Introduction

Albert in Beijing

London, April 3, 1848. Queen Victoria's head hurt. She had been kneeling with her face pressed to the wooden pier for twenty minutes. She was angry, frightened, and tired from fighting back tears; and now it had started raining. The drizzle was soaking her dress, and she only hoped that no one would mistake her shivers for fear.

Her husband was right next to her. If she just stretched out her arm, she could rest a hand on his shoulder, or smooth his wet hair—anything to give him strength for what was coming. If only time would stand still—or speed up. If only she and Prince Albert were anywhere but here.

And so they waited—Victoria, Albert, the Duke of Wellington, and half the court—on their knees in the rain. Clearly there was a problem on the river. The Chinese armada's flagship was too big to put in at the East India Docks, so Governor Qiying was making his grand entry to London from a smaller armored steamer named after himself, but even the *Qiying* was uncomfortably large for the docks at Black-wall. Half a dozen tugs were towing her in, with great confusion all around. Qiying was not amused.

Out of the corner of her eye Victoria could see the little Chinese band on the pier. Their silk robes and funny hats had looked splendid an hour ago, but were now thoroughly bedraggled in the English rain. Four times the band had struck up some Oriental cacophony, thinking that Qiying's litter was about to be carried ashore, and four times had given up. The fifth time, though, they stuck to it. Victoria's stomach lurched. Qiying must be ashore at last. It was really

happening.

And then Qiying's envoy was right in front of them, so close that Victoria could see the stitching on his slippers. There were little dragons, puffing smoke and flames. It was much finer work than her own ladies-in-waiting seemed able to do.

The envoy droned on, reading the official proclamation from Beijing. Victoria had been told what it said: that the Grand Exemplar the Cultured Emperor Daoguang recognized the British queen's desire to pay her respects to the imperial suzerainty; that Victoria had begged for the opportunity to offer tribute and taxes, paying the utmost obeisance and asking for commands; and that the emperor agreed to treat her realm as one of his inferior domains, and to allow the British to follow the Chinese way.

But everyone in Britain knew what had really happened. At first the Chinese had been welcome. They had helped fund the war against Napoleon, who had closed the continent's ports to them. But since 1815 they had been selling their goods at lower and lower prices in Britain's ports, until they put Lancashire's cotton mills out of business. When the British protested and raised tariffs, the Chinese burned the proud Royal Navy, killed Admiral Nelson, and sacked every town along the south coast. For almost eight centuries England had defied all conquerors, but now Victoria's name would go down forever in the annals of shame. Her reign had been an orgy of murder, rapine, and kidnapping; defeat, dishonor, and death. And here was Qiying himself, the evil architect of Emperor Daoguang's will, come to ooze more cant and hypocrisy.

At the appropriate moment Victoria's translator, kneeling just behind her, gave a perfect courtier's cough that only the queen could hear. This was the signal: Qiying's minion had reached the part about investing her as a subject ruler. Victoria raised her forehead from the dock and sat up to receive the barbaric cap and robe that signified her nation's dishonor. She got her first good look at Qiying. She did not expect to see such an intelligent- and vigorous-looking middle-aged fellow. Could he really be the monster she had dreaded?

And Qiying got his first look at Victoria. He had seen a portrait of her at her coronation, but she was even stouter and plainer than he had expected. And young– very, very young. She was soaked and appeared to have little splinters and bits of mud from the dock all over her face. She did not even know how to kowtow properly. What graceless people!

And now came the moment of blackest horror, the unthinkable. With deep bows, two mandarins stepped from behind Qiying and helped Albert to his feet. Victoria knew she should make no sound or gesture– and in very truth, she was frozen to the spot, and could not have protested had she tried.

They led Albert away. He moved slowly, with great dignity, then stopped and looked back at Victoria. The world was in that glance.

Victoria swooned. A Chinese attendant caught her before she fell to the dock; it would not do to have a queen, even a foreign devil queen, hurt herself at such a moment. Sleepwalking now, his expression frozen and his breath coming in gasps, Albert left his adopted country. Up the gangplank, into the luxurious locked cabin, and on to China, there to be invested as a vassal in the Forbidden City by the emperor himself.

By the time Victoria recovered, Albert was gone. Now, finally, great sobs racked her body. It could take Albert half a year to get to Beijing, and the same to get back; and he might wait further months or years among those barbarians until the emperor granted him an audience. What would she do? How could she protect her people, alone? How could she face this wicked Qiying, after what he had done to them?

Albert never came back. He reached Beijing, where he astonished the court with his fluent Chinese and his knowledge of the Confucian classics. But on his heels came news that landless farm workers had risen up and were smashing threshing machines all over southern England; and then that bloody street battles were raging in half the capitals of Europe. A few days later the emperor

received a letter from Qiying suggesting that it might be best to keep a talented prince like Albert safely out of the country. All this violence was as much about the painful transition to modernity as about the Chinese Empire, but there was no point taking chances with such turbulent people.

So Albert stayed in the Forbidden City. He threw away his English suits and grew a Manchu pigtail, and with each passing year his knowledge of the Chinese classics deepened. He grew old, alone among the pagodas, and after thirteen years in the gilded cage, he finally just gave up living.

On the other side of the world Victoria shut herself away in under-heated private rooms at Buckingham Palace and ignored her colonial masters. Qiying simply ran Britain without her. Plenty of the so-called politicians would crawl on their bellies to do business with him. There was no state funeral when Victoria died in 1901; just shrugs and wry smiles at the passing of the last relic of the age before the Chinese Empire.

Looty in Balmoral

In reality, of course, things didn't happen this way. Or at least, only some of them did. There really was a Chinese ship called the *Qiying*, and it really did sail into London's East India Docks in April 1848 (Figure I.1). But it was not an ironclad gunboat carrying a Chinese governor to London: the real *Qiying* was just a gaily painted wooden junk. British businessmen in the Crown Colony of Hong Kong had bought the little boat a couple of years before and decided that it would be a jolly jape to send it back to the old country.

Queen Victoria, Prince Albert, and the Duke of Wellington really did come down to the river, but not to kowtow before their new master. Rather, they came as tourists to gawk at the first Chinese ship ever seen in Britain.

The ship really was named after the governor of Guangzhou. But Qiying had not accepted British submission in 1842 after destroying the Royal Navy. In reality, he negotiated China's surrender that same year, after a small British

squadron sank every war junk it could find, silenced the coastal batteries, and closed the Grand Canal linking Beijing to the rice-rich Yangzi Valley, threatening the capital with starvation.

And Emperor Daoguang really did rule China in 1848. But Daoguang did not tear Victoria and Albert apart: in fact the royal couple lived on in bliss, punctuated by Victoria's moods, until Albert died in 1861. The reality was that Victoria and Albert tore Daoguang apart.

Figure I.1. The real *Qiying*: boatloads of Londoners row out to see the ship in 1848, as recorded by an artist from the *Illustrated London News*.

History is often stranger than fiction. Victoria's countrymen broke Daoguang and shattered his empire for that most British of vices—a cup of tea (or, to be precise, several billion cups of tea). In the 1790s the British East India Company, which ran much of South Asia as a private fiefdom, was shipping 23 million pounds of Chinese tea leaves to London every year. The profits were enormous, but there was one problem: the Chinese government was not interested in importing British manufactured goods in return. All it wanted was silver, and the company was having trouble raising enough to keep the trade going. So there was much joy when the traders realized that whatever the

Chinese government might want, the Chinese people wanted something else: opium. And the best opium grew in India, which the company controlled. At Guangzhou the one Chinese port where foreigners could trade—merchants sold opium for silver, used the silver to buy tea, then sold the tea for even greater profits back in London.

As so often in business, though, solving one problem just created another. Indians ate opium and Britons dissolved it and drank it, consuming ten to twenty tons every year (some of it going to calm babies). Both techniques produced mildly narcotic effects, enough to inspire the odd poet and stimulate a few earls and dukes to new debaucheries, but nothing to worry about. The Chinese, on the other hand, smoked it. The difference was not unlike that between chewing coca leaves and lighting up a crack pipe. British drug dealers contrived to overlook this difference but Daoguang did not, and in 1839 declared war on drugs.

It was an odd war, which quickly degenerated into a personal face-off between Daoguang's drug czar, Commissioner Lin Zexu, and the British superintendent of trade at Guangzhou, Captain Charles Elliot. When Elliot realized he was losing, he persuaded the traders to surrender a staggering seventeen hundred tons of opium to Lin; and he got the traders to agree to this by guaranteeing that the British government would reimburse them for their losses. The merchants did not know if Elliot actually had the authority to promise this, but they grabbed the offer all the same. Lin got his opium; Elliot saved face and kept the tea trade moving; and the merchants got top price (plus interest and shipping) for their drugs. Everyone won.

Everyone, that is, except Lord Melbourne, Britain's prime minister. Melbourne, who was expected to find £2 million to compensate the drug dealers, did *not* win. It should have been madness for a mere naval captain to put a prime minister on the spot like this, but Elliot knew he could rely on the business community to lobby Parliament to recover the money. And so it was that personal, political, and financial interests thickened around Melbourne

until he had no choice but to pay up and then send an expedition to make the Chinese government reimburse Britain for the confiscated opium (Figure I.2).

This was not the British Empire's finest hour. Contemporary analogies are never precise, but it was rather as if in response to the U.S. Drug Enforcement Agency making a major bust, the Tijuana cartel prevailed on the Mexican government to shoot its way into San Diego, demanding that the White House reimburse the drug lords for the street value of the confiscated cocaine (plus interest and carriage charges) as well as paying the costs of the military expedition. Imagine, too, that while it was in the neighborhood, a Mexican fleet seized Catalina Island as a base for future operations and threatened to blockade Washington until Congress gave the Tijuana drug lords monopoly rights in Los Angeles, Chicago, and New York.

The difference, of course, is that Mexico is in no position to bombard San Diego, while in 1839 Britain could do whatever it wanted. British ships brushed aside China's defenses and Qiying signed a humiliating treaty, opening China to trade and missionaries. Daoguang's wives were not carried off to London, the way Albert went to Beijing in the scene I imagined at the beginning of this introduction, but the "Opium War" broke Daoguang all the same. He had let down 300 million subjects and betrayed two thousand years of tradition. He was right to feel like a failure. China was coming apart. Addiction soared, the state lost control, and custom crumbled.

Figure 1.2. Not their finest hour: British ships blowing Chinese war junks out of the Yangzi River in 1842. At the far right the *Nemesis*, the world's first all-iron warship, is living up to its name.

Into this uncertain world came a failed civil service candidate named Hong Xiuquan, who had grown up just outside Guangzhou. Four times Hong had trekked to the city to take the arduous civil service entrance exams; four times he had flunked. Finally, in 1843, he collapsed and had to be carried back to his village. In his fevered dreams, angels took him up to heaven. There he met a man who, he was told, was his elder brother, and standing shoulder-to-shoulder the two of them battled demons under their bearded father's gaze.

No one in the village could make sense of this dream, and Hong seemed to forget about it for several years, until one day he opened a little book he had been given in Guangzhou on one of his trips to the examination hall. It summarized the Christians' sacred texts—and, Hong realized, held the key to his dream. The brother in his dream was obviously Jesus, which made Hong God's Chinese son. He and Jesus had chased the demons out of heaven, but the dream seemed to mean that God wanted Hong to expel them from earth, too. Patching together a mix of evangelical Christianity and Confucianism, Hong proclaimed a Heavenly Kingdom of Great Peace. Angry peasants and bandits flocked to his banner. By 1850 his motley crew was defeating the disorganized imperial armies sent against him, and he followed God's will by introducing radical social reforms. He redistributed land, legislated equal rights for women, and even banned footbinding.

In the early 1860s, while Americans slaughtered each other with artillery and repeating rifles in the world's first modern war, the Chinese were doing the same with cutlasses and pikes in the world's last traditional war. For sheer horror, the traditional version far outdid the modern one. Twenty million died, mostly through starvation and disease, and Western diplomats and generals exploited the chaos to push farther into East Asia. In 1854, looking for coaling stations between California and China, the American Commodore Perry forced

Japan's ports open. In 1858 Britain, France, and the United States won new concessions from China. Emperor Xianfeng, who understandably hated the foreign devils who had destroyed his father, Daoguang, and were now exploiting his war against Hong, tried to wriggle out of the new treaty, but when Xianfeng got difficult, the British and French governments made him an offer he couldn't refuse. They marched on Beijing and Xianfeng beat an undignified retreat to a nearby vacation spot. The Europeans then burned his beautiful Summer Palace, letting him know they could do the same to the Forbidden City if they felt like it, and Xianfeng caved in. Shattered even more badly than his father had been, he refused to leave his hiding place or meet with officials ever again, and retreated into drugs and sex. He died a year later.

Prince Albert expired just a few months after Xianfeng. Despite spending years campaigning to persuade the British government that poor drains spread disease, Albert probably died from typhoid carried through Windsor Castle's wretched sewers. Sadder still, Victoria—as deeply enamored of modern plumbing as Albert—was in the bathroom when he passed away.

Robbed of the love of her life, Victoria sank deeper into moods and melancholy. But she was not completely alone. British officers presented her with one of the finest curiosities they had looted from the Summer Palace at Beijing: a Pekinese dog. She named him Looty.

Locking In

Why did history follow the path that took Looty to Balmoral Castle, there to grow old with Victoria, rather than the one that took Albert to study Confucius in Beijing? Why did British boats shoot their way up the Yangzi in 1842, rather than Chinese ones up the Thames? To put it bluntly: Why does the West rule?

To say the West "rules" might sound a little strong; after all, however we define "the West" (a question I will return to in a few pages), Westerners have not exactly been running a world government since the 1840s, and regularly fail

to get their own way. Many of us are old enough to remember America's ignominious scramble out of Saigon (now Ho Chi Minh City) in 1975 and the way Japanese factories drove Western rivals out of business in the 1980s. Even more of us now have the sense that everything we buy is made in China. Yet it is also obvious that in the last hundred years or so Westerners have shipped armies to Asia, not the other way around. East Asian governments have struggled with Western capitalist and Communist theories, but no Western governments have tried to rule on Confucian or Daoist lines. Easterners often communicate across linguistic barriers in English; Europeans rarely do so in Mandarin or Japanese. As a Malaysian lawyer bluntly told the British journalist Martin Jacques, "I am wearing your clothes, I speak your language, I watch your films, and today is whatever date it is because you say so."

The list could go on. Since Victoria's men carried off Looty the West has maintained a global dominance without parallel in history.

My goal is to explain this.

At first glance, it might not look like I have set myself a very difficult task. Nearly everyone agrees that the West rules because the industrial revolution happened there, not in the East. In the eighteenth century British entrepreneurs unleashed the energies of steam and coal. Factories, railroads, and gunboats gave nineteenth-century Europeans and Americans the ability to project power globally; airplanes, computers, and nuclear weapons allowed their twentieth-century successors to cement this dominance.

This did not mean that everything had to turn out exactly as it did, of course. If Captain Elliot had not forced Lord Melbourne's hand in 1839, the British might not have attacked China that year; if Commissioner Lin had paid more attention to coastal defenses, the British might not have succeeded so easily. But it does mean that irrespective of when matters came to a head and of who sat on the thrones, won the elections, or led the armies, the West was always going to win in the nineteenth century. The British poet and politician Hilaire Belloc summed it up nicely in 1898:

Whatever happens we have got
The Maxim Gun, and they have not.

End of story.

Except, of course, this is not the end of the story. It just prompts a new question: *Why* had the West got the Maxim gun when the rest had not? This is the first question I address, because the answer tells us why the West rules today; and, armed with the answer, we can pose a second question. One of the reasons people care about why the West rules is that they want to know whether, how long, and in what ways this will continue—that is, what will happen next.

This question grew increasingly pressing as the twentieth century wore on and Japan emerged as a major power; and in the early twenty-first it has become unavoidable. China's economy doubles in size every half-dozen years and will probably be the world's largest before 2030. As I write, in early 2010, most economists are looking to China, not the United States or Europe, to restart the world's economic engine. China hosted spectacular Olympic Games in 2008 and two Chinese "taikonauts" have taken spacewalks. China and North Korea both have nuclear weapons, and Western strategists worry about how the United States will accommodate itself to China's rising power. How long the West will stay on top is a burning question.

Professional historians are famously bad prophets, to the point that most refuse to talk about the future at all. The more I have thought about why the West rules, though, the more I have realized that the part-time historian Winston Churchill understood things better than most professionals. "The farther backward you can look," Churchill insisted, "the farther forward you are likely to see." Following in this spirit (even if Churchill might not have liked my answers), I will suggest that knowing why the West rules gives us a pretty good sense of how things will turn out in the twenty-first century.

I am not, of course, the first person to speculate on why the West rules. The

question is a good 250 years old. Before the eighteenth century the question rarely came up, because it frankly did not then make much sense. When European intellectuals first started thinking seriously about China, in the seventeenth century, most felt humbled by the East's antiquity and sophistication; and rightly so, said the few Easterners who paid the West any heed. Some Chinese officials admired Westerners' ingenious clocks, devilish cannons, and accurate calendars, but they saw little worth emulating in these otherwise unimpressive foreigners. If China's eighteenth-century emperors had known that French philosophers such as Voltaire were writing poems praising them, they would probably have thought that that was exactly what French philosophers ought to be doing.

Yet from almost the first moment factories filled England's skies with smoke, European intellectuals realized that they had a problem. As problems went, it was not a bad one: they appeared to be taking over the world, but did not know why.

Europe's revolutionaries, reactionaries, romantics, and realists went into a frenzy of speculation on why the West was taking over, producing a bewildering mass of hunches and theories. The best way to begin asking why the West rules may be by separating these into two broad schools of thought, which I will call the "long-term lock-in" and "short-term accident" theories. Needless to say, not every idea fits neatly into one camp or the other, but this division is still a useful way to focus things.

The unifying idea behind long-term lock-in theories is that from time immemorial some critical factor made East and West massively and unalterably different, and determined that the industrial revolution would happen in the West. Long-termers disagree—fiercely—on what that factor was and when it began to operate. Some emphasize material forces, such as climate, topography, or natural resources; others point to less tangible matters, such as culture, politics, or religion. Those who favor material forces tend to see "the long term" as being very long indeed. Some look back fifteen thousand years to the end of

the Ice Age; a few go back even further. Those who emphasize culture usually see the long term as being a bit shorter, stretching back just one thousand years to the Middle Ages or two and a half thousand to the age of the Greek thinker Socrates and China's great sage Confucius. But the one thing long-termers can agree on is that the Britons who shot their way into Shanghai in the 1840s and the Americans who forced Japan's harbors open a decade later were merely the unconscious agents of a chain of events that had been set in motion millennia earlier. A long-termer would say that by beginning this book with a contrast between Albert-in-Beijing and Looty-in-Balmoral scenarios, I was just being silly. Queen Victoria was always going to win: the result was inevitable. It had been locked in for generations beyond count.

Between roughly 1750 and 1950 nearly all explanations for why the West ruled were variations on the long-term lock-in theme. The most popular version was that Europeans were simply culturally superior to everyone else. Since the dying days of the Roman Empire most Europeans had identified themselves first and foremost as Christians, tracing their roots back to the New Testament, but in trying to explain why the West was now coming to rule, some eighteenth-century intellectuals imagined an alternative line of descent for themselves. Two and a half thousand years ago, they argued, the ancient Greeks created a unique culture of reason, inventiveness, and freedom. This set Europe on a different (better) trajectory than the rest of the world. The East had its learning too, they conceded, but its traditions were too muddled, too conservative, and too hierarchical to compete with Western thought. Many Europeans concluded that they were conquering everyone else because culture made them do it.

By 1900 Eastern intellectuals, struggling to come to terms with the West's economic and military superiority, often bought into this theory, though with a twist. Within twenty years of Commodore Perry's arrival in Tokyo Bay a "Civilization and Enlightenment" movement was translating the classics of the French Enlightenment and British liberalism into Japanese and advocating catching up with the West through democracy, industrialism, and the

emancipation of women. Some even wanted to make English be the national language. The problem, intellectuals such as Fukuzawa Yukichi insisted in the 1870s, was long-term: China had been the source of much of Japan's culture, and China had gone terribly wrong in the distant past. As a result, Japan was only "semicivilized." But while the problem was long-term, Fukuzawa argued, it was not locked in. By rejecting China, Japan could become fully civilized.

Chinese intellectuals, by contrast, had no one to reject but themselves. In the 1860s a "Self-Strengthening" movement argued that Chinese traditions remained fundamentally sound; China just needed to build a few steamships and buy some foreign guns. This, it turned out, was mistaken. In 1895 a modernized Japanese army surprised a Chinese fortress with a daring march, seized its foreign-made guns, and turned them on China's steamships. The problem clearly went deeper than having the right weapons. By 1900 Chinese intellectuals were following the Japanese lead, translating Western books on evolution and economics. Like Fukuzawa, they concluded that Western rule was long-term but not locked in; by rejecting its own past China could catch up too.

But some Western long-termers thought there was simply nothing the East could do. Culture made the West best, they claimed, but was not the ultimate explanation for Western rule, because culture itself had material causes. Some believed that the East was too hot or too diseased for people to develop a culture as innovative as the West's; or perhaps there were just too many bodies in the East—consuming all the surplus, keeping living standards low, and preventing anything like the liberal, forward-looking Western society from emerging.

Long-term lock-in theories come in every political coloring, but Karl Marx's version has been the most important and influential. In the very days that British troops were liberating Looty, Marx—then writing a China column for the *New York Daily Tribune*—suggested that politics was the real factor that had locked in Western rule. For thousands of years, he claimed, Oriental states had

been so centralized and so powerful that they had basically stopped the flow of history. Europe progressed from antiquity through feudalism to capitalism, and proletarian revolutions were about to usher in communism, but the East was sealed in the amber of despotism and could not share in the progressive Western trajectory. When history did not turn out exactly as Marx had predicted, later Communists (especially Lenin and his followers) improved on his theories by claiming that a revolutionary vanguard might shock the East out of its ancient slumber. But that would only happen, Leninists insisted, if they could shatter the old, fossilized society - at whatever cost. This long-term lock-in theory is not the only reason why Mao Zedong, Pol Pot, and the Kims of North Korea unleashed such horrors on their people, but it bears a heavy burden of responsibility.

Right through the twentieth century a complicated dance went on in the West as historians uncovered facts that did not seem to fit the long-term lock-in stories, and long-termers adjusted their theories to accommodate them. For instance, no one now disputes that when Europe's great age of maritime discovery was just beginning, Chinese navigation was far more advanced and Chinese sailors already knew the coasts of India, Arabia, East Africa, and perhaps Australia.[1] When the eunuch admiral Zheng He sailed from Nanjing for Sri Lanka in 1405 he led nearly three hundred vessels. There were tankers carrying drinking water and huge "Treasure Ships" with advanced rudders, watertight compartments, and elaborate signaling devices. Among his 27,000 sailors were 180 doctors and pharmacists. By contrast, when Christopher Columbus sailed from Cadiz in 1492, he led just ninety men in three ships. His biggest hull displaced barely one-thirtieth as much water as Zheng's; at eighty-five feet long it was shorter than Zheng's mainmast, and barely twice as long as his rudder. Columbus had no freshwater tankers and no real doctors. Zheng had magnetic compasses and knew enough about the Indian Ocean to fill a twenty-one-foot-long sea chart; Columbus rarely knew where he was, let alone where he was going.

This might give pause to anyone assuming that Western dominance was locked in in the distant past, but several important books have argued that Zheng He does, after all, fit into long-term lock-in theories: we just need more sophisticated versions. For example, in his magnificent book *The Wealth and Poverty of Nations*, the economist David Landes renews the idea that disease and demography always gave Europe a decisive edge over China, but adds a new twist by suggesting that dense population favored centralized government in China and reduced rulers' incentives to exploit Zheng's voyages. Because they had no rivals, most Chinese emperors worried more about how trade might enrich undesirable groups like merchants than they did about getting more riches for themselves; and because the state was so powerful, they could stamp out this alarming practice. In the 1430s they banned oceanic voyages, and in the 1470s perhaps destroyed Zheng's records, ending the great age of Chinese exploration.

The biologist and geographer Jared Diamond makes a similar case in his classic *Guns, Germs, and Steel*. His main goal is to explain why it was societies within the band of latitude that runs from China to the Mediterranean Sea that developed the first civilizations, but he also suggests that Europe rather than China came to dominate the modern world because Europe's peninsulas made it easy for small kingdoms to hold out against would-be conquerors, favoring political fragmentation, while China's rounder coastline favored centralized rulers over petty princes. The resulting political unity allowed fifteenth-century Chinese emperors to ban voyages like Zheng's.

In fragmented Europe, by contrast, monarch after monarch could reject Columbus's crazy proposal, but he could always find someone else to ask. We might speculate that if Zheng had had as many options as Columbus, Hernán Cortés might have met a Chinese governor in Mexico in 1519, not the doomed Montezuma. But according to long-term lock-in theories, vast impersonal forces such as disease, demography, and geography ruled that possibility out.

Lately, though, Zheng's voyages and plenty of other facts have started

striking some people as just too awkward to fit into long-term models at all. Already in 1905 Japan showed that Eastern nations could give Europeans a run for their money on the battlefield, defeating the Russian Empire. In 1942 Japan almost swept the Western powers out of the Pacific altogether, then, bouncing back from a shattering defeat in 1945, changed direction to become an economic giant. Since 1978 China, as we all know, has moved along a similar path. In 2006 China beat out the United States as the world's biggest carbon emitter, and even in the darkest days of the 2008–2009 financial crisis, China's economy kept growing at rates that Western governments would envy in the best of years. Maybe we need to throw out the old question and ask a new one: not *why* the West rules, but *whether* the West rules. If the answer is no, then long-term lock-in theories that seek ancient explanations for a Western rule that does not actually exist seem rather pointless.

One result of these uncertainties has been that some Western historians have developed a whole new theory explaining why the West used to rule but is now ceasing to do so. I call this the short-term accident model. Short-term arguments tend to be more complicated than long-term ones, and there are fierce disagreements within this camp. But there is one thing short-termers do all agree on: pretty much everything long-termers say is wrong. The West has not been locked into global dominance since the distant past; only after 1800 CE, on the eve of the Opium War, did the West pull temporarily ahead of the East, and even that was largely accidental. The Albert-in-Beijing scenario is anything but silly. It could easily have happened.

Lucking Out

Orange County in California is better known for conservative politics, manicured palm trees, and long-time resident John Wayne (the local airport is named after him, despite his dislike of planes flying over the golf course) than for radical scholarship, but in the 1990s it became the epicenter of short-term

accident theories of global history. Two historians (Bin Wong and Kenneth Pomeranz) and a sociologist (Wang Feng) at the University of California's Irvine campus[2] wrote landmark books arguing that whatever we look at—ecology or family structures, technology and industry or finance and institutions, standards of living or consumer tastes—the similarities between East and West vastly outweighed the differences as late as the nineteenth century.

If they are right, it suddenly becomes much harder to explain why Looty came to London rather than Albert heading east. Some short-termers, like the maverick economist Andre Gunder Frank (who wrote more than thirty books on everything from prehistory to Latin American finance), argue that the East was actually better placed to have an industrial revolution than the West until accidents intervened. Europe, Frank concluded, was simply "a distant marginal peninsula" in a "Sinocentric world order." Desperate to get access to the markets of Asia, where the real wealth was, Europeans a thousand years ago tried to batter their way through the Middle East in the Crusades. When this did not work some, like Columbus, tried sailing west to reach Cathay.

That failed too, because America was in the way, but in Frank's opinion Columbus's blunder marked the beginning of the change in Europe's place in the world system. In the sixteenth century China's economy was booming but faced constant silver shortages. America was full of silver; so Europeans responded to China's needs by getting Native Americans to claw a good 150,000 tons of precious metal out of the mountains of Peru and Mexico. A third of it ended up in China. Silver, savagery, and slavery bought the West "a third-class seat on the Asian economic train," as Frank put it, but still more needed to happen before the West could "displace Asians from the locomotive."

Frank thought that the rise of the West ultimately owed less to European initiative than to a "decline of the East" after 1750. This began, he believed, when the silver supply started shrinking. This set off political crises in Asia but provided a bracing stimulus in Europe, where, as they ran out of silver to export, Europeans mechanized their industries to make goods other than silver

competitive in Asian markets. Population growth after 1750 also had different results at each end of Eurasia, Frank argued, polarizing wealth, feeding political crises, and discouraging innovation in China but providing cheaper labor for new factories in Britain. As the East fell apart the West had the industrial revolution that should, by rights, have happened in China; but because it happened in Britain, the West inherited the world.

Other short-termers, though, disagree. The sociologist Jack Goldstone (who taught for some years at the University of California's Davis campus and coined the term "California School" to describe the short-term theorists) has argued that East and West were roughly equally well (or poorly) placed until 1600, each ruled by great agrarian empires with sophisticated priesthoods guarding ancient traditions. Everywhere from England to China, plagues, wars, and the overthrow of dynasties brought these societies to the brink of collapse in the seventeenth century, but whereas most of the empires recovered and re-imposed strictly orthodox thought, northwest Europe's Protestants rejected Catholic traditions.

It was that act of defiance, Goldstone suggests, that sent the West down the path toward an industrial revolution. Freed from the fetters of archaic ideologies, European scientists laid bare the workings of nature so effectively that British entrepreneurs, sharing in this pragmatic can-do culture, learned to put coal and steam to work. By 1800 the West had pulled decisively ahead of the rest.

None of this was locked in, Goldstone argues, and in fact a few accidents could have changed the world completely. For instance, at the battle of the Boyne in 1690 a Catholic musket ball ripped through the shoulder of the coat worn by William of Orange, the Protestant pretender to England's throne. "It's well it came no nearer," William is supposed to have said; well indeed, says Goldstone, speculating that if the shot had hit a few inches lower England would have remained Catholic, France would have dominated Europe, and the industrial revolution might not have happened.

Kenneth Pomeranz at Irvine goes further still. As he sees it, the fact that there was an industrial revolution at all was a gigantic fluke. Around 1750, he argues, East and West were both heading for ecological catastrophe. Population had grown faster than technology and people had already done nearly everything possible in the way of extending and intensifying agriculture, moving goods around, and reorganizing themselves. They were about to hit the limits of what was possible with their technology, and there was every reason to expect global recession and declining population in the nineteenth and twentieth centuries.

Yet the last two hundred years have seen more economic growth than all earlier history put together. The reason, Pomeranz explains in his important book *The Great Divergence*, is that western Europe, and above all Britain, just got lucky. Like Frank, Pomeranz sees the West's luck beginning with the accidental discovery of the Americas, creating a trading system that provided incentives to industrialize production; but unlike Frank, he suggests that as late as 1800 Europe's luck could still have failed. It would have taken a lot of space, Pomeranz points out, to grow enough trees to feed Britain's crude early steam engines with wood—more space, in fact, than crowded western Europe had. But a second stroke of luck intervened: Britain, alone in all the world, had conveniently located coalfields as well as rapidly mechanizing industries. By 1840 Britons were applying coal-powered machines to every walk of life, including iron warships that could shoot their way up the Yangzi River. Britain would have needed to burn another 15 million acres of woodland each year—acres that did not exist—to match the energy now coming from coal. The fossil-fuel revolution had begun, ecological catastrophe had been averted (or at least postponed into the twenty-first century), and the West suddenly, against all odds, ruled the globe. There had been no long-term lock in. It was all just a recent, freakish accident.

The variety of short-term explanations of the Western industrial revolution, stretching from Pomeranz's fluke that averted global disaster to Frank's

temporary shift within an expanding world economy, is every bit as wide as the gulf between, say, Jared Diamond and Karl Marx on the long-term side. Yet for all the controversy within both schools, it is the battle lines *between* them that produce the most starkly opposed theories of how the world works. Some long-termers claim that the revisionists are merely peddling shoddy, politically correct pseudo-scholarship; some short-termers respond that long-termers are pro-Western apologists or even racists.

The fact that so many experts can reach such wildly different conclusions suggests that something is wrong in the way we have approached the problem. In this book I will argue that long-termers and short-termers alike have misunderstood the shape of history and have therefore reached only partial and contradictory results. What we need, I believe, is a different perspective.

The Shape of History

What I mean by this is that both long-termers and short-termers agree that the West has dominated the globe for the last two hundred years, but disagree over what the world was like before this. Everything revolves around their differing assessments of premodern history. The only way we can resolve the dispute is by looking at these earlier periods to establish the overall "shape" of history. Only then, with the baseline established, can we argue productively about why things turned out as they did.

Yet this is the one thing that almost no one seems to want to do. Most experts who write on why the West rules have backgrounds in economics, sociology, politics, or modern history; basically, they are specialists in current or recent events. They tend to focus on the last few generations, looking back at most five hundred years and treating earlier history briefly, if at all—even though the main issue at dispute is whether the factors that gave the West dominance were already present in earlier times or appeared abruptly in the modern age.

A handful of thinkers approach the question very differently, focusing on distant prehistory then skipping ahead to the modern age, saying little about the thousands of years in between. The geographer and historian Alfred Crosby makes explicit what many of these scholars take for granted—that the prehistoric invention of agriculture was critically important, but "between that era and [the] time of development of the societies that sent Columbus and other voyagers across the oceans, roughly 4,000 years passed, during which little of importance happened, *relative to what had gone before.*"

This, I think, is mistaken. We will not find answers if we restrict our search to prehistory or modern times (nor, I hasten to add, would we find them if we limited ourselves to just the four or five millennia in between). The question requires us to look at the whole sweep of human history as a single story, establishing its overall shape, before discussing why it has that shape. This is what I try to do in this book, bringing a rather different set of skills to bear.

I was educated as an archaeologist and ancient historian, specializing in the classical Mediterranean of the first millennium BCE. When I started college at Birmingham University in England in 1978, most classical scholars I met seemed perfectly comfortable with the old long-term theory that the culture of the ancient Greeks, created two and a half thousand years ago, forged a distinctive Western way of life. Some of them (mostly older ones) would even say outright that this Greek tradition made the West better than the rest.

So far as I remember, none of this struck me as being a problem until I started graduate research at Cambridge University in the early 1980s, working on the origins of Greek city-states. This took me among anthropological archaeologists working on similar processes in other parts of the world. They openly laughed at the quaint notion that Greek culture was unique and had started a distinctive democratic and rational Western tradition. As people often do, for several years I managed to carry two contradictory notions in my head: on the one hand, Greek society evolved along the same lines as other ancient societies; on the other, it initiated a distinctive Western trajectory.

The balancing act got more difficult when I took my first faculty position, at the University of Chicago, in 1987. There I taught in Chicago's renowned History of Western Civilization program, ranging from ancient Athens to (eventually) the fall of communism. To stay even one day ahead of my students I had to read medieval and modern European history much more seriously than before, and I could not help noticing that for long stretches of time the freedom, reason, and inventiveness that Greece supposedly bequeathed to the West were more honored in the breach than the observance. Trying to make sense of this, I found myself looking at broader and broader slices of the human past. I was surprised how strong the parallels were between the supposedly unique Western experience and the history of other parts of the world, above all the great civilizations of China, India, and Iran.

Professors enjoy nothing more than complaining about their administrative burdens, but when I moved to Stanford University in 1995 I quickly learned that serving on committees could be an excellent way to find out what was going on outside my own little field. Since then I have directed the university's Social Science History Institute and Archaeology Center, served as chair of the Classics department and senior associate dean of the School of Humanities and Sciences, and run a large archaeological excavation—which all meant plenty of paperwork and headaches, but which also let me meet specialists in every field, from genetics to literary criticism, that might be relevant to working out why the West rules.

I learned one big thing: to answer this question we need a broad approach, combining the historian's focus on context, the archaeologist's awareness of the deep past, and the social scientist's comparative methods. We could get this combination by assembling a multidisciplinary team of specialists, pooling deep expertise across a range of fields, and that is in fact just what I did when I started directing an archaeological excavation on Sicily. I knew nowhere near enough about botany to analyze the carbonized seeds we found, about zoology to identify the animal bones, about chemistry to make sense of the residues in

storage vessels, about geology to reconstruct the landscape's formation processes, or about a host of other indispensable specialties, so I found specialists who did. An excavation director is a kind of academic impresario, bringing together talented artists who put on the show.

That is a good way to produce an excavation report, where the goal is to pile up data for others to use, but books-by-committee tend to be less good at developing unified answers to big questions. As a result, in the book you are reading now I take an *inter-* rather than *multi*disciplinary approach. Instead of riding shotgun over a herd of specialists, I strike off on my own to draw together and interpret the findings of experts in numerous fields.

This courts all kinds of dangers (superficiality, disciplinary bias, and just general error). I will never have the same subtle grasp of Chinese culture as someone who has spent a lifetime reading medieval manuscripts, or be as up-to-date on human evolution as a geneticist (I am told that the journal *Science* updates its website on average every thirteen seconds; while typing this sentence I have probably fallen behind again). But on the other hand, those who stay within the boundaries of their own disciplines will never see the big picture. The interdisciplinary, single-author model probably is the worst way to write a book like this—except for all the other ways. To me it certainly seems the least bad way to proceed, but you will have to judge from the results whether I am right.

So what are the results? I argue in this book that asking why the West rules is really a question about what I will call social development. By this I basically mean societies' abilities to get things done—to shape their physical, economic, social, and intellectual environments to their own ends. Back in the nineteenth century and well into the twentieth, Western observers mostly took it for granted that social development was an unquestioned good. Development is progress (or evolution, or History), they implicitly and often explicitly said, and progress—whether toward God, affluence, or a people's paradise—is the point of life. These days that seems less obvious. Many people feel that the

environmental degradation, wars, inequality, and disillusionment that social development brings in its train far outweigh any benefits it generates.

Yet whatever moral charge we put on social development, its reality is undeniable. Almost all societies today are more developed (in the sense I defined that word in the previous paragraph) than they were a hundred years ago, and some societies today are more developed than others. In 1842 the hard truth was that Britain was more developed than China—so developed, in fact, that its reach had become global. There had been empires aplenty in the past, but their reach had always been regional. By 1842, however, British manufacturers could flood China with their products, British industrialists could build iron ships that outgunned any in the world, and British politicians could send an expedition halfway around the globe.

Asking why the West rules really means asking two questions. We need to know both why the West is more developed—that is, more able to get things done—than any other region of the world, and why Western development rose so high in the last two hundred years that for the first time in history a few countries could dominate the entire planet.

The only way to answer these questions, I believe, is by measuring social development to produce a graph that—literally—shows the shape of history. Once we do that, we will see that neither long-term lock-in nor short-term accident theories explain the shape of history very well at all. The answer to the first question—why Western social development is higher than that of any other part of the world—does not lie in any recent accident: the West has been the most developed region of the world for fourteen of the last fifteen millennia. But on the other hand, neither was the West's lead locked in in the distant past. For more than a thousand years, from about 550 through 1775 CE, Eastern regions scored higher. Western rule was neither predetermined thousands of years ago nor a result of recent accidents.

Nor can either long-term or short-term theories by themselves answer the second question, of why Western social development has risen so high

compared to all earlier societies. As we will see, it was only around 1800 CE that Western scores began surging upward at astonishing rates; but this upturn was itself only the latest example of a very long-term pattern of steadily accelerating social development. The long term and the short term work together.

This is why we cannot explain Western rule just by looking at prehistory or just by looking at the last few hundred years. To answer the question we have to make sense of the whole sweep of the past. Yet while charting the rise and fall of social development reveals the shape of history and shows us what needs to be explained, it doesn't actually *do* the explaining. For that we need to burrow into the details.

Sloth, Fear, and Greed

"History, *n*. An account, mostly false, of events, mostly unimportant, which are brought about by rulers, mostly knaves, and soldiers, mostly fools." It is sometimes hard to disagree with Ambrose Bierce's comic definition: history can seem to be just one damned thing after another, a chaotic jumble of geniuses and dolts, tyrants and romantics, poets and thieves, accomplishing the extraordinary or scraping the barrel of depravity.

Such people stud the pages that follow, which is as it should be. After all, it is flesh-and-blood individuals, not vast impersonal forces, who do all the living, dying, creating, and fighting in this world. Yet behind all the sound and fury, I will argue, the past nevertheless has strong patterns, and with the right tools historians can see what they are and even explain them.

I will use three of these tools.

The first is biology,[3] which tells us what humans truly are: clever chimps. We are part of the animal kingdom, which is itself part of the larger empire of life, stretching from the great apes all the way down to amoebas. This very obvious truth has three important consequences.

First, like all life-forms, we survive because we extract energy from our

environment and turn that energy into more of ourselves.

