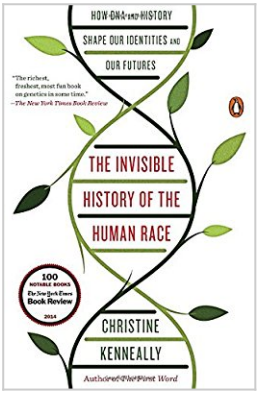

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures

By Christine Kenneally

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally

• A *New York Times* Notable Book •

“The richest, freshest, most fun book on genetics in some time.” —*The New York Times Book Review*

We are doomed to repeat history if we fail to learn from it, but how are we affected by the forces that are invisible to us? In *The Invisible History of the Human Race* Christine Kenneally draws on cutting-edge research to reveal how both historical artifacts and DNA tell us where we come from and where we may be going. While some books explore our genetic inheritance and popular television shows celebrate ancestry, this is the first book to explore how everything from DNA to emotions to names and the stories that form our lives are all part of our human legacy. Kenneally shows how trust is inherited in Africa, silence is passed down in Tasmania, and how the history of nations is written in our DNA. From fateful, ancient encounters to modern mass migrations and medical diagnoses, Kenneally explains how the forces that shaped the history of the world ultimately shape each human who inhabits it.

The Invisible History of the Human Race is a deeply researched, carefully crafted and provocative perspective on how our stories, psychology, and genetics affect our
past and our future.

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures

By Christine Kenneally

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally

• A *New York Times* Notable Book •

“The richest, freshest, most fun book on genetics in some time.” —*The New York Times Book Review*

We are doomed to repeat history if we fail to learn from it, but how are we affected by the forces that are invisible to us? In *The Invisible History of the Human Race* Christine Kenneally draws on cutting-edge research to reveal how both historical artifacts and DNA tell us where we come from and where we may be going. While some books explore our genetic inheritance and popular television shows celebrate ancestry, this is the first book to explore how everything from DNA to emotions to names and the stories that form our lives are all part of our human legacy. Kenneally shows how trust is inherited in Africa, silence is passed down in Tasmania, and how the history of nations is written in our DNA. From fateful, ancient encounters to modern mass migrations and medical diagnoses, Kenneally explains how the forces that shaped the history of the world ultimately shape each human who inhabits it.

The Invisible History of the Human Race is a deeply researched, carefully crafted and provocative perspective on how our stories, psychology, and genetics affect our
past and our future.

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally Bibliography

- Sales Rank: #427901 in Books
- Brand: Penguin Books
- Published on: 2015-10-27
- Released on: 2015-10-27
- Original language: English
- Number of items: 1
- Dimensions: 8.40" h x 1.30" w x 5.70" l, 1.00 pounds
- Binding: Paperback
- 368 pages

Editorial Review

Review
“The construction of identity is the concern at the heart of this original and provocative book, which employs the approaches of psychology, sociology, philosophy, and Mendelian genetics. Case studies of ethnic groups point to a complex, reciprocal relationship among DNA, culture, and environment . . . . Genetic traits, Kenneally shows, are modified by factors such as other genes, noncoding DNA, and chemical changes in the body. She suggests that one’s understanding of one’s identity is at least as deterministic as one’s genetic inheritance. When it comes to our knowledge of DNA, Kenneally writes, ‘there is still more dark matter in this particular universe than not.’”
—The New Yorker

“[A] smart, splendid, highly entertaining look at how DNA, increasingly visible to us since we first sequenced the human genome in 2000, can ‘open up tracts of human history that had been entirely obscure.’ . . .While DNA may now be visible, however, it remains more hint than history. Kenneally, a journalist and linguist, shows that just as a gene usually delivers its genetic message only in conversation with an incoming chemical messenger, so our DNA tells its tales most fully only in light of the history of the people who carry and interrogate it. It takes all those threads to get the whole story. And Kenneally wants it all. . . . [W]hat will prove lasting is her evocation of how much perspective and even wisdom can be extracted from some determined digging and a bit of spit. The breadth of this book; its abundance of enthralling accounts and astonishing science; its adept, vivid writing; and Kenneally’s exquisitely calibrated judgment make it the richest, freshest, most fun book on genetics in some time.”
—The New York Times Book Review

“[Questions about genealogy] can upend lives, particularly those of adoptees or descendants of slaves . . . But what receives far less attention is how genealogy can reveal secrets about all of us, at once: the emergence of our species, the political history of the world, and the origins of the social structures that dictate modern life. As Christine Kenneally writes in this engrossing new book, genealogy’s boom gives us “historical transparency” as never before. *The Invisible History of the Human Race* is packed with stories that make this point . . . . Ms. Kenneally points out, the categories we use to talk about race — black, white, Asian, Hispanic — are in large part cultural. Genetic differences among populations don’t fit into clear-cut boundaries. In fact, if the genome has taught us anything, it is that our DNA has far less influence on our lives than the culture we are born into. And here lies the best argument for genealogy: It unearths nature and nurture, to make our invisible histories visible, free for all to know and to judge.”
—The New York Times

“Is it our genetic history that makes us who we are? How much can we find out about it from its traces in our cells? And how much do we want to know? Ms. Kenneally’s approach is suitably global, stretching from the racially ambiguous Melungeons of the American South to the genetically bottlenecked Samaritan community in Israel, and she is storyteller enough to get us through the acronym-strewn fields of contemporary biology without losing sight of the big themes of identity and history.”
—The Wall Street Journal

“A family mystery—a gap where her father’s father should be—goaded science writer Christine Kenneally into exploring the phenomenon of identity. Kenneally goes at it full tilt, taking a machete to a jungle of genomics; reassessing the contentious practice of genealogy; unravelling the knotted realities of adoption;

and pondering DNA testing. This sparkling, sometimes harrowing read is packed with intriguing interludes, such as still-speculative findings on the dark-skinned Melungeons of Appalachia."
—Nature

"[A] bold and absorbing work."
—The Australian

"In the current fad for omnibus histories of absolutely everything, designed to replace ancient metaphysics, perhaps, or answer some marketing brainwave, no one has succeeded in quite the way Christine Kenneally has. She approaches her task with a very specific enquiry: what is the interplay between genetics and human history? Searching for an answer, she uncovers worlds within worlds. Kenneally brings the old nurture–nature debate into updated focus."
—Australian Book Review

"In her more impressive and forensic work, *The Invisible History of the Human Race*, Kenneally also marries the humanities and sciences, by threading them together in our very DNA. . . . [She] takes us into exciting new terrain, describing the work of biologists and historians sleuthing for the skeletons in our genetic closets… There's so much to Kenneally's nuanced and ambitious book. She skilfully melds social history and science, to offer a telling of our human story that feels ripe and right for our time."
—The Age

"Genealogy gets a bad rap, author Christine Kenneally writes, because of its hint of elitism, its whiff of self-absorption, and its slightly queasy associations with the concepts of breeding and eugenics. (This view of the project is borne out when she looks at a Nazi genealogical book, with its list of approved German names and essays on race hygiene.) But, she argues, wanting to understand the story of one's ancestors is understandable and human; it just doesn't go far enough. If there's any overarching theme in this sprawling, entertaining look at genetics and genealogy, it's that we are always more than the sum of our biological parts."
—Boston Globe

"Shudder, all ye Daughters of the American Revolution, then pick up a copy of Christine Kenneally's entertaining stew of a book . . . [T]he title is a mouthful, and the topic turns out to be both tantalizing and unruly. . . . Kenneally treks through research and tracks down experts in economics, psychology, history and genetics. Very pointedly, she crafts a love letter to genealogy. . . . Kenneally has a gift for explanatory journalism."
—Newsday

"Scientists and scholars of humanities have separately made remarkable advances in understanding links between chromosomes and health or race, culture and specific traits, Kenneally writes. 'But DNA does what it does without regard to any of the conceptual silos,' and so does she."
—Misadventures Magazine

"Kenneally's book offers a . . . judicious view of what gets 'passed down' . . . . [She] offers example after example of how the work of amateur genealogists and professional geneticists is rewriting history both in academia and the popular imagination."
—Salon

