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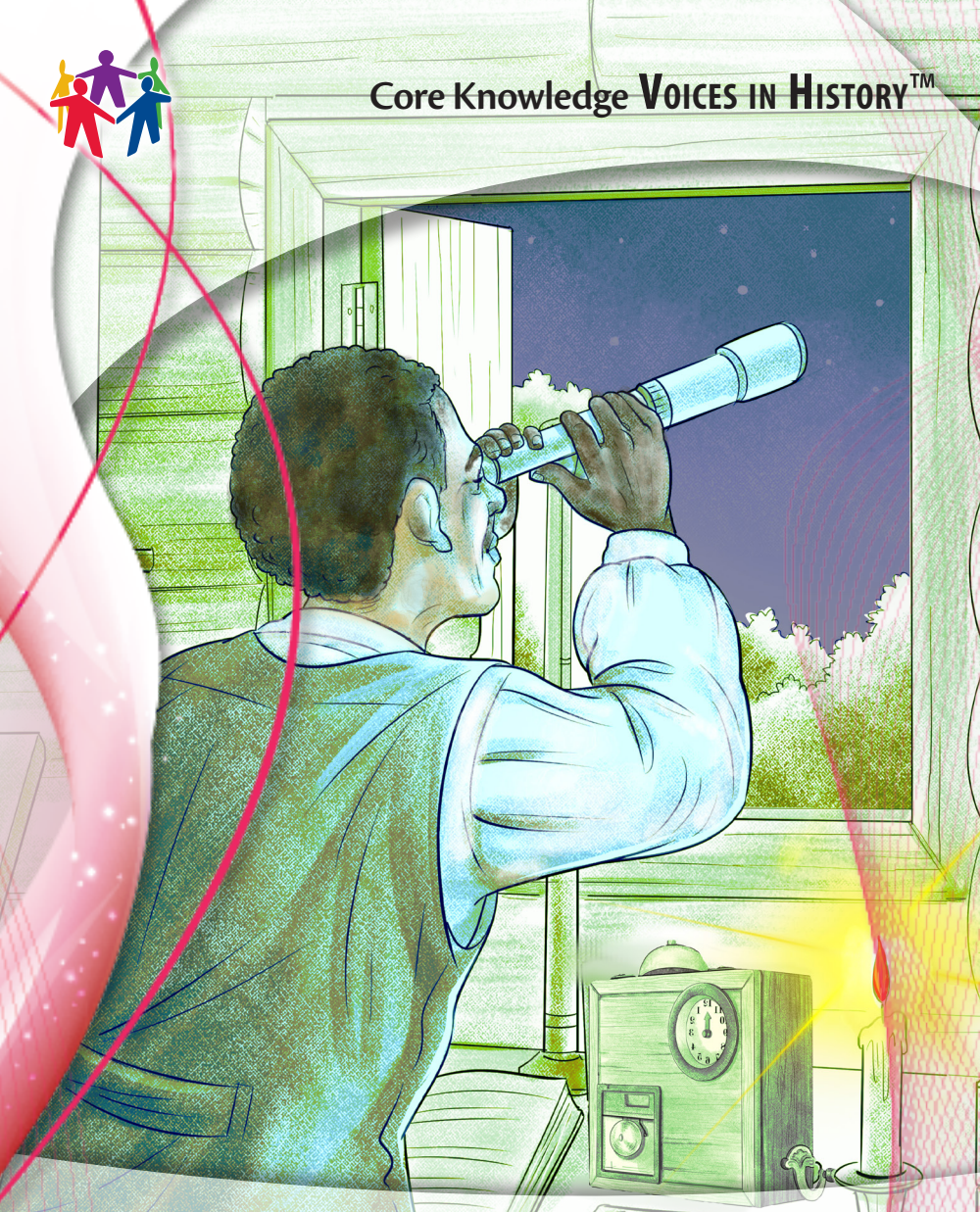

Benjamin Banneker

A Colonial Genius Shining in the Darkness

by Dionna L. Mann

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Behold ye Christians! and in pity see
Those Afric sons which Nature formed free;
Behold them in a fruitful country blest,
Of Nature's bounties see them rich possest,
Behold them herefrom torn by cruel force,
And doomed to slavery without remorse,
This act, America, thy sons have known;
*This cruel act, relentless they have done.**

—Benjamin Banneker

Dedicated to my beautiful mathematical boy, JNM.

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* Benjamin Banneker, "Behold ye Christians! and in pity see," *Friends' Review: A Religious, Literary, and Miscellaneous Journal, ed. Samuel* Rhoads (Philadelphia, 1861), 14:219.

1

Benjamin, Farm Boy

It was November 9, 1731. The maple trees of colonial Maryland were wearing yellow and orange when Benjamin Banneker entered the world. Little did his proud and grateful parents know that their child's name would one day be uttered by some of the most famous men in American history.

Abolitionists, people who pushed to end the institution of enslaving others, would shout his accomplishments from the rooftops. Indeed, Benjamin's name would be spoken time and time again as proof that intelligence, genius even, can belong to anyone—no matter the color of their skin. But right now, he was just a newborn, warm and loved on his mother's chest, safe inside his grandmother's home.

Benjamin was the firstborn child of Robert and Mary Banneker. Though the institution of American slavery would not be abolished for more than 130 years, Benjamin's parents were not enslaved. They were free and made their living as tobacco farmers. Because Benjamin's parents were free, Benjamin never had to endure being enslaved. He was born free, as all people should be.

Benjamin's mother was also freeborn. That was because his mother's mother, his maternal grandmother, was a white woman from England. Her name was Molly Welsh. Molly was a poor milkmaid working on an English cattle farm. One day, a dairy cow kicked over her bucket of milk. The cow's owner accused Molly of stealing the milk.

Molly was arrested, tried in court, and convicted as a felon! As punishment, she was forced to board a ship headed for the British colonies in North America. She was to become an indentured servant in what was then called the New World. As an indentured servant, she would have to work without pay for seven years for the person who covered the cost of her passage from England. Around 1683, the ship carrying Molly—and other convicts—landed off the coast of Maryland. Molly ended up laboring for a Maryland tobacco farmer.

After Molly finished her indenture, she continued to farm tobacco in Maryland. She saved up her money and purchased her own farmland. Although she did not agree with the institution of slavery, she eventually went down to the docks on the Chesapeake Bay and purchased two African men who had been stolen from their home country. These men would help her work her farm. She determined to give the men their freedom, just as she was given hers.

felon: someone who has committed a federal crime

One of the men Molly purchased had an African name—it sounded like "Banneker." Some say his name was Bannaka, but how it was written in his African language and how Molly wrote it out in English are unknown. It took some time, but soon Molly and Bannaka were able to communicate. Bannaka told Molly that he had been a prince from a ruling family in West Africa. A rival tribe had kidnapped him and sold him to those involved in the slave trade.

Based on his name, which may mean "the sweet place" or "belongs to the place," historians who study words and languages suggest that Bannaka was of the Wolof people of West Africa. Others believe he was of the Dogon people, also of West Africa. Historically, the Dogon people were exceptional farmers who were said to possess an uncanny knowledge of the stars. They were also known to be great mathematicians. One thing we do know is that after Molly gave Bannaka his freedom, the two of them got married. Molly took Banneker as her last name. Benjamin's mother, Mary, was their firstborn daughter.

Benjamin's father, Robert, had also been kidnapped from Africa to be enslaved in the colonies. He, too, worked on a tobacco farm in Maryland. His so-called owner taught him about the Bible. After being baptized into the Church of England, Benjamin's father took on the

uncanny: mysterious

anglicized name Robert. He was also given his freedom at this time. Later, Robert and Mary got married. Robert took on his wife's last name, Banneker.

At first, Robert and Mary lived with Mary's mother, Molly. They helped her on her farm. Benjamin's parents wisely set aside some of their share of the farm's profits each year. Eventually, they were able to purchase twenty-five acres of their own land near Molly's. On that lot, they grew some of the finest tobacco. Within a short while, Robert was able to purchase one hundred acres nearby.