Second, like all the more intelligent animals, we are curious creatures. We are constantly tinkering, wondering whether things are edible, whether we can have fun with them, whether we can improve them. We are just much better at tinkering than other animals, because we have big, fast brains with lots of folds to think things through, endlessly supple vocal cords to talk things through, and opposable thumbs to work things through.

That said, humans—like other animals—are obviously not all the same. Some extract more energy from the environment than others; some reproduce more than others; some are more curious, creative, clever, or practical than others. But the third consequence of our animalness is that large groups of humans, as opposed to individual humans, *are* all much the same. If you pluck two random people from a crowd, they may be as different as can be imagined, but if you round up two complete crowds they will tend to mirror each other rather closely. And if you compare groups millions strong, as I do in this book, they are likely to have very similar proportions of energetic, fertile, curious, creative, clever, talkative, and practical people.

These three rather commonsensical observations explain much of the course of history. For millennia social development has generally been increasing, thanks to our tinkering, and has generally done so at an accelerating rate. Good ideas beget more good ideas, and having once had good ideas we tend not to forget them. But as we will see, biology does not explain the whole history of social development. Sometimes social development has stagnated for long periods without rising at all; sometimes it has even gone into reverse. Just knowing that we are clever chimps is not enough.

This is where the second tool, sociology, comes in.[1] Sociology tells us simultaneously what causes social change and what social change causes. It is one thing for clever chimps to sit around tinkering, but it is another altogether for their ideas to catch on and change society. That, it seems, requires some sort of catalyst. The great science-fiction writer Robert Heinlein once suggested

that "Progress is made by lazy men looking for easier ways to do things." We will see later in this book that this Heinlein Theorem is only partly true, because lazy women are just as important as lazy men, sloth is not the *only* mother of invention, and "progress" is often a rather upbeat word for what happens. But if we flesh it out a little, I think Heinlein's insight becomes about as good a one-sentence summary of the causes of social change as we are likely to find. In fact, as the book goes on I will start passing off a less pithy version of it as my own Morris Theorem: "Change is caused by lazy, greedy, frightened people looking for easier, more profitable, and safer ways to do things. And they rarely know what they're doing." History teaches us that when the pressure is on, change takes off.

Greedy, lazy, frightened people seek their own preferred balance among being comfortable, working as little as possible, and being safe. But that is not the end of the story, because people's success in reproducing themselves and capturing energy inevitably puts pressure on the resources (intellectual and social as well as material) available to them. Rising social development generates the very forces that undermine further social development. I call this the paradox of development. Success creates new problems; solving them creates still newer problems. Life, as they say, is a vale of tears.

The paradox of development is constantly at work, confronting people with hard choices. Often people fail to rise to its challenges, and social development stagnates or even declines. At other times, though, sloth, fear, and greed combine to push some people to take risks, innovating to change the rules of the game. If at least a few of them succeed and if most people then adopt the successful innovations, a society might push through the resource bottleneck and social development will keep rising.

People confront, and solve, such problems every day, which is why social development has generally kept moving upward since the end of the last ice age. But as we will see, at certain points the paradox of development creates tough ceilings that will yield only to truly transformative changes. Social

development sticks at these ceilings, setting off a desperate race. In case after case we will see that when societies fail to solve the problems that confront them, a terrible package of ills—famine, epidemic, uncontrolled migration, and state failure—begins to afflict them, turning stagnation into decline; and when famine, epidemic, migration, and state failure are joined by further forces of disruption, like climatic change (collectively, I call these the five horsemen of the apocalypse), decline can turn into disastrous, centuries-long collapses and dark ages.

Between them, biology and sociology explain most of the shape of history—why social development has generally risen, why it rises faster at some times and slower at others, and why it sometimes falls. But these biological and sociological laws are constants, applying everywhere, in all times and all places. They by definition tell us about humanity as a whole, not about why people in one place have fared so differently from those in another. To explain that, I will argue throughout this book, we need a third tool: geography.[5]

Location, Location, Location

"The Art of Biography is different from Geography," the humorist Edmund Bentley observed in 1905; "Biography is about chaps, but Geography is about maps." For many years, chaps—in the British sense of upper-class men—dominated the stories historians told, to the point that history was barely distinguishable from biography. That changed in the twentieth century as historians made women, lower-class men, and children into honorary chaps too, adding their voices to the mix, but in this book I want to go further. Once we recognize that chaps (in large groups and in the newer, broader sense of the word) are all much the same, I will argue, all that is left is maps.

Many historians react to this claim like a bull to a red rag. It is one thing, several have said to me, to reject the old idea that a few great men determined that history would unfold differently in East and West; it is another altogether

to say that culture, values, and beliefs were unimportant and to seek the reason why the West rules entirely in brute material forces. Yet that is more or less what I propose to do.

I will try to show that East and West have gone through the same stages of social development in the last fifteen thousand years, in the same order, because they have been peopled by the same kinds of human beings, who generate the same kinds of history. But I will also try to show that they have not done so at the same times or at the same speed. I will conclude that biology and sociology explain the global similarities while geography explains the regional differences. And in that sense, it is geography that explains why the West rules.

Put so bluntly, this probably sounds like as hard-line a long-term lock-in theory as could be imagined, and there have certainly been historians who have seen geography that way. The idea goes back at least as far as Herodotus, the fifth-century-BCE Greek often credited with being the father of history. "Soft countries breed soft men," he insisted; and, like a string of determinists since him, he concluded that geography had destined his own homeland for greatness. Perhaps the most remarkable example is Ellsworth Huntington, a Yale University geographer who marshaled rafts of statistics in the 1910s to demonstrate that his hometown of New Haven, Connecticut, had an almost-ideal climate for stimulating people to greatness. (Only England was better.) By contrast, he concluded, the "too uniformly stimulating" climate of California—where I live—merely produced elevated rates of insanity. "The people of California," Huntington assured readers, "may perhaps be likened to horses which are urged to the limit so that some of them become unduly tired and break down."

It is easy to mock this kind of thing, but when I say that geography explains why the West rules I have something rather different in mind. Geographical differences do have long-term effects, but these are never locked in, and what counts as a geographical advantage at one stage of social development may be irrelevant or a positive disadvantage at another. We might say that while

geography drives social development, social development determines what geography means. It is a two-way street.

To explain this a bit better—and to give a quick road map for the rest of the book—I would like to look back twenty thousand years, to the coldest point in the last ice age. Geography then mattered very much: mile-thick glaciers covered much of the northern hemisphere, dry and barely habitable tundras fringed them, and only closer to the equator could small bands of humans make a living by gathering and hunting. Distinctions between the south (where people could live) and the north (where they could not) were extreme, but within the southern zone distinctions between East and West were relatively minor.

The end of the Ice Age changed the meaning of geography. The poles remained cold and the equator remained hot, of course, but in half a dozen places between these extremes—what, in Chapter 2, I will call the original cores—warmer weather combined with local geography to favor the evolution of plants and/or animals that humans could domesticate (that is, genetically modify to make them more useful, eventually reaching the point that the genetically modified organisms could survive only in symbiosis with humans). Domesticated plants and animals meant more food, which meant more people, which meant more innovation; but domestication also meant more pressure on the very resources that drove the process. The paradox of development went straight to work.

These core regions had all been fairly typical of the relatively warm, habitable regions during the Ice Age, but they now grew increasingly distinct, both from the rest of the world and from one another. Geography had favored them all, but had favored some more than others. One core, the so-called Hilly Flanks in western Eurasia, had uniquely dense concentrations of domesticable plants and animals; and since groups of people are all much the same, it was here, where resources were richest and the process easiest, that moves toward domestication began. That was around 9500 BCE.

Following what I hope is common sense, throughout this book I use the

expression "the West" to describe all the societies that have descended from this westernmost (and earliest) of the Eurasian cores. The West long ago expanded from the original core in southwest Asia[6] to encompass the Mediterranean Basin and Europe, and in the last few centuries the Americas and Australasia too. As I hope will become clear, defining "the West" like this (rather than picking on some supposedly uniquely "Western" values such as freedom, rationality, or tolerance, and then arguing about where these values came from and which parts of the world have them) has major consequences for understanding the world we live in. My goal is to explain why a particular set of societies that descend from the original Western core – above all, those of North America – now dominate the globe, rather than societies in another part of the West, societies descended from one of the other cores, or, for that matter, no societies at all.

Following the same logic, I use "the East" to refer to all those societies that descend from the easternmost (and second-oldest) of the Eurasian cores. The East also long ago expanded from its original core between China's Yellow and Yangzi rivers, where the domestication of plants began around 7500 BCE, and today stretches from Japan in the north into the countries of Indochina in the south.

The societies that descend from the other cores—a southeastern core in what is now New Guinea, a South Asian one in modern Pakistan and northern India, an African one in the eastern Sahara Desert, and two New World cores in Mexico and Peru—all have their own fascinating histories. I touch on these repeatedly in what follows, but I focus as relentlessly as I can on East-West comparisons. My reasoning is that since the end of the Ice Age, the world's most developed societies have almost always been ones that descended from either the original Western or the original Eastern core. While Albert in Beijing is a plausible alternative to Looty in Balmoral, Albert in Cuzco, Delhi, or New Guinea is not. The most efficient way to explain why the West rules is therefore to zero in on East-West comparisons, and that is what I have done.

Writing the book this way has its costs. A more properly global account, looking at every region of the world, would be richer and more nuanced, and would give the cultures of South Asia, the Americas, and other regions full credit for all the contributions they have made to civilization. But such a global version would also have drawbacks, particularly in loss of focus, and it would need even more pages than the book I did write. Samuel Johnson, eighteenth-century England's sharpest wit, once observed that while everyone admired *Paradise Lost*, "None ever wished it longer than it is." What applies to Milton, I suspect, applies even more to anything I might come up with.

If geography really did provide a Herodotus-style long-term lock-in explanation of history, I could wrap this book up rather quickly after pointing out that domestication began in the Western core around 9500 BCE and in the Eastern core around 7500. Western social development would simply have stayed two thousand years ahead of Eastern and the West would have gone through an industrial revolution while the East was still figuring out writing. But that, obviously, did not happen. As we will see in the chapters that follow, geography did not lock in history, because geographical advantages are always ultimately self-defeating. They drive up social development, but in the process social development changes what geography means.

As social development rises, cores expand, sometimes through migration and sometimes through copying or independent innovation by neighbors. Techniques that worked well in an older core—whether those techniques were agriculture and village life, cities and states, great empires, or heavy industry—spread into new societies and new environments. Sometimes these techniques flourished in the new setting; sometimes they just muddled along; and sometimes they needed huge modifications to work at all.

Odd as it may seem, the biggest advances in social development often come in places where methods imported or copied from a more developed core do not work very well. Sometimes this is because the struggle to adapt old methods to new environments forces people to make breakthroughs; sometimes it is

because geographical factors that do not matter much at one stage of social development matter much more at another.

Five thousand years ago, for instance, the fact that Portugal, Spain, France, and Britain stuck out from Europe into the Atlantic was a huge geographical disadvantage, meaning that these regions were a very long way from the real action in Mesopotamia[7] and Egypt. By five hundred years ago, however, social development had risen so much that geography changed its meanings. There were new kinds of ships that could cross what had always been impassable oceans, which abruptly made sticking out into the Atlantic a huge plus. It was Portuguese, Spanish, French, and English ships, rather than Egyptian or Iraqi ones, that started sailing to the Americas, China, and Japan. It was western Europeans who began tying the world together with maritime trade, and western European social development soared upward, overtaking the older core in the eastern Mediterranean.

I call this pattern the "advantages of backwardness,"[8] and it is as old as social development itself. When agricultural villages began turning into cities (soon after 4000 BCE in the West and 2000 BCE in the East), for instance, access to the particular soils and climates that had favored the initial emergence of agriculture began to matter less than access to great rivers that could be tapped to irrigate fields or used as trade routes. And as states kept expanding, access to great rivers started mattering less than access to metals, or to longer trade routes, or to sources of manpower. As social development changes, the resources it demands change too, and regions that once counted for little may discover advantages in their backwardness.

It is always hard to say in advance how the advantages of backwardness will play out: not all backwardness is equal. Four hundred years ago, for instance, it seemed to many Europeans that the booming plantations of the Caribbean had a brighter future than North America's farms. With hindsight we can see why Haiti turned into the poorest place in the western hemisphere and the United States into the richest, but predicting such outcomes is much harder.

One very clear consequence of the advantages of backwardness, though, was that the most developed region within each core moved around over time. In the West it shifted from the Hilly Flanks (in the age of early farmers) southward to the river valleys of Mesopotamia and Egypt as states emerged and then westward into the Mediterranean Basin as trade and empires became more important. In the East it migrated northward from the area between the Yellow and Yangzi rivers to the Yellow River basin itself, then westward to the Wei River and the region of Qin.

A second consequence was that the West's lead in social development fluctuated, partly because these vital resources—wild plants and animals, rivers, trade routes, manpower—were distributed in different ways across each core and partly because in both cores the processes of expansion and incorporation of new resources were violent and unstable, pushing the paradox of development into overdrive. The growth of Western states in the second millennium BCE, for example, made the Mediterranean Sea not only a highway for commerce but also a highway for forces of disruption. Around 1200 BCE Western states lost control, and migrations, state failures, famines, and epidemics set off a core-wide collapse. The East, which had no such inland sea, went through no comparable collapse, and by 1000 BCE the West's lead in social development had narrowed sharply.

Over the three thousand years that followed, the same pattern has played out again and again with constantly changing consequences. Geography determined where in the world social development would rise fastest, but rising social development changed what geography meant. At different points the great steppes linking eastern and western Eurasia, the rich rice lands of southern China, the Indian Ocean, and the Atlantic Ocean were all crucially important; and when the Atlantic rose to prominence in the seventeenth century CE, those people best placed to exploit it—at first chiefly the British, then their former colonists in America—created new kinds of empires and economies and unlocked the energy trapped in fossil fuels. And that, I will

argue, is why the West rules.

The Plan

I have divided the chapters that follow into three sections. Part I (Chapters 1–3) confronts the most basic issues: What is the West? Where do we start our story? What do we mean by "rule"? How can we tell who is leading or ruling? In Chapter 1, I set out the biological basis of the story in the evolution and dispersal of modern humans over the planet; in Chapter 2, I trace the formation and growth of the original Eastern and Western cores after the Ice Age; and in Chapter 3, I break the narrative to define social development and explain how I will use it to measure differences between East and West.[9]

In Part II (Chapters 4–10), I trace the stories of East and West in detail, asking constantly what explains their similarities and differences. In Chapter 4, I look at the rise of the first states and the great disruptions that wracked the Western core in the centuries down to 1200 BCE. In Chapter 5, I consider the first great Eastern and Western empires and how their social development rose toward the limits of what was possible in agricultural economies; then in Chapter 6, I discuss the great collapse that swept Eurasia after about 150 CE. In Chapter 7, we reach a turning point, with the Eastern core opening a new frontier and taking the lead in social development. By about 1100 CE the East was again pressing against the limits of what was possible in an agricultural world, but in Chapter 8 we will see how this set off a second great collapse. In Chapter 9, I describe the new frontiers that Eastern and Western empires created on the steppes and across the oceans as they recovered, and examine how the West closed the development gap on the East. Finally, in Chapter 10, we will see how the industrial revolution converted the West's lead into rule and the enormous consequences this had.

In Part III (Chapters 11 and 12) I turn to the most important question for any historian: So what? First, in Chapter 11, I pull together my argument that

behind all the details of what has happened in the last fifteen thousand years, two sets of laws—those of biology and sociology—determined the shape of history on a global scale, while a third set—those of geography—determined the differences between Eastern and Western development. It was the ongoing interplay between these laws, not long-term lock-ins or short-term accidents, that sent Looty to Balmoral rather than Albert to Beijing.

This is not how historians normally talk about the past. Most scholars seek explanations in culture, beliefs, values, institutions, or blind accident rather than the hard surfaces of material reality, and few would be caught dead speaking of laws. But after considering (and rejecting) some of these alternatives, I want to go one step further, suggesting in Chapter 12 that the laws of history in fact give us a pretty good sense of what is likely to happen next. History has not come to an end with Western rule. The paradox of development and the advantages of backwardness are still operating; the race between the innovations that drive social development upward and the disruptions that drag it down is still on. In fact, I will suggest, the race is hotter than ever. New kinds of development and disruption promise—or threaten—to transform not just geography but biology and sociology too. The great question for our times is not whether the West will continue to rule. It is whether humanity as a whole will break through to an entirely new kind of existence before disaster strikes us down—permanently.

Before East and West

What Is the West?

"When a man is tired of London," said Samuel Johnson, "he is tired of life; for there is in London all that life can afford." It was 1777, and every current of thought, every bright new invention, was energizing Dr. Johnson's hometown. London had cathedrals and palaces, parks and rivers, mansions and slums. Above all, it had things to buy—things beyond the wildest imaginings of previous generations. Fine ladies and gentlemen could alight from carriages outside the new arcades of Oxford Street, there to seek out novelties like the umbrella, an invention of the 1760s that the British soon judged indispensable; or the handbag, or toothpaste, both of them products of the same decade. And it was not just the rich who indulged in this new culture of consumption. To the horror of conservatives, tradesmen were spending hours in coffee shops, the poor were calling tea a "necessary," and farmers' wives were buying pianos.

The British were beginning to feel they were not like other people. In 1776 the Scottish sage Adam Smith had called them "a nation of shopkeepers" in his *Inquiry into the Nature and Causes of the Wealth of Nations*, but he had meant it as a compliment; Britons' regard for their own well-being, Smith insisted, was making everyone richer. Just think, he said, of the contrast between Britain and China. China had been "long one of the richest, that is, one of the most fertile,

best cultivated, most industrious, and most populous, countries of the world," but had already "acquired that full complement of riches which the measure of its laws and institutions permits it to acquire." The Chinese, in short, were stuck. "The competition of the labourers and the interest of the masters," Smith predicted, "would soon reduce them to the lowest rate which is consistent with common humanity," with the consequence that "the poverty of the lower ranks of people in China far surpasses that of the most beggarly nations in Europe... Any carrion, the carcase of a dead dog or cat, for example, though half putrid and stinking, is as welcome to them as the most wholesome food to the people of other countries."

Johnson and Smith had a point. Although the industrial revolution had barely begun in the 1770s, average incomes were already higher and more evenly distributed in England than in China. Long-term lock-in theories of Western rule often start from this fact: the West's lead, they argue, was a cause rather than a consequence of the industrial revolution, and we need to look back further in time—perhaps much further—to explain it.

Or do we? The historian Kenneth Pomeranz, whose book *The Great Divergence* I mentioned in the introduction, insists that Adam Smith and all the cheerleaders for the West who followed him were actually comparing the wrong things. China is as big and as varied, Pomeranz points out, as the whole continent of Europe. We should not be too surprised, then, that if we single out England, which was Europe's most developed region in Smith's day, and compare it with the average level of development in the whole of China, England scores higher. By the same token, if we turned things around and compared the Yangzi Delta (the most developed part of China in the 1770s) with the average level of development across the whole of Europe, the Yangzi Delta would score higher. Pomeranz argues that eighteenth-century England and the Yangzi Delta had more in common with each other (incipient industrialism, booming markets, complex divisions of labor) than England did with underdeveloped parts of Europe or the Yangzi Delta did with underdeveloped

parts of China—all of which leads him to conclude that long-term theorists get things back-to-front because their thinking has been sloppy. If England and the Yangzi Delta were so similar in the eighteenth century, Pomeranz observes, the explanation for Western rule must lie *after* this date, not before it.

One implication is clear: if we want to know why the West rules, we first need to know what "the West" is. As soon as we ask that question, though, things get messy. Most of us have a gut feeling about what constitutes "the West." Some people equate it with democracy and freedom; others with Christianity; others still with secular rationalism. In fact, the historian Norman Davies has found no fewer than twelve ways that academics define the West, united only by what he calls their "elastic geography." Each definition gives the West a different shape, creating exactly the kind of confusion that Pomeranz complains about. The West, says Davies, "can be defined by its advocates in almost any way that they think fit," meaning that when we get right down to it, "Western civilization is essentially an amalgam of intellectual constructs which were designed to further the interests of their authors."

If Davies is right, asking why the West rules means nothing more than arbitrarily picking some value to define the West, claiming that a particular set of countries exemplifies this value, then comparing that set with an equally arbitrary set of "non-Western" countries to reach whatever self-serving conclusions we like. Anyone who disagrees with our conclusions can simply choose a different value to exemplify Westernness, a different set of countries exemplifying it, and a different comparison set, coming—naturally—to a different but equally self-serving conclusion.

This would be pointless, so I want to take a different approach. Instead of starting at the end of the process, making assumptions about what count as Western values and then looking back through time to find their roots, I will start at the beginning. I will move forward through time from the beginning until we reach a point at which we can see distinctive ways of life emerging in different parts of the world. I will then call the westernmost of these distinctive

regions "the West" and the easternmost "the East," treating West and East for what they are- geographical labels, not value judgments.

Saying we must start at the beginning is one thing; finding it is another altogether. As we will see, there are several points in the distant past at which scholars have been tempted to define East and West in terms of biology, rejecting the argument I made in the introduction that folks (in large groups) are all much the same and instead seeing the people in one part of the world as genetically superior to everyone else. There are also points when it would be all too easy to conclude that one region has, since time immemorial, been culturally superior to all others. We must look into these ideas carefully, because if we make a misstep here at the start we will also get everything about the shape of the past, and therefore about the shape of the future, too, wrong.

In the Beginning

Every culture has had its own story about how things started, but in the last few years astrophysicists have given us some new, scientific versions. Most experts now think time and space began over 13 billion years ago, although they do not agree on just how that happened. The dominant "inflationary" theory holds that the universe initially expanded faster than the speed of light from an infinitely dense and infinitely small point, while a rival "cyclical" theory argues that it blew up when a previous universe collapsed. Both schools agree that our universe is still expanding, but while inflationists say it will continue to grow, the stars will go out, and eventually infinite darkness and coldness will descend, cyclists claim it will shrink back on itself, explode again, and start another new universe.

It is hard to make much sense of these theories unless you have had years of advanced mathematical training, but fortunately our question does not require us to begin quite so early. There could be neither East nor West when there were no directions at all and when the laws of nature did not exist. Nor

could East and West be useful concepts before our sun and planet took shape 4.5 billion years ago. Perhaps we can speak of East and West once the earth's crust formed, or at least once the continents reached something like their current positions, by which point we are already into the last few million years. Really, though, all these discussions are beside the point: East and West cannot mean anything for the question in this book until we add another ingredient to the mix—humans.

Paleoanthropologists, who study early humans, like controversy even more than historians do. Their field is young and fast moving, and new discoveries constantly turn established truths on their heads. If you get two paleoanthropologists into a room they are likely to come out with three theories of human evolution, and by the time the door shuts behind them, all will be out of date.

The boundary between humans and prehumans is necessarily fuzzy. Some paleoanthropologists think that as soon as we see apes that could walk upright we should start speaking of humans. Judging from the fossilized remains of hip and toe bones, some East African apes began doing this 6 or 7 million years ago. Most experts, though, think this sets the bar too low, and standard biological classifications in fact define the genus *Homo* ("mankind" in Latin) by bundling together an increase in brain size from 400–500 cubic centimeters to roughly 630 (our own brains are typically about twice as big) with the first evidence for upright apes smashing stones together to create crude tools. Both processes began among bipedal East African apes around 2.5 million years ago. Louis and Mary Leakey, the famous excavators of Olduvai Gorge in Tanzania (Figure 1.1), named these relatively big-brained, tool-using creatures *Homo habilis*, Latin for "Handy Man." (Until recently, paleoanthropologists, like most people, thought nothing of applying the word "man" to individuals of both sexes; that has changed, but by convention scientists still use single-sex names like Handy Man.)

East and West meant little when *Homo habilis* walked the earth—first,

because these creatures lived entirely within the forests of East Africa, and no regional variations had yet developed, and second, because the expression "walked the earth" is actually overly generous. Handy Men had toes and ankles like ours, and certainly did walk, but their long arms suggest that they also spent a lot of time in trees. These were fancy apes, but not much more. The marks their stone tools left on animal bones show that *Homo habilis* ate meat as well as plants, but it looks like they were still quite low on the food chain. Some paleoanthropologists defend a man-the-hunter theory, seeing *Homo habilis* as smart and brave enough to kill game armed with nothing more than sticks and broken stones, but others (rather more convincingly) see in *Homo habilis* man-the-scavenger, following the real killers (like lions) around, eating the bits they didn't want. Microscopic studies show that marks from Handy Man's tools did at least get onto animal bones before those from hyenas' teeth.


ASIA
Heidelberg
Schöningen
Neander Valley
Hohle Fels
Leipzig
Dolní Věstonice
Chauvet
Grotte Cussac
Altamira
Atapuerca
Gibraltar
Mediterranean Sea
Shanidar
Tešik-Taš
ALGERIA
ISRAEL
MOROCCO
AFRICA
River Nile
Nariokotome
Kalanda
Olduvai Gorge
Atlantic Ocean
Indian O
Mumbwa Cave
Apollo 11 Cave
Cape Town
Klasies Mouth Cave
Pinnacle Point

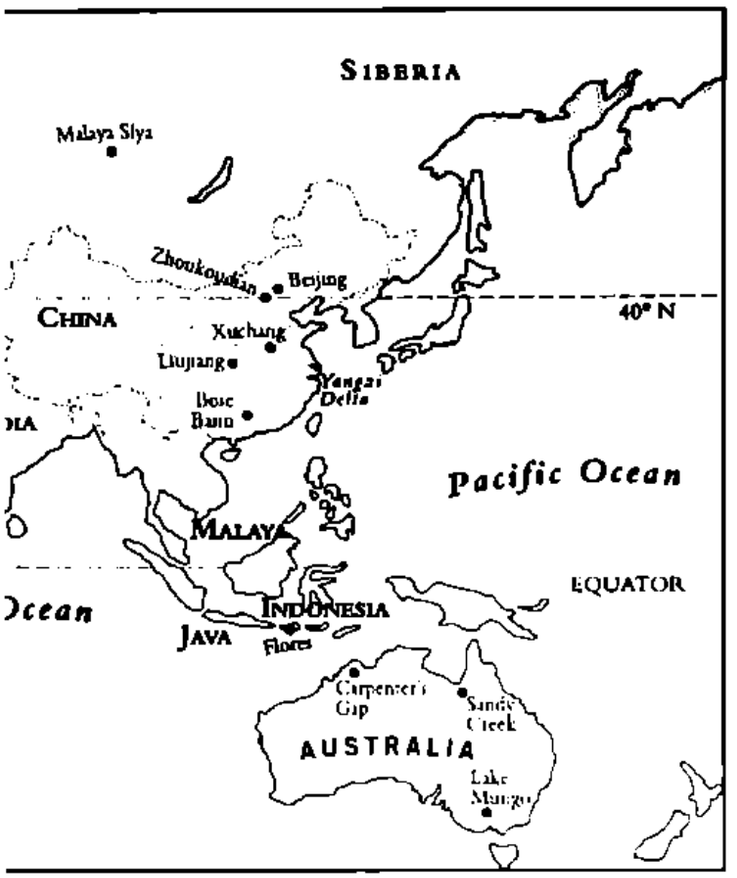


Figure 1.1. Before "East" and "West" meant much: locations in the Old World mentioned in this chapter

For 25,000 generations Handy Men scampered and swung through the trees in this little corner of the world, chipping stone tools, grooming each other, and mating. Then, somewhere around 1.8 million years ago, they disappeared. So far as we can tell this happened rather suddenly, although one of the problems in studying human evolution is the difficulty of dating finds precisely. Much of the time we depend on the fact that the layers of rock containing the fossil bones or tools may also contain unstable radioactive isotopes whose rate of decay is known, so that measuring the ratios between

the isotopes gives dates for the finds. These dates, however, can have margins of error tens of thousands of years wide, so when we say the world of *Homo habilis* ended suddenly, "suddenly" may mean a few lifetimes or a few thousand lifetimes.

When Charles Darwin was thinking about natural selection in the 1840s and 1850s he assumed that it worked through the slow accretion of tiny changes, but in the 1970s the biologist Stephen Jay Gould suggested instead that for long periods nothing much happens, then some event triggers a cascade of changes. Evolutionists nowadays divide over whether gradual change (evolution by creeps, as its critics call it) or Gould's "punctuated equilibrium" (evolution by jerks) is better as a general model, but the latter certainly seems to make most sense of *Homo habilis*'s disappearance. About 1.8 million years ago East Africa's climate was getting drier and open savannas were replacing the forests where *Homo habilis* lived; and at just that point, new kinds of ape-men[10] took Handy Man's place.

I want to hold off putting a name on these new ape-men, and for now will just point out that they had bigger brains than *Homo habilis*, typically about 800 cc. They lacked the long, chimplike arms of *Homo habilis*, probably meaning that they spent nearly all their time on the ground. They were also taller. A million-and-a-half-year-old skeleton from Nariokotome in Kenya, known as the Turkana Boy, belongs to a five-foot-tall child who would have reached six feet had he survived to adulthood. As well as being longer, his bones were less robust than those of *Homo habilis*, suggesting that he and his contemporaries relied more on their wits and tools than on brute strength.

Most of us think that being smart is self-evidently good. Why, then, if *Homo habilis* had the potential to mutate in this direction, did they putter along for half a million years before "suddenly" morphing into taller, bigger-brained creatures? The most likely explanation lies in the fact that there is no such thing as a free lunch. A big brain is expensive to run. Our own brains typically make up 2 percent of our body weight but use up 20 percent of the energy we

consume. Big brains create other problems too: it takes a big skull to hold a big brain· so big, in fact, that modern women have trouble pushing babies with such big heads down their birth canals. Women deal with this by in effect giving birth prematurely. If our babies stayed in the womb until they were almost self-sufficient (like other mammals), their heads would be too big for them to get out.

Yet risky childbirth, years of nurturing, and huge brains that burn up one fifth of our food intake are all fine with us--finer, anyway, than using the same amounts of energy to grow claws, more muscles, or big teeth. Intelligence is much more of a plus than any of these alternatives. It is less obvious, though, why a genetic mutation producing bigger brains gave ape-men enough advantages to make the extra energy costs worthwhile a couple of million years ago. If being smarter had not been beneficial enough to pay the costs of supporting these gray cells, brainy apes would have been less successful than their dumber relatives, and their smart genes would have quickly disappeared from the population.

Perhaps we should blame it on the weather. When the rains failed and the trees the ape-men lived in started dying, brainier and perhaps more sociable mutants might well have gained an edge over their more apelike relatives. Instead of retreating ahead of the grasslands, the clever apes found ways to survive on them, and in the twinkling of an eye (on the timescale of evolution) a handful of mutants spread their genes through the whole pool and completely replaced the slower-witted, undersized, forest-loving *Homo habilis*.

The Beginnings of East and West?

Whether because their home ranges got crowded, because bands squabbled, or just because they were curious, the new ape-men were the first such creatures to leave East Africa. Their bones have been found everywhere from the southern tip of the continent to the Pacific shores of Asia. We should not

imagine great waves of migrants like something out of a cowboy movie, though; the ape-men were surely barely conscious of what they were doing, and crossing these vast distances required even vaster stretches of time. From Olduvai Gorge to Cape Town in South Africa is a long way—two thousand miles—but to cover this ground in a hundred thousand years (the length of time it apparently took) ape-men only needed, on average, to expand their foraging range by 35 yards each year. Drifting northward at the same rate would take them to the threshold of Asia, and in 2002 excavators at Dmanisi in the Republic of Georgia found a 1.7-million-year-old skull that combines features of *Homo habilis* and the newer ape-men. Stone tools from China and fossil bones from Java (then still joined to the Asian mainland) may be almost as old, implying that after leaving Africa the ape-men picked up speed, averaging a cracking pace of 140 yards per year.[11]

We can only realistically expect to distinguish Eastern and Western ways of life after ape-men left East Africa, spreading through the warm, subtropical latitudes as far as China; and an East-West distinction may be just what we do find. By 1.6 million years ago, there are obvious Eastern and Western patterns in the archaeological record. The question, though, is whether these contrasts are important enough that we should imagine distinct ways of life lying behind them.

Archaeologists have known about these East-West differences since the 1940s, when the Harvard archaeologist Hallam Movius noticed that the bones of the new, brainy ape-men were often found in association with new kinds of flaked stone tools. Archaeologists called the most distinctive of these tools "Acheulean hand axes" ("ax" because they look like axheads, even though they were clearly used for cutting, poking, and pounding as well as chopping; "hand" because they were handheld, rather than being attached to sticks; and Acheulean after the small French town of St. Acheul, where they were first found in large numbers). Calling these tools works of art might be excessive, but their simple symmetry is often much more beautiful than Handy Men's cruder

flakes and chopping tools. Movius noticed that while Acheulean hand axes were common in Africa, Europe, and southwest Asia, none had been found in East or Southeast Asia. Instead, Eastern sites produced rougher tools much like the pre-Acheulean finds associated with *Homo habilis* in Africa.

If the so-called Movius Line (Figure 1.2) really does mark the beginning of separate Eastern and Western ways of life, it could also provide an astonishingly long-term lock-in theory—one holding that almost as soon as ape-men moved out of Africa, they divided between Western/technologically advanced/Acheulean hand ax cultures in Africa and southwest Asia and Eastern/technologically less advanced/flake-and-chopper cultures in East Asia. No wonder the West rules today, we might conclude: it has led the world technologically for a million and a half years.

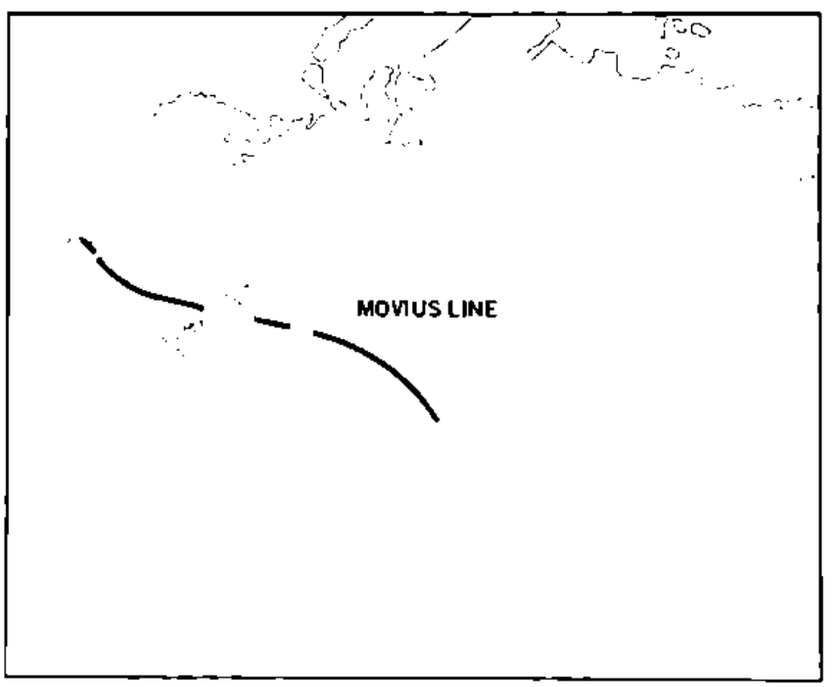


Figure 1.2. The beginnings of East and West? This map shows the Movius Line, which for about a million years separated Western hand-ax-using cultures from Eastern flake-and-chopper-using

Identifying the Movius Line, though, is easier than explaining it. The earliest Acheulean hand axes, found in Africa, are about 1.6 million years old, but there were already ape-men at Dmanisi in Georgia a hundred thousand years before that. The first ape-men clearly left Africa before the Acheulean hand ax became a normal part of their toolkit, carrying pre-Acheulean technologies across Asia while the Western/African region went on to develop Acheulean tools.

A quick glance at Figure 1.2, though, shows that the Movius Line does not divide Africa from Asia; it actually runs through northern India. This is an important detail. The first migrants left Africa *before* Acheulean hand axes were invented, so there must have been subsequent waves of migration out of Africa, bringing hand axes to southwest Asia and India. So we need to ask a new question: Why did these later waves of ape-men not take Acheulean technology even farther east?

The most likely answer is that rather than marking the boundary between a technologically advanced West and a less-advanced East, the Movius Line merely separates Western regions where access to the sort of stones needed for hand axes is easy from Eastern areas where such stones are rare and where good alternatives—such as bamboo, which is tough but does not survive for us to excavate—are easily available. According to this interpretation, as hand-ax users drifted across the Movius Line they gradually gave Acheulean tools up because they could not replace broken ones. They carried on producing choppers and flakes, for which any old pebble would do, but perhaps started using bamboo for tasks previously done with stone hand axes.

Some archaeologists think finds from the Bose Basin in south China support this thinking. About 800,000 years ago a huge meteor crashed here. It was a disaster on an epic scale, and intense fires burned millions of acres of forest. Before the impact, ape-men in the Bose Basin had used choppers, flakes,

and (presumably) bamboo, like other East Asians; but when they returned after the fires they started making hand axes rather like the Acheulean ones perhaps, the theory runs, because the fires had burned off all the bamboo, in the process exposing usable cobbles. After a few centuries, as the vegetation grew back, the locals gave up hand axes and went back to bamboo.

If this speculation is right, East Asian ape-men were perfectly capable of making hand axes when conditions favored these tools, but normally did not bother because alternatives were more easily available. Stone hand axes and bamboo tools were just two different tools for doing the same jobs, and ape-men all lived in much the same ways, whether they found themselves in Morocco or Malaya.

That makes reasonable sense, but, this being prehistoric archaeology, there are other ways of looking at the Movius Line too. So far I have avoided giving a name to the ape-men who used Acheulean hand axes, but at this point the name we give them starts to matter.

Since the 1960s most paleoanthropologists have called the new species that evolved in Africa about 1.8 million years ago *Homo erectus* ("Upright Man") and have assumed that these creatures wandered through the subtropical latitudes to the shores of the Pacific Ocean. In the 1980s, however, some experts began focusing on subtle differences between *Homo erectus* skulls found in Africa and those found in East Asia. They suspected that they were in fact looking at two different species of ape-men. They coined a new name, *Homo ergaster* ("Working Man"), for those who evolved in Africa 1.8 million years ago and then spread all the way to China. Only when *Homo ergaster* reached East Asia, they suggested, did *Homo erectus* evolve from them. *Homo erectus* was therefore a purely East Asian species, distinct from the *Homo ergaster* who filled Africa, southwest Asia, and India.

If this theory is correct, the Movius Line was not just a trivial difference in tool types: it was a genetic watershed that split early ape-men in two. In fact, it raises the possibility of what we might call the mother of all long-term lock-in

theories: that East and West are different because Easterners and Westerners are—and have been for more than a million years—different kinds of human beings.

The First Easterners: Peking Man

This technical debate over classifying prehistoric skeletons has potentially alarming implications. Racists are often eager to pounce on such details to justify prejudice, violence, and even genocide. You might feel that taking the time to talk about a theory of this kind merely dignifies bigotry; perhaps we should just ignore it. But that, I think, would be a mistake. Pronouncing racist theories contemptible is not enough. If we really want to reject them, and to conclude that people (in large groups) really are all much the same, it must be because racist theories are wrong, not just because most of us today do not like them.

Basically, we do not know whether there was just one kind of ape-man on earth around 1.5 million years ago—meaning that ape-men (in large groups) were all much the same from Africa to Indonesia—or whether there was one distinct species of *Homo ergaster* west of the Movius Line and another of *Homo erectus* east of it. Only further research will clear that question up. But we do know, without a shadow of doubt, that within the last million years distinct species of ape-men *did* evolve in East and West.

Geography probably had a lot to do with this. The ape-men that drifted out of Africa around 1.7 million years ago were well adapted to subtropical climes, but as they wandered northward, deeper into Europe and Asia, they had to face longer and harsher winters. Living in the open air, like their African ancestors, became increasingly impractical as they advanced toward a line roughly 40 degrees north of the equator (running from the top of Portugal to Beijing; see Figure 1.1). So far as we can tell, building huts and making clothes were beyond their mental capacities, but they could figure out one response: take shelter in

caves. Thus were born the cavemen we all heard about as children.

Cave-dwelling was a mixed blessing for the ape-men, who regularly had to share space with bears and lion-sized hyenas whose teeth could crunch up bones. It was a godsend for archaeologists, though, because caves preserve prehistoric deposits well, allowing us to trace how the evolution of ape-men began diverging in the Eastern and Western parts of the Old World as different adaptations to the colder climates took hold.

