Wilbur Wright
1867 - 1912
Orville Wright
1871 - 1948
American Inventors of the First Aircraft Capable of Powered, Sustained, and Controlled Flight

WILBUR WRIGHT WAS BORN on April 16, 1867, in Millville, Indiana.

ORVILLE WRIGHT WAS BORN on August 19, 1871, in Dayton, Ohio.

Their parents were Milton and Susan Wright. Milton was a minister and Susan was a homemaker. Wilbur was the third and Orville was the sixth of seven children. Two of the Wright children died as
infants. Five lived to be adults: Reuchlin, Lorin, Wilbur, Orville, and Katharine.

THE WRIGHT BROTHERS GREW UP in several places. Their father traveled often for his job, and sometimes the family moved with him. Over the years, the family lived in Cedar Rapids, Iowa; Richmond, Indiana; and Dayton, Ohio. The brothers lived in Dayton most of their lives.

The Wright household was a happy, loving place. Milton and Susan Wright encouraged their children to be curious and independent. Wilbur recalled being inspired “to investigate whatever aroused curiosity.”

Susan Wright was very mechanical. She fostered her children’s interest in the way things work. Their father wasn’t as mechanically inclined, but he did nurture his children’s fascination with things. Once, he bought them a toy helicopter powered by a rubber band. They were fascinated. They took it apart, put it back together, and made sketches of the toy. It sparked a life-long interest in flying.

The brothers were incredibly close. From childhood to adulthood, they were each other’s best friends. Wilbur once wrote: “From the time we were little children, my brother Orville and myself lived together, played together, worked together, and, in fact, thought together. We usually owned all of our toys in common, talked over our thoughts and aspirations so that nearly everything that was done in our lives has been the result of conversations, suggestions, and discussions between us.” They even had nicknames for each other. Wilbur was “Ullam” and Orville was “Bubs.”
WILBUR AND ORVILLE WRIGHT WENT TO SCHOOL at the public schools. Wilbur was a serious student. Orville was not as concerned about his studies. Once, Orville’s teacher caught him playing with a toy aircraft during class. He told her that he and Wilbur were working on building a plane that would carry them.

Wilbur planned to go to college at Yale University, but a sporting accident changed that. During his senior year, he was seriously injured while playing hockey. At that same time, his mother was diagnosed with tuberculosis. He decided to stay in Dayton and devote himself to her care. Susan Wright died of tuberculosis in 1889.

STARTING TO WORK TOGETHER: The year their mother died, Orville dropped out of high school. He’d worked several summers as a printer’s apprentice. A friend with a small press suggested they go into the printing business together. Orville agreed.

PRINTING BUSINESS: Within a year, Wilbur decided to join Orville in the printing business. They started a series of newspapers, with Wilbur as the editor. Their first paper was a weekly called The West Side News. Next, they published a daily paper called The Evening Item. They loved the creative side of running a paper, and the mechanical side, too. Their fascination and curiosity led them to build their own printing press.

The papers didn’t make much money, but the brothers learned a lot. While continuing their printing business, they began to explore other things.

BICYCLE BUSINESS: In 1892, Wilbur and Orville turned their attention to bicycles. There were new developments in bikes that made them easier to ride. Earlier bicycles were made with one big wheel
in front. They were very difficult to balance. The new bikes had two wheels of equal size and were much easier to ride. Soon people all over the country became enthusiastic cyclists. The Wright Brothers opened a shop, where they sold and repaired bicycles.

In 1896, the Wright Brothers began building their own bicycles. The name of their shop was the Wright Cycle Company. They were always eager to learn. They constantly worked on improving their
bikes and the way they were produced. They built an internal combustion engine that powered the tools in the shop. Their work on bicycles led the ever-curious brothers to one of the most exciting areas of science and invention of the time: aviation.

**AVIATION AT THE TURN OF THE 20th CENTURY:** Throughout history, flight captured the imaginations of inventors. In the 1400s, *Leonardo Da Vinci* sketched early aircraft with wings that flapped, like birds’. In the 1700s, *Jacques and Joseph Montgolfier* successfully invented a hot air balloon. In the late 1700s, George Cayley developed a “fixed wing” aircraft. (That means the wings didn’t move during flight). Cayley built the first glider to carry a human, in 1849.

