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BIOGRAPHICAL MEMOIR

OF

ORVILLE WRIGHT

1871—1948

BY

WILLIAM F. DURAND

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## ORVILLE WRIGHT

1871-1948

BY WILLIAM F. DURAND

The boy is father to the man. Never, perhaps, has this old saying been better exemplified than in the life of Orville Wright. Born on August 19, 1871, in Dayton, Ohio, the son of Rev. Milton and Susan Catherine (Koerner) Wright, he began to show in early years the characteristics of mechanical genius and initiative which later, working with his brother, four years older, led to the successful demonstration of aerial flight in a man-made structure.

Placed in kindergarten shortly after reaching five years of age, he began the systematic evasion of the school for association with another boy to play with an old sewing machine belonging to this boy's mother. Orville watched the clock and returned home at the hour he normally would from the school. This went on merrily until his mother, seeing his teacher one day, said that she hoped Orville was doing well. The teacher replied that she had not seen Orville since the first day when his mother brought him, and supposed that she had decided not to send him to the school. What transpired when the actual facts became known is not a matter of record.

Orville was early inculcated with the lesson that if he desired spending money he must earn it and this he did in a great variety of ways. Wiping dishes, making minor household repairs and odd jobs of all sorts brought in the small sums which were expended chiefly for tools and mechanical toys.

In June 1878, when Orville was seven years old the Wright family moved from Dayton, Ohio, to Cedar Rapids, Iowa, because of the advancement of his father who was made a Bishop of the United Brethren Church. Here, soon after their arrival, the father, returning from a trip on church business showed to his boys, Wilbur and Orville, a small toy helicopter with propeller driven by a twisted rubber band, the

invention of the Frenchman, Alphonse Penaud. This toy when released, flew to the ceiling where it fluttered for a few seconds before falling to the floor. This wonderful toy made a deep and lasting impression on the boys and may be taken as the starting point of their great life interest.

Between the ages of young boyhood and early manhood, aside from progression through grammar and high school, Orville Wright occupied his time with a wide variety of enterprises and projects. Among these, the following may be noted. The organization of an army of a dozen school boys with himself as general. The life of the army was brief due to the intervention of the school janitor. In June, 1881, the family removed from Cedar Rapids to Richmond, Indiana, where Orville took up the business of building and flying kites. This soon developed into a phase of building them for sale, by which means he obtained his spending money for a time. Next came an ambitious project, the building of a foot-power full-size lathe, in which he was assisted by his brother, Wilbur. Next, with Wilbur and other boys, he organized two circuses which were carried out with parade and success, admission, one cent.

At the age of eleven Orville became interested in wood engraving and this led to the making of a printing press to make prints from his blocks. About this time the family moved again, this time back to Dayton, Ohio, where he renewed his relations with his old chum of kindergarten days, Ed Stines. Young Stines had a small printing press—not much more than a toy—and from this start there developed a long continued activity in the printing business, through the acquirement of a small but effective press by way of trade for a boat they had made. This activity passed on into the printing and issue of a small newspaper called the "Midget," together with advertising material for various clients.

By way of diversion from the printing business, Orville and his chum learned the telegraph code and with small toy senders practiced sending messages to each other, which they would later verify by shouted voice. Also, at about this time, Orville

and Wilbur undertook the somewhat extensive job of adding a front porch to the house and of making some changes in the internal arrangement of the rooms, all of which were highly appreciated by the rest of the family.

Orville's interest in printing led him to take employment during two summer vacations with a printing establishment in Dayton. Later he undertook the project of building a full size press, in which he was assisted by Wilbur. This was followed by the printing and issue of a small newspaper, the "West Side News," which ran for a year as a weekly and was then converted into a five column daily, called the "Evening News." This ran for a time and was then abandoned for a new interest, bicycles. Orville had owned, in Richmond, a bicycle of the first high wheel type. Now they found themselves in a position to buy machines of the new chain drive pattern and Orville soon became interested in track racing. This was followed by a decision to go into the bicycle business, selling, repairing, and manufacturing. Two successive moves into larger quarters followed with expanding business. Along with bicycles as the leading line, Orville found odd moments in which to interest himself in a new form of calculating machine, and also in a new and improved form of typewriter.

