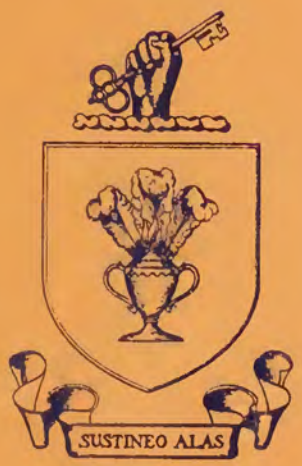
Octave CHANUTE AVIATION PIONEER



CHANUTE FIELD, ILLINOIS

FOREWORD

The Personnel of Chanute Field and the Army Air Corps are deeply grateful to Mr. W. H. Williamson, author, and Mr. Curtis D. MacDougall, State Supervisor, Illinois Writers Project, Works Progress Administration, for their splendid research and compilation of the material contained in this pamphlet. To Mr. Hal O'Flaherety, Managing Editor, Chicago Daily News, our sincere appreciation for the excellent photograph of Octave Chanute, Aviation Pioneer, in whose honor this station was named.

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April 5, 1940.

Octave Chanute
1832—1910

OCTAVE CHANUTE - AVIATION PIONEER

"Once in a blue moon" the world is blessed with an Octave Chanute. Though he belongs to the ages, Chicago has an especial claim, because the last twenty-one years of his life were spent in this city. Here it was that he made his most intensive studies; constructed experimental machines, and developed the great principles which are fundamental in the science of flying in heavier-than-air machines.

Octave Chanute and Samuel Pierpont Langley, who was Superintendent of the Smithsonian Institution in Washington, jointly own the honor of being the true pioneers of aviation in the United States, and the first practicable pioneers in the world.

Both began their intensive studies and experiments in the late '80s. Both devised and utilized the wing warping and aileron principles for lateral stabilization of airplanes. Both gave freely of their findings for the sake of advancing the science of air navigation, and the Wright brothers were especially indebted to Chanute.

Chanute Field at Rantoul, Illinois, and Langley Field, near Washington - great military flying fields - are named for them. Neither profited one penny from their great work, and Chanute unquestionably spent thousands of dollars of his own money without asking or receiving anything in return. He was one of those superb characters who have left "footprints on the sands of time."

Born in Paris, France, in 1832, Octave Chanute came to the United States at six years of age, when his father accepted the post of Vice President of Jefferson College, in Louisiana. There he remained until 1844 when his father moved to New York, in which city Chanute completed his common school education, and - to use his own words - "became thoroughly Americanized."

When seventeen years old, in 1849, he secured a position with the Hudson River Railroad, and continued with that company until its line was completed to Albany, in 1853. During those years he was studying various phases of engineering as he worked.

Bear in mind the fact that facilities for technical study and research were then comparatively meagre. It must be obvious that Octave Chanute was largely self taught, and learned much from actual work along with his studies.

During the next quarter century of his life he became world famous as a civil engineer, construction engineer, architect, designer and builder of great bridges, and was also the great pioneer in chemical methods for preserving railroad ties by impregnation. Not until he was past sixty did he begin his intensive studies in aviation.

Coming west in 1853, Chanute held responsible positions with the Toledo, Peoria and Western Railroad; Pittsburg, Fort Wayne & Chicago; Ohio & Mississippi; Kansas, Fort Scott & Memphis, and the southern division of the Atchison, Topeka & Santa Fe roads. This covered a period of ten years, and in 1863 Chanute was employed as chief engineer for construction and maintenance for the Chicago & Alton railroad. This position he held until 1867.

Winning an open competition, in 1867 he designed and supervised the construction of the Union Stock Yards in Chicago, and in 1871 designed and supervised construction of the Union Stock Yards in Kansas City, Mo.

During this period, though actively engaged in splendid engineering and construction work, Octave Chanute also designed the great Kansas City bridge over the Missouri River, a pioneer structure which attracted world wide attention for its strength and beauty.

Returning to the East in 1873, he spent the next ten years of his life as Chief Engineer for the Erie Railroad, and was also chairman of the engineering committee which reported on the need for urban rapid transit in New York City.