Robert added Benjamin's name to the deed of their land. True, he was only five years old at the time. However, Robert and Mary were likely hoping that by making their son a property owner no one would ever challenge his right to be free.

The Bannekers built a small but sturdy log cabin for their family. They used timbers they'd hewn from trees growing on their own land. They put in a mud-and-stick chimney and a hearth for cooking. There was at least one window with shutters to keep out the rain. Benjamin's dad built the furniture. His mother made their mattresses and clothes. She set up an herb garden—the medicine cabinet of colonial times.

Next, they prepared the land for tobacco. They built

hewn: cut down

sheds to hang and dry their harvest. They fenced in lots for their animals. They set up vegetable gardens, planted fruit trees, and braided and coiled straw skeps for bees to make honey in.

Soon, Benjamin's family grew. Benjamin had four sisters—Julian, who was born with health problems and didn't live long; Esther, who was better known as Minta; Jemima; and Molly, named after their grandmother. Benjamin's entire family pitched in to help run the Banneker farm.

It was hard work to grow tobacco. First, the Bannekers had to start the seedlings. Then they had to prepare the ground to replant the seedlings. All year, they had to remove by hand all the hungry worms and insects that loved eating tobacco leaves. When it was time to harvest,

skeps: hives

it was all hands on deck. Now it was time to cut the leaves from the plants, bundle them, and hang them to dry. And the leaves had to be harvested and hung in such a way that they did not get wet and moldy.

Once the leaves were cured, the Bannekers twisted them and rolled them into ropes. They packed the rolled ropes into barrels called hogsheads. If they did it right, they could get a thousand pounds of tobacco into one hogshead! As he got older, Benjamin would help his father hitch the hogsheads behind horses or oxen and then take their valuable crop down to the docks to be sold at an auction.

In addition to growing tobacco, Benjamin's family worked together in their vegetable gardens. They harvested fruit from their orchard—cherries, pears, and apples. Benjamin helped with feeding the pigs, gathering eggs from the chickens, milking the cows, and harvesting the honey.

As the only boy, Benjamin probably enjoyed some one-on-one time with his father when they were trapping game that roamed within their woods. They likely fished the waters of the Patapsco River, which flowed into the Chesapeake Bay. All kinds of wild game added to their diet—turkeys, quail, partridges, hares, squirrels, perch, catfish, oysters, crayfish, and many others!

auction: sale at which the person willing to pay the most gets the item

Unfortunately, Benjamin's days with his dad were cut short. Robert passed away when Benjamin was twenty-seven years old. It was written in their family Bible: "Robert Banneker departed this life, July 10th 1759."*

Benjamin Banneker was now the man of the house. One by one, Benjamin's sisters grew up and got married. They began their own families on their own land. It was up to Benjamin and his mother to manage the farm now. Thankfully, they were both healthy and hardworking.

Did You Know?

In the 1600s and 1700s, England's courts sent fifty to sixty thousand convicts to the British colonies in North America to be indentured servants. This practice often spared these so-called criminals' lives. It also provided colonial planters and merchants with an inexpensive labor force.

Census

According to the 1790 census, Maryland's population that year was 319,728. Of that number, 8,043 were free people of color, and 103,036 were people who had been enslaved.

Get This!

Tobacco planters in colonial times were paid in tobacco notes. Benjamin's parents purchased their farm with notes received from selling seven thousand pounds of their high-quality tobacco.

* Martha Ellicott Tyson, *A Sketch of the Life of Benjamin Banneker: From Notes Taken in 1836* (Baltimore: Maryland Historical Society, 1854), 4.

2

Benjamin, Naturalist

When Benjamin Banneker was young, he had a curious mind. He loved to observe things in nature. At night, he'd lie outside and gaze at the sparkle of stars in the dark sky. During the day, he'd watch his father's bees buzz in and out of their hives. And at all times, unusual weather caught his attention.

One thing Benjamin especially enjoyed was discovering patterns in nature. For example, when Benjamin was seventeen, creatures called cicadas emerged from the ground like an army. Benjamin listened as the numerous insects with their bulging red eyes, fat black bodies, and gossamer wings called for mates. Their sharp humming noise filled his summer days. As the insects gorged themselves, leaves disappeared from treetops.

gossamer: delicate

Benjamin wanted to know more about these insects, which he called *locusts*. He was determined to know their secrets. So he observed their behavior. He watched the female cicadas drill holes in tree branches to lay their eggs. When the insects' young, called *nymphs*, hatched, Benjamin watched them drop to the ground to burrow beneath the soil. He wondered how long they would remain in the ground before emerging again.

One year passed, then two, then ten. Finally, seventeen years later, when Benjamin was thirty-four, he had his answer. The cicadas emerged again! Was this a pattern, a periodic cycle of seventeen years? Benjamin hoped to be alive in seventeen more years, if only to see if his hypothesis were true. And guess what? It was!

Right on time, when Benjamin was fifty-one years old, all those cicadas came crawling out of the ground! Benjamin was excited to discover the pattern. He found it well deserving of a mention in his commonplace book, a writing journal for everyday observations. Benjamin Banneker was likely one of the first American naturalists, if not the first, to observe and record the life cycle of the cicada.

hypothesis: something assumed to be true until proven otherwise

In His Own Words

*The first great Locust year that I can Remember was 1749. I was then about Seventeen years of age when thousands of them came and was creeping up the trees and bushes, I then imagined they came to eat and destroy the fruit of the Earth . . . . I therefore began to kill . . . them. . . . Again in the year 1766, which is Seventeen years after the first appearance, they made a Second, and appeared to me to be full as numerous as the first. . . . Again in the year 1783 which was Seventeen years since their second appearance to me, they made their third; and they may be expected again in the year 1800. . . . So that if I may venture So to express it, their periodical return is Seventeen years, but they, like the Comets, make but a short stay with us— **

—Benjamin Banneker

* Benjamin Banneker's Original Handwritten Document: Observations and Study of the Cicada, 1800

3

Benjamin, Reader and Mathematician

In addition to learning through observation, Benjamin Banneker learned a great deal from books. He loved to read. His grandmother, Molly Welsh, had taught him how. Though Maryland was a slaveholding state, Maryland's laws never forbade teaching either free or enslaved Black people to read and write. In the colonies, the most common book to read was the Bible. Benjamin's grandmother had a big Bible in English, and Benjamin knew its contents well. For years, it was his only book.

Unlike today, when Benjamin was growing up, free public schools were uncommon. Children were taught by family members. There were no such things as free public libraries, either. However, when Benjamin was still of elementary school age, a religious group called the Society of Friends, or Quakers, opened a one-room schoolhouse not far from his home. Benjamin got to attend! The Quaker teacher welcomed all children, no matter their color or gender.

How excited Benjamin must have been to be allowed to learn from a teacher and from books! He was able to discover geography, history, science, and all kinds of arithmetic. And Benjamin was not the only Black child attending, either. A boy named Jacob Hall was his classmate. Like Benjamin, Jacob was freeborn, and he and Benjamin became lifelong friends.

Not only could Benjamin read well, but he could write well too. As an adult, his penmanship flowed elegantly from his quill pen across paper. Whether he was writing letters, journal entries, math problems, or poetic passages, his handwriting was neat and precise.

Benjamin had a keen mind for mathematics. If his teacher explained any kind of mathematical problem, he quickly understood how to solve it. When books explained algebra or geometry or trigonometry, he grasped it. It was like Benjamin's mind was hardwired to understand math.

Benjamin discovered that he loved creating and solving math puzzles. He came up with puzzles for others to solve. In return, some of his peers would give him their math puzzles. He was even able to use logarithms for complex multiplication. (A logarithm is a function for making multiplication easier, especially for numbers with lots of decimal places.) Benjamin became well known in his community for possessing amazing mental abilities.

Another thing Benjamin learned was how to play the flute and the violin. As each day waned, he'd sit beneath his favorite old chestnut tree and play a sweet tune. It was as if he were bidding the constellations to make their nocturnal rise.

