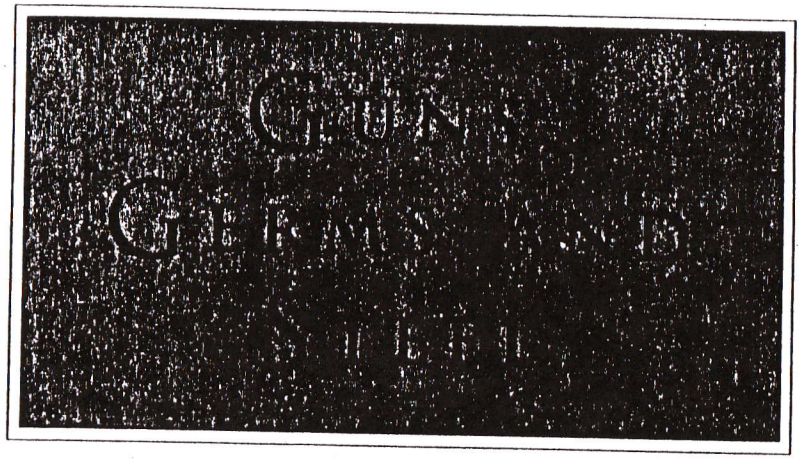

THE FATES OF HUMAN SOCIETIES

Jared Diamond

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WE ALL KNOW THAT HISTORY HAS PROCEEDED VERY DIFferently for peoples from different parts of the globe. In the 13,000 years since the end of the last Ice Age, some parts of the world developed literate industrial societies with metal tools, other parts developed only nonliterate farming societies, and still others retained societies of hunter-gatherers with stone tools. Those historical inequalities have cast long shadows on the modern world, because the literate societies with metal tools have conquered or exterminated the other societies. While those differences constitute the most basic fact of world history, the reasons for them remain uncertain and controversial. This puzzling question of their origins was posed to me 25 years ago in a simple, personal form.

In July 1972 I was walking along a beach on the tropical island of New Guinea, where as a biologist I study bird evolution. I had already heard about a remarkable local politician named Yali, who was touring the district then. By chance, Yali and I were walking in the same direction on that day, and he overtook me. We walked together for an hour, talking during the whole time.

Yali radiated charisma and energy. His eyes flashed in a mesmerizing way. He talked confidently about himself, but he also asked lots of probing questions and listened intently. Our conversation began with a subject then

on every New Guinean's mind—the rapid pace of political developments. Papua New Guinea, as Yali's nation is now called, was at that time still administered by Australia as a mandate of the United Nations, but independence was in the air. Yali explained to me his role in getting local people to prepare for self-government.

After a while, Yali turned the conversation and began to quiz me. He had never been outside New Guinea and had not been educated beyond high school, but his curiosity was insatiable. First, he wanted to know about my work on New Guinea birds (including how much I got paid for it). I explained to him how different groups of birds had colonized New Guinea over the course of millions of years. He then asked how the ancestors of his own people had reached New Guinea over the last tens of thousands of years, and how white Europeans had colonized New Guinea within the last 200 years.

The conversation remained friendly, even though the tension between the two societies that Yali and I represented was familiar to both of us. Two centuries ago, all New Guineans were still "living in the Stone Age." That is, they still used stone tools similar to those superseded in Europe by metal tools thousands of years ago, and they dwelt in villages not organized under any centralized political authority. Whites had arrived, imposed centralized government, and brought material goods whose value New Guineans instantly recognized, ranging from steel axes, matches, and medicines to clothing, soft drinks, and umbrellas. In New Guinea all these goods were referred to collectively as "cargo."

Many of the white colonialists openly despised New Guineans as "primitive." Even the least able of New Guinea's white "masters," as they were still called in 1972, enjoyed a far higher standard of living than New Guineans, higher even than charismatic politicians like Yali. Yet Yali had quizzed lots of whites as he was then quizzing me, and I had quizzed lots of New Guineans. He and I both knew perfectly well that New Guineans are on the average at least as smart as Europeans. All those things must have been on Yali's mind when, with yet another penetrating glance of his flashing eyes, he asked me, "Why is it that you white people developed so much cargo and brought it to New Guinea, but we black people had little cargo of our own?"

It was a simple question that went to the heart of life as Yali experienced it. Yes, there still is a huge difference between the lifestyle of the average New Guinean and that of the average European or American. Comparable differences separate the lifestyles of other peoples of the world as well. Those huge disparities must have potent causes that one might think would be obvious.

Yet Yali's apparently simple question is a difficult one to answer. I didn't have an answer then. Professional historians still disagree about the solution; most are no longer even asking the question. In the years since Yali and I had that conversation, I have studied and written about other aspects of human evolution, history, and language. This book, written twenty-five years later, attempts to answer Yali.