For understanding Eastern ape-men, the most important site is Zhoukoudian near Beijing, right on the 40-degree line, occupied on-and-off from about 670,000 through 410,000 years ago. The story of its excavation is an epic in its own right, and forms the backdrop to part of Amy Tan's excellent novel *The Bonesetter's Daughter*. While European, American, and Chinese archaeologists were digging here between 1921 and 1937, the hills around the site became the front line in a brutal civil war among Nationalists, Communists, and assorted homegrown warlords. The excavators often worked to the sound of gunfire and had to dodge bandits and checkpoints to take their finds back to Beijing. The project finally collapsed when Japan invaded China, Zhoukoudian became a Communist base, and Japanese troops tortured and murdered three members of the team.

Matters then went from bad to worse. In November 1941, when war between Japan and the United States looked certain, a decision was taken to ship the finds to New York for safekeeping. Technicians packed them into two large crates to await collection in a car from the American embassy in Beijing. No one knows for sure if the car ever came, or where, if it did come, it took the crates. One story has it that Japanese soldiers intercepted the U.S. Marines escorting the finds at the very moment bombs started falling on Pearl Harbor, arrested them, and abandoned the priceless finds. Life was cheap in those dark days, and no one paid much attention to a few boxes of rocks and bones.

But all was not lost. The Zhoukoudian team had published their finds meticulously and had sent plaster casts of the bones to New York—an early

example of the importance of backing up data. These show that by 600,000 years ago Peking Man[12] (as the excavators dubbed the Zhoukoudian ape-men) had diverged from tall, lanky Africans like the Turkana Boy toward a stockier form, better suited to cold. Peking Men were typically around five feet three inches tall and less hairy than modern apes, though if you ran into one on Main Street it would certainly be disconcerting. They had short, wide faces, with low, flat foreheads, a heavy single eyebrow, and a big jaw with almost no chin.

Conversation with Peking Man would be a challenge. So far as we can tell, the basal ganglia (the parts of the brain that allow modern humans to combine a small number of mouth movements into an infinite number of utterances) of *Homo erectus* were poorly developed. The well-preserved skeleton of the Turkana Boy also has a neural canal (holding the spinal cord) only three quarters as wide as a modern human's, suggesting that he could not control his breathing precisely enough to talk anything like we do.

That said, other finds suggest—indirectly—that ape-men in the Eastern Old World could communicate, after a fashion. In 1994 archaeologists on the little island of Flores near Java excavated what appeared to be 800,000-year-old stone tools. Eight hundred thousand years ago Flores was definitely an island, separated from the mainland by twelve miles of ocean; all of which seemed to mean that *Homo erectus* must have been able to communicate well enough to make boats, sail over the horizon, and colonize Flores. Other archaeologists, however, dismayed at the idea of boat-building *Homo erectus*, countered that perhaps these "tools" were not tools at all; maybe they were simply rocks bashed into misleading shapes by natural processes.

The argument could easily have deadlocked, as archaeological debates so often do, but in 2003 Flores yielded up even more astonishing discoveries. A deep sounding exposed eight skeletons, all dating around 16,000 BCE, all belonging to adults, and all under four feet tall. The first of Peter Jackson's films of *The Lord of the Rings* had just come out, and journalists immediately labeled these prehistoric little people "hobbits," after J.R.R. Tolkien's furry-footed

halflings. When animal populations are isolated on islands where there are no predators they quite often evolve into dwarf forms, and this is presumably how the "hobbits" came to be so small. To have shrunk to hobbit size by 16,000 BCE, though, ape-men must have colonized Flores many thousands of generations earlier—perhaps even as long as 800,000 years ago, as the stone tools found in 1994 suggest. The implication, once again, is that *Homo erectus* could communicate well enough to cross the sea.

The ape-men at Zhoukoudian, then, could probably make themselves understood much better than chimpanzees or gorillas, and the deposits from the cave suggest that they could also make fire at will. On at least one occasion Peking Men roasted a wild horse's head. Cuts on the skull show they were after its tongue and brain, both rich in fats. They may have been fond of one another's brains too: in the 1930s the excavators inferred cannibalism and even headhunting from bone-breakage patterns. A 1980s study of the plaster casts showed that most of the marks on the skulls were actually caused by the teeth of prehistoric giant hyenas rather than other Peking Men, but one skull—an additional fragment of which was excavated in 1966—definitely shows stone tool marks.

If instead of bumping into a Peking Man on a modern Main Street you could take a time machine back to Zhoukoudian half a million years ago, you would have a disorienting and alarming experience. You would see the cavemen communicating, perhaps with grunts and gestures, but you would not be able to talk to them. Nor could you get through to them by drawing pictures; there is no good evidence that art made any more sense to *Homo erectus* than it does to chimpanzees. The Peking Men that evolved in the Eastern Old World were very different from us.

The First Westerners: Neanderthals

But were Peking Men also different from the ape-men that were evolving in the

Western Old World? The oldest finds from Europe, made in 1994 in a chain of caves at Atapuerca in Spain, date back about 800,000 years (roughly to the time that *Homo erectus* may have taken to boats and colonized Flores). In some ways, the Atapuerca finds were rather like those from Zhoukoudian: many of the bones were crisscrossed with cut marks from stone tools exactly like those that butchery would produce.

The hints of cannibalism grabbed headlines, but paleoanthropologists were even more excited by the ways in which Atapuerca differed from Zhoukoudian. The Atapuerca skulls had bigger brain cavities than those of *Homo erectus* and rather modern-looking noses and cheekbones. The paleoanthropologists concluded that a new species was emerging, which they called *Homo antecessor* ("Ancestral Man").

Homo antecessor helped make sense of a string of finds going back to 1907, when workmen had turned up a strange jawbone in a sandpit in Germany. This species, named Heidelberg Man after a nearby university town, looked much like *Homo erectus* but had heads more like ours, with high, rounded skulls and brains of about 1,000 cc—much bigger than the 800 cc average for *Homo erectus*. It looks as if the pace of evolutionary change accelerated all across the Old World after 800,000 years ago as ape-men entering the cold north encountered wildly different climates where random genetic mutations could flourish.[13]

Here at last we have some incontrovertible facts. By 600,000 years ago, when Heidelberg Man came onto the scene and Peking Man ruled the roost at Zhoukoudian, there were definitely different species of *Homo* in the Eastern and Western parts of the Old World: in the East the small-brained *Homo erectus* and in the West the larger-brained *Homo antecessor* and Heidelberg Man.[14]

When it comes to brains, size is not everything. Anatole France won the Nobel Prize for literature in 1921 with a brain no bigger than Heidelberg Man's. Yet Heidelberg Man does seem to have been a lot smarter than earlier ape-men

or contemporary Peking Man. Before Heidelberg Man showed up, stone tools had barely changed for a million years, but by 500,000 BCE Heidelberg Man was making thinner and therefore lighter versions, striking more delicate flakes using soft (probably wood) hammers as well as just banging rocks together. This suggests better hand-eye coordination. Heidelberg Men and Women also made more specialized tools and began preparing specially shaped stone cores from which they could strike further tools at will, which must mean that they were just a lot better than *Homo erectus* at thinking about what they wanted from the world and how to get it. The very fact that Heidelberg Man could survive at Heidelberg, well north of the 40-degree line, is itself evidence of a smarter ape-man.

Zhoukoudian's occupants changed little between 670,000 and 410,000 years ago, but Western ape-men continued evolving across this period. If you crawl several hundred yards into the dank Spanish caves at Atapuerca, mostly on your belly and sometimes using ropes, you come to a forty-foot drop into the aptly named Pit of Bones—the densest concentration of ape-man remains ever found. More than four thousand fragments have been recovered here since the 1990s, dated between 564,000 and 600,000 years ago. Most belong to teenagers or young adults. What they were doing so far beneath the earth remains a mystery, but like the older Atapuerca deposit, the Pit of Bones has remarkably diverse human remains. The Spanish excavators classify most of them as Heidelberg Man, but many foreign scholars think they look more like yet another species—the Neanderthals.

These most famous of cavemen were first recognized in 1856, when quarry workers in the Neander Valley (Tal or Thal in German) showed a local schoolteacher a skullcap and fifteen bones they had found (excavations in the 1990s recovered a further sixty-two fragments from the workers' waste dump). The teacher showed them to an anatomist, who, with impressive understatement, pronounced them "pre-Germanic."

The Atapuerca finds suggest that Neanderthals emerged gradually across a

quarter of a million years. Rather than climate change or expansion into new areas providing conditions for a few mutants to out-breed and replace Heidelberg Man, this may have been a case of genetic drift, with many different kinds of ape-men developing alongside one another. "Classic" Neanderthals appeared by 200,000 years ago and within another hundred thousand years spread over much of Europe and east into Siberia, though so far as we know they did not reach China or Indonesia.

Just how much did Neanderthals differ from Peking Men? They were typically about the same height as Eastern ape-men and were even more primitive-looking, with sloping foreheads and weak chins. They had big front teeth, often worn down from use as tools, set in forward-thrust faces with large noses, the latter perhaps an adaptation to the cold air of Ice Age Europe. Neanderthals were more heavily built than Peking Men, with broader hips and shoulders. They were as strong as wrestlers, had the endurance of marathon runners, and seem to have been ferocious fighters.

Despite having much heavier bones than most ape-men, Neanderthals got injured a lot; the closest modern parallel to their bone-breakage patterns, in fact, comes from professional rodeo riders. Since there were no bucking broncos to fall off a hundred thousand years ago (modern horses would not evolve until 4000 BCE), paleoanthropologists are confident that Neanderthals got hurt fighting—with one another and with wild animals. They were dedicated hunters; analysis of nitrogen isotopes from their bones shows that they were massively carnivorous, getting an amazing proportion of their protein from meat. Archaeologists had long suspected that Neanderthals got some of their meat by eating one another, just like Peking Man, and in the 1990s finds in France proved this beyond a doubt. The bones of half a dozen Neanderthals were found mixed with those of five red deer. The ape-men and deer had been treated exactly the same way: first they were cut into pieces with stone tools, then the flesh was sliced off their bones, and finally their skulls and long bones were smashed to get at their brains and marrow.

The details I have emphasized so far make Neanderthals sound not so different from Peking Men, but there is more to the story than this. For one thing, Neanderthals had big brains—even bigger brains than ours, in fact, averaging around 1,520 cc to our 1,350 cc. They also had wider neural canals than the Turkana Boy, and these thick spinal cords gave them more manual dexterity. Their stone tools were better made and more varied than Peking Men's, with specialized scrapers, blades, and points. Traces of tar on a stone point found embedded in a wild ass's neck in Syria suggest that it had been a spearhead attached to a stick. Wear patterns on tools suggest that Neanderthals used them mostly for cutting wood, which rarely survives, but at the waterlogged German site of Schöningen four beautifully carved seven-foot-long spears turned up near heaps of wild horse bones. The spears were weighted for thrusting, not throwing; for all their smartness, Neanderthals may not have been coordinated enough to use missile weapons.

The need to get up close to scary animals may account for Neanderthals' rodeo-rider injuries, but some finds, especially from Shanidar Cave in Iraq, hint at entirely different qualities. One skeleton showed that a man had survived with a withered arm and deformed legs for years, despite losing his right forearm and left eye (in her bestselling novel *The Clan of the Cave Bear*, Jean Auel based her character Creb—the disabled spiritual leader of a Neanderthal band living in Crimea—on this skeleton). Another man at Shanidar had crippling arthritis in his right ankle, but also managed to get by, at least until a stab wound killed him. Having bigger brains doubtless helped the weak and injured to help themselves; Neanderthals could definitely make fire at will and could probably turn animal skins into clothes. All the same, it is hard to see how the Shanidar men could have coped without help from able-bodied friends or family. Even the most austere scientists agree that Neanderthals—by contrast with all earlier kinds of *Homo* and their contemporaries at Zhoukoudian—showed something we can only call "humanity."

Some paleoanthropologists even think that Neanderthals' big brains and

wide neural canals allowed them to talk more or less like us. Like modern humans they had hyoid bones, which anchor the tongue and let the larynx make the complex movements needed for speech. Other scholars disagree, though, noting that Neanderthal brains, while big, were longer and flatter than ours, and that the speech areas were probably less developed. They also point out that although the relevant areas survive on the bases of only three skulls, it looks as if Neanderthals' larynxes were very high in their necks, meaning that despite their hyoid bones they could vocalize only a narrow range of sounds. Maybe they could just grunt single syllables (what we might call the "me Tarzan, you Jane" model), or maybe they could express important concepts—"come here," "let's go hunting," "let's make stone tools/dinner/love"—by combining gestures and sounds (the *Clan of the Cave Bear* model, where Neanderthals have an elaborate sign language).

In 2001 it began to look like genetics might settle things. Scientists found that one British family that for three generations had shared a speech disorder called verbal dyspraxia also shared a mutation on a gene called FOXP2. This gene, it turned out, codes for a protein influencing how the brain processes speech and language. This does not mean that FOXP2 is "the language gene": speech is a bewilderingly complex process involving countless genes working together in ways we cannot yet fathom. FOXP2 came to geneticists' attention because sometimes it just needs one thing to go wrong for a whole system to crash. A mouse chews through a two-cent wire and my twenty-thousand-dollar car won't start; FOXP2 malfunctions and the brain's elaborate speech networks seize up. All the same, some archaeologists suggested, maybe random mutations producing FOXP2 and related genes gave modern humans linguistic skills that earlier species, including Neanderthals, lacked.

But then the plot thickened. As everyone now knows, deoxyribonucleic acid (DNA—is the basic building block of life, and in 2000 geneticists sequenced the modern human genome. What is less well known is that back in 1997, in a scene reminiscent of *Jurassic Park*, scientists in Leipzig, Germany, extracted

ancient DNA from the arm of the original Neanderthal skeleton found in the Neander Valley in 1856. This was an extraordinary feat, since DNA begins breaking down immediately upon death, and only tiny fragments survive in such ancient material. The Leipzig team is not about to clone cavemen and open a Neanderthal Park, so far as I know,[15] but in 2007 the process of sequencing a draft of the Neanderthal genome (which was completed in 2009) produced a remarkable discovery—that Neanderthals also had the FOXP2 gene.

Maybe this means that Neanderthals were as chatty as us; or maybe that FOXP2 was not the key to speech. One day we will surely know, but for now all we can do is observe the consequences of Neanderthals' interactions. They lived in bigger groups than earlier types of ape-men, hunted more effectively, occupied territories for longer periods, and cared about one another in ways earlier ape-men could not.

They also deliberately buried some of their dead, and perhaps even performed rituals over them—the earliest signs of that most human quality of all, a spiritual life, *if* we are interpreting the evidence correctly. At Shanidar, for instance, several bodies had definitely been buried, and the soil in one grave contained high concentrations of pollen, which might mean that some Neanderthals laid a loved one's body on a bed of spring flowers. (Rather less romantically, some archaeologists point out that the grave was honeycombed with rat burrows, and that rats often carry flowers into their lairs.)

In a second case, at Monte Circeo near Rome, construction workers in 1939 exposed a cave that had been sealed by a rockfall fifty thousand years ago. They told archaeologists that a Neanderthal skull sat on the floor in the middle of a circle of rocks, but because the workers moved the skull before experts saw it, many archaeologists harbor doubts.

Finally, there is Teshik-Tash in Uzbekistan. Here Hallam Movius (he of Movius Line fame) found the skeleton of a boy encircled, he said, by five or six pairs of wild goat horns. However, the deposits at Teshik-Tash are full of goat horns, and Movius never published plans or photographs of the finds to

convince skeptics that these particular ones were in a meaningful pattern.

We need clearer evidence to lay this question to rest. Personally, I suspect that there is no smoke without fire, and that Neanderthals did have some kind of spiritual life. Perhaps they even had medicine women and shamans like Iza and Creb in *The Clan of the Cave Bear*. Whether that is right or not, though, if the time machine I invoked earlier could transport you to Shanidar as well as to Zhoukoudian, you would see real behavioral differences between Eastern Peking Man and Western Neanderthals. You would also be hard-pressed to avoid concluding that the West was more developed than the East. This may already have been true 1.6 million years ago, when the Movius Line took shape, but it was definitely true a hundred thousand years ago. Again the specter of a racist long-term lock-in theory rears its head: Does the West rule today because modern Europeans are the heirs of genetically superior Neanderthal stock, while Asians descend from the more primitive *Homo erectus*?

Baby Steps

No.

Historians like giving long, complicated answers to simple questions, but this time things really do seem to be straightforward. Europeans do not descend from superior Neanderthals, and Asians do not descend from inferior *Homo erectus*. Starting around seventy thousand years ago, a new species of *Homo*—us—drifted out of Africa and completely replaced all other forms.[16] Our kind, *Homo sapiens* ("Wise Man"), did interbreed with Neanderthals in the process. Modern Eurasians share 1 to 4 percent of their genes with the Neanderthals, but everywhere from France to China it is the same 1 to 4 percent.[17] The spread of modern humans wiped the slate clean. Evolution of course continues, and local variations in skin color, face shape, height, lactose tolerance, and countless other things have appeared in the two thousand generations since we began spreading across the globe. But when we get right

down to it, these are trivial. Wherever you go, whatever you do, people (in large groups) are all much the same.

The evolution of our species and its conquest of the planet established the biological unity of mankind and thereby the baseline for any explanation of why the West rules. Humanity's biological unity rules out race-based theories. Yet despite the overwhelming importance of these processes, much about the origins of modern humans remains obscure. By the 1980s archaeologists knew that skeletons more or less like ours first appeared around 150,000 years ago on sites in eastern and southern Africa. The new species had flatter faces, more retracted under their foreheads, than earlier ape-men. They used their teeth less as tools, had longer and less muscular limbs, and had wider neural canals and larynxes positioned better for speaking. Their brain cavities were a little smaller than Neanderthals' but their skullcaps were higher and more domed, leaving room for bigger speech and language centers and stacked layers of neurons that could perform massive numbers of calculations in parallel.

The skeletons suggested that the earliest *Homo sapiens* could walk the walk just like us, but—oddly—the archaeology suggested that for a hundred thousand years they stubbornly refused to talk the talk. *Homo sapiens* tools and behavior looked much like those of earlier ape-men, and—again like other ape-men, but utterly unlike us—early *Homo sapiens* seemed to have had just one way of doing things. Regardless of where archaeologists dug in Africa, they kept coming up with the same, not particularly exciting, kinds of finds. Unless, that is, they excavated *Homo sapiens* sites less than fifty thousand years old. On these younger sites *Homo sapiens* started doing all kinds of interesting things, and doing them in lots of different ways. For instance, archaeologists identify no fewer than six distinct styles of stone tools in use in Egypt's Nile Valley between 50,000 and 25,000 BCE, whereas before then a single fashion prevailed from South Africa to the shores of the Mediterranean.

Humans had invented style. Chipping stone tools this way, rather than that way, now marked a group off as different from their neighbors; chipping them a

third way marked a new generation as different from their elders. Change remained glacial by the standards we are used to, when pulling out a four-year-old cell phone that can't make movies, locate me on a map, or check e-mail makes me look like a fossil, but it was meteoric compared to all that had gone before.

As any teenager coming home with hair dyed green or a new piercing will tell you, the best way to express yourself is to decorate yourself, but until fifty thousand years ago, it seemed that almost no one had felt this way. Then, apparently, almost everyone did. At site after site across Africa after 50,000 BCE archaeologists find ornaments of bone, animal tooth, and ivory; and these are just the activities that leave remains for us to excavate. Most likely all those other forms of personal adornment we know so well—hairstyles, makeup, tattoos, clothes—appeared around the same time. A rather unpleasant genetic study has suggested that human body lice, which drink our blood and live in our clothes, evolved around fifty thousand years ago as a little bonus for the first fashionistas.

"What a piece of work is a man!" gasps Hamlet when his friends Rosencrantz and Guildenstern come to spy on him. "How noble in reason! how infinite in faculty! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god!" And in all these ways, how unlike an ape-man. By 50,000 BCE modern humans were thinking and acting on a whole different plane from their ancestors. Something extraordinary seemed to have happened—something so profound, so magical, that in the 1990s it moved normally sober scientists to flights of rhetoric. Some spoke of a Great Leap Forward;[15] others of the Dawn of Human Culture or even the Big Bang of Human Consciousness.

But for all their drama, these Great Leap Forward theories were always a little unsatisfactory. They required us to imagine not one but two transformations, the first (around 150,000 years ago) producing modern human bodies but not modern human behavior, and the second (around

50,000 years ago) producing modern human behavior but leaving our bodies unchanged. The most popular explanation was that the second transformation --the Great Leap—began with purely neurological changes that rewired the brain to make modern kinds of speech possible, which in turn drove a revolution in behavior; but just what this rewiring consisted of (and why there were no related changes to skulls) remained a mystery.

If there is anywhere that evolutionary science has left room for supernatural intervention, some superior power breathing a spark of divinity into the dull clay of ape-men, surely it is here. When I was (a lot) younger I particularly liked the story that opens Arthur C. Clarke's science-fiction novel *2001: A Space Odyssey* (and Stanley Kubrick's memorable, if hard to follow, movie version). Mysterious crystal monoliths drop from outer space to Earth, come to upgrade our planet's ape-men before they starve into extinction. Night after night Moon-Watcher, the alpha ape-man in one band of earthlings, feels what Clarke calls "inquisitive tendrils creeping down the unused byways of his brain" as a monolith sends him visions and teaches him to throw rocks. "The very atoms of his simple brain were being twisted into new patterns," says Clarke. And then the monolith's mission is done: Moon-Watcher picks up a discarded bone and brains a piglet with it. Depressingly, Clarke's vision of the Big Bang of Human Consciousness consists entirely of killing things, culminating in Moon-Watcher murdering One-Ear, the top ape-man in a rival band. Next thing the reader knows, we are in the space age.

Clarke set his *2001* moment 3 million years ago, presumably to account for the invention of tools by *Homo habilis*, but I always felt that the place where a good monolith would really do some work was when fully modern humans appeared. By the time I started studying archaeology in college I had learned not to say things like that, but I couldn't shake the feeling that the professionals' explanations were less compelling than Clarke's.

The big problem archaeologists had in those far-off days when I was an undergraduate was that they simply had not excavated very many sites dating

between 200,000 and 50,000 years ago. As new finds accumulated across the 1990s, though, it began to become clear that we did not need monoliths after all; in fact, the Great Leap Forward itself began to dissolve into a series of Baby Steps Forward, spread across tens of thousands of years.

We now know of several pre-50,000-BCE sites with signs of surprisingly modern-looking behavior. Take, for instance, Pinnacle Point, a cave excavated in 2007 on the South African coast. *Homo sapiens* moved in here about 160,000 years ago. This is interesting in itself: earlier ape-men generally ignored coastal sites, probably because they could not work out how to find much food there. Yet *Homo sapiens* not only headed for the beach—distinctly modern behavior—but when they got there they were smart enough to gather, open, and cook shellfish. They also chipped stones into the small, light points that archaeologists call bladelets, perfect as tips for javelins or arrows—something that neither Peking Man nor Europe's Neanderthals ever did.

On a handful of other African sites people engaged in different but equally modern-looking activity. About a hundred thousand years ago at Mumbwa Cave in Zambia people lined a group of hearths with stone slabs to make a cozy nook where it is easy to imagine them sitting around telling stories, and at dozens of sites around Africa's coasts, from its southern tip to Morocco and Algeria in the north (and even just outside Africa, in Israel), people were sitting down and patiently cutting and grinding ostrich eggshells into beads, some of them just a quarter of an inch across. By ninety thousand years ago people at Katanda in the Congo had turned into proper fishermen, carving harpoons out of bone. The most interesting site of all, though, is Blombos Cave on Africa's southern coast, where in addition to shell beads, excavators found a 77,000-year-old stick of ocher (a type of iron ore). Ocher can be used for sticking things together, waterproofing sails, and all kinds of other tasks; but in recent times it has been particularly popular for drawing, producing satisfyingly bold red lines on tree bark, cave walls, and people's bodies. Fifty-seven pieces turned up at Pinnacle Point, and by 100,000 BCE it shows up on most African sites, which probably

means that early humans liked drawing. The truly remarkable thing about the Blombos ocher stick, though, is that someone had scratched a geometric pattern on it, making it the world's oldest indisputable work of art—and one made for producing more works of art.

At each of these sites we find traces of one or two kinds of modern behavior, but never of the whole suite of activities that becomes familiar after 50,000 BCE. Nor is there much sign yet that the modern-looking activities were cumulative, building up gradually until they took over. But archaeologists are already beginning to feel their way toward an explanation for the apparent baby steps toward fully modern humanity, driven largely by climate change.

Geologists realized back in the 1830s that the miles-long, curving lines of rubble found in parts of Europe and North America must have been created by ice sheets pushing debris before them (not, as had previously been thought, by the biblical flood). The concept of an "ice age" was born, although another fifty years passed before scientists understood exactly why ice ages happen.

Earth's orbit around the sun is not perfectly round, because the gravity of other planets also pulls on us. Over the course of a hundred thousand years our orbit goes from being almost circular (as it is now) to being much more elliptical, then back again. Earth's tilt on its axis also shifts, on a 22,000-year rhythm, as does the way the planet wobbles around this axis, this time on a 41,000-year scale. Scientists call these Milankovich cycles, after a Serbian mathematician who worked them out, longhand, while interned during World War I (this was a very gentlemanly internment, leaving Milankovich free to spend all day in the library of the Hungarian Academy of Sciences). The patterns combine and recombine in bewilderingly complex ways, but on a roughly hundred-thousand-year schedule they take us from receiving slightly more solar radiation than the average, distributed slightly unevenly across the year, to receiving slightly less sunlight, distributed slightly more evenly.

None of this would matter much except for the way Milankovich cycles interact with two geological trends. First, over the last 50 million years

continental drift has pushed most land north of the equator, and having one hemisphere mostly land and the other mostly water amplifies the effects of seasonal variations in solar radiation. Second, volcanic activity has declined across the same period. There is (for the time being) less carbon dioxide in our atmosphere than there was in the age of the dinosaurs, and because of this the planet has—over the very long run and until very recently—steadily cooled.

Through most of Earth's history the winters were cold enough that it snowed at the poles and this snow froze, but normally the sun melted this ice every summer. By 14 million years ago, however, declining volcanic activity had cooled Earth so much that at the South Pole, where there is a large landmass, the summer sun no longer melted the ice. At the North Pole, where there is no landmass, ice melts more easily, but by 2.75 million years ago temperatures had dropped enough for ice to survive year-round there, too. This had huge consequences, because now whenever Milankovich cycles gave Earth less solar radiation, distributed more evenly across the year, the North Pole ice cap would expand onto northern Europe, Asia, and America, locking up more water, making the earth drier and the sea level lower, reflecting back more solar radiation, and reducing temperatures further still. Earth then spiraled down into an ice age—until the planet wobbled, tilted, and rotated its way back to a warmer place, and the ice retreated.

Depending on how you count, there have been between forty and fifty ice ages, and the two that spanned the period from 190,000 through 90,000 BCE—crucial millennia in human evolution—were particularly harsh. Lake Malawi, for instance, contained just one-twentieth as much water in 135,000 BCE as it does today. The tougher environment must have changed the rules for staying alive, which may explain why mutations favoring braininess began flourishing. It may also explain why we have found so few sites from this period; most protohumans probably died out. Some archaeologists and geneticists in fact estimate that around 100,000 BCE there were barely twenty thousand *Homo sapiens* left alive.

If this new theory is correct, the population crisis would have done several things at once. On the one hand, by shrinking the gene pool it would have made it easier for mutations to flourish; but on the other, if *Homo sapiens* bands became smaller they would die out more easily, taking any advantageous mutations with them. If (as seems likely from the tiny number of sites known from this period) there were also fewer bands, groups would meet less often and have less chance to pool their genes and knowledge. We should probably imagine that for a hundred thousand years tiny bands of protohumans eked out livings in Africa in unfriendly and unpredictable environments. They did not meet, interbreed, or exchange goods and information very often. Genetic mutations flourished in these isolated pockets of people, some producing humans very like us, some not. Some groups figured out harpoons, many made beads, but most did neither, and the specter of extinction haunted them all.

These were dark days for *Homo sapiens*, but around seventy thousand years ago their luck changed. Eastern and southern Africa became warmer and wetter, which made hunting and gathering easier, and humans reproduced as rapidly as their food sources. Modern *Homo sapiens* had been evolving for a good hundred thousand years, with a lot of trial, error, and extinctions, but when the climate improved, those populations with the most advantageous mutations took off, outbreeding less brainy humans. There were no monoliths; no Great Leap Forward; just a lot of sex and babies.

Within a few thousand years early humans reached a tipping point that was as much demographic as biological. Instead of dying out so often, bands of modern humans grew big enough and numerous enough to stay in regular contact, pooling their genes and know-how. Change became cumulative and the behavior of *Homo sapiens* diverged rapidly from that of other ape-men. And once that happened, the days of biological distinctions between East and West were numbered.

Out of Africa—Again

Climate change is rarely simple, and while *Homo sapiens*' homelands in eastern and southern Africa were getting wetter seventy thousand years ago, North Africa was drying out. Our ancestors, multiplying rapidly in their home ranges, chose not to spread in that direction; instead, little bands wandered from what is now Somalia across a land bridge to southern Arabia, and then to Iran (Figure 1.3). At least, this is what we think they must have done. There has been relatively little archaeological exploration in South Asia, but we have to assume bands of modern humans moved this way, because by 60,000 BCE they had reached Indonesia, taken to boats, crossed fifty miles of open water, and wandered as far as Lake Mungo in southern Australia. The colonists moved fifty times faster than *Homo erectus/ergaster* had done when they left Africa, averaging more than a mile a year compared to the earlier ape-men's thirty-five yards.

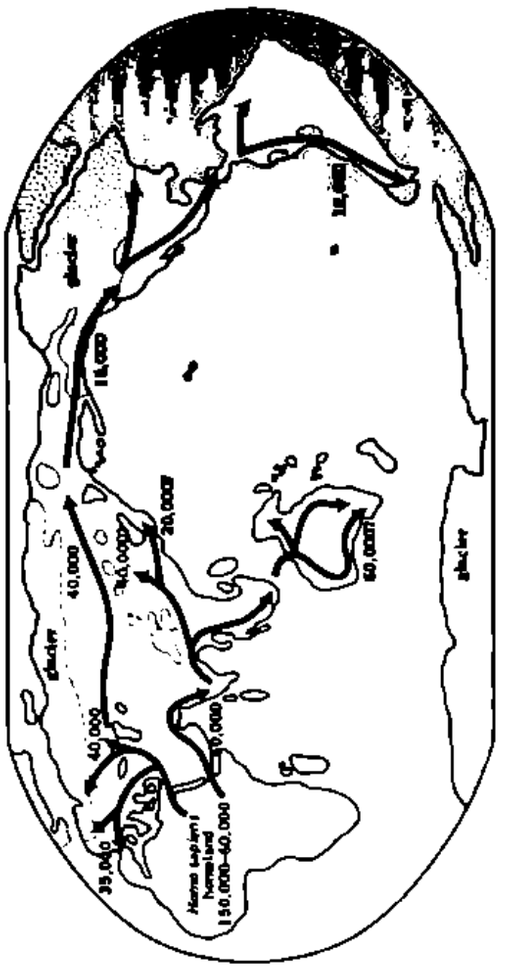


Figure 1.3. The unity of mankind restored: the spread of fully modern humans out of Africa between roughly 60,000 and 12,000 years ago. The numbers show how many years ago humans arrived in each part of the world and the coastlines represent those of the late Ice Age, around 20,000 years ago.

Between fifty thousand and forty thousand years ago a second wave of migrants probably moved through Egypt into southwest and central Asia, spreading from there into Europe. Clever enough to make themselves delicate blades and bone needles, these modern humans cut and sewed fitted clothing

and built houses out of mammoth tusks and skins, turning even the frigid wastes of Siberia into a home. Around 15,000 BCE humans crossed the land bridge linking Siberia and Alaska and/or sailed in short hops along its edge. By 12,000 BCE they had left coprolites (scientist-speak for dung) in caves in Oregon and seaweed in the mountains of Chile. (Some archaeologists think humans also crossed the Atlantic along the edge of ice sheets then linking Europe and America, though as yet this remains speculative.)

The situation in East Asia is less clear. A fully modern human skull from Liujiang in China may be 68,000 years old, but there are some technical problems with this date, and the oldest uncontroversial remains date back only to around 40,000 BCE. More digging will settle whether modern humans reached China relatively early or relatively late,[19] but they certainly reached Japan by twenty thousand years ago.

Wherever the new humans went, they seem to have wrought havoc. The continents where earlier ape-men had never set foot were teeming with giant game when *Homo sapiens* arrived. The first humans to enter New Guinea and Australia encountered four-hundred-pound flightless birds and one-ton lizards; by 35,000 BCE these were extinct. The finds from Lake Mungo and a few other sites suggest that humans arrived around 60,000 BCE, meaning that humans and megafauna coexisted for twenty-five millennia, but some archaeologists dispute the dates, putting humanity's arrival just forty thousand years ago. If they are right, the great beasts disappeared suspiciously quickly after humans arrived. In the Americas, the first human colonists fifteen thousand years ago met camels, elephants, and huge ground sloths; within four thousand years these, too, were all extinct. The coincidence between the coming of *Homo sapiens* and the going of the giant animals is, to say the least, striking.

There is no direct evidence that humans hunted these animals to extinction or drove them off their ranges, and alternative explanations for the extinctions (like climate change or comet explosions) abound. But there is less debate over

the fact that when modern humans entered environments already occupied by ape-men, the ape-men became extinct. Modern humans had entered Europe by 35,000 BCE, and within ten thousand years Neanderthals had vanished everywhere except the continent's mountainous fringes. The latest Neanderthal deposits known to us, from Gibraltar in southern Spain, date to around 25,000 BCE. After dominating Europe for 150,000 years, the Neanderthals simply disappeared.

The details of how modern humans replaced ape-men, though, are crucial for deciding whether racial explanations for Western rule make sense. We do not know, yet, whether our ancestors actively killed less intellectually gifted species or just outcompeted them for food. At most sites, modern human deposits simply replace those associated with Neanderthals, suggesting that the change was sudden. The main exception is Reindeer Cave in France, where phases of Neanderthal and modern human occupation apparently alternated between 33,000 and 35,000 years ago, and the Neanderthal layers contain stone foundations for huts, bone tools, and necklaces of animal teeth. The excavators suggested that Neanderthals learned from modern humans and were moving toward a Dawn of Neanderthal Consciousness. Several finds of ocher on Neanderthal sites in France (twenty pounds of it in one cave) may point the same way.

It is easy to imagine heavily muscled, low-browed Neanderthals watching the quicker, talkative newcomers painting their bodies and building huts, then struggling to repeat these actions with their clumsy fingers, or perhaps trading freshly killed meat for jewelry. In *The Clan of the Cave Bear*, Jean Auel imagined modern humans contemptuously chasing off Neanderthal "Flatheads," while Neanderthals just tried to stay out of the way of "the Others"—except, that is, for Ayla, an orphaned five-year-old human girl whom the Neanderthal Cave Bear clan adopt, with transformative results. It is all fantasy, of course, but it is as plausible as anyone else's guess (unless we follow those unromantic archaeologists who point out that sloppy excavation is the

most economical explanation for the interleaved Neanderthal and human deposits at Reindeer Cave, meaning that there is no direct evidence for Flatheads learning from Others).

The bottom line is sex. If modern humans replaced Neanderthals in the Western Old World and *Homo erectus* in the Eastern regions without interbreeding, racist theories tracing contemporary Western rule back to prehistoric biological differences must be wrong. But was that what happened?

In the heyday of so-called scientific racism in the 1930s, some physical anthropologists insisted that modern Chinese people were more primitive than Europeans because their skulls had similarities (small ridges on top, relatively flat upper faces, nonprotruding jaws, shovel-shaped incisors) to those of Peking Man. So, too, these anthropologists pointed out, the skulls of Australia's indigenous peoples had similarities—ridges around the back for attaching neck muscles, shelflike brows, receding foreheads, large teeth—with those of Indonesian *Homo erectus* a million years ago. Modern Easterners, these (Western) scholars concluded, must have descended from these more primitive ape-men, while Westerners descended from the more advanced Neanderthals; and that might well explain why the West rules.

No one puts things so crudely today, but if we are serious about asking why the West rules we have to confront the possibility that *Homo sapiens* interbred with premodern peoples, and that Eastern populations remain biologically less advanced than Western. We will never be able to excavate copulating cavemen to see whether *Homo sapiens* merged their genes with Neanderthals in the West and with Peking Man in the East, but fortunately we do not need to, because we can observe the consequences of their trysts in our own bodies.

Each of us has inherited our DNA from all the ancestors we ever had, which means that in theory geneticists could compare the DNA of everyone alive and draw a family tree going back to humanity's most recent shared ancestor. In practice, though, the fact that half the DNA in your body comes from your mother's line and half from your father's makes disentangling the information

as difficult as unscrambling an egg.

Geneticists found a clever way around this problem by focusing on mitochondrial DNA. Rather than being reproduced sexually, like most DNA, mitochondrial DNA is transmitted solely by women (men inherit mitochondrial DNA from their mothers but do not pass it on). Once upon a time we all had the same mitochondrial DNA, so any difference between the mitochondrial DNA in my body and that in yours must be the result of random mutations, not sexual mixing.

In 1987 a team led by the geneticist Rebecca Cann published a study of mitochondrial DNA in living people from all over the world. They distinguished about 150 types within their data and realized that no matter how they shuffled the statistics, they kept getting three key results: first, that there is more genetic diversity in Africa than anywhere else; second, that the diversity in the rest of the world is just a subset of the diversity within Africa; and third, that the deepest—and therefore oldest—mitochondrial DNA lineages all come from Africa. The conclusion was unavoidable: the last female ancestor shared by everyone in the world must have lived in Africa—African Eve, as she was immediately dubbed. As Cann and her colleagues observed, she was "one lucky mother." Using standard estimates of mutation rates in mitochondrial DNA, they concluded that Eve lived 200,000 years ago.

Throughout the 1990s paleoanthropologists argued over the Cann team's conclusions. Some questioned their methods (there are thousands of ways to arrange the scores, in theory all equally valid) and others their evidence (most of the "Africans" in the original study were actually African-Americans), but no matter who redid the samples or the numbers, the results came out much the same. The only real change was to push Eve's lifetime closer to 150,000 years ago. To clinch matters, African Eve got company at the end of the 1990s when technical advances allowed geneticists to examine nuclear DNA on the Y chromosome. Like mitochondrial DNA, this is reproduced asexually, but is transmitted only through the male line. The studies found that Y-chromosome

DNA also has the greatest variety and deepest lineages in Africa, pointing to an African Adam living between sixty thousand and ninety thousand years ago, and an origin for non-African variants around fifty thousand years ago.[20] In 2010, geneticists added one more detail: immediately after they left Africa, *Homo sapiens* copulated enough with Neanderthals to pick up a trace of their DNA, and they then spread this mix across the rest of the planet.

But some paleoanthropologists remain unconvinced, insisting that genetics counts for less than the skeletal similarities they see between Western *Homo sapiens* and Neanderthals and between Eastern *Homo sapiens* and *Homo erectus*. In place of the out-of-Africa model they propose a "multiregional" model. Maybe, they concede, the initial Baby Steps Forward did happen in Africa, but population movements between Africa, Europe, and Asia then promoted such rapid gene flows that beneficial mutations in one place spread everywhere within a few thousand years. As a result, slightly different kinds of modern humans evolved in parallel in several parts of the world. That would explain both the skeletal and the genetic evidence, and would also mean that Easterners and Westerners really are biologically different.

Like so many theories, multiregionalism can cut two ways, and some Chinese scientists have insisted that China is exceptional beause—as the *China Daily* newspaper puts it—"modern Chinese man originated in what is present-day Chinese territory rather than Africa." Since the late 1990s, though, the evidence has tipped steadily against this idea. There has been relatively little analysis of ancient DNA in East Asia, and still less that offers cheer to the multiregionalists. The authors of one Y-chromosome study even conclude that "the data do not support even a minimal *in situ* hominid contribution to the origin of anatomically modern humans in East Asia." In Europe, initial studies of Neanderthal mitochondrial DNA found zero overlap with human mitochondrial DNA (whether found in 24,000-year-old skeletons or in living, breathing Europeans), suggesting that Neanderthals and *Homo sapiens* did not —perhaps could not—interbreed at all. The unraveling of the full Neanderthal

genome has now shown that this went too far, and that Neanderthals did once inspire enough passion among *Homo sapiens* to make a small mark on our DNA; but it also showed that that mark is exactly the same all the way from France to China. Everywhere in Eurasia, people (in large groups) are all much the same.