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algebra: area of mathematics that studies number operations, where numbers are represented by letters
geometry: area of mathematics that includes the study of lines, angles, and surfaces
trigonometry: area of mathematics that involves the study of triangles
waned: came to an end
constellations: arrangements of stars

The African Prince

If Benjamin's grandfather was from the Dogon tribe, it's possible that he taught Benjamin geometric principles. "All who had known his grandfather, the African prince, conceded that it was from him *that the student grandson inherited the fine qualities of the mind through which the name of Banneker became famous."**

A Math Puzzle!

Here is one of Benjamin's math puzzles.

Suppose a ladder 60 feet long be placed in a Street so as to reach a window on one Side 37 feet high, and without moving it at bottom, will reach another window on the other side of the Street which is 23 feet high, requiring the breadth of the Street.

Hint: *Use the Pythagorean theorem.***

* Martha Ellicott Tyson, *Banneker the Afric-American Astronomer*: *From the Posthumous Papers of Martha E. Tyson*, ed. [Anne Tyson Kirk] (Philadelphia: Friends' Book Association, 1884), 31.

** The answer to Benjamin Banneker's triangular puzzle is 102.65 feet.

4

Benjamin, Clockmaker

One day, when Benjamin was about twenty years old, he borrowed a man's pocket watch. Benjamin wanted to know how the timepiece worked. What made it quietly beat like musical notes played in perfect time?

With the owner's permission, Benjamin removed the tiny screws from the back of the watch. He was determined to discover its secrets. Once the workings of the watch were revealed, Benjamin was amazed. Inside was a tiny, moving mechanical puzzle. He gazed with

wonderment at the movement. The tiny wheels, gears, springs, and pinions all worked together—*tick-tick-tick*—to move the hands of the watch. The timepiece was math in motion!

Benjamin wondered if he could make his own version of the watch, a larger one—a clock. His mind was set in motion. He was going to try!

Confident that he could put the pocket watch back together, Benjamin took apart the mechanical work of art. He sketched each tiny piece—each gear and wheel, each pinion, each plate. He noted how one piece connected to another, how they functioned together. Benjamin then used math to scale the parts to make larger ones for his timepiece.

The only problem was that Benjamin didn't have any silver or gold to melt down to make the parts. And he didn't have any special clock-making machinery or tools to build his clock, either. But he did have a whittling knife, some simple carpentry tools, and acres of woods surrounding his farm. He would make his clock out of wood!

First, he picked the perfect kind of tree with the perfect kind of wood. Next, he seasoned, or aged, the wood so it wouldn't shrink or crack over time. Then, when his farm duties were done, Benjamin set his hands to work.

pinions: gears with teeth that fit into a larger wheel

Piece by piece, Benjamin created all the parts for his clock. Then, with great patience and care, he put his 3D math puzzle together. How proud his parents must have been when, a short time later, his clock project was nearly complete!

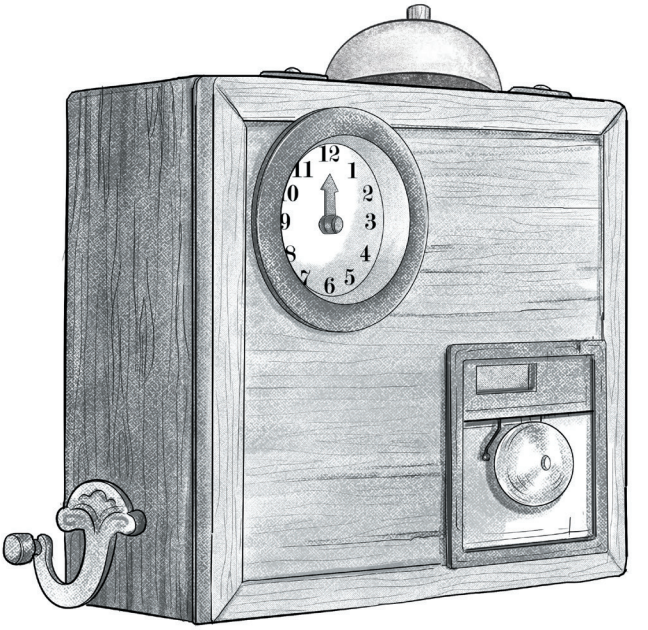
All Benjamin needed now was a bell for the clock's movement to strike at the top of every hour. So Benjamin saddled his horse and rode to the nearest town. He found a place where he could purchase a bell, and then he returned home. How his heart must have pounded as he wound it up! Would it work? Would his clock keep time as the pocket watch had? Would it strike the bell at the top of the hour?

Tick-tick-tick-tick . . . bong.

Yes! It worked!

Word got out about Benjamin's timepiece. People from all around came to see it. It was a marvel! Hardly anyone in those parts had seen such a thing as a wooden clock. People were amazed. There he was, Benjamin Banneker—a self-taught timepiece maker, a Black farmer who could do just about anything he set his mind to. He had made a clock using nothing more than simple tools and wood! Benjamin's mind and hands had produced a mechanical wonder.

Years later, when Elizabeth Ellicott, Benjamin's neighbor and the wife of his friend George Ellicott, came to visit, she was impressed. His wooden clock was still keeping time. Its bell still struck at the top of the hour, as it had for decades!



5

Benjamin, Neighbor and Friend

When Benjamin was growing up, not much happened in his neck of the woods. True, wild animals—wolves, brown bears, and bobcats—made the area their haunts. The Patapsco River, with its ebbs and flows each season, proved to be a source of wonder. And there was the occasional traveling man who'd stop by to sell goods or to shoe the horses. But still, it was rural farm life at its best. However, when Benjamin was about forty years old, his spot of Maryland earth was about to change.

Four brothers—Joseph (1732–80), Andrew (1734–1809), Nathaniel (1736–97), and John (1739–95) Ellicott—invested in building a gristmill, or grain mill, in an area known as the Hollow, right on the falls of the Patapsco River. This was just about a mile from Benjamin's property.

The workers building the mill felled acres upon acres of trees. They built a sawmill and a dam and dug out quarries. They put in roads and built a bridge. From the edges of his property, Benjamin could see the workers hauling load after load of supplies, materials, and equipment down to the site. Right before Benjamin's eyes, the landscape was changing.

When all was said and done, the Ellicotts' water-powered stone gristmill was up and running. It was fully automated to grind up wheat, corn, and rye. Stone turned upon stone, milling grain into flour. Levers on elevators carried the foodstuff up and over, spilling flour into bins. Benjamin liked to go down to watch the machines working inside the mill. It must have reminded him of the movement of his clock at home. The mill was math in motion.

Benjamin had reason to visit the mill routinely. He and his mother sold produce from their farm to the Ellicotts. The Ellicotts bought all the vegetables, poultry, fruit, and honey their workers would need from the Bannekers.

Pretty soon, the brothers opened the Ellicott & Co. store. Benjamin and his mother could now exchange the value of their produce for store items. His mom bartered for things like shoes and fabric. Benjamin bartered for sugar, molasses, gunpowder, and tools. No doubt his favorite items to obtain were books, paper, and ink.

quarries: large holes dug to extract stone and other building materials
automated: operated by machinery that runs itself
bartered: traded

The Ellicotts were members of a religious group called the Society of Friends, or Quakers—the same group that had run the school Benjamin had attended as a boy. Quakers respected all people, no matter the color of their skin, so Benjamin felt welcome at the Ellicott & Co. store. He could sit and socialize inside for as long as his farm work allowed. He could rest his feet and read the recently established local newspaper, the *Maryland Journal and Baltimore Advertiser*. He could post and receive letters at the store and exchange mathematical puzzles with his neighbors.

Charles Dorsey, a young man who worked at the store, remembered an older Benjamin sharing his math puzzles. He said of one such puzzle, "His question made so deep an impression on my mind that I have ever since retained a perfect recollection of it."

