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Blockchain Chicken Farm

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And Other Stories of Tech in
China's Countryside

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Xiaowei Wang

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Introduction

This evening, I am brushing my teeth surrounded by dozens of pin-size black worms that roil and roll along white ceramic tile. A child's socks and underwear are hung out to dry on a small rack next to the sink. It's been raining all day. I'm in a small village in southern China, at the border of Jiangxi and Guangdong. I arrived in the village to try to understand how e-commerce has affected life here, with farmers selling goods directly to consumers, using WeChat's robust mobile payment system. After missing the last bus back to the nearest city, I am now on an involuntary meditation retreat.

Since I'm American, my hosts have assumed I need spacious, extraordinarily comfortable conditions, which is why I'm staying at the most modern house in the village, by myself. It's a two-story concrete building with an outhouse that has a ceramic squat toilet, just a few convenient steps away from the front door.

It's so cold here that I can see my breath inside. There are no radiators, just a small plastic space heater that defeatedly wheezes lukewarm air. It's the only sound I hear besides a low, watery gurgle, accompanied by the wind rattling through cracks of the window frame.

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Nighttime is dense and dark here, with no streetlights and few houses, eerily emphasized by the silence of the village. My movements feel muffled and dull. I am unused to this kind of solitude, as someone who spends most of my time in cities, and I am scared—stuck in a new place with only the worms to talk to, maybe a ghost or two, re-playing supernatural horror movies in my mind. Without the stimulation of light and sound, my mind turns over thoughts and stories on repeat, revisiting inconsequentially boring past moments like a mantra: Did Xinghai think I was a jerk because I didn't say thank you earlier when he dropped me off? Did I end my e-mail to Gu in the wrong tone? What if I get stuck in this village forever? How slow would I be at harvesting rice? I get bored with my own thoughts and download a night-light app on my phone after scrolling through pages of App Store reviews.

“Why are you here?” One of my hosts, an old rice farmer, asked me this earlier. I had been traveling for days, and in my exhaustion, his question took on a more existential note. It took me a minute before I could sputter, “I'm here to see you.”

I felt the pull of rural China about three years ago, after visiting villages in Guizhou, seeing a side of China very different from the one portrayed in most forms of media. This pull was amplified by my need to challenge my own *metronormativity*—a portmanteau of “metropolitan” and “normative,” coined by the theorist and scholar Jack Halberstam.

Metronormativity is pervasive—it's the normative, standard idea that somehow rural culture and rural people are backward, conservative, and intolerant, and that

the only way to live with freedom is to leave the countryside for highly connected urban oases. Metronormativity fuels the notion that the internet, technology, and media literacy will somehow “save” or “educate” rural people, either by allowing them to experience the broader world, offering new livelihoods, or reducing misinformation.

For me, challenging this metronormativity is crucial. So much of the extended crises and the rise of authoritarian populism throughout the world has been a result of globalization. The urban-rural dynamic is central to globalization, with rural areas serving as the engine, the site of extractive industries from industrial agriculture to rare earth mining. I believe our ability to confront metronormativity will determine our shared future. We are intertwined across cities, villages, and national boundaries, bound by material circumstance.

I have traveled to rare earth and copper mines in Inner Mongolia, driven along dusty highways past wind turbines and data centers, visited villages where artificial intelligence training data is made, and seen empty villages where all the young people have left for electronics factory jobs in cities. Rather than seeing the way technology has shifted or produced new livelihoods in rural China, I have been humbled to see the ways rural China fuels the technology we use every day, around the world.

Questioning metronormativity means demanding something outside the strict binaries of rural versus urban, natural versus man-made, digital versus physical, and remote as disengaged versus metropolitan as connected. To question metronormativity demands a vision of living that serves life itself, and not just life in cities. Embarking

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on this line of questioning demanded a big change in my own core beliefs.

The dynamics of rural China are not isolated to China itself. Yet because of its geographic distance from the United States, it remains a kind of periphery. These rural peripheries, the edges of the world, hidden from view, enable our existence in cities. These areas produce everything from the cotton in the clothes we wear to the minerals that create the computers in data centers. They also produce the food we eat. It is impossible to disentangle the countryside from food—food is at the core of the dynamic between the rural and the global. As humans, we eat to survive, and our appetite for food has carved new geographies and technologies into the world. Urbanite appetites, especially, have shifted rural economies, ecologies, and societies over the past three decades.

I have a difficult time grasping the full dynamics of complex concepts like climate change, which creates economic and ecological relationships at a dizzying array of scales throughout the world. Yet agriculture and what we eat are tangible manifestations of these entangled global issues that affect all of us. According to a recent United Nations report, a third of human greenhouse gas emissions stem from industrial agricultural practices. These same industrial agriculture practices have rearranged the way rural communities live, fomenting political change around the world.

Conducting research in rural China meant that I could, selfishly, return to villages that I love being in. There was an allure to living at a pace and scale that felt

comprehensible, to living in a place that felt grounded. It is easy to romanticize rural Chinese villages as idyllic scenes of nature, small and disengaged—yet many of them are sites of economies and agricultural practices that are foundational to our world. And as numerous historians, such as Robert Brenner and Sue Headlee, have shown, shifts in agriculture and rural politics were crucial for the transition into industrialization and capitalism throughout the world. In thinking through agriculture, through a sense of place and belonging, I was influenced by the writings of bell hooks and Wendell Berry, for whom being and belonging acquire a sense of urgency—especially in a political and economic system that dislocates people from place and community. It would have been easy to attribute the loss of belonging, of place, to just technology accelerating us into the singularity of despondency. But challenging my metro-normativity meant challenging these ideas of the digital world versus the physical world, and pulling back the idea that becoming a Luddite and disengaging is the only way to reclaim a sense of belonging.