ALTHOUGH YALI'S QUESTION concerned only the contrasting lifestyles of New Guineans and of European whites, it can be extended to a larger set of contrasts within the modern world. Peoples of Eurasian origin, especially those still living in Europe and eastern Asia, plus those transplanted to North America, dominate the modern world in wealth and power. Other peoples, including most Africans, have thrown off European colonial domination but remain far behind in wealth and power. Still other peoples, such as the aboriginal inhabitants of Australia, the Americas, and southernmost Africa, are no longer even masters of their own lands but have been decimated, subjugated, and in some cases even exterminated by European colonialists.

Thus, questions about inequality in the modern world can be reformulated as follows. Why did wealth and power become distributed as they now are, rather than in some other way? For instance, why weren't Native Americans, Africans, and Aboriginal Australians the ones who decimated, subjugated, or exterminated Europeans and Asians?

We can easily push this question back one step. As of the year A.D. 1500, when Europe's worldwide colonial expansion was just beginning, peoples on different continents already differed greatly in technology and political organization. Much of Europe, Asia, and North Africa was the site of metal-equipped states or empires, some of them on the threshold of industrialization. Two Native American peoples, the Aztecs and the Incas, ruled over empires with stone tools. Parts of sub-Saharan Africa were divided among small states or chiefdoms with iron tools. Most other peoples—including all those of Australia and New Guinea, many Pacific

islands, much of the Americas, and small parts of sub-Saharan Africa—lived as farming tribes or even still as hunter-gatherer bands using stone tools.

Of course, those technological and political differences as of A.D. 1500 were the immediate cause of the modern world's inequalities. Empires with steel weapons were able to conquer or exterminate tribes with weapons of stone and wood. How, though, did the world get to be the way it was in A.D. 1500?

Once again, we can easily push this question back one step further, by drawing on written histories and archaeological discoveries. Until the end of the last Ice Age, around 11,000 B.C., all peoples on all continents were still hunter-gatherers. Different rates of development on different continents, from 11,000 B.C. to A.D. 1500, were what led to the technological and political inequalities of A.D. 1500. While Aboriginal Australians and many Native Americans remained hunter-gatherers, most of Eurasia and much of the Americas and sub-Saharan Africa gradually developed agriculture, herding, metallurgy, and complex political organization. Parts of Eurasia, and one area of the Americas, independently developed writing as well. However, each of these new developments appeared earlier in Eurasia than elsewhere. For instance, the mass production of bronze tools, which was just beginning in the South American Andes in the centuries before A.D. 1500, was already established in parts of Eurasia over 4,000 years earlier. The stone technology of the Tasmanians, when first encountered by European explorers in A.D. 1642, was simpler than that prevalent in parts of Upper Paleolithic Europe tens of thousands of years earlier.

Thus, we can finally rephrase the question about the modern world's inequalities as follows: why did human development proceed at such different rates on different continents? Those disparate rates constitute history's broadest pattern and my book's subject.

While this book is thus ultimately about history and prehistory, its subject is not of just academic interest but also of overwhelming practical and political importance. The history of interactions among disparate peoples is what shaped the modern world through conquest, epidemics, and genocide. Those collisions created reverberations that have still not died down after many centuries, and that are actively continuing in some of the world's most troubled areas today.

For example, much of Africa is still struggling with its legacies from recent colonialism. In other regions—including much of Central America,

Mexico, Peru, New Caledonia, the former Soviet Union, and parts of Indonesia—civil unrest or guerrilla warfare pits still-numerous indigenous populations against governments dominated by descendants of invading conquerors. Many other indigenous populations—such as native Hawaiians, Aboriginal Australians, native Siberians, and Indians in the United States, Canada, Brazil, Argentina, and Chile—became so reduced in numbers by genocide and disease that they are now greatly outnumbered by the descendants of invaders. Although thus incapable of mounting a civil war, they are nevertheless increasingly asserting their rights.

In addition to these current political and economic reverberations of past collisions among peoples, there are current linguistic reverberations—especially the impending disappearance of most of the modern world's 6,000 surviving languages, becoming replaced by English, Chinese, Russian, and a few other languages whose numbers of speakers have increased enormously in recent centuries. All these problems of the modern world result from the different historical trajectories implicit in Yali's question.

Before seeking answers to Yali's question, we should pause to consider some objections to discussing it at all. Some people take offense at the mere posing of the question, for several reasons.

One objection goes as follows. If we succeed in explaining how some people came to dominate other people, may this not seem to justify the domination? Doesn't it seem to say that the outcome was inevitable, and that it would therefore be futile to try to change the outcome today? This objection rests on a common tendency to confuse an explanation of causes with a justification or acceptance of results. What use one makes of a historical explanation is a question separate from the explanation itself. Understanding is more often used to try to alter an outcome than to repeat or perpetuate it. That's why psychologists try to understand the minds of murderers and rapists, why social historians try to understand genocide, and why physicians try to understand the causes of human disease. Those investigators do not seek to justify murder, rape, genocide, and illness. Instead, they seek to use their understanding of a chain of causes to interrupt the chain.