Back to Kansas City in 1883, Chanute opened offices as a consultant on bridge design. Here he designed and had charge of the construction of iron bridges over the Missouri and Mississippi Rivers, for the Chicago, Burlington & Northern, and the Atchison, Topeka & Santa Fe roads.

Chanute for years had observed the disintegration of railroad ties, and had been seeking a method for arresting it. From 1880 until 1885 he was chairman of a Committee of the American Society of Civil Engineers, which prepared a report which was standard and authoritative for many years.

Fundamentally this contemplated the impregnation of railroad ties with chemical compounds which would resist dampness and the boring of insects. Following this line, he designed and supervised construction of plants for various railroads, for treating the timber to be used as railroad ties.

Impregnation with creosote was the method strongly advanced by Chanute. All the world today knows that that method has been successfully used for many years for the preservation of railroad ties, telephone and telegraph poles, and for underground timber construction of all kinds.

Octave Chanute had two great principles in mind - the preservation of timber, and the conservation of forests. As late as the summer of 1910 - the year of his passing - he journeyed to Berne, Switzerland, to attend a world conference of railroad men. There his address on creosote impregnation was outstanding.

Joining the Western Society of Engineers in 1869, the year of its organization, Chanute was elected president in 1901, and in 1909 was elected Honorary Life Member. For more than forty years an honored member of the Society of Civil Engineers, he was president of that body in 1891. For more than half a century, he was one of the world's most distinguished engineers.

Though aviation is scarcely mentioned in the foregoing, common honesty would seem to demand that the facts be presented - the background of the man who generously devoted the later years of his life to the study of aviation, and gave to the world facts and findings which were priceless.

Now - to aviation! Indicative of the intense application, the boundless capacity for detail, the tireless energy of the man, it is only fair to recite the fact that Octave Chanute's studies ranged all the way from the wingspread and sustaining surface of the butterfly to the calculus of higher mathematics.

How in the world he ever found time to make the studies which he subsequently applied, is amazing and almost bewildering. While he was very actively engaged in construction on the ground, Octave Chanute's thoughts were soaring. One is reminded of the comment of Confusius regarding Lao-Tse:-

"Though his feet are on the ground, his head is in the clouds."

Records of the Western Society of Engineers show that

Octave Chanute went back in his research to 400 B.C., to Archytas of Smyrna, credited with being the inventor of the kite. Through the centuries, whenever and wherever there was definite record, he studied the history of Chinese and Japanese kites.

Leonardo da Vinci, in 1500, made numerous experiments relative to flying. Chanute studied his findings. Space forbids mention of all -- for that matter -- of more than a few of the experiments which he studied. And one is hard put to figure how he even learned of them.

Yet the records of the Western Society of Engineers show that Octave Chanute studied "L'Empire de l'air," published in 1881 by L. P. Mouillard, Paris, France. Mouillard's studies had embraced sixty-four birds, ranging from the sparrow to the vulture. He weighed and measured them, setting down the surface area in square feet per pound, and the pounds per square feet foot of surface area.

Several very early experimenters were intrigued with the promise of "negative gravity," the theory that birds possessed in their feathers a negative force of magnetism which pushed them from the earth -- just the reverse of actual gravity, or the lodestone. Chanute studied them all.

Let it here be mentioned that as Chanute progressed in his studies, he wrote his findings, and "held fast to that which was good." Much of his studies must have been made during the later years of his intense construction and engineering activity. When past sixty, having accumulated considerable money by good works, he devoted all of his time and energy to aviation. He had established his home in Chicago in 1889.

Late in 1891 the Railroad and Engineering Journal printed the first of a series of articles by Chanute on "Progress in Flying Machines," in which he set forth the results of his studies. These articles were issued in book form in 1894, and constitute a source of pioneer information of extreme interest and importance.

Recognized as an authority on aerial navigation, he was made chairman of the committee for the International Conference on Air Navigation at the World's Columbian Exposition in Chicago in 1893. That was the first international conference held in the New World. That was the approximate time when Chanute put aside all other activities and devoted himself solely to aviation.

Unfortunately there does not seem to be definite printed record for a few years. It seems obvious that Chanute withdrew to the privacy of his own home, for intensive study and for the construction of models of flying machines.

