

Burying the Prairie: An Epitaph

Chelsea Biondolillo

"The act of vividly recalling a patch of the past is something that I seem to have been performing with the utmost zest all my life."

— Vladimir Nabokov, *Speak, Memory*

"Maybe nothing is sustainable and permanent. Maybe that is the beginning of wisdom."

— Paul Gruchow, *Journal of a Prairie Year*

The smell of dead rat, if experienced close-up, settles into your nasal cavity seemingly for good. The way it sticks to the back of your throat is more like a flavor than a scent. And it will come back to you when you least expect it, on an otherwise sweet breeze, or echoing soured milk first thing some morning.

Stephanie, a recent Master's student in Biology, digs a dead rat out of a five-gallon bucket while I watch, pen in hand. The bucket is half-buried on the side of a Nebraskan country road, about an hour outside of Kearney. The bucket with its bait rat has been here for about a week, acting as a beetle trap. Stephanie wears one purple rubber glove—the kind people use to wash dishes—to lift the rat out from the blend of loose hair and soil that covers it.

The road stretches past us like an unspooled ribbon through vast squares of pastures and croplands. A cornfield reaches up on one side of the road, as far as I can see, uniformly bright green and bladed; on the other, a newer planting of soy sprawls low to the ground with deeper-green, shiny, oval leaves; and then in the far distance, a mown wheat field, bleached to cream, the soft tops waving, a field of downy feathers. Green, deeper green, and bleached cream: these are the three colors of the plains-lands, now.

I have spent most of my life on the edges of the country, the steep-sided northwest, the mossed and liquid southeast, the great leafed and stone forests of the mid-Atlantic. I've come to Nebraska to learn about the more subtle center. I've been told that it's only a homogenous landscape to those who hurtle through it at 75 miles per hour on their way to somewhere else, yet, with beetles on my mind, I've come to sit and sift and see for myself.

Prairie comes from the Old French word for meadow, *praerie*. In *Journal of a Prairie Year*, Paul Gruchow declares that "To name a thing is, in some literal sense, to take possession of it." And so the first European settlers did, in Lockean fashion, by laboring to convert the great central American swath from grasses to crops. These first homesteaders were efficient in their labors and passed that efficiency on to their descendants. In Nebraska today, barely 150 years after the first land grants were made by the US government, less than one percent of the original tallgrass remains.

Stephanie holds the rat by the tail and rattles it against the side of the bucket. As she does, black and orange beetles, about an inch long, fall out of holes in the rat that they themselves have created, and into the bottom of the bucket. They have chewed the rat from the inside out until it is just an empty, stinking shell of skin and shedding hair, which Stephanie throws over her shoulder once it is free of beetles. She reaches back into the bucket, and carefully picks up a beetle between her thumb and forefinger. She squints at it for just a moment.

"Tom," she says, and throws the beetle off in the direction of the rat. She picks up another. "Marge." This time, she puts the beetle in a Tupperware dish, sized just right for a picnic's worth of sandwiches that sits between her and a research assistant named Rafael. She picks out two more Toms and another Marge. She throws them one, two, off to the side, and three, into the plastic

photos by Chelsea Biondolillo



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dish. Rafael, an exchange student from Brazil, then picks up each Marge and places a mark on its back with an electric pen, branding it. The mark is about as big as a period on this page. After he brands them, Rafael (whose specialty is microbes and their use in farming science), places the beetles in a different five-gallon bucket that we've brought with us.

I have been making tick marks on a data sheet that Stephanie has given me, and I now have three tick marks in the *Nicrophorus tomentosus* column and two in the *Nicrophorus marginalis* column. Tom and Marge, for short. Over the course of the day, I will also add tick marks to *Nicrophorus orbicollis*, *Necrodes surinamensis*, and *Oiceoptoma rugulosum* columns.

There is another column on the page for *Nicrophorus americanus*, or the American burying beetle. I flip back through several observation days and see only blank *N. americanus* columns. This is the beetle I've come here to see.

The American burying beetle—like the compass plant, the bison, and the passenger pigeon—once roamed widely across the tallgrass prairies of the United States. Tunneling through rich soil tangled with the roots of grasses and cottonwood trees, the beetle would shuffle dirt from front to back, aerating the soil and moving nutrients around, until it could smell the most alluring scent of decay: after rigor mortis but before maggots. It burrowed to just below some recently departed creature and then dug out a shaft underneath the carcass. The vole or rat or prairie chicken or finch would slowly tip down as the shaft opened up like a maw. The animal or bird would slide under the grass line, and the beetle would clamber over it, covering it with loose soil. And then the real excavation work would begin. At least that's the way things used to be. The American burying beetle has been on the endangered species list since 1987.

