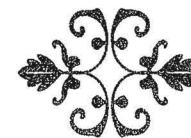


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*Uncovering the New World
Columbus Created*



CHARLES C. MANN



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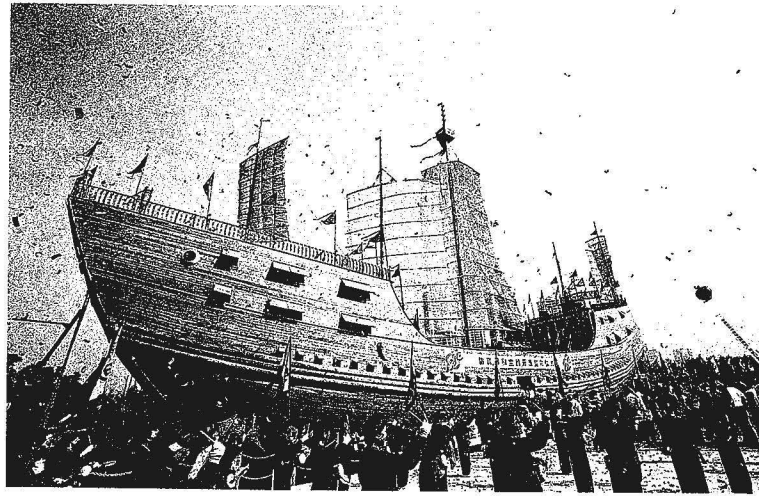
Shiploads of Money (*Silk for Silver, Part One*)

“THAT EXTRA LITTLE EFFORT”

Vastness was its greatest characteristic, with wonder close behind. The vastness—intimidating, confounding, beyond credence—spoke clearly from a hundred miles away. It is said that kings in their palaces looked over the ocean to see a new mountain range on the horizon: wide-bellied ships by the hundred, rigged fore and aft, soldiers massed at their bulwarks. Strange war-like banners snapped from the topgallants. The armada was larger than any before or since. It must have seemed *geographic*. Wonder attended its sails, followed by capitulation and obeisance. These were the great maritime expeditions sponsored by the Ming emperor Yongle in the early fifteenth century. Such a mark did they leave that some historians believe they were the font of the stories of Sinbad the Sailor.

Built in enormous dry docks, encrusted with precious metals, replete with technical innovations—double hulls, watertight compartments, rust-proofed nails, mechanical bilge pumps—that Europe would not discover for a century, the Chinese ships were marvels for their time. The flagship of their commander, Zheng He, was more than 300 feet long and 150 feet wide, the biggest wooden vessel ever constructed. Records claim it had nine masts. Zheng’s grandest expedition had 317 ships, an amazing figure even now. The Spanish Armada, then the largest fleet in European history, consisted of just 137; the biggest was half the size of Zheng’s flagship.

Zheng himself was among the more unlikely figures to grace Chinese history. Strikingly tall and powerfully built, a Muslim from the backlands, he was captured as a child in 1381 during one of the Yuan dynasty’s last battles



To celebrate the 2010 Olympics, China displayed this exact copy of Zheng He's flagship. Six centuries after the original was built, the ship still was large enough to dazzle crowds.

against the invading Ming. (For a synopsis of Chinese dynastic history, see the chart on p. 127.) Standard treatment by the Ming of enemy boys was castration. The emasculated Zheng was pressed into service at the Ming court and gained a reputation for shrewdness and competence. Displaying his eye for the main chance, he jumped to support a coup in which the monarch's uncle seized power from his nephew. The usurper became the Yongle emperor.* Zheng became one of his most trusted lieutenants. When the ambitious sovereign planned a series of sea expeditions, he put his favorite eunuch in charge.

The voyages began in 1405 and ended in 1433 and took Zheng across the Indian Ocean as far as southern Africa. The Yongle emperor viewed them as a way to throw his weight around, and they were powerfully effective. During these voyages Zheng's fleet subjugated a misbehaving Chinese enclave in Sumatra; intervened in a civil war in Java; invaded Sri Lanka and took its captured ruler to China; and wiped out bandits in Sumatra. Even where no swords were unsheathed Zheng's armadas were a political triumph, scaring the wits out of every foreign leader who saw them. But the voyages were not

* By convention emperors were referred to not by their personal names, but by the names of their reigns. For example, the usurping uncle, born Zhu Di, chose Yongle ("perpetual happiness") as his title, and thus became the Yongle emperor: the ruler during the Yongle period.

followed up. They had become a target in political infighting—one bureaucratic faction championing them, another trying to take down the first by decrying their expense. Yongle's son and successor aligned with the faction that opposed his father's policies. He canceled the grand naval adventures on the day he ascended to the throne. Ultimately almost all records of Zheng's travels were suppressed. China didn't again send ships so far outside its borders until the nineteenth century.

Many researchers have seen the failure to continue as emblematic of a fatal insularity in Chinese society. "Why did China not make that extra little effort that would have taken it around the southern end of Africa and up into the Atlantic?" asked Landes, the Harvard historian, in his *Wealth and Poverty of Nations*. Landes's answer: "The Chinese lacked range, focus, and above all, curiosity." Hobbled by Confucian ideology, arrogant and complacent, China was "a reluctant improver and a bad learner." *The European Miracle*, University of Melbourne historian Eric Jones's celebrated account of the West's climb to political dominance, similarly attributes China's rejection of foreign adventures to "empty cultural superiority" and "self-engrossment." After Zheng He, the empire "retreated from the sea and became inward-looking." China, the McGill University political scientist John A. Hall charged in *Powers and Liberties: The Causes and Consequences of the Rise of the West*, "was stuck in the same stage for over two thousand years, while Europe, in comparison, progressed like a champion hurdler." Bubbling with entrepreneurial vim, Portugal, the Netherlands, Spain, and Britain dragged sclerotic China into the rough-and-tumble of the outside world.

Other scholars disagree with this image of Chinese passivity. Nor do they believe the shutdown of Zheng He's voyages exemplified a cultural lack of curiosity or drive. No matter how far the admiral traveled from home, these writers note, he never encountered a nation richer than his own. Technologically speaking, China was so far ahead of the rest of Eurasia that foreign lands had little to offer except raw materials, which could be obtained without going to the bother of dispatching gigantic flotillas on lengthy journeys. Beijing easily could have sent Zheng past Africa to Europe, observed the George Mason University political scientist Jack Goldstone. But the empire stopped long-range exploration "for the same reason the United States stopped sending men to the moon—there was nothing there to justify the costs of such voyages."

In a broader sense, though, the question remains. Zheng's voyages were an exception to a longer, more consequential trend. During most of the Ming dynasty (1368–1644), Beijing issued edicts that effectively banned private sea trade. The Yongle emperor and a few other rulers opened it up, but they

were exceptions; as a rule, the dynasty clamped down on international exploration and exchange. So draconian were the prohibitions that in 1525 the court ordered coastal officials to destroy all private seagoing vessels.

As puzzling in today's context as the shutdown was its reversal. Fifty years after the demolition order another emperor reversed course. With the court bureaucracy's reluctant blessing, a new generation of Chinese ships went on the waters. Soon the Ming had been drawn into a worldwide network of exchange. In a trice, the Chinese economy became enmeshed with Europe (a place previously regarded as too poor to be worth bothering with) and the Americas (a place the emperors hadn't known existed).

The court had long feared that unrestricted trade would lead to chaos. Indeed, it did have catastrophic by-effects, though not those predicted by imperial bureaucrats. I've already described how the Columbian Exchange across the Atlantic shaped economic and political institutions. Now I turn to the Pacific, where the economic exchange established itself first and greased the skids for the Columbian Exchange. Accordingly, this chapter concerns economics and politics. The next chapter describes their ecological consequences; an environmental convulsion that had dire economic and political consequences for China—among them, in part, its later collapse before the West.

“MERCHANTS WERE PIRATES,
PIRATES WERE MERCHANTS”

Why did China let in the flood? The decision was driven by two factors, one largely political, one largely economic. The political factor was the Ming desire to enhance the power of the state. Beijing's prohibition on private trade had less to do with an abhorrence of trade than a desire to control it for the dynasty's benefit. Unhappily, the attempt backfired—the reaction to the trade ban ended up weakening government control, rather than strengthening it. When Beijing finally admitted this, it abandoned its previous policy. Further driving the emperors to make this decision was the economic factor: China had severe money woes. Literally so—the empire had lost control of its own coinage, and merchants had to buy and sell goods with little lumps of silver. To obtain the necessary silver, China lifted its trade ban, opening itself to the world. Soon the great ships of the galleon trade were carrying silk and silver across the Pacific—the final links in the global economic and ecological network begun by Colón's efforts in the Caribbean islands and Legazpi's sojourn in the Philippine islands.

RECENT CHINESE DYNASTIES

Tang	618–907 A.D.
Chaotic interregnum	907–960
Song	960–1279
Yuan (Mongols)	1279–1368
Ming	1368–1644
Qing (Manchus)	1644–1911

Chinese history is divided into dynasties, beginning before 2000 B.C. The tally here is simplified; the Song dynasty, for instance, is usually split into two eras (it fell apart after an invasion and regrouped with its power center in a different place). And this list doesn't show the messy transitions between dynasties—the Ming dynasty is usually said to have seized power in 1368, but fighting with the Yuan lasted for several decades before and after that date.

The Ming trade bans have often been described as emblems of Chinese cultural deficiency (Landes: “the Confucian state abhorred mercantile success”). But they were more complicated than that. The bans did not stop *all* foreign contact. They permitted one exception: “tribute payments,” in which foreigners, hosted in designated government hostels, were generously allowed to offer presents to the throne. Then the emperor would, out of politeness, give them Chinese goods in return. He also allowed them to sell anything he didn't want, which was often quite a lot.

Coastal merchants recognized the ban-and-tribute scheme for what it was: a way for the government to control international commerce. It was a busy, lucrative affair—in 1403–04, at the height of the supposed ban on foreign merchants, the Ming court hosted “tribute delegations” from no less than thirty-eight nations. Naturally, the Ming wanted the profits from trade. What the dynasty didn't want was the traders themselves; foreign goods, not foreign people. With a few exceptions, *all* contact with the world outside was supposed to be supervised by Beijing.*

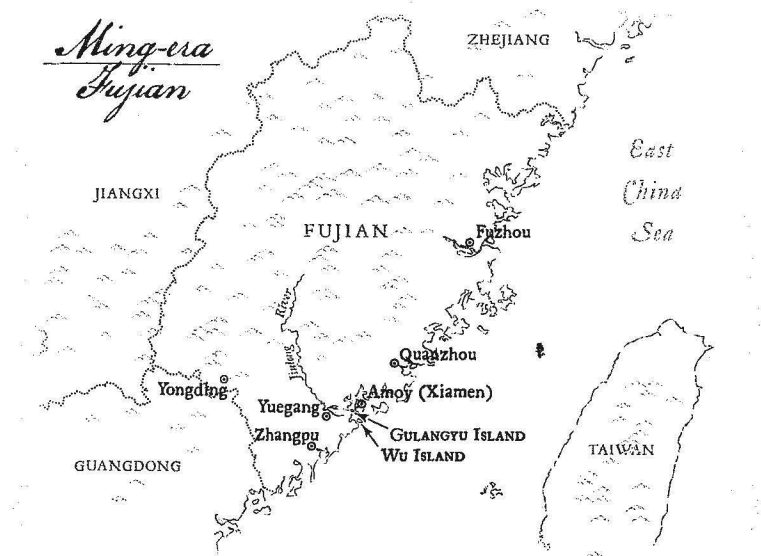
With bureaucratic logic, court bureaucrats reasoned that because maritime trade was outlawed the nation therefore didn't need a coastal force to police that trade. China reduced its navy to a few vessels, not enough to

* The Ming dynasty's predecessors, the Mongol-led Yuan, had tried to do exactly the same thing, forbidding private overseas trade in 1303, 1311, and 1320. In each case the law was soon repealed. The prospect of monopoly was tempting, but the Yuan always found it more profitable—and *much* less trouble—to tax private trade than to run the trade themselves.

patrol the nation's long coastline. The entirely unsurprising result was a delirium of smuggling (if business is outlawed, only outlaws will do business).

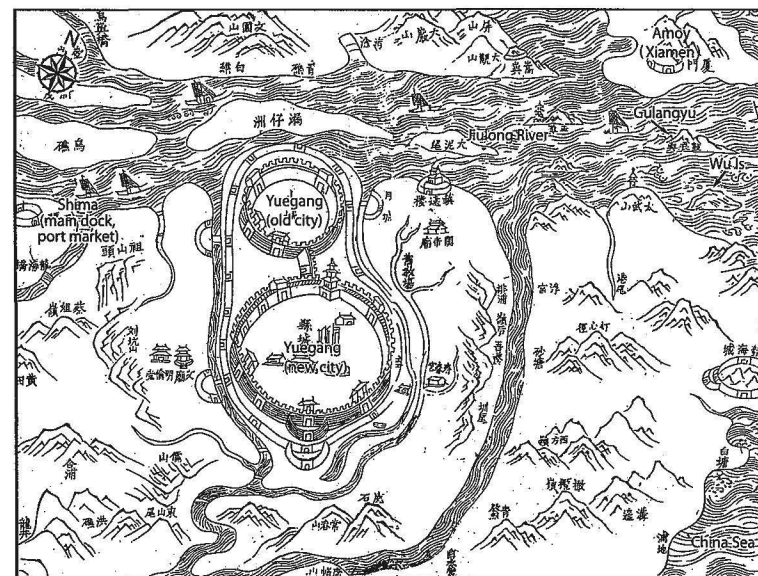
Wokou filled the southeastern coast. Literally, *wokou* means "Japanese pirates," but most weren't Japanese and many weren't pirates. Although they sometimes had bases in Japan, the majority of the *wokou* groups were led by Chinese traders who turned to smuggling after one Ming edict or another eliminated their livelihoods. Their ships were crewed by a crazy quilt of citizens in trouble: scholars who had failed to obtain an official post; bankrupt businesspeople; draft dodgers; fired government clerks; starving farmers; disgraced monks; escaped convicts; and, of course, actual professional smugglers. Scattered among them were a few skilled sailors lured into piracy by the promise of wealth. When officials tried to stop these people, violence often ensued. Every now and then this led to the occupation of a city. "Merchants were pirates, pirates were merchants," Lin Renchuan, a historian at Xiamen University, told me. They would trade peacefully if they could; not so peacefully if they couldn't.

China's efforts to control piracy were hampered by incompetence at the top. Histories of the late Ming dynasty are like advertisements for the virtues of democracy. One emperor refused to meet with his ministers for twenty years. Another was a drunk. A third ran away from his duties and lived in the



palace garden, researching alchemical recipes for immortality and prostituting hundreds of young women. This last was the Jiajing emperor, who reigned from 1521 to 1567. He put the empire into the hands of a cabal of grand secretaries, who concerned themselves with personal advancement, rather than, say, the piracy on the southeast coast.

Worst affected by piracy was the resource-poor province of Fujian, in southeastern China, facing Taiwan across the Taiwan Strait. Most of the province consists of low but craggy mountains with weathered red soil; flat, arable land is mainly confined to river valleys and a narrow ribbon along the coast. "The mountains peak in rocky summits, and the labor of plowing never ceases," moaned one thirteenth-century Fujianese writer. "The lowlands are salt marshes and cannot be tilled." Famine was a constant risk; despite big terracing and land-reclamation projects, Fujian couldn't grow enough grain to feed itself. Half of the province's rice had to be imported—not an easy task, because the mountains isolate Fujian from the rest of the nation. Among the region's few natural assets are the fine natural harbors



The walled city of Yuegang, portrayed in this seventeenth-century Chinese map, was once one of the world's most important ports. Today its role has been taken by the modern city of Xiamen (then the village of Amoy), on an island in the harbor.

that scallop its stony coast. For evident reasons, Fujian depended on the sea. It has long been China's center for maritime trade—which, in the days of sail, meant that it was China's center for international trade. When international trade was officially banned, Fujianese found themselves in an uncomfortable position—there was nothing for them on land.

The conflict was particularly intense around the port city of Yuegang. Located at the mouth of the Jiulong River, Yuegang's harbor was full of small islets, sandbars, and other shipping hazards. Because of the area's notorious haze, navigation was difficult—when I puttered about the harbor during my visits, I sometimes couldn't see boats that were only a few hundred yards away. The main docks were several miles up the Jiulong, in water so shallow that ships had to be towed in on the incoming tide. The location was an anti-piracy measure: criminals would not dare raid the docks, because the incoming tide that permitted entrance was too strong to allow escape. At the same time, many Yuegang shipowners *were* pirates—the harbor protected them from people like themselves.

The old city, full of Tang dynasty shrines, was connected by a raised walkway to the newer Ming city, built further inland with larger walls. Inside both were packed huddles of houses—"bandit dens," sneered one official in the 1560s, whose inhabitants "have collaborated with foreigners to spread chaos to the detriment of the local area for a long time now." Indeed, Yuegang was such a pirates' paradise that at one point Beijing divided the populace into groups of ten families that had to account for their members every five days; if one family did something illegal, all ten would be punished.

Imperial China's day-to-day history is largely recorded in the annual gazetteers sent to Beijing from each of the nation's counties. Yuegang's county had so much *wokou* trouble that the gazetteer's compilers eventually devoted a special appendix to it: "Bandit Incursions."

Bandit Incursions began in 1547, when a Dutch merchant/pirate/smug-gler group set up a base on Wu Island, a recently shuttered naval base just south of Yuegang's harbor. "Dutch" is a bit of a misnomer; the traders flew a Dutch flag, but they were a hodgepodge of Spanish, Portuguese, and Dutch hustlers with some semi-enslaved Malays. Chinese and Japanese *wokou* happily sent ships to trade with them, as did legitimate businesspeople from Yuegang; a busy, multilingual market sprang up in Wu Island's small but serviceable harbor. Unenthusiastic about the encampment was Zhu Wan, governor for both Fujian and Zhejiang, the province to the north. He dispatched soldiers to drive out the foreigners.

Wu Island consists of two rocky, steep, scrub-covered mounds with a low "saddle" between them. The Dutch had ensconced themselves in an impro-



A former pirate stronghold, Wu Island, in the hazy waters off of Yuegang, is now a center for fishing and aquaculture.

vised fort atop one of the mounds, forcing the Chinese to attack uphill. In a brief skirmish, the merchant/pirate group beat back the Chinese forces. Zhu changed tactics: he imprisoned ninety local merchants who had traded at Wu Island. In a gesture that even the unsympathetic gazetteer described as altruistic, the Dutch sent emissaries to plead for their allies' lives. Dismissing the entreaties, Governor Zhu beheaded all ninety. The Dutch abandoned Wu Island and gave up their attempt to trade openly; later they roamed the region, preying on the very Fujianese merchants and smugglers with whom they previously had collaborated.

Zhu Wan was anything but satisfied. A rigid, moralistic former magistrate, Zhu irritated his superiors by denouncing corruption at every level in a spray of angry memoranda. He was such a stickler that when his subordinates gave small gifts to his visiting family he punished himself with a hefty fine. Late in 1548 Zhu assaulted a major smuggling base in Zhejiang, scuttling more than 1,200 illicit boats. Led by the infamous "Baldy" Li, *wokou* fled by the hundred to a new base in the extreme southern end of Fujian. Three months later Zhu's men hunted them down there, killing almost 150 and capturing scores of Portuguese, Japanese, and Chinese smugglers.

