

*The Flights and Fights Involving the Langley Aerodrome*  
*By Nick Engler*

As morning dawned on 28 May 1914, the “Aerodrome A” perched like a giant dragonfly on the edge of Lake Keuka, surrounded by journalists, photographers, even a videographer. Members of the scientific elite and Washington DC power structure were also there, among them Charles Doolittle Walcott, the Secretary of the Smithsonian Institution, and Albert Zahm, the director of the recently reopened Langley Aerodynamical Laboratory. They carefully spun the event for the media, explaining why they were attempting to fly the infamous Langley Aerodrome eleven years after two highly-publicized, unsuccessful, and nearly-catastrophic launch attempts.

A cool breeze blew down the lake, gently rocking the four tandem wings that sprouted from the Aerodrome’s central framework. It was time to go. As the sun crept higher in the sky the winds would kick up. With a pronounced 12-degree dihedral between the pairs of 22-foot wings, even a modest crosswind could flip the old aircraft if it got under a wing. Workmen from the Curtiss Aeroplane and Motor Company of Hammondsport, New York lined up along the pontoons and outriggers recently added to the airframe. They lifted the half-ton aircraft a foot or so above the ramp, duck-walked it into the water and turned it into the wind.

Glenn Curtiss waded out, stepped onto the braces between the forward pontoons and climbed into the nacelle that hung beneath the framework. He settled into the cockpit and tested the familiar Curtiss controls – wheel, post and shoulder yoke borrowed from one of his early pushers.<sup>1</sup> This system had replaced the dual trim wheels that had steered the original Aerodrome. Workmen stood in the shallow water behind the forward wings and swung the twin propellers.<sup>2</sup> The old Manly-Balzer engine sprang to life – or as much life as it had left. It had been damaged by age or carelessness and only produced two-thirds of the 52 brake horsepower it had generated in 1903. To compensate, Curtiss had added a new carburetor and high-tension magneto ignition. He also reshaped the props, giving them a “bent-end” profile to increase the thrust. He hoped it would be enough.



*From left to right, Charles Walcott, Glenn Curtiss, Walcott's daughter Helen, Albert Zahm and C.C. Wittmer, a Curtiss pilot, standing in front of the rebuilt Langley Aerodrome at Lake Keuka on 28 May 1914.*

Curtiss advanced the throttle and the Aerodrome moved forward. As it gained speed, the wings fluttered a little but showed none of the elasticity that had plagued Langley's 1903 flight attempts.<sup>3</sup> Curtiss had replaced Langley's flimsy, hollow-core ribs with pieces of solid wood, laminated to hold the camber. He had also doubled-up on the spars. In addition to the central spar atop each wing, there was a second beneath it that stretched a third of the wing length. He replaced the slender guy posts (to which the wing rigging was attached) with sturdy A-frames and moved them backwards to better coincide with the center of pressure. All of this, when combined with the brace work between the wings and the pontoons, greatly strengthened the wings and made them less likely to deform or collapse as they had eleven years before.

The Aerodrome gained speed steadily, but painfully slowly. Curtiss was well out on the lake and far from his audience when pontoons finally went up “on the step” and the aircraft began to dance on the waves. He pulled back on the wheel, praying there was enough lift. In rebuilding the wings, he had altered the camber from a deep 1/16 to a much gentler 1/28. He did this by shortening the ribs, eliminating a section of each wing forward of its leading spar. This also narrowed the chord, raised the aspect ratio and created a rounded leading edge. Finally, he had abandoned the semi-porous “percaline” used to cover the wings in 1903 and substituted airtight doped cotton. The lift was increased, if only just enough. The reconstructed Aerodrome left the surface of Lake Keuka for a little over 3 seconds and traveled 150 feet through the air. It wasn't much, but it was a flight. A motorboat met Curtiss on the lake and towed the aircraft back to the ramp.



*The Langley Aerodrome flies just above the surface of Lake Keuka on 2 June 1914. None of these hop-flights last more than 5 seconds or achieved an altitude of more than a few feet.*

Walcott and Zahm were effusive. However short, they declared, this hop-flight vindicated its inventor. If Langley's Aerodrome was flyable now; it could have flown in 1903. The media was less than impressed. The flight had occurred far out on the lake, too remote for the photographers or the filmmaker to capture it. Curtiss attempted a second flight after breakfast, but it was aborted when the Aerodrome threw a propeller.

Because it was paramount that this event generate favorable press, Curtiss had the media back five days later. This time he knew where to put them along the lake shore or in boats so they could see the Aerodrome lift off. He made several flights, none of them lasting more than a few seconds. But the press got what they wanted, photos of Langley's Aerodrome with a little daylight showing between pontoons and water. They dutifully printed the photos along with Walcott's and Zahm's pronouncements. Zahm, in fact, was the "correspondent" for the stories that appeared in *Scientific American* concerning the Hammondsport trials. According to the June 6, 1914 edition of *Scientific American*:

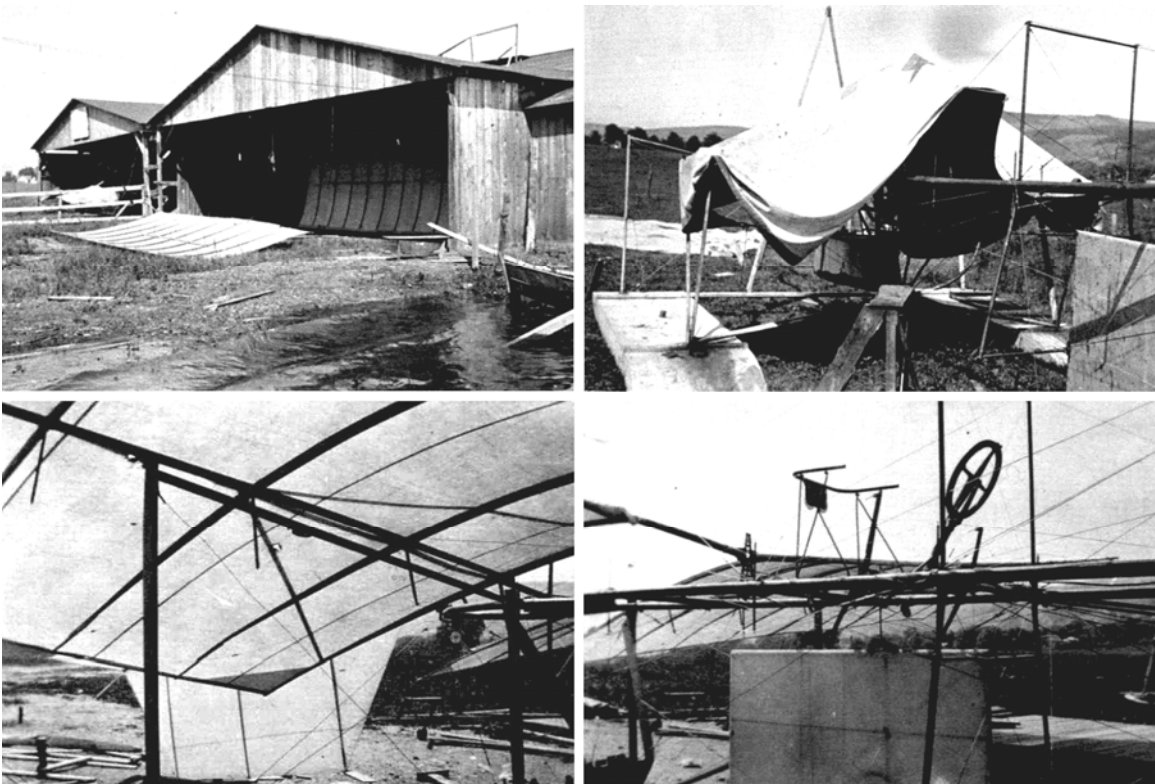
"The machine and its engine has been shipped from the Smithsonian Institution to the Curtiss factory in early April and was re-clothed without change of size or shape. The framing, the engine, propellers, wings, rudders, and controls are, therefore, just as Langley left them... The brief successful flight of May 28th proved the Langley's invention had been the first machine in history capable of prolonged free flight with a passenger. A great scientist and inventor, misunderstood and persecuted in his lifetime, is vindicated."

## ***Patents and Politics***

Zahm's and Walcott's distortion of the 1914 test-flights and the unwarranted conclusion that the Langely *Aerodrome A* was airworthy in its original 1903 configuration was repeated in hundreds of newspapers and magazines worldwide. By coincidence, the Wrights' English patent attorney, Griffith Brewer, visited Orville Wright in Dayton, Ohio just days after the initial flights of the *Aerodrome*. At Orville's request, Brewer returned to England via Hammondsport, arriving at the Curtiss camp on Lake Keuka in mid-June. Posing as a journalist, he took photos to document the changes that had been made to the *Aerodrome*, and then fired off a letter that exposed the deception to the *New York Times* on 22 June 1914. In his letter, Brewer asked some embarrassing questions:

- "Why has Langley's most interesting machine been taken out of the Smithsonian and altered from its original historic state to try to make it fly?"
- "Why if such a demonstration were decided upon, was not some impartial, unprejudiced person chosen to make the test instead of the person who has been found guilty of infringement of the Wright Patent?"
- "Why, if the Langley flying machine was a practical flying machine, did not those in charge of the machine try to fly it without alteration? ...This should have been easy if the machine invented by Professor Langley was really capable of flight."

This, in turn, it generated a controversy that raged for nearly thirty years in the popular press. Instead of vindicating Langley, it eventually wedded his name to a



*Snapshots taken by Brewer and others that document the changes made by Curtiss to the Langley Aerodrome in 1914.*

failure that overshadowed his many successes and diminished the scientific institution he had once led.

The media was quick to understand why Curtiss had staged this event. In 1909, the Wright brothers filed a legal suit against Curtiss and his company for infringement of their patent. The Wright brothers and Curtiss had been duking it out in the courts ever since, with injunctions, depositions, expert testimonies, and years of legal delays. In 1913, Judge John R. Hazel of the United States District Court for the Western District of New York had decided for the Wrights and in early 1914 Curtiss lost his last possible appeal.<sup>4</sup> According to the media, he was on the ropes; the continued existence of the Curtiss Aeroplane and Motor Company in doubt unless he could come up with a good reason to reopen the case.<sup>5</sup> On 5 June 1914, Flight magazine had observed, "This test has a purpose in view besides vindicating Langley. It is held by this proof of the capability of the Langley machine to fly, certain patent claims can be successfully overcome."

This was just what Curtiss' lead attorney W. Benton Crisp was planning. The Wright patent described an aircraft control system. If a successful example of airplane controls that predated the Wrights – the legal term was "prior art" – could be found, then it could be argued that the Wrights had no right to the broad claims they were making for their patent. In fact, Curtiss and Crisp did not intend to rely on only one example. In addition to the Langley Aerodrome, Curtiss would also eventually build a replica of an airplane designed in 1883 by Alexandre Goupil. It had "elevons," precursors to the ailerons that Curtiss used for roll control.

The motives of the Smithsonian Institution were less clear. The manned *Aerodrome A* was a technological dead end; the few successful unmanned aerodromes that Langley had flown in 1896 and afterwards did not influence the development of aeronautics except to inspire a few early aviators, among them the Wright brothers. Why had Secretary Walcott and the Smithsonian risked their reputations by revisiting a failed experiment just to "vindicate" a dead colleague?

The question was its own answer. Reputation was the coin of the realm in Washington DC, then as it is now. The stated purpose of the Smithsonian may have been to advance and share scientific knowledge, but it existed in a city that ran on politics. Secretary Walcott may have been an accomplished paleontologist, but he was also a highly effective politician. And he was effective because he had carefully groomed his reputation. He had just one outstanding blemish that limited his potency in his current position – the failure of the Langley Aerodrome.

## ***Aerodrome Beginnings***

Charles Walcott had been deeply involved with the Aerodrome long before the Hammondsport trials. He had, in fact, played a vital role in its inception in 1898. By that time, he had been a player in Washington for nearly two decades.



Walcott had joined the United States Geological Survey (USGS) as “employee #20” in 1879 and quickly rose through the ranks. Not only did he write three ground-breaking works on paleontology in the span of a decade, he was adept at working with organizations outside the USGS. He organized the Smithsonian’s growing fossil collection and produced a massive paleontological exhibit for Chicago’s 1893 Columbian Exhibition.<sup>6</sup>

In 1894, the Director of the USGS, Major John Wesley Powell, fell afoul of Congress over policies that restricted the development of western lands. He was forced to resign and Walcott was appointed to the directorship, not because he was the most senior or the most accomplished scientist at the USGS, but because it was generally agreed that he had the political acumen to repair links with Congress. That trust was well-founded. By 1898, Walcott had doubled the size and responsibilities of the USGS, as well as its allotted funding. He had also cultivated many useful friendships around town and was on a first-name basis with President William McKinley.

In 1897, George Brown Goode, the Assistant Secretary of the Smithsonian Institution, died unexpectedly. The Smith keenly felt his loss. Goode, an accomplished naturalist, historian and author, was the first director of the National Museum and was being groomed for the top position. Secretary Samuel P. Langley, who had been in charge since 1887, was a popular figurehead. Every American was thankful to him for making the railroads run on time – he had established time zones and then telegraphed accurate time data (based on astronomical observations) to the railroad stations. His subsequent discovery of sun spots and exciting experiments with unmanned flying “aerodromes” had kept him in the news and made the Smithsonian a household word. But his micromanagement and autocratic airs limited his effectiveness as a leader, and his reclusiveness and aversion to publicity diminished him politically. By contrast, Goode was a respected and energetic leader, a brilliant planner and organizer, and the Smithsonian’s best political asset. With Goode gone, the Smith was in trouble.

The Smithsonian Board of Regents offered the Assistant Secretary position to Walcott knowing he was one of the few who could fill Goode’s shoes. He wouldn’t even have to move – the USGS offices were in the Smithsonian’s overcrowded National Museum building. After much



*Charles Doolittle Walcott in 1898.*

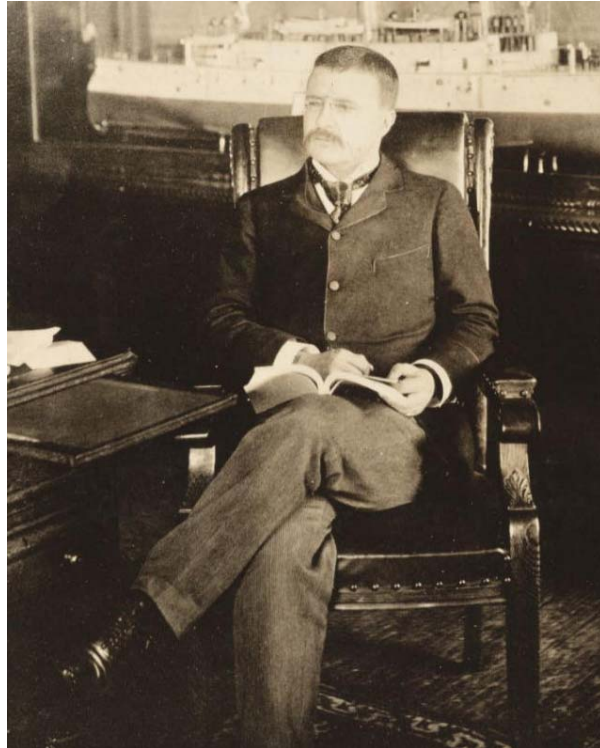
cajoling, Walcott agreed to take on the position in addition to his USGS duties only until another suitable candidate could be found. Once in the saddle, he attacked the problems he saw with characteristic energy and immediately began reorganizing the museum, instituting an administrative system that lasts to this day.

The Smithsonian of 1897 was not the powerhouse that now dominates the Mall in the center of Washington DC. It had been ignored and underfunded by Congress since its inception in 1846. The Institution was the result of a decade-long debate of what to do with James Smithson's half-million-dollar bequest to the United States of America for "the increase & diffusion of knowledge among men."<sup>7</sup> Its central building, nicknamed "The Castle," was built in 1855. The National Museum Building was built nearby in 1881, mostly to house exhibits left over from the 1876 Centennial International Exposition of Philadelphia – the first World's Fair. By the end of the nineteenth century, the Smithsonian was crippled by a lack of space. Langley had added a zoological park – the National Zoo – in 1889, but that had done nothing to alleviate the overcrowding.

Walcott was well-aware than the Smithsonian needed to expand, and was equally mindful that it needed the support of Congress to do so. It must have occurred to him that a big win for the Smith would go a long way's toward polishing its reputation and attracting political support. In February of 1898, two events combined that allowed him to produce that win. First, the February edition of *Popular Science* published a laudatory biography of Walcott that ratcheted his reputation up several notches. And second, the explosion of the *U.S.S. Maine* in Havana Harbor that same month caused the U.S. military to inventory its weapons as war with Spain became imminent. In his diary, Walcott described what happened next:

- 21 March 1898 – Walcott runs across Langley in his workshop, which was proximate to Walcott's paleontology lab. They discuss adapting Langley's aerodrome design to carry a man. Langley is positive; says such a thing could be of great service to his country.<sup>8</sup>
- 22 March 1898 – Walcott meets Langley again and asks if he was serious about building a manned aerodrome. Langley says, "Yes, if the money could be secured."
- 24 March 1898 – Walcott calls on President McKinley and tells him about the "Langley flying machine." McKinley suggests he talk to Secretary of War George de Rue Meiklejohn and Assistant Secretary of the Navy Theodore Roosevelt.
- 25 March 1898 – Walcott meets with Roosevelt. Roosevelt pens a memorandum to other members of the War Department saying, "...the machine has worked. It seems to me worthwhile for this government to try whether or not it will work on a large enough scale to be of use in the event of war."