Second, doesn't addressing Yali's question automatically involve a Eurocentric approach to history, a glorification of western Europeans, and an obsession with the prominence of western Europe and Europeanized

America in the modern world? Isn't that prominence just an ephemeral phenomenon of the last few centuries, now fading behind the prominence of Japan and Southeast Asia? In fact, most of this book will deal with peoples other than Europeans. Rather than focus solely on interactions between Europeans and non-Europeans, we shall also examine interactions between different non-European peoples—especially those that took place within sub-Saharan Africa, Southeast Asia, Indonesia, and New Guinea, among peoples native to those areas. Far from glorifying peoples of western European origin, we shall see that most basic elements of their civilization were developed by other peoples living elsewhere and were then imported to western Europe.

Third, don't words such as "civilization," and phrases such as "rise of civilization," convey the false impression that civilization is good, tribal hunter-gatherers are miserable, and history for the past 13,000 years has involved progress toward greater human happiness? In fact, I do not assume that industrialized states are "better" than hunter-gatherer tribes, or that the abandonment of the hunter-gatherer lifestyle for iron-based statehood represents "progress," or that it has led to an increase in human happiness. My own impression, from having divided my life between United States cities and New Guinea villages, is that the so-called blessings of civilization are mixed. For example, compared with hunter-gatherers, citizens of modern industrialized states enjoy better medical care, lower risk of death by homicide, and a longer life span, but receive much less social support from friendships and extended families. My motive for investigating these geographic differences in human societies is not to celebrate one type of society over another but simply to understand what happened in history.

DOES YALI'S QUESTION really need another book to answer it? Don't we already know the answer? If so, what is it?

Probably the commonest explanation involves implicitly or explicitly assuming biological differences among peoples. In the centuries after A.D. 1500, as European explorers became aware of the wide differences among the world's peoples in technology and political organization, they assumed that those differences arose from differences in innate ability. With the rise of Darwinian theory, explanations were recast in terms of natural selection and of evolutionary descent. Technologically primitive peoples were considered evolutionary vestiges of human descent from apelike ancestors. The displacement of such peoples by colonists from industrialized societies exemplified the survival of the fittest. With the later rise of genetics, the explanations were recast once again, in genetic terms. Europeans became considered genetically more intelligent than Africans, and especially more so than Aboriginal Australians.

Today, segments of Western society publicly repudiate racism. Yet many (perhaps most!) Westerners continue to accept racist explanations privately or subconsciously. In Japan and many other countries, such explanations are still advanced publicly and without apology. Even educated white Americans, Europeans, and Australians, when the subject of Australian Aborigines comes up, assume that there is something primitive about the Aborigines themselves. They certainly look different from whites. Many of the living descendants of those Aborigines who survived the era of European colonization are now finding it difficult to succeed economically in white Australian society.

A seemingly compelling argument goes as follows. White immigrants to Australia built a literate, industrialized, politically centralized, democratic state based on metal tools and on food production, all within a century of colonizing a continent where the Aborigines had been living as tribal hunter-gatherers without metal for at least 40,000 years. Here were two successive experiments in human development, in which the environment was identical and the sole variable was the people occupying that environment. What further proof could be wanted to establish that the differences between Aboriginal Australian and European societies arose from differences between the peoples themselves?

The objection to such racist explanations is not just that they are loathsome, but also that they are wrong. Sound evidence for the existence of human differences in intelligence that parallel human differences in technology is lacking. In fact, as I shall explain in a moment, modern "Stone Age" peoples are on the average probably more intelligent, not less intelligent, than industrialized peoples. Paradoxical as it may sound, we shall see in Chapter 15 that white immigrants to Australia do not deserve the credit usually accorded to them for building a literate industrialized society with the other virtues mentioned above. In addition, peoples who until recently were technologically primitive—such as Aboriginal Australians and New Guineans—routinely master industrial technologies when given opportunities to do so.

An enormous effort by cognitive psychologists has gone into the search for differences in IQ between peoples of different geographic origins now living in the same country. In particular, numerous white American psychologists have been trying for decades to demonstrate that black Americans of African origins are innately less intelligent than white Americans of European origins. However, as is well known, the peoples compared differ greatly in their social environment and educational opportunities. This fact creates double difficulties for efforts to test the hypothesis that intellectual differences underlie technological differences. First, even our cognitive abilities as adults are heavily influenced by the social environment that we experienced during childhood, making it hard to discern any influence of preexisting genetic differences. Second, tests of cognitive ability (like IQ tests) tend to measure cultural learning and not pure innate intelligence, whatever that is. Because of those undoubted effects of childhood environment and learned knowledge on IQ test results, the psychologists' efforts to date have not succeeded in convincingly establishing the postulated genetic deficiency in IQs of nonwhite peoples.

