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To Be Human

By

Layla S. Gordon

A Thesis Submitted to the Honors Council

For Honors in Creative Writing

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Artist's Statement

I write in an attempt to convey the way I perceive the world and my place in it. I am not separate from the natural world but, as a human, deeply part of it. I want my readers to feel how, as much as any other species, our history and existence are part of the Earth. Sometimes in the built environment, especially large cities, I lose my connection to my roots and to my own person. In writing, I reclaim that connection and hope to restore it for my audience. Every human behavior is either conditioned or evolutionary. Either we were taught to do something, or it was a genetic advantage at some point in our history. My work explores why we act the way we do, and how that makes us who we are. I can never hope to find the answer without first exploring who my ancestors were and where I came from.

The topic of human evolutionary history presented itself to me when I visited Oldupai Gorge with my study abroad class in Tanzania. The gorge had first provided the clues that human beings evolved in East Africa. Standing at the lookout point, I felt deeply part of my evolutionary history. Nothing had ever felt so poetic or so natural, and I knew I had to write about it. I jotted down my first few thoughts in my notebook, then reflected on them that night in my journal. Every time I put my idea for my thesis into words, it became clearer and more alluring.

I grew up fascinated with wildlife. I wanted to study dolphins when I was seven, and by thirteen I was arguing with my grandfather about how chimpanzees have language. I wanted to be a part of what I was reading, imagining myself in Gombe with Jane Goodall and South Africa with Kevin Richardson. Three years into my education as an animal behavior major, I had begun to think about everything in evolutionary terms. Every behavior and feeling invoked a “why” - that was both exciting and frustrating if it had no answer. When I decided to write about science,

I wanted a reader to feel the excitement I felt and to ask the same questions. My interest in science and nature stemmed from the creative and compelling books I had read as a child and as a teenager, like *My Life With the Chimpanzees*, by Jane Goodall, *Poisonwood Bible*, by Barbara Kingsolver, *A Brief History of Time*, by Stephen Hawking, and *The Sixth Extinction*, by Elizabeth Kolbert.

I had seldom written about science for a nonscientific audience before. Boiling down the essence of evolutionary history to its bare bones proved more challenging than anticipated. I often found myself using specific jargon or spending too much time on technical explanations where the reader might get lost. In my first draft of “Reaching Earth,” I had described the foods that indigenous Americans cultivated before European colonization, rather than simply stating that they didn’t grow wheat. My advisor pointed out that the extensive descriptions were both unnecessary and only existed because I was writing like a scientist. Having a non-STEM advisor helped me see these mistakes and work to remedy them. More than just craft-wise, I struggled to let go of sentences or paragraphs that weren’t helping my thesis, though they felt essential to me, either emotionally or scientifically. I spent two semesters reminding myself that it’s okay if not everything is explained.

I planned to write five essays, each about a different event in a different geographic region, each of which changed the course of human evolution. The events would be compared or contrasted to a phenomenon in modern human society, told through my own memories. The essay would align with the geographic route that *Homo sapiens* walked in colonizing the planet. Though I loosely retained this structure, none of my essays were as straightforward as I first imagined. The changes couldn’t be confined to a specific region or time period, and my narrative was hardly linear.

Each essay posed a different set of challenges and forced a different approach. Writing “Becoming,” about East Africa, I was starting with the events in my life that were most recent in my memory. This provided the advantage that my connection to Tanzania was still strong since I had been living there just a few months before I began writing. I hadn’t had much time, however, to reflect on my experiences, or relate them to the other events in my life. For this reason, my first essay is the most limited in scope and the most straightforward. Though it deals with two evolutionary milestones -- hunting and cooking -- the narrative takes place over the course of one day. I chose to focus on my experience with the Hadzabe rather than another Tanzanian tribe because the Hadzabe live in a way that forced me to analyze my own connection to my heritage, my privilege, and my life’s choices. Though I lived in an Iraqw village and spent much of my time with Maasai and Bantu people, their lifestyles didn’t offer the same evolutionary lens as the Hadza lifestyle.

The second essay, “Land of War and Beer,” posed a different kind of challenge. The issues at hand were more complex and sensitive, but also more personal to my own life. The essay required more digressions and more reflection than I had planned; in my first draft I had tried to write much like the first essay, the sections alternating between evolutionary history and personal narrative. I quickly realized how necessary political and historical digressions were, but even then I struggled to simply relay the history rather than argue a point. My fourth and fifth essays, “The Paradox of Being Human” and “Reaching Earth,” followed in the same manner. My advisor used the term “frankenstory” to describe the disconnected parts that came together to create something cohesive and new. I had never written a “frankenstory” before, but learning to do so gave me freedom in the essay I didn’t know I could have. Developing the skill to digress

and come back to the central theme has made nonfiction writing more fun, more interesting, and more promising for my future work.

Each of these essays challenged me to slow down in both my descriptions and dramatization. I would forget that the reader couldn't see what I could, or hadn't been where I had. I wrote more like I was reminding someone of something they had experienced first hand, rather than conveying it in detail. Slowing down enough to create an image for my audience allowed me to revisit the scene in question and notice a detail I had missed. In "Out of the Cave" I had forgotten that the tarantula bit me the week before going to Pai. I had been remembering the bite and my trip as two disconnected events, but in slowing down and communicating the streets of Pai to the reader, I remembered why the trip was so significant for me.

I wrote the essays one at a time, in the order they would appear. I started by collecting all the research I could find in one document, then writing all my thoughts on my theme in a separate document. I composed the first draft of the essay once these steps were done, drawing on my animal behavior and biology education, my journals from my travels, my research and my written thoughts. The process of composing each essay was a little different. My East Asia and Europe essays required more work, more time, and more drafts than my others. With each, after a first draft, I had to start from scratch. I once had a yoga teacher tell me at the beginning of class, "You bring a different body to the mat every day." She meant that my balance, strength, and concentration won't be the same every time I practice, so if poses don't come as easily some days, it's only natural. I thought about that a lot writing my thesis. Every day my mind was in a different headspace, and a section that flowed one day might frustrate me the next.

I try not to emulate other writers, but their influence seeps onto the page, and I let it. Before I began writing, I had read *Sapiens* by Yuval Noah Harari, *A History of the World in Six*

Glasses by Tom Standage, and *The Sixth Extinction* by Elizabeth Kolbert. Each of these books shaped how I thought about humanity, and made me want to delve deeper into my evolutionary past. Other than these works, I had few examples of longform creative science writing to guide me, so in addition to informing my thesis, these books influenced my writing style more than I initially intended. While writing, I read *Behind the Beautiful Forevers* by Katherine Boo, *The Places in Between* by Rory Stewart, and *A Tale of Love and Darkness* by Amos Oz. The first two are beautiful examples of travel narratives; though Boo moved to India, it remained her second culture, and she never lived in Annawadi. Oz's book provided an example of masterful digressions -- a frankenbook made of frankenstories. I noticed in my writing that my style tended to mimic whichever author I was reading at the time. This was true beyond the mentioned works, as I was also reading essays and books for my classes, such as *Darwin Comes to Town*, by Menno Schilthausen, "Street Haunting," by Virginia Woolf, and *Kim* by Rudyard Kipling. In my revision process I returned to my own voice, but left untouched a few of the marks these writers left.

My advisor and I met for an hour every other week to discuss what I'd written. After every meeting, I went through two rounds of revision. In the first, I considered his suggestions and incorporated them as I saw fit. I let my essay sit for a few days before evaluating how my changes were or weren't working. The revision process came more easily than the composing process, but I found revision less satisfying. It felt more like putting together pieces of a puzzle than creating the puzzle from scratch.

Writing this thesis taught me both about myself and about my writing. It helped me realize the evolutionary reasoning behind my love of other animals, and it taught me that even if my ancestors could survive somewhere, that doesn't mean I belong in that place. I learned that I

tend to couch statements in the negative, rather than the positive, and I've learned that it's easier for me to write about science than about myself. This thesis unites who I've become as an individual with the species we've become as a collective, helping me discover what it means to be human.

But this work is far from complete. I have yet to write about most of the places I've visited, and have barely brushed the surface of human evolutionary history. As I continue to travel and learn, I will continue to add essays and revise those existing. My hope is that this thesis may become a book in its own time. But at the very least it will inspire my future work, and has taught me to be a better writer.

Becoming

Thirty-five kilometers from Serengeti National Park, the ground falls away to yield a 300-foot-deep ravine, nicknamed “the cradle of humanity.” The ravine is named “Oldupai Gorge” after the wild sisal plant that covers the landscape, known in the Maasai tongue as “oldupai.” In the middle of the gorge stands a layered monolith. Every layer shelters secrets about our evolutionary history, each of which took anthropologists Mary and Louis Leakey decades to uncover. The monolith makes the gorge scientifically invaluable. The gorge yielded the oldest ape skull ever found. It provided the evidence to conclude that humanity evolved in Africa. It’s where our ancestors began to walk upright and to make stone tools. The gorge is where we began to be human.

In March of 2019 I visited Oldupai Gorge with my study abroad program. I had read about Jane Goodall meeting Louis Leakey here for the first time. I had read about Dian Fossey falling into a hole, breaking her ankle, and throwing up on a fossil here. There was an aura of evolutionary mysticism surrounding the gorge. When I got home to Rhotia (an Iraqw village) that night, I wrote in my journal, “If it weren’t so scientific, it would be spiritual.”

I stood at the lookout point, my face covered with dust and sunscreen, my crimson plastic “Outdoor” water bottle at my feet, and I thought about the Maasai pastoralists who herded cattle here, before it became a study site. Because of the ravine’s scientific sanctity, for nearly a century indigenous people have had to find somewhere else to graze their cattle. The gorge doesn’t support my livelihood, as it did for the cattle herders. When the Maasai roamed in the ravine, they did so because their parents, grandparents and great-grandparents had done the same. Hominids had lived there for millions of years; it had supported humanity since our birth, nurtured our development, and hid our chalk-white bones in its red soil beside those of our

ancestors. Every pastoralist, nomad, warrior, builder, hunter, and agrarian was linked to every other. When the indigenous people were displaced, that link was broken. By cracking open the layers of the gorge, we interrupted the very thing that made it scientifically valuable in the first place.

The ninety-plus degree equatorial heat was getting to me; I took shelter in the wooden, circular, air-conditioned museum and read about *Homo habilis* from a little sign next to a glass case. It was the first hominid species to use complex stone tools. I took out my Harry Potter themed notebook and copied the copper plaque. I got hungry and foraged for some Blue Diamond almonds in my rainbow hemp-fabric backpack.

Two weeks before arriving at Oldupai Gorge, my study abroad group had visited the last hunter-gatherer tribe in Tanzania -- The Hadzabe. We got in the dusty green Land Rovers right after breakfast and drove an hour on dirt roads, discussing the different types of rock music, introducing each other to Grateful Dead and Mandolin Orange songs, and singing along to Lynyrd Skynyrd. Two hours later we tumbled out the door onto a dusty hillside near Lake Eyasi and covered our white faces in hats and sunscreen. Our guide for the day doubled as our translator; the Hadzabe don't speak Swahili, only Hadzane, so our intensive language immersion wouldn't help us that day. After a short hike, we stood under the savannah sun, listening to the history of the Hadzabe and facts about their contemporary lives. I did my best to pay attention. I remember hearing that they number fewer than fifteen hundred. Hadzane is unique among Tanzanian tribal languages and shares no recognizable history with the others. I remember hearing about laws that apply to most Tanzanians, but not to the Hadzabe -- they can smoke weed, they can hunt without a permit, they don't have to send their children to school -- and being profusely warned that just because we're with them does not mean we can smoke weed,

even if we're offered. I remember laughing. After that, I only remember wishing for shade. My skin was burning like toast and I finished an entire bottle of water just standing there. We continued the ascent to a rocky overhang, under which a group of Hadzabe men sat with their sand-colored, flea-bitten dogs, waiting for us.

A teenage boy to my left watched me while he spun a bowstring out of animal tendons. I reached down to pet one of the dogs, but it got up and ran away from me. I stood with my group, uncomfortably aware of my tie-dye overalls amidst the Hadza gazelle-hide clothes and baboon-hair headbands. The men started to build a fire. I ventured to the front of the group to watch. Each Hadza man in turn held a stick between his palms, perpendicular to a thin, flat piece of wood, and moved his hands back and forth down the length of the stick, over and over, until the wood slate blackened and sparked. Beneath the slate lay a little pile of dry straw, and when the red sparks promised flames, the men coaxed the embers onto the kindling. They blew lightly, cradled it in their hands, then gestured to Harrison -- the largest man in our group -- to try.

The Hadza men had succeeded quickly and easily; the task seemed no harder than lighting a match, but Harrison labored for five minutes over the stubborn wood. Then Evan, another man, came forward and succeeded with more ease than Harrison. Matt, a third man, didn't succeed at all, but Luke, a fourth man and ever the outdoorsman, could've been one of the Hadzabe. I wanted to try, but I was nervous. What if it wasn't appropriate for women and I offended them? What if I couldn't do it and ruined it for all the other women? Frank, my Swahili teacher, saw me looking around for reassurance, and pushed me forward. I pressed the twig between my palms and rolled it back and forth as fast as I could, bringing my hands down its length toward the ground. The top of the twig danced from side to side as my hands moved, like a building in an earthquake. Nothing happened. I pressed harder into the twig and rolled it faster

between my palms. I heard someone yell “stronger!” and I tried to be stronger. I did it. A minute later I had burned a hole right through the wooden slab and into the kindling. My palms were raw from the rough bark, my hands shook from adrenaline and exertion, and my forearms would be sore the next day, but the Hadzabe cheered and Ali stepped up to go next.

