SMITHSONIAN

IN YOUR CLASSROOM

SPRING 2003

History through Primary Sources

STORIES OF THE WRIGHTS' FLIGHT

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Smithsonian Institution

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Smithsonian in Your Classroom is produced by the Smithsonian Center for Education and Museum Studies. Teachers may duplicate these materials for educational purposes.

This issue is part of a series that employs primary sources in the study of historical events. Students compare firsthand accounts of the Wright brothers' first flights on December 17, 1903, and then compare these to a secondary source, a newspaper story that appeared the next day.

Our definitions of *primary source* and *secondary source* are those used by the Smithsonian Archives:

Primary sources are documents or objects created as part of daily life—birth certificates, photographs, diaries, letters, etc.—or reports from people directly involved in the subject.

Secondary sources are documents that interpret, analyze, or synthesize information, usually produced by someone not directly involved in the subject.

THE LESSON ADDRESSES THE FOLLOWING STANDARDS:

National Standard for History

The student understands the development of technological innovations and the major scientists and inventors associated with them. Therefore, the student is able to identify and describe the significant achievements of important scientists and inventors.

National Standards for Historical Thinking

The student engages in historical analysis and interpretation. Therefore the student is able to

- consider multiple perspectives in the records of human experience
- distinguish fact and fiction by comparing documentary sources on historical figures and events

The student conducts historical research. Therefore, the student is able to

- interrogate historical data
- formulate historical questions from encounters with historical documents and other records from the past
- obtain historical data from a variety of sources

National Language Arts Standards

Students conduct research by generating ideas and questions, and by posing problems. They gather, evaluate, and synthesize data from a variety of sources (e.g., print and non-print texts, artifacts, people) to communicate their discoveries.

The most important artifact of the Wright brothers' story, the 1903 Wright Flyer, is the centerpiece of the Smithsonian National Air and Space Museum. To celebrate the centennial of the first flight, the museum will open *The Wright Brothers & the Invention of the Aerial Age* on October 11, 2003. This sweeping exhibition will include interactive stations, rarely seen photographs, and such artifacts as a Wright-built bicycle and pieces of wood and fabric from the Flyer that were carried to the moon on the Apollo 11 mission. An online version of the exhibition will debut this summer at **www.nasm.si.edu/wrightbrothers**. The exhibition is made possible through the generous sponsorship of Alcoa.

Among the many letters the Smithsonian received on June 2, 1899, was a request for information on human flight. The writer, Wilbur Wright of Dayton, Ohio, wished to obtain "such papers as the Smithsonian Institution has published on this subject, and if possible a list of other works in print in the English language." Wilbur Wright was unknown to the Smithsonian. He and his younger brother, Orville, were co-owners of a small shop that sold hand-built bicycles. Wilbur's letter affirmed his obscurity—he saw fit to mention that he was not a "crank."

"I am an enthusiast, but not a crank in the sense that I have some pet theories as to the proper construction of a flying machine," he wrote. "I wish to avail myself of all that is already known and then if possible add my mite [little bit] to help on the future worker who will attain final success."

Wilbur and Orville, thirty-two and twenty-eight years old in 1899, lived together in the Wright family house, along with their sister, Katharine, and their father, Milton, a bishop of an evangelical church. The brothers became interested in flight as children, when their father brought home a little flying toy powered by a rubber band. Their interest was renewed in 1896, when they read about a German experimenter named Otto Lilienthal and his fatal crash in what we would now call a hang glider. The Wrights did not have "pet theories" about flying, but they quickly identified the crucial problem of aviation at the time—the lack of a means of maintaining balance and control.

A Smithsonian official responded to Wilbur's letter by sending several pamphlets and a list of books. In a note, he mentioned that a book by Smithsonian Secretary Samuel P. Langley, *Experiments in Aerodynamics,* was available for one dollar. Wilbur promptly sent a note of thanks and a dollar for the Langley work.

Thus ended what Wright brothers biographer Tom D. Crouch has called "the most important exchange of correspondence in the history of the Smithsonian." A little more than a year after the Wrights began studying the pamphlets, they were well on their way to solving the problems of balance and control. In less than five years, they solved every problem that had prevented humanity from taking wing. On December 17, 1903, Orville Wright flew in a motor-powered craft for twelve seconds across 120 feet of sand near Kitty Hawk, North Carolina. It was, as Orville put it, "the first time in the history of the world that a machine carrying a man and driven by a motor had lifted itself from the ground in free flight."

WING WARPING

When the Wrights began their studies of aviation, they did not overlook the great experts on the subject—the birds. In his letter to the Smithsonian, Wilbur wrote that birds "are the most perfectly trained gymnasts in the world and are specially well fitted for their work, and it may be that man will never equal them."

