

SMITHSONIAN MISCELLANEOUS COLLECTIONS
VOLUME 81, NUMBER 5

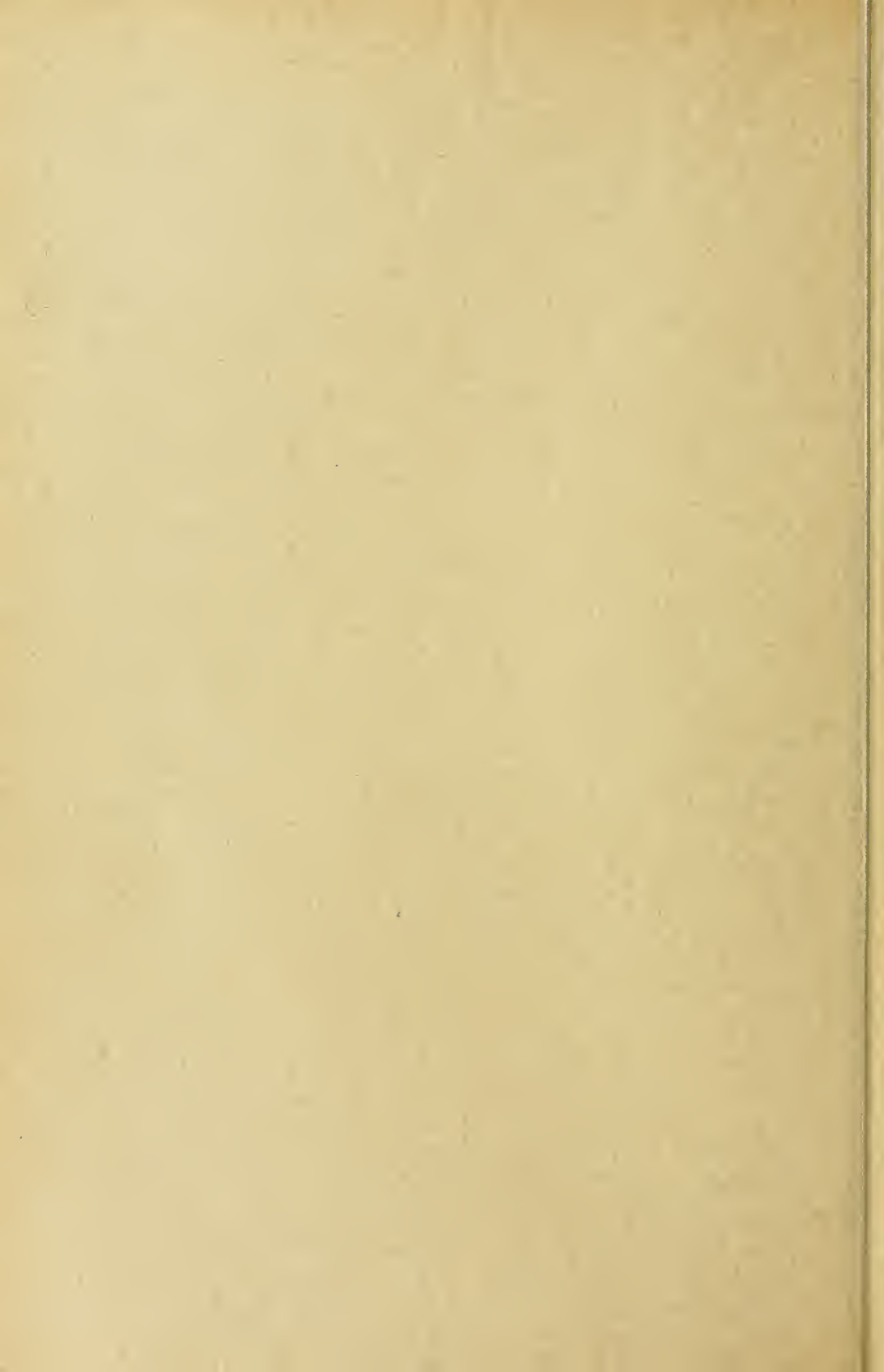
THE RELATIONS BETWEEN THE
SMITHSONIAN INSTITUTION AND
THE WRIGHT BROTHERS

BY
CHARLES G. ABBOT
Secretary, Smithsonian Institution



(PUBLICATION 2977)

CITY OF WASHINGTON
PUBLISHED BY THE SMITHSONIAN INSTITUTION
SEPTEMBER 29, 1928



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PREFATORY NOTE

This statement represents an attempt on the part of the Smithsonian Institution to clarify an unfortunate controversy, and to correct errors where errors have been made, in order to do justice alike to three great pioneers of human flight—Wilbur and Orville Wright, and Samuel Pierpont Langley—as well as to the Smithsonian Institution.



THE RELATIONS BETWEEN THE SMITHSONIAN INSTITUTION AND THE WRIGHT BROTHERS

BY CHARLES G. ABBOT

SECRETARY, SMITHSONIAN INSTITUTION

For several months past, beginning February 13, 1928, when I first addressed Mr. Orville Wright, a month after my election as Secretary, I have sought to end the so-called Langley-Wright controversy. In a friendly, personal conference with Mr. Orville Wright on April 19, he explained to me the points regarding which he feels that the Smithsonian Institution has dealt unjustly with the Wright brothers, and stated that what he termed a "correction of history" by the Smithsonian was essential.

So far as I am aware, all men agree that on December 17, 1903, at Kitty Hawk, North Carolina, Orville and Wilbur Wright, alternately piloting their plane, made the first sustained human flights in a power propelled heavier-than-air machine.

These successful flights by the Wright brothers came as the culmination of: (1) Their extensive laboratory experiments to determine the behavior of plane and curved surfaces in air. (2) Their numerous gliding flights during several years at Kitty Hawk and elsewhere. (3) Their original design and construction of their flying machine and of the engine and propellers.

The Smithsonian Institution has recognized these achievements in the following manner:

1. By printing articles by Wilbur and Orville Wright in the Smithsonian Annual Reports. (See Smithsonian Annual Reports, 1902, pp. 133-148; 1914, pp. 209-216.)

2. By printing other articles descriptive of their achievements. (See Smithsonian Annual Reports, 1903, pp. 179-180; 1908, p. 133; 1910, pp. 147-151, 160-161.)

