THE IMMORTAL LIFE OF HENRIETTA LACKS

Rebecca Skloot

A Few Words About This Book

This is a work of nonfiction. No names have been changed, no characters invented, no events fabricated. While writing this book, I conducted more than a thousand hours of interviews with family and friends of Henrietta Lacks, as well as with lawyers, ethicists, scientists, and journalists who've written about the Lacks family. I also relied on extensive archival photos and documents, scientific and historical research, and the personal journals of Henrietta's daughter, Deborah Lacks.

I've done my best to capture the language with which each person spoke and wrote: dialogue appears in native dialects; passages from diaries and other personal writings are quoted exactly as written. As one of Henrietta's relatives said to me, "If you pretty up how people spoke and change the things they said, that's dishonest. It's taking away their lives, their experiences, and their selves." In many places I've adopted the words interviewees used to describe their worlds and experiences. In doing so, I've used the language of their times and backgrounds, including words such as colored. Members of the Lacks family often referred to Johns Hopkins as "John Hopkin," and I've kept their usage when they're speaking. Anything written in the first person in Deborah Lacks's voice is a quote of her speaking, edited for length and occasionally clarity.

Since Henrietta Lacks died decades before I began writing this book, I relied on interviews, legal documents, and her medical records to re-create scenes from her life. In those scenes, dialogue is either deduced from the written record or quoted verbatim as it was recounted to me in an interview. Whenever possible I conducted multiple interviews with multiple sources to ensure accuracy. The extract from Henrietta's medical record in chapter 1 is a summary of many disparate notations.

The word HeLa, used to refer to the cells grown from Henrietta Lacks's cervix, occurs throughout the book. It is pronounced hee-lah.

About chronology: Dates for scientific research refer to when the research was conducted, not when it was published. In some cases those dates are approximate because there is no record of exact start dates. Also, because I move back and forth between multiple stories, and scientific discoveries occur over many years, there are places in the book where, for the sake of clarity, I describe scientific discoveries sequentially, even though they took place during the same general period of time.

The history of Henrietta Lacks and the HeLa cells raises important issues regarding science, ethics, race, and class; I've done my best to present them clearly within the narrative of the Lacks story, and I've included an afterword addressing the current legal and ethical debate surrounding tissue ownership and research. There is much more to say on all the issues, but that is beyond the scope of this book, so I will leave it for scholars and experts in the field to address. I hope readers will forgive any omissions.

The Immortal life of Henrietta Lacks

We must not see any person as an abstraction.
Instead, we must see in every person a universe with its own secrets,
with its own treasures, with its own sources of anguish,
and with some measure of triumph.
—ELIE WIESEL
from The Nazi Doctors and the Nuremberg Code
The Immortal life of Henrietta Lacks

PROLOGUE

The Woman in the Photograph

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here's a photo on my wall of a woman I've never met, its left corner torn and patched together with tape. She looks straight into the camera and smiles, hands on hips, dress suit neatly pressed, lips painted deep red. It's the late 1940s and she hasn't yet reached the age of thirty. Her light brown skin is smooth, her eyes still young and playful, oblivious to the tumor growing inside her—a tumor that would leave her five children motherless and change the future of medicine. Beneath the photo, a caption says her name is "Henrietta Lacks, Helen Lane or Helen Larson."

No one knows who took that picture, but it's appeared hundreds of times in magazines and science textbooks, on blogs and laboratory walls. She's usually identified as Helen Lane, but often she has no name at all. She's simply called HeLa, the code name given to the world's first immortal human cells—her cells, cut from her cervix just months before she died.

Her real name is Henrietta Lacks.

I've spent years staring at that photo, wondering what kind of life she led, what happened to her children, and what she'd think about cells from her cervix living on forever—bought, sold, packaged, and shipped by the trillions to laboratories around the world. I've tried to imagine how she'd feel knowing that her cells went up in the first space missions to see what would happen to human cells in zero gravity, or that they helped with some of the most important advances in medicine: the polio vaccine, chemotherapy, cloning, gene mapping, in vitro fertilization. I'm pretty sure that she—like most of us—would be shocked to hear that there are trillions more of her cells growing in laboratories now than there ever were in her body.

There's no way of knowing exactly how many of Henrietta's cells are alive today. One scientist estimates that if you could pile all HeLa cells ever grown onto a scale, they'd weigh more than 50 million metric tons—an inconceivable number, given that an individual cell weighs almost nothing. Another scientist calculated that if you could lay all HeLa cells ever grown end-to-end, they'd wrap around the Earth at least three times, spanning more than 350 million feet. In her prime, Henrietta herself stood only a bit over five feet tall.

I first learned about HeLa cells and the woman behind them in 1988, thirty-seven years after her death, when I was sixteen and sitting in a community college biology class. My instructor, Donald Defler, a gnomish balding man, paced at the front of the lecture hall and flipped on an overhead projector. He pointed to two diagrams that appeared on the wall be-

hind him. They were schematics of the cell reproduction cycle, but to me they just looked like a neon-colored mess of arrows, squares, and circles with words I didn't understand, like "MPF Triggering a Chain Reaction of Protein Activations."

I was a kid who'd failed freshman year at the regular public high school because she never showed up. I'd transferred to an alternative school that offered dream studies instead of biology, so I was taking Defler's class for high-school credit, which meant that I was sitting in a college lecture hall at sixteen with words like mitosis and kinase inhibitors flying around. I was completely lost.

"Do we have to memorize everything on those diagrams?" one student yelled.

Yes, Defler said, we had to memorize the diagrams, and yes, they'd be on the test, but that didn't matter right then. What he wanted us to understand was that cells are amazing things: There are about one hundred trillion of them in our bodies, each so small that several thousand could fit on the period at the end of this sentence. They make up all our tissues—muscle, bone, blood—which in turn make up our organs.

Under the microscope, a cell looks a lot like a fried egg: It has a white (the cytoplasm) that's full of water and proteins to keep it fed, and a yolk (the nucleus) that holds all the genetic information that makes you you. The cytoplasm buzzes like a New York City street. It's crammed full of molecules and vessels endlessly shuttling enzymes and sugars from one part of the cell to another, pumping water, nutrients, and oxygen in and out of the cell. All the while, little cytoplasmic factories work 24/7, cranking out sugars, fats, proteins, and energy to keep the whole thing running and feed the nucleus. The nucleus is the brains of the operation; inside every nucleus within each cell in your body, there's an identical copy of your entire genome. That genome tells cells when to grow and divide and makes sure they do their jobs, whether that's controlling your heartbeat or helping your brain understand the words on this page.

Defler paced the front of the classroom telling us how mitosis—the process of cell division—makes it possible for embryos to grow into babies, and for our bodies to create new cells for healing wounds or replenishing blood we've lost. It was beautiful, he said, like a perfectly choreographed dance.

All it takes is one small mistake anywhere in the division process for cells to start growing out of control, he told us. Just one enzyme misfiring, just one wrong protein activation, and you could have cancer. Mitosis goes haywire, which is how it spreads.

"We learned that by studying cancer cells in culture," Defler said. He grinned and spun to face the board, where he wrote two words in enormous print: HENRIETTA LACKS.

Henrietta died in 1951 from a vicious case of cervical cancer, he told us. But before she died, a surgeon took samples of her tumor and put them in a petri dish. Scientists had been trying to keep human cells alive in culture for decades, but they all eventually died. Henrietta's were different: they reproduced an entire generation every twenty-four hours, and they never stopped. They became the first immortal human cells ever grown in a laboratory.

"Henrietta's cells have now been living outside her body far longer than they ever lived inside it," Defler said. If we went to almost any cell culture lab in the world and opened its freezers, he told us, we'd probably find millions—if not billions—of Henrietta's cells in small vials on ice.

Her cells were part of research into the genes that cause cancer and those that suppress it; they helped develop drugs for treating herpes, leukemia, influenza, hemophilia, and Parkinson's disease; and they've been used to study lactose digestion, sexually transmitted diseases, appendicitis, human longevity, mosquito mating, and the negative cellular effects of working in sewers. Their chromosomes and proteins have been studied with such detail and precision that scientists know their every quirk. Like guinea pigs and mice, Henrietta's cells have become the standard laboratory workhorse.

"HeLa cells were one of the most important things that happened to medicine in the last hundred years," Defler said.

Then, matter-of-factly, almost as an afterthought, he said, "She was a black woman." He erased her name in one fast swipe and blew the chalk from his hands. Class was over.

As the other students filed out of the room, I sat thinking, That's it? That's all we get? There has to be more to the story.

I followed Defler to his office.

"Where was she from?" I asked. "Did she know how important her cells were? Did she have any children?"

"I wish I could tell you," he said, "but no one knows anything about her."

After class, I ran home and threw myself onto my bed with my biology textbook. I looked up "cell culture" in the index, and there she was, a small parenthetical:

In culture, cancer cells can go on dividing indefinitely, if they have a continual supply of nutrients, and thus are said to be "immortal." A striking example is a cell line that has been reproducing in culture since 1951. (Cells of this line are called HeLa cells because their original source was a tumor removed from a woman named Henrietta Lacks.)

That was it. I looked up HeLa in my parents' encyclopedia, then my dictionary: No Henrietta.