...

By 300,000 years ago, *Homo erectus*, the father of *Homo sapiens*, had learned to control fire¹. If you saw a *Homo erectus* man lying on the beach in Zanzibar, you might not guess that he was a different species. You might take note of his wide shoulders and big teeth, but you’d probably just conclude that he spends a little too much time at the gym and should’ve gotten braces as a kid. Unlike Australopithecus and our other more ape-like ancestors, these hominids walked upright with an easy, human gait, arms swinging by their sides. Before them, hominids had protruding guts and powerful jaws. But those hominids did not have fire. 300,000 years ago humans depended on fire for nearly everything, from socializing to cooking to protection. But the erect man (*Homo erectus*) had been playing with matches for nearly a million years. In that time he figured out that keeping raw meat in the flame made it easier to chew and sustained him longer. As erectus jaw muscles dwindled, their heads had more space for something we consider a defining feature of humanity -- brains.

In the words of primatologist Richard Wrangham, “How lucky that Earth has fire.” About a hundred thousand years after the Homo genus learned to rely on flames, the wise man (*Homo sapiens*, as we have ever so humbly named ourselves) appeared on the scene. 200,000 years ago, though our brains were large, our numbers were not. We were physically weaker than our ape relatives and we had little more ecological significance than a jellyfish. Our fire kept the prowling lions at bay only long enough for us to reproduce. But with every passing century, we

mastered our surroundings a little more. We burned down forests to create productive grasslands that attracted big game. Our ecological significance slowly grew as we altered ecosystems to support ourselves. Anthropologist Yuval Noah Harari wrote, “The domestication of fire was a sign of things to come.” Even when we intentionally started to repurpose our landscape, our effect was still local. We wouldn’t alter much for 100 millennia. For the time being, *Homo sapiens* was gradually spreading across the continent, just trying to hunt enough calories to survive.

...

After I learned how to make a fire Hadzabe-style, my group followed the guide further up the hillside to a somewhat-open bushland plateau. We formed a line as three shirtless men taught us to shoot their bows and arrows. I was pretty confident. I mean, this wasn’t my first archery lesson. When my little brother turned eight, my dad bought him an archery set and I would practice all the time, so I didn’t anticipate any problems with the Hadzabe bows. But the bowstring was so tight I could barely pull it back. Three times in a row I shot an arrow straight into a bush, about forty-five degrees to the right of the target. At least I was consistent. After my three dismal tries I snuck back into line to try again. I still missed. Were I trying to shoot a gazelle, it would turn around and laugh at me.

During this process our guide and translator was explaining to us how the Hadzabe hunt. They eat nearly anything except snakes. The region around Lake Eyasi blooms with desert roses, which can be boiled and condensed to make a poison powerful enough to bring down a giraffe. The Hadzabe hunters coat their arrows in the liquid, and woe to the animal that gets so much as grazed by an arrowhead. The men are expert trackers, and if their arrow doesn’t kill an animal

outright, they follow its panicked trail until they find it paralyzed by the poison. Boiling the meat renders that toxin harmless, and the camp can share a few bushpigs around their hearths.

...

When I was eight, I stepped on a butterfly and cried. I used to carry daddy-long-legs out of my camp bunk so the other girls wouldn't kill them. I decided to become vegetarian when I was nine, and vegan at eighteen. During the cultural visit, I had to force myself to listen to stories of slow deaths of the Hadzabe's prey and imagine a bushpig's wide, fearful eyes in the moments before the hunting knife ended it all. But I am an anomaly. Out of the twenty-six students on the trip, two of us were vegan. I can restrict my diet because I was born in plenty. While snow piles high for fifty miles around me, I walk on white tile floors and choose from wooden shelves whether I prefer purple carrots or orange carrots, whether I want mini avocados from Spain or Haas avocados from Mexico. Hunter-gatherers don't have that option.

Cooking was just a step, albeit a significant one, in the process of *Homo sapiens* evolution. Fire would influence which individuals survived to reproduce and which perished². It would render inedible foods edible, and let us glean more calories from foods we already depended on. But first, humans needed something to cook. In other words, before hominids could cook, we had to hunt. In 1969, Irvan DeVore and Richard Lee proposed that our small, slow, clawless predecessors could not have hunted large prey without unprecedented levels of intelligence and cooperation.

For a habiline (an ancient hominid) to kill an antelope, he first had to catch it. Habilines walked upright, but not like *Homo sapiens* or *Homo erectus*. Even a prehistoric Usain Bolt could not chase down an antelope on his own. Habilines had tools, but none that could quickly kill at a distance. They needed to cooperate. They would space themselves out along the path they

planned to pursue the prey, and when one individual had run his course, the next would take over until the antelope was tired enough to be killed. Or maybe they would collectively chase a herd of wildebeest off a cliff, then climb down and take their share. Whatever the strategy, they couldn't do it alone.

Once the prey was dead, the small vulnerable habilines were at the mercy of other hungry predators looking for an easy snack. Eating at the site of the kill would be like sending a papyrus invitation to hyenas that said, *You are cordially invited to the grasslands for habiline hour de vours followed by an entree of freshly killed antelope*. Dragging the whole carcass back to their territory would take too long and be too labor intensive. At any point they could be attacked by a predator, or even other hominids. Instead, some of the hunters would cut off large chunks of meat using serrated stone knives, while others would be on hyena guard. They knew their roles. This was both an organized division of labor and a practice in delayed gratification, two basic foundations of contemporary human society. The individuals with brains too small to plan ahead, those with too little self control to share their kill, and those without the patience to eat only once they were in the safety of the forest were excluded from the hunt and didn't survive long enough to reproduce³.

But sometimes, the men might have come home from the hunt empty-handed. The antelope had gotten away, or the leopard stole the kill. On these days, the band would have relied on the tubers, nuts, berries and mushrooms that the women collected. Because hunting took men farther from the home and for longer periods of time, the women were tasked with raising the children. Gender roles unfolded. Some of these berries and mushrooms were poisonous and could kill a person in a few minutes. The women needed knowledge acquired over generations of

gatherers in order to avoid these or learn how to make them edible. The knowledge and practices of gathering perhaps gave rise to the beginnings of lore and customs⁴.

...

After my study abroad group “learned” to shoot a bow and arrow, we followed the women through the bush. My tie-dye overalls only came down to the middle of my calves, and in trying to keep my exposed shins away from the thorns, I walked headfirst into an acacia branch. The student affairs manager untangled my braid from the thorns, only to watch me fall on my butt. The Hadzabe women finally halted next to a green acacia tree and began digging with a stick. Two minutes later they emerged victorious (and scratch-free) from the brush with two giant round roots. One woman handed her root to my friend, who had no idea what to do with it. The woman took the root back, split it down the middle, and took a bite of the white, milky center. We passed it around for everyone to taste. The roots almost bypassed me, but I made sure to get my hands on one. I regretted it. It was bitter and starchy. I asked why they eat this, and the guide told me it’s a source of water. Of course. I felt guilty as I discreetly threw my little chunk of acacia root into the bushes. I preferred the water in my bottle.

The group was getting hungry, so we left the Hadzabe and went to eat our packed lunches under a baobab tree with fruits swinging tantalizingly out of reach. I opened my collapsible, blue, silicone tupperware and filled myself with rice and beans that -- thank god -- I didn’t have to hunt. I crunched on my neatly sliced cucumbers and carrots, and dropped a cucumber in the dirt, then hastily buried it beneath the baobab. Maybe a cucumber vine is snaking around the base of the baobab now, marking my presence. One by one, students popped on their tupperware lids and headed back to the jeeps.

Three million years ago if a mutant hominid had been born with my skin color, hair color, and philosophical tendency toward a vegan diet, they would have died. Studying abroad, I spent four months pouring oral rehydration salts into my water bottle and making sure I had enough Dale's Raw Food Bars and scratched sunglasses to get me through an expedition. I rode in jeeps to see the impala and giraffes my ancestors hunted. Though the same species, my genes were different from those of the *Homo sapiens* who evolved there. My skin and eyes were lighter, my feet flatter, and I had little brown dots covering my face, endearingly called freckles. My blood wasn't suited to highland oxygen levels, and I had to take pills to ward off any parasites to which the indigenous people are genetically resistant. The food they grew was the food they had, so they had to be able to eat it. It wouldn't be possible to live in East Africa with a peanut allergy.

On the little SFS (School for Field Studies) campus in rural, remote Rhotia we had indoor showers and industrial ovens. We needed them because we didn't know how to be Tanzanian. Five kilometers away, on the farms bordering Karatu, the communal water pump was an hour or more away on foot. My homestay mama's family had two bowls, for both cooking and serving. The first time I visited her, it took us three hours to make a lunch of cabbage, rice, and vegetables. Sophia, a cook for my study abroad program, would rejoin her Maasai family during the off season to take her cattle to Ngorongoro crater, where the water was more plentiful. She trekked for miles after her cattle with no water bottle or Dale's Raw Food Bars, and had never worn sunscreen in her life. And Bura, a security guard on the program's campus, would stay awake all night outside our tents to guard us from lions or hyenas, or anything else that might want our Blue Diamond almonds. During breaks, Sophia and Patricia would make us chai and they would teach me Swahili. I interviewed Sophia for a WWF project I had for my environmental policy class. I'd postpone my jog for five more minutes so Bura could show me

the jackal impression he'd been working on. We are not different species, yet their recent ancestors evolved here, and mine did not. It's only been seventy-thousand years since our ancestors were the same - a blink of an eye on the evolutionary timescale. But in that blink my ancestors lost East Africa as a home.

Notes

- 1/2: Wrangham, Richard. *Catching Fire How Cooking Made Us Human*. Profile, 2010.
- 3: DeVore, Irvén, and Richard B. Lee. *Man the Hunter: the First Intensive Survey of a Single, Crucial Stage of Human Development-- Mans Once Universal Hunting Way of Life*. Routledge, 2017.
- 4: Harari, Yuval N. *Sapiens : A Brief History of Humankind*. Translated by John Purcell and Haim Watzman, First U.S. ed., Harper, 2015.

Land of War and Beer

In 2013 I was sitting with my tenth-grade class at Kibbutz Ketura in southern Israel, staring at the stars. We were on a field trip to the famous kibbutz. Two of my classmates, Sarah and Anna, were joke-wrestling in the middle of our circle because of some game we were playing, though I can't remember what. In a split second, the whole group jumped up, and I saw the fear on their faces before I heard the siren. It took me a moment to snap out of my star-induced reverie, and I'd already lost five of my precious fifteen seconds to get to safety. Luckily, some of our rooms were just a few feet away, and rather than a single bomb shelter or two for the entire community, like most places, each room could be turned into a shelter. I ran into the nearest one with a few classmates and wedged myself between the wall and the nightstand to make room for everyone else. Yosh punched out the screen in the window and placed the white, foot-thick bomb shutter on the window frame. Mendel was making fun of everyone for being so solemn and scared. I felt grateful when someone finally told him to shut up.

Five minutes passed. Maybe ten. Maybe fifteen. I don't remember exactly, but it seemed like an hour until we heard the all-clear siren. Meital, one of our leaders who lived in the dorms with us, had been in border security in the army, and she guessed that refugees from Sudan trying to cross the Egyptian border into Israel to get to safety triggered the missile siren. Sometimes it happens. We went back to playing our game.

...

I learned about prehistoric humans in my sixth grade social studies class. I had to draw a series of pictures for homework comparing the lives of cavemen and neanderthals. When the neanderthals disappeared, the neolithic revolution began and people planted farms to make their lives easier; cro-magnon was smart and neanderthal wasn't. Then I learned to write my name in

hieroglyphs, because Mrs. Klein, my teacher, taught us that farming started in Egypt and then boom, there was civilization.

For five years I thought farming, the neanderthal disappearance, and the advent of civilization all happened at the same time, and I thought I was smart for knowing about it all. I never considered that we could have existed anywhere but the fertile crescent. I wasn't entirely sure what evolution was. My parents were atheists, but sent me and my siblings to a religious Jewish school. No one taught me that other human species once existed, or that neanderthals were humans. I was pretty sure every human used to live in Egypt. Did I not wonder how the neanderthals disappeared? Why didn't I question the timeline of it all? Why were all my drawings exclusively of men? The funny part was, in sixth grade I was the best student in my class. I got 100% at the end of the year and Mrs. Klein bumped me up to the advanced class for the next year. Yet what I learned was wrong. The word extinction never appeared in the curriculum, and we skipped about 60,000 years of human history. I'd be shocked if Mrs. Klein knew neanderthal brains were bigger than ours, and even more shocked if she knew beer was one of the reasons Early Modern Humans (EMH) settled into farming¹. But she did get one thing right -- it all happened in the Middle East.

...

200,000 years ago *Homo sapiens* (hereafter sapiens or EMH) emerged in East Africa. We were a restless, flexible species, surviving in forests, savannahs, and deserts. A few dozen millennia after our birth, we ventured out of Africa for the first time. By about 177,000 years ago, sapiens had made it to northern Israel. About 110,000 years ago, sapiens crossed the Bab al-Mandab strait between Ethiopia and Yemen, first stepping foot onto the Arabian Peninsula. 100,000 years ago we pushed into the Middle East again. But all these ventures were short lived.

Every time sapiens crossed continental lines, we were pushed back again by another human species. For a hundred millennia, we couldn't get a foothold outside of Africa.