Starting with the toy helicopter, Orville and Wilbur continued always sensitive to anything in the public press regarding attempts at human flight. In 1895 they were much impressed with accounts of Lilienthal's gliding experiments in Germany and after his tragic death, their interest became still keener. This led to an appeal to the Smithsonian Institution in Washington for literature references on human flight. In reply several references were given and when these were obtained, it furnished material for many days absorbing reading and study. Further reading and study led them to the conclusion that progress toward the solution of the problem of human flight must lie through gliding experiments. Lilienthal became their hero, and they became thoroughly absorbed in this new and enticing problem. This led, in 1899, to the building and flying of a large biplane kite fitted for a warping of the

wings by means of four cords leading to the ground. This experiment was for the purpose of testing the idea of warped wing lateral control—a control feature of the first plane to demonstrate, a few years later, the possibility of human flight. The Wright brothers were now fully committed to a serious study of the problem of human flight, first by way of gliding.

Diligent reading of all available literature on the subject was followed by the construction of their first glider in the late summer and early fall of 1900. This was first to be tested by flight as a kite. Inquiry and correspondence indicated the sand dunes of the North Carolina coast as the most suitable location for such tests and the glider was shipped there and tested during the late fall, both as a kite and, carrying Wilbur or Orville, as a glider. These tests, while encouraging, showed, in various respects, marked departures from the results they had been led to expect from such information and data as they had been able to find in their reading.

These tests of 1900 were followed by the construction of and tests on a second larger glider in the late summer and early fall of 1901. This second glider was of the same general type and form as the first, with such changes in details as their experience with number one appeared to suggest. These second tests, while still encouraging, showed many departures from what was anticipated from their available information, and presented several new problems relating to the lift and control of cambered surfaces as affected by the travel of the center of pressure on such surfaces under varying angles of attack.

In order to gain first hand information, Orville constructed a small and somewhat crude wind tunnel in which he made direct measurements of some of these puzzling questions. These results were so interesting and provocative, that the two brothers in the fall of 1901 made a much larger and more effective form of wind tunnel in which, during the fall, some two hundred forms and proportions of air foils were tested, and a large amount of useful information obtained. To put these new data to test, a third glider was built and tested in the early fall of 1902 in more than a thousand flights. These flights were very

successful and resulted in setting a number of records for gliding flights.

Following this, on their return to Dayton in the fall of 1902, they set to work on plans for a power flight. The first problem here was the engine. Failing to find a firm willing to undertake the building of an engine with the power estimated as needed and within the limits of weight available, they hired a mechanic and built the engine themselves, of 12 to 16 horsepower and, with accessories, weighing 170 pounds. The design of the propellers was a second problem which gave them much study and some trouble, all of which was successfully met, and propellers, two in number turning in opposite directions in order to balance gyroscopic effects, gave good results later in actual flight.

Finally in late September of 1903 they had everything in readiness and made their start for Kitty Hawk, N. C.

The time required for assembling the plane, installing the motor and for preliminary tests, together with spells of bad weather, carried the time along to December 17, before an actual power flight was made—the first flight in a man-made machine, carrying a man, leaving the ground under its own power and returning under control to the ground from whence it had started.

With Orville Wright at the controls, the plane on a level track, took off after a run of about 40 feet and remained in the air 12 seconds with a run equivalent to 540 feet in still air. This was followed by a second flight with Wilbur at the controls, substantially a repetition of the first flight in time and distance. Two further flights were made, the last of which with Wilbur at the controls lasted 59 seconds with a run over the ground of 852 feet.

Thus, after more than three years, given very largely to this enterprise, the possibility of human flight was fully demonstrated.

Then followed two years of intensive further development in a 68 acre flying field about eight miles from Dayton.

In January of 1904, they began the building of a new plane along the general lines of the Kitty Hawk plane, but heavier, stronger and with many changes in detail resulting from the

Kitty Hawk experience. A new engine was also built and installed. In this plane they made hundreds of flights in their field, working at improvements and changes as indicated by experience. By the fall of 1905 they had made two record flights, one of  $20\frac{3}{4}$  miles in thirty-five minutes, seventeen seconds, and one of  $24\frac{1}{5}$  miles in thirty-eight minutes, three seconds.