As I graduated from high school and worked my way through college toward a biology degree, HeLa cells were omnipresent. I heard about them in histology, neurology, pathology; I

used them in experiments on how neighboring cells communicate. But after Mr. Defler, no one mentioned Henrietta.

When I got my first computer in the mid-nineties and started using the Internet, I searched for information about her, but found only confused snippets: most sites said her name was Helen Lane; some said she died in the thirties; others said the forties, fifties, or even sixties. Some said ovarian cancer killed her, others said breast or cervical cancer.

Eventually I tracked down a few magazine articles about her from the seventies. Ebony quoted Henrietta's husband saying, "All I remember is that she had this disease, and right after she died they called me in the office wanting to get my permission to take a sample of some kind. I decided not to let them." Jet said the family was angry—angry that Henrietta's cells were being sold for twenty-five dollars a vial, and angry that articles had been published about the cells without their knowledge. It said, "Pounding in the back of their heads was a gnawing feeling that science and the press had taken advantage of them."

The articles all ran photos of Henrietta's family: her oldest son sitting at his dining room table in Baltimore, looking at a genetics textbook. Her middle son in military uniform, smiling and holding a baby. But one picture stood out more than any other: in it, Henrietta's daughter, Deborah Lacks, is surrounded by family, everyone smiling, arms around each other, eyes bright and excited. Except Deborah. She stands in the foreground looking alone, almost as if someone pasted her into the photo after the fact. She's twenty-six years old and beautiful, with short brown hair and catlike eyes. But those eyes glare at the camera, hard and serious. The caption said the family had found out just a few months earlier that Henrietta's cells were still alive, yet at that point she'd been dead for twenty-five years.

All of the stories mentioned that scientists had begun doing research on Henrietta's children, but the Lackses didn't seem to know what that research was for. They said they were being tested to see if they had the cancer that killed Henrietta, but according to the reporters, scientists were studying the Lacks family to learn more about Henrietta's cells. The stories quoted her son Lawrence, who wanted to know if the immortality of his mother's cells meant that he might live forever too. But one member of the family remained voiceless: Henrietta's daughter, Deborah.

As I worked my way through graduate school studying writing, I became fixated on the idea of someday telling Henrietta's story. At one point I even called directory assistance in Baltimore looking for Henrietta's husband, David Lacks, but he wasn't listed. I had the idea that I'd write a book that was a biography of both the cells and the woman they came from—someone's daughter, wife, and mother.

I couldn't have imagined it then, but that phone call would mark the beginning of a decadelong adventure through scientific laboratories, hospitals, and mental institutions, with a

cast of characters that would include Nobel laureates, grocery store clerks, convicted felons, and a professional con artist. While trying to make sense of the history of cell culture and the complicated ethical debate surrounding the use of human tissues in research, I'd be accused of conspiracy and slammed into a wall both physically and metaphorically, and I'd eventually find myself on the receiving end of something that looked a lot like an exorcism. I did eventually meet Deborah, who would turn out to be one of the strongest and most resilient women I'd ever known. We'd form a deep personal bond, and slowly, without realizing it, I'd become a character in her story, and she in mine.

Deborah and I came from very different cultures: I grew up white and agnostic in the Pacific Northwest, my roots half New York Jew and half Midwestern Protestant; Deborah was a deeply religious black Christian from the South. I tended to leave the room when religion came up in conversation because it made me uncomfortable; Deborah's family tended toward preaching, faith healings, and sometimes voo doo. She grew up in a black neighborhood that was one of the poorest and most dangerous in the country; I grew up in a safe, quiet middle-class neighborhood in a predominantly white city and went to high school with a total of two black students. I was a science journalist who referred to all things supernatural as "woo-woo stuff;" Deborah believed Henrietta's spirit lived on in her cells, controlling the life of anyone who crossed its path. Including me.

"How else do you explain why your science teacher knew her real name when everyone else called her Helen Lane?" Deborah would say. "She was trying to get your attention." This thinking would apply to everything in my life: when I married while writing this book, it was because Henrietta wanted someone to take care of me while I worked. When I divorced, it was because she'd decided he was getting in the way of the book. When an editor who insisted I take the Lacks family out of the book was injured in a mysterious accident, Deborah said that's what happens when you piss Henrietta off.

The Lackses challenged everything I thought I knew about faith, science, journalism, and race. Ultimately, this book is the result. It's not only the story of HeLa cells and Henrietta Lacks, but of Henrietta's family—particularly Deborah—and their lifelong struggle to make peace with the existence of those cells, and the science that made them possible.

The Immortal life of Henrietta Lacks

DEBORAH'S VOICE

When people ask—and seems like people always be askin to where I can't never get away from it—I say, Yeah, that's right, my mother name was Henrietta Lacks, she died in 1951, John Hopkins took her cells and them cells are still livin today, still multiplyin, still growin and spreadin if you don't keep em frozen. Science calls her HeLa and she's all over the world in

medical facilities, in all the computers and the Internet everywhere.

When I go to the doctor for my checkups I always say my mother was HeLa. They get all excited, tell me stuff like how her cells helped make my blood pressure medicines and antidepression pills and how all this important stuff in science happen cause of her. But they don't never explain more than just sayin, Yeah, your mother was on the moon, she been in nuclear bombs and made that polio vaccine. I really don't know how she did all that, but I guess I'm glad she did, cause that mean she helpin lots of people. I think she would like that.

But I always have thought it was strange, if our mother cells done so much for medicine, how come her family can't afford to see no doctors? Don't make no sense. People got rich off my mother without us even knowin about them takin her cells, now we don't get a dime. I used to get so mad about that to where it made me sick and I had to take pills. But I don't got it in me no more to fight. I just want to know who my mother was.

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1

The Exam

On January 29, 1951, David Lacks sat behind the wheel of his old Buick, watching the rain fall. He was parked under a towering oak tree outside Johns Hopkins Hospital with three of his children—two still in diapers—waiting for their mother, Henrietta. A few minutes earlier she'd jumped out of the car, pulled her jacket over her head, and scurried into the hospital, past the "colored" bathroom, the only one she was allowed to use. In the next building, under an elegant domed copper roof, a ten-and-a-half-foot marble statue of Jesus stood, arms spread wide,

holding court over what was once the main entrance of Hopkins. No one in Henrietta's family ever saw a Hopkins doctor without visiting the Jesus statue, laying flowers at his feet, saying a prayer, and rubbing his big toe for good luck. But that day Henrietta didn't stop.

She went straight to the waiting room of the gynecology clinic, a wide-open space, empty but for rows of long straight-backed benches that looked like church pews.

"I got a knot on my womb," she told the receptionist. "The doctor need to have a look."

For more than a year Henrietta had been telling her closest girlfriends something didn't feel right. One night after dinner, she sat on her bed with her cousins Margaret and Sadie and told them, "I got a knot inside me."

"A what?" Sadie asked.

"A knot," she said. "It hurt somethin awful—when that man want to get with me, Sweet Jesus aren't them but some pains."

When sex first started hurting, she thought it had something to do with baby Deborah, who she'd just given birth to a few weeks earlier, or the bad blood David sometimes brought home after nights with other women—the kind doctors treated with shots of penicillin and heavy metals.

Henrietta grabbed her cousins' hands one at a time and guided them to her belly, just as she'd done when Deborah started kicking.

"You feel anything?"

The cousins pressed their fingers into her stomach again and again.

"I don't know," Sadie said. "Maybe you're pregnant outside your womb—you know that can happen."

"I'm no kind of pregnant," Henrietta said. "It's a knot."

"Hennie, you gotta check that out. What if it's somethin bad?"

But Henrietta didn't go to the doctor, and the cousins didn't tell anyone what she'd said in the bedroom. In those days, people didn't talk about things like cancer, but Sadie always figured Henrietta kept it secret because she was afraid a doctor would take her womb and make her stop having children.

About a week after telling her cousins she thought something was wrong, at the age of twenty-nine, Henrietta turned up pregnant with Joe, her fifth child. Sadie and Margaret told Henrietta that the pain probably had something to do with a baby after all. But Henrietta still said no.

"It was there before the baby," she told them. "It's somethin else."

They all stopped talking about the knot, and no one told Henrietta's husband David anything about it. Then, four and a half months after baby Joseph was born, Henrietta went to the

bathroom and found blood spotting her underwear when it wasn't her time of the month.

She filled her bathtub, lowered herself into the warm water, and slowly spread her legs. With the door closed to her children, husband, and cousins, Henrietta slid a finger inside herself and rubbed it across her cervix until she found what she somehow knew she'd find: a hard lump, deep inside, as though someone had lodged a marble just to the left of the opening to her womb.

Henrietta climbed out of the bathtub, dried herself off, and dressed. Then she told her husband, "You better take me to the doctor. I'm bleedin and it ain't my time."

Her local doctor took one look inside her, saw the lump, and figured it was a sore from syphilis. But the lump tested negative for syphilis, so he told Henrietta she'd better go to the Johns Hopkins gynecology clinic.

Hopkins was one of the top hospitals in the country. It was built in 1889 as a charity hospital for the sick and poor, and it covered more than a dozen acres where a cemetery and insane asylum once sat in East Baltimore. The public wards at Hopkins were filled with patients, most of them black and unable to pay their medical bills. David drove Henrietta nearly twenty miles to get there, not because they preferred it, but because it was the only major hospital for miles that treated black patients. This was the era of Jim Crow—when black people showed up at white-only hospitals, the staff was likely to send them away, even if it meant they might die in the parking lot. Even Hopkins, which did treat black patients, segregated them in colored wards, and had colored-only fountains.