Many of Li's gang turned out to be from influential Yuegang merchant families.* Angered by this evidence of routine collusion among local elites

* "Families" is a misnomer. The traders were *gongsis*, which were clan-like groups of related families that often had hundreds of members. I'm reluctant to use the term *gongsi*, though, because it now means "company"—an indication of the familial roots of many Chinese businesses but a source of potential confusion to readers.

and foreign smugglers, Zhu ordered all the captives to be summarily executed—the second round of executions in two years. The executions united Zhu's enemies against him. Yuegang's wealthy appealed to Zhu's superiors: the courtiers of the alchemy-besotted Jiajing emperor. Zhu was demoted, then fired, then subjected to politically motivated investigations. Facing indictment, he poisoned himself in January 1550. "Even if the Emperor doesn't kill me," Zhu said, "powerful court officials will kill me. And even if powerful court officials don't kill me, the people of Fujian and Zhejiang will kill me."

Emboldened by Zhu's absence, pirate gangs seized entire towns, pillaging "until the stench of rotten flesh forced them to leave." In one city north of Yuegang more than twenty thousand people died after a pirate assault. Across southeast China, the Ming historian Luo Yuejiong recalled, terrified families "ate without cooking their food, and slept unsoundly on their pillows; farmers left behind their pitchforks and women dozed off on their looms." When the *wokou* attacked, Luo wrote,

fathers and sons, young and old, were taken prisoner and followed the pirates on the road. As for the dead, their heads and bodies were found in different places, bones left out in the grassy swamps, heads stiff. Looking on the horizon, the coastal counties were almost nothing but hilly ruins.

Wokou were "burning homes, seizing women and children, and stealing huge quantities of valuables," wrote the chronicler Zhuge Yuansheng in 1556. "Officials and common people alike were killed with weapons, their bodies, numbering in the tens of millions [an idiom for "huge numbers"], filled ravines. Government troops dared not oppose them." At the mere appearance of *wokou* in an area, he wrote, "people scream in panic and take flight." In a scene straight out of a Stephen Chow martial-arts comedy,

[a] messenger from Songjiang [near Shanghai] rode at a gallop into town and cried out to his followers, "We're here! We're here!" The locals misunderstood him and thought the [pirates] were coming. Men and women scurried like ants, nothing could stop them. Women and children were separated, families lost countless valuables and possessions. At the time, more than 600 soldiers were garrisoned at the city, stationed on the bastions along the walls; they all threw down their weapons and armor and ran away. Not until the next day did calm return to the town.

In Yuegang the *wokou* didn't strike back at the government until 1557, according to the county gazetteer, when a disgruntled farmer secretly opened the city gates to two pirate gangs. Overwhelming all resistance, the *wokou* "abducted more than a thousand people and burned more than a thousand homes."

Dire as it was, the assault was a sideshow. Even as *wokou* beset Yuegang, twenty-four of the city's merchants pooled resources and built a fleet to work with the pirates in what amounted to an interlocking network of joint ventures. The traders had access to domestic markets; the smugglers, to foreign goods. Known as the Twenty-four Generals, the merchants decided to control access to their home markets by carving up Yuegang, gangland style, into neighborhoods, each dominated by a single "general" in an earthen-walled fortress. Three hundred imperial soldiers were sent to dislodge them. The Twenty-four Generals beat back the attack. Observing this success, other smugglers in other parts of Fujian followed the Generals' lead, forming the Twenty-four Constellations and the Thirty-six Bravos. The region became a bewildering, violent amalgam of overlapping loyalties and betrayals, as business gangs and pirate gangs from different neighborhoods, regions, and nations vied among themselves for control of the smuggling trade.

For Coastal Surveillance Vice Commissioner Shao Pian—the late Zhu Wan's subordinate—the last straw occurred when Fujianese traders invited three thousand Japanese and Portuguese smugglers to reoccupy the former Dutch base at Wu Island. Shao had no good options. Bled by cutbacks, the imperial navy was outgunned and outmanned by the *wokou*—indeed, for its missions it often hired smugglers, who had superior skill and experience. Worse, he could not trust many of his own officers, because they came from the merchant families involved in the smuggling. In a classic move, Shao forged an alliance with—that is, bribed—Hong Dizhen, former leader of the three thousand *wokou* at Wu Island. Hong gathered up a force in 1561 and attacked the smugglers' largest bases in Yuegang. "Countless *wo* died," the gazetteer states—a face-saving formulation meaning that the pirate gangs, who were allied with the entire local populace, drove Hong back with heavy losses.

Shao effectively capitulated. "Over ten years," the gazetteer reported, "we lost one outpost, two smaller outposts, a prefecture, six counties and no fewer than twenty-some fortified towns. . . . People wailed and ghosts cried out, and the stars and moon gave off no light as the grassy wilderness itself moaned." The world's richest, most technologically advanced nation had utterly lost control of its borders. In 1567 a new Ming emperor threw in the towel and rescinded the ban on private foreign trade.

The government reversed course not only because it recognized its inability to stop smuggling, or because it had begun to appreciate how much Fujian's populace depended on trade. Beijing had come to realize that the nation desperately needed the merchants' most important good: silver.

OUT OF MONEY

Several hundred years before the birth of Christ, the Chinese state began to issue round coins made of bronze, an alloy of copper and tin. Each coin was worth its own weight in bronze and had a square hole in its center. The system had defects. Because bronze was not especially valuable, a single coin wasn't worth much. To create units of larger value, people strung the coins together into groups of one hundred or one thousand.

The strings were heavy, bulky—and still not worth much. Asking large-scale Chinese traders to use them was like asking today's mergers-and-acquisition bankers to buy companies with rolls of quarters. Worse, according to Richard von Glahn, a historian at the University of California at Los Angeles who specializes in the history of Chinese currency, the empire ultimately didn't have enough copper to keep up with the demand for coins. The copper-starved Song dynasty was forced to create a "short-string" standard, in which strings of 770 coins were officially treated as if they contained a thousand.

In 1161 the Song dynasty introduced what would become the first modern paper currency: the *huizi*. Regional governments and powerful merchants had experimented with paper money for two centuries, but the *huizi* was the first nationwide, state-printed banknote. It was denominated in terms of bronze coins; the lowest-value note was worth two hundred coins and the highest was worth three thousand. (The first European banknotes appeared in 1661, five centuries later.)

Theoretically speaking, people could redeem their *huizi* for actual coins. In fact, the Chinese government and Chinese merchants quickly discovered that printing *huizi* would reduce the demand for coins^{*}, letting them export the latter to Japan, which used Chinese bronze coins for its currency, too. The more the government printed bills, the greater the number of coins that could be exported. Within a few decades of their creation, *huizi* notes were decoupled, as a practical matter, from coins; no matter what the bills claimed, they couldn't be redeemed for bronze. They had effectively become what economists call *fiat money*.

Fiat money has no intrinsic value, and is worth something only because a government declares it is. The U.S. dollar is an example, as is the euro. As

pieces of paper, dollar bills and euro bills are next to worthless. Yet because they are officially printed by government institutions, people can hand these colorful paper rectangles to grocery-store clerks and walk out with bags of food. The silver pesos that circulated in the Spanish empire, by contrast, were *commodity money*: valuable because they were made of a valuable substance. So were Chinese bronze coins, although the bronze wasn't especially precious.

From a government's point of view, commodity money is problematic, because the government does not fully control the money supply—the nation's currency is at the mercy of random shocks. For example, at the time of Colón's voyages cowry shells were used as currency from Burma to Benin.^{*} Then Europeans shipped in vast quantities of shells from the cowry-rich Maldiv Islands, in the Indian Ocean. Governments throughout the region were overwhelmed. A financial system that had been in place for centuries disintegrated in a flash.

This kind of external pressure has no impact on fiat money. With fiat money, the government has near-complete control over the money supply; it determines how many banknotes are needed and instructs the mints to print them. In theory, politicians can expand or contract the money supply to foster better economic conditions.

Fiat money's greatest defect is the same as its greatest strength: the government decides how many banknotes to print. After introducing paper bills, Song emperors made a stunning discovery: they could buy things simply by stamping patterns of ink onto pieces of paper. For several decades the strategy was successful. As the use of paper money expanded throughout the empire, the nation needed to increase the supply of paper bills, and the emperor's outlays were absorbed in the overall rise. In the early thirteenth century the emperor decided to fight enemies in the north—first the Jin, then the Mongols. To pay for supplies and troops, he turned the printing presses on "high." Inflation was the result. The Song lost to the Mongols before they could set off monetary catastrophe. The Mongols, who became the Yuan dynasty, issued their own paper money—lots of it. To them belongs the honor of inventing hyperinflation. By the 1350s Yuan paper money was practically worthless. In the next decade the dynasty fell to the Ming uprising.

Upon taking the throne, the first Ming ruler, the Hongwu emperor, ordered that new coins be issued in his name—no more worthless paper bills! Alas, the Hongwu emperor discovered that the empire had nearly exhausted

^{*} To those accustomed to metal coins, the idea of using shells for money may seem primitive. But they had a signal advantage: unlike the era's coins, which were often debased or faked, shells could not readily be altered or counterfeited.

its copper mines. Naturally, the price of copper rose; bronze coins ended up costing more to produce than they were supposed to be worth. It was as if every penny cost two pennies to manufacture. Unsurprisingly, not many coins were issued. Ming coins became rarities, so rarely seen that businesspeople hesitated to accept them—merchants had too little experience with the coins to know whether they were genuine or counterfeit.

Quickly the Ming dynasty, like its predecessors, discovered the virtues of an active printing press. Again inflation exploded; the value of the paper bills fell by roughly 75 percent in about a decade. The Hongwu emperor responded by refusing to produce any more coins. Force people to use paper bills—that was the idea. It didn't work. Shutting down the mints increased the scarcity, and hence the rarity, of the new coins, further eroding their value as currency. It also pushed up the value of old coins, which people trusted and understood. And it dramatically increased counterfeiting. The fake coins were for the most part easily distinguishable from real ones. But merchants were so desperate for some way for their customers to pay them that they accepted the counterfeits anyway, although they demanded a premium.

As businesspeople snatched up all the old and counterfeit coins they could find, the value of paper bills continued to fall. In 1394 the government banned the use of its own coins—a policy that “flouted economic realities,” wrote von Glahn, the UCLA historian, in *Fountain of Fortune* (1996), a fine history of Chinese money that I have been drawing upon here. As one would expect, the policy failed. The emperors kept trying, prohibiting coins in 1397, 1403, 1404, 1419, and 1425. Every time the ban failed, the emperors would again officially permit coins to circulate—until the next ban. Meanwhile the Ming kept printing paper notes at inflationary rates. All of this may sound completely unhinged, and it was. In the feud- and faction-ridden Ming court, government policies were often accidental by-products of ministerial intrigues, enacted with little regard for their actual effects. The result was that by the time *wokou* were terrorizing the southeast coast, the Chinese empire had no functioning currency.

I am oversimplifying. The currency *did* function—intermittently, unpredictably. Each emperor produced coins with his name stamped on the face. When he died, the succeeding ruler would quickly declare that his predecessor's coins were valueless; only new coins minted by the new emperor would be valid currency. Merchants suddenly saw “their capital evaporate in a single day, often silently mourning their losses before committing suicide,” according to the *Ming Shi*, the official history of the dynasty.

Needing something to pay with, merchants and their customers would

use old coins from earlier reigns until the new emperor's money arrived; given the lack of copper and dynastic inefficiency, this frequently took years, even decades. Then they would use the new coins until the government suddenly banned them. The result, according to the Taiwanese historian Quan Hansheng, was a constant game of financial hot-potato, with everyone trying to use their coins until just before they lost all value—at which point they would try to unload them onto some hapless sucker.

“Virtually from morning to evening the rules change, and still there is no set policy,” moaned one sixteenth-century imperial chancellor. “The people fear that the money they get today will be useless tomorrow and they will no doubt starve. Thus the more the coins change, the more chaos ensues, and the more restrictions there are, the more people panic, so that stores dare not open for business, there is no buying or selling, and cries of anguish ring out.”

“Coins received in the morning couldn't be used by evening,” explained a central-China gazetteer in 1606. Shopkeepers would suddenly refuse them en masse.

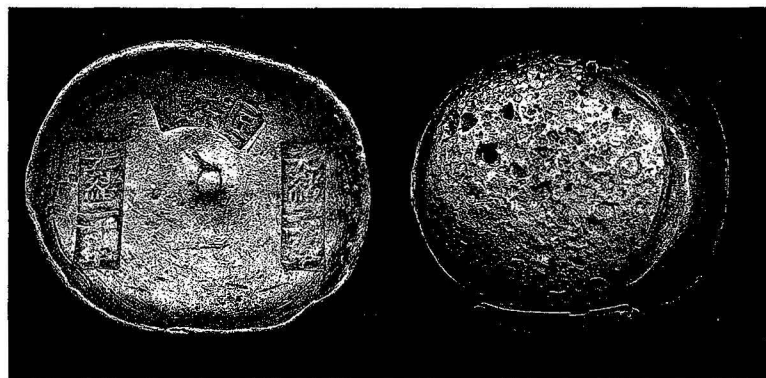
One person would suggest it, and everyone else would agree. Although such actions were strictly forbidden, they had no regard for the law. Before long, merchants from other regions would come to buy old coins, and they would exchange them at a ratio of three to one and cart them away. This is what you call monopolization at its extreme, the power of devious people. Wealthy merchants and powerful brokers sit back and reap heavy profits while the average person suffers. It never ends.

Were these complaints exaggerated? In 1521 the Jiajing emperor began his reign. Still a young man, he was decades away from his prostitute-fueled pursuit of immortality and fiercely determined to regain control of the nation's money supply. He decided to issue new coins that would be of such high quality that the people would reject the old coins and counterfeits. The results were described a century later by the geographer and historian Gu Yanwu in a grandly titled compendium, *The Strategic Advantages and Weaknesses of Each Province in the Empire*. Gu looked at Zhangpu County, about ten miles south of Yuegang. As the Jiajing reign began, Gu reported, the currency preferred by county merchants was, unbelievably, coins from the Song dynasty—the Yuanfeng reign, to be precise, which had ended more than four centuries before, in 1085 A.D. During the next decade, the Jiajing emperor established mints and punched out coins as fast as possible. The effort made

not a jot of difference in Zhangpu County. Year after year, Gu wrote, the preferred money flipped arbitrarily from one Song emperor to another. After each switch, people stuck with the previously favored coins were left high and dry. Not until 1577, five years after the Jiajing emperor's death, did Zhangpu County use legal currency. For the first time in decades, people used coins minted by the current ruler, the Wanli emperor. The reprieve was brief, Gu wrote. "Only one year later, they stopped using Wanli coins."

Silver had long been recognized as a store of value, though rarely used for ordinary, small-scale transactions because it was too scarce and costly. But the uncertainty over bronze coins and paper money grew to the point where desperate merchants took to carrying around little silver ingots, often shaped like shallow bowls one to four inches in diameter. When traders met, they used the ingots to buy and sell, weighing them with jewelers' scales and clipping off needed sums with special shears; to evaluate the ingots' purity, they used *kanyinshi* (silvermasters), who charged a fee for the evaluation and routinely cheated all parties. Awkward as it was, this system was better than using coins that might lose their value at any time. By the end of the *wokou* crisis, one writer complained in 1570, coins were used in fewer than one-tenth of all market transactions. The Chinese government didn't issue the ingots; as if in a libertarian fantasy, the money supply was effectively privatized. Anybody who could lay hands on some silver could get *kanyinshi* to certify it— instant money! Everyone was paying bills with splinters of silver.

Grudgingly and gradually, the Ming emperors adopted this system, too.



Called *sycee*, these small silver ingots were used in the Ming and Qing eras instead of coins. The stamps include the mark of the silversmith (difficult to read, but probably Shunxiang Smithy) and the date (the twentieth year of the Guangxu emperor's reign, or 1895).

China's basic tax system—farmers paid a portion of their harvest—hadn't changed for eight hundred years. But over time it had become encrusted with loopholes and extra levies, which created opportunities for corruption. In a series of edicts, Beijing reordered the tax rolls and ordered the citizenry to pay an ever-increasing share of their taxes in raw silver, rather than in kind. By the 1570s, as the Wanli reign began, more than 90 percent of Beijing's tax revenue arrived as lumps of shiny metal.

China was the world's biggest economy. Its "silverization" meant that tens of millions of wealthy Chinese suddenly needed chunks of silver for such basic tasks as paying taxes or running a business. It stoked a voracious demand for the metal. Inconveniently, China's silver mines were just as played out as its copper mines. Businesspeople had trouble laying their hands on enough silver to pay for anything, including their taxes. The sole nearby supply of silver was in Japan. On an official level, China and Japan were not friendly—indeed, the two nations were soon to fight a war in Korea. To get the silver necessary to keep business going, merchants turned to *wokou*. Businesspeople sold silk and porcelain to brutal men with silver, then turned around and used the silver to pay their taxes, which in turn was spent on military campaigns against those brutal men. The Ming government was at war with its own money supply.

Unable to reconcile the contradiction, Beijing finally allowed Fujianese merchants to trade overseas without fear of punishment. Now acting in the open, they sent thousands of people—younger sons from extended families—throughout Asia to establish beachheads for later trading or extortion. Even a backwater like the Malay village of Manila may have had as many as 150 Chinese residents in 1571, when Legazpi showed up. Hundreds more apparently resided elsewhere in the islands. The unexpected discovery of silver-bearing foreigners in the Philippines was, from the Chinese point of view, a godsend. The galleons that brought over Spanish silver were ships full of money.

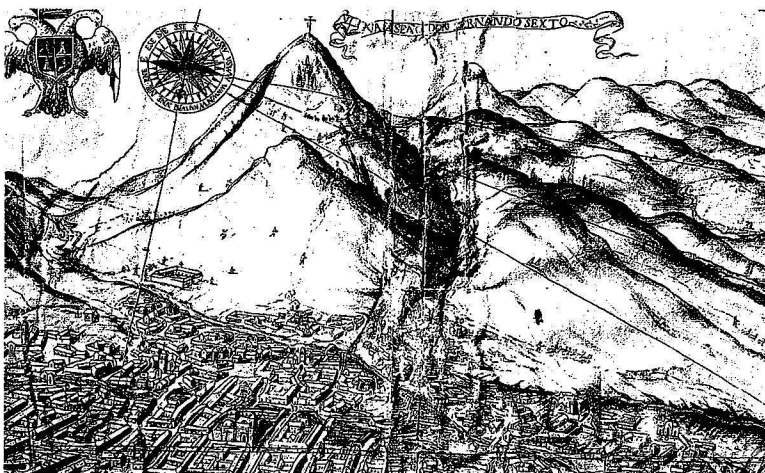
"THE TREASURE OF THE WORLD"

How did silver get on those galleons? According to the stories, it began with a man named Diego Gualpa or Hualpa in April 1545. He was out walking at thirteen thousand feet, possibly looking for a lost llama, on a plateau in the Andes Mountains, at the southern tip of Bolivia. (The altitude, amazingly, was not extreme for the Andes, where most of the population lives on high plains that are almost at that level.) No trees, no animals, no crops, no

homes—just a bare, dome-shaped hill, clawed by wind and snow, surrounded by still taller mountains splashed with ice. Stumbling on a high ridge, he steadied himself by seizing a shrub. It came out of the shallow soil. Beneath it, in the hole made by its roots, was a metallic sparkle. Gualpa or Hualpa was on a ledge of silver ore three hundred feet long and thirteen feet wide and three hundred feet deep—the biggest silver strike in history.

