the turn of the new millennium, in the majority of ethnographic accounts, animals were traditionally cast by anthropologists as a symbolic resource, there to help researchers think about how humans engage with other humans (Mullin 1999). Since then, Candea (2010: 4) describes an explosion of interdisciplinary interest in the topic of human-animal relations that rejects the idea of symbolic reductionism, or the idea of animals as only existing as symbols for humans to better understand their own culture. The place of animals as active participants is part of a larger ontological turn as described above, which addresses the human/animal binary. It is with a focus on interspecies relations that Candea (2010: 4) considers the theoretical question of who or what may be considered a participant. Within this new ecological and theoretical framework, work that explores the relationships between species is emerging. Garcia (2010: 85) discusses how horses might communicate, as well as ways that they can become therapeutic agents within the field of Equine Facilitated Learning and Equine Facilitated Psychotherapy. Further, she contends that exploring this topic can help bring ecological awareness as well as emotional wellbeing (Garcia 2010: 85). Maurstad et al. (2013) contribute to the discussion by revealing the importance of landscape and environment in bonding relationships, which they contend is missing from much literature.

In her review Cassidy (2012) uncovers how climate change impacts the various human-animal assemblages in the world, drawing attention to what many would consider an indistinguishable relationship between two seemingly distinct categories of contemplation. Animistic belief systems around the world have been documented as disrupted by loss of biodiversity (Cassidy 2012: 26). Cassidy (2012: 27) also discusses the way that sustainable reindeer management "depends on movement within a landscape that includes animals, weather, rivers, plants, and other geographical features, any of which may be animated or personified." Thus the prac-

tice of holism that anthropologists engage in becomes ever more relevant in complex situations because within such an arena topics specific to other disciplines require inclusion and contemplation. This brings us to an extremely relevant area of discussion, namely, multi and transdisciplinary research.

Multi and Transdisciplinary

The national boundaries that countries have in place are unheeded by air, water, and migratory animals, which means that no one country has the capacity to avoid or mitigate any environmental damage singularly but must be willing to engage with others. Disciplines both within and beyond anthropology are arguing that to meet the current and future challenges in the Anthropocene, a multidisciplinary or transdisciplinary approach is called for in order to engage with the subject from different perspectives, providing holistic considerations (Chin et al. 2013; Chaplin III and Fernandez 2013; Gibson-Graham and Roelvink 2010; Newel et al. 2005).[17] This includes new conceptual frameworks as well as combined methods that demonstrate the value of different disciplines working together instead of tackling problems separately. This is underpinned by researchers who acknowledge that their role as academics has changed dramatically with the prospect of global warming (Gibson-Graham and Roelvink 2010; Cassidy 2012).

Crate (2011: 183) contends that the way to engage with both local and global contexts primarily involves conceptualizing the role of anthropology not as a solitary discipline but as one that can become involved in multi and transdisciplinary research and practice that can be adopted at a cross-scale level. Lazrus (2012: 295) writes about the calls made for more integrated research between island and scientifically based knowledge, in order to understand the complexities of climate change and disasters. Combining understanding and knowledge would ideally permeate the traditional dichotomy of local and scientific knowledge. Kelman and West (2009: 130) propose anthropology without borders defined as willingness to undertake fieldwork in any situation and alongside people from all disciplines and cultural backgrounds. Crate's ethnographic climate research offers hope.

With her call for anthropologists to "become more globalized as agents for change by being more active as public servants and engaging more with non-anthropological approaches regarding climate change" (Crate 2011: 183; 2009: 139), it will be interesting to observe whether anthropologists are willing to expand their anthropological methods to include others as a way to embrace new approaches. Indeed while it may seem to some as a critique of whether current anthropologist methods are sufficient, we do not believe this is Crate's argument. Rather, she highlights that in this particular epoch, there is an increasing need for research that goes beyond the discipline to encompass wide-scale and comprehensive understanding, which includes working with others and learning about their methods. Finally, Crate discusses the need for a new level of reflexivity that anthropologists need to practice when it comes to climate change, particularly when many come from nations that can be described as perpetrators of environmental degradation.

Tsing (2009: 380) also argues for new modes of multi-sited, multidisciplinary research requiring different ethnographic methods. She discusses the various ways anthropologists approach this topic, from the collaborative relationships formed between researchers and their participants, to the new and experimental collaborations occurring with researchers from other disciplines. An excellent example is the Matsutake Worlds Research Group formed by Tsing, which has a mission statement that depicts the various interfaces and points of contact they engage with, signaling hope in the fringes of ecological destruction.