Otto Lilienthal of Germany had conducted a number of experiments with gliders, but they were not really successful because they all failed in lateral stability and eventually caused the death of that intrepid pioneer. Lilienthal and other experimenters with gliders were using their own bodies as the sole means of establishing stability.

Most of them -- and this was also true of Chanute's first experiments -- saw the operator suspended in a harness under the machine. He would run down a hill in the teeth of wind until the sustaining ability of his "wings" would lift him from the ground. Then, by moving his body, he sought to maintain stability.

Other experimenters would lie flat in the machine; have it dragged or pushed rapidly down a hill into the wind, and then -- solely by body movement -- seek to establish and maintain stability. None of those experiments was successful. Movement of the body sufficed only under the most favorable conditions.

Chanute concluded that any method of maneuvering the machine by changing the position of the body, was wrong. He believed that some means must be provided for adjusting the position of the wings by some definite mechanical means. He believed that the surfaces -- not the man -- must be movable.

Exhaustive study convinced him that ten definite problems must be solved, and the solutions combined into one harmonious whole. These are the ten problems which he listed:

1. Supporting power and resistance of air.
2. The motor -- its character and its energy.
3. The instrument for obtaining propulsion.
4. The form and kind of the apparatus.
5. The extent of the sustaining surfaces.
6. The material and texture of the apparatus.
7. The maintenance of the equilibrium.
8. The guidance in any desired direction.
9. The starting up under all conditions.
10. The alighting safely anywhere.

Consulting problems 2 and 9, it is obvious that Chanute did not propose nor vision the art of flying as depending solely upon the vagaries of weather. He did not believe that man must wait for a favorable wind, nor be deterred by a violent wind.

He believed that man could and would find means whereby he could fly any time, any place. Often in his earlier days as a railroad, bridge, and construction engineer, he had conquered seemingly insuperable obstacles, and unquestionably had boundless faith in man's engineering ability where the air would be concerned.

Though merely an opinion of the writer of this article, it may be logic to assume that if Octave Chanute had not met and overcome tremendous obstacles of land and water, he would not have been so serenely confident of man's ability to meet and overcome the obstacles of the air.

Having become convinced of certain definite principles, Chanute was ready to start mechanical work and experiments. Referring to Page 600, Journal of the Western Society of Engineers for December, 1897, one finds this statement, calling for explanation:

"In December, 1895, Chanute secured the services of Mr. A. M. Herring, a civil and mechanical engineer, who had for some years been making experiments in Aviation, this being the recent name given to attempts to imitate the birds."

Though recent dictionaries contain many new words, a large proportion of them were formerly colloquial terms. Investigation shows that "aviation" is comparatively at least, a brand new word with a definite background of pure language; with its root in Latin and its branch in French.

Strangely enough, the New English Dictionary, from the Oxford University Press, and the Dictionary of the American Language, from the University of Chicago Press, do not contain the word. Webster's Unabridged, of 1934, contains the word, as does also the New Century Dictionary of 1927, the latter giving a more complete definition than the former:

"Aviation: The act, art, or science of flying by mechanica means, especially with machines heavier than air; navigation of the air with flying machines or aeroplanes."

Sub-definition says that "aviator" is "ex-French aviateur." And all are derived from the Latin root word "avis," bird. Dictionaries of 1885 in the Chicago Public Library do not contain either word, nor is there any mention of such word in the standard French dictionary published fifteen or more years prior to 1900.

Though in common use in newspapers and magazines for five

or six years, the word "aviation" does not appear to have been included in any English language dictionary prior to the turn of the century. The statement in the Journal of the Western Society of Engineers is an indirect quote from a speech made by Octave Chanute before the Society.

Thus it is fairly obvious that Chanute was a pioneer sponsor of the word, as well as a pioneer in the science. His French birth and ancestry; his knowledge of the French language, and his close study of pioneer French experiments, establish a close contact.

Now to turn back to the experimental days: Chanute and Herring worked together on the construction of gliders embracing various ideas, until June, 1896, when they went to Miller Station, Indiana, on the sand dunes along Lake Michigan. With them were two chief assistants named Avery and Butosov.