3. By making the first award of the Langley gold medal for aeronautics to Wilbur and Orville Wright. This award was made on February 10, 1909, and the medal was formally presented on February 10, 1910. (See Smithsonian Annual Reports, 1909, pp. 22, 107, 111; 1910, pp. 22-23, 104-110.)

4. By formal vote of the Board of Regents, March 15, 1928, as follows:

WHEREAS, To correct any erroneous impression derived from published statements that the Smithsonian Institution has denied to the Wright brothers due credit for making the first successful human flight in power-propelled heavier-than-air craft:

Resolved, That it is the sense of the Board of Regents of the Smithsonian Institution that to the Wrights belongs the credit of making the first successful flight with a power-propelled heavier-than-air machine carrying a man.

5. By requesting the Wright brothers to furnish for exhibit in the National Museum the originals or models of any planes made by the Wrights up to 1910, the selection to be at their discretion. (The request specifically included the Kitty Hawk plane. See pages 5 and 6 following, for letters of Secretary Walcott to Wilbur Wright of March 7, 1910, and April 11, 1910.)

6. By exhibiting in the National Museum the plane flown at Fort Myer in 1908 by Orville Wright, which is the first airplane bought for military purposes by any government.

7. By exhibiting since 1922 in the National Museum twelve double-sided frames containing forty-nine photographs showing the circumstances of the Kitty Hawk and Fort Myer flights.

Mr. Wright feels, however, that the Smithsonian Institution has appeared to be engaged in propaganda with the

object of exalting Langley at the expense of himself and his brother as follows:

1. By predominant mention of the achievements of Langley in the addresses at the time of the first presentation of the Langley medal.
2. By a misleading account of the exercises of February 10, 1910, printed in the Smithsonian Annual Report of 1910.
3. By what he regarded as the lack of cordiality in an invitation by Secretary Walcott in April, 1910, to the Wright brothers to deposit the Kitty Hawk or other planes in the U. S. National Museum.
4. By the contract, in 1914, for experiments with the Langley machine made with Mr. Glenn Curtiss, at that time a defendant in a patent suit brought by the Wright brothers.
5. By claims of priority in capacity to fly, for the Langley machine, based on the experiments of 1914, and repeated in Smithsonian publications as well as on labels in the National Museum.
6. By failure to recognize properly the abilities of the Wrights as research men.

I propose to take up these points seriatim:

1. Mr. Wright's feeling that predominant mention of the achievements of Langley was made at the presentation of Langley medals to him and his brother.

The main address on February 10, 1910,¹ was by the late Dr. Alexander Graham Bell, a friend of Langley, a close observer of his experiments for a period of ten years, and a Regent of the Smithsonian Institution. The occasion was the first award of a gold medal bearing Langley's name, which had been established at the suggestion of Dr. Bell to perpetuate Langley's place in aeronautics. Responding to a feeling then prevalent that Langley, on account of the

¹ See Smithsonian Annual Report, 1910, pp. 104-108.

ill success of his experiments of 1903, had met with unjust ridicule, and doubtless inspired also by the partiality of a friend, it cannot be denied that Dr. Bell made less prominent in comparison with Langley's achievements the successful pioneer work of the Wrights than he might well have done appropriately on that occasion. But Dr. Bell was not lacking in appreciation of the Wrights. In the following letter recommending establishment of the Langley medal he suggests the fitness of awarding it to the Wright brothers:

Beinn Bhreagh,
Near Baddeck,
Nova Scotia,

December 5, 1908.

Hon. C. D. Walcott,
Secretary, Smithsonian Institution,
Washington, D. C.

Dear Secretary Walcott:

The Wright brothers are being deservedly honored in Europe. Can not America do anything for them? Why should not the Smithsonian Institution give a Langley medal to encourage aviation?

Yours, sincerely,

ALEXANDER GRAHAM BELL.

(See Smithsonian Annual Report, 1909, p. 107.) By reference to the same Report¹ it will be seen also how strongly Senator Lodge felt in regard to the merits of the Wright brothers.

2. Mr. Wright's feeling that the summary of the exercises of February 10, 1910, printed in the Smithsonian Annual Report of 1910 was misleading.

I acknowledge with regret that the summary of the proceedings given at an earlier page of the Smithsonian Annual Report for 1910 (pp. 22-23) is misleading. The summary quotes the following words from Mr. Wilbur Wright:

¹ Smithsonian Annual Report, 1909, p. 111.

“The knowledge that the head of the most prominent scientific institution of America believed in the possibility of human flight was one of the influences that led us to undertake the preliminary investigation that preceded our active work. He recommended to us the books which enabled us to form sane ideas at the outset. It was a helping hand at a critical time, and we shall always be grateful.”

From the context it would appear that Mr. Wright made this statement at the ceremony. This was not the case. Actually the statement was quoted by Dr. Bell in his speech from an extract of a private letter from the Wright brothers which Dr. Octave Chanute had quoted at the Langley Memorial meeting, December 3, 1906.¹ The full statement made by Wilbur Wright at the ceremony is given as approved by him at pages 109-110 of the same Smithsonian Annual Report, that for 1910.

Mr. Orville Wright assures me that though he and his brother both drew encouragement from the fact that so celebrated a scientific man as Dr. Langley had adventured his reputation in the field of heavier-than-air aviation, the Wrights did not rely on Langley's experimental data or conclusions, but made laboratory researches of their own, on which their constructions were based exclusively. I fully accept this assurance as a true statement of historical fact.

3. Mr. Wright's feeling that Secretary Walcott's invitations to deposit the Kitty Hawk and other planes in the National Museum lacked cordiality.

The letters referred to are as follows:

Smithsonian Institution,
Washington, U. S. A.,
March 7, 1910.

My dear Mr. Wright:

The National Museum is endeavoring to enlarge its collections illustrating the progress of aviation and, in this connection, it has

¹ See Smithsonian Miscellaneous Collections, Vol. XLIX, Art. IV, Publ. No. 1720, p. 32.

been suggested that you might be willing to deposit one of your machines, or a model thereof, for exhibition purposes.

The great public interest manifested in this science and the numerous inquiries from visitors for the Wright machine make it manifest that if one were placed on exhibition here it would form one of the most interesting specimens in the national collections. It is sincerely hoped that you may find it possible to accede to this request.

With kindest regards, I am

Very truly yours,

CHARLES D. WALCOTT,

Secretary.