Benjamin must have enjoyed seeing the small town of Ellicott's Lower Mills go up right before his eyes. In addition to the store, he saw a fine school rise. He saw horse stables being built. He saw a wheelwright shop go in—a place where people made and repaired wooden wheels. He saw homes go up and a large community warehouse rise, all where woods once stood.

The Ellicotts also built a meetinghouse for their fellow Quakers. Inside, everyone would sit in silence, listening for the quiet voice of God, before speaking. Anyone was welcome, and Benjamin sometimes attended. The Ellicotts—and Quakers in general—did not believe in racial or gender inequality. The Ellicotts, for example, had never used slave labor while building their mill, and they pushed to end the American institution of enslaving people from Africa.

When Benjamin was in his late forties and George Ellicott was not yet twenty, they became better acquainted. George was the fourth son of Andrew Ellicott, one of the founders of the mill. He was a mathematician, surveyor, and amateur astronomer. Despite their age difference, George knew that he and Benjamin had a lot in common.

Benjamin had made a clock. George's family included those who had made clocks. Benjamin loved stargazing. George loved studying the stars. Benjamin loved complex math. George loved complex math, too. George and Benjamin were kindred spirits.

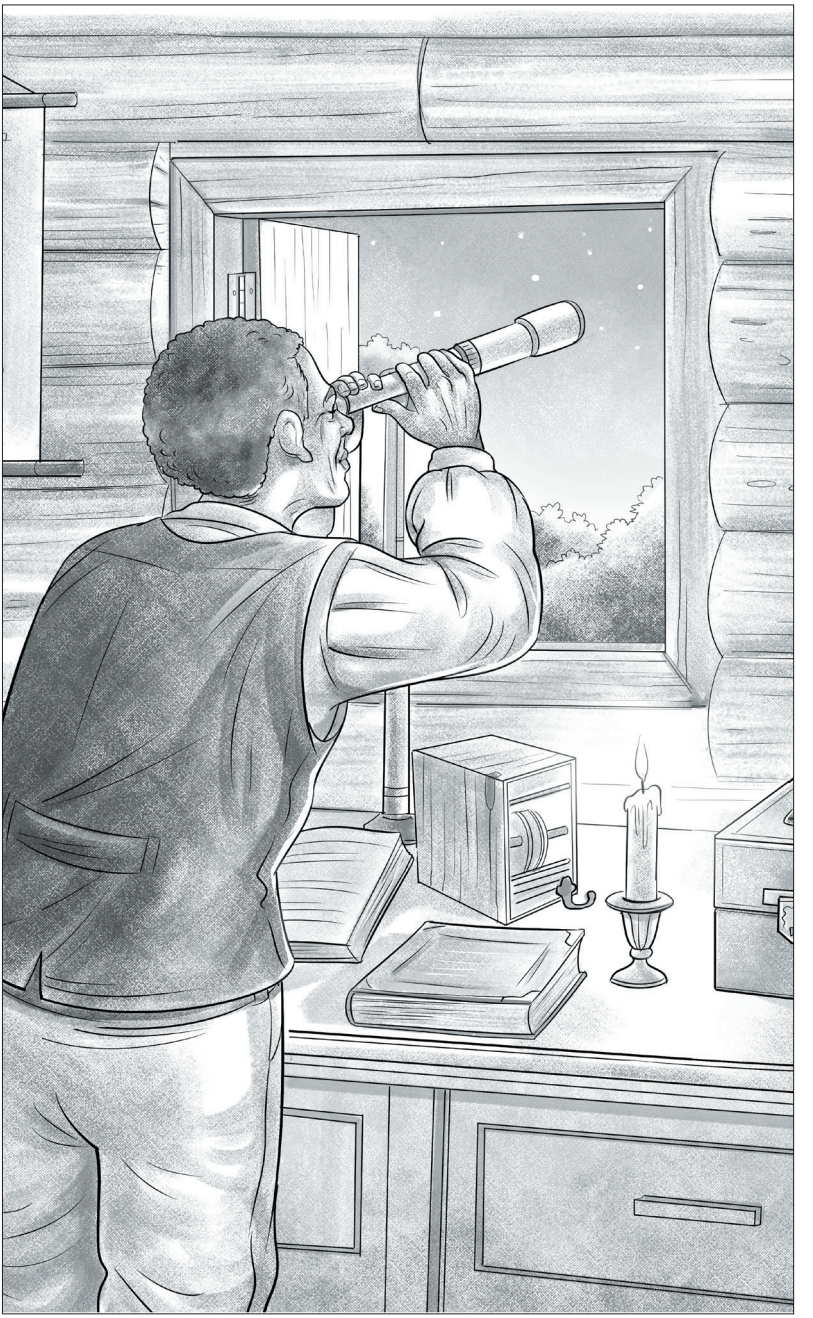
George loved sharing what he knew about astronomy with others. He agreed to teach Benjamin all he knew about astronomy. Benjamin was eager to learn it all. After all, Benjamin had observed how celestial bodies would tick along in space like an elegant, precise timepiece. They were math in motion.

surveyor: someone who measures the shape, size, and position of an area of land

George loaned Benjamin a pedestal telescope. Now Benjamin could go outside at night, peer upward, and see the movement of the stars in a way he had never seen before! He could watch the moon *tick-tick-tick* among the stars like hands on a clock. He could locate Jupiter and see its moons blink in and out as they danced around it. Benjamin was amazed at how precisely the orbs above him kept time.

George also loaned Benjamin the things he would need to make solar and lunar eclipse predictions. He loaned him a sturdy worktable, astronomy books, lunar tables, and calculating and drafting instruments. George promised to return to show Benjamin how to use everything to diagram an upcoming eclipse. But Benjamin couldn't wait for George to explain the math. He would teach himself!

Even by candlelight, Benjamin pored over George's astronomy books to learn their secrets. And guess what? In just a short time, Benjamin's keen mind was able to grasp them! He learned about Earth's dimensions and its axis. He learned about the moon and the sun. He learned the mathematical way of finding latitude and longitude. He learned how a mathematical instrument called a *sector* could be used to diagram solar and lunar eclipses.



Of course, it's one thing to learn something from a book and another thing to do it. Could Benjamin predict a solar eclipse? He decided to try.

He made curved lines. He drew angles. He jotted down points and numbers. When all was said and done, Benjamin made a calculated guess about when the next solar eclipse would be. He figured it would occur on "April 14th day, at 37 minutes past 7 o'clock in the morning."*

Benjamin sent George a letter along with his mathematical hypothesis—a geometric drawing along with the math that showed how he came to his conclusion. George was amazed! True, Benjamin's math was a little off, but that was because he had used two books that approached the computations differently. Still, Benjamin had taught himself the complicated principles behind astronomy! With just a little correction, Benjamin could now measure the rhythmic, ecliptic motion of the bodies that danced in the night sky.

* Tyson, *Banneker the Afric-American Astronomer*, 28–29.

Inquiring Minds Want to Know

Two of George Ellicott's books that Benjamin Banneker used to teach himself astronomy were Charles Leadbetter's A Compleat System of Astronomy *and James Ferguson's* Astronomy Explained upon Sir Isaac Newton's Principles, and Made Easy to Those Who Have Not Studied Mathematics.

6

Benjamin, Astronomer

Once he realized he could do the math of astronomy, Benjamin Banneker set his mind to using what he had learned to make celestial predictions for the upcoming year, 1791. He would compile an *ephemeris*, or a collection of tables that list the future positions of the moon and planets. He also planned to figure out if there would be any solar or lunar eclipses that could be seen locally that year. He would determine and list the local times of sunrise and sunset for each day and the moon's phases for each month. It would be careful work, but Benjamin knew he would love the math!

Benjamin's goal, though, was more than just to have fun. He hoped to complete all of these scientific computations for an almanac. As a farmer, Benjamin knew how important almanacs were. Farmers used them to know when to begin their planting season. With agriculture being the main industry in the colonies, almanacs were best-selling publications. If Benjamin worked his mind as hard as he had worked his farm, maybe, just maybe, he could make a living studying the stars! That would be wonderful.

After all, he was getting older and was unable to farm tobacco like he used to.

