Journal *of the* American Association
for the Advancement of Curriculum Studies

ABENG FOR MULTISPECIES' FLOURISHING

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Introduction

We revisit our collaborative poetic inquiry (Khan et al., 2021), which explored the place of poetry in informing the epistemic foundations of mathematics, science, and technology education and in bringing to complicated curricular conversations our recent experiences and emerging connections. Our work attempts to signal beyond Anthropocentric concerns by recognizing that multispecies' and human flourishing are co-constituted.

We consciously and humbly draw upon an analogy with the *abeng*, a Ghanian word for an animal's 'horn.' The blowing of the horn in the West Indies called enslaved people to the cane fields and allowed Maroon armies to communicate among themselves (Cliff, 1984/1995). We take "the breath in our bones" literally, that is, how the literal atmosphere through its poetic meanderings comes into the myriad and endless forms most beautiful and most wonderful of some of our multispecies kin. We wonder, what are changes in the composition of that atmosphere—the breath in our bones— due to rising anthropogenic carbon dioxide doing to the bodies/'bones' of our multispecies kin? Our work is a form of *symbiopoetics*, riffing off of Helmreich's (2009) *symbiopolitics,* and a poetic call to gather our marooned communities together.

Call and the Response

the trees knew. the trees and the ferns and the moss and the lichen knew. the rocks knew…the bacteria in your eyes, between your teeth, roaming the smooth expanse of your stomach knew and acted...the whales sang of what it would mean. and the smallest plankton had to get ready after centuries of making life out of sun. the coral had to get ready after perfecting collaboration bright solid and grown...all life would have to change the meaning of breathing. they all knew. (Gumbs, 2020, p.198, excerpt from the poem *conditions*)

Figure 1 *"Resurrection Fern" 1*

Note. Photograph Steven Khan (CC BY NC ND 4.0)[2]

C de breath in dese bones

Who listens to the earth, to the species on it?
Who feels the shortness of their breath?
Whose job is it to give warning?
Most cultures have had elders or spiritualists to give the call,
to listen to the world,

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to read and write the world and the word,
to blow the abeng,
to cause us to gather.
If not mathematicians, scientists, technologists and educators then who?

I think it needs to be more explicit.
It is the colonial cultures,
the 'more developed world',
the old and new Empires that have contributed most of the carbon.

They have stolen the pathways
from "'lesser' developed" to "'more' developed."
Unjust as colonialist countries stole people, culture, resources,
they've stolen an 'easy' future,
they've stolen the breath in our bones
by handcuffing those country's options for advancement.
All we have left are uneasy futures.

There is power in the abeng
Gaia's call
The earth a breathing being, exhaling
inhaling…
If Climate change is Earth's call…
is the abeng humanity's call…?
Or is it last call for all?

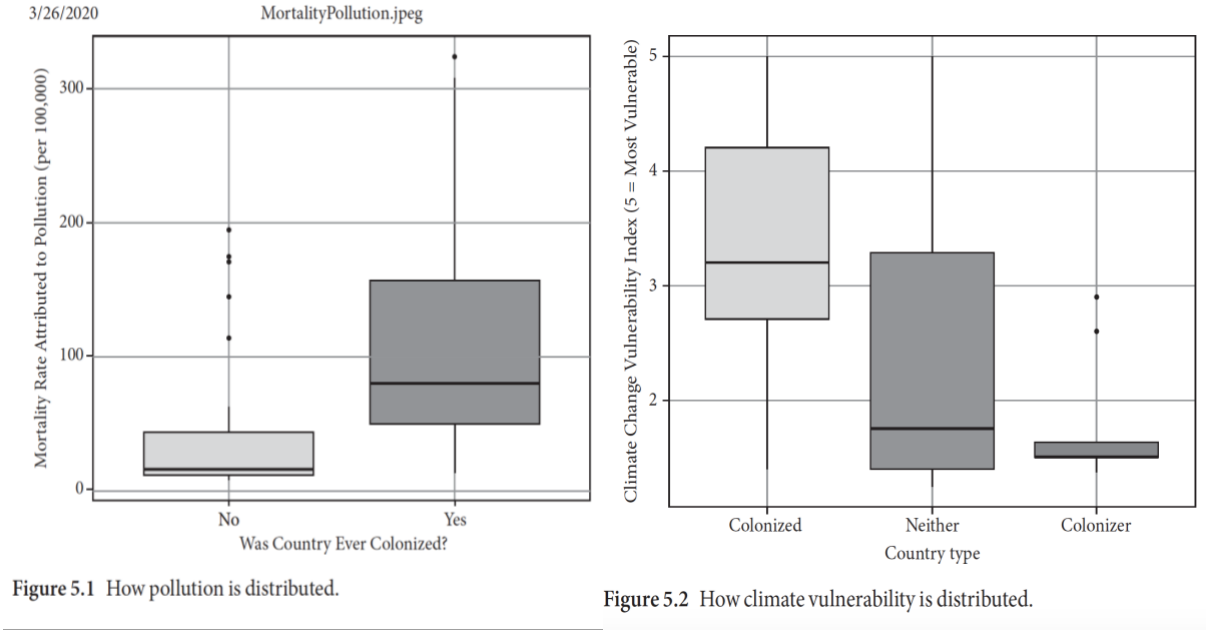
(co-composed by authors, 2021)

We, like our Earthbound multispecies kin in Gumbs' poem know what is happening (IPCC, 2021). Knowing is not enough. We aim to change the way you breathe *in* the world. We want to change the way your body moves in relation to other bodies. We want you to find new rhythms and new reasonings. In breathing this paper, we invite you to approach it via the notion of errantry, that is, it "follows neither an arrowlike trajectory nor one that is circular and repetitive, nor is it mere wandering—idle roaming...[where] one might become lost…in errantry one knows every moment where one is—at every moment [one is] in relation to the other" (Wing, p. xvi in Glissant, 1997). Our others in this work are both human and other-than-human.

Abeng vs. Anthropocene: Towards a New Science of Human Discourse

Figure 2

A Poem in Two Boxplots or How Pollution and Climate Vulnerability Are Distributed in Relation to Previous Colonization (LHS) or Colonizer status (RHS).



Note. Source: Táíwò, 2022, p 164, p. 171.

We will not squander breath or space flagellating the Anthropocene (Haraway, 2016; Maynard & Simpson, 2022; Moore, 2016; Yusoff, 2018). Yusoff's (2018) eviscerating critique of White Geology's ongoing complicity and willful ignorance or intentional blindness towards communities who continue to live within its racist-colonial-capitalist-ecocidal wake (see Figure 2) resonates. She argues:

> If the Anthropocene proclaims a sudden concern with the exposures of environmental harm to white liberal communities, it does so in the wake of histories in which these harms have been *knowingly* exported to black and brown communities under the rubric of civilization, progress, modernization and capitalism. The Anthropocene might seem to offer a dystopic future that laments the end of the world, but imperialism and ongoing (settler) colonialisms have been ending worlds for as long as they have been in existence. The Anthropocene as a politically infused geology and scientific/popular discourse is just now noticing the extinction it has chosen to continually overlook in the making of its modernity and freedom (Yusoff, 2018, p. xiii, italics added for emphasis)

We too say this is not new; it is known, has been known, and is only finally of concern to White Imaginaries of exceptionality or difference due to the existential risk it poses to a

particular way of being human that has masqueraded as the only way of Being Human—Man (Wynter, 2003). Instead of the Anthropocene, and the various curricula and curricular theories that have led us to this point, we turn to a different conceptual and metaphoric field in our deployment of the abeng as hearing a call to gather.

The blowing of the abeng—or more recently a conch's shell in the West Indies (Figure 3)—recalls its use by Maroon armies to communicate among themselves in planning freedom raids on plantations and in organizing rebellions. Today, 'New World' Africans blow the abeng symbolically as "a call to arm themselves…to stand up and defend their culture and traditions against extinction" (Abengcentral, n.d.).