The first flight, December 17, 1903, at the moment of takeoff

Wilbur became particularly interested in the turkey vulture, or buzzard. He noted that when one wing tip is twisted upward and the other downward, the buzzard "becomes an animated windmill and instantly begins to turn."

The brothers began to think about mechanisms that would similarly "warp" the wings of a flying machine and allow the pilot to maintain lateral balance and to make lateral turns. Wilbur happened upon an idea one day at the bicycle shop. While talking to a customer, he idly picked up a cardboard container for a bicycle inner tube, which was empty and open at both ends. Holding the rectangular box in both hands, he pressed down on opposite corners. The other two corners moved simultaneously—one went up and the other went down—but the box otherwise retained its shape. Imagining the box as a span of wings, he saw that wing tips could be simultaneously warped, perhaps by a system of wires.

In the summer of 1899, the Wrights designed such a system for a biplane kite. When they were satisfied that the system could be applied to a "man-carrying" glider, they traveled to Kitty Hawk, North Carolina, to test the glider.

WHY KITTY HAWK?

The optimum wind speed for the glider's wing design, according to air pressure tables published by Otto Lilienthal, was between fifteen and twenty miles an hour. From the U.S. Weather Bureau, the Wrights learned that the weather station at Kitty Hawk, on the Outer Banks of North Carolina, was one of the windiest places in the country. The average wind speed was about sixteen miles an hour in September. They decided to make the tests in September of 1900.

Kitty Hawk had other things going for it. It had high, treeless hills for launching the glider and broad sand beaches for soft landings. The Wrights made a trip there every year between 1900 and 1903, each time testing an improvement on their design. They lived on their own on the dunes, first in a wind-whipped tent, then in a hand-built shed.

Kitty Hawk postmaster William J. Tate later wrote that the people of this remote outpost of the South regarded the visitors as "a pair of harmless nuts, not dangerous, but simply crazy on the subject of flying." Nevertheless, the Wrights found themselves with many volunteer helpers at Kitty Hawk—a ground crew of sorts, which came to include men from the U.S. Life-Saving Service, an antecedent of the Coast Guard.

The Wrights were pleased with the system of control on the 1900 glider, but with a pilot on board they could get off the ground only in dangerously strong winds. When they returned to Kitty Hawk the next year, they tested larger and more deeply curved wings. The results were again disappointing. Orville wrote that the tests confirmed "the belief already formed that the accepted tables of air pressure were not to be altogether relied upon."

BREAKTHROUGH

Back in Dayton in the fall of 1901, the Wrights constructed a wind tunnel out of a wooden box. A fan at one end of the box blew a steady, straight stream of air against mounted miniature wings. They made observations through a glass panel in the top of the box. By measuring the factors of lift and wind resistance, they were able to prove that Lilienthal's calculations were incorrect.

But now, with this device, they could study an endless variety of wing shapes and sizes. When they returned to North Carolina in 1902, they made nearly a thousand flights on wings designed according to their own data.

From the beginning, the Wrights believed that putting a motor on a flying machine would be relatively easy. The patent that would eventually make them wealthy men was not for a motorized machine, but for the method of control embodied in the 1902 glider.

"In every meaningful sense," says Smithsonian curator Peter Jakab, the glider "flew just as a Boeing 747 airliner or a modern jet fighter flies, and it was the first machine ever to do so."

TAKEOFF

The 1903 Wright Flyer had the same basic structure as the 1902 glider, but it was larger and sturdier to accommodate the weight of the motor, the transmission system, and two rear-mounted propellers. It had a wingspan of just over forty feet and weighed just over six hundred pounds. A front rudder, or elevator, controlled up-and-down motion. A rear rudder controlled side-to-side motion. The wing-warping system controlled the roll of the craft. The pilot, lying prone on the bottom wing, could operate the front rudder with a lever. He could operate the rear rudder and the wing-warping system simultaneously by shifting his hips.

On the underside were two skids that rested on a little trolley. The trolley fit over a monorail track. The Flyer would move along the track to build up speed for takeoff.

On December 14, 1903, the Wrights laid sixty feet of the track down a slope of a sand hill. With the help of the lifesaving men, they carried the Flyer to the top. They tossed a coin to decide who would take the first turn as pilot. Wilbur won.

Orville held on to one of the wing tips and ran alongside to steady the Flyer as it rolled down the track. It moved so fast that in just a moment he had to let go. Wilbur turned up the front rudder, but at too sharp an angle. After rising about fifteen feet, the Flyer stalled and fell back down to the sand.

For their next attempt, on the morning of December 17, the Wrights laid the track on the sand flats. It was windy enough that they did not need the extra force of gravity. A successful launch from level ground would be better proof that the machine could lift itself.

It was Orville's turn to be pilot. On this, the historic twelve-second flight, he had the same kind of trouble—the front rudder responded too readily, so that the Flyer rode bumpily on the air. Each brother took two turns that morning. On the fourth flight, Wilbur stayed in the air for almost a minute and traveled 852 feet.