Using George Ellicott's astronomical drafting tools, astronomy books, and lunar tables, Benjamin began his computations. He filled line after line with data. His pen moved across the page as precisely as the ticking of a pocket watch. He checked and cross-checked his math. How proud he must have been when his project was complete! Too bad his mother was no longer alive. She would have been proud, too.

Benjamin carefully made a handwritten copy of everything and posted it to a printer in Baltimore through the Ellicott store. Would his work be accepted for publication? After all, astronomers who calculated the scientific tables found in almanacs were in big demand.

The first printer's answer was no. The printer, returned Benjamin's manuscript. But Benjamin did not give up. He sent it off to a second printer. Once again, it was returned. Still, Benjamin was not disheartened. He sent it off to a third printer.

The third printer's name was John Hayes. Hayes was a member of the Maryland Society for Promoting the Abolition of Slavery and was active in other, similar causes. And guess what? Hayes was interested in printing an almanac with Benjamin's scientific tables!

But before Hayes moved forward in footing the cost of printing an almanac by Benjamin, he needed someone to cross-check Benjamin's math. Hayes sent Benjamin's calculations to a fellow abolitionist and one of the foremost astronomers of the day, Major Andrew Ellicott (1754–1820), a cousin of George Ellicott's who lived in Philadelphia.

Andrew Ellicott was the geographer of the United States. He'd been super busy mapping out and drawing state lines in what had been the British colonies. As a land surveyor, Andrew knew much about using stars for navigation, mapping, and surveying. Printers, including Hayes, had even published Andrew's scientific work in almanacs. When Andrew heard that a Black man, one from where his family in Maryland was living, had taught himself how to calculate an ephemeris, he was fascinated.

In the meantime, Hayes informed Benjamin that his manuscript was in Andrew's hands for fact-checking. Straightaway, Benjamin penned a letter to Andrew. Benjamin explained that he was a "young beginner[. . .] in Astronomy" who hoped Andrew would find his ephemeris "so near the truth, that it needs but little correction."*

* Carter G. Woodson, ed., *The Mind of the Negro as Reflected in Letters Written During the Crisis, 1800–1860* (Washington, D.C.: The Association for the Study of Negro Life and History, 1926), xxiii.

Andrew Ellicott's exact response to Benjamin's work is unknown. He did find Benjamin's calculations to be accurate, but he may have considered them not complete enough to print. Whatever Andrew's response, Hayes told Benjamin that despite his good work, Hayes was already known for publishing Major Andrew Ellicott's ephemerides, and he didn't want to change that.

But that wasn't the end of it. As an abolitionist, Andrew Ellicott was a member of the Pennsylvania Society for Promoting the Abolition of Slavery—the sibling organization of the one that Hayes belonged to in Maryland. He sent Benjamin's letter and manuscript to the president of the society, a printer named James Pemberton, thinking he might be interested in Benjamin's work. After all, in a new nation where enslavement was still legal, it wasn't every day that one received a scientific document created by a free Black man.

And Pemberton was interested, not just as a printer but also as an abolitionist. In order to counter the false but widespread belief that Black people were intellectually inferior to white people, abolitionist societies at the time often printed materials that shone a spotlight on Black people's intellectual accomplishments. Pemberton was sure that an almanac with scientific figures worked out by a Black man of science, one who had taught himself astronomy, would get people's attention!

Pemberton contacted a friend of his in Baltimore, asking for more information on Benjamin. His friend, as it turned out, knew both the printer John Hayes and George Ellicott's brother Elias. Pemberton's friend wrote back to him that according to Elias Ellicott, "the Calculation of the Almanack was nearly brought to perfection but is refer'd to next season," and that Hayes had declined to print Benjamin's ephemeris only because he was already printing Andrew Ellicott's, "not as he had any reason to doubt its exactness."

Pemberton felt sure now that publishing Benjamin's ephemeris was the right thing to do. The only problem was that 1790 was drawing to a close. It was too late for a printer to prepare a 1791 almanac with Benjamin's work. Benjamin was not disheartened. He set his mind on 1792.

Did You Know?

Astronomers use symbols based on mythology to represent the planets of the solar system. The symbol for the planet Mercury is the head and winged cap of the Roman god Mercury. For his ephemeris, Benjamin learned these symbols and drew them precisely with the nib of a quill pen.

7

Benjamin, Surveyor's Assistant

What a wonderful surprise was in store for fifty-nine-year-old Benjamin! Major Andrew Ellicott, George Ellicott's cousin who had seen Benjamin's scientific almanac work, was riding up on his horse. He was about to invite Benjamin on a scientific adventure.

The major had been commissioned by President George Washington to conduct a land survey of the newly established federal territory just south of Maryland. It was uninhabited land destined to become the nation's capital, the city of Washington in the District of Columbia—better known today as Washington, D.C. Ellicott needed qualified men, men who knew astronomy, to help him map out a square of land hugging the Potomac River that measured no more than ten miles on each side. He had asked his brothers to be his assistants, but they wouldn't be able to join him for three months. And Ellicott couldn't wait three months. President George Washington and Secretary of State Thomas Jefferson wanted him to get started right away. He asked his cousin George Ellicott,

but George couldn't take the time away from his business. Then George reminded Andrew that they both knew someone else who could help.

Ellicott didn't care that Benjamin had brown skin. What he needed was Benjamin's keen mind! He knew that Benjamin understood astronomy. He knew from George and his other family in Ellicott's Lower Mills that Benjamin was a decent, honest, and dependable man. He knew that Benjamin was a self-starter and a quick learner, able to grasp complicated math formulas practically overnight. True, he was nearly sixty years old. But still, Andrew Ellicott hoped Benjamin Banneker would say yes to assisting him with the science needed to survey the land.

With Ellicott's request on the table, Benjamin had a choice to make. Would he leave his farm and journey south by horseback alongside Ellicott to work on surveying undeveloped land? Would he become a member of Ellicott's team, even without knowing how the others might treat him? Benjamin said yes! Ellicott quickly informed President George Washington and Secretary of State Thomas Jefferson.

Thomas Jefferson

*I am happy to be able to inform you that we have now in the United States a negro . . . who is a very respectable Mathematician . . . to be employed under one of our chief directors in laying out the new federal city . . . and in the intervals of his leisure, while on that work, he made an Almanac for the next year, which he sent me in his own handwriting, and which I inclose to you. I have seen very elegant solutions of Geometrical problems by him. Add to this that he is a very worthy and respectable member of society. **

—Thomas Jefferson

How excited Benjamin must have been, and perhaps a little nervous, too! He had never traveled very far from home. Nor had he ever worked with the likes of well-known and respected men of science like Major Andrew Ellicott, who had served in the Revolutionary War. But Benjamin Banneker could carry his own. Anyone who knew Benjamin recognized this. George Ellicott's wife, Elizabeth, helped Benjamin obtain suitable clothing—not only for the cold, damp weather but also for those times he might be greeting men like President George Washington.

* Thomas Jefferson to Nicolas de Condorcet, Philadelphia, August 30, 1791, Founders Online, National Archives, https://founders.archives.gov/documents/Jefferson/01-22-02-0092.

Why would a surveyor need a mathematician and astronomer like Benjamin Banneker to serve as a scientific assistant? At the time, surveyors used astronomy to figure out their longitude and latitude, or their position on Earth. They set marker stones on undeveloped land and provided exact coordinates of the stones for global maps. For the new federal district, they would place stones every mile in straight lines, marking a precise square of ten miles per side.

As Ellicott's assistant, Benjamin Banneker hunkered down at the field camp near Jones Point, not far from the Potomac River. For three months, he would live inside the surveyor's observatory tent. Throughout the night, he would use Ellicott's top-of-the-line astronomical equipment to keep a detailed log of all the information that Ellicott would need to do his fieldwork.