70,000 years ago, that changed. Curly-haired, dark-eyed, slight of frame sapiens crossed the Sinai Desert, and blonde-haired, blue-eyed, burly neanderthals greeted them at the door. Our long lost brothers. Esaw. Abel. We've all heard the stories. You can imagine that it wasn't a welcome reception. Probably something along the lines of, "Do I really have to kill you again?" But something was different this time. In previous explorations, neanderthals had stood their ground, killed what sapiens they could, and chased the rest off the continent. But 70,000 years ago, when droves of EMH poured into Eurasia, neanderthals couldn't drive them out. We stayed, multiplied, and spread?

Why? Merely 30,000 years prior, EMH had failed to eke out a life there. How did we manage it this time? Why did we want to?

Maybe the answer to both these questions is the same. It's possible something changed genetically and we could now physically defeat neanderthals in band warfare. But Eurasia was neanderthal territory. They knew the environment and were better adapted to it than we could have hoped to be. One on one, a neanderthal would win every time. Ten on ten, the neanderthal's still got us beat. But what about 100 on 100? 1,000 on 1,000?

There are two theories about the disappearance of the neanderthals. The first is called the interbreeding theory. It tells a charming story of Romeo-neanderthal and Juliette-sapiens; the story suggests that sapiens and neanderthals were hardly different species, so when they met after a two-million year separation, they still had enough genes in common to reproduce. And reproduce they did. Over a few dozen millennia, neanderthals were absorbed by sapiens. At the

end of the last ice age, modern humans emerged, a hybrid of the two species. If you've ever read *Clan of the Cave Bear* by Jean M. Auel, you know this theory. It's a nice story.

The other theory is genocide. It's called the replacement theory. In the words of Yuval Noah Harrari, author of *Sapiens*, "tolerance is not a sapiens trademark." Before EMH arrived, neanderthals had been in Eurasia for nearly 400,000 years, and their ancestors had been there for two million. When the last ice age began, neanderthal populations were unfazed by the expanding glaciers. Their range spread from the Iberian Peninsula and Britain to Uzbekistan and central Russia. From the Sinai Desert to the North Sea. Their name comes from the Neander Valley in Germany. They could survive in nearly any environment. Their future on the planet was almost secure. Then sapiens showed up.

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Sapiens societies share common stories. Religion is a story. Law is a story. Money is a story. Our ability as a species to think abstractly and imagine realities beyond our own makes us unique. It doesn't make us smarter or better than other species, just different. Neanderthals had bigger brains than us, but that doesn't mean they could think abstractly. A sapiens leader had to motivate a thousand individuals to fight for a land that wasn't their home, against an enemy who had done them no harm, to reap no worldly benefits, and perhaps die in the process. Essentially, the sapiens needed to believe they were fighting for something beyond themselves. Maybe some kind of afterlife or moral purpose. Sound familiar? One way or another, 70,000 years ago, we were in Eurasia to stay.

When Yuval Noah Harari said that tolerance is not a sapiens trademark, he wasn't just talking about early modern humans. He didn't say tolerance *wasn't* a sapiens trademark, he said "*isn't*." Yuval Noah Harari lives in Jerusalem. Every day he takes a bus or a car through East

Jerusalem to his office at the Hebrew University Campus on Mount Scopus. Every day, the military police stop him at the gate, check his car, and ask him a few questions before letting him through. If he takes the bus, they board the bus, check under the seats, and ask the driver the questions. When he enters the main building, they ask for his ID. I know this, not because I know Dr. Harari's personal routine, but because I spent my first semester of college at Hebrew University. This is daily life.

I remember one day especially well during that semester in Jerusalem: November 19th 2015. It was my little brother's tenth birthday and I felt guilty for not calling him. I was eating dinner in the dining room. Probably quinoa or corn schnitzel. My friend Haley walked in with a sly smile on her lips, the type that would let us know she was about to make a joke. I watched her walk up to a table with some of her friends, and as they looked up to tell her what they had just found out, I saw their faces. I stopped talking and tried to hear what was happening. Haley's friend, Maya, took Haley's hands and told her something that made her smile disappear. Her eyes widened in her skull. Maya got up from her seat to take Haley out of the dining room as she broke down sobbing. The table erupted in whispers and the rest of the room fell silent. Then we heard our friend Josh wailing in the courtyard. Someone came over to our table to tell us what had happened. Ezra Schwartz. Josh's childhood best friend. The jester of USY (United Synagogue Youth). He was dead.

Earlier that night, on the road from Jerusalem to an Israeli settlement in the West Bank, there was a traffic jam. Ezra was in a car with two of his friends. There were Palestinian men snaking between the immobile cars, and I imagine that's when Ezra and his friends got scared. Maybe it was when they saw the gun. Maybe it wasn't until the men were at their window. In a

split second, a bullet broke through the glass and hit Ezra in the neck. He didn't die right away. He made it to the hospital. He died there.

For the two months before Ezra died, the violence had been mounting. I had an app on my phone that told me when and where a terrorist attack had occurred and directed me to the safest route home. October 14th, before Ezra died, I was lying awake in my bed, too stressed to sleep. I needed to see my thoughts on paper. I wrote, in my first journal entry since I was seven, "I hate the chaos and discrimination and the constant fear and paranoia. I hate myself for being suspicious of people and I hate the feeling that no one's in charge. I feel helpless because there's nothing I can do to make the situation better and the most I can do is stay alive." I've forgotten that I felt that way. I wrote every day from then on. By the night of Ezra's death a month later, the only thing I wrote in my journal about the terrorism was, "The world is falling apart and no one knows what to do about it." I had stopped writing long-winded paragraphs about the political atmosphere of the world. I had nothing left to say.

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Two peoples claim to be indigenous to the area between the Jordan River and the Mediterranean Sea. 2,000 years ago, when the Romans sacked Jerusalem and destroyed the second temple, they named this area "Palestina," after the biblical enemy of the Jewish people, the Philistines³. Drove of Jews were taken North into Europe as slaves. Others fled. Many, though, stayed in the place they knew as home. Judaism became illegal in the Empire and the Romans used the gold from the temple to pay for the erection of the Colosseum in Rome. Carved into the Arch of Titus is a scene depicting Roman legionaries carrying the solid gold menorah (the famous one that burned for eight days and eight nights) out of Jerusalem. It wasn't a pretty time. Famous Jewish rabbis became known for the ways they died in torture chambers. Rabbi

Akivah, one of the most celebrated rabbis in history, had his skin combed with iron rakes as he chanted the “shmah,” a passage from the Torah. Judaism became matrilineal rather than patrilineal because rape by Roman soldiers was so common, women couldn’t always know if their children belonged to their husbands. Seven centuries later, Rome had fallen, the Byzantine Empire had come and gone, but the violence wasn’t over.

Mohammad had made a name for himself in Arabia, then came to Palestina to ascend to heaven. Right on the spot where the Jewish second temple had stood. Arab Caliph Omar decided to come to Jerusalem and take it in the prophet’s name. He renamed it Al-Quds, meaning “the holy.” For the next several hundred years, Palestina was in Arab hands. Jews were a minority, referred to as “the people of the book. They fought alongside the Arab Muslims during the crusades and retained their second class citizenship through every Arab change of hands. The Egyptians. The Saudis. The Persians. The Ottomans. Fast forward. By the end of the nineteenth century, antisemitism in Europe had reached new heights. An Austrian man named Theodore Herzl stood up and said that the only way to escape oppression and live as a free Jew was through self-determination. Waves of Jews migrated from Europe to Palestina, now also called Zion. But it wasn’t just our home anymore, as it once had been. There were other peoples living there, and self-determination for us, would mean second-class citizenship for them.

After World War I the British and French congratulated themselves on their victory by dividing up the Middle East. The British got Palestine. As the Holocaust brewed, Jews tried to escape to Palestine/Zion, but the British had closed the borders. They fought for the Jews in Europe, and fought against them in the Middle East. The British publicly hung Palestinian Jews convicted of helping European Jews immigrate. After the Holocaust, the global Jewish population had been halved. The world suddenly decided the right to Jewish self-determination

was a moral issue. On November 29th, 1947, the United Nations passed the partition plan with a two-thirds majority. Jerusalem would become international territory, controlled by the UN. Jews would keep half of Palestine, a land they named “Israel,” to exist as they wished. The other half would go to the Arab Muslims. They had not yet united as a people to call themselves “Palestinians.” For the time being they were just Arabs forced to relocate. Jews danced in the streets. They had a home, however small it may have been. Within a day of the vote, gunshots interrupted the dancing. The Arab Muslims did not accept the Partition Plan.

For the next year and a half, Israeli Jews and Arab Muslims fought a bloody war of independence. The Jews won. The Arabs got nothing. Seventy years went by. Wars. Wars. Wars. With every attack, every attempt to wipe Israel off the map, Israel got more defensive, and more violent. They “othered” their former brothers and sisters. They called them the enemy, the very thing that had been done to them for 2,000 years. In 1964, a mere decade and a half after Israeli independence, a man named Yasir Arafat told the disenfranchised people of former Palestine that they were Palestinians. They were one people, and they should fight as such. They were living in “the West Bank” of Jordan. Yasir Arafat demanded that the West Bank and Jerusalem become the Palestinian state. In 1967, the Israeli Defense Forces (IDF) bombed an air force base in Egypt. The base had been preparing fighter jets to attack the Jewish State. In six days, the IDF had captured the Golan Heights from Syria, the Sinai Desert from Egypt, and the West Bank from Jordan. The Palestinians were citizens of no country with no autonomy or power to choose their own fate, and now they were forced to live within the walls of those who displaced them. By 2015, little had changed.

The UN altered the definition of refugee for Palestinians. For nearly every person in the world, “A refugee is someone who has been forced to flee his or her country because of

persecution, war or violence.” For Palestinians, refugees are “persons whose normal place of residence was Palestine during the period 1 June 1946 to 15 May 1948, and who lost both home and means of livelihood as a result of the 1948 conflict.” Parents could now pass their refugee status on to their children. The grandchildren of those who fled in 1948 are still considered refugees. And their children will be refugees until they achieve Palestinian statehood. That status affords them protection from the UN, but makes citizenship harder to obtain from neighboring countries. It forces the world to sympathize with them, but they can’t own the land they live on. Their only way out is through Palestinian statehood. In 1993, Israeli Prime Minister Yitzhak Rabin offered Yasir Arafat everything he had asked for except Jerusalem. It was the year of the Oslo Accords. It was the year that they both won Nobel Peace Prizes. Yasir Arafat declined. A Palestinian faction, Hamas, publicly opposed the Oslo Accords. They did not recognize Israel’s right to exist. Protests erupted in Israel among the political right. They did not recognize Palestine’s right to exist. In 1995, Yitzhak Rabin was assassinated by Yigal Amir at a peace rally⁴.

Hamas currently controls the Gaza strip. They frequently launch rockets into Israel. Likud, a right wing party in Israel controls the Knesset, or Israeli Parliament. They’re responsible for the continued settlement of the West Bank. Hoping for peace feels like hoping for a letter from Hogwarts. That November in 2015, some Palestinian men were tired of fruitlessly hoping and saw the settlers as the root of their struggles. Ezra Schwartz was a settler. It didn’t matter that he was American, or a volunteer, or only a temporary resident. He was Jewish and he was on their land, so they shot him.

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The two theories about neanderthal extinction -- the replacement theory and the interbreeding theory -- seem to oppose each other, but it's possible that both are true. Four to six percent of non-African DNA is neanderthal. Despite the trend of sapiens intolerance, every so often a neanderthal-Romeo and a sapiens-Juliet successfully reproduced. Over 40,000 years, some of these hybrids made their way into the sapiens gene pool. Maybe a few sapiens with lighter skin, inherited from their neanderthal ancestors, were better adapted to the Eurasian Ice Age winters. The decreased levels of melanin in their skin let them absorb more vitamin D from the sun and reduced their chances of getting rickets. It's possible these individuals had a higher chance of survival than their "pure" sapiens siblings, and the fair skin trait multiplied in the population. Blue eyes were still rare in the Middle East. They wouldn't spread until sapiens colonized Europe, but they were in the population. 30,000 years ago the last of the neanderthals disappeared, leaving only their hybrid descendants behind.

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12,000 years ago, the last Ice Age ended. Glaciers melted, lakes formed, and ecosystems changed. In the Fertile Crescent (the Lower Nile to the Persian Gulf), cereal grains thrived. Barley and wheat grew in quantities they never had before, and nomadic sapiens discovered something miraculous -- grains could be stored. The hunter-gatherer lifestyle was unstable. Famines could decimate populations of sapiens. Cereal grains solved that. When no other wild foods were available, stored grains could sustain sapiens bands until the hardship ended. Dried grains could be soaked in water and turned into gruel, which could be mixed with whatever wild berries, mushrooms, or tubers were available. Occasionally, though, someone left a bitumen-lined basket of gruel out for a few days and it would become fizzy. Maybe, if it had been left out for long enough, it would give the drinker a little buzz.

Imagine for a moment that you're a prehistoric sapiens in Israel during a famine. You've been out hunting all day, trying to find any prey that hasn't left the region in search of water, but you have nothing to show for it. You come home to your mud hut to find that you've left your gruel out in the desert sun, but you have nothing else, so you eat it anyway. Five minutes later your head is swimming and you feel abnormally calm. Maybe you feel like finding a pretty sapiens girl, or maybe you just want to stare at the stars because they've never looked so beautiful. The crickets are singing harmoniously, and you don't know why. You don't understand the magic behind the fermentation process, but you know you didn't feel this way before you ate your gruel. Is there something up there in those pretty stars making you feel like this? Is there something watching you? Maybe someone?