Abeng was also the name of a Jamaican newspaper in the late 1960s that was a gathering space for a generation of critical Caribbean scholars (Bogues, 2009, p. 135). According to Hill (2007), "[t]he choice of Abeng as the name for the newspaper was intended to be a

Figure 3 *Le Marron Inconnu de Port au Prince, Haiti*

Note. Photograph by Kristina Just (CC BY 2.0)
https://commons.wikimedia.org/w/index.php?curid=66656838

reaffirmation of the culture of resistance as well as a clear identification with the Afro-slave roots of Jamaican culture" (p. 3). Of significance for Curriculum scholars is Hill's analysis of the need for different forms of organization for the work of survival and regeneration that is now needed.

Hill offers (2007), "One lesson in particular gleaned from the story of Abeng is that there is no 'thought' and 'action';—there is only 'thought,' 'action,' and 'organization.' For it is organization that mediates and joins the two." (p. 14). *Organization* then is a pedagogical pivot (Ellsworth, 2005) through which thought and action effect change. Radical organizing in the present moment calls for a dis-assemblage and organic rhizomatic re-assemblage of networks of connection and relation—regenerations (Hawken, 2021).

Sylvia Wynter (1990) has named the project, of which we are a part, the creation of a new science of human discourse,[3] new ways of living. She writes,

> The appeal of the Abeng is therefore to the larger issue of retrieving the lost *motives* of our "native" human self-interest…This terrain when fully occupied will be that of a new science of human discourse, of human "life" beyond the "master discourse" of our governing "privileged text", and its sub/versions" (Wynter, 1990, p.366, italics added)

Wynter's stated challenge is to *re-enchant* Humanism *outside* and *beside* the epistemic and sociogenic apparatuses employed by *man* to move towards an "*autopoiesis of the human*" (Wynter & Thomas, 2006), that is, "to redefine what it is to *be* human" (Wynter, 2000, p. 25). Her ultimate concern is with *human freedom* and its trans-formative potential. Wynter's autopoiesis of the Human requires a moving beyond stale binary logics to consider simultaneously the multiple vectors of oppression that limit human flourishing and freedom.

In her most recent work Wynter (2015) argues that such an "autopoetic turn" requires a "Second Emergence" to parallel the first emergence that begat Man at the end of the Western-European Middle Ages. In proposing multispecies flourishing as a goal for American Curriculum Studies, we take up Wynter's challenge in decentering but not devaluing the Human After Man, but re-establishing relations of kinship and respect with the rest of the enspirited world. Our method and motive follow Wynter's lead through Martiniquan poet-activist Aimé Césaire.

[3] Wynter's conceptualization is drawn from Martiniquan poet Aimé Cesairé's exploration of the relation between *Poetry and Knowledge* (1945). Interested readers are pointed to that text (available in translation online) and its criticism, such as by Mckittrick et al. (2018).

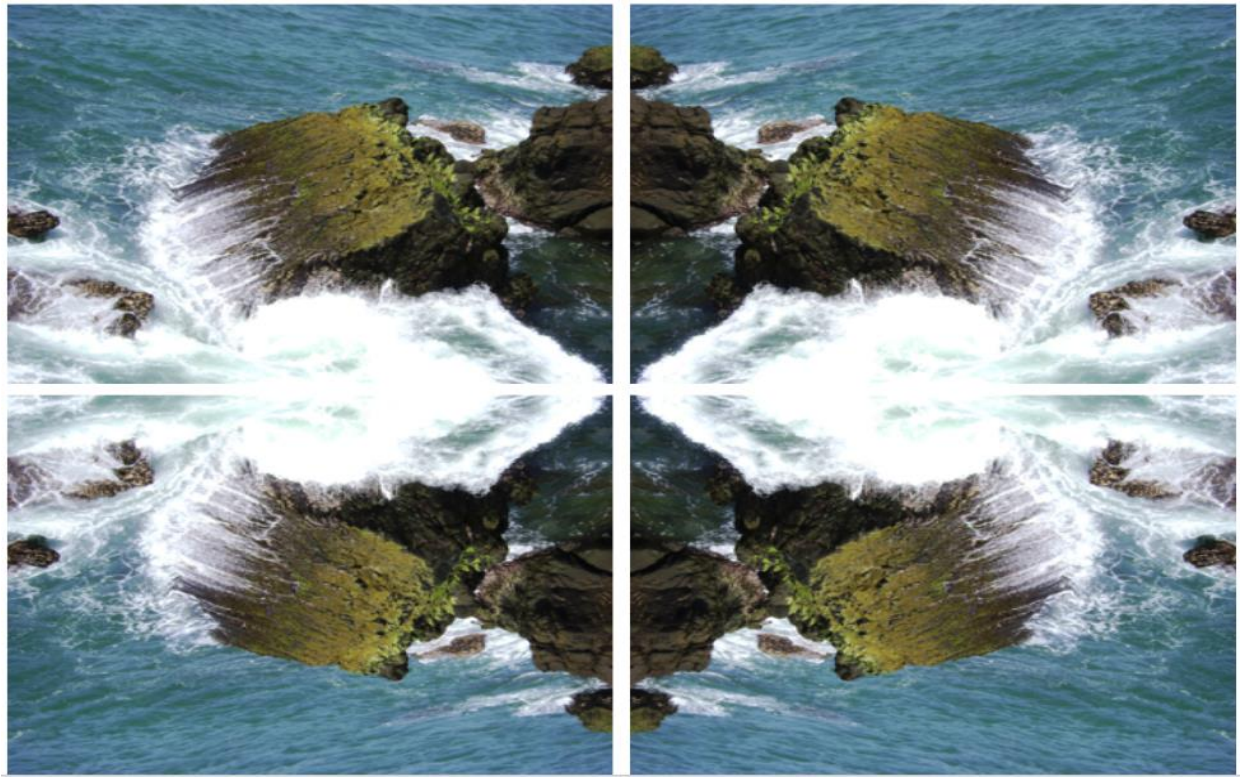
Method & Motive: Poetic Inquiry & Poietic Entreaty

> *La connaissance poétique naît dans le grand silence de la connaissance scientifique. [Poetic knowledge is born in the great silence of scientific knowledge]*
>
> *Césaire, 1945, online*

> *After thousands of years on the earth, we have only caught a glimpse of the potentially limitless possibilities of poetry.*
>
> *Leggo, 2017, p.28*

In *Poetry and Knowledge* (1945, English translation 1946, online), Césaire describes scientific knowledge as "poor and starving," "impersonal," "impoverished," and ultimately dissatisfying—a language that we see as distancing us from our multispecies kin. To Césaire, satisfying knowledge begins in a "state of fear and love", "strangeness and intimacy", a "climate of emotion and imagination" in what "[p]oets have always known" as a music, "which can only ever be the beating of the wave against the rock of the world" (see Figure 4) and whose "truth has beauty as its sign". This is the beginning for Césaire's and Wynter's new science of the human—one that begins with attention to word, sound, breath, rhythm, and multispecies' meaning.

Figure 4 *Poetry as the Beating of the Wave Against the Rock of the World*



Note. Photograph by Steven Khan. (CC BY-NC-ND 4.0)

Poetic Inquiry: Enchantment of Place (Sameshima et al., 2017) redraws the connections "between poetry and the natural world with attention to broadening the ecological scope and impact of the work of poetic inquirers" (p. 16) and deepens engagement with poetry as ontological (a way to be and become), epistemological (a way of knowing and coming to know), ecological (an attention to inter-relationality) and imaginal (a way to conceive things anew). In that volume, Beavington (2017) examines poetic pedagogy in science education noting that it is not intended to replace scientific inquiry but walks a parallel and equally valid path that "imparts the scientific approach with relationality" (p. 356) and inter-subjectivity.

The idea of parallel and equal but relational is reminiscent of the two-row wampum treaty agreement that forms the foundation of this land now called Canada, which the authors name home. This view is complemented by Parker's (2011) *Collection of Indian Poetry to 1930*, which collects and resituates poetry as one of the many literary forms used by the First Peoples of the Americas.