What differentiates *N. americanus* from all those Toms and Marges is size. The other common name of americanus is "Giant Carrion Beetle," and it can grow to over two inches in length. The more common carrion beetles, the Toms, Marges, Orbies, and Suris, are lucky to get half as long. The American burying beetle (or "ABB") is large enough that it can bury prairie chickens, squirrels, and even small rabbits. ABBs served a vital, if indelicate, role. Yet they can no longer be found in the majority of their historic range. Nobody is sure exactly why they vanished or how to bring them back.

I take a photograph of Stephanie holding a Marge and a Tom. They are both black, with bright orange blotches on their backs like a Clifford Still painting. Their antennae are topped with small florets. Each beetle is about an inch long, and one, she says, has a grayish cast to its pronotum, or the chip of shell that covers its thorax. That's how she knows which to collect and which to discard.

She keeps the Marges because they are close relatives of the ABB, and so are about to become study subjects. Stephanie and her assistants are collecting *N. marginalis* and *N. orbicollis* beetles (and ABBs when they find them) for a researcher named Jessica Jurzenski who is trying to figure out if the beetles can be effectively relocated to better habitats. Jurzenski will defend her dissertation, "Factors Affecting the Distribution and Survival of Endangered American Burying Beetles, *Nicrophorus americanus* Olivier" at the University of Nebraska, Lincoln in just a few days. She's invited me to sit in on her defense.

Before Jurzenski's defense, however, I stop at The Nature Conservancy's Derr House outside of Grand Island Nebraska for a "prairie field day." All through a hot, still day, entomologists, herpetologists, mammologists, ornithologists, botanists, and land managers lead an enthusiastic group of mostly retirees and school children on a handful of informative walks through different conservation sites. The goal today is to inspire the visitors with the vast diversity that the seas of grasses contain. With a greater understanding of the richness of the prairie ecosystem, organizers hope, will come an urge to save it.

Gerry Steinauer, a botanist with Nebraska's Game and Parks, leads the prairie restoration walk. He explains that even when given full advantage and care, it takes five years for native plants to "weed out" invasives like poison hemlock, thistle, lamb's quarters, and the common sunflower. But these best efforts of the Conservancy's ecological engineers can only go so far.

Says Steinauer, "We can never get it back to the *Prairie*. If you had a native prairie in eastern Nebraska before settlement, there might be 150 species of plants on an acre of upland. It had topsoil, deep, rich, organic topsoil that thick," here he holds his hands about a foot apart and swings them over a patch of exotic Queen Anne's lace growing between stands of native bluestems. "That topsoil is all in the ocean now. It's eroded because it's been farmed. We've lost all that topsoil that was home to a thousand species of nematodes, bacteria, fungi."

He grimaces and nudges a patch of sod with his boot, "We're down to this light brown, clay soil." While the clay can support the hardier and fast growing plants like Canadian wild rye, more delicate wildflowers and tiny, fleeting sedges have so far proven impossible to permanently restore. Is it possible that one of those minute flowers or some rare nematode held the key to the ABB's survival?

In the heat of summer, the prairie is a mosaic of textures and colors. Red slivers of rye; golden-brown, feathered bluestem; soft gray-green vetches. The plains wind twists through the different plants, shaking some, rustling others. Dicksissels, horned larks, and grasshopper sparrows call from deep in the grass. Cicadas and dragonflies hum their two rusted notes. Under the soil, spiders, ants, and beetles tunnel through the soil without making a single sound a human ear can hear.

If these species were to vanish, we would feel a loss. But they, in not existing, would feel, literally, nothing. A philosophical question then: Should our sentimentality and guilt be the most important determinant in reclamation efforts? Or should our likelihood of success? Why save the prairie if, in itself, it is a fleeting system, a mere geologic moment of grassland between forest and desert?

Twelve thousand years ago, Nebraska was at the southern boundary of ice-age glaciers. Mammoths and saber-toothed tigers roamed the temperate savannahs that were left behind as



the glaciers receded. As the land warmed, a spruce forest replaced the grasslands. (Grasslands are always replaced by something—they do not linger, geologically speaking, the way tracts of dense trees and desert dunes do.) Steinhauer described a temperate woodland more akin to Canada's hardwood forests, which persisted until a couple thousand years ago, when the earliest Americans began to use fire to manage the continent's interior. Neolithic peoples most likely learned the benefit of fire in the aftermath of lightning storms. They began an effective campaign, burning travel paths and clearing buffalo hunting grounds across the heavily wooded landscape.