In April, Roosevelt convened a committee with members from the Army, Navy, and civilian sector. After discussions with Langley, the committee recommended pursuing a manned aerodrome and forwarded their recommendation to the Army and Navy. The Navy declined, saying that an airplane would likely be of more use on land. But the Army bit and in November it assigned Langley the task of developing a manned airplane for military use. They agreed to fund the program for \$50,000 – \$25,000 in 1898 and another \$25,000 in 1899 if sufficient progress was made. It was also supposed to be a secret program, but an account of the Langley's windfall appeared in the newspaper the very next day.



*Assistant Secretary of the Navy Theodore Roosevelt in 1898.*

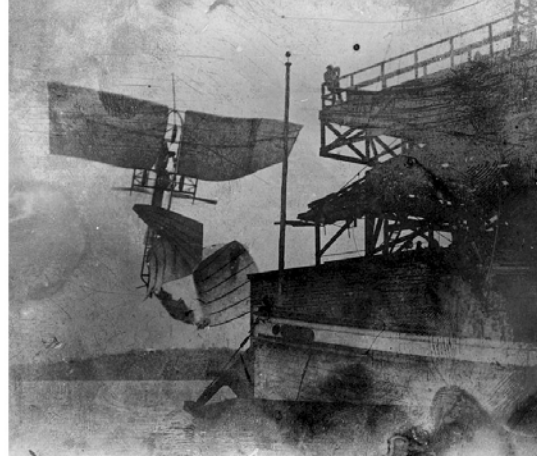
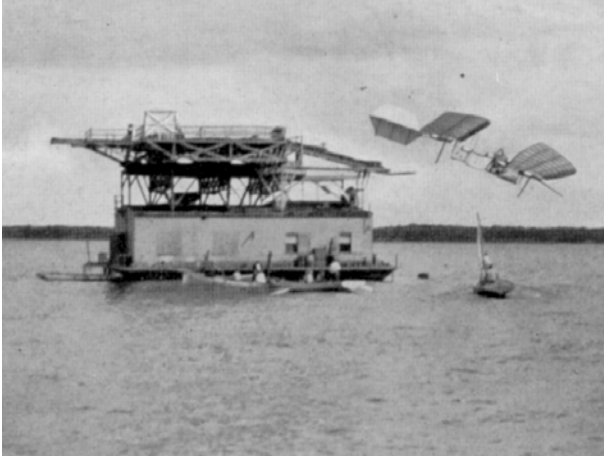
This in and of itself was an earth-shaking accomplishment. The War Department's Board of Ordinance, which provided the money, had never before invested in the actual development of a technology to this extent. They were legendary misers; hoarders that had defied President Abraham Lincoln and delayed the distribution of repeating rifles to the U.S. Army during the American Civil War on the grounds that they would "waste bullets."<sup>10</sup> In getting them to fund a speculative experiment, Langley – with Walcott's initiative – had moved a mountain. And this achievement had its desired effect. In 1902, while Langley's star was still on the rise, Congress agreed to erect a new building for the National Museum, directly across the Mall from the Smithsonian Castle.

### ***Rebuilding a Reputation***

On 30 June 1898 Walcott went back to the USGS full time. Richard Rathbun, who had joined the Smithsonian in 1897 with Walcott, became Assistant Secretary and head of the National Museum. But with his offices in the National Museum Building, Walcott was never very far away from the goings-on at the Smith. He shared in the triumph when the new museum building was funded, then was heart-broken when the Aerodrome twice failed to fly.

Langley made his first attempt to launch the Aerodrome on 7 October 1903, flinging it from the top of a houseboat with a giant catapult. The Aerodrome left the catapult and traced a gentle arc to the surface of the Potomac River. It showed no ambition to fly, it simply "slid into the water like a handful of wet





*Left, attempt to launch the Langley Aerodrome on 7 October 1903; right, the attempt to launch on 8 December 1903.*

mortar" as one newspaper reported. The second attempt on 8 December 1903 was much more spectacular, but equally disappointing. As the Aerodrome left the catapult, the back wings folded up, the tail crumpled and the aircraft turned almost upside-down as it dropped into the river. Its pilot, Charles Manly, was trapped beneath the wreckage in the icy water. He did not panic, but kept his head and dove down and away from the sinking aircraft. He surfaced yards away and was quickly plucked from the water by workmen in a rowboat.

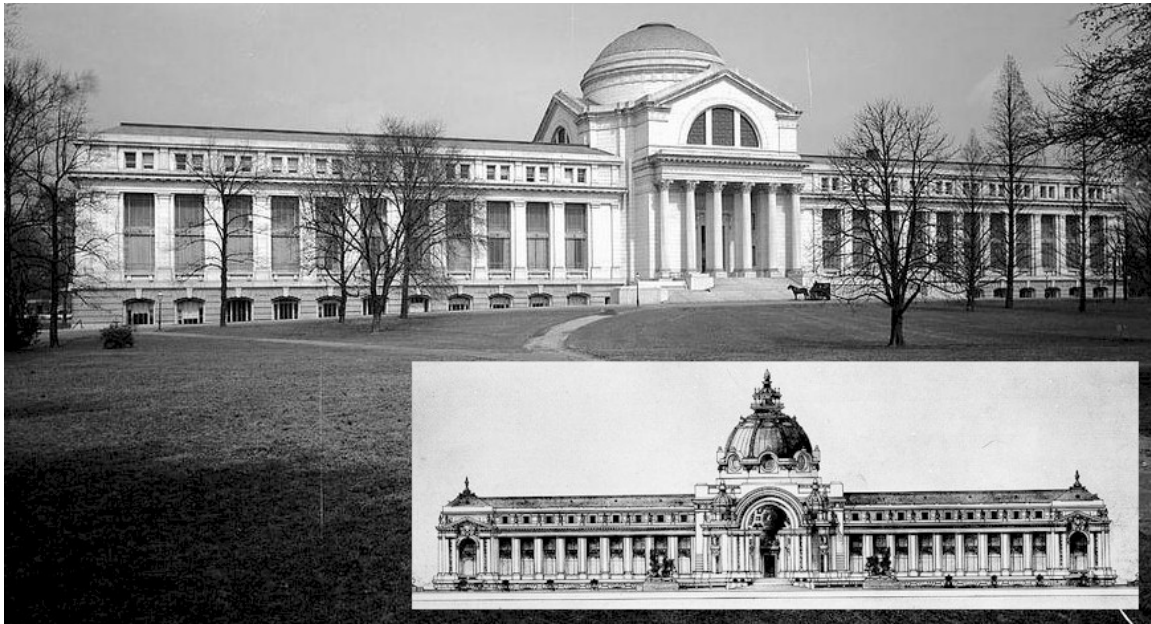
What caused these failures is still a matter of debate, but the photos taken of the Aerodrome during the launches clearly point to the wings. They were just too flimsy. When traveling through the air at flight speed, they could not hold their shape, angle of attack, or even their horizontal position. The photos from the 7 October launch show the forward wings are twisted so as to drive the nose of the aircraft down. There aren't as many photos to analyze of the 8 December attempt because the aircraft was launched late in the day when the light was waning. But the one photo that does exist shows the back wings folded up. The spars seem to have snapped at their roots as the Aerodrome left the catapult and the wings took its full weight. In both cases, the wings failed or deformed.

Langley laid the blame elsewhere. After both launch attempts, he insisted the Aerodrome was airworthy; the fault was in the launching mechanism. It had caught on something as it was flung into the air.<sup>11</sup> He pointed out that this was an experiment; he was close to the solution, he just needed more money to continue the tests until he licked the launch problem. He had already applied for an additional \$25,000 in September 1903, but after the second failure, the Army declined. In its final report on the Aerodrome project, the Army concluded, "we are still far from the ultimate goal, and it would seem as if years of constant work and study by experts, together with the expenditure of thousands of dollars, would still be necessary before we can hope to produce an apparatus of practical utility on these lines." They deposited the remains of the Aerodrome at the Smithsonian in case Langley wanted to continue the tests on his own dime. Privately, several members of the Army said they would like to see further tests.

Publically, the Army was much more critical, as was Congress and the media. The *Boston Herald* suggested Langley should give up airplanes and try submarines. Representative Gilbert Hitchcock of Nebraska commented to the *Brooklyn Eagle*, "You can tell Langley for me ... that the only thing he ever made fly was government money " Walcott was appalled as Langley was lampooned again and again in the newspapers and on the floors of Congress, and not just because his friend was under fire. These comments affected Walcott's respectability as well as Langley's.

Samuel Pierpont Langley died on February 26, 1906, leaving the Smithsonian with its reputation at low ebb. Not only had it suffered the embarrassment of the failed Aerodrome, there had been problems with the new building. Work was halted in 1905 as its ornate baroque design was exchanged for a simpler dome and columns. That same year, the Smithsonian's accountant W.W. Karr was found with his hands in the till. And toward the end of the year, reports began to surface that a pair of bicycle mechanics from Dayton, Ohio had developed a practical airplane with no financial resources other than their own earnings. When compared to the \$50,000 Langley had spent – \$73,000 if you counted what he borrowed from internal Smithsonian funds – this was a major political embarrassment.

The Board of Regents first offered the Smithsonian's reigns to Henry Fairfield Osborn, another administrative genius whose innovative dinosaur displays at the Museum of Natural History were drawing crowds. When Osborn declined, they turned again to Charles Walcott, who this time accepted the challenge and began to rebuild the Smithsonian's reputation. And part of his plan to do so was to rehabilitate Langley's reputation as a pioneer in the science of aeronautics.



*The new United States National Museum Building (now the Museum of Natural History) as it appeared in 1911 and its original baroque design (inset).*



*The 1910 Langley Medal for Aerodromics awarded to the Wright brothers.*

In late 1909, the Smithsonian instituted the “Samuel P. Langley Medal for Aerodromics” to recognize recipients for contributions to knowledge of aeronautics and aviation. The first Langley Medal would be awarded to the Wright brothers whose reputation had achieved rock-star status after their triumphant tour of Europe and highly-publicized flights around New York City. Some members of the award committee – among them the Wrights’ one-time supporter, Octave Chanute – argued that the Wrights were too commercially-focused to deserve the award. The patent infringement suits that they were beginning to file were drawing attention. But Walcott knew he needed to ride the Wrights’ considerable coat-tails to get Langley back in the news and in a favorable light. President William Howard Taft awarded the Langley Medal to Wilbur and Orville Wright on 19 February 1910. At the award banquet, Alexander Graham Bell gave a long speech enumerating Langley’s achievements in aviation, barely mentioning the Wright brothers. When he did mention them, he made it seem as if the Wrights had built upon Langley’s work. The 1910 Smithsonian Annual Report, which published copies of these speeches, compounded this misconception by misquoting Wilbur.<sup>12</sup>

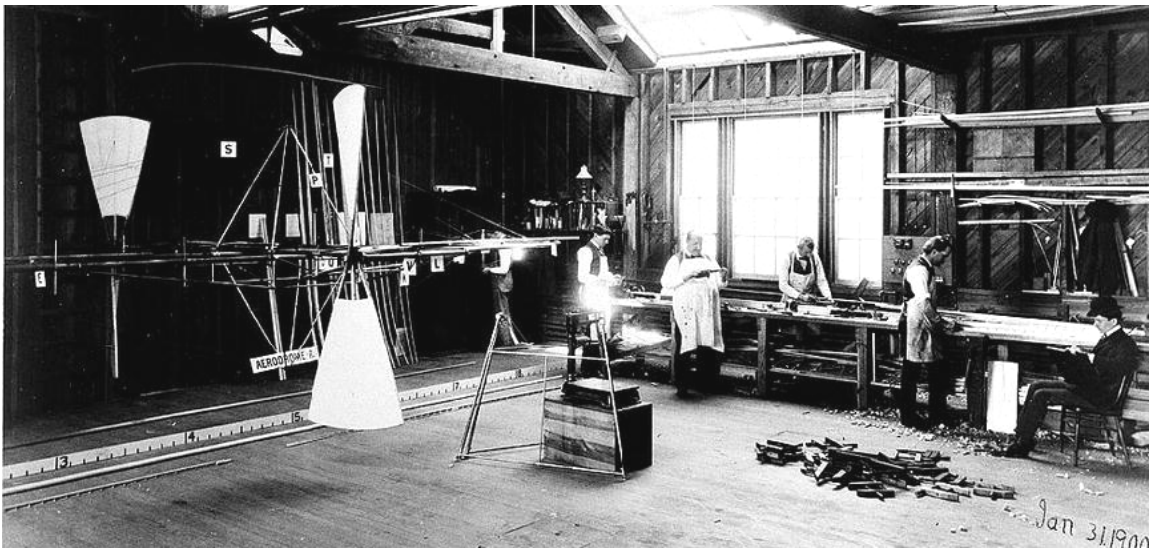
A month later, the Smithsonian opened its new building across the Mall and began moving its natural history collections to their new digs. The old National Museum building became the Arts and Industries building, and with the fossils gone there was suddenly enough room to display some airplanes. Walcott planned to exhibit four Langley aerodromes, including *Aerodrome A*. He wrote Wilbur Wright on March 7, asking that the Wrights supply a Wright aircraft, or perhaps an engine and some models. Wilbur countered by offering Walcott models if he wanted them, but also telling him that the 1903 Wright Flyer – the first airplane to make a sustained and controlled powered flight – was available. Walcott responded on April 11, describing the planned aviation exhibit in more detail. He seemed unimpressed with the offer of the 1903 Flyer and more

interested in displaying the 1909 Wright Military Flyer "...inasmuch as that machine used at Fort Myer has attracted such world-wide interest..." The most telling remark in his letter, however, was, "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." After their experience at the Langley Medal ceremony, Wilbur and Orville could not help but think that the exhibit, as described, would aggrandize Langley's work at the expense of theirs. Wilbur declined to reply and Walcott did not persist. In the end, he represented the Wrights by procuring the worn-out *Signal Corps No. 1* from the Army. This was the Military Flyer he had seemed so keen on in his letter.

### ***Jump-Starting the Langley Laboratory***

In 1911, at the inaugural banquet of the American Aeronautical Society<sup>13</sup> in Washington the attendees – Walcott among them – earnestly discussed creating a "central aerodynamics laboratory" with a board of advisors to direct the research in this emerging technology. European nations already had similar organizations such as Britain's Advisory Committee for Aeronautics and France's Central Establishment for Military Aeronautics. Proposals were floated in the press and before members of Congress with the U.S. Navy, Massachusetts Institute of Technology, Bureau of Standards, and the Smithsonian all vying for control of the proposed institution. Outgoing President Taft established a committee to study the matter in 1912, but its efforts came to nothing.

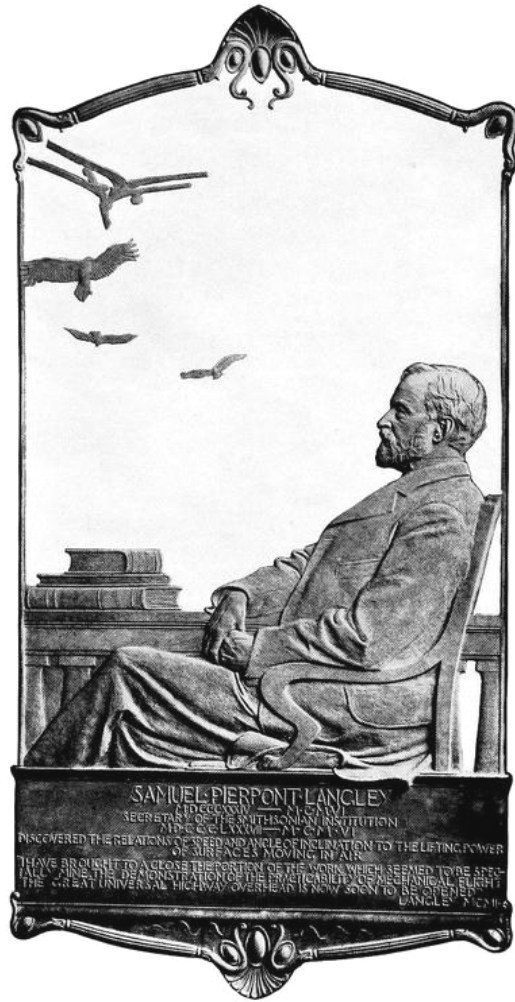
In February 1913, a month after President Woodrow Wilson was inaugurated, Walcott reopened Langley's workshop at the Smithsonian, contracting Albert Zahm to run it. Zahm was an aeronautics pioneer himself, having done wind tunnel work at Catholic University as early as 1901.<sup>14</sup> Zahm immediately began casting around for something to do. It was proposed that the Smithsonian erect a new building complete with wind tunnels to replace the small workshop, but Walcott could not raise the funding.