The debate over multiregional origins drags on, and as recently as 2007 new finds from Zhoukoudian and from Xuchang were being trumpeted as showing that modern humans must have evolved from *Homo erectus* in China. Even as the publication announcing these finds was being printed, however, other scholars drove what looks to be the final nail into the multiregionalist coffin. Their sophisticated multiple-regression analysis of measurements from more than six thousand skulls showed that when we control for climate, the variations in skull types around the world are in fact consistent with the DNA evidence. Our dispersals out of Africa in the last sixty thousand years wiped the slate clean of all the genetic differences that had emerged over the previous half million years.

Racist theories grounding Western rule in biology have no basis in fact. People, in large groups, are much the same wherever we find them, and we have all inherited the same restless, inventive minds from our African ancestors. Biology by itself cannot explain why the West rules.

Prehistoric Picassos

So if the racial theories are wrong, where *did* East and West begin? The answer has seemed obvious to many Europeans for more than a hundred years: even if biology does not enter into it, they have confidently asserted, Europeans have just been culturally superior to Easterners ever since there were such things as modern humans. The evidence that convinced them began to appear in 1879. Charles Darwin's *On the Origin of Species*, published two decades earlier, had made fossil-hunting a respectable hobby for gentlemen, and like so many of his

class, Don Marcelino Sanz de Sautuola took to looking for cavemen on his estates in northern Spain. One day, with his daughter in tow, he visited the cave of Altamira. Archaeology is not much fun for eight-year-olds, so while Sautuola fixed his eyes on the ground, little Maria ran around playing games. "Suddenly," she told an interviewer many years later, "I made out forms and figures on the roof." She gasped: "Look, Papa, bulls!"

Figure 1.1. "After Altamira, all is decadence..." Just part of the stunning Ceiling of Bulls discovered by eight-year-old Maria Sanz de Sautuola in 1879, which ruined her father's life and took Picasso's breath away.

All archaeologists dream of an "Oh my God" moment—the instant of absolute disbelief, when time stands still and everything falls away in the face of the unbelievable, awe-inspiring discovery. Not many archaeologists actually have one, and maybe no archaeologist ever had one quite like this. Sautuola saw bison, deer, layer upon layer of multicolored animals covering twenty feet of the cave's ceiling, some curled up, some cavorting, some leaping gaily (Figure 1.1). Each was beautifully, movingly rendered. When Picasso visited the site years later, he was stunned. "None of us could paint like that," he said. "After

Altamira, all is decadence."

Sautuola's first reaction was to laugh, but quickly he became "so enthusiastic," Maria recalled, "that he could hardly speak." He gradually convinced himself that the paintings really were ancient (the latest studies suggest some are more than 25,000 years old). Back in 1879, though, no one knew this. In fact, when Sautuola presented the site at the International Congress of Anthropology and Prehistoric Archaeology in Lisbon in 1880, the professionals laughed him off the stage. Everyone knew that cavemen could not produce such art; Sautuola, they agreed, was either a liar or a sucker. Sautuola took this—rightly—as an attack on his honor. He died a broken man eight years later. His "Oh my God" moment ruined his life.

Not until 1902 did Sautuola's main critic actually visit Altamira and publicly recant, and since then several hundred prehistoric painted caves have been found. Chauvet Cave in France, one of the most spectacular of all, was discovered as recently as 1994, so well preserved that it looked like the artists had just stepped out for a quick bite of reindeer and would be back at any moment. One of the paintings at Chauvet is thirty thousand years old, making it one of the earliest traces of modern humans in western Europe.

Nothing quite like these cave paintings has been found anywhere else in the world. The modern human migration out of Africa had swept away all distinctions created by the Movius Line and all biological divergences between earlier species of ape-men; but should we locate the true beginning of a special (and superior) Western tradition thirty thousand years ago in a uniquely creative culture that filled northern Spain and southern France with prehistoric Picassos?

The answer, perhaps surprisingly, lies in the frozen wastes of Antarctica. Every year snow falls there, burying previous snows, and compressing them into thin layers of ice. These layers are like a chronicle of ancient weather. By separating them, climatologists can measure their thickness, telling us how much snow fell; establish the balance between isotopes of oxygen, revealing

temperatures; and compare the amounts of carbon dioxide and methane, illuminating greenhouse effects. But drilling cores through the ice sheets is one of the toughest assignments in science. In 2004 a European team finished extracting an Antarctic core almost two miles deep, going back an astonishing 740,000 years, to the days when Neanderthals were still a twinkle in some ape-man's eye. The scientists did this despite temperatures that plunged to -58°F in winter and never got above -13°, being forced to start over when the drill jammed in 1999, and having to use a plastic bag filled with ethanol as a makeshift drill bit for the final hundred yards.

The results these supermen and -women of science extracted from the ice make one thing very clear: the world the Altamira artists lived in was cold. Temperatures had started tumbling again after modern humans left Africa, and around twenty thousand years ago—when more artists were daubing ocher and charcoal on cave walls than ever before or since—the last ice age reached its chilling climax. Average temperatures stood 14°F below those of recent times. That made a staggering difference. Mile-thick glaciers covered northern Asia, Europe, and America, locking up so much water that the sea level was more than three hundred feet lower than today. You could have walked from Africa to England, Australia, or America without ever laying eyes on the sea. Not that you would have wanted to visit many of these places; at the edges of the glaciers winds howled and dust storms raged across vast arid steppes, frigid in winter and barren in summer. Even in the least forbidding regions, within 40 degrees of the equator, short summers, meager rainfall, and reduced levels of carbon dioxide in the air limited plant growth and kept animal (including human) populations low. Things were as bad as in the worst days before modern humans left Africa.

Life was easier in what are now the tropics than it was in Siberia, but wherever archaeologists look, they find that people adapted to the Ice Age in rather similar ways. They lived in tiny bands. In colder environments, a dozen people was a big group; in the milder regions, twice that many might stick

together. They learned when different plants ripened and where to find them; when animals migrated ahead of the seasons and where they could intercept them; and they followed both around the landscape. Those who did not learn these things starved.

Such tiny bands would have struggled to reproduce themselves. Like modern hunter-gatherers in marginal environments, they must have come together from time to time to exchange marriage partners, trade goods, tell stories, and perhaps speak to their gods, spirits, and ancestors. These gatherings would have been the most exciting social events on the calendar. We are guessing, of course, but many archaeologists think these festival days lie behind western Europe's spectacular cave paintings: everyone put on their best skins and beads, painted their faces, and did what they could to decorate their holy meeting places, making them truly special.

The obvious question, though, is why—if these hard facts of life applied all across Africa, Asia, and Europe—we find such spectacular cave paintings only in western Europe. The traditional answer, that Europeans were more culturally creative than anyone else, seems to make a lot of sense, but we might do better to turn the question around. The history of European art is not a continuous catalogue of masterpieces running from Chauvet to Chagall; the cave paintings died out after 11,500 BCE and many millennia passed before we know of anything to equal them.

Looking for the roots of Western rule in a thirty-thousand-year tradition of European creativity is obviously mistaken if this tradition in fact dried up for thousands of years. Perhaps we should ask instead why the cave paintings ended, because once we do so it starts to look like the astonishing finds from prehistoric Europe have as much to do with geography and climate as with any special Western culture.

Through most of the Ice Age, northern Spain and southern France were excellent hunting grounds, where herds of reindeer migrated from summer to winter pastures and back again. But when temperatures started rising about

fifteen thousand years ago (more on this in Chapter 2) the reindeer stopped migrating this far south in winter, and the hunters followed them northward.

It cannot be a coincidence that western European cave painting declined at just the same time. Fewer and fewer artists crawled under the ground with their animal-fat lamps and sticks of ocher. Sometime around 13,500 years ago the very last artist walked away. He or she probably did not realize it, but on that day the ancient tradition died. Darkness fell in the caves, and for millennia only bats and dripping water disturbed their tomblike silence.

Why did beautiful cave paintings not move steadily northward across Europe after 11,500 BCE as hunters followed the retreating reindeer? Probably for the very good reason that northern European hunters did not have such convenient caves to paint. Northern Spain and southern France have a tremendous number of deep limestone caves; northern Europe has far fewer. The efforts prehistoric peoples made to decorate their meeting places rarely survived for us to find unless hunting grounds coincided with deep caves. Whenever this happy coincidence failed to arise, people must have gathered nearer to or even above the surface. Exposed to wind, sun, and rain for twenty thousand years, few traces of their artwork survive.

"Few traces" is not the same as "no traces," though, and sometimes we get lucky. At the wonderfully named Apollo 11 Cave in Namibia, slabs of stone with drawings of rhinos and zebras peeled off the wall, fell to the floor, and were preserved under deposits that formed between 19,000 and 26,000 years ago, and some Australian examples are even older. At Sandy Creek, mineral deposits that built up over part of a carving on a cave wall can be dated to about 25,000 years ago and fragments of pigment are 26,000 to 32,000 years old, while at Carpenter's Gap part of a painted cave wall fell into 40,000-year-old occupation debris, making it even earlier than Chauvet.

None of the African or Australian examples compares aesthetically with the best French and Spanish work, and there are quite a few deep caves outside western Europe that do not have paintings (like Zhoukoudian, reoccupied

twenty thousand years ago). It would be silly to claim that all humans put equal effort into cave art, let alone that all artistic traditions are equally successful. But given the preservation issues and the fact that archaeologists have been looking longer and harder in Europe than anywhere else, the survival of anything at all on other continents suggests that all modern humans, everywhere, shared the urge to create art. Where the conditions for cave painting were not so good as in western Europe, people may have put their energy into other media.

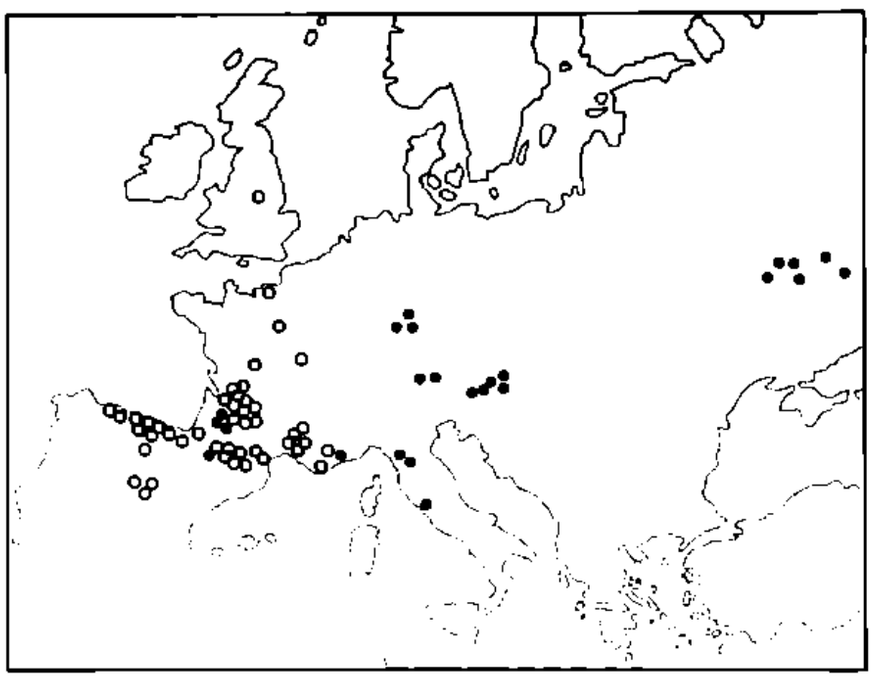


Figure 1.5. The beginnings of Western culture? The open circles show cave paintings 12,000 or more years old, and the solid circles show finds of portable art of the same age.

Figure 1.5 shows nicely that while cave art clusters in western Europe, stone, clay, and bone models of humans and animals are more common farther east. If the economics of publishing allowed it, I could show pictures of dozens

of quite extraordinary figurines, found everywhere from Germany to Siberia. Since it does not, I will limit myself to the most recent discovery, found in 2008 at Hohle Fels in Germany (figure 1.6) a two-inch-tall statuette of a woman with no head but with gigantic breasts, carved 35,000 years ago from mammoth ivory. Around the same date hunters at Malaya Siya near Lake Baikal in Siberia surely one of the most inhospitable spots on earth took time to engrave pictures of animals on bones; and by 25,000 BCE groups up to 120 strong were gathering in huts of mammoth bone and skin at Dolní Vestonice in the Czech Republic, where they made thousands of clay figurines of animals and, again, large-breasted women. In East Asia the artistic record remains thin, but the earliest find a tiny model bird carved perhaps fifteen thousand years ago from a deer antler, discovered at Xuchang in 2009 seems so sophisticated that we can be confident that future excavations will reveal a flourishing Ice Age artistic tradition in China, too.

Figure 1.6. The urge to create: a two-inch tall, 35,000 year old headless statuette of a huge breasted

"Venus," carved from mammoth ivory, found in 2008 at Hohle Fels in Germany

Ice Age humans outside western Europe, lacking the conditions that made Chauvet and Altamira what they were, apparently found other outlets for their creativity. There is precious little evidence that earlier ape-men felt any creative urges at all, but imagination seems to be hardwired into *Homo sapiens*. By fifty thousand years ago humans had the mental faculties to seek meaning in the world and the skills to represent these meanings in art and (probably, though we cannot observe it) poetry, music, and dance. Once again, people (in large groups) all seem to be much the same, wherever we find them. For all its splendor, Altamira did not make the West different from the rest.

Technological, intellectual, and biological differences accumulated for more than a million and a half years after the first ape-men left Africa, dividing the Old World into a Neanderthal/*Homo sapiens* West and a *Homo erectus* East. Around a hundred thousand years ago the West was characterized by relatively advanced technology and even hints of humanity, while the East looked increasingly backward; but when fully modern humans moved out of Africa sixty thousand years ago they swept all this away. By the time the last ice age reached its climax twenty thousand years ago, "east" and "west" were just directions in which the sun rose and set. Far more united the little bands of humans scattered from Britain to Siberia—and (relatively) soon to cross over into America—than divided them. Each band foraged and hunted, roaming over huge areas as plants ripened and animals came and went. Each must have known its territory intimately and have told stories about every rock and tree; each had its own art and traditions, tools and weapons, spirits and demons. And each surely knew that their gods loved them, because they were, in spite of everything, still alive.

Humans had come as far as they were likely to in such a cold, dry world;

and there, we must suspect, things would have stayed, had the earth not wobbled under their feet.

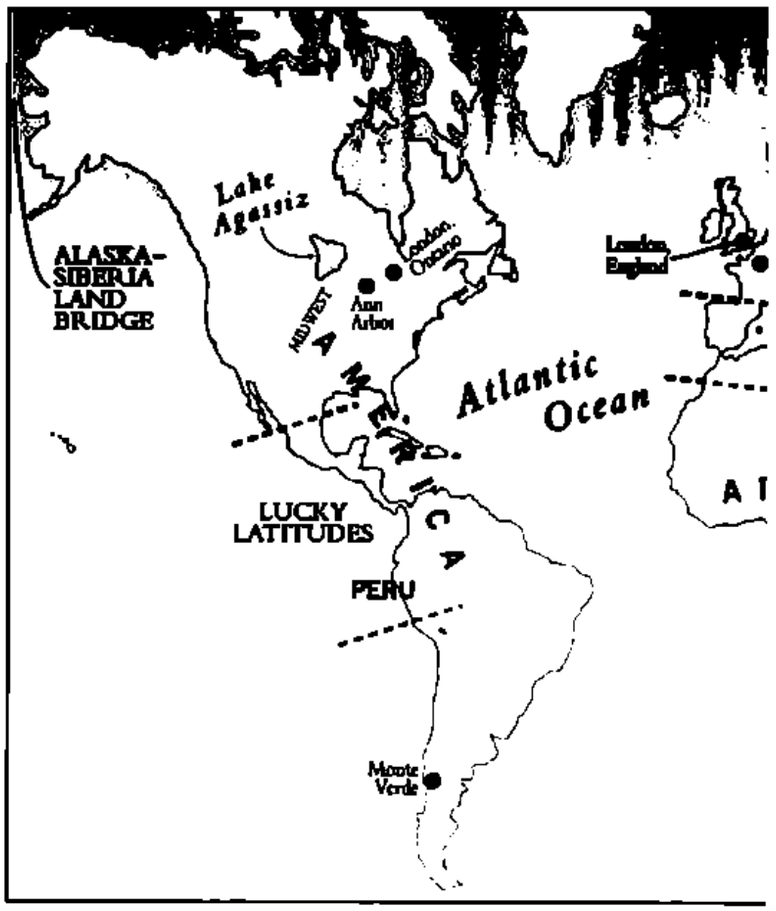
2

The West Takes the Lead

Global Warming

Though the cavemen shivering around their campfires twenty thousand years ago could not know it, their world had begun moving back toward warmth. Over the next ten thousand years the combination of climate change and their own superfast brains would transform geography, generating distinct regional ways of life that have continued to this very day. East and West began to mean something.

The consequences of global warming were mind-boggling. In two or three centuries around 17,000 BCE the sea level rose forty feet as the glaciers that had blanketed northern America, Europe, and Asia melted. The area between Turkey and Crimea, where the waves of the Black Sea now roll (Figure 2.1), had been a low-lying basin during the Ice Age, but glacial runoff now turned it into the world's biggest freshwater lake. It was a flood worthy of Noah's ark,[21] with the waters rising six inches per day at some stages. Every time the sun came up, the lakeshore had advanced another mile. Nothing in modern times begins to compare.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ALASKA–
SIBERIA
LAND
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Ann Arbor
MIDWEST
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LATITUDES
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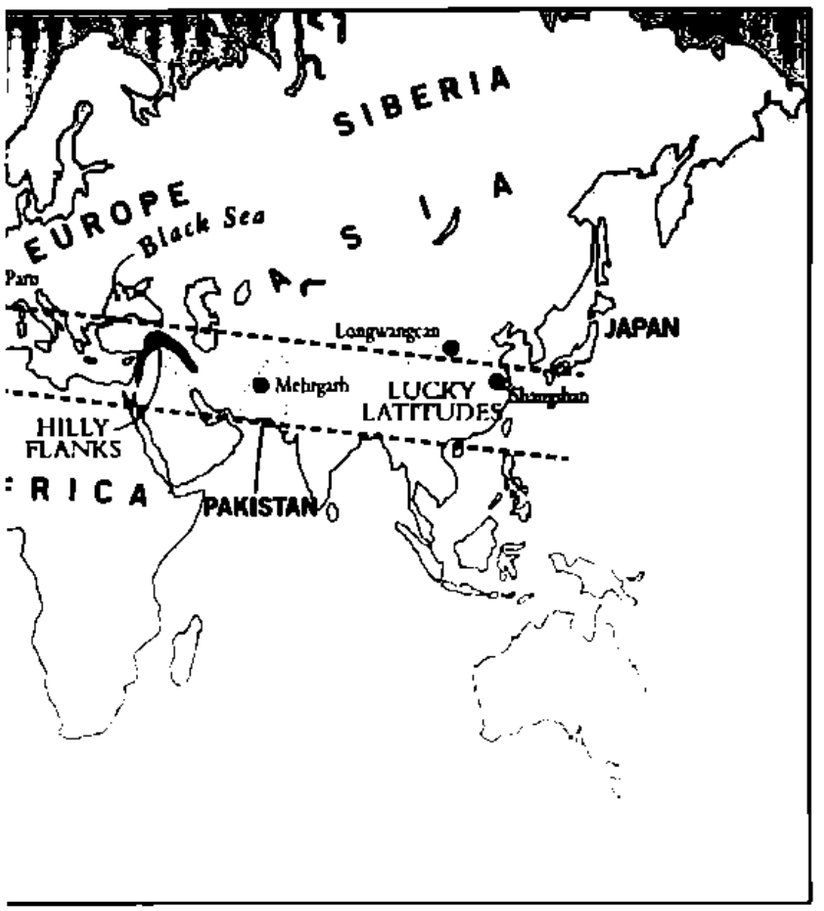


Figure 2.1. The big picture: this chapter's story seen at the global scale

Earth's changing orbit set off a wild seesaw of warming and cooling, feast and famine. Figure 2.2 shows how the ratios between two isotopes of oxygen in the Antarctic ice cores mentioned in Chapter 1 zigzagged back and forth as the climate changed. Only after about 14,000 BCE, when melting glaciers stopped dumping icy water into the oceans, did the world clearly start taking two steps toward warmth for every one back toward freezing. Around 12,700 BCE these steps turned into a gallop, and within a single lifespan the globe warmed by

about 5°F, bringing it within a degree or two of what we have known in recent times.

Medieval Christians liked to think of the universe as a Great Chain of Being, from God down to the humblest earthworm. The rich man in his castle, the poor man at his gate - all had their allotted places in a timeless order. We might do better, though, to imagine an anything-but-timeless Great Chain of Energy. Gravitational energy structures the universe. It turned the primeval cosmic soup into hydrogen and helium and then turned these simple elements into stars. Our sun works as a great nuclear reactor converting gravitational into electromagnetic energy, and plants on Earth photosynthesize a tiny portion of this into chemical energy. Animals then consume plants, metabolizing chemical energy into kinetic energy. The interplay between solar and other planets' gravities shapes the earth's orbit, determining how much electromagnetic energy we get, how much chemical energy plants create, and how much kinetic energy animals make from it; and that determines everything else.

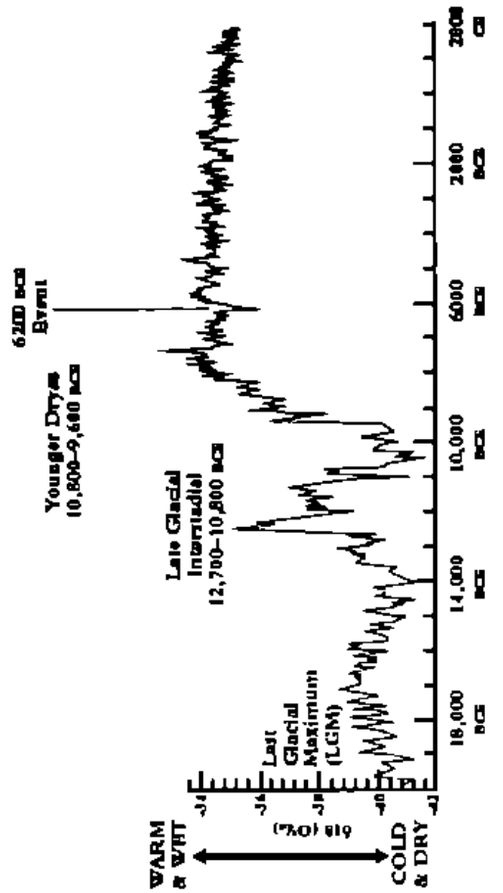


Figure 2.2. A story written in ice: the ratio between oxygen isotopes in air bubbles trapped in the Antarctic ice pack, revealing the swings between warm/wet and cold/dry weather across the last twenty thousand years

Around 12,700 BCE, Earth leaped up the Great Chain of Energy. More sunlight meant more plants, more animals, and more choices for humans, about how much to eat, how much to work, and how much to reproduce. Every individual and every little band probably combined the options in their own ways, but overall, humans reacted to moving up the Great Chain of Energy in much the same ways as the plants and animals they preyed upon: they

reproduced. For every human alive around 18,000 BCE (maybe half a million) there were a dozen people in 10,000 BCE.

Just how people experienced global warming depended on where they lived. In the southern hemisphere the great oceans moderated the impact of climate change, but the north saw dramatic contrasts. For foragers in the pre–Black Sea Basin, warming was a disaster, and things were little better for people living on coastal plains. They had enjoyed some of the Ice Age world's richest pickings, but a warmer world meant higher sea levels. Every year they retreated as waves drowned a little more of their ancestral hunting grounds, until finally everything was lost.[22] Yet for most humans in the northern hemisphere, moving up the Great Chain of Energy was an unalloyed good. People could follow plants and other animals north into regions that were previously too cold to support them, and by 13,000 BCE (the exact date is disputed) humans had fanned out across America, where no ape-man had trod before. By 11,500 BCE people reached the continent's southern tip, scaled its mountains, and pushed into its rain forests. Mankind had inherited the earth.

The Garden of Eden

The biggest beneficiaries of global warming lived in a band of "Lucky Latitudes" roughly 20–35 degrees north in the Old World and 15 degrees south to 20 degrees north in the New (see Figure 2.1). Plants and animals that had clustered in this temperate zone during the Ice Age multiplied wildly after 12,700 BCE, particularly, it seems, at each end of Asia, where wild cereals—forerunners of barley, wheat, and rye in southwest Asia and of rice and millet in East Asia—evolved big seeds that foragers could boil into mush or grind up and bake into bread. All they needed to do was wait until the plants ripened, shake them, and collect the seeds. Experiments with modern southwest Asian wild grains suggest that a ton of edible seeds could have been extracted from just two and a half acres of plants; each calorie of energy spent on harvesting earned fifty

calories of food. It was the golden age of foraging.

In the Ice Age, hunter-gatherers had roamed the land in tiny bands because food was scarce, but their descendants now began changing their ways. Like the largest-brained species of several kinds of animals (whether we are talking about bees, dolphins, parrots, or our closest relatives, apes), humans seem to clump together instinctively. We are sociable.

Maybe big-brained animals got this way because they were smart enough to see that groups have more eyes and ears than individuals and do better at spotting enemies. Or maybe, some evolutionists suggest, living in groups came before big brains, starting what the brain scientist Steven Pinker calls a "cognitive arms race" in which those animals that figured out what other animals were thinking—keeping track of friends and enemies, of who shared and who didn't—outbred those whose brains were not up to the task.

Either way, we have evolved to like one another, and our ancestors chose to exploit Earth's movement up the Great Chain of Energy by forming bigger permanent groups. By 12,500 BCE it was no longer unusual to find forty or fifty people living together within the Lucky Latitudes, and some groups passed the hundred mark.

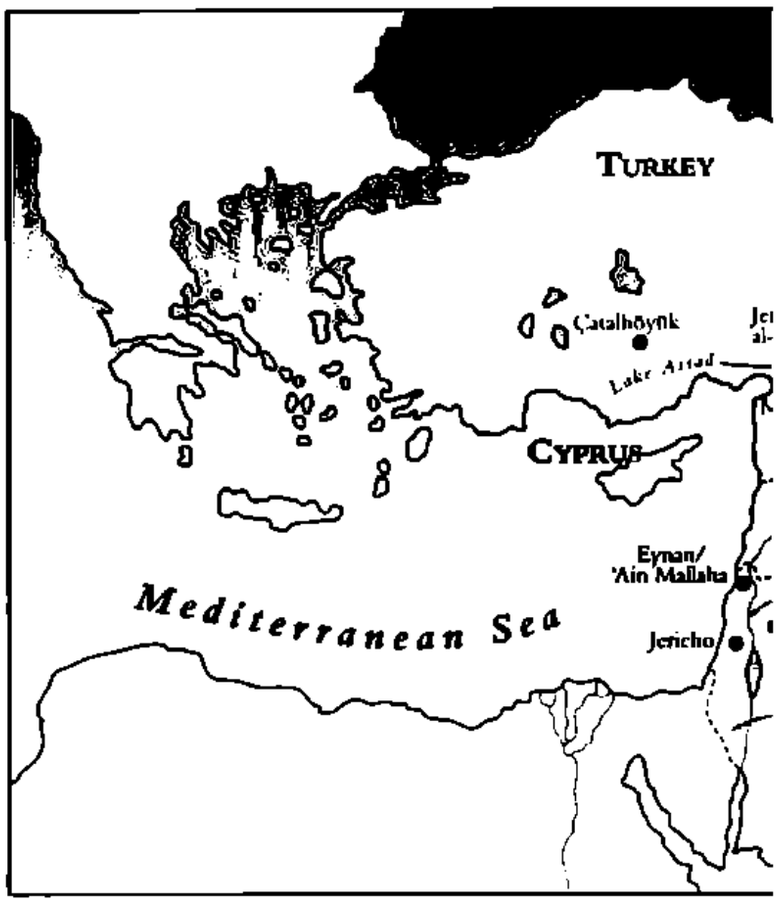
In the Ice Age, people had tended to set up camp, eat what plants and kill what animals they could find, then move on to another location, then another, and another. We still sing about being a wandering man, rambling on, free as a bird, and so on, but when the Great Chain of Energy made settling down a serious possibility, hearth and home clearly spoke to us more strongly. People in China began making pottery (a bad idea if you plan to move base every few weeks) as early as 16,000 BCE, and in highland Peru hunter-gatherers were building walls and keeping them clean around 11,000 BCE—pointless behavior for highly mobile people, but perfectly sensible for anyone living in one place for months at a stretch.

The clearest evidence for clumping and settling comes from what archaeologists call the Hilly Flanks, an arc of rolling country curving around the

Tigris, Euphrates, and Jordan valleys in southwest Asia. I will spend most of this chapter talking about this region, which saw humanity's first major movement away from hunter-gatherer lifestyles—and with it, the birth of the West.

The site of 'Ain Mallaha in modern Israel (Figure 2.3; also known as Eynan) provides the best example of what happened. Around 12,500 BCE, now-nameless people built semisubterranean round houses here, sometimes thirty feet across, using stones for the walls and trimming tree trunks into posts to support roofs. Burned food scraps show that they gathered an astonishing variety of nuts and plants that ripened at different times of year, stored them in plaster-lined waterproof pits, and ground them up on stone mortars. They left the bones of deer, foxes, birds, and (above all) gazelle scattered around the village. Archaeologists love gazelles' teeth, which have the wonderful property of producing different-colored enamel in summer and winter, making it easy to tell what time of year an animal died. 'Ain Mallaha has teeth of both colors, which probably means that people lived there year-round. We know of no contemporary sites like this anywhere in the world outside the Hilly Flanks.

Settling down in bigger groups must have changed how people related to one another and the world around them. In the past humans had had to follow the food, moving constantly. They doubtless told stories about each place they stopped: this is the cave where my father died, that is where our son burned down the hut, there is the spring where the spirits speak, and so on. But 'Ain Mallaha was not just one place in a circuit; for the villagers who lived here, it was *the* place. Here they were born, grew up, and died. Instead of leaving their dead somewhere they might not revisit for years, they now buried them among and even inside their houses, rooting their ancestors in this particular spot. People took care of their houses, rebuilding them over and over again.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Çatalhöyük
Lake Assad
CYPRUS
Eynan/
'Ain Mallaha
Mediterranean Sea
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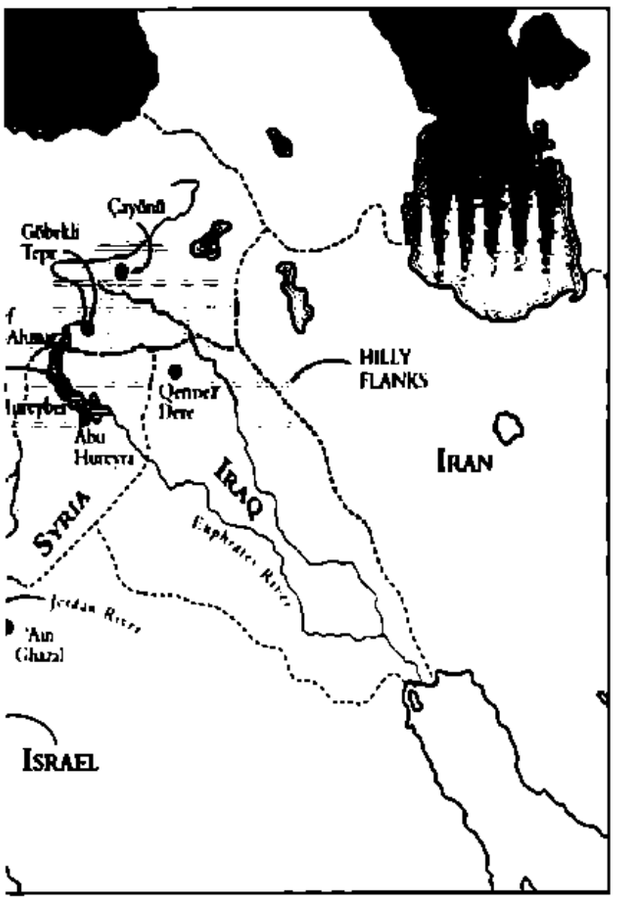


Figure 2.3. The beginning of the West: sites in and around the Hilly Flanks discussed in this chapter

They also started worrying about dirt. Ice Age foragers had been messy people, leaving their campsites littered with food scraps. And why not? By the time maggots moved in and scavengers showed up, the band would be long gone, seeking the next source of food. It was a different story at 'Ain Mallaha, though. These people were not going anywhere, and had to live with their garbage. The excavators found thousands of rat and mouse bones at 'Ain Mallaha—animals that had not existed in the forms we know them during the

Ice Age. Earlier scavengers had had to fit human refuse into a broader feeding strategy. It was a nice bonus if humans left bones and nuts all over a cave floor, but any proto-rats who tried to rely on this food source would starve to death long before humans came back to replenish it.

Permanent villages changed the rules for rodents. Fragrant, delicious mounds of garbage became available 24/7, and sneaky little rats and mice that could live right under humans' noses fared better in this new setting than big, aggressive ones that attracted attention. Within a few dozen generations (a century would be plenty of time; mice, after all, breed like mice) rodents in effect genetically modified themselves to cohabit with humans. Sneaky (domestic) vermin replaced their big (wild) ancestors as completely as *Homo sapiens* had replaced Neanderthals.

Domestic rodents repaid the gift of endless garbage by voiding their bowels into stored food and water, accelerating the spread of disease. Humans learned to dislike rats for just this reason; some among us even find mice scary. The scariest scavengers of all, though, were wolves, who also find garbage irresistible. Most humans see drawbacks to having terrifying, *Call of the Wild*–type monsters hanging around, so as with the rodents, it was smaller, less threatening animals that fared best.

Archaeologists long assumed that humans actively domesticated dogs, making the tamer wolf cubs into pets and breeding them to produce tamer-still pups who liked humans almost as much as humans liked themselves, but recent studies suggest that natural selection once again worked without our conscious input. Either way, though, the interaction of wolves, garbage, and humans created the animals we call dogs, which could kill the disease-bearing rodents that competed with them for scraps and even fight with true wolves, earning their place as man's best friend. Woman's, too: around 11,000 BCE an elderly woman was buried at 'Ain Mallaha with one hand resting on a puppy, both of them curled up as if asleep.[23]

Daily Bread

In the introduction to this book I spun out the science-fiction writer Robert Heinlein's one-liner that "progress is made by lazy men looking for easier ways to do things" into a general sociological theory that history is made by lazy, greedy, frightened people (who rarely know what they're doing) looking for easier, more profitable, and safer ways to do things. This principle kicked in with a vengeance in the Hilly Flanks at the end of the Ice Age, creating a distinctive Western way of living, with higher social development than in any other part of the world.

We can probably praise (or blame) women for this. In modern hunter-gatherer societies women do most of the plant gathering while men do more hunting. Judging from the tendency for men's graves to contain more spear-and arrowheads while women's have more grinding tools, things were similar in prehistory, too, which suggests that the answer to the question that has dominated this book so far—when and where we should start speaking of a Western way of life distinct from other ways—grew out of the ingenuity of women living in the Hilly Flanks nearly fifteen thousand years ago.

Wild cereals are annual plants. That is, they grow, produce seeds, and die in one season, then their seeds grow into new plants the next year. When a plant ripens, the rachis (little stalks attaching individual seeds to the plant) weaken and one by one the seeds fall to the ground, where their protective husks shatter and they germinate. For foragers fifteen thousand years ago the simplest way to harvest such seeds was to take a basket and shake the plants so the almost-ripe seeds fell into it. The only problem was that every seed on every wild plant in every stand ripened at different times. If gatherers got to a stand late in the season, most of the seeds would already have fallen and germinated or been eaten by birds. If they came too early the rachis would still be strong and most seeds would be too firmly attached to shake loose. Either way, they lost most of the crop. They could, of course, visit the stand repeatedly, but then they would have less time to visit other stands.

We don't know whether sloth (not wanting to walk from stand to stand), greed (just wanting more food), or fear (of hunger or of someone else getting to the plant first) was the inspiration, but someone, very likely a woman, had a bright idea: Why not take some of the best seeds and replant them in a particularly fertile spot? Then, she presumably thought, if we look after them—turning the soil, pulling up weeds, maybe even watering the plants—we can rely on them to be there every year, and even to give us better yields. Life is good.

Once again, the earliest direct evidence comes from the Hilly Flanks, and indirectly we can thank the Ba'ath Party for it. The Ba'athists are best known as Saddam Hussein's murderous political movement in Iraq, but they first seized power next door in Syria in 1963. After purging their rivals they set about modernizing Syria. Damming the Euphrates to create the fifty-mile-long Lake Assad that now generates most of Syria's electricity was a big part of this. Foreseeing that the dam would flood the heart of the Hilly Flanks, the Syrian Directorate General of Antiquities launched an international campaign to study the sites that would be destroyed. In 1971 a British team explored the mound of Abu Hureyra. Finds on the surface suggested there had been a village here around 7000 BCE, and the archaeologists documented this in rich detail; but one trench revealed that this village had been built on the ruins of an older settlement, dating back to 12,700 BCE.

This was a huge bonus. The excavators raced against time, as the floodwaters rose, and against war, as the Syrian army drafted their workers to fight Israel in the 1973 Yom Kippur/Ramadan conflict. By the time the site was drowned, the team had excavated a little over five hundred square feet of the earliest village: a tiny area, but one of the most important in archaeology. They found semisubterranean circular huts, grinding stones, hearths, and thousands of carbonized seeds. Most came from wild grasses, but a handful of plump, heavy rye seeds stood out.

These seeds suggest that people at Abu Hureyra were using hoes to till fields. They were planting seeds beneath the surface rather than just dropping

them on it, and this favored larger seedlings, which find it easier to push their way up to the air, over smaller ones, which find this difficult. If the prehistoric cultivators simply ate everything they grew this would not have mattered, but if they saved some of the seeds to plant again next year, big seeds would be slightly overrepresented. At first the difference would not be enough to notice, but if cultivators repeated this often enough, they would gradually change the meaning of "normal" as the average size of seeds slowly increased. Archaeobotanists (people who study ancient plant remains) call these bigger seeds "cultivated," to distinguish them from wild grains and from the fully domesticated grains we eat today.

By the time the 'Ain Mallahans buried the old woman and her little dog around 11,000 BCE, Abu Hureyrans had replanted rye so often that it gave them bigger seeds. This must have seemed a small thing at the time, but it proved (to use one of archaeology's worst puns) the seed from which the West would grow.

Paradise Lost

Half a planet away, icily indifferent to puppies and rye, the glaciers kept melting. A hundred thousand years earlier their advance had scoured North America, creating the vast flatness of the Midwest; their retreat now turned these increasingly forested plains into a boggy, mosquito-infested mess. Drunken woodland is what ecologists call it—the ground gets so wet that trees cannot stand up straight. Ridges of boulders and ice that had not melted yet trapped the runoff from glaciers in vast lakes. Geologists have named the biggest of these Lake Agassiz (Figure 2.1) after the Swiss scientist who, back in the 1830s, first realized that there must have been global ice ages. By 10,800 BCE Lake Agassiz covered almost a quarter-million square miles of the western plains, four times the area of modern Lake Superior. Then the inevitable happened: rising temperatures and rising waters undermined the icy spur holding the lake back.

Its collapse was a drawn-out cataclysm, in striking contrast to many modern disaster stories. In the impressively implausible movie *The Day After Tomorrow*, for instance, Dennis Quaid plays Jack Hall, a scientist (apparently the only one) who has noticed that global warming is going to cause the ice caps to collapse the next day. Summoned to the White House, he tells the president that a superstorm is about to create temperatures of -150°F, switching off the Gulf Stream that bathes northern Europe's coasts with tropical water and keeps London, England, from having winters like London, Ontario. The superstorm will trigger a new ice age, Hall insists, making most of North America uninhabitable. Not surprisingly, the president is skeptical. Nothing gets done. A few hours later the storm erupts, trapping Hall's son in New York. Heroics ensue.

I won't spoil the plot by telling you how the movie turns out, except to say that when Lake Agassiz really turned off the Gulf Stream around 10,800 BCE, things unfolded rather differently. There was no superstorm, but for twelve hundred years, while the lake drained into the Atlantic, the world slid back into ice age conditions. (Geologists call the period 10,800–9600 BCE the Younger Dryas after the waterlogged petals of a little flower called the Arctic Dryas that is common in peat bogs of this date.) The wild cereals that had fed permanent villages in the Hilly Flanks, made garbage heaps possible, and given us mice and dogs now grew less thickly and yielded fewer, smaller seeds.[21]

Mankind was expelled from the Garden of Eden. Abandoning year-round villages, most people divided into smaller groups and went back to roaming the hillsides in search of their next meal, much like their ancestors at the coldest point of the Ice Age. Animal bones from the Hilly Flanks show that gazelles were getting smaller by 10,500 BCE as people overhunted them, and the enamel on human teeth regularly has telltale ridges indicating chronic childhood malnutrition.