While the brothers were discussing what to do next, a strong wind tipped the Flyer. One of the lifesaving men, John T. Daniels, tried to hold on to it, but got tangled in the wires and went tumbling away with the machine. Daniels suffered a few bruises. For the rest of his life he would say that he was the first victim of an airplane crash.

The Flyer could not be fixed at Kitty Hawk, but it hardly mattered. The brothers were eager to get back to Dayton for Christmas. As they told the press a few weeks later, "We at once packed our goods and returned home, knowing that the age of the flying machine had come at last."

Pam Henson

As director of the Institutional History Division of the Smithsonian Archives, Pam Henson is the keeper of American history at the points where it intersects with the Smithsonian's history. The archives include financial records, photographs, portraits, blueprints, newspaper clippings, and thousands of pieces of correspondence, including Wilbur Wright's first letter to the Smithsonian. "Institutional history" is a rather cold term for what Pam finds in these primary sources—an intimate understanding of people who have been involved with the institution.

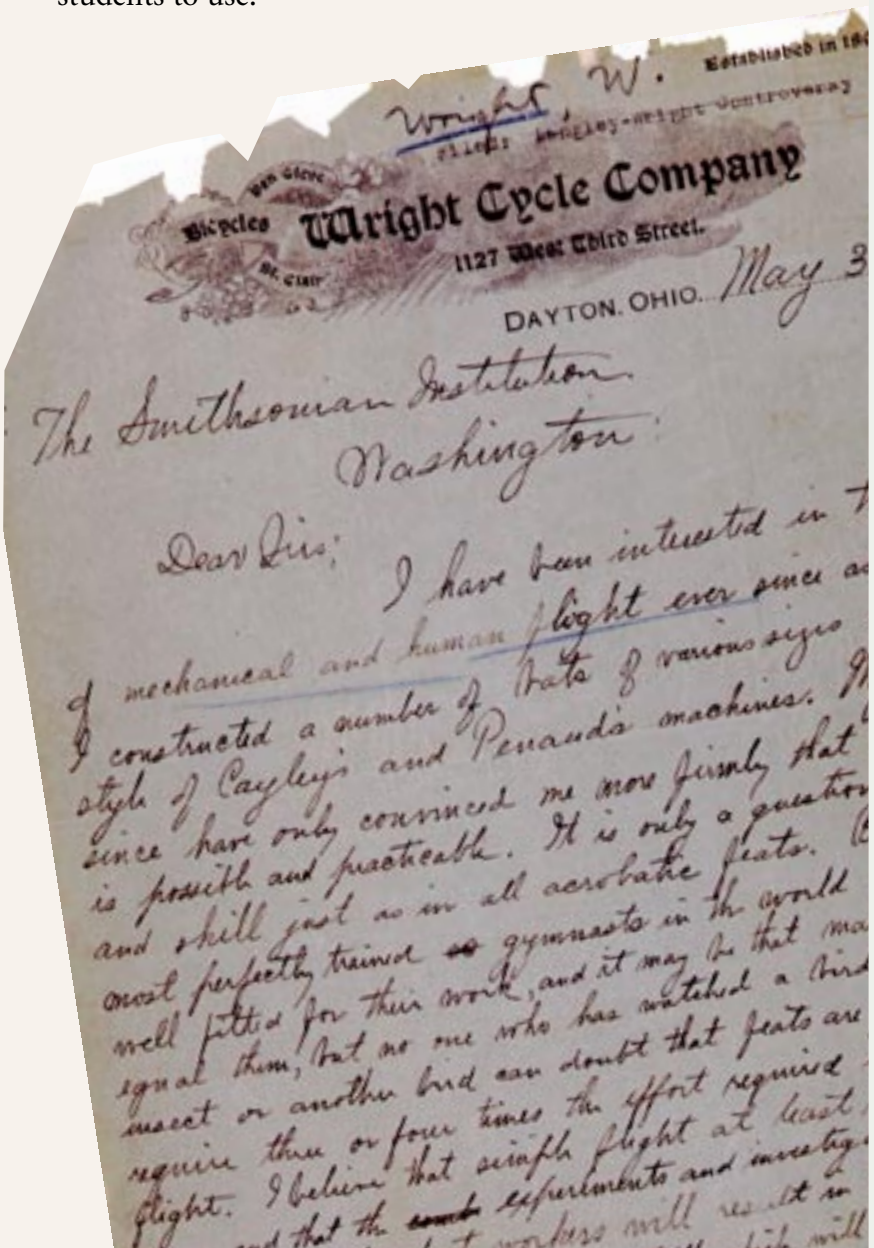
"The Wright letter is *physically* revealing," she said. "The letterhead shows that they were not at an engineering firm. They were in a bicycle shop. You see that they were fairly modest in the way they present themselves. You get that, their quietness and modesty, but also their seriousness of purpose. They were systematically going about things. They were going to the experts first. It conveys exactly where they were at that point in time."