"The Matsutake Worlds Research Group documents the rich variety of cultural and ecological lifeways emerging across matsutake's path. We study matsutake picking and the matsutake commodity chain, showing how diverse cultures and ecologies engage each other in the matsutake trade. We are interested in matsutake cultures and ecologies as multispecies worlds where life continues in the midst of great disturbances" (The Mutsutake Worlds Research Group 2009).

The members of the group have their own separate disciplinary expertise, knowledge of different languages and are drawn from different parts of the world, making it an excellent example of research that is transboundary and transdisciplinary. The point of their project is that it requires a combination of expertise (Tsing, writing for the Matsutake Worlds Research Group 2009: 381). It also requires Tsing as well as other researchers to retrain themselves in mycology and forest ecology to understand their object of study.

The intriguing work this group undertakes is of particular importance when we consider a multispecies ethnographic style of research because they uncover the ways the mushroom interacts and creates worlds of meaning in its various points of connection with other species, both biotic and abiotic. Anthropologists often collaborate with those from other disciplines, but the emerging research of recent years highlights the need to not only remain within their own level of expertise but learn more about other specializations. Multispecies encounters highlight the shift in who or what can be a participant, while also demonstrating the way researchers are stepping out beyond their own zones of comfort. Perhaps the urgency of what is happening to all life on the planet within this juncture propels this shift.

Future Concerns

Much literature of the Anthropocene reflects fear for what may occur as ecosystems become more unstable. There is an increase of apocalyptic stories about environmental devastation in both social media (Kloor 2013) and academic literature (Pimm and Raven 2000; McDaniel and Borton 2002; Dirzo and Raven 2003; Wake and Vredenburg 2008; Thomas et al. 2004; Wagler 2011). All these speak of real fears that we may not survive the Anthropocene, especially at the rate that humans exploit and degrade the composition and functionality of ecosystems. Included here is the loss of biodiversity and potential extinction of many species, including ultimately our own. Shea (2001), Wilkie (2002), and Littleton and Park (2009) describe vector-borne diseases and heat related illnesses that will be imported into new places. Ebi et al. (2007: 264) identify climate change health risks specific to the mountainous ranges of the Hindu Kush region of the Himalayas. In other concerns, Mirza (2003) warns of the change in storm trajectories that could mean the expansion of hurricanes into new areas, as well as increased intensity and frequency in the places that already experience them (Pielke et al. 2005).

It seems ironic that as humans we have become so powerful that we are now a force of nature, yet our self-appointed place of dominance is so unstable that we may not be able to repair or save the planet we have come to slowly destroy. We are not separate entities, and of our self-destruction we are almost oblivious. Quite poignantly, Farbotko (2010: 48) argues, "only after they disappear will islands become an absolute truth of the urgency of climate change, and thus act as a prompt towards saving the rest of the planet." One may ask the question: what tipping point[18] of which ecosystem will it take to notice the demise of ecosystems, biodiversity, and all the unique topographies? When we look for hope in the midst of such impending crises, it seems important to find tangible, concrete ways to move forward.

Nexus of Hope

> We are parts of a living world … most of us have lost that sense of unity of biosphere and humanity which would bind and reassure us all with an affirmation of beauty. (Garcia 2010: 85)

What we do know from the literature is that worldviews, life processes, and the relationships that exist between all living entities on Earth are at risk and as such there is no easy, straightforward solution. Thus, the places where researchers are beginning to stumble upon hope, found in the margins of ecological destruction, offer a sense of purpose. They do not presume to know the answers (Rose 2013a: 12) yet engage with the Anthropocene fully.

In this same vein, anthropologist Rose (2009: 87) appeals for what she calls "writing in the Anthropocene," whereby researchers are engaging with the multispecies communities that exist, and writing from a place of occupied connectivity. This comes with wider considerations of how scholars might produce narratives from within the Anthropocene instead of gazing into it from the outside objectively (Rose 2013b). It is also about how we might best narrate in this multispecies, multicultural world of life, where, as Rose (2013a: 9) writes, "dialogue is not a single-species project. As knowledge, and as subjectivity, dialogue emerges within 'biosocial loops'."

Indeed, if we are open and curious to the mutualities existing between the various species and selfhoods, Rose (2013a: 3) contends we can better relate to what we share rather than what may makes us different. Within this relationality, "our ethical imaginations are called upon" (Rose 2013a: 3). Kohn (2014) discusses developing an ethical practice in the Anthropocene, "one that could include, in some way or another, those many other kinds of beings that lie beyond us and with whom we make our lives." How this may be carried out is exemplified by Tsing and others in their engagement with other species in order to encourage a sense of connection to our surroundings that make us *want* to look after it. Yet, Rose (2013a: 8) warns that "the impossible position [of the unknown future] concerns the necessity of speaking of that which is beyond our ken." Thus, when we are called to intervene, and feel helpless to know how, narratives and dialogue within the Anthropocene must begin slowly as noted. Indeed, "to face others is to become a witness and to experience our incapacity in this position" (Rose 2013a: 8).