We see our work in this paper and together as more than poetic inquiry. As Curriculum scholars with intersecting disciplinary, scholarly, and identity locations, which are compounds not merely collections, our work is a *poietic entreaty*—a soliciting on behalf of ourselves, our children, other people's children, and our multispecies partners, past and future ancestors on this planet—all our relations—for the creative emancipation of the fecund music of living landscapes (Bundy, 1999) via curricula experiences for (multi)literate imaginations. We see poetry as one means to unsettle the imagination and mythologies—the curricular tracks—in what is called the Anthropocene and to solicit new ceremonies After Man.

Finding & Soliciting[4] Ceremony: S-p-e-l-l-i-n-g it out

Queer Caribbean diasporic Black feminist writer/poet Alexis Pauline Gumbs describes her project in *Dub: Finding Ceremony* (2020) as,

> an artifact and tool for breath retraining and interspecies ancestral listening. It is structured to ask, what if you could breathe like whales who sing underwater and recycle air to sing again before coming up for air? What if you could breathe like coral from a multitude of simultaneous openings connected to one source built upon the bones of all your dead? What if you could breathe like cyanobacteria who made the sky into oxygen millions of years ago…? What then? And by then I mean now. These are the

[4] Used with awareness of the etymological terrain through which this word travels but mostly in the sense of "set in motion" as well as "entreat" or "petition" (see https://www.etymonline.com/word/solicit).

> ceremonies I found…[M]any of these passages ask of you what my ancestors are asking of me. (p. xiii)

Her poetic response to the inspiration and provocations offered by Sylvia Wynter's goal to re-enchant Humanism is an abeng for unlearning ourselves, our habits of thinking, doing and organizing, or more familiarly, as Ellsworth (2004) might describe, putting outside and inside in relation in the awareness of the making and unmaking and remaking of self in relation.

Gumbs' Caribbean poetic register is different from that of the British register of landscape writer Robert Macfarlane's collaboration with illustrator Jackie Morris in *The Lost Spells* (Macfarlane & Morris, 2020). There, Macfarlane and Morris extend a similar invitation, an incantation to spell[5] anew, ways of Being. They say,

> Loss is the tune of our age, hard to miss and hard to bear. Creatures, places and words disappear, day after day, year on year. But there has always been singing in dark times—and wonder is needed now more than ever. 'To enchant' means both to make magic and to sing out. So let these spells ring far and wide; let speak their words and seek their art, let the wild world into your eyes, your voice, your heart. (p. 2)

As multiple world-ending events unfold all around us, the biophonies that make up the sonic signature of our planet's life are going silent; letting the 'wild' world in is becoming increasingly challenging. Acoustic ecologist Bernie Krause (2012) describes comparing soundscapes[6] recorded in an area of the Sierra Nevada mountains that had undergone selective logging – in the same space at the same time (summer solstice) and under similar conditions (temperature, precipitation, weather) but one year apart:

> [I]t was obvious that the once-sonorous voice of the meadow had vanished. Gone was the thriving density of birds. Gone, too, was the overall richness that had been present the year before ... Over the past two decades, I have returned more than a dozen times to the same spot at the same time of year, but the bioacoustic vitality I captured before logging has not returned (pp. 70–71).

The sonic curriculum landscape has changed. Perhaps even the songs of our soils are changing: Rillig et al. (2019) wonder about the potential for sound pollution in soils and its negative effects on the kin there. They note that "[s]ound does not yet appear in the soil science, ecology, or microbiology curriculum, and thinking about sound is currently very much at the fringes" (p. 45). We do not yet hear the sound of the composting, kin

[5] Here we are verbifying 'spelling' as in to cast a spell in keeping with a Wynterian leitmotif of re-enchantment.
[6] These recordings can be experienced at http://www.thegreatanimalorchestra.com/ Lincoln Meadow 1988 and 1989.

composing, taking place all around us. We are oblivious to the abeng of the planet, calling us to gather, to prepare, to breathe differently and inviting us to dismantle and partner again for regeneration.

But what if we listened and organ-ized differently?

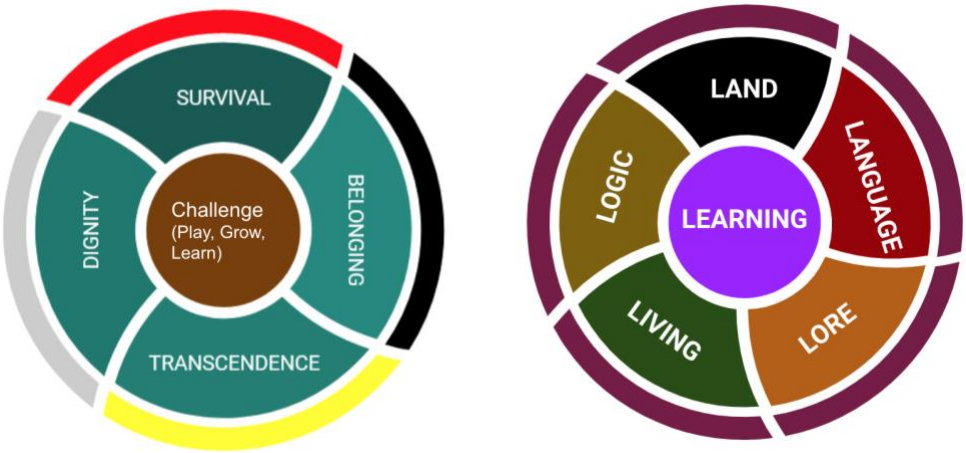
This sonic (Davis, 1997; Gershon, 2017) and stomatic curriculum for multispecies' flourishing does not ask the already racial-capitalist inflected question of "Which or whose knowledge is of most *worth*?" that has anchored much of 20th century Curriculum Studies' vanities (Pinar, 2004). Rather, such a Curriculum Studies begins with a consideration of all our ancestors—"Kindred beyond taxonomy" (Gumbs, 2020, p. xii) and requires study (Pinar, 2005), "into the political content and context of places [we] have never lived and during times that [we] have never been alive…[and] to trust and know [ourselves] intimately and in the same moment to stop knowing who [we] am [are]" (Gumbs, 2020, p. xii-xiii). Such work, Gumbs argues, necessitates a "species-scale betrayal of our founding mythologies" (p. x)—a questioning of the reified resources and rationalizations that we have used to make of our lives something sensible. For *Homo narrans* (Gumbs, 2020, p. xi), we are a species always capable of wording and worlding ourselves anew and expanding curriculum as for life/living by inviting greater participation with other Earthkin.

For Multispecies' Flourishing

> *I write in order to invite conversation about what it means to be human on the earth in the twenty-first century. I write with the hope that others will share their stories, too. I write with the anticipation that we will discover together how to make difficult and critical decisions for living, the kind of decisions that will sustain the ecology of our countless interconnections with all the sentient and non-sentient creation. I write poetry and essays as a way to hold out my hands in both gratitude and invitation, always seeking to make connections.*
>
> *Leggo, 2020, p. 221*

Multispecies work is a study in complexity of living, learning, and becoming with, alongside, and through other planetary beings and cosmological phenomena (Kirksey & Helmreich, 2010; van Dooren, Kirksey & Munster, 2016). Khan (2020), working mythopoetically (Doll, 2000; Haggerson Jr, 2000) has taken up this work in Curriculum Studies. Our ongoing work (Khan & Bowen, 2022; Khan, et. al, 2022; Khan, Karrow, et al., 2022;) uses the framework shown in Figure 5 to guide our analyses.

Figure 5 *Multispecies Flourishing Framework*



Our notion is of a set of reciprocal relations among these elements. The right side of the image identifies developing respectful knowledge and relationships with land, the languages of humans and other species, the stories (lore) told about that land through those languages that enable a continuity of living forms over time, and the logics (grammars and biosemiotic codes) that structure relationships of meaning from which learning emerges as places of attention. The left side identifies the intersectional purposes to which curricular experiences might be attuned.