*The Langley Aerodynamical Laboratory as it appeared in 1900. Workmen are assembling the Aerodrome that Langley would attempt to fly in 1903.*



On May 6 – “Langley Day,” according to a decree by the Smithsonian – Glenn Curtiss was awarded the Langley Medal. This time Alexander Graham Bell gave a speech that actually mentioned the accomplishments of the recipient, although Walcott used the same occasion to unveil a bronze tablet at the Castle that lionized Langley’s contributions to aeronautics. Specifically, it immortalized Langley’s discovery of the “relations of speed and angles of inclination to the lifting power of surfaces moving in the air.” While Langley had done research in this area, the effect was actually discovered by a French artillery officer, Col. Du Chemin, in 1829.<sup>15</sup>



*The Langley Tablet, unveiled in 1913.*

On May 23 of that year, Walcott convened a committee to direct the workshop, calling it the “Advisory Committee of the Langley Aerodynamical Laboratory.” Walcott was the president, Zahm was the recorder, and the rest of the committee was peopled with high-profile names in aviation, among them Orville Wright and Glenn Curtiss.

All of this was bold politics. By reopening the workshop and creating a capable governing body, Walcott told Congress in effect, “Why create a new national laboratory for aerodynamics when we’ve already got one up and running?” The Langley Medal and the commemorative tablet emphasized Langley’s successes. Even Langley Day (May 6) was calculated to draw focus away from the failure of the 1903 *Aerodrome A* – 6 May 1896 was the date that Langley made his first successful flights with unmanned aerodromes.

But it didn’t work. Walcott’s opponents found an obscure law passed a few years earlier that prevented executive agencies such as the Smithsonian “from requesting the heads of departments to permit members of their respective departments to meet at the Institution and serve on an advisory committee.” They used this to force Walcott to disband his Advisory Committee. Although Langley’s workshop remained open, it no longer had the political status afforded by the famous and well-placed advisors.



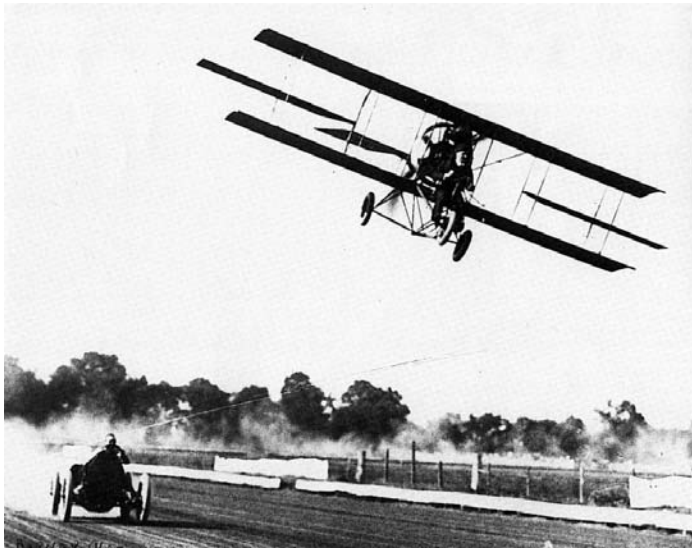
## ***An Idea Whose Time Had Come***

As Walcott was slowly rebuilding Langley's reputation, the Wright brothers' was being eroded. They had been international celebrities and national heroes in 1909. But this changed when they filed a law suit for patent infringement and began to ask royalties not just from aircraft manufacturers, but also producers of aviation events and even individual exhibition pilots. Pilots and plane-makers that had once admired the Wrights now carefully followed the patent suits and rooted against the brothers. Editorials appeared that condemned the Wrights for their apparent greed and attempts to monopolize this fragile new industry. To the general public, the Wrights were made to look less like heroes and more like aspiring robber barons.

This was the situation in January of 1914 when a panel of three justices on the United States Court of Appeals, Second Circuit upheld Judge Hazel's decision that the Curtiss Aeroplane and Motor Company to have infringed on Patent No. 821,393 – the Wright brothers' 1906 patent on an aircraft control system. They also upheld his judgment that the patent was entitled to “liberal interpretation” as it was the grandfather or “pioneer” patent of the aviation industry.<sup>16</sup> It was an electrifying decision for the entire aviation community; the decision made it possible for Orville Wright – Wilbur was now deceased – to create a patent monopoly on the airplane, the same as Alexander Graham Bell had done with the telephone.

The Wright Company's board of directors met in New York immediately after the decision was announced and proposed to do just that by hiring William F. McComb – a confidant of the President Woodrow Wilson with deep Democratic connections – to lobby the administration to buy Wright aircraft. Orville balked. He did not want his company or the aviation industry tied to a particular political party. He did not want to manage a colossal manufacturing operation, nor did he want to build one by bankrupting dozens of other companies. He began to plot a way to shed himself of his corporate obligations and the burden of the Wright patent. In the meantime, he let it be known through the *New York Times* he was willing to work with any aircraft manufacturer who was willing to pay 20% of the purchase price to license their aircraft. This was the same percentage that the Wright Company had charged Burgess and others who had licensed their patents and designs – in short, it was business as usual.<sup>17</sup>

Usual or not, 20% was a financial impossibility for most U.S. airplane manufacturers prior to World War I; none of them were that prosperous. Had it been enforced it would have put most of them out of business, creating a monopoly through attrition. The news seemed even worse for Curtiss, if that were possible. Other airplane companies might be able to negotiate royalties and payments, but there was too much bad blood between Orville Wright and Glenn Curtiss for Curtiss to expect any mercy. Wilbur had run himself ragged defending the Wright patent in court, then contracted typhoid fever while on one of his many trips. His worn down physical condition almost certainly made him more



*Lincoln Beachey racing Barney Oldfield, a popular race car driver, at an exhibition. The reason that Walcott turned Beachey down may have been that Beachey was too much of a showman and Walcott wanted the Aerodrome flights to have the appearance of a serious scientific investigation*

susceptible and more likely to succumb to the disease, and the Wright family held Curtiss indirectly responsible for Wilbur's death.

That same month, Lincoln Beachey, a well-known aviator and a stockholder in the Curtiss company, wrote to the Smithsonian and asked for the loan of the remains of *Aerodrome A*. His proposal was to restore the airframe, then mount a modern motor and propellers and attempt to fly the old aircraft. It was not a new idea; Bell, Chanute, and members of the U.S. Army had all suggested something

similar as early as 1906 – a good number of people in Washington believed that the *Aerodrome* was not a failure; it simply had been improperly launched. Walcott had actually written to Curtiss about making another launch attempt prior to Beachey's inquiry; it seemed a good initial project for the Langley Aerodynamical Laboratory. Walcott turned Beachey down, but the letter started a ball rolling.

Walcott could not help but notice that news and editorials concerning the "patent wars" had damaged Orville Wright's reputation. The country had just spent the better part of a decade trust-busting with President Theodore Roosevelt to level the economic playing field for smaller companies. The word "monopoly" had a stink about it, even if it was supported by the courts. If the *Aerodrome* flew, it would show that manned aircraft could have flown before the Wrights; their patent had no right to pioneer status, and the suit would go back to the courts. Not only would Langley be rehabilitated; the Smithsonian would be seen as having saved the aircraft industry. It might be the big win needed to procure some serious funding for the Langley Aerodynamical Laboratory.

Not long afterwards, Walcott invited Curtiss to bring one of his new flying boats to Washington for Langley Day – 6 May 1914. Curtiss, who was aware of Beachey's proposal, replied that he would rather restore and fly the *Aerodrome*. There was a series of phone calls between Curtiss, Bell, and Walcott as the project began to take shape. There would be two separate missions, the first to show that the 1903 *Aerodrome* was airworthy and the second to investigate the properties of the tandem-wing configuration. On March 25, Walcott told Bell that Curtiss could reproduce the *Aerodrome* for \$2000. It was a bargain-basement estimate; it's almost certain that Curtiss proposed such a low cost because he

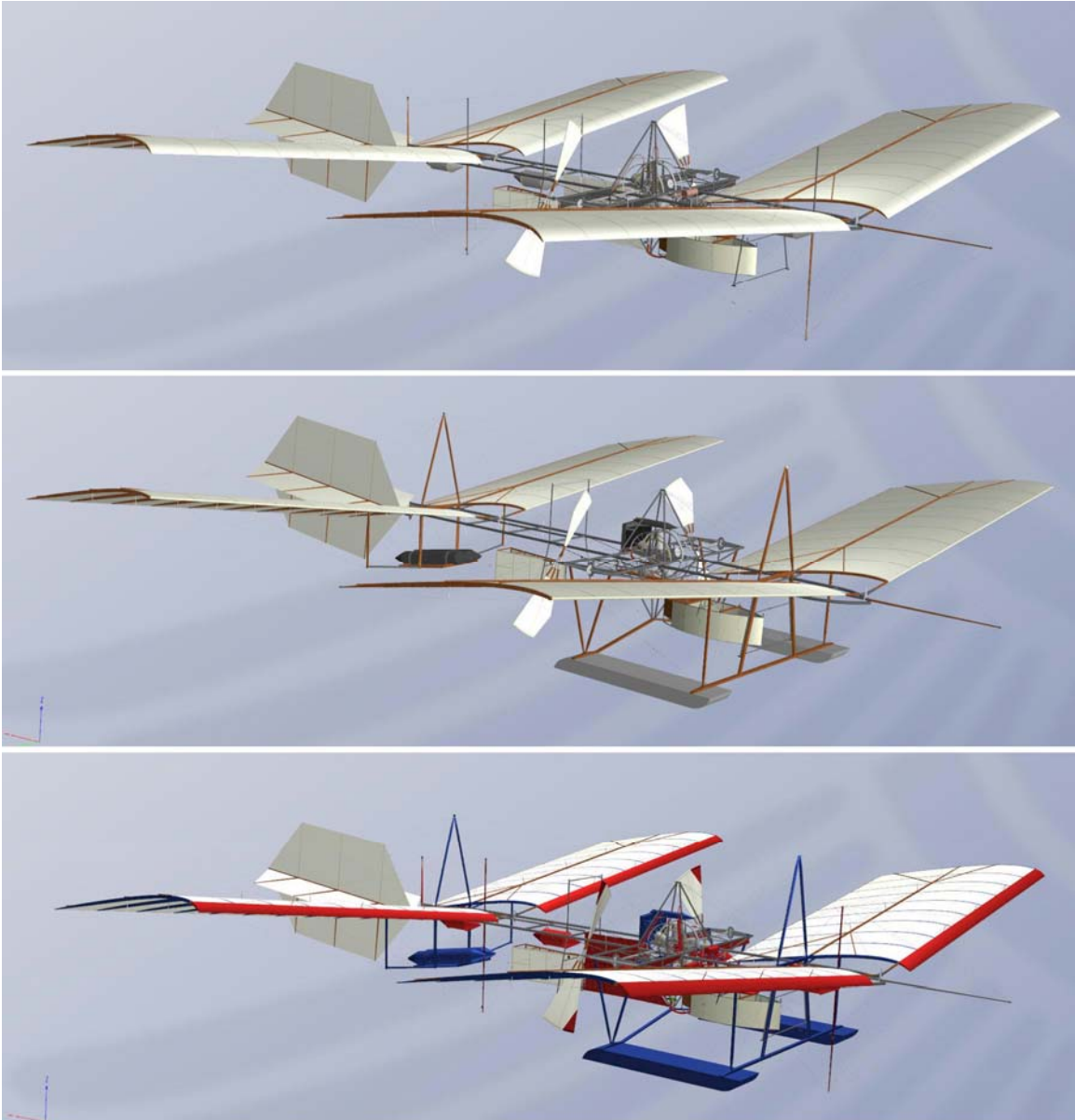
stood to gain so much from the project. Then Bell and Walcott discussed whether it was proper for the Smithsonian to fund the experiment, given its possible commercial impact. To avoid that hornet's nest, Walcott volunteered \$1000 of his own money and Bell offered to chip in the rest.

On March 30, Walcott, Bell, and Curtiss met at Bell's home in Washington. Walcott wanted the Aerodrome replica ready to fly by Langley Day – May 6, 1914. Curtiss could not guarantee that he could get it done that quickly, and Walcott suggested it might be faster to rebuild the original Aerodrome. After all, the central frame was ready to go; it had been repaired by Charles Manly, Langley's assistant, before it was stored. Bell objected, arguing that the 1903 *Aerodrome A* was a valuable historic artifact. But technically it was not; the Aerodrome was still the property of the U.S. Army and some members of that Army had indicated that they would like to see the machine fully tested. Walcott prevailed, expedience was paramount, and on April 2 the Smithsonian shipped the original Aerodrome airframe to Curtiss Aeroplane and Motor Company in Hammondsport, New York. This was followed by the original engine several days later. All parties agreed that this project should proceed in confidence, with no announcement. The Smithsonian Board of Regents was never consulted or asked to approve these actions, although Bell was a member of this board.

### ***Making the Aerodrome Airworthy***

In Hammondsport, Curtiss' workmen had been working exclusively on the "*America*," a flying boat designed to make a record-setting flight across the Atlantic Ocean. Curtiss had them set this aside and everyone concentrated on the Aerodrome. Charles Manly, who had built the Aerodrome engine, joined the team along with Albert Zahm, who was the Smithsonian's on-site representative. They briefly discussed building a copy of the original catapult Langley had used in 1903, but decided it would save effort to launch the Aerodrome from pontoons. The team struggled mightily to get the Aerodrome ready on time, but was plagued by unanticipated problems. The airframe was much weaker than expected and had to be strengthened. In addition to replacing the ribs and adding spars, Curtiss extended the outriggers that mounted the pontoons, adding wire rigging between the outriggers and the wing spars much the same way the upper and lower wings of a biplane are rigged. This created a trusswork that braced the wings for about a third of their length.

The old Manly-Balzer engine would not operate properly and the propellers did not produce enough thrust. Curtiss replaced the original dry-cell battery ignition with a high-tension magneto, and the primitive box-shaped drip carburetor with a modern float-regulated carburetor. Still the engine would not produce the necessary RPMs, so Curtiss trimmed the propellers to give them a more modern shape with less drag.



Langley's 1903 Aerodrome or "Aerodrome A" is shown in the top illustration and its May-June 1914 reincarnation is shown in the middle. At first glance, these two aircraft look very similar to one another. They have the same wing configuration, tail, airframe, and drive train. It was this similarity that gave verisimilitude to the Smithsonian claim that the hop-flights of the 1914 version proved that the 1903 version was airworthy.

However, when you look past their obvious similarities, these were very different airplanes. There were changes to every major aircraft system, including the wings, airframe, engine, propellers and controls. The bottom illustration proves the point. It's a composite of both versions of the Aerodrome. The parts of the 1903 Aerodrome that were discarded in 1914 are shown in red, while the parts that were added or substantially modified in 1914 are shown in blue.

While there are many changes, three in particular helped make the 1914 version airworthy – and survivable. First, the wings were sufficiently reinforced to support the aircraft in flight without breaking or distorting overmuch. Second, the pitch and yaw controls responded to pilot input well enough to keep the aircraft balanced in flight. And third, landing gear (pontoons) made a safe take-off and landing possible. Had the original 1903 Aerodrome flown and then strayed over land, any landing would have been a crash. And the first thing to hit would have been the pilot.

The original controls were two small wheel-cranks beside the pilot's seat. The forward wheel moved the "steering rudder" beneath the aircraft left and right for yaw control; the rear wheel moved the Penaud tail up and down for pitch. There was no roll control; Langely had depended on a pronounced dihedral angle between the wings to provide roll stability. These controls could not possibly respond in time to what Curtiss knew to be the demands of aviation, so he replaced them with a standard Curtiss wheel, post, and yoke.<sup>18</sup> He linked the rudder to the yoke at first, and then switched to the wheel. The tail was linked to the control post. Eventually, he locked the rudder in place and modified the Aerodrome's Penaud tail to move side to side as well as up and down.

By the time Curtiss had worked out these solutions, Langley Day had come and gone. He was not confident enough to attempt his first mission – to show that the Aerodrome might have flown in 1903 – until late May. By this time the Aerodrome was no longer the same aircraft it had been in 1903; even a casual comparison of photos that Brewer and others took in June 1914 with those taken of Aerodrome in 1903 shows this to be the case. (See the 3-views at the end of this article.) But Curtiss, Walcott, and the Hammondsport team would say that it was close enough, some of them until they day they died.

Curtiss made a few straight-ahead hops on May 28, June 2 and June 5, none lasting more than a few seconds. These were not the results he and Walcott had hoped for, but the media had their story and the photos to support it. Walcott was quick to press the political advantage. Within a week – 11 June 1914 – and while these news stories were still fresh in the minds of legislators, House Minority Leader James R. Mann of Illinois read into the Congressional record the results of the Hammondsport trials. He then asserted the need to “provide under some scientific bureau of the Government some means for further investigations and experiments with regard to heavier-than-air Machines.” Mann intimated that this “scientific bureau” should be under the direction of the Smithsonian Institution, as suggested by its Secretary. He also mentioned a dollar amount, “...\$50,000 to continue investigations along the line of aeronautics under the Smithsonian Institution.” Nothing was decided, but the point was made.