Human geographers Gibson-Graham and Roelvink (2010: 342) adopt the stance of experimental researchers, "opening to what can be learned from what is happening on the ground. To put this in the form of a mandate, we are being called to read the potentially positive futures visible in the present order of things, and to imagine how to strengthen and move them along" (Gibson-Graham and Roelvink 2010: 342).

Thus, instead of having as Plumwood (2002: 175–176) says, an attitude and condition of "prejudiced superiority, of deafness, of closure" to our earth-others, she expresses the concept of an "open stance," understood as an open curiosity to our earth-others that celebrates the interrelatedness we share and experience as a transformative way of seeing the world. We argue that if we choose to become reassured by the splendor of these intertwined elements of connection, which implicate our very being with that of all others, then we are gifted in two very important ways. First, we are reminded that the human species does not function separately from anything else, and as such it is our self-appointed position of superiority that is the greatest concern. Thus the ontological turns are a timely reaction to the interrogation of human subjectivity to provide a framework for practical research that explores this very theme. By drawing our attention away from the human species is to appreciate the multifarious associations at work in the planet, so we can find a way to "be and become" within the Anthropocene with purpose and hope that all is not lost. An overarching message that much of the literature reveals is the need to open

oneself to the possibility of living and seeing the world other than we do so we do not take our existence and planet Earth for granted. After all, there is no planet B!

Perhaps it is here that we find a nexus of hope, that within the chaos described by researchers in both the social and natural sciences, there exist reconfigured ecologies, which perform in-common relationships between both humans and more than humans.

Conclusion

The deep-rooted dichotomies that have permeated classifications of knowledge have created a separation and disconnection between humans and their environment. The increasing recognition of the term Anthropocene within the Geological Timescale challenges any notion that humankind is uninvolved with Nature. Interrogating the concept of the Anthropocene reveals its Janus-faced propensities, demanding attention as to *how* the concept is applied within local, regional, and global politics, yet, simultaneously includes an invitation to think otherwise. New ontological considerations different to the naturalization of a "Nature" based on cultural positioning seem to be engaged in *not* simply replacing one totalizing theory with another. Instead, the categories that both social and natural scientists are familiar with become leaky, in that they cannot be considered tangible and fixed. The various themes that emerge when we open up dialogue of and for the Anthropocene demonstrate that no one subject or concern is disconnected from others. All entities on Earth, be it human, animal, biotic, and abiotic, are enmeshed in a complex world of associations and interactions that help keep them and those they engage with alive.

How might we as researchers continue to evolve our conceptual and methodological practices to reflect the plurality of life forms that make up our world as well as their complex modes of engagements? Research within anthropology contributes rich data that displays the diverse ways people experience and respond to their environment within their own specific socio-economic and topographical context. In accord with the literature, we contend that to be fully implicated in the world, to write *in* the Anthropocene, there is an urgent demand for research that expands the traditional categories of who can be a participant beyond that of the human to include other species and non-organic entities. In doing this, researchers are responding directly to the assumption that Earth, its ecosystems, biotic and abiotic life all interact and exist in entangled relations to one another. By expanding our criteria of how and in which way we might bear witness and share stories, a new dimension is brought to research that lends itself particularly well to the discursive arena that is the Anthropocene.

Finally, amid fears and concerns of an unknown future, hope comes in the way we can embrace and be reassured by what could be when we look within the margins of ecological destruction and research sites. Here, multi and transdisciplinary work is a pragmatic response in this epoch that many disciplines are taking a step toward, including anthropology. The value of combining knowledge bases lets us understand, contemplate, and position ourselves best within this juncture.

▪ **HANNAH GIBSON** holds her BA in Social Anthropology and Spanish at Massey University, New Zealand, where she is currently finishing a postgraduate degree leading to a Masters. She has been researching the Anthropocene for the past nine months and undertaking fieldwork at an Equine Assisted Psychotherapy facility. Positioning the horses as partici-

pants, she is applying multispecies ethnographic methodology, looking to see how humans and horses create meaningful experiences together. Her plans for the future include studying medical anthropology at the Master and PhD level. Hannah's special interests include infertility, new reproductive technologies, contested and rare illnesses, sexuality, and multispecies ethnography.

SITA VENKATESWAR is based in the Social Anthropology program at Massey University, Aotearoa/New Zealand. She is Associate Director of the Massey chapter of the recently established New Zealand India Research Institute (NZIRI). Her ethnography *Development and Ethnocide: Colonial Practices in the Andaman Islands* (2004) is based on her PhD fieldwork in the Andaman Islands and her coedited book, *The Politics of Indigeneity: Dialogues and Reflections on Indigenous Activism* (2011), is published by Zed Books. Her current research on the implications of climate change for food production takes a political ecology approach to follow the fortunes of millet cultivation in India.

