

## Text excerpts from *Hidden Figures*

### Mobilization

There was no escaping the heat during the summer of 1943, especially for the African-American women working in Camp Pickett's laundry boiler plant. Camp Pickett was an army training center in central Virginia that processed eighteen thousand bundles of laundry each week. Inside the facility, the heat and humidity were so intense that the workers stepped outdoors into the 100-plus-degree summer heat to get relief.

The job at the plant was hard work. Some of the women loaded the soldier's dirty laundry into the boilers. Others heaved the sopping clothes into the dryers. Another team worked the pressing machines, like cooks at a giant griddle. The laundry workers existed at the bottom of the war's great pyramid of employees. They earned forty cents an hour—among the lowest wages of all war workers—but for women with few employment options, even that modest sum felt like a windfall.

Dorothy Vaughan considered applying for a job at the laundry. The thirty-two-year-old taught math at the black high school in Farmville, Virginia, about thirty miles from Camp Pickett. Her family was better off financially than many others—her husband's parents owned a barbershop, a pool hall, and a service station in town—but Dorothy wanted to find a job to earn extra money. While teaching offered status, it didn't pay well. Virginia's white public school teachers earned some of the lowest salaries in the United States, and black teachers in Virginia earned 50 percent less than that. Dorothy could earn twice her teacher's salary by working at the laundry.

Some women with Dorothy's education might have seen taking the laundry job as an unthinkable choice. Wasn't the purpose of a college degree to get away from dirty and difficult work? In addition, the camp was far enough away from Farmville that Dorothy would have to live in employee housing during the week and only go home on weekends.

But Dorothy didn't care. She would do whatever was necessary to save enough money so that her four children might be able to get the best education possible. She knew that schooling was the best way to prepare her children to live in a world that would require more of them than white children, and attempt to give them less in return.

## Dorothy Vaughan's Childhood

Dorothy Vaughan was born in Kansas City, Missouri, in 1910. Her mother died when Dorothy was two years old, and her father remarried a few years later. Dorothy's stepmother encouraged her to succeed, teaching her how to read before she was old enough to start school. The family moved to West Virginia when Dorothy was eight.

Dorothy studied hard and became valedictorian of her high school class. She earned a full scholarship to Wilberforce University, the country's oldest private black college, located near Xenia, Ohio. The African Methodist Episcopal Sunday School Convention of West Virginia sponsored the scholarship.

At Wilberforce, Dorothy majored in math. She earned good grades, and one of her professors recommended her for graduate study in mathematics at Howard University, in Washington, DC. At the time, with the Depression still affecting the country, Dorothy's parents struggled to make enough money to support the family. Dorothy decided to turn down graduate school in order to take a job; the money she earned would contribute to her family's household and improve the chances that her younger sister might be able to follow her path to college. Dorothy looked for work as a teacher, the most stable career at the time for black women with a college degree.

After graduation in 1929, Dorothy taught math and English at a black school in rural Tamms, Illinois, a region that depended on cotton farming. That year the Depression caused a collapse in cotton prices that hit the area so hard that the local school board closed Dorothy's school, leaving no public education available for African-American students. Dorothy was forced to look for work again, and she found another teaching job at a school in coastal North Carolina. But things weren't any better there. That school also ran out of money in the middle of the year. Dorothy returned home and worked as a waitress at a hotel until 1931, when she took a job teaching in Farmville, Virginia.

It was in Farmville that Dorothy met Howard Vaughan, a tall, charismatic bachelor who worked as a bellman at various luxury hotels. Howard traveled south to hotels in Florida in the winter and north to hotels in upstate New York and Vermont in the summer. In between jobs, he always returned to Farmville, where his family lived.

Dorothy and Howard fell in love, married, and settled in Farmville. She attended Beulah African Methodist Episcopal Church with her family and played piano on Sunday mornings. She had found steady work and a fulfilling life in the small town. But then World War II started, bringing with it more job opportunities and the hope for even better times ahead.

## War Work

In the early 1940s, the United States government spread the word far and wide that it was hiring. Bulletins listing civil service jobs—nonmilitary government jobs—plastered the walls at local post offices. And it was on a trip to the Farmville post office during the spring of 1943 that Dorothy saw a notice for the laundry job at Camp Pickett. But as she glanced over the other bulletins, the word “mathematics” caught her eye. She looked more closely and learned that a federal agency in Hampton, Virginia, was looking for women to fill a number of mathematical jobs at a facility specializing in the development of airplanes.