Typical ores are at most a few percent silver. The ledge was as much as 50 percent. It was so rich that the Spaniards didn't know how to purify it—they kept boiling away the silver. Andean Indians had some of the world's most advanced metallurgy. Locals were able to do what the foreigners couldn't, in low-temperature smelters fueled by dry grass and llama dung. Soon thousands of native smelters sent their smoke into the chill Andean air. By the early 1560s, two decades after the first strike, the Imperial Villa of Potosí, to give the new boomtown its formal name, had a population of as much as fifty thousand. It would have had even more if Spain hadn't done everything it could to keep people out. Despite these efforts the count grew to 160,000 by 1611. Potosí was as big as London or Amsterdam. It was the highest, richest city in the world.

Lawless, louché, and luxurious, Potosí set the template for countless boomtowns afterward. Courtesans in Chinese silk walked on Persian carpets in rooms sprinkled with scented water. Miners gave fortunes to beggars and



Shown in this drawing from 1768, Potosí spread across the plains below the silver mountains. Cold, crowded, and violent, it was the highest city in the world and probably the richest.

spent fortunes on swords and clothes and elaborate celebrations. In a market-stall bidding war, two men drove the price for a single fish to five thousand silver pesos, many years' income for most Europeans. Another man showed up for a duel in "a brocaded tunic the color of mother-of-pearl, studded with diamonds, emeralds, and strands of pearl." At one celebration a city street was actually paved with silver bars. "I am rich Potosí," crowed the city coat of arms, "the treasure of the world, the king of the mountains, the envy of kings."

Enviably, perhaps, but also uncomfortable. Wind and altitude conspire to make the town amazingly cold and the terrain almost lifeless. The air is so thin that the first time I visited I got woozy carrying my suitcase up a flight of stairs. Humiliatingly, my host's ten-year-old sister scooted to my side, grabbed the bag, and ran with it to my room. During the silver era every cup of flour, every piece of clothing, and every scrap of wood had to be carried into the city by llama. Now Bolivia has cars and trucks, but many houses in Potosí still lack heat, as they did in centuries past. In the morning my blanket crackled with frost. Seeing my blue lips, my host's mother kindly melted a cup of coca tea.

Almost as important as the mountain of Potosí was a second Andean peak, Huancavelica, eight hundred miles northwest, which gleamed with mercury deposits. In the 1550s Europeans in Mexico discovered a way to use mercury, rather than heat, to purify silver ore. (Rediscovered, actually—the technique had been known in China for centuries.) Miners pulverized silver ore, spread the powdery result over a flat surface, typically a stone patio, then used rakes and hoes to mix in saltwater, copper sulfate, and mercury, forming a stiff cake. Men, mules, and horses walked over the cake, their footfalls providing the energy for a complex reaction that slowly forced the mercury to combine with the silver in the ore, forming a sticky amalgam. Workers poured water over the cake, washing away everything but the amalgam, which was then scraped into cloth sacks. In time the loosely bonded mercury and silver separated; mercury being a liquid, it dripped out of the sacks, leaving bagfuls of pure silver. After watching a demonstration of the technique, Viceroy Francisco de Toledo seized the Huancavelica mines for the crown, thus arranging what he called "the most important marriage in the world, between the mountain of Huancavelica and the mountain of Potosí."

As long as the mercury lasted, the viceroy realized, the mines would no longer be dependent on Indian technology, which in turn meant that Spaniards could treat natives wholly as a source of labor. Andean peoples had a tradition of communal work that had been co-opted by the Inka to build a great highway system. Taking a page from the Inka playbook, Viceroy

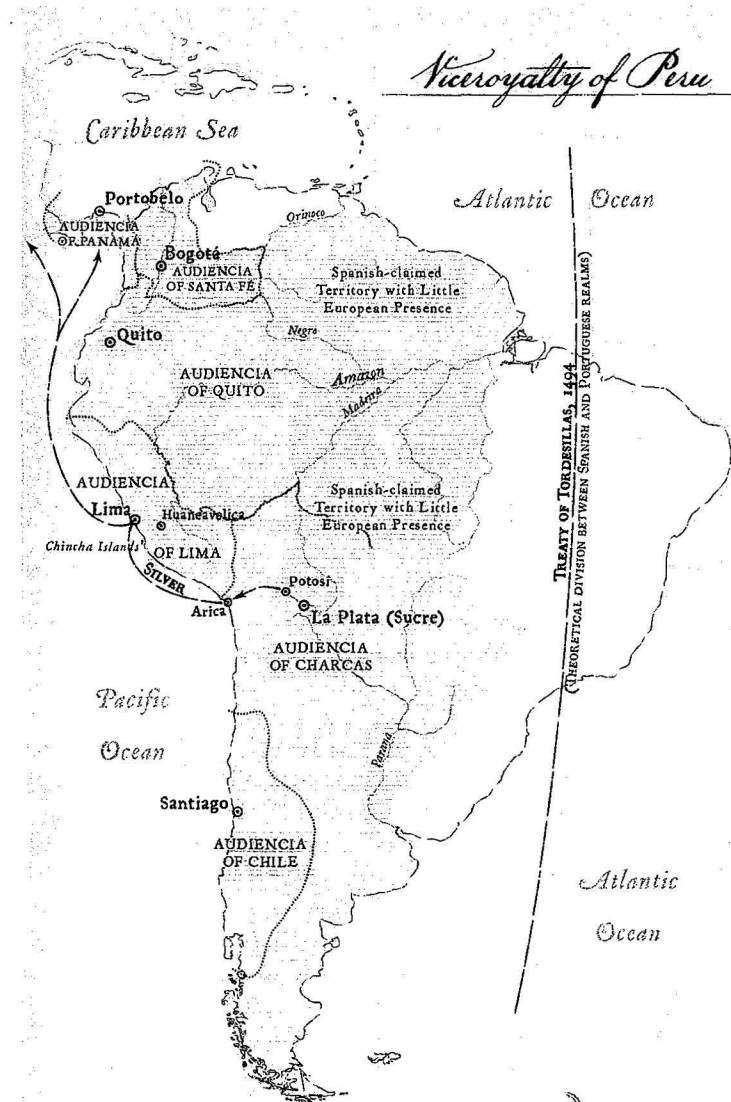
Toledo forced natives to deliver, as a tribute, weekly quotas of men to the silver and mercury mines—at the start, roughly four thousand a week each for Potosí and Huancavelica. As lagniappe, mineowners also imported several hundred African slaves each year. Sometimes it is said that the mines killed three to eight million people. This is an exaggeration. Still, conditions were appalling, especially at Huancavelica.

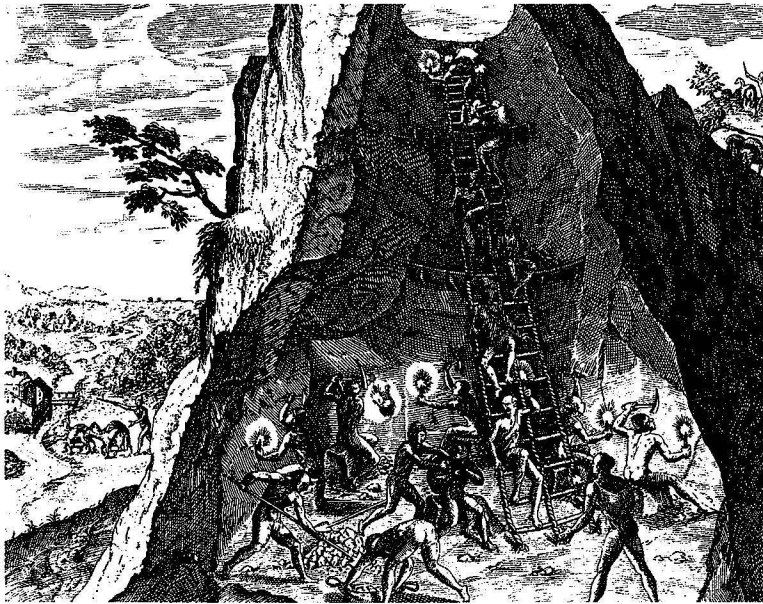
The entrance to the mercury mine was a great archway with pilasters and the royal coat of arms cut into the living rock of the mountain. Inside, the tunnels rapidly narrowed and spread out like jellyfish tentacles. Candles strapped to their foreheads, Indians hauled ore through cramped tunnels with next to no ventilation. Heat from the earth vaporized the mercury—a slow-acting poison—so workers stumbled through the day in a lethal steam. Even in cooler parts of the mine they were hacking away at the ore with picks, creating a fug of mercury, sulfur, arsenic, and silica. The consequences were predictable. Workers served in two-month shifts, often several times a year; after a single stint, many shook from the initial effects of mercury toxicity. Foremen and supervisors died, too—they also spent too much time in the mine. So determined were natives to avoid the mercury pits that parents maimed their children to prevent them from having to serve.

Huancavelica ore was refined in a ceramic oven; the mercury boiled off and condensed on the inside surfaces. If the oven were opened before it was cool—something mineowners, eager to start the next refining cycle, often insisted upon—the result was a faceful of mercury vapor. Numerous official inspectors urged the crown to shut down Huancavelica. But reasons of state always won out; the need for silver was too great. As the mineshafts went deeper into the mountain the inspectors urged that the state dig ventilation shafts. The first was not created for eight decades. Officials who dug up graves in 1604 reported that when miners' corpses decomposed they left behind puddles of mercury.*

Conditions at Potosí were less lethal, but no less inhumane. In near-complete darkness gangs of conscripted Indians carried hundred-pound loads of ore up and down dangling rope-and-leather ladders. Like ants on a string, one chain of men descended one side of the ladders while another chain climbed up the other. Initially Indians were given two weeks' rest

* Mercury poisoning was not the sole cause of death. Equally lethal were pneumonia, tuberculosis, silicosis (lesions in the lungs caused by inhalation of silica dust), and asphyxiation (breathing carbon dioxide in badly ventilated tunnels). In 1640 a royal inspector saw three Indians fall into a pit so filled with carbon dioxide that candles couldn't burn (carbon dioxide, which is heavier than air, pools in low areas). Although the pit wasn't deep, the workers did not get up. Their bodies were not retrieved; descending into the pit was too dangerous.





The itinerant artist and editor Theodorus de Bry never saw the mines of Potosí, but he captured something of their cruelty in this engraving from the 1590s.

above ground for every week of work beneath the surface. Later the rest periods vanished. When miners hit a patch of low-quality ore, they were forced to work harder to make their quota of silver. Failure to meet the quota would be punished by whips, clubs, and stones. Horrified antislavery activists denounced the “hellish pits” of Potosí. “If twenty healthy Indians enter on Monday, half come out on Saturday as cripples,” one outraged priest wrote to the Spanish royal secretary. How, he asked, could Christian leaders allow this?

Part of the reason that the rule of law broke down beneath the surface was that it had broken down above the surface as well. Violence of every conceivable variety flourished in Potosí. Construction workers found murder victims stuffed into walls or shoved under rocks. Tailors rioted after a guild election, forcing one faction leader to seek shelter in an Augustinian monastery. When the government sent agents to arrest him, the friars jumped on them with drawn swords. City council members wore chain mail at meetings and carried swords and pistols. Political disputes were sometimes

resolved by duels fought right in the room. As one may imagine, the ambience was hostile to family life. Despite Potosí’s huge population, no child was born there to a European for more than half a century. So unexpected was the first birth that the baby’s arrival—on Christmas Eve, 1598—was widely attributed to the miraculous intervention of Nicola da Tolentino, the patron saint of infants.

Potosí was as conflict prone as pirate-ridden Yuegang, but the battles were regarded differently, at least by their chroniclers. The main Chinese accounts of the *wokou*—county gazetteers and official reports—are terse and matter-of-fact, whereas Potosí’s most important chronicler, Bartolomé Arzáns de Orsúa y Vela (1676–1736), spent three decades writing a massive, 1,300-page history of the city that is, among other things, a breathless paean to romantic honor of the sort mocked in *Don Quixote*. Arzáns never published his book, partly because he was afraid to go public—local families might not have liked his descriptions of their forefathers’ mayhem, no matter how glorified.

Despite the golden haze Arzáns cast over events, one can see from his account how the city’s violence evolved from cinematic face-offs between alpha males into full-fledged battles between ethnic groups. In 1552, seven years after Gualpa or Hualpa discovered silver, the bellicose adventurer Pedro de Montejó arrived in Potosí. In Arzáns’s telling, Montejó put up placards challenging one and all to combat, “spear against spear.” Such fights “were an admirable thing in Potosí,” Arzáns explained. In a city with a permanent European population that almost exclusively consisted of young men on the make, “killing and hurting each other was the sole entertainment.”

By general consensus, Montejó had one obvious opponent: the equally bellicose Vasco Gudínez, who had already established a reputation as the city’s go-to man for threats and mayhem. Early on Easter morning both men, accompanied by their seconds, rode to the battleground, followed by a crowd of layabouts. After an exchange of insults, Arzáns recounted, the two men “charged at each other and collided so hard that it was like bringing together two rocks.” Gudínez, badly wounded,

withdrew some distance and threw his spear at Montejó with such violence that he did not have time to dodge, and it struck his buckler, passing entirely through it and wounding him in the arm, breaking through the chain mail and the steel plate, and much of the tip went into his body. . . . Montejó, fatally injured and without the defense of his buckler, attacked his opponent with diabolical force with the tip of his sword; he responded to Gudínez’s parry with his shield, and raising his

arm brave Montejó unleashed a fierce blow to the head that dazed Gudínez and, worse, wounded and knocked his horse to the ground, spilling much blood. Now Montejó had him down and was about to cut off his head, but at the first step he [Montejó] fell dead, pierced through the chest. Gudínez got up with alacrity, and stumbled to the corpse and put his sword to its neck, thinking that he wasn't yet dead.

Arzáns evidently embellished the details of this encounter—he claimed that the two men's seconds thereupon engaged in a three-hour battle to the death, which the wounded Gudínez tarried to watch en route to his sickbed. Arzáns may even have gotten some basic facts wrong (no record exists of any Potosino named Pedro de Montejó, for instance). But the underlying scenario seems indisputable: the city was chock-full of brutal thugs. To reestablish control, the provincial government in Lima sent in troops. After a round of skirmishes, Arzáns wrote, Gudínez's second, a specially vicious hoodlum, was drawn and quartered; Vasco Gudínez himself was jailed.

Vasco means "Basque," and the name was no accident—a disproportionate number of Potosinos were from the Basque country in Spain's Atlantic coast. Culturally, linguistically, and geographically isolated from the rest of Spain, mountainous and agriculturally unpromising, the Basque region was, so to speak, the Fujian of Spain—a center for nautical trade and emigration. Two-thirds of Potosí's mines and the municipal council were controlled by Basques by 1602. Basque leaders bribed royal bureaucrats to look the other way when taxes were due; if non-Basque miners posed a competitive threat, Basque gangs provided muscle. When royal officials tried to sell off a Basque mineowner's lease for unpaid taxes, a Basque gang stabbed to death the would-be purchaser in Potosí's central square. Resentment grew among colonists from other parts of Spain, many of whom lived in wildcat mining camps outside the city. In furtive meetings anti-Basque miners took to identifying themselves with caps made from vicuña wool (the vicuña is a relative of the llama) and called themselves Vicuñas. Basques had no need to identify themselves by dress; they spoke their homeland's native tongue, Euskara, which is unrelated to Spanish.

The struggle gained intensity in August 1618, when a new lawman came to town. In the loosely governed city, he was that most terrifying figure, a tax inspector. "Punctual and tidy, intelligent and modest, he enjoyed nothing more than fulfilling his duties," wrote the Bolivian historian Alberto Crespo of the inspector. "His name was Alonso Martínez Pastrana and he was not Basque." This humorless bean-counter soon learned that Potosinos had been cheating massively on their taxes. The king was supposed to be paid one-fifth of the silver from the mines, as well as part of the revenue from mercury

sales and coin minting. Martínez Pastrana calculated that Potosinos had collectively shorted the king 4.5 million pesos, more than the mines' official annual output. Because Basques owned the biggest mines and dominated the city government, they were responsible for most of the fraud. Eighteen of the twenty-four members of the municipal council owed back taxes, the inspector said; eleven of the offenders were Basque. Three years later, after a battle with corrupt treasury officials, Martínez Pastrana finally was able to ban overt tax cheats from membership on the municipal council.

In June 1622 a Basque gang leader was found dead on the street, his hands and tongue cut off and minced. Vicuñas correctly were blamed. Furious Basque goon squads roamed the squares, threatening to lynch the "Moors, treasonous Jews and cuckolds" responsible for the murder. If they met a stranger in the street, one account claims, they challenged him in Basque; anyone who responded in Spanish would perish. After a round of murders, a stone-throwing Vicuña mob converged on the home of Domingo de Verasátegui, head of a powerful Basque family—he was one of four wealthy brothers, two of whom were on the municipal council. He was saved only by the sudden appearance of the head of the royal court, who personally escorted him to the safety of the city jail. Verasátegui died a few months later of natural causes, unusual in Potosí.

The crown appointed a new governor for Potosí the following May. (The governor, or *corregidor*, was the highest district-level authority.) Felipe Manrique was a violent man with a short fuse—years before, in a moment of rage, he had slain his wife. On his journey to Potosí the widower met and was smitten by Verasátegui's widow, inflaming Vicuña suspicions. They razed the governor's house, shooting Manrique four times in the process. A full-fledged riot exploded two months later when a Basque tipped his hat to two Vicuñas "in a very arrogant manner." Manrique dispatched military patrols but couldn't stop several thousand Vicuñas from pillaging the homes of prominent Basques.

Seventy years before, Fujian's Zhu Wan had learned the hard way that incorruptible pursuit of duty is not always a means for successful career advancement in government service. Zhu was driven to suicide. The implacable tax collector Martínez Pastrana was luckier: he escaped with his life, though not his career. His superiors bowed to pressure and ended his mission in August 1623, a few weeks before the Vicuñas burned down Governor Manrique's house. He ended up in bitter retirement in Lima, where a street bears his name.

By contrast, the all-too-corruptible Governor Manrique left office on February 19, 1624. The next day he married Verasátegui's widow and moved into her splendid manor—"serving to eliminate every doubt," observed Crespo,

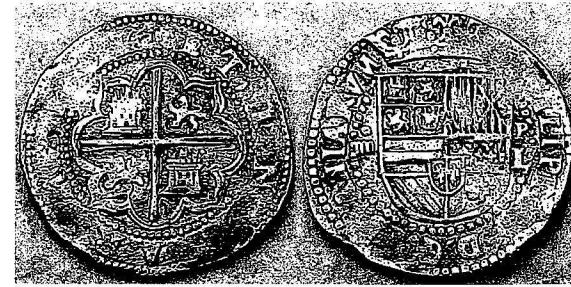
the Bolivian historian, about “the badly concealed connections that linked the governor and the Basques.” Manrique moved to Cuzco (the Spanish name for the former Inka capital of Qosqo), a wealthy man who would become wealthier. With the departure of both men, passions ebbed. Vicuñas disappeared into the countryside, where they robbed travelers with impunity for years.