The thesis sustained is that human flourishing at scale is obligatorily dependent on care for and flourishing of our multispecies partners. Examples of this in the Canadian context include the genocides and near extinction of the buffalo (Brink, 2008) and beaver (Hood, 2011) nations. Both of these ecological keystone species, of plains and wetlands respectively, were the victims of settler colonial insatiability for already occupied land, 'entrepreneurial' wealth, comfort, and fashion, which was supported with governmental 'frontier' policies.

We draw attention to these two world-shaping mammalian kin, given both of their near extinctions and their place in the life-worlds and wisdom teachings of several Indigenous nations across Turtle Island. We are drawn to the stories that these animal nations embody and that are remembered in the Seven Ancestor (or Grandfather) Teachings (Empowering the Spirit, 2019). The buffalo teaches respect, and the beaver, as Ojibwe writer Leanne Betasamosake Simpson (2021) recalls, teaches wisdom or "kindness in the practice of knowledge…one that needs care and humility" (p. 14). It is this **kin**dness that we find missing at times in some critical and scientific approaches to curriculum studies

and for which we find the mythopoetic strand of Curriculum Studies (Leonard & Willis, 2008; Macdonald, 1981) to be most hospitable.

The Breath in Those Bones or What the Buffalo Taught Me (Steven)

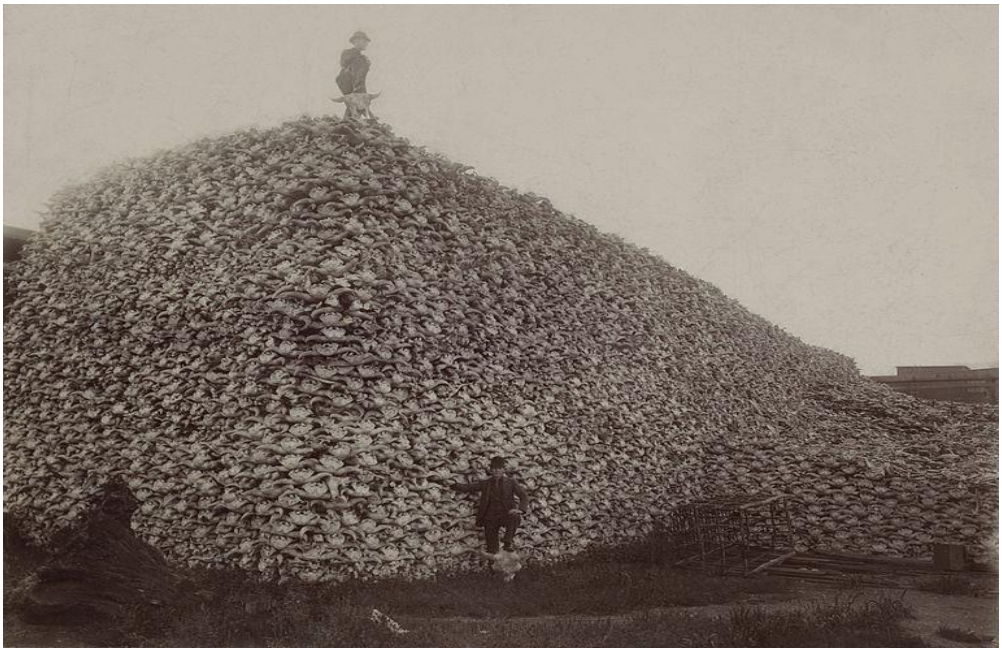
Between 2017 and 2020, while living and working on Treaty 6 Territory in Canada, a traditional gathering place for diverse Indigenous Peoples,[7] I began to learn about the significance of the buffalo to the many peoples of the plains and to find consonance with the curriculum of communal buffalo hunting alongside other communal practices (Mignolo, 2009), all of which stand in contrast with extractive-exploitative capitalist practices. I learned about the near extinction of the buffalo and their centrality to the spiritual and material lives of Plains peoples. I learned about the consequences of the genocidal policy to "kill every buffalo" as part of the clearing of the plains for agriculture and settlement. My inability to imagine the scale of that loss and the mourning left a deep impression on me as a result, in particular, of listening to some recorded accounts of what transpired in the wake of this loss.

For example, a Crow woman, Pretty Shield, recounts that when the buffalo went away, "Sickness came, strange sickness, that nobody knew about, when there was no meat" (Galloway, 1996, p. 131). "Our wise-ones became fools...even our children were different when the buffalo was here" (pp. 131–132). Later, reading about the prevalence of diabetes in First Nation communities, the connection was made between the change in diets and lifestyles and the culinary curriculum of Indian Residential Schools (DyckFehderau, 2017) in the memories of survivors, exemplifying the conceit of this paper that human flourishing is entangled with the flourishing of multispecies' partners whose lives are respected and remembered in ritual and winter counts (Figure 6).

From the plains and this consideration of the effects of dietary colonization, my curriculum studies brought me to the present, to a mathematician, Imre Loladze (2014), and his many years of difficulty in doing the research he wanted to do about the effect of increased atmospheric carbon dioxide on the nutritional quality of many of our essential food crops. An old photograph of a leaf with pieces missing—possibly due to fungi, decay, or the activity of leaf-cutting insects—came to mind as I pondered the breath in these bones (Figure 7).

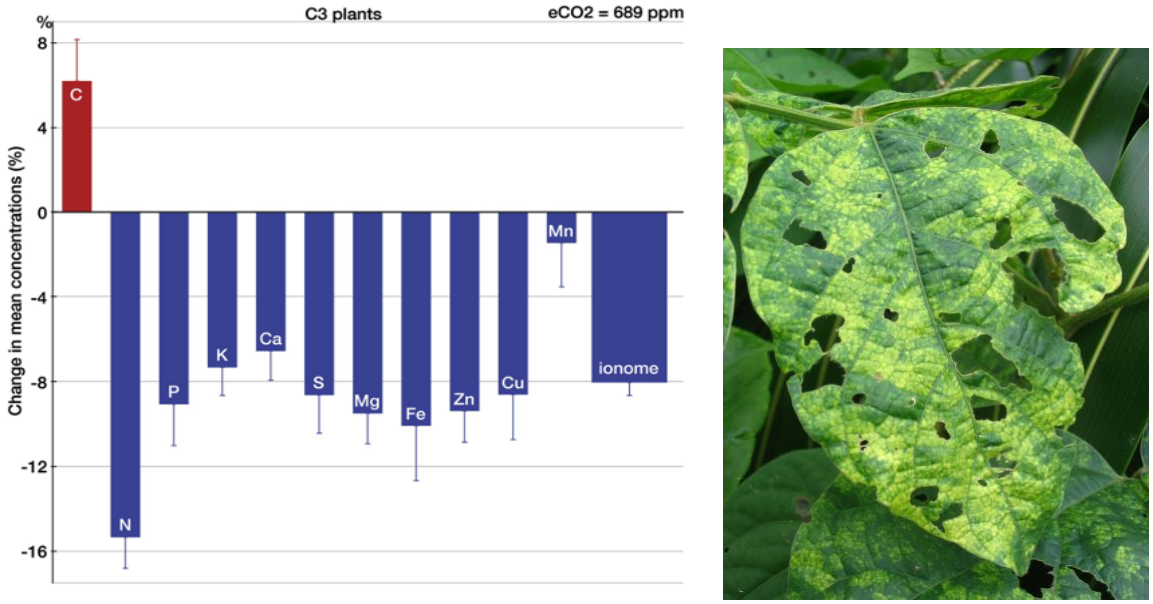
[7] These diverse Indigenous Peoples include the Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, Ojibway, Saulteaux, Anishinaabe, Inuit, and many others.