So when the nurse called Henrietta from the waiting room, she led her through a single door to a colored-only exam room—one in a long row of rooms divided by clear glass walls that let nurses see from one to the next. Henrietta undressed, wrapped herself in a starched white hospital gown, and lay down on a wooden exam table, waiting for Howard Jones, the gynecologist on duty. Jones was thin and graying, his deep voice softened by a faint Southern accent. When he walked into the room, Henrietta told him about the lump. Before examining her, he flipped through her chart—a quick sketch of her life, and a litany of untreated conditions:

Sixth or seventh grade education; housewife and mother of five. Breathing difficult since childhood due to recurrent throat infections and deviated septum in patient's nose. Physician recommended surgical repair. Patient declined. Patient had one toothache for nearly five years; tooth eventually extracted with several others. Only anxiety is oldest daughter who is epileptic and can't talk. Happy household. Very occasional drinker. Has not traveled. Well nourished, cooperative. Patient was one of ten siblings. One died of car accident, one from rheumatic heart, one was poisoned. Unexplained vaginal bleeding and blood in urine during last two pregnancies; physician recommended sickle cell test. Patient declined. Been with

husband since age 15 and has no liking for sexual intercourse. Patient has asymptomatic neuro syphilis but cancelled syphilis treatments, said she felt fine. Two months prior to current visit, after delivery of fifth child, patient had significant blood in urine. Tests showed areas of increased cellular activity in the cervix. Physician recommended diagnostics and referred to specialist for ruling out in fection or cancer. Patient canceled appointment. One month prior to current visit, patient tested positive for gonorrhea. Patient recalled to clinic for treatment. No response.

It was no surprise that she hadn't come back all those times for follow-up. For Henrietta, walking into Hopkins was like entering a foreign country where she didn't speak the language. She knew about harvesting tobacco and butchering a pig, but she'd never heard the words cervix or biopsy. She didn't read or write much, and she hadn't studied science in school. She, like most black patients, only went to Hopkins when she thought she had no choice.

Jones listened as Henrietta told him about the pain, the blood. "She says that she knew there was something wrong with the neck of her womb," he wrote later. "When asked why she knew it, she said that she felt as if there were a lump there. I do not quite know what she means by this, unless she actually palpated this area."

Henrietta lay back on the table, feet pressed hard in stirrups as she stared at the ceiling. And sure enough, Jones found a lump exactly where she'd said he would. He described it as an eroded, hard mass about the size of a nickel. If her cervix was a clock's face, the lump was at four o'clock. He'd seen easily a thousand cervical cancer lesions, but never anything like this: shiny and purple (like "grape Jello," he wrote later), and so delicate it bled at the slightest touch. Jones cut a small sample and sent it to the pathology lab down the hall for a diagnosis. Then he told Henrietta to go home.

Soon after, Howard Jones sat down and dictated notes about Henrietta and her diagnosis: "Her history is interesting in that she had a term delivery here at this hospital, September 19, 1950," he said. "No note is made in the history at that time, or at the six weeks' return visit that there is any abnormality of the cervix."

Yet here she was, three months later, with a full-fledged tumor. Either her doctors had missed it during her last exams—which seemed impossible—or it had grown at a terrifying rate.

The Immortal life of Henrietta Lacks

Clover

Henrietta Lacks was born Loretta Pleasant in Roanoke, Virginia, on August 1, 1920. No one knows how she became Henrietta. A midwife named Fannie delivered her into a small shack on a dead-end road overlooking a train depot, where hundreds of freight cars came and went each day. Henrietta shared that house with her parents and eight older siblings until 1924, when her mother, Eliza Lacks Pleasant, died giving birth to her tenth child.

Henrietta's father, Johnny Pleasant, was a squat man who hobbled around on a cane he often hit people with. Family lore has it that he killed his own brother for trying to get fresh with Eliza. Johnny didn't have the patience for raising children, so when Eliza died, he took them all back to Clover, Virginia, where his family still farmed the tobacco fields their ancestors had worked as slaves. No one in Clover could take all ten children, so relatives divided them up—one with this cousin, one with that aunt. Henrietta ended up with her grandfather, Tommy Lacks.

Tommy lived in what everyone called the home-house—a four-room log cabin that once served as slave quarters, with plank floors, gas lanterns, and water Henrietta hauled up a long hill from the creek. The home-house stood on a hillside where wind whipped through cracks in the walls. The air inside stayed so cool that when relatives died, the family kept their corpses in the front hallway for days so people could visit and pay respects. Then they buried them in the cemetery out back.

Henrietta's grandfather was already raising another grandchild that one of his daughters had left behind after delivering him on the home-house floor. That child's name was David Lacks, but everyone called him Day, because in the Lacks country drawl, house sounds like hyse, and David sounds like Day.

Young Day was what the Lacks family called a sneak baby: a man named Johnny Coleman had passed through town; nine months later Day arrived. A twelve-year-old cousin and midwife named Munchie delivered him, blue as a stormy sky and not breathing. A white doctor came to the home-house with his derby and walking stick, wrote "stillborn" on Day's birth

certificate, then drove his horse-drawn buggy back to town, leaving a cloud of red dust behind.

Munchie prayed as he rode away, Lord, I know you didn't mean to take this baby. She washed Day in a tub of warm water, then put him on a white sheet where she rubbed and patted his chest until he gasped for breath and his blue skin warmed to soft brown.

By the time Johnny Pleasant shipped Henrietta off to live with Grandpa Tommy, she was four and Day was almost nine. No one could have guessed she'd spend the rest of her life with Day—first as a cousin growing up in their grandfather's home, then as his wife.

As children, Henrietta and Day awoke each morning at four o'clock to milk the cows and feed the chickens, hogs, and horses. They tended a garden filled with corn, peanuts, and greens, then headed to the tobacco fields with their cousins Cliff, Fred, Sadie, Margaret, and a horde of others. They spent much of their young lives stooped in those fields, planting tobacco behind mule-drawn plows. Each spring they pulled the wide green leaves from their stalks and tied them into small bundles—their fingers raw and sticky with nicotine resin—then climbed the rafters of their grandfather's tobacco barn to hang bundle after bundle for curing. Each summer day they prayed for a storm to cool their skin from the burning sun. When they got one, they'd scream and run through fields, snatching armfuls of ripe fruit and walnuts that the winds blew from the trees.

Like most young Lackses, Day didn't finish school: he stopped in the fourth grade because the family needed him to work the fields. But Henrietta stayed until the sixth grade. During the school year, after taking care of the garden and livestock each morning, she'd walk two miles—past the white school where children threw rocks and taunted her—to the colored school, a three-room wooden farmhouse hidden under tall shade trees, with a yard out front where Mrs. Coleman made the boys and girls play on separate sides. When school let out each day, and any time it wasn't in session, Henrietta was in the fields with Day and the cousins.

If the weather was nice, when they finished working, the cousins ran straight to the swimming hole they made each year by damming the creek behind the house with rocks, sticks, bags of sand, and anything else they could sink. They threw rocks to scare away the poison ous cottonmouth snakes, then dropped into the water from tree branches or dove from muddy banks.

At nightfall they built fires with pieces of old shoes to keep the mosquitoes away, and watched the stars from beneath the big oak tree where they'd hung a rope to swing from. They played tag, ring-around-the-rosy, and hopscotch, and danced around the field singing until Grandpa Tommy yelled for everyone to go to bed.

Each night, piles of cousins packed into the crawl space above a little wooden kitchen house just a few feet from the home-house. They lay one next to the other—telling stories about the headless tobacco farmer who roamed the streets at night, or the man with no eyes who lived by the creek—then slept until their grandmother Chloe fired up the woodstove below and woke them to the smell of fresh biscuits.

One evening each month during harvest season, Grandpa Tommy hitched the horses after supper and readied them to ride into the town of South Boston—home of the nation's second-largest tobacco market, with tobacco parades, a Miss Tobacco pageant, and a port where boats collected the dried leaves for people around the world to smoke.

Before leaving home, Tommy would call for the young cousins, who'd nestle into the flat wagon on a bed of tobacco leaves, then fight sleep as long as they could before giving in to the rhythm of the horses. Like farmers from all over Virginia, Tommy Lacks and the grandchildren rode through the night to bring their crops to South Boston, where they'd line up at dawn—one wagon behind the next-waiting for the enormous green wooden gates of the auction warehouse to open.

When they arrived, Henrietta and the cousins would help unhitch the horses and fill their troughs with grain, then unload the family's tobacco onto the wood-plank floor of the warehouse. The auctioneer rattled off numbers that echoed through the huge open room, its ceiling nearly thirty feet high and covered with skylights blackened by years of dirt. As Tommy Lacks stood by his crop praying for a good price, Henrietta and the cousins ran around the tobacco piles, talking in a fast gibberish to sound like the auctioneer. At night they'd help Tommy haul any unsold tobacco down to the basement, where he'd turn the leaves into a bed for the children. White farmers slept upstairs in lofts and private rooms; black farmers slept in the dark underbelly of the warehouse with the horses, mules, and dogs, on a dusty dirt floor lined with rows of wooden stalls for livestock, and mountains of empty liquor bottles piled almost to the ceiling.