Dorothy assumed the bulletin was meant for the eyes of the white, well-to-do students at the all-female State Teachers College in Farmville. It never occurred to her that the Langley Memorial Aeronautical Laboratory would accept an application from an African-American woman.

But during World War II, the United States asked for help from all its citizens. Workers—black, white, and from every other ethnic background, women as well as men—were needed, and black newspapers spread the word about war jobs.

In the first week of May 1943, the *Norfolk Journal and Guide* published an article that caught Dorothy's eye. “Paving the Way for Women Engineers,” read the headline. The accompanying photo showed eleven well-dressed African-American women in front of Hampton Institute's Bemis Laboratory, graduates of Engineering for Women, a war training class. Maybe there were opportunities for African-American women who loved numbers. Dorothy decided to fill out an application.

## Jobs, Good Jobs, and Very Good Jobs

In Dorothy Vaughan's world, there were black jobs, and there were *good* black jobs. Sorting laundry, making beds in white people's houses, working in tobacco plants—those were black jobs.

Owning a barbershop or a small business, working in the post office or on the railroad—those were *good* black jobs.

Being a teacher or a preacher, a doctor or a lawyer—those were *very good* black jobs.

But the job at the aeronautical laboratory was something entirely new, something so unusual it hadn't been dreamed of yet. It was an opportunity that had the potential to change the future of Dorothy's family. Even if the war ended in six months or a year, earning a much higher salary for that brief time could help her save money for her children's education.

That spring, Dorothy Vaughan filled out and mailed two job applications, one to work at the Camp Pickett laundry and one to work as a mathematician at Langley. The application for the laundry job was straightforward. There was such demand for laundry workers that she couldn't imagine not being hired.

The other application asked for Dorothy's work history, references, schools attended, languages spoken. One question asked: "How soon could you be ready to start work?"

She filled in the blank: *48 hours*.

If she got a chance, she could be ready to go in forty-eight hours. Because a chance like that might never come around again.

## The “Colored” Computers

On her first day of work at Langley, Dorothy Vaughan spent the morning in the personnel department filling out paperwork. As part of her orientation, she held up her right hand and swore the United States civil service oath of office: “I, Dorothy Vaughan, do solemnly swear that I will support and defend the Constitution of the United States against all enemies, foreign and domestic. . . .”

She took the pledge seriously, but it was her identification badge that made her feel like an official employee. The badge—a blue metal circle featuring an image of her face with the winged NACA logo on either side—granted her access to the various facilities at the Langley Laboratory.

Since its establishment in 1917, the Langley Memorial Aeronautical Laboratory’s operations had been concentrated on the campus of Langley Field, an Army Air Corps base located on the eastern bank of Hampton’s Back River. The Service Building, where Dorothy went through orientation, was one of the oldest buildings on the field. Year after year, the number of buildings had grown, until the laboratory decided to expand to the area on the western side of the river. That land was still a forest when the construction began, and employees joked about having to work in such a remote place. The weekly Langley employee newsletter *Air Scoop* described it as a “land of desolation, a land of marshes and mosquitoes.”

After Dorothy finished the morning’s paperwork, she boarded a campus shuttle that drove her to the end of a forested back road connecting the East Side of the Langley campus with the West Side. She looked around at the strange landscape of two-story brick offices and construction sites with half-finished buildings. Towering behind one of the buildings was a gigantic three-story-high ribbed-metal pipe. It was part of a wind tunnel called the Sixteen-Foot High-Speed Tunnel, which was used for experiments on airplanes. To make the scene even more unusual, all of the buildings had been painted dark green to camouflage them against possible attacks from America’s wartime enemies.

The shuttle bus stopped to let Dorothy off at the front door of an office building called the Warehouse Building. She went inside and found rooms filled with desks arranged classroom style. There were office-bright ceiling lights and narrow windows that looked out over the construction going on outside. From inside the rooms, Dorothy heard a new, unfamiliar sound: the steady beat of mechanical calculating machines, so big they each took up an entire desktop. It was like listening to a parade of drums: each time a click when a number was entered, a drumbeat when the operations key was hit, and a full drumroll when the machine ran through a complex calculation.

