

How We Invented the Airplane

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Orville Wright
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The dream to be able to fly like birds is as old as humanity itself. This dream was finally realised on December 17, 1903 at about 10.35 AM in Kitty Hawk, North Carolina, USA. The men who made this possible were two brothers, Wilbur (1867-1912) and Orville (1871-1948) Wright.

To place the contributions of the Wright brothers in the proper context let us begin with a quote from a lecture delivered by Octave Chanute on May 2, 1890.

Success might be much hastened by an association of searchers in this field of inquiry [flight], for no one man is likely to be simultaneously an inventor to imagine new shapes and new motors, a mechanical engineer to design the arrangement of the apparatus, a mathematician to calculate its strength and stresses, a practical mechanic to construct the parts, and a syndicate of capitalists to furnish the needed funds. It is probably because the working out of a complete invention requires so great

a variety of talent that progress has been so slow.

The Wright brothers were from a low middle class family and their formal education did not go beyond high school, and though each spent the time for a full course neither ever received a diploma. Their means of livelihood came from the bicycle shop which they started in 1892-93. They began by repairing for other boys and later opened their own shop to sell bicycles, including those of their own make. But it turned out that these two brothers formed the *association* that finally succeeded.

Octave Chanute (1832-1910), born in France, was a naturalized American. A construction engineer living in Chicago, he was very keenly interested in aeronautics, had directed experiments with gliders of his own design and was one of the best historian/ bibliographer of man's attempts to fly. His monumental work *Progress in Flying Machines* (available online¹) is a collection of articles he wrote in *The Railroad and Engineering Journal* starting from October 1891 and was published in 1894. It provides an excellent account of the state of art on the flying machines till then.

In any subject there comes a time when the body of knowledge accumulated over a long period of time by contributions of many generations becomes enormously large and the subject acquires a wild character. For the generations coming later, it becomes difficult

<http://invention.psychology.msstate.edu/i/Chanute/library/>

to know what is available and what direction the subject will take. Then it so happens that there appears a gifted individual who can assimilate what is known in the subject and present it in an organised manner so that the subject can move on to the next stage of its development. Veda Vyasa is supposed to have done it for *The Vedas*, Euclid did it for geometry and Purandaradasa for (Carnatic) classical music. Octave Chanute's *Progress in Flying Machines* did this for aeronautics. Here is what he set out to do in his articles (from the preface to the book):

1. To satisfy himself whether, with our present mechanical knowledge and appliances, more particularly the light motors recently developed, men might reasonably hope eventually to fly through the air. He now thinks that this question can be answered in the affirmative.
2. To save the waste of effort on the part of experimenters, involved in trying again devices which have already failed; and to point out, as much as may be, the causes of such failures. To this end an earnest effort was made to gather all the experimental records which were accessible, and to obtain a thorough understanding of them, so as to bring out clearly the reason of the failure. The reader must be the judge as to the measure of success which has attended this effort.
3. To furnish an account of those recent achievements which render it less chimerical than it was a few years ago to experiment with a flying machine, and to give such an

understanding of the principles involved and of the results thus far accomplished, as to enable an investigator to distinguish between an inadequate proposal, sure to fail, and a reasonable design, worthy of consideration, and perhaps (after due investigation and preliminary trial) of experiment upon an adequate scale.

The Wright brother's interest in flying machines began in their childhood when their father brought home a toy in 1878. In an article written by them for the 1908 issue of *The Century Magazine* (this article has been reproduced in the book under review) they give a vivid account of that incident:

Our personal interest in it dates from our childhood days. Late in the autumn of 1878, our father came into the house one evening with some object partly concealed in his hands, and before we could see what it was, he tossed it into the air. Instead of falling to the floor, as we expected, it flew across the room till it struck the ceiling, where it fluttered awhile, and finally sank to the floor. It was a little toy, known to scientists as a "hélicoptère," but which we, with sublime disregard for science, at once dubbed a "bat". It was a light frame of cork and bamboo, covered with paper, which formed two screws, driven in opposite directions by rubber bands under torsion. A toy so delicate lasted only a short time in the hands of small boys, but its memory was abiding.



They made many copies of the toy but whenever they tried to scale it up they failed. Then they shifted to kite-flying where soon they became experts but "... as we became older, we had to give up this fascinating sport as unbecoming to boys of our ages." Their interest in flying machines was revived in 1895 when they read about the gliding experiments of Otto Lilienthal in Germany. Starting in 1891, Lilienthal, the world's first true aviator, flew – actually glided – over 2500 times, covering 270 yards in his longest attempt. When the brothers read in newspapers in 1896 that Lilienthal was killed in one of his experiments, they wondered if they could go from where he had left off and started seriously searching for articles written on the problem of flying. After exhausting the Dayton public library for related literature, in May 1899 Wilbur wrote to the Smithsonian Institution in Washington for suggestions about further literature on the subject. In response the Institution sent them many reprints and a list of titles including the above mentioned *Progress in Flying Machines* by Chanute which they soon procured and studied. The fact that the brothers finally succeeded, strongly suggests that Chanute eminently achieved what he set for himself while writing his book.