There has never been another catastrophe on quite this scale. To find a parallel, in fact, we have to turn to science fiction. In 1941 Isaac Asimov, then

just starting his career, published a story called "Nightfall" in the magazine *Astounding Science Fiction*. He set it on Lagash, a planet with six suns. Wherever Lagashians go, at least one sun is shining and it is always day—except for once every 2,049 years, when the suns line up just right for a passing moon to create an eclipse. The sky darkens and the stars come out. The terrified populace goes mad. By the time the eclipse ends the Lagashians have destroyed their civilization and plunged themselves into savagery. Over the next 2,049 years they slowly rebuild their culture, only for night to fall again and start the whole process over.

The Younger Dryas sounds like "Nightfall" revisited: the earth's orbit generates wild swings between freezing and thawing, which every few thousand years produce disasters like the draining of Lake Agassiz, wiping the slate of history clean. Yet while "Nightfall" is a great story (the Science Fiction Writers of America voted it the best science-fiction story of all time, and for what it is worth it has my vote too) it is not such a good model for historical thinking. In the real world not even the Younger Dryas could wipe the slate clean like "Nightfall." We might do better, in fact, to follow the ancient Greek thinker Heraclitus, who—2,500 years before Asimov sat down to write—observed, "You can't step into the same river twice." It is a famous paradox: the second time you put your foot into a stream the waters you originally disturbed have flowed on to the sea and the river is not the same river anymore.

In just the same way, you cannot have the same ice age twice. The societies in the Hilly Flanks when Lake Agassiz collapsed around 10,800 BCE were no longer the same as those that had been there during the previous ice age. Unlike Asimov's Lagashians, earthlings did not go mad when nature turned their world upside down. Instead they applied a particularly human skill, ingenuity, and built on what they had already done. The Younger Dryas did not turn the clock back. Nothing ever does that.

Some archaeologists suggest that far from being a Nightfall moment, the Younger Dryas actually speeded innovation up. Like all scientific techniques,

those used to date the earliest cultivated rye seeds from Abu Hureyra have built-in margins of error. The site's excavators point out that while the midpoints of the date ranges for the large rye seeds mentioned earlier fall around 11,000 BCE, before the Younger Dryas, they could perfectly well have been harvested five hundred years later, *after* the Younger Dryas began. Perhaps it was not laziness or greed that prompted the women of Abu Hureyra to tend rye; maybe it was fear. As temperatures fell and wild foods declined, Abu Hureyrans may have experimented, discovering that careful tending produced more and bigger seeds. On the one hand, cold, dry weather made it harder to cultivate cereals; on the other, the harsher weather increased incentives to do so. Some archaeologists imagine Younger Dryas foragers carrying bags of seeds around, scattering them in promising-looking spots as insurance against nature letting them down.

Further digging will show whether this is right, but we already know that not everyone in the Hilly Flanks responded to climatic disaster by returning to moving around in search of food. At Mureybet, just upstream from Abu Hureyra, French excavators found a new village established around 10,000 BCE. They exposed only twenty-five square feet of the earliest levels before Lake Assad swallowed this site too, but it was enough to show that the villagers scraped together sufficient wild plants and gazelles to hang on year-round. And in a house dated 10,000–9500 BCE the archaeologists made an unexpected discovery: embedded in a clay bench were the horns of a wild aurochs, the fierce six-foot-tall predecessor of the modern ox, plus the shoulder blades of two more.

No pre–Younger Dryas site has yielded anything quite this odd, but after 10,000 BCE villages filled up with all kinds of surprising things. Take, for example, Qermez Dere in northern Iraq, exposed by bulldozing in 1986. Only two small trenches could be excavated, one of which hit an area for preparing wild foods, much like those known from 'Ain Mallaha or Abu Hureyra. The other trench, though, produced no evidence of domestic activities. Instead it

contained a sequence of three roundish chambers, each twelve to fifteen feet across and dug five feet beneath the ancient ground level. The first chamber was plastered and a row of four pillars had been set in the floor, so close together that it was hard to move around the room. One of the pillars was found intact: molded in clay and plaster over a stone core, it tapered and had odd bulges near the top, making it look like a stylized human torso with shoulders. The room had been filled (apparently deliberately) with several tons of earth, containing several groups of big animal bones and unusual objects like stone beads. A new room was then dug, just like the first one, on almost exactly the same spot; it, too, was plastered then filled in with tons of earth. Then a third room was dug in the same place, plastered, and filled in. After dumping a few baskets of soil into this final chamber, people placed six human skulls, minus their jawbones, just above the floor. The skulls were in bad shape, suggesting that they had been in circulation for a long time before being buried here.

What on earth were these people doing? It is a standing joke among archaeologists that whenever we cannot figure out what we have dug up, we say it is religious (having just finished excavating a site on Sicily that I think is religious, I should confess to not finding the joke very funny anymore). The problem, of course, is that we cannot dig up past beliefs; yet that does not mean archaeologists are just making things up when they talk about prehistoric religion.

If we take a fairly commonsense definition of religion as belief in powerful, supernatural, normally unseen beings who care about humans and expect humans to care about them (which seems to apply to so many societies that some evolutionary psychologists think religion is hardwired into the human brain), we should be able to recognize, if not necessarily understand, remains of rituals through which people communicated with a divine world.

Rituals are notoriously culture-specific. Depending on when and where you find yourself, it may be that the mighty ones will listen only if you pour the blood of a live white goat on the right side of this particular rock; or only if you

take off your shoes, kneel down, and pray facing in that direction; or if you tell your misdeeds to a man in black who doesn't have sex; and so on. The list is endless. Yet despite their wondrous variety, rituals do have certain things in common. Many require special places (mountaintops, caves, unusual buildings), objects (images, statues, valuable or foreign goods), movements (processions, pilgrimages), and clothes (highly formal, totally disheveled), all heightening the sense of stepping outside the everyday. Feasting, often involving unusual foods, is popular; so too is fasting, which induces altered states of mind. Sleep deprivation, pain, repetitive chanting and dancing, or (the favorite) drugs all do the same job, and may tip truly holy people into trances, fits, and visions.

These sites have it all: strange underground rooms, humanoid pillars, jawless skulls—and while everything in the archaeology of religion is speculative, I find it hard not to see them as religious responses to the Younger Dryas. The world was freezing, plants were dying, and the gazelles were going away; what could be more natural than asking gods, spirits, and ancestors for aid? What could make more sense than identifying special people and creating special places to facilitate communication? The shrine at Qermez Dere looks like an amplifier, turning up the volume on requests for help.

So when the world warmed up at the end of the Younger Dryas, around 9600 BCE, the Hilly Flanks were not the same place they had been when the world had warmed up at the end of the main ice age, three thousand years earlier. Global warming did not step into the same society twice. Sites from the earlier period of warming, such as 'Ain Mallaha, give the impression that people just happily took advantage of nature's bounty, but in the villages that popped up around the Hilly Flanks after 9600 BCE people sank serious resources into religion. Many post-9600 sites have evidence for elaborate treatment of human and aurochs skulls and several have big, underground chambers that look like communal shrines. At Jerf al-Ahmar in Syria, now slumbering alongside so many other sites beneath the waters of Lake Assad, French archaeologists

found ten multiroomed houses around a large underground chamber. A human skull was sitting on a bench and in the middle of the room was a headless skeleton. It looks disturbingly like a human sacrifice.

Most spectacular of all is Göbekli Tepe, perched on a hilltop with commanding views across southeast Turkey. Since 1995 its German and Turkish excavators have exposed four sunken chambers, up to ten feet deep and thirty feet across, dating to 9000 BCE or even earlier. Like the smaller, earlier chambers at Qermez Dere, each had been deliberately filled in. Each contained T-shaped stone columns, some seven feet tall, decorated with carved animals. Geomagnetic surveys suggest that fifteen more chambers remain unexcavated; in all there may be two hundred stone pillars at the site, many weighing over eight tons. A twenty-foot-long pillar found unfinished in a quarry weighed fifty tons.

People did all this with nothing more sophisticated than flint tools. While we will never know why this particular hilltop was so sacred, it certainly looks like a regional sanctuary, perhaps a place for festivals where hundreds of people congregated for weeks at a time, carving pillars, dragging them to the chambers, and setting them upright. One thing seems certain, though: never before in history had such large groups worked together.

Humans were not passive victims of climate change. They applied ingenuity, working to get the gods and ancestors on board in the struggle against adversity. And while most of us doubt that these gods and ancestors actually existed, the rituals may well have done some good anyway as a kind of social glue. People who sincerely believed that big rituals in lavish shrines would win the gods' aid were surely more likely to tough it out and stick together no matter how hard times got.

By 10,000 BCE, the Hilly Flanks stood out from the rest of the world. Most people in most places still drifted between caves and campsites, like the one excavated since 2004 at Longwangcan in China, where the only traces of their activity that survive are small circles of baked earth from campfires. A battered

piece of shale from this site might be a simple stone spade, perhaps implying that cultivation of crops had begun, but there is nothing like the fat rye seeds of Abu Hureyra, let alone the monuments of Mureybet or Qermez Dere. The most substantial building known from the Americas is a small hut of bent saplings covered with hides, detected by meticulous excavators at Monte Verde in Chile; while in the whole of India archaeologists have not been able to find even that much, and scatters of stone tools are the only traces of human activity.

A distinctive Western world was taking shape.

Paradise Transformed

By 9600 BCE Earth was warming up again, and this time around, Hilly Flankers already knew how to get the most from grasses. They quickly (by the standards of earlier times, anyway) resumed cultivation. By 9300 BCE wheat and barley seeds from sites in the Jordan Valley were noticeably bigger than wild versions and people were modifying fig trees to improve their yields. The world's oldest known granaries, clay storage chambers ten feet wide and ten feet tall, come from the Jordan Valley around 9000 BCE. By then cultivation was under way in at least seven pockets in the Hilly Flanks, from modern Israel to southeast Turkey, and by 8500 BCE big-seeded cereals were normal all across the region.

Changes were very slow indeed by modern standards, but over the next thousand years they made the Hilly Flanks increasingly different from any other part of the world. The people of this area were, unknowingly, genetically modifying plants to create fully domesticated crops that could not reproduce themselves without human aid. Like dogs, these plants needed us as much as we needed them.

Plants, like animals, evolve because random mutations occur when DNA is copied from one generation to the next. Once in a while, a mutation increases a plant's chance of reproducing. This is particularly common if the environment is changing too, as happened when permanent villages created niches in which

small, tame wolves had advantages over big, fierce ones, or when cultivation gave big seedlings advantages over small ones. I already mentioned that wild cereals reproduce by having each seed ripen and fall to the ground at a different time from the others, whereupon the husk shatters, leaving the seed free to grow. But a few plants—just one per one or two million normal plants—have a random mutation on a single gene that strengthens the rachis connecting the seed to the plant and also the husk protecting the seed. When these seeds ripen they do not fall to the ground and the husks cannot shatter. The seeds literally wait for a harvester to come along and get them. Before there were any harvesters the mutant plants died out each year because their seeds could not get into the soil, making this a most disadvantageous mutation. The same thing happened if humans shook the plants and caught the grains that fell; the mutant seeds would not fall, and once again died out.

Archaeobotanists argue passionately over just what happened to change this situation, but most likely good old-fashioned greed got involved. After investing their energy in hoeing, weeding, and watering the best stands of grasses, women (assuming, again, that it was women) may have wanted to squeeze every last bit of food from their plants. That would have meant visiting each stand to shake the bushes several times, and they would surely have noticed that no matter how hard they shook, some stubborn seeds—the mutants with the tough rachis—just would not drop. What could be more natural than to rip the offending stalk out of the ground and take the whole plant home? Wheat and barley stalks do not weigh much, after all, and I'm fairly sure that's how I would react if confronted by a cereal that would not surrender.

If women then replanted a random selection of their seeds, they would have taken mutant seeds along with normal ones; in fact, the mutants would be slightly *overrepresented*, because at least some normal seeds would already have fallen and been lost. Each year that they replanted they would slightly increase the proportion of mutants in their cultivated stands. This was clearly an agonizingly slow process, quite invisible to the people involved, but it set off

an evolutionary spiral just as dramatic as what happened to mice in garbage dumps. Within a couple of thousand years, instead of one plant that waited for the harvester per field of one or two million, they had *only* genetically modified domesticated plants. The excavated finds suggest that even around 8500 BCE fully domesticated wheat and barley were still almost unheard of. By 8000, though, about half the seeds we find in the Hilly Flanks have the tough rachis that would wait for the harvester; by 7500, virtually all do.

Laziness, greed, and fear constantly added improvements. People discovered that planting cereals in a garden one year then protein-rich beans the next replenished the soil as well as varying their diet; in the process, they domesticated lentils and chickpeas. Crushing wheat and barley on coarse grindstones filled bread with grit, which wore people's teeth down to stumps; so they sieved out the impurities. They found new ways to prepare grains, baking clay into waterproof pots for cooking. If we are right to draw analogies with modern agriculturalists, women would have been responsible for most or all of these innovations, as well as for learning to weave linen into clothes. Skins and furs were out.

While women tamed plants, men (probably) took on animals. By 8000 BCE herders in what is now western Iran were managing goats so effectively that bigger, calmer strains evolved. Before 7000 BCE herders turned the wild aurochs into something like the placid cows we know today and tamed wild boars into pigs. Across the next few thousand years they learned not to kill all animals for meat while they were still young but to keep some around for wool and milk, and then—most useful of all—to harness them to wheeled carts.[25] Previously, moving anything meant picking it up and carrying it, but an ox in harness could deliver three times the draft power of a man. By 4000 BCE the domestication of plants and animals converged in the ox-drawn plow. People carried on tinkering, but nearly six thousand years would pass before humans added significant new energy sources to this package by harnessing the power of coal and steam in the industrial revolution.

The early farmers of the Hilly Flanks transformed the way people lived. Those of us who quake at the prospect of sitting next to a screaming baby on a long plane ride should spare a thought for female foragers, who regularly carry their infants with them as they walk thousands of miles every year gathering plants. Not surprisingly, they do not want too many children; consciously or not, they space their pregnancies by extending breastfeeding into the child's third or fourth year (producing breast milk prevents ovulation). Ice Age foragers probably followed similar strategies, but the more they settled down, the less they needed to do this. Having more babies in fact became a boon, providing extra labor, and recent skeletal studies suggest that the average woman in an early farming village, staying in one place with stores of food, gave birth to seven or eight babies (of whom maybe four would survive to their first birthday and perhaps three to reproductive age) as compared to the mere five or six live births of her roving ancestresses. The more food people grew, the more babies they could feed; although, of course, the more babies they fed, the more food they had to grow.

Population soared. By 8000 BCE some villages probably had five hundred residents, ten times the size of pre–Younger Dryas hamlets such as 'Ain Mallaha. By 6500 Çatalhöyük in modern Turkey had perhaps three thousand. These were villages on steroids, and they had all the problems that implies. Microscopic analysis of sediments from Çatalhöyük shows that people simply dumped garbage and night soil in stinking heaps between houses, to be trodden into the dust and mud. The filth would have appalled hunter-gatherers but surely delighted rats, flies, and fleas. We can see from tiny pieces of excrement trodden into the dirt floors that villagers also stabled domestic animals in their homes, and human skeletons from the site of 'Ain Ghazal in Jordan show that by 7000 BCE tuberculosis had jumped from cattle to people. Settling down and raising more food increased fertility, but also meant more mouths to feed and more germs to share, both of which increased mortality. Each new farming village probably grew rapidly for a few generations until fertility and mortality

balanced each other out.

Yet for all the squalor, this was clearly what people wanted. Little hunter-gatherer bands had had broad geographical horizons but narrow social ones: the landscape changed but the faces did not. The early farmer's world was just the opposite. You might pass your whole life within a day's walk of the village where you were born, but what a place it was—full of shrines where the gods revealed themselves, festivals and feasts to delight the senses, and gossipy, nosy neighbors in solid houses with plastered floors and waterproof roofs. These buildings would strike most people today as cramped, smoky, smelly hovels, but they were a big step up from sharing damp caves with bears or huddling out of the rain under skins stretched over branches.

Early farmers tamed the landscape, breaking it into concentric circles—at the center was home; then came the neighbors; then the cultivated fields; then the pastures, where shepherds and flocks trekked between summer and winter grazing; and beyond them the wild, an unregulated world of scary animals, savages who hunted, and who knew what monsters. A few excavations have found stone slabs incised with lines that, at least to the eye of the believer, look a bit like maps of fields divided by tiny paths; and around 9000 BCE villagers in Jerf al-Ahmar and some of the neighboring sites now under Lake Assad seem to have been experimenting with a kind of protowriting, scratching images of snakes, birds, farm animals, and abstract signs on little stone tokens.

By imposing such mental structures on their world, Hilly Flankers were, we might say, domesticating themselves. They even remade what love meant. The love between husband and wife or parent and child is natural, bred into us over millions of years, but farming injected new forces into these relationships. Foragers had always shared their knowledge with their young, teaching them to find ripe plants, wild game, and safe caves, but farmers had something more concrete to pass down. To do well, people now needed property—a house, fields, and flocks, not to mention investments like wells, walls, and tools. The first farmers were apparently quite communal, sharing food and perhaps

cooking collectively, but by 8000 BCE they were building bigger, more complicated houses, each with its own storerooms and kitchens, and perhaps dividing the land into privately owned fields. Life increasingly focused on small family groups, probably the basic unit for transmitting property between generations. Children needed this material inheritance, because the alternative was poverty. Transmitting property became a matter of life and death.

There are signs of what can only be called an obsession with ancestors. We perhaps see it as early as 10,000 BCE, with the jawless skulls of Qermez Dere, but as farming developed, it escalated. Burying multiple generations of the dead under house floors became common, mingling bodies in ways that seem to express very physically the link between property and descent. Some people went further, disinterring bodies after the flesh decayed, removing the skulls, and reburying the headless corpses. Using plaster, they modeled faces on the skulls, sticking shells in the eye sockets and painting in details like hair.

Dame Kathleen Kenyon, a formidable woman in the man's world of 1950s archaeology, was the first to document this horror-movie custom in her excavations at the famous site of Jericho on the West Bank, but plastered skulls have now been found in dozens of settlements. What people did with the skulls is less clear, since we only find ones that have been reburied. Most were placed in pits, though at Çatalhöyük one young woman was buried around 7000 BCE hugging to her breast a skull that had been replastered and painted red no fewer than three times.

Such intimacy with corpses makes most of us squeamish but clearly mattered a lot to early farmers in the Hilly Flanks. Most archaeologists think it shows that ancestors were the most important supernatural beings. The ancestors had passed on property, without which the living would starve; in return the living honored them. Possibly ancestral rituals clothed the transmission of property in a holy aura, justifying why some people owned more than others. People may also have used skulls for necromancy, summoning ancestors to ask when to plant, where to hunt, and whether to raid

neighbors.

Ancestor cults flourished all over the Hilly Flanks. At Çatalhöyük almost every house had bodies under the floor and ancestral skulls plastered into the surfaces and walls. At 'Ain Ghazal two pits were found containing life-size statues and busts made from bundles of reeds coated with plaster. Some had twin heads; most were painted with giant, staring eyes. Most striking of all, around 8000 BCE people at Çayönü in southeast Turkey built what its excavators labeled a "House of the Dead," with sixty-six skulls and more than four hundred skeletons stashed behind an altar. Chemists identified deposits on the altar as hemoglobin crystals from human and animal blood. More human blood was caked on clay bowls, and two other buildings also had bloodstained altars, one with the image of a human head carved on it. The mind fairly boggles. It sounds like a slasher movie—struggling victims tied to altars, priests tearing their jugulars open with razorsharp flint blades and sawing off their heads for storage, worshippers drinking their blood...

Or maybe not. Nothing archaeologists dig up can prove or disprove such flights of fancy. Still, the statues and the House of the Dead seem to imply the emergence of religious specialists who somehow persuaded everyone that they had privileged access to the supernatural. Perhaps they could fall into trances or fits; perhaps they could just describe their visions better. Whatever the reason, priests may have been the first people to enjoy institutionalized authority. Here, perhaps, we see the beginnings of entrenched hierarchy.

Whether that is true or not, hierarchy developed fastest *within* households. I have already observed that men and women had had different roles in foraging societies, the former more active in hunting and the latter in gathering, but studies of contemporary groups suggest that domestication sharpens the sexual division of labor, tying women to the home. The high mortality/high fertility regime required most women to spend most of their lives pregnant and/or minding small children, and changes in agriculture—changes that women themselves probably pioneered—reinforced this. Domesticated cereals

need more processing than most wild foods, and since threshing, grinding, and baking can be done in the home while supervising infants, these logically became women's work.

When land is abundant but labor is scarce (as in the earliest days of cultivation), people normally cultivate large areas lightly, with men and women hoeing and weeding together. If population increases but the supply of farmland does not, as happened in the Hilly Flanks after 8000 BCE, it makes sense to work the land more intensively, squeezing more from each acre by manuring, plowing, and even irrigating. All these tasks require upper-body strength. Plenty of women are as strong as men, but men do increasingly dominate outdoor work and women indoor work as agriculture intensifies. Grown men work the fields; boys tend the flocks; and women and girls manage the ever more sharply defined domestic sphere. A study of 162 skeletons dating around 7000 BCE from Abu Hureyra revealed striking gender distinctions. Both men and women had enlarged vertebrae in their upper backs, probably from carrying heavy loads on their heads, but only women had a distinctive arthritic toe condition caused by spending long periods kneeling, using their toes as a base to apply force while grinding grain.

Weeding, clearing stones, manuring, watering, and plowing all increased yields, and inheriting a well-tended field, rather than just any bit of land, made all the difference to a household's fortunes. The way religion developed after 9600 BCE suggests that people worried about ancestors and inheritance, and we should probably assume that it was at this point that they began reinforcing their rituals with other institutions. With so much at stake, men in modern peasant cultures want to be sure they really are the fathers of the children who will inherit their property. Foragers' rather casual attitudes about sex yield to obsessive concern with daughters' premarital virginity and wives' extramarital activities. Men in traditional agricultural societies typically marry around the age of thirty, after they have come into their inheritance, while women generally marry around fifteen, before they have had much time to stray. While we cannot

be sure that these patterns originated at the dawn of farming, it does seem rather likely. By, say, 7500 BCE a girl would typically grow up under the authority of her father, then, as a teenager, exchange it for the authority of a husband old enough to be her father. Marriage would become a source of wealth as those who already had good lands and flocks would marry others in the same happy situation, consolidating holdings. The rich got richer.

Having things worth inheriting meant having things worth stealing, and it is surely no coincidence that evidence for fortifications and organized warfare mushrooms in the Hilly Flanks after 9600 BCE. Modern hunter-gatherer life is famously violent; with no real hierarchy to keep their passions in check, young hunters often treat homicide as a reasonable way to settle disagreements. In many bands, it is the leading cause of death. But to live together in villages, people had to learn to manage interpersonal violence. Those that did so would have flourished—and have been able to harness violence to take things from other communities.

The most remarkable evidence comes from Jericho, famous for the biblical story of the walls that tumbled down when Joshua blew his trumpet. When Kathleen Kenyon dug there fifty years ago, she did find walls—but not Joshua's. Joshua lived around 1200 BCE, but Kenyon uncovered what looked like fortifications eight thousand years older. She interpreted these as a defensive bastion, twelve feet high and five feet thick, dating to around 9300 BCE. New studies in the 1980s showed that she was probably mistaken, and that her "fortification" actually consisted of several small walls built at different times, perhaps to hold back a stream; but her second great find, a stone tower twenty-five feet tall, probably really was defensive. In a world where the most advanced weapon was a stick with a pointed stone tied to the end, this was a mighty bulwark indeed.

Nowhere outside the Hilly Flanks did people have so much to defend. Even in 7000 BCE, almost everyone outside this region was a forager, shifting seasonally, and even where they had begun to settle down in villages, such as

Mehrgarh in modern Pakistan or Shangshan in the Yangzi Delta, these were simple places by the standards of Jericho. If hunter-gatherers from any other place on earth had been airlifted to Çayönü or Çatalhöyük they would not, I suspect, have known what hit them. Gone would be their caves or little clusters of huts, replaced by bustling towns with sturdy houses, great stores of food, powerful art, and religious monuments. They would find themselves working hard, dying young, and hosting an unpleasant array of microbes. They would rub shoulders with rich and poor, and chafe under or rejoice in men's authority over women and parents' over children. They might even discover that some people had the right to murder them in rituals. And they might well wonder why people had inflicted all this on themselves.

Going Forth And Multiplying

Fast-forward ten thousand years from the origins of hierarchy and drudgery in the prehistoric Hilly Flanks to Paris in 1967.

To the middle-aged men who administered the University of Paris campus in the dreary suburb of Nanterre—the heirs of traditions of patriarchy stretching back to Çatalhöyük—it seemed obvious that the young ladies in their charge should not be allowed to entertain young gentlemen in their dorm rooms (or vice versa). Such rules have probably never seemed obvious to the young, but for three hundred generations teenagers had had to live with them. But not anymore. As winter closed in, students challenged their elders' right to dictate their love lives. In January 1968 Daniel Cohn-Bendit, nowadays a respected Green Party member of the European Parliament but then a student activist known as "Danny the Red," compared the minister for youth's attitudes to the Hitler Youth's. In May students took on armed police in running street-fights, paralyzing downtown Paris with barricades and burning cars. President De Gaulle met secretly with his generals to find out whether—if it came to a new Bastille Day—the army would stand by him.

Enter Marshall Sahlins, a youngish anthropology professor from the University of Michigan. Sahlins had made his name with a series of brilliant essays on social evolution and by criticizing the Vietnam War; now he forsook Ann Arbor ("a small university city made up exclusively of side streets," he unkindly but not unfairly called it) to spend two years at the Collège de France, the Mecca of both anthropological theory and student radicalism. As the crisis deepened, Sahlins sent a manuscript to the journal *Les temps modernes*, required reading for everyone who was anyone on the French intellectual scene. It was to become one of the most influential anthropological essays ever written.

"Open the gates of nurseries, universities, and other prisons," student radicals had scrawled on a wall at Nanterre. "Thanks to teachers and exams competitiveness starts at six." Sahlins's manuscript offered something to the students: not an answer, which the anarchists probably did not want ("Be a realist, demand the impossible" went one of their slogans), but at least some encouragement. The central issue, Sahlins argued, was that bourgeois society had "erected a shrine to the Unattainable: *Infinite Needs*." We submit to capitalist discipline and compete to earn money so we can chase Infinite Needs by buying things we don't really want. We could learn something, Sahlins suggested, from hunter-gatherers. "The world's most primitive people," he explained, "have few possessions *but they are not poor*." This only sounded like a paradox: Sahlins argued that foragers typically worked just twenty-one to thirty-five hours per week—less than Paris's industrial laborers or even, I suspect, its students. Hunter-gatherers did not have cars or TVs, but they did not know they were supposed to want them. Their means were few but their needs were fewer, making them, Sahlins concluded, "the original affluent society."

Sahlins had a point: Why, he asked, did farming ever replace foraging if the rewards were work, inequality, and war? Yet replace foraging it clearly did. By 7000 BCE farming completely dominated the Hilly Flanks. Already by 8500 BCE

cultivated cereals had spread to Cyprus and by 8000 had reached central Turkey. By 7000 fully domesticated plants had reached all these areas and spread eastward to (or, perhaps, developed independently in) Pakistan. They had reached Greece, southern Iraq, and central Asia by 6000, Egypt and central Europe by 5000, and the shores of the Atlantic by 4000 (Figure 2.4).

Archaeologists have argued for decades over why this happened, without much agreement. At the end of a magisterial recent review, for instance, the strongest generalization that Graeme Barker of Cambridge University felt he could make was that farmers replaced foragers "in different ways and at different rates and for different reasons, but in comparable circumstances of challenges to the world they knew."

Yet although the process was messy –going on across millennia at the scale of entire continents, how could it not be?—we can make quite a lot of sense of it if we remember that it was, at the end of the day, all about Earth's movement up the Great Chain of Energy. Orbital change meant that Earth captured more of the sun's electromagnetic energy; photosynthesis converted some of that larger share into chemical energy (that is, more plants); metabolism converted some of that larger stock of chemical energy into kinetic energy (that is, more animals); and farming allowed humans to extract vastly more energy from plants and other animals for their own use. Pests, predators, and parasites in turn sucked as much of this newfound energy out of farmers as they could, but there was still plenty left over.

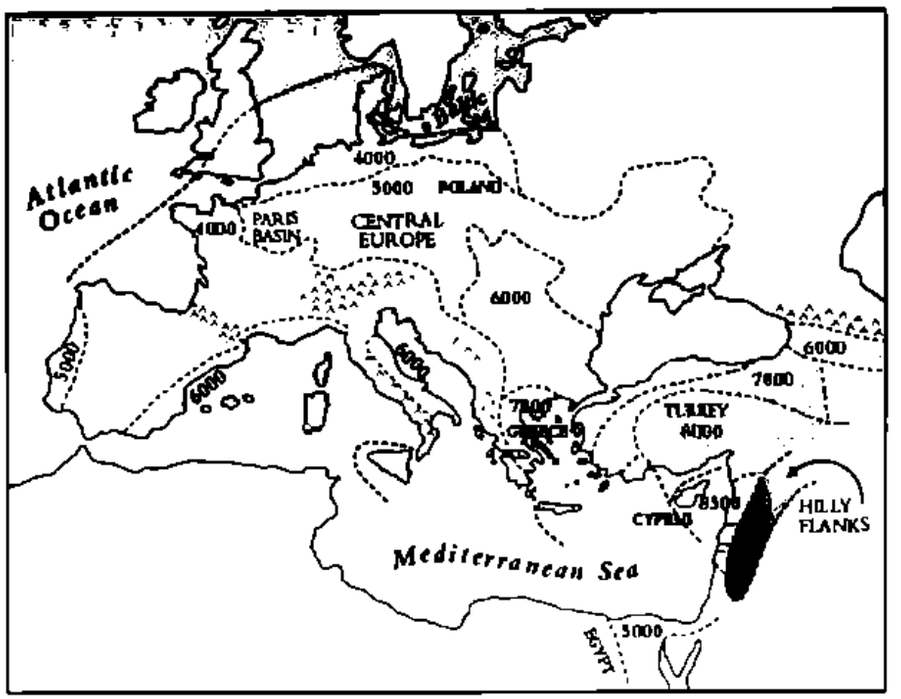


Figure 2.4. Going forth and multiplying, version one: the westward spread of domesticated plants from the Hilly Flanks to the Atlantic, 9000–4000 BCE

Humans, like plants and other animals, found a major outlet for their extra energy in sexual reproduction. High birthrates meant that new villages could grow rapidly until every square inch of available land was being farmed, whereupon hunger and sickness rose until they canceled out fertility. Energy capture and energy consumption then reached a rough balance. Some villages stabilized like this, always hovering on the edge of misery; in others a few daring souls decided to start over. They might walk an hour to a vacant (perhaps less desirable) spot in the same valley or plain—or trudge hundreds of miles in search of green pastures they had heard about. They might even cross the seas. Many adventurers must have failed, the ragged, starving survivors crawling home with their tails between their legs. Others, though, triumphed. Population

boomed until deaths caught up with births again or until colonies spun off colonies of their own.

Most farmers expanding into new territory found foragers already living there. It is tempting to imagine scenes like something out of old Western movies, with cattle raids, scalping, and shoot-outs (with both sides using bows and arrows), but the reality may have been less dramatic. Archaeological surveys suggest that the first farmers in each region tended to settle in different areas from the local foragers, almost certainly because the best farmland and the best foraging grounds rarely overlapped. At least at first, farmers and foragers may have largely ignored each other.

Eventually, of course, foraging did disappear. You will find few hunters or gatherers today prowling the manicured landscapes of Tuscany or Tokyo's suburbs. Farming populations grew rapidly, needing only a few centuries to fill up the best land, until they had no option but to push into the (in their eyes) marginal territories of the foragers.

There are two main theories about what happened next. The first suggests that farmers basically destroyed the original affluent society. Disease might have played a part; rats, flocks, and permanent villages certainly made farmers less healthy than hunter-gatherers. We should not, though, imagine epidemics like those that carried off Native Americans in their millions after 1492. The farmers' and foragers' disease pools had been separated by just a few miles of forest, not uncrossable oceans, so they had not diverged very far.

Yet even without mass kill-offs, weight of numbers was decisive. If foragers decided to fight, as happened on so many colonial frontiers in modern times, they might destroy the odd farming village, but more colonists would just keep coming, swamping resistance. Alternatively, foragers might choose flight, but no matter how far they fell back, new farmers would eventually arrive, chopping down still more trees and breathing germs everywhere, until foragers ended up in the places farmers simply could not use, such as Siberia or the Sahara.

The second theory says none of these things happened, because the first

farmers across most of the regions shown in Figure 2.4 were not descendants of immigrants from the Hilly Flanks at all. They were local hunter-gatherers who settled down and became farmers themselves. Sahlins made farming sound deeply unattractive compared to the original affluent society, but in all likelihood foragers rarely faced a simple choice between two lifestyles. A farmer who left his plow and started walking would not cross a sharp line into foragers' territory. Rather, he would come to villages where people farmed a little less intensively than he did (maybe hoeing their fields instead of plowing and manuring), then people who farmed less intensively still (maybe burning patches of forest, cultivating them until the weeds grew back, then moving on), and eventually people who relied entirely on hunting and gathering. Ideas, people, and microbes drifted back and forth across this broad contact zone.

When people realized that neighbors with more intensive practices were killing the wild plants and chasing off the animals that their own foraging lifestyles depended on, rather than attacking these vandals or running away they also had the option of joining the crowd and intensifying their own cultivation. Instead of picking farming over foraging, people probably only decided to spend a little less time gathering and a little more time gardening. Later they might have to decide whether to start weeding, then plowing, then manuring, but this was—to repeat an image from the previous chapter—a series of baby steps rather than a once-and-for-all great leap from the original affluent society to backbreaking toil and chronic illness. On the whole, across hundreds of years and thousands of miles, those who intensified also multiplied; those who clung to their old ways dwindled. In the process, the agricultural "frontier" crept forward. No one chose hierarchy and working longer hours; women did not embrace arthritic toes; these things crept up on them.

No matter how many stone tools, burned seeds, or house foundations archaeologists dig up, they will never be able to prove either theory, but once again genetics has come (partly) to the rescue. In the 1970s Luca Cavalli-Sforza of Stanford University began a massive survey of European blood groups and

nuclear DNA. His team found a consistent gradient of gene frequencies from southeast to northwest (Figure 2.5), which, they pointed out, mapped quite well onto the archaeological evidence for the spread of farming shown in Figure 2.4. Their conclusion: after migrants from western Asia brought farming to Europe, their descendants largely replaced the aboriginal foragers, pushing their remnants into the far north and west.

The archaeologist Colin Renfrew argued that linguistics also supported Cavalli-Sforza's scenario: the first farmers, he suspected, not only replaced European genes with southwest Asian ones but also replaced Europe's native languages with Indo-European ones from the Hilly Flanks, leaving just isolated pockets of older tongues such as Basque. The drama of dispossession that ended the original affluent society is inscribed in modern Europeans' bodies and reenacted every time they open their mouths.

At first the new evidence only increased the scholarly arguments. Linguists immediately challenged Renfrew, arguing that modern European languages would differ much more from one another if they had really begun diverging from an ancestral tongue six or seven millennia ago, and in 1996 an Oxford team led by Bryan Sykes challenged Cavalli-Sforza on the genetics. Sykes looked at mitochondrial DNA rather than the nuclear DNA Cavalli-Sforza had studied, and instead of a southeast–northwest progression, like Figure 2.5, identified a pattern too messy to be represented easily on a map, finding six groups of genetic lineages, only one of which could plausibly be linked to agricultural migrants from western Asia. Sykes suggested that the other five groups are much older, going back mostly to the original out-of-Africa peopling of Europe 25,000 to 50,000 years ago; all of which, he concluded, indicates that Europe's first farmers were mainly aboriginal foragers who decided to settle down, rather than the descendants of immigrants from the Hilly Flanks.

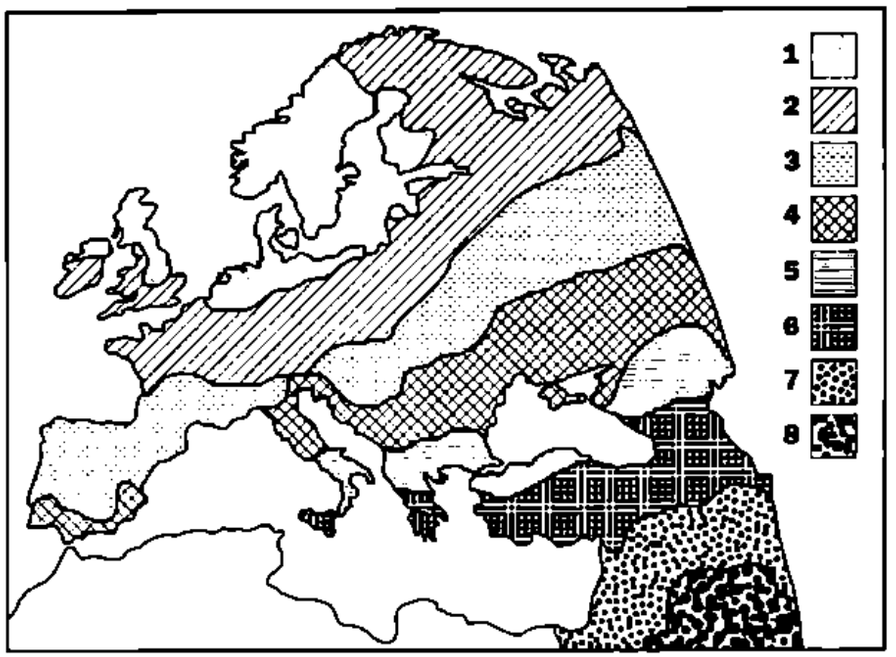


Figure 2.5. A story written in blood: Luca Cavalli-Sforza's interpretation of Europe's genetic makeup, based on a massive sample of nuclear DNA. He concluded that this map, showing degrees of genetic similarity of modern populations to the hypothesized colonists from the Hilly Flanks, with 8 representing complete similarity and 1 the lowest level of correspondence (measuring the first principal component in his statistical manipulation of the results, accounting for 95 percent of the variation in the sample), showed that colonists descended from the Hilly Flanks spread agriculture across Europe. But many archaeologists and some geneticists disagree.

The Cavalli-Sforza and Sykes teams squared off fiercely in the pages of the *American Journal of Human Genetics* in 1997, but since then their positions have steadily converged. Cavalli-Sforza now calculates that immigrant farmers from western Asia account for 26–28 percent of European DNA; Sykes puts the figure nearer 20 percent. To say that one of Europe's first farmers descended from southwest Asian immigrants for every three or four who descended from natives is oversimplifying, but is not far wrong.

Neither Cavalli-Sforza's and Renfrew's claims nor Sykes's alternative – nor even the emerging compromise between them—would have made the students at Nanterre very happy, because all the theories treat the triumph of farming as inevitable. Competition, genetics and archaeology imply, has little to do with exams or teachers, because it has always been with us. Its logic means that things had to turn out more or less as they did.

But is this true? People, after all, have free will. Sloth, greed, and fear may be the motors of history, but each of us gets to choose among them. If three-quarters or more of Europe's first farmers descended from aboriginal foragers, surely prehistoric Europeans could have stopped farming in its tracks if enough of them had decided against intensifying cultivation. So why did that not happen?

Sometimes it did. After sweeping from what is now Poland to the Paris Basin in a couple of hundred years before 5200 BCE, the wave of agricultural advance ground to a halt (Figure 2.4). For a thousand years hardly any farmers invaded the last fifty or sixty miles separating them from the Baltic Sea and few Baltic foragers took up more intensive cultivation. Here foragers fought for their way of life. Along the farming/foraging fault line we find remarkable numbers of fortified settlements and skeletons of young men killed by blunt-instrument traumas on the front and left sides of their skulls—just what we would expect if they died fighting face-to-face with right-handed opponents using stone axes. Several mass graves may even be grisly relics of massacres.