Pam spoke to us in the week after the *Columbia* disaster. In the television coverage, she recognized the kind of inchoate history that is in the first newspaper reports of the Wrights' historic flight.

"There were the speculations that very quickly disappear," she said of the *Columbia* story. *"Can this be terrorism?* That was a silly kind of speculation. Then you heard things that sounded like rumor but might turn out to be very important. A reporter had heard of someone in California who saw debris. At first this seemed unlikely, but it turned out to be a Cal Tech astronomer. This evidence might show exactly where the failure began."

As Pam sees it, newspapers occupy a "gray area" between primary and secondary sources. A firsthand account of an event in a newspaper article is a primary source; a reporter's synthesis of information is a secondary source.

"It's a matter of who's saying it," she said. "It's instinctive for us to go to the people who actually experienced an event. Think of the questions that are asked in court. Were you an *eyewitness?* Is this *hearsay?* Those are good analytical terms for students to use."


Wright Cycle Company
1127 West Third Street.
DAYTON, OHIO. May 3
The Smithsonian Institution
Washington
Dear Sirs:
I have been interested in
mechanical and human flight ever since a
I constructed a number of kites & various sizes
style of Cayley's and Penaud's machines. S
since have only convinced me more firmly that
is possible and practicable. It is only a question
and skill just as in all acrobatic feats.
most perfectly trained gymnasts in the world
well fitted for their work, and it may be that ma
equal them, but no one who has watched a bird
insect or another bird can doubt that feats are
require three or four times the effort required
flight. I believe that simple flight at least
and that the experiments and investig

For this lesson, students get into five groups. Each group examines one of the primary source documents on pages 8–12, looking for answers to specific questions about the Wright brothers' first flights. The students come together to compare answers, to discuss the reliability of the sources, and to reach conclusions about the best—or most likely—answers to the questions. They then compare their work to a secondary source, an article that appeared the next day, December 18, 1903, in the Norfolk *Virginian-Pilot.*

The primary source documents are **a)** Orville Wright's diary entry for December 17, 1903, **b)** a telegram Orville sent to Bishop Milton Wright on the same day, **c)** a letter in which Bishop Wright reports the news to a journalist, **d)** an oral history of the first flights by the lifesaving man John T. Daniels, and **e)** the Wright brothers' recollections of the flights, from a magazine article they wrote in 1908.

PREPARATION

Make enough copies of the primary source documents to give every student a copy of his or her group's document. Make enough copies of the graphic organizer on page 7 and the newspaper article on page 13 for everyone in the class. You may choose to use printouts from the new Web site of the Smithsonian Center for Education and Museum Studies, **www.SmithsonianEducation.org.** There, the documents appear in fuller form. The newspaper article appears in its entirety.

VOCABULARY

aeronautics, alchemist, altitude, ascent, discontinuance, glider, hummock, lateral, maneuver, mythical, navigator, rigors, rudder, sidling, stature, velocity

BACKGROUND OF THE *VIRGINIAN-PILOT* STORY

After the last flight on December 17, the Wrights walked to Kitty Hawk to send the telegram to their father. In their message, they asked him to inform the press because they wanted the big news to break in their hometown. The Kitty Hawk operator sent the message to a relay office in Norfolk, Virginia. The Norfolk operator tapped back a reply: he wanted to know if he could share the story with a friend of his, a young reporter for the *Virginian-Pilot.* "Positively no," said the Wright brothers. But the operator could not help himself. That afternoon, the reporter friend burst into the *Virginian-Pilot* city room with the bootlegged news.

The city editor filled out the few facts with information from sources in the Kitty Hawk area—and, it seems, with pure fantasy. The Wrights' thirty-word telegram about the brief, fluttering flights grew into a story headlined FLYING MACHINE SOARS 3 MILES IN TEETH OF HIGH WIND OVER SAND HILLS AND WAVES AT KITTY HAWK ON CAROLINA COAST. The editor was "able to state authentically" that Wilbur Wright executed "all sorts of maneuvers" before letting go a cry of "Eureka" like "the alchemist of old."

The Associated Press picked up the story while the Wrights were on their way back to Dayton by train. At the depot in Huntington, West Virginia, they sent a telegram to their sister, Katharine Wright, that put a punch line on the whole episode: "Have survived perilous trip reported in papers. Home tonight."

Step One

Hand out the primary source documents. As the groups read their assigned documents, hand out the graphic organizer, which contains these questions:

- When did the flights take place (date/time of day)?
- Where did the flights take place (town/state)?
- Who flew the plane?
- What was the time/distance/altitude/speed of the longest flight?
- Where was the plane launched (an incline or level ground)?
- Why did the flights end?
- Who witnessed the flights?