My perspective on this controversy comes from 33 years of working with New Guineans in their own intact societies. From the very beginning of my work with New Guineans, they impressed me as being on the average more intelligent, more alert, more expressive, and more interested in things and people around them than the average European or American is. At some tasks that one might reasonably suppose to reflect aspects of brain function, such as the ability to form a mental map of unfamiliar surroundings, they appear considerably more adept than Westerners. Of course, New Guineans tend to perform poorly at tasks that Westerners have been trained to perform since childhood and that New Guineans have not. Hence when unschooled New Guineans from remote villages visit towns, they look stupid to Westerners. Conversely, I am constantly aware of how stupid I look to New Guineans when I'm with them in the jungle, displaying my incompetence at simple tasks (such as following a jungle trail or erecting a shelter) at which New Guineans have been trained since childhood and I have not.

It's easy to recognize two reasons why my impression that New Guineans are smarter than Westerners may be correct. First, Europeans have for thousands of years been living in densely populated societies with central governments, police, and judiciaries. In those societies, infectious epidemic diseases of dense populations (such as smallpox) were historically the

major cause of death, while murders were relatively uncommon and a state of war was the exception rather than the rule. Most Europeans who escaped fatal infections also escaped other potential causes of death and proceeded to pass on their genes. Today, most live-born Western infants survive fatal infections as well and reproduce themselves, regardless of their intelligence and the genes they bear. In contrast, New Guineans have been living in societies where human numbers were too low for epidemic diseases of dense populations to evolve. Instead, traditional New Guineans suffered high mortality from murder, chronic tribal warfare, accidents, and problems in procuring food.

Intelligent people are likelier than less intelligent ones to escape those causes of high mortality in traditional New Guinea societies. However, the differential mortality from epidemic diseases in traditional European societies had little to do with intelligence, and instead involved genetic resistance dependent on details of body chemistry. For example, people with blood group B or O have a greater resistance to smallpox than do people with blood group A. That is, natural selection promoting genes for intelligence has probably been far more ruthless in New Guinea than in more densely populated, politically complex societies, where natural selection for body chemistry was instead more potent.

Besides this genetic reason, there is also a second reason why New Guineans may have come to be smarter than Westerners. Modern European and American children spend much of their time being passively entertained by television, radio, and movies. In the average American household, the TV set is on for seven hours per day. In contrast, traditional New Guinea children have virtually no such opportunities for passive entertainment and instead spend almost all of their waking hours actively doing something, such as talking or playing with other children or adults. Almost all studies of child development emphasize the role of childhood stimulation and activity in promoting mental development, and stress the irreversible mental stunting associated with reduced childhood stimulation. This effect surely contributes a non-genetic component to the superior average mental function displayed by New Guineans.

That is, in mental ability New Guineans are probably genetically superior to Westerners, and they surely are superior in escaping the devastating developmental disadvantages under which most children in industrialized societies now grow up. Certainly, there is no hint at all of any intellectual *dis*advantage of New Guineans that could serve to answer Yali's question.

The same two genetic and childhood developmental factors are likely to distinguish not only New Guineans from Westerners, but also hunter-gatherers and other members of technologically primitive societies from members of technologically advanced societies in general. Thus, the usual racist assumption has to be turned on its head. Why is it that Europeans, despite their likely genetic disadvantage and (in modern times) their undoubted developmental disadvantage, ended up with much more of the cargo? Why did New Guineans wind up technologically primitive, despite what I believe to be their superior intelligence?

A GENETIC EXPLANATION isn't the only possible answer to Yali's question. Another one, popular with inhabitants of northern Europe, invokes the supposed stimulatory effects of their homeland's cold climate and the inhibitory effects of hot, humid, tropical climates on human creativity and energy. Perhaps the seasonally variable climate at high latitudes poses more diverse challenges than does a seasonally constant tropical climate. Perhaps cold climates require one to be more technologically inventive to survive, because one must build a warm home and make warm clothing, whereas one can survive in the tropics with simpler housing and no clothing. Or the argument can be reversed to reach the same conclusion: the long winters at high latitudes leave people with much time in which to sit indoors and invent.

Although formerly popular, this type of explanation, too, fails to survive scrutiny. As we shall see, the peoples of northern Europe contributed nothing of fundamental importance to Eurasian civilization until the last thousand years; they simply had the good luck to live at a geographic location where they were likely to receive advances (such as agriculture, wheels, writing, and metallurgy) developed in warmer parts of Eurasia. In the New World the cold regions at high latitude were even more of a human backwater. The sole Native American societies to develop writing arose in Mexico south of the Tropic of Cancer; the oldest New World pottery comes from near the equator in tropical South America; and the New World society generally considered the most advanced in art, astronomy, and other respects was the Classic Maya society of the tropical Yucatán and Guatemala in the first millennium A.D.