Incredibly, the Basque-Vicuña war had almost no effect on the flow of silver. Even as Basques and Vicuñas fought in the streets, they cooperated on mining and refining the silver, then shipping it from Potosí. The last was a huge task. One account describes how a single shipment of 7,771 bars left the city in 1549, four years after the lode’s discovery. Each bar was about 99 percent silver and weighed more than eighty pounds. All were stamped with serial numbers by the foundry and marked with the owner’s stamp, the foundry stamp, and the tax man’s stamp. By the time the assayer individually certified its purity with his stamp, the bar looked as if it had been graffiti-tagged by a demented numerologist. Each llama could carry only three or four bars. (Mules are bigger than llamas, but need more water and are less surefooted.) The shipment required more than two thousand of the beasts. They were watched by more than a thousand Indian guards who in turn were watched by squads of Spanish pistoleros.

Despite these obstacles the Americas produced a river of silver—more than 150,000 tons between the sixteenth and eighteenth centuries, according to the silver trade’s most prominent historians, Dennis O. Flynn and Arturo Giráldez of the University of the Pacific. For those centuries Spanish silver washed around the planet—it was 80 percent or more of the world’s output—overwhelming governments and financial institutions everywhere it landed. “Right at the beginning there was this *shot* of silver into Europe,” Flynn told me over the course of a long conversation. “We can’t be sure about the numbers, but the amount of silver in Europe may have doubled.”

The Spanish silver peso became a universal currency, linking European nations much as the euro does today. (It was called, famously, a “piece of eight,” because it was worth eight reales—reales were then the basic Spanish coin.) Pesos were the main currency in the Portuguese, Dutch, and British empires and widely used in France and the German states. “Because silver was the money supply,” Flynn said, “there was an uncontrolled jump—an explosion, really—in the money supply across Europe.” Flynn was trained as an economist. “Rapid, unplanned shocks to the money supply are generally a bad idea,” he said. Inflation and financial instability were the result.

After sixty years of frenzied production, Flynn and Giráldez wrote, the world had accumulated so much silver that its value began to fall. A million pesos in 1640 was worth about a third of what a million pesos had been worth



Much of the silver from Potosí and Mexico was transformed into “cob” coins, hammered between crudely engraved dies. This four-reale coin was made in Potosí in the 1570s, before the coins received dates. The “L” is the initial of the mint assayer.

in 1540. The impact was multifarious and planet-wide. As the price slid, so did the profits from silver mining—the mining that was the financial backbone of the Spanish empire. Spain did not adjust its tax rates for currency fluctuations (in modern terms, they weren’t indexed to inflation). The king collected the same amount of taxes in silver as he had before, but its value plunged, throwing the government into crisis. Spain’s economy turned to ash, followed by the economies of a dozen other states equally dependent on Spanish silver, one after another like a chain of firecrackers. The well-off felt beggared; the beggars felt desperate. With nothing to lose, they picked up stones from the streets and looked for targets. Ruin was followed by riot and revolution.

American silver was not the sole cause of the upheaval; still, threads of silver link the revolts against Spain in the Netherlands and Portugal, the ruinous Fronde civil war in France, and even the Thirty Years’ War. Flynn and Giráldez said that one of their contributions was to point out that the turbulence in Europe, though devastating, was “a kind of sideshow—most of the silver actually went to Asia.” And not just to some generalized part of Asia. A disproportionate share of the silver ended up in a single port in a single Chinese province: Yuegang, in Fujian.

“A FINE BOATLOAD OF WOODEN NOSES”

Once one of the world’s most important ports, Yuegang has become a nondescript industrial suburb. The sole remaining sign of its former prominence is a three-story, hexagonal tower that was once part of the city walls. When I

visited not long ago, the gate was locked; I had to wait for a neighbor to show up with a key. Inside the tower were signs of occupation by a homeless man: grubby blankets, empty ramen packets, girlie magazines. All I could see from the top of the tower was a printing plant and a smoky trash dump and the long rectangles of spinach and tobacco fields. The docks where chroniclers had described junks "packed together like fish scales" were almost empty. Only the geography was unchanged: beyond the harbor was the Taiwan Strait, Taiwan itself, and the South China Sea.

By the mid-1580s, barely a decade into the galleon trade, Yuegang was sending twenty or more big junks to the Philippines every March, at the start of the rainy season. (Before the silver boom, just one or two small ships went there, even during the intervals when trade was legal.) As many as five hundred merchants crammed aboard each ship with every imaginable commodity: silk and porcelain, of course, but also cotton, iron, sugar, flour, chestnuts, oranges, live poultry, jam, ivory, gems, gunpowder, lacquerware, tables and chairs, cattle and horses, and whatever else the Chinese thought Europeans might want. "Some just brought little bits of stuff," said Li Jinming, a historian at Xiamen University who is the author of a history of Yuegang. "Whatever they could get their hands on. They could sell it at a big premium." Merchants with little capital could only obtain goods to sell by borrowing at high interest rates. "They had to leave their wives and children with the lender as security," Li told me. "If a trader died, the family was out of luck." Lenders took everything they had to repay the contract. If that was not enough, he said, "the wives and children would become servants. The lender could sell their labor to someone else—it was like slavery."

Typically each ship was chartered by a wealthy trader, who rented space in the hold to the others, usually for 20 percent of the merchant's gross sales. Belowdecks was a warren of sealed, watertight compartments, windowless and barely the size of a closet, in which traders stored their goods. Porcelain was packed tightly in cases, Li said, with rice separating the plates and bowls. "They injected water on all sides, then set down the case in a humid place. It glued the ceramics into a solid, unbreakable mass." Theft was rare aboard ship—thieves couldn't escape with their loot. Nonetheless, merchants brought their own food, slept atop their goods, and stayed inside their dark, noisome compartment during the entire ten-day passage to Manila.

"If they could, they went only once," Li said. Small-scale traders tried to avoid repeat voyages—"the trip was too dangerous." The small islands and shallow water in the harbor restricted shipping to several narrow channels, along which oceangoing vessels had to be slowly pulled by smaller boats. *Wokou* lurked in the fog. To draw pirates from their hiding places, merchants

sent out scouts in fast, maneuverable galleys. If they spotted *wokou*, they could skip away with a warning. Because the scouts could not travel as far as the Philippines, the last stage of the outward journey was particularly dangerous. Dutch pirates routinely ambushed Chinese ships on the approach to Manila, seizing everything aboard.

The merchants usually docked at Cavite, a long, skinny peninsula five miles from Manila, on the south side of the great bay.* A crowd of Chinese men—sales agents—awaited them. Cautiously the traders would disembark from their cubicles, blinking in the sun, looking for an agent from their extended family. Agents knew how much silver was in the most recent galleon and could raise or lower prices quoted to the Spaniards accordingly; they also had contacts necessary to bribe colonial inspectors. For their services they charged 20 to 30 percent of the sales price. Only after all the Yuegang traders had chosen agents would the ship be inspected by customs agents, who collected a tax—"three percent on everything to his Majesty," as one Manila governor put it. Then the dickering would begin. Everyone had at most two months to make a deal, because the galleons began leaving in mid-June to avoid typhoon season.

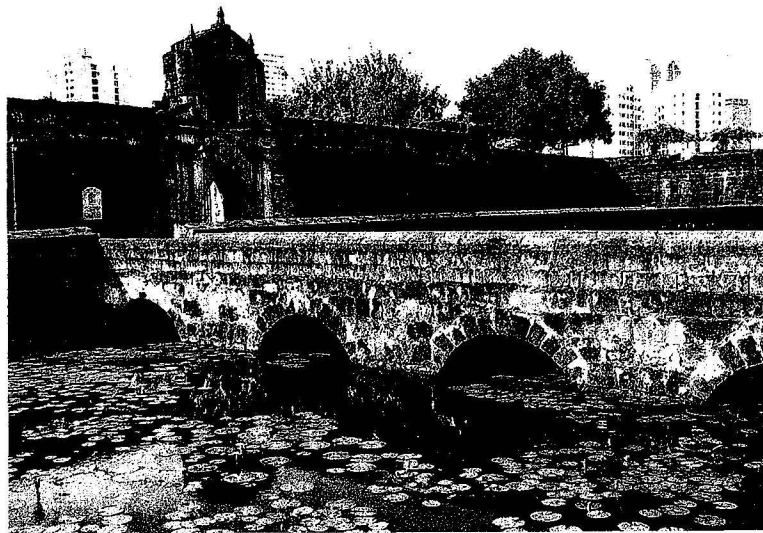
Spanish buyers usually met the agents in the *Parián*, a Chinese ghetto that was a kind of metastasis of Yuegang, full of Fujianese washed by the silver trade to the Philippines. Located in a swamp outside Manila's walls, the *Parián* was created in 1583 by Spanish officials in an attempt to control the growing number of Chinese, whom they regarded as conniving, job-stealing illegal immigrants. Initially it consisted of nothing but four big shed-like buildings Yuegang traders had built to store their goods. To encourage Manila's Chinese residents to leave their homes and move into their warehouses, the Spaniards announced that any non-Spaniards found outside the *Parián* after sunset would be executed. In some sense, the quarantine was tit for tat: Europeans were not allowed to set foot in China, so Chinese were restricted from the little piece of Europe in Manila.

Denied permanent access to the European town, the Chinese built their own. Around the warehouses grew a maze of arcade-like shopping areas crammed with intensely competitive stores, teahouses, and restaurants. The narrow streets between were jammed at all hours with men in long, floppy-sleeved robes, embroidered silk shoes, and high round caps. Doctors and

* The tip of the peninsula is Sangley Point, *sangley* (a Fujianese word for "traveling merchant") being a pejorative reference to Filipinos of Chinese descent. A typical use of the term is a Manila church official's complaint in 1628 about the "great danger" posed by the "swarms of abandoned heathen sangleys."

apothecaries hawked jars of unguents, tisanes, and medicinal roots. People were buying, selling, and making, arguing over tiny cups of Fujianese tea, racing about with piles of carefully packed bundles, eating foods that appalled the Europeans (a Yuegang favorite: chicken embryos baked inside the egg by burying the eggs in piles of salt and exposing the piles to the sun). It was the first Chinatown in the orbit of the West.

For Spain, the *Parián* was an oddity and a humiliation. From the beginning, when Spain ejected Muslims and Jews from its kingdom, the empire had what it thought of as a civilizing mission: universal conversion to Christianity. Manila was thronged by missionaries, heads afire with the zeal to bring the Roman Catholic church to Asia. They forced Filipino and Malay natives to adopt the cross, but this was a side project. The true goal, at least at the beginning, was to conquer and convert China. Believing that Cortés (conqueror of Mexico) and Pizarro (conqueror of Peru) had needed only small bands of committed men to seize entire empires for Christ, these clerics and soldiers initially imagined that a few thousand Spaniards could repeat these feats in China. In Manila, the Ming realm seemed so near—vast riches,



Frightened by the crowded Chinese ghetto called the *Parián*, Manila's few hundred resident Spaniards literally walled themselves off from it. To enter Manila proper, *Parián* residents had to walk across this moat and through a heavily guarded gate.

spiritual and material, almost close enough to touch. Wiser counsel eventually prevailed, as Manila's governors and the Spanish court concluded that China was too big to conquer. Indeed, the Spaniards in the colony began to worry that China might conquer *them*. Fearing annihilation, they allowed the Chinese an otherwise unthinkable concession: to live in their own infidel quarter, worshipping their own un-Christian idols. They even allowed it to have its own *gobernadorcillo*—a mini-governor.

Parián artisans and shopkeepers sold the Spaniards everything from roof tiles to marble statues of Baby Jesus—"much prettier articles than are made in Spain, and sometimes so cheap that I am ashamed to mention it," wrote Domingo de Salazar, bishop of the Philippines. Colonists flocked to the Chinese ghetto, where stores purveyed the latest European styles. European merchants griped about the competition. The monarchy ordered the shops moved further away, but Spaniards kept coming to them, attracted by the low prices.

The trades "pursued by Spaniards have all died out," Salazar lamented, "because people buy their clothes and shoes from the [*Parián*]." As a warning, he told the story of a Spanish bookbinder and his Chinese apprentice. After carefully observing the master at his work, the apprentice set up his own shop in the *Parián*, driving his former master out of business. "His work is so good there is no need of the Spanish tradesman." The Chinese were not universally successful, of course. One shopkeeper sold a wooden nose to a Spaniard who had lost his in a duel. He tried to capitalize on his success by importing "a fine boatload of wooden noses." Sales were poor.

By 1591, twenty years after Legazpi entered Manila, the *Parián* had several thousand inhabitants, dwarfing the official city, which had only a few hundred European colonists. For the Chinese, the arrangement was convenient. They had created a Chinese city outside of China, where the nominal presence of the Spanish authorities insulated them from the scrutiny of the Ming. To the Spaniards, the ghetto was alarming, alien, an unwelcome necessity. And it was *big*, especially when compared to Manila. Despite constant exhortation, Spaniards refused to settle there in any numbers. The city was too remote, too hot, and, above all, too full of disease, especially what we now know as malaria. European residents often sought cooler air by building homes in the hills around town. By bad luck, the hills are the habitat of the mosquito that is the islands' main malaria vector. The more Europeans escaped the heat, the more they got sick.

The only reason Manila attracted any Europeans at all was because it represented an extraordinary opportunity: China would pay twice as much for Spanish silver as the rest of the world. And its merchants were willing to sell

silk and porcelain amazingly cheaply. "The prices of everything are so moderate, it's almost for free," one Spaniard had crowed when the Chinese first arrived in Manila. Yet somehow the deals rarely were as lucrative as the newcomers wanted. To their dismay, the Chinese were always able to play them off against each other, bargaining them down time after time. Sitting in the nexus of exchange made Manila's colonists wealthy, but not as wealthy as they wanted. "Among all those one hundred and fifty families who are settled at Manila, there are not two who are *very* rich," grouched the Spanish admiral Hieronimo de Bañuelos y Carrillo in 1638.

Trying to regain the advantage, the Manila government imposed taxes, freight charges, and registration fees on Chinese merchants; they were effectively forced to pay soldiers to stand guard over their property. Angered, the Chinese staged an Ayn Rand-style producers' strike, starving Manila of supplies, and the Spaniards backed down. Frustrated, the king ordered the colony to create a kind of cartel: it would buy all incoming Chinese goods at a single price and "distribute [them] fairly among the citizens." In theory, this would wipe out all the Chinese retailers, which in turn would greatly reduce the *Parián*, which in turn would greatly reduce Spanish anxieties.

Economics 101 says that cartels rarely work, because individual cartel members will cheat and cut side deals. In this case, Economics 101 was correct. Spaniards made secret arrangements with Chinese traders, paying higher prices for better-quality silk or the first chance to select pieces of porcelain. When the galleons left Manila for Mexico, they met Spanish dories full of contraband silk and silver a few miles outside the harbor.

Madrid was dismayed by the magnitude of the galleon trade—too much silver was going out, and too much silk and porcelain was coming in. Exact figures are not possible to calculate, but somewhere between a third and a half of the silver mined in the Americas went to China, either directly via the galleon trade or indirectly, via Europeans' purchases of Chinese goods shipped overland by Central Asian traders or around Africa by the Dutch and the Portuguese. The monarchy was furious, because the king wanted the silver to buy supplies and pay troops in Spain's innumerable wars. ("The Manila galleon's most fearsome adversary was beyond doubt the Spanish administration itself," the French historian Pierre Chaunu observed.) To prune back the galleon trade, officials cut the number of ships allowed to cross the Pacific to two per year. In response the galleons became enormous, ballooning to two thousand tons. Built by conscripted Malays out of tropical hardwoods, they were castles of the sea. On the Manila-bound lap they carried more than fifty tons of silver—equal, Flynn and Giráldez have calculated, to the combined annual exports of the Dutch East India Company, the English East India Company, and the Portuguese Estado da Índia.

Much or most of that silver was illegal. Worried Mexican officials informed the monarchy in 1602 that the galleons that year had exported almost four hundred tons of silver—eight times the declared amount. Furious imprecations from Madrid changed nothing; smuggling was too lucrative. "The king of China could build a palace with the silver bars which have been carried to his country . . . without their having been registered," Admiral Bañuelos y Carrillo complained thirty-six years later. In 1654 the *San Francisco Javier* sank near Manila Bay. Its official manifest claimed that it carried 418,323 pesos. Centuries later, divers found 1,180,865 aboard. Even if one assumes, absurdly, that the divers found every last coin, the cargo was almost two-thirds contraband.

To restrict trade on the other side, the government issued import quotas. If the junks brought too much silk or porcelain to Manila, customs officials were supposed to send it back. To get around the quotas, Chinese traders arranged to have their agents meet the junks as they approached the Philippines. Much of the onboard merchandise had been ordered the year before, by Spaniards looking at samples. In a mirror image of the Spanish practice of loading illicit silk and porcelain onto galleons after they left Manila, the Chinese offloaded illicit silk and porcelain from their junks before they arrived. Only after these transactions did the ship officially enter the harbor and let the Spanish harbor patrol guide it to its berth.

Spain had its own silk weavers and dressmakers, as did its colony in Mexico. But the scale of Chinese textile production was so much bigger that Europeans couldn't compete. Indeed, the silver-hungry Ming dynasty actually *forced* farmers to plant mulberry trees, the food for silkworms. Landowners with between five and ten *mu* (one *mu* is about one-sixth of an acre) had to plant, the official history of the dynasty says, "half a *mu* each of mulberry and cotton." Those with more than ten *mu* had to plant "twice as much." Farmers who didn't plant mulberry had "to pay one bolt of silk." Spurred by these decrees, farmers in eastern China covered the hills with mulberry trees. By the 1590s, the Fujianese writer Xie Zhaozhe was reporting areas with "mulberries planted on every foot or inch." Rich farmers, he claimed, devoted "more than a million *mu*" (roughly 130,000 acres) to mulberry trees—entire landscapes of a single species. Working in a frenzy, farmers upriver from Yuegang harvested silk five times a year.

To their north, villages in the lower Yangtze became congested hives of small silk factories, attracting workers from other parts of China and spewing out goods at frightening volume. Yuegang merchants sold this silk in Manila, making profits of 30 to 40 percent. Spanish merchants doubled, tripled, or even quadrupled the price and still sold their goods in the Americas for a third the cost of Spanish textiles. Incredibly, they sold silk from

China—silk that had crossed two oceans!—in Spain for less than silk produced in Spain. So much raw silk poured into Mexico that a secondary industry sprang up, with thousands of weavers and dressmakers making clothes from Chinese silk and exporting them throughout the Americas and across the Atlantic.

Yuegang merchants initially exported silk as bolts of fabric. But as they got to know their customers, according to Quan Hansheng, the Taiwanese historian, they acquired samples of Spanish clothing and upholstery and in China made perfect knockoffs of the latest European styles. Into the galleons went stockings, skirts, and sheets; vestments for cardinals and bodices for coquettes; carpets, tapestries, and kimonos; veils, headdresses, and passementeries; silk gauze, silk taffeta, silk crepe, and silk damask. Packed alongside them were women's combs and fans; spices and incense; gems cut and uncut and mounted into rings and pendants; and, alas, Malay slaves.

Alarmed Europeans saw their textile mills threatened—and fought a covert regulatory war against Chinese competition. They importuned the king to restrict silk imports to bolts of fabric, rather than finished clothing. They insisted that he block direct travel between Manila and any place in the world except Acapulco, so that Chinese imports could be monitored. They demanded that he set import quotas by restricting incoming silk to a given number of chests of a specified size. Chinese merchants evaded every trade barrier, often aided by Spaniards in Manila. They built special chests with false bottoms and sides to conceal pre-made clothing. They sent agents to Acapulco to facilitate smuggling on the Mexican end of the trade. They designed special presses to mash huge quantities of silk into the chests, packing them so tightly, according to Li, the Fujianese scholar, "that a single sea-chest had to be carried by six men."