Night at the warehouse was a time of booze, gambling, prostitution, and occasional murders as farmers burned through their season's earnings. From their bed of leaves, the Lacks children would stare at ceiling beams the size of trees as they drifted off to the sound of laughter and clanking bottles, and the smell of dried tobacco.

In the morning they'd pile into the wagon with their unsold harvest and set out on the long journey home. Any cousins who'd stayed behind in Clover knew a wagon ride into South Boston meant treats for everyone—a hunk of cheese, maybe, or a slab of bologna—so they waited for hours on Main Street to follow the wagon to the home-house.

Clover's wide, dusty Main Street was full of Model As, and wagons pulled by mules and horses. Old Man Snow had the first tractor in town, and he drove it to the store like it was a

car—newspaper tucked under his arm, his hounds Cadillac and Dan baying beside him. Main Street had a movie theater, bank, jewelry store, doctor's office, hardware store, and several churches. When the weather was good, white men with suspenders, top hats, and long cigars—everyone from mayor to doctor to under taker—stood along Main Street sipping whiskey from juice bottles, talking, or playing checkers on the wooden barrel in front of the pharmacy. Their wives gossiped at the general store as their babies slept in a row on the counter, heads resting on long bolts of fabric.

Henrietta and her cousins would hire themselves out to those white folks, picking their tobacco for ten cents so they'd have money to see their favorite Buck Jones cowboy movies. The theater owner showed silent black-and-white films, and his wife played along on the piano. She knew only one song, so she played happy carnival-style music for every scene, even when characters were getting shot and dying. The Lacks children sat up in the colored section next to the projector, which clicked like a metronome through the whole movie.

A

s Henrietta and Day grew older, they traded ring-around-the-rosy for horse races along the dirt road that ran the length of what used to be the Lacks tobacco plantation, but was now simply called Lacks Town. The boys always fought over who got to ride Charlie Horse, Grandpa Tommy's tall bay, which could outrun any other horse in Clover. Henrietta and the other girls watched from the hillside or the backs of straw-filled wagons, hopping up and down, clapping and screaming as the boys streaked by on horseback.

Henrietta often yelled for Day, but sometimes she cheered for another cousin, Crazy Joe Grinnan. Crazy Joe was what their cousin Cliff called "an over average man"—tall, husky, and strong, with dark skin, a sharp nose, and so much thick black hair covering his head, arms, back, and neck that he had to shave his whole body in the summer to keep from burning up. They called him Crazy Joe because he was so in love with Henrietta, he'd do anything to get her attention. She was the prettiest girl in Lacks Town, with her beautiful smile and walnut eyes.

The first time Crazy Joe tried to kill himself over Henrietta, he ran circles around her in the middle of winter while she was on her way home from school. He begged her for a date, saying, "Hennie, come on … just give me a chance." When she laughed and said no, Crazy Joe ran and jumped straight through the ice of a frozen pond and refused to come out until she agreed to go out with him.

All the cousins teased Joe, saying, “Maybe he thought that ice water might’a cool him off, but he so hot for her, that water nearly started boiling!” Henrietta’s cousin Sadie, who was Crazy Joe’s sister, yelled at him, “Man you so much in love with a girl, you gonna die for her? That ain’t right.”

No one knew what happened between Henrietta and Crazy Joe, except that there were some dates and some kisses. But Henrietta and Day had been sharing a bedroom since she was four, so what happened next didn’t surprise anyone: they started having children together. Their son Lawrence was born just months after Henrietta’s fourteenth birthday; his sister Lucile Elsie Pleasant came along four years later. They were both born on the floor of the home-house like their father, grandmother, and grandfather before them.

People wouldn’t use words like epilepsy, mental retardation, or neurosyphilis to describe Elsie’s condition until years later. To the folks in Lacks Town, she was just simple. Touched. She came into the world so fast, Day hadn’t even gotten back with the midwife when Elsie shot right out and hit her head on the floor. Everyone would say maybe that was what left her mind like an infant’s.

The old dusty record books from Henrietta’s church are filled with the names of women cast from the congregation for bearing children out of wedlock, but for some reason Henrietta never was, even as rumors floated around Lacks Town that maybe Crazy Joe had fathered one of her children.

When Crazy Joe found out Henrietta was going to marry Day, he stabbed himself in the chest with an old dull pocketknife. His father found him lying drunk in their yard, shirt soaked with blood. He tried to stop the bleeding, but Joe fought him—thrashing and punching—which just made him bleed more. Eventually Joe’s father wrestled him into the car, tied him tight to the door, and drove to the doctor. When Joe got home all bandaged up, Sadie just kept saying, “All that to stop Hennie from marrying Day?” But Crazy Joe wasn’t the only one trying to stop the marriage.

Henrietta’s sister Gladys was always saying Henrietta could do better. When most Lackses talked about Henrietta and Day and their early life in Clover, it sounded as idyllic as a fairy tale. But not Gladys. No one knew why she was so against the marriage. Some folks said Gladys was just jealous because Henrietta was prettier. But Gladys always insisted Day would be a no-good husband.

Henrietta and Day married alone at their preacher’s house on April 10, 1941. She was twenty; he was twenty-five. They didn’t go on a honeymoon because there was too much work to do, and no money for travel. By winter, the United States was at war and tobacco companies were supplying free cigarettes to soldiers, so the market was booming. But as large farms flourished, the small ones struggled. Henrietta and Day were lucky if they sold

enough tobacco each season to feed the family and plant the next crop.

So after their wedding, Day went back to gripping the splintered ends of his old wooden plow as Henrietta followed close behind, pushing a homemade wheelbarrow and dropping tobacco seedlings into holes in the freshly turned red dirt.

Then one afternoon at the end of 1941, their cousin Fred Garret came barreling down the dirt road beside their field. He was just back from Baltimore for a visit in his slick '36 Chevy and fancy clothes. Only a year earlier, Fred and his brother Cliff had been tobacco farmers in Clover too. For extra money, they'd opened a "colored" convenience store where most customers paid in IOUs; they also ran an old cinderblock juke joint where Henrietta often danced on the red-dirt floor. Everybody put coins in the jukebox and drank RC Cola, but the profits never amounted to much. So eventually Fred took his last three dollars and twenty-five cents and bought a bus ticket north for a new life. He, like several other cousins, went to work at Bethlehem Steel's Sparrows Point steel mill and live in Turner Station, a small community of black workers on a peninsula in the Patapsco River, about twenty miles from downtown Baltimore.

In the late 1800s, when Sparrows Point first opened, Turner Station was mostly swamps, farmland, and a few shanties connected with wooden boards for walkways. When demand for steel increased during World War I, streams of white workers moved into the nearby town of Dundalk, and Bethlehem Steel's housing barracks for black workers quickly overflowed, pushing them into Turner Station. By the early years of World War II, Turner Station had a few paved roads, a doctor, a general store, and an ice man. But its residents were still fighting for water, sewage lines, and schools.

Then, in December 1941, Japan bombed Pearl Harbor, and it was like Turner Station had won the lottery: the demand for steel skyrocketed, as did the need for workers. The government poured money into Turner Station, which began filling with one-and two-story housing projects, many of them pressed side by side and back-to-back, some with four to five hundred units. Most were brick, others covered with asbestos shingles. Some had yards, some didn't. From most of them you could see the flames dancing above Sparrows Point's furnaces and the eerie red smoke pouring from its smokestacks.

Sparrows Point was rapidly becoming the largest steel plant in the world. It produced concrete-reinforcing bars, barbed wire, nails, and steel for cars, refrigerators, and military ships. It would burn more than six million tons of coal each year to make up to eight million tons of steel and employ more than 30,000 workers. Bethlehem Steel was a gold mine in a time flush with poverty, especially for black families from the South. Word spread from Maryland to the farms of Virginia and the Carolinas, and as part of what would become known as the Great Migration, black families flocked from the South to Turner Station—the Promised Land.

The work was tough, especially for black men, who got the jobs white men wouldn't touch. Like Fred, black workers usually started in the bowels of partially built tankers in the shipyard, collecting bolts, rivets, and nuts as they fell from the hands of men drilling and welding thirty or forty feet up. Eventually black workers moved up to the boiler room, where they shoveled coal into a blazing furnace. They spent their days breathing in toxic coal dust and asbestos, which they brought home to their wives and daughters, who inhaled it while shaking the men's clothes out for the wash. The black workers at Sparrows Point made about eighty cents an hour at most, usually less. White workers got higher wages, but Fred didn't complain: eighty cents an hour was more than most Lackses had ever seen.

Fred had made it. Now he'd come back to Clover to convince Henrietta and Day that they should do the same. The morning after he came barreling into town, Fred bought Day a bus ticket to Baltimore. They agreed Henrietta would stay behind to care for the children and the tobacco until Day made enough for a house of their own in Baltimore, and three tickets north. A few months later, Fred got a draft notice shipping him overseas. Before he left, Fred gave Day all the money he'd saved, saying it was time to get Henrietta and the children to Turner Station.