After working all night, Benjamin was still not done. During the day, he continued to tend to Ellicott's astronomical clock. He wound it and checked it to keep it ticking properly. He tried his best to keep the temperature inside the observation tent just right. When it was too cold—and it was often cold in those winter months—Benjamin kept the fire going. He closed and secured tent vents if it was raining. If it got too warm, he opened the vents. And he regularly recorded the temperature, too. It was a grueling schedule, certainly not easy on Benjamin's old bones. But Benjamin faithfully tended to his tasks.

Surely Ellicott appreciated having Benjamin as his assistant. Benjamin was Ellicott's GPS—and we all know how easy it is to get lost without a GPS! With Benjamin's help, Ellicott could begin his all-important task of mapping out the nation's new capital, soon to be home to the president's mansion and the legislative building. With Benjamin's help, Ellicott was able to install the capital's first boundary stone on April 15, 1791.

Benjamin was there, right at the beginning!

Before Benjamin knew it, spring had arrived at the

surveyor's camp, and with it came Ellicott's brothers. Benjamin was glad to be able to return to the comforts of his own home. After all, he wanted to finish his work for a 1792 almanac.

His experience working with Major Ellicott as a trusted member of his surveying team must have boosted Benjamin's confidence. He really was an astronomer—as true as true north! Maybe this time, Benjamin's manuscript would be accepted for printing!

Did You Know?

For ten years, while the city of Washington was being mapped out and built, Philadelphia served as the capital of the United States of America.

Cool Colonial Tech

Eighteenth-century surveying equipment included:

- *an iron measuring chain, also called a Gunter's chain*
- *a surveyor's compass, also called a circumferentor*
- *a zenith telescope, also called a zenith sector*
- *a transit and equal altitude instrument*
- *telescopic levels*

8

Benjamin, Almanac Maker

It was April 1791. Benjamin had a lot of work to do if he was to complete all the scientific calculations needed for a 1792 almanac printing. Hour after hour, day after day, night after night, he used math to prepare much of what was needed for an almanac. As he had done before, he checked and double-checked his calculations.

Thankfully, Benjamin had nephews who could help him with his gardens and with caring for his animals. There was also Jacob Hall's grandson, who would come by and do chores. That definitely helped a lot, but Benjamin still had to care for his personal needs. He had to cook his meals, wash his clothes, and tidy up his place. But he spent most of his time pouring his mind into creating the astronomical and mathematical parts for a 1792 almanac.

To keep his project organized, Benjamin went down to the Ellicott & Co. store and purchased a handsome journal with three hundred blank, unlined sheets of fine paper sewn together inside. After working out his computations on loose pieces of paper, he copied the finished versions

for each month on the front sides of the journal's pages and his notes and sources for his formulas on the backs. One of the first mathematical drawings in his journal was for a projection of an upcoming solar eclipse.

By June, all of Benjamin's scientific tables for 1792 were complete!

Benjamin put on his long waistcoat and broad-brimmed hat. He secured a copy of his manuscript, likely inside a leather satchel called a haversack, mounted his horse, and galloped toward Baltimore, about ten miles away. He was headed to see William Goddard, a printer.

Goddard was a businessman. Upon meeting Benjamin and seeing his ephemeris, he promptly agreed to print an almanac with Benjamin's name on the front! Goddard paid Benjamin for his work. He then got busy obtaining essays, poems, and stories—the kinds of literary items often included in almanacs.

For a foreword, Goddard received a stirring and heartfelt essay written by James McHenry, a senator to the U.S. Congress from Maryland. McHenry praised Benjamin's accomplishments as a self-taught man of science. He used what Benjamin had done as an astronomer as "fresh proof"* that people with African heritage are in no way inferior to those with European heritage.

* Benjamin Banneker, *Benjamin Banneker's Pennsylvania, Delaware, Maryland and Virginia Almanack and Ephemeris, for the Year of Our Lord, 1792* (Baltimore, 1792), 3.

How excited Benjamin must have been when 1792 began! His almanacs were rolling off the presses. They were being printed and sold in several cities, including Baltimore, Alexandria, and Philadelphia. And they quickly sold out! More had to be printed!

All kinds of people, including some of the best-known men of science, were talking about this self-taught Black man who could calculate the movement of the stars.

That was just the beginning of Benjamin Banneker's almanac-publishing career. He continued to publish them every year until 1797.

Notably, the foreword of his 1793 edition contained a copy of an impassioned letter that Benjamin had bravely written to Secretary of State Thomas Jefferson in 1791, asking the statesman to consider the plight of those enslaved. When Benjamin posted his letter, he included a copy of his almanac for the following year. He asked Jefferson to see it as proof of what people with ancestors from Africa could do, if only they were given the opportunity. Benjamin's 1793 almanac also contained Jefferson's astonishing reply to Benjamin. Jefferson seemed to say that he would consider Benjamin's plea. Those letters were of great interest to the public.

Letters of Interest

Sir . . .

I suppose it is a truth too well attested to you, to need a proof here, that we are a race of Beings who have . . . long been looked upon with an eye of contempt, and that we have long been considered . . . Scarcely capable of mental endowments.

Sir I hope . . . that you are a man far less inflexible in Sentiments of this nature, than many others . . . and that you are willing and ready to Lend your aid and assistance to our relief. . . .

Now Sir if this is founded in truth, I apprehend you will readily embrace every opportunity to eradicate that train of absurd and false ideas . . . and that your Sentiments are concurrent with mine, which are that one universal Father

hath given being to us all, and that he hath . . . made us all of one flesh, . . . all with the same faculties, and that . . . we are all of the Same Family. . . .

Sir, I . . . [am] recommending to you and all others, to wean yourselves from these narrow prejudices . . . and as Job proposed to his friends "Put your Souls in their Souls stead," thus shall your hearts be enlarged with kindness and benevolence toward [those enslaved]. . . .

. . . And now Sir, I shall conclude and Subscribe my Self with the most profound respect your most Obedient humble Servant,

*Benjamin Banneker**

Letters of Interest

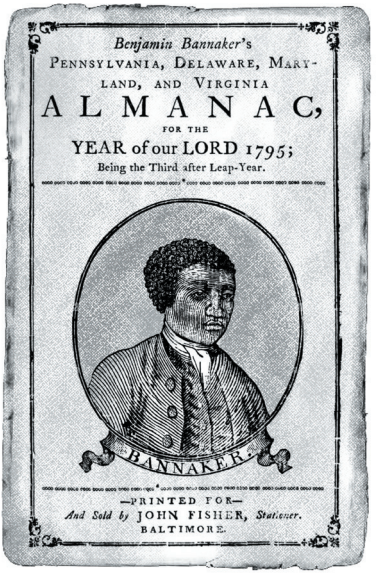
Sir

I thank you sincerely for your letter of the 19th. instant and for the Almanac it contained. No body wishes more than I do to see such proofs as you exhibit, that nature has given to our black brethren, talents equal to those of the other colours of men. . . . I can add with truth that no body wishes more ardently to see a good system commenced for raising the condition both of their body and mind to what it ought to be . . . . I have taken the liberty of sending your almanac to Monsieur de Condorcet, Secretary of the Academy of sciences at Paris, . . .

* Benjamin Banneker to Thomas Jefferson, Baltimore County, August 19, 1791, Founders Online, National Archives, https://founders.archives.gov/documents/Jefferson/01-22-02-0049.

because I considered it as a document to which your whole colour had a right for their justification against the doubts which have been entertained of them. I am with great esteem, Sir Your most obedt. humble servt.,

Th. Jefferson **



Some editions of Benjamin's 1795 almanac had a woodcut portrait of him on the cover or title page. This gentleman of science, who was obviously a Black man, looked as distinguished in his portrait as any other respected man of the time.

Benjamin's almanacs made him popular, but they didn't make him rich. Did that upset him? Probably not. For Benjamin, the important thing about publishing his almanacs had to be that he was recognized as an accomplished scientist—and that his work was being used as proof that a person's skin color or place of origin has no bearing on their intelligence.

** Thomas Jefferson to Benjamin Banneker, Philadelphia, August 30, 1791, Founders Online, National Archives, https://founders.archives.gov/documents/Jefferson/01-22-02-0091.