Then the famine is over. The berries are in fruit and the prey has returned. The landscape is flecked by golden wheat, a gift from the heavens. You're not dependent on dried grains anymore. You can get whatever you want to eat, anywhere you want. But what if the famine comes again? What if the lands dry up and the prey disappears? You harvest all the wheat and barley you can and find a nice, cool cave to store it in. But not all of it. Maybe you leave a little out in the sun for a few days and see if it gets fizzy again. It does. Add a few berries and see how it changes the taste. Maybe some surrounding bands have noticed how much wheat your territory produces. Maybe they see that river flowing south out of the mountains. So they attack. Now you have a choice. It would be easier to leave, but you don't. You gather a few dozen of the strongest in your band and defend your territory. Maybe you clear out some of the plants that can't be stored, or some of the wheat and barley plants that don't taste as sweet. You've invested in this land now. You're not leaving. You don't quite give up gathering, but each year you rely on it a little less and less. Fifty generations later, your descendents are still here. They've perfected that

fizzy drink and have even invented wooden barrels for making it. They drink it through dried straw out of a big communal vat, and thank the stars for giving it to them.

That fizzy drink became what we now call “beer.” It wasn’t just discovered once, but many times throughout the fertile crescent. It shifted humans from passive consumers to active creators. EMH no longer simply harvested and stored wild grains, but cultivated and protected them. Civilizations sprung up around them. Individuals who had an intolerance to gluten would perish. “Man-the-hunter” hunted less. We invented bread and ate as many carbs as the fields would provide.

Civilization was in the making. A few thousand years went by, and we had religion. The stars who had given us beer now had names, and monuments in their honor. A few thousand years more and we could write. We drew glyphs in wet clay and let it dry into bricks. The glyphs represented gods or beers -- the two most important things. About five thousand years ago, in present day Iran, the first city emerged. It was called Ur. The Hibri people lived there. Around the year 2,000 BCE a child in Ur was born to an idol-shop owner. His name was Avram, but he would later change it to Abraham. Perhaps you’ve heard of him.

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In the fall of 2015, almost every Friday afternoon I would take the “4” bus to the Jerusalem Central Bus Station, then the “32” forty minutes to a little suburb called “Mazkeret Batya.” That’s where my cousins live. My parents were in New York, and my siblings were scattered around the world, so while I was living in Jerusalem, my cousins were my family. After taking my shoes off and putting my backpack down in my cousin Rachel’s room, I would go into the kitchen. Sometimes my aunt would leave out a mop for me to clean the floor before shabbat, sometimes she would be in the kitchen cutting vegetables for a salad and I would help her, but

most times she would leave about six bags of lettuce on the counter for me to wash. I found it oddly meditative. 60% of Israel is desert, so in order to feed the population, farmers and scientists teamed up to develop methods of growing vegetables in sand. This lettuce had come from the desert, and sometimes little sand flies would get caught between leaves and end their lives there. My job was to wash all the sand and all the flies from each leaf before drying it. In Judaism, just about the most unkosher thing you can do is eat a bug. So my job was crucial.

If I finished with the lettuce in time, I would get to braid the challah. Usually Rachel, the youngest in her family and the only girl, would stand on a chair next to me, and I would teach her to weave six strands of dough together. Sometimes she would manage three strands. Before dinner I would French braid her hair and she would keep the braid in all weekend. Though she would complain about it hurting every time, the next week she would beg me to do it again. Rachel had blonde, straw-colored straight neanderthal hair, which looked more like wheat than the flour in the challah did. Somehow, over ten thousand years, wheat had transformed from wild, golden berries in the field to fine, white flour in a bag. At the end of the last ice age, wheat fields probably spanned the length of what is now Mazkeret Batya. Jerusalem didn't become one of the first cities by accident. It was on protectable land (three hills) surrounded by resources. It was the city King David chose for the capital of his kingdom. The city the Maccabees defended to the death. It was a city worth fighting for. It still is. It's the city Arafat demanded, and the city Rabin refused to give up. It's the city Ezra Schwartz died for. However the advent of farming has changed the world beyond the fertile crescent, for the past four thousand years in Jerusalem, not much has changed but the method of storing the wheat.

If Rachel and I finished the challah early, we would go downstairs and play ping pong with the boys in the bomb shelter.

Notes

- 1: Standage, Tom. *A History of the World in 6 Glasses*. Walker & Co, 2005.
- 2: Harari, Yuval N. *Sapiens : A Brief History of Humankind*. Translated by John Purcell and Haim Watzman, First U.S. ed., Harper, 2015.
- 3: Mark, Joshua J. "Israel." *Ancient History Encyclopedia*. Ancient History Encyclopedia, 26 Oct 2018. Web. 11 Dec 2019.
- 4: Yitzhak Rabin – Biographical. NobelPrize.org. Nobel Media AB 2019. Thu. 12 Dec 2019.
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Out of the Cave

In the summer of 2016, I lived in Huay Pakoot, a little Karen village in Northern Thailand, with an organization called Global Visions International (GVI). I was spending my summer volunteering in elephant conservation and research. On July 17th I walked down the wooden steps of my homestay into the dawn air, and like every other morning, I stopped to watch the mist rising over the forested mountains. The rainforest below was waking up to the gibbons calling each other. But there was something eerie about the mist. The sun hadn't fully risen yet, and the setting moon had a reddish tinge. Earlier in the morning my homestay family had seemed to feel it too. Wampon, my homestay mama, didn't smile and was unusually harsh with her children. When I got up to base, Ellie, an intern from England, was telling the other interns and volunteers about a strange voice she had heard the night before.

The Karen people are an indigenous hill tribe who live in Northern Thailand and Southern Myanmar. They speak Packinyaw, a language Google Translate doesn't recognize, and they eat rice, eggs and pork essentially every meal. There's no Pad Thai in the hills. The Karen people are Buddhist animists. They believe that the world is controlled by 27 spirits, all of which inhabit every living thing, and most nonliving things. Some of these spirits are good, some bad. When the Karen kill a pig for dinner, they beat it to death with wooden clubs to drive away the bad spirits. The pig's human-like shrieks reach every corner of the village. The people of Huay Pakoot believe that the spirits can sometimes take human or animal form, and that they live in the forest at the bottom of the village, a place teeming with vipers and tarantulas. Appropriately, it's called the spirit forest.

Ellie's homestay bordered the spirit forest. The night before, she was in her room and she heard a beautiful song in a language she didn't recognize. It wasn't Packinyaw. The voice

sounded like it was coming from the driveway. She thought maybe her homestay mama or a neighbor was singing. But when she got outside, there was no one there. Then the voice stopped. Ellie turned around to go back inside, and she heard the voice again. She walked to the end of the driveway to see where it was coming from. It was coming from the spirit forest. The next morning her homestay mama told her she hadn't heard any voice. No one else in the village had either.

As Ellie told us this story, Suli, a researcher from Malaysia, ate breakfast on the other side of the room. The base manager, Danielle, who the villagers jokingly called Danya (which means meat), joined our circle and told us not to let Suli hear. Apparently, three months earlier he had unlocked his house and saw a woman with long, ragged black hair tied to a chair with a gag covering her mouth. He ran away and came back with his girlfriend, Megan. When Megan opened the door, the woman was gone. Since then, Suli had not only believed in the spirits, he'd been terrified of them. In fact, all the researchers and staff members believed in the spirits.

As a full moon approaches, the bad spirits can take human form and settle in the village.

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In each new space *Homo sapiens* settled, we told a new story -- a tale that the sapiens had to believe without seeing in order to live as a collective. A tale of war could mobilize droves of Early Modern Humans (EMH) to go to fight the other human species. A tale of leadership convinced sapiens societies to give most of their resources to one almighty ruler. Some tales simply existed to explain the unexplainable, like a disembodied voice singing in the night. Though these stories were not embedded in our genes, our capacity to tell them was. So fifty thousand years ago, when EMH settled in East Asia, we behaved like our Middle Eastern siblings -- we waged war on other human species. We wiped out *Homo erectus*, the evolutionary

father of sapiens. Extant for two million years, *Homo erectus* had persisted longer than any other human species; we were mere infants in comparison. We eliminated *Homo floresiensis* and *Homo denisova*. The latter took so long to kill off, six to eight percent of Asian and indigenous Australian DNA is Denisovan¹.

In the Middle East, civilization and religion came from agriculture. The glaciers melted and the wheat fields took their place. Sapiens stayed near the wheat and built flourishing settlements, which became walled cities. They established the cultures that birthed all existing monotheistic religions, along with a smattering of polytheistic ones. In East Asia, on the other hand, EMH thrived as hunters and gatherers. A few EMH communities tried their hand at rice farming, but the hunting and gathering societies controlled the land, often terrorizing their sedentary siblings². We don't know much about prehistoric East Asian cultures. The climate was hot and humid, and fossils didn't preserve well. But during long periods of rain, EMH bands would retreat into caves for shelter. These rainy months give archeologists a glimpse into their lives.

In 2006 archeologists unearthed Tham Lod, or Lod Cave, in Thailand. A kilometer and a half deep, the cave is like a little prehistoric village. Parts of it are filled with hearths, presumably where EMH would spend family time at night after a long day of hunting gibbons in the rain. Areas of the cave were used for manufacturing stone tools, a necessity if the cave dwellers wished to hunt anything without claws or long teeth. Ochre paintings of humans and animals cover other areas. I imagine paleolithic parents dumping their kindergarten-age children at cave painting class while they went to the stream for some adult time -- maybe to make more children. More likely, though, these paintings represented spirits.

In Sulawesi, Indonesia, the oldest figurative cave art in the world depicts images not so different from those in Tham Lod. The Sulawesi art illustrates a hunt, but the hunters are not humans. They have two legs, two arms, and potentially spears and ropes. But some also have tails. Others have bird and cat heads. The humanoid figures are tiny compared to the buffalo and pig figures being hunted. The paintings are 44,000 years old. Humans only reached East Asia 45,000 years ago. Thousands of years later, thousands of miles away, European hunters would paint the same type of image on a cave wall in Lascaux, France. Instead of a buffalo, they'd depict an Aurochs, but they'd replace human heads with bird and feline heads all the same³. These paintings show the significance of the relationship between humans and wildlife, but they also represent superhuman beings, or spirits.

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On July 3rd of that summer, I woke up in a tent in a circus-themed hostel in Pai. A swimming pool served as the hostel's centerpiece. Between the pool and front desk, boxes of bowling pins, hoola hoops, ribbons, flame throwers, batons and unicycles dotted the tiled floor. The boxes attracted the loud and colorful tourists of the city. The right side of the pool boasted a bar, a pool table, and a foosball table so that tired jugglers could comfortably get drunk under neon lights without having to walk more than twenty feet. To the left of the pool, rows of white tents lined a grassy hill. I woke up surrounded by tents filled with a slew of (likely) hungover international tourists. My friend, Katie, was already dressed. I had come to Pai with nine other GVI volunteers and interns for the weekend, looking to escape Huay Pakoot's tarantulas and boiled cucumbers. I walked outside to find the rest of my group and passed seven or eight people in bloody bandages and slings. One of them advised me not to rent a motorcycle. The rest of my group was finishing up breakfast. I ordered a mango smoothie while Vanessa, a volunteer from

America, took a break from juggling bowling pins to lead a yoga class next to the pool. Vanessa had been a circus performer for two years before she came to Thailand. She was in her element. But even she agreed that it would be nice to sleep at night, something drunk circus performers and lack of air conditioning wouldn't allow.

We decided to move hostels. On our way out, we saw a pamphlet that said "Lod Cave." There was a little explanation of the early cave-dwelling people that lived there, and "Pre-paid tour" written beside it in large, red letters. We called the tour company, then we went shopping. Open storefronts displayed racks of kaleidoscopic sundresses and sarongs along car-free paved roads. Jake, the only man from GVI who came to Pai, opted out of the "girly" things and got a Chang beer at an empty restaurant. I bought myself a turquoise elephant shirt to go with my three pairs of elephant pants. We visited a Buddhist temple in the city center and used our new clothes to cover our legs and arms modestly. Some monks greeted us and escorted us to their brothers watching Muay Thai on TV. They drank jasmine water with us and taught us to meditate. We labored up hundreds of steps to take pictures with a giant white buddha, and I met an Israeli named Eyal who had just spent ten years in China mastering Kung Fu. He clambered back down the hundreds of steps with us while he talked about his martial arts training, and joined us for a few beers by a public pool.

Fueled by sugary Thai coffee and jasmine tea, we had spent the whole day moving. We had climbed dozens of flights of steps and walked the length of the city. As the sun began to set, we checked into our spa-like hostel. Stepping over the threshold, the world transformed. A wooden swing hung from a tree limb behind the reception building. Flowers floated in a fountain at the entrance. The noise of the circus hostel seemed to exist only in another universe. My friends Manda, Klara, Katie and I shared a room. Our plush western beds had been made with

white linen sheets, and our room boasted a bathroom with a western toilet. Coming from a village with only squatty potties, that was a big deal.

The week before, I hadn't slept much. The Karen sleep under mosquito nets, on floor mats about an inch and a half thick. The mat wasn't soft enough to comfortably sleep on my side, so I spent nights on my back staring up at the spiders, illuminated in the moonlight, looking for a way through the net. I would get tired after our morning treks and take a nap in a hammock at base. That Wednesday, a tarantula bit me during my nap. My thumb swelled, then my hand went red and numb. I threw up, and ate no more for three days, while my fever worked with the tropical heat to sweat the venom out. My friends almost had to go to Pai without me.

Manda, Katie, Klara and I collapsed on the mattresses at the hostel and had to be convinced to get back up for dinner. As we dragged our tired feet along the pavement, the sky opened up and drenched us in a tropical rain. By some miracle, a Thai couple in a closed pickup truck took pity on us. Crouched down and packed together like sardines in the covered bed of the truck, the ten of us hitchhiked to an Italian restaurant. Pizza and pasta could not have been better had we been in Rome. After the owners drove us home, we fell asleep together across six white beds watching *It's Complicated* starring Meryl Streep and Alec Baldwin.