Thinking he might be interested in what experiments they plan to do, Wilbur wrote to Chanute on May 13, 1900. Here are a few interesting quotes from this letter. (There were two things for which Orville often chided Wilbur: one, for talking down to him as if he

were still a "kid"; two, Wilbur's habit of saying or writing "I" when he should have said "we".)

For some years now I have been afflicted with the belief that flight is possible to man. My disease has increased in severity and I feel that it will soon cost me an increased amount of my money if not my life. I have been trying to arrange my affairs in such a way that I can devote my entire time for a few months to experiment in this field.

... .. It is possible to fly without motors, but not without knowledge and skill. This I conceive to be fortunate, for man, by reason of his greater intellect, can more reasonably hope to equal birds in knowledge than to equal nature in the perfection of her machinery.

... .. My observations of the flight of buzzards leads me to believe that they regain their lateral balance when partly overturned by a gust of wind, by a torsion of the tips of the wings. If the rear edge of the right wing tip is twisted upward and the left downward the bird becomes an animated windmill and instantly begins to turn, a line from its head to its tail being the axis.

Chanute responded immediately and he became a trusted friend of the brothers. He soon became convinced that the brothers were on the right track and his encouragement



went a long way in keeping the brothers on their track in spite of some failures which are inevitable in any grand endeavour.

The brothers started their field experiments in Kitty Hawk, North Carolina in 1900 (Sept.–Oct.) and continued over the next three years, 1901 (Jul.–Aug.), 1902 (Sept.–Oct.) and 1903 (Oct.–Dec.). Chanute arranged for a talk for the *Western Society of Engineers* by Wilbur Wright on the results of their experiments; working towards it, the brothers made a few more experiments, this time in their laboratory, and were convinced that they were right. (The paper based on the talk is reproduced elsewhere in this issue.) It was during this time that they built their *wind tunnel* and tested various wing shapes.

An account of their invention – How we Invented the Airplane – given by Orville Wright which is the main part of the book under review was given in a deposition on January 13, 1920, as witness for the United States Government in a law suit. This is one of the best accounts of the process of invention of the airplane. Next in the book is an article by Orville Wright – After the First Flight – written around 1920. There is an introduction and a concluding essay by Fred C Kelly, a longtime friend and authorised biographer of the Wright brothers. In the appendix to this edition, an article by the brothers – The Wright Brother's Aeroplane – which appeared in the 1908 issue of *The Century Magazine* has been reproduced. The worth of the book is greatly enhanced by the wealth of photographs, 76 in all, wonderfully reproduced

with commentary by Fred Kelly.

The Wright brothers came to aeronautics from an unusual background. As noted earlier, their education didn't go beyond high school and they weren't from wealth. Yet, they dared to attack one of the most difficult science-cum-engineering problems of their day and succeeded. There are lessons in this for youngsters beginning to study science and engineering. The knowledge that has been accumulated in any branch which they are supposed to be studying, appears so enormous that they feel daunted by the very prospect of it and wonder if they can make any contribution to it at all! But the fact is while science/engineering set out with the primary intention of solving problems around us, in most cases, in spite of the work of many generations, the original problem still remains unsolved and they may be waiting for newer approaches! For example, as A P J Abdul Kalam has observed in his article (see *Resonance*, Vol. 8, No. 10, p.62), a flapping wing aircraft with high maneuverability is waiting to be invented.

There is an interesting parallel between the achievements of the Wright brothers and Pierre and Marie Curie. Both happened at about the same time. While the Curies were busy distilling Radium out of a huge quantity of Uranium-ore-waste in a makeshift laboratory in Paris in addition to their teaching duties, the Wright brothers were starting their work in their makeshift field laboratory in Kitty Hawk during their free time from work at their bicycle company. Their native

countries were slow in realising the worth of their discoveries – the first industrial scale production of radium was undertaken in USA while France was the first nation to start production of airplanes in large quantities (so much so that when the First World War began, France had 1400 military aircraft; Germany, 1000; Russia, 800; and Great Britain, 400. The U.S. flying machine inventory was 23!). And both inventions were

effectively used in the First World War, though for opposite purposes.

This book and other books of this kind should be made available in all school/college libraries.

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First European powered flight in France (1906) by Alberto Santos Dumont who modeled his plane after a box kite.



Henri Ferman flew across France—world's first cross-country flier in 1908.



First plane with an all metal body (1915) designed by Hugo Junkers.



Blanche Stuart Scott was the first woman pilot.



In the 20's and 30's many distance and speed records were set. Perhaps the most famous was the nonstop, solo flight by Charles Lindbergh (1927) crossing the Atlantic – a distance of 3610 miles.

Courtesy: Biman Nath, RRI

This book offers a concise and fascinating history of that remarkable accomplishment, much of it in the words of the inventors themselves. The heart of the book is Orville Wright's personal account, written in connection with an obscure lawsuit filed against the U.s. government. Long forgotten until a typewritten copy was discovered among the Wright papers at the Library of Congress, it is the best, most detailed account of how the Wright brothers succeeded in creating the machine that lifted man into the sky on wings.the brothers first became interested in the problem of flight after rea