Soon, with a child on each side, Henrietta boarded a coal-fueled train from the small wooden depot at the end of Clover's Main Street. She left the tobacco fields of her youth and the hundred-year-old oak tree that shaded her from the sun on so many hot afternoons. At the age of twenty-one, Henrietta stared through the train window at rolling hills and wide-open bodies of water for the first time, heading toward a new life.

The Immortal life of Henrietta Lacks

The Immortal life of Henrietta Lacks

3

Diagnosis and Treatment

A

4

The Birth of HeLa

G

ey's twenty-one-year-old assistant, Mary Kubicek, sat eating a tuna-salad sandwich at a long stone culture bench that doubled as a break table. She and Margaret and the other women in the Gey lab spent countless hours there, all in nearly identical cat-eye-glasses with fat dark frames and thick lenses, their hair pulled back in tight buns.

At first glance, the room could have been an industrial kitchen. There were gallon-sized tin coffee cans full of utensils and glassware; powdered creamer, sugar, spoons, and soda bottles on the table; huge metal freezers lining one wall; and deep sinks Gey made by hand using stones he collected from a nearby quarry. But the teapot sat next to a Bunsen burner, and the freezers were filled with blood, placentas, tumor samples, and dead mice (plus at least one duck Gey kept frozen in the lab for more than twenty years after a hunting trip, since it wouldn't fit in his freezer at home). Gey had lined one wall with cages full of squealing rabbits, rats, and guinea pigs; on one side of the table where Mary sat eating her lunch, he'd built shelves holding cages full of mice, their bodies filled with tumors. Mary always stared at them while she ate, just as she was doing when Gey walked into the lab carrying the pieces of Henrietta's cervix.

"I'm putting a new sample in your cubicle," he told her.

Mary pretended not to notice. Not again, she thought, and kept eating her sandwich. It can wait till I'm done.

Mary knew she shouldn't wait—every moment those cells sat in the dish made it more likely they'd die. But she was tired of cell culture, tired of meticulously cutting away dead tissue like gristle from a steak, tired of having cells die after hours of work.

Why bother? she thought.

G

ey hired Mary for her hands. She was fresh out of college with a physiology degree when her adviser sent her for an interview. Gey asked Mary to pick up a pen from the table and write a few sentences. Now pick up that knife, he said. Cut this piece of paper. Twirl this

pipette.

Mary didn't realize until months later that he'd been studying her hands, checking their dexterity and strength to see how they'd stand up to hours of delicate cutting, scraping, tweezing, and pipetting.

By the time Henrietta walked into Hopkins, Mary was handling most of the tissue samples that came through the door, and so far all samples from TeLinde's patients had died.

At that point, there were many obstacles to growing cells successfully. For starters, no one knew exactly what nutrients they needed to survive, or how best to supply them. Many researchers, including the Geys, had been trying for years to develop the perfect culture medium—the liquid used for feeding cells. The recipes for Gey Culture Medium evolved constantly as George and Margaret added and removed ingredients, searching for the perfect balance. But they all sounded like witches' brews: the plasma of chickens, purée of calf fetuses, special salts, and blood from human umbilical cords. George had rigged a bell and cable from the window of his lab across a courtyard to the Hopkins maternity ward, so nurses could ring anytime a baby was born, and Margaret or Mary would run over and collect umbilical cord blood.

The other ingredients weren't so easy to come by: George visited local slaughterhouses at least once a week to collect cow fetuses and chicken blood. He'd drive there in his rusted-out old Chevy, its left fender flapping against the pavement, shooting sparks. Well before dawn, in a rundown wooden building with a sawdust floor and wide gaps in the walls, Gey would grab a screaming chicken by the legs, yank it upside down from its cage, and wrestle it to its back on a butcher block. He'd hold its feet in one hand and pin its neck motionless to the wood with his elbow. With his free hand, he'd squirt the bird's chest with alcohol, and plunge a syringe needle into the chicken's heart to draw blood. Then he'd stand the bird upright, saying, "Sorry, old fella," and put it back in its cage. Every once in a while, when a chicken dropped dead from the stress, George took it home so Margaret could fry it for dinner.

Like many procedures in their lab, the Gey Chicken Bleeding Technique was Margaret's creation. She worked out the method step-by-step, taught it to George, and wrote detailed instructions for the many other researchers who wanted to learn it.

Finding the perfect medium was an ongoing experiment, but the biggest problem facing cell culture was contamination. Bacteria and a host of other microorganisms could find their way into cultures from people's unwashed hands, their breath, and dust particles floating through the air, and destroy them. But Margaret had been trained as a surgical nurse, which meant sterility was her specialty—it was key to preventing deadly infections in patients in the operating room. Many would later say that Margaret's surgical training was the only reason the Gey lab was able to grow cells at all. Most culturists, like George, were biologists; they knew nothing about preventing contamination.

Margaret taught George everything he knew about keeping cultures sterile, and she did the same with every technician, grad student, and scientist who came to work or study in the lab. She hired a local woman named Minnie whose sole job was washing the laboratory glassware using the only product Margaret would allow: Gold Dust Twins soap. Margaret was so serious about that soap, when she heard a rumor that the company might go out of business, she bought an entire boxcar full of it.

Margaret patrolled the lab, arms crossed, and leaned over Minnie's shoulder as she worked, towering nearly a foot above her. If Margaret ever smiled, no one could have seen it through her ever-present surgical mask. She inspected all the glassware for spots or smudges, and when she found them—which was often—she'd scream, "MINNIE!" so loud that Mary cringed.

Mary followed Margaret's sterilizing rules meticulously to avoid her wrath. After finishing her lunch, and before touching Henrietta's sample, Mary covered herself with a clean white gown, surgical cap, and mask, and then walked to her cubicle, one of four airtight rooms George had built by hand in the center of the lab. The cubicles were small, only five feet in any direction, with doors that sealed like a freezer's to prevent contaminated air from getting inside. Mary turned on the sterilizing system and watched from outside as her cubicle filled with hot steam to kill anything that might damage the cells. When the steam cleared, she stepped inside and sealed the door behind her, then hosed the cubicle's cement floor with water and scoured her workbench with alcohol. The air inside was filtered and piped in though a vent on the ceiling. Once she'd sterilized the cubicle, she lit a Bunsen burner and used its flame to sterilize test tubes and a used scalpel blade, since the Gey lab couldn't afford new ones for each sample.

Only then did she pick up the pieces of Henrietta's cervix—forceps in one hand, scalpel in the other—and carefully slice them into one-millimeter squares. She sucked each square into a pipette, and dropped them one at a time onto chicken-blood clots she'd placed at the bottom of dozens of test tubes. She covered each clot with several drops of culture medium, plugged the tubes with rubber stoppers, and labeled each one as she'd labeled most cultures they grew: using the first two letters of the patient's first and last names.

After writing "HeLa," for Henrietta and Lacks, in big black letters on the side of each tube, Mary carried them to the incubator room that Gey had built just like he'd built everything else in the lab: by hand and mostly from junkyard scraps, a skill he'd learned from a lifetime of making do with nothing.

George Gey was born in 1899 and raised on a Pittsburgh hillside overlooking a steel mill. Soot from the smokestacks made his parents' small white house look like it had been permanently charred by fire and left the afternoon sky dark. His mother worked the garden and fed her family from nothing but the food she raised. As a child, George dug a small coal mine in the hill behind his parents' house. He'd crawl through the damp tunnel each morning with a pick, filling buckets for his family and neighbors so they could keep their houses warm and stoves burning.

Gey paid his way through a biology degree at the University of Pittsburgh by working as a carpenter and mason, and he could make nearly anything for cheap or free. During his second year in medical school, he rigged a microscope with a time-lapse motion picture camera to capture live cells on film. It was a Frankensteinish mishmash of microscope parts, glass, and 16-millimeter camera equipment from who knows where, plus metal scraps, and old motors from Shapiro's junkyard. He built it in a hole he'd blasted in the foundation of Hopkins, right below the morgue, its base entirely underground and surrounded by a thick wall of cork to keep it from jiggling when street cars passed. At night, a Lithuanian lab assistant slept next to the camera on a cot, listening to its constant tick, making sure it stayed stable through the night, waking every hour to refocus it. With that camera, Gey and his mentor, Warren Lewis, filmed the growth of cells, a process so slow—like the growth of a flower—the naked eye couldn't see it. They played the film at high speed so they could watch cell division on the screen in one smooth motion, like a story unfolding in a flip book.

It took Gey eight years to get through medical school because he kept dropping out to work construction and save for another year's tuition. After he graduated, he and Margaret built their first lab in a janitor's quarters at Hopkins—they spent weeks wiring, painting, plumbing, building counters and cabinets, paying for much of it with their own money.

Margaret was cautious and stable, the backbone of the lab. George was an enormous, mischievous, grown-up kid. At work he was dapper, but at home he lived in flannels, khakis, and suspenders. He moved boulders around his yard on weekends, ate twelve ears of corn in one sitting, and kept barrels full of oysters in his garage so he could shuck and eat them anytime he wanted. He had the body of a retired linebacker, six feet four inches tall and 215 pounds, his back unnaturally stiff and upright from having his spine fused so he'd stop throwing it out. When his basement wine-making factory exploded on a Sunday, sending a flood of sparkling burgundy through his garage and into the street, Gey just washed the wine into a storm drain, waving at his neighbors as they walked to church.