Still a third type of answer to Yali invokes the supposed importance of lowland river valleys in dry climates, where highly productive agriculture

depended on large-scale irrigation systems that in turn required centralized bureaucracies. This explanation was suggested by the undoubted fact that the earliest known empires and writing systems arose in the Tigris and Euphrates Valleys of the Fertile Crescent and in the Nile Valley of Egypt. Water control systems also appear to have been associated with centralized political organization in some other areas of the world, including the Indus Valley of the Indian subcontinent, the Yellow and Yangtze Valleys of China, the Maya lowlands of Mesoamerica, and the coastal desert of Peru.

However, detailed archaeological studies have shown that complex irrigation systems did not *accompany* the rise of centralized bureaucracies but *followed* after a considerable lag. That is, political centralization arose for some other reason and then permitted construction of complex irrigation systems. None of the crucial developments preceding political centralization in those same parts of the world were associated with river valleys or with complex irrigation systems. For example, in the Fertile Crescent food production and village life originated in hills and mountains, not in lowland river valleys. The Nile Valley remained a cultural backwater for about 3,000 years after village food production began to flourish in the hills of the Fertile Crescent. River valleys of the southwestern United States eventually came to support irrigation agriculture and complex societies, but only after many of the developments on which those societies rested had been imported from Mexico. The river valleys of southeastern Australia remained occupied by tribal societies without agriculture.

Yet another type of explanation lists the immediate factors that enabled Europeans to kill or conquer other peoples—especially European guns, infectious diseases, steel tools, and manufactured products. Such an explanation is on the right track, as those factors demonstrably *were* directly responsible for European conquests. However, this hypothesis is incomplete, because it still offers only a proximate (first-stage) explanation identifying immediate causes. It invites a search for ultimate causes: why were Europeans, rather than Africans or Native Americans, the ones to end up with guns, the nastiest germs, and steel?

While some progress has been made in identifying those ultimate causes in the case of Europe's conquest of the New World, Africa remains a big puzzle. Africa is the continent where protohumans evolved for the longest time, where anatomically modern humans may also have arisen, and where native diseases like malaria and yellow fever killed European explorers. If a long head start counts for anything, why didn't guns and

steel arise first in Africa, permitting Africans and their germs to conquer Europe? And what accounts for the failure of Aboriginal Australians to pass beyond the stage of hunter-gatherers with stone tools?

Questions that emerge from worldwide comparisons of human societies formerly attracted much attention from historians and geographers. The best-known modern example of such an effort was Arnold Toynbee's 12-volume *Study of History.* Toynbee was especially interested in the internal dynamics of 23 advanced civilizations, of which 22 were literate and 19 were Eurasian. He was less interested in prehistory and in simpler, nonliterate societies. Yet the roots of inequality in the modern world lie far back in prehistory. Hence Toynbee did not pose Yali's question, nor did he come to grips with what I see as history's broadest pattern. Other available books on world history similarly tend to focus on advanced literate Eurasian civilizations of the last 5,000 years; they have a very brief treatment of pre-Columbian Native American civilizations, and an even briefer discussion of the rest of the world except for its recent interactions with Eurasian civilizations. Since Toynbee's attempt, worldwide syntheses of historical causation have fallen into disfavor among most historians, as posing an apparently intractable problem.

Specialists from several disciplines have provided global syntheses of their subjects. Especially useful contributions have been made by ecological geographers, cultural anthropologists, biologists studying plant and animal domestication, and scholars concerned with the impact of infectious diseases on history. These studies have called attention to parts of the puzzle, but they provide only pieces of the needed broad synthesis that has been missing.

Thus, there is no generally accepted answer to Yali's question. On the one hand, the proximate explanations are clear: some peoples developed guns, germs, steel, and other factors conferring political and economic power before others did; and some peoples never developed these power factors at all. On the other hand, the ultimate explanations—for example, why bronze tools appeared early in parts of Eurasia, late and only locally in the New World, and never in Aboriginal Australia—remain unclear.

Our present lack of such ultimate explanations leaves a big intellectual gap, since the broadest pattern of history thus remains unexplained. Much more serious, though, is the moral gap left unfilled. It is perfectly obvious to everyone, whether an overt racist or not, that different peoples have fared differently in history. The modern United States is a European-

molded society, occupying lands conquered from Native Americans and incorporating the descendants of millions of sub-Saharan black Africans brought to America as slaves. Modern Europe is not a society molded by sub-Saharan black Africans who brought millions of Native Americans as slaves.