"This book is a trailblazer because it's the first one I've ever read that examines how biology, psychology, and history come together to shape each one of us as individuals. […]It's thoughtful, carefully researched

and engaging. I think this book makes a good companion volume for the previous book, too."
— GrrlScientist, *The Guardian*

"Kenneally, a science journalist, begins this gripping book with a personal story: Nobody in her family knows who her real grandfather is. She wonders whether contemporary DNA sequencing technologies could help her find out. The result is a tale that braids cultural and scientific insight together, to explore what it means to have ancestors — and how the human past reaches into our future."
—Annalee Newitz, *io9* (A Best Science Book of 2014)

"[A] fascinating and wide-ranging investigation of our obsession with ancestry and genetics — how we glean information about our pasts and futures, and the ways (both negative and positive) we have used this knowledge."
—Isaac Fitzgerald, *Buzzfeed* (A Best Nonfiction Book of 2014)

"In captivating prose . . . Kenneally examines the impact environment can have both on a person's immediate conditions and the long-term influences exerted by cultural factors over many generations. She interviews molecular biologists working to understand how genes influence physical traits, population geneticists attempting to reconstruct the genetic configuration of centuries-old populations, genealogists looking to create family lineages (as well as the principals of companies promoting such searches), and those in charge of the Mormon archive of personal demographic data, the largest of its sort in the world. Kenneally ties these fascinating strands into a complex, powerful, and engaging narrative. She superbly compares and contrasts the related concepts of race and lineage while tackling the ways in which eugenicists and Nazis misunderstood and misused the data available to them. With those abuses in mind, she also confronts the premise that simply making use of such information may be problematic. Kenneally offers a rich, thoughtful blend of science, social science, and philosophy in a manner that mixes personal history with the history of the human species."
—Publishers Weekly

"Kenneally, a freelance journalist whose essays have appeared in the *New Yorker*, the *New York Times* and *New Scientist*, successfully attempts a 'synthesis between the ways we consider genes and health, genes and culture, genes and history, genes and race and genes and special traits' . . . . Kenneally illustrates how the intersection of genetic information with family histories and census data can engender surprising (and sometimes unsettling) results—e.g., the identification of a modern American descendant of Genghis Khan."
—Kirkus Reviews

"Christine Kenneally's marvellous *The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures* is one of those mind-tilting books that makes the reader look at everything anew, including sticky questions of religion and race."
—Miriam Cosic, author of *Only Child* and *The Right To Die: An Examination of the Euthanasia Debate*

"Magnificently rich and sweeping in scope, in impeccable yet intimate prose."
—Cordelia Fine, ARC Future Fellow in Psychological Sciences and Associate Professor at the University of Melbourne; author of *Delusions of Gender: How Our Minds, Society, and Neurosexism Create Difference*

"What a remarkable tour of the thousands of ways the past shapes who we are. Christine Kenneally covers everything from Tasmanian convict records to the absurdly complex genetics of height. By the end, you'll have changed the way you think about identity, your name, and all those double helixes in your cells."
—AJ Jacobs, Author of the *Year of Living Biblically* and organizer of the Global Family Reunion

“Like [Kenneally’s]book, *The First Word, The Invisible History of the Human Race* is thoroughly researched and masterfully executed.”
—Jon Palfreman, author of *Brain Storms*: The Race to Unlock the Mysteries of Parkinson's Disease

“The word ‘brilliant’ gets thrown around a lot, but it should be saved for Christine Kenneally and her book *The Invisible History of the Human Race*. Transcending the nature-nurture dichotomy, Kenneally shows us how our societies and our selves got to be the way they are. Don’t read this book looking for neat answers—gaze instead through a glorious kaleidoscope of science, psychology, history, and first-class storytelling.”
—Susan Cain, *New York Times* bestselling author of *Quiet: The Power of Introverts in a World That Can’t Stop Talking*

“Christine Kenneally’s brilliant, ambitious work integrates cutting-edge genetics with a deeply humanistic perspective on our personal and communal past. Transcending the usual intellectual silos, she shows how historical events became inscribed in DNA and how our ancestry casts riveting shadows onto the future. This wholly original book will change how you view your parents, your children, and your own messy, mosaic self.”
—Amanda Schaffer, contributor to the *New Yorker* online and contributing editor at *MIT Technology Review*

“Christine Kenneally vividly traces the astonishing 21st century progress in the science of who we are. And she never loses sight of the human stories we tell about our heredity and history, which constitute us just as much as bits and genes do.”
—Jordan Ellenberg, professor of mathematics at the University of Wisconsin; author of *How Not To Be Wrong: The Power of Mathematical Thinking*

“Christine Kenneally’s sensational book belongs in the backpack of anyone who wants to explore his or her family’s past. Crisply written and packed with myriad fresh facts and rights, *The Invisible History* will make the journey down the genealogical trail a lot richer and more meaningful.”
—Sylvia Nasar, author of *Grand Pursuit: The Story of Economic Genius*

About the Author
Christine Kenneally is an award-winning journalist and the author of The First Word: The Search for the Origins of Language, which was a finalist for the Los Angeles Times Book Prize. She lives in Melbourne, Australia.

Introduction

We follow in the steps of our ancestry, and that cannot be broken.

—Midnight Oil

One cannot and must not try to erase the past merely because it does not fit the present.

—Golda Meir

There’s a moment somewhere between the North Pole and the South when I look out my window and see the top of the Himalayas. At first the shapes are clouds, but then they resolve into immense snow-covered crags,

perfectly still in the cumulus sea. It doesn't matter how many times I've seen them before; I am always surprised. They are proof that I am somewhere very high and very strange. At thirty thousand feet light floods the plane. Ahead the night drapes across the earth. We barrel toward the darkness, and then we tunnel quickly through it. In a few hours, when we land, it will be morning.

I call my boyfriend's attention to the window. "CB! Look!" He wonders if anyone is over there on the mountains. Perhaps there are a few souls right on the tip. But if so, it's just us and them and all the other long-distance flying containers up here. We are tracing the outer edge of the human envelope. Below, six billion people inhale. Above, there's nothing to breathe.

It's at about this point, when I am too tired to read, I have consumed too much wine, and all I can do is stare, that the human condition starts to get to me. Half the plane is unconscious, the other half is gingerly stepping over them, and there is a permanent line to the toilets. In addition to this aerial trip, my boyfriend and I were embarking on a few heady metaphorical ones as well. We had met in England and were heading to Melbourne to meet my parents. Maybe at some point we would become parents too. It was momentous to contemplate, and it's a truism that we didn't know the half of it, but we didn't even know what we didn't know.

Here's one thing I didn't know when I was flying above the Indian Ocean. One of my great-great-grandfathers was called Michael Deegan, and 170 years before we got on our plane, he followed a similar trajectory, from high in the Northern Hemisphere to way down in the Southern. He was only fifteen years old and he crossed the oceans on a bark called the Kinnear. The trip took 105 days. The boat left Dublin with 174 men and arrived in Australia with 172. Deegan had left a country on the edge of a famine in which one million people died and two and a half million people fled within a ten-year period. He had stolen a handkerchief and was now a convict on his way to Van Diemen's Land. Even if he survived his sentence, he was forbidden to return home. All the Kinnear's passengers boarded as criminals, but many of them disembarked compliant. At the end of the journey, the ship's surgeon entered a report on the character of each of the survivors: "good," "orderly," or even "very good." Yet somehow Deegan remained "troublesome."

In the twenty-first century we move through space in these high-speed vessels and through our lives inside little envelopes of time. Usually we know people from the generation or two that come before us, and probably the generation or two that come after, but mortality draws a thick line across the horizon ahead, and existence—or the lack of it—marks the line behind us. It's not common in the West to have met, or even know much about, anyone born three generations before us. Do these people shape us anyway, whether we know about them or not?

• • •

Humanity has been making some consequential moves for a long time now. Over the course of hundreds of thousands of years, we populated Africa; then we left the continent in waves and spread across the world. The global travel that began more than sixty thousand years ago continued for the next forty-five thousand years before we settled every habitable continent on earth.