Gey was a reckless visionary—spontaneous, quick to start dozens of projects at once, filling the lab and his basement at home with half-built machines, partial discoveries, and piles of junkyard scraps only he could imagine using in a lab. Whenever an idea hit him, he sat wherever he was—at his desk, kitchen table, a bar, or behind the wheel of his car—gnawing on his ever-present cigar and scribbling diagrams on napkins or the backs of torn-off bottle labels. That's how he came up with the roller-tube culturing technique, his most important invention.

It involved a large wooden roller drum, a cylinder with holes for special test tubes called roller tubes. The drum, which Gey called the "whirligig," turned like a cement mixer twenty-four hours a day, rotating so slowly it made only two full turns an hour, sometimes less. For Gey, the rotation was crucial: he believed that culture medium needed to be in constant motion, like blood and fluids in the body, which flow around cells, transporting waste and nutrients.

When Mary finally finished cutting the samples of Henrietta's cervix and dropping them in dozens of roller tubes, she walked into the incubator room, slid the tubes one at a time into the drum, and turned it on. Then she watched as Gey's machine began churning slowly.

H

enrietta spent the next two days in the hospital, recovering from her first radium treatment. Doctors examined her inside and out, pressing on her stomach, inserting new catheters into her bladder, fingers into her vagina and anus, needles into her veins. They wrote notes in her chart saying, "30 year-old colored female lying quietly in no evident distress," and "Patient feels quite well tonight. Morale is good and she is ready to go home."

Before Henrietta left the hospital, a doctor put her feet in the stirrups again and removed the radium. He sent her home with instructions to call the clinic if she had problems, and to come back for a second dose of radium in two and a half weeks.

Meanwhile, each morning after putting Henrietta's cells in culture, Mary started her days with the usual sterilization drill. She peered into the tubes, laughing to herself and thinking, Nothing's happening. Big surprise. Then, two days after Henrietta went home from the hospital, Mary saw what looked like little rings of fried egg white around the clots at the bottoms of each tube. The cells were growing, but Mary didn't think much of it—other cells had survived for a while in the lab.

But Henrietta's cells weren't merely surviving, they were growing with mythological intensity. By the next morning they'd doubled. Mary divided the contents of each tube into two, giving them room to grow, and within twenty-four hours, they'd doubled again. Soon she was dividing them into four tubes, then six. Henrietta's cells grew to fill as much space as Mary gave them.

Still, Gey wasn't ready to celebrate. "The cells could die any minute," he told Mary.

But they didn't. They kept growing like nothing anyone had seen, doubling their numbers every twenty-four hours, stacking hundreds on top of hundreds, accumulating by the millions. "Spreading like crabgrass!" Margaret said. They grew twenty times faster than Henrietta's normal cells, which died only a few days after Mary put them in culture. As long as they had food and warmth, Henrietta's cancer cells seemed unstoppable.

Soon, George told a few of his closest colleagues that he thought his lab might have grown the first immortal human cells.

To which they replied, Can I have some? And George said yes.

12
The Storm

T

here was no obituary for Henrietta Lacks, but word of her death reached the Gey lab quickly. As Henrietta's body cooled in the "colored" freezer, Gey asked her doctors if they'd do an autopsy. Tissue culturists around the world had been trying to create a library of immortal cells like Henrietta's, and Gey wanted samples from as many organs in her body as possible, to see if they'd grow like HeLa. But to get those samples after her death, someone would have to ask Henrietta's husband for permission.

Though no law or code of ethics required doctors to ask permission before taking tissue from a living patient, the law made it very clear that performing an autopsy or removing tissue from the dead without permission was illegal.

The way Day remembers it, someone from Hopkins called to tell him Henrietta had died, and to ask permission for an autopsy, and Day said no. A few hours later, when Day went to Hopkins with a cousin to see Henrietta's body and sign some papers, the doctors asked again about the autopsy. They said they wanted to run tests that might help his children someday. Day's cousin said it wouldn't hurt, so eventually Day agreed and signed an autopsy permission form.

Soon Henrietta's body lay on a stainless-steel table in the cavernous basement morgue, and Gey's assistant, Mary, stood in the doorway breathing fast, feeling like she might faint. She'd never seen a dead body. Now there she was with a corpse, a stack of petridishes, and the pathologist, Dr. Wilbur, who stood hunched over the autopsy table. Henrietta's arms were extended, as if she were reaching above her head. Mary walked toward the table, whispering to herself, You're not going to make a fool of yourself and pass out.

She stepped around one of Henrietta's arms and took her place beside Wilbur, her hip in Henrietta's armpit. He said hello, Mary said hello back. Then they were silent. Day wanted Henrietta to be presentable for the funeral, so he'd only given permission for a partial autopsy, which meant no incision into her chest and no removal of her limbs or head. Mary opened the

dishes one by one, holding them out to collect samples as Wilbur cut them from Henrietta's body: bladder, bowel, uterus, kidney, vagina, ovary, appendix, liver, heart, lungs. After dropping each sample into a petridish, Wilbur put bits of Henrietta's tumor-covered cervix into containers filled with formal dehyde to save them for future use.

The official cause of Henrietta's death was terminal uremia: blood poisoning from the buildup of toxins normally flushed out of the body in urine. The tumors had completely blocked her urethra, leaving her doctors unable to pass a catheter into her bladder to empty it. Tumors the size of baseballs had nearly replaced her kidneys, bladder, ovaries, and uterus. And her other organs were so covered in small white tumors it looked as if someone had filled her with pearls.

Mary stood beside Wilbur, waiting as he sewed Henrietta's abdomen closed. She wanted to run out of the morgue and back to the lab, but instead, she stared at Henrietta's arms and legs—anything to avoid looking into her lifeless eyes. Then Mary's gaze fell on Henrietta's feet, and she gasped: Henrietta's toenails were covered in chipped bright red polish.

"When I saw those toenails," Mary told me years later, "I nearly fainted. I thought, Oh jeez, she's a real person. I started imagining her sitting in her bathroom painting those toenails, and it hit me for the first time that those cells we'd been working with all this time and sending all over the world, they came from a live woman. I'd never thought of it that way."

A

few days later, Henrietta's body made the long, winding train ride from Baltimore to Clover in a plain pine box, which was all Day could afford. It was raining when the local undertaker met Henrietta's coffin at the Clover depot and slid it into the back of a rusted truck. He rolled through downtown Clover, past the hardware store where Henrietta used to watch old white men play checkers, and onto Lacks Town Road, turning just before The Shack, where she'd danced only a few months earlier. As the undertaker drove into Lacks Town, cousins filed onto porches to watch Henrietta pass, their hands on hips or clutching children as they shook their heads and whispered to the Lord.

Cootie shuffled into his yard, looked straight into the falling rain, and yelled, "Sweet Jesus, let that poor woman rest, you hear me? She had enough!"

Amens echoed from a nearby porch.

A quarter-mile down the road, Gladys and Sadie sat on the broken wooden steps of the home-house, a long pink dress draped across their laps and a basket at their feet filled with

makeup, curlers, red nail polish, and the two pennies they'd rest on Henrietta's eyes to keep them closed for the viewing. They watched silently as the undertaker inched through the field between the road and the house, his tires sinking into puddles of red mud.

Cliff and Fred stood in the graveyard behind the house, their over alls drenched and heavy with rain. They'd spent most of the day thrusting shovels into the rocky cemetery ground, digging a grave for Henrietta. They dug in one spot, then another, moving each time their shovels hit the coffins of unknown relatives buried with no markers. Eventually they found an empty spot for Henrietta near her mother's tombstone.

When Cliff and Fred heard the undertaker's truck, they walked toward the home-house to help unload Henrietta. When they got her into the hallway, they opened the pine box, and Sadie began to cry. What got her most wasn't the sight of Henrietta's lifeless body, it was her toenails: Henrietta would rather have died than let her polish get all chipped like that.

"Lord," Sadie said. "Hennie must a hurt somethin worse than death."

For several days, Henrietta's corpse lay in the hallway of the home-house, doors propped open at each end to let in the cool wet breeze that would keep her body fresh. Family and neighbors waded through the field to pay respects, and all the while, the rain kept coming.

The morning of Henrietta's funeral, Day walked through the mud with Deborah, Joe, Sonny, and Lawrence. But not Elsie. She was still in Crownsville and didn't even know her mother had died.

The Lacks cousins don't remember much about the service—they figure there were some words, probably a song or two. But they all remember what happened next. As Cliff and Fred lowered Henrietta's coffin into her grave and began covering her with handfuls of dirt, the sky turned black as strap molasses. The rain fell thick and fast. Then came long rumbling thunder, screams from the babies, and a blast of wind so strong it tore the metal roof off the barn below the cemetery and sent it flying through the air above Henrietta's grave, its long metal slopes flapping like the wings of a giant silver bird. The wind caused fires that burned tobacco fields. It ripped trees from the ground, blew power lines out for miles, and tore one Lacks cousin's wooden cabin clear out of the ground, threw him from the living room into his garden, then landed on top of him, killing him instantly.

Years later, when Henrietta's cousin Peter looked back on that day, he just shook his bald head and laughed: "Hennie never was what you'd call a beatin-around-the-bush woman," he said. "We shoulda knew she was tryin to tell us somethin with that storm."