MR. WILBUR WRIGHT,
Dayton, Ohio.

Dayton, Ohio,

March 26, 1910.

Mr. Charles D. Walcott,
Washington, D. C.

My dear Dr. Walcott:

Your letter of the 7th of this month has been received. If you will inform us just what your preference would be in the matter of a flier for the National Museum we will see what would be possible in the way of meeting your wishes. At present nothing is in condition for such use. But there are three possibilities. We might construct a small model showing the general construction of the airplane, but with a dummy power plant. Or we can reconstruct the 1903 machine with which the first flights were made at Kitty Hawk. Most of the parts are still in existence. This machine would occupy a space 40 feet by 20 feet by 8 feet. Or a model showing the general design of the latter machine could be constructed.

Yours truly,

WILBUR WRIGHT.

Smithsonian Institution,

Washington, U. S. A.,

April 11, 1910.

Dear Mr. Wright:

Yours of March 26th came duly to hand, and the matter of the representation of the Wright airplane has been very carefully considered by Mr. George C. Maynard, who has charge of the Division of Technology in the National Museum. I told him to indicate what he would like for the exhibit, in order that the matter might

be placed clearly before you and your brother. In his report he says:

The following objects illustrating the Wright inventions would make a very valuable addition to the aeronautical exhibits in the Museum:

1. A quarter-size model of the airplane used by Orville Wright at Fort Myer, Virginia, in September, 1908. Such a model equipped with a dummy power plant, as suggested by the Wrights, would be quite suitable.

2. If there are any radical differences between the machine referred to and the one used at Kitty Hawk, a second model of the latter machine would be very appropriate.

3. A full-size Wright airplane. Inasmuch as the machine used at Fort Myer has attracted such world-wide interest, that machine, if it can be repaired or reconstructed, would seem most suitable. If, however, the Wright brothers think the Kitty Hawk machine would answer the purpose better, their judgment might decide the question.

4. If the Wright brothers have an engine of an early type used by them which could be placed in a floor case for close inspection that will be desirable.

The engine of the Langley Aerodrome is now on exhibition in a glass case and the original full-size machine is soon to be hung in one of the large halls. The three Langley quarter-size models are on exhibition. The natural plan would be to install the different Wright machines along with the Langley machines, making the exhibit illustrate two very important steps in the history of the aeronautical art.

The request of Mr. Maynard is rather a large one, but we will have to leave it to your discretion as to what you think it is practicable for you to do.

Sincerely yours,

CHARLES D. WALCOTT,

Secretary.

MR. WILBUR WRIGHT,
1127 West Third Street,
Dayton, Ohio.

I cannot but feel that Mr. Wright has erred in ascribing to Dr. Walcott any but a sincere invitation to the Wrights to make their own selection of whatever they thought best suited and most available to deposit in the National Museum for the purpose of illustrating their achievements. It is to be recalled, too, that in 1910 the world was ringing with the triumphant demonstrations of the Wrights at Fort Myer and in France of ability to make long-continued air flights. At that moment the Fort Myer plane was far more cele-

brated than the Kitty Hawk plane. Now, of course, all is changed. We have the Fort Myer plane. But it is profoundly regretted by patriotic Americans that the Kitty Hawk plane is not in a place of honor in the United States National Museum.

4. Mr. Wright's feeling that the contract to test the Langley plane in 1914 with Mr. Glenn Curtiss, then a defendant in a suit with the Wrights, was unfriendly to them.

I concede to Mr. Wright that it lacked of consideration to put the tests of the Langley plane into the hands of his opponent, Mr. Curtiss. As early as 1908 Dr. Walcott had had correspondence with Mr. Manly and with Dr. Chanute on the desirability of further experiments with the Langley Aerodrome under Manly's direction. Lack of means, from which the Smithsonian then as now suffered, doubtless stood in the way. Without having been familiar myself with all the circumstances at that time, I believe it was owing to the fact that Mr. Curtiss had the available plant and Manly had not, so that the former could make the tests at smaller expense than the latter, that Dr. Walcott determined to place the machine in Curtiss' hands for trial. The Smithsonian paid Mr. Curtiss \$2,000 to make the experiments. Yet the fact that the results of these tests might prove valuable to Mr. Curtiss in his defense against Mr. Wright's suit, and the unfavorable aspect in which that might put the Smithsonian Institution, if foreseen, might well have deterred from the course of action adopted. The appointment of Dr. A. F. Zahm to represent the Smithsonian as official observer at the Hammondsport tests has been criticized. At that time Dr. Zahm, a recognized aeronautic authority, was the official recorder of the Langley Aeronautical Laboratory of the Smithsonian Institution, a position he had held since May, 1913, so that his appointment as indicated was natural.

As to the propriety of testing Langley's machine in 1914, some have objected on the ground that it was a precious specimen, taken from the National Museum to be wantonly subjected to destruction. This is not true. The machine, excepting its engine, was never on public exhibition until 1918. In 1904 it was specifically placed by the War Department¹ at the disposal of the Smithsonian for further tests. It had been kept continuously in the shops where it was made from the winter of 1903 until it was taken to Hammondsport.

In 1914 airplane construction had not reached the comparatively standardized stage of the present day. It was then thought possible that the tandem, dragon-fly type of the Langley Aerodrome had merits which should be developed. There was also the thought that a decisive success might rescue from unmerited ridicule Langley's fame. These, I submit, were circumstances very properly inviting the making of the tests. But I feel that it was a pity that Manly, Dr. Langley's colleague, could not have been the man chosen to make them.

5. Mr. Wright's feeling that claims in priority of capacity to fly for the Langley machine based on 1914 experiments were unjustified and prejudicial to the Wright brothers.

The claims published by the Smithsonian relating to the 1914 experiments at Hammondsport were sweeping. In the Report of the U. S. National Museum for 1914, page 47,²

¹ It is frequently erroneously stated that the Congress appropriated \$100,000 to Langley for his experiments. The sum of \$50,000 allotted to him by the Board of Ordnance and Fortifications of the War Department was all the public money that he ever had for the purpose. There was no direct Congressional appropriation whatever.