Each group should fill out only one row of the organizer. (Group A fills out the Document A row, etc.) In answering the questions, students should only use information contained in the assigned document. They should not draw upon anything they've previously learned about the Wright brothers.

Let the students know that not every document contains an answer to every question. If they come to a question without an answer, they should put down a question mark.

Step Two

Ask each group to summarize its assigned document for the class and to report its answers to the questions. Have all of the students follow along by writing down the other groups' answers on the organizer. You might also reproduce the organizer on the board or on an overhead for the whole class to see.

Again, question marks will suffice for unanswerable questions.

Step Three

As a class, address the question at the end of each column: *What seems to be the best answer?* Try to reach a consensus. When there are discrepancies between the groups' answers in the columns, ask students to consider factors that would affect the reliability of sources—distance from the event, reliance on memory, reliance on hearsay, etc.

An example of a discrepancy: Orville Wright's telegram says that the longest flight lasted fifty-seven seconds, but he says in his diary that it lasted fifty-nine seconds. Bishop Wright says fifty-seven seconds in his letter. Should the bishop's statement be taken as good supporting evidence?

A study of the documents should reveal that the bishop relied on the information in the telegram. At some point in the relays of the message, Orville's report of fifty-nine seconds—the correct time—was misstated or mistyped. Students might have noticed a detail that calls the accuracy of the telegram into question: Orville became "Orevelle."

There will be times when no amount of study will reveal conclusive answers. Students will have to decide if, as historians, they should reach an answer based on inference or if they should let the question go as unanswerable.

Step Four

Hand out copies of the Norfolk *Virginian-Pilot* article, which Bishop Wright calls "friendly, though incorrect."

Ask students to read the story and mark anything that differs from the conclusions on the graphic organizer.

As a class, make a list of the differences that the students found. What accounts for the differences? Does it seem that the writer of the article was on the scene at Kitty Hawk?

The students will probably agree that the newspaper story is almost entirely inaccurate, but is it entirely without value?

Says Smithsonian archivist Pam Henson: "The article tells us how newsworthy this event was. The inventors are compared to Archimedes [the alchemist]. So although we have to question the facts, it is useful to see how such an event was received."

ASSESSMENT

To assess the students' understanding of the use of primary source documents in this lesson, you might ask each student to

- Select the document that he or she thinks is the most reliable account of the events
- List the advantages and disadvantages of using primary source documents

EXTENSION OR ENRICHMENT

Assign an essay in which students use the documents as the basis for a well-rounded description of the events of December 17, 1903. They should attempt to answer the basic journalistic questions: Who? What? When? Where? Why?

They may find that all of the answers lead to a *why* question. The flights were made at Kitty Hawk, North Carolina, but *why* Kitty Hawk? The flights were made by the Wright brothers, but behind this fact is the ultimate question of the story: *Why* the Wright brothers? Why did these two bicycle builders succeed in solving a problem that had been on the human mind for centuries?

Students will have to look beyond the documents for answers. If they concluded from the lesson that firsthand accounts are valuable research sources, direct them to our Web site, **www.SmithsonianEducation.org**. It includes a repository of excerpts from the Wrights' letters, diaries, and magazine articles. The passages are arranged according to subject. For more of the Wrights' accounts of December 17, click on "The Wrights Write" and then "First Flight."

	When did the flights take place (date/time of day)?	Where did the flights take place (town/state)?	Who flew the plane?	What was the time/ distance/altitude/ speed of the longest flight?	Where was the plane launched (an incline or level ground)?	Why did the flights end?	Who witnessed the flights?
GROUP A							
GROUP B							
GROUP C							
GROUP D							
GROUP E							
WHAT SEEMS TO BE THE BEST ANSWER?							

GROUP A

Orville Wright's diary, December 17, 1903

Orville's diary

After running the engine and propellers a few minutes to get them in working order, I got on the machine at 10:35 for the first trial. . . . On slipping the rope the machine started off increasing in speed to probably 7 or 8 miles. . . . Mr. Daniels took a picture just as it left the tracks. I found the control of the front rudder quite difficult. . . . As a result the machine would rise suddenly to about 10 ft. and then as suddenly, on turning the rudder, dart for the ground. A sudden dart when out about 100 feet from the end of the tracks ended the flight. Time about 12 seconds (not known exactly as watch was not promptly stopped.) . . .