The Immortal life of Henrietta Lacks

13
The HeLa Factory

Not long after Henrietta's death, planning began for a HeLa factory—a massive operation that would grow to produce trillions of HeLa cells each week. It was built for one reason: to help stop polio.

By the end of 1951 the world was in the midst of the biggest polio epidemic in history. Schools closed, parents panicked, and the public grew desperate for a vaccine. In February 1952, Jonas Salk at the University of Pittsburgh announced that he'd developed the world's first polio vaccine, but he couldn't begin offering it to children until he'd tested it on a large scale to prove it was safe and effective. And doing that would require culturing cells on an enormous, industrial scale, which no one had done before.

The National Foundation for Infantile Paralysis (NFIP)—a charity created by President Franklin Delano Roosevelt, who'd himself been paralyzed by polio—began organizing the largest field trial ever conducted to test the polio vaccine. Salk would inoculate 2 million children and the NFIP would test their blood to see if they'd become immune. But doing this would require millions of neutralization tests, which involved mixing blood serum from newly vaccinated children with live poliovirus and cells in culture. If the vaccine worked, the serum from a vaccinated child's blood would block the poliovirus and protect the cells. If it didn't work, the virus would infect the cells, causing damage scientists could see using a microscope.

The trouble was, at that point, the cells used in neutralization tests came from monkeys, which were killed in the process. This was a problem, not because of concern for animal welfare—which wasn't the issue then that it is today—but because monkeys were expensive. Doing millions of neutralization tests using monkey cells would cost millions of dollars. So the NFIP went into overdrive looking for a cultured cell that could grow on a massive scale and would be cheaper than using monkeys.

The NFIP turned to Gey and a few other cell culture experts for help, and Gey recognized the opportunity as a gold mine for the field. The NFIP's March of Dimes was bringing in an average of $ 50 million in donations each year, and its director wanted to give much of that money to cell culturists so they could find a way to mass-produce cells, which they'd been wanting to do for years anyway.

The timing was perfect: by chance, soon after the NFIP contacted Gey for help, he realized that Henrietta's cells grew unlike any human cells he'd seen.

Most cells in culture grew in a single layer in a clot on a glass surface, which meant they ran out of space quickly. Increasing their numbers was labor-intensive: scientists had to repeatedly scrape the cells from one tube and split them into new ones to give them more space. HeLa cells, it turned out, weren't picky—they didn't need a glass surface in order to grow. They could grow floating in a culture medium that was constantly stirred by a magnetic device, an important technique Gey developed, now called growing in suspension. This meant that HeLa cells weren't limited by space in the same way other cells were; they could simply divide until they ran out of culture medium. The bigger the vat of medium, the more the cells grew. This discovery meant that if HeLa was susceptible to poliovirus, which not all cells were, it would solve the mass-production problem and make it possible to test the vaccine without millions of monkey cells.

So in April 1952, Gey and one of his colleagues from the NFIP advisory committee—William Scherer, a young postdoctoral fellow at the University of Minnesota—tried infecting Henrietta's cells with poliovirus. Within days they found that HeLa was, in fact, more susceptible to the virus than any cultured cells had ever been. When they realized this, they knew they'd found exactly what the NFIP was looking for.

They also knew that, before mass-producing any cells, they'd need to find a new way to ship them. Gey's air freight shipping system worked fine for sending a few cells to colleagues here and there, but it was too expensive for shipping on a massive scale. And growing cells by the billions wouldn't help anyone if they couldn't get those cells where they needed to go. So they began experimenting.

On Memorial Day 1952, Gey gathered a handful of tubes containing HeLa cells and enough media for them to survive for a few days, and packed them into a tin lined with cork and filled with ice to prevent overheating. Then he typed up careful instructions for feeding and handling, and sent Mary to the post office to ship them to Scherer in Minnesota. Every post office in Baltimore was closed for the holiday except the main branch downtown. Mary had to take several trolleys to get there, but she made it. And so did the cells: When the package arrived in Minneapolis about four days later, Scherer put the cells in an incubator and they began to grow. It was the first time live cells had ever been successfully shipped in the

mail.

In the coming months—to test different delivery methods, and make sure the cells could survive long trips in any climate—Gey and Scherer sent tubes of HeLa cells around the country by plane, train, and truck, from Minneapolis to Norwich to New York and back again. Only one tube died.

When the NFIP heard the news that HeLa was susceptible to polio virus and could grow in large quantities for little money, it immediately contracted William Scherer to oversee development of a HeLa Distribution Center at the Tuskegee Institute, one of the most prestigious black universities in the country. The NFIP chose the Tuskegee Institute for the project because of Charles Bynum, director of "Negro Activities" for the foundation. Bynum—a science teacher and civil rights activist who was the first black foundation executive in the country—wanted the center to be located at Tuskegee because it would provide hundreds of thousands of dollars in funding, many jobs, and training opportunities for young black scientists.

In just a few months, a staff of six black scientists and technicians built a factory at Tuskegee unlike any seen before. Its walls were lined with industrial steel autoclaves for steam sterilizing; row upon row of enormous, mechanically stirred vats of culture medium; incubators; glass culturing bottles stacked on their sides; and automatic cell dispensers—tall contraptions with long, thin metal arms that squirted HeLa cells into one test tube after another. The Tuskegee team mixed thousands of liters of Gey culture medium each week, using salts, minerals, and serum they collected from the many students, soldiers, and cotton farmers who responded to ads in the local paper seeking blood in exchange for money.

Several technicians served as a quality-control assembly line, staring through microscopes at hundreds of thousands of HeLa cultures each week, making sure the samples were alive and healthy. Others shipped them on a rigid schedule to researchers at twenty-three polio-testing centers around the country.

Eventually, the Tuskegee staff grew to thirty-five scientists and technicians, who produced twenty thousand tubes of HeLa—about 6 trillion cells—every week. It was the first-ever cell production factory, and it started with a single vial of HeLa that Gey had sent Scherer in their first shipping experiment, not long after Henrietta's death.

With those cells, scientists helped prove the Salk vaccine effective. Soon the New York Times would run pictures of black women hunched over microscopes examining cells, black hands holding vials of HeLa, and this headline:

UNIT AT TUSKEGEE HELPS POLIO FIGHT

Corps of Negro Scientists Has Key Role in Evaluating of Dr. Salk's Vaccine

HELA CELLS ARE GROWN

Black scientists and technicians, many of them women, used cells from a black woman to help save the lives of millions of Americans, most of them white. And they did so on the same campus—and at the very same time—that state officials were conducting the infamous Tuskegee syphilis studies.

A

t first the Tuskegee Center supplied HeLa cells only to polio testing labs. But when it became clear that there was no risk of a HeLa shortage, they began sending the cells to any scientist interested in buying them, for ten dollars plus Air Express fees. If researchers wanted to figure out how cells behaved in a certain environment, or reacted to a specific chemical, or produced a certain protein, they turned to Henrietta's cells. They did that because, despite being cancerous, HeLa still shared many basic characteristics with normal cells: They produced proteins and communicated with one another like normal cells, they divided and generated energy, they expressed genes and regulated them, and they were susceptible to infections, which made them an optimal tool for synthesizing and studying any number of things in culture, including bacteria, hormones, proteins, and especially viruses.

Viruses reproduce by injecting bits of their genetic material into a living cell, essentially reprogramming the cell so it reproduces the virus instead of itself. When it came to growing viruses—as with many other things—the fact that HeLa was malignant just made it more useful. HeLa cells grew much faster than normal cells, and therefore produced results faster. HeLa was a workhorse: it was hardy, it was inexpensive, and it was everywhere.

And the timing was perfect. In the early fifties, scientists were just beginning to understand viruses, so as Henrietta's cells arrived in labs around the country, researchers began expos-

ing them to viruses of all kinds—herpes, measles, mumps, fowl pox, equine encephalitis—to study how each one entered cells, reproduced, and spread.

Henrietta's cells helped launch the fledgling field of virology, but that was just the beginning. In the years following Henrietta's death, using some of the first tubes of her cells, researchers around the world made several important scientific advances in quick succession. First, a group of researchers used HeLa to develop methods for freezing cells without harming or changing them. This made it possible to send cells around the world using the already-standardized method for shipping frozen foods and frozen sperm for breeding cattle. It also meant researchers could store cells between experiments without worrying about keeping them fed and sterile. But what excited scientists most was that freezing gave them a means to suspend cells in various states of being.

Freezing a cell was like pressing a pause button: cell division, metabolism, and everything else simply stopped, then resumed after thawing as if you'd just pressed play again. Scientists could now pause cells at various intervals during an experiment so they could compare how certain cells reacted to a specific drug one week, then two, then six after exposure. They could look at identical cells at different points in time, to study how they changed with age. And by freezing cells at various points, they believed they could see the actual moment when a normal cell growing in culture became malignant, a phenomenon they called spontaneous transformation.

Freezing was just the first of several dramatic improvements HeLa helped bring to the field of tissue culture. One of the biggest was the standardization of the field, which, at that point, was a bit of a mess. Gey and his colleagues had been complaining that they wasted too much time just making medium and trying to keep cells alive. But more than anything, they worried that since everyone was using different media ingredients, recipes, cells, and techniques, and few knew their peers' methods, it would be difficult, if not impossible, to replicate one another's experiments. And replication is an essential part of science: a discovery isn't considered valid if others can't repeat the work and get the same result. Without standardized materials and methods, they worried that the field of tissue culture would stagnate.

