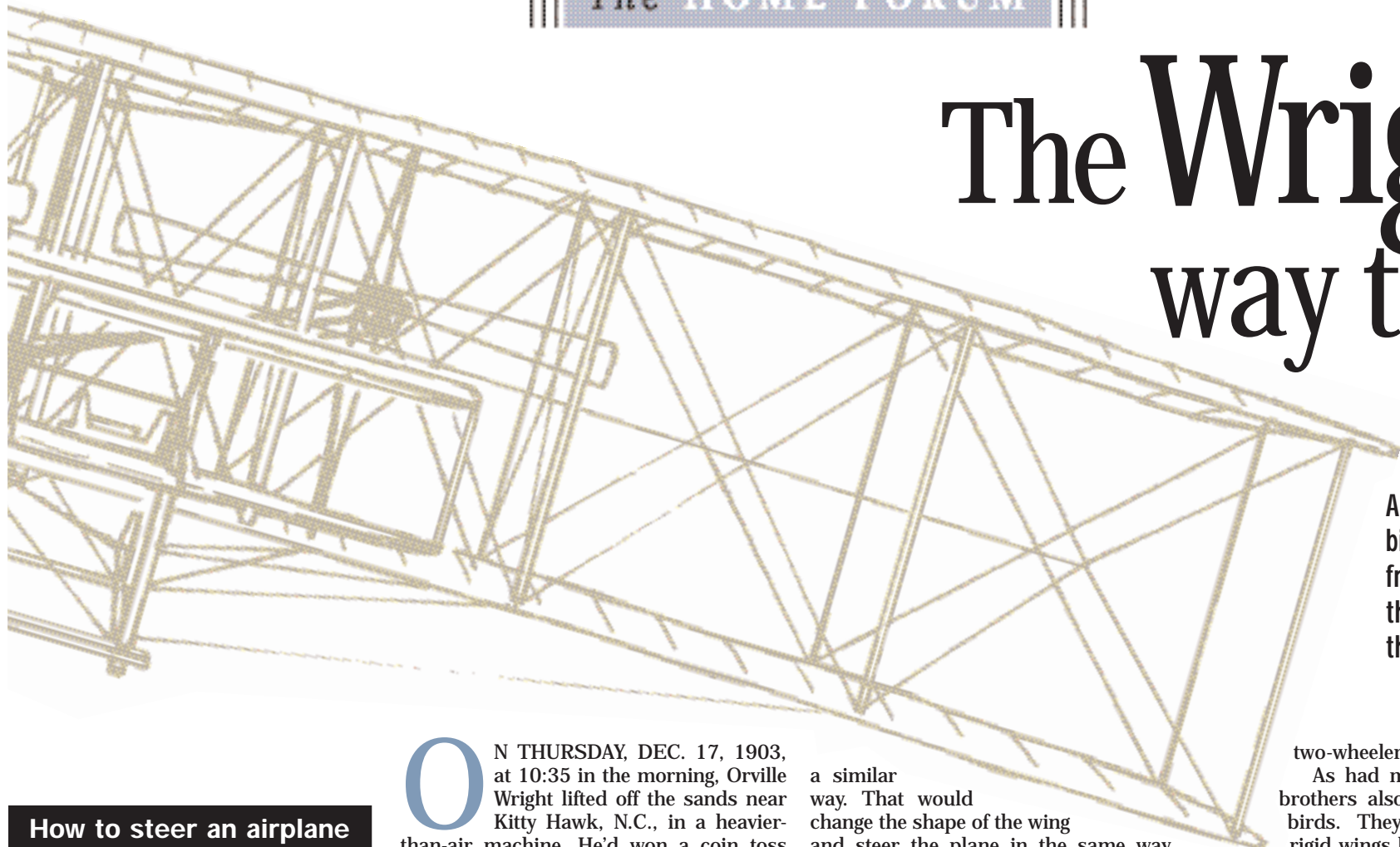


The HOME FORUM

# The Wright way to fly



A century ago, two bicycle mechanics from Ohio propelled the world into the Age of Aviation.

two-wheeler, it could be done.