The fire cultivated prairie, while young compared to the basement rocks it overlays, had at least two thousand years to develop an ecosystem rich in plant, insect, and animal life that modern agriculture dismantled in less than a century. "What a thousand acres of Silphiums looked like when they tickled the bellies of the buffalo is a question never again to be answered, and perhaps not even asked" wrote Aldo Leopold in 1949. "Mechanized man, oblivious of florals, is proud of his progress in cleaning up the landscape on which, willy-nilly, he must live out his days." I do not feel proud when I look out at the tidy checkerboard monocultures that dominate the roadside landscape along a corridor of I-80 that marks our agricultural progress. Yet I have a host of luxuries, edible and otherwise, that I can afford because of the cheap food this American breadbasket provides: not only do I bear a familial resemblance to him, but I owe much to mechanized man.

As our chatty knot of burgeoning and hobbyist conservationists wind through the paths in back of Derr House, I wonder aloud about the buffalo. Their grazing habits are very different from those of domestic cattle, and some prairie purists say that even the best restoration will be deficient without them. Perhaps it is a lack of buffalo that is preventing an ABB resurgence.

"We could have an hour long discussion about buffalo," Gerry stage-whispers to me. But we never do.

Two days later, in Lincoln, while the pavement outside shimmers under record temperatures, I sit in an air-conditioned room above the student union as Jurzenski presents her research to an engaged and supportive group of around 40 people. She gets all of her signatures and becomes a doctor of philosophy in entomology based on her work tracking carrion beetles through the Nebraska Sandhills and nearby cornfields. Jurzenski is a pragmatic philosopher and an enthusiastic scientist—but her data cannot tell us whether or not we ought to save the beetle, only suggest the odds of our success if we were to try.

"I was sent here based on a rumor about passenger pigeons," I tell her, after she's had time to collect handshakes, hugs, and post-doc recommendations. One of my own mentors told me a story about the ABB needing passenger pigeons to thrive, the insinuation being that we were spending research money trying to save a doomed species. This idea intrigued me enough to contact Jurzenski. "Is it true that the ABB can't fully recover now that the pigeon is extinct?"

"It's mostly just been conjecture. Nobody's ever really confirmed that." Her own advisor was a major proponent of the pigeon hypothesis, but she says, while the disappearances of the beetles might match up with most historical pigeon populations—it doesn't account for the populations of beetles that remain. In other words, all the ABBs would be gone if the pigeon was a required part of their diet. "Now the greater prairie chickens are probably a source for them currently, and I don't know what the reduction of their range has been." We sit in silence a moment, before she pulls out some maps and data sheets for me to puzzle over.

A keystone species is supposed to offer clues to the overall quality of its habitat based on its own health. And it's likely that the mysterious disappearance of the beetle is related to the completely unmysterious disappearance of American prairies. But direct lines of cause and effect are most common in theory. The practical universe is rarely so predictable.

American burying beetles can eat any dead animal, but they need something large to provide space in which to raise their young. And they do raise them. The Nicrophorinae sub-family of beetles is one of only two true beetle families that offer parental care (Scarabeidae, or dung beetles, is the other). While other insect parents lay eggs and then die or otherwise leave their nests to fate, a breeding pair of carrion beetles cooperatively bury their (pungent) two-parent home, and then take turns regurgitating food for the developing larvae. As a result, the carcass has to be large enough to support both adults from the time of egg-laying through hatching, and then the entire growing family.

While the passenger pigeon was a sizeable bird, and it did once frequent the prairie in flocks large enough to block the sun, there were always other options for the beetles, such as rabbits, grouse, weasels and migrating waterfowl.

And the prairie, though key, wasn't their only range. Though Jurzenski studies the Nebraskan beetles, their historic range included the majority of Eastern states. They were found as far north as Canada, as far east as Rhode Island, and as far south as Oklahoma and the Texas panhandle. Passenger pigeons might account for much of that territory—but they've been gone awhile, while the beetle still persists in a few pockets, such as the Sandhills in north-central Nebraska. Jurzenski says that despite over two decades of research, they are still no closer to a definitive answer.

"It disappeared from all these areas," here she sweeps her hand across a US map, "and there's no common factor in changes that have happened."

She does mention one interesting clue. If you overlay a map of the few remaining ABB populations on to a nighttime satellite map of the United States, the beetles are all in the darkest areas. But studies on light pollution continue to thwart conservationists: again and again they've shown that an increase in environmental lights themselves don't impact typical behaviors. "The thing is though," says Jurzenski, "more lights means more people. We've done this somehow; we just may never be able to point to a single direct cause."