The same scene and the same sounds played in all the rooms where the women were working. Women were performing the same work at a similar place on the East Side. The only difference between the East Computers and the West Computers was obvious: all of the women sitting at the desks in Dorothy’s work space were black.

## Take a Seat

The room for the West Area computing pool was set up for about twenty workers. As members of a pool, each woman had to be ready to work on any mathematical assignment that came through the door. Because the engineering problems that the Langley Laboratory worked on were so complex, the problems had to be broken down into smaller parts, with each part assigned to a different woman.

Dorothy Vaughan took a seat, and the women welcomed her. Most had graduated from black colleges like Hampton Institute, the Virginia State College for Negroes, or Arkansas Agricultural, Mechanical & Normal College. Many of the women had years of teaching experience; others were starting their first jobs, just out of college.

Quite a few of the women belonged to the same civic organizations, churches, and Greek letter organizations, such as Alpha Kappa Alpha or Delta Sigma Theta. Dorothy realized that by working in Langley's West Computing section, she was in one of the world's most exclusive groups. In 1940, just 2 percent of all black women earned college degrees, and 60 percent of those women became teachers, most in public elementary and high schools. At a time when just 10 percent of white women and not even a third of white men had earned college degrees, the West Computers had found jobs at the "single best and biggest aeronautical research complex in the world."

At the front of the room, like teachers in a classroom, sat two white women, the West Computing section head and her assistant. The work that came to a particular section usually flowed from the top of the pyramid down: engineers came to the head of the entire computing operation, who handed down tasks to each section head, who then divided up the work among the women in her section. Over time, some of the engineers developed favorites and brought assignments directly to the section head or even to a particular human computer.

Dorothy was a welcome addition to the computer pool. The women had too much work to do in too little time. The National Advisory Committee for Aeronautics planned to double the size of Langley's West Area in the next three years. When Dorothy arrived, the agency was scrambling to keep up with the American aircraft industry, which had gone from the country's forty-third largest industry in 1938 to the world's number one by 1943.

## Trouble in the Lunchroom

In the middle of the day, the women of West Computing walked as a group over to the cafeteria. Langley was so crowded that each team had a designated thirty-minute window for lunch, just enough time for a quick meal and a little conversation.

Most groups sat together out of habit. For Dorothy and the West Computers, segregated seating was required. The women of West Computing were the only black women professionals at the laboratory, not exactly excluded but not quite included, either. A white cardboard sign on a table in the back of the cafeteria said "Colored Computers" in crisply stenciled black letters. It was the only sign in the cafeteria; no other group needed assigned seating.

This kind of racial insult was all too common. It was the kind of subtle jab that African Americans had learned to tolerate, if not accept, in order to function in their daily lives. The women probably expected it, but in the environment of the laboratory, a place that had chosen them for their intellectual talents, the sign seemed particularly offensive.

At first, the women tried to ignore the sign. They pushed it aside and tried to pretend it wasn't there. In the office, the women felt equal, but in the cafeteria and the bathrooms, the "Colored" signs were a reminder that some were more equal than others.

A mathematician named Miriam Mann finally decided she didn't want to look at that cafeteria sign anymore. Not even five feet tall, her feet just grazing the floor when she sat down, Miriam had a huge personality. Dorothy and the other West Computers watched as Miriam slipped the sign into her purse. Her small act of defiance made them all feel a bit anxious but also empowered.

But the next day, the sign reappeared.

Miriam removed it again.

This happened again and again for weeks. Sometimes the sign disappeared for a few days or a week—sometimes longer—but each time it was eventually replaced with an identical twin.

As the sign drama played itself out in the Langley cafeteria, an important civil rights case was playing out in the courts. Irene Morgan, an employee at the Baltimore-based aircraft manufacturer Glenn L. Martin Company, worked on an airplane production line. In the summer of 1944, Morgan traveled on the Greyhound bus to her hometown in Gloucester County, Virginia, next door to Hampton. On the return trip she was arrested because she refused to move to the back of the bus. The NAACP Legal Defense Fund defended Morgan, and in 1946, the US Supreme Court ruled in *Morgan v. Virginia* that segregation on interstate buses was illegal.

What were the women at West Computing doing making such a fuss about a sign in the cafeteria? Outside Langley, serious civil rights battles were being fought on the streets and in the courts.

"They are going to fire you over that sign, Miriam," her husband said.

But being black in America was a never-ending series of decisions about when to fight and when to let things go. "Then they're just going to have to do it," Miriam said.

