

To Be Honest

by Jeffrey A. Lockwood

My job is to kill.

But I usually describe my profession euphemistically as "applied ecology" or "pest management." As an entomologist on the faculty of the University of Wyoming's College of Agriculture, I work to develop new and better methods of managing grasshopper outbreaks that would otherwise devastate the western rangelands that ranchers depend on to feed their livestock. While agriculture brings forth life, entomology is largely premised on taking life.

I flatter myself that I make substantial contributions to science by refining the use of insecticides. But the bottom line is that I am an assassin: my job is to extinguish life. I am expected to do it well—efficiently and professionally. This year, I will direct the killing of no fewer than 200 million grasshoppers and more than a billion other creatures, mostly insects. Their accumulated bodies will weigh over 250 tons and fill twenty dump trucks. That's a lot of killing, and each year it gets harder.

I began to study grasshoppers in 1986, learning how they spent their days. Few scientists have taken the time simply to observe these insects, although this seemed to me a reasonable initial step in getting to know them. During that first summer in Wyoming, I savored long, lonely hours watching grasshoppers in a field south of Laramie. As the insects lounged in the soothing morning sun, or took their siesta in the sizzling afternoon heat, I struggled to stay alert and focused on my work, systematically recording their behavior for later analysis. In the words of Konrad Lorenz, "It takes a very long period of watching to become really familiar with an animal and without the love for the animal itself, no observer, however patient, could ever look at it long enough to make valuable observations on its behavior."

Our empathy for animals that are not soft and warm grows slowly; years of familiarity breed compassion. It might seem difficult to connect intimately with grasshoppers, but they are rather endearing when you give them a chance. We readily bond with infantile forms; the oversized head and eyes of a baby melt our hearts. It is no coincidence that Walt Disney chose a cricket for his first insect character—Jiminy's features trigger a subconscious parental instinct. Grasshoppers are innocent and affable creatures, although they can be a bit scrappy when crowding around a particularly tasty morsel (such as a recently deceased comrade).

Grasshoppers are also beautiful animals. On an afternoon's walk, I can find twenty or more species. *Dactylotum bicolor* is a garish pink, blue, and black pencil-stub of a grasshopper. Like Jack Sprat and his wife, the sleek, velvety black males of *Boopedon nubilum* are the antithesis of the obese, mottled-brown females. The size of a mouse, the wingless pink-and-green *Brachystola magna* lumbers across weedy fields munching sunflowers. Only a sharp eye can detect *Hypochlora alba*, a ghostly green grasshopper that vanishes as it tumbles into a patch of the cudweed that constitutes its only food. An adrenaline rush gives way to a sigh of relief upon finding *Aeropedellus clavatus*, an acoustical mimic of the prairie rattler. I can't help but wonder if all this splendor was a necessary consequence of evolution or whether it's simply a miraculous expression of joy.

When I started my research,

I was largely an observer of the insecticidal spectacle conducted by various agencies and orchestrated by the U.S. Department of Agriculture. These programs were intended to protect the grass needed by livestock, and the USDA paid the entire cost of spraying pests on federal land, half the cost on state land, and one-third of the cost on private land. As a consequence, the killing fields were immense. The smallest operation permitted by policy was ten thousand acres, but this does not approximate the scope of effort brought to bear against a major outbreak. In 1985 and 1986, more than twenty million acres were blanketed with insecticide.

As a developing scientist new to such staggering proportions, I was anxious to innovate and explore novel approaches to improving grasshopper management. To my disappointment, any interest the USDA had at the time in new ideas was subsumed by the enormous investments that fueled their control programs.

However, in response to economic and environmental concerns, the USDA was forced to abandon its subsidy program in 1996, a decision that effectively tripled the cost of grasshopper control for ranchers. This is where I came in. With my colleagues, I developed a method of application whereby insecticides are applied in strips at a fraction of traditional rates, with untreated strips in between. This wasn't rocket science, but it worked (largely because grasshoppers move readily into treated swaths, perhaps in search of a cannibalistic snack).