MAGIC MOUNTAIN

Commercial and political imperatives constantly collided. In 1593 the Manila governor, Gómez Pérez Dasmariñas, decided to fulfill Madrid's long-held dream of conquering the Maluku Islands, the spice centers that Legazpi had failed to seize. The supply of European sailors in Manila being inadequate for the task, Pérez Dasmariñas abducted 250 Fujianese merchants from incoming junks to serve as galley slaves. Protests from Manila's Chinese tradespeople led the governor to promise to release the sailors—and seize the necessary men instead from the Parián. "The next day, all their windows were closed, and the merchants closed their shops," the historian Bartolomé

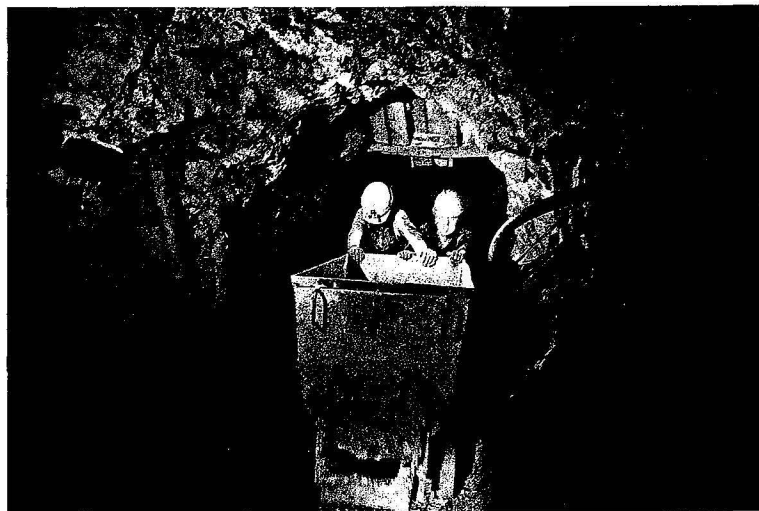
Leonardo de Argensola reported a few years later. "The community was deprived of the provisions which they supplied to it."

After more threats from Pérez Dasmariñas, the Chinese caved in, allowing him to conscript more than four hundred men. In return, he promised to treat the men well. The expedition left in October 1593. Contrary winds and currents made the passage to the Malukus difficult. Fearing the expedition would not reach its destination as fast as he wanted, the governor ordered the conscripts chained to their galley benches, where sailors whipped them to greater effort. As further motivation, he cut their elaborately braided hair. "Such an insult among the Chinese is worthy of death, for they place all their honor in their hair," Argensola wrote. "They keep it carefully tended and gaily decked, and esteem it as highly as ladies in Europa." In a well-planned mutiny, the enslaved Chinese in the flagship killed Pérez Dasmariñas and his crew while they slept, then rowed for Fujian.

To Spaniards, the lesson from Pérez Dasmariñas's death was clear: the Chinese were untrustworthy and dangerous. The Manila government evicted twelve thousand of them in 1596. In a few years they were as numerous as before and the government was planning more deportations. Anti-immigration firebrands like Bishop Salazar's successor, Miguel de Benavides, wanted to eject every Chinese person from the islands. There can be no exceptions, he told the king. Spanish businesses would take advantage of any loopholes and hire illegal immigrants. If a hundred Chinese were legally allowed in the Philippines, Benavides predicted, "ten thousand will remain."

Into the festering situation blithely sailed three Chinese high officials. Arriving without notice in May 1603, they emerged from a Chinese warship in sedan chairs ringed by bodyguards and led by drummers and musicians; at the head of the parade marched two men who cried, "Make way for the mandarins!" If Parián residents failed to prostrate themselves, one eyewitness reported, the bodyguards flogged them. The three visitors were the chief military official in Fujian, the county magistrate for Yuegang, and a high-ranking eunuch from Beijing. They had been sent by the emperor to present a letter to Manila's governor, Pedro Bravo de Acuña. It is hard to imagine what Acuña thought as he heard the contents of the letter. Rumors were circulating in China, it explained, of a magic mountain in Cavite, loaded with gold and silver, all free for the taking. The three visitors had been sent to ascertain whether the mountain existed.

To judge by the appalled reports in Chinese records, the expedition seems to have originated in some daffy con job that bubbled through the court bureaucracy—not the only incident of its type in the Ming dynasty. But to the Spaniards, who watched the mandarins comb the colony for gold and sil-



Potosí's mines still operate, though at a low level. Scouring the mountain for its last grains of metal, poor miners hack away in lightless tunnels. Conditions are dismayingly like those in centuries past, except that the men are mining zinc and tin, rather than silver.

ver, the visitors looked like a scouting party for an invasion—a Ming-style Trojan horse. Surely these people could not be the pack of bumbler they appeared to be—they must be part of a sinister plot. While Governor Acuña debated whether to kill the officials, they apologized for the mix-up and suddenly left.

Fearing the departure signaled an imminent invasion, Acuña ordered his forces to demolish Chinese houses that were too close to Manila's defensive wall, register every Chinese person in the Parián—and buy or confiscate every Chinese weapon.

What happened next is difficult to sort out, because Spanish and Chinese accounts of events differ radically. In the Spanish version, angry Chinese gathered outside the city walls to protest. Acuña sent seventy soldiers, led by his nephew, to quell the protest. Unprovoked, the Chinese mob attacked the soldiers, killing all but four, and fled to the hills outside Manila. After restoring order to the Parián, the government sent a peace emissary to the rioters. The Chinese treacherously slew him and went on a rampage. Naturally, the official reports explain, the government had to protect the citizenry. It sent out more troops. The Chinese in the hills resisted. But they had few weapons and inevitably suffered heavy losses.

Eleven years after the killings, the Ming geographer Zhang Xie wrote *Studies on the East and West Oceans*, a summary of Chinese foreign relations. In it was an account of the incident from the point of view of Parián residents—an account that included a few details that Spanish officials had neglected to mention. Zhang agreed that the Spaniards had entered the Parián and “bought every bit of iron in Chinese hands at a hefty price,” supposedly to make cannons. But from that point his account was quite different. There was no angry mob outside the walls, no unprovoked slaughter of soldiers. Instead the government, having effectively disarmed the Chinese, announced a formal residency check, during which they divided the ghetto into groups of three hundred, placed each group in a separate courtyard—and slaughtered it. As word of the massacre leaked out, Zhang wrote, thousands of Chinese fled to the hills outside Manila. After an inconclusive clash, the Spaniards sent a peace emissary. “The Chinese worried that it was a trick to lure them out, and killed the emissary,” Zhang admitted. “The barbarians grew angry, and set up an ambush outside the city.” When the Chinese ran out of food, they decided to take it from Manila—and walked into the Spanish ambush. Three hundred Spaniards died in the ensuing battle. So did as many as twenty-five thousand Chinese, most of them Fujianese. According to Zhang, only three hundred Chinese survived. A second wave of deaths followed, as some of the new widows in Fujian, many of whom now faced bondage to pay their husbands' debts, killed themselves.

Incredibly, the massacre had no real consequences. Just months after wiping out the Chinese in Manila, the city fathers put down the welcome mat for new immigrants. And Spanish merchants were begging the junks to return—they wanted to buy cheap Chinese silk. “The Spaniards who had seen the Chinese as such a grave threat that their survival depended on their complete disappearance didn't hesitate to do everything possible to ensure the massive repopulation of the Parián,” Manel Ollé Rodríguez, a Barcelona historian of Spanish-Chinese relations, observed in 2007.

In Beijing, the Wanli emperor decided that the three treasure mountain officials were responsible for the explosion in the Parián, and ordered them beheaded. Although he accused the Spaniards of “murder[ing] people without license,” he also conceded that the dead Fujianese “were base people, ungrateful to China, their native country, to their parents, and to their relatives, since so many years had passed during which they had not returned to China.” Translation: they weren't worth the cost of a punitive expedition. Besides, the government still needed the silver.

Within two years the galleon trade and the Parián were almost back to normal. “The Chinese gradually flocked back to Manila,” reported the *Ming*

Shi, the official history of the dynasty. "And the savages [Spaniards], who saw profit in the commerce with China, did not oppose them. The Chinese population began to grow once more."

Because the situation had reverted to its pre-massacre state, the Spaniards in Manila were as few, dependent, and scared as ever they had been. Eventually they again tightened restrictions on the Chinese. Rebellions flowered in the Parián, followed by expulsions and massacres. The cycle repeated itself in 1639, 1662, 1686, 1709, 1755, 1763, and 1820, each time with an awful death toll.

To modern eyes, the scenario is hard to credit: why would the Chinese keep returning? It is one thing to take a onetime risk, as small-time Fujianese traders did when they made their single visits to Manila; it is another to set up an establishment that will be sacked every few years, with great loss of life. During these incidents the Parián Chinese frequently managed to kill a third or more of the Europeans in the Philippines, as they did in 1603. Yet Manila's merchants invariably invited them back, even smuggling their potential executioners past customs. Why would they repeatedly set up a situation in which they had an excellent chance of being killed?

In *Power and Plenty* (2007), a history of trade in the last millennium, Ronald Findlay and Kevin O'Rourke suggest one way to think about this situation. When economics textbooks describe trade, Findlay and O'Rourke write, they describe two countries "endowed with a certain amount of the various factors of production—land, labor, capital, and so on." The two nations have technologies that transform those factors into goods, "together with a set of preferences over those goods." Private entities within each nation "trade with each other, or not as the case may be, and the consequences of trade are derived for consumers and producers alike."

Typically one country (the United States, for example) can produce Good A (wheat, say) cheaply and well, while the other (Japan) can better produce Good B (consumer electronics). By exchanging Good A for Good B (that is, wheat for DVD players) people in both nations will be better off—a classic win-win situation. This is the theory of "comparative advantage," a building block of economic theory. Vast amounts of evidence support the theory's veracity, which is why almost all economists firmly believe it, and firmly support free trade, which maximizes the potential for all sides to benefit.

In the textbooks, government appears mainly as an outside factor that imposes tariffs, quotas, levies, and so on, influencing the outcome of private trade, often reducing the net economic benefit. But the state does this because trade has two roles: one highlighted in economics textbooks, where private markets allow both sides to gain economically, and one that rarely appears in those textbooks, in which trade is a tool of statecraft, the goal is

political power, and both sides usually do not win. In this second role, the net economic benefit of trade is much less important than the political benefit to each side, and the government interventions that exasperate economists can be useful, even vital tools to achieve national preeminence.*

The greatest expansions of world trade have tended to occur when both roles are aligned and commercial ambitions can be enforced, as Findlay and O'Rourke put it, "with the barrel of a Maxim gun, the edge of a scimitar, or the ferocity of nomadic horsemen." Today violence is less common, if only because powerful weapons are so cheap that all sides have them, and states tend to make do with tools like subsidies to industry, exchange-rate manipulation, and export and import regulations. But still today trade expands when government sees it as a way to project and increase power—witness the recent history of Japan and China.

At the same time, the two roles often conflict, and the conflict leads, as in Manila, to a considerable amount of profoundly fractured cerebration. For Spain, Manila was both a trading post and a projection of Spanish power in the Pacific. Its traders wanted to generate as much profit as possible by importing as much silk as possible; its political rulers, by contrast, wanted to seize Asian lands, convert Asians to Christianity, thwart Dutch and Portuguese ambitions—and have as much of the silver as possible come to Spain, because the state needed it to pay for wars in Europe. Considered purely as a trading entrepôt, Manila should house as few Spaniards as possible—they were expensive to send over and kept dying of disease—and let Chinese people do all the work. To serve best as an imperial outpost, though, the Spaniards needed to ensure that all vital civic functions were in loyal Spanish hands, and minimize the number and influence of the Chinese. Every step to satisfy one imperative worked against the other.

Like the Spanish court, the Ming court struggled to reconcile the divergent roles of trade. On the one hand, silver from the silk trade became a source of imperial wealth and power. American silver helped pay for huge military projects, including much of the Great Wall of China, which the Ming were revamping and extending. And it fueled an explosion of commerce within China, which led to an economic boom. On the other hand, the money that enabled business to grow also set off inflation, which had its

* In practice, the picture is complicated by business's attempts to manipulate government for their own ends, often to the detriment of state policies, and by groups within the state that use power for private gain. Nevertheless, the distinction between trade as a private exchange between willing parties and trade as a tool of state aggrandizement is useful. Indeed, one reason for the conflict between today's free traders and anti-globalization activists is that the former regard the first role as paramount whereas the latter think in terms of the second.

worst impact on the poor. And silver was ever a political threat to the dynasty, because it controlled neither the trade nor the source. Alarming, the emperors could not restrict the flow of silver into Fujian, even if they wanted to, because of rampant smuggling. In the eyes of the court, the Fujianese merchants were people of dubious loyalty who had created in the Parián an important Chinese city that was outside imperial supervision. They were becoming wealthy and powerful in a way that was hard for the court to control. Little wonder Beijing kept a wary eye on Yuegang!

There is little evidence, though, that Beijing anticipated the worst consequences. As in Europe, so much silver flooded into China that the price eventually dropped. By about 1640 silver was worth no more in China than it was in the rest of the world. At this point the Ming government was tripped up by an error it had committed decades in the past.

When the court had ordered citizens to pay their taxes in silver, it had set up the tax rolls in terms of the *weight* of silver people had to pay, not its *value*. As with Spain, the taxes were not indexed for inflation. As with Spain, the same amount of tax was worth less money when the price of silver dropped. The Ming dynasty had a revenue shortfall. Not having paper currency, the government couldn't print more money—deficit spending was impossible. Suddenly it couldn't pay for national defense. It was a bad time to run out of money for the military: China was then under assault by the belligerent northern groups now called Manchus. According to William Atwell, a historian at Hobart and William Smith Colleges, the Chinese government's dependence on the silver trade helped push it over the edge. The takeover by the Manchus—they became the Qing dynasty—took decades and was bloody even by the tough standards of Chinese history. Nobody knows how many millions died.

Atwell's contentions have been vigorously debated, yet there is little doubt that China's entry had consequences of a sort rarely discussed in freshman economics textbooks. Flynn and Giráldez point out that China devoted a big fraction of its productive base to acquiring the silver needed for commerce and government. For hundreds of years, China produced silk, porcelain, and tea to acquire a commodity, silver, which was needed to replace the paper notes that the government had made valueless. It was as if to buy a newspaper for a dollar one first had to make and sell something else to get the dollar banknote. Actually, it was worse: the silver stocks had to be constantly replenished, incurring further costs, because the metal was constantly worn away as it passed from hand to hand. (Paper money wears out, too, but costs next to nothing to replace.)

Given the circumstances, acquiring the silver was entirely rational—it

provided monetary stability. But it was also extremely costly. "Rather than pull silver out of their own ground (had China contained rich silver deposits, which it did not), the Chinese produced exports to buy silver that was pulled out of the ground somewhere else," Flynn wrote in an e-mail to me. "Even scholars tend to impute mystical qualities to commodity monies like silver and gold, but we must recognize them as physical products that involve massive production costs. A significant hunk of the GDP of China—then the world's biggest economy—was surrendered in order to secure a white metal that was produced mostly in Spanish America and Japan. Some people made enormous profits from doing this, but think about what else those resources could have been used for."

There was a related, equally large consequence: the Columbian Exchange.



Lovesick Grass, Foreign Tubers, and Jade Rice

(*Silk for Silver, Part Two*)

HIDDEN PASSENGERS

Trade brought more than silver across the Pacific. Tobacco may have led the parade. Somehow Portuguese ships brought the species across oceans and borders to Guangxi, in southern China, where archaeologists have unearthed locally made tobacco pipes dating back to 1549.* Little more than two decades later, the plant arrived in the southeast, aboard a silver ship from Manila. Not long after that, it filtered into the northeast, probably from Korea.

Nicotiana tabacum was as much an object of fascination in Yuegang as in London and Madrid. "You take fire and light one end [of the pipe] and put the other end in your mouth," explained the seventeenth-century Fujianese poet Yao Lü. "The smoke goes down your throat through the pipe. It can make one tipsy." Writing not long after the smoking weed arrived in Fujian, Yao was amazed by its rapid spread across the province. "Now there is more here than in the Philippines," he marveled, "and it is exported and sold to that country."

Then as now, smoking was made to order for the boredom and inertia of

* The reader will have noted that I barely mention Dutch and Portuguese trade in Asia, which centered on spices, and focus on Spain and the galleon trade. This is partly to simplify a complex narrative, but mainly because the Spanish empire, the first truly global enterprise, is more germane to this book. In addition, the Netherlands and Portugal were entangled with that empire: the former not wresting full independence from it until 1648; the latter, long independent, forced by dynastic mishaps to accept a Spanish king from 1580 to 1640.

army life. Tobacco was embraced by Ming soldiers, who disseminated it as they marched around the empire. In the southwestern province of Yunnan, one physician reported, Chinese soldiers "entered miasma-ridden [malarial] lands, and none of them were spared disease except for a single unit, whose members were in perfect health. When asked the reason, the answer was that they all smoked." (Mosquitoes dislike smoke, so smoking actually may have provided some protective effect against malaria-carrying insects.) From that point, the account continued, "smoking spread . . . and now in the southwest, whether old or young, they cannot stop smoking from morning until night." As a child in the 1630s, the writer Wang Pu had never heard of tobacco. When he grew to adulthood, he later recalled, "customs suddenly changed, and all the people, even boys not four feet tall, were smoking."

"Tobacco is everywhere," announced what was apparently China's first smoking how-to book. Calling the plant "golden-thread smoke" and "lovesick grass"—the latter a nod to its penchant for hooking the user—the Qing dynasty's legions of smokers may have been the planet's most enthusiastic nicotine slaves. An ostentatious addiction to tobacco became the hallmark of the fashionable rich. Men boasted of their inability to eat, converse, and even think without a lighted pipe. Women carried special silk tobacco purses with elaborate jeweled fastenings; to protect their delicate feminine essences from the harsh spirit of tobacco, they smoked extra-long pipes, some so big that they had to be lugged around by servants. A new poetic sub-genre emerged among China's wealthy aesthetes: the hymn to tobacco.

*Puffing fragrance, exhaling the Sage's vapor;
Bluish tendrils born from the subtle Smoke.
The Gentleman's Companion, it warms my heart
And leaves my mouth feeling like a divine furnace.*

Late-waking aristocratic women slept with their heads elevated on special blocks so that attendants could do their hair and makeup while they were unconscious—it shortened the time between waking and the first tobacco of the day. "The scene is a little hard to imagine," remarked Timothy Brook, the Canadian historian whose studies of Chinese tobacco I am drawing upon here.

Brook found the tale of the sleeping smokers in Chen Cong's *Yancao pu* (Tobacco Manual), a learned collection of tobacco-related poetry and prose from 1805. An even more recondite compendium, Lu Yao's *Yan pu* (Smoking Manual), appeared around 1774. Lu, a former provincial governor, laid down the rules for nicotine consumption in aristocratic circles. Like a modern etiquette handbook, the manual provided a set of smoking do's and don'ts:

Do smoke: after waking up; after a meal; with guests; while writing;
when growing tired from reading; while waiting for a good friend
who hasn't shown up yet.