The next morning we woke up ready to see some ancient skeletons. But we didn't want to visit the last Ice Age hungry. We ate at a little burger stand on the street, and the cook made me a homemade veggie burger from scratch. With renewed energy, we followed a map to Lod Cave. A little red booth beside the gate housed a man with a list of reservations. We told him our names and followed the path, covered with bamboo to prevent us from slipping in the mud. As we neared the cave, the commercial tourist city of Pai disappeared to yield a muddy, forested, humid riverine ecosystem. Thirty feet below the path a gurgling stream drowned out the noise of

the city. The canopy of leaves tinted everything with a pale green light. We followed the stream into the cave and the smell of batshit replaced the smell of dirt. Within ten minutes, Katie had gotten pooped on. Another ten minutes, and Georgie, Odette and Vanessa had too. About a hundred rusty, slippery metal stairs started the tour. The dense darkness slowed our climb. The path was lit up along the sides so we could see where we were going, and most of the tour groups had headlamps. We did not. I already missed the light green tint of the woods.

Trying not to slip on the slick rock or hit my head on a stalagmite, I followed a Chinese tour group around the corner. A little bamboo conical hat, wrapped in green ribbon on the top and on the bottom, and tasseled with red ribbon covered the top of a stalactite. Some tourist child had probably left it there, but it was nice to think of it as a paleolithic human relic. Then there were the skeletons. Every so often, a few feet off the path, the rock indented. Prehistoric bones sat next to little signs with facts about cave life. 15,000 years ago, the cave-dwellers moved out and converted the shelter into a cemetery. Occasionally, I wandered away from the group to look at different skeletons or to climb a little subterranean hill. We probably spent an hour in that cave. One of the little signs read that multiple bands of humans lived here at once, each in a different part of the cave. But I didn't read most of the signs. It hurt my eyes to read in the dark, and at the time, ancient bones didn't really interest me. I was cold and longed for the heat and humidity I had just escaped. I missed my white linen bed and my homemade veggie burger. My group led the way through the rest of the damp blackness. I felt grateful when I saw the literal light at the end of the tunnel.

I heard the stream gurgling once again, and though it was a repulsive muddy brown, it was the way out. We got into a bamboo raft steered by a Karen man. He took off his sandals, rolled up his pants legs, and stepped into the muddy stream to push us along. Once it got too

deep to stand, he hopped in the front and pushed us with a pole. Until then, I had escaped the bat poop. Now, twice, from fifty meters above me, yellowish-white liquid splattered into my hair and onto my jeans. As our raft emerged into the sunlight, we all cheered. The smell of wet soil replaced the smell of wet bat pee and the distant hum of traffic returned. We stepped off the raft into the open air, onto a wooden platform, and retraced our steps along the bamboo-lined path. We welcomed back the commercial tourist city, and gave ourselves over to contemporary comfort. One of the English girls pulled wet wipes from her backpack and passed them around. Someone found a nearby spa on Google Maps, and we followed our phones to get Thai Massages. My friend, Klara, and I lay side by side in a little white room as Thai women pulled our limbs and cracked our backs. The cave was all but forgotten.

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Anthropologists today know that long after the advent of agriculture, most East Asian cultures were hunter-gatherers by choice. They had begun to domesticate rice, but deserted their crops and reverted to a nomadic lifestyle. Researchers don't know why. I don't either, but I do have a guess. Growing enough food to survive isn't easy amidst giant hungry herbivores. If a tribe of sapiens settled down to farm, they had to either protect their crops from hungry elephants, or make due with what the elephants didn't eat. Investing a lifetime of labor into grain fields wasn't sustainable.

Back in Huay Pakoot, every morning at seven we left base to track elephants. My first week, I met Lulu, a seven year old female. Elephants and humans age at the same rate, so a seven year old elephant is like a seven year old human, except she weighs two tons. In other words, dangerously playful. Lulu's name sounded like mine and she was by far the clumsiest of her family, so I identified with her. Lulu only had one tusk. One night, two years earlier, she had

left her family to explore the rainforest. She found a rice field, belonging to one of the Huay Pakoot families. Like any five year old finding a delicious treat for the first time, she ate as much as she could before her mom could find her. But the rice was covered in pesticides. Lulu got sick. The next few weeks the five year old elephant fought for her life at the Chiang Mai elephant hospital. Her tusks softened. One of them fell out. Lulu survived, but she doesn't eat rice anymore.

Prehistoric sapiens didn't have pesticides. They had spears and slingshots and might take down a water buffalo with enough cooperation, but not an elephant. East Asians could hunt, but not defend. The first settlers of the Fertile Crescent defended their land to the death, if they had to, but there were no elephants in the fertile crescent. In Asia, defending land wasn't worth it if an elephant would just eat all your crops anyway. So when hunter-gatherer tribes attacked, it was easier to run than to fight. At least until the third millennium BCE.

Rice cultivation spread in Asia, starting in Yangtze, China, around 3,200 BCE. The East Asian EMH settled down to farm exclusively in 1,700 BCE. Domesticated rice reached modern-day Thailand around 1,000 BCE. When the Israelites were walking out of Egypt, tropical Asia was learning to farm. But not all of the Southeastern cultures were thrilled with what their Chinese neighbors were bringing over. Some hunter-gatherer cultures disappeared into the Northern rainforests and maintained their lifestyle. Over 100 generations or so, the stature of these populations shortened and their skin darkened. They adapted to their new environment and hid from the incoming tide of agriculture. But the rainforest is disappearing and the hunter-gatherers are all but gone. In a country that was 70 percent forest just a hundred years ago, the measly 20 percent remaining can't sustain hunting and gathering like it once could. Regardless, the people of Northern Thailand are done moving. The short-statured, dark-skinned Karen still

make slingshots and spears, though mostly for fun. Little but their physical appearance marks their nomadic past.

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Root Pharroot owned a coffee farm. His family used to sell their beans to Starbucks. He opened a coffee shop in Huay Pakoot called “Root’s Coffee,” catering to the new wave of elephant-crazed westerners. Luckily for me, Root’s Coffee was across the road from my homestay. Caffeine-addict that I am, every morning by 6:30 I would leave Wampon’s house to get my coffee fix. Usually I would see Phoebe, an Australian staff member, with Danielle, the English base manager. Five baht for tea, ten for coffee (fourteen and twenty-eight cents respectively). Most days, Root would give us a banana muffin for free (who needs to be vegan all the time, right?). His coffee was blacker, stronger, and more bitter than anything Starbucks had to offer. Pro coffee drinkers only.

Every morning Root would come out from behind his little counter with his hand grinder and coffee maker, and say “*Dablue, Oh choo ah, Layla?*” and I would answer, “*Dabwee* (tired).” Other volunteers would trickle in. Arthur, a Belgian volunteer, liked to sit in the hammock at the end of the cafe’s wooden platform, watching the verdant forest wake up. Before 7am Root’s Coffee would close and Root would walk up the hill with us to base. In addition to a coffee farmer and a business owner, Root was also a “Gorchaw Gay,” or an elephant watcher. Most of the elephants GVI studied had been rescued from camps, circuses or zoos and introduced into the forest. Not knowing how to be wild, they needed someone to teach them. Dee Dee, Lulu’s best friend, didn’t know how to forage for food when he was first introduced. That was the job of the elephant watcher.

Root was the Gorchaw Gay for Kum Suk, the herd matriarch. One volunteer asked Root if watching Kum Suk was fun. He responded that she was a boring old lady who didn't do anything. In other words, no. He still loved her, though. On one hike, Root jumped from a rock onto Kum Suk's neck and just sat there for five minutes, playing with her ears while she playfully tossed her head. When he slid off, he patted her on the shoulder and lovingly pet her trunk. Root may have been the only Gorchaw Gay who could get away with climbing onto his elephant. Another day, we were all eating lunch in the forest next to the herd, when Wan Mai, the baby, trumpeted. He had been startled by a water buffalo, but to his family, the nearby humans just as easily could have been the threat. Young elephants are protected by the entire herd at any hint of danger, so while his family surrounded him, Kum Suk trunk-slapped. Threatened elephants throw their trunks against the ground and make a sound like a rubber ball bouncing. The trumpet is a signal to other elephants, but the trunk-slap is a warning to threats. It says, "Leave or I'll charge."

The elephants weren't really going to hurt us. We were a bunch of frail, unthreatening creatures running to hide behind trees. But we had been cooking lunch, and the firepit was still burning. Root's first thought was that in trying to protect Wan Mai, the older elephants would step into the fire pit and burn themselves. He mobilized the other Gorchaw Gays to put the fire out, lest it should hurt his boring old lady. Root was unique. Most of the villagers didn't watch elephants. Most didn't own business. Most didn't grow coffee.

The cash crop of the epoch is rice. Nearly every agricultural family in the village owned a rice farm. Once a week, a truck would come into the village laden with cabbage, cucumbers, eggs, bananas, mangos, and other foods from the lowlands. And out would go the rice. That's not to say they didn't eat the rice themselves. They did. Every meal. The Karen alcohol of choice

was rice wine (it tasted nothing like wine, but rather rubbing alcohol mixed with vinegar). Breakfast was rice cooked with tomatoes and sliced hard boiled eggs. When volunteers would come to the village for the first time, they were warned. Some left the village vowing to never eat rice again. After I left, I didn't eat rice for a year.

After 45,000 years in Asia, the hunter-gatherers had surrendered to agriculture.

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Most of the elephants of Thailand live in captivity. Even if all the elephant camps were to release their charges tomorrow, the forests of Thailand are no longer large enough to support them. Logging, development, and agriculture have depleted their habitat. Two centuries ago, the Europeans introduced steel to the Thai people. Along with the metal, they brought the “slash and burn” method of farming. In order to grow their crops, farmers use steel tools to clear part of the forest, then burn the stumps and remaining vegetation. For the next seven or eight years the burnt vegetation acts as a fertilizer. Once the soil's nutrients are depleted, the farmer slashes and burns a different part of the forest. A destroyed part of the forest will take a century or two to regenerate. Millennia will pass before it regains its former biodiversity. But for the Karen, there's no returning to pre-slash and burn agriculture methods. The farmers don't know how. It's been too long and rice is too high in demand. They have families to feed. Children to send to school. Ailing mothers to care for. Better to burn the forest and look away from the empty, depleted fields. What other choice do they have? Not everyone can be Root.

The people of Northern Thailand are adapted to hunting and gathering. When Middle Eastern sapiens settled down, their population's metabolism changed. Over time, they could better process carbs, and their bodies could tolerate gluten. Over ten thousand years they adapted to a sedentary lifestyle, allowing them to grow taller and fatter. They're still adapting. Asian

agriculture is not ten thousand years old. Seven thousand years from now, the populations of Thailand may look different. Rice and a sedentary lifestyle may change their metabolism and their physical appearance, but perhaps we'll never know.

Seven thousand years from now the rainforests in which they live may be gone. The elephants from which they protect their rice will be extinct. Tourists may walk through preserved Karen houses the way I walked through Lod Cave, in a larger city fueled by a tourist economy. They may wonder about the purpose of the little hole in the kitchen floor (the place for the iron bowl functioning as a stove). They may read signs about the misty rainforests that once surrounded the village, and when they're done examining the bamboo walls, they may go get Thai massages.

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My last week in the village, Root asked me and some other volunteers if we wanted to help him plant his coffee field that weekend. I couldn't because I was returning home to Starbucks and western toilets, but I promised I would the next time I came to Huay Pakoot. I haven't been back. Every summer I think about it. I want to see the elephants again and the dawn mist rising over the mountains. I want to watch Sah Jah the elephant with her golden eyes and record every grumble she emits. I want to eat the fried bananas, and even the rice. I'm afraid if I don't go soon, it will be too late, but there's always an internship, or a family vacation. Thailand is so far away. The first two years after I left, Root would Facebook message me, asking when I was coming back. But he's stopped asking.

Notes

1- Harari, Yuval N. *Sapiens: A Brief History of Humankind*. Translated by John Purcell and

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3- Aubert, M., Lebe, R., Oktaviana, A.A. *et al.* Earliest hunting scene in prehistoric art. *Nature* **576**, 442–445 (2019). <https://doi.org/10.1038/s41586-019-1806-y>

The Paradox of Being Human

In 2016, after my first semester of college, my dog Balto died. He had been sick for five days and couldn't eat. The vet had misdiagnosed him and charged us hundreds of dollars for antibiotics that didn't work. In mid-December, Balto, an emaciated skeleton, had wandered off to die alone. My family and I spent hours looking for him in the woods to bring him home. I didn't even realize that my phone had fallen out of my pocket and gotten run over by a car. After four hours of searching in the snow my Dad found Balto. He had been 120 pounds and six feet tall when he stood on two legs. But in my Dad's arms, as he carried him into our house, he looked small. Like a sick child. My Dad carried him into the upstairs hallway and my parents (both doctors) got an IV pack from their bathroom. We forced the needle between Balto's shoulder blades. Every few minutes he would break into a fit of shaking. I held his head in my lap. Around midnight, I took my pillow and blanket to the stairs and lay next to him in fetal position, with one arm around him.

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I spent the summer of 2019 in Galicia, Spain, in a town called O Grove. Flower-lined cobbled streets connected the red-roofed houses to the rocky shores. Yellow-legged seagulls dotted the skies. The food market by the dock opened every morning except Sunday (It's Catholic Spain after all). In early June the town dedicated a weekend to the Celtic pirates who first colonized the sheltered estuarine coast. I was interning at the Bottlenose Dolphin Research Institute (BDRI). Every day that the wind didn't blow too strong, or the rain didn't force us indoors, the BDRI team would be out collecting field data.