Regarding publicity of the first flight on December 17, 1903, the brothers had desired that it emanate from Dayton, and a telegram was sent to their father briefly announcing the results. Through a leakage at Norfolk, a reporter of the *Norfolk Virginian Pilot* got a tip and published a sensational account of which the details were drawn from his own imagination. Following this, the reaction of the public at large and especially of the press seems now absolutely incomprehensible. The *Virginian Pilot* reporter sent a brief outline of the story to twenty-one newspapers in the United States with an offer of the full story. Only five were sufficiently interested to reply, and of these only three printed the story. From this time on for the next three years the Wright brothers with all of their continued experimental work adjacent to Dayton were practically ignored by the press. Editors simply refused to believe the story. Finally, however, nearly three years after the event, the *Scientific American* in its issue of December 15, 1906, printed an editorial announcement in which the editor accepted the truth of the flight and spoke of it as an "epoch making invention of the first successful aeroplane flying machine."

Curiously enough the first serious attempt to give this great news to the public was by way of a small periodical "Gleanings in Bee Culture," owned and edited by a man named Root. In several issues of his journal, Root reported on the Kitty Hawk flight and on the various flights of 1904, 1905, but these notices gained little or no recognition from the press at large. There was widespread disbelief in the possibility of human flight and a feeling of incredulity in such widely scattered references to the Wrights and their work as infrequently appeared in the press.



If the attitude of the public at large and of the press is now hard to understand, that of Government officials, especially those of the War Department is still more so. The Wright brothers from the first were very desirous of giving to the Government the full benefit of their discoveries and of their invention of a practicable flying machine. To this end they had desired to offer to our Government a world monopoly on all their patents and to impart to the proper officials all of their information regarding the design and construction of the plane.

Already England had approached the Wrights showing a definite interest in what they had accomplished and had asked them to submit a proposal to the War Office. They were in no hurry to do this, however, desiring to give their own Government a first chance. They wrote, therefore, on January 18, 1905, to their Member of Congress, outlining what they had accomplished and asking him to learn whether such performance was of interest to the Government. The letter was forwarded to the Secretary of War who, in turn, passed it on to the Board of Ordnance and Fortification.

The reply was largely a form letter in no way responsive to the Wright communication, and assumed that they had not yet brought their invention to a practicable condition.

There was some further correspondence with the British War Office, but it finally appeared that the British were more interested in obtaining information as to what had been accomplished, than in acquiring a plane for themselves. Octave Chanute, a pioneer himself in aeronautic research and a close friend of the Wrights, urged them to make another approach to the United States Government. Accordingly they drew up and sent a letter to the Secretary of War offering to build and deliver to the War Department an airplane capable of carrying an operator with a supply of fuel sufficient for a flight of 100 miles and with a minimum speed of 30 miles an hour for a distance of twenty-five miles; the plane not to be accepted until after the successful performance of these requirements.

This letter received a reply as little responsive to the proposal as did their first letter. The reply assumed that they were applicants for a grant of money for the development of the plane, and appeared to assume that the airplane under proposal was still in an undeveloped and experimental stage. This was followed by further correspondence which accomplished practically nothing in developing any basis of dealing with the Wrights, or in evoking any real interest by the Board of Ordnance and Fortification in the subject.

Finally, in the spring of 1906 Godfrey Cabot of Boston learning of this situation wrote to his relative, Senator Henry Cabot Lodge, who forwarded the letter to the Secretary of War together with a letter of his own. This all went again to the Board of Ordnance and Fortification. This resulted in a proposal to send a representative of the Board to Dayton to observe the results of the work of the Wrights, but no such representative was sent. After further desultory correspondence, the Board wrote on May 22, 1907, requesting the Wrights to make a formal proposal which was forwarded on May 31. This was followed by correspondence regarding the price and other details of the proposal, all of which resulted in nothing until some time later.