² See also Smithsonian Annual Report, 1914, pp. 9-10 and 217-222; also the label of the full-sized Langley machine as first installed in 1918 in the National Museum, hereafter quoted.

we read: "Owing to a defect in the launching apparatus, the two attempts to fly the large machine during Dr. Langley's life proved futile, but in June last, without modification, successful flights were made at Hammondsport, N. Y." Certainly this was not literally true, but Assistant Secretary Rathbun, who wrote the statement given above, I am certain believed this to be true. There were, however, many differences. (I refer only to the first tests when the original Langley-Manly engine was used.) Mr. Wright claims that essential changes tending to improve the chances of success were made on the basis of knowledge gained subsequent to 1903.

Some of the differences were favorable, some unfavorable, to success. Just what effects, favorable or unfavorable, the sum total of these changes produced can never be precisely known. In the opinion of some experts, the tests demonstrated that Langley's machine of 1903 could have flown, and in the opinion of others, these tests did not demonstrate it. It must ever be a matter of opinion.

In 1918, the Langley plane, reconstructed as nearly as possible as of 1903, using all available original parts, by Mr. R. L. Reed, the foreman who had most to do with it in Langley's time, was exhibited in the U. S. National Museum with this label:

THE ORIGINAL, FULL-SIZE,
LANGLEY FLYING MACHINE, 1903

Later this label was amplified to read as follows:

ORIGINAL LANGLEY
FLYING MACHINE, 1903

THE FIRST MAN-CARRYING AEROPLANE IN THE HISTORY OF THE WORLD CAPABLE OF SUSTAINED FREE FLIGHT. INVENTED, BUILT, AND TESTED OVER THE POTOMAC RIVER BY SAMUEL PIERPONT LANGLEY IN 1903. SUCCESSFULLY FLOWN AT HAMMONDSPORT, N. Y., JUNE 2, 1914. DIMENSIONS: 55 FEET LONG, 48 FEET WIDE; SUSTAINING WING SURFACE, 1,040 SQUARE FEET.

Vigorous criticism of the statements made by the Smithsonian relative to the test of 1914, and the capability of flight of Langley's machine having appeared, Dr. Walcott in 1925 asked Dr. J. S. Ames and Admiral David W. Taylor, members and now Chairman and Vice-Chairman, respectively, of the National Advisory Committee for Aeronautics, to examine the circumstances and report. Their conclusions were summarized in the following letter, supported by several appendices which are printed herein, the whole of which was given to the press by Dr. Walcott on June 9, 1925.

Washington, D. C.,
June 3, 1925.

Dr. Charles D. Walcott,
Secretary, Smithsonian Institution,
Washington, D. C.

Dear Doctor Walcott :

The announcement that Mr. Orville Wright had arranged to have the first Wright airplane deposited in a British museum having aroused considerable controversy as to the accuracy of the label attached to the Langley flying machine now on exhibition in the Smithsonian Institution, you have asked us to examine the Langley machine, look into its history, and advise you whether we consider it desirable to modify the present label.

We have made a careful study, not only of the history of the Langley machine itself, but also of all the circumstances connected with its tests. We append to this letter (Appendix I) a suggested modified label, and a statement of our views and conclusions (Appendix II), upon which our recommendation is based.

There is no question but that the Wrights were the first to navigate the air, thus reaching the goal long sought by many, but in our opinion, when Langley's 1903 machine was wrecked in launching, he too, after years of effort, following a different road, was in sight of the same goal. He was like the prophet of old who, after forty years of wandering in the wilderness, was permitted to view the promised land upon which he never set his foot. Langley's accomplishments in aeronautics were notable, and he is entitled to full credit for them. We believe that the Langley machine of 1903 was capable of sustained flight had it been successfully launched, and it is naturally fitting that the Smithsonian Institution should

perpetuate with pride, by exhibiting his models and flying machine, suitably labeled, the aeronautical achievements of its distinguished secretary.

It is unfortunate that in the past the situation has been beclouded by patent litigation, in which the Smithsonian Institution had no part, involving temptation for one side to exaggerate and distort favorably Langley's work, and for the other side to belittle and deny it. While bitterness thus engendered survives, it cannot be expected that any label can be placed upon Langley's machine that will be fully acceptable to everyone. The appended suggested label departs from the customary brief title in two respects. In the first place, it is much longer and goes more into the history of the exhibit than is customary. In the second place, in view of the facts that the exhibit deals with the border line between success and failure of man's effort to fly, and that the original Wright machine, a purely American product and the first to fly, is destined to a museum in another country, we have suggested that the label on the Langley machine, also a purely American product and capable of flight but not successfully flown, contain an explicit and definite statement, which would be unnecessary under other circumstances, giving to the Wrights the credit due them as the first to fly, on December 17, 1903.

It is our earnest hope that this proposed restatement of the label will prove satisfactory both to yourself and to Mr. Orville Wright, with both of whom we have had such friendly relations on the National Advisory Committee for Aeronautics and in whose judgment and fairness of mind we have such implicit confidence.

Respectfully yours,

(Signed) JOSEPH S. AMES

Professor of Physics,

Johns Hopkins University.

(Signed) D. W. TAYLOR

Rear Admiral (C. C.) U. S. N., Retired.

APPENDIX I

(Ames-Taylor Report)

LABEL

LANGLEY FLYING MACHINE

THE ORIGINAL LANGLEY FLYING MACHINE OF 1903, RESTORED. IN THE OPINION OF MANY COMPETENT TO JUDGE, THIS MACHINE WAS THE FIRST HEAVIER-THAN-AIR CRAFT IN THE HISTORY OF THE WORLD CAPABLE OF SUSTAINED FREE FLIGHT UNDER ITS OWN POWER, CARRYING A MAN.

THIS MACHINE SLIGHTLY ANTEDATED THE WRIGHT MACHINE DESIGNED AND BUILT BY WILBUR AND ORVILLE WRIGHT, WHICH, ON DECEMBER 17, 1903, WAS THE FIRST IN THE HISTORY OF THE WORLD TO MAKE A SUSTAINED FREE FLIGHT UNDER ITS OWN POWER, CARRYING A MAN.