O Grove sat in an inlet of the Atlantic called the Ria de Arousa. Down the dock, past the market, next to the oyster-canning factory, a rocky outcrop called Rons jutted into the sea. A

badly sculpted statue of Jesus stood on its own rock island a few feet to the North and West. On most field research days we would be here, scanning for six hours through a spotting scope and binoculars for a sign of the Ria's resident group of dolphins. There was no shade on Rons. On clear days, the sun seemed to burn through our clothes. One time the spotting scope gave me a tan line. The top half of my face was burnt, the bottom half wasn't. On overcast days, though, the wind burned as harshly as the sun. Interns brought winter jackets and scarves in mid-June.

Once every week or two, we went out on Tyba. Tyba was BDRI's large boat, meant for the open sea. She was twelve meters long and about six meters tall. The name "Tyba" came with the boat when Bruno, BDRI's director and head researcher, bought her. Supposedly the name meant "good" in Arabic. According to my Arabic professor it really means "delicious," a word reserved for food, but Bruno doesn't need to know that. It was bad luck to change her name anyway. Tyba days were ten to fourteen hours long. Eight to twelve of us rotated between scanning on the top deck, scanning at the front, and recording coordinates, depth, salinity, and temperature at the back. There were no breaks. We got no time for meals. We ate lunch while we worked. Before we boarded the boat at sunrise, Severine, one of our bosses, handed out motion sickness pills. Woe to the person who didn't take one on a day with high swell. Soon after we would reach the open sea, the common dolphins would surround us. They were the smaller, kinder version of the bottlenose dolphins to which we devoted most of our time. Anywhere between ten and two hundred would swim alongside Tyba. They would breach and leap and turn on every side. I always prayed to be in the front at the beginning of the day so I could be close to them.

But the best days were usually on Benur, BDRI's smaller boat. She was a little gray rib. "Benur" didn't mean anything, but it was the name the boat came with, so Severine and Bruno

couldn't change it. We took her into the Ria to study the bottlenose dolphins up close. On Tyba, we stood nearly ten feet above the water -- more if we were on the top deck. But on Benur, we sat no higher than the surface of the sea. Sometimes the dolphins would swim close enough to touch. Especially the curious newborns. But Benur didn't have a bathroom. Returning to the harbor to pee was not an option. We would lose the dolphins, or lose precious time finding them. Once my friend Lisa didn't drink any water when she was scheduled to go on Benur, just to be sure she wouldn't have to go to the bathroom. She gave herself heat stroke and couldn't come into work for the next two days. One of my roommates, Amber, was sick for her first three weeks of the internship, but when she was first scheduled on Benur, she didn't consider refusing. The wind was high that day and she spent the whole morning shivering. It started raining and she wore only a sweatshirt. She was sick for another two weeks. The wild dolphins, though, couldn't care less about us. We were one of hundreds of boats out every morning. Why did we crave contact with them so much? Why would we dehydrate ourselves and make ourselves sick to study another species when we could have been on the beach in Barcelona?

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45,000 years ago, the first waves of *Homo sapiens* migrated to Europe. Genetic analysis of sapiens corpses from the last ice age revealed that EMH individuals died up to 2,000 miles away from where they were born¹. That's about the distance between New York and Mexico, or Jerusalem and Moscow. It didn't take long for our ancestors to take over the inhospitable continent, but that wasn't the challenge. With no houses, no heating, no winter jackets, and essentially no summer, to survive an ice age in Europe was a feat. The cold wasn't the only challenge. As in the Middle East, neanderthal-sapiens relationships were hostile. And then there was the wildlife: wolves, aurochs, mammoths, cave lions, saber-toothed tigers, and grizzly bears.

They weren't exactly roaming the Louvre, discussing the Mona Lisa. 25,000 years ago, during the last glacial maximum (LGM), *Homo sapiens* nearly disappeared from Europe. By 16,000 years ago, though, something strange had happened.

Last Spring I went to see the movie *Alpha* with my friend. We sat in the front row and watched the drama of an interspecies relationship. An injured man and an injured wolf, both isolated from the safety of their groups, form an unlikely friendship and protect each other from the harsh European winter. They snuggle at night to keep each other warm, and risk their own lives to save each other's. It's fiction.

We didn't domesticate dogs. Domestication implies intention. It implies that we thought out the costs and benefits of associating with predators. It also implies that we changed them, but they didn't change us -- wolves became dogs, we stayed the same. But we didn't control our fate as much as we like to believe. Sapiens didn't choose to domesticate wolves, we coevolved with them². We entered into a mutualistic relationship with another predator having trouble surviving, but we did so cautiously. So did they. At first, just the boldest wolves came close to our hearths. Having wolves nearby kept other predators -- cave lions and saber-toothed tigers -- at bay. So we fed them scraps to keep them close. We really just threw unwanted fat and skin in their general direction, but during the lean winters, this was the line between a wolf pack's life and death. The more curious, bolder packs survived, while the cautious ones died off. And every so often, one sapiens band would raid the camp of another, or a saber-toothed tiger would get hungry in the night. For the price of a little spare meat, sapiens could earn themselves the protection of wolves. So the sapiens who refused to share or who feared the wolves would die, and the next generations of sapiens would be slightly less fearful.

Down the generations, the wolves crept closer to the hearth, and the sapiens wanted them to. A soft spot grew in the hearts of sapiens for this fuzzy predator. The canids weren't just protectors, they were useful hunters. Ice Age prey wasn't easy to kill. Early European sapiens weren't hunting white tailed deer with guns, they were hunting mammoths and aurochs and buffalo with stone spears. Mammoths with tusks as sharp as the spears; aurochs with more aggression than a human could muster; buffalo with the horns to rival a mammoth's tusks and the temperament to rival an aurochs' aggression. Facing these beasts became easier for the sapiens who had wolf allies. Anthropologist Yuval Noah Harari says that our ability to cooperate and communicate allowed humans to conquer the world. He means our ability to cooperate and communicate with members of our own species. He's talking about language and collective story-telling, but he could just as easily be talking about dogs.

A few thousand years had passed and the glaciers hadn't retreated. Wolves were now sleeping in tents and caves with their humans, though they're hardly wolves anymore. In Anthropologist Darcy Morey's 1994 article "The Early Evolution of the Domestic Dog" there's a picture of a human skeleton in fetal position. Under the human's left arm is a skeleton of a young canid. They died that way. Maybe they were too weak to move on and lay down together to comfort each other while they froze or starved. As a human, I'm assigning emotion and a story to these creatures. I don't know what really happened. But I do know that wild animals aren't known to cuddle with humans. The skeleton under the sapiens' arm was no wolf cub. That was a puppy.

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One of my bosses at BDRI, Severine, had a golden retriever named Ariel. Severine usually didn't come with us on land-based data collection days, so when the lab was a little

quieter, she would bring in Ariel. Walking up to the lab in the morning, we would sometimes see her through the window and a collective “aww” would resonate throughout our group. If I didn’t have to prepare equipment for research that day, I would sit with her at the top of the stairs until the last possible second. Sometimes moving around the lab was difficult because of the crowd of interns that would congregate around her. More than once the staff yelled at us. It was always worth it.

Ariel was eight years old with deteriorating tendons. Sometimes Severine had to leave work in the afternoon to take her to a vet appointment. After a walk Ariel had to be helped up the stairs. She had hypothyroidism, which caused some skin disease that made our hands smell when we pet her. Dogs used to serve a purpose. They used to help us hunt, or protect our camps. Golden retrievers specifically were bred to retrieve fowl in Scotland that their owners had shot down³. I’d have liked to see Ariel try that. In our coevolution with dogs, there’s no doubt that modern canids have changed from their grey wolf ancestors. They’re friendlier. They can have floppy ears or brindled and spotted coats. Sometimes they come in sizes small enough to fit in a purse, or faces so flat they look like they ran into a brick wall.

Dogs (among other domestic animals) have those traits because the genes that code for them are linked to the genes for friendliness and curiosity⁴. Human prosociality isn’t as obvious, but it’s still present. Our history with dogs has made us genetically more cooperative and docile. Something called neural crest cells, which shape our faces and affect our behavior, have been decreasing in both humans and dogs for a dozen millennia. Neanderthals had a plethora of them⁵. *Homo sapiens* didn’t just evolve alongside dogs, we evolved the same way. The humans who live today are descendents of those who relied on dogs for over ten thousand years. Loving a dog

is no longer a cost-benefit analysis. Rather it's a rush of serotonin and oxytocin in the brain. It's evolutionary.

Domestication happened more than once. The domestication of dogs in Europe happened first, but around 12,000 years ago, it happened again in Asia, separately. Further, dogs aren't our only nonhuman partners. Within a few thousand years of this first domestication, we were living with goats, sheep, cows and pigs, all in different parts of Eurasia. These are all food animals, not man's best friend, but soon afterwards we domesticated horses and cats, and didn't even eat them. Sapiens was simultaneously intolerant of some species, and emotionally protective of others. We'd befriend wolves to kill mammoths. We were (and are) genocidal towards other humans, but in its last moments, we'd curl up in the snow with a puppy.

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When I was nine years old, I became a vegetarian. At eighteen, I became a vegan. Living in rural O Grove in Northwest Spain, not a single restaurant in walking distance had a vegan option. One time, at dinner with my friends, I put olive oil and tomatoes from a friend's plate on the table's bread rolls, because there was nothing I could order. When the interns would eat pizza on the beach for dinner, I would stir fry vegetables and bring my dinner in a tupperware. The local grocery store seldom had tofu, and it was the worst tofu I've ever had. Eating the fish or eggs would've been easier for me and everyone involved, but I couldn't do it. I couldn't stop remembering where they came from. I knew what it took to produce them and I had too much empathy for the dying fish or mistreated hens. I have never heard of members of another species forgoing meals because they felt bad for their prey. Granted, most humans don't do this either, but at least it's possible for us. A wild predator who became a vegetarian for ethical reasons simply would not live to reproduce. But thanks to dogs, we are no longer wild.

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Prehistoric humans domesticated cattle three times. The zebu line is in Africa, the taurine line is in the Near East, and the aurochsen line is in Europe. The cow we know today -- the black and white spotted one in the green pasture pictured on a milk carton -- is a hybrid of the Taurine and Aurochsen lines. Baby mammals produce an enzyme called “lactase” that breaks down lactose, the sugar in milk. When juvenile mammals are weaned, their bodies stop producing lactase. Before the domesticated dairy cow, adult humans couldn’t drink milk. So imagine a population of lactose intolerant *Homo sapiens* choosing to adopt famously aggressive creatures, then trying to milk them. Imagine approaching an Aurochs, Taurus, or Zebu mother, towering over your sapiens self, and removing her calf so you can use the milk that you probably won’t be able to digest. How did this happen successfully on three separate continents?

We’re not entirely sure about the mechanics of the transition from wild aurochsen to tame cattle, but we can guess. We didn’t select the cow for milk. We hunted aurochsen with our dog partners. At first, we weren’t selective. We killed what we could. But we became more successful and more intentional, so we took on the most aggressive. We spared those who didn’t charge or who came wandering curiously into our camps. We followed the herds the way African lions follow wildebeest migrations. The wild aurochsen fed themselves, chose their own mates, and wandered where they pleased; we simply picked off the mean ones and followed the herd.

Around eight thousand years ago in present day Turkey, the aurochs became the cow⁵. Wild aurochsen were still extant, but wouldn’t be for much longer. Even the domesticated cow couldn’t be easily milked, though. As agriculture replaced hunting throughout Europe, the cattle were used to pull carts and plow fields. But every so often there was a famine. We killed the cattle we could for beef, but we needed some to maintain the herd. Simply because they had no

choice, people started to milk. The people with the rare mutation for processing lactose were more likely to survive than those without. So lactose tolerance spread in some of the populations of Europe, and eventually Asia and Africa, and we built our lives around milk.

The phrase “milk and honey” appears in the Torah twenty times. We can guess that dairy was pretty important. Even so the Romans didn’t drink milk, they used cattle for farming. The Zebu line was domesticated in the Indus valley before moving to Africa, yet Hindi people don’t eat cows. It’s one of the most famous aspects of their religion. We didn’t build cultures and religions around domesticated dogs, but we did so around cattle. Anthropologists debate whether or not the cow was the first farm animal to be domesticated. Some say goats or sheep. It probably all happened at once. But it doesn’t really matter. They all provided us with milk and manual labor (sometimes wool) when they were healthy, but when they got older we slaughtered them for meat. We had to both care for them and kill them.

My friend Mindy comes from a family of pig farmers. She showed me all her favorite pigs on her phone and told me their names. She talks about them as if they’re pets and tells me how much she loves them. When the pigs are about two years old, Mindy’s family packs them up and sends them on a truck to the slaughterhouse.