As for Curtiss, he set the Aerodrome aside for a few weeks while he ramped up the *America* project again, and then began the second part of his mission – to see what value, if any, the tandem wing configuration might have for modern aeronautics. The tests continued, albeit at a more leisurely rate and under new management. When he was certain the *America* was back on track, Curtiss bowed out and went to Buffalo, New York to set up a new factory. Albert Zahm took over the testing of the Aerodrome.

It was apparent to all who attended the initial test flights that the original Manly-Balzer engine didn't have the oomph to get the Aerodrome in the air and keep it there. Among the first things that Zahm and his crew did was swap out the old radial for a new Curtiss 80 hp V-8. They also scrapped the twin pusher propellers



and replaced them with a single tractor screw. Flights resumed in September of 1914 and the Aerodrome performed much better. Curtiss pilot Gink Doherty was able to keep the machine aloft for distances up to half a mile, reaching an altitude of 30 feet. And the machine continued to evolve. Zahm and crew experimented with its center of gravity, control linkages, the diameter and pitch of the propeller, number and position of the pontoons, the length of the secondary spars, and a dozen other details. In March 1915 while Lake Keuka was still frozen, they swapped the pontoons for skis, reducing weight and drag. Eventually they were able to fly 20 miles – the length of the lake. But throughout all this experimentation, the Curtiss team was never able to navigate the Aerodrome. Of the three pilots who eventually flew the aircraft – Glenn Curtiss, Elwood Doherty, and Walter Johnson. – none ever made a successful turn of more than a few degrees.

In early June of 1915, Orville's brother Lorin visited Hammondsport under an assumed name and observed several Aerodrome flights before he was found out. As luck would have it, he witnessed a flight in which the rear A-frame that supported the wing rigging was swapped out for something approaching the original guy post. The back wings collapsed in flight, just as they had during a launch attempt in 1903. The photographs he took were confiscated, but he was able to note this change and many others that had been made to the Aerodrome up to that time. And there were probably more changes after that. The flight tests continued until November 1915 when Curtiss called a halt. The Aerodrome was disassembled, packed up, and returned to the Smithsonian.

### ***The Patent Pool***

There was no need for further flights. The politicking had worked – sort of. On March 3, 1915, Congress had created the National Advisory Council for Aeronautics (NACA) "to supervise and direct the scientific study of the problems of flight with a view to their practical solution." It was established as an entity separate from the Smithsonian or any other institution – not exactly what Walcott had wanted. However, Walcott was appointed to the governing council, made head of the executive committee, and was then chosen to lead the new NACA a few years later. He remained in control for the rest of his life. And he was eventually able to build an experimental facility with Langley's namesake, although the Langley Memorial Aeronautical Laboratory ended up in Newport News, Virginia rather than Washington DC. It was a not-so-classic case of a politician not getting his cake and eating it anyway.

It also solved Curtiss' problems, although not in the way that he had expected. Orville never took full advantage of the patent suit that he had won. Once the Wright patent was awarded pioneer status, the Wright Company re-filed against Curtiss but no one else. Curtiss filed for an extension and continued to ship airplanes, as did many other American manufacturers – in short, nothing changed. Instead of moving to create a patent monopoly, Orville concentrated on buying up stock from the shareholders of the Wright Company.



*The first meeting of the National Advisory Council for Aeronautics on 23 April 1915. Charles Walcott was not present, although he was on the board. All twelve of the board members were appointed by President Woodrow Wilson. Orville Wright would be asked to join the council in 1920.*

In October 1915, when he had acquired the majority of the stock, Orville Wright sold the Wright Company along with its patents to a group of New York investors led by mining tycoon William Boyce Thompson. Over the next year the reconstituted Wright Company acquired the Crane-Simplex Automobile company and the Glenn L. Martin Aircraft Company, then renamed this expanded manufacturing conglomerate as the Wright-Martin Aircraft Corporation. The Wright-Martin partners had paid somewhere between \$250,000 and \$500,000 for the Wright patent, and to make back their investment they began licensing the patent as the Wright Company had done years before.<sup>19</sup> On 18 December 1916, Wright-Martin sent letters to all the major American aircraft manufacturers asking them for a fee of 5% of the cost of each new airplane with a \$10,000 annual minimum. While this wasn't as drastic as a patent monopoly, it was nonetheless perceived as a potential burden to the aircraft industry – especially by the industry's biggest customer, the U.S. military.

As the First World War progressed and America's participation loomed, the military had increased their orders for airplanes. Curtiss reported sales of \$6 million in 1915, and in October 1916 the Wall Street Journal reported that he had \$11 million in orders. That would more than double before the end of the year. The military feared that with orders on the rise, the aircraft industry would pass the licensing fees on to them.<sup>20</sup> In response, the War and Navy departments met with Charles Walcott in late December of 1916, after which the Franklin D. Roosevelt – then the Assistant Secretary of the Navy – sent a letter to NACA on

13 January 1917 calling it's attention to a "serious state of affairs...brought about by the uncertainty of the situation as regards aeronautic patents." He asked that NACA study the situation and suggest "some line of action to be taken." This was well outside of NACA's charter; it was responsible for research in aeronautic science and had no authority over the aviation business. But such was Walcott's reputation as an effective politician that the military came to him for a solution.

On 5 February 1917, Walcott sent a letter to President Woodrow Wilson, advising him of the "patent situation," quoting Roosevelt's letter, and claiming that airplane manufacturers had "greatly increased the sale prices of their products." He also identified the Wright patent as the single greatest cause of this looming problem and suggested that the government secure all the troublesome aeronautical patents "by purchase or condemnation."<sup>21</sup> Secretary of the Navy Josephus Daniels sent a copy of Walcott's letter to the Chairman of the House Committee on Naval Affairs, along with President Wilson's approval. Chairman Lemuel P. Padgett attached a rider to a naval appropriation bill then before Congress "...to enable the Secretary of War and the Secretary of the Navy to secure by purchase, condemnation, donation, or otherwise, such basic patent or patents as they may consider necessary to the manufacture and development of aircraft in the United States and its dependencies, for governmental and civil purposes..." The bill was passed 13 February 1917 and the military assigned this responsibility to Walcott. On 20 February 1917 – before the bill was signed into law – NACA sent letters to the major American aviation manufacturers, requesting them to submit lists of the patents they owned.

On 23 March, NACA floated the idea of a "patent pool" to the manufacturers.<sup>22</sup> Instead of a 5% royalty for patents, as proposed by Wright-Martin, the government would pay 1.25%. Not surprisingly, the manufacturers resisted. But NACA had a very big carrot and a very big stick to convince them to cooperate. The carrot was the promise of increased orders for airplanes, engines, and other aviation equipment. The stick was the threat of "condemnation." Since the government had awarded the patents, it could also take them away. Wright-Martin and Curtiss agreed to the pool in June 1917 and were immediately rewarded with multi-million dollar contracts. Other major companies followed in July. NACA incorporated the patent pool as the Manufacturer's Aircraft Association (MAA). Dr. Joseph Ames of John Hopkins University, a member of the NACA board with no known business interests, was listed as the first incorporator.

Of all the members, Curtiss benefited most from MAA patent pool. Upon joining, a manufacturer was freed from "...any and all claims which they or any of them may have had against each other for damages and profits on account of any infringement, or alleged infringement." Not surprisingly Curtiss' lawyer, W. Benton Crisp, had written the agreement. Curtiss never had the need or the opportunity to try the Aerodrome defense in court.

Orville no longer had any financial interest in the Wright patent, of course, but he was also affected by the MAA in a subtle yet important way. With the advent of the patent pool and the threat of a patent monopoly lifted, the negative press that the Wright name had suffered for waging the “patent wars” stopped. Slowly, the Wright brothers’ reputation began to recover. The public perception of Orville changed from that of a greedy industrial magnate to the grand old man of aviation.

### ***Maintaining the Flow of Misinformation***

Throughout these events, the Smithsonian stuck to its version of the Aerodrome test flights. There was a need to do so. Fiscally conservative members of Congress and the military were being dragged reluctantly into the twentieth century where wars were decided by weapons as much as tactics. A good national defense strategy had to include a heavy investment in technology. The performance of the Langley Aerodrome had become central to a much larger conversation that the country was having about the role of the government in the advance of science and technology. It was counterproductive for someone to point at “Langley’s Folly” as an example of an investment that didn’t pay off. More important, for the Smithsonian to admit that they had misrepresented the facts of the Hammondsport trials would be as much of an embarrassment as the 1903 failure of the Aerodrome.

In August of 1915, Albert Zahm published “The First Man-Carrying Aeroplane Capable of Sustained Free Flight: Langley’s Success as a Pioneer in Aviation” in the Annual Smithsonian Report for 1914. Zahm mentioned the two separate goals of the project, and also claimed that the first goal – the vindication of Langley – was accomplished May 28 through June 5 “...with the Langley aeroplane, kept as nearly as possible in its original condition.” He mentioned some of the changes, but the implication was that these were made during the second phase of the project as Curtiss was investigating the tandem configuration. In the last sentence, he claimed that Langley “developed and built the first many-carrying aircraft capable of sustained free flight.”<sup>23</sup>

Similar reports and papers appeared in the Annual Reports of 1915 through 1918. The spin in these articles began appearing in popular magazines, books, and encyclopedias. The 1917 edition of *Jane’s All the World’s Aircraft*, in its “Historical Aircraft” section, listed the Langley Aerodrome as capable of flight. In another example, the May-October 1915 edition of *St. Nicholas*, a popular magazine for children, an article “What Every One Should Know About Aeroplanes” opened with a photo of the Langley Aerodrome at Lake Keuka and explained “...the vindication of this great pioneer’s work was accomplished... when Mr. Glenn Curtiss flew the selfsame machine, repaired of course, over Lake Keuka eleven years later.”

In 1918, the Smithsonian restored the *Aerodrome A* to its original 1903 configuration and hung it in the Arts and Industries Building. The original label

simply identified the airplane, but this was soon replaced with one that read, "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." Up until now Orville had held his tongue, thinking that any public comment from him might be misinterpreted. "A denial of these statements by me might have been looked upon by the public as a jealous attack upon the work of a man who was dead," Orville later explained. But it was one thing to overstate Langley's success in magazines and books, and quite another to exhibit the Aerodrome as the first true airplane in a museum whose purpose was to preserve the history of the nation. Orville began to fight back in earnest.



*The Langley Aerodrome hanging in the Arts and Industries Building (formerly the National Museum Building).*

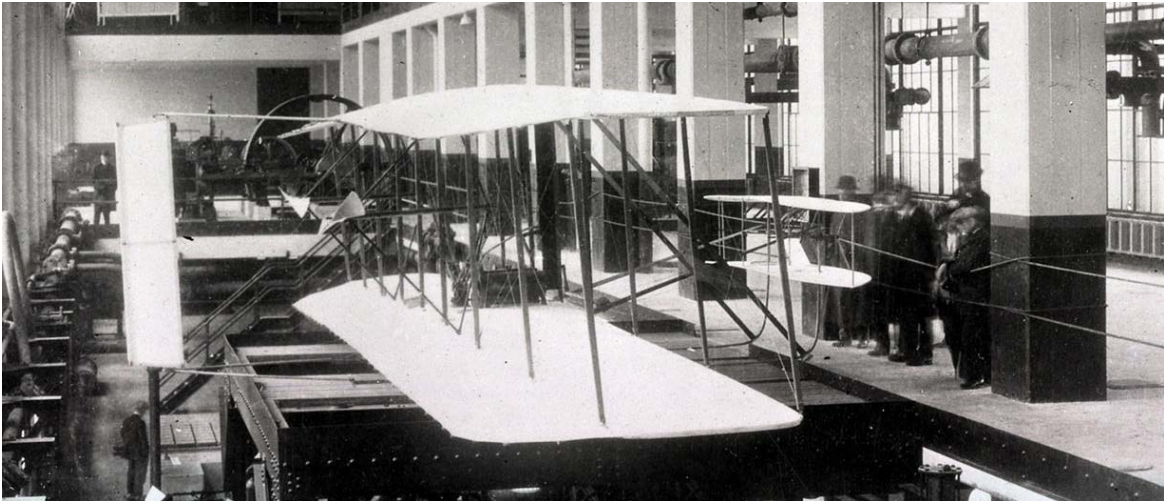
## ***The Albert Medal***

Fortunately, Orville Wright had an airplane too.

On 17 December 1903, after the Wrights had made four successful flights, a gust of wind had rolled and smashed the *Wright Flyer I*, rendering further test flights impossible without extensive repairs. Anxious to get home for Christmas, the brothers dismantled the Flyer, packed it in boxes, and shipped it to Dayton. They stored the boxes in a shed near the back of their property, the same shed that Orville occasionally used as a darkroom. There the boxes sat for over 12 years.

Sometime in late 1915 or early 1916, after he had sold the Wright Company, Orville began to restore the Flyer. He opened the boxes for the first time since he had packed them in Kitty Hawk. We can only imagine the mess that must have greeted him. Not only were parts of the aircraft broken and missing, the boxes had been submerged in river water for eleven days during the flood that inundated Dayton in 1913. Pieces of the Flyer were covered with mud, mildew, and rust. It was a big job, and Orville gathered several former employees of the Wright Company to accomplish it, including Charlie Taylor, the machinist who had built the engines for the Wright's first airplanes. Orville, Charlie and crew carefully cleaned, repaired, and replaced parts of the airplane. The engine case had been broken and the crankshaft and flywheel lost. Charlie cast and



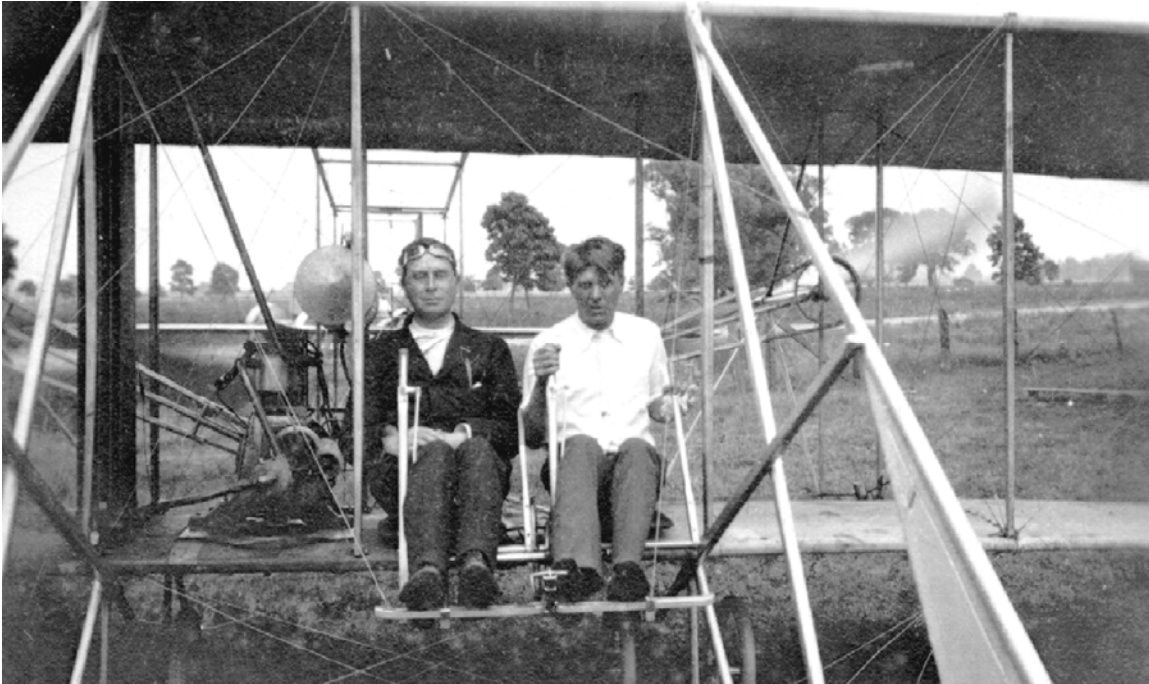


*The recently restored 1903 Wright Flyer I at the Massachusetts Institute of Technology in 1916.*

machined a new case, and then built up the engine, borrowing parts from old motors where he could find them and making them anew when necessary. Over several months, Orville and his workmen carefully restored the aircraft to its original condition, even covering it with the same brand of cotton muslin the brothers has used a dozen years before.

The restored 1903 *Wright Flyer I* made its first public appearance at the Massachusetts Institute of Technology on 11 through 14 June 1916. The occasion was the opening of the new Cambridge Campus, and the *Wright Flyer* was the guest of honor. Visitors were astounded to learn the aircraft still existed. Alexander Graham Bell, who attended the event, was bewildered that the Smithsonian had not acquired the aircraft. He helped to arrange a meeting between Charles Walcott and Orville Wright to discuss the possibility, but it produced no results. No one knows exactly what was said at the meeting, but Orville left feeling the Smithsonian was not especially interested. The *Flyer* began to pop up infrequently at special aviation events; it next appeared at the Pan-American Aeronautical Exhibition in New York in February 1917 beside a modern Wright-Martin Model R military biplane. It would be displayed four more times between 1917 and 1924 – not often, but enough to remind folks that this valuable historic artifact, “the first machine to fly,” according to its signage, still existed.