Don't smoke: while listening to a zither; feeding cranes; appreciating
orchids; observing plum blossoms; making ancestral offerings;
attending the morning court assembly; sleeping with a beautiful
woman.

From today's perspective, the Chinese courtier's ornate surrender to tobacco seems absurd, but it had many equally odd counterparts abroad. At the same time that Lu Yao was laying out smoking etiquette, wealthy English were taking snuff (finely ground tobacco stems) in public sessions heavy with ritual. Opening their silver or ivory snuffboxes—"a fetish of the eighteenth century," as the anthropologist Berthold Laufer put it—fashionable young blades scooped out measures of fresh-ground snuff with finger-length ladles made of bone. Parties fell quiet as groups of men in embroidered waistcoats simultaneously inserted tiny pucks of ground tobacco into their noses, then whipped out lace handkerchiefs to muffle the ensuing volley of sneezes. Mastering the arcana of snuff was, for the addict, worth the bother: snorted tobacco delivers nicotine to the bloodstream faster than cigarette smoke. Few were more enraptured by the ritual than the celebrated London dandy Beau Brummell, who claimed to have a different snuffbox for every day of the year. Brummell instructed his fellow gallants in the subtle art of using only one hand to open the box, extract a pinch of snuff, and stick it in a nostril. The injection had to be accomplished with a rakish tilt of the head to avoid unsightly brown drips.

Snuff mania had few consequences in England other than interrupted party chatter, high laundry bills, and nasopharyngeal cancer. China's tobacco addiction occurred in an entirely different context, and thus had an entirely different impact. *N. tabacum* was part of an unplanned ecological invasion that shaped, for better and worse, modern China.

At the time, China had roughly a quarter of the world's population, which had to provide for itself on roughly a twelfthth of the world's arable land. Both figures are imprecise at best, but there is little dispute that the nation has long had a lot of people and that it always has had relatively little land to grow crops to feed them. In practical terms, China had to harvest huge amounts of food—half or more of the national diet—from areas with enough water to grow rice and wheat. Unluckily, those areas are relatively small. The nation has many deserts, few big lakes, irregular rainfall, and just two major rivers, the Yangzi and the Huang He (Yellow). Both rivers run

long, looping courses from the western mountains to the Pacific coast, emptying into the sea scarcely 150 miles from each other. The Yangzi carries mountain runoff into the rice-growing flats near the end of its course. The Huang He takes it into the North China Plain, then as now the center of Chinese wheat production. Both areas are vital to feeding the nation; there are no other places in China like them. And both are prone to catastrophic floods.

Song and Yuan, Ming and Qing—every dynasty understood both this vulnerability and the concomitant necessity of maintaining China's agricultural base by controlling the Yangzi and Huang He. So important was water management that European savants like Karl Marx and Max Weber identified it as China's most important institution. Creating and operating huge, complex irrigation systems, Weber claimed, required organizing masses of laborers, which inevitably created a powerful state bureaucracy and subjugated the individual. In an influential book from 1957, the historian Karl Wittfogel built on Marx to describe China and places with similar water-control needs as "hydraulic societies." Wittfogel's view of these societies can be gathered from the title of his book: *Oriental Despotism*. Europe, to his mind, avoided despotism because farmers didn't need irrigation. They fended for themselves, which created traditions of individualism, entrepreneurship, and technological progress that China never had. In recent years this thesis has fallen out of favor. Most Sinologists today believe that hydraulic Asia was just as diverse, individualistic, and market oriented as anywhere else, including non-hydraulic Europe. But this image still remains influential, at least in the West, where China is all too often viewed as an undifferentiated mass of workers, moving ant-wise to the directives of the state.

None of the challenges to past thinkers dispute that China had a relative dearth of land suitable for rice and wheat. From this perspective, the Columbian Exchange was a boon, and China raced to embrace it. "No large group of the human race in the Old World was quicker to adopt American food plants than the Chinese," Alfred W. Crosby wrote in *The Columbian Exchange*. Sweet potatoes, maize, peanuts, tobacco, chili peppers, pineapple, cashew, manioc (cassava)—all poured into Fujian (via the galleon trade), Guangdong (the province southwest of Fujian, via Portuguese ships in Macao), and Korea (via Japan, which took them from the Dutch). All became part of the furniture of Chinese life—who can imagine Sichuan (Szechuan) food today without heaps of hot peppers? "While men who stormed Tenochtitlan with Cortés still lived," Crosby said, "peanuts were swelling in the sandy loams near Shanghai; maize was turning fields green in south China; and the sweet potato was on its way to becoming the poor man's

staple in Fujian.” Today China is the world’s biggest sweet potato grower, producing more than three-quarters of the global harvest; it is also the world’s second-biggest maize producer.

Epitomizing China’s readiness to experiment was the Yuegang merchant Chen Zhenlong, who came across sweet potatoes (*Ipomoea batatas*) during a visit to Manila in the early 1590s. Probably native to Central America, *I. batatas* had been encountered by Colón on his first voyage; Spaniards had brought the species to the Philippines, where it was quickly adopted by Malays, who already grew the tuber crop taro. Liking the taste, Chen decided to take sweet potatoes home with him. “He bribed the barbarians to get segments of their vines several feet in length,” reported his great-great-great-grandson in *True Account of the Story of Planting Sweet Potatoes in Qinghai, Henan, and Other Provinces* (1768), a book-length essay devoted to bragging about the sweet potato feats of the author’s ancestors. Chen hid the vines by twisting them around ropes and tossing the ropes into a basket. Spanish customs agents noticed nothing. (They weren’t trying to stop the export of sweet potatoes per se, so much as trying to prevent the Chinese from getting their hands on *anything* from which they might derive commercial advantage.) In this way Chen smuggled sweet potatoes into China. “Even though the vines were withered,” his great-great-great-grandson wrote later, “they flourished after he stuck cuttings in infertile ground.”



Sweet potatoes in China are often eaten raw, the skin whittled off in a fashion that makes them somewhat resemble ice cream cones.

The 1580s and 1590s, an intense point in the Little Ice Age, were two decades of hard cold rains that flooded Fujianese valleys, washing away rice paddies and drowning the crop. Famine shadowed the rains. Poor families were reduced to eating bark, grass, insects, and even the seeds found in wild-goose excrement. Chen Zhenlong and his friends seem initially to have thought of the *fanshu*—foreign tubers—as an amusing novelty; they gave them away as presents, a slice or two at a time, neatly wrapped in a box. (Botanically speaking, *fanshu* is a misnomer; *I. batatas* actually has a modified root, rather than a proper tuber.) As hunger tightened its grip, Chen’s son, Chen Jinglun, showed the *fanshu* to the provincial governor, to whom he was an adviser. The younger Chen was asked to conduct a trial planting near his home. Successful results persuaded the governor to distribute cuttings to farmers and instruct farmers how to grow and store them. “It was a great fall harvest; both near and far food was abundant and disaster was no longer a threat,” exulted the great-great-great-grandson. Near Yuegang, as much as 80 percent of the locals were living on sweet potatoes.*

Governmental promotion of foreign crops was nothing new in Fujian. Sometime before 1000 A.D., Fujianese merchants brought in a novel type of rice—early-ripening Champa rice—from Southeast Asia. Because the new rice matured quickly, it could be planted in areas with shorter growing seasons. After intensive breeding, farmers created varieties that grew quickly enough to let them plant two crops a year in the same field—one of rice, then a second of wheat or millet. Harvesting twice as much from the same amount of land, Chinese farms became more productive than farms elsewhere in the world. The then-ruling Song dynasty actively promoted the new rice, distributing free seeds, publishing illustrated how-to brochures, sending out agents to explain cultivation techniques, and even providing some low-interest loans to help smallholders adapt. This aggressive adaptation and promotion of a new technology was a key reason for the nation’s subsequent prosperity, and its preeminence.

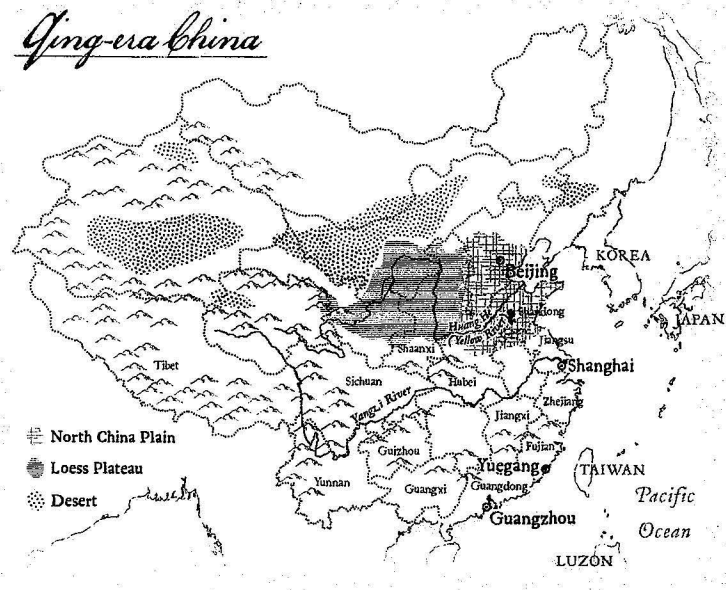
Still, Fujian was lucky that sweet potatoes arrived when they did. The crop spread through the province just in time for the fall of the Ming dynasty,

*Chen was not the only sweet-potato smuggler. According to a nineteenth-century gazetteer, the Chinese doctor Lin Huailan successfully treated a sick Vietnamese princess in 1581. At a banquet in his honor, he was served sweet potatoes. Vietnam had banned exporting the tuber to China “on penalty of death,” the gazetteer recounted, but Lin decided to take some anyway. “While crossing the border, he was questioned by a [Vietnamese] border official. Lin answered truthfully, and requested that the officer secretly let him through. The officer said: ‘As for what happens today, being a servant of the country, it would be disloyal of me to let you pass; however, being grateful for your virtues, to deny you would be unrighteous.’ He then drowned himself. Lin returned, and the tuber spread across Guangdong.”

which ushered in decades of violent chaos. Incoming Manchu forces seized Beijing in 1644, beginning a new dynasty: the Qing. The last Ming emperor hanged himself, and pretenders emerged to lead a rump state. Initially it was based in Fujian. In a disordered interlude, pieces of the Ming military splintered away and became, in effect, *wokou*. Meanwhile actual *wokou* took advantage of the confusion. To deny supplies to the Ming/*wokou*, the Qing army forced the coastal population from Guangdong to Shandong—the entire eastern “bulge” of China, a 2,500-mile stretch of coastline—to move en masse into the interior.

Beginning in 1652, soldiers marched into seaside villages and burned houses, knocked down walls, and smashed ancestral shrines; families, often given only a few days’ warning, evacuated with nothing but their clothes. All privately owned ships were set afire or sunk. Anyone who stayed behind was slain. “We became vagrants, fleeing and scattering,” one Fujianese family history recalled. People “simply went in one direction until they halted,” another said. “Those who did not die scattered over distant and nearby localities.” For three decades the shoreline was emptied to a distance inland of as much as fifty miles. It was a scorched-earth policy, except that the Qing scorched the enemy’s earth, not their own.

For Fujian, the coastal evacuation amounted to a spectacularly harsh ver-



sion of the Ming dynasty’s ban on overseas trade. In the 1630s, before the political convulsions and the trade bans, twenty or more big junks went to Manila every year, each carrying hundreds of traders. During the evacuation, the number fell to as low as two or three, all illicit. Like the Ming trade bans, the Qing coastal clearance effectively turned over the silver trade to *wokou*.

As it happened, the trade was turned over to one pirate in particular: Zheng Chenggong, known in the West as Koxinga (the name is a corruption of a Chinese honorific). Born in Japan to a Japanese mother and a Fujianese Christian father who was a prominent pirate, Zheng had spent his life flouting Ming law. When the Qing came in, he realized that *wokou* were better off with the lackadaisical, corrupt Ming. He became an admiral in the rump Ming state and led an enormous sea-based assault on the Qing that came close to toppling the new regime. Afterward, he returned to piracy, amassing a fleet that one eyewitness, a Dominican missionary in Fujian, estimated at fifteen to twenty thousand vessels and an army of “a hundred thousand men at arms, all the necessary sailors, and eight thousand horses.” Based in a palace in Amoy (now called Xiamen), a city across the river from Yuegang, Zheng controlled the entire southeast coast—a true pirate king.

Manila’s traders, having no alternative, begged Zheng in 1657 to buy their silver. When his ships appeared in the harbor, the galleon trade resumed. Perhaps distracted by his running battle with the Qing, Zheng took longer than one would expect to realize that a) the Spaniards in the Philippines had no source but him for silk and porcelain; and b) he, Zheng, was a pirate with a large army. Not until 1662 did he dispatch the Dominican missionary—dressed in the rich robes of an imperial emissary—to Manila with a proposal to change the terms of trade. The Spaniards would give him all their silver, as before. In return, Zheng would not kill them. Panicked, the Spanish governor decided to expel the Chinese in the Philippines. Refusing to be ejected, they barricaded themselves in the Parián. As was by that point customary, Spanish troops forcibly rounded up the Chinese, slaughtering many and forcing the rest to leave Manila on jam-packed ships. The precaution turned out to be needless; just two months later, Zheng died unexpectedly, probably of malaria. His sons fought over their inheritance, and the Manila trade was left alone.

The Qing had ordered the coastal evacuation, but it had disastrous consequences for them, too. As the treasury official Mu Tianyan complained, closing down the silver trade effectively froze the money supply. Because silver was always being wasted, lost, and buried, the pool of Chinese money was actually shrinking. “Every day there is less and less to meet the demand, with no way to restore it,” Mu wrote to the emperor. When the money supply falls, each unit becomes more valuable; prices fall in a classic deflationary spi-

ral. To stop the importation of silver “yet desire the wealth of fortune and convenience of use,” Mu asked, “how is this different from blocking a source of water while expecting to benefit from its flow?” Reluctantly agreeing, the Qing lifted the ban in 1681.

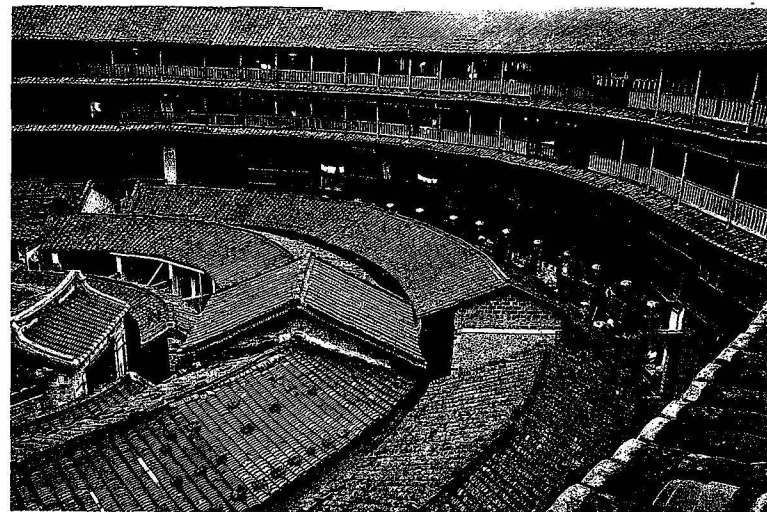
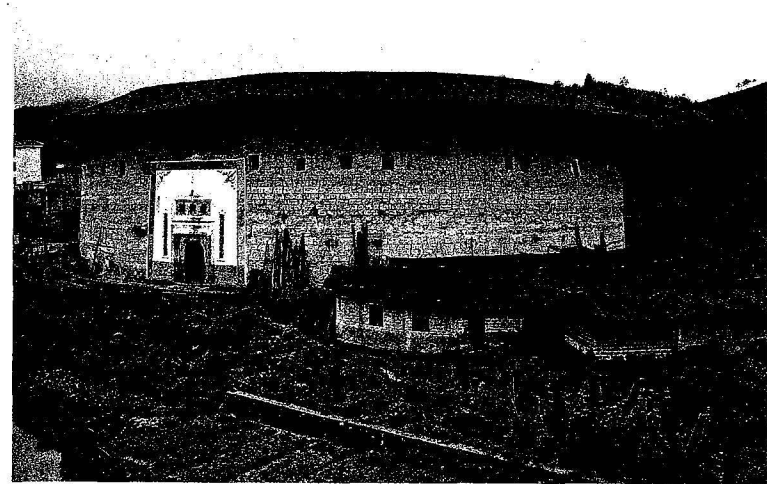
Meanwhile, though, coastal people had flooded into the mountains of Fujian, Guangdong, and Zhejiang. Inconveniently, these areas were already inhabited. Most of the inhabitants belonged to a different ethnic group, the Hakka, famed for their *tulou*—fortress-like complexes, usually but not always circular, whose earthen outer walls contain scores of apartments, all facing onto a central courtyard. (Today these amazing structures are a tourist attraction.) Decades before the expulsion, the Fujianese scholar Xie Zhaozhe had observed that the Hakka in the hills were packed into every scrap of available real estate:

There is not an inch of open ground. . . . Truly as someone once said, “Not a drop of water goes unused, and as much as possible even the most rugged parts of mountains are cultivated.” One could say that there isn’t a bit of land left.

Unable to support themselves, poor Hakka and other mountain peoples had been emigrating north and west for a century, renting uninhabited highland areas—terrain too steep and dry for rice—in neighboring provinces. They cut and burned the tree cover and planted cash crops, mainly indigo, in the exposed earth. After a few years of this slash-and-burn the thin mountain soil was exhausted and the Hakka moved on. (“When they finish with one mountain, they simply move on to the next,” the geographer Gu Yanwu complained.) As coastal refugees poured into the mountains, the highland exodus accelerated.

Landless and poor, the Hakka refugees were mocked as *pengmin*—shack people. Strictly speaking, shack people were not vagabonds; they rented land in the heights that was owned but not used by farmers in the more fertile valleys. Shifting from one temporary home to the next, *pengmin* eventually occupied a crooked, 1,500-mile stretch of montane China from the sawtooth hills of Fujian in the southeast to the silt cliffs around the Huang He in the northwest.

Neither rice nor wheat, China’s two most important staples, would grow in the shack people’s marginal land. The soil was too thin for wheat; on steep slopes, the irrigation for rice paddies requires building terraces, the sort of costly, hugely laborious capital improvement project unlikely to be undertaken by renters.



Thousands of *toulou*, clan dwellings of the Hakka, still dot the mountains of Fujian. Made from rammed earth mixed with rice stalks, they had no windows on lower floors as a defensive measure.

Almost inevitably, they turned to American crops: maize, sweet potato, and tobacco. Maize (*Zea mays*) can thrive in amazingly bad land and grows quickly, maturing in less time than barley, wheat, and millet. Brought in from the Portuguese at Macao, it was known as "tribute wheat," "wrapped grain," and "jade rice." Sweet potatoes will grow where even maize cannot, tolerating strongly acid soils with little organic matter and few nutrients. *I. batatas* doesn't even need much light, as one agricultural reformer noted in 1628. "Even in low, narrow, damp alleys, where there is only a few feet of ground, if you can look up and see the sky, you can plant them there."