Figure 6 *Hill of American Buffalo Skulls, 1892*



Note. Source: Burton Historical Collection, Detroit Public Library. Photographer unknown. https://digitalcollections.detroitpubliclibrary.org/islandora/object/islandora%3A151477

Figure 7 *Graph comparing change in micronutrients and photograph of leaf.*

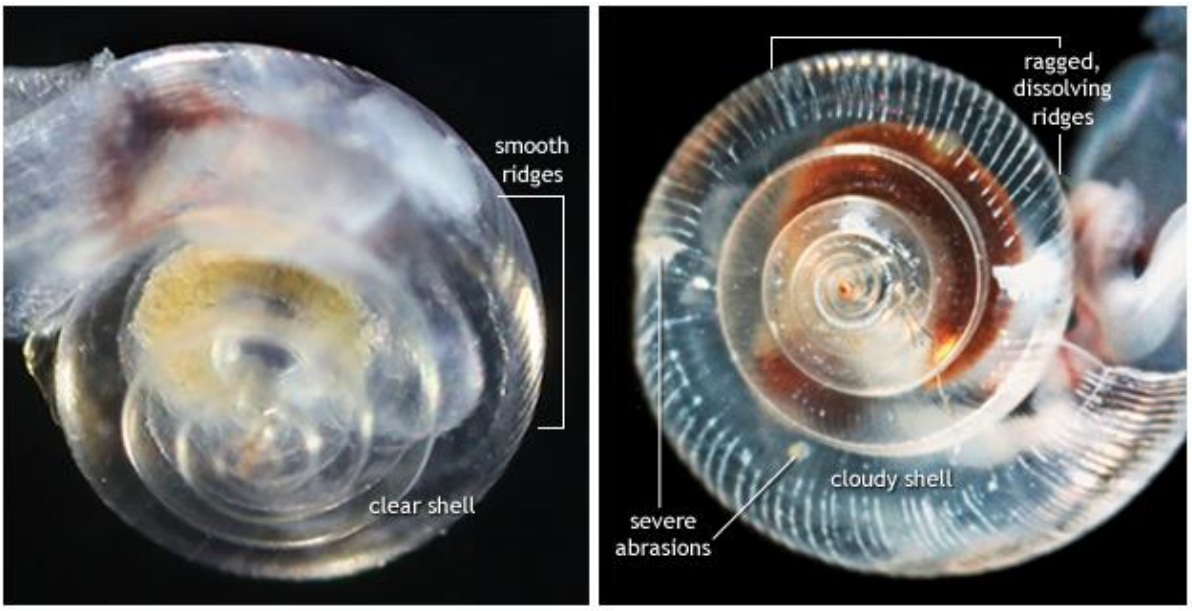


Note. Left: Effect of CO2 on individual chemical elements in plants (Source: Loladze, 2014). Right: Leaf photograph by Steven Khan (CC BY NC ND 4.0)

From there, my studies connected to other stories in the worlds of other non-terrestrial kin under elevated CO2 atmospheres—the precarities that are engendered by a depletion of the nutritional quality of human food sources are mirrored in the literal dissolution of the bodies of our aquatic multispecies relatives at the base of other food webs due to ocean acidification (Figure 8). We know, in the current phase of this pandemic, there is more sickness yet to come as nutritional quality (and quantity) changes and intersects with existing inequities and precarities.

In my (Steven) teaching, I try to make explicit these curricular threads that connect the early history of the Americas (including the Caribbean), educational policies such as residential schools, and these predictable effects based on scientific understanding and indigenous wisdom. This is how I hear and try to amplify the sound of the abeng of these specific partners and honour the breath in their bones (Batacharya & Wong, 2018).

Figure 8 *Shell Damage to Pteropods Under Elevated CO2 Levels*



(left) A healthy ocean snail has a transparent shell with smoothly contoured ridges. **(right)** A shell exposed to more acidic, corrosive waters is cloudy, ragged, and pockmarked with 'kinks' and weak spots. Photos courtesy Nina Bednarsek, NOAA PMEL.

Note. Credit: Nina Bednarsek, National Oceanic & Atmospheric Administration, Bednaršek et al., 2014.

Hearing the Rhythm, Pattern, and Pulse of Data (Michael)

As an experienced field biologist/ecologist/ethologist and beginning teacher, I wanted my elementary students to see, feel, and connect to nature—its animals and plants, its ebbs and flows, the energy and soul of the land—the way field biologists experience it when doing fieldwork.

My Grade 5 students roared with laughter again. During our observational studies of bugs and plants outside, from which we were going to construct self-sustaining ecosystems in sealed containers, one student asked how bees could find the right flowers, so I was demonstrating the bee waggle dance…how in the hive when one bee found a patch of flowers they told other bees about it by doing a dance. How in the dance the direction the bee was walking and the speed of the butt waggling was watched by other bees and they used that information to determine direction and distance to fly. To find the flowers. I was connecting their observations of the outside world—especially the "small world" of organisms as seen by them—to "book knowledge" from science so they could better understand the ecosystems they were examining. We danced. And then talked about dancing. And the world of the small organisms whose world we were interested in. The knowns. And the unknowns.

Hearing the rhythm,
pulse and pattern of data requires
an attuning to its details—
its silences and its rhythm—
just as one listens to music.
How does one attune one's
students to experience data in this way,
so that they hear both the earth
and
the representations of it as a harmony?

(Composed by Michael Bowen)

Years later, those same students were in my Grade 8 science classes, and they still talked, and laughed, about waggle dancing.

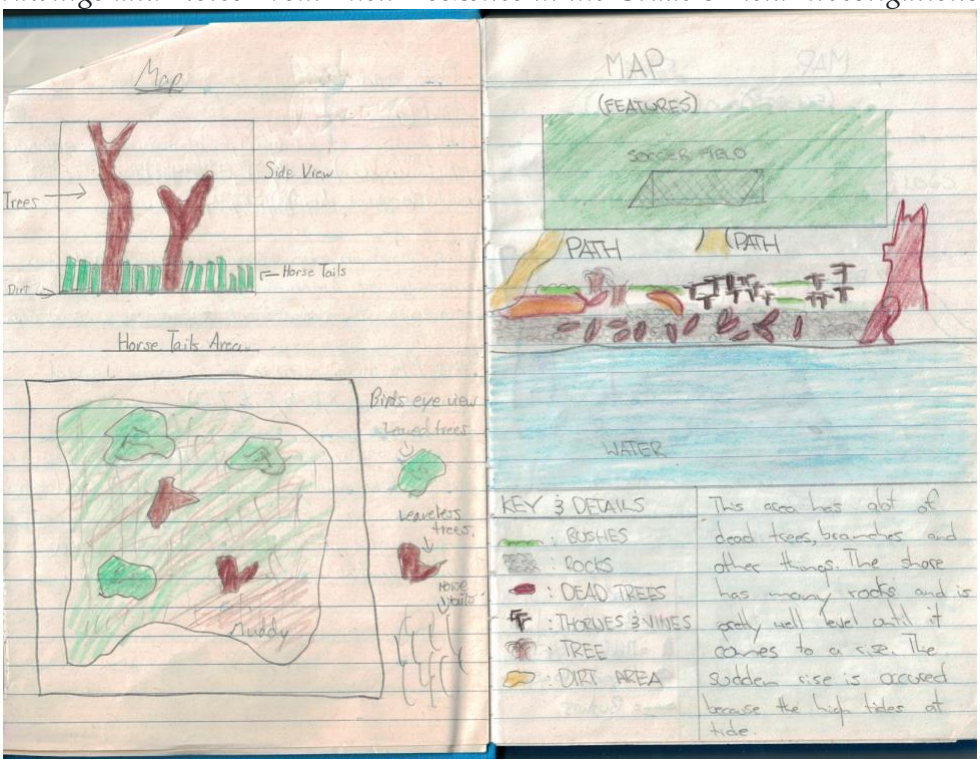
In the end-of-year, Grade 8 biology unit, I had my students pick out five-metre square areas of the school campus in which to conduct field investigations in the following months. To start with, I wanted them to examine in detail the site they had chosen and what was there—leaves, plants, insects. I partnered with the school art teacher. Together, we had a joint project where our students sketched and drew what was in their "ecozone," how it looked, how it felt so that they saw kin such as sowbugs and horsetails