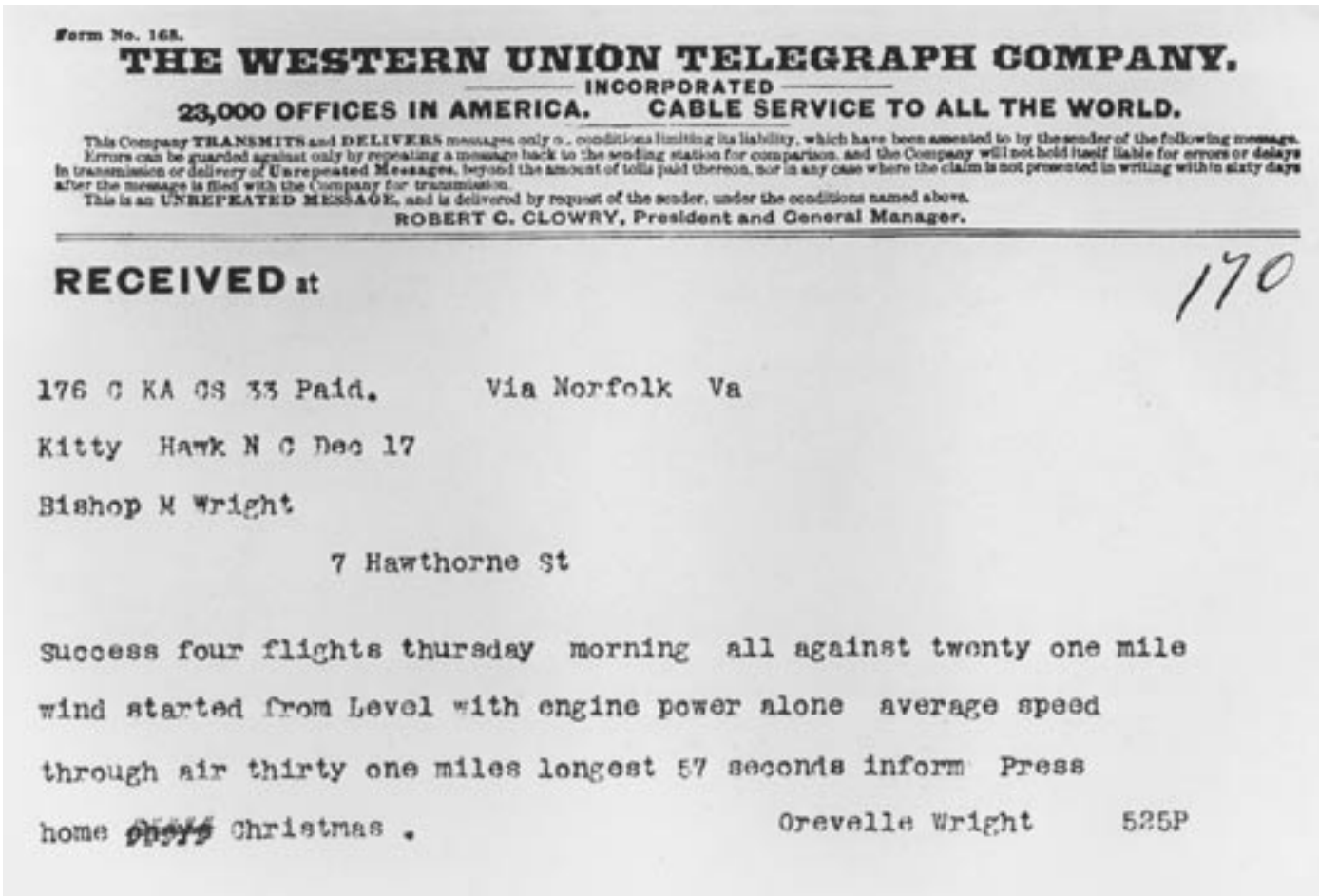
After repairs, at 20 min. after 11 o'clock Will made the second trial. The course was about like mine, up and down but a little longer over the ground though about the same in time. Dist. not measured but about 175 ft. . . .

At about 20 minutes till 12 o'clock I made the third trial. When out about the same distance as Will's, I met with a strong gust from the left which raised the left wing and sidled the machine off to the right in a lively manner. . . . At the time of its sidling it had raised to a height of probably 12 to 14 feet.

At just 12 o'clock Will started on the fourth and last trip. The machine started off with its ups and downs as it had before, but by the time he had gone over three or four hundred feet he had it under much better control, and was traveling on a fairly even course. It proceeded in this manner till it reached a small hummock out about 800 feet from the starting ways, when it began its pitching again and suddenly darted into the ground. The front rudder frame was badly broken up, but the main frame suffered none at all. The distance over the ground was 852 feet in 59 seconds.

GROUP B

Telegram from Orville to his father, December 17, 1903



Form No. 168.

THE WESTERN UNION TELEGRAPH COMPANY.

INCORPORATED

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This is an **UNREPEATED MESSAGE**, and is delivered by request of the sender, under the conditions named above.

ROBERT C. CLOWRY, President and General Manager.