In the south, many farmers' diets revolved around the sweet potato: sweet potatoes baked and boiled, sweet potatoes ground into flour for noodles, sweet potatoes mashed with pickles or deep-fried with honey or chopped into stew with turnips and soybean milk, even sweet potatoes fermented into a kind of wine. In the west, China was a land of maize and another American import: potatoes, originally bred in the Andes Mountains. When the wandering French missionary Armand David lived in a hut in remote, scraggy Shaanxi, his meal plan would not have been out of place, except for a few garnishes, in the Inka empire. "The only plant cultivated near our cabin is the potato," he noted in 1872. "Maize flour, along with potatoes, is the mountain peoples' daily diet; it's usually eaten boiled and mixed with the tubers."

Nobody knew how many shack people were in the hills. Hoping, perhaps, that hiding the problem would avoid the need to solve it, Qing bureaucrats left them out of census reports. But all evidence suggests that the number was not small. In Jiangxi, Fujian's western neighbor, the rigid, nit-picking provincial treasurer insisted in 1773 that the shack people, many of whom had lived in Jiangxi for decades, counted as actual inhabitants of the province and therefore should be included in the reports sent to Beijing. He dispatched field workers to enumerate every Hakka head and every Hakka shack. In rugged Ganxian County, they tallied 58,340 settled inhabitants, most in the main town of Ganzhou—and 274,280 shack people in the surrounding slopes. In county after county the story was repeated, sometimes with a few thousand wanderers, other times a hundred thousand or more. Hidden from the government, more than a million shack people had been slashing and burning their way across Jiangxi. And that, as the Qing court must have realized, was only one medium-sized province.

Coupled with the outflow of shack people was a second, parallel, even bigger wave of migration into the parched, mountainous, thinly settled west. In their quest for social stability, the Ming had prohibited people from leaving their home regions. Reversing course, the Qing actively promoted a

westward movement. Much as the United States encouraged its citizens to move west in the nineteenth century and Brazil provided incentives to occupy the Amazon in the twentieth, China's new Qing masters believed that filling up empty spaces was essential to the national destiny. ("Empty," that is, from the Qing point of view; dozens of non-Chinese peoples—Tibetans, Yao, Uighurs, Miao—lived in them. By sending in people from the center, the Qing were forcibly incorporating these previously autonomous cultures into the nation.)* Lured by tax subsidies and cheap land, migrants from the east swarmed into the western hills. Most of the newcomers were, like the shack people, poor, politically luckless, and scorned by urban elites. They looked at the weathered, craggy landscape, so unwelcoming to rice—and they, too, planted American crops.

China's fifth-largest province is Sichuan, adjacent to Tibet and nearly as alpine. Back in 1795, according to Lan Yong, a historian at Sichuan's Southwest University, it was a big, roomy place: more land than California, a population as low as 9 million. Just 2,300 square miles of its surface, an area half the size of Los Angeles County, were considered arable. During the next twenty years, Lan has written, American crops moved into the ridges and highlands, increasing the pool of farmland to almost 3,700 square miles. As Sichuan's agricultural capacity increased, its population increased in tandem, to 25 million. Something similar occurred in Shaanxi Province, Sichuan's even emptier neighbor to the northeast. Migrants poured into the steep, arid hills along the border between them, knocking down the trees that clung to the slopes to make room for sweet potatoes, maize, and, later, potatoes. The amount of cropland soared, followed by the amount of food grown on that cropland, and then the population. In some places the number of inhabitants increased a hundredfold in little more than a century.

For almost two thousand years, China's numbers had grown very slowly. That changed in the decades after the violent Qing takeover. From the arrival of American crops at the beginning of the new dynasty to the end of the eighteenth century, population soared. Historians debate the exact size of the increase; many believe the population roughly doubled, to as much as 300 million people. Whatever the precise figure, the jump in numbers had big consequences. It was the demographic surge that transformed the nation into a watchword for crowding.

China was not the only Asian nation transformed by the Columbian Exchange. Sweet potatoes became a staple in a broad swath extending from

* The ethnic group generally indicated by the word "Chinese" is the Han. The Manchu were pushing Han from the Chinese core into peripheral areas settled by other peoples.



Maize at the edge of the Gobi Desert, in Inner Mongolia

Tahiti to Papua New Guinea, and from New Zealand to Hawai'i. Surprisingly, *I. batatas* was known in much of this area before Columbus—archaeologists have found burned remains of the plant dating back as early as 1000 A.D. in Hawai'i, Easter Island, the Cook Islands, and New Zealand. (Some researchers view the species's movement across the Pacific as evidence of contact between ancient Polynesians and American Indians; others argue that the seeds, which are contained in small, buoyant, spherical capsules, must have floated across the sea.) Initially it had little impact. But about the time that the Spaniards arrived in Manila *I. batatas* was displacing native crops like yam, sago, and banana. As had the Chinese, islanders were using sweet potato's high yields and tolerance of bad soil to move into highland areas that had been lightly settled before. New Guinea was so transformed that some archaeologists speak of an "Ipomoean revolution." Still, the impact in China was bigger, if only because China is so big, and because the country had a centralized government that could enforce policies that spread sweet potato.

Were maize, potatoes, and sweet potatoes entirely responsible for China's population boom? No. American plants arrived as the Qing were transforming China. Ambitious on many fronts, the dynasty fought disease and hunger, the nation's two major killers, by enacting a program, the world's first, of smallpox inoculation; expanding a nationwide network of granaries

that bought surplus grain and sold it at low, state-controlled prices during shortages; and implementing what were, for the era, sophisticated disaster-relief programs (some were as simple as a halt in the collection of grain levies in famine-struck areas). At the same time, the Qing campaigned against the nation's traditional population-control method: female infanticide. Many Chinese men had spent their days as bachelors, because infanticide removed women from the population. Now more could marry and have babies; now their babies were less likely to die from smallpox and starvation. Now, too, farm families were less likely to be driven into penury by the state: the Kangxi emperor promised in 1713 that the dynasty would never raise the basic tax on cropland, even though it was making massive investments in transportation networks so that farmers could sell their harvests, raising their incomes. Happily, those harvests were likely to grow; the Little Ice Age was waning. Some of these policies had been first emplaced by the Ming; the Qing merely executed them efficiently. But all helped raise the number of children, and the proportion of that number who survived to adulthood.

Still, as noted by Lan, the Sichuan historian, most of the increase took place in the areas with American crops. The families that Qing policies encouraged to move west needed to eat, and what they ate, day in and day out, was maize, potatoes, and sweet potatoes. Part of the reason China is the world's most populous nation is the Columbian Exchange.

MALTHUSIAN INTERLUDE

Hong Liangji was born in 1746 near the mouth of the Yangzi, into a family that slowly went on the skids after the unexpected death of his father. Brilliant but volatile, tall and red-faced, Hong "was in his element when he was singing and drinking," one friend recalled. He was often upbraided at school for drunken antics even as he won prizes for his intellect and prose style. An intense, impatient, and easily infuriated man, he would grab his interlocutor's wrist, lean in close, and hammer his point home with febrile intensity. "His eyes would narrow and you could see his neck redden with anger," another friend said, remembering political discussions. "Then he was extremely unsociable." His friends put up with him because he was a fine poet, a lively essayist, and a noted scholar who studied waterways, reconstructed administrative boundaries, and assembled a comprehensive geography of the Qing empire. His greatest intellectual feat, though, passed almost unnoticed. Sometime in 1793 Hong Liangji thought of an idea that may never have occurred to anyone else before.

After finally winning a place in the Qing bureaucracy at the age of forty-four—Hong had failed the civil service exam four times—he was sent as an education inspector to Guizhou Province, in the southwestern hinterland. Essentially a sloping, heavily eroded limestone shelf, the province is a humid jumble of steep gorges, protuberant hills, and long caverns. It was another target for Qing occupation, thronged with migrants from central China who were pushing out its original inhabitants, the Miao. The newcomers were climbing up the hills, planting maize, and beginning families. Hong wondered how long the boom could last.

"Today's population is five times as large as that of thirty years ago," he wrote, with perhaps pardonable exaggeration, "ten times as large as that of sixty years ago, and not less than twenty times as large as that of a hundred years ago." He imagined a man with "a ten-room house and 100 *mu* [about seventeen acres] of farmland." If the man married and had three adult sons, then eight people—the four men and their wives—would live on the parents' farm.

Eight people would require the help of hired servants; there would be, say, ten people in the household. With the ten-room house and the 100 *mu* of farmland, I believe they would have just enough space to live in and food to eat, although barely enough. In time, however, there will be grandsons, who, in turn, will marry. The aged members of the household will pass away, but there could still be more than twenty people in the family. With more than twenty people sharing a house and working 100 *mu* of farmland, I am sure that even if they eat very frugally and live in crowded quarters, their needs will not be met.

Hong conceded that the Qing had opened up new land to support China's population. But the amount of farmland had

only doubled or, at the most, increased three to five times, while the population has grown ten to twenty times. Thus farmland and houses are always in short supply, while there is always a surplus of households and population. . . .

Question: Do Heaven-and-earth have a way of dealing with this situation? Answer: Heaven-and-earth's way of making adjustments lies in flood, drought, and plagues.

Five years later, in England, a similar notion came to another man: Rev. Thomas Robert Malthus. A shy, kindly fellow with a slight harelip, Malthus

was the first person to hold a university position in economics—that is, the first professional economist—in Britain, and probably the world. He was impelled to think about population growth after a disagreement with his father, a well-heeled eccentric in the English style. The argument was over whether the human race could transform the world into paradise. Malthus thought not, and said so at length—55,000 words, published as an unsigned broadside in 1798. Several longer versions followed. These were signed; Malthus had become more confident.

"The power of population," Malthus proclaimed, "is indefinitely greater than the power in the earth to produce subsistence for man." In textbooks today this notion is often depicted by recourse to a graph. One line on the graph represents the total food supply; it slowly rises in a line from left to right as people clear more land and farm more efficiently. Another line starts out low, quickly curves to meet the first, then soars above it; that line represents human population, growing exponentially. Eventually the gap between the two lines cannot be bridged, and the Four Horsemen of the Apocalypse pay a call. Every effort to increase the food supply, Malthus argued, will only lead to an increase in population that will more than cancel out the increase in the food supply—a state of affairs today known as a *Malthusian trap*. Forget Utopia, Malthus said. Humanity is doomed to exist, now and forever, at the edge of starvation. Forget charity, too: helping the poor only leads to more babies, which in turn produces increased hardship down the road. No matter how big the banquet grows, there will always be too many hungry people wanting a seat at the table. The Malthusian trap cannot be escaped.

The reaction was explosive. "Right from the publication of the *Essay on Population* to this day," the great economic historian Joseph Schumpeter declared, "Malthus had the good fortune—for this is good fortune—to be the subject of equally unreasonable, contradictory appraisals." John Maynard Keynes regarded Malthus as the "beginning of systematic economic thinking." Percy Bysshe Shelley, on the other hand, derided him as "a eunuch and a tyrant." John Stuart Mill viewed Malthus as a great thinker. To Karl Marx he was a "plagiarist" and a "shameless sycophant of the ruling classes." "He was a benefactor of humanity," Schumpeter wrote. "He was a fiend. He was a profound thinker. He was a dunce."

Hong, by contrast, was ignored. Unlike Malthus, he never developed his thoughts systematically, in part because he devoted his energy to criticizing the corrupt officials whom he believed were looting the Qing state. Appalled at the government's brutal, incompetent reaction to a rebellion by starving peasants in Sichuan and Shaanxi, Hong quit his job in 1799. On his way out, he shot off a rambling but remarkably blunt letter to the crown prince, who passed it to the Jiaqing emperor (not to be confused with the alchemy-crazed

Jiajing emperor, who ruled two centuries before). The angered emperor sentenced Hong to life in exile, silencing him.

The lack of recognition was unmerited; Hong apparently captured the workings of the Malthusian trap better than Malthus. (I use the hedge word “apparently” because he never worked out the details.) The Englishman’s theory made a simple prediction: more food would lead to more mouths would lead to more misery. In fact, though, the world’s farmers have more than kept pace. Between 1961 and 2007 humankind’s numbers doubled, roughly speaking, while global harvests of wheat, rice, and maize tripled. As population has soared, in fact, the percentage of chronically malnourished has *fallen*—contrary to Malthus’s prediction. Hunger still exists, to be sure, but the chance that any given child will be malnourished has steadily, hearteningly declined. Hong, by contrast, pointed to a related but more complex prospect. The continual need to increase yields, Hong presciently suggested, would lead to an ecological catastrophe, which would cause social dysfunction—and with it massive human suffering.

Exactly this process is what researchers today mean when they talk about the Malthusian trap. Indeed, one way to summarize today’s environmental disputes is to say that almost all boil down to the question of whether humankind will continue to accumulate wealth and knowledge, as has been the case since the Industrial Revolution, or whether the environmental impacts of that accumulation—soil degradation, loss of biodiversity, consumption of groundwater supplies, climate change—will snap shut the jaws of the Malthusian trap, returning the earth to pre-industrial wretchedness. Alarming in this context, China provides an example of the latter, at least in part. In the decades after American crops swept into the highlands, the richest society in the world was convulsed by a struggle with its own environment—a struggle it decisively lost.

“THE MOUNTAINS REVEAL THEIR STONES”

Between the 1680s, when the Qing resumed the silver trade, and the 1780s, the price of rice in Suzhou, a rice-trading center near modern Shanghai, more than quadrupled. Incomes did not keep up—a recipe for social unrest. As if on cue, rebellions exploded across China; the convulsion that dismayed Hong is alone said to have led to several million deaths. Part of the reason for the price hike was the influx of silver to Fujian, according to Quan Hansheng, the economic historian, which drove up Chinese food prices in exactly the same way that the influx of silver to Spain had earlier driven up European

prices. The population boom presumably increased demand, putting further pressure on the price. State purchases for granaries sometimes had the same effect. But a big reason for the price rise was that many farmers simply stopped growing rice.

Qing emperors had made a priority of improving transportation networks so that farmers could sell crops profitably. The intent was to facilitate the movement of staple foods; the new roads would help merchants ship rice and wheat from places with abundant harvests to places that needed supplies. Instead smallholders discovered they could make more money by switching from rice and wheat to sugarcane, peanuts, mulberry trees, and, most of all, tobacco.

Initially the Qing court cracked down on this shift, insisting that peasant farmers practice “correct agriculture”—that is, grow rice and wheat. “Tobacco is not healthy for the people,” the Yongzheng emperor proclaimed in 1727. “Because cultivating tobacco requires using rich land, its cultivation is harmful for growing grain.” But as the court grew more insular and debased—seemingly the fate of all Chinese dynasties—it lost interest in enforcing agricultural correctness.

Farmers seized their opportunity. Tobacco required four to six times more fertilizer and twice as much labor as rice, but was more profitable; China’s growing battalions of nicotine addicts were willing to pay more for their pipes than their food. (Some were doubly addicted: they cut their tobacco with opium.) Tobacco appeared in almost every corner in China, according to Tao Weining, an agricultural historian in Guangdong. And it was a big presence in those places: in two typical hilly areas examined by Tao, “nearly half” of the total farmland was devoted to *N. tabacum*. In consequence, the local price of rice doubled, as did the price of most common vegetables and fruits. Farmers ended up spending their tobacco profits on food expensively imported from other parts of China. As in Virginia, tobacco drained the land. When farmers exhausted the soil from one former rice paddy, they went to the next. And when they ran out of rice paddies, they went into the hills.

The same phenomenon is still occurring today. When two friends and I visited the *tulou* houses in Fujian, we walked around the mountain hamlet of Yongding. Generations past, the villagers’ ancestors had hacked small, semi-circular rice terraces out of the slopes, fertilizing the thin red earth with manure and night soil, then filling the paddies by diverting mountain streams. At the edge of the village a sign proclaimed that China Tobacco, a state monopoly, had contracted with Yongding’s farmers to convert their paddies to tobacco. The company had built a new road to facilitate harvest.



Even four centuries after its introduction tobacco remains so profitable in China that villagers still turn rice paddies into tobacco plots. These Fujianese farmers are drying tobacco in 2009.

From atop the terraces we looked down on horizontal arcs of splayed, fleshy green arrows: *N. tabacum*.

In Yongding, the villagers had replaced some of the lost rice with maize, shoving plants into the ground everywhere they could find a scrap of plausible land: roadside ditches, backyard plots, the walls of the gullies below the houses. Somebody had stuck maize seedlings into a pickup-sized heap of dirt and gravel left by a recent landslide. During the eighteenth century, the same kind of thing took place all over China. Jamming maize and sweet potatoes into every nook and crevice, shack people and migrants almost tripled the nation's cultivated area between 1700 and 1850. To create the necessary farmland, they knocked down centuries-old forests. Bereft of tree cover, the slopes no longer retained rainwater. Soil nutrients washed down the hills. Eventually the depleted land would not support even maize and sweet potatoes. Farmers would clear more forest, and the cycle would begin anew.*

* Agriculture was not the only cause of deforestation. China consumed huge quantities of timber as fuel and building material. To get the wood, platoons of workers went to distant places, where they wiped out entire forests. Alas, so much lumber was lost, damaged, and stolen during shipping, reported Yang Chang, a historian in Hubei Province's Huazhong Normal University, that less than 2 percent of it was actually used by its intended recipients.

Some of the worst devastation was in the steep, crabbed hills of eastern central China, home of the shack people. Heavy, hammering rains, common in this area, constantly flush out minerals and organic matter. The weathered soil can't hold water—"if it doesn't rain for ten days," one local writer said in 1607, "the soil becomes dry and scorched and cracks like the lines on a tortoise's back." The land was arable, in the sense that maize and sweet potatoes would grow in it. But harvesting them for more than a season or two was next to impossible without shoveling in generous amounts of lime or ashes to reduce acidity, manure to boost organic matter, and fertilizer to increase nitrogen and phosphorus. This had to be done every year, because rain kept leaching nutrients.

Shack people, one recalls, rented their farms from landowners in the valleys below. Renting for short, fixed periods, they had no incentive to fertilize, and little means to do it even should they have wanted to. Because the crop was new to their experience, they made beginners' mistakes. Maize is planted in widely spaced rows, unlike wheat and millet, which is grown across solid blocks. Many farmers did not realize for a long time that maize therefore left more of the soil uncovered and hence exposed to rain. And some didn't understand that planting the maize in rows straight up and down the hills, rather than across the slope, would channel that rain down the slope, increasing erosion.

Even if one fertilized the upland soil and minimized the impact of rain, upland deforestation could still cause disaster below, according to Anne R. Osborne, a historian at Rider University, in New Jersey, whose studies of the shack people I am relying on for this account. "The narrowness of the valley plains and basins meant that human settlement and most food production were concentrated along the edges of the rivers," Osborne explained. When the uplands were covered with vegetation, they released rainwater slowly; floods were rare. Replacing stands of trees on steep slopes with temporary plots of maize and sweet potatoes reduced the mountains' water-storage capacity. Rainfall went down the hills in sheets, setting off floods. "Flood waters pouring out of the highlands met almost flat land on the neighboring basins and plains," Osborne wrote. "Slowing suddenly, they dropped their loads of silt, in the river channels or over the farmers' fields, destroying fertile fields and obstructing the channels for future drainage."