“Why are you here?” I am here because looking at technology in rural China, in places that produce the technology we use, places that show how globally entangled we are with one another, allows me to confront the scarier question that technology poses: What does it mean to live, to be human right now? Looking at tech in rural China forced me to examine the ideologies that drive engineers and companies to build everything from AI farming systems and blockchain food projects to shopping sites and payment platforms. These assumptions

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about humans and the way the world *should* work are more powerful than sheer technical curiosity in driving the creation of new technologies and platforms. Embedded in these tools are their makers' and builders' assumptions about what humans need, and how humans *should* interact. It is not enough to critique these assumptions, because in simply critiquing, we remain caught in the long list of binaries: Tech is dehumanizing, tech brings liberation. Tech dragged the world into the mess it's in, tech frees it from this mess. Tech creates isolation, tech connects marginalized communities. The difficult work that we face is to live and thrive beyond binaries and assumptions, and to aid and enable others to do so. How do we begin this work?

At the age of ninety-five, five years before her death, the activist Grace Lee Boggs wrote *The Next American Revolution*. Published in 2010, the book sounded an alarm bell for our present condition—a time when politics was no longer politics as usual, where traditional forms of protest were not enough to induce change, and when ecological disaster wrought by unfettered material and technological growth was looming. Despite all this, she pointed to a source of hope: “the great turning.” The great turning, a term borrowed from Buddhism, refers to a growing tidal wave of people now taking the first step toward change: addressing spiritual impoverishment. “These are the times to grow our souls,” she writes. The way to respond to crisis is to practice compassion and change the cycle of suffering. We can all actively practice compassion in our own way, whether we are doctors, teachers, or businesspeople. Engineers and makers and builders of technology

have this opportunity; I hope this book sparks something for you. After all, code is words made executable—we must take care in what we say. And for those of us who see code as an apocryphal text, who see technology as indeed accelerating us toward a despondent, tightly controlled world, I hope this book reaffirms the power that you hold in *being human*, and demonstrates ways certain technologies might actually serve open systems. To spark the great turning, we need to transform our compassion, our imagination, and our society—we cannot focus on reforming our technologies alone. Most of all, I hope that this book brings you to parts of China that you might never visit, takes you beyond a map of abstractions, a flat map made by metronormativity.

At some point on my involuntary meditation retreat, I start to panic. I have my phone, there's 4G service, and, trying to combat the dark, I scroll Twitter, read the news, peruse my WeChat feed. Against the heaviness of the night, the oppressive immediacy of the cold and quiet, and the lurking outhouse worms, the words on the *New York Times* website feel far away, flimsy. My thoughts feel flimsy.

With my phone screen on, set to my new night-light app, I finally begin drifting into sleep.

In the morning, the scarce winter light starts to shine at 7:00 a.m. I wake to a different world, one that is much less scary, much less sinister than my mind had imagined, at night, in silence. I hear the sounds of ducks and chickens, a single car in the distance. After tidying up the house, I walk past rice paddies and a small stream to the main road. I stand, waiting for the bus.

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On a Blockchain Chicken Farm in the Middle of Nowhere

1.

There is a cell phone service blackout in the city of Zhenjiang on the day I visit the Vinegar Culture Museum. As I leave the bullet train station, I frantically tap my ride-hailing app, DiDi, in hopes that some car will show up on the screen. My phone doesn't have 4G or even 3G, just a puny little one-bar signal, for emergency calls.

It's a balmy day in Zhenjiang, a small city outside Nanjing, the old imperial capital for the Ming dynasty, before Beijing was even on a map. During childhood trips to China, my mental categorization of places was based on whether or not a city had a McDonald's, an approximation of the "tiered city" system. Throughout China, the tiered city system is like an economic badge, calculated by a mystical formula that takes in the city's contribution to GDP, average monthly incomes, and housing prices. First-tier cities include Beijing, Guangzhou, and Shanghai, places that have dozens of McDonald's restaurants scattered throughout. Third-tier cities like Zhenjiang are much smaller, with maybe only one or two McDonald's restaurants alongside a slew of knockoffs.

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I give up trying to find a signal and wave down a taxicab. The driver eagerly asks: “Guess you had to take a cab, not a DiDi, right? No cell phone service?” He explains that there’s a serious protest in Zhenjiang today. Thousands of People’s Liberation Army veterans have arrived from all parts of China, staging a massive protest by marching on the main city square. In response, the government shut down cell phone service in the downtown area, hoping to keep photos off social media and WeChat.

“What are they protesting about?” I ask. “Pensions,” the taxi driver answers, and I see his grimace reflected in the rearview mirror. “What kind of society are we turning into,” he says, “where we don’t even give old army vets their pensions?”

I nod in agreement and we both fall silent, neither of us wanting to continue on the topic. In Xi Jinping’s China, it’s uncomfortable for two strangers to go too deep into the subject of *zhengzhi* (politics, 政治). There are no clear-cut consequences for discussing politics—after all, this is precisely how the system of censorship works, with a shadowy unease that looms over public conversations. Censorship is not made explicit; you just censor yourself. No one knows the consequences of critique, but no one wants to find out.

The Zhenjiang Vinegar Culture Museum is bustling today, and the guided tour I am on is full. The museum is located next to the Hengshun vinegar company’s main factory, and pungent smells of fermentation waft through the building. Several college students are here, enjoying an outing without authority figures. A bored teenager is

accompanied by her parents—when I ask where they are coming from, her parents tell me Nanjing, and that this is a celebratory post-*gaokao* trip. The *gaokao* is China’s grueling university-entry test that spans three days, as the entire nation waits with anticipation for the average score. The nation’s obsession with *gaokao* is similar to an academic March Madness. During *gaokao* week, weather and map apps on your phone will text to alert you: “It’s raining, don’t forget your umbrella on the way to the *gaokao*!” or “It’s *gaokao* season, don’t forget to be quiet and courteous! Valuing education and the future of our children are our socialist values!”

The tour meanders through a section on the historical vinegar-making process, where a large sign boasts VINEGAR TECHNOLOGY. Images printed on foam core of jet-black vinegar in bowls are mounted on the walls. Traditional Chinese vinegar is an inky substance that is both fragrant and sour.