These results are completely lopsided: it was not the case that 51 percent of the Americas, Australia, and Africa was conquered by Europeans, while 49 percent of Europe was conquered by Native Americans, Aboriginal Australians, or Africans. The whole modern world has been shaped by lopsided outcomes. Hence they must have inexorable explanations, ones more basic than mere details concerning who happened to win some battle or develop some invention on one occasion a few thousand years ago.

It *seems* logical to suppose that history's pattern reflects innate differences among people themselves. Of course, we're taught that it's not polite to say so in public. We read of technical studies claiming to demonstrate inborn differences, and we also read rebuttals claiming that those studies suffer from technical flaws. We see in our daily lives that some of the conquered peoples continue to form an underclass, centuries after the conquests or slave imports took place. We're told that this too is to be attributed not to any biological shortcomings but to social disadvantages and limited opportunities.

Nevertheless, we have to wonder. We keep seeing all those glaring, persistent differences in peoples' status. We're assured that the seemingly transparent biological explanation for the world's inequalities as of A.D. 1500 is wrong, but we're not told what the correct explanation is. Until we have some convincing, detailed, agreed-upon explanation for the broad pattern of history, most people will continue to suspect that the racist biological explanation is correct after all. That seems to me the strongest argument for writing this book.

AUTHORS ARE REGULARLY asked by journalists to summarize a long book in one sentence. For this book, here is such a sentence: "History followed different courses for different peoples because of differences among peoples' environments, not because of biological differences among peoples themselves."

Naturally, the notion that environmental geography and biogeography influenced societal development is an old idea. Nowadays, though, the

view is not held in esteem by historians; it is considered wrong or simplistic, or it is caricatured as environmental determinism and dismissed, or else the whole subject of trying to understand worldwide differences is shelved as too difficult. Yet geography obviously has *some* effect on history; the open question concerns how much effect, and whether geography can account for history's broad pattern.

The time is now ripe for a fresh look at these questions, because of new information from scientific disciplines seemingly remote from human history. Those disciplines include, above all, genetics, molecular biology, and biogeography as applied to crops and their wild ancestors; the same disciplines plus behavioral ecology, as applied to domestic animals and their wild ancestors; molecular biology of human germs and related germs of animals; epidemiology of human diseases; human genetics; linguistics; archaeological studies on all continents and major islands; and studies of the histories of technology, writing, and political organization.

This diversity of disciplines poses problems for would-be authors of a book aimed at answering Yali's question. The author must possess a range of expertise spanning the above disciplines, so that relevant advances can be synthesized. The history and prehistory of each continent must be similarly synthesized. The book's subject matter is history, but the approach is that of science—in particular, that of historical sciences such as evolutionary biology and geology. The author must understand from firsthand experience a range of human societies, from hunter-gatherer societies to modern space-age civilizations.

These requirements seem at first to demand a multi-author work. Yet that approach would be doomed from the outset, because the essence of the problem is to develop a unified synthesis. That consideration dictates single authorship, despite all the difficulties that it poses. Inevitably, that single author will have to sweat copiously in order to assimilate material from many disciplines, and will require guidance from many colleagues.

My background had led me to several of these disciplines even before Yali put his question to me in 1972. My mother is a teacher and linguist; my father, a physician specializing in the genetics of childhood diseases. Because of my father's example, I went through school expecting to become a physician. I had also become a fanatical bird-watcher by the age of seven. It was thus an easy step, in my last undergraduate year at university, to shift from my initial goal of medicine to the goal of biological

research. However, throughout my school and undergraduate years, my training was mainly in languages, history, and writing. Even after deciding to obtain a Ph.D. in physiology, I nearly dropped out of science during my first year of graduate school to become a linguist.

Since completing my Ph.D. in 1961, I have divided my scientific research efforts between two fields: molecular physiology on the one hand, evolutionary biology and biogeography on the other hand. As an unforeseen bonus for the purposes of this book, evolutionary biology is a historical science forced to use methods different from those of the laboratory sciences. That experience has made the difficulties in devising a scientific approach to human history familiar to me. Living in Europe from 1958 to 1962, among European friends whose lives had been brutally traumatized by 20th-century European history, made me start to think more seriously about how chains of causes operate in history's unfolding.

For the last 33 years my fieldwork as an evolutionary biologist has brought me into close contact with a wide range of human societies. My specialty is bird evolution, which I have studied in South America, southern Africa, Indonesia, Australia, and especially New Guinea. Through living with native peoples of these areas, I have become familiar with many technologically primitive human societies, from those of hunter-gatherers to those of tribal farmers and fishing peoples who depended until recently on stone tools. Thus, what most literate people would consider strange lifestyles of remote prehistory are for me the most vivid part of my life. New Guinea, though it accounts for only a small fraction of the world's land area, encompasses a disproportionate fraction of its human diversity. Of the modern world's 6,000 languages, 1,000 are confined to New Guinea. In the course of my work on New Guinea birds, my interests in language were rekindled, by the need to elicit lists of local names of bird species in nearly 100 of those New Guinea languages.