NOTES

1. In their own research domains, both authors consider the idea of entanglements of species, and "specific material relations of the ongoing differentiation of the world" (Barad 2010: 265). In Gibson's multispecies ethnographic research with Equine Assisted Psychotherapy, species boundaries become blurred as horses, humans, and the environment are co-constitutive and interconnected by sharing invisible and visible vulnerabilities. Venkateswar's ongoing research explores webs of symbiotic relationships linking millet cultivation to visible and invisible life forms to constitute and confer resilience.
2. Although we did not include it within our discussion, we acknowledge the argument against the introduction of a new geological interval that several scholars make. See Solli et al. (2011), Visconti (2014), Autin and Holbrook (2012), Gibbard and Walker (2014) and Castree (2014) for an introduction to the debate.
3. One of the main reasons that it has yet to receive official recognition is the lack of agreement of when it might have started (Certini and Scalenghe 2014: 2). See Ruddiman (2003) for a discussion on whether geological changes have been occurring throughout history and prehistory. Other scientists such as Crutzen (2002: 23) argue that the intense impact that humans have had on the structure and functioning of the earth has accelerated since the Enlightenment and industrialization dating from the 1800s, which has brought about a proliferation of fossil fuel usage, particularly with the invention of the steam engine.
4. Latour's (2013) Gifford lectures are valuable resources where he discusses the idea of the Anthropocene, contending that anthropogenic activity is not evenly distributed, nor can it be said that all of the human induced climate change is the result of the entire human population.
5. For more on the discussion see Harris (2012).
6. We invoke the work of Povinelli (2014) when discussing the "otherwise" originating from Emmanuel Levinas (1981) to refer to that which is ungraspable, unobtainable, and other than what *is*. By positing the "other" as something out of our reach, Levinas's work challenges the Enlightenment idea that all things can be known in the world.
7. Capitalization of "Nature" is used to reflect this separation and objectification of nature from society.
8. Kersten (2013: 40) points out the name "Anthropocene" is different from all of the previous labels given to the Earth's geological epochs, which were all named after extinct species that had been found in the fossil record at each interval.
9. Urry's (2010) article ""Consuming the Planet to Excess" is part of a special issue of *Theory, Culture and Society* that engages with climate change and its implications.

10. Lövbrand et al. (2014: 4) writes that "the 'humanization' of the natural environment implied by the advent of the Anthropocene suggests a breeching of the human-nature divide inherited from the Enlightenment era."
11. Strauss and Orlove (2003) contribute a thoughtful discussion looking at the intersections of weather climate and culture, while Vörösmarty et al. (2010) illuminate concerns that "nearly 80% of the world's population is exposed to high levels of threat to water security."
12. See for instance the collaborative networks and forum associated with the Future Earth initiative: http://www.icsu.org/future-earth (accessed 1 September 2014).
13. New theoretical considerations form part of a larger interdisciplinary explosion of interest spanning philosophy, sociology, geography, media studies, and science studies (Badmington 2000; Wolfe, 2010; Diprose 2009; Castricano 2008; Foucault 1970; Haraway 1991; Latour 2005).
14. Worsham (2013: 52) writes, "the promise of posthumanism—as a mode of being, knowing, and engaging with the world—comes in its resolute nonanthropocentrism and nonspeciesism. Posthumanism makes explicit the fact that historically what has counted as knowledge and as a knowing subject has been decisively limited by our speciesbeing."
15. For additional materials and information on the project, see the companion website www.multispecies-salon.org.
16. Pringle et al. (2011) and Yamin-Pasternak (2011) contribute more interesting discussion on Fungi, the Anthropocene, and cultural entanglements. For more ethnographic examples, see also Hayward's (2010) fieldwork with cup corals, while Paxson's (2008) explores the microbiopolitics of raw milk cheese.
17. Of relevance is the position of historian Dipesh Chakrabarty (2009) who signals that the Anthropocene, the issues pertaining to it, and responses to it are not just matters for the sciences or the applied social sciences, but integrally for wider humanities because it alters the ways we have to engage with history.
18. The term "tipping point" has been used within social and natural science, described by Lenton and Schellnhuber (2007: 97) as "those components of the Earth System that are at least sub-continental in scale and can be switched—under particular conditions—into a qualitatively different state by small perturbations." Lenton et al. (2008) draw on literature from an international workshop to compile a list of where the tipping points of different ecosystems lie. Within anthropology, Nuttall (2012) brings an interesting perspective to the tipping point discourse, examining the way it is used to inform policies and think about the future.

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