In the meantime the French were becoming deeply interested in the Wrights and in reports of what they had accomplished. Copies were made of the Wright plane and experimental work was carried on. With increase in the tempo of this interest, the Wrights became involved in a lively correspondence with France answering inquiries for information. Then followed visits in Dayton by representatives of French interests of one sort or another. Along with this keen interest in France, there was no lack of incredulity, especially among members of the Aero Club of France. With reports of visitors returning from Dayton, and with the gradual accumulation of evidence, however, the performance of the Wrights became generally accepted, and out of this grew the granting by the Wrights of an option to the French War Ministry for a limited time, for the purchase

of a plane of stated performance and at an agreed price of \$200,000.

Just at this time, there was trouble brewing with Germany over Morocco, and it is believed that the interest of the Ministry was due to the desire to have an airplane available for scouting missions. In the end this resulted in nothing. The Moroccan situation became eased, it was believed the crisis was past and the Ministry failed to exercise its option.

In 1906 the Wrights were engaged in developing a new airplane engine. Their work was, about this time, brought to the attention of the Charles R. Flint Company of New York who were interested in new developments of importance, and who had connections in Europe. This developed rapidly into a proposal from Mr. Flint to act as the business representative of the Wrights, especially with reference to business in Europe. In May of 1907 a telegram came from Flint to the Wrights, urging that one of them should start for Europe at once. Wilbur was followed by Orville who arrived in Paris in August, later visiting London and Berlin. Nothing of importance came of these visits and business discussions, and Wilbur returned to the United States in November of 1907, followed a little later by Orville.

Returning from France, the Wrights found a distinctly more favorable attitude by the U. S. Board of Ordnance and Fortification and after some conference and discussion, a basis for a contract was agreed on.

The specifications called for a machine to be tested in the presence of Army officers, capable of carrying for one hour a passenger besides the pilot, with an average speed not less than 40 miles an hour in a ten mile test, and carrying enough fuel for a flight of 125 miles.

The War Department was strongly condemned in the press for asking such extremes of performance, it being asserted in the press that no such performances had as yet been demonstrated, or were indeed believed possible.

The Wright bid was accepted February 8, 1908 and construction was promptly begun. On March 3 of the same year, a

contract was signed with a wealthy Frenchman for the organization of a syndicate to buy the rights to manufacture, sell or license the use of the Wright airplane in France. With these two governments showing an active interest in the Wright airplane, the period of public disbelief in the possibility of human flight began to shift over into one of qualified belief and later into a definite acceptance of the reality of what the Wrights had accomplished.

Test flights were to be made in France and the plane for the U. S. War Department was to be tested at Fort Myer across the Potomac River from Washington. It was finally decided that Wilbur should go to France and Orville remain to carry out the tests at Fort Myer. These tests extended over a period of two weeks, some eight or ten in number, definitely establishing the fulfillment of the specifications and with continued increase of record performance. On the last flight, September 17, 1908, something went wrong with the controls and the machine crashed, killing Lieut. Thomas Selfridge, Jr., who, at his own request, was a passenger. Orville Wright himself was seriously injured, with three hip bone fractures and a dislocation of one of them.

Toward the last of December, 1908, Orville Wright recuperating from his injuries at Fort Myer, went with his sister Katherine to France to join Wilbur. The latter had been most successful in his demonstration flights and great enthusiasm was in evidence throughout France. Demonstration flights continued at Pau in the south of France, attracting great interest, among others of King Edward VII of England and of King Alfonso of Spain. After further demonstration flights in Rome, the Wrights returned to Paris and then went to London whence they returned home to Dayton.

Next came the final test flights at Fort Myer in 1909 which were successfully carried out, chiefly by Orville, resulting in substantial advances beyond specification requirements and in a corresponding bonus beyond the purchase price.

Immediately after completing these U. S. Army tests, Orville Wright set out for Berlin in accordance with an understanding

reached with German authorities on their previous visit to Europe. This visit was for the purpose of training German pilots and giving exhibition flights. The latter, given in the Tempelhof grounds and at Potsdam, were successful in the highest degree and awoke unbounded enthusiasm in the spectators. In October of 1909 he took the German Crown Prince for a flight, the first airplane flight with royalty as a passenger. His last flight in Germany was a twenty-five minute run at which Kaiser Wilhelm was an interested and enthusiastic spectator. He then sailed with his sister for New York, arriving on November 4, and thence home to Dayton.