As had many before them, the brothers also studied the flight of birds. They concluded that the rigid wings birds use to soar were a better model for airplane wings than the flapping motion birds use to propel themselves through the air. (Many thought that flapping was the way to go.)

**O**N THURSDAY, DEC. 17, 1903, at 10:35 in the morning, Orville Wright lifted off the sands near Kitty Hawk, N.C., in a heavier-than-air machine. He'd won a coin toss with his older brother Wilbur to be the pilot. The machine bucked like a bronco, but managed to reach an altitude of 10 feet, covering 120 feet in about 12 seconds. The era of air travel had begun. A mere 66 years later, humans landed on the moon.

a similar way. That would change the shape of the wing and steer the plane in the same way birds shape their wings to change directions. In modern aircraft, ailerons do the same thing. (Ailerons are the movable flaps on the trailing edges of airplane wings.)

**Were they really the first to fly?**

The Wrights built upon the work of many flight pioneers. But aviation scholars agree that the Wrights hold clear title to the world's first successful airplane. It's a much clearer claim, in fact, than Thomas Edison has to the invention of the light bulb or Alexander Graham Bell to the telephone.

Samuel Langley, a noted scientist at the time, was backed by the Smithsonian Institution. It looked as though he would be the first to fly an airplane. But his craft crashed just a few days before the Wright brothers' successful flight. A

Brazilian living in Paris, Alberto Santos-Dumont, was already famous for his hot-air balloon flights. He flew an airplane of his own design in 1905. At the time, Europe was skeptical of the Wrights' claim.

**What kind of research did they do?**

The Wrights wrote to the Smithsonian Institution for information on flying, including results of previous experiments. They used their knowledge of bicycles to apply principles of balance to flight. Some thought that flying would involve too many complex movements for a human to master. The brothers' experience with bicycles gave them confidence that, like riding a

**What exactly did the Wright brothers accomplish that day?**

Theirs was the first sustained, controlled flight in a heavier-than-air machine (lighter-than-air balloons first hoisted humans in 1783). To do this, the Wrights had to solve many engineering problems. "They were the first to realize," says Tom Crouch, "that the airplane was going to be a complicated machine made up of individual systems, all of which would have to mesh if it was going to work." Mr. Crouch is senior curator at the National Air and Space Museum in Washington, D.C. The Wrights saw that the big problem wasn't getting a plane into the sky, but controlling it in flight. This involved mastering three kinds of movement: pitch, roll, and yaw. (See illustration, left.)

**What was 'wing warping'?**

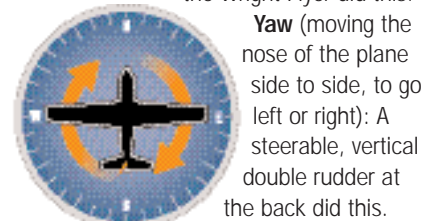
The brothers knew that they needed to be able to turn right or left in the air. One day Orville was twisting an empty bicycle inner-tube box. (As you probably know, the brothers owned a bicycle shop in Dayton, Ohio.) He suddenly realized that an airplane wing could be twisted, or warped, in

**How to steer an airplane**

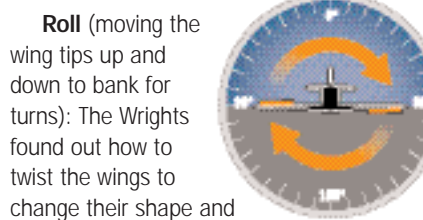
ONE OF THE Wright brothers' breakthroughs was the way they solved the problem of controlling a plane in flight. A pilot must be able to steer a plane in three dimensions:



**Pitch** (moving the nose of the airplane up and down to fly higher or lower): The two small wings at the front of the Wright Flyer did this.



**Yaw** (moving the nose of the plane side to side, to go left or right): A steerable, vertical double rudder at the back did this.