9

Benjamin, Walker

In the autumn of his life, Benjamin grew weaker and weaker. His one-hundred-acre tobacco farm was no longer being worked. Because Benjamin had never married, he had no children to help him farm his land. His sisters weren't able to help him grow tobacco either. They were all married and had families and responsibilities of their own.

While many tobacco farmers living in the early United States used labor of enslaved individuals, Benjamin was not about to consider that as an option. For a short while, he rented out some of his land to other farmers. But when he'd go to collect the rent, they'd argue or even shoot their guns in his direction, daring him to even try. If the renters were white, Benjamin, as a Black man, had few legal options to right the wrong. The laws of the day were unfairly written.

And so Benjamin decided to sell off his land.

In 1785, he sold twenty acres to his nephew Greenbury Morton. In 1792, he sold ten acres to a free

Black neighbor named John Barton. And in 1799, he sold his last seventy-two acres to the Ellicotts. Wisely, he kept the right to live in his home and to work his garden lot until he died.

Interestingly, Benjamin did not sell his land to the Ellicotts for cash. Rather, Benjamin and the Ellicotts came up with a bartering arrangement of sorts. They figured that the land was worth 180 pounds. In typical form, Benjamin created a mathematical equation based on how long he expected to live. He divided the total cash value of his property by his life expectancy. Based on his formula, the Ellicotts agreed to give Benjamin a yearly credit of twelve pounds at the Ellicott & Co. store. If he didn't use his entire credit at the store, Ellicott & Co. would pay him the difference at the end of the year. Benjamin kept an accurate tally of credits and the cost of items he got from the store in his commonplace book. He penned his ledger as carefully as if he were preparing work for an almanac. The Ellicott & Co. store extended yearly credits to him until the day he died.

Despite being in his late sixties and then his seventies during this time, Benjamin still enjoyed doing celestial calculations. So he continued to calculate monthly ephemerides and upcoming lunar and solar eclipses, recording them in the same journal he used to keep track

of his store credit. Perhaps his almanacs stopped being published because his stardom had burned out, or maybe he just got too old to be bothered.

Besides stargazing, another thing that Benjamin enjoyed doing in his older years was walking through the orchard his father had planted. Jacob Hall's grandson would sometimes walk beside him just in case Benjamin needed a shoulder to steady him. In the spring, the blossoms of cherry trees would line the path for their old friend. In the summer, bees would zip around his head as if to say hello. In the fall, branches heavy with pears would respectfully bow toward their familiar colonial gentleman. Each day, each night, each season had its own beauty. If only Benjamin's legs weren't so weak and his breathing so heavy, then he could enjoy it better.

Old age was knocking at his door. Indeed, the time clock of this kind, intelligent, white-haired man was winding down.

After his walk one morning, Benjamin lay down to sleep for a short while. A gentle fire warmed his old bones. He closed his eyes, no doubt dreaming of the night, when stars would shine bright. But Benjamin Banneker did not open his eyes again. On October 9, 1806, Benjamin Banneker died in his sleep. He was seventy-four years old.

An announcement of his passing appeared in the October 28, 1806, issue of the *Federal Gazette and Baltimore Daily Advertiser*.

Announcement

On Sunday, the 9th instant, departed this life at his residence in Baltimore county, in the 73d [sic] year of his age, Mr. BENJAMIN BANNEKER, a black man, and immediate descendant of an African father. He was well known in his neighborhood for his quiet and peaceable demeanor, and among scientific men as an astronomer and mathematician. In early life he was instructed in the most common rules of arithmetic, and thereafter, with the assistance of different authors, he was enabled to acquire a perfect knowledge of all the higher branches of learning. Mr. B was the calculator of several almanics [sic] which were published in this, as well as some of the neighboring states, and although of late years none of his almanacs were published, yet he never failed to calculate one every year, and left them among his papers, prefering [sic] solitude to mixing with society, and devoted the greatest part of his time in reading and contemplation, and to no books was he more attached than the scriptures. At his decease he bequeathed all his astronomical and philosophical books and paper to a friend.

*Mr. Banneker is a prominent instance to prove that a descendant of Africa is susceptible of as great mental improvement and deep knowledge into the mysteries of nature as that of any other nation.**

* Obituary of Benjamin Banneker, *Federal Gazette and Baltimore Daily Advertiser*, October 28, 1806

10

Benjamin, Inspirer

Benjamin's family and friends were attending his graveside funeral when thick black smoke began to rise from the direction of Benjamin's log cabin. Was Benjamin's home on fire? The funeral party ran to see. It was Benjamin's log cabin! But it was too late to save anything. In the end, all that was left of the mathematician's home was a pile of smoldering timbers.

Thankfully, Benjamin's nephew had already returned George Ellicott's table, books, and astronomical tools. Additionally, per Benjamin's wishes, his nephew had given Benjamin's journals, letters, and other papers to George and his family.

Benjamin's sister had already removed their grandmother's old Bible, the wooden bed their father had made, and the mattress their mother had made. Benjamin wanted her to have them. But everything else that once belonged to Benjamin Banneker was lost in the blaze.

Benjamin's wooden clock, which had kept time for more than fifty years, had gone up in flames.

Had someone intentionally set Benjamin's house on fire? If so, why? It's an unsolved mystery to this day. One thing is for sure. If there was an arsonist who wanted to wipe out Benjamin's accomplishments, they did not succeed.

The name Benjamin Banneker shines even now.

One reason we know so much about Benjamin is because George Ellicott's daughter Martha Ellicott Tyson wrote a biographical sketch about him. Additionally, for generations, the Ellicott family took good care of Benjamin's papers and journals, even loaning them to the Maryland Historical Society so others could have access to them.

Martha remembered visiting the old, white-haired gentlemen of exceptional intelligence and kindly manner, though she was only eleven when he died. When Martha got older, her mother, Elizabeth Ellicott, encouraged her to write something about Benjamin, her father's old friend.

And so Martha conducted interviews with those who knew Benjamin well. She corresponded with his nieces and nephews. She examined primary resources like the pages from his mother's family Bible. Martha took careful notes. She compiled these firsthand accounts and wrote a remembrance of Benjamin's life. She had it read to the Maryland Historical Society, and it raised great interest.

Years later, Martha's daughter, Anne, with the encouragement of Frederick Douglass, edited her mother's work. *Banneker the Afric-American Astronomer: From the Posthumous Papers of Martha E. Tyson* was published by the Friends' Book Association of Philadelphia in 1884. Tyson's work is a rich resource that biographers use to this day.

Others who lived in the 1800s were also interested in preserving Benjamin's accomplishments. There was John H. B. Latrobe, a respected lawyer and inventor; Moses Sheppard, a well-known Baltimore businessman; and the Reverend Daniel Alexander Payne, a prominent African Methodist church leader. All of them viewed Benjamin's journals, manuscripts, letters, and correspondences at the Maryland Historical Society.

Latrobe's biographical sketch of Benjamin was published to much success. Payne gave sermons and lectures about Benjamin, and they were some of his congregants' favorites. Payne even attempted to raise funds to have a monument built over Benjamin's unmarked grave.

In 1854, a group of successful Black men in Philadelphia formed a society that encouraged

congregants: members of a religous community

intellectual and literary excellence in young Black men. They named it the Banneker Literary Institute. Members were expected to lecture and debate about politics, literature, philosophy, and of course astronomy.

In the centuries following Benjamin's death, many aimed to keep Benjamin's accomplishments alive. They did so not with the intent of elevating the man but rather to inspire those who, like Benjamin, could trace their heritage to Africa. This was especially important during those times. The majority of Black people in the United States were oppressed by a slaveholding society that had been built on the false ideology that Black people were less intelligent, less *human*, than those with white skin.

Benjamin Banneker was proof that intelligence and ability could be inherited by anyone. His achievements proved that opportunity is often all that is needed for a person's natural abilities to shine. Benjamin Banneker's life showed that it's possible to keep one's internal light beaming toward the stars despite societal darkness

Indeed, the light of Benjamin Banneker—a free, Black, self-taught colonial man of science—glows even still, just like Venus before dawn.