Though the exact dates do not appear available, it is certain that they pitched camp and began their experimental flying about June 15, and continued until early in July. They were actually engaged in flying for at least fourteen days. First they tested a pure Lilenthal machine. Chanute wished first to solve Problem No. 7 -- the maintenance of equilibrium. That apparatus was quickly proved unsatisfactory.

Instead of moving the bodily weight of the flyer to maintain lateral stability -- to control the center of gravity -- Chanute believed that mechanism must be devised within the apparatus itself; to shift the surfaces so as to bring back a varying center of pressure over a fixed center of gravity; the operator not to move except to steer.

Discussing this point later before the Western Society of Engineers, Mr. Chanute said that "the results have been extremely gratifying." He explained that under the Lilienthal method it was necessary for the operator to shift his body as rapidly as a tight rope dancer, sometimes as much as fifteen or eighteen inches.

Then the experiments continued with other types of gliders, one type being biplane, the other the Quinque design with five tiers of wings. The wings swung on pivots, restrained by rubber springs when the wind struck one side more than the other, or changed the center of pressure fore and aft. Mechanical pressure was applied to all, when necessary.

Experiments quickly proved that the five winged apparatus

was not an improvement on the biplane, in either safety or efficiency. It was quickly rejected. Grouping, or placement of the wings, was gradually changed. Part of the experiments consisted of releasing feathers in front of the apparatus when in flight, and watching the paths of the air currents which swept past the wings.

Camp was broken in July and Chanute expressed the belief that "more had been learned during those two weeks of experiments with full sized machines than in seven years of theoretical study."

Returning to Chicago, three full sized machines were constructed, embracing the best features indicated or developed by the former experiments. One was an improved mechanical control of the wing surfaces which came to be known as the "wing warping" device, the fundamental principle which solved the problem of lateral stability, or Problem 7.

Toward the end of August, 1896, Chanute and his associates again went to the sand dunes and for a month proceeded with more experimental flying. Due to his age -- he was sixty-five -- he made few flights, but directed all of them. However, he insisted upon making some of the flights for a reason which will be quickly disclosed.

When Chanute again returned to Chicago, at least five of his problems -- 4, 5, 6, 7 and 8, had been solved, with clear indications how to proceed toward the solution of the remaining five. How successful were these experiments, is shown by an address made by Chanute before the Western Society of Engineers, of which the following is part of an indirect quote:

"Continuing, Mr. Chanute said that when all the problems which had indicated were solved -- and it had been shown that many of them were partly if not wholly solved -- they would still have to be combined into one harmonious design before a commercial flying machine was produced. It would therefore be conceived that a good deal of experimenting will be required and that such experiments will be fraught with danger.

"He had nevertheless advised in his writings and in an article in the Engineering Magazine for April, 1896, that experiments be carried on preferably with full sized machines, carrying a man, as the more fruitful and instructive method.

"This was good advice, but it might prove dangerous for others to follow. He therefore deemed it desirable that he

should ascertain himself how much of risk this involved, if made with due care and precaution."

Right there is the explanation of why Octave Chanute insisted upon making some of the experimental flights himself. He was not willing to ask any man to do something which he would not do, and do it first.

Instead of taking letters patent on any of his discoveries, Octave Chanute published them openly; gave them to the world for the sake of the science of aviation. Learning that the Wright brothers were experimenting in North Carolina, he immediately proceeded to help them.

Though they declined financial assistance, they gladly accepted his advice, and the aid of the great principles established by his experiments. Especially valuable was his solution of the problem of equilibrium, lateral stability. Size and placement of wings (planes); form and kind of apparatus; material and texture of apparatus, and steering gear, both lateral and perpendicular, were also of vast importance.

Let it be observed that Octave Chanute sought first the solution of fundamental problems, believing that the application of motive power could be the more easily studied when those first problems were solved. To use a phrase -- he sought to creep before he flew.

Wright brothers were using the Lilienthal method of operating gliders, with the operator suspended in a harness under the machine. Chanute believed that the aviator should be seated in the machine, thus to be able to devote his close attention to steering.