At many tourist locations in China, tour guides and exhibits like to remind you that China was *the first*. The first in what? Well, just about anything. The first to invent gunpowder or paper, or to build a crazy-long wall . . . and vinegar is no exception. According to one panel, making vinegar was part of the *Qimin Yaoshu*, or Essential Techniques for the Welfare of the People, written 1,500 years ago, back when Europe was still in the Dark Ages. This was the text Charles Darwin referred to in studies on evolution, due to the *Qimin Yaoshu*’s references to breeding and animal domestication, reaffirming that the Chinese were *the first* to notice how genetic variation works.

The tour concludes in a mirrored hall with hundreds of vinegars on the shelf, from Heinz white vinegar to different types of balsamic. The tour guide cheerily describes it as a pleasant global vinegar showcase. She solemnly points out the packaging on genuine Hengshun Zhenjiang vinegar.

“And of course,” she says, “you can always tell when a bottle is a fake. Fake vinegar is not fermented, so when you shake it, it will not foam up.” Holding a bottle of real vinegar in one hand and a bottle of fake vinegar in the other, she briskly shakes both at the same time. “See?” she says. “See the difference?”

2.

Matilda Ho, founder of Bits x Bites, shakes my hand firmly and has precisely thirty minutes to talk. She has carefully drawn eyeliner and is carrying a MacBook Air in one arm. She speaks rapidly. Our conversation on food security and food safety unfolds over these thirty minutes at the Bits x Bites office in Shanghai, with a glass door so clean and transparent that I walked into it on my way to meet her.

Founded in China, Bits x Bites is the world’s *first* venture capital fund dedicated to food innovation. Its mission is to “shape the future of good food,” providing both investment returns and social benefit. The portfolio of Bits x Bites companies ranges from meal kits to lab-grown meat to “weather-proof farms” that provide a hermetic seal against the outside world of climate change; it also includes some gene-editing startups. In addition to Bits

x Bites, Matilda is also the founder of Yimishiji, an on-line organic farmers market focused on the Shanghai-area “foodshed,” a term used to describe the geographic area that grows and transports food for a particular population. A small village that relies on subsistence farming has a tiny, local foodshed, while certain upper-class consumers in Shanghai have a global foodshed.

The Yimishiji app is filled with images of beautiful produce. Sunlit eggs, streamlined stalks of celery, a lone bright orange carrot that seems to say demurely, *I am luxury, you want me*. Compared to the chaotic, open-air wet markets that most of China has traditionally shopped at, filled with slabs of fresh meat dangling on hooks, tanks of live seafood, and colossal piles of produce sold under tents, Yimishiji is a sharp break, catering to China’s up-and-coming urban middle class. And unlike the food at China’s open-air markets, all the items on Yimishiji have been independently tested for food safety. On Yimishiji, there are no bottles of fake vinegar. There are not even mass-produced products like Hengshun Zhenjiang vinegar.

Fake vinegar is the least of China’s food-safety woes. A deliberately tongue-in-cheek headline from the Hong Kong newspaper *South China Morning Post* reads: FIRM USES HUMAN HAIR IN SOY SAUCE “BREAKTHROUGH.” The article reveals that ground-up human hair was being put in soy sauce, cutting production costs by half. Profiteers diluted the original sauce with hair, then put the doctored soy sauce back in empty brand-name bottles and onto supermarket shelves.

Other unsavory cost-cutting techniques include making tapioca bubble tea balls with plastic green peas and

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using inedible red dyes on chilies. “Gutter oil,” a type of recycled oil, is rampant, since cooking oil is a big expense, given the stir-fried nature of Chinese cuisine. Gutter oil entrepreneurs collect the massive amount of restaurant waste that is produced by millions of people eating out every night. They then filter and extract the oil back out of the waste, reselling the recycled oil to restaurants and supermarkets.

Food-safety incidents can be fatal. In 2008, before the Beijing Olympics, several infants in China died from kidney stones, and thousands more were suddenly sick, in critical condition. Investigators quickly traced the cause back to infant formula produced by Sanlu, a dairy company. The formula had been mixed with melamine. Melamine is similar in appearance to milk and boosts protein content. Often used in cattle feed, it is toxic to humans above certain doses. In order to increase profits and yield, farmers producing dairy for Sanlu had added melamine to their milk. The amount of melamine in Sanlu’s infant formula exceeded the United Nations’ food standard threshold for melamine in infant formula, with lethal results.

Existing food-safety scandals were just a small drop in a sea of risk. Matilda knows this all too well, with her background as a management consultant to multinational food corporations in China. As China’s middle-class numbers increase to nearly half a billion, more of the world’s population is demanding increased food choice and availability. Matilda points out that this is not a China-specific problem: middle-class consumers globally expect constant availability of a range of foods, and this lengthens the supply chain across towns, provinces, and

countries, making it possible to always have strawberries at the supermarket, no matter what season it is. But with the addition of each block on the chain comes another potential source of failure.

Careful sourcing from farms is only part of the solution. Even the best products can be stymied by broken links in the cold chain during transport. Matilda gives the example of truck drivers, who will often turn off their refrigeration in order to save gasoline money and pocket the extra cash. When you start transporting food across hundreds of kilometers, control over the transportation process decreases. And due to effects on the ultimate food safety of perishable goods, this means, for consumers, the difference between a night out on the town and a night at the hospital.

3.

Traveling back from Shanghai, I talk to the political scientist and food-safety expert John Yasuda on the phone. He's in Oxford, England, and I'm standing on the second floor of the Shanghai Hongqiao train station, huddled in a McDonald's, one of the few quiet spots in the sprawling building. "Food safety is a nasty problem that combines macro-political, economic questions into a problem that is lived out day-to-day," John tells me. The more we talk, the more insurmountable food safety seems to become, given the interconnected, global span of the issue—a "wicked problem," a new type of problem whose name Horst Rittel and Melvin Webber coined to describe the increasingly entangled, global nature of related challenges.