From the ninth century, when Vikings set out to sea in longboats, through the ages of expansion, slavery, the spice trade, and the colonialism that ended in the twentieth century, thousands of ships crossed the oceans. The vessels carried explorers, prisoners, slaves, and immigrants far away from the places where they were born, in most cases never to return. In the second half of the nineteenth century, now known as the age of mass migration, the movement peaked, with more than fifty-five million emigrants embarking from the Old World and heading to the Americas and Australia. On the human scale the ships marked crucial chapters in

the lives of many individuals—and in the lives of everyone who descended from them. Culturally they changed the stories of families forever. Biologically the ships delivered mixed samples of human genomes. Everywhere they went they transformed the human landscape, releasing new variants into the local gene pool, creating never-before-seen mixes of human material, and founding novel lineages that branched and then branched again.

I wonder if my convict ancestor thought about whether he would have descendants who might one day look back on his life or who would know him only as a wisp in a cloud of long-dead family. He lived for many, many years after his terrible journey, and though he died long before I was born, I've spoken to people who have spoken to people who once spoke to him. Oh look, here comes the human condition again: He and I have physically touched people who have physically touched each other. But although we will never speak, and I will never see him or hear his voice, he is here with me, and not just in my thoughts. This isn't a metaphor but a fact, as real as the Himalayas. There is information within me that came from him, and if my boyfriend and I have children, some of that information will be inside them too.

We are ourselves vessels. Inside each cell that is inside each person is a massive library of DNA, three billion base pairs that have been passed down to us. I think about this while I sit on the plane; the principle is true for all 466 of my fellow passengers, no matter what class they're in or their reasons for travel. They all carry their great-great-grandparents inside, and they carry traces of their grandparents' ancestors too. Here in this plane are multitudes, 1.4 trillion base pairs that have been passed down through history by millions of people. It's a miracle we ever got off the ground.

• • •

In second grade our teacher gave the class a project: We were to go home and interview our parents and then draw a family tree. That afternoon I explained the project to my parents. I would write my name and birth date, and then I would draw a branch growing up out of my name. At the end of that branch I would write their names and what they did for a living, and then I would add their parents' names and birth dates, and I would then draw lines stretching up to them.

I had never before thought much about my forebears. My parents had told me that my father's parents had died before I was born, and my mother's parents lived in another country. And yet here, in the tree I was carefully drawing, I could see that these people had once existed, and they were connected to me.

If I was lucky, my teacher said, my parents would be able to name their grandparents—my great-grandparents—and say when they lived and what they did.

But I was not so lucky. It turned out that my parents were interested in the project, but they were upset about it too: Why is your teacher asking you these questions? This is homework? What business is it of hers?

In the end my parents made a few suggestions and, naturally, I wrote them down. They could have kept a lid on their ire and lied to me right then and there, but that wasn't something they did, and they were too indignant to conceal it. So I learned early that the past can bother people in surprising ways and that memory is meaningful but odd. That incident gave rise to a lifelong interest in why family matters, how it shapes you, and especially why people who are long dead still matter so much to you, who are alive.

Pretty much everyone alive today has been asked some form of the question "Who are you?" and the ancient and universal impulse has been to respond by talking about our family. For many years I did a good job of squashing that ancient and universal impulse, studying biology and history in high school and starting a degree and acquiring all sorts of research skills. Occasionally I prodded my mother about my grandparents, but for the most part a thick mist hung in the part of my brain that stores all the questions about family and

history and identity. That changed one day in 1990 when my parents and my four siblings were assembled in my parents' kitchen, and my father announced that it was time to tell us that the man we thought was his father wasn't actually his father. The man who raised him, who we thought was our long-dead grandfather, was actually our dad's long-dead grandfather. Our father's mother was our great-grandfather's daughter.

For my father this was an awful admission. He had trouble speaking, and I can still see his crooked right arm and hand supporting his forehead. My mother had her hand on his shoulder, and we five children sat there watching. Their distress was extraordinary, yet none of us shared it, not then and not since. The world has galloped on since my father was born, and at least in our part of it, few people today are concerned with matters of paternity in the way they were in the 1930s. By some mysterious process, even though my conservative parents raised us to be like them, neither did we.

Which is not to say that we weren't disoriented. A truth that none of us had questioned—what is reasonable to call a small foundation stone of our identity—had cracked. Humans tend not to act well when things like that happen, and I still cringe at my first response, which was to exclaim, "I knew there was something going on!" only to realize that my father, who never cried, was choking back tears.

What then? My father didn't want to talk more about it. But I did: What was his name, this man, my actual paternal grandfather, and shouldn't his last name be my last name? Who was he, anyway? Did my father look like him? Wait, did I? Like all normal children, I had spent a considerable amount of time imagining the sudden death of both my parents and my ensuing survival adventure. (My knapsack was packed and ready, just in case.) For half a minute the old daydream stirred, I was long lost to someone else, and here was a truly unknown unknown, a story that hadn't been told.

But my father shut it down again. He had once heard a name, he said, but he had no documentary evidence to prove the connection, so he wouldn't tell us what it was.

And that's where I got stuck. When you put flesh and blood and information together, you are bound to get some heady mysteries and painful feelings, but what can you ever actually know?

• • •

Our trip past the Himalayas turned out to be the first of many, and CB and I are now married and back in Melbourne, raising two young American Australians that we created from scratch.

This morning, a typical morning, begins in the kitchen in a house not too far from the one in which I grew up. But after breakfast we push the dishes to the other end of the table, and the four of us stare at a container full of salt water, a cold bottle of gin, and a four glasses with a nip of fluorescent green liquid in each. Although it looks as if we are about to make some cheerful cocktails, it is only 10:00 a.m., and our boys are just nine and six. Instead, we are going to extract some cells from our saliva, break them open, and tease the DNA out.

"DNA is—" I begin.

"I know what DNA is," says my nine-year-old.

"Okay. What is it?"

"It's this stuff in your body that goes around." He draws a tight spiral in the air with his finger. "It basically introduces you and where you're from. And it makes your blood type."

I was going to crib Wikipedia, but this pretty much covers it. I didn't learn about DNA until the last year of high school, when we dutifully ran through a few Mendelian tables, adding a dominant gene and a recessive gene or two recessives or two dominants. I enjoyed the neatness of the calculation, but I didn't think much about it beyond that. Back then the word "gene" was barely part of society's vocabulary, but that changed quickly. Starting in the 1990s, scientists and journalists began to announce with ever-growing frequency that the gene for some trait—intelligence, language, red hair, personality—had finally been found. Much has changed since those early days, but many of the ideas that were popularized then are still around in some form today:

- Genes are the atoms of the biological universe.
- Genes are Father Time, predestination, the hand of fate, the story of your life, inescapably inscribed on your cells.
- But only sometimes.
- The connection between a single gene and a single trait may be cleanly observable.
- The connection between a single gene and a single trait may be murky and complicated.
- The connection between many genes and a single trait may be observable and complicated.
- A genetic mutation or a missing gene or an extra gene or a segment of DNA that doesn't seem to make anything may still shape you.
- Or it may do nothing at all.
- Genomes are human bar codes, our ineluctable and most true identity.
- You are so shockingly, so powerfully, so undeniably you that you can't help leaving traces of yourself everywhere you go—a tiny hair, a single cell, a trace of saliva all may lead back to you.

In the late nineties there was even a brief but brightly flaring hope that soon we would all be able to replicate ourselves. Human cloning was a topic in almost every major magazine and newspaper, and at times it felt as if barely a week went by without an article about clones that was written in such urgent tones it seemed our exact replica was about to knock on the front door and demand the car keys. The ethics of cloning were debated endlessly, as were the best candidates for the procedure. In 1998, in a rarely granted interview with the hugely influential software designer and business mogul Bill Gates, Barbara Walters, one of America's most well-known journalists, challenged the billionaire about Microsoft's influence on the world and Gates's personal influence on his company. And then, in a question that must have felt a lot more piercing and relevant at the time, she probed, "Would you want to be cloned?" Wisely, Gates answered that he would not.

As of 2014 there are still no artificially produced human clones, at least none that we know of, and journalists have long since stopped asking people if they want to be cloned. Many well-known animal clones, like Dolly the sheep and the resurrected "extinct" ibex, have died (some prematurely, some horribly). Other cloned animals, like Copycat, the world's first cloned pet (born in 2001), are doing well. (The company that created Copycat, however, is no longer in existence.) In 2013, for the first time ever, a mouse was cloned from only a single drop of blood. In 2014 a Korean company called Sooam Biotech announced the birth of a dachshund clone called Mini Winnie, which it had created for a British woman who won a competition.