We will never know what acts of heroism and savagery went on along the edge of the North European Plain seven thousand years ago, but geography and economics probably did as much as culture and violence to fix the farming/foraging frontier. Baltic foragers lived in a chilly Garden of Eden, where rich marine resources supported dense populations in year-round villages. Archaeologists have unearthed great mounds of seashells, leftovers from feasts, which piled up around the hamlets. Nature's bounty apparently allowed the

foragers to have their cake (or shellfish) and eat it: there were enough foragers to stand up to farmers but not so many that they had to shift toward farming to feed themselves. At the same time, farmers found that the plants and animals that had originally been domesticated in the Hilly Flanks fared less well this far north.

We frankly do not know why farming did finally move north after 4200 BCE. Some archaeologists emphasize push factors, proposing that farmers multiplied to the point that they steamrollered all opposition; others stress pull factors, proposing that a crisis within forager society opened the north to invasion. But however it ended, the Baltic exception seems to prove the rule that once farming appeared in the Hilly Flanks the original affluent society could not survive.

In saying this I am not denying the reality of free will. That would be foolish, although plenty of people have succumbed to the temptation. The great Leo Tolstoy, for instance, closed his novel *War and Peace* with an odd excursus denying free will in history—odd, because the book is studded with agonized decisions (and indecisions), abrupt changes of mind, and not a few foolish blunders, often with momentous consequences. All the same, said Tolstoy, "Free will is for history only an expression connoting what we do not know about the laws of human history." He continued:

> The recognition of man's free will as something capable of influencing historical events...is the same for history as the recognition of a free force moving the heavenly bodies would be for astronomy...If there is even a single body moving freely, then the laws of Kepler and Newton are negated and no conception of the movement of the heavenly bodies any longer exists. If any single action is due to free will, then not a single historical law can exist, nor any conception of historical events.

This is nonsense. High-level nonsense, to be sure, but nonsense all the

same. On any given day any prehistoric forager could have decided not to intensify, and any farmer could have walked away from his fields or her grindstone to gather nuts or hunt deer. Some surely did, with immense consequences for their own lives. But in the long run it did not matter, because the competition for resources meant that people who kept farming, or farmed even harder, captured more energy than those who did not. Farmers kept feeding more children and livestock, clearing more fields, and stacking the odds still further against foragers. In the right circumstances, like those prevailing around the Baltic Sea in 5200 BCE, farming's expansion slowed to a crawl. But such circumstances could not last forever.

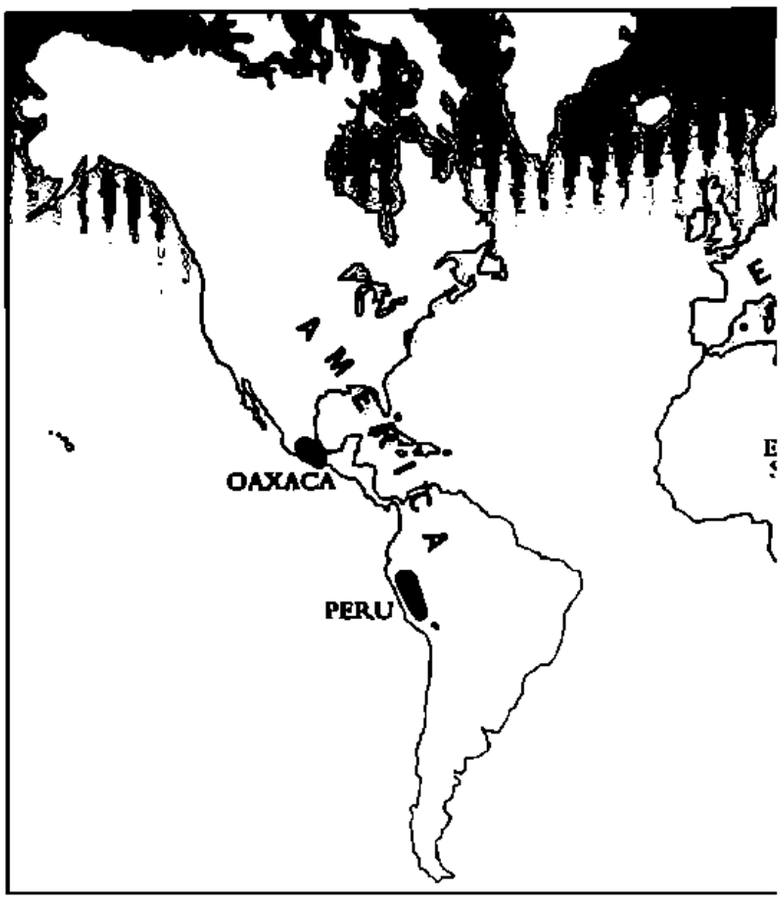
Farming certainly suffered local setbacks (overgrazing, for instance, seems to have turned the Jordan Valley into a desert between 6500 and 6000 BCE), but barring a climatic disaster like a new Younger Dryas, all the free will in the world could not stop agricultural lifestyles from expanding to fill all suitable niches. The combination of brainy *Homo sapiens* with warm, moist, and stable weather plus plants and animals that could evolve into domesticated forms made this as inevitable as anything can be in this world.

By 7000 BCE the dynamic, expansive agricultural societies at the western end of Eurasia were unlike anything else on earth, and by this point it makes sense to distinguish "the West" from the rest. Yet while the West was different from the rest, the differences were not permanent, and across the next few thousand years people began independently inventing agriculture in perhaps half a dozen places across the Lucky Latitudes (Figure 2.6).

The earliest and clearest case outside the Hilly Flanks is China. Cultivation of rice began in the Yangzi Valley between 8000 and 7500 BCE and of millet in north China by 6500. Millet was fully domesticated around 5500 and rice by 4500, and pigs were domesticated between 6000 and 5500. Recent finds suggest that cultivation began almost as early in the New World too. Cultivated squash was evolving toward domesticated forms by 8200 BCE in northern Peru's Nanchoc Valley and in Mexico's Oaxaca Valley by 7500–6000 BCE. Peanuts

appear in Nanchoc by 6500, and while archaeological evidence that wild teosinte was evolving into domesticated corn in Oaxaca goes back only to 5300 BCE, geneticists suspect that the process actually began as early as 7000.

The Chinese and New World domestications were definitely independent of events in the Hilly Flanks, but things are less clear in Pakistan's Indus Valley. Domesticated barley, wheat, sheep, and goats all appear abruptly at Mehrgarh around 7000 BCE—so abruptly that many archaeologists think that migrants from the Hilly Flanks carried them there. The presence of wheat seems particularly telling, because so far no one has identified local wild wheats from which domesticated wheat could have evolved anywhere near Mehrgarh. Botanists have not explored the region very thoroughly (not even the Pakistani army has much stomach for poking around these wild tribal lands), so there may be surprises in store. And while present evidence does suggest that Indus Valley agriculture was an offshoot of the Hilly Flanks, we should note that it rapidly went its own way, with local zebu cattle domesticated by 5500 BCE and a sophisticated, literate urban society emerging by 2500 BCE.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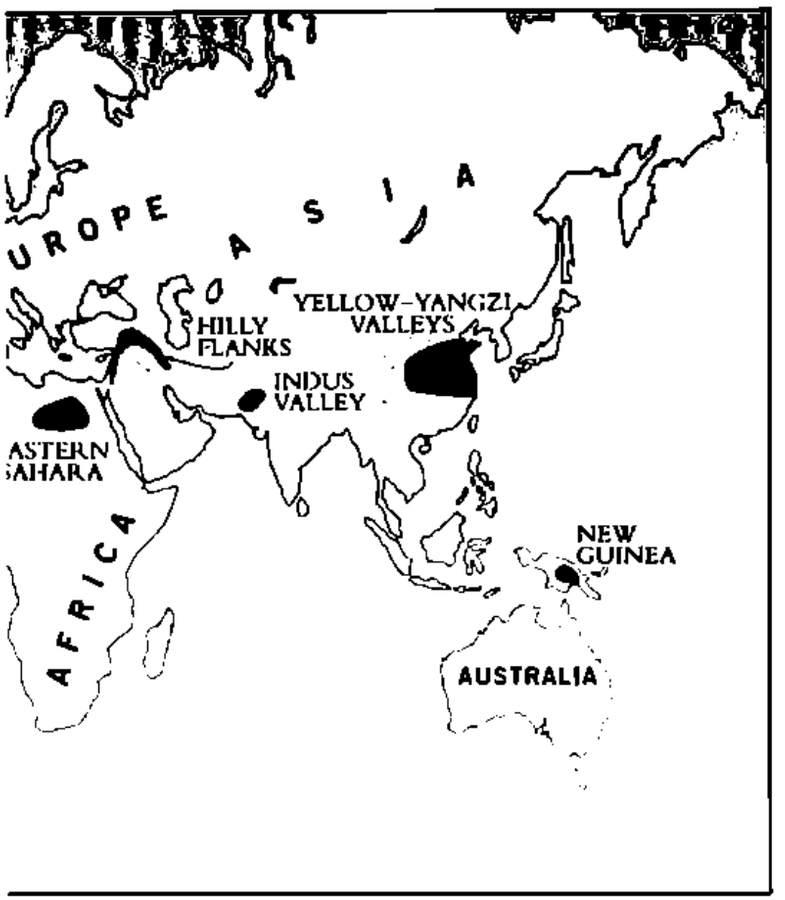

Figure 2.6. Promised lands: seven regions around the world where domestication of plants or animals may have begun independently between 11,000 and 5000 BCE

The eastern Sahara Desert was wetter around 7000 BCE than it is now, with strong monsoon rains filling lakes every summer, but it was still a brutal place to live. Adversity was apparently the mother of invention here: cattle and sheep could not survive in the wild, but foragers could eke out a living if they herded animals from lake to lake. Between 7000 and 5000 BCE the foragers turned themselves into pastoralists and their wild cattle and sheep into larger, tamer

animals.

By 5000 BCE agriculture was also emerging in two highland zones, one in Peru, where llama or alpaca were being herded and quinoa seeds were mutating to wait for the harvester, and one in New Guinea. The New Guinean evidence has been as controversial as that from the Indus Valley, but it now seems clear that by 5000 BCE highlanders were burning off forests, draining swamps, and domesticating bananas and taro.

These regions have had very different histories, but, like the Hilly Flanks, each was the starting point for a distinctive economic, social, and cultural tradition that has lasted down to our own day. Here we can finally answer the question that has dogged us since Chapter 1, of how to define the West. We saw there the historian Norman Davies's criticisms of what he called the "elastic geography" of definitions of the West, "designed," as he put it, "to further the interests of their authors." Davies threw the baby out with the bathwater, refusing to speak of the West at all. Thanks to the time depth archaeology provides, we can now do better.

The modern world's great civilizations all go back to these original episodes of domestication at the end of the Ice Age. There is no need to let the intellectual squabbles Davies describes rob us of "the West" as an analytical category: it is simply a geographical term, referring to those societies that descended from the westernmost Eurasian core of domestication, in the Hilly Flanks. It makes no sense to talk about "the West" as a distinctive region before about 11,000 BCE, when cultivation began making the Hilly Flanks unusual; and the concept starts to become an important analytical tool only after 8000 BCE, when other agricultural cores also started appearing. By 4500 BCE the West had expanded to include most of Europe, and in the last five hundred years colonists have taken it to the Americas, the Antipodes, and Siberia. "The East," naturally enough, simply means those societies that descended from the easternmost core of domestication that began developing in China by 7500 BCE. We can also speak of comparable New World, South Asian, New Guinean, and

African traditions. Asking why the West rules really means asking why societies descended from the agricultural core in the Hilly Flanks, rather than those descended from the cores in China, Mexico, the Indus Valley, the eastern Sahara, Peru, or New Guinea, came to dominate the planet.

One long-term lock-in explanation springs to mind immediately: that people in the Hilly Flanks—the first Westerners—developed agriculture thousands of years before anyone else in the world because they were smarter. They passed their smartness on with their genes and languages when they spread across Europe; Europeans took it along when they colonized other parts of the globe after 1500 CE; and that is why the West rules.

Like the racist theories discussed in Chapter 1, this is almost certainly wrong, for reasons the evolutionist and geographer Jared Diamond laid out forcefully in his classic book *Guns, Germs, and Steel*. Nature, Diamond observed, is just not fair. Agriculture appeared in the Hilly Flanks thousands of years earlier than anywhere else not because the people living here were uniquely smart, but because geography gave them a head start.

There are 200,000 species of plants in the world today, Diamond observed, but only a couple of thousand are edible, and only a couple of hundred have much potential for domestication. In fact, more than half the calories consumed today come from cereals, and above all wheat, corn, rice, barley, and sorghum. The wild grasses these cereals evolved from are not spread evenly over the globe. Of the fifty-six grasses with the biggest, most nutritious seeds, thirty-two grow wild in southwest Asia and the Mediterranean Basin. East Asia has just six wild species; Central America, five; Africa south of the Sahara, four; North America, also four; Australia and South America, two each; and western Europe, one. If people (in large groups) were all much the same and foragers all over the world were roughly equally lazy, greedy, and scared, it was overwhelmingly likely that people in the Hilly Flanks would domesticate plants and animals before anyone else because they had more promising raw materials to work with.

The Hilly Flanks had other advantages too. It took just one genetic mutation to domesticate wild barley and wheat, but turning teosinte into something recognizable as corn called for dozens. The people who entered North America around 14,000 BCE were no lazier or stupider than anyone else, nor did they make a mistake by trying to domesticate teosinte rather than wheat. There was no wild wheat in the New World. Nor could immigrants bring domesticated crops with them from the Old World, because they could enter the Americas only while there was a land bridge from Asia. When they crossed, before the rising oceans drowned the land bridge around 12,000 BCE, there were no domesticated food crops to bring; by the time there were domesticated food crops,[26] the land bridge was submerged.

Turning from crops to animals, the odds favored the Hilly Flanks almost as strongly. There are 148 species of large (over a hundred pounds) mammals in the world. By 1900 CE just 14 of them had been domesticated. Seven of the 14 were native to southwest Asia; and of the world's 5 most important domesticates (sheep, goat, cow, pig, and horse), all but the horse had wild ancestors in the Hilly Flanks. East Asia had 5 of the 14 potentially domesticable species and South America just 1. North America, Australia, and Africa south of the Sahara had none at all. Africa, of course, teems with big animals, but there are obvious challenges in domesticating species such as lions, who will eat you, or giraffes, who can outrun even lions.

We should not, then, assume that people in the Hilly Flanks invented agriculture because they were racially or culturally superior. Because they lived among more (and more easily) domesticable plants and animals than anyone else, they mastered them first. Concentrations of wild plants and animals in China were less favorable, but still good; domestication came perhaps two millennia later there. Herders in the Sahara, who had just sheep and cattle to work with, needed another five hundred years, and since the desert could not support crops, they never became farmers. New Guinean highlanders had the opposite problem, with just a narrow range of plants and no domesticable large

animals. They needed a further two thousand years and never became herders. The agricultural cores in the Sahara and New Guinea, unlike the Hilly Flanks, China, the Indus Valley, Oaxaca, and Peru, did not develop their own cities and literate civilizations—not because they were inferior, but because they lacked the natural resources.

Native Americans had more to work with than Africans and New Guineans but less than Hilly Flankers and people in China. Oaxacans and Andeans moved quickly, cultivating plants (but not animals) within twenty-five centuries of the end of the Younger Dryas. Turkeys and llamas, their only domesticable animals other than dogs, took centuries more.

Australians had the most limited resources of all. Recent excavations show that they experimented with eel farming, and given another few thousand years may well have created domesticated lifestyles. Instead, European colonists overwhelmed them in the eighteenth century CE, importing wheat and sheep, descendants of the original agricultural revolution in the Hilly Flanks.

So far as we can tell, people were indeed much the same everywhere. Global warming gave everyone new choices, among working less, working the same amount and eating more, or having more babies, even if that meant working harder. The new climate regime also gave them the option of living in larger groups and moving around less. Everywhere in the world, people who chose to stay put, breed more, and work harder squeezed out those who made different choices. Nature just made the whole process start earlier in the West.

East of Eden

Maybe so, the advocate of long-term lock-in theories might agree; maybe people really are much the same everywhere, and maybe geography did make Westerners' jobs easier. Yet there is more to history than weather and the size of seeds. Surely the details of the particular choices people made among working less, eating more, and raising bigger families matter too. The end of a

story is often written in its beginning, and perhaps the West rules today because the culture created in the Hilly Flanks more than ten thousand years ago, the parent from which all subsequent Western societies descend, just had more potential than the cultures created in other core regions around the world.

Let us take a look, then, at the best-documented, oldest, and (in our own times) most powerful civilization outside the West, that which began in China. We need to find out how much its earliest farming cultures differed from those in the West and whether these differences set East and West off along different trajectories, explaining why Western societies came to dominate the globe.

Until recently archaeologists knew very little about early agriculture in China. Many scholars even thought that rice, that icon of Chinese cuisine in our own day, began its history in Thailand, not China. The discovery of wild rice growing in the Yangzi Valley in 1984 showed that rice could have been domesticated here after all, but direct archaeological confirmation remained elusive. The problem was that while bakers inevitably burn some of their bread, preserving charred wheat or barley seeds for archaeologists to find, boiling, the sensible way to cook rice, rarely has this result. Consequently it is much harder for archaeologists to recover ancient rice.

A little ingenuity, however, soon got archaeologists around this roadblock. In 1988 excavators at Pengtoushan in the Yangzi Valley (Figure 2.7) noticed that around 7000 BCE potters began mixing rice husks and stalks into their clay to prevent pots cracking in the kiln, and close study revealed surefire signs that these plants were being cultivated.

The real breakthroughs, though, began in 1995, when Yan Wenming of Peking University[47] teamed up with the American archaeologist Richard MacNeish, as hardcore a fieldworker as any in the world. (MacNeish, who began digging in Mexico in the 1940s, logged an awe-inspiring 5,683 days in the trenches—nearly ten times what I have managed to do; and when he died in 2001, aged eighty-two, it was with his boots on, in an accident while doing

fieldwork in Belize. He reportedly talked archaeology with the ambulance driver all the way to the hospital.) MacNeish brought to China not only decades of expertise studying early agriculture but also the archaeobotanist Deborah Pearsall, who in turn brought a new scientific technique. Even though rice rarely survives in archaeological deposits, all plants absorb tiny amounts of silica from groundwater. The silica fills some of the plant's cells, and when the plant decays it leaves microscopic cell-shaped stones, called phytoliths, in the soil. Careful study of phytoliths can reveal not just whether rice was being eaten but also whether it was domesticated.

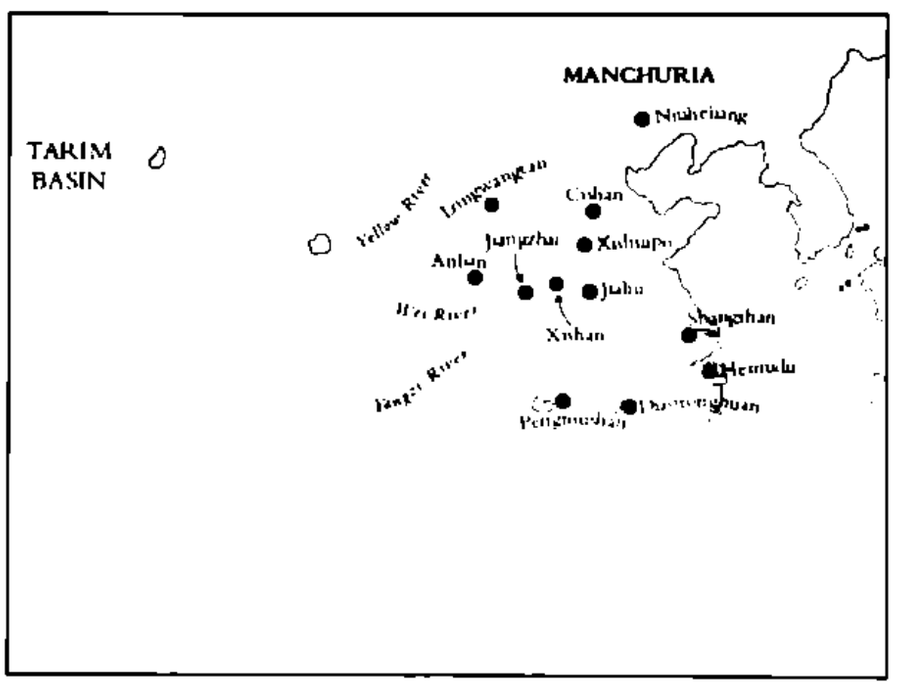

Figure 2.7. The beginning of the East: sites in what is now China discussed in this chapter

Yan and MacNeish dug a sixteen-foot-deep trench in Diaotonghuan Cave near the Yangzi Valley, and Pearsall was able to show from phytoliths that by

12,000 BCE people were uprooting wild rice and bringing it back to the cave. Rather like the Hilly Flanks, where wild wheat, barley, and rye flourished as the world warmed up, this was a hunter-gatherer golden age. There is no sign in the phytoliths that rice was evolving toward domestic forms the way rye was evolving at Abu Hureyra, but the Younger Dryas was clearly just as devastating in the Yangzi Valley as in the West. Wild rice virtually disappeared from Diaotonghuan by 10,500 BCE, only to return when the weather improved after 9600. Coarse pottery, probably vessels for boiling the grains, became common about that time (2,500 years before the first pottery from the Hilly Flanks). Around 8000 BCE the phytoliths start getting bigger, a sure sign that people were cultivating the wild rice. By 7500 BCE fully wild and cultivated grains were equally common at Diaotonghuan; by 6500, fully wild rice had disappeared.

A cluster of excavations in the Yangzi Delta since 2001 supports this timeline, and by 7000 BCE people in the Yellow River valley had clearly begun cultivating millet. Jiahu, a remarkable site between the Yangzi and Yellow rivers, had cultivated rice and millet and perhaps also domesticated pigs by 7000 BCE, and at Cishan a fire around 6000 BCE scorched and preserved almost a quarter of a million pounds of large millet seeds in eighty storage pits. At the bottom of some pits, under the millet, were complete (presumably sacrificed) dog and pig skeletons, some of the earliest Chinese evidence for domesticated animals.

As in the West, domestication involved countless small changes across many centuries in a range of crops, animals, and techniques. The high water table at Hemudu in the Yangzi Delta has given archaeologists a bonanza, preserving huge amounts of waterlogged rice as well as wood and bamboo tools, all dating from 5000 BCE onward. By 4000, rice was fully domesticated, as dependent on human harvesters as were wheat and barley in the West. Hemudans also had access to domesticated water buffalo and were using buffalo shoulder blades as spades. In northern China's Wei Valley archaeologists have documented a steady shift from hunting toward full-blown

agriculture after 5000 BCE. This was clearest in the tools being used: stone spades and hoes replaced axes as people moved from simply clearing patches in the forest to cultivating permanent fields, and spades got bigger as farmers turned the soil more deeply. In the Yangzi Valley recognizable rice paddies, with raised banks for flooding, may go back as far as 5700 BCE.

Early Chinese villages, like Jiahu around 7000 BCE, looked quite like the first villages in the Hilly Flanks, with small, roughly round semisubterranean huts, grindstones, and burials between the houses. Between fifty and a hundred people lived at Jiahu. One hut was slightly larger than the others but the very consistent distribution of finds suggests that wealth and gender distinctions were still weak and cooking and storage were communal. This was changing by 5000 BCE, when some villages had 150 residents and were protected by ditches. At Jiangzhai, the best-documented site of this date, huts faced an open area containing two large piles of ash, which may be remains of communal rituals.

The Jiangzhai sacrifices—if such they are—look pretty tame compared to the shrines Westerners had already been building for several thousand years, but two remarkable sets of finds in graves at Jiahu suggest that religion and ancestors were every bit as important as in the Hilly Flanks. The first consists of thirty-plus flutes carved from the wing bones of red-crowned cranes, all found in richer-than-average male burials. Five of the flutes can still be played. The oldest, from around 7000 BCE, had five or six holes, and while they were not very subtle instruments, modern Chinese folk songs can be played on them. By 6500 BCE seven holes were normal and the flutemakers had standardized pitch, which probably means that groups of flautists were performing together. One grave of around 6000 BCE held an eight-hole flute, capable of playing any modern melody.

All very interesting; but the flutes' full significance becomes clear only in the light of twenty-four rich male graves containing turtle shells, fourteen of which had simple signs scratched on them. In one grave, dating around 6250 BCE, the deceased's head had been removed (shades of Çatalhöyük!) and replaced with

sixteen turtle shells, two of them inscribed. Some of these signs—in the eyes of some scholars, at least– look strikingly like pictograms in China's earliest full-blown writing system, used by the kings of the Shang dynasty five thousand years later.

I will come back to the Shang inscriptions in Chapter 4, but here I just want to observe that while the gap between the Jiahu signs (around 6250 BCE) and China's first proper writing system (around 1250 BCE) is almost as long as that between the strange symbols from Jerf al-Ahmar in Syria (around 9000 BCE) and the first proper writing in Mesopotamia (around 3300 BCE), China has more evidence for continuity. Dozens of sites have yielded the odd pot with an incised sign, particularly after 5000 BCE. All the same, specialists disagree fiercely over whether the crude Jiahu scratchings are direct ancestors of the five-thousand-plus symbols of the Shang writing system.

Not the least of the arguments in favor of links is the fact that so many Shang texts were also scratched on turtle shells. Shang kings used these shells in rituals to predict the future, and traces of this practice definitely go back to 3500 BCE; could it be, the excavators of Jiahu now ask, that the association of turtle shells, writing, ancestors, divination, and social power began before 6000 BCE? As anyone who has read Confucius knows, music and rites went together in first-millennium-BCE China; could the flutes, turtle shells, and writing in the Jiahu graves be evidence that ritual specialists able to talk to the ancestors emerged more than five thousand years earlier?

That would be a remarkable continuity, but there are parallels. Earlier in the chapter I mentioned the peculiar twin-headed statues with giant staring eyes, dating around 6600 BCE, found at 'Ain Ghazal in Jordan; Denise Schmandt-Besserat, an art historian, has pointed out that descriptions of the gods written down in Mesopotamia around 2000 BCE are strikingly like these statues. In East and West alike, some elements of the first farmers' religions may have been extremely long-lived.

Even before the discoveries at Jiahu, Kwang-chih Chang of Harvard

University -the godfather of Chinese archaeology in America from the 1960s until his death in 2001- had suggested that the first really powerful people in China had been shamans who persuaded others that they could talk to animals and ancestors, fly between worlds, and monopolize communication with the heavens. When Chang presented this theory, in the 1980s, the evidence available only allowed him to trace such specialists back to 4000 BCE, a time when Chinese societies were changing rapidly and some villages were turning into towns. By 3500 BCE some communities had two or three thousand residents, as many as Çatalhöyük or 'Ain Ghazal had had three thousand years earlier, and a handful of communities could mobilize thousands of laborers to build fortifications from layer upon layer of pounded earth (good building stone is rare in China). The most impressive wall, at Xishan, was ten to fifteen feet thick and ran for more than a mile. Even today it still stands eight feet high in places. Parts of children's skeletons in clay jars under the foundations may have been sacrifices, and numerous pits full of ash within the settlement contained adults in poses suggesting struggle, sometimes mixed with animal bones. These may have been ritual murders like those from Çayönü in Turkey, and there is some evidence that such grisly rites go back to 5000 BCE in China.

If Chang was right that shamans were taking on leadership roles by 3500 BCE, they may have lived in the large houses, covering up to four thousand square feet, that now appeared in some towns (archaeologists often call these "palaces," though that is a bit grandiose). These had plastered floors, big central hearths, and ash pits holding animal bones (from sacrifices?). One contained a white marble object that looks like a scepter. The most interesting "palace," at Anban, stood on high ground in the middle of the town. It had stone pillar bases and was surrounded by pits full of ash, some holding pigs' jaws that had been painted red, others pigs' skulls wrapped in cloth, and others still little clay figurines with big noses, beards, and odd pointed hats (much like Halloween witches).

Two things about these statuettes get archaeologists excited. First, the

tradition of making them lasted for thousands of years, and a very similar model found in a palace dating around 1000 BCE had the Chinese character *wu* painted on its hat. *Wu* meant "religious mediator," and some archaeologists conclude that all these figurines, including the ones from Anban, must represent shamans. Second, many of the figurines look distinctly Caucasian, not Chinese. Similar models have been found all the way from Anban to Turkmenistan in central Asia along the path that later became the Silk Road, linking China to Rome. Shamanism remains strong in Siberia even today; for a price, ecstatic visionaries will still summon up spirits and predict the future for adventurous tourists. The Anban figurines might indicate that shamans from the wilds of central Asia were incorporated into Chinese traditions of religious authority around 4000 BCE; they might, some archaeologists think, even mean that the shamans of the Hilly Flanks, going back to 10,000 BCE, had some very distant influence on the East.

Other fragments of evidence suggest this is perfectly possible. The most extraordinary is a set of mummies from the Tarim Basin, almost totally unknown to Westerners until the magazines *Discover*, *National Geographic*, *Archaeology*, and *Scientific American* gave them a publicity blitz in the mid-1990s. The mummies' Caucasoid features seem to prove beyond doubt that people did move from central and even western Asia into China's northwest fringes by 2000 BCE. In a coincidence that seems almost too good to be true, not only did the people buried in the Tarim Basin have beards and big noses like the Anban figurines; they were also partial to pointed hats (one grave contained ten woolen caps).

It is easy to get overexcited about a few unusual finds, but even setting aside the wilder theories, it looks like religious authority was as important in early China as in the early Hilly Flanks. And if any doubts remain, two striking discoveries from the 1980s should dispel them. Archaeologists excavating at Xishuipo were astonished to find a grave of around 3600 BCE containing an adult man flanked by images of a dragon and a tiger laid out in clamshells. More

clamshell designs surrounded the grave. One showed a dragon-headed tiger with a deer on its back and a spider on its head; another, a man riding a dragon. Chang suggested that the dead man was a shaman and that the inlays showed animal spirits that helped him to move between heaven and earth.

A discovery in Manchuria, far to the northeast, surprised archaeologists even more. Between 3500 and 3000 BCE a cluster of religious sites covering two square miles developed at Niuheliang. At its heart was what the excavators called the "Goddess Temple," an odd, sixty-foot-long semisubterranean corridor with chambers containing clay statues of humans, pig-dragon hybrids, and other animals. At least six statues represented naked women, life size or larger, sitting cross-legged; the best preserved had red painted lips and pale blue eyes inset in jade, a rare, hard-to-carve stone that was becoming the luxury good of choice all over China. Blue eyes being unusual in China, it is tempting to link these statues to the Caucasian-looking figurines from Anban and the Tarim Basin mummies.

Despite Niuheliang's isolation, half a dozen clusters of graves are scattered through the hills around the temple. Mounds a hundred feet across mark some of the tombs, and the grave goods include jade ornaments, one of them carved into another pig-dragon. Archaeologists have argued, with all the ingenuity that lack of evidence brings out in us, over whether the men and women buried here were priests or chiefs. Quite possibly they were both at once. Whoever they were, though, the idea of burying a minority of the dead—usually men—with jade offerings caught on all over China, and by 4000 BCE actual worship of the dead was beginning at some cemeteries. It looks as if people in the Eastern core were just as concerned about ancestors as those in the Hilly Flanks, but expressed their concern in different ways—by removing skulls from the dead and keeping them among the living in the West, and by honoring the dead at cemeteries in the East. But at both ends of Eurasia the greatest investments of energy were in ceremonies related to gods and ancestors, and the first really powerful individuals seem to have been those who communicated with invisible

worlds of ancestors and spirits.

By 3500 BCE agricultural lifestyles rather like those created in the West several millennia earlier—involving hard work, food storage, fortifications, ancestral rites, and the subordination of women and the young to men and the old—seem to have been firmly established in the Eastern core and were expanding from there. The Eastern agricultural dispersal also seems to have worked rather like that in the West; or, at least, the arguments among the experts take similar forms in both parts of the world. Some archaeologists think people from the core area between the Yellow and Yangzi rivers migrated across East Asia, carrying agriculture with them; others, that local foraging groups settled down, domesticated plants and animals, traded with one another, and developed increasingly similar cultures over large areas. The linguistic evidence is just as controversial as in Europe, and as yet there are not enough genetic data to settle anything. All we can say with confidence is that Manchurian foragers were living in large villages and growing millet by at least 5000 BCE. Rice was being cultivated far up the Yangzi Valley by 4000, on Taiwan and around Hong Kong by 3000, and in Thailand and Vietnam by 2000. By then it was also spreading down the Malay Peninsula and across the South China Sea to the Philippines and Borneo (Figure 2.8).

Just like the Western agricultural expansion, the Eastern version also hit some bumps. Phytoliths show that rice was known in Korea by 4400 BCE and millet by 3600, the latter reaching Japan by 2600, but prehistoric Koreans and Japanese largely ignored these novelties for the next two thousand years. Like northern Europe, coastal Korea and Japan had rich marine resources that supported large, permanent villages ringed by huge mounds of discarded seashells. These affluent foragers developed sophisticated cultures and apparently felt no urge to take up farming. Again like Baltic hunter-gatherers in the thousand years between 5200 and 4200 BCE, they were numerous (and determined) enough to see off colonists who tried to take their land but not so numerous that hunger forced them to take up farming to feed themselves.

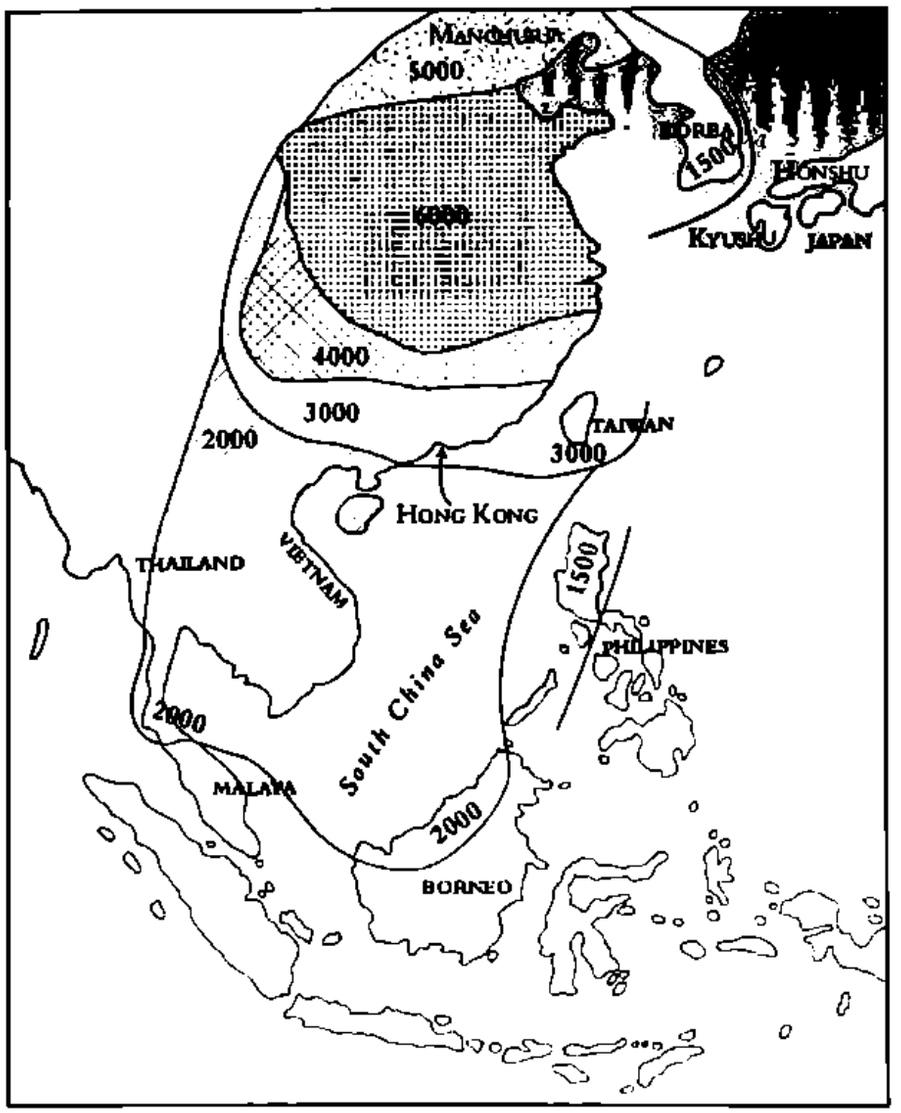

Figure 2.8. Going forth and multiplying, version two: the expansion of agriculture from the Yellow-Yangzi valleys, 6000–1500 BCE

In both Korea and Japan the switch to agriculture is associated with the appearance of metal weapons—bronze in Korea around 1500 BCE and iron in

Japan around 600 BCE. Like European archaeologists who argue over whether push or pull factors ended the affluent Baltic foraging societies, some Asianists think the weapons belonged to invaders who brought agriculture in their train while others suggest that internal changes so transformed foraging societies that farming and metal weapons suddenly became attractive.

By 500 BCE rice paddies were common on Kyushu, Japan's southern island, but the expansion of farming hit another bump on the main island of Honshu. It took a further twelve hundred years to get a foothold on Hokkaido in the north, where food-gathering opportunities were particularly rich. But in the end, agriculture displaced foraging as completely in the East as in the West.

Boiling and Baking, Skulls and Graves

How are we to make sense of all this? Certainly East and West were different, from the food people ate to the gods they worshipped. No one would mistake Jiahu for Jericho. But were the cultural contrasts so strong that they explain why the West rules? Or were these cultural traditions just different ways of doing the same things?

Table 2.1 summarizes the evidence. Three points, I think, jump out. First, if the culture created in the Hilly Flanks ten thousand years ago and from which subsequent Western societies descend really did have greater potential for social development than the culture created in the East, we might expect to see some strong differences between the two sides of Table 2.1. But we do not. In fact, roughly the same things happened in both East and West. Both regions saw the domestication of dogs, the cultivation of plants, and domestication of large (by which I mean weighing over a hundred pounds) animals. Both saw the gradual development of "full" farming (by which I mean high-yield, labor-intensive systems with fully domesticated plants and wealth and gender hierarchy), the rise of big villages (by which I mean more than a hundred people), and, after another two to three thousand years, towns (by which I

mean more than a thousand people). In both regions people constructed elaborate buildings and fortifications, experimented with protowriting, painted beautiful designs on pots, used lavish tombs, were fascinated with ancestors, sacrificed humans, and gradually expanded agricultural lifestyles (slowly at first, accelerating after about two thousand years, and eventually swamping even the most affluent foragers).