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Food safety is crucial for political stability, and is ultimately a reflection on a country's governance. For a long time, China's food woes were exacerbated by political corruption and bribery. In 2013, Xi Jinping made it a priority to address agriculture and food safety in China, remarking, "If our party can't even handle food-safety issues properly, then people will ask whether we are fit to keep ruling China."

The party's priority on food safety for political stability is manifested in its censorship of food-safety scandals.¹ After all, the numbers would cause government officials to lose face, undermining their authority. Compared to countries like Mexico and Turkey, which have similar GDPs per capita, China's food-safety index rating is significantly lower. Compared to countries like Singapore, with similarly authoritarian governments, China's food-safety score is shockingly low.

Why is China so bad at food safety? John elaborates on the problems of scale that Matilda mentioned. Feeding 22 percent of the world's population on 7 percent of the world's arable land is just plain difficult. Complicating this task are the demands on China's smallholder farmers. Nearly 98 percent of Chinese farmers have land that is less than the size of two football fields. There is enormous pressure on these farmers to produce enough food for the nation, ensuring food security. "The food bowl of the Chinese people must always remain firmly in their own hands,"² remarked Xi Jinping during his first few months as president in 2013. These farmers have additional pressure to produce enough food for export, which comprises 10 percent of China's massive GDP, alongside humanitar-

ian relief food, crucial to China's bid as a global leader. And despite the amount of control the national government appears to have, the governance of food safety in China is fairly decentralized, with the bulk of the responsibility on province- and county-level agricultural bureaus.

Although centralization and consolidation seem like they might be the answer, industrialized agriculture would only displace farmers. As John points out, land in China is a precious resource, especially as China urbanizes and threatens the red line, an agricultural "defense line." Most of all, the land allocated to farmers serves as a basic form of poverty alleviation—no matter how poor you are, you can always go back to the land and farm food for yourself and your family. Privatizing land would only reproduce social inequality, John says, and that would threaten political stability.

Ultimately, food safety revolves around social trust, and John thinks that "social trust can't scale." When supply chains were shorter, being able to meet your farmer created this trust. With supply chains now long and complex, the chance you might meet the Australian farmer who grew the kiwi you eat or the Mexican farmer who produced the avocado on your plate is low. Farmers themselves are also isolated from seeing the people they provide food for; they send their products off to larger corporations that then redistribute them. These corporations demand low prices, squeezing farmers into a bind. In the case of Sanlu's melamine scandal, farmers felt the pressure from Sanlu to stretch their product to the point where it became lethal. This pressure to keep prices low increases with scale: the difference of a penny means a

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lot more when it's multiplied by millions of gallons of milk.

As John says this, I think of a common refrain I hear in China: "The West doesn't understand our problems. We just have too many people. The government has to operate at a scale you can't even imagine."

Staring out over the Shanghai Hongqiao train station, I watch as crowds of people line up, pushing each other through ticket gates, for sold-out high-speed trains that leave every five minutes. I wonder if it's all actually true.

That's the thing about trust. We live in a time when, through networks built using technology, there are more connections in the world. Can trust be easily extended? In the past, your network was small; you ate food produced by your local foodshed. Now, in cities, you rely on a much bigger network to put food on your plate.

In this light, the age-old argument for government can seem appealing: some kind of structure has to exist to mediate trust, to control the masses, the workers and farmers. The Chinese government is continuing its battle for food safety, with the same opacity it has always operated under. It's pursuing a variety of tactics, from increased involvement at the local level to using high-tech measures like blockchain in the newly formed Food Safety Cloud (食品安全云), to prevent record falsification at all points in the chain, whether at the local or the provincial scale.³ The question is, will a large, lumbering government truly manage to help scale up social trust, given the mistrust people have toward the government already, after all the food-safety scandals? And if these initiatives

operate as closed systems between the government and the corporations that make this technology, how can they regain the public's trust?

4.

On a humid summer day in the city of Guangzhou, I head to Alibaba's brand-new Hema supermarket with my uncle. Outside the supermarket is Hema's mascot, a giant hippopotamus in Alibaba blue. Its rotund snout takes up most of its face, leading to some peach emoji jokes online.

Hema supermarket is clean and precise, an off-line version of Yimishiji but with distinct differences: unlike the seasonal, local, organic foods that Yimishiji has, Hema has a vast selection of foods from any season, from any part of the world. Vacuum-sealed slabs of Norwegian farmed salmon from a special Alibaba-Norwegian Seafood Council partnership, raspberries from the United States, hunks of pork from Fujian, cherries from New Zealand, and soup dumplings from Shanghai all sit neatly under soothing lighting. All the food at Hema is guaranteed to be fresh, high quality, and most of all safe.

Shopping at Hema is not cheap, but that's what Alibaba and other tech companies are betting on. Over the past few years, tech companies including Alibaba, JD.com, and NetEase are all making forays into the food and food-retailing space, leveraging tight control over all degrees of the chain. These companies are centralizing production and shipping, with the help of informatics and sensors,

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giving consumers a sense of control over their food. This becomes apparent throughout the Hema store, as the pre-packaged produce states the day of the week it was received in-store and the exact farm it came from.

As we wander through the aisles, my uncle stops in the seafood section. Seafood is a luxury in China, a luxury that more and more people can now afford. Live fish in tanks, paddling shrimp, and lobsters lumbering in crowded bins sit in the section, like a zoo exhibit. Chinese cuisine and eating habits demand fresh seafood, never frozen, killed the day of cooking.

Rather than trusting the government, people have shifted their trust to the private sector: Hema, Alibaba. This leads to cascading, glaring contradictions. The problems of food safety are the result of a privatized, free market model of agriculture with global reach—where competitive market behavior drives cost cutting. The government serves as a way to mediate social trust, to regulate and protect its citizens. Along the way, the government has struggled to be effective, which has conveniently led private companies to compete in the free market for a monopoly on food safety. Business articles laud Hema and other tech-company supermarkets as innovators digging into food safety: the same set of market forces that created the problem is now purportedly coming to the rescue.