If our turn-of-the-century conviction that a race of more "us"es was imminent has proved to be as goofily off-kilter as our 1950s expectation that by now everyone's car would fly, one of the more interesting consequences of this obsession was learning why the idea doesn't actually work very well. We now know that if you took a person's genome and tried to grow another human being from it, the resulting person would, of course, have much in common with the first, but he would be different as well. This is because while you can, at least theoretically, replicate a genome, you cannot replicate the precise conditions in which it developed. Genes respond to the environment around them. They get turned on and off by experience, and any one person's life experience is as unique as our mothers once told us it was. Even identical twins raised

in the same household can differ in height, facial features, or any number of traits. Typically the older identical twins get—that is, the more life experience they have—the more different they look too.

As far as science is concerned, it's not just our unique lives that make true clones impossible; it's the myriad unpredictable, unreplicable, and in some ways unknowable elements of a life that may trigger a genetic response. How could we quantify the factors that may affect a single gene in a year? How could we replicate the exact sequence and number of factors that shape one person's genome in a lifetime? What, for example, was the impact on your genome of that unseasonably hot summer when you were eight? What about that traumatic encounter when you were ten? What was the effect of all that bread you ate at school, which was made from that particular wheat, which was imported from another country and which itself had an irreducible, hard-to-recapture life history?

Still, the iconic life of genes—their ubiquitous media presence, the casual way we attribute everything physical or emotional to them or specifically not to them, the intense attention they receive in the booming literature of parenthood, their telltale traces at crime scenes, and their Rosetta stone–like status in the science of being human—has grown.

• • •

CB and I pick up the glasses of salt water and swill it in our mouths. We are supposed to sluice it for thirty seconds, but the strong taste, combined with the sudden abundance of my spit, makes it hard to hold in. The saline collects cells from our mouths and as it does, the salt weakens the cell walls. Finally we spit it out into the green liquid, which is three parts water and one part detergent. "The cells of your body are like balloons," says CB. "And there's another little balloon inside them, which is called a nucleus. The detergent bursts the big balloon, and then it bursts the nucleus too, and then your DNA floats out."

He holds up a glass of saline. "Do you guys want to do it?"

N. is romantic. "Is that what the ocean tastes like?"

F. is unmoved. "No. I'm not doing it. I'm never doing it!"

I offer him two dollars. He swills the saline.

Once the boys have spit out their own saline-plus-cells, CB and I carefully stir the new mixture. It's still green but foggy, and a white foam layer has formed on top. Now the salt and detergent are breaking apart the cells and nuclei. Next we gently add the gin, letting it fall smoothly onto the back of a teaspoon and into the glass. It creates a new clear layer between the green and the foam. Because DNA does not dissolve in alcohol, the idea of this stage is to separate the DNA from the other bits of cell that are floating in the solution. Then we wait as, slowly, small white clumps appear, then a spidery line forms on the surface of my liquid. For one soaring second, we are all riveted to the same spot, thinking exactly the same thought: That's it!

We sit there poking at the fluid, swirling it around and watching as the clumps are pulled along, strand by strand. Inside each fragment is part of a code that has many more bits of information than stars you can see in the sky. These bits—scientists now say—have the potential to not just map tens of thousands of years of human genetic history but also to drop a small pin at the coordinates where our own DNA is located in it. And here, contained in these four glasses, is the genetic code for my entire family, my beautiful boys, who according to their DNA are not only mine: Half the stuff in their glasses came from me and half from CB, but it also all came through us. They are the children of a lineage, and inside the clumps that wander in their soapy water are organized pairs of amino acids that were arranged long before they or I was born—the result

of thousands of generations shuffling their DNA.

• • •

Can our own personal DNA tell us about the history of the world? Isn't that a bit presumptuous? For most of us, big history is not personal but something out there that we are enjoined to learn, a stack of snapshots of people and things that have been officially declared important.

On top of the pile is everything we think of as modern. Here are an iPhone and a Prius. Here's the conflict in Syria. Here's patient zero with H1N1. Underneath these photos are shots of the glamorous hairstyles, world events, and technological absurdities of the previous decades—here's a cell phone the size of your sneaker, a computer the size of your house.

Further down are images from the nineteenth and eighteenth centuries: industry, ocean voyages, the beginning of journalism. Before these are images of a wonderful time called the Renaissance, when everyone painted and sculpted. Under them there are pictures of the Middle Ages, when peasants wore a lot of burlap and carried a lot of disease.

Prior to the peasants are the Vikings (helmets with nose guards, boats with many oars). They follow grimy snaps of the Dark Ages (muddier burlap, even more terrifying diseases). The pictures of the Romans (roads, plumbing, orgies) come before those of the Vikings, though they follow those of the Greeks (gods, columns, statues). There are a few pictures of biblical times (sand, camels, sun). They sit on top of a long reign of Egyptians (pyramids, mummies, cats).

By the time you get to the mummies, the pile is much shorter. Here are images of a long and undistinguished period of general barbarism, when people wore pelts and carried weapons. Down closer to the bottom of the pile are fuzzy pictures of the Stone Age (stones, scraggly hair, cave drawings), and below these only a handful of pictures remain.

These pictures are so dark you can barely make anything out in them at all. Here's a cave. Here's some ocher. Here, at the bottom of the stack, is a creature that looks a lot like a chimpanzee.

It's fine to carry around these discrete snapshots, but it's worth considering that history is continuous. We can track our way back through it by following the records we create, the writing that goes back six thousand years and the drawing that goes back forty thousand years. We can track our way back with oral histories, rumors, and stories that get passed down. Now, we can also track back through it with the longest thread of all, DNA.

• • •

Why do we care about where, or rather whom, we come from? Is it because of what is passed down to us from previous generations? Do the lives of our forebears impact ours in some way? Or is that just a story we like to tell ourselves? Within our families we have many convictions about traits, inheritance, and the mysteries of familial resemblance—she has her father's nose; he has his grandfather's cheeky sense of humor; those two are like peas in a pod. But what is real and what is myth? What do we actually know?

Over the years I've come to view the silence in my own family about my father's father as an actual thing, not as the absence of something. I can see that the secret of his birth had a huge impact on his life, and I suspect it has on mine as well. And what of the man behind the secret? Did he leave anything more significant than the loud bang of a door shut down the generations? About 25 percent of my DNA comes from him. How has it shaped me?

This question led me to a few thousand more questions, which in turn eventually led me toward this book. The Invisible History of the Human Race became a personal quest to track down people from all over the world who could shine light on the package of things that gets passed down to us from our ancestors. As it turns out, the package is brimming: stories and secrets, names and dates, feelings, ideas and decision-making tools, and DNA. And that was merely the beginning. What makes the material that gets passed down in both our minds and our bodies so fundamentally interesting is how it shapes our lives, our identities, and our futures.

It was only after I began my quest that I stumbled across the idea of path dependency, a concept invented by physicists to explain how machines could most efficiently use energy to do their work. Path dependency was taken up to fascinating effect by economists to explain how what happens in the future may depend on the path that was taken from the past to the present. They used it to explain why some economies are healthier than others, why some laws are written the way they are, and why technology looks like it does in different places. When we talk about positive or negative spirals in our lives, when something that is good keeps getting better, or when something that is bad feeds back on itself and gets worse, we are talking about patterns that are path dependent.

The QWERTY keyboard is the classic example of path dependency in technology. Of all the keyboard setups that competed to become the standard in the era of the typewriter, QWERTY, for some godforsaken reason, won. Despite the fact that it was not the easiest or the best design for human hands, millions of people ended up using it, and eventually it became so firmly established that it was impossible to revise it. People were committed, and that commitment meant that nearly all laptops and keyboard are today laid out in the QWERTY design.