Companies for the manufacture of Wright's airplanes had been organized in France and Germany and a plane had been sold in Italy before any serious attempt was made by American industry to undertake such manufacture. Finally, on November 22, 1909, nearly six years after the Kitty Hawk flight, a company was organized for this purpose, with many impressive names in business circles on the list of stockholders. The Wrights realized that the time was not yet ripe for manufacture on any large scale and a decision was reached to undertake the development of a more widespread interest in flying through flight exhibitions, and for a time this constituted the chief activity of the company, following which a gradual shift over into manufacture developed.

Aside from occasional exhibition flights, Orville Wright during this period devoted most of his time to the supervision of engineering at the factory in Dayton, while Wilbur was occupied in looking after patent litigation with which the Wrights were grievously plagued for some years—finally, however, winning out in the most important of these suits.

Tragedy was just ahead. On May 30, 1912, Wilbur Wright died, and Orville succeeded him as President of the Wright Company. In 1913 he made a trip to Europe on business relating to a patent suit in Germany and at the same time sanctioned the organization of a Wright Company in England.

During 1914 Orville Wright bought up all the stock of the Wright Company except that held by his friend Robert J.

Collier. This move was for the purpose of uniting the stock of the Company practically under one name and then selling out, thus retiring himself from active association with the business. This was accomplished in 1915 and his holding was taken over by a group of eastern capitalists.

Over a period of some thirty years from 1910, much of Orville Wright's attention was taken up with an unfortunate controversy with the Smithsonian Institution, finally settled to Mr. Wright's satisfaction by a statement by Dr. C. G. Abbot, executive officer of the Institution. In the years about 1910, there was correspondence between Mr. Wright and the Smithsonian Institution regarding a flying machine or a model of one for deposit in the National Museum, along with the restoration of the Langley plane which fell into the Potomac River in a trial flight nine days before the successful flight of the Wright plane at Kitty Hawk in 1903. When first exhibited in the National Museum in 1918, the Langley machine bore the simple title, *The Original Full Size Langley Flying Machine, 1903*. For this simple label, others were substituted later containing the claim that Langley's machine "was the first man carrying aeroplane in the history of the world capable of sustained free flight".

There was never any controversy as to who first *accomplished* sustained free flight. That was everywhere conceded to the Wrights, but the claim that the Langley machine was *capable* of such flight was challenged by Mr. Wright in defense of his own and of his brother's pioneer achievements. Nothing came of the early correspondence regarding the furnishing, by the Wrights, of a model or a full-sized plane for exhibit in the National Museum, but finally in 1914, resulting from a proposal by Glenn Curtis of Hammondsport, N. Y., it was decided to turn over the original Langley machine to Mr. Curtis for an attempt to prove that this machine was capable of sustained free flight.

Numerous changes were made in the machine, some of them of definite importance to the test, and with these changes, a few flights were made over Lake Keuka, N. Y., none exceeding five seconds in duration. Following this the Smithsonian an-

nounced in its Annual Report for 1914 that the Langley machine "has demonstrated that with its original structure and power, it is capable of flying with a pilot and several hundred pounds of useful load. . . ." This claim was again challenged by Mr. Wright and a long and very unfortunate controversy resulted. Finally, in 1928, Orville Wright, in reply to a request from the Science Museum, South Kensington, London, sent the original Kitty Hawk flight plane to that Institution for exhibit.

Dr. C. G. Abbot became executive officer of the Smithsonian Institution in 1928 and took up the task of carrying on negotiations with Mr. Wright regarding the matters at issue between him and the Institution. Finally it settled down to the proposal that Dr. Abbot should prepare a statement for review by Mr. Wright, covering the salient points at issue. Several drafts were made of such a statement and it was not until 1942 that one was finally drawn up acceptable to Mr. Wright. In this statement Dr. Abbot stated, "It is to be regretted that the Institution published statements repeatedly to the effect that these experiments of 1914 (at Hammondsport, N. Y.) demonstrated that Langley's plane of 1903, without essential modification, was the first heavier than air machine capable of maintaining sustained human flight."