By the time the Wrights got involved, people all over the world were working on flying machines. But the craft all lacked a way to control flight. Consequently, there were many failures, and deaths, in early flying attempts.

In 1896, Samuel P. Langley flew the first steam-powered model airplane in Washington, D.C. Another major figure in experimental flight was Octave Chanute. Chanute was an engineer and early champion of aviation. He sponsored inventors and innovators like the Wright brothers in developing gliders. One of those early gliders inspired the Wrights’ own design.

Also in 1896, another leader in early aviation, Otto Lilienthal, died in a glider accident. Lilienthal was the best glider pilot of the era. He had flown more than 2,000 flights in aircraft he’d designed. What caused his deadly crash was his inability to control his glider.
The Wrights read of the efforts of Langley and Chanute and the tragic death of Lilienthal. They became committed to understanding the possibilities and problems of human flight. They read everything they could about current aircraft design and engineering. Through a systematic, thorough analysis of the problems of flight, they invented the first successful airplane.

**LIFT, THRUST, AND CONTROL:** The Wright brothers focused on three problems: lift, thrust, and control. “Lift” refers to the flow of air over and under the wings, which allows the plane to become airborne. “Thrust” is the movement of the plane forward, driven by the propeller and engine. “Control” was a more complex problem. They broke that down into “pitch,” “yaw,” and “roll.” “Pitch” is the up and down movement of the plane. “Yaw” is the movement of the plane to the right or left. “Roll” refers to the motion that tips the wings up and down, allowing it to turn. Another insight into the control of an aircraft came from their knowledge of bicycles. Based on their experience, the Wrights also knew that a pilot could, like a cyclist, use his body to balance an aircraft in the air.

**LEARNING FROM BIRDS:** With all these ideas in mind, the brothers studied the flight of birds. Focusing on how the air flowed over a bird’s wing in flight, the Wrights studied how air flow created “lift.” They also noted how birds changed the shape of their wings in flight to allow turning or other maneuvers in the air.

**“WARPED WINGS”:** From his observation of birds in flight, Wilbur made an important discovery. “The thought came to me that possibly a bird adjusted the tips of its wings so as to present one tip at a positive angle and the other at a negative angle,” he wrote.
Wilbur was eager to transfer his understanding of bird flight into solving the problems of human flight. In 1899, he made a biplane kite (a biplane has two sets of wings). The biplane was flexible enough to “warp,” or twist. It mimicked the action of a bird’s wings.

The idea came to him when he twisted a long cardboard box. The sides of the box were like the biplane’s wings. As Wilbur twisted the box, one end of the wings turned up, increasing lift at that part. At the same time, the other end of the wings turned down, decreasing lift. This allowed the plane to “roll” right or left. Wilbur thought that he could control the twist, or warp, with metal cables attached to the wings on his biplane kite.

Wilbur’s biplane kite was just 5 feet across. He and Orville tested it, and it worked. Next, they wanted to build and test gliders based on their design. They needed to find a place with consistent high winds and soft landing sites. They chose a small fishing village called Kitty Hawk, North Carolina, on the Atlantic shore.
KITTY HAWK: Beginning in 1900, the Wright brothers began a series of test flights with gliders at Kitty Hawk. The winds were strong, there were tall dunes from which to launch their gliders, and the sandy shore cushioned the fall of the gliders on landing.

In their first days at Kitty Hawk, the Wrights flew the glider as a kite. There were many crashes, requiring constant rebuilding of the craft. But one of the most remarkable things about the brothers was their ability to learn from their mistakes. They were never
discouraged by the failure of a plane. They took down the data, re-
built the aircraft, and tried again.

Soon, they began flying the glider with one of them on board. These early piloted attempts produced good and bad results. The “wing warping” worked, but the craft didn’t get enough lift.

**REFINING THE AIRPLANE**: The Wrights returned to Dayton and continued to work on their aircraft. Over the next few years, they split their time between Dayton and Kitty Hawk. Back in Kitty Hawk in 1901, they tested their rebuilt craft. Once again they faced problems and crashes.
Returning to Dayton at the end of 1901, the brothers began to think there was something wrong with their data. They were using the calculations for predicting lift that had been accepted for years. They determined the data must be incorrect. So they decided to build their own experiment, from the ground up.