When I came across the notion of path dependency, I realized like a thunderclap that this book was actually about how path dependency affects people in both their minds and their bodies. Path dependency is, of course, another way of talking about evolution, in that nothing ever evolves completely from out of the blue. The process is fundamentally stepwise: Evolution builds on what came before. The shapes of our bodies and our brains, for example, are constrained by the forms that they took in our ancestors. It’s no accident that we look like chimpanzees, because humans and chimpanzees shared an ancestor more than five million years ago.

The question that came to concern me, and that lies at the heart of this book, is how many of our decisions, and how much of our self-knowledge, are ultimately path dependent. The only way to find that out, of course, is to pause, turn around, and look back at all the paths the human race has taken. Ideally that would involve reconstructing some of the significant paths that have led to us to the present—where they began, who traveled along them, where they gently curved, and where they turned more sharply. As the saying goes, it’s not really the destination that matters but the journey you take to get there.

Since we are asking what is passed down, we have to ask who is doing the passing. Was it our parents, our society, our government? Has something been passed down incidentally or with purpose? Is the transmission complete or partial? And what do we believe about what we are passing down as we pass it down? Can we even see what we are passing down? In the case of culture, we generally believe we can. In the case of DNA, the answer for most of human history has been no.

Still, if you have ever wondered what has been passed down to you, if you have wondered, as I have, how much the past really does matter, you are particularly fortunate to be alive at the present moment. Because all the tools that we need to gaze back at the past—the records we have created, the abstract legacies of culture, and the visibility of DNA—have been radically transformed in the last ten years.

The massive digitization of paper records has completely changed the way we access and use them and, more important, what they can tell us. Additionally, and partly because of the utility of these new digital systems, some canny researchers have worked out how to measure the impact of distant historical events on the attitudes of communities today.

And then, of course, there's DNA, nature's digital record. Much of our general interest in DNA over the past few decades has been in genes and how they affect our health and determine our physical features. But as we got to know the genome better, it turned out that DNA has as much to do with our past as it does with our future. We learned that most of the genome is not coding DNA—that is, genes that express proteins, which then carry out some function in our bodies—but rather noncoding DNA, or what used to be called junk DNA. We now know that even if its impact isn't direct, noncoding DNA may influence our genes in significant ways—or it may do nothing very obvious at all. But even in the latter case, as a group of brilliant scientists has shown, we may learn how to read the book of our history in it.

The most remarkable thing about the use of DNA as a historical tool is that it illuminates not just the biological past but the social past as well. As people make people, who make more people, they pass down their genes and an enormous quantity of noncoding DNA, and in all of this DNA we can trace the choices of populations, as well as fateful personal encounters, that took place thousands of years ago. So, although we have debated for years about the ways in which DNA shapes society (is it deterministic? is it indifferent? does it shape intelligence, behavior, race?), it is far more obviously the case that society shapes DNA.

Now it is becoming increasingly clear that if we bring together DNA with written records and with the more abstract legacies of a community, like its loyalties, emotions, and ideas, what used to be unknowable will come into view in high definition. The continuous streaming of all history becomes more visible, and we can begin to see not just microhistory and macrohistory but also the paths that run between them. What's more, we can begin to untangle the ways in which the operation of genes and our understanding (or misunderstanding) of them also shapes history.

Constructing a history out of all these pieces of information ultimately enables us to understand how the events that occur within our own tiny envelope of existence map onto the stories that extend over long timescales; how lifetimes are shaped by eras and populations; how the lives of ordinary people shape eras; and how much the past makes us who we are and how free are we from it. Using written records, cultural history, and DNA also makes it much easier to understand that the vast forces that shaped the history of the world shaped you and your family as well. And the arrow points both ways: Your family has shaped world history.

But here is the problem with finding out what gets passed down: We often feel strongly that we already know what comes down to us, how it comes down, what it looks like, and how it affects us. First, then, we have to examine our fundamental notions about what gets passed down—which, of course, are themselves passed down.

Part I

Ideas About What Is Passed

Down Are Passed Down

Chapter 1

Do Not Ask What Gets Passed Down

Yet why not say what happened?

—Robert Lowell, “Epilogue”

In the lunch line at the local Returned & Services League in Parramatta, Australia, I stood behind two elderly ladies who were comparing notes on their relatives. We were attending a genealogy road show, a modest gathering in a modest town, similar in size and scope to thousands of family history meetings all over the world. At this particular event freelance historians and genealogists-for-hire offered lectures on topics like ship manifests and military history, while archivists advised about document search. The exhibit hall was busy with stalls from companies like Ancestry.com, as well as local societies with an ultrasmall niche, like cricket club records from the 1800s or employee records from the railroad. One group helped convict descendants connect with one another. In Australia being able to link yourself to a convict is something of a genealogical jackpot, much like status in other countries might be conferred by membership in the General Society of Mayflower Descendants, the Descendants of the Illegitimate Sons and Daughters of the Kings of Britain, or Son of a Witch in Massachusetts.

I wandered the display hall, had software explained to me, spoke to experts, and chatted with attendees, but the point of the gathering remained weirdly elusive. A powerful force had brought these people together, but even though they seemed to agree that that force mattered a lot, no one could explain to me precisely how or why.

The ladies in front of me spoke of their lineages as if they were discussing recipes (You do this, then this, then this) or perhaps comparing flowers in their gardens (Oh, you have one of those too!).The lunch line was slow, so the comparisons went on and on, and every time they mentioned another person in their respective family trees a bead of sweat popped up under my hairline. Dear God, here were only two people, yet they had so many cousins, and they kept piling them on. It wasn’t what they were saying that unnerved me; it was the numerical implications. Consider: If everyone has four grandparents, then she has eight great-grandparents, which means she has sixteen great-great-grandparents and thirty-two great-great-great-grandparents, so that in five generations, everyone has sixty-two people to account for, and that’s just the people in one’s direct line.

If you count the siblings of direct ancestors, the numbers are, frankly, disconcerting. Even if your own parents had no brothers or sisters, chances are that the further back you go, the more siblings exist in your family line. It was common in the nineteenth century for families to have five or eight or even more than ten children, so if you want to explore the fortunes that have befallen your family in the relatively recent past, you could easily be looking for three hundred people or more. If you have a child, his heritage effectively doubles the calculation. In order to trace the unique tree from which he branched, you must put together your own crowded lineage with that of your partner’s.

This was too much to think about. How could I survey this whole when it was so paralyzingly big? How could I understand these people when each of them represented so many thousands of diverse lives? When my husband was a graduate student, he had to physically brace himself every time he walked into the university library, as the sight of all those books, written by all those people, about so many more people, with references to even more people who had written many more books about other people, was too much to contemplate. Or rather, what was too much was the multiplicity of the books plus the intrusive realization that he would never in his lifetime be able to read them all. Hundreds of people blithely stepped over the library’s threshold all day long, but for CB, to catch a glimpse of the library’s immense holdings was to come face to face with his own mortality. I felt much the same at this gathering. How could so many individuals have existed, each passing something on before he or she died? All I wanted to do was chat with some keen hobbyists, but now Death was tapping me on the shoulder in Parramatta.

After a few minutes, though, I started to take in what all the attendees were looking at: hundreds and hundreds of historical documents, self-published books, CD-ROMs with lists of lists of names, databases chock-full of people who had once lived and whom no living person now remembered. Everyone in this hall was looking for someone who was gone forever.

Still, even in the presence of all this data, I couldn't seem to find a way to actually get inside the story of family history and world history and the history of all this history, and it wasn't just a problem with this particular road show. Since I had started telling people about the subject of my book, I had received a lot of polite encouragement, but there was a constant buzz of skepticism as well. "Genealogy?" said a friend. "That's like those people who believe in past lives, isn't it? And they're always Cleopatra, never an anonymous slave."

• • •

The activity of tracing's one's lineage does not, in fact, have a great reputation. One of genealogy's purported offenses is that it has all the real-world verifiability of astrology. That, at least, was a proposition I could explore. But the thing about astrology is that you don't tend to find lots of people being outraged by it. Where genealogy was concerned, I met many people who proclaimed their indifference to it, but it was often an extremely vigorous indifference.

"Oh, it's a real American thing," one person observed. "Everyone I spoke to there does it."

Others objected because it was not "real history," being too personal.

Some assumed that because genealogists were not trained archivists, even when they did find a valuable old document with a relative's name or story in it, they didn't know what they were looking at.