For tonight, my aunt has requested we pick up several pounds of live shrimp. A few of them are at one end of the tank, reminding me of an aquarium display. Most are in the center, zooming around. My uncle sticks a net

into the water, and some manage to flee. He pours dozens of swimming, frenzied shrimp into a big plastic bag, and places it in our cart. I stare as they dart back and forth, knocking into each other, beady black eyes protruding on stalks from the sides of their body. At this scale, a mass of shrimp seems more like a sinister invasion of insects than a tempting dinner.

5.

Chongqing is a sprawling, messy, mountainous city. The day I arrive, the air pollution is so thick it has blotted out the sun, casting a haze that turns the sky orange with a hint of gray. It looks like an apocalyptic-movie scene, as if the next rainstorm might topple the city. The “horizontal skyscraper” by the architect Moshe Safdie is almost finished. It’s a long building that sits perilously atop three other skyscrapers, spanning several city blocks.

Through tunnels and over highways perched on mountains, my bus travels to Nanchuan District, two hours from the center of Chongqing. Another two hours and Chongqing’s haze has been left behind. The bus goes through newly constructed tunnels, lights fresh and bright, untarnished, no buildup of dust from exhaust fumes.

I arrive in Sanqiao village, in the green mountains of Guizhou, where the blockchain chicken roams.

The village has a single paved road. The bus stop is next to a small store, and faces a large hill. I ask several

people who are walking along the single road for directions to the village government headquarters. Sometimes the person does not understand me and I cannot understand them. In China's vast geography, each region has its own unique spoken dialect. Dialects can be so strong that fluent Mandarin speakers from elsewhere will not understand what a local person is saying. I can recall one visit to my mother's ancestral home when a cousin had to translate for me throughout the entire dinner.

This area of Guizhou has its own dialect as well as its own distinct language, given that it is home to the Miao ethnic minority. It's also one of the poorest regions in China, with an average household income of RMB 5,000 (about US\$700) a year.

Sanqiao is dreamlike, with mountains covered in fog. I walk along a river with a small white bridge spanning a steep ravine. The village government headquarters stands on another daunting hill, past a battered-looking elementary school painted pink. I can hear the high pitch of children's voices reciting a poem.

A large red sign across from the newly constructed hospital reads BEING LAZY IS A DISGRACE, BEING SELF-RELIANT LEADS TO STRENGTH (好吃懶惰不光彩, 自力更生才出彩). It's one of the many political slogans that are part of the government's poverty-alleviation policy, and eerily reminiscent of several American values: Don't be lazy. Pull yourself up by the bootstraps. Hustle hard. Underneath the large red sign is a woman at a desolate fruit stand rearranging the oranges in her crate over and over. Hustle has come to Sanqiao.

6.

Blockchain chicken is not the actual name of the chicken I am here to see. The official name is Bubuji (步步鸡), or GoGoChicken, as some English PR materials call it. The COO of Shanghai Lianmo Technology, the company behind blockchain chicken, says that he explicitly keeps “blockchain” out of the name. To him, overhyped blockchain projects have turned the term “blockchain” into marketing gloss.

These blockchain chickens sell for up to RMB 300 (US\$40) on JD.com. Typical buyers are upper-class urbanites—people willing to pay a premium on food.

I meet with one of the village secretary’s fresh-faced assistants, Ren. He grew up in the county. He’s thirty years old, and unlike many of his peers, he returned home after college in Chongqing, to help his ailing parents. He joined the local government because he figured if he had to come home, he might as well try to make the place he lived in a little less impoverished, a little more wealthy, and ultimately a little more lively.

We head to the GoGoChicken farm. As meat consumption increases in China, even places like KFC and McDonald’s are subject to food-safety issues. Enter blockchain, the exotic technology that will address tracking and provenance, especially in chickens.

Ren tells me that, funnily enough, there’ve been a lot of GoGoChicken stories in the news, but very few visits to the farm. When we do get to the farm, I’m surprised by how friendly it looks. The entrance is small and peaceful, with brightly painted cartoon chickens on the walls.

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Farmer Jiang is in charge of this blockchain chicken operation. He's wearing a straw hat in the rain. Behind him is a colorful mural of a chicken farmer with the same straw hat and chickens clustered around him. He's just plain nice.

Farmer Jiang has been raising chickens for a long time, long before blockchain was a technology. His specialty has always been *linxiaji* (under-the-tree chickens, 林夏季). They are free-range, vegetarian-fed chickens, the kind that roam around Sanqiao's lush canopy, getting plenty of exercise. Typical overstuffed chickens on industrial poultry farms are fed constantly in order to reach the correct weight for slaughter in under one month. These free-range blockchain chickens are raised for at least three months before slaughter. As Farmer Jiang describes the chickens' diet of local corn, my mouth starts watering at how delicious their eggs must be.

The GoGoChicken project is a partnership between the village government and Lianmo Technology, a company that applies blockchain to physical objects, with a focus on provenance use cases—that is, tracking where something originates from. When falsified records and sprawling supply chains lead to issues of contamination and food safety, blockchain seems like a clear, logical solution.

That is one of the many promises of blockchain. In its origins, blockchain was structured with a set of assumptions about the social conditions under which it operates, and many of its advocates and engineers have pushed a political vision of the world that is somewhere between libertarianism and anarchy. But like a lot of technology

these days, it has been adopted by companies and governments to make money, including a chicken farm in a small remote village of Guizhou.

Farmer Jiang says that raising free-range chickens is a yearly uphill battle. One set of problems was the threat of disease, and the material difficulties of making sure several thousand chickens survived over three months.

“Chickens aren’t very smart,” Farmer Jiang says as we walk around the farm, into a neatly kept feeding barn. “Or brave. If you have them outside of cages, at night they can get scared. They cluster around lights and they overcrowd each other, killing each other. A kind of chicken stampede.”

The bigger problem was that Jiang didn’t have a reliable market every year. He had to do all the selling and marketing himself. Even when he did make a sale, the profit margin was low or he sold at a loss. Buyers had a difficult time trusting him, and trusting that the chickens were indeed free-range, worth the higher asking price.