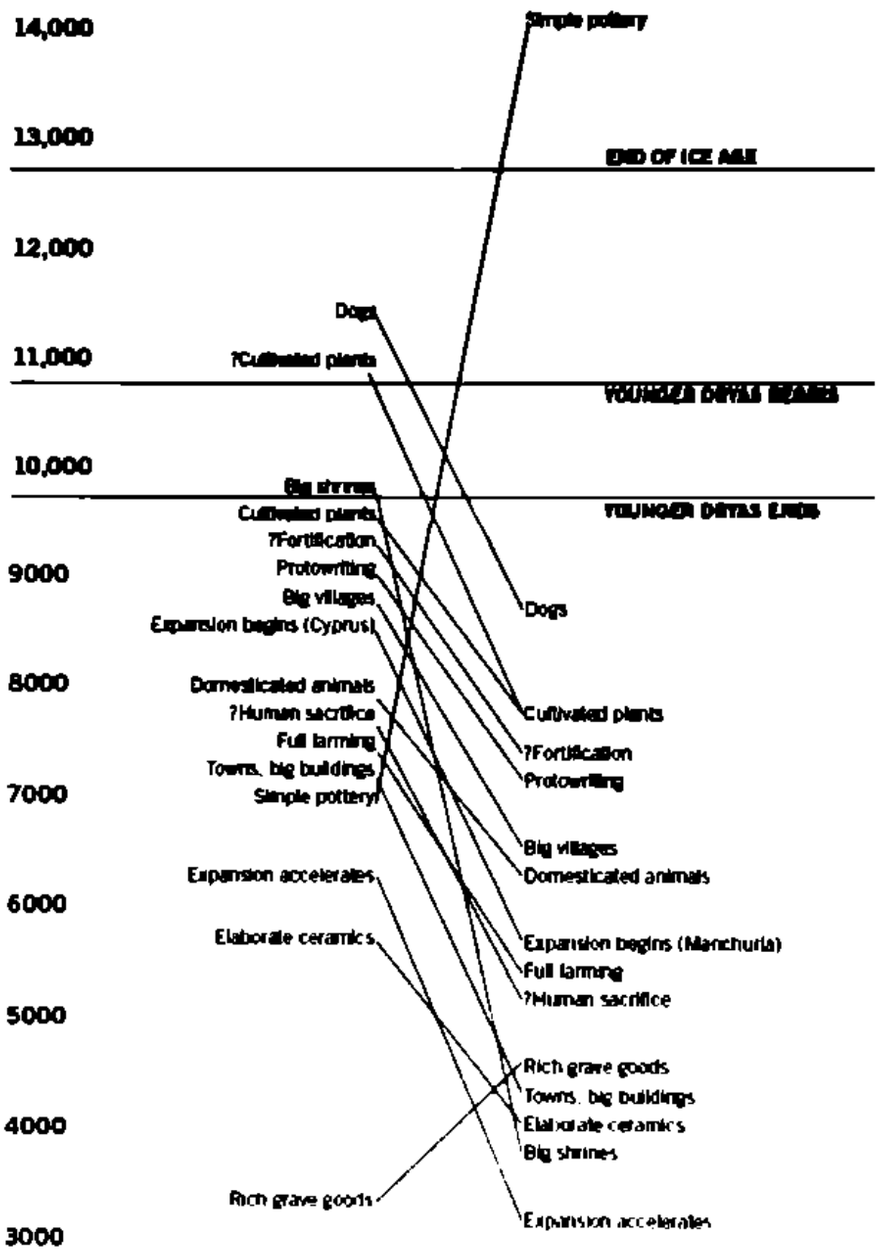
14,000
13,000
12,000
11,000
10,000
9000
8000
7000
6000
5000
4000
3000
Simple pottery
END OF ICE AGE
Dogs
?Cultivated plants
YOUNGER DRYAS BEGINS
Big shrines
Cultivated plants
YOUNGER DRYAS ENDS
?Fortification
Protowriting
Big villages
Expansion begins (Cyprus)
Domesticated animals
?Human sacrifice
Full farming
Towns, big buildings
Simple pottery
Expansion accelerates
Elaborate ceramics
Rich grave goods
Dogs
Cultivated plants
?Fortification
Protowriting
Big villages
Domesticated animals
Expansion begins (Manchuria)
Full farming
?Human sacrifice
Rich grave goods
Towns, big buildings
Elaborate ceramics
Big shrines
Expansion accelerates

Table 2.1. The beginnings of East and West compared

Second, not only did similar things happen in both East and West, but they also happened in more or less the same order. I have illustrated this in Table 2.1 with lines linking the parallel developments in each region. Most of the lines have roughly the same slope, with developments coming first in the West, followed about two thousand years later by the East.[28] This strongly suggests that developments in the East and West shared a cultural logic; the same causes had the same consequences at both ends of Eurasia. The only real difference is that the process started two thousand years earlier in the West.

Third, though, neither of my first two points is *completely* true. There are exceptions to the rules. Crude pottery appeared in the East at least seven thousand years earlier than in the West, and lavish tombs one thousand years earlier. Going the other way, Westerners built monumental shrines more than six thousand years before Easterners. Anyone who believes that these differences set East and West off along distinct cultural trajectories that explain why the West rules needs to show why pottery, tombs, and shrines matter so much, while anyone (me, for instance) who believes they did not really matter needs to explain why they diverge from the general pattern.

Archaeologists mostly agree why pottery appeared so early in the East: because the foods available there made boiling so important. Easterners needed containers they could put on a fire and consequently mastered pottery very early. If this is right, rather than focusing on the pottery itself, we should perhaps be asking whether differences in food preparation locked East and West into different trajectories of development. Maybe, for instance, Western cooking provided more nutrients, making for stronger people. That, though, is not very convincing. Skeletal studies give a rather depressing picture of life in both the Eastern and Western agricultural cores: it was, as the seventeenth-century English philosopher Thomas Hobbes more or less put it, poor, nasty, and short (though not necessarily brutish). In East and West alike early farmers

were malnourished and stunted, carried heavy parasite loads, had bad teeth, and died young; in both regions, improvements in agriculture gradually improved diet; and in both regions, fancier elite cuisines eventually emerged. The Eastern reliance on boiling was one among many differences in cooking, but overall, the similarities between Eastern and Western nutrition vastly outweigh the differences.

Or maybe different ways of preparing food led to different patterns of eating and different family structures, with long-term consequences. Again, though, it is far from obvious that this actually happened. In both East and West the earliest farmers seem to have stored, prepared, and perhaps eaten food communally, only to shift across the next few millennia toward doing these things at the family level. Once more, East-West similarities outweigh differences. The early Eastern invention of pottery is certainly an interesting difference, but it does not seem very relevant to explaining why the West rules.

What of the early prominence of elaborate tombs in the East and the even earlier prominence of elaborate shrines in the West? These developments, I suspect, were actually mirror images of each other. Both, as we have seen, were intimately linked to an emerging obsession with ancestors at a time when agriculture was making inheritance from the dead the most important fact of economic life. For reasons we will probably never understand, Westerners and Easterners came up with different ways to give thanks to and get in contact with the ancestors. Some Westerners apparently thought that passing their relatives' skulls around, filling buildings with bulls' heads and pillars, and sacrificing people in them would do the trick; Easterners generally felt better about burying carved jade animals with their relatives, worshipping their tombs, and eventually beheading other people and throwing them in the grave too. Different strokes for different folks; but similar results.

I think we can draw two conclusions from Table 2.1. First, early developments in the Western and Eastern cores were mostly rather similar. I do not want to gloss over the very real differences in everything from styles of

stone tools to the plants and animals people ate, but none of these differences lends much support to the long-term lock-in theory we have been discussing, that something about the way Western culture developed after the Ice Age gave it greater potential than Eastern culture and explains why the West rules. That seems to be untrue.

If any long-term lock-in theory can survive confronting the evidence in Table 2.1, it is the simplest one of all, that thanks to geography the West got a two-thousand-year head start in development, retained that lead long enough to arrive first at industrialization, and therefore dominates the world. To test this theory we need to extend our East-West comparison into more recent periods to see if that is what really happened.

That sounds simple enough, but the second lesson of Table 2.1 is that cross-cultural comparison is tricky. Just listing important developments in two columns was only a start, because making sense of the anomalies in Table 2.1 required us to put boiling and baking, skulls and graves into context, to find out what they meant within prehistoric societies. And that plunges us into one of the central problems of anthropology, the comparative study of societies.

When nineteenth-century European missionaries and administrators started collecting information about the peoples in their colonial empires, their reports of outlandish customs amazed scholars. Anthropologists catalogued these activities, speculating about their diffusion around the globe and what they might tell us about the evolution of more civilized (by which they meant more European-like) behavior. They sent eager graduate students to exotic climes to collect more examples. One of these bright young men was Bronislaw Malinowski, a Pole studying in London who found himself in the Trobriand Islands in 1914 when World War I broke out. Unable to get a boat home, Malinowski did the only reasonable thing; after sulking briefly in his tent, he got himself a girlfriend. Consequently, by 1918 he understood Trobriand culture from the inside out. He grasped what his professors in their book-lined studies had missed: that anthropology was really about explaining how customs fit

together. Comparisons must be between complete functioning cultures, not individual practices torn out of context, because the same behavior may have different meanings in different contexts. Tattooing your face, for instance, may make you a rebel in Kansas, but it marks you as a conformist in New Guinea. Equally, the same idea may take different forms in different cultures, like the circulating skulls and buried jades in the prehistoric West and East, both expressing reverence toward ancestors.

Malinowski would have hated Table 2.1. We cannot, he would have insisted, make a grab bag of customs from two functioning cultures and pass judgment on which was doing better. And we certainly cannot write books with chapter titles like "The West Takes the Lead." What, he would have asked, do we mean by "lead"? How on earth do we justify disentangling specific practices from the seamless web of life and measuring them against each other? And even if we could disentangle reality, how would we know which bits to measure?

All good questions, and we need to answer them if we are to explain why the West rules—even though the search for answers has torn anthropology apart over the last fifty years. With some trepidation, I will now plunge into these troubled waters.

3

Taking the Measure of the Past

Archaeology Evolving

Social evolution was still rather a new idea when cultural anthropologists launched the rebellion against it described at the end of Chapter 2. The word's modern sense goes back only to 1857, when Herbert Spencer, a homeschooled English polymath, published an essay called "Progress: Its Law and Cause." Spencer was an odd character, who had already tried his hand at being a railway engineer, a copy editor at the then brand-new magazine *The Economist*, and a romantic partner of the lady novelist George Eliot (none of which suited him; he never held a steady job or married). This essay, though, was an overnight sensation. In it Spencer explained, "From the remotest past which Science can fathom, up to the novelties of yesterday, that in which progress essentially consists, is the transformation of the homogeneous into the heterogeneous." Evolution, Spencer insisted, is the process by which things begin simply and get more complex, and it explains everything about everything:

> The advance from the simple to the complex, through a process of successive differentiations, is seen alike in the earliest changes of the Universe to which we can reason our way back, and in the earliest changes which we can inductively establish; it is seen in the geologic

> and climatic evolution of the Earth; it is seen in the unfolding of every single organism on its surface, and in the multiplication of kinds of organisms; it is seen in the evolution of Humanity, whether contemplated in the civilized individual, or in the aggregate of races; it is seen in the evolution of Society in respect alike of its political, its religious, and its economical organization; and it is seen in the evolution of all those endless concrete and abstract products of human activity which constitute the environment of our daily life.

Spencer spent the next forty years bundling geology, biology, psychology, sociology, politics, and ethics into a single evolutionary theory. He succeeded so well that by 1870 he was probably the most influential philosopher writing in English, and when Japanese and Chinese intellectuals decided they needed to understand the West's achievements, he was the first author they translated. The great minds of the age bowed to his ideas. The first edition of Charles Darwin's *On the Origin of Species*, published in 1859, did not contain the word "evolution" nor did the second or third, nor even the fourth or fifth. But in the sixth imprint, in 1872, Darwin felt compelled to borrow the term that Spencer had by now popularized.[29]

Spencer believed that societies had evolved through four levels of differentiation, from the simple (wandering bands without leaders) through the compound (stable villages with political leaders) and doubly compound (groups with churches, states, complex divisions of labor, and scholarship) to the trebly compound (great civilizations like Rome and Victorian Britain). The scheme caught on, though no two theorists quite agreed on how to label the stages. Some spoke of evolution from savagery through barbarism to civilization; others preferred evolution from magic through religion to science. By 1906 the forest of terminologies was so annoying that Max Weber, the founding father of sociology, complained about "the vanity of contemporary authors who conduct themselves in the face of a terminology used by someone else as if it were his

toothbrush."

Whatever the labels evolutionists used, though, they all faced the same problem. They had a gut feeling that they must be right, but little hard evidence to prove it. The newly forming discipline of anthropology therefore set out to supply data. Some societies, the thinking went, are less evolved than others: the colonized peoples of Africa or the Trobriand Islands, with their stone tools and colorful customs, are like living ancestors, reflecting what civilized people in trebly compound societies must have been like in prehistory. All that the anthropologist had to do (apart from putting up with malaria, internal parasites, and ungrateful natives) was take good notes, and he (not too often she in those days) could come home and fill in the gaps in the evolutionary story.

It was this intellectual program that Malinowski rejected. In a way, though, it is odd that the issue came up at all. If evolutionists wanted to document progress, why not do so directly, using archaeological data, the physical remains left behind by actual prehistoric societies, rather than indirectly, using anthropological observations of contemporary groups and speculating that they were survivals? The answer: archaeologists a century ago just did not know very much. Serious excavation had barely begun, so evolutionists had to combine the skimpy information in archaeological reports with incidental details from ancient literature and random ethnographic accounts—which made it all too easy for Malinowksi and like-minded anthropologists to expose evolutionists' reconstructions as speculative just-so stories.

Archaeology is a young science. As little as three centuries ago, our most ancient evidence about history—China's Five Classics, the Indian Vedas, the Hebrew Bible, and the Greek poet Homer—barely reached back to 1000 BCE. Before these masterpieces, all was darkness. The simple act of digging things up changed everything, but it took a while. When Napoleon invaded Egypt in 1799 he brought with him a legion of scholars, who copied down or carried off dozens of ancient inscriptions. In the 1820s French linguists unlocked the secrets of

these hieroglyphic texts, abruptly adding two thousand years to documented history. Not to be outdone, in the 1840s British explorers tunneled into ruined cities in the lands that are now Iraq or, hanging from ropes, transcribed royal inscriptions in the mountains of Iran; before the decade was over, scholars could read Old Persian, Assyrian, and the wisdom of Babylon.

When Spencer started writing about progress in the 1850s, archaeology was still more adventure than science, bursting with real-life Indiana Joneses. It was only in the 1870s that archaeologists began applying the geological principle of stratigraphy (the commonsense insight that since the uppermost layers of earth on a site must have got there after the lower layers, we can use the sequence of deposits to reconstruct the order of events) to their digs, and stratigraphic analysis became mainstream only in the 1920s. Archaeologists still depended on linking their sites with events mentioned in ancient literature to date what they excavated, and so until the 1940s finds in most parts of the world floated in a haze of conjecture and guesswork. That ended when nuclear physicists discovered radiocarbon dating, using the decay of unstable carbon isotopes in bone, charcoal, and other organic finds to tell how old objects were. Archaeologists began imposing order on prehistory, and by the 1970s a global framework was taking shape.

When I was a graduate student in the 1980s one or two senior professors still claimed that when they had been students their teachers had advised them that the only essential tools for fieldwork were a tuxedo and a small revolver. I am still not sure whether I should have believed them, but whatever the truth of the matter, the James Bond era was certainly dying by the 1950s. The real breakthroughs increasingly came from the daily grind of an army of professionals, grubbing facts, pushing further into prehistory, and fanning out across the globe.

Museum storerooms were overflowing with artifacts and library shelves groaning under the weight of technical monographs, but some archaeologists worried that the fundamental question- *what does it all mean?*—was going

unanswered. The situation in the 1950s was the mirror image of the 1850s: where once grand theory sought data, now data cried out for theory. Armed with their hard-won results, mid-twentieth-century social scientists, particularly in the United States, felt ready for another crack at theorizing.

Calling themselves neo-evolutionists to show that they were more advanced than fuddy-duddy "classical" evolutionists like Spencer, some social scientists began suggesting that while it was wonderful to have so many facts to work with, the mass of evidence had itself become part of the problem. The important information was buried in messy narrative accounts by anthropologists and archaeologists or in historical documents: in short, it was not scientific enough. To get beyond the forest of nineteenth-century typologies and create a unifying theory of society, the neo-evolutionists felt, they needed to convert these stories into numbers. By measuring differentiation and assigning scores they could rank societies and then search for correlations between the scores and possible explanations. Finally, they could turn to questions that might make all the time and money spent on archaeology worthwhile—whether there is just one way for societies to evolve, or multiple ways; whether societies cluster in discrete evolutionary stages (and if so, how they move from one stage to another); or whether a single trait, such as population or technology (or, for that matter, geography), explains everything.

In 1955 Raoul Naroll, an anthropologist working on a vast multi-university data-gathering project called the Human Relations Area Files, took the first serious stab at what he described as an index of social development. Randomly choosing thirty preindustrial societies from around the world (some contemporary, others historical), he trawled the files to find out how differentiated they were, which, he thought, would be reflected in how big their largest settlements were, how specialized their craftworkers were, and how many subgroups they had. Converting the results to a standard format, Naroll handed out scores. At the bottom were the Yahgan people of Tierra del Fuego, who had impressed Darwin in 1832 as "exist[ing] in a lower state of

improvement than [those] in any other part of the world." They scored just twelve out of a possible sixty-three points. At the top were the pre-Spanish-conquest Aztecs, with fifty-eight points.

Over the next twenty years other anthropologists tried their hands at the game. Despite the fact that each used different categories, data sets, mathematical models, and scoring techniques, they agreed on the results between 87 and 94 percent of the time, which is pretty good for social science. Fifty years after Spencer's death, a hundred after his essay on progress, neo-evolutionists looked poised to prove the laws of social evolution.

Anthropology Devolving

So what happened? If neo-evolutionists had delivered the goods and explained everything about social evolution, we would all have heard about it. And more to the point right now, they would already have answered the why-the-West-rules question. That question is, after all, about the relative levels of development of Eastern and Western societies: whether, as long-term lock-in theorists claim, the West pulled ahead long ago, or, as short-term accident theorists would have it, the West's lead is very recent. If neo-evolutionists could measure social development we would not have to mess around with complicated diagrams like Table 2.1. It would just be a matter of calculating Eastern and Western scores at various points since the end of the Ice Age, comparing them, and seeing which theory corresponds better with reality. So why has no one done this?

Largely, I suspect, because neo-evolutionism imploded. Even before Naroll took up his slide rule in the 1950s, the desire to measure societies struck many anthropologists as naïve. The "law-and-order crowd" (as critics called Naroll and his ilk), with their punch cards of coded data, arcane debates about statistics, and warehouse-size computers, seemed strangely divorced from the reality of archaeologists digging trenches or anthropologists interviewing

hunter-gatherers; and as the times started a-changing in the 1960s, neo-evolutionism began to look not so much ridiculous as downright sinister. The anthropologist Marshall Sahlins, for example, whose "Original Affluent Society" essay I mentioned in Chapter 2, had begun his career in the 1950s as an evolutionist, but in the 1960s decided that "sympathy and even admiration for the Vietnamese struggle, coupled to moral and political disaffection with the American war, might undermine an anthropology of economic determinism and evolutionary development."

By 1967, when Sahlins was in Paris arguing that hunter-gatherers were not really poor, a new generation of anthropologists—who had cut their teeth on America's civil rights, antiwar, and women's movements, and were often steeped in the counterculture—was staking out much tougher positions. The only thing evolutionists were really doing, they suggested, was ranking non-Western societies by how much they resembled the Westerners doing the measuring, who—amazingly—always gave themselves the highest scores.

"Evolutionary theories," the archaeologists Michael Shanks and Christopher Tilley wrote in the 1980s, "easily slip into ideologies of self-justification or assert the priorities of the West in relation to other cultures whose primary importance is to act as offsets for our contemporary 'civilization.'" Nor, many critics felt, was this confidence in numbers merely a harmless game Westerners played to make themselves feel good; it was part and parcel of the hubris that had given us carpet-bombing, the Vietnam War, and the military-industrial complex. Hey hey, ho ho, LBJ had got to go; and so, too, the professors of ethnocentrism with their arrogance and their mathematics.

The sit-ins and name-calling turned an academic debate into a Manichean showdown. To some evolutionists, their critics were morally bankrupt relativists; to some critics, evolutionists were stooges of American imperialism. Through the 1980s and '90s anthropologists fought it out in hiring, tenure, and graduate admissions committees, ruining careers and polarizing scholarship.

Anthropology departments on America's most famous campuses degenerated into something resembling bad marriages, until, broken down by years of mutual recriminations, the couples started leading separate lives. "We no longer [even] call each other names," one prominent anthropologist lamented in 1984. In the extreme case—at Stanford, my own university—the anthropologists divorced in 1998, formally splitting into the Department of Anthropological Sciences, which liked evolution, and the Department of Cultural and Social Anthropology, which did not. Each did its own hiring and firing and admitted and trained its own students; members of one group had no need to acknowledge members of the other. They even gave rise to a new verb, to "stanfordize" a department.

The woes—or joys, depending on who was talking -of stanfordization kept anthropologists entertained in bars at professional conferences for several years, but stanfordizing is not much of a solution to one of the biggest intellectual problems in the social sciences.[30] If we are going to explain why the West rules we need to confront the arguments on both sides of this issue.

Social evolution's critics were surely right that the law-and-order crowd was guilty of hubris. Like Herbert Spencer himself, in trying to explain everything about everything they perhaps ended up explaining rather little about anything. There was a lot of confusion over what neo-evolutionists were actually measuring, and even when they agreed on just what was supposed to be evolving within societies (which mostly happened when they stuck to Spencer's favorite idea of differentiation) it was not always obvious what ranking the world's societies in a league table would actually accomplish.

Score sheets, the critics insisted, obscure more than they reveal, masking the peculiarities of individual cultures. I certainly found that to be true when I was studying the origins of democracy in the 1990s. The ancient Greek cities that invented this form of government were really peculiar; many of their residents honestly believed that instead of asking priests what the gods thought, the best way to find the truth was to get all the men together on the

side of a hill, argue, and take a vote. Giving ancient Greece a score for differentiation does not explain where democracy came from, and burying the Greeks' peculiarity somewhere in an index of social development can actually make the task harder by diverting attention from their unique achievements.

Yet that does not mean that an index of social development is a waste of time; just that it was the wrong tool for that specific question. Asking why the West rules is a different *kind* of question, a grand comparative one that requires us to range across thousands of years of history, look at millions of square miles of territory, and bring together billions of people. For this task an index of social development is exactly the tool we need. The disagreement between long-term lock-in and short-term accident theories is, after all, about the overall shape of social development in East and West across the ten or so millennia that "East" and "West" have been meaningful concepts. Instead of concentrating on this and directly confronting each other's arguments, long-termers and short-termers tend to look at different parts of the story, use different bodies of evidence, and define their terms in different ways. Following the law-and-order crowd's lead and reducing the ocean of facts to simple numerical scores has drawbacks but it also has the one great merit of forcing everyone to confront the same evidence—with surprising results.

What to Measure?

The first step is to figure out exactly what we need to measure. We could do worse than listen to Lord Robert Jocelyn, who fought in the Opium War that made Western rule clear to all. On a sweltering Sunday afternoon in July 1840 he watched as British ships approached Tinghai, where a fort blocked their approach to the Yangzi River mouth. "The ships opened their broadsides upon the town," Jocelyn wrote, "and the crashing of timber, falling houses, and groans of men resounded from the shore. The firing lasted from our side for nine minutes...We landed on a deserted beach, a few dead bodies, bows and

arrows, broken spears and guns remaining the sole occupants of the field."

The immediate cause of Western rule is right here: by 1840 European ships and guns could brush aside anything an Eastern power could field. But there was, of course, more to the rise of Western rule than military power alone. Armine Mountain, another officer with the British fleet in 1840, likened the Chinese force at Tinghai to something out of the pages of medieval chronicles: it looked "as if the subjects of [those] old prints had assumed life and substance and colour," he mused, "and were moving and acting before me unconscious of the march of the world through centuries, and of all modern usage, invention, or improvement."

Mountain grasped that blowing up ships and forts was merely the proximate cause of Western dominance, the last link in a long chain of advantages. A deeper cause was that British factories could turn out explosive shells, well-bored cannon, and oceangoing warships, and British governments could raise, fund, and direct expeditions operating halfway round the world; and the ultimate reason that the British swept into Tinghai that afternoon was their success at extracting energy from the natural environment and using it to achieve their goals. It all came down to the fact that Westerners had not only scrambled further up the Great Chain of Energy than anyone else but also scrambled so high that—unlike any earlier societies in history—they could project their power across the entire world.

This process of scrambling up the Great Chain of Energy is the foundation of what, following the tradition of evolutionary anthropologists since Naroll in the 1950s, I will call social development—basically, a group's ability to master its physical and intellectual environment to get things done.[21] Putting it more formally, social development is the bundle of technological, subsistence, organizational, and cultural accomplishments through which people feed, clothe, house, and reproduce themselves, explain the world around them, resolve disputes within their communities, extend their power at the expense of other communities, and defend themselves against others' attempts to extend

power. Social development, we might say, measures a community's ability to get things done, which, in principle, can be compared across time and space.

Before we go any further with this line of argument, there is one point I need to make in the strongest possible terms: measuring and comparing social development is not a method for passing moral judgment on different communities. For example, twenty-first-century Japan is a land of air-conditioning, computerized factories, and bustling cities. It has cars and planes, libraries and museums, high-tech health-care and a literate population. The contemporary Japanese have mastered their physical and intellectual environment far more thoroughly than their ancestors a thousand years ago, who had none of these things. It therefore makes sense to say that modern Japan is more developed than medieval Japan. Yet this implies nothing about whether the people of modern Japan are smarter, worthier, or luckier (let alone happier) than the Japanese of the Middle Ages. Nor does it imply anything about the moral, environmental, or other costs of social development. Social development is a neutral analytical category. Measuring it is one thing; praising or blaming it is another altogether.

I will argue later in this chapter that measuring social development shows us what we need to explain if we are to answer the why-the-West-rules question; in fact, I will propose that unless we come up with a way to measure social development we will never be able to answer this question. First, though, we need establish some principles to guide our index-making.

I can think of nowhere better to start than with Albert Einstein, the most respected scientist of modern times. Einstein is supposed to have said that "in science, things should be made as simple as possible, but no simpler": that is, scientists should boil their ideas down to the core point that can be checked against reality, figure out the simplest possible way to perform the check, then do just that—nothing more, but nothing less either.

Einstein's own theory of relativity provides a famous example. Relativity implies that gravity bends light, meaning—if the theory is right—that every time

the sun passes between Earth and another star, the sun's gravity will bend the light coming from that star, making the star appear to shift position slightly. That provides an easy test of the theory—except for the fact that the sun is so bright that we cannot see stars near it. But in 1919 the British astronomer Arthur Eddington came up with a clever solution, very much in the spirit of Einstein's aphorism: by looking at the stars near the sun during a solar eclipse, Eddington realized, he could measure whether they had shifted by the amount Einstein predicted.

Eddington set off to the South Pacific, made his observations, and pronounced Einstein correct. Acrimonious arguments ensued, because the difference between results that supported Einstein and results that disproved him was tiny, and Eddington was pushing the instruments available in 1919 to their very limits; yet despite the theory of relativity's complexity,[32] astronomers could agree on what they needed to measure and how to measure it. It was then just a matter of whether Eddington had got the measurements right. Coming down from the sublime movement of the stars to the brutal bombardment of Tinghai, though, we immediately see that things are much messier when we are dealing with human societies. Just what should we be measuring to assign scores to social development?

If Einstein provides our theoretical lead, we might take a practical lead from the United Nations Human Development Index, not least because it has a lot in common with the kind of index that will help answer our question. The UN Development Programme devised the index to measure how well each nation is doing at giving its citizens opportunities to realize their innate potential. The Programme's economists started by asking themselves what human development really means, and boiled it down to three core traits: average life expectancy, average education (expressed by literacy levels and enrollments in school), and average income. They then devised a complicated weighting system to combine the traits to give each country a score between zero, meaning no human development at all (in which case everyone would be dead)

and one perfection, given the possibilities of the real world in the year the survey was done. (In case you're wondering, in the most recent index available as I write, that for 2009, Norway came first, scoring .971, and Sierra Leone last, with .340.)

The index satisfies Einstein's rule, since three traits is probably as simple as the UN can make things while still capturing what human development means. Economists still find a lot not to like about it, though. Most obviously, life expectancy, education, and income are not the only things we could measure. They have the advantage of being relatively easy to define and document (some potential traits, like happiness, would be much harder), but there are certainly other things we could look at (say employment rates, nutrition, or housing) that might generate different scores. Even economists who agree that the UN's traits are the best ones sometimes balk at conflating them into a single human development score; they are like apples and oranges, these economists say, and bundling them together is ridiculous. Other economists are comfortable both with the variables chosen and with conflating them, but do not like the way the UN statisticians weight each trait. The scores may look objective, these economists point out, but in reality they are highly subjective. Still other critics reject the very idea of scoring human development. It creates the impression, they say, that Norwegians are 97.1 percent of the way toward ultimate bliss, and 2.9 times as blissful as people in Sierra Leone—both of which seem, well, unlikely.

But despite all the criticisms, the human development index has proved enormously useful. It has helped relief agencies target their funds on the countries where they can do most good, and even the critics tend to agree that the simple fact of having an index moves the debates forward by making everything more explicit. An index of social development across the last fifteen-thousand-plus years faces all the same problems as the UN's index (and then some), but it also, I think, offers some similar advantages.

Like the UN economists, we should aim to follow Einstein's rule. The index

must measure as few dimensions of society as possible (keep it simple) while still capturing the main features of social development as defined above (don't make it *too* simple). Each dimension of society that we measure should satisfy six rather obvious criteria. First, it must be relevant: that is, it must tell us something about social development. Second, it must be culture-independent: we might, for example, think that the quality of literature and art are useful measures of social development, but judgments in these matters are notoriously culture-bound. Third, traits must be independent of one another—if, for instance, we use the number of people in a state and the amount of wealth in that state as traits, we should not use per capita wealth as a third trait, because it is just a product of the first two traits. Fourth, traits must be adequately documented. This is a real problem when we look back thousands of years, because the available evidence varies so much. Especially in the distant past, we simply do not know much about some potentially useful traits. Fifth, traits must be reliable, meaning that experts more or less agree on what the evidence says. Sixth, traits must be convenient. This may be the least important criterion, but the harder it is to get evidence for something or the longer it takes to calculate results, the less useful that trait is.

There is no such thing as a perfect trait. Each trait we might choose inevitably performs better on some of these criteria than on others. But after spending many months now looking into the options, I have settled on four traits that I think do quite well on all six criteria. They do not add up to a comprehensive picture of Eastern and Western society, any more than the UN's traits of life expectancy, education, and income tell us everything there is to know about Norway or Sierra Leone. But they do give us a pretty good snapshot of social development, showing us the long-term patterns that need to be explained if we are to know why the West rules.

My first trait is energy capture. Without being able to extract energy from plants and animals to feed soldiers and sailors who did little farming themselves, from wind and coal to carry ships to China, and from explosives to

hurl shells at the Chinese garrison, the British would never have reached Tinghai in 1840 and blown it to pieces. Energy capture is fundamental to social development—so much so that back in the 1940s the celebrated anthropologist Leslie White proposed reducing all human history to a single equation: $E \times T \rightarrow C$, he pronounced, where E stands for energy, T for technology, and C for culture.

This is not quite as philistine as it sounds. White was not really suggesting that multiplying energy by technology tells us all we might want to know about Confucius and Plato or artists like the Dutch Old Master Rembrandt and the Chinese landscape painter Fan Kuan. When White spoke of "culture" he in fact meant something rather like what I am calling social development. But even so, his formulation is too simple for our purposes. To explain Tinghai we need to know more.

All the energy capture in the world would not have taken a British squadron to Tinghai if they had not been able to organize it. Queen Victoria's minions had to be able to raise troops, pay and supply them, get them to follow leaders, and carry out a host of other tricky jobs. We need to measure this organizational capacity. Up to a point organizational capacity overlaps with Spencer's old idea of differentiation, but neo-evolutionists learned in the 1960s that it is almost impossible to measure differentiation directly, or even to define it in a way that will satisfy critics. We need a proxy, something closely related to organizational capacity but easier to measure.

The one I have chosen is urbanism. Perhaps that will seem odd; after all, the fact that London was a big place does not directly reflect Lord Melbourne's revenue flows or the Royal Navy's command structure. On further reflection, though, I hope the choice will seem less odd. It took astonishing organization to support a city of 3 million people. Someone had to get food and water in and waste products out, provide work, maintain law and order, put out fires, and perform all the other tasks that go on, day in, day out, in every great city.

It is certainly true that some of the world's biggest cities today are

dysfunctional nightmares, riddled with crime, squalor, and disease. But that, of course, has been true of most big cities throughout history. Rome had a million residents in the first century BCE; it also had street gangs that sometimes brought government to a halt and death rates so high that more than a thousand country folk had to migrate into Rome every month just to make up the numbers. Yet for all Rome's foulness (brilliantly evoked in the 2006 HBO television series *Rome*), the organization needed to keep the city going was vastly beyond anything any earlier society could have managed—just as running Lagos (population 11 million) or Mumbai (population 19 million), let alone Tokyo (population 35 million), would have been far beyond the Roman Empire's capabilities.

This is why social scientists regularly use urbanism as a rough guide to organizational capacity. It is not a perfect measure, but it is certainly a useful rough guide. In our case, the size of a society's largest cities has the extra advantage that we can trace it not only in the official statistics produced in the last few hundred years but also in the archaeological record, allowing us to get an approximate sense of levels of organization all the way back to the Ice Age.

As well as generating physical energy and organizing it, the British of course also had to process and communicate prodigious amounts of information. Scientists and industrialists had to transfer knowledge precisely; gunmakers, shipbuilders, soldiers, and sailors increasingly needed to read written instructions, plans, and maps; letters had to move between Asia and Europe. Nineteenth-century British information technology was crude compared to what we now take for granted (private letters needed three months to get from Guangzhou to London; government dispatches, for some reason, needed four), but it had already advanced far beyond eighteenth-century levels, which, in turn, were well head of the seventeenth century. Information processing is critical to social development, and I use it as my third trait.

Last but sadly not least is the capacity to make war. However well the British extracted energy, organized it, and communicated, it was their ability to

turn these three traits toward destruction that settled matters in 1840. I grumbled in Chapter 1 about Arthur C. Clarke equating evolution with skill at killing in his science-fiction classic *2001: A Space Odyssey*, but an index of social development that did not include military power would be no use at all. As Chairman Mao famously put it, "Every Communist must grasp this truth: 'Political power grows out of the barrel of a gun.'" Before the 1840s, no society could project military power across the whole planet, and to ask who "ruled" was nonsense. After the 1840s, though, this became perhaps the most important question in the world.

Just as with the UN's human development index, there is no umpire to say that these traits, rather than some other set, are the ultimate way to measure social development, and again like the UN index, any change to the traits will change the scores. The good news, though, is that none of the alternative traits I have looked at over the last few years changed the scores much, and none changed the overall pattern at all.[33]

If Eddington had been an artist he might have been an Old Master, representing the world at a level of detail painful to behold. But making an index of social development is more like chainsaw art, carving grizzly bears out of tree trunks. This level of roughness and readiness would doubtless have turned Einstein's hair even whiter, but different problems call for different margins of error. For the chainsaw artist, the only important question is whether the tree trunk looks like a bear; for the comparative historian, it is whether the index shows the overall shape of the history of social development. That, of course, is something historians will have to judge for themselves, comparing the pattern the index reveals with the details of the historical record.

Provoking historians to do this may in fact be the greatest service an index can perform. There is plenty of scope for debate: different traits and different ways of assigning scores might well work better. But putting numbers on the table forces us to focus on where errors might have crept in and how they can be corrected. It may not be astrophysics, but it is a start.

How to Measure?

Now it is time to come up with some numbers. It is easy enough to find figures for the state of the world in 2000 CE (since it is such a nice round number, I use this date as the end point for the index). The United Nations' various programs publish annual statistical digests that tell us, for instance, that the average American consumes 83.2 million kilocalories of energy per year, compared to 38 million for the average person in Japan; that 79.1 percent of Americans live in cities, as against 66 percent of Japanese; that there are 375 Internet hosts per thousand Americans but only 73 per thousand Japanese; and so on. The International Institute for Strategic Studies's annual *Military Balance* tells us, so far as it can be known, how many troops and weapons each country has, what their capabilities are, and how much they cost. We are drowning in numbers. They do not add up to an index, though, until we decide how to organize them.

Sticking to the simple-as-possible program, I set 1,000 points as the maximum social development score attainable in the year 2000 and divide these points equally between my four traits. When Raoul Naroll published the first modern index of social development in 1956 he also gave equal points to his three traits, if only, as he put it, "because no obvious reason appeared for giving one any more weight than another." That sounds like a counsel of despair, but there is actually a good reason for weighting the traits equally: even if I thought up reasons to weight one trait more heavily than another in calculating social development, there would be no grounds to assume that the same weightings have held good across the fifteen-thousand-plus years under review or have applied equally to East and West.

Having set the maximum possible score for each trait in the year 2000 at 250 points, we come to the trickiest part, deciding how to award points to East and West at each stage of their history. I will not go step-by-step through every calculation involved (I summarize the data and some of the main complexities in the appendix at the end of this book, and I have posted a fuller account

online),[34] but it might be useful to take a quick look inside the kitchen, as it were, and explain the procedure a bit more fully. (If you don't think so, you can of course skip to the next section.)

Urbanism is probably the most straightforward trait, although it certainly has its challenges. The first is definitional: Just what do we mean by urbanism? Some social scientists define urbanism as the proportion of the population living in settlements above a certain size (say, ten thousand people); others, as the distribution of people across several ranks of settlements, from cities down to hamlets; others still, as the average size of community within a country. These are all useful approaches, but are difficult for us to apply across the whole period we are looking at here because the nature of the evidence keeps changing. I decided to go with a simpler measure: the size of the largest known settlement in East and West at each moment in time.

Focusing on largest city size does not do away with definitional problems, since we still have to decide how to define the boundaries of cities and how to combine different categories of evidence for numbers within them. It does, though, reduce the uncertainties to a minimum. When I played around with the numbers I found that combining largest city size with other criteria, such as the best guesses at the distribution of people between cities and villages or the average size of cities, hugely increased the difficulties of the task but hardly changed the overall scores at all; so, since the more complicated ways of measuring produced roughly the same results but with a whole lot more guesswork, I decided to stick to simple city sizes.

In 2000 CE, most geographers classified Tokyo as the world's biggest city, with about 26.7 million residents.[35] Tokyo, then, scores the full 250 points allotted to organization/urbanism, meaning that for all other calculations it will take 106,800 people (that is, 26.7 million divided by 250) to score 1 point. The biggest Western city in 2000 CE was New York, with 16.7 million people, scoring 156.37 points. The data from a hundred years ago are not as good, but all historians agree that cities were much smaller. In the West, London had about

6.6 million residents (scoring 61.80 points) in 1900 CE, while in the East Tokyo was still the greatest city, but with just 1.75 million people, earning 16.39 points. By the time we get back to 1800 CE, historians have to combine several different kinds of evidence, including records of food supply and tax payments, the physical area covered by cities, the density of housing within them, and anecdotal accounts, but most conclude that Beijing was the world's biggest city, with perhaps 1.1 million souls (10.30 points). The biggest Western city was again London, with about 861,000 people (8.06 points).

The further we push back in time, the broader the margins of error, but for the thousand years leading up to 1700 the biggest cities were clearly Chinese (with Japanese ones often close behind). First Chang'an, then Kaifeng, and later Hangzhou came close to or passed a million residents (around 9 points) between 800 and 1200 CE. Western cities, by contrast, were never more than half that size. A few centuries earlier the situation was reversed: in the first century BCE Rome's million residents undoubtedly made it the world's metropolis, while Chang'an in China had probably 500,000 citizens.

As we move back into prehistory the evidence of course becomes fuzzier and the numbers become smaller, but the combination of systematic archaeological surveys and detailed excavation of smaller areas still gives us a reasonable sense of city sizes. As I mentioned earlier, this is very much chainsaw art. The most commonly accepted estimates might be as much as 10 percent off but are unlikely to be much wider of the mark than that; and since we are applying the same methods of estimation to Eastern and Western sites, the broad trends should be fairly reliable. To score 1 point on this system requires 106,800 people, so slightly more than one thousand people will score 0.01 points, the smallest number I felt was worth entering on the index. As we saw in Chapter 2, the biggest Western villages reached this level around 7500 BCE and the biggest Eastern ones around 3500 BCE. Before these dates, West and East alike score zero (you can see tables of the scores in the appendix).

It might be worth taking a moment here to talk about energy capture as

well, since it poses very different problems. The simplest way to think about energy capture is in terms of consumption per person, measured in kilocalories per day. Following the same procedure as for urbanism, I start in the year 2000 CE, when the average American burned through some 228,000 kilocalories per day. That figure, certainly the highest in history, gets the West the full compliment of 250 points (as I said earlier in the chapter, I am not interested in passing judgment on our capacities to capture energy, build cities, communicate information, and wage war; only in measuring them). The highest Eastern consumption per person in 2000 CE was Japan's 104,000 kilocalories per day, earning 113.89 points.

Official statistics on energy go back only to about 1900 CE in the East and 1800 in the West, but fortunately there are ways to work around that. The human body has some basic physiological needs. It will not work properly unless it gets about 2,000 kilocalories of food per day (rather more if you are tall and/or physically active, rather less if you are not; the current American average of 3,460 kilocalories of food per day is, as supersized waistbands cruelly reveal, well in excess of what we need). If you take in much less than 2,000 kilocalories per day your body will gradually shut down functions—strength, vision, hearing, and so on—until you die. Average food consumption can never have been much below 2,000 kilocalories per person per day for extended periods, making the lowest possible score about 2 points.