When we generated our first large-scale success on three square miles of rangeland, I knew something of what J. Robert Oppenheimer felt as the first atomic fireball blistered the New Mexican desert and he muttered, "I am become Death, the destroyer of worlds." Like myself, he never chose a target, ordered a strike, or pulled a release lever, but he provided those who make such decisions with the option. Recently, the method that we pioneered has been employed on a quarter of a million acres throughout the West, killing perhaps twenty billion grasshoppers.

Perhaps because I began relating to grasshoppers one at a time, my encounters with control programs have a haunting quality. Unable to fully grasp the number of individuals killed in a control program, the effect is similar to scanning a stadium packed with tens of thousands of individuals. As it's impossible to make out faces in such a crowd, they meld into an anonymous mass of humanity, a numerical attendance figure.

To conceive of the single largest spray program in the West, imagine a desolate tract of rangeland encompassing six million football fields. This area is so large that you would need a month to walk its border, and a company of gardeners equal to the population of New York City to mow its surface in a day. Over this area, we spread 375,000 gallons of insecticide, the amount of liquid that would be contained in a line of beer bottles 157 miles long—enough to give every person in the U.S. a heaping teaspoon. A few days later, we have killed five hundred billion grasshoppers. With this number of corpses, we could fill six hundred gymnasiums, and it would take a working surface of twenty square miles to stitch a quilt of their wings. Imagine giving each person on earth eighty of these small corpses.

Walking across the prairie after the first large-scale program that I had witnessed, I hardly noticed the corpses. But the stillness was profound. In a grassland swarming with life one day earlier, there were now no bees playing connect-the-dots with wildflowers, no ants staggering under their masochistic loads of seeds, no ground beetles lumbering in their search of a meal, no flies circling with their whining plea for a sip of sweat, and, of course, no grasshoppers erupting in pandemonium from beneath my feet. Like Lilliputian scenes from the suburbs of Hiroshima, the architecture remained but there was no movement and no sound, save the ghostly swaying of the grass and the eerie whisper of the wind. To hear the silence of Rachel Carson is to know the power of poison.

These days, the weapon of choice for most ranchers and local pest management agencies is diflubenzuron, a chemical that, even at very low levels, inhibits the formation or hardening of the insect's cuticle or exoskeleton. I am proud that we now use less than one percent of the amount of insecticide that was applied just ten years ago, but the quantitative success belies the qualitative effects. Within a week of treatment, the insects molt into deformed monsters, with grotesquely twisted wings and misshapen legs. Often, their hind legs fall off, as the cuticle is too weak to withstand the pressure of jumping. They become lethargic, appearing dazed or exhausted. Like forgotten war refugees, the amputees stagger about aimlessly. Each summer, I walk the prairie after spraying to see the gruesome results of a control program, so that I never forget what I have made possible.

The first time I fully sensed death

at such a tremendous scale was during a sabbatical leave in Australia, a land known for its ability to touch the human spirit. My purpose in going there was to learn from the world's most efficient and effective locust control program. The Australian Plague Locust Commission's headquarters bears an uncanny resemblance to a war room, with color-coded targets on wall-sized maps, the static-laden chatter of radios,

and a camaraderie reminiscent of a grizzled platoon. The formal lessons they offered me concerning logistics, communications, and survey were informative, but what I ultimately learned was not part of the structured tutorial.

The sparse grasslands that fringe the outback near Broken Hill are notorious for their capacity to foster locusts—the migratory, swarming form into which some grasshoppers develop under outbreak conditions. My introduction to these creatures occurred on an unusually wet, gray morning. My guide pointed at the birds swooping from a distant treeline to join a raucous flock, just visible as it churned in the clumped canopy of grasses. It was an enormous all-you-can-eat buffet of locust nymphs.