**THE WIND TUNNEL**: The remarkable Wright brothers, in attempting to create a better set of data, invented a device used to this day. Their wind tunnel measured the lift of an airplane wing. They tested almost 200 different wing designs in the wind tunnel. Using the data, they were able to build a better airplane wing.

When the Wright brothers returned to Kitty Hawk in 1902, they tested their new craft. The glider had enough lift. Now they concentrated on control: pitch, roll, and yaw. Both brothers took turns as pilot. In fact, they flew some 1,000 flights in just three years. They became two of the best, most experienced pilots of their time.
Like Wilbur, Orville had his share of crashes. One, he recalled, ended in “a heap of flying machine, cloth, and sticks, with me in the center without a scratch or bruise.” As always, they took the crashes in stride. They rebuilt the plane, learned from their mistakes, and moved on.

The test flight season in Kitty Hawk proved successful. Wilbur and Orville made glider flights of 622 and 615 feet each. They returned to Dayton. In the winter of 1902-03, they set their sights on a new challenge. They wanted their aircraft to be powered. So, they built a small gasoline engine, which they also designed. It was light—just 180 pounds—and produced 8 horsepower.
They made another important innovation. Unable to find propellers that fit their needs, they created their own. In another exceptional insight, the Wrights saw that a propeller functions as a wing. “It was apparent that a propeller was simply a wing traveling in a spiral course,” said Orville.

With a new plane, engine, and propellers, the Wright brothers left Dayton in the fall of 1903. They shipped the parts of the plane to Kitty Hawk, where they put it together. It was, according to Orville, “a whopper flying machine.” Called simply “The Flyer 1,” the plane was the largest they’d ever built, measuring 40 feet from wingtip to wingtip.

As always, the brothers faced failure. The propeller cracked and had to be replaced. There were other problems, too. But Wilbur and Orville persevered.

**DECEMBER 17, 1903:** On December 17, 1903, Wilbur and Orville Wright flew into history. First, it was Orville, who, at 10:35 A.M., flew the Flyer a total of 12 seconds, covering 120 feet. Next, with Wilbur at the controls, the Flyer covered 175 feet. Orville next flew 200 feet, and for the last time that day, Wilbur flew 852 feet.

The Wrights had accomplished what many thought was impossible. They had flown an aircraft capable of powered, sustained, controlled flight. But the Flyer was caught by a gust of wind that afternoon. It was destroyed and never flew again.

The Wright brothers sent their father a telegram with the news. Bishop Wright spread the news to the media.

Wilbur and Orville were eager to get back to work. They went back to Dayton, and back to work improving their aircraft. They
decided they wanted to continue building and flying aircraft in Ohio. So they built a workshop and flew out of a site called Huffman Prairie, near Dayton. (It's now the site of Wright Patterson Air Force Base.)

1904 - 1905: Over the next few years the Wright brothers built several versions of their first Flyer. They improved all aspects of the plane, and by October 1905, they had a craft that flew 39 minutes, going 24 miles around Dayton. The plane could do figure eights in the air, and could even carry passengers.
PATENTS AND PROBLEMS: The brothers knew they had to protect their invention with a patent. A patent is a document granted by a government that protects the exclusive right of an inventor to make, use, or sell his or her invention for a specific number of years. The Wrights were granted Patent Number 821-393 on May 23, 1906, “For a Flying Machine.”

Their first contract was with the U.S. Army. They agreed to develop an airplane that could fly for one hour at 40 miles per hour, and carry a pilot and a passenger.

Next, the Wrights signed an agreement with French investors to allow them to build planes in Europe according to the Wrights’ design.

PROVING THEMSELVES TO THE WORLD: In 1908, Wilbur went to France. There were many people in Europe who didn’t believe the Wrights’ claims. So Wilbur showed them, in person. He gave a series of flights for the public, who were awed by what they saw.

Orville had stayed in the U.S. to work on the Army aircraft. During testing, the plane crashed. The crash killed his passenger, an army officer named Thomas Selfridge. Orville was also seriously injured. When he was better, he went to Europe. Soon, he and Wilbur returned to the U.S. They worked on the Army aircraft and trained pilots.