Langley's machine was designed by Samuel Pierpont Langley, Secretary of the Smithsonian Institution, and completed in 1903. The original machine was never successfully launched into the air: attempts at launching with a catapult on October 7 and December 8, 1903, were failures owing to defects in the operation of the catapult launching device, and the machine was damaged severely. In 1914, using all available parts remaining, the machine was re-constructed, with certain modifications, and with hydroplane floats attached for the purpose of enabling it to rise from the water instead of being launched by a catapult. In that condition, and carrying a man, it was successfully flown with the original power plant, at Hammondsport, New York, June 2, 1914, and photographed in flight. With a modified and more powerful power plant, it was subsequently flown repeatedly. These tests indicated that the original airplane would have flown if successfully launched in the tests of 1903. After the Hammondsport flights the pontoons were removed and the airplane was restored in accordance with original drawings and data to its original condition, and is constructed in the main of the original parts.

Washington, D. C.,

June 3, 1925.

APPENDIX II

(Ames-Taylor Report)

THE LANGLEY FLYING MACHINE.

Memorandum for Dr. Charles D. Walcott,
Secretary, Smithsonian Institution.

1. In connection with our letter to you of even date, concerning the label on the Langley Flying Machine in the National Museum, we beg to add the following remarks of an historical nature, and our views and conclusions in some detail.

2. Professor S. P. Langley became actively interested and engaged in the study of aeronautics in 1887, and was assiduous in the theoretical and experimental study of the subject till his death in 1906. The more important of his results were finally published in Volume 27 of "Smithsonian Contributions to Knowledge," Part 1, issued in 1891, entitled "Experiments in Aerodynamics"; Part 2, the "Internal Work of the Wind," 1893; and Part 3, the "Langley Memoir on Mechanical Flight," 1911. In the course of his study he became convinced of the possibility of "mechanical flight," *i. e.*, of constructing a heavier-than-air machine, to be driven by an engine, and sufficiently powerful and stable to carry a man. To this end he constructed certain models about 12 feet wide by 15 feet long, weighing approximately 30 pounds, each driven by a $1\frac{1}{2}$ horsepower steam engine which with its boiler weighed not over 7 pounds per horsepower. These models actually did fly, in one case as long as 1 minute and 49 seconds and for a distance of 4,300 feet. These two machines made successful flights on May 6, 1896, in the presence of Dr. A. Graham Bell, and on November 28, 1896, in the presence of Mr. Frank G. Carpenter. The model machines numbered 5 and 6 were placed on exhibition in the National Museum on April 21, 1905. Finally, by the aid of a grant of \$50,000 made by the Board of Ordnance and Fortification of the War Department in December, 1898, which was later supplemented by funds to the amount of \$20,000 from the Smithsonian Institution, he constructed in the years from 1898 to 1903 a full-size flying machine (which he called an "aerodrome"), a reproduction on a scale approximately 4:1 of these steam models which had previously flown in 1896. The engine of this final machine was a radial 5 cylinder, water cooled, gasoline type, 5 inch bore by $5\frac{1}{2}$ inch stroke, developing 52.4 horsepower at 950 r. p. m., and

weighing 125 pounds, or 2.2 pounds per horsepower. This engine was designed and built by Mr. Charles M. Manly at the Smithsonian shops. Two tests were attempted with this flying machine, Mr. Manly being the pilot in both cases.

3. The machine was designed to obtain its initial impetus by means of a spring-catapult propelling it along a pair of rails on top of a house boat. The first test was conducted in the middle of the Potomac River, opposite Widewater, Virginia; and suitable provision was made for the flotation of the machine upon its landing on the surface of the river as it was intended to do. The second test was made on December 8, 1903, off the Arsenal Point in the Potomac River at the junction of the Georgetown Channel and the Eastern Branch. A full description of the machine and the tests is given in "Langley Memoir on Mechanical Flight," published in 1911. Both attempts to launch the machine failed. The first on October 7, 1903, failed because a lug on a pin projecting from the bottom of the lower front guy post hung in its slot on a support on the launching car or catapult, causing the front wings to be badly twisted from a positive angle of lift to a negative angle of depression, thus forcing the front end of the machine downwards instead of supporting it, and resulting in the machine striking the water about 150 feet in front of the house boat from which it was launched. The front wings and propellers were broken by the impact and the rear wings and control surfaces were destroyed by towing the machine through the water. The second test on December 8, 1903, failed for reasons which were never absolutely determined. Photographs of the operation show clearly, however, that the immediate cause was the collapse of the rear part of the machine. This was probably due to a sudden gust of wind striking it and throwing it against a stanchion as it passed down the launching track, while it was still in contact with the catapult. Thus, no evidence was obtained of the aerodynamic or other features of the machine itself. Further study at the time was not possible because funds were exhausted and the public prejudice against the work made it impossible for Dr. Langley to raise either public or private funds.

4. The machine was drawn from the water in its damaged condition the night of December 8, 1903. A few days later it was removed to the shops of the Smithsonian Institution where the frame was repaired and the engine, which had not been injured, was stored for further use till such time as additional funds might become available to build new wings and to defray the expenses of

further tests. Official disposition of that part of the machine belonging to the War Department was made on March 23, 1904, when by formal letter of the Board of Ordnance and Fortification, signed by Major General G. S. Gillespie, President of the Board, and addressed to Dr. Langley, the Board stated that ". . . all of the material procured for experiments with the aerodrome from allotments of this Board will be left in your possession, in order that it may be available for any future work which you may be able to carry on in the solution of the problem of mechanical flight; unless, of course, the Board of Ordnance and Fortification shall otherwise direct, but until such action be taken there will be no necessity for a separation or distribution of the property so far as the Board is concerned."

5. It would seem from the above that at that time there was expectation that further tests would be made with the machine.

6. The machine had in the meantime been cleaned and restored to its original condition, except for the necessary wings and control surfaces. The ribs and cloth covering on the original wings and control surfaces had been so damaged as to require replacement, but the metal fittings were all saved for rebuilding the wings when it might become possible.

7. The engine was shipped to New York in 1906 and exhibited at the first aeronautical show which was held at the Grand Central Palace by the Aero Club of America. It was then returned to Washington and placed on temporary exhibition in the National Museum, but the rest of the machine remained in the Smithsonian shops and was not then placed on exhibition in the National Museum.

8. It appears that as early as 1908 the Smithsonian Institution contemplated making further tests with the Langley Flying Machine. This is evident from a memorandum of September 14, 1908, signed by Cyrus Adler, addressed to Mr. Rathbun, at the Smithsonian Institution, which reads as follows:

"September 14, 1908.

"For Mr. Rathbun:

"I had a talk today with Mr. Chanute, the gist of which I should like to put on record.