So, what's in a cause? Does it really matter if it was roads or farms or domestic animals, or some combination of all three that's killed the beetle? It does if you're a research lab trying to re-introduce them. New colonies in Rhode Island and Martha's Vineyard, for example, seem to be

thriving—without passenger pigeons, bison, or tallgrass, while attempts to establish a breeding population in Ohio have failed for six years in a row. They put healthy beetle pairs out in the fall, and can't find any trace of them the following spring. They could be dying over the winter, or migrating somewhere else.

This is one of the problems with studying a relatively small creature that is only above ground at night. It's also why Jurzenski's field team collects Marges and *N. orbicollis* specimens in addition to ABBs: the greater the number of test subjects, the more data points.

"We don't even necessarily know if they are coming back strong in Nebraska, or if they were always strong and nobody knew it. We have such a good population up in the Sandhills. It's one thing to try and explain the decline, but we don't even know why they're doing so well where they are." The entomologists who specialize in ABB have only managed to exclude causes: it isn't street lights or pesticides or traffic sounds. One of the larger questions that Jurzenski struggles with is what happens to the shoulds and oughts of beetle conservation efforts, if we don't even know what's killed them.

The smaller beetles, the Marges and Toms and the rest, have thriving populations. It's possible that the ABB is the insect equivalent of megafauna, and they have just become too large for their ecological niche.

"At a single carcass, the ABB will beat out the other beetles, but on a larger scale, just finding the right resources might be a struggle," Jurzenski hypothesizes. I imagine the prairie from the ABB's perspective: a network of anthropogenic obstacles—cow sheds, construction sites, corn rows, driveways, all punctuated by rats, mice, blackbirds, and thousands of smaller competitors. I wonder if they are more rare in our sanitized agricultural landscape, or if the scavengers who follow us: possums, jays, dogs, are simply too efficient for the prairie to support in addition to the ABB.

On the scale of Earth's history, prairies, like humans, have winked on in the last few moments. But on our human scale they were always here, until the disaster of modern man. It is very difficult to imagine how the land changes from forest to grassland to desert—without our terrible machinations. And yet change it does, even though the time scale is beyond our experience. We hypothesize, model, and project it, but we cannot see it in the same way we can see plants and animals die.

In prairie reconstruction efforts, in beetle breeding programs, we want to undo a thing we have done to our environment. We want to save the grasses and the beetles from ourselves, as we failed to save the passenger pigeon, as we are failing the arctic and polar bears. We want to return the great meadows of the Louisiana Purchase to some state we imagine as golden. As though our lives immortal could be made in the roll of a hill or the blended shades of grass.

It is a fallacy, this possibility of return: the planet has a wobble, and from it, climate, as day-lengths and river beds, drifts. Ice will melt in one latitude and freeze in another, sand will blow across one national boundary and collect inconveniently in another, ponds will dry and levees flood.

The American prairie and its beetles seem to ask whether restoration is a fool's errand, a nostalgic yearning, or a sentimental journey. Like all those inches of dark topsoil and the woolly mammoths that once browsed above them, the ABBs' role may simply be gone. And in their wake, a mosaic of farms has emerged. It is possible, therefore, to answer the question of duty with full granaries, and rest easy. We can say we have paid a black and orange coin for our plenty. But was that coin ours to spend? How many more worms, beetles, birds, and buffalo will our future cost us, and how much of ourselves do we risk losing in the bargain?

Perhaps, then, conservation can cultivate something even more valuable today than crops: humility. Maybe what we need is to be humbled, to understand that our place in this world is to care not just for an insect, but one that lives among death and the unmaskable smell of death. One that disgusts us, that resists even our most concerted grace and attention. To care not just for forests, mountains and painted canyons, but for sere grasses and the tiny wildflowers they conceal between their blades. To labor against easy returns. Nature can't always be just the things we love and treasure. And our attention to the world around us must become something more than duty.

Antoine de Saint-Exupery, in *The Little Prince*, posits that "What is essential is invisible to the eye." Though I looked through dozens of buckets with Stephanie, next to cornfields and wheat fields and soy, and though I counted thousands of beetles, I never made a single mark under *Nicrophorus americanus*. While there is still no single piece of data that can quantify the importance of the American burying beetle, that empty column might just make all the difference in the world.

What if what is essential is this: the beetle was here and may soon be gone? Such a small thing, this tiny orange and black puzzle piece, but from it, perhaps we could learn how better to appreciate impermanence and not squander the fleeting perfections between even the smallest blades of grass.