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July 14th, 2019 I saw a blue whale -- the largest creature on the planet. It’s almost mythical. We followed the whale for two hours, further into the open Atlantic, speeding into the setting sun while the wind rushed around us. We don’t know much about the rare giant, but we do know it dives for fifteen minutes at a time, sometimes half an hour. It dives to depths the sunlight can’t reach, and tends to travel alone. After we first spotted the whale’s blow, Bruno exclaimed, “If we lose this blue whale, I’m resigning.” He was joking. Probably. Lucky for us,

this not-so-solitary blue whale was feeding with its closest relative, the fin whale. The fin whale is slightly smaller than its giant cousin, but has a larger dorsal fin and a white patch on the right side of its head. But wait. Common dolphins were leaping around the blue whale on all sides. Though hundreds of pounds, next to the whale, they looked like puppies. They acted like puppies. We couldn't follow the whale into the depths, but we could follow the dolphins and hope they stayed with the giant. So that's what we did. We lost the fin whale. We didn't care. I wondered what the blue whale was thinking. Whether it even noticed us. Or the dolphins. Did it see them the way we see dogs? Did it think they were cute, or annoying? And why were the dolphins there in the first place? Tyba followed the whale for two hours further into the Atlantic. When the sun began to lower in the sky and the wind picked up, Severine announced that we had to turn around. Speeding back to O Grove I was excited, but sad, convinced I would never see anything so magnificent again. I haven't seen another blue whale, but I did see something as magnificent.

On August 3rd, I was on Tyba again. The sea was smooth as glass and we counted hundreds of little blue sharks breaking the surface around us. Sunfish fins flopped left and right, and common dolphins brought their newborns to show off. The sun rose bright and warm after a fiery dawn. The day was already incredible. I was on the top deck with Severine and Bruno when from the back Lisa shouted, "Whale!" Severine shoved a clipboard in my hand and I grabbed a pen and a stopwatch. Time for respiratory samples. We followed the fin whale for fifteen minutes. It was exciting, but it certainly wasn't the first whale we'd seen in the past few weeks. Then Kira, another intern, saw two dorsal fins. Severine was convinced it was just a parasite on the whale's back making it appear as two fins. I agreed. But they were getting closer. Twenty meters away from the whale, we confirmed there was more than one. I started respiratory

samples from the beginning and squeezed my friend Emma's hand to keep from screaming. This sample only lasted six minutes before a white patch rose from the depths, just five meters from Tyba. There were three fin whales. Two fin whales together was not unheard of, but three? These creatures were supposed to be solitary. What was happening?

For four hours we followed them. Our GPS led us along the edge of a crater on the ocean floor. Bruno knew they would be feeding there. Sure enough, after every long dive, three white patches surfaced right below us or right next to us. Severine confided in me that she was sometimes afraid one would surface into our boat accidentally, not even noticing we were there. In the middle of the afternoon, I spotted a pod of bottlenose dolphins. We had enough respiratory data on the whales, and though we didn't want to leave them, it was time to survey a new species. We sped towards them, and they swam towards us. But they weren't really swimming towards us. They were heading towards the fin whales we had just left. So we turned back around and rejoined our three friends. The dolphins started leaping and breaching the same way the common dolphins did with the blue whale. Bottlenose dolphins were known to kill other cetaceans, not play with them. Neither Bruno nor Severine had ever seen anything like it before. And then we saw another blow. Coming towards us from a kilometer away was a fourth fin whale.

One of these supposedly solitary creatures had travelled with a blue whale and a pod of common dolphins. Two weeks after that, three of these solitary creatures travelled together and were later joined by a group of bottlenose dolphins and another fin whale. Perhaps there is a link between interspecies relationships and prosocial behavior. In other words, maybe individuals who are social with each other are also social with other species. It was certainly true for

humans. Why not for cetaceans? Could a marine domestication be in the works in the depths of the Atlantic?

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We BDRI interns lived in two apartments. The interns in the other apartment adopted a seagull. Julia, an intern, was at the beach with her boyfriend on a Sunday. She was swimming in the sea when she saw a bird struggling to stay afloat. She approached it and noticed its broken wing. Julia called our boss, Bruno, knowing he'd rescued his fair share of injured animals, to ask what to do. That afternoon, the people in Julia's apartment got a surprise.

They named the seagull Carmen. They fashioned a cast out of gauze for her wing. Every morning they went down to the fish market to buy her fresh fish. Carmen took to standing in the plant pot on the veranda. Our BDRI group chat filled with pictures of Carmen nestled between green leaves as large as her head. Her little beak would poke between the branches and her thin yellow legs looked like two extra plant stems. The interns bought her an inflatable rainbow kiddie pool. When Carmen first used it, they took a video. I was cooking curry in my apartment with my roommate, Alex, when we saw it. We bent over my phone watching Carmen play in the water, ignoring our dinner on the stove. In the background of the video, Corinne, a British intern, repeated, "Aww bless him" about five times. Carmen's caretakers were laughing and gushing about how happy she was. Another night I was watching *Nice Guys* with my friend, Wenna, who lived in that apartment, and Sophie, a French intern, walked through the common room to feed Carmen. When Sophie opened the door to the veranda the smell of fish and bird poop flooded the common room. Wenna confessed that she didn't like Carmen because of how much she made the apartment smell. Everyone in the common room glared at her.

On days the BDRI team was researching in the field, every twenty minutes we had to count all the birds in view. I still remember all the scientific names, but I don't know most of their common names. On land, we usually counted a few *Larus ridibundus*, a few *Larus melanocephalus*, ten to twenty *Phalacrocorax aristotelis*, and one or two *Egretta garzetta*. Sometimes a few other species would be thrown in. But what we were really counting was *Larus michahellis*, or the yellow-legged seagull. At La Rons there were usually more than fifty. On Tyba, they could number in the thousands, and I often feared getting pooped on while eating my breakfast. When we would count thousands of *Larus michahellis*, we were just counting in one spot. Usually they were congregated on one or two rock islands. Along the rest of the coast there were tens of thousands more we couldn't see.

On the day of Carmen's release, all the interns in her apartment brought her to the beach in a wooden box. Julia sent us a video with the caption, "Adios Carmenos, we love you." The following weeks, sometimes we would call her name into the cloud of gulls to see if she would respond. One time at Rons, two or three weeks after Carmen's release, a yellow-legged seagull came walking up to us. She was pecking at a puddle in the rock, probably hoping to find a fish trapped inside. "Carmen? Is that you?" we asked. She didn't respond. Someone tried to look at her wing, but once Carmen had healed, her wing looked the same as any other seagull's.

The sea was a familiar Douglas level two. It looked just as it had the day we saw the blue whale. We were following the Ria's resident group of bottlenose dolphins through the spotting scope, and they looked large and powerful in the absence of fin whales. After that day, I would only go on Benur and Tyba once more each. The summer was coming to a close and I would soon be with Luna, my excitable puppy, rather than the aging Ariel. But for the time being, I watched the bird peck the puddle between scans, and stood on my aching feet to follow the

dolphins. The seagull stayed next to us for twenty minutes or so before giving up on the puddle and flying away into the cloudy sky. I watched her beat her light gray wings against the air, almost, but not quite, graceful.

Notes

- 1: Haber, Marc, et al. “Ancient DNA and the Rewriting of Human History: Be Sparing with Occam’s Razor.” *Genome Biology*, vol. 17, no. 1, Nov. 2016, doi:10.1186/s13059-015-0866-z.
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Reaching Earth

In December of 2019, I was walking in Manhattan at midnight. Cigarette butts and gum decorated Chelsea's sidewalks. The street glistened with freshly laid tar forced on top of layers of asphalt. Little foot-high iron cages filled with dry soil held fragile, bare trees. My sister and I were walking towards a club called Hudson Terrace on 11th Avenue. The lights of New Jersey across the river replaced the stars we couldn't see, and I wondered how far we would have to dig to reach Earth -- to reach soil that city planners hadn't placed there. If we dug in the little tree cages, we would just reach the concrete sidewalk. Below that, the subway. Below that, probably another layer of subway, where the express trains bypass the local stations. I could have taken the club's building, turned it upside down, and stuck it into the ground and I would still not have reached Earth.

September 12th, 1609, Henry Hudson and his crew arrived on an island called Mannahatta, meaning the land of many hills. They were searching for a Westward passage to Asia for the Dutch East India Company¹. When the Englishmen stepped off their tattered boat, they found forested hills filled with beavers and bobcats. Lenape men and women wearing only loin-cloths and skirts may have watched the explorers land, and may have even shown them a thing or two about fashioning clothes out of beaver skin. No pigeons, no rats, no cigarette butts. Streams flowed from the yet unnamed rivers on either side of the island. Narrow wood paths connected streams to hills to Lenape camps. Mannahatta's inhabitants had never heard of the Dutch East India Company. The earth was below their heels. This was America.

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24,000 years ago, some Siberian sapiens had settled in the caves of the Yukon². They were the first humans, sapiens or otherwise, to step foot on the American continents. It was the

middle of the ice age during the last glacial maximum (LGM), when the average global temperature was ten degrees Fahrenheit. Sea levels left exposed the Beringia shrublands, now covered by the Bering Strait. I imagine that when humans first wandered across Beringia, the land they discovered was mostly ice. They may have wrestled a few polar bears and spotted some arctic foxes, but the Yukon wasn't quite teeming with life. Ice sheets in modern-day Canada and Alaska were two miles thick. Glacial walls loomed twice as high as the walls of the Grand Canyon. Over the next 12,000 years, the immigrants spread to the Chilean mountains and the Floridian coast.

At a sustained gait, the American pronghorn is the fastest animal on the planet. The slightest unexpected rustle in the brush will send them bounding to safer grounds. No other creature on the American continents comes close to its speed. So why would the pronghorn spend so much energy to be so fast? That's like sprinting away from a snapping tortoise when you could just take a quick step or two back. But the pronghorn wasn't always the fastest. Before humans arrived, the North American cheetah prowled the Great Plains. The pronghorns who could outrun a cheetah got to live. In the words of Rob Dunn, author of *The Wild Life of Our Bodies*, "They run from ghosts. We all do."

So what happened to the American cheetah?

As in Europe, the sapiens newcomers spread quickly. Spears from the Clovis people have been found in Washington state and Chile from the same time period³. These explorers travelled south and discovered a wilderness complete with mastodons, giant ground sloths, American cheetahs, giant tortoises, saber-toothed tigers, and glyptodons (large armadillo-like animals). American megafauna had never met humans before. The wave of extinctions following human settlements in the Americas is now known as the Pleistocene megafauna extinction. Like

the bison and pronghorn, a few species survived. Most of America's large wildlife didn't have time to realize that the small, two-legged, fangless, clawless, armorless Clovis hunter was more lethal than the equally doomed cheetah.

12,000 years ago, the glaciers melted and Beringia became part of the sea. The people on the American continents were isolated from their European and Asian source populations. When Alexander the Great spread Hellenism and Julius Caesar crossed the Rubicon, the dictators seemed to shake the Earth, yet the ancestors to Native Americans felt nothing. When Eurasian sapiens built cities around agriculture, their cousins were here, cultivating food forests and hunting Bison. Bread was alien, and gluten tolerance unnecessary. They missed livestock domestication and the discovery of alcohol. Meanwhile, European cultures were forming without the trademark foods we associate with them today. Two hundred potato species flourished in the Andes, and the Irish knew nothing about it. The Italians adopted the noodle from the Chinese, but undomesticated tomatoes remained trapped in the New World, far from becoming pizza or pasta sauce. Aztecs brewed chocolate as a bitter drink for their royalty, and the Swiss kept their milk safely in another hemisphere. When the Europeans first arrived in the Americas, they called it the "New World." Because that's what it was. One without written languages, let alone any Bibles.

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"Vilmos Katz arrived in New York City a month after his twentieth birthday. Born in 1903 in the predominantly Jewish town of Munkacs, Hungary... upon arrival, Vilmos adopted the American name William and moved to Brooklyn... which, during the decade, was experiencing monumental growth as incoming immigrant families populated the neighborhoods." This passage comes from *We Are the Gordons*, a book my sister, Arielle

Gordon, is writing about our family. My grandmother Sylvia is at the center of it. Vilmos, or William, was her father.

In Russia, Tsipporah Marin was known for her needlework. Maybe not nationally -- the Tsar certainly hadn't heard of her -- but across a few Jewish villages, at least. She made tapestries and rugs and embroidered dresses and pillows. In 1913, when her parents and most of her siblings had already left, when Tsar Alexander's nationalist antisemitism was reaching new heights, Tsipporah had no choice but to board a ship headed for New York. She could only afford the passage in steerage. There wasn't enough room for her needlework. Just a few dresses and a memento or two.

Decades after the journey, she would tell her grandchildren the story. One day, in the middle of the Atlantic, weeks from land, Tsipporah went up to the deck for some fresh air. As she surfaced, little birds came twittering overhead. Tsipporah in Hebrew means "bird," and she felt she had an intrinsic connection with her namesakes. So she twittered back. The conversation lasted just long enough for her to get across that she wanted a needle and some thread. So the next day she came up to the deck again and was not surprised to find her needle and thread waiting for her. The birds had flown to her home in Russia, found her needlework supplies, and brought them back to her. Tsipporah spent the rest of the journey working on a red, black, and white tapestry with a red diamond made of smaller red diamonds in the middle, a red and black snowflake in each corner, and a border of black squares, each with one red square on every side. It now hangs in the hallway, between my Dad's study and my parents' bedroom.

Upon arriving in New York, Tsipporah changed her name to Sadie and got a job as a seamstress. She enrolled in Bronx Evening Elementary to learn English and began to study for her citizenship exam. A few months ago, my sister found Sadie's old Yiddish-to-English

dictionary with a Yiddish citizenship study guide. A month before Sadie arrived, Henoah Gordon docked in Boston. He had just come from Dvinsk, Russia. He changed his name to “Henry” and worked as a shoemaker for a supposed uncle. In 1917, after graduating from Bronx Evening Elementary School, Sadie’s friends took her to Worcester Massachusetts. They had heard of Henry through a mutual friend and thought it was about time Sadie met a nice Jewish boy. In 1923, Henry and Sadie were married. In 1928, the second of their two sons, Edward Robert Gordon, or “Bob,” was born in the Bronx.