Critics with more existential concerns argued that even if you had access to this or that document from someone's past, you could never determine from it what he or she was truly like.

In fact, I soon discovered, the criticisms of genealogy were legion. Genealogists were overly romantic. Genealogists were elitist. Genealogists were divisive. Genealogy, wrote Guardian columnist Zoe Williams, "conveys a silent prejudice that never has the guts to announce itself. Ferreting about for antecedents in parish records says, effectively: 'I attach a certain value to having always come from Suffolk or wherever. Oh, no, no, no, I don't mean being foreign is bad, I just mean it's so much nicer not to be.'"

The Times journalist Sathnam Sanghera offered some of the most blistering criticisms of family history: "Show me a genealogist and I'll show you someone who is basically obsessed with proving that they come from royal, aristocratic or celebrity lineage. Creepy and boring." Sanghera, who wrote a 336-page book about his own life as a young Sikh growing up in Wolverhampton in the eighties, added: "And before anyone points out the hypocrisy of a memoirist slagging off genealogy, life writing and genealogy are completely different. One being the equivalent of an interest in music, the other the equivalent of an interest in hi-fi equipment. Though perhaps a better way of putting it is that genealogy is the academic equivalent of endlessly googling yourself."

In a blog post titled Genealogy is Bunk, science writer Richard Conniff took the argument further. "The rich and famous . . . used to be the only ones who bothered with family history. It was a way to maintain their power, by asserting that they'd always been here and therefore always would be. Curiously, biologists doing long-term studies of primates in the wild say that's how family connections function in nature, too: In high-ranking baboon and vervet monkey families, grandmothers routinely make sure that little Tiffany Baboon and young Percy Vervet III get special treatment from lesser juveniles. This gives the kids a habit of social

dominance—and can thus help maintain a monkey dynasty for generations."

Like many critics, Conniff was convinced that in addition to being bunk on the grounds of egalitarianism, genealogy was bunk on evidentiary grounds as well: "Go back ten generations in any family, and the odds are that someone has climbed unacknowledged up the family tree. Sir Winston Churchill prided himself on his descent from the great eighteenth-century general John Churchill, Duke of Marlborough. But the family had a colorful history of sexual misadventure; Winston's own father died of syphilis, and his mother was said to have taken 200 lovers during the course of their marriage." How representative was this privileged woman of the paternity rates in her culture or another? Many critics invoked the specter of illegitimacy as a problem for genealogy.

Conniff explained that his teen daughter was a genealogy buff and that he wanted her to know that "nothing in her genealogy defines her." Really? If a person's genealogy is the series of individuals whose coupling eventually produced that person, then it's hard to see how this assertion is plausible: Surely some part of our identity has come down to us through our parents from our grandparents and from their parents. What we inherited needn't be physical, and it needn't be direct. The way people think about themselves is to some extent a reaction to the ideas about identity that were transmitted in their families. If you take genealogy to include all the qualities that characterize the people who are part of your lineage—not just their biologies but also their unique histories (their cultures, their choices, their personalities, and the significant events they lived through)—then the influence that these factors had on them, and in turn had on you, is an open and interesting question. Indeed, the more I considered the case made by the antigenealogists, the less clear it became to me that they knew enough about how these hard-to-define aspects of life are transmitted over the course of generations to conclude that they don't actually shape us.

What about the fact that people are literally created from material that comes from their parents and, before that, from their parents' parents? Facial features, for example, are strongly hereditary. What about the fact that how we look often affects how we think about ourselves? I am not arguing that the unique combination of DNA that we inherit from our parents completely, or even mostly, determines who we are or how we see ourselves, but it certainly contributes to it.

While the extent to which we are shaped by the DNA we inherit, and by the degree to which we are influenced by the world in which we grow up (which may largely influence us through the DNA we inherit), is contentious, no one factor in any part of anyone's life defines him or her. I will return to these ideas later, but for now we can at least say this: If you are someone's biological child, then by definition your DNA came from him or her. You might be raised by people who had nothing to do with your actual conception, and you will no doubt be influenced by their culture. Your genes too will be molded by many aspects of the environment in which you are raised, but your DNA comes to you through your genealogy.

Even if you end up with a version of a gene that neither your mother nor your father possessed, it was created out of the DNA they passed on to you. Even if you end up with a trait that neither of your parents had, your DNA may underpin that trait, and your DNA came from them. Indeed, none of the stuff that is you would hold together in the shape of a human being without the underlying genetic codes, which will continue to function throughout your life.

What was it about family history that inspired so much umbrage? No one rants about self-indulgent knitters or accuses tennis players of being emotionally void. Yet there was a special level of scorn reserved for the world's genealogists. It seemed that a sophisticated worldview precluded thinking about the questions that the Parramatta hobbyists had gathered to ask: What do we have in common with our ancestors? What don't we have in common? What in our lives came to us from them? The more I thought about it, the larger the gap seemed between the real people I met at the road show and the educated consensus on the futility of their

quest.

• • •

It wasn't just journalists and science writers who dismissed curiosity about one's lineage; academics did too. One professor of psychology told me: "I find it offensive that people fractionate themselves and find meaning in that. It means nothing; it says nothing about who you are." A historian observed, "People only want a family history of themselves that serves their identity at the moment. When it's something ugly, they want it erased."

When I asked an archivist about the attitude in his field, he told me: "It is still a pervasive idea that the genealogists are not our friends, and they're not really users, they're just sort of dilettante hobbyists that are consuming resources."

Even among the geneticists to whom I spoke, those who had looked into their family past were sometimes bashful about admitting it:It's just a bit of fun, you know?

In a 2012 essay in the New York Review of Books, Richard Lewontin, a Harvard professor of biology, mentioned his role as treasurer for the Marlboro Historical Society in Vermont, where he fields requests for copies of a history of Marlboro written over two hundred years ago by the Reverend Ephraim Newton. The history includes a great deal of genealogical information, and, Lewontin wrote, "Over and over, our correspondents write of the 'pride' they have in descending from these early settlers." He continued:

Surely pride or shame are appropriate sentiments for actions for which we ourselves are in some way responsible. Why, then, do we feel pride (or shame) for the actions of others over whom we can have had no influence? Do we, in this way, achieve a false modesty or relieve ourselves of the burdens of our own behavior?

Later Lewontin discussed the idea that Jews may share a genetic legacy and that this is considered "a source of group identity and pride." He reiterated:

Once again we have the question of why having knowledge of remote ancestors and a shared history makes us "proud." Is it that preening ourselves before the glass of history seems less egotistical than inspecting our images in the glass of fashion?

Lewontin's dismissal is unmistakable, and yet by the same argument we probably shouldn't feel any satisfaction when our favorite football team wins a game. Usually we do, though, and perhaps genealogy is no more complicated than that—the impulse to cheer on the home team, even if most of the team is dead. At any rate, if it's not appropriate to have feelings about belonging to a group that is genetically or historically connected, where should the cutoff be? Can we be proud of our grandparents? By Lewontin's measure, no, because we have had no influence over their actions. But the same would go for much of our parents' lives too. There's something nihilistic about asking, Why should we feel proud? The implied question is Why should we feel anything? Well, why not?

Around the same time that Lewontin's essay was published, obituaries announced the death of Essie Mae Washington-Williams, who was born in 1925 in Aiken, South Carolina. In 2003 Washington-Williams announced at a press conference that she was the illegitimate daughter of Strom Thurmond, a white American congressman, and Carrie Butler, an African American teen who worked as a maid in the Thurmond household. By the time Washington-Williams was in her early twenties, Thurmond was governor of South Carolina. Later he became a long-standing senator in the U.S. Congress and at one time ran for the office of U.S. president. A strict segregationist, he said: "All the laws of Washington and all the bayonets of

the Army cannot force the Negro into our homes, our schools, our churches and our places of recreation and amusement."

Washington-Williams waited until Thurmond died before she publicly revealed that he was her father. "My children deserve the right to know from whom, where and what they have come," she said. "I am committed in teaching them and helping them to learn about their past. It is their right to know and understand the rich history of their ancestry, black and white." Washington-Williams was a mother of four, a grandmother of thirteen, and a great-grandmother of four by the time she wrote her memoir in 2005. It's hard to imagine her descendants feeling nothing as they think about her past.