Several other people joined the fight on Wright’s behalf. Orville’s sister Katharine began a letter-writing campaign, impugning political figures such as Ohio Governor James M. Cox to speak out against the Smithsonian’s attempts to rewrite history. Harry Haskell, a journalist who had attended Oberlin College with Katharine, wrote editorials for the *Kansas City Star* and other newspapers.<sup>24</sup> The most effective counterpunches, however, came from Griffith Brewer who, in effect, rallied all of England to the Wright brother’s defense.



*Griffith Brewer (left) with Max Rinehart (right) in a Wright Model B. Max was an instructor at the Wright Flying School near Dayton, Ohio, USA.*

Of all the characters in this drama, Brewer was probably the least politically-motivated and at the same time, the most politically adroit. Brewer was an accomplished balloonist and a patent attorney who specialized in aeronautical patents. He had traveled to LeMans, France in 1908 to see Wilbur fly. The two met, had dinner, found they shared the same subtle sense of humor, and liked each other immediately. On 8 October 1908, Wilbur treated Brewer to a flight, making him the first Briton ever to fly in a powered aircraft. At Wilbur's invitation, Brewer visited the Wrights in America in the summer of 1910 and became one of the first pupils at the Wright Flying School. While there, he flew with Orville, making him one of three people ever to fly with both of the Wright brothers.<sup>25</sup> Thereafter he made almost annual visits to Dayton, Ohio and Orville's summer home on Lambert Island, Ontario, thirty in all before he died in 1948, the same year that Orville passed away.

Brewer put together the British Wright Company to manage the Wright patents in England. For a lawyer, he seemed much more interested in cooperation than confrontation. He filed only a single patent infringement suit on the Wright's behalf, and it was this suit that Brewer had come to America in 1914 to discuss with Orville. Instead of suing unlicensed British aircraft manufacturers one at a time, Brewer had approached their largest customer, the British military. He had discussed the possibility of purchasing a blanket license for the Wright patent that would cover any airplane manufactured in England. He had a figure in mind – £25,000, approximately \$125,000 at the 1914 exchange rate (about \$10 million in 2017 dollars). Orville was amenable. He had recently committed to buying

back all the outstanding shares of stock in the Wright Company and he needed the cash.

Before Brewer could return to London and close negotiations, Europe descended into World War One. In early August of 1914, England suddenly found itself in dire need of military equipment, including thousands of airplanes. The funds that the Royal Flying Corps and the Royal Naval Air Service had earmarked for patent fees were suddenly very dear. Brewer begged Orville to accept a lower payment and Orville acquiesced. The final amount was just £15,000 (\$75,000), which eventually worked out to just a few dollars per airplane. Considering that the Wright Company had charged the Burgess Company and others up to \$1000 per aircraft, this amounted to a generous contribution to the British war effort. England was very much in Orville's debt, and Brewer did not let them forget it.

As the Smithsonian continued to claim that the Aerodrome was the first true airplane, Brewer suggested that England register an opinion to the contrary. In 1917, the Royal Society of the Arts – of which Brewer was a Fellow – awarded Orville Wright and his brother Wilbur (posthumously) the Albert Medal, one of England's highest civilian honors. This award was created in 1864 to “acknowledge the profound creativity and innovation of those that work to tackle some of the world's intractable problems.” Only a handful of Americans had been so esteemed, including Thomas Edison and Alexander Graham Bell.

On 27 October 1917, England sent a delegation to Dayton, Ohio headed by Lord Northcliffe, owner/publisher of England's *Daily Mail* and *London Times*. Northcliffe brought with him prominent British citizens from England's government, military, sciences and commerce to pay homage to the Wrights. They were met by similar folk from America, including Ohio Governor James Cox, aeronaut Frank S. Lahm, inventor Charles Kettering, and tycoon Charles Flint. Also present were reporters from 147 news services worldwide. As he presented the medal, Lord Northcliffe told the gathering, “Wilbur and Orville Wright were the first persons to ascend from earth in a mechanically propelled aeroplane. To them and to them only is due the credit. Moreover, they were the real inventors of the means of controlling all aeroplanes.”

And although he didn't mention the Smithsonian Institution by name, he leveled a powerful accusation in their direction. “I hope that these words of mine will have some effect upon checking those who are trying to rob your citizens of their credit... There have been efforts made on the part of others to claim the honor of designing and successfully flying the first heavier-than-air machine. I bring messages from England from persons in high authority that will serve to show that the Wright brothers are regarded there as being justly entitled to this honor. I want to do what I can to assure them the historical recognition which is their due.”

The presentation of the Albert Medal and Lord Northcliffe's speech took place at Memorial Hall in Dayton, Ohio. The centerpiece of this affair, suspended from the flies over the stage, was the restored 1903 *Wright Flyer I*.

## ***Escalation***

The Smithsonian did not answer Northcliffe's accusations. They pointedly ignored the Albert Medal presentation and continued to promote Langley's Aerodrome as the first true airplane. Their contention seemed on its way to becoming accepted aviation history, a prospect which rankled Griffith Brewer as much as it did Orville Wright. The Englishman decided to take another stab at setting the record straight.

On 21 October 1921, Brewer gave a speech to the Royal Academy of Sciences in London, England titled "Aviation's Greatest Controversy." In it, he charged "the Hammondsport trials have been inaccurately reported to the Smithsonian Institution. An official report declaring that the Langley machine had been flown at Hammondsport has since been issued by the Smithsonian Institution." He described the changes that had been necessary to convert the Aerodrome into an airworthy machine, and for the first time divided them into alterations that had been made prior to May-June 1914, and those that had been made afterward. He also told how the Aerodrome was restored to its original condition at the Smithsonian, then labeled as the first true airplane, Brewer said unequivocally "...both the Smithsonian reports and the inscription on the machine are misleading and untrue. No attempt was made at Hammondsport to fly the original Langley machine." This speech was simultaneously published in the October edition of the U.S. Air Service Journal, along with rebuttals from Charles Walcott and Albert Zahm. The November issue carried rebuttals from Charles Manly and Glenn Curtiss.

Because Brewer was a patent attorney for the Wrights, some dismissed his attack as mercenary. However, there was no mercenary effect. The position of the Smithsonian Institution at that time represented little hazard to the value of the British patents; the government had paid its one-time fee. Neither did it affect the American patents; the NACA/MAA patent pool had both validated those patents and neutralized their alleged economic threat. Brewer was simply exposing an untruth and correcting the historical record as he saw it.

Brewer's speech and its rebuttals created a furor. It galvanized Orville, who up to this time had presumed the Smithsonian was misled by Curtiss and Zahm. But Walcott's response to Brewer's speech had made it clear that the Smithsonian was partly responsible for the deception, which hardened Orville in his position. While both sides of the controversy dug in, Brewer suggested a drastic course of action, fighting politics with politics – banish the original 1903 *Wright Flyer I*, arguably the most precious historic artifact in aviation, to the Science Museum in Kensington, England's equivalent of the Smithsonian. As early as 1920, Sir Henry Lyons, the director of the Science Museum, had asked to exhibit the Flyer

for a short time while his curators made precise measurements and drawings so they could build an exact replica of the aircraft. Orville had promised to supply the drawings himself, but he never seemed to get around to it. In 1923, Brewer approached both Orville and Lyons with a proposal to exhibit the Flyer in England permanently.

Since Orville had begun to exhibit the restored aircraft, several American museums had offered to give the Flyer a home, but none with the prestige of the Smithsonian. The Science Museum had the status that Orville wanted; and although it wasn't his native land, England had proved loyal and supportive. He responded to Brewer, "If I were to receive a proposition from the officers of the Kensington Museum offering to provide our 1903 machine a permanent home in the Museum, I would accept the offer, with the understanding, however, that I would have the right to withdraw it at any time after five years, if some suitable place for its exhibition in America should present itself." Sir Henry Lyons contacted Orville and they began to work out the details of transporting the plane to England. On 30 April 1925, Orville announced that he intended to send the Flyer to England unless the Smithsonian rescinded its position on the Hammondsport trials – in effect ransoming the Flyer for the truth.

Walcott responded on 4 May, reasserting the Smithsonian's position that the Langley Aerodrome was indeed capable of flight. Even then Orville made an effort to keep the Flyer in America. He asked Chief Justice William Howard Taft, who was also the Chancellor of the Smithsonian, to convene an impartial investigation into the matter. When Taft declined, Orville had Grover Loening carry a message to the Smithsonian saying that he would give them the Flyer if, when they next published their annual report, they would print both sides of the controversy and display the Flyer in the National Museum with a label that identified it as the first successful man-carrying airplane.

Walcott's response to this was to ask two fellow members of NACA, Dr. Joseph Ames (who had helped form the MAA) and Rear Admiral David W. Taylor to look into the matter and make recommendations. Their report, submitted 3 June, was a waffle – both sides of this controversy had some validity, they decided. The Wrights had flown first, but Langley they likened to Moses. He had led his people to the promised land of aviation, but either through bad luck or bad design, hadn't been able to fly himself. Ames and Taylor's fence-sitting was best summed up in the wording they prescribed for a new label on the Aerodrome exhibit:

"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 built by Wilbur and Orville Wright, which on December 17, 1903, was the first in history to accomplish sustained free flight under its own power, carrying a man.”

Walcott made the recommended changes to the label, but the interpretive information displayed with the Aerodrome also included a recounting of the 1914 Hammondsport trials and stated that the original machine “would have flown if it had been successfully launched.” It also said that the Aerodrome’s engine and airframe were the same in the 1914 trials as they were in 1903, and that the wings and controls had been “reconstructed.” Orville saw the change of labels as nothing more than smoke, meant to appear conciliatory while the Smithsonian continued to promote the Aerodrome as the first true airplane. If he had any doubts that his decision to send the Flyer abroad was the best course of action, they were resolved by the reaction of the Washington establishment in 1925.

As Orville was getting the Flyer ready to ship, Charles Walcott died and Charles Abbott was promoted to Secretary of the Smithsonian. Abbott had come on board in 1895 to run the Smithsonian’s Astrophysical Laboratory. He was an ardent admirer of Langley and a fellow solar scientist. Within weeks of his appointment he dealt with his first Aerodrome-related crisis as Orville published his reasons for sending the Flyer abroad.

“I believe my course in sending our Kitty Hawk machine to a foreign museum is the only way of correcting the history of the flying machine, which by false and misleading statements has been perverted by the Smithsonian Institution,” Orville wrote. “In its campaign to discredit others in the flying art, the Smithsonian has issued scores of these false and misleading statements. They can be proved to be false and misleading from documents. But the people of today do not take the trouble to examine this evidence.

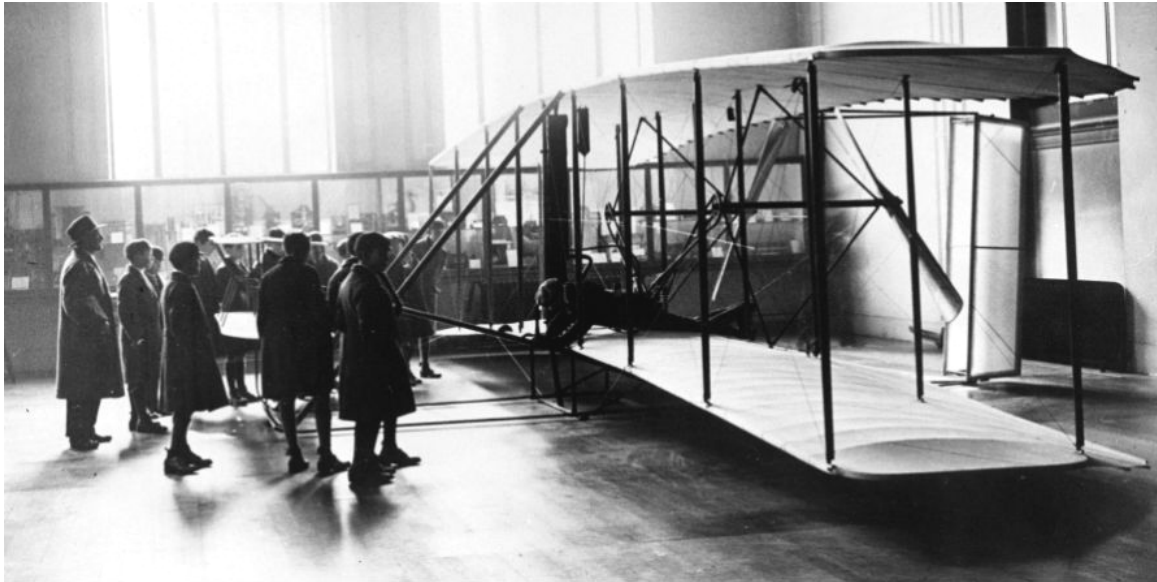
“With this machine in any American museum the national pride would be satisfied; nothing further would be done and the Smithsonian would continue its propaganda. In a foreign museum this machine will be a constant reminder of the reasons of its being there, and after the people and petty jealousies of this day are gone, the historians of the future may examine impartially the evidence and make history accord with it.

“Your regret that this old machine



Secretary Charles Abbott playing tennis behind the Smithsonian Castle.

must leave our country can hardly be so great as my own.”



*The 1903 Wright Flyer on display at the Science Museum in Kensington, England.*

Abbott quickly responded with an offer to change the label on the Aerodrome again – in fact, it was changed to one that simply read, “Langley Aerodrome, the original Samuel Pierpont Langley Flying Machine of 1903, Restored.” This was not enough for Orville; a change of labels did not address the mounds of misinformation that the Smithsonian had issued beginning in 1914.

There were more such crises, and they seemed to come in quick succession as the twenty-fifth anniversary of the Kitty Hawk flights came and went. Senator Hiram Bingham and Representative Lindsay Warren pushed a bill through Congress to fund a national memorial to the Wright brothers at Kill Devil Hills, North Carolina in 1927. In 1929, *Popular Science* magazine published “The Real Fathers of Flight,” an unauthorized biography of the Wright brothers in six parts by John R. McMahon. It was expanded to become a book, “*The Wright Brothers: The Fathers of Flight*,” in 1930. Each time the Wright story was told in the media, it mentioned the exile of the Flyer and laid the blame on the Smithsonian.

In an effort to reduce the damage that was accumulating, Abbott published “The Relations between the Wright Brothers and the Smithsonian Institution” just before the twenty-fifth anniversary of the first flight in 1928. It was part apology, part excuse, and part rationalization. In regard to the 1914 Aerodrome test flights, Abbott echoed Ames and Taylor as he wrote, “In the opinion of some experts, the tests demonstrated that the Langley machine of 1903 could have flown, and in the opinion of some others, these test did not demonstrate it. It must ever be a matter of opinion.” Unfortunately this wasn’t Orville’s opinion.

Orville and Abbot met on April 19, 1929 to discuss their differences and Abbott admitted there were changes made to the Aerodrome prior to the May-June 1914 flights. But he refused to publish them or do anything that would damage the reputation of Charles Walcott or the Smithsonian Institution.

In 1934, at the request of Charles Abbot and with the approval of Orville Wright, Charles Lindbergh waded into the controversy in the hopes that he could mend fences. Lindbergh was to head a small committee that would arbitrate the controversy. He was reluctant; he told both Abbott and Orville that he had demands on his time and didn't know if he had the resources to resolve this problem. Nonetheless, Lindbergh dutifully played the role of mediator for several years.

Orville told Lindbergh and Abbott he wanted to focus on the 1914 Hammondspport trials and whether or not they had proved that the 1903 Aerodrome was airworthy in its original condition and configuration. If the committee judged the Aerodrome could have flown in 1903, he would bring the Flyer home. If not, he expected the Smithsonian to "rectify the offenses committed by it in the past in its own publications by printing full corrections in these same publications. These corrections shall be unequivocal, and shall be given a prominence and circulation equal to that given to the former statements of which they are a correction, so that in the future the matters involved can not be misunderstood."

Orville produced a list of changes to the original Aerodrome, carefully winnowed so as not included any changes made after June 1914. Abbott sent these to Albert Zahm, who wrote his objections to most of the items on the list. Abbot suggested publishing a complete history, including Langley's work in aeronautics, the history of the Aerodrome, Zahms' 1914 report, Orville's list of changes, Zahm's notes on Orville's list, and all that had happened since 1914. Orville objected; this was too complex; it obscured the heart of the controversy. He repeated to Abbot just what he needed to declare a truce: "That the Smithsonian publish a paper presenting a list of specifications in parallel columns of those features of the Langley machine of 1903 and the Hammondspport machine of 1914, in which there were differences, with an introduction stating that the Smithsonian now finds that it was misled by the Zahm report of 1914...(and) that it ask its readers to disregard all of its former statements and expressions of opinion regarding the flights at Hammondspport in 1914, because these were based on misinformation as the list to follow will show."

Abbott apparently objected to publishing Orville's list without context and did not reply. Lindbergh eventually gave up. He wrote in his diary, "The fault lies primarily with the Smithsonian people. But Orville Wright is not an easy man to deal with in the matter. I don't blame him much, though, when I think of the way he was treated for a period of years."