Out of all those interests grew my most recent book, a nontechnical account of human evolution entitled *The Third Chimpanzee*. Its Chapter 14, called "Accidental Conquerors," sought to understand the outcome of the encounter between Europeans and Native Americans. After I had completed that book, I realized that other modern, as well as prehistoric, encounters between peoples raised similar questions. I saw that the question with which I had wrestled in that Chapter 14 was in essence the question Yali had asked me in 1972, merely transferred to a different part of

the world. And so at last, with the help of many friends, I shall attempt to satisfy Yali's curiosity—and my own.

THIS BOOK'S CHAPTERS are divided into four parts. Part 1, entitled "From Eden to Cajamarca," consists of three chapters. Chapter 1 provides a whirlwind tour of human evolution and history, extending from our divergence from apes, around 7 million years ago, until the end of the last Ice Age, around 13,000 years ago. We shall trace the spread of ancestral humans, from our origins in Africa to the other continents, in order to understand the state of the world just before the events often lumped into the term "rise of civilization" began. It turns out that human development on some continents got a head start in time over developments on others.

Chapter 2 prepares us for exploring effects of continental environments on history over the past 13,000 years, by briefly examining effects of island environments on history over smaller time scales and areas. When ancestral Polynesians spread into the Pacific around 3,200 years ago, they encountered islands differing greatly in their environments. Within a few millennia that single ancestral Polynesian society had spawned on those diverse islands a range of diverse daughter societies, from hunter-gatherer tribes to proto-empires. That radiation can serve as a model for the longer, larger-scale, and less understood radiation of societies on different continents since the end of the last Ice Age, to become variously hunter-gatherer tribes and empires.

The third chapter introduces us to collisions between peoples from different continents, by retelling through contemporary eyewitness accounts the most dramatic such encounter in history: the capture of the last independent Inca emperor, Atahuallpa, in the presence of his whole army, by Francisco Pizarro and his tiny band of conquistadores, at the Peruvian city of Cajamarca. We can identify the chain of proximate factors that enabled Pizarro to capture Atahuallpa, and that operated in European conquests of other Native American societies as well. Those factors included Spanish germs, horses, literacy, political organization, and technology (especially ships and weapons). That analysis of proximate causes is the easy part of this book; the hard part is to identify the ultimate causes leading to them and to the actual outcome, rather than to the opposite possible outcome of Atahuallpa's coming to Madrid and capturing King Charles I of Spain.

Part 2, entitled "The Rise and Spread of Food Production" and consisting of Chapters 4–10, is devoted to what I believe to be the most important constellation of ultimate causes. Chapter 4 sketches how food production—that is, the growing of food by agriculture or herding, instead of the hunting and gathering of wild foods—ultimately led to the immediate factors permitting Pizarro's triumph. But the rise of food production varied around the globe. As we shall see in Chapter 5, peoples in some parts of the world developed food production by themselves; some other peoples acquired it in prehistoric times from those independent centers; and still others neither developed nor acquired food production prehistorically but remained hunter-gatherers until modern times. Chapter 6 explores the numerous factors driving the shift from the hunter-gatherer lifestyle toward food production, in some areas but not in others.

Chapters 7, 8, and 9 then show how crops and livestock came in prehistoric times to be domesticated from ancestral wild plants and animals, by incipient farmers and herders who could have had no vision of the outcome. Geographic differences in the local suites of wild plants and animals available for domestication go a long way toward explaining why only a few areas became independent centers of food production, and why it arose earlier in some of those areas than in others. From those few centers of origin, food production spread much more rapidly to some areas than to others. A major factor contributing to those differing rates of spread turns out to have been the orientation of the continents' axes: predominantly west–east for Eurasia, predominantly north–south for the Americas and Africa (Chapter 10).

Thus, Chapter 3 sketched the immediate factors behind Europe's conquest of Native Americans, and Chapter 4 the development of those factors from the ultimate cause of food production. In Part 3 ("From Food to Guns, Germs, and Steel," Chapters 11–14), the connections from ultimate to proximate causes are traced in detail, beginning with the evolution of germs characteristic of dense human populations (Chapter 11). Far more Native Americans and other non-Eurasian peoples were killed by Eurasian germs than by Eurasian guns or steel weapons. Conversely, few or no distinctive lethal germs awaited would-be European conquerors in the New World. Why was the germ exchange so unequal? Here, the results of recent molecular biological studies are illuminating in linking germs to the rise of food production, in Eurasia much more than in the Americas.

Another chain of causation led from food production to writing, possibly the most important single invention of the last few thousand years

(Chapter 12). Writing has evolved de novo only a few times in human history, in areas that had been the earliest sites of the rise of food production in their respective regions. All other societies that have become literate did so by the diffusion of writing systems or of the idea of writing from one of those few primary centers. Hence, for the student of world history, the phenomenon of writing is particularly useful for exploring another important constellation of causes: geography's effect on the ease with which ideas and inventions spread.