Then Zhou Ling arrived from Shanghai, to serve as the Sanqiao village aid cadre. China’s poverty-alleviation efforts deploy millions of aid cadres across China, typically younger members of the party, who provide all kinds of assistance and relief, including repairing water pumps and conducting digital literacy initiatives. These poverty-alleviation programs reflect China’s “fragmented authoritarianism,” which is both decentralized and autocratic: decentralized at the local scale with fairly loose controls, but authoritarian on national policies.⁴ The contradiction of this fragmented-authoritarian model can create a lot of

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confusion between the official policy and what is actually happening on the ground.

Zhou connected Farmer Jiang with Lianmo Technology, which was hoping to pilot more blockchain and Internet of Things projects, including the profitable business of poultry tracking, as China consumes five billion chickens a year (which is still only about half the American chicken-consumption rate of nine billion per year).

Jiang shows us around the rest of the farm—several pristine feeding areas, and the “control” room where the base station sits. Each chicken wears an ankle bracelet that is physically tamperproof, which tracks characteristics such as number of steps taken and the location of the chicken. A chicken Fitbit of sorts.

The front plate of the ankle bracelet has a QR code on it. All this data is viewable on a website accessible with a password, and the website includes constantly streaming surveillance footage of the chickens to ensure that they have not been adulterated in any way by an intruder. There’s also a map of the chickens’ movements. Data about the chickens is uploaded via the base station to Anlink, a proprietary enterprise blockchain that is an experiment by the sprawling ZhongAn, an online-only insurance company.

Sanqiao chickens are under heavy surveillance. In addition to wearing the ankle bracelets, the chickens are tested every two weeks by the local branch of the Ministry of Agriculture for any signs of antibiotic usage, which is illegal under the category of free-range. While it may seem like overkill, it might be a small price to pay in order to win back public trust.

These chickens are delivered to consumers' doors, butchered and vacuum sealed, with the ankle bracelet still attached, so customers can scan the QR code before preparing the chicken. Scanning this code leads them to a page with details about the chicken's life, including its weight, the number of steps it took, and its photograph. In Shanghai, these details are seen as a sign of authenticity and food safety, while in the United States they could easily be read from an animal-welfare angle. Farmer Jiang lets me scan an ankle bracelet, and the experience is underwhelming. While I know this is actual information about the chicken, it would be easy for Lianmo Technology to create a series of fake web pages for these chickens. Since the Anlink blockchain is an enterprise blockchain, consumers have little interaction with that part of the technology.

The village secretary's assistant, Ren, and I head back to Jiang's house for tea. It's a humble home with three rooms. In one corner of the living room is a stove with a large metal top—it functions as a table, stove, and hearth for Guizhou's chilly winters. Jiang's mother is there, along with his wife. A flat-screen TV is behind him—the product of blockchain chicken earnings from last year.

In the end, Jiang sold six thousand chickens through the blockchain project. And as part of the communal nature of village life, several other local families were employed by the project. In a poverty-alleviation effort, profits were redistributed between Farmer Jiang's family and the three hundred other households in the village.

Despite its success, the future of blockchain chicken

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is uncertain. Neither the code, nor the equipment, nor the software belongs to Jiang: it ultimately remains Lianmo Technology's. Jiang tells me that last year, Lianmo Technology's GoGoChicken project ordered six thousand chickens in advance, to sell off to JD.com's online supermarket and other platforms. There was no such order this year, so Jiang is left on his own. Ren's boss, the village's party secretary, Chairman Chen, is currently in talks with a company to provide chickens to nearby Chongqing. As with a lot of startups, uncertainty swirls around how the technical infrastructure will continue to function, and whether Lianmo Technology will continue to support a project with such high overhead costs.

Farmer Jiang has more buyers for his free-range chickens now that they are blockchain free-range chickens. But in switching to blockchain, the farmer's overhead has increased significantly, with the cost of the ankle bracelets and the technical infrastructure. By the end of the process, Farmer Jiang makes RMB 100 (US\$14) on each chicken, not accounting for costs.

Still, Jiang is optimistic. He's no longer a stranger to the process of raising surveilled chickens. With the slow influx of money to the village, a postsecondary vocational school is being built. Other projects like a "smart mushroom tent" have arrived, sponsored by the state-owned liquor company, Kweichow Moutai. The watering and the temperature and humidity of the tent are controlled automatically by a system of sensors, producing cremini and shiitake mushrooms on logs.

As we sit in his house, with our feet around the

hearth, Farmer Jiang starts gathering up oranges and putting them into a plastic bag. He admits that it's not easy for this area of Guizhou to develop economically. It's the geography, he says. It's remote, it's mountainous. The terrain makes it difficult to farm certain crops. But precisely because it is remote, it boasts a pollution-free environment, with fresh air and clean soil. The problem is, the villagers don't quite know how to put a dollar value on that. I tell him, I'm not sure anyone does.

As Ren and I leave, Farmer Jiang hands us the big plastic bag of oranges. "Take these! I grew these myself for my family! They're organically farmed. I used the GoGo-Chicken poop as fertilizer."

In the car, driving through the small mountain paths back to the bus stop, I ask Ren, "So, what do you think of *qukuailian* [blockchain, 区块链]?" Although we've seen the GoGoChicken farm, I haven't explicitly brought up blockchain at all during my visit.

"Blockchain? What's blockchain?" asks Ren.

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Onstage at the Internet Archive's Decentralized Web Summit in San Francisco, the founder of the Lightning Network, a protocol layer that sits on top of Bitcoin's blockchain, is speaking into the microphone. The Decentralized Web Summit is host to an eclectic assortment of people, a caricature of the Bay Area's tech scene.

The speaker is reed thin and bespectacled, and both of his hands firmly grasp the sides of the podium. His

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shoulders are slightly slouched. The audience sits rapt, eagerly waiting to hear what he has to say.