Lindbergh was not the first or the last person to attempt to mediate the Wright/Smithsonian controversy. Throughout his tenure as Secretary, Abbot received regular correspondence asking why the Smithsonian had not yet apologized to Orville Wright. The aviation magazine *Contact* initiated a drive to petition the Smithsonian to admit its error. Bills were introduced in Congress to investigate and resolve the matter. A group calling themselves “Men With Wings” organized to support the return of the Flyer to America. And hundreds of concerned Americans, including schoolchildren, wrote the Smithsonian to complain. This happened so frequently that Abbott developed a “form letter” to answer these inquiries, enumerating the things the Smithsonian had done to make amends.<sup>26</sup>

The one thing the Smithsonian could not do, however, was admit it was wrong. As late as 1941, Abbot said as much to “Jack” Stearns Gray, an aviatrix who had barnstormed in a Wright Model B with her husband George Gray beginning in 1912. Mrs. Gray persisted beyond the form letter, exchanging opinions with the Secretary several times. Abbot ended the correspondence on 6 November 1941 writing, “It appears that the only thing that would satisfy Dr. Wright and his partisans is for the Institution to say it believes what it does not believe; namely, that Langley’s plane as of 1903 was by its nature incapable of flight. I cannot recommend the Institution publish an untruth.”

## ***Resolution***

In the end it was politics – or at least political considerations – that finally resolved this stand-off. In early 1942, Fred C. Kelly contacted Charles Abbott to tell him that he was writing the first authorized biography of the Wright brothers. As part of Kelly’s agreement with Orville Wright, he was to do what he could to resolve the differences between the Smithsonian and the Wrights.<sup>27</sup> Abbott’s first reaction was to tell Kelly how much grief this problem had cost him. Then, for four months, he recycled the same objections and opinions that he had raised when Lindbergh and others had attempted to negotiate a settlement.

Kelly, however, brought two things to the table that hadn’t been tried before – a sense of humor and an exceptionally perceptive understanding of human nature. In addition to being an accomplished journalist and biographer, Kelly was also a humorist and had written books and articles on the psychology of economics. Kelly’s letters to Orville were playful and those to Abbott were unfailingly respectful. He did not confront either man and as a result earned the trust and friendship of both. Abbott cut off the conversation at



32A caricature of Fred Kelly thought to have been drawn by the author himself.

one point, but Kelly was patient and eventually brought him back.

Abbott himself must have felt tremendous pressure. An authorized biography would have a shelf-life measured in eons, and Kelly wasn't shy about telling Abbott that it would have an entire chapter dedicated to the tale of the Wright/Smithsonian controversy. The invention of the airplane was a matter of national pride, the exile of the Wright Flyer in England was a continuous embarrassment for the Smithsonian, and the Board of Regents wanted to end it. On the other hand, the Board also wanted to avoid the embarrassment of admitting the Smithsonian's error. In fact Frederick C. Walcott, Charles Walcott's nephew, was on the board and did not want to see his uncle's name disparaged. Additionally, Albert Zahm – who was now responsible for the aviation section of the Library of Congress – was in the loop and anxious to preserve his own reputation. If all this wasn't pressure enough, Abbott knew that Orville was an old man. If Abbott didn't write a better ending to the tale now, he might never get another chance.

In the summer, Abbot stopped blustering, put pen to paper, and began to work out what he might publish that would end the conflict. "He seems desperate to satisfy you," Kelly told Orville. Nonetheless Abbott was slow to respond to Kelly's suggestions and Orville's demands, probably because he had to run any response past the Board of Regents. But the two parties inched towards an agreement. In August, Abbott requested Kelly come to Washington for two long face-to-face sessions in which they hammered out the details. Abbot balked on small points, particularly concerning Walcott and Zahm, but Kelly was good-natured and insistent. By the end of September, Walcott sent Orville what he hoped was the final version of the apology that he would publish in the Smithsonian Miscellaneous Reports. "I judge that he has completely caved in," Kelly wrote to Orville.

When Orville and Abbott next met at a NACA meeting on 23 October, Orville was "as happy as a schoolboy over the outcome," Abbot told Kelly. All seemed forgiven, but there was one more hiccup. Three days later, the Smithsonian published "The 1914 Tests of the Langley 'Aerodrome'" which listed every change made to the Aerodrome prior to its test flights and apologized for the misinformation the Smithsonian had published on this matter, and said in plain language, "The flights of the Langley Aerodrome at Hammondsport in 1914...did not warrant statements published by the Smithsonian Institution that these test proved that the Langley machine of 1903 was capable of sustained flight carrying a man." Unfortunately Abbott, without consulting Kelly or Orville, had made some minor changes right before publication, adding comments about the list of changes to the Aerodrome and Langley's 1896 flights. This angered Orville. Fortunately, Kelly stepped in before Orville could confront Abbott. He talked Orville down, pointing out that the media had received the news of the Smithsonian's apology very well and were already celebrating the end of the feud. The *New York Times*, in an article titled "An Air Quarrel Ended," summed it



up this way: “Dr. Abbott’s sweeping repudiation of past Smithsonian claims cannot remake history, but so generous an acknowledgement should end old estrangements. The editor ended with this hopeful plea: “Perhaps Orville Wright will now bring the Kitty Hawk plane home to the United States, where it should rest forever.”

Orville held his tongue and agreed to bring the Flyer back from England. In fact, Orville very graciously buried the hatchet after the release of Kelly’s book, “*The Wright Brothers: A Biography Authorized by Orville Wright*,” in May 1943. The book contained a copy of Abbott’s apology of 26 October 1942, giving it much wider distribution than it might have had otherwise. Orville wrote to Abbott, “I can well understand the difficult position you found yourself in when you took over the administration of the Institution at a time when it had on its hands an embarrassing controversy for which you were not responsible, so I appreciate the more your effort to correct the record of the tests at Hammondsport in 1914 which brought on that controversy.”

Orville and Abbott had intended to share the good news about bringing the Flyer home with the publication of the 1942 Smithsonian Annual Report, due to be released in the summer of 1943 and containing yet another copy of Abbott’s apology. But they were delayed by one more round of politics. Every year since he had come to office in 1933, President Franklin D. Roosevelt had sent a congratulatory note to Orville on the date of the first powered flights at Kitty Hawk. This year would mark the fortieth anniversary of those flights and Roosevelt asked to make the announcement himself at a White House dinner on



*The dedication ceremony at the Smithsonian when the 1903 Wright Flyer was installed in the Arts and Industries Building. The Flyer was returned from England in 1948..*



*Left to right – Orville Wright, Secretary Jesse Jones, and General Henry “Hap” Arnold in an awkward three-way handshake at the Collier Trophy Award Ceremony on 17 December 1943.*

17 December 1943, where the annual Robert J. Collier Trophy (for excellence in aeronautics) would be awarded. Orville and Abbot agreed, and Orville wrote Col. Ernest Mackintosh, the director of the Kensington Science Museum on 8 December 1943 to inform him of the decision to bring the Flyer back to America. “I think you will not be surprised in learning of this decision,” wrote Orville. “But I wish to let you know of it before the public announcement is made.”<sup>28</sup>

As fate would have it, Roosevelt was unable to attend his own event. He had recently been diagnosed with congestive heart failure, a state secret of which Orville and Abbot were unaware. As 17 December dawned, the president had just returned from the Tehran Conference, the first of the “Big Three” meetings between Roosevelt, Stalin, and Churchill. Due to his deteriorating condition, the president was dangerously exhausted by the 7,000-mile journey. Orville, unaware of the president’s infirmity, was understandably upset and refused to speak when it came time for him to present the Collier Trophy to General Hap Arnold. He simply handed the envelope containing the certificate of award to the general and sat down. But Arnold covered Orville’s silence graciously with a witty remark.<sup>29</sup> Roosevelt’s words were read by Secretary of Commerce Jesse Jones.

To an audience that included not only Hap Arnold, but also Eddie Rickenbacker, Roscoe Turner, Igor Sikorsky, Glenn Martin, Grover Loening and other aviation greats, Jones read Roosevelt’s summary of aviation’s “contribution to the progress of man” in war and peace. “All of these achievements and all of these hopes stem from the first Wright plane, whose basic principles still govern flying...The nation will welcome it back as the outstanding example of American genius.”

### ***Which Leaves One Final Question...***

Although Charles Abbot's 1942 apology and retraction ended the feud between Orville Wright and the Smithsonian Institution, it did not answer the question that had started the mess. Beyond the politics, there was a contingent in Washington

informally called the "Langley Society" that believed the original 1903 Langley Aerodrome could have made a sustained flight with a person aboard *if* it had been properly launched. In his apology Abbot admitted that, because of the changes made to the aircraft, the 1914 experiments at Hammondsport did not prove that the Aerodrome — in its original configuration — was "capable of flight." So the question remains: Could the 1903 Langley Aerodrome have flown?

Several aeronautical engineers have studied the 1903 Aerodrome and concluded that it was *not* capable of flight because the structure was too weak and excessively "*aeroelastic*." That is, the structure could be easily distorted by the forces in play during flight. In their 1955 book *Aeroelasticity*, authors Raymond L. Bisplinghoff, Holt Ashley, and Robert L. Halfman observe "Perhaps the first designer to be affected [by aeroelasticity] was Professor Samuel L. Langley of the Smithsonian Institution. In light of modern knowledge, it seems likely that the unfortunate wing failure which wrecked Langley's machine on the Potomac River houseboat in 1903 could be described as wing torsional divergence." In 1981, the Langley Aerodrome was cleaned and restored for the first time since 1918. While it was accessible, NASA engineers Wilmer Reed III, Rodney Ricketts, and Robert Doggett tested the wings and found that because of "overall lack of structural rigidity, especially torsional rigidity of the wing and fuselage, it [is] highly probable that the collapse of the machine during launch can be attributed to... overload due to elastic deformations."

More recently, in 2004 Lorenzo Auriti and James DeLaurier of the University of Toronto built a models of the Great Aerodrome wings and conducted wind tunnel tests. They found that during a launch the wings would twist with the leading edges down and the trailing edges up; the lower guys posts were subjected to loads beyond their breaking point, and the guy wires would "yield," depriving the spars of critical support. Their conclusion was "the Aerodrome was not capable of flight as launched off the houseboat [in 1903]. The wing loads found were higher than the structure could support."

According to these experts, the 1903 Aerodrome airframe had two fatal flaws. First, the wings would not hold their camber or angle of attack when the air was flowing over them. In the first few critical moments of flight, the wings twisted or deformed so they actually pointed the Aerodrome down. Second, the structure would not support the aircraft in flight, particularly during the stresses of a catapult launch. The lower guy posts would snap, the wires would go slack, and the spars would break where they joined the fuselage. Indeed, both of these flaws seemed to have manifested themselves in the two launch attempts of 1903.

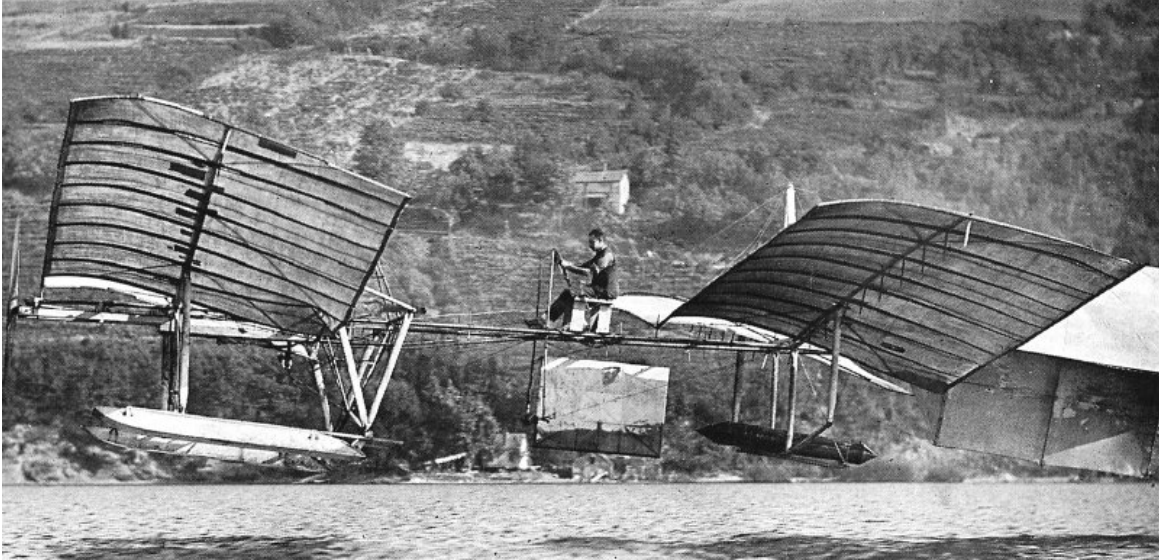
If you closely examine the 1914-1915 Hammondsport trials, they support these conclusions. Ironically, the Smithsonian Institution claimed that these same trials proved the Langley Aerodrome was the first aircraft capable of manned flight. But a detailed review of the experimental data suggests just the opposite. Furthermore, the Hammondsport flights expose another potential flaw. That is,

given the inefficient design of the wings and propellers, the available thrust may not have been sufficient to keep the aircraft in the air even if the airframe had been stronger.

The initial flights in late May and early June of 1914 plainly show that the Aerodrome (in its 1914 configuration) could not sustain flight with its original engine. When the Aerodrome reached flying speed, skimming across Lake Keuka on its pontoons, the pilot pulled back on the control lever to pitch the nose up. The airplane would leave the surface of the lake, but never for more than a few seconds. It would rise no more than 2 or 3 feet (0.6 to 0.9 meters) — just enough for the pontoons to leave the water — and continue for 100 to 150 feet (30 to 45 meters) before it settled back down on the lake. The standard procedure for this situation would have been for the pilot to hold the nose level or slightly down and let the airplane continue in "ground effect" (close to the surface where the air balls up under the wings and creates additional lift) while it gained enough speed to climb. Certainly Curtiss and his pilots tried this, but the available thrust was not enough to gain speed or altitude, or even keep the aircraft flying in ground effect.

Clearly embarrassed by this lackluster performance, Curtiss claimed that the inability to sustain flight was due to increased weight. The pontoons, he said, added 320 pounds (145 kilograms). The original Aerodrome had weighed 850 pounds; its Hammondsport reincarnation weighed 1170 pounds (386 versus 531 kilograms). It was a believable story, but it was not the whole truth. More important than excess weight was insufficient thrust. The Aerodrome's inability to fly was primarily due to the underperformance of its engine. The Manly-Balzer motor only produced about 35 horsepower, two-thirds of the power it had delivered in 1903. Curtiss had compensated for the lack of power as best he could, adding a modern ignition and carburetor to the motor and reshaping the propellers to make them more efficient. But it was not enough. Later tests would show that the reworked engine and propellers produced only 300 pounds of thrust (1335 Newtons), well below the 450 pounds (2002 Newtons) measured in 1903. Curtiss could not explain this to the public because it would have exposed the central lie of the Hammondsport trials. Despite press releases to the contrary, the Aerodrome, excepting its pontoons, was *not* the same aircraft Langley had attempted to fly in 1903. There were, in fact, over 30 alterations, including the reworked engine and propellers. Much of the excess weight had nothing to do with pontoons. It was there because of the doubled-up spars, solid ribs, A-shaped wing supports and other parts that Curtiss had added or modified to strengthen the airframe.

Shortly after the trials on 5 June, Curtiss left Hammondsport for Buffalo, NY to organize a new factory. He asked Albert Zahm to take over the investigation of the Aerodrome, but he left instructions that clearly show that Curtiss understood the true problem. Instead of reducing weight, he had his crew remove the original engine and substituted an 80-horsepower motor and modern propeller. In



*Elwood "Gink" Doherty flying the Aerodrome on 17 September 1914. The Aerodrome has been fitted with a 80 hp Curtiss engine and a modern tractor propeller. The pilot and controls were also repositioned to adjust the center gravity.*



*The Langley Aerodrome on 9 March 1915. The original engine has been replaced and the aircraft has been mounted on skates so it can take off from the frozen surface of Lake Keuka.*

September 1914, the Aerodrome began to fly, eventually reaching altitudes of 30 feet (9 meters) and traveling for up to 20 miles (32 kilometers). But that success was tainted for the simple reason that it was accomplished without the original motor.

So in March 1915, while Lake Keuka was still frozen over, Zahm and his team reinstalled the original engine, and then replaced the pontoons with skates. This reduced the weight of the Aerodrome to 995 pounds (451 kilograms), somewhat closer to its original weight. (Although no one ever pointed it out, this experiment



showed that the pontoons added just 145 pounds – 66 kilograms – to the aircraft; airframe improvements had added the remainder.) On 10 March, Curtiss pilots made several take-off runs across the ice. The best measured flight was only 75 feet (23 meters) in length. Even without pontoons, the lightened Aerodrome could not sustain itself in the air. The motor, by the way, continued to misbehave as it had in 1914.