In 1909, Wilbur also made his first public flights in the U.S. In New York Harbor, he flew before one million amazed spectators. Soon, Wilbur and Orville Wright became two of the most famous people in the country.
Wilbur and Orville never liked the life of fame. Still, their old friend Octave Chanute said, it was their own doing. “I know that the reception of honors becomes oppressive to modest men. But in this case you have brought the trouble on yourselves by completing the solution to a world-old problem, accomplished with great ingenuity and patience at much risk of personal injury to yourselves.”

THE WRIGHT COMPANY: In 1909, the brothers formed the Wright Company. They started a factory in Dayton to build planes. The planes were tested and flown at Huffman Prairie.

Orville and Lt. Lahm making a world’s record flight at Fort Meyer, Virginia, July 27, 1909. They flew 50 miles at 40 miles per hour.
Wilbur also had to focus on patent problems faced by the company. Several American and European firms had stolen their technology and were making planes. This was patent infringement. They had not paid the Wright brothers for the right to make and sell airplanes that were clearly based on the Wrights’ patented designs. So Wilbur sued these companies in court. This took up much of his time, and took him away from the planes and flying he loved. The company lost its edge over the competition.

A GLIMPSE OF THE WRIGHT BROTHERS IN THEIR TIMES: In 1910, Wilbur and Orville were interviewed by journalist Kate Carews. She described them this way: “Wilbur is the bald Wright brother, Orville the Wright brother with a mustache. Wilbur is all action, Orville looks as if he has affections as well. Wilbur is a family cut-up. Orville you’d go to with your troubles.”
In that same interview, Carews asked the Wright brothers about the future of flight. She asked if planes would ever be used to transport people in large numbers, as trains did. “No,” said Wilbur. “That would be too expensive.” Asked if planes would ever carry freight, he again replied “No.”

Asked about the airplane’s use in war, Wilbur said they’d be used for scouting, but never for transporting troops.

Instead, the Wright brothers imagined airplanes becoming “automobiles of the air.” Orville imagined “stations in every town for landing a launching of flying machines and the supply of gasoline.”

**WILBUR’S DEATH:** Worn out from the effort to defend their patents, Wilbur became very ill. He came down with typhoid fever and died on May 30, 1912. He was just 45 years old. His father, Bishop Milton Wright remembered him this way: “A short life, full of consequences. An unfailing intellect, imperturbable temper, great self-reliance and as great modesty, seeing the right clearly, pursuing it steadily, he lived and died.”

**ORVILLE’S LATER LIFE:** After Wilbur died, Orville stayed on at the Wright Company until 1915. That year, he sold his part of the company. But he stayed involved with aviation. He continued to work on improvements in aircraft. He was a member of the National Advisory Committee for Aeronautics. That group eventually became NASA (National Aeronautics and Space Administration).

Orville also served as a consultant during World War I for aircraft developed for military use. He became a famous, honored figure in America and throughout the world.
WILBUR AND ORVILLE WRIGHT'S HOME AND FAMILY: The Wright Brothers lived most of their lives in Dayton. Neither of them ever married or had children. They remained close to their siblings, especially their sister, Katharine. Orville Wright suffered a heart attack and died on January 30, 1948.

THEIR INVENTIONS: The Wright Brothers are two of the most important inventors in history. They invented the very first aircraft that was capable of powered, sustained, and controlled flight.
Their vision and accomplishment stand as one of the most important achievements in the history of invention. As Darrel Collins of the Kitty Hawk National Memorial stated, “Before the Wright Brothers, no one in aviation did anything fundamentally right. Since the Wright Brothers, no one has done anything fundamentally different.”

The plaque next to a replica of the 1903 airplane in the Air and Space Museum outlines their contribution. “By original scientific research, the Wright Brothers discovered the principles of human flight. As inventors, builders, and flyers, they further developed the aeroplane, taught man to fly, and opened the era of aviation.”

Wilbur and Orville Wright’s invention changed the way we live. Air travel, made possible by their invention, has transformed our world. Every part of the Earth is now reachable by airplane. Their invention shrunk the boundaries that separated the people of the world. Space travel, which promises to shrink the boundaries of our solar system and beyond, is an advancement made possible by the remarkable Wright brothers.

WORLD WIDE WEB SITES:
http://wright.nasa.gov/wilbur.htm
http://www.first-to-fly.com/History/Wright
http://www.nasm.si.edu/wrightbrothers/
http://www.nps.gov/wrbr/