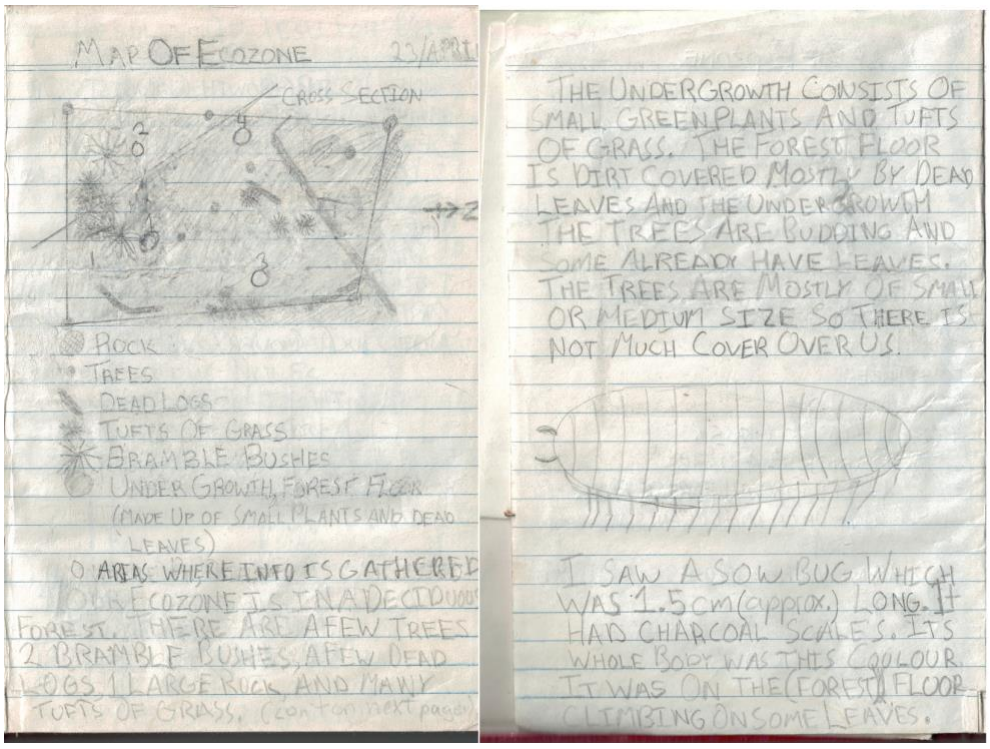
that had previously escaped their notice (Figure 9). Then, each week, students conducted investigations of relationships between biotic and abiotic features in their ecozone. Every week they reported their findings to their peers, telling them stories of what they did, what they saw, what they found (see Roth, 1995). As spring closed, they then compared how their ecozones looked with their original sketches.

What I remember most of this activity three decades later is their enthusiasm discussing the changes they observed, connecting the location and what was in it with their findings, as if they'd never seen a spring or the growth that happens in it despite having lived through it a dozen times before. The focus, their connection to the earth, the plants, the invertebrates, their ability to see, was better than anticipated. I'd asked them to look, to describe, to feel, and they'd done that more than I had ever expected.

Figure 9

Student Drawings and Notes From Their Ecozones in the Grade 8 Field Investigations.





Seven years later, I am now in my PhD program and studying the data/graph analysis practices of students in a mid-level undergraduate ecology course. One-on-one, they describe on video what they see, how they make sense of/interpret a graph that depicts changes in plant distribution frequency as elevation changes up the side of a mountain (see Bowen & Roth, 2002). Coincidentally, we were ON a mountain, at the top, at a university where other mountains across an inlet could be seen, the temperature (via snow and rain) and plant distribution profiles visible out the windows every day.

Getting TO the university (and the interview) required travelling UP a mountain THROUGH those zones of plants and weather.

Most students struggled with the graph,

had trouble interpreting it.

Most students never referred to the mountains just outside the room and what they could see.

Most students never referred to their drive up the mountain.

Not once.

They were science majors

but not connecting the nature they lived in/by/through/with to the science they were learning,

not linking the lived-in world to

the representations of data and graphs.
And, as we later realized,
their interpretive struggles of inscriptions
extended from their lack of connection between the two.

The graph was an abstraction
unrelated to their world.
They neither saw the world nor
the data describing it.

How they learned science did not connect them. (Composed by Michael Bowen)

The contrast was painfully stark between the students in my Grade 5/8 who looked/saw/felt their science and their world through their studies and the undergraduates who did not connect "science" with "the world" outside. My young students saw the dance, the poetics, between their data and the world they studied—how each entwined the other—whereas the undergraduates did not, ignoring one and struggling with the other.

Colonialist practices in education and teaching about research dispassionately, abstractly, in rooms without windows, results in ecocide raising its head without most being able to really hear the desperation in the cries of the earth. The **pulses and rhythms** of the world, and the present discordant jarring **peals of the earth's pain**, go **mostly unheard**.

Even scientists describe that pain of the earth **dispassionately,**
as that is what they've learned is the proper manner of doing so.
To a climate scientist
their data is **a rising orchestra of sound,**
a discordant opera with more and more instruments with
more and more singers joining in,
heading collectively
towards **a terrible climax,**
a crescendo followed by **a sharp**
F
A
L
L
with a single, keening, voice at the end
slowly and plaintively
f a d i n g a w a y y y.

Much scientific discourse is already poetic but the cadence, the pulse, rhythm, and pattern, is hidden away in the traditional style of academic prose and paragraphing . . . as if they were not ever to be spoken by living breathing beings. Beings with breath in their bones. As Curriculum scholars, we need to do better at helping our students—and their students—and the public, hear the operatic cries of the earth. More poetry is needed (see Calderón Moya-Méndez & Zwart, 2022). As educators we need to do what we do differently, teach science **so the world is SEEN, the breath is FELT, and the horns, the sirens, the cries and the pleas are HEARD.**

It made me wonder
about the sounds of climate change
and how they could be used
to teach
about climate change.

The methane bubbles
breaking the surface where methane hydrates are.
The sound of permafrost shifting as it melts.
The cracking of glaciers as they break.
Ice shelves sliding in Antarctica.

In all of the things I've read about teaching about climate change
the use of sound, the howling of the earth's organs
as they
slowly
fracture,
has not been part of any curricula
(Composed by Michael Bowen)

When I first used terms like "cries" and "pleas" and "pain" as metaphors for needing to attend to the earth's changes due to global warming, I worried it was hyperbole, that my language was too strong. I don't worry that I'm using hyperbole anymore; in fact, I worry prose words alone are no longer enough. So, a poem…

Honeybees

I didn't understand honeybee navigation,
until I understood that they saw the world,
differently.

We saw that they had a dance,
but could not appreciate its significance, its steps,
until we learned how they used UV light and,
markings invisible to our eyes.

We only saw what we asked questions about.
We have to understand them differently
than we are conditioned to understand them.

Not just the sensing, it is the shifting in positionality, to appreciate it more closely to the way in which it is experienced/meaningful.
To the bee.
Understand how we are bounded by frameworks,
By structuring(s),
we impose.
(Composed by Michael Bowen)

Figure 11
A Variety of Bees on Sunflower

Note. Photograph Steven Khan (CC BY-NC-ND 4.0)

And now I let the yard be more bee-friendly.
Native "weeds"
Asters and goldenrod
adorn

For a late fall feeding
Millions of miniature suns
Like the first images of the Webb
A universe of ancestral reminders.