Application of the wing warping principle was effected by the Wrights, under Chanute's direction, by the use of levers controlling strong wires leading to the upper rear wing tips. Thus an added strain was placed upon the tips, depressing them, and providing greater resistance to the air.

Just as the human body inclines toward a curve when rounding it at speed; just as a railroad track is built on a sloping tangent as a curve, in the direction of the curve, in the same manner the wing-warp inclined the airplane in the direction of the curve, and stability was maintained.

Equilibrium was established. Just as soon as the curve had been rounded, or the unexpected wind pressure on one side of the

machine had decreased, the wing-warp strain was decreased or removed and the machine proceeded on an even keel. Lack of that principle caused the death of Otto Lilienthal.

Some early airplanes applied the wing-warp by wires leading from the aviator's seat, the arms of which were pivoted. Thus a slight movement to right or left, by the aviator, would apply the strain to the wing tips and depress them.

So long as wing surfaces of airplanes were made of resilient fabric, that wing warping device was used, being an indispensable adjunct. Nowadays with rigid metal or composition surfaces, it is no longer used, the result being accomplished by other means.

But Octave Chanute established the principle, and he gave it to the public freely, through the media of pamphlets and personal instruction by word of mouth. Long before the Wright brothers made their first flight with a motor driven biplane, European experimenters were using it.

Consulting page 296 of Pocket-Book of Aeronautics, by Hermann W. L. Moedeback, published in London in 1907, one finds this paragraph:-

"Mr. C. Chanute of Chicago, Illinois, came to the conclusion that equilibrium was the most important problem to solve, and he thought that it might be made automatic by reversing previous practice, and making the surfaces movable instead of the man."

Wright brothers maintained close secrecy regarding their apparatus, so that the theory advanced and proved in gliders by Chanute, had become an accomplished fact in a motor driven machine before the above mentioned book was in print.

During the passing years there have been many and tremendous improvements in heavier-than-air machines, but the patience, engineering skill, and enthusiasm of Octave Chanute were chiefly responsible for the actual birth of the airplane.

Supporting that conclusion is the comment of the Aeronautical Journal in June, 1904:

"Chanute may fairly be considered the progenitor of the biplane, for his multiple plane gliders ***** were the first to be at all successful. He collaborated with the Wright brothers in their experiment and they owe much to his learning and ability."

Possessing the visions of a seer, Chanute said to the Western Society of Engineers, early in 1904:-

"Flying machines promise better results as to speed, but yet will be of limited commercial application. They may carry mails and reach inaccessible places, but they can't compete with railroads as carriers of passengers or freight. They will not fill the heavens with commerce, abolish custom houses, or revolutionize the world, for they will be too expensive for the loads which they can carry, and subject to too many wind contingencies. Success is, however, probable."

Four years later, in 1908, he said that airplanes would some day "make war so terrible as to compel peace." He had then reached the advanced age of 76 years, and his mind was more crystal clear than ever.

Thus, in retrospect, one sees the man who for nearly three score years had devoted his life to useful, constructive work. Possessing amazing vigor and dynamic energy alike of mind and body, he was blessed with the ebullient enthusiasm of youth, and generosity that is almost beyond belief.

Chicago in particular and Illinois in general are also especially indebted to Octave Chanute because he was the organizer and first president of the Aero Club of Illinois, established in February, 1910. Composed of one hundred prominent Chicagoans who banded together for the purpose of advancing the science of aviation in Illinois, that organization led immediately to the formation of the International Aviation Meet Association.

Under the auspices of that organization, Chicago was the scene, in August, 1911, of the greatest aviation meet in world history. But Octave Chanute did not live to see it. To the grief and dismay of his associates, he departed this life on November 23, 1910, at his home on North Dearborn Parkway.

Interred at Peoria, Illinois, his memory is kept green by giving his name to a town in Kansas, thru which he built a railroad; by a memorial in Marquette Park, Gary, Indiana, a great city that rose upon the sand dunes of Indiana where he made his historic glider flights; and lastly by a grateful nation that honored him by naming the Air Base at Rantoul, Illinois, out of respect for his early contributions to aviation. Chanute Field is proud of the background of its illustrious namesake. The Army Air Corps salutes a distinguished gentleman.