A few years ago, my grandmother, Sylvia, came to my house with a newspaper clipping from the ‘50s. The paper showed my grandmother at 18 years old in a red bathing suit on the beach. Her short black hair was slicked back, and her eyelashes rivaled Elizabeth Taylor’s. She wore the same shade of bright red lipstick she wears today, and her lips betrayed no smile. I asked her why the photographer took that picture. She responded, “Because I was very pretty.”

In 1959, Sylvia Katz met Bob Gordon at a party. He was in the navy, studying to be a dentist. She was very pretty. “Bob. Bob Gordon. Animated, mischievous, and utterly charming.” That’s from my sister’s book again. Their three sons, Howard, Lawrence, and Richard, unite Sylvia’s Hungarian ancestry with Bob’s Russian ancestry. When the boys were just eight, six, and three, Bob had a stroke. The left half of his body was paralyzed. He had to stop working as a dentist and, to support her family, Sylvia got a job as a guidance counselor in a local public high school. Sylvia’s mother had died when she was eighteen, and her father not long after, so it was up to Sadie, Bob’s mother, to take care of the children while Sylvia worked. The boys loved their parents, but it was Sadie who raised them. It was Sadie who told them bedtime stories about the birds on the ship. In 1983, Larry Gordon met Emily Linzer. She was born in the Bronx, but her

family was from Lodz, Poland. I am Emily and Larry's middle child. Polish, Russian, Hungarian, and Jewish.

For two millennia, since the Romans sacked Jerusalem, Jews have been living in Europe. First as Roman slaves, then as second or third class citizens of the empires that followed. Years of persecution forced the Ashkenazi Jewish communities of Europe into shtetls, bubbles of isolation from the gentile world. They only married each other. Ashkenazi Jews developed their own language, Yiddish, and only interacted with their persecutors when absolutely necessary. Assimilation wasn't an option. Even decades before the holocaust, anti-semitic mobs kept the Jews in their shtetls. Amos Oz's grandparents, before they emigrated to Israel, prayed for Hitler to conquer Eastern Europe because they feared the mobs more than they feared Hitler. The Middle Eastern genes that Jews brought to Europe were only diluted when Roman soldiers or Slavic armies would rape Jewish women. White skin, blonde hair, and occasionally a tolerance for dairy were introduced into the gene pool. My father has bright blue eyes, dark but white skin, and hair that can only be described as a Jew-fro. My mother looks as Slavic as they come. Straight blonde hair, freckled cheeks, and eyes that look like they have the sea behind them.

My parents were born on the once beaver-ridden land that was Lenape territory. The Lenape no longer exist. Those who survived the Native American Genocide either assimilated into American society or were absorbed by the Cherokee nation. Mannahatta, the land of many hills, has become Manhattan, the land of bagels and high rent. Sporadic Lenape camps have been replaced by Harlem, Brooklyn, and the Bronx, all famously home to Old World immigrants and descendants of slaves. A land that was so isolated for so long has become the epitome of diffusion and integration. Ethnicities from everywhere but the Americas have made the island their own. Their children are unprecedented genetic phenomena -- the union of genetic histories.

...

In the summer of 2019, I was talking to my friend, Lily, from my internship in Spain. Lily's from England. She told me that there are no sharks off the coast of England. In all of Great Britain, there are no bears, coyotes, wolves, or any other top predator. I looked it up. Bears went extinct in Britain around 1000 CE. They were hunted to death. The largest predator on the island is a fox, so naturally, the English invented the fox hunt. Even predators the size of toddlers are too threatening. Wild animals don't come larger than deer. Lily said that she thinks of America as a vast, wild place filled with wolves and bears. She thinks of America the way most people think of Asia, or Africa. And she's not wrong. After the Pleistocene extinction, American wildlife and the newly settled humans learned to live in balance. Native Americans would continue to hunt and alter the landscape, but they weren't a threat to the survival of other species. The wildlife that survived the extinction was now essentially safe. Until the Europeans arrived.

The Great Plains was one of those places Lily was talking about. The American wilderness. But America runs on wheat. Wheat makes up sixty percent of crops produced in the United States. Pizza, hamburgers, chocolate chip cookies -- all American staples, all contain wheat. Even french fries are often coated in a wheat batter before they're cooked. The wheat belt in America is a strip of land, 1,500 miles long, spanning from Alberta, Canada to Texas. Most of the wheat that feeds America is grown in the wheat belt. About sixty million acres of that land are devoted to wheat fields. Almost all wheat fields are monoculture, meaning that where the grain lives, nothing else does. Certainly not bison or pronghorn. The fertile plains that support these fields are quickly being sucked dry. "America the Beautiful" must have been written before we ate so much bread.

...

My family hasn't seen bears on our property in Goshen, New York since I was a kid. I don't remember actually seeing one since 2010. Occasionally they'd loot our garbage to let us know they were still there, but for nearly a decade they never got close to our house in daylight. In July of 2019, my Dad took a video of a black bear walking in front of our house. The day after that, a different black bear showed up with a cub in tow.

In 2016, the Lego company had bought a tract of land in Goshen. They wanted to build a new Legoland amusement park. For three years, the town argued. Half of us fought the change, while the other half threw all their weight behind it. We had town meetings, angry Facebook arguments, and posted signs in front of our houses. Legoland won. In the summer of 2019, construction began. Now, when I go to my friend's house in Goshen, I take Arcadia road. I make a left off Conklintown, pass the cow pasture of Arcadia farm, and drive up the hill. When I reach the top, I can see for miles to my left. It used to be a sea of trees. Before 2019, the autumn leaves would look like a calm fire. Now, those trees are gone. Cranes stick out of the expanse like broken nails in a two-by-four. Soon, the dirt will be covered by feet of concrete. When I reach the top of the hill, a Tudor house sits to my right. My mother and I used to envy that house. It's gorgeous. There's a small glass sunroom on the southwestern side. And what a view it had. I recently heard that the owners are trying to sell. Small wonder. I don't expect anyone to buy. No one wants to live near Legoland.

The site of Legoland's construction was once home to the bears in my backyard. When the trees were cut down, the bears had to find somewhere else to live. The deer followed. Foxes, wolves, and coyotes have been spotted around town. The wild places are disappearing, and with them, the wildlife.

In 2015, my sister and I visited Dubrovnik, Croatia. The old city of Dubrovnik is made entirely of stone. The ground is the same limestone as the buildings and the walls. We didn't see dirt or grass anywhere in the old city. It was like a castle without a roof. It was built to close itself up in the event of an invasion. Built like a fortress. Walking through Manhattan, I feel like I'm walking in a very large fortress. Instead of limestone, it's built of concrete and asphalt. Instead of the tropical Adriatic, the island juts into the polluted Hudson. But rather than keeping anything out, it contains what's already within. It's already been invaded. There are no Lenape left. The city is filled with African, European, and Asian descended people. Even those from Central and South America are most likely of Spanish descent. Within the fortress, the parks are like gardens. None of the land remains from the time it was Mannahatta. It's all been planted or replanted. Most of the species aren't native to the region. Some aren't even native to America. Species from every crevice of the planet flock to its allure and the concrete walls close around them.

...

I lived in Manhattan during the summer of 2018 to intern for an urban agriculture company called Sprout by Design. One Wednesday afternoon, after working on a project in Chelsea, I bought a wheatgrass plant at the Union Square farmers' market. I wasn't sure what wheatgrass was, but the vendor told me to water it every other day, bring it inside on hot afternoons, and keep it in the shade. I sat on a blue plastic subway seat on the 1-train, taking my new charge home to my apartment in Morningside Heights. Little lime green shoots stood in the soil, each about half a centimeter in diameter. They would break if I moved the wrong way. I cradled my plant and shielded it from suspicious pigeons and insects, as if it were an injured bunny that needed protection from hungry hawks. In my sixth floor apartment, I shimmied open

the window facing a brick-walled courtyard, constantly shaded, devoid of sun and soil. My wheatgrass settled onto my grey air conditioning unit that stuck out over my red brick windowsill. We had made it home. I was a plant mother.

Over the next few weeks, my plant thrived. He seemed to grow inches in a day. I watered him, shaded him, cooled him, and when he got too tall, clipped him for my smoothies. I'd heard wheatgrass was healthy, but I had no idea why. He was the only bit of green in the courtyard. I knew my neighbors could all see him, and I felt smug being the only person with a living plant on her windowsill. No one else had the audacity to try to grow something green in a grey courtyard. Considering the year before two of my roommate's three succulents had died in my care, I was pretty proud of myself.

One day, I was clipping my wheatgrass for a smoothie. He had stopped growing as much, but I figured he was just beyond childhood. This was normal. Sometimes plants stop growing. But I looked down into his soil, and a layer of two-inch-thick white mold had flooded his roots. Over the next few days, my wheatgrass faded from emerald to yellow. I buried him in the dumpster in the concrete courtyard. He didn't even get a ceremony. In my weeks with him, I had become confident enough to take home a mint plant as well, but that weekend I brought my mint upstate to live with my mother. The mint is still alive, a year and a half later.

That summer, I had gone home nearly every weekend. On the fourth of July, I climbed a tree and sliced my hand open on a broken stub of a branch. My dad stitched it up. I didn't have to go back to Manhattan for another week and a half. At the thought of staying home, relief spread through my fingers and toes like hot tea in December. My high school friends -- Zach, Melissa, and Tali -- and I spent our days swimming in the Goshen reservoir, sitting on the dock of Glenmere lake at sunset, hiking through Catskill waterfalls, and drinking cheap beer on

Melissa's patio. Zach drove us in his windowless Jeep down forest roads filled with potholes while Melissa smoked cigarettes in the back seat. The nights were freckled with stars and the air smelled like air, not gasoline. In mid July I got on a New Jersey Transit train headed for Penn Station. My Dad dropped me off at the Harriman stop. We had almost been late. I had hoped we would be. Then I would get one more day at home. Instead, I climbed into the train car and cried.

That was a summer I went running every day. If morning temperatures climbed past ninety degrees, I took my blue Nikes to my building's basement treadmill. Otherwise, I ran beside the Hudson in Riverside Park. I was used to trail running in Lewisburg and Goshen. My feet knew only soft soil aerated by ants and worms, sheltered by emerald canopies. One weekend my mom came to visit. I don't know what she saw or how I'd changed, but after a few hours with me, she tried to put me on Prozac. Maybe I should've said yes. We were walking from a French restaurant in Harlem back to my apartment in Morningside, and she noticed my limp. I told her how any pressure on my feet felt like they were breaking. She asked me how old my running shoes were. I told her a year and a half. She diagnosed me with plantar fasciitis. I looked it up. Plantar fasciitis is a deterioration of foot cartilage. The tissue in the feet becomes inflamed as it loses its cartilaginous cushioning. It's a condition that primarily afflicts elderly women. I liked to think that at twenty one years old I wasn't yet elderly. My feet told me otherwise. Plantar fasciitis was the consequence of pounding my feet on concrete for five miles every day. I would have to stop running immediately.

One Friday, I had finished a community garden project in Brooklyn a little early. I wanted to go home. My mom told me she would pick me up, but she didn't want to drive into Manhattan. She asked if I could walk across the George Washington Bridge, and she would wait in Fort Lee, the New Jersey town where the bridge ends. So I took the A-train up to Washington

Heights and dragged my inflamed feet across the Hudson. The sun was setting over New Jersey and the smog in the air turned the sky bright pink and orange. The suspension cords of the GW were connected with steel netting to make sure no one could jump. I wondered how many people had tried. Halfway over the bridge, my sister called me from Tel Aviv. She and my childhood friend, Sophie, had gone to the gay pride parade together. They were telling me all about it. How hot it was, how drunk everyone had been, the odd places rainbow glitter had lodged, how much fun they had had. The cars shook the concrete of the most travelled bridge in the world and I wondered how much higher I was than Henry Hudson had been when he first laid eyes on Mannahatta. I wondered how far I would have to dig to reach Earth. I felt like air. I hardly even realized when I crossed into New Jersey. My phone died so I watched the bridge's shadow lengthen across the river. When I stepped off the bridge on the other side, my mom's car was waiting. I was going home.

The last weekend of the summer, I fixed my mom's garden. She had gotten tired of tending it. I harvested eleven zucchini at least as large as my head and uprooted the last vestiges of nightshade. The basil had begun to flower so I harvested what I could and made a pesto with spicy arugula. I liked to take a book and sit behind the garden wall surrounded by the green crops. I liked to walk barefoot through the woods and stare at the emerald canopy. I had missed the color green, missed walking without limping, not killing plants, missed being in a place where something can live. Not just survive, but really live. Especially humans. But one more week of my internship remained. So the Sunday afternoon train brought me back to Penn Station with some zucchinis to give to my friend, Carly. That night, sleeping in Carly's apartment on the Upper West Side, I got up at midnight and went to the bathroom. I spent six hours throwing up. I went back to bed at sunrise and spent the day under a blanket with a high fever.

My mom came to pick me up that evening. I never finished that last week. I couldn't. I couldn't survive on miles of concrete where not even a house plant can grow. I couldn't live in the land of blue plastic subway seats and starless nights. Every part of my body rejected it So I went home to my dog, Luna, and to Zach's jeep. I went home to Melissa's patio, to hikes with Tali, and to Glenmere lake. And when I got back to Bucknell, beautifully perched amidst farms and forests, when I moved into my house on the stream and went walking at Dale's Ridge, I didn't have to dig to reach the Earth anymore.

Notes

- 1: "The Welikia Project." *The Welikia ("Way-LEE-Kee-Uh") Project*, welikia.org/.
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