Source in public domain provided by NASA and STScI
https://webbtelescope.org/contents/media/images/2022/035/01G7DCWB7137MYJ05CSH1Q5Z1Z

And there are bees
But not as many as the elders in my community remember
When they dripped,
like honey
Off the flowers of their youth.
(Original poem by Steven Khan)

Flights of Bumblebees and Tsars of Saltan: Poetically Humans Dwell (Doug)

The Flight of the Bumblebee is a musical piece written by Nikolai Rimsky-Korsakov in 1899–1900 as an interlude to the opera, *The Tale of Tsar of Saltan*, an allegory of significance (Pushkin, 1996). The imagery the tune evokes and the lessons the story conveys situate *this* poetic inquiry. This is my *response* to the *call* of the abeng. I am inspired by Heidegger's (1971/1975) astute recognition that an essential feature of our humanity is "poetic"—we are poetic creatures; in his own words, "man [humanity] must dwell

poetically". (p. xiv, emphasis added). Rallying against humanity's present life as technological being, Heidegger (1971/1975) recognizes and then champions the manner poetry grounds human beings through his careful tracing of the intimate and interconnected relationship between thinking, language, and poetry. Hofstadter (1975) captures this beautifully:

> So poetry—together with language and thinking that belong to it are identical with it as essential poetry—has for Heidegger an indispensable function for human life: it is the creative source of the humanness of the dwelling life of man [humans]. Without the poetic element in our own being, and without poets and their great poetry, we would be brutes, or what is worse and what we are most like today: viscous automata of self-will. (p. xv)

Tangible examples of the abeng can be experienced in our immediate everyday experiences in/with nature, notwithstanding its contestation,[8] if we are receptive, willing, and attuned to listening for it. For me, as I live in a rural agrarian environment and teach in an urban faculty of education where future teachers are educated and certified to become the next generation of teachers, teacher educators, and curriculum scholars, my professional and personal lives commingle. Connected with the land, my family and I enjoy the bounty nature provides—maple syrup in the spring, honey in the summer, and garden vegetables in the fall.

Below I provide an example of how my immediate lived experiences transcend professional practice to demonstrate how I may respond to the unimaginable realities of what is confronting us regarding anthropogenic climate change. I shed light on my personal stance to the threatening changes humanity has wrought for life on Earth: how this stance manifests in my scholarship and teaching; how I refuse to invest my time and attention to systems serving to perpetuate the abuse of life and planetary rhythms, while considering my responsibility as an educator to reveal and study the workings of these systems; and the extent to which I hold myself responsible for establishing an ethical imperative against such systems of havoc (Original Call For Papers, p. 2).

The Flight of the Bumblebee is a musical interlude occurring between operatic acts to heighten the emotional reaction to the story. When invited to contribute to this paper, an opening regarding the plight of the honeybee in relation to climate change presented itself. The "plight of the honeybee" and the musical composition, the Flight of the Bumblebee, are rife with the imagery and symbolism suited to poetic inquiry.

[8] The concept of "nature" has been problematized by many such as McKibben (2006).

The Plight of the Honeybee

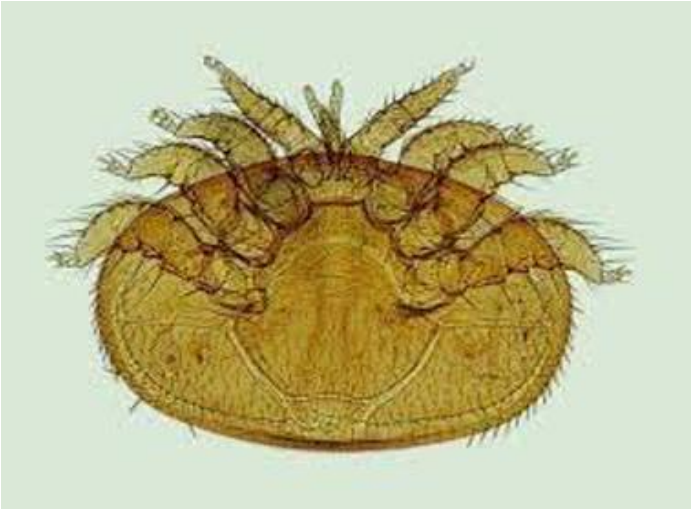
I began "keeping" honeybees about twenty years ago, initially as a pastime because I enjoyed honey and was intrigued with humanity's ingenuity at 'domesticating' an insect to produce honey for human consumption. That's where it began. At that time, I was a novice and intoxicated with the romantic prospect of joining a somewhat reclusive and mysterious form of insect husbandry.

Much has changed in the beekeeping industry. Namely, it became clear within a short span of years of keeping bees, that if I were to keep bees, I was going to have to adopt "best management" practices to keep them alive. Even with that, there were no guarantees bee colonies could be kept alive. "Best management" practices consist of ensuring one's bees are treated with several forms of pesticide seasonally, to ensure an invasive parasite, the Varroa mite (Figures 12 and 13), does not kill the hived bees. Left untreated, this mite will eventually weaken a colony and kill it.

Varroa mite have been a persistent problem since the parasite made its way into North America over twenty-five years ago from Europe (Apis Information Centre, n.d.). Successive exposure to pesticide has unleashed the negative implications of evolution with pesticide resistance developing in current mites (Rinkevich, 2020). The mite is not native to North America, nor is the honeybee for that matter, which originated in Africa. Both are what you might refer to as "invasive species." We have one invasive species now at risk because of another.

Figure 12

Varroa Mite Under Light Microscope.



Note. In the public domain (Pixabay)

Source: https://pixabay.com/illustrations/varroa-mite-bee-parasite-1196510/

Figure 13 *Honeybee with Varroa Mite Clinging on Abdomen*

Note. In the public domain (Pixabay)
Source: https://pixabay.com/photos/bee-honeybee-honeycomb-close-up-85576/

Bred to produce honey, honeybees reproduce quickly, with new generations produced every twenty-one days, to create colonies of 50,000–75,000 honeybees a season. They exist to collect nectar and pollen in vast quantities, mixing these with their saliva to produce honey, mating, laying, and tending eggs/larva, and raising a new generation of bees. A typical honey season in southern Ontario might produce 50–300 pounds of honey.

The Varroa mite is one pest; there are many others that can wreak havoc, including but not limited to the hive beetle, other mite species, bacteria, and viruses. Each requires the adoption of "best management" practices through the administration of some form of pesticide, antibiotic, sugar syrup, or physical manipulation. Without these, honeybees usually die during the long and cold Canadian winter months (Figure 14). Even with all of these precautions, it seems increasingly difficult to get honeybees to survive the winter. Through domestication, they too are susceptible to the instability of extremes created by climate change—earlier spring temperatures, warmer winters, hotter and dryer summers, wetter falls.

Figure 14

Deceased Bee Colony and Varroa Mite Infestation

Note. Photograph by Douglas D. Karrow

The spring of 2021 was particularly warm, with daytime temperatures rising to the mid-twenties the first week of March. Typically, we do not see temperatures this warm in this part of Ontario for several more months. By the first week of May, a swarm from another bee yard had moved into a beehive in my own yard. In my experience keeping bees, I had never caught another bee swarm so early in the season. Typically, bees swarm late May to mid-July. This meant that bee colonies in the surrounding neighbourhood

were thriving, with queens laying thousands of eggs, colonies multiplying at record speeds, with swarms looking for additional space.[9]

When honeybees thrive, so do their parasites. Toward the end of summer that year, the numbers of bees in this swarm started to decline in number. This is typical of *Varroa* mite establishing itself in the colony as the mites work their way into developing bee pupa. By the end of November that fall, the hive was weak and didn't look like it would make it through the upcoming winter. By mid-January, it was dead.

Most modern beekeepers would have treated the colony with a miticide; late summer that year, however, I had stopped doing this. I'm concerned about the exposure of the honey to the pesticide (even though best management practices require all honey to be removed prior to pesticide treatment, pesticide residues remain on the wax comb), the long-range evolutionary pressure this has on the *Varroa* mite, and the safe application and disposal of the pesticide during the management practice. This means I experience increasingly higher than typical hive losses each year. Once in a while, a colony will make it through winter without pesticide treatment.