"He spoke of Mr. Manly's desire to fly Mr. Langley's flying machine just as it was constructed in order to demonstrate that it could have flown. Mr. Chanute said that in his opinion Mr. Langley's machine could fly just as it was constructed, and this had been

demonstrated by the fact that a Frenchman has built a machine exactly like Mr. Langley's which has flown, but he believed further that the machine would be wrecked in alighting.

"I thought you might care to have this because it is more than likely that before very long, through the War Department or in some other way, the question of trying the machine will be forcibly brought up.

Very truly yours,

CYRUS ADLER."

This is further evidenced by the following correspondence between Dr. Walcott and Dr. Octave Chanute, one of the pioneers in flying experiments:

"November 16, 1908.

"Dear Dr. Chanute:

"In a letter received during the summer while I was away from the city, Mr. Charles M. Manly says:

The Langley machine is today capable of more than any other machine yet built, and is apt to remain so for some time. The engine is now seven years old and still is the peer of the world.

"Mr. Manly has suggested that he be permitted to make trial tests of the Langley machine at some future time. I write to ask whether in your judgment it would be wise to have an attempt made to fly with it.

Sincerely yours,

CHAS. D. WALCOTT."

"Chicago, Illinois,

November 20, 1908.

"Mr. Chas. Walcott,
Secy., Smithsonian Instn.,
Washington, D. C.

"Dear Sir:

"I have your letter of the 16th, asking whether in my judgment, it would be wise to make an attempt to fly with the Langley machine.

"I have never seen this machine but I suppose that I understand it fairly well from descriptions.

"My judgment is that it would probably be broken when alighting on hard ground and possibly when alighting on the water, although the operator might not be hurt in either case.

"If the Institution does not mind taking this risk and suitable arrangements can be made about the expense. I believe that it

would be desirable to make the test, in order to demonstrate that the Langley machine was competent to fly and might have put our government in possession of a type of flying machine, which, although inferior to that of the Wrights, might have been evolved into an effective scouting instrument.

Yours truly,

O. CHANUTE."

" November 27, 1908.

" Dear Sir:

" I wish to thank you for your letter of November 21, in relation to the Langley machine. I will talk the matter over with Mr. Manly the next time I see him.

Very truly yours,

CHAS. D. WALCOTT."

" DOCTOR OCTAVE CHANUTE,

61 Cedar Street,

Chicago, Illinois."

9. In 1910, the Smithsonian Institution made an effort to secure the original Wright machine of 1903, or a model thereof for exhibition in the National Museum. This is evidenced by the following correspondence between Dr. Walcott and Mr. Wilbur Wright:

" Smithsonian Institution,

Washington, U. S. A.,

March 7, 1910.

" My dear Mr. Wright:

" The National Museum is endeavoring to enlarge its collections illustrating the progress of aviation and, in this connection, it has been suggested that you might be willing to deposit one of your machines, or a model thereof, for exhibition purposes.

" The great public interest manifested in this science and the numerous inquiries from visitors for the Wright machine make it manifest that if one were placed on exhibition here it would form one of the most interesting specimens in the national collections. It is sincerely hoped that you may find it possible to accede to this request.

" With kindest regards, I am

Very truly yours,

CHARLES D. WALCOTT,

Secretary."

" MR. WILBUR WRIGHT,
Dayton, Ohio."

“ Dayton, Ohio,
March 26, 1910.

“ Mr. Charles D. Walcott,
Washington, D. C.

“ My dear Dr. Walcott:

“ Your letter of the 7th of this month has been received. If you will inform us just what your preference would be in the matter of a flier for the National Museum we will see what would be possible in the way of meeting your wishes. At present nothing is in condition for such use. But there are three possibilities. We might construct a small model showing the general construction of the airplane, but with a dummy power plant. Or we can reconstruct the 1903 machine with which the first flights were made at Kitty Hawk. Most of the parts are still in existence. This machine would occupy a space 40 feet by 20 feet by 8 feet. Or a model showing the general design of the latter machine could be constructed.

Yours truly,

WILBUR WRIGHT.”

“ Smithsonian Institution,
Washington, U. S. A.,
April 11, 1910.

“ Dear Mr. Wright:

“ Yours of March 26th came duly to hand, and the matter of the representation of the Wright airplane has been very carefully considered by Mr. George C. Maynard, who has charge of the Division of Technology in the National Museum. I told him to indicate what he would like for the exhibit, in order that the matter might be placed clearly before you and your brother. In his report he says:

The following objects illustrating the Wright inventions would make a very valuable addition to the aeronautical exhibits in the Museum:

1. A quarter-size model of the airplane used by Orville Wright at Fort Myer, Virginia, in September, 1908. Such a model equipped with a dummy power plant, as suggested by the Wrights, would be quite suitable.

2. If there are any radical differences between the machine referred to and the one used at Kitty Hawk, a second model of the latter machine would be very appropriate.

3. A full-size Wright airplane. Inasmuch as the machine used at Fort Myer has attracted such world-wide interest, that machine, if it can be repaired or reconstructed, would seem most suitable. If, however, the Wright brothers think the Kitty Hawk machine would answer the purpose better, their judgment might decide the question.

4. If the Wright brothers have an engine of an early type used by them which could be placed in a floor case for close inspection that will be desirable.

"The engine of the Langley Aerodrome is now on exhibition in a glass case and the original full-size machine is soon to be hung in one of the large halls. The three Langley quarter-size models are on exhibition. The natural plan would be to install the different Wright machines along with the Langley machines, making the exhibit illustrate two very important steps in the history of the aeronautical art.

"The request of Mr. Maynard is rather a large one, but we will have to leave it to your discretion as to what you think it is practicable for you to do.

Sincerely yours,

CHARLES D. WALCOTT,
Secretary."

"MR. WILBUR WRIGHT,
1127 West Third Street,
Dayton, Ohio."

10. Apparently, nothing developed from the above correspondence. Dr. Walcott's last letter quoted above was never replied to. It is a matter of grave regret that at that time the Wright brothers did not see their way to reconstruct and deposit in the National Museum their original full-size airplane, the first machine ever to fly successfully with a man, because then, in 1910, it would have been the only full-size flying machine on exhibition in the National Museum, the Langley machine being still in the shops of the Smithsonian Institution awaiting further tests.