When she finished her historic announcement, the elegant and assured Washington-Williams spoke of the "great sense of peace" that came over her when she decided to share the details of her family's history. For some, no doubt for many, the details of their own lineage, and certainly that of others, may be banal. But when those details are lost or suppressed, they can take on an enormous power.

• • •

Perhaps neither question—Why should we feel proud? or Why shouldn't we feel proud?—can take us far. But it is surely interesting to ask,Why do we feel proud? because quite clearly many people do. Even Lewontin allows that all cultures in every era have been interested in ancestry. Were they motivated by pride, sorrow, amusement, or curiosity? It's surprisingly hard to answer this question.

Wendy Roth, a professor of sociology at the University of British Columbia, says that when she was a little girl, she wanted to be a genealogist when she grew up: "I was always the family record keeper." But Roth's family was Jewish, and because of the disruptions of World War II they didn't know much about earlier generations. "There is a sense that other people can do genealogy, but for us the records are gone," Roth explained. "I have one friendship with a woman in England who traced her family back to the 1500s and I've always lived a little vicariously through her."

Once, when Roth was backpacking in Europe, she visited Rymanów, Poland, the town that had been home to one of her great-grandfathers. The only traces of the Jewish community that once lived there were the ruins of a synagogue. Roth met a man who must have been in his eighties, and they communicated in a traveler's mix of drawing and impromptu sign language. She told him she wanted to find the old Jewish cemetery, and he led her up a steep hillside. "It was hard for me to keep up with him," she recalled. "He was so spry." They reached an area of chest-high weeds where the cemetery had been, and he mimed to her that he was a small child during the war. "He acted out that in this cemetery the Nazis had come, and they had lined up Jews, and then opened fire on all of them, and then they took the gravestones and used them to pave a road." Roth's guide then pointed to the road the Nazis had built, which lay beneath them, down the hill.

To feel that she finally stood somewhere that her ancestors had stood was an extraordinary experience for Roth. About fifteen years later, she and her husband traveled to Švencionys, Lithuania, where, she believed, a great-great-grandfather must have lived. There had once been a vibrant Jewish community there. Unusually, the Jewish cemetery was still intact: "We were crawling around again, it was totally overgrown, lots of stones fallen over but mostly in one piece." They had a translator with them to help find the gravestones for the family, including one for Roth's great-great-grandfather. When Roth saw it, she realized that it also held the name of her great-great-great-grandfather. It was the first time she had learned his name.

It was "unbelievable," she said. "Absolutely unbelievable. I was in tears." Why was this encounter so emotional? "It's a feeling of breaking through a wall. Of the frustration of wanting to know more about your family and your past and what people's lives were like, and where they came from, and who they were, and what their personal stories were, and feeling like you're never going to be able to uncover that. Once you

have that feeling of that great mystery, any piece of information feels like a treasure trove. Whether it's a name or a place where somebody once was, it's a form of a connection that you thought you were never going to have."

Roth interviewed many people who traced their family histories (see more on this in chapter 12), and she was always struck by the difficulty they had explaining what exactly compelled them. "With avid genealogists and especially genetic genealogists, I try to get at the question of why they are interested," she said. "What is amazing to me is that people can't articulate it. It's like it is such a basic urge or a basic primal interest that they have a really hard time putting it into words. Some people try, and they'll give you answers that sound a little clichéd. They'll talk about wanting to find their own place in history, or wanting to know where they came from, or they'll talk about it making history more interesting to them, but the level of commitment of a lot of people means to me that it must go deeper than that."

I came across Wendy Roth when I started looking for general studies of genealogy. Someone, I reasoned, must have investigated the psychology of family history or, surely, examined how different philosophies of heredity have shaped this ubiquitous human experience. I asked genealogists, geneticists, historians, and others whose work invoked in some way questions of inheritance and history, but none could point me to a body of work on which he or she relied.

Apart from Roth, a few scholars have investigated the topic, but usually only briefly and in isolation. This seemed odd. After all, historians acknowledge that attitudes and even feelings are passed down culturally. Economists study the way socioeconomic status, especially poverty, is reproduced. Psychologists, social scientists, and even English professors recognize that the family is a powerful engine of inheritance. Most scholars of human behavior accept that individuals are shaped in some way by the people who raised them and that even a family unit may possess a character. Yet there was apparently no field that brought together all these ideas about inheritance.

• • •

Like Roth, I became my own family's historian. But even though the fragments of past generations I glimpsed struck me as wondrous, I did not dig down for a long time. When I did begin to look further into my family's past, I experienced a strange array of emotions, including relief and contentment, but there was despair too.

I found myself drawn to one ancestor and then another, and sometimes a single detail was all it took for me to feel, at least for a little while, that I had a relationship with them. The day I realized that I could learn about Julia Dillon, my father's great-grandmother, was a revelation to me. She was one of my sixteen great-grandparents, and I had heard her name many times but knew nothing about her. I couldn't explain why I had never thought about her as an actual person who left physical traces in time.

I found her name on a ship's register and was stunned to learn that in 1862 she brought her four children by herself from Ireland to Australia on a ship called the Lightning. At the time I had two small children of my own, and I did everything in my power to avoid taking them with me to the supermarket, where they made a trip through the dairy section feel like The Odyssey. How did Julia manage her children on that long voyage?

Once she arrived in Australia, Julia reunited with her husband, Daniel, who had arrived on an earlier voyage. The family lived for a while on the goldfields of rural Victoria, and Julia had five more children. Like so many families of that era, Julia's lost children along the way. Jeremiah died at fifteen of a fever. Johanna died at eighteen while she was in service in a small country town. I found the browned, crisp transcript of the inquest into her death in the state archives. She had been complaining of pain and was sent to bed. Her employer, Elizabeth Farrell, later checked on her. "I found her very hot and racked with pain," she said. "I

proposed to give her a mustard plaster." The doctor was summoned and he gave her a dose of medicine and then ordered another dose. "Ought the medicine make her as sick?" wondered Farrell. They left poor Johanna alone, and later Farrell climbed the stairs to look in on her. For a minute she thought she was asleep, but Johanna was gone. "I found her dead," Farrell said. She then called out to the manager that "Johanna was dead in the bed."

Despite the resilience that characterized most of Julia's life, the hardship of her days flattened me. Once, while I was attending a conference in the United States, I woke at 5:00 a.m. with jet lag after covering in a day approximately the same distance that it took Julia forty days to cross. I told a genealogist at the conference that the thought of her hardships made me sad.

"But you can be impressed by her!" the genealogist replied, and I was.

I began to shake the malaise when it occurred to me one day that even though I had all sorts of complicated feelings about Julia, I had no idea what she would have thought of me. Who was I to her? Merely one of her son's many granddaughters. Here is the brutal asymmetry of a big family and time. Julia sits at a node in our family tree from which many, many branches sprout. I, on the other hand, am a twig. Even if she were alive, I'm not sure I would mean much to her.

Later I found a photo of Julia. She was about seventy at the time, and it was hard to tell if she was just small in stature or shrunken by age. She wore a frilly black dress and a black bonnet, which was secured under her neck with white flowers arrayed at the front. Her eyelids dragged down at their corners. I suspected the photo had been taken to commemorate a death in the family. Did her eyes, light and inscrutable, reflect sorrow? Was it exhaustion? I still don't know what it means to have a relationship with her, but that was, without a doubt, my father's nose on her face.

• • •

How do we personally lose or find information about our lineage? Our tendency is to assume that whatever we don't know about ourselves or our families has simply fallen away naturally, through attrition over time. Certainly, memory has absolute limits, but there are psychological forces at work too.

In 2012 Jordi Quoidbach, Daniel Gilbert, and a colleague wrote about an experiment they had carried out where people in different age groups were asked about either what they had liked, valued, or prioritized ten years earlier or how much they thought their current preferences were likely to change over the next ten years. The scientists found that their subjects were pretty good at assessing how much they had changed in the previous ten years, which was always a considerable amount. By contrast, the participants in the study always underestimated how much they were likely to change in the next ten years. In fact, they didn't think they were going to change much at all.