Nymphs are the immature, wingless stage of grasshoppers or, in this case, locusts. Although each one is only the size of a push pin, they form bands ten feet wide and a mile in length. With two thousand nymphs per square yard, a single band may include twelve million insects—roughly equivalent to the entire human population on the Australian continent. Warmed by the morning sun, the nymphal anarchy coalesces in a surging, leaderless mass—and the march begins.

On a quiet afternoon, the faint rustling of millions of mandibles grinding and bodies tumbling accompanies the sinuous band as it rolls across the grasslands. These waves of life are so thick that they can be seen from airplanes; at five hundred feet they appear as arching shadows with rings of bare soil in their wake, marking the places where they stopped and fed on previous days. Deep in the outback the adults are relatively harmless, but their flights take them inexorably toward the farmlands that border the arid interior of the continent. The swarms look like shimmering dust storms rolling over the baked grasslands. Grains of sand, stars in space, locusts in flight—the sheer numerical splendor is terrifying and joyous.

Early one morning we traveled to the site of a spray program. I had planned to lend a hand in the body count or "efficacy assessment," but I never got beyond trying to comprehend the essence of the massacre. I had observed such programs in the United States, but never one in which death was so apparent. Perhaps it was the recency of the insecticide application, my empathy after having been engulfed by a swarm the previous day, or my detachment from the farmers who benefited from the program, but I was stricken by the scene around me.

Everywhere locusts were lying in the burnt-red dust. Some were dead but many were still twitching in the spasms brought on by the neurotoxin. I am told that some bombardiers in World War II were unable to continue their duties once they witnessed the carnage on the ground. It was as if I had seen, *really seen*, for the first time, what it meant to dole out wholesale death.

When I was in fourth grade,

my older brother, who occasionally thrashed me when we were younger, came to my defense against a seventh grade bully. The miscreant never again accosted me, but my brother did. As the love of a brother transcends the scraps and tussles of growing up, so my relationship with grasshoppers is conflicted, swinging between affection and aggression. In the midst of my own violence, I have defended them from government bullies who understand little of their nature and care even less.

In 1989, the USDA planned to import exotic parasites and pathogens to attack the native grasshoppers of the western states. These organisms, tiny wasps that lay their eggs in those of grasshoppers and fungi that invade the tissues of insects, were to be gathered from around the world and released on the prairie. Because it risked permanently damaging our vast grassland ecosystem, I engaged in a long, bitter, and eventually successful battle to stop this effort.

The program was missing important elements, such as a provision for protecting nontarget organisms. I found results of laboratory studies hidden away by the USDA that revealed that the wasp proposed for release would have parasitized a grasshopper species that suppresses snakeweed, a poisonous plant that induces abortions in cattle. Yet there would have been no way to put the genie back in the bottle if things were to go dreadfully wrong.

At least with insecticides, every use is an intentional act that invokes regulatory constraints. We can avoid national parks, wildlife refuges, and habitats where beneficial species reside—unlike parasites, which spread and invade without regard to such considerations. And we know that chemicals will eventually break down, whereas parasites and pathogens will increase in numbers. For all of the damage that we can do and have done with toxins, the potential for ill-conceived introductions of exotic species to disrupt natural systems is even greater.

Grasshoppers, unnoticed, sculpt the prairie, prune poisonous weeds, compost dead plants, and feed the birds. And with each passing year, the quiet chorus of their lives becomes more deeply instilled in my being, while the rousing refrains of their sporadic outbreaks continue to draw the attention of government agencies.

Taking life—like giving life—can be a sacred act. A friend of mine who is an herbalist believes that one must harvest medicinal plants with thankfulness, understanding, and humility to access the full potential of the resulting extract. Indigenous peoples asked permission or forgiveness of the animals they hunted, and perhaps modern agriculture should act with such humility and grace when killing is necessary. Following the lead of native people, agriculturalists would do well to understand that the land is shared with other creatures, and their needs are worthy of our understanding.