11. In September, 1911, the Smithsonian Institution secured and placed on exhibition in the National Museum the original Wright airplane that was tested at Fort Myer in 1908, and purchased by the War Department, being the first military airplane purchased by the Government.

12. In January, 1914, the late Lincoln Beachey, one of the pioneer aviators, and others, again suggested that it would be of interest to determine by actual test whether the essential features of Professor Langley's aerodynamic theory, as illustrated in his 1903 machine, were correct. Finally, at the initiative of the Smithsonian Institution, the Curtiss Aeroplane Company was invited to submit a bid to refit the machine and to make tests. The formal letter to the Curtiss Aeroplane Company was dated March 31, 1914, and the reply offering to undertake the work for a price of \$2,000, was

written by Mr. G. H. Curtiss on April 1, 1914. The machine was thereupon sent to the shops of the Curtiss Aeroplane Company at Hammondsport, New York, on April 2, 1914, and the engine was shipped on April 13, 1914.

13. In preparing the machine for flight with the original engine, certain modifications and additions were made. These were due, in the main, to the fact that, whereas the original machine was fitted for use with a catapult, these new tests were to be made from the surface of a lake, using hydroplaning floats. Therefore, certain changes were necessary to attach these floats to the machine and to properly inter-brace them and the supporting surfaces together.

14. It is perfectly clear from the correspondence between the Smithsonian Institution and the Curtiss Aeroplane Company that no emphasis was placed upon the use of the original machine, as such, but that what was desired was knowledge concerning certain features of the Langley design, which was expressed in Dr. Walcott's letter of March 31, 1914, previously referred to, in the following terms:

“In connection with the reopening and development of work under the Langley Aerodynamical Laboratory, it seems desirable to make a thorough test of the principles involved in the construction of the Langley heavier-than-air man carrying flying machine, especially the question as to the tandem arrangement of the planes, and general stability, especially longitudinal stability.”

15. A brief interesting account of the Hammondsport tests is contained in the Annual Report of the Smithsonian Institution for 1914, pages 217 to 222.

16. After the flights were discontinued in November, 1915, the machine was returned to the Smithsonian shops on June 26, 1916. There it was completely overhauled. New wings and control surfaces were built to the same form and size (with solid instead of hollow ribs to save the expense of the latter) so as to refit the machine for exhibition purposes in the National Museum and restore it as nearly as possible to its original condition as it was in 1903. As much of the original material was used as possible. When this overhaul was completed, it was placed on exhibition in the National Museum on January 15, 1918.

17. It is seen that up to 1915 the Langley machine was used solely and properly for the purposes intended by Professor Langley himself, for which it was originally turned over by the Board of Ordnance and Fortification which had defrayed the major portion of its cost. When all had been done to this end that was possible,

the machine became properly an exhibit in the National Museum. It was never an exhibit until 1918.

18. Previous to this date, there had been placed on exhibit in the Museum the two Langley steam-driven models which had successfully flown in 1896, and the quarter-size model of the large machine equipped with its 3 horsepower radial gasoline engine. The first two of these are approximately, and the latter exactly, one-fourth the linear dimensions of the full-size machine. It is thus clear that, when in the letters from the Smithsonian Institution to Messrs. Wilbur and Orville Wright, of March 7 and April 11, 1910, the request was made for models of their successful machines, it was the hope to have both Langley and the Wright brothers represented in the Museum by exhibits of the same character.

19. The question whether the original Langley machine of 1903 was capable of flight under its own power and carrying a pilot has been a controversial one since, subsequent to the Hammondspport trials of 1914, there was litigation to which the Smithsonian Institution was in no way a party, involving infringement, or alleged infringement of the Wright patents by other manufacturers, and since, in 1921, the English patent attorney for the Wrights published a violent attack, with allegations of fraud, etc., in connection with the Hammondspport trials.

20. There are just three questions involved, which must be answered before it is possible to determine the capability of flight of the original Langley machine. These questions are: First, was the power plant adequate? Second, did the machine embody the proper aerodynamic principles to enable it to balance and maintain itself in the air? Third, was it sufficiently strong structurally to carry its weight and the stresses due to flying?

21. As regards the power plant, there seems no question that, in the Hammondspport trials the original Manly engine never developed the power of which it was demonstrated to be capable in 1903. Furthermore, during the Hammondspport trials with the original engine, the weight lifted into the air, including the pontoons, was 40 per cent greater than that of the machine as of 1903 with a pilot. Moreover, the bracing and supports to the pontoons and the pontoons themselves must have added materially to the resistance of the machine. If under these circumstances, the Langley machine was capable of arising from the water, which was demonstrated, there is no question in our mind that the 1903 machine had an adequate power plant.

22. With reference to the second question, although there were some changes in the supporting and guiding surfaces in the Hammondsport machine as compared with those of the 1903 machine, they were not, in our judgment, material, either as regards the Hammondsport machine when fitted with the original Manly engine, or subsequently when modified by a more powerful engine with a tractor screw. Moreover, the machine as it stood was virtually an exact copy of a quarter-size model which had shown itself aerodynamically quite satisfactory. We conclude, accordingly, that the answer to the second of the fundamental questions above is also in the affirmative.

23. When it comes to the question of strength, the case is not so clear. There is no question that the changes made in 1914 provided additional strength. Additional strength was obviously needed if 40 per cent additional weight was to be carried. However, the fact that additional strength was provided renders it impossible to remove the third question from the realm of controversy. This is a question for technical experts. A complete wing, one-quarter of the sustaining area, showed, by sand load test, ability to carry a total weight of 260 pounds without damage, while one-quarter of the weight of the original machine and pilot was $207\frac{1}{2}$ pounds, only. Subsequently, the Hammondsport machine with a much more powerful engine (a Curtiss 80 horsepower engine) and with only a moderate increase in strength, showed itself capable of flight carrying 1,520 pounds, or 85 per cent more weight than the original machine of 1903. These facts, in our opinion, establish a strong presumption in favor of the adequacy of the structural strength of the original machine. However, we have asked the disinterested head of the Design Section of the Bureau of Aeronautics of the Navy Department, to study with his experts the original machine and give us their opinion as to the adequacy of the original structure. They are of the opinion that structurally the original Langley flying machine was capable of level and controlled flight.