**Roll** (moving the wing tips up and down to bank for turns): The Wrights found out how to twist the wings to change their shape and thereby increase or decrease lift. They called it 'wing warping.' Today, 'roll' is controlled by ailerons, flaps on the back edge of the wings.

**Why was one wing of their airplane 4 inches longer than the other?**

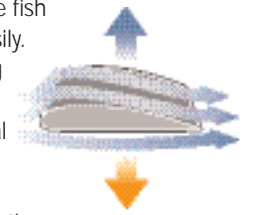
The gasoline engine designed by the brothers weighed 170 pounds and produced 12 horsepower – about twice as powerful as the average lawn mower today. It was mounted next to the pilot, who flew lying down. The extra weight on the engine's side of the craft was offset by the increased lift from the longer wing. Still, someone had to run alongside the plane during takeoff to hold the wing up until the plane rose into the air. So that was Wilbur's job on the first flight.

Gregory M. Lamb

**How airplanes stay up**

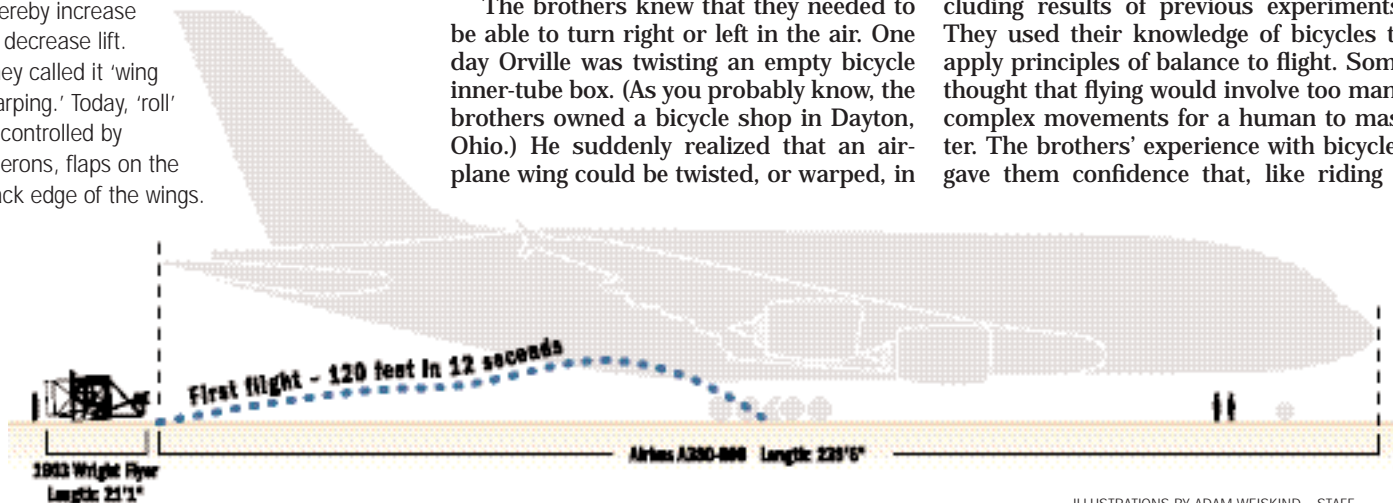
Airplanes fly because their wings are shaped in a special way. Look at the illustration: The wing is round in front and narrows to a point in the back. It looks sort of like a fish. This 'streamlined' shape helps the wing move through the air (and the fish through water) very easily.

Unlike a fish, a wing is flat on the bottom. This creates an unequal flow of air above and below the wing. The unequal air flow means the pressure of the air above the wing is less than the air pressure beneath it. The unequal pressure creates an upward force called 'lift,' which keeps the plane in the air.



Looking at it another way, the rush of air coming down off the top of the wing is pushing down at an angle. Pushing the air down pushes the wing up, creating more lift.

Source: Retired NASA physicist David P. Stern



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