RECEIVED at 170

176 C KA CS 33 Paid. Via Norfolk Va

Kitty Hawk N C Dec 17

Bishop M Wright

7 Hawthorne St

Success four flights thursday morning all against twenty one mile wind started from Level with engine power alone average speed through air thirty one miles longest 57 seconds inform Press home ~~Christ~~ Christmas .

Orevelle Wright 525P

GROUP C

Letter from Bishop Milton Wright to a journalist, December 22, 1903

Bishop Wright

My sons Wilbur and Orville are expected under the parental roof—always their home—within a few days. . . . The Norfolk dispatch was evidently a friendly, though incorrect report. My sons say their four successful flights . . . were "from the level." There are two screw propellers directly behind the double-decked aeroplane and none under it for uplifting it. To get under headway they laid a single-rail track straight down the hill, but began flight from the level. . . . I do not know the distance of each several flight, but from the time maximum, of 57 seconds, no one flight could have exceeded a thousand feet. All reported as to what Orville or Wilbur said is not so unlikely, but probably mythical. The height of ascent I do not know, but certainly they aimed it should not be above about thirty feet. . . .

P.S. Wilbur is 36, Orville 32, and they are as inseparable as twins. For several years they have read up on aeronautics as a physician would read his books, and they have studied, discussed, and experimented together. Natural workmen, they have invented, constructed, and operated their gliders, and finally their "Wright Flyer," jointly, all at their own personal expense. About equal credit is due each.

The Wright family house

GROUP D

John T. Daniels in an interview with Collier's Weekly, *September 17, 1927*

Men of the Life-Saving Service at Kill Devil Hills, North Carolina

We knew that they were going to fly, but we didn't know what was going to happen when they did. We had watched them for several years and seen how they figured everything out before they attempted it.

We had seen the glider fly without an engine, and when those boys put an engine in it we knew that they knew exactly what they were doing.

Adam Etheridge, Will Dough, W.C. Brinkley, Johnny Moore and myself were there on the morning of December 17th. We were a serious lot. Nobody felt like talking.

Wilbur and Orville walked off from us and stood close together on the beach, talking low to each other for some time. After a while they shook hands, and we couldn't help notice how they held on to each other's hand, sort 'o like they hated to let go; like two folks parting who weren't sure they'd ever see each other again. . . .

Orville climbed into the machine, the engine was started up and we helped steady it down the monorail until it got under way. The thing went off with a rush and left the rail as pretty as you please, going straight out into the air maybe 120 feet when one of its wings tilted and caught in the sand, and the thing stopped.

We got it back up on the hill again, and this time Wilbur got in. The machine got a better start this time and went off like a bird. It flew near about a quarter of a mile, but was flying low, and Wilbur must have miscalculated the height of a sand ridge just where he expected to turn, and the rudder hit the sand. He brought the plane down, and we dragged it back to the hill again.

They were going to fix the rudder and try another flight when I got my first—and, God help me—my last flight.

A breeze that had been blowing about twenty-five miles an hour suddenly jumped to thirty-five miles or more, caught the wings of the plane, and swept it across the beach just like you've seen an umbrella turned inside out and loose in the wind. I had hold of an upright of one of the wings when the wind caught it, and I got tangled up in the wire that held the thing together. . . .

The machine was a total wreck. The Wrights took it to pieces, packed it up in boxes and shipped it back to their home in Dayton. They gave us a few pieces for souvenirs, and I have a piece of the upright that I had hold of when it caught me up and blew away with me.

"*The Wright Brothers' Aeroplane*" *by Wilbur and Orville Wright, in* The Century Magazine, *September 1908*

Wilbur and Orville in 1909

The first flights with the power-machine were made on the 17th of December, 1903. Only five persons besides ourselves were present. These were Messrs. John T. Daniels, W.S. Dough, and A.D. Etheridge of the Kill Devil Life Saving Station; Mr. W.C. Brinkley of Manteo, and Mr. John Ward of Naghead. Although a general invitation had been extended to people living within five or six miles, not many were willing to face the rigors of a cold December wind in order to see, as they no doubt thought, another flying-machine not fly. The first flight lasted only twelve seconds, a flight very modest compared with that of birds, but it was, nevertheless, the first in the history of world in which a machine carrying a man had raised itself by its own power into the air in free flight, had sailed forward on a level course without reduction of speed, and had finally landed without being wrecked. The second and third flights were a little longer, and the fourth lasted fifty-nine seconds, covering a distance of 852 feet over the ground against a twenty-mile wind.

After the last flight, the machine was carried back to camp and set down in what was thought to be a safe place. But a few minutes later, while we were engaged in conversation about the flights, a sudden gust of wind struck the machine, and started to turn it over. All made a rush to stop it, but we were too late. Mr. Daniels, a giant in stature and strength, was lifted off his feet, and falling inside, between the surfaces, was shaken about like a rattle in a box as the machine rolled over and over. He finally fell out upon the sand with nothing worse than painful bruises, but the damage to the machine caused a discontinuance of experiments.