According to Quoidbach and his colleagues, people have a tendency to think of the present as a "watershed moment at which they have finally become the person they will be for the rest of their lives." The researchers dubbed the phenomenon the "end of history illusion," and they showed that it applied to personality traits, core values, and even best friends. Quoidbach found that the older people got, the less pronounced the illusion was, yet even the oldest subjects believed they had finally become the person they would be for the rest of their lives. "History," wrote the researchers, "is always ending today."

Perhaps the end-of-history illusion also applies to the way people think about generational time. We live in a temporal envelope. For most of us the horizon extends forward maybe two generations and back just two or three. It is hard to break out of the mind-set that we stand at a crucial center point of that span and that all the people who came before were merely precursors to us. It isn't until you populate the family tree out that it

becomes clear how brief a human life is, how soon it is over, and how you only play a bit part in a story line that expands out and contracts back and goes off in directions that no one can predict or control.

People who dig into their lineage may find it a startling corrective to the feeling that they exist at the apogee of an arc, one that has been heading inexorably toward them and that only gracefully declines away from them. Or maybe people delve into their past because they have started to lose their "presentism" for other reasons. It is telling that the most common triggers for a genealogical quest are major life events, such as the death of a parent or a grandparent or the birth of a child or grandchild, events that typically cause people to stop and consider the more existential questions: Where do I come from? Where do I go from here? What is my legacy?

Simply getting older is an incentive as well. "People get married and have children and careers, and then they retire and they have the sad remorse that they don't have their parents around anymore, so they seek for their past," David Lambert from the New England Historic Genealogical Society told me. Aging is, of course, inevitable, and yet in Western culture people are embarrassed by it. In 2012 the novelist Will Self told the Guardian that some of the characters in his novel Umbrella were inspired by family members in his grandfather's generation. "In a kind of tedious middle-aged way I was doing a bit of family history," he said.

Yet it makes an entirely practical sense that the older you get, the more you begin to perceive the boundaries of your envelope. By the time you reach middle age, you've passed through a few personal epochs, and there is texture in your life history. Chances are the number of dead people in your life has increased too. The consciousness of what is to be lost grows, as does the consciousness of what has been.

While there may be comfort in finding one's place in a big family tree of somewhat similar people, there is disorientation too. I found it dizzying to try to hold all my ancestors in my head, and it wasn't the sheer number of them that made me uncomfortable so much as the realization that all those people once existed, and they undoubtedly all thought that history ended with them too.

My confusion may be explained in part by the psychology of Western culture. A famous study compared the thinking of people from Western, educated, industrialized, rich, and democratic nations (dubbed WEIRD) to people from different cultures. The Westerners, they found, were much more individualistic and perceived themselves to be autonomous and self-contained. They were less motivated to conform and more inclined to feel that they drove their destiny. By contrast, people in non-WEIRD societies were more naturally inclined to see their identity as inextricably connected to their network of family and community. They were enmeshed in roles and relationships and were more oriented to cooperation and the desire to "fit in" rather than "stand out."

Some people may be offended by the idea that they are not entirely in charge of their own destiny, but many—at least by the time they are forty—come to suspect that they are not. If they are older yet and trying to figure out what it means to have a legacy—if their children have children—then simply by virtue of having survived for long enough, they've begun to have a lot more in common with their long-dead ancestors than they used to.

The problem with letting go of our personal presentism is that it not only undermines the sense that now is more important than then but it also calls into question a whole cluster of connected and comforting assumptions. For example, we experience ourselves as a whole, yet the smallest glance backward tells us we are put together by fractions. While the complicated process of development makes most of the seams of our original self invisible to the naked eye, we were once made up of halves. When our parents made us, they each contributed a sample of their DNA, donating twenty-three chromosomes each; if we take the perspective of our parents' parents, we were made up of four parts, as each of them donated about 25 percent

of their DNA to us.

We think of our culture as a whole too. Everything in our day-to-day lives is covered by the same patina of familiarity, but in reality we live in a patchwork of ancient and modern technologies. The same is true of language. Think about a term like “Trojan horse.” We apply it to software that smuggles something unwanted onto our computers, but the original concept came from real people who once lived in ancient Greece. What ordinary or new words today might last two thousand years in the future: Dot-com? Internet? YOLO?

• • •

Not all cultures regard looking back into one’s past as a strange pursuit. Nor do they insist that family history is not also valid history. In fact, the reality that many westerners must actively search for their great-grandparents’ names because they don’t already know them appears odd to other cultures. Many Asian genealogies are tracked through deep time, and some cultures keep extraordinarily old family record books, adding the name of a new member when he or she is born. These genealogies are descendancy based, as opposed to ours, which are ascendancy based, the difference being that we put ourselves in the spotlight.

“China is where you want to be born if you want to easily do your family history research,” one researcher told me. “They have been keeping family history records . . . and have these wonderful family books, jai pu, where based on your surname you can go back and trace your ancestry for a couple of thousand years.” He continued, “I think westerners sometimes misunderstand the Chinese asworshipping their ancestors, but it’s really an incredibly deep cultural feeling that if you’re not connected to your descendants, your ancestors, and your siblings, you’re not . . . it’s like you’re not whole.”

In 2009 an official update charting the descendants of Confucius, “The Top Family on Earth,” was completed in China’s Shandong Province, where Confucius was born 2,560 years earlier. According to the revised tree, the ancient advocate for peace and social harmony fathered eighty-three generations numbering some two million individual descendants. (An earlier revision in 1937 counted only 600,000 descendants. The new version was the first to include women, overseas family members, and ethnic minorities, like seventy-one-year-old Muslim Kong Xiangxian from Yunnan Province. At the time of the update, the pantheon of Confucius’s living offspring included the childless ninety-year-old Kong Demao, the only direct descendent of Confucius in mainland China, and sixteen-year-old James Hung of West London, grandson of a clan elder and a big fan of Manchester United.)

In New Zealand’s Maori culture, there is a specialized lexicon for talking about families through time. Whakapiri is what Maori do when they work out what ancestors they have in common with others. The recitation of genealogy and stories that are passed from one generation down to the next is called whakapapa. It’s said that if a Maori learns his genealogy, he will be able to trace his way back through the millennia, person by person, to when his ancestors first arrived in New Zealand.

Many cultures in Africa have an equally strong oral tradition. In West Africa the griot is the person who memorizes all the histories and carries the group’s identity. In Somalia children under the age of ten learn their genealogy by heart—their lineage, their subfamily, and the larger clan group to which they belong for ten generations back.

Users Review

From reader reviews:

Herman Deans:

The actual book The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures will bring that you the new experience of reading a book. The author style to explain the idea is very unique. If you try to find new book to read, this book very ideal to you. The book The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures is much recommended to you to study. You can also get the e-book in the official web site, so you can quickly to read the book.

Harriett Costello:

The book untitled The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures is the publication that recommended to you you just read. You can see the quality of the reserve content that will be shown to anyone. The language that article author use to explained their ideas are easily to understand. The article author was did a lot of analysis when write the book, therefore the information that they share for your requirements is absolutely accurate. You also could get the e-book of The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures from the publisher to make you far more enjoy free time.

Susan Hare:

Is it a person who having spare time subsequently spend it whole day by watching television programs or just telling lies on the bed? Do you need something new? This The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures can be the respond to, oh how comes? A book you know. You are and so out of date, spending your spare time by reading in this new era is common not a geek activity. So what these publications have than the others?

Doug Martin:

As we know that book is significant thing to add our knowledge for everything. By a reserve we can know everything we really wish for. A book is a range of written, printed, illustrated or even blank sheet. Every year ended up being exactly added. This book The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures was filled in relation to science. Spend your spare time to add your knowledge about your research competence. Some people has diverse feel when they reading a book. If you know how big benefit from a book, you can sense enjoy to read a book. In the modern era like now, many ways to get book you wanted.

Read The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally for online ebook

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally books to read online.

Online The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally ebook PDF download

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally Doc

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally Mobipocket

The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally EPub

RW7AZL5PO02: The Invisible History of the Human Race: How DNA and History Shape Our Identities and Our Futures By Christine Kenneally