Remter (2021) gives a brief history of *Varroa* mite infestation in Germany noting that, 40 years on, the number of chemical treatments has tripled. He contrasts this with Gwynedd in Wales where the medicalized modernist approach was limited with keepers distancing colonies and "trusting in their ability to take care of themselves." He notes that, "Western honeybees were found to be capable of gaining complex knowledge about the mites, some colonies have learned how to disturb mites' brood cycles, how to groom each other for mites, and even how to attack them" (para 5). We note here that the bees learn, react, respond—redrawing their lived curriculum for their life and their living both as a hive and as a species. They listened to the changing notes, the pulses, in their hive, while for the most part we have not. We must learn to, and rewrite curricula accordingly. Remter argues that, "the modernist idea of the controllably pure (super)organism … is shifting toward an emergent and dynamic multi-species body, concomitant with a range of multispecies care practices" (para 6) that requires a shift from hygienic control and domination to more care-full and trust-full set of social relationships that at times will necessitate, "mourning for the once stable but now lost formation of a multi-species body that was collectively cared for" (para 7).

[9] Bees tend to swarm when they run out of hive space or food, with old queens leaving the hive and taking several thousands of worker bees with them. Once an alternate hive is located, they move in, the queen resumes laying, and the colony fixates on re-establishing itself.

Implications for Pedagogical Practice

In re-telling the story and the imaginal evocations of the Flight of the Bumblebee, we have discovered some ethical jewels. Embedded within the story, the virtues of 'forgiveness' and 'love,' which upon first glance may seem obtuse and irrelevant, have implications for pedagogical practice.

The education of teachers and their students must be undergirded by forgiveness and love to move away from an education that lays blame, creates resentment, guilt, distrust, and worst of all, despair and hopelessness. The challenges of climate change, for that matter, all socio-politico-ecological justice issues, must rise above the tendency to castigate the other, and instead begin by modelling a pedagogical practice of forgiveness and then love. Only through forgiveness—reconciliation, reparation and regeneration, a new 3Rs for education for generations to come—and multispecies care can love be realized. Through pedagogical love—being taught by our relatives and partners on this planet—hope for futures as yet unimagined remains.

Lessons on learning to listen to and mourn our multispecies partners on this planet…

Bees have language that is mostly spatial and vibrational (Bakker, 2022) with a syntax that is based on "the type, frequency, angle and amplitude of vibrations made by the bees' bodies…as they move through space" (para 4). Humans have communicated with bees for centuries using musical instruments known as bull roarers. Bakker (2022) describes the use of bullroarers by the /Xam (San) people of Africa to calm bees and direct them to a new hive. Elsewhere in Africa the greater honeyguide and humans work together in a mutually beneficial relationship. Bakker (2022) describes it thus,

> First, the hunters make their special call, signaling that they are ready to hunt honey. In the case of the Yao hunters in the Niassa National Reserve in Mozambique, who were the focus of researchers led by Claire Spottiswoode at Cambridge University, this sound is something like a *brrr-hmmm*: a loud trill followed by a grunt. In return, the honeyguides approach and sing back to the hunters with a special chattering call.
>
> The birds then fly in the direction of the bees' nest, followed by the hunters. When the birds' chatter dwindles and they stop flying, the hunters know they are close. They scan the tree branches and hit nearby tree trunks with their axes to provoke bees into revealing the location of the nest. The hunters then make a bundle of leaves and wood and set it alight just under the nest, smoking the bees into lethargy before felling the trees with their axes and chopping open the nest. As they fill buckets to take back home, flinging away dry combs containing no honey, they expose food for the birds. The honeyguides wait patiently, flying down to feed only after the humans are gone. Before the Yao hunters

> depart, they gather up the wax and present it on a little bed of fresh green leaves, honoring the contribution of the birds to their hunt. (Para 35 & 36)

These complex relationships between humans and bees and humans and other species and bees are an example of the types of multispecies ceremonies After Man to which we believe the abeng of our other partners on this planet are calling us and which asks us to look beyond our own self/species-interest. As Milman (2022) laments in telling the story of the rediscovery of the world's largest bee (*Megachile pluto* which is about 4X larger than the European honeybee) in the forests of Indonesia, its celebrity status further imperiled the species due to potential trade by collectors of rare animals and the slow pace of having its conservation status confirmed.

In response to a reviewer who wished for more, something 'new' and posed the question of "what can we do?" we recommend the Anthropocene-Curriculum project (online, n.d.) and the Anthropocene commons which represent robust interdisciplinary conversations and collaborations. In particular, the former offers as Anthropocene Curriculum courses (https://www.anthropocene-curriculum.org/courses) that are perhaps places of ending, beginning, hope and connecting. We cannot offer what-to-do's in a general sense as this requires local knowledge and meaningful collaboration. Sometimes, what is required is simply 'letting-be' (*Gelassenheit*, p. 10), an antidote to our instrumental/scientific tendency to "fix things". Like the Welch and African beekeepers, and some North American beekeepers (Offord, 2017) — letting-be bees (and other things (curriculum), e.g., resisting the tendency to "treat them" —grants us the possibility of dwelling in a world in a totally different way. "They promise a new ground and foundation upon which we can stand and endure in a world of technology without being manipulated by it" (Heidegger, 1959, p. 55).

The Anthropocene, like the abeng is a call to gather, to band together, resist and assist others in their struggle for freedom against current sequalae of infections by pathogenic plantation structures, logics, embodiments, and systems, which reduce all of life and life's processes—the breath in our bones—to economic and exchange value.
We have little patience for Curriculum Studies' obsession with, and perhaps also fetishization or reification of, the Anthropocene which can at times serve as a distraction from a myriad of mounting multispecies' mournings and miseries.

[10] Gelassenheit is a term Heidegger borrowed from Meister Eckhart, a medieval mystic (1260-1327), whose work was deeply inspiration for him (Caputo, 1986).

Conclusion

Mes ah nah, shi egwuh tah gwish en aung
Sin da mik ke aum baun
Kag ait suh, ne meen wain dum

Me nah wau, wau bun dah maun
Gi yut wi au, wau bun dah maun een
Shing wauk, shing wauk nosa
Shi e gwuh ke do dis an naun.

Ah beauteous tree! ah happy sight!
That greets me on my native strand
And hails me, with a friend's delight,
To my own dear bright mother land
Oh 'tis to me a heart-sweet scene,
The pine—the pine! that's ever green.

(Excerpt and translation of "To the Pine Tree", Bamewawagezhikaquay aka Schoolcraft, in Parker, 2011, p. 56)

Bamewawagezhikaquay—Woman of the Sound the Stars Make Rushing Through the Sky—is the Ojibwe name of the poet known as Jane Johnston Schoolcraft. She is identified by Parker (2011) as the "first known poet to write in an American Indian language" (p. 51). In the excerpt of "To the Pine Tree," the trees "greet" her return from Europe "with a friend's delight," which in Anishinaabemowin speaks to the animacy and agency of both members of this multispecies relationship. In choosing this excerpt as part of our closing, we signal that there are other calls that our multispecies partners on this planet have made and continue to make in inviting us to partnership.

The call of the abeng being sounded by those with breath in their bones across this entire planet is urgent. We are urgently called to organize ourselves in relation to our multispecies kin differently. The abeng is a call to "Tout Monde" (Glissant, 2020) to a reign of radical relationality among humans and our multispecies kin of fin, feather, scale, skin, hyphae and pili. The abeng is also a call to reconciliation, reparation, regeneration, responsibility, and respect.

The abeng is a call to communal activity, a call to kindness, to listening and learning from the curricular lessons of our kindred beyond taxonomy. In hearing the abeng of our multispecies partners in seeking to learn and speak the many languages of the many

nations (including non-human ones) as part of the curriculum of all subjects (not only math, science, and technology) going forward, may we extend and receive greetings of friendship and gratitude as we learn to spell new ceremonies and economies of respect and kindness with this breath in our bones.

[*Are you breathing differently now?*]

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