“Life is ‘nasty, brutish, and short,’ right?” He pauses, then talks about Usenet, a distributed message board system. He attributes the demise of Usenet to what he calls bad actors—essentially, jerks. He continues, “That’s always been the problem with society. Society has always had the issue of assholes ruining it for everybody.”

The sentiment he shares is common among cryptocurrency and blockchain enthusiasts—a cynical view of human nature, where people are selfish and untrustworthy. The idea that life is “nasty, brutish, and short” comes from the political and moral philosophy of Thomas Hobbes, who argued that a strong, authoritarian government is needed to curb the selfish instinct that lives in all of us. A few hundred years later, the “tragedy of the commons” concept would solidify Hobbes’s thinking as scientific. Many crypto and blockchain enthusiasts will cite this concept often and candidly.

The concept of the tragedy of the commons was popularized in 1968 by the ecologist Garrett Hardin, who also argued that the overpopulation of the earth would lead to disaster because of finite resources. Hardin’s tragedy of the commons was the condition where individual users, motivated by their own self-interest, ruin a shared resource system for everyone. Hardin gave the example of herders who, caring only about the survival of their own herds, destroyed pastures by overgrazing common land.

Like his theories on overpopulation, Hardin's tragedy of the commons was later exposed as deeply problematic, as politics disguised as science. His scientific ideas stemmed from his racist, eugenicist beliefs as a white nationalist, and many of the groups he saw as unable to manage shared resources were in non-Western countries.⁵

And setting aside Hardin's political ideologies, the tragedy of the commons theory is just plain wrong. The concept was disproved with in-depth data and careful science in 1990 by Elinor Ostrom, who would be awarded a Nobel Prize for her work.

However, since Hardin was an ecologist, the tragedy of the commons became naturalized, seen as neutral science rather than political belief. In reality, Hardin's ideas were based on terrifying assumptions, a world in which human nature and natural resources were static, finite, and fixed.

Despite Ostrom's work, the belief in innate human selfishness in a world of scarcity had become ingrained outside of ecology—in fields like information science and economics.⁶ This belief in selfishness and scarcity is one of the core ideologies that gave rise to blockchain.

Although blockchain has become synonymous with Bitcoin, they are not quite the same. Bitcoin is one use of blockchain, but it remains separate from blockchain technology. Some have used a biological analogy to illustrate the difference: if blockchain is DNA, Bitcoin is a distinct species. Blockchain is a special kind of distributed

record-keeping system that uses cryptography to prevent records from being falsified, eliminating the need to trust a centralized authority to verify records.

For example, since food-safety inspection records in China are subject to falsification, instead of there being one canonical record owned by one organization that could be tampered with, a number of records could exist. These records could be distributed among many people: the farmer, the local inspection bureau, the end consumer. If these records are coordinated and kept in sync through a system, people could trust this distributed system rather than a central government authority to deem food safe. If one bad actor at the local inspection bureau did try to fudge the register, the system would reject the change, making it nearly impossible to falsify a record. The special thing about this system is that the distributed record keepers wouldn't have to trust one another; they may never even have to interact with each other, instead letting the technology mediate. This system of coordination and enforcement is blockchain—immutable, tamperproof records that have a range of mechanisms built in to prevent bad actors. To me, this system sounds ideal at first blush. But the technical implementation of such a system creates a different reality.

In blockchain, a set of records is called a block. Multiple computers, or nodes, hold a list of prior records. Each block of records is mathematically chained to the previous block of records. In order to link the blocks, a “hashing function” has to be performed by computers: guessing random numbers to solve a math problem, a task that

requires enormous amounts of computing power and electricity.

After this hashing function, blocks are then on the blockchain, and this is transmitted to all the other computers on the network. Since the blocks are all mathematically chained together, to falsify a record would mean having to redo all the work for subsequent blocks on the chain, requiring so much electricity and resources that falsification is disincentivized.

Bitcoin arrived in 2008, at the beginning of a global financial crisis. At the time, a paper was circulated online, written by someone named Satoshi Nakamoto, proposing a peer-to-peer currency. The paper outlined this peer-to-peer currency, or Bitcoin, as Nakamoto called it. Instead of a central bank verifying transactions and preventing double spending, Nakamoto proposed the system of blockchain to verify and keep records of transactions. Bitcoin would be the incentive for people with computers to verify and put blocks on the blockchain. This is the core of the Bitcoin blockchain. It leads with the idea that bad actors are intrinsic in a system, and to prevent their actions, enormous amounts of electricity must be spent on preventing them through hashing functions.

The first block on the Bitcoin blockchain was created along with the text “THE TIMES 03/JAN/2009 Chancellor on brink of second bailout for banks”—the anti-centralization message of Bitcoin coming through loud and clear. And since 2008, the cryptocurrency and blockchain space has blossomed beyond Bitcoin into

other currencies and other blockchains, currencies like Ethereum and EOS, all with slightly different consensus algorithms—ways of ensuring that individual computers, or nodes, have records that agree with each other.

Hardin's original essay in 1968 used the example of the medieval commons, a place where peasants grazed their cows. According to Hardin, the ungoverned nature of the commons led to overgrazing, which is why the commons had to eventually be enclosed and privatized. Yet Hardin was also wrong about this history—the commons model had actually thrived in Europe for hundreds of years. The mismanagement of the commons by peasants was a lie, an excuse made up by powerful landowners who wanted to seize and control these spaces.

During a long conversation with a Chinese blockchain engineer, I learn that the core belief of a government like China's is steeped in what is termed "patriarchal authoritarianism": its citizens cannot be trusted, so the government needs to control them. Citizens must trust that the predominantly male-led government has their best interests at heart. The government expects its citizens to believe that the system works, without question, by instilling fear that without it a few bad actors would ruin things for everyone. And so the story of blockchain in China seems like a game of pick your poison: Who do you trust more, the machine or the government?