In addition to a brief history of the controversy with Mr. Wright, the Abbot statement contained a long and detailed list of the changes made in the Langley machine, before undergoing the Hammondsport tests. With the acceptance of this statement by Mr. Wright as satisfactory to him, the way would appear to be open for the return of the Kitty Hawk machine to its native land, and to an honored place in our National Museum.

The Wrights were the recipients of many awards and medals. The list for Orville Wright includes the following: B.S. Earlham College, Indiana, 1909; LLD, 1931; Dr. Tech. Sci., Royal Technical College, Munich, 1909; LLD Oberlin, 1910; Harvard University, 1930; Huntington (Indiana) College, 1935, Sc.D. Trinity, 1915; Cincinnati, 1917; Ohio State University, 1930; M.A. Yale, 1919; Dr. Eng'g University of Michigan, 1921;

Dr. Sci. Otterbein College, Westville, Ohio, 1947; Dr. Eng'g University of Dayton, 1943; Award of Collier Trophy, 1913; Gold Medal, Aero Club of France, 1908; Aero Club of United Kingdom, 1908; Academy of Sports of France, 1908; Aeronautical Society of Great Britain, 1908; Congress of U. S., 1909; State of Ohio, 1909; City of Dayton, 1909; Aero Club of America, 1909; French Academy of Sciences, 1909; Cross of Chevalier of Legion of Honor, French, 1909; Cross of Officer of Legion of Honor, 1924; Langley Medal, Smithsonian Institution, 1910; Elliott Cresson Medal, Franklin Institute, 1914; Albert Medal, Royal Society Arts, 1917; John Fritz Medal, 1920; Bronze Medal International Peace Society; John Scott Medal, 1925; Washington Award, 1927; Distinguished Flying Cross Award, 1929; Daniel Guggenheim Medal, 1930; Franklin Medal, 1933; Hon. Member Aero Club of Sarthe France; Aeronautical Society Great Britain; Aero Club of America; Osterreichischen Flugtechnischen Vereines, Vienna; Verein Deutscher Flugtechniker, Berlin; American Society of Mechanical Engineers; Aeronautical Society of America; Institute of Mechanical Engineers, London; National Academy of Sciences; Hon. Aircraft Pilot Certificate, No. 1, issued by Civil Aeronautics Authority, 1940.

In 1915, by Act of Congress, the National Advisory Committee for Aeronautics was organized, and Orville Wright was appointed by President Wilson, one of the civilian members. This post Mr. Wright held until his death, with quite regular attendance twice a year (annual and semi-annual meetings) in Washington. He thus served as a member of this Committee for some thirty-three years.

Due to the accident at Fort Myer when Lieut. Selfridge was killed, Mr. Wright received severe back and hip injuries requiring some replacements by metal. This condition caused severe pain when traveling by railroad due to the jar and tremor of the car and his keen devotion to duty to the Advisory Committee for Aeronautics is shown by his willingness to subject himself, at least twice a year, to the train ride from Dayton to Washington for attendance at these meetings.



After his retirement from active business pursuits, Orville Wright lived quietly at his home in Dayton. For occupation he spent much time with the records of the extended research work carried on both before and following the Kitty Hawk flight; with work in his laboratory on new ideas of interest to him; and with reading. He was an active and interested reader—fiction, biography, scientific journals, with occasional turns to an encyclopedia. He often read late at night and most of his late evenings were spent in this way. His chief public obligation was attendance at meetings of the National Advisory Committee for Aeronautics. He was also greatly interested in the Dayton Art Institute and in the Engineer's Club of Dayton. Among the projects worked on in his laboratory may be noted an automatic record changer for phonograph; a cipher machine during World War II, for the purpose of speeding up the transmission of cipher messages; and an improved form of typewriter. In connection with the subject of inventions, mention may here be made of the system of airplane control by wing warping mechanically connected with rudder control, which embodies the aerodynamic equivalents of the system employed at the present time. Mention may also be made of the fact that while wind tunnels had been constructed in Europe, the wind tunnel of the Wrights was the first in the United States.

An event of supreme interest to Orville Wright occurred in December, 1928. This was a pilgrimage, organized by the National Aeronautic Association, to Kitty Hawk, to the site of the first flight in 1903, twenty-five years earlier. This pilgrimage was participated in by members of the Aeronautic Association, members of the National Advisory Committee for Aeronautics, Members of Congress, officers of the Army and Navy and other high Government officials, with, of course, Mr. Wright at the head of the list—some 200 in number.