24. It should not be thought that the original Langley machine was, in any sense, a finished product. Langley himself regarded his machine as only a beginning; numerous problems had occurred to him which needed solution before aviation could be considered practicable. Since Langley and the Wright brothers looked at the subject from such different angles it would have been an inestimable advantage to the science and the art of aviation if Langley had been able to continue his work.

25. In conclusion, we beg to call attention to the fact that a careful examination of the Langley machine now on exhibition in the National Museum shows that there are four minor inaccuracies as compared to the original machine of 1903, which should be remedied, namely:

- (a) The safety flotation tanks should be installed;
- (b) The fin forward of the dihedral rudder should be removed;
- (c) The vertical surface at the rear of the dihedral rudder should be removed; and
- (d) The catapult lugs should be fitted to the king post.

Respectfully submitted,

JOSEPH S. AMES,

Professor of Physics,

Johns Hopkins University.

D. W. TAYLOR,

Rear Admiral (C. C.) U. S. N., Retired."

In October, 1925, Dr. Walcott directed that the label of the large Langley machine of 1903 should be altered to read as follows:

LANGLEY AERODROME

THE ORIGINAL LANGLEY FLYING MACHINE OF 1903, RESTORED

IN THE OPINION OF MANY COMPETENT TO JUDGE, THIS WAS THE FIRST HEAVIER-THAN-AIR CRAFT IN THE HISTORY OF THE WORLD CAPABLE OF SUSTAINED FREE FLIGHT UNDER ITS OWN POWER, CARRYING A MAN.

THIS AIRCRAFT SLIGHTLY ANTEDATED THE MACHINE DESIGNED AND BUILT BY WILBUR AND ORVILLE WRIGHT, WHICH, ON DECEMBER 17, 1903, WAS THE FIRST IN THE HISTORY OF THE WORLD TO ACCOMPLISH SUSTAINED FREE FLIGHT UNDER ITS OWN POWER, CARRYING A MAN.

The aeronautical work of Samuel Pierpont Langley, third Secretary of the Smithsonian Institution, was begun in 1887. By fundamental scientific research he discovered facts, the publication of which largely laid the foundation for modern aviation. Langley designed large model aeroplanes which repeatedly flew in 1896 with automatic stability for long distances. The U. S. War Department, impressed by his success, authorized him to construct a man-carrying machine which was completed in the Smithsonian shops in the spring of 1903. Attempts made to launch it on October

7 and December 8, 1903, failed owing to imperfect operation of the catapult launching device. In these trials the wings and control surfaces were badly damaged and lack of funds prevented other tests at that time. The aeroplane was left by the War Department with the Smithsonian Institution for further experiments. In 1914 (following the foundation by the Institution of the Langley Aerodynamical Laboratory) the experiments were resumed, using all available parts of the original machine. The frame and engine were the same as in the first trials; the reconstructed wings were used without the leading edge extension; the control surfaces were reconstructed; and launching pontoons with necessary trussing were substituted for the original catapult. Thus equipped, and weighing over 40 per cent more than in 1903, with Glenn H. Curtiss as the pilot, it was successfully flown at Hammondsport, N. Y., June 2, 1914. With a more powerful engine and tractor propeller it was subsequently flown repeatedly. These tests indicated that the original machine would have flown in 1903 had it been successfully launched. After the Hammondsport flights the machine was restored in accordance with the original drawings and data under the supervision of one of the original mechanics, using all original parts available. In 1918 the machine thus restored was deposited in the National Museum for permanent exhibition. (Its 52-horsepower gasoline engine was designed by Charles M. Manly, who superintended the construction of the machine and piloted it in 1903.)

THE MODEL AERODROMES DESIGNED BY LANGLEY, THE LANGLEY-MANLY ENGINE, AND PHOTOGRAPHS OF THE MACHINES IN FLIGHT ARE SHOWN NEARBY.

6. As regards the sixth point as given on page 3 I do not know the basis for Mr. Wright's feeling that the Smithsonian has failed to recognize properly the abilities of himself and his brother as research men.

The Institution has published two articles, one by Wilbur Wright on "Some Aeronautical Experiments" and the other by Orville Wright on "Stability of Aeroplanes" (see Smithsonian Annual Reports, 1902, pp. 133-148, and 1914, pp. 209-216). Such publication by the Smithsonian Insti-

tution is in itself definite recognition of the status of the Wrights as discoverers of new truths.

The Smithsonian Institution has borne charges in which have occurred the words "hostile," "insidious," "false propaganda," in consequence of the events I have described. In order to show that the Institution's officers have not been insincere I quote the following passage from a letter which I sent to the Editor of the Journal of the Royal Aeronautical Society, April 27, 1928:

1. Langley himself said after the two unsuccessful launchings in 1903: "Failure in the aerodrome itself or its engines there has been none; and it is believed that it is at the moment of success, and when the engineering problems have been solved, that a lack of means has prevented a continuance of the work." He died in the same belief.

2. Manly twice risked his life in this faith, and eagerly wished to risk it thus again. From conversation I had with him in 1925, I am certain that he also died in the same belief.

3. Chanute on several occasions stated that "he had no doubt" that Langley's machine "would have flown if it had been well launched into the air."

Such, then, in brief review are statements that have been made. In concluding this account, I express, on behalf of the Smithsonian Institution, regret:

1. That any loose or inaccurate statements should have been promulgated by it which might be interpreted to Mr. Wright's disadvantage.

2. That it should have contributed by the quotation on page 23 of the Smithsonian Annual Report of 1910 to the impression that the success of the Wright brothers was due to anything but their own research, genius, sacrifice, and perseverance.

3. That the experiments of 1914 should have been conducted and described in a way to give offense to Mr. Orville Wright and his friends.

I renew to Mr. Wright on behalf of the Smithsonian Institution, my invitation of March 4, 1928, to deposit for

perpetual preservation in the United States National Museum the Kitty Hawk plane with which he and his brother were the first in history to make successful sustained human flight in a power propelled heavier-than-air machine. Finally, as a further gesture of good-will, I am willing to let Langley's fame rest on its merits, and have directed that the labels on the Langley Aerodrome shall be so modified as to tell nothing but facts, without additions of opinion as to the accomplishments of Langley. This label now reads as follows:

LANGLEY AERODROME
THE ORIGINAL SAMUEL PIERPONT LANGLEY
FLYING MACHINE OF 1903, RESTORED.

DEPOSITED BY
THE SMITHSONIAN INSTITUTION

301,613