At the beginning and end of each summer, I sneak away from my field assistants and collaborators to be alone, to pray. This is a time when I experience the fullness of the prairie, when I seek what lies at the core of my intentions as a scientist, and when I release the guilt and shame. The thought-words are different each time, but the question I ask myself persists—Why do I continue to develop the means of killing these creatures?

I justify killing grasshoppers because my intentions are purified by love for them. I am soothed by the notion that I mean well, that I foster a world in which there is less killing and fewer misunderstandings between species. I tell myself that intentions are all that we really control; outcomes are evasive and uncertain. But spraying thousands of acres with insecticides, regardless of intentions, is going to do a lot of harm. A Buddhist priest once told me that the Samurai were Zen masters—they killed with a depth of awareness we can barely imagine. The mindfulness of Buddhism allows one to be profoundly effective, but, he noted, you are still stuck with deciding what to do effectively. Slicing an enemy in half with perfect awareness still makes a mess.

Vignettes from a documentary on killing have haunted my memory for years. The film followed a condemned killer over the course of his last days. Ironically, I found the most compelling character to be not the convict, nor his family, nor the victim's family, but the warden. Here was a good and kind man burdened with the obligation of premeditated murder. The warden acted with dignity and compassion; he was gentle but not fawning, supportive but not patronizing, regretful but not apologetic. He struggled to make the most difficult of all social responsibilities as decent as humanly possible.

And so I ask who is taking the more meaningful role: the compassionate warden at the side of the condemned, making the execution more dignified and decent, or the protestors in the streets outside, shouting slogans against the death penalty? Perhaps I would be a better environmentalist if I refused to use insecticides, but would I be creating a more decent world for my fellow creatures if I left my job in protest? Or should I keep working to find ways of killing fewer creatures with more humane, less toxic methods?

I claim to be a compassionate executioner. After all, if somebody has to kill, it might as well be someone with an inkling of empathy. But to be precise, I am not the executioner—that would be the aerial applicator. In fact, I generally avoid the treatment programs. To sustain the analogy, I'm really in the business of designing less cruel electric chairs, and this sometimes seems even more perverse than pulling the switch. Perhaps it doesn't do the convulsing grasshopper (or inmate) a whole lot of good to know that I care, but maybe society can retain some of its humanity if I can make the act of killing less brutal and less frequent.

Inescapably, we live by death.

I study how to kill better and less, but a little more of me dies with each field season. If my current projects succeed in reducing the amount of toxin needed to restore grasshopper infestations to naturally manageable levels, during the next outbreak we will reduce our insecticide use by ten thousand tons and limit our killing fields to less than half of their historical scale. Still, the carnage will not be avoided; that is the ugly middle ground called compromise. I am convinced that it is easier to be a member of Earth First! or the Chemical Manufacturer's Association than a member of neither. The atheists and the theists have it easy.

I sometimes wish I could throw myself at one of the extremes—environmentalism or anthropocentrism, mysticism or rationalism, religion or science. But to do so is to become truncated, half human. Some people can choose one or the other, but living and working with grasshoppers, knowing their beauty and innocence while being deeply responsible for their deaths, has shown me that both of these ways of knowing must be honored for our agriculture and our civilization to flourish.

Scientists have a unique opportunity in this venture: we can understand, connect with, and tell the story of the natural world. For those who are willing, it is possible to both comprehend the facts and transcend them for the sake of the spirit. And when we are open to this possibility, I have found that with time, technical data give way to a deeper kind of knowledge that relies on intuition, tradition, experience, and faith—and beyond knowledge lies the possibility of wisdom. For me, the data of "percent mortality" has given rise to the knowledge of how to control grasshoppers with minimal harm. My wisdom, however nascent, comes from seeing the death of grasshoppers and the integrity of their biotic communities (including the human elements), and realizing that we are all one, that we are diminished by their deaths and uplifted by their lives.