The Congress of the United States had authorized the erection of a national monument on Kill Devil Hill by an Act signed by the President on March 2, 1927, and the National Aeronautic Association had authorized the erection of a me-

morial on the spot from which the first Kill Devil flight took place. The corner stone of the national monument was laid on December 17, 1928 at 2 P. M., by the Hon. Dwight F. Davis, Secretary of War, with appropriate addresses and the memorial of the National Aeronautic Association was unveiled on the same day at 3 P. M. with an address by Mr. John F. Victory, Secretary of the National Advisory Committee for Aeronautics. The national monument is a shaft of Monterey Granite some fifty feet in height, while the memorial is a ten ton granite boulder with a bronze tablet suitably inscribed.

Orville Wright had the reputation of never having made a public address. On two occasions, however, he made a close approach. When the two brothers returned to New York from Europe in 1909, Wilbur made a speech at a Lawyers' Club in New York and when he had finished, Orville was introduced and called on for a few words. He replied in effect that he agreed with everything that Wilbur had said, and sat down. Another occasion was when the National Advisory Committee for Aeronautics held a meeting in Orville Wright's home in Dayton on December 17, 1936. He had carefully counted the number of members and arranged the chairs in an oval form, but, by oversight, without a chair for himself. As befits a good host he stood for a time until a chair was brought. In the meantime, the regular chairman of the Committee being absent, Orville Wright was nominated to preside as chairman of the meeting; whereupon he, standing, undertook to address a seated audience arguing why he should not be elected to this office. The members noted that he was actually making a speech, which caused him to abruptly terminate his remarks, whereupon he was duly elected temporary chairman.

In April of 1946 the President signed the certificate of the Award of Merit to Orville Wright for distinguished service with the National Advisory Committee for Aeronautics during the great war. Due to delays in the War Department, plans for the actual award were delayed until January of 1948 and it was planned that he would come to Washington on January 15 for that purpose, but the condition of his health would not

permit and gradually growing weaker, he died on January 30, without personally having received the award.

The name of Orville Wright will always stand as representing a man of fine personal qualities, modest yet firm in holding to what he considered right and just, and withal a great and original thinker and with his brother, the first to solve the *problem of human flight in a man-made machine, with all that this epoch making invention has developed into in our own day.*

LIST OF PRINCIPAL CONTRIBUTIONS TO SCIENCE  
BY ORVILLE WRIGHT

- Stability of Aeroplanes. *Franklin Institute, Journal*, vol. 178, pp. 249-258, September, 1914. Published also in *Annual Report of the Board of Regents of the Smithsonian Institution*, 1914, pp. 209-216. Abstracted in *Scientific American Supplement*, vol. 78, pp. 206-207, September 26, 1914. Presented at the stated meeting of the Institute held Wednesday, May 20, 1914, when Dr. Wright received the Institute's Elliott Cresson Medal.
- How We Made The First Flight. *Aviation*, v. 15, pp. 737-741, December 17, 1923. Reprinted from *Flying*, December, 1913.
- The Early History Of The Airplane. Dayton, Ohio, [1922]. (Pamphlet.) Contains three articles, which are reprints of articles in the *Century Magazine* and *Flying*. pp. 1-8. The Wright Brothers' Aeroplane, by Orville and Wilbur Wright, pp. 9-15. How We Made The First Flight, by Orville Wright. Dayton-Wright Airplane Co.
- (With Wright, Wilbur). Our Aeroplane Tests At Kitty Hawk. *Scientific American*, vol. 98, p. 423, June 13, 1908.
- (With Wright, Wilbur). The Wright Brothers' Aeroplane. *Century Magazine*, vol. 76, pp. 641-650, September, 1908. Reprinted in *Aviation*, Vol. 15, pp. 732-737, December 17, 1923.
- Practical aeronautics; an understandable presentation of interesting and essential facts in aeronautical science. By Hayward, Charles B., with introduction by Orville Wright. Chicago. *American School of Correspondence*, 1912, 1917.