ENTIRE CLASS

The Norfolk Virginian-Pilot, *December 18, 1903*

The problem of aerial navigation without the use of a balloon has been solved at last.

Over the sand hills of the North Carolina coast yesterday, near Kitty Hawk, two Ohio men proved that they could soar through the air in a flying machine of their own construction, with the power to steer it and speed it at will. This, too, in the face of a wind blowing at the confirmed velocity of twenty-one miles an hour.

Like a monster bird, the invention hovered above the breakers and circled over the rolling sand hills at the command of its navigator and, after soaring for three miles, it gracefully descended to earth again and rested lightly upon the spot selected by the man in the car as a suitable landing place. . . .

START WAS SUCCESS.

Wilbur Wright, the chief inventor of the machine, sat in the operator's car and when all was ready his brother unfastened the catch which held the invention at the top of the slope.

The big box began to move slowly at first, acquiring velocity as it went, and when half way down the hundred feet the engine was started.

The propeller in the rear immediately began to revolve at a high rate of speed, and when the end of the incline was reached the machine shot out into space without a perceptible fall.

By this time the elevating propeller was also in motion, and, keeping its altitude, the machine slowly began to go higher and higher until it finally soared sixty feet above the ground. . . .

COAST FOLK AMAZED.

The little crowd of fisher folk and coast guards, who have been watching the construction of the machine with unconcerned curiosity since September 1st, were amazed.

They endeavored to race over the sand and keep up with the thing of the air, but it soon distanced them and continued its flight alone, save the man in the car. . . .

"It is a success," declared Orville Wright to the crowd on the beach after the first mile had been covered.

But the inventor waited. Not until he had accomplished three miles, putting the machine through all sorts of maneuvers en route, was he satisfied.

Then he selected a suitable place to land, and, gracefully circling, drew his invention slowly to the earth, where it settled, like some big bird, in the chosen spot.

"Eureka," he cried, as did the alchemist of old.

PAGES. THREE CENTS PER COPY.

HIGH WIND OVER
AWK ON CAROLINA COAST

CANAL BUILT
IOUT SUSPICION OF
NATIONAL DISHONOR"

and Gorman in Fiery Debate on
Floor of the Senate

NO BALLOON
ATTACHED
TO AID IT

Three Years of Hard, Secret
Work by Two Ohio Brothers
Crowned With Success

ACCOMPLISHED WHAT
LANGLEY FAILED AT

With Man as Passenger Huge
Machine Flew Like Bird
Under Perfect Control

BOX KITE PRINCIPLE
WITH TWO PROPELLERS

RESOURCES

WEB SITES

College Park Aviation Museum
http://www.pgparks.com/places/historic/cpam
(The Web site of this Smithsonian Affiliate museum includes online aviation activities for kids.)

NASA's *Re-Living the Wright Way*
http://wright.nasa.gov

U.S. Centennial of Flight Commission
http://www.centennialofflight.gov

Wilbur's Letter to the Smithsonian
http://www.si.edu/archives/documents/wright.htm

The Wright Brothers & the Invention of the Aerial Age
Smithsonian National Air and Space Museum
http://www.nasm.si.edu/wrightbrothers

The Wright Brothers in Photographs Collection
http://Worlddmc.ohiolink.edu/History/Login
(This databank contains hundreds of images from the Wright State University collection.)

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Ages 4–8

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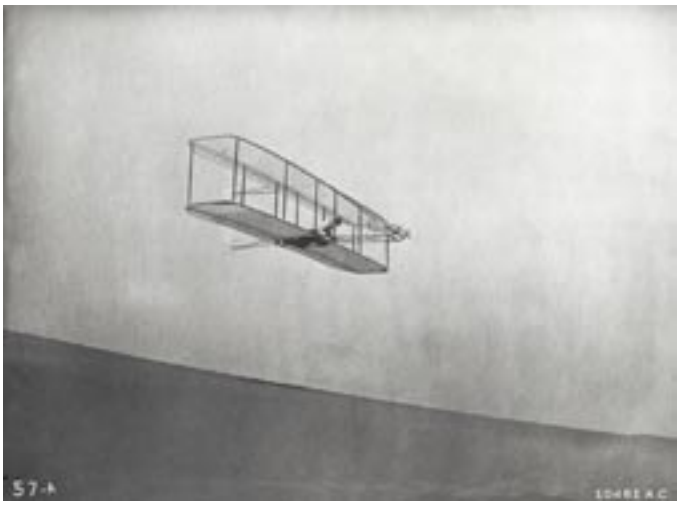

The Wrights' 1902 glider

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