Scientists often attack spirituality, and I believe that the reason is fear—a sense of anxiety, even dread, that there remain elements and processes of the world that are fundamentally and ultimately beyond our capacity to control, quantify, or rationalize. I suspect that many scientists are hostile to mystical notions in order to prevent the impure thoughts of transcendent experience, the troubling touch of subjective feeling, and the unsettling whisper of spiritual insight from confusing the rational process of analysis. To focus on one-half of what it means to be human, they chant a mantra of materialism to deny anything that lies outside of science. Rather than sustaining the illusion of objectivity, they could open themselves to a respectful, caring, even loving relationship with the creatures they study. But then they would end up like me—attached to the creatures I kill, with all of the unrest that this entails.

Although ideals make for fine philosophical tracts and political treatises, real life is full of complexity, uncertainty, diplomacy, and nuance. I often encounter those who preach about how the world ought to be, but rarely do these futurists wish to engage in the actual work of getting us from here to there. Of course, the middle way risks the pitfall of rationalization, as we talk ourselves into perpetuating the status quo. I try to forgive myself and secure nature's pardon by contending that with each killing season we are one step closer to a just and compassionate future. And so I will continue to decimate grasshoppers for the benefit of agriculture and continue to mourn them for the sake of human culture.

But the putative virtues of "killing them softly" beg the question of why kill them in the first place. There are no comprehensive solutions to the universal dilemma that we must kill to live. No philosopher, theologian, artist, or scientist has offered a general solution to the mystery of suffering and death. Paradoxes are not solved—they are lived in, and perhaps lived through. The wicked irony embedded in this paradox is that I take psychic sanctuary in making my victims anonymous by numerical imaginings. On a recent trip to Australia, I watched an aerial spray program with detached interest, taking mental notes of logistical and methodological details. But I cringed when a colleague looked down at the parched soil and lifted his foot to grind a single nymph under his heel. It is harder to crush a grasshopper slated to be sprayed than it is to watch the airplane lay down a blanket of death.

My memory is drawn to the summer of 1992, when I stood on a desolate tract of sunburnt rangeland infested with Mormon crickets (which are actually a bizarre species of katydid, named for their legendary invasion of Mormon farms) near Edgerton, Wyoming. A dense band of insects numbering in the tens of thousands had been sprayed a few hours earlier, and I arrived to find them staggering about on the slopes.

Humpbacked, wingless, with antennae streaming behind, it was as if a sadistic fisherman had dumped a net-full of melanic prawns on the prairie, where they flailed desperately.

The poisoned crickets were unable to hop uphill, so each movement brought them down into the ravines. In the dry creek beds they accumulated in what looked like stagnant black streams. On the hillside I lifted one cricket from within the sagebrush where it had become entangled. I grimaced at its convulsions, which were aggravated by my handling, then set it down on the dusty soil to resume its dying journey to the anonymous mass of writhing bodies at the bottom of the draw.

So in the end, how do I live as an assassin? I know that the grasshoppers' suffering and my pain are real. I know that they die so I might live. Grasshoppers are my ecological communion—their bodies are my life. Through them, I have found meaning in my work, experienced connectedness to other beings, and gained a sense of purpose in this world. Perhaps my destiny is that of the warden, to assure that these creatures do not die unknown, by the hand of a dispassionate executioner. To be mourned is to have one's life—and death—touched by another sentient being. Perhaps that is all that any of us can hope for.

But does one man's perspective offset the billions of deaths? I am suffocating under the expanding mass of corpses that pile onto my conscience each year. And so, I tell their story and mine—and ask something of you. At your next meal, say grace, give thanks, remember them.

Jeffrey A. Lockwood is a professor of entomology at the University of Wyoming. His research is devoted to managing overabundant grasshopper populations and conserving rare grasshopper species. He is director of the Association for Applied Acridology International and an editorial board manager for the **Journal of Insect Conservation**. He has taught classes on biodiversity, agricultural ethics, science and religion, and, of course, entomology.

This article originally appeared in **Orion** (Summer 2001). 187 Main Street, Great Barrington, MA 01230. <http://www.oriononline.org>