What holds for writing also holds for technology (Chapter 13). A crucial question is whether technological innovation is so dependent on rare inventor-geniuses, and on many idiosyncratic cultural factors, as to defy an understanding of world patterns. In fact, we shall see that, paradoxically, this large number of cultural factors makes it easier, not harder, to understand world patterns of technology. By enabling farmers to generate food surpluses, food production permitted farming societies to support full-time craft specialists who did not grow their own food and who developed technologies.

Besides sustaining scribes and inventors, food production also enabled farmers to support politicians (Chapter 14). Mobile bands of hunter-gatherers are relatively egalitarian, and their political sphere is confined to the band's own territory and to shifting alliances with neighboring bands. With the rise of dense, sedentary, food-producing populations came the rise of chiefs, kings, and bureaucrats. Such bureaucracies were essential not only to governing large and populous domains but also to maintaining standing armies, sending out fleets of exploration, and organizing wars of conquest.

Part 4 ("Around the World in Five Chapters," Chapters 15–19) applies the lessons of Parts 2 and 3 to each of the continents and some important islands. Chapter 15 examines the history of Australia itself, and of the large island of New Guinea, formerly joined to Australia in a single continent. The case of Australia, home to the recent human societies with the simplest technologies, and the sole continent where food production did not develop indigenously, poses a critical test of theories about intercontinental differences in human societies. We shall see why Aboriginal Australians remained hunter-gatherers, even while most peoples of neighboring New Guinea became food producers.

Chapters 16 and 17 integrate developments in Australia and New Guinea into the perspective of the whole region encompassing the East

Asian mainland and Pacific islands. The rise of food production in China spawned several great prehistoric movements of human populations, or of cultural traits, or of both. One of those movements, within China itself, created the political and cultural phenomenon of China as we know it today. Another resulted in a replacement, throughout almost the whole of tropical Southeast Asia, of indigenous hunter-gatherers by farmers of ultimately South Chinese origin. Still another, the Austronesian expansion, similarly replaced the indigenous hunter-gatherers of the Philippines and Indonesia and spread out to the most remote islands of Polynesia, but was unable to colonize Australia and most of New Guinea. To the student of world history, all those collisions among East Asian and Pacific peoples are doubly important: they formed the countries where one-third of the modern world's population lives, and in which economic power is increasingly becoming concentrated; and they furnish especially clear models for understanding the histories of peoples elsewhere in the world.

Chapter 18 returns to the problem introduced in Chapter 3, the collision between European and Native American peoples. A summary of the last 13,000 years of New World and western Eurasian history makes clear how Europe's conquest of the Americas was merely the culmination of two long and mostly separate historical trajectories. The differences between those trajectories were stamped by continental differences in domesticable plants and animals, germs, times of settlement, orientation of continental axes, and ecological barriers.

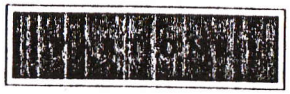
Finally, the history of sub-Saharan Africa (Chapter 19) offers striking similarities as well as contrasts with New World history. The same factors that molded Europeans' encounters with Africans molded their encounters with Native Americans as well. But Africa also differed from the Americas in all these factors. As a result, European conquest did not create widespread or lasting European settlement of sub-Saharan Africa, except in the far south. Of more lasting significance was a large-scale population shift within Africa itself, the Bantu expansion. It proves to have been triggered by many of the same causes that played themselves out at Cajamarca, in East Asia, on Pacific islands, and in Australia and New Guinea.

I harbor no illusions that these chapters have succeeded in explaining the histories of all the continents for the past 13,000 years. Obviously, that would be impossible to accomplish in a single book even if we did understand all the answers, which we don't. At best, this book identifies several constellations of environmental factors that I believe provide a large part

of the answer to Yali's question. Recognition of those factors emphasizes the unexplained residue, whose understanding will be a task for the future.

The Epilogue, entitled "The Future of Human History as a Science," lays out some pieces of the residue, including the problem of the differences between different parts of Eurasia, the role of cultural factors unrelated to environment, and the role of individuals. Perhaps the biggest of these unsolved problems is to establish human history as a historical science, on a par with recognized historical sciences such as evolutionary biology, geology, and climatology. The study of human history does pose real difficulties, but those recognized historical sciences encounter some of the same challenges. Hence the methods developed in some of these other fields may also prove useful in the field of human history.

Already, though, I hope to have convinced you, the reader, that history is not "just one damn fact after another," as a cynic put it. There really are broad patterns to history, and the search for their explanation is as productive as it is fascinating.



FROM EDEN TO CAJAMARCA