Curtiss and Zahm made one more attempt to test part of the Aerodrome's original configuration. Ever since the Aerodrome's rear wings had collapsed during a launch attempt on 8 December 1903, some in aviation had suggested the wings could not support the weight of the aircraft in flight. Griffith Brewer had mentioned the weakness of the airframe in his 22 June 1914 letter to the *New York Times*. "Langley was under the mistaken impression that it was necessary to have extreme lightness and a large surface in order to fly," wrote Brewer. "The result was that he designed wings of very small strength..." Orville Wright, who had more cause than most to study the Aerodrome's construction, zeroed in on the guy posts. Writing to Earl Findley, editor of the *U.S. Air Services Journal*, Orville recounted the changes made to the Aerodrome airframe in 1914 and observed, "The most vital change was one that few would have noticed. That was in the location of the guy-posts which braced the wings. The wings of the Langley machine collapsed in both attempts to fly it in 1903, due to a fault in the wing trussing. When Langley designed his wing trussing he had no data on the location of the center of pressure on cambered wings and placed the guy posts too far forward.... This fatal fault in Langley's design was corrected by Zahm and Curtiss by moving the posts approximately 30 inches rearward... Without the change in the location of the guy-posts the Langley plane of 1903 would have collapsed in every attempt to fly it."

Langley supporters had countered by claiming the airframe was sufficiently strong; the fault was in the launching mechanism. It had caught the Aerodrome during both of the attempted launches. In June 1915, possibly hoping to allay suspicions of weakness and remove more weight, Zahm had workers remove the rear A-frame that had been added to better support the rear wings. They replaced it with a single vertical post similar to the original guy post. The rear wings folded up on an attempted take-off, just as they had in 1903.

This was the experiment that Orville's brother Lorin Wright had witnessed. That January, in response to the newest patent suit the Wrights had brought against him, Curtiss had cited the flights of the Aerodrome at Hammondsport, arguing that other airplanes could have flown before the Wright brothers' Flyer. Lorin was in Hammondsport to spy on what Curtiss was doing with the Aerodrome. And although Curtiss' workmen confiscated Lorin's photos, apparently hoping to cover up the results of the experiment, Lorin made a full report when he got back to Dayton. Word got out.

Based on these results, it's hard not to conclude that the Aerodrome was fatally flawed. It is all but certain that the modern aeronautical engineers who have studied the aircraft are correct; the 1903 airframe was too flimsy. After all, Glenn Curtiss, one of the most savvy airplane designers in America at the time, would not fly the Aerodrome until he had reinforced the wings and changed the rigging so the bracing wires were in line with the centers of pressure. The one time his crew did revert to the original construction, the wings failed. It's also apparent the wings and propellers were inefficient, unable to provide sufficient lift and thrust without a great deal of power. From the trials, we know that 35 horsepower was not enough to sustain flight, while 80 horsepower was. Somewhere between the two is a threshold — just enough power to keep the aircraft in the air. Was this threshold at or below the 52 horsepower available in 1903 when the engine was running at its peak? It may have been, but it's just as likely it was not.<sup>30</sup>

The take-away from all of this is that it's very likely the 1903 Langley Aerodrome was incapable of flight, but not completely certain. The one thing we can say with certainty is that science suffers when mixed with politics. If the Hammondsport trials had been conducted without the agendas of Glenn Curtiss and the Smithsonian Institution, we'd have better answers

*Nick Engler*

*18 February 2017*

[www.wright-brothers.org](http://www.wright-brothers.org)

*With gratitude to Louis Chmiel, the author of "[Ohio: Home of the Wright Brothers](#)," for his help in researching and preparing this article.*

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### **Notes**

<sup>1</sup>Like many pioneer aircraft, Curtiss airplanes had a proprietary, non-standard control system. Curtiss pilots grasped a wheel mounted on a post in front of them; their shoulders inside a yoke or frame. Turning the wheel moved the rudder to yaw the airplane right and left; pushing it forward or pulling it back moved the elevator to pitch the nose up and down. Tilting their torso right and left moved the yoke, which in turn angled the ailerons, rolling the airplane clockwise and counterclockwise. Curtiss used these controls in his aircraft up until 1915 when he switched to the standard "stick-and-rudder" control system that had developed in Europe.

<sup>2</sup>Originally, the 1903 Langley Aerodrome had an ingenious hand crank that allowed the pilot to start the engine from the cockpit. This was removed for the 1914 flights possibly because it would have interfered with the Curtiss controls.

<sup>3</sup>Aeronautical engineer Raymond Bisplinghoff and others studied the structure of the Aerodrome and found that the lightly-built wings were excessively

*aeroelastic*. As the Aerodrome approached flying speed, the wings would twist as the center of pressure moved along the chord. The hollow ribs would flex. The wings could not reliably maintain their camber or angle of attack.

<sup>4</sup>The Wright Company filed suits against Glenn Curtiss and the Herring-Curtiss Company for patent infringement in the State of New York in August 1909. Judge John R. Hazel, a federal jurist for the United States District Court for the Western District of New York was assigned to the case. Glenn Curtiss and the Herring-Curtiss Company resided in Hammondsport in western New York. The original patent suit was dismissed in 1910 after the Herring-Curtiss Company declared bankruptcy. Curtiss reorganized his enterprise as the Curtiss Aeroplane and Motor Company, and the Wrights filed anew. Judge Hazel ruled in favor of the Wright brothers in February 1913, assigning the Wright patent "pioneer" status. Curtiss appealed the ruling, and the case was reassigned to the United States Court of Appeals for the Second Circuit. Judges Emile Lacombe, Alfred Coxe, and Henry Ward upheld Judge Hazel's ruling, including the designation of pioneer status, on 13 January 1914.

<sup>5</sup>It is by no means clear that Curtiss and his company were in real financial danger after the Wrights won their patent suit. Judging from outward appearances, the suit seemed not to have affected him at all. In 1914, Curtiss was the most successful of the American airplane manufacturers. In the year immediately following, his company grew from 150 to 2000 employees as World War One ramped up and orders for Curtiss airplanes grew. It's quite possible that the danger was nothing more than media hyperbole; on close inspection the "patent wars" that preoccupied the aviation press at the time seem to have been more of a patent skirmish. Furthermore, even if the American aviation industry wasn't exactly robust before the Great War, the records show that the technology was. Aviation companies and individual inventors filed hundreds of new patents during this time, while the Wall Street Journal reported an ever-increasing number of airplane manufacturers and a "rapid development of the machine." At the same time, it was tough to sell an airplane in America. For one thing, America had little money for defense during the early years of aviation because it had no income tax – the Sixteenth Amendment was not ratified until 1913 and there was no infrastructure to collect the tax until sometime after that. As late as 1916, the U.S. military had only 102 airplanes in service while European nations could boast thousands. The evidence seems to suggest that if the pioneer American aviation industry failed to thrive, it was more likely due to the U.S. government's inability to support it than it was American patent-holders trying to control it. Why then was Curtiss keen to get the Aerodrome in the air? Perhaps for two reasons: First, at the time he could not have known that the court's decision would ultimately prove to be more annoying than it was enforceable; and second, a perceived danger could affect airplane sales and investor confidence whether it was real or not. In this way, Curtiss may have been as concerned about appearances as Walcott and the Smithsonian.

<sup>6</sup>Walcott's scientific profession, paleontology, greatly enhanced his reputation. He came to that field shortly after Charles Darwin's theory of evolution had sent shockwaves through the philosophical underpinnings of the developed world. The examination of the fossil record took on enormous importance in the public's mind and paleontological discoveries were often front-page news. At the turn of the twentieth century, dinosaurs and mass extinctions were popular topics of conversation among the curious, the same way that the Big Bang and the CERN Supercollider are today. Paleontologists were afforded the same reverence and awe we now reserve for theoretical physicists.

<sup>7</sup>James Smithson was geologist and chemist, and member of the Royal Society of London. He died in 1829 leaving his fortune to his nephew with instructions that if his nephew died without heirs, the money would pass to the United States of America to found "at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge." No one knows why he made this bequest; he had never even visited America. Smithson's nephew died without an heir in 1835 and the United States was informed of the unexpected gift of more than half a million dollars. For a decade, the U.S. government debated on how to use this windfall. During this time, the government lost Smithson's bequest on shaky bond investments, then restored the money out of its own pockets at the urging of former President John Quincy Adams, then a Representative in Congress. President James Polk finally signed the legislation, much of it shaped by Adams, creating the Smithsonian Institution in 1846. Almost from its inception, the Smith was involved with aeronautics. Its first Secretary, Joseph Henry, was a friend and supporter of aeronaut Thaddeus Lowe. With Henry's recommendation, Lowe created the United States Army Balloon Corps which used its balloons in the American Civil War to observe troop movements.

<sup>8</sup>Publically, Langley had announced that he had taken his aeronautical experiments as far as he wanted to go and would not pursue manned flight. In June 1897, he wrote an article for *McLure's Magazine*, saying, "I have done the best I could in a difficult task, with results which it may be hoped will be useful to others. I have brought to a close the portion of the work which seemed to be specially mine – the demonstration of the practicability of mechanical flight – and for the next stage, which is the commercial and practical development of the idea, it is probable that the world may look to others. The world, indeed, will be supine if it [does] not realize that a new possibility has come to it, and that the great universal highway overhead is now soon to be opened." Privately, however, he let it be known to his friends that he was open to continuing his research as long as the funding could be found.

<sup>9</sup>By this time the Spanish-American War was all but over. The last major military action was fought on 13 August 1898 when Manila fell to U.S. forces under General Wesley Merritt. On 1 October 1898, representatives from Spain and the United States met in Paris, France to negotiate a peace treaty and that treaty

was signed on 10 December. With hostilities over, the initial impulse for the US military to fund a flying machine had evaporated and Langley's mission was not as urgent or clearly defined. In fact, after its brief fling with imperialism, the United States was slipping back into its former provincial character. Insulated from potential enemies by two oceans, what interest could America have in global politics? What possible need could it have for a large standing army equipped at great expense with the latest military technology? The circumstances that had prompted the Army to fund Langley were fading, and his failure to meet the agreed-upon schedule – he was supposed to fly in 1900 – would further erode his support at the U.S. War Department.

<sup>10</sup>Abraham Lincoln, who was the only U.S. President to hold a patent for an invention, was a champion of new technologies on the battlefield. He was determined to equip the Union troops with breech loading rifles to replace their outdated muskets, and was especially enamored of the new repeating rifles, many of which he test-fired himself. The chief of army ordinance General James W. Ripley opposed him in this, convinced that the older muzzleloaders encouraged troops to conserve ammunition and make every shot count. Additionally, the cartridges required for breechloaders were more expensive than musket balls, and Ripley did not have the distribution network in place to keep the soldiers supplied with the new ammunition. Lincoln attempted to go around Ripley, even ordered him to purchase the new rifles, but Ripley obstinately dragged his feet. In 1898, this obstinate concern for conservation of ordinance was still very much ingrained in the U.S. military, as Assistant Secretary of the Navy Theodore Roosevelt was about to find out. Roosevelt would leave his position in Washington to organize a volunteer cavalry, the "Rough Riders," then join the war effort in Cuba. There his soldiers, equipped with Springfield repeating rifles, faced Spanish with more advanced clip-loaded Mausers that could fire eight bullets to the Springfield's one. The American troops would triumph, but with heavy casualties.

<sup>11</sup>Langley's insistence that the Aerodrome had caught on its launching mechanism was probably true, although this wasn't the reason that the machine failed to fly. It was just one event in a series of catastrophes that either deformed or broke the Aerodrome's flimsy wings. The catapult was designed to fall away from the aircraft as it reached the end of the 70-foot launching rail. Observers on the launching platform on 7 October 1903 reported that the front guy post caught on the catapult as it fell away – without sufficient lift, the Aerodrome would have lost altitude when the supports dropped down and the tip could have easily snagged on the rail. Rigging wires ran from the top of the guy posts to trailing wing spars. These wires were angled backwards – the guy posts were 30 inches ahead of the spars. If the bottom of a guy post caught, the top of the post would tilt forward. The rigging wires would pull the trailing spars upwards, raising the wings' trailing edges and twisting the front wings just as they are shown in the photos of the launch. The twisted front wings started the Aerodrome in a descending arc down to the waters of the Potomac River. Something similar but



much more destructive may have happened to the rear wings during the launch attempt on 8 December 1903. Observers report the tail was caught and mangled as soon as the catapult was released. The dragging tail may have pulled the rear legs of the airframe off of their carriage. As the back end of the Aerodrome dropped, any number of Aerodrome parts might have caught on the catapult, including the rear wings. As the catapult continued to propel the Aerodrome forward, the captured wings may have snapped at their roots. This is consistent with the one and only photo of this launch. It shows the rear wings folded up and the tail in a crumpled ball.

<sup>12</sup>When Samuel Langley died in 1906, Wilbur Wright wrote a condolence letter to Octave Chanute who was at that time a good friend to both Langley and the Wright brothers. In this letter, Wilbur said, “The knowledge that the head of the most prominent scientific institution in America believed in the possibility of human flight was one of the incentives that led us to undertake the preliminary investigation that preceded our active work. He recommended to us the books that helped us form sane ideas at the outset. It was a helping hand at a critical time and we shall always be grateful.” Chanute quoted Wilbur’s letter later that year at a memorial for Langley, and the quote ended up in a Smithsonian pamphlet on the life of its former Secretary. Alexander Graham Bell repeated that same quote during the 1910 Langley Medal ceremony at the end of a long speech that enumerated Langley’s scientific accomplishments with barely a mention of the medal recipients, Wilbur and Orville Wright. In that context, Bell made it sound as if the Wright brothers had acknowledged that their accomplishments were a continuation of Langley’s work. To compound this misconception, the account of the ceremony in the 1910 Smithsonian Annual Report made it appear as if this quote had been part of Wilbur’s acceptance speech at the medal ceremony.

<sup>13</sup>The American Aeronautical Society was a spin-off from the Aero Club of America. It organized in 1908 with the goal of advancing the science of aeronautics. One of its missions was to convince the American government to establish a national laboratory for aviation. In 1909, the AAS had bought the *Golden Flier* from the newly-formed Herring-Curtiss Company so its members could glean hands-on experience with aviation. This was the first airplane to be built in America specifically for commercial sale and it was this sale that prompted the Wright brothers to file the first law suit in the “patent wars.”

<sup>14</sup>Dr. Albert Zahm was a professor at Catholic University in Washington, DC when he built the first wind tunnel in America. It began operation just two months before the Wright brothers built their tunnel. Zahm did extensive research on drag and found that a cigar or tear shape with the rounded end pointed forward into the airstream produces less drag than other shapes. These findings resulted in the cigar-shaped aircraft fuselages that are common to this day.

<sup>15</sup>It's interesting to note that originally the tablet was planned to celebrate "Langley's Law" as his major contribution to aeronautics. Langley had first proposed this law in 1893, saying that it required less power to fly fast than to fly slow. The Smithsonian sent a letter with the proposed copy for the tablet to several aviation experts for comment, among them the Wright brothers. Wilbur Wright replied that it would be unwise and unfair for the Smith to rest Langley's reputation in aerodynamics on the "so-called Langley Law" or upon the computations which gave rise to it. Wilbur suspected, as did others, that Langley's experimental methods were flawed. In fact, Langley hadn't performed the experiment at all; he just predicted the results. Practical experience in aeronautics later proved the "law" to be untrue.

<sup>16</sup>Pioneer patents are entitled to much broader protection under American patent law than those that are deemed to be improvements in an existing technology. In *Westinghouse v. Boyden Power Brake Co.*, the Supreme Court defined a pioneer patent to cover "...a function never before performed, a wholly novel device, or one of such novelty and importance as to mark a distinct step in the progress of the art, as distinguished from a mere improvement or perfection of what has gone before." The court cited the examples of Elias Howe's sewing machine, Samuel Morse's telegraph, and Alexander Graham Bell's telephone. Judges Hazel and Hand adjudicated the Wright's *combination* of movable aerodynamic surfaces for pitch, roll and yaw control to be a unique solution to the problem of aeronautical balance and navigation, not just an improvement on what had been tried before. It was therefore entitled to be considered a pioneer patent and given a "liberal interpretation." The concept of a pioneer patent is unique to American patent law, which partly explains why the Wright brothers had more difficulty defending their patent in Europe than they did at home.

<sup>17</sup>While 20% of the purchase price was a steep fee to pay to license the Wright patent, there is no record that Orville ever attempted to enforce it. He had no active patent infringement suits with any company other than the Curtiss Aeroplane and Motor Company. In response to the Wright demands, Curtiss made some changes to his aircraft control system and claimed that these put his aircraft outside the scope of the Wright patent. This forced the Wright Company to file a new patent suit in December 1914. Aircraft manufacturing companies which did not have a licensing agreement with the Wright Company kept a watchful eye on the suit as it progressed, but continued as they had before.

<sup>18</sup>There is no better illustration of the differences between Langley's approach to aviation and the Wrights' than a comparison of their control systems. The Wright controls, although primitive, allowed for constant and immediate input from the pilot as he reacted to changes in the attitude of the airplane and adjusted the roll, pitch, and yaw to keep the aircraft balanced and headed in the desired direction. The Wright pilot faced forward, his body aligned with the motion of the machine. The control movements were instinctive or easily imprinted on muscle memory – the Flyer was designed to be an extension of the pilot. By contrast, the Langley

pilot had two “trim wheels” with which he could make slow, minute adjustments to the direction and altitude of the machine. Langley saw no need for constant pilot input; the attitude of the Aerodrome in the air was expected to be stable and self-correcting. The pilot did not even face forward in what passed for a cockpit; he sat sideways where he could watch the world pass by beyond the trim wheels. Curtiss, whose airplanes were built around the same control philosophy as the Wrights’, knew he had to upgrade the Aerodrome’s controls before he could safely fly it.