## War Birds

African Americans carefully read every newspaper article about the Tuskegee Airmen, a group of black military pilots who fought during World War II. As with any other fliers, their lives depended on knowing their plane's strengths and weaknesses, and every response it would make as it waltzed through the sky. By the summer of 1944, the men of the 332nd Fighter Group were flying North American P-51 Mustangs.

"It's best described as a 'pilot's airplane,'" said an American military officer in a front-page article in the *Washington Post*. "It's very fast and handles beautifully at high speeds." With a big four-blade propeller and a Rolls-Royce Merlin engine, the Mustang sped across the sky like a four-hundred-miles-per-hour racehorse. The Tuskegee Airmen and lots of other pilots considered it to be the best plane in the world.

"I will get you up in the air, let you do your job, and bring you back to earth safely," promised the Mustang to its pilots, like a trusted horse to its rider. And helping the plane to make good on that promise was now part of Dorothy Vaughan's full-time job.

## The Secret Weapon

But Dorothy couldn't really talk to her friends and family about her work. During World War II, the National Advisory Committee for Aeronautics wanted to defeat Germany by air, both by creating planes capable of destroying their targets and by coming up with technological advancements that would give the United States a military advantage. The Langley Laboratory was one of the United States' most powerful weapons, a secret weapon hidden in plain sight in a small southern Virginia town.

While the performance of the Mustang airplanes fighting overseas was a topic of front-page news, the daily work of the West Computers and the others in the lab was considered sensitive and even secret. Bosses told their employees to stay on the lookout for spies disguised as soldiers or people who might try to get valuable information from laboratory employees. *Air Scoop*, the newspaper of the NACA, sounded the alarm: "You tell it to someone who repeats it to someone . . . so SOMEONE you know . . . may die!"

The Langley employees took the warning to heart. Even if they had wanted to talk about their work, they would have found it difficult to find someone outside the lab who would understand what they were talking about.

Off campus, people around town often found the Langley employees a bit peculiar. They had strange accents from other parts of the country. Many of them wore rumpled shirts with no ties, and some wore sandals or sported beards. Locals called them "brain busters" or "NACA nuts"; the less polite called them "weirdos."

## *"What Makes Things Fly?"*

*The pace of discovery and invention was so fast at Langley that an entry-level position there was considered by many people to be like studying at the world's best engineering school. In addition to receiving on-the-job training, employees had the chance to take classes in math and physics and other subjects that would help them further understand how to design better planes.*

*And that's what Dorothy did. With the goal of turning women math teachers into crack junior engineers, the laboratory sponsored a crash course in engineering physics for the newly arrived computers. Two days a week after work, Dorothy Vaughan and the other new mathematicians filed into a makeshift classroom at the laboratory for an intensive class in the fundamental theory of aerodynamics, which is the study of objects moving through the air. They also attended a weekly two-hour laboratory session for hands-on training in one of the wind tunnels, and they had an average of four hours of homework on top of their six-day workweek.*

*What makes things fly? Dorothy asked herself all day long at her new job. She had never flown on a plane and had never before given much thought to the question. The first course she took at Langley taught her the basics of aerodynamics. She learned that when a wing moves through the air, the air gets cut into two parts. There is slower-moving airflow on the bottom of the wing, and faster-moving airflow on the top. This creates two different pressures, and it's this difference in pressure that creates lift, the almost magical force that causes the wing—and the plane attached to it—to rise into the sky.*

## The Disappointment of Hampton High School

Mary Jackson had passed the old Hampton High School too many times to count. The building was located in the middle of the city, not far from her house, but she had never set foot inside. On her first night of class, in the spring of 1956, Mary was nervous. Her classmates were the same people she had worked with during the day for the past five years, but she was anxious about meeting with them outside of the Langley campus.

The thought of entering the whites-only school also worried Mary. Nothing could have prepared her for the shock she experienced when she walked through the door. Hampton High School was a dilapidated, musty old building.

Mary Jackson was stunned. This was what she and the rest of the black children in the city had been denied all these years? She had assumed that if whites had worked so hard to deny her admission to the school, it must have been a beautiful place. But this?

What a nonsensical thing that black and whites went to different schools! If the city had combined its resources, it could have built one beautiful school for both black and white students. Throughout the South, cities had maintained two separate and inefficient school systems, which shortchanged both black and white students.