Did You Know?

In 1980, the United States Postal Service issued a stamp honoring Benjamin Banneker. Museums, streets, state and national parks, schools, and even an asteroid all bear his name.

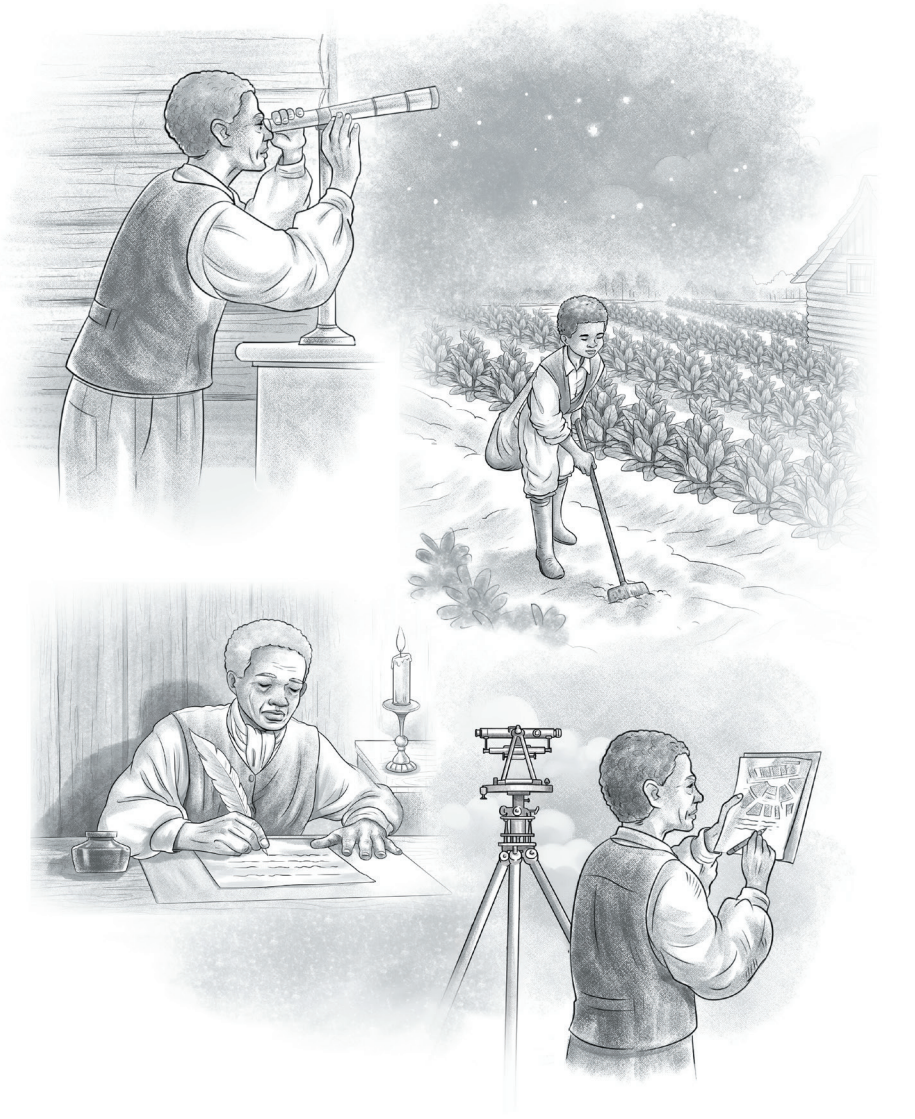
Visit!

Walk the land originally owned by the Bannekers at the Benjamin Banneker Historical Park and Museum in Maryland. Step inside a log cabin just like the one Benjamin's father built. On certain days, cook the same kinds of foods that Benjamin ate. On certain nights, peer through telescopes, and see the same stars he saw.

See a statue of Benjamin Banneker with telescope in one hand and hat in the other at the Founding of America *exhibit at the Smithsonian Institution's National Museum of African American History and Culture in Washington, D.C.*

Say What?

On March 25, 2021, a 1793 Benjamin Banneker almanac sold at auction for $42,500!



Discussion Questions

1. If you lived in Benjamin's time, do you think you would have enjoyed spending time with him? Why or why not?

2. Can you give an example of how Benjamin didn't give up and persevered despite obstacles?

3. Do you think Benjamin was grateful for having been taught how to read and write? Why or why not? Why are you glad you're able to read?

4. What do you think Benjamin hoped to accomplish by writing Thomas Jefferson, who was then secretary of state? How do you think Benjamin felt when he received a reply to his letter from Thomas Jefferson?

5. Benjamin loved solving math puzzles. Why do you think that was the case?

6. Benjamin liked to make observation about things happening in nature. He liked to write about them in his journal. What kinds of things would you like to observe in nature? Why would it be a good idea to keep a journal?

7. Even though Benjamin Banneker and George Ellicott had many differences, why do you think they became good friends anyway? How do you think they benefited from their friendship?

8. In 1791, after Thomas Jefferson read Benjamin's letter and saw his scientific work for an almanac, Jefferson replied, "I can add with truth that no body wishes more ardently to see a good system commenced for raising the condition both of their body and mind to what it ought to be." How would things have turned out differently if Thomas Jefferson had followed through and used his influence to end slavery, especially after he became the third president of the United States in 1801?

9. What challenges do you think Benjamin faced when teaching himself astronomy?

10. If you could meet Benjamin Banneker, what questions would you ask him?

11. Do you think someone intentionally burned down Benjamin's log cabin after he passed away? Why or why not?

Meet the Author

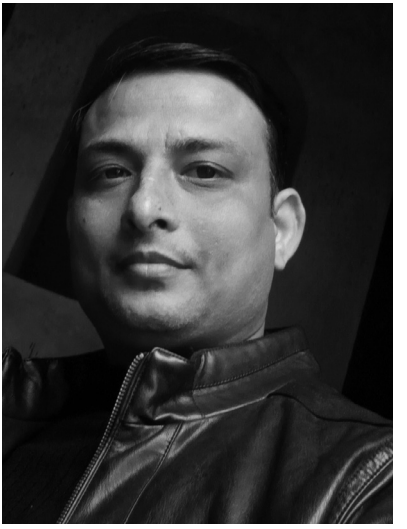
Dionna L. Mann was born in Chicago but grew up in the Windy City's south suburbs, where her imagination drove her onto her bike and into the woods on all-day make-believe adventures. She dreamed of becoming a special education teacher, and when she grew up, she got to enjoy volunteering and working in her local school system for twenty-plus years. As a researcher, Dionna enjoys discovering lesser-known individuals who shine within the margins of African American history. Her kidlit work has appeared in magazines such as *Ladybug*, *Cricket*, and *Spider* and has sold to *Highlights for Children*. As a work-for-hire author, Dionna has published titles for Scholastic Press, Lerner, Capstone, Curriculum

Associates, WETA, Core Knowledge, and Spooky Cheetah Press. Her photo-supported book for third to fifth graders, *Orcas*, can be found in Scholastic Press's award-winning Nature's Children series.

Find her online at dionnalmann.com.

The author wishes to offer a huge thanks to both Stephen Bilanow, a NASA senior geolocation analyst and historic reenactor who brings George Ellicott to life, and Breena Doyle, director and naturalist at the Benjamin Banneker Historical Park and Museum, for sharing their scientific and historical expertise with her and volunteering their time to give her manuscript a thorough look-see.

Meet the Illustrator



Santosh Neogi was born in Kolkata (in Western India). Santosh is a graduate of the Lucknow College of Arts and Crafts in Lucknow, India. Santosh draws inspiration from the colonial architecture, the captivating art galleries, and the cultural festivals that are all part of his home. These were the influences that prompted him to start painting at a very young age. Kolkata's rich culture inspires him to paint using rich tones and colours. Santosh has spent the last several years pursuing his career as a children's book illustrator.

Credits

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