<sup>19</sup>Pliny Williamson, the lawyer who brokered this deal for Orville, claimed he was due \$50,000 or 10% of the sale price for his troubles. Orville offered him \$25,000 and Pliny would later settle for \$20,000. The general ledger of the Wright Company records a payment of \$250,000 at the time the company was sold.

<sup>20</sup>Additionally there was an odd law on the books that allowed patent-holders to recover license fees for unlicensed products from the U.S. government while indemnifying the manufacturer that had failed to pay those fees. In truth, Wright-Martin’s 5% licensing fee was not outside business norms. European manufacturers typically paid more for use of aeronautical patents. Nor was the U.S. military opposed in principal to paying licensing fees. At that time it was paying patent license fees for other war materials, including an 18% fee for machine guns. The objection that the military had to the Wright-Martin patent fee seems to have been based on the high cost of each airplane (even without the royalty fee attached) and the sheer volume of airplanes needed.

<sup>21</sup>Media accounts of the “patent wars,” followed by Walcott’s alarm to the “patent situation” have been interpreted by many historians to show that the growth of the American aviation industry was stunted by patent gridlock, beginning with the Wright patent. In their article “The myth of the early aviation patent hold-up—how a US government monopsony commandeered pioneer airplane patents,” authors Ron Katznelson and John Howells surveyed the pioneer American aviation industry and charted its activities. Their findings show that production, patents, and investment were all on the increase in the years preceding 1917 in anticipation of increased orders for war materials. The market had not responded negatively to the 1913 decision of Judge Hazel that found for the Wrights and granted their patent pioneer status, or the verdict of the appeals court that upheld his decision in 1914. Furthermore, members of the industry repeatedly told the government that they stood ready to fulfill increased wartime orders, should they ever materialize. Walcott’s “patent situation” did not exist. It was, at best, an overreaction to the Wright-Martin letter brought on by years of media hype surrounding the Wright patent and the patent suit the Wright Company had brought against Curtiss. At worst, it was an attempt by the industry’s largest customer – the U.S. military – to control the market.

<sup>22</sup>“Patent pool” was a misleading term. NACA did not propose that manufacturers pool their patents and share in the royalties according to each company’s

contribution, as has often been reported. Instead, it was proposed that the government would reimburse the companies for the royalties they paid, but that there would be a cap of no more than \$2 million total reimbursement for any one calendar year no matter how many airplanes were ordered. (This was later reduced to \$1 million.) Furthermore, only Wright-Martin and Curtiss would receive fees from the pool, since these companies owned important “basic” aviation patents. Wright-Martin would receive 67.5% of the royalty fees, Curtiss 20%, and the MAA would retain the remaining 12.5% for administrative costs. The patents held by other members were, in effect, worthless. The only possible reasons that another company had to join the MAA “patent pool” was that (1) the government wouldn’t do business with a company unless it joined and (2) it could simply usurp the patents it needed by “condemnation.” History excuses these draconian terms as necessary owing to the exigencies of war. But the bill passed by Congress in 1917 granted the Department of War and the Navy (and its agent, NACA) the power to enforce these terms “for governmental and civil purposes.” There was no expiration date; these powers did not cease when the war ended. In fact, the MAA persisted for almost sixty years surviving one anti-trust suit after another until it was finally dissolved in 1975.

<sup>23</sup>As fate would have it, Zahm's paper appeared in the Annual Report right after a paper by Orville Wright entitled, "The Stability of Airplanes." In his paper, Orville described the science behind the new Wright "automatic stabilizer" – the first autopilot – for which he was awarded the Collier Trophy for aeronautics on 3 February 1914. Orville and Wilbur had worked together on the stabilizer since 1905. With Wilbur now deceased, this achievement was the last fruit of one of the world's most dynamic and prolific partnerships. For the Smithsonian to use this same publication to claim for itself the Wrights' most important and hard-won accomplishment must have hurt the surviving brother to his core.

<sup>24</sup>Haskell’s contribution to Orville’s cause was much more valuable than it might first appear. Henry Haskell would later glean two Pulitzer Prizes for his editorial talents.

<sup>25</sup>The other two are Katharine Wright, Wilbur and Orville’s sister, and Charlie Furnas, a mechanic they hired in 1908. Charlie was the world’s first airplane passenger, making flights with both Wilbur and Orville on 14 May 1908 to check that the new Wright “Model A” Flyer would carry two people aloft, as the Wrights had promised their prospective customers in France and America.

<sup>26</sup>Allegedly, there was even a plot to kidnap the Flyer, wrest it from the clutches of the British, and forcibly return it to America. On 3 January 1937, Orville Wright received a mysterious letter from “H.M.” informing him that the people who were planning the 1939 New York World’s Fair, in cahoots with the Smithsonian Institution, planned to ask the British Science Museum to display the Flyer at the Fair. “Then the Smithsonian was to invoke a law already on the books that it could claim any scientific relic in the hands of the Government.”

<sup>27</sup>The story of how Kelly came to write “The Wright Brothers” with Orville’s help tells you much about Kelly’s character and why he was probably one of the few people with both the incentive and the interpersonal skills to resolve the Wright-Smithsonian feud. At the time Kelly contacted Abbott, Orville Wright had not yet really “authorized” Kelly’s biography. Kelly had written an article for Harpers magazine in 1939 called “How the Wright Brothers Began.” Before he submitted it for publication, he sent it to Orville Wright and asked for his comments. Orville was glad to be asked for input; much speculative drivel had been written about the Wrights and he appreciated Kelly’s concern for accuracy. Thereafter, Kelly began sending Orville fragments of a Wright brothers’ biography and asking him to review them. Orville, who had been under pressure from friends to write or commission a biography, fell into an easy partnership with Kelly, whom he found good-natured, respectful, patient, and eager to follow his suggestions. Kelly had been born in Xenia, Ohio very near Dayton, and visited home often. During these trips, he began dropping by Hawthorne Hill to see Orville and their friendship grew. But after a few years Orville seemed to lose interest in the biography. The aging aviator took longer and longer to return the chapters that Kelly sent him and his comments dwindled. Kelly knew he had to revive Orville’s interest to complete the project, so he took up Orville’s cause in his long battle with the Smithsonian. Kelly’s plan and motive in contacting Abbot in 1942 was to save his book. And it worked brilliantly. With the surrender of the Smith, Orville was beholden to Kelly. The two of them completed the biography in less than a year. “The Wright Brothers” by Fred C. Kelly was released in 1943.

<sup>28</sup>The Flyer remained in England until 1948. It could not be shipped safely until the Second World War ended, then it lingered for a while longer while curators at the Science Museum in Kensington carefully measured the aircraft and created a precise copy.

<sup>29</sup>As Orville pointedly ignored the microphone that was offered to him and simply handed Hap Arnold the Collier Trophy, the General eased the uncomfortable silence by saying, “There is no one from whose hands I would rather receive this trophy than Orville Wright.” This event is often cited as an example of Orville’s aversion to public speaking. In point of fact, Orville gave many speeches but he rarely said more than was necessary to be polite. For him to be this rude in such a public setting was indicative of how much he had been affected by the Smithsonian feud and how disappointed he was to be stood up by the President of the United States at its conclusion.

<sup>30</sup>The unspoken implication in the Smithsonian’s argument that the Langley Aerodrome was the first airplane capable of flight, or in Curtiss’s legal stance that the Aerodrome could have flown before the Wrights, was that the Aerodrome was just as scientifically advanced as the Wright Flyer. With that in mind, consider these facts: The Aerodrome could not sustain flight for more than 5 seconds with 35 horsepower and 300 pounds (1335 Newtons) of thrust. (Langley



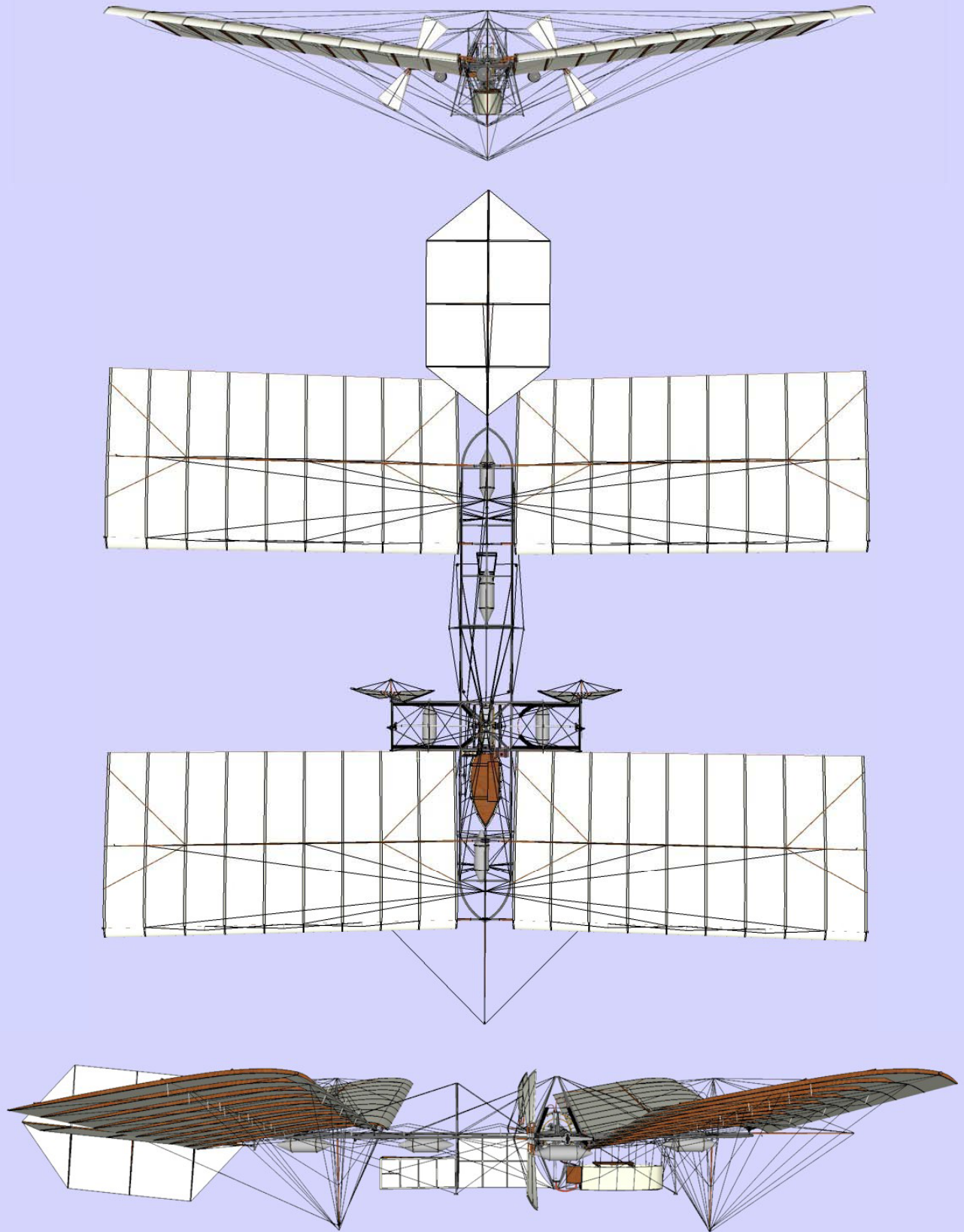
had originally calculated that the Aerodrome would fly with just 24 horsepower.) The Wright Flyer was able to sustain flight for 59 seconds with 12 horsepower and 135 pounds (601 Newtons) of thrust. None of the pilots who flew the Aerodrome in 1914 (when it was equipped with an 80-horsepower engine) were able to make a turn of more than a few degrees. The first Wright Flyer was destroyed by the wind before the Wrights could test its ability to turn, but a close copy — the Wright Flyer II, equipped with an 18-horsepower engine — was able to fly for 5 minutes and make 4 complete turns of the field over which it flew. Finally, the Aerodrome (in its 1903 configuration) had no way to safely land the aircraft and insure the survival of its pilot. Had the Aerodrome actually flown and then strayed over land before it ran out of fuel, it's likely the engine and airframe would have come crashing down on top of Charles Manly. The Wright Flyer had skids which allowed the Wrights to recover the aircraft and its pilot safely (or with minor damage at most) after each flight.

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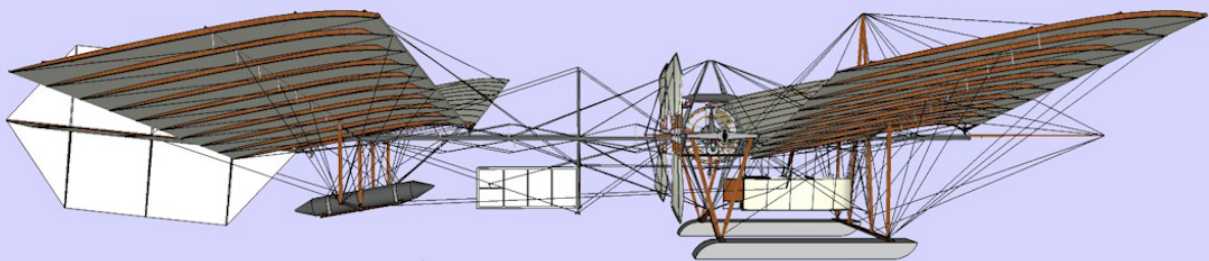
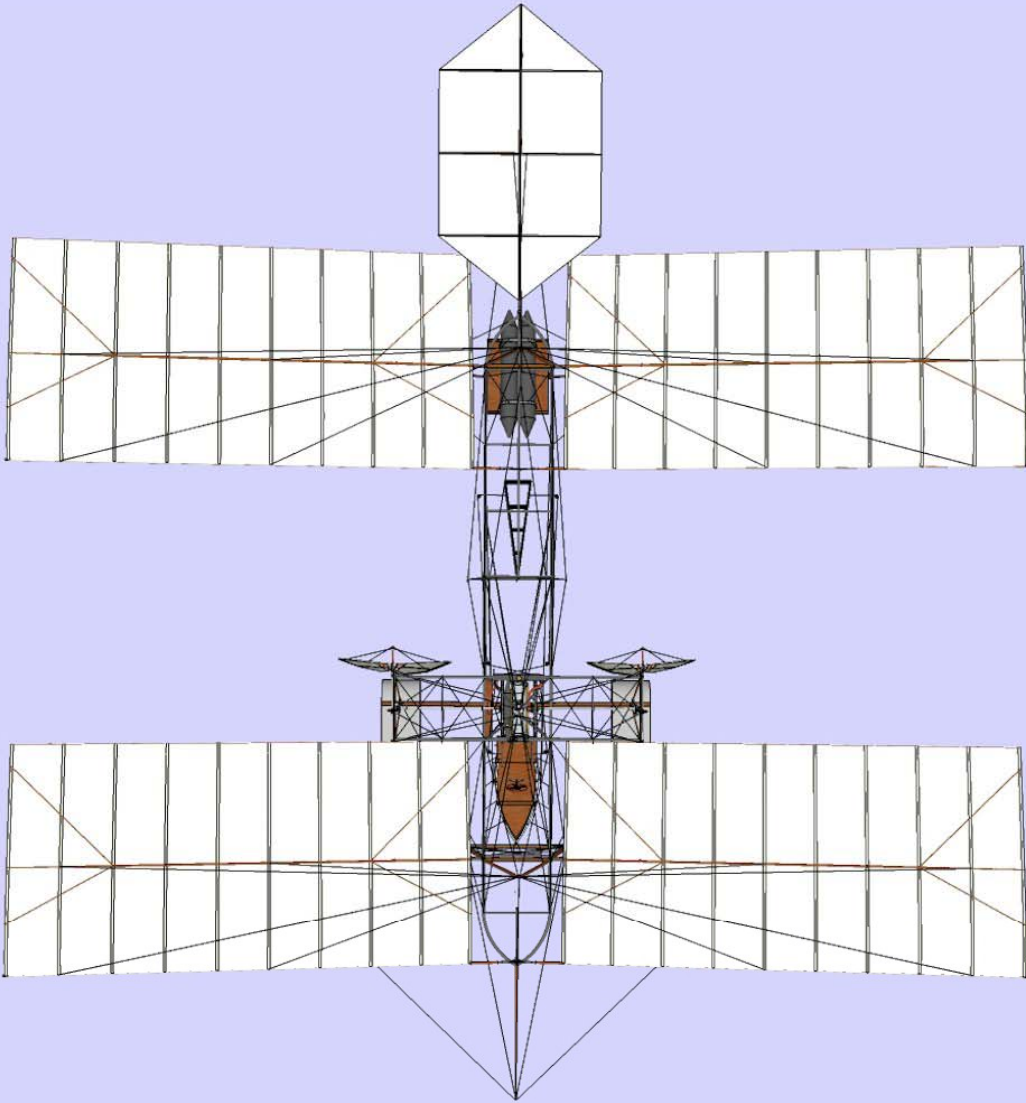