Floods were especially problematic for rice farmers, even though their livelihood depended on flooding. Paddies require a continuous trickle of incoming water. If the flow is too weak, the water evaporates; if the flow is too fast, the paddy spills over its banks, carrying away nutrients and possibly the rice itself. Farmers used upstream dikes to hold back water until needed, controlling irrigation levels by adjusting gates. In a flood, the sudden gush of

water could wipe out both the dikes and the paddies they fed, bringing down the whole system. Paradoxically, the deluges drowned the rice crop—and then, later, dried out the paddies because the dikes no longer held water for them. By cutting down the forests, the shack people were not only laying waste to the land around them, they were helping to devastate the agricultural infrastructure miles downstream. Because this was occurring in the lower Yangzi, the shack people were wrecking a chunk of the nation's agricultural heartland.

Some locals wholly understood the problem. When the urban scholar Mei Zengliang paid a nostalgic visit in 1823 to the mountain town in which he had spent his childhood, he asked his former neighbors about the shack people. No ecologist today would have much to add to their response.

On uncleared mountains [the villagers told him], the soil is firm and the rocks hold fast; grass and trees are thick, years of rotting leaves cover the ground to depths of as much as 2 to 3 *cun* [three to four inches]. Whenever it rains, the rainwater runs off the trees and onto the rotten leaves, then into the soil and rocks, before seeping through cracks in the rocks to form streams. This water flows slowly, and as it flows downward the soil does not go with it. . . . Today [shack people] strip the mountains with blades and axes, and loosen their soil with shovels and hoes, so that before even one rainfall has finished, the sand and rocks wash down with the water, quickly flowing into ravines.

Erosion from the heights drowned the rice paddies in the lower Yangzi valleys, further driving up the price of rice, which encouraged more maize production in the heights, which drowned more rice in the valleys.

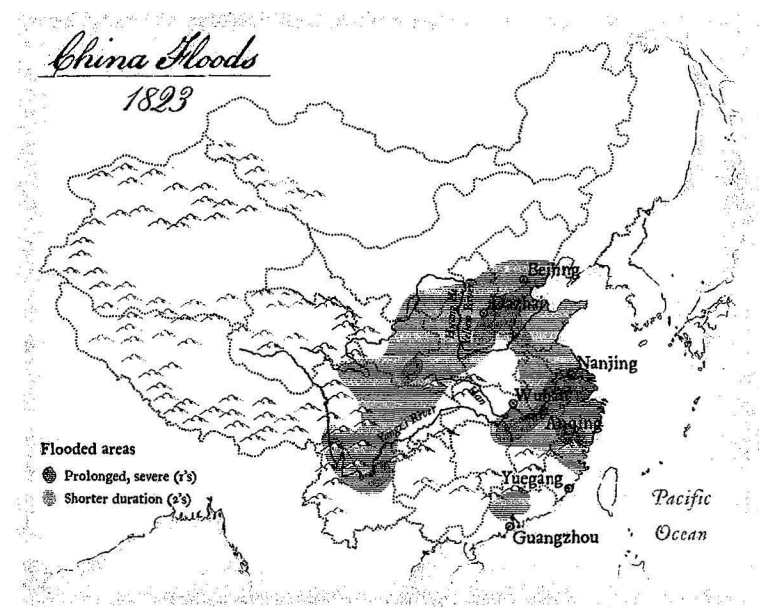
As shack people moved into the mountains, floods became ever more frequent. In the Song dynasty (960–1279 A.D.), major floods occurred somewhere in the empire at an average clip of about three every two years. Some farmers, many of them Hakka, illegally moved into the hills during the Ming dynasty (1368–1644), removing trees as they did. Predictably, the pace of deluges increased to almost two per year. The Qing (1644–1911) actively promoted moving peoples into mountain forests. As night follows day, the surge in migration led to a surge in deforestation; the flood rate more than tripled, to a little more than six major floods a year. Worse, the floods mostly targeted China's agricultural centers. Poring through personal diaries, county gazetteers, provincial archives, and imperial disaster-relief records, the historian Li Xiangjun found that 16,384 floods had occurred during the Qing dynasty. The great majority were small. But 13,537 of them occurred in the

rich farmlands in the lower Yangzi and Huang He. And the floods kept growing. Between 1841 and 1911, the Qing faced more than thirteen major floods a year—a Katrina every month, as one historian put it to me. “The government had constant disasters in the most populous parts of the realm,” he said. “The areas that were most important to feeding everyone. It was not good.”

In the 1970s a team of researchers at China's central meteorological bureau pored through huge numbers of local records, looking for descriptions of rainfall and temperature in past centuries. As one might expect, the researchers found few scientific measurements, but many verbal accounts. When they encountered phrases like—to use their examples—“10 consecutive days of heavy summer rain caused rivers to overflow,” “spring and summer floods drowned countless people and animals,” “summer and fall floods washed away the seedlings of cereal crops,” “several days of heavy rains such that boats could travel over land,” and “massive winds and heavy rains inundated fields and houses,” the researchers concluded that the area had experienced a flood, and marked the map with a 1 in the corresponding area. Descriptions of severe drought were marked with a 5. They gave conditions in between 2, 3, or 4. Although the resultant maps were subjective, the overall course of events was clear. Flipping through the maps in the meteorological bureau book was like watching an animated movie of environmental collapse.

Overwhelmed by the detail on the maps, I decided to look at four rice centers on the lower Yangzi: the cities of Nanjing, Anqing, and Wuhan, and the upper Han River, an important northern tributary of the Yangzi. Between 1500 and 1550, these areas had sixteen number 1s: sixteen major floods. Between 1600 and 1650, they had eighteen—roughly the same number. Between 1700 and 1750, at the height of the colder, wetter Little Ice Age, there were twenty-seven. Then the Little Ice Age ended, the weather became drier, and there was less rain and snow. But the number of 1s in these parts of China's agricultural core kept increasing. Between 1800 and 1850 these four places alone had thirty-two major floods. Some of the floods extended for hundreds of miles along the river, the 1's inundating city after city, each digit standing for thousands of wrecked lives.

Officials in Zhejiang Province, dismayed by the mounting problems, announced in 1802 that the government would begin sending the despised shack people “back to their native places.” They also banned planting maize in the mountains. Almost nothing happened. The officials tried again in 1824, banning the species outright—Zhejiang was supposed to be a maize-free zone. Again nothing happened. The imperial government had a network of



"censors" entrusted with rooting out incompetence and corruption. Zhejiang's censors repeatedly asked Beijing to send troops to rip out maize. There was no response. In the kind of phenomenon that makes one despair of the human race's ability to govern itself, the pace of land clearing actually accelerated in the first part of the nineteenth century.

Zhejiang censor Wang Yuanfang couldn't understand it. In the past, he knew, landlords hadn't understood that renting their unused upland property would have disastrous consequences. "Now [in 1850] the waterways are filled with mud, the fields are buried under sand, the mountains reveal their stones and the officials and people know of the great disaster, but they do nothing to stop it. Why?" (Emphasis in original.)

In part, the failure was due to an inherent problem with mass illegal immigration. It is not easy to deport huge numbers of people—tearing them from homes and families built up over years—without mass suffering. Governments that seek popular support shrink from inflicting this kind of agony (unless the loss of support from one group is made up for by increased support from another). Logistically, there is also the problem of finding a destination for people who have left their original homes decades before. In the case of the shack people, Osborne argued, neither governmental queasiness

nor confusion was the chief obstacle. The main problem was that the erosion represented a classic collective-action problem. A legal loophole ensured that rental income, unlike farm income, was tax free. Landowners with rentable property in the highlands thus had an easy source of untaxable income. The ensuing deforestation might ravage their own fields in the valleys, but the risks would be spread across an entire region, whereas the landowners' profits were theirs alone. Absorbing all of the gain and only a fraction of the pain, local business interests beat back every effort to rein in shack people.

In an environmentalists' nightmare, the shortsighted pursuit of small-scale profit steered a course for long-range, large-scale disaster. Constant floods led to constant famine and constant unrest; repairing the damage sapped the resources of the state. American silver may have pushed the Ming over the edge; American crops certainly helped kick out the underpinnings of the tottering Qing dynasty.

Other factors played their part, to be sure. A rebellion led by a Hakka mystic tore apart the nation, briefly setting up a state of shack people in the Hakka hills of the southeast. A series of weak emperors allowed the bureaucracy to wallow in inattention and corruption. The empire lost two wars with Great Britain, forcing it to cede control of its borders. British forces freely disseminated the opium that the government had gone to war to exclude. And so on—catastrophe, like success, has many progenitors. Unknown to the rampaging European armies, though, their path had been smoothed by the Columbian Exchange.

UNLEARNING FROM DAZHAI

For two generations, one of the most celebrated places in China was Dazhai. A hamlet of a few hundred souls in the dry, knotted hills of north-central China, Dazhai was ravaged by floods in 1963. Standing in the wreckage with his signature sweat-absorbing towel around his head, the local Communist Party secretary refused aid from the state and instead promised that Dazhai would rebuild itself with its own resources—and create a newer, more productive village at the same time. Harvests soared, despite the flood and the area's infertile soil.

Delighted by the increase, Mao Zedong bused thousands of local officials to the village and instructed them to emulate what they saw. Mainly, they saw spade-wielding peasants working in a fury to terrace the hills from top to bottom; rest breaks occurred while reading Mao's *Little Red Book* of revolu-

tionary proverbs. The atmosphere was cult-like: one group walked for two weeks to see the calluses on a Dazhai laborer's hands. China needed to produce grain from every scrap of land, the officials learned. Slogans, ever present in Maoist China, explained how to do it:

Move Hills, Fill Gullies and Create Plains!
Destroy Forests, Open Wastelands!
In Agriculture, Learn from Dazhai!

Filled with excitement, lashed on by local authorities, villagers fanned out across the hills, cutting the scrubby trees on the pitches, slicing the slopes into earthen terraces, and planting what they could on every newly created flat surface. Despite heat and hunger, people worked all day and then lighted lanterns and worked at night. The terraces converted unplatable steep slopes into new farmland. In one village that I visited farmers increased the area of cultivable land by about 20 percent, which seems typical.

Dazhai is in a geological anomaly called the Loess Plateau. For eon upon eon winds have swept across the deserts to the west, blowing grit and sand into central China. Millennia of dust fall have covered the region with vast heaps of packed silt—"loess," geologists call it—some of them hundreds of feet deep. The Loess Plateau is about the size of France, Belgium, and the Netherlands combined.

Loess doesn't form soil so much as pack together like wet snow. For centuries, people in the plateau have dug caves in the loess and lived in them. *Yaodong*, as these cave dwellings are called, are quite cozy—the one I stayed in had a heated platform bed cut from a block of loess. An adjacent woodstove vented through the platform, warming the bed in winter. Looking at the *yaodong* walls that night, I realized that the room, like a scientific probe, revealed the earth's workings. As a rule, soil has three layers: a thin scrim of dead leaves, bits of wood, and other organic matter on top; a band of dark topsoil, usually no more than a foot deep, shot through with humus (partly decomposed organic matter); and a stratum of subsoil below, lighter colored but rich with iron, clay, and minerals. Loess is different; my bedroom walls, carved from a giant heap of mashed-together grit, were uniform from top to bottom.

As every child who plays with mud knows, dust piles are easy to wash away. Silt grains "act like single particles," said Zheng Fenli, a soil scientist at the Institute of Soil and Water Conservation, in the Loess Plateau city of Yangling. They don't clump together firmly. If knocked free by flowing water, Zheng told me, silt grains "are very easy to transport." Washed down

steep hills, they can be carried great distances. The Huang He makes a big loop right through the Loess Plateau. It carries an enormous burden of silt—more than any other river in the world—into the North China Plain, China's agricultural heartland.

Because the plain is flat, the river slows down. As the current falters, the silt in the water deposits on the river bottom and along the banks. The silt replenishes the soil—a main reason for the area's farming primacy—but it also builds up the riverbed. In consequence, the Huang He rises one to three inches a year. Over time, it has lifted itself as much as forty feet over the surrounding land. When farmers harvesting wheat fields want to see the river, they look *up*. Moving high in the air, the river wants (so to speak) to overflow its banks, spilling into the North China Plain and creating a ruinous flood.

Such disasters have been a threat for millennia—"two breaks every three years and a channel change every century," the Chinese used to say of the Huang He. But in the eighteenth and nineteenth centuries, erosion drove the breaks and channel changes to be more lethal. In an attempt to subdue the floods, the Qing established a corps of engineers who maintained a five-hundred-mile line of dikes, a network of spillways, locks, and dams, and an array of as many as sixteen secondary channels into which the river could be divided—a hydraulic infrastructure easily as impressive as the Great Wall, and one that was more important to the life of the nation. Not only did the system control a staggeringly complex irrigation network, it connected the river to the Grand Canal, a 1,103-mile passage between Beijing and Hangzhou (a port south of modern Shanghai) that is the longest artificial waterway in the world. Qing emperors may have spent 10 percent or more of the imperial budget on the Huang He.

Nonetheless the system was constantly overwhelmed. As the Chinese weather bureau maps show, excess silt made the Huang He spill over its banks a dozen times between 1780 and 1850—about once every six years. All of the floods were huge. One deluge in 1887 was among the deadliest ever recorded; estimates of the dead range up to a million.

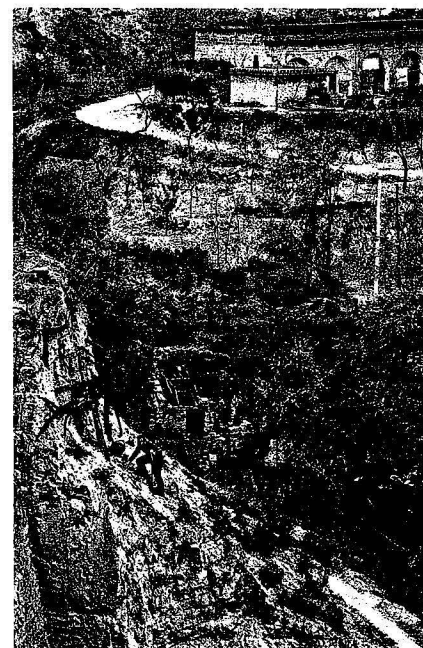
The cause of the flooding—deforestation in the Loess Plateau—was well understood. But Beijing did little about it, even though much of the land clearance had its roots in Qing policies, and the floods were blows to imperial legitimacy. The court's failure to act was not foreordained. Neither was the myopia of the landlords who rented to the shack people. Nobody will ever know whether decisive action could have resolved the nation's ecological problems, because it wasn't tried. Instead the floods continued until the dynasty fell, an event the floods had helped to bring about.

Which made it all the more incredible when Mao Zedong ordered *more*

land clearing in the Loess Plateau. Most of the region was already deforested, but the steepest slopes—land too steep to farm—were still covered by low, scrubby growth that held back erosion. Exactly this land was targeted in the 1960s and 1970s for conversion, Dazhai style, into terraces. The terrace walls, made of nothing but packed earth, constantly fell apart; in one Loess Plateau village that I visited after a rainfall, half the population seemed to be shoring up crumbling terraces by pounding the walls flat with shovels. Even when the terraces didn't crumble, rains sluiced away the nutrients and organic matter in the soil. Zuitou, the village, is nestled into steep hills along the Huang He. Walking along the steep paths between *yaodong*, I could almost watch the terraces sliding into the water.

Because erosion removed nutrients, harvests in the newly planted land dropped quickly. To maintain yields, farmers cleared and terraced new land, which washed away in turn—a perfect example of a “vicious circle,” according to Vaclav Smil, a University of Manitoba geographer who has long studied China's environment (his first book on the subject, *The Bad Earth*, appeared in 1984). Erosion into the Huang He went up by about a third during the Dazhai era, Chinese researchers reported in 2006.

The consequences were dire and everywhere apparent. Declining harvests on worsening soil forced huge numbers of farmers to become migrants. Zuitou lost half of its population. “It must be one of the greatest wastes of human labor in history,” Smil told me. “Tens of millions of people



Beginning in the 1960s, farmers throughout China's Loess Plateau stripped the forest and carved earthen terraces out of the hills (opposite). Because the loess erodes easily, every rain caused terraces to erode (above); maintenance was a constant issue. Eventually the terraces on the steepest slopes collapsed completely (left), and farmers found themselves trying to eke out a living on hills almost too steep to stand on.

being forced to work night and day, most of it on projects that a child could have seen were a terrible stupidity. Cutting down trees and planting grain on steep slopes—how could that be a good idea?”

In the most marginal areas farmers planted maize. North of Zuitou, at the edge of the Gobi Desert, I walked around plots of maize growing in almost pure sand. Until the 1960s the region had been covered with thorny forest scrub. Then Mao ordered aggressive planting. It was like forcing people to farm a beach. Astounding to me, the locals had actually coaxed some maize from the sand—drying cobs made little yellow heaps on rooftops and barren yards. On carts hauled by tiny Chinese motorbikes men were driving around piles of maize stalks tall as two-story buildings. In the light wind the air was intensely gritty. The Loess Plateau, which once caught dust from the desert, was now producing it.

The People's Republic had initiated plans to halt deforestation. In 1981 Beijing ordered every able-bodied citizen older than eleven to “plant 3–5 trees per year” wherever possible. Three years before, Beijing had initiated what may be the planet's biggest ecological program, the “Three Norths” project: a 2,800-mile band of trees running like a vast screen across China's north, northeast, and northwest, including the frontier of the Loess Plateau. Scheduled to be completed in 2050, this Green Wall of China will, in theory, slow down the winds that drive desertification and dust storms.

Despite their ambitious scope, these efforts did not directly address the soil degradation that was the legacy of Dazhai. Confronting the destruction was politically difficult, though: it had to be done without admitting that Mao had made mistakes. (When I asked local officials if the Great Helmsman had erred, they politely changed the subject.) Only in the last decade did Beijing chart a new course.

Today many of the terraces Zuitou's farmers hacked out of the loess are reverting to nature. In what locals call the “3-3-3” system, farmers replant one-third of their land—the steepest, most erosion-prone slopes—with grass and trees, natural barriers to erosion. They cover another third of the land with harvestable orchards. The final third, mainly plots on the gully floor that have been enriched by earlier erosion, is cropped intensively. By concentrating their limited supplies of fertilizer on that land, farmers can raise yields enough to make up for the land they have sacrificed—that's the theory, anyway. To help the transition along, farmers are compensated with an annual delivery of grain and a small cash payment for up to eight years. By 2010, the program covered more than 56,000 square miles of gully villages, an area the size of Iowa.

At first glance, it seems that a dictatorship would be perfectly suited to

accomplish this task. The government can simply order loess dwellers to stop growing millet and plant almonds without worrying about property rights or political protest. It can direct whole villages to go into the hills en masse and plant saplings, millions upon millions of them, in small pits shaped like fish scales. And when the farmers and fields are shifted around, the planners can point to their accomplishments with pride.

Things look different on the ground. Provincial, county, and village officials are rewarded if they plant the number of trees envisioned in the plan, not whether they have chosen tree species suited to local conditions (or listened to scientists who say that trees are not appropriate for grasslands to begin with). Farmers who reap no direct benefit from their work—they are installing trees that do not produce fruit, cannot be cut for firewood, and supposedly stop erosion miles from their homes—have little incentive to take care of the trees they are forced to plant. The entirely predictable result is visible on the back roads of Shaanxi: fields of dead trees, each in its fish-scale pit, lining the roads for miles. “Every year we plant trees,” the farmers say, “but no trees survive.”

During my visit the lines of dead trees dotted the slopes like contour marks, stretching for miles. The harvest was over, and farmers were about to be marched back in for another try. Tree by tree, the government was trying to undo the accidental legacy of the global silver trade.