## Young, Gifted, and Black

While Mary Jackson was busy at work helping the NACA build supersonic airplanes, girls in high school were beginning to imagine different possibilities for themselves. Even though teaching was still the best option available, there were now more career choices.

On October 5, 1957, Christine Mann, a senior at the Allen School for girls in Asheville, North Carolina, left her dorm room first thing in the morning and walked to the library. Her job was to open the library and organize the newspapers and magazines before anyone else arrived. She took a moment to read the headlines as she set up the displays.

Since the beginning of the year, newspapers around the country had discussed the racial crisis in Little Rock, Arkansas: nine black teenagers trying to integrate the all-white Central High School had turned that state's capital city into a military battleground. The Arkansas National Guard had been called out to prevent the black students from entering the school. In response, the federal government sent US Army troops to escort the nine students into the school. The crisis unfolded over days, and each morning Christine followed the news of the brave children who were close to her in age.

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The showdown had dominated the headlines—and then the Soviet Union launched *Sputnik*. The Russians did it—they had created a satellite and launched it into orbit—and they did it before the United States. With tensions between the two countries already high because of the Cold War, this news put everyone further on edge. The United States needed to catch up!

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*Caption: A replica of the Soviet Union's Sputnik 1, the first artificial satellite to be put into outer space.  
Credit: Courtesy of the National Air and Space Museum and NASA*

At the Langley Memorial Aeronautics Laboratory, there was great pressure to outperform the Russians at 360 miles above Earth, the altitude at which a satellite would fly around the planet. For the engineers, beating the Russians in space was a matter of personal and professional pride.

In the rest of the country, the fear was political. "Red-Made Satellite Flashes Across the US," read the *Daily Press* in Newport News. "Sphere Tracked in 4 Crossings over US," read *The New York Times*.

When Christine read the news, she felt she had fallen asleep in one world and awakened in another. October 4, 1957, marked the end of the postwar era, a time when the world was rebuilding after the destruction of World War II. The morning of October 5 was the official dawn of the space age, the beginning of mankind's realizing a long-held dream to fly beyond Earth's atmosphere and visit outer space.

President Dwight D. Eisenhower tried to dismiss the Russians' "small ball in the air" as an insignificant achievement, but the American people knew better. *Sputnik*, some experts declared, was nothing less than a technological declaration of war. The Russians had won the first battle, but the space race was just getting started.

## The Sputnik Age

For the third time in the century, the United States found itself falling behind other countries technologically during a period of international tension. On the cusp of World War I, the country didn't have enough airplanes, so the government created the National Advisory Committee for Aeronautics. At the start of World War II, America's aircraft industry lagged behind Germany's, but during the war it surged to global dominance. Now the threat came from the Soviet Union.

"It wasn't just *Sputnik*. The Soviet Union had missiles—perhaps hundreds of them—with the power to reach US cities and deliver nuclear bombs. A new term began to make the rounds in policy circles, the press, and private conversations: the "missile gap."

Black newspapers and their readers wasted no time in making the link between America's inadequacy in space and the dreadful conditions facing many black students in the South. "While we were forming mobs to drive Autherine Lucy [the black woman who integrated the University of Alabama in 1956] from the Alabama campus, the Russians were compelling ALL children to attend the best possible schools," argued the *Chicago Defender*. Until the United States changed its views on racial inequality and gave the same opportunities to all students, it would never be able to lead the world, the newspaper commented.

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## *Sputnik and the Dawn of the Space Age*

History changed on October 4, 1957, when the Soviet Union successfully launched Sputnik I. The world's first artificial satellite was about the size of a beach ball (58 cm or 22.8 inches in diameter), weighed only 83.6 kg or 183.9 pounds, and took about 98 minutes to orbit the Earth on its elliptical path. That launch ushered in new political, military, technological, and scientific developments. While the Sputnik launch was a single event, it marked the start of the space age and the U.S.-U.S.S.R. space race.

The Sputnik launch changed everything. As a technical achievement, Sputnik caught the world's attention and the American public off-guard. Its size was more impressive than Vanguard's intended 3.5-pound payload. In addition, the public feared that the Soviets' ability to launch satellites also translated into the capability to launch ballistic missiles that could carry nuclear weapons from Europe to the U.S. The the Soviets struck again; on November 3, Sputnik II was launched, carrying a much heavier payload, including a dog named Laika.