Blockchain, like an authoritarian regime, uses a parallel logic: people cannot be trusted in a free market, and bad actors are intrinsic to a social system. In order to mediate trust, a technical infrastructure is better than a government; governments are made up of fallible people,

whereas technical infrastructure works automatically. Instead of the government moderating trust, blockchain does so with machines.

At the Decentralized Web Summit, I attend a few technical sessions, rooms filled with blockchain developers who hold an enormous amount of power through the technical decisions they make. In the blockchain space, technical problems and challenges are intrinsically linked to governance issues. For example, certain vulnerabilities within blockchains in the past have led to further technical decisions, decisions that have threatened the idea that blockchain should be immutable in the first place. Code and law become conflated in the blockchain.

And that leads to a widespread belief that the blockchain should be governed by the community of developers around it. In recent years, the community has become increasingly well funded by venture capital, with millions of dollars being doled out to blockchain projects that only further solidify the political system we live in. When I look around at the community present at the conference, most of the developers are white and male. This community does not include people like Ren and Jiang. One speaker at the conference, Karissa McKelvey of Digital Democracy, puts it, “Blockchain governance is not unbiased or neutral. It’s just shifting bureaucratic roles to more technical roles. At some point, you have to trust someone.” Given the demographics of those in the technical roles, McKelvey bluntly says, “You might even say it’s colonialism.”

A system of record keeping used to be textual, readable,

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and understandable to everyone. The technical component behind it was as simple as paper and pencil. That system was prone to falsification, but it was widely legible. Under governance by blockchain, records are tamperproof, but the technical systems are legible only to a select few. Even exploring transactions on a blockchain requires some amount of technical knowledge and access. The technology of record keeping has become increasingly more complex. This complexity requires trust and faith in the code—and trust in those who write it. For those of us who don't understand the code, trusting a record written in natural language on a piece of paper seems at the very least a lot clearer.

We trust all sorts of technical systems every day without having to read their code. The software that flies our planes, runs our city trains. Like a lot of emerging technologies, blockchain is beholden only to its makers, and to a handful of well-funded companies. The conventional answer to this is to suggest government regulation of software, as is the case with airplane and train software. Yet the political ethos of blockchain is precisely about taking power away from a central authority like the government. And deep down, I find that sentiment admirable. However, blockchain has yet to answer the question: If it takes power away from a central authority, can it truly put power back in the hands of the people, and not just a select group of people? Will it serve as an infrastructure that amplifies trust, rather than increasing both mistrust and a singular reliance on technical infrastructure? Will it provide ways to materially organize and enrich a community, rather than further accelerating financial systems

that serve a select few? Can the community expand and diversify itself, so that it does not reproduce the system of power and patriarchy that it is attempting to dismantle?

I wander through the Decentralized Web Summit, sipping a grapefruit LaCroix and peering into rooms illuminated by neon lights. Years ago, I would have gotten an enormous thrill from this conference: the light-filled rooms, the eccentric but well-dressed audience who jet around from Berlin to San Francisco with casual, glittering affluence, after-parties with good drugs at plush lofts, and most of all, the way changing the world seems to be just a keystroke away. A few people here are “blockchain bros,” young men hyped on internet culture and the promise of blockchain. Some of them are ready to pitch their companies at any given moment. More recently, popular support for Bitcoin and cryptocurrency has oscillated between feverish excitement and wariness about its electricity consumption—it requires more electricity annually than Switzerland. By creating a system based on the assumption that humans are destructive and selfish, you only end up making those assumptions reality: a self-fulfilling prophecy. It serves as a reminder of the physical, material relationships that bind our world together.

There is some debate about whether blockchain and crypto are here to stay, whether the technology is actually able to do all the things it says it will do. I think of the melamine-milk scandal, and whether blockchain would have helped in that situation. The contamination came from farmers, driven by economic pressures. Blockchain wouldn't have helped prevent falsification, but it would have made the milk more expensive. Under

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authoritarianism, which benefits from holding expertise within its realm of power, and under an economic system that thrives off inequality in creating a market, of course blockchain is here to stay. It creates another layer of inequality, another incentive to make food a commodity.

That is the intrinsic flaw, the infuriating circular logic. We operate under game theory conditions, under market forces, under the belief that we *will* lie to each other because someone else has more, and we have more to gain. And so we create solutions that further exacerbate this inequality. This is what happens when resources like food are treated as commodities to be bought and sold, to make money from, instead of as a basic human right.

In some of the projects being discussed in rooms at the Decentralized Web Summit, the utopian language makes me cringe. Other projects give me significantly more hope. A decentralized web does not necessarily mean blockchain; it can include other tools that promote shared, community management in a legible way. These projects, many of which are alternatives to blockchain, feel exciting, almost utopian.

The truth is, we all want some kind of utopia, even if utopia is, by definition, not a place. We want a way for things to get better, to get perfect. What many of us are feeling right now, what we see, is that the existing economic systems don't serve us.

As I run into friends at the conference and we discuss the talks we've attended, I know that I too want things to get better, and that I hold hope for technology to help us fix things—I remain, in some ways, an unabashed techno-optimist.

During lunch, I sit in a sunlit room, eating a chicken sandwich. This is where my travels get weird. For all our models of what will happen in a decentralized age, for all our incredible new technologies, we still cling to fictions about human nature. We have sequenced the human genome and we believe that humans can evolve, become ever more advanced. Yet, instead of designing technology that fosters and cultivates communal behaviors of trust, we still design technology that assumes scarcity and cultivates selfishness. This coercive design relies on a view of human nature that comes from a Hobbesian era when people barely had running water, a fictional, universal view of humanity that has been disproved over and over by research.

I think back to a different lunch, to my lunch with Ren before I visited the blockchain chicken farm. It was, ironically, a vegetarian meal at a small restaurant in the village. A large digital clock with the printed words `COMPUTER ETERNITY TIME` hung above us, red LCD numbers changing every minute as if it were showing an inevitable count toward fictional progress. I wonder: Who must agree to live in fictions that someone else wrote, and who has the power to write fictions for the rest of us? And if anyone can write fictions, why can't we write new ones?