Gey and several colleagues had already organized a committee to develop procedures to "simplify and standardize the technique of tissue culturing." They'd also convinced two fledgling biological supply companies—Microbiological Associates and Difco Laboratories—to begin producing and selling ingredients for culture media, and taught them the techniques necessary to do so. Those companies had just started selling media ingredients, but cell culturists still had to make the media themselves, and they all used different recipes.

Standardization of the field wasn't possible until several things happened: first, Tuskegee began mass-producing HeLa; second, a researcher named Harry Eagle at the National Insti-

tutes of Health (NIH) used HeLa to develop the first standardized culture medium that could be made by the gallon and shipped ready to use; and, third, Gey and several others used HeLa to determine which glassware and test-tube stoppers were least toxic to cells.

Only then, for the first time, could researchers around the world work with the same cells, growing in the same media, using the same equipment, all of which they could buy and have delivered to their labs. And soon they'd even be able to use the first-ever clones of human cells, something they'd been working toward for years.

Today, when we hear the word clone, we imagine scientists creating entire living animals—like Dolly the famous cloned sheep—using DNA from one parent. But before the cloning of whole animals, there was the cloning of individual cells—Henrietta's cells.

To understand why cellular cloning was important, you need to know two things: First, HeLa didn't grow from one of Henrietta's cells. It grew from a sliver of her tumor, which was a cluster of cells. Second, cells often behave differently, even if they're all from the same sample, which means some grow faster than others, some produce more poliovirus, and some are resistant to certain antibiotics. Scientists wanted to grow cellular clones—lines of cells descended from individual cells—so they could harness those unique traits. With HeLa, a group of scientists in Colorado succeeded, and soon the world of science had not only HeLa but also its hundreds, then thousands, of clones.

The early cell culture and cloning technology developed using HeLa helped lead to many later advances that required the ability to grow single cells in culture, including isolating stem cells, cloning whole animals, and in vitro fertilization. Meanwhile, as the standard human cell in most labs, HeLa was also being used in research that would advance the new field of human genetics.

Researchers had long believed that human cells contained forty-eight chromosomes, the threads of DNA inside cells that contain all of our genetic information. But chromosomes clumped together, making it impossible to get an accurate count. Then, in 1953, a geneticist in Texas accidentally mixed the wrong liquid with HeLa and a few other cells, and it turned out to be a fortunate mistake. The chromosomes inside the cells swelled and spread out, and for the first time, scientists could see each of them clearly. That accidental discovery was the first of several developments that would allow two researchers from Spain and Sweden to discover that normal human cells have forty-six chromosomes.

Once scientists knew how many chromosomes people were supposed to have, they could tell when a person had too many or too few, which made it possible to diagnose genetic diseases. Researchers worldwide would soon begin identifying chromosomal disorders, discovering that patients with Down syndrome had an extra chromosome number 21, patients with Klinefelter syndrome had an extra sex chromosome, and those with Turner syndrome lacked

all or part of one.

With all the new developments, demand for HeLa grew, and Tuskegee wasn't big enough to keep up. The owner of Microbiological Associates—a military man named Samuel Reader—knew nothing about science, but his business partner, Monroe Vincent, was a researcher who understood the potential market for cells. Many scientists needed cells, but few had the time or ability to grow them in large enough quantities. They just wanted to buy them. So together, Reader and Vincent used HeLa cells as the springboard to launch the first industrial-scale, for-profit cell distribution center.

It started with what Reader lovingly referred to as his Cell Factory. In Bethesda, Maryland, in the middle of a wide-open warehouse that was once a Fritos factory, he built a glass-enclosed room that housed a rotating conveyor belt with hundreds of test-tube holders built into it. Outside the glass room, he had a setup much like Tuskegee's, with massive vats of culture medium, only bigger. When cells were ready for shipping, he'd sound a loud bell and all workers in the building, including the mailroom clerks, would stop what they were doing, scrub themselves at the sterilization station, grab a cap and gown, and line up at the conveyor belt. Some filled tubes, others inserted rubber stoppers, sealed tubes, or stacked them inside a walk-in incubator where they stayed until being packaged for shipping.

Microbiological Associates' biggest customers were labs like NIH, which had standing orders for millions of HeLa cells delivered on set schedules. But scientists all over the world could call in orders, pay less than fifty dollars, and Microbiological Associates would overnight them vials of HeLa cells. Reader had contracts with several major airlines, so whenever he got an order, he'd send a courier with cells to catch the next flight out, then have the cells picked up from the airport and delivered to labs by taxi. Slowly, a multibillion-dollar industry selling human biological materials was born.

Reader recruited the top minds in the field to tell him what products they needed most and show him how to make them. One of the scientists who consulted for Reader was Leonard Hayflick, arguably the most famous early cell culturist left in the field today. When I talked with him he said, "Microbiological Associates and Sam Reader were an absolute revolution in the field, and I'm not one to use the word revolution lightly."

As Reader's business grew, demand for cells from Tuskegee plummeted. The NFIP closed its HeLa production center because places like Microbiological Associates now supplied scientists with all the cells they needed. And soon, HeLa cells weren't the only ones being bought and sold for research—with media and equipment standardization, culturing became easier, and researchers began growing cells of all kinds. But none grew in quantities like HeLa.

As the Cold War escalated, some scientists exposed Henrietta's cells to massive doses of radiation to study how nuclear bombs destroyed cells and find ways to reverse that damage. Others put them in special centrifuges that spun so fast the pressure inside was more than 100,000 times that of gravity, to see what happened to human cells under the extreme conditions of deep-sea diving or spaceflight.

The possibilities seemed endless. At one point, a health-education director at the Young Women's Christian Association heard about tissue culture and wrote a letter to a group of researchers saying she hoped they'd be able to use it to help the YWCA's older women. "They complain that the skin and tissues of the face and neck inevitably show the wear and tear of years," she wrote. "My thought was that if you know how to keep tissue alive there must be some way of equalizing the reserve supply to the area of the throat and face."

Henrietta's cells couldn't help bring youth to women's necks, but cosmetic and pharmaceutical companies throughout the United States and Europe began using them instead of laboratory animals to test whether new products and drugs caused cellular damage. Scientists cut HeLa cells in half to show that cells could live on after their nuclei had been removed, and used them to develop methods for injecting sub stances into cells without destroying them. They used HeLa to test the effects of steroids, chemotherapy drugs, hormones, vitamins, and environmental stress; they infected them with tuberculosis, salmonella, and the bacterium that causes vaginitis.

At the request of the U.S. government, Gey took Henrietta's cells with him to the Far East in 1953 to study hemorrhagic fever, which was killing American troops. He also injected them into rats to see if they'd cause cancer. But mostly he tried to move on from HeLa, focusing instead on growing normal and cancerous cells from the same patient, so he could compare them to each other. But he couldn't escape the seemingly endless questions about HeLa and cell culture from other scientists. Researchers came to his lab several times each week wanting to learn his techniques, and he often traveled to labs around the world to help set up cell-culture facilities.

Many of Gey's colleagues pressured him to publish research papers so he could get credit for his work, but he always said he was too busy. At home he regularly stayed up all night to work. He applied for extensions on grants, often took months to answer letters, and at one point continued to pay a dead employee's salary for three months before anyone noticed. It took a year of nagging from Mary and Margaret for George to publish anything about growing HeLa; in the end, he wrote a short abstract for a conference, and Margaret submitted it for publication. After that, she regularly wrote and submitted his work for him.

By the mid-fifties, as more scientists began working with tissue culture, Gey became weary. He wrote to friends and colleagues saying, "Someone should coin a contemporary

phrase and say, at least for the moment, 'The world has gone nuts over tissue culture and its possibilities.' I hope that some of this hullabaloo over tissue culture has at least had a few good points which have helped others … I wish for the most part, however, that things would settle down a bit."

Gey was annoyed by the widespread fixation on HeLa. After all, there were other cells to work with, including some he'd grown himself: A.Fi. and D-i Re, each named after the patient it came from. He regularly offered them to scientists, but they were harder to culture, so they never took off like Henrietta's cells. Gey was relieved that companies had taken over HeLa distribution so that he didn't have to do it himself, but he didn't like the fact that HeLa was now completely out of his control.

Since the launch of the HeLa production factory at Tuskegee, Gey had been writing a steady stream of letters to other scientists, trying to restrict the way they used Henrietta's cells. At one point he wrote his longtime friend and colleague Charles Pomerat, lamenting the fact that others, including some in Pomerat's lab, were using HeLa for research Gey was "most capable" of doing himself, and in some cases had already done, but not yet published. Pomerat replied:

With regard to your … disapproval for a wide exploration of the HeLa strain, I don't see how you can hope to inhibit progress in this direction since you released the strain so widely that it now can be purchased commercially This is a little bit like requesting people not to work on the golden hamster! … I realize that it is the goodness of your heart that made available the HeLa cell and therefore why you now find that everybody wants to get into the act.

Pomerat suggested that Gey should have finished his own HeLa research before "releasing [HeLa] to the general public since once released it becomes general scientific property."

But Gey hadn't done that. And as soon as HeLa became "general scientific property," people started wondering about the woman behind the cells.

The Immortal life of Henrietta Lacks