In reality, though, the lowest scores have always been above 2 points, because most of the energy humans consume is in nonfood forms. We saw in Chapter 1 that *Homo erectus* was probably already burning wood for cooking at Zhoukoudian half a million years ago, and Neanderthals were certainly doing so 100,000 years ago, as well as wearing animal skins. Since we know so little about Neanderthal lifestyles our guesses cannot be very precise, but by tapping into nonfood energy sources Neanderthals definitely captured on average another thousand-plus kilocalories per day on top of their food, earning them about 3.25 points altogether. Fully modern humans cooked more than

Neanderthals, wore more clothes, and also built houses from wood, leaves, mammoth bones, and skins - all of which, again, were parasitic on the chemical energy that plants had created out of the sun's electromagnetic energy. Even the technologically simplest twentieth-century-ce hunter-gatherer societies captured at least 3,500 calories per day in food and nonfood sources combined. Given the colder weather, their distant forebears at the end of the Ice Age must have averaged closer to 4,000 kilocalories per day, or at least 4.25 points.

I doubt that any archaeologist would quibble much over these estimates, but there is a huge gap between Ice Age hunters' 4.25 points and the contemporary gasoline-and electricity-guzzling West's 250. What happened in between? By pooling their knowledge, archaeologists, historians, anthropologists, and ecologists can give us a pretty good idea.

Back in 1971, the editors of the magazine *Scientific American* invited the geoscientist Earl Cook to contribute an essay that he called "The Flow of Energy in an Industrial Society." He included in it a diagram, much reprinted since then, showing best guesses at per-person energy consumption among hunter-gatherers, early agriculturalists (by which he meant the farmers of southwest Asia around 5000 BCE whom we met in Chapter 2), advanced agriculturalists (those of northwest Europe around 1400 CE), industrial folk (western Europeans around 1860), and late-twentieth-century "technological" societies. He divided the scores into four categories of food (including the feed that goes into animals whose meat is eaten), home and commerce, industry and agriculture, and transport (Figure 3.1).

Cook's guesstimates have stood up remarkably well to nearly forty years of comparison with the results gathered by historians, anthropologists, archaeologists, and economists.[3] They only provide a starting point, of course, but we can use the detailed evidence surviving from each period of Eastern and Western history to tell us how far the actual societies departed from these parameters. Sometimes we can draw on textual evidence, but in most periods up to the last few hundred years archaeological finds—human and animal

bones; houses; agricultural tools; traces of terracing and irrigation; the remains of craftsmen's workshops and traded goods, and the carts, ships, and roads that bore them—are even more important.

Sometimes help comes from surprising directions. The ice cores that featured so prominently in Chapters 1 and 2 also show that airborne pollution increased sevenfold in the last few centuries BCE, mostly because of Roman mining in Spain, and in the last ten years, studies of sediments from peat bogs and lakes have confirmed this picture. Europeans apparently produced nine or ten times as much copper and silver in the first century CE as in the thirteenth century CE, with all the energy demands that implies people to dig the mines, and animals to cart away the slag; more of both to build roads and ports, to load and unload ships, and carry metals to cities; watermills to crush the ores; and above all wood, as timber to shore up mineshafts and fuel to feed forges. This independent source of evidence also lets us compare levels of industrial activity in different periods. Not until the eleventh century CE—when Chinese documents say that the relentless demands of ironworkers stripped the mountains around Kaifeng so bare of trees that coal, for the first time in history, became an important power source--did pollution in the ice return to Roman-era levels, and only with the belching smokestacks of nineteenth-century Britain did pollution push seriously beyond Roman-era levels.

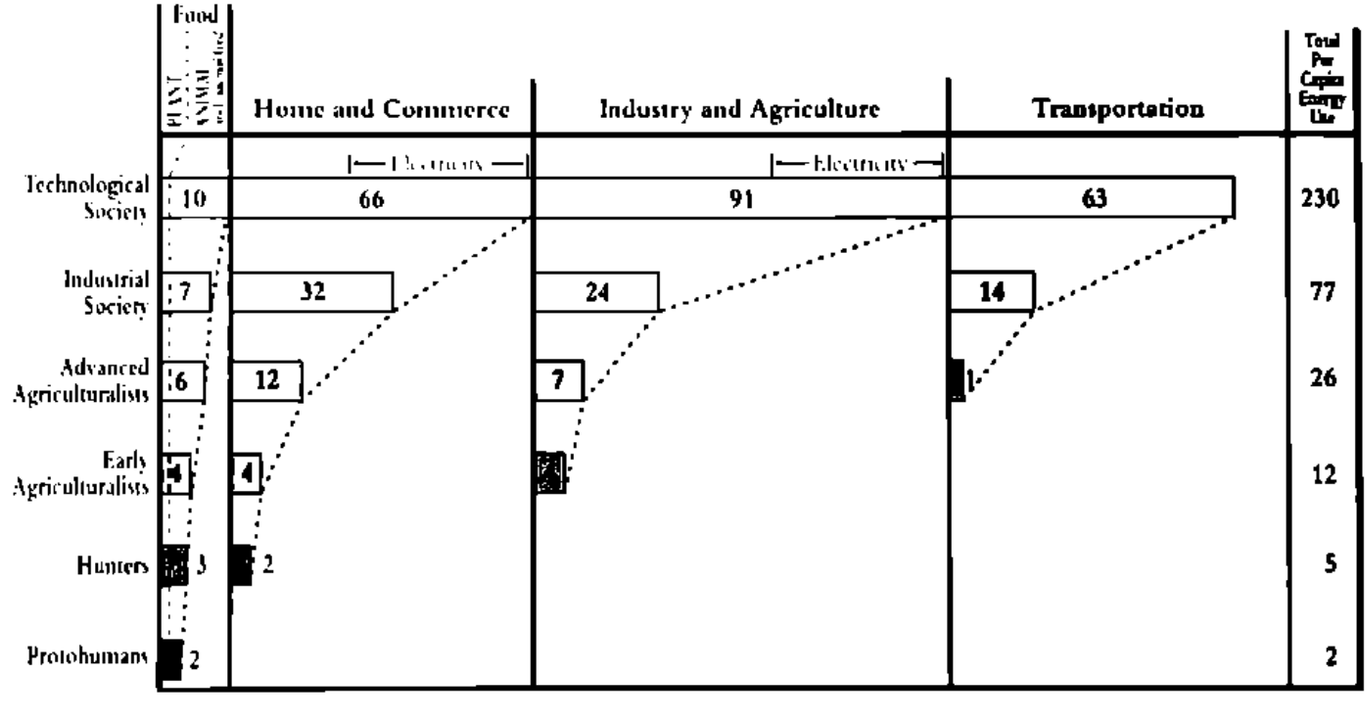
Food
PLANT
ANIMAL
Home and Commerce
Industry and Agriculture
Transportation
Total Per Capita Energy Use
Electricity
Electricity
Technological Society
10
66
91
63
230
Industrial Society
7
32
24
14
77
Advanced Agriculturalists
6
12
7
1
26
Early Agriculturalists
4
4
12
Hunters
3
2
5
Protohumans
2
2

Figure 3.1. The Great Chain of Energy in numbers: the geoscientist Earl Cook's estimates of energy capture per person per day, from the time of *Homo habilis* to 1970s America

Once again, I want to emphasize that we are doing chainsaw art. For instance, I estimate per-person energy capture at the height of the Roman Empire, in the first century CE, around 31,000 kilocalories per day. That is well above Cook's estimate of 26,000 calories for advanced agricultural societies, but archaeology makes it very clear that Romans ate more meat, built more cities, used more and bigger trading ships (and so on, and so on) than Europeans would do again until the eighteenth century. That said, Roman energy capture could certainly have been 5 percent higher or lower than my estimate. For reasons I address in the appendix, though, it was probably not more than 10 percent higher or lower, and definitely not 20 percent. Cook's framework and the detailed evidence constrain guesstimates pretty tightly, and as with the urbanism scores, the fact that the same person is doing the guessing in all cases, applying the same principles, should mean that the errors are at least consistent.

Information technology and war-making raise their own difficulties, discussed briefly in the appendix and more fully on my website, but the same principles apply as with urbanism and energy capture, and probably the same margins of error too. For reasons I discuss in the appendix, the scores will need to be systematically wrong by 15 or even 20 percent to make a real difference to the fundamental pattern of social development, but such big margins of error seem incompatible with the historical evidence. In the end, though, the only way to know for sure is for other historians, perhaps preferring other traits and assigning scores in other ways, to propose their own numbers.

Fifty years ago the philosopher Karl Popper argued that progress in science is a matter of "conjectures and refutations," following a zigzag course as one researcher throws out an idea and others scramble to disprove it, in the process coming up with better ideas. The same, I think, applies to history. I am

confident that any index that stays close to the evidence will produce more or less the same pattern as mine, but if I am wrong, and if others find this scheme wanting, hopefully my failure will encourage them to uncover better answers. To quote Einstein one more time, "There could be no fairer destiny for any theory...than that it should point the way to a more comprehensive theory in which it lives on."

When and Where to Measure?

Two final technical issues. First, how often should we calculate the scores? If we wanted to, we could trace changes in social development from year to year or even month to month since the 1950s. I doubt that there would be much point, though. After all, we want to see the overall shape of history across very long periods, and for that—as I hope to show in what follows - taking the pulse of social development once every century seems to provide enough detail.

As we move back toward the end of the Ice Age, though, checking social development on a century-by-century basis is neither possible nor particularly desirable. We just can't tell much difference between what was going on in 14,000 and the situation in 13,900 BCE (or 13,800 for that matter), partly because we don't have enough good evidence and partly because change just happened very slowly. I therefore use a sliding scale. From 14,000 through 4000 BCE, I measure social development every thousand years. From 4000 through 2500 BCE the quality of evidence improves and change accelerates, so I measure every five hundred years. I reduce this to every 250 years between 2500 BCE and 1500 BCE, and finally measure every century from 1400 BCE through 2000 CE.

This has its risks, most obviously that the further back in time we go, the smoother and more gradual change will look. By calculating scores only every thousand or five hundred years we may well miss something interesting. The hard truth, though, is that only occasionally can we date our information much

more precisely than the ranges I suggest. I do not want to dismiss this problem out of hand, and will try in the narrative in Chapters 4 through 10 to fill in as many of the gaps as possible, but the framework I use here does seem to me to offer the best balance between practicality and precision.

The other issue is *where* to measure. You may have been struck while reading the last section by my coyness about just what part of the world I was talking about when I generated numbers for "West" and "East." I spoke at some points about the United States and at others about Britain; sometimes of China, sometimes of Japan. Back in Chapter 1 I described the historian Kenneth Pomeranz's complaints about how comparative historians often skew analysis of why the West rules by sloppily comparing tiny England with enormous China and concluding that the West already led the East by 1750 CE. We must, he insisted, compare like-sized units. I spent Chapters 1 and 2 responding to this by defining West and East explicitly as the societies that have descended from the original Western and Eastern agricultural revolutions in the Hilly Flanks and the Yellow and Yangzi river valleys; now it is time to admit that that resolved only part of Pomeranz's problem. In Chapter 2, I described the spectacular expansion of the Western and Eastern zones in the five thousand or so years after cultivation began and the differences in social development that often existed between core areas such as the Hilly Flanks or Yangzi Valley and peripheries such as northern Europe or Korea; so which parts of the East and West should we focus on when working out scores for the index of social development?

We could try looking at the whole of the Eastern and Western zones, although that would mean that the score for, say, 1900 CE would bundle together the smoking factories and rattling machine guns of industrialized Britain with Russia's serfs, Mexico's peons, Australia's ranchers, and every other group in every corner of the vast Western zone. We would then have to concoct some sort of average development score for the whole Western region, then do it again for the East, and repeat the process for every earlier point in

history. This would get so complicated as to become impractical, and I suspect it would be rather pointless anyway. When it comes to explaining why the West rules, the most important information normally comes from comparing the most highly developed parts of each region, the cores that were tied together by the densest political, economic, social, and cultural interactions. The index of social development needs to measure and compare changes within these cores.

As we will see in Chapters 4–10, though, the core areas have themselves shifted and changed across time. The Western core was geographically actually very stable from 11,000 BCE until about 1400 CE, remaining firmly at the eastern end of the Mediterranean Sea except for the five hundred years between about 250 BCE and 250 CE, when the Roman Empire drew it westward to include Italy. Otherwise, it always lay within a triangle formed by what are now Iraq, Egypt, and Greece. Since 1400 CE it has moved relentlessly north and west, first to northern Italy, then to Spain and France, then broadening to include Britain, Belgium, Holland, and Germany. By 1900 it straddled the Atlantic and by 2000 was firmly planted in North America. In the East the core remained in the original Yellow-Yangzi zone right up until 1800 CE, although its center of gravity shifted northward toward the Yellow River's central plain after about 4000 BCE, back south to the Yangzi Valley after 500 CE, and gradually north again after 1400. It expanded to include Japan by 1900 and southeast China by 2000 (Figure 3.2). For now I just want to note that all the social development scores reflect the societies in these core areas; why the cores shifted will be one of our major concerns in Chapters 4 through 10.

The Pattern of the Past

So much for the rules of the game; now for some results. Figure 3.3 shows the scores across the last sixteen thousand years, since things began warming up at the end of the Ice Age.

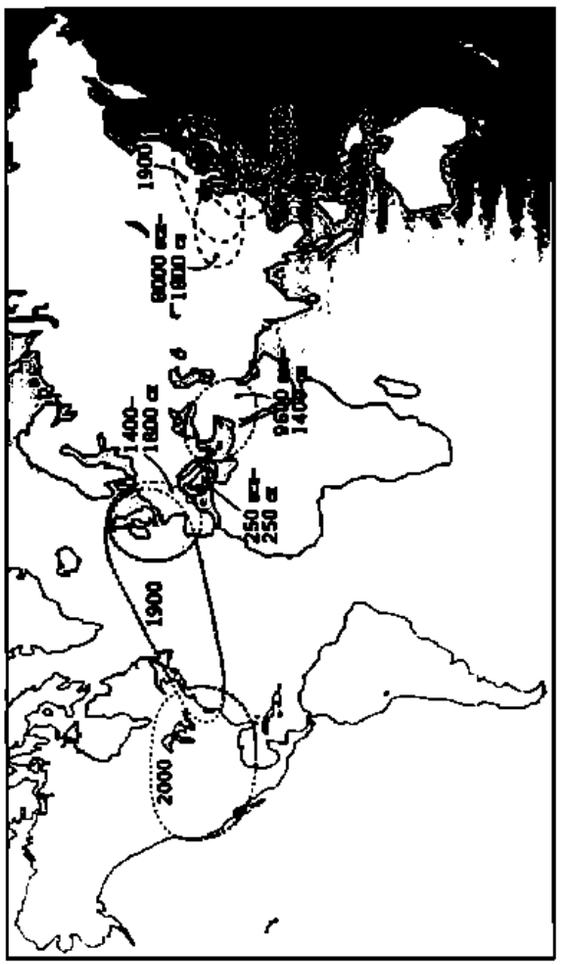

Figure 3.2. Shifting centers of power: the sometimes slow, sometimes rapid relocation of the most highly developed core within the Western and Eastern traditions since the end of the Ice Age

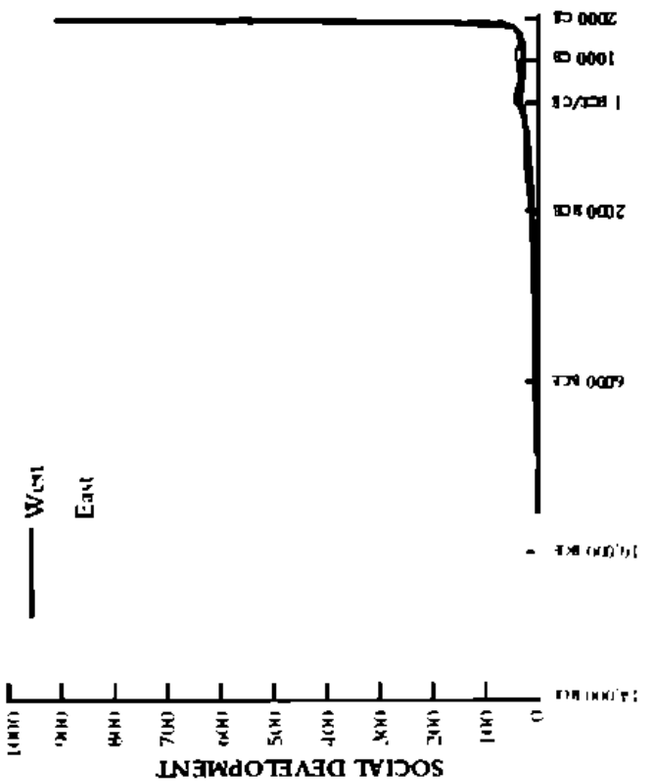

Figure 3.3. Keeping score: Eastern and Western social development since 14,000 BCE

After all this buildup, what do we see? Frankly, not much, unless your eyesight is a lot better than mine. The Eastern and Western lines run so close together that it is hard even to distinguish them, and they barely budge off the bottom of the graph until 3000 BCE. Even then, not much seems to happen until just a few centuries ago, when both lines abruptly take an almost ninety-degree turn and shoot straight up.

But this rather disappointing-looking graph in fact tells us two very important things. First, Eastern and Western social development have not differed very much; at the scale we are looking at, it is hard to tell them apart through most of history. Second, something profound happened in the last few

centuries, by far the fastest and greatest transformation in history.

To get more information, we need to look at the scores in a different way. The trouble with Figure 3.3 is that the upward swing of the Eastern and Western lines in the twentieth century was so dramatic that to have the scale on the vertical axis go high enough to include the scores in 2000 CE (906.38 for the West and 565.44 for the East) we have to compress the much lower scores in earlier periods to the point that they are barely visible to the naked eye. This problem afflicts all graphs that try to show patterns where growth is accelerating, multiplying what has gone before, rather than simply adding to it. Fortunately there is a convenient way to solve the problem.

Imagine that I want a cup of coffee but have no money. I borrow a dollar from the local version of Tony Soprano (imagine, too, that this story is set back in the days when a dollar still bought a cup of coffee). He is, of course, my friend, so he won't charge me interest so long as I pay him back within a week. If I miss the deadline, though, my debt will double every seven days. Needless to say, I fail to show up when the payment is due, so now I owe him two dollars. Fiscal prudence not being my strength, I let another week pass, so I owe four dollars; then another week. Now his marker is worth eight dollars. I skip town and conveniently forget our arrangement.

Figure 3.4 shows what happens to my debt. Just like Figure 3.3, for a long time there is nothing much to see. The line charting the interest becomes visible only around week 14—by which time I owe a breathtaking $8,192. On week 16, when my debt has spiraled to $32,768, the line finally pulls free from the bottom of the graph. By week 24, when the mobsters track me down, I owe $8,260,608. That was one expensive cup of coffee.

By this standard, of course, the growth of my debt in the first few weeks—from one, to two, to four, to eight dollars—was indeed trivial. But imagine that I had bumped into one of the loan shark's foot soldiers a month or so after my fateful coffee, when my debt stood at sixteen dollars. Let us also say that I didn't have sixteen dollars, but did give him a five. Concerned for my health, I

make four more weekly payments of five dollars each, but then drop off the map again and stop paying. The black line in Figure 3.5 shows what happened when I paid nothing, while the gray one shows how my debt grows after those five five-dollar payments. My coffee still ends up costing more than $3 million, but that is less than half what I owed without the payments. They were crucially important—yet they are invisible in the graph. There is no way to tell from Figure 3.5 why the gray line ends up so much lower than the black.

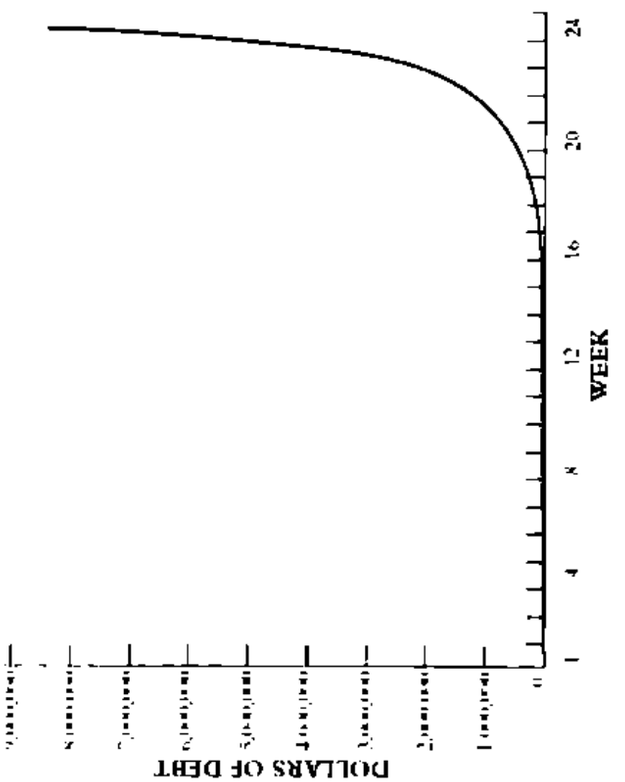

Figure 3.4. The $8 million cup of coffee: compound interest plotted on a conventional graph. Even though the cost of a cup of coffee spirals from $1 to $8,192 across fourteen weeks, the race to financial disaster remains invisible on the graph until week 17.

Figure 3.6 tells the story of my ruin in a different way. Statisticians call

Figures 3.4 and 3.5 linear-linear graphs, because the scales on each axis grow by linear increments; that is, each week that passes occupies the same amount of space along the horizontal axis, each dollar of debt the same space on the vertical axis. Figure 3.6, by contrast, is what statisticians call log-linear. Time is still parceled out along the horizontal scale in linear units, but the vertical scale records my debt logarithmically, meaning that the space between the bottom axis of the graph and the first point on the vertical axis covers my debt's tenfold growth from one to ten dollars; in the space between the first and second points it again expands tenfold, from ten to a hundred dollars; then tenfold more, from a hundred to a thousand; and so on to ten million at the top.

Politicians and advertisers have turned misleading us with statistics into a fine art. Already a century and a half ago the British prime minister Benjamin Disraeli felt moved to remark, "There are three kinds of lies: lies, damned lies, and statistics," and Figure 3.6 may strike you as proving his point. But all it really does is highlight a different aspect of my debt than Figures 3.4 and 3.5. A linear-linear scale does a good job of showing just how bad my debt is; a log-linear scale does a good job of showing how things got to be so bad. In Figure 3.6 the black line runs smooth and straight, showing that without any payments the size of my debt accelerates steadily, doubling every week. The gray line shows how after four weeks of doubling, my series of five-dollar payments slow down, but do not cancel out, my debt's rate of growth. When I stop paying, the gray line once again rises parallel to the black one, since my debt is once again doubling every week, but does not end up at quite such a dizzying height.

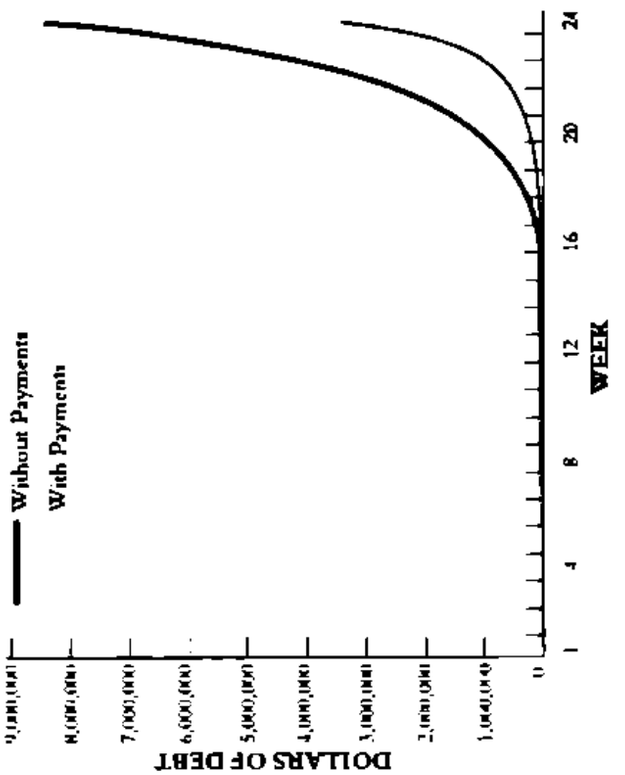

Figure 3.5. A poor way to represent poor planning: the black line shows the same spiral of debt as Figure 3.4, while the gray line shows what happens after small payments against the debt in weeks 5 through 9. On this conventional (linear-linear) graph, these crucial payments are invisible.

Neither politicians nor statistics *always* lie; it is just that there is no such thing as a completely neutral way to present either policies or numbers. Every press statement and every graph emphasizes some aspects of reality and downplays others. Thus Figure 3.7, showing social development scores from 14,000 BCE through 2000 CE on a log-linear scale, produces a wildly different impression than the linear-linear version of the same scores in Figure 3.3. There is much more going on here than met the eye in Figure 3.3. The leap in social development in recent centuries is very real and remains clear; no amount of fancy statistical footwork will ever make it go away. But Figure 3.7

shows that it did not drop out of a clear blue sky, the way it seemed to do in Figure 3.3. By the time the lines start shooting upward (around 1700 CE in the West and 1800 in the East) the scores in both regions were already about ten times higher than they were at the left-hand side of the graph—a difference that was barely visible in Figure 3.3.

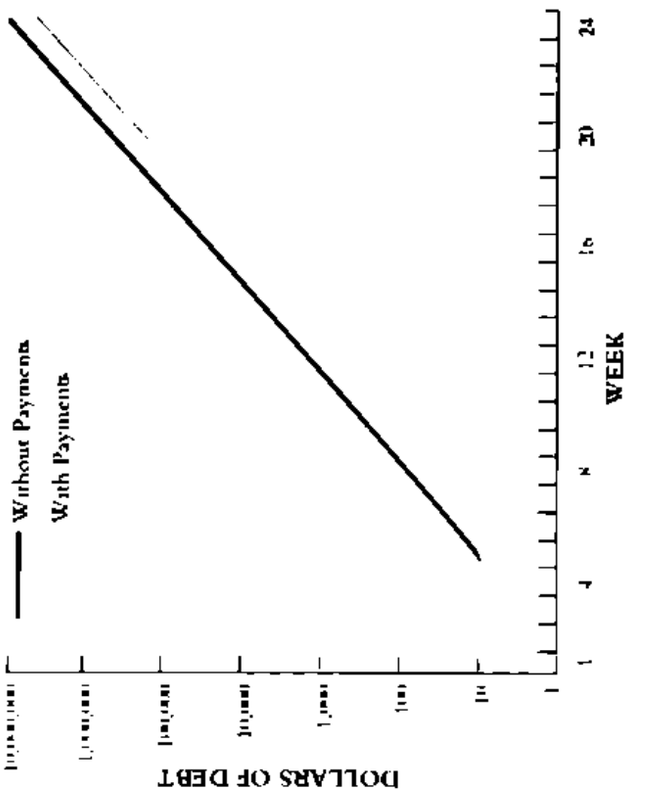

Figure 3.6. Straight roads to ruin: the spiral of debt on a log-linear scale. The black line shows the steady doubling of the debt if no payments are made, while the gray shows the impact of the small payments in weeks 5 through 9 before it goes back to doubling when the payments stop.

Figure 3.7 shows that explaining why the West rules will mean answering several questions at once. We will need to know why social development leaped

so suddenly after 1800 CE to reach a level (somewhere close to 100 points) where states could project their power globally. Before development reached such heights, even the strongest societies on earth could dominate only their own region, but the new technologies and institutions of the nineteenth century allowed them to turn local domination into worldwide rule. We will also, of course, need to figure out why the West was the first part of the world to reach this threshold. But to answer either of these questions we will also have to understand why development had already increased so much over the previous fourteen thousand years.

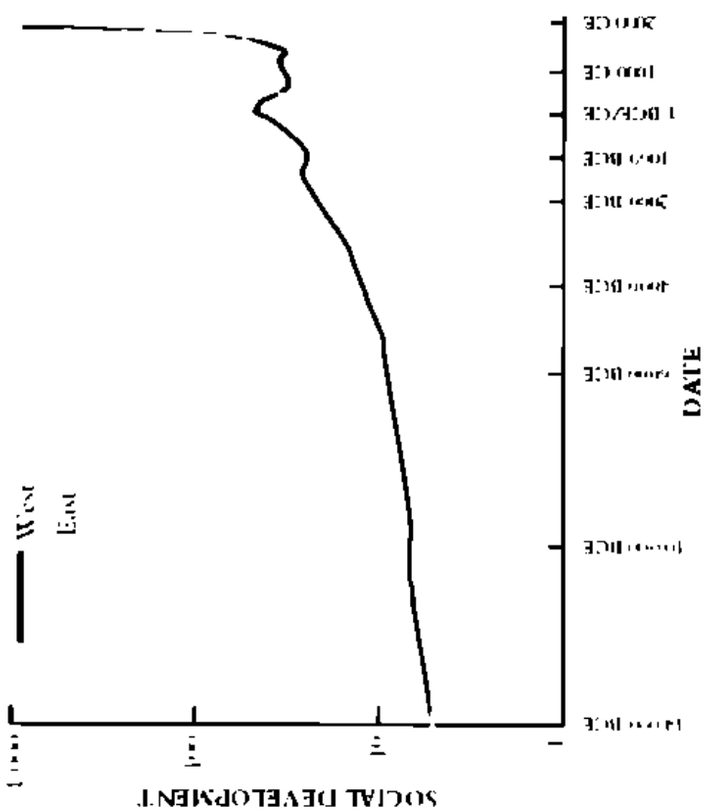

Figure 3.7. The growth of social development, 14,000 BCE–2000 CE, plotted on a log-linear scale. This may be the most useful way to present the scores, highlighting the relative rates of growth in East and

Nor is that the end of what Figure 3.7 reveals. It also shows that the Eastern and Western scores were not in fact indistinguishable until just a few hundred years ago: Western scores have been higher than Eastern scores for more than 90 percent of the time since 14,000 BCE. This seems to be a real problem for short-term accident theories. The West's lead since 1800 CE is a reversion to the long-term norm, not some weird anomaly.

Figure 3.7 does not necessarily disprove short-term accident theories, but it does mean that a successful short-term theory will need to be more sophisticated, explaining the long-term pattern going back to the end of the Ice Age as well as events since 1700 CE. But the patterns also show that long-term lock-in theorists should not rejoice too soon. Figure 3.7 reveals clearly that Western social development scores have not *always* been higher than Eastern. After converging through much of the first millennium BCE, the lines cross in 541 CE and the East then remains ahead until 1773. (These implausibly precise dates of course depend on the unlikely assumption that the social development scores I have calculated are absolutely accurate; the most sensible way to put things may be to say that the Eastern score rose above the Western in the mid sixth century CE and the West regained the lead in the late eighteenth.) The facts that Eastern and Western scores converged in ancient times and that the East then led the world in social development for twelve hundred years do not disprove long-term lock-in theories, any more than the fact that the West has led for nearly the whole time since the end of the Ice Age disproves short-term accident theories; but again, they mean that a successful theory will need to be rather more sophisticated and to take account of a wider range of evidence than those offered so far.

Before leaving the graphs, there are a couple more patterns worth pointing out. They are visible in Figure 3.7, but Figure 3.8 makes them clearer. This is a conventional linear-linear graph but covers just the three and a half millennia

from 1600 BCE through 1900 CE. Cutting off the enormous scores for 2000 CE lets us stretch the vertical axis enough that we can actually see the scores from earlier periods, while shortening the time span lets us stretch the horizontal axis so the changes through time are clearer too.

Two things particularly strike me about this graph. The first is the peak in Western scores in the first century CE, around forty-three points, followed by a slow decline after 100 CE. If we look a little farther to the right, we see an Eastern peak just over forty-two points in 1100 CE, at the height of the Song dynasty's power in China, then a similar decline. A little farther still to the right, around 1700 CE, Eastern and Western scores both return to the low forties but this time instead of stalling they accelerate; a hundred years later the Western line goes through the roof as the industrial revolution begins.

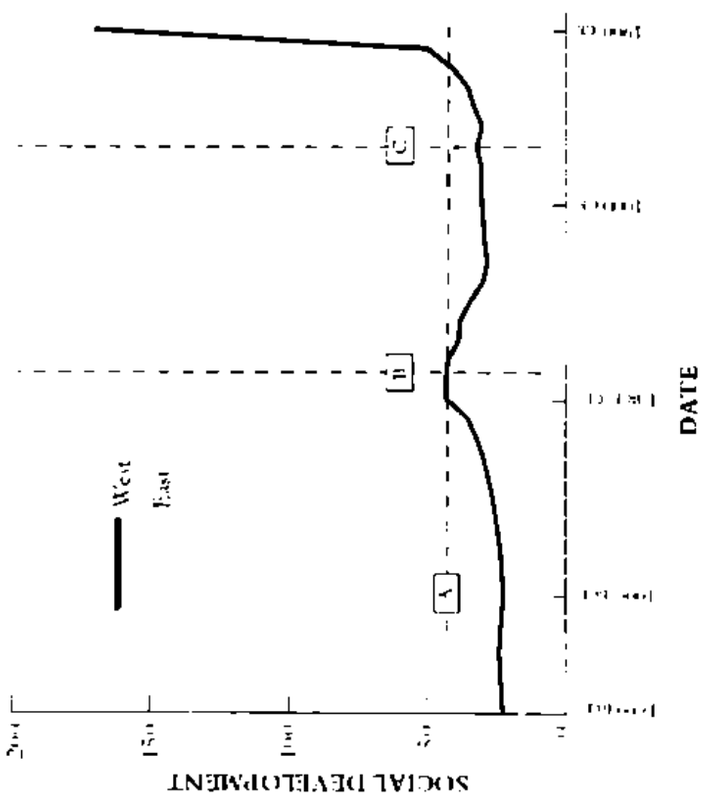

Figure 3.8. Lines through time and space: social development across the three and a half millennia between 1600 BCE and 1900 CE, represented on a linear-linear plot. Line A shows a possible threshold around 43 points, which may have blocked the continuing development of the West's Roman Empire in the first centuries CE and China's Song dynasty around 1100 CE, before East and West alike broke through it around 1700 CE. Line B shows a possible connection between declining scores in both East and West in the first centuries CE, and line C shows another possible East-West connection starting around 1300 CE.

Was there some kind of "low-forties threshold" that defeated Rome and Song China? I mentioned in the introduction that, in his book *The Great Divergence*, Kenneth Pomeranz argued that East and West alike ran into an ecological bottleneck in the eighteenth century that should, by rights, have caused their social development to stagnate and decline. Yet they did not, the reason being, Pomeranz suggested, that the British—more through luck than judgment—combined the fruits of plundering the New World with the energy of fossil fuels, blowing away traditional ecological constraints. Could it be that the Romans and Song ran into similar bottlenecks when social development reached the low forties but failed to open them? If so, maybe the dominant pattern in the last two thousand years of history has been one of long-term waves, with great empires clawing their way up toward the low-forties ceiling then falling back, until something special happened in the eighteenth century.

The second thing that strikes me about Figure 3.8 is that we can draw vertical lines on it as well as horizontal ones. The obvious place to put a vertical line is in the first century CE, when Western and Eastern scores both peaked, even though the Eastern score was well below the Western (34.13 versus 43.22 points). Rather than (or as well as) focusing on the West hitting a low-forties ceiling, perhaps we should be looking for some set of events affecting both ends of the Old World, driving down Roman and Han Chinese social development scores regardless of the levels they had reached.

We could put another vertical line around 1300 CE, when Eastern and Western scores again followed similar patterns, although this time it was the

Western score that was much lower (30.73 as against 42.66 points). The Eastern score had already been sliding for a hundred years, but the Western score now joined it, only for both lines to pick up after 1400 and accelerate even more sharply around 1700. Again, instead of focusing on the scores hitting a low-forties ceiling in the early eighteenth century, perhaps we should look for some global events that started pushing Eastern and Western development along a shared path in the fourteenth century. Perhaps the industrial revolution came first to the West not because of some extraordinary fluke, as Pomeranz concluded, but because East and West were both on track for such a revolution; and then something about the way the West reacted to the events of the fourteenth century gave it a slight but decisive lead in reaching the takeoff point in the eighteenth.

It seems to me that Figures 3.3, 3.7, and 3.8 illuminate a real weakness in both long-term lock-in and short-term accident theories. A few of the theorists focus on the story's beginning in the agricultural revolution, while the great majority look only at its very end, in the last five hundred years. Because they largely ignore the thousands of years in between, they rarely even try to account for all the spurts of growth, slowdowns, collapses, convergences, changes in leadership, or horizontal ceilings and vertical links that jump out at us when we can see the whole shape of history. That, putting it bluntly, means that neither approach can tell us why the West rules; and that being the case, neither can hope to answer the question lurking beyond that—what will happen next.

Scrooge's Question

At the climax of Charles Dickens's *A Christmas Carol*, the Ghost of Christmas Yet to Come brings Ebenezer Scrooge to a weed-choked churchyard. Silently, the Ghost points out an untended tombstone. Scrooge knows his name will be on it; he knows that here, alone, unvisited, he will lie forever. "Are these the shadows of the things that Will be, or are they shadows of the things that May

be, only?" he cries out.

We might well ask the same question about Figure 3.9, which takes the rates of increase in Eastern and Western social development in the twentieth century and projects them forward.[37] The Eastern line crosses the Western in 2103. By 2150 the West's rule is finished, its pomp at one with Nineveh and Tyre.

The West's epitaph looks as clear as Scrooge's:

WESTERN RULE
1773–2103
R.I.P.

Yet are these really the shadows of the things that Will be?

Confronted with his own epitaph, Scrooge fell to his knees. "Good Spirit," he begged, grabbing the specter's hand, "assure me that I yet may change these shadows you have shown me, by an altered life!" Christmas Yet to Come said nothing, but Scrooge worked out the answer for himself. He had been forced to spend an uncomfortable evening with the Ghosts of Christmas Past and Christmas Present because he needed to learn from both of them. "I will not shut out the lessons that they teach," Scrooge promised. "Oh, tell me I may sponge away the writing on this stone!"

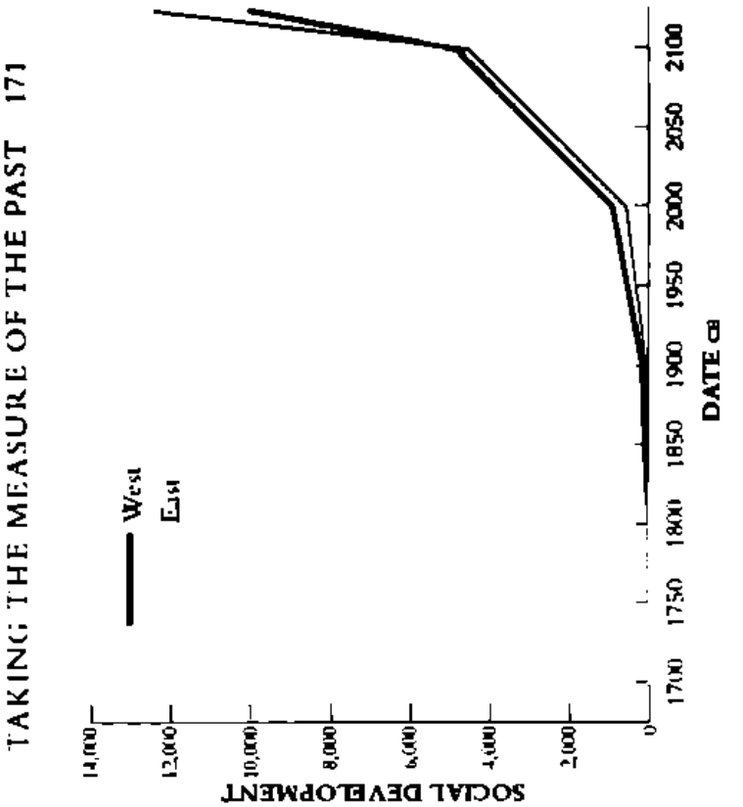

Figure 3.9. The shape of things to come? If we project the rates at which Eastern and Western social development grew in the twentieth century forward into the twenty-second, we see the East regain the lead in 2103. (On a log-linear graph, the Eastern and Western lines would both be straight from 1900 onward, reflecting unchanging rates of growth; because this is a linear-linear plot, both curve sharply upward.)

I commented in the introduction that I'm in a minority among those who write on why the West rules, and particularly on what will happen next, in not being an economist, modern historian, or political pundit of some sort. At the risk of overdoing the Scrooge analogy, I would say that the absence of premodern historians from the discussion has led us into the mistake of talking exclusively to the Ghost of Christmas Present. We need to bring the Ghost of

Christmas Past back in.

To do this I will spread Part II of this book (Chapters 4 to 10) being a historian, telling the stories of East and West across the last few thousand years, trying to explain why social development changed as it did, and in Part III (Chapters 11 and 12) I will pull these stories together. Then, I believe, will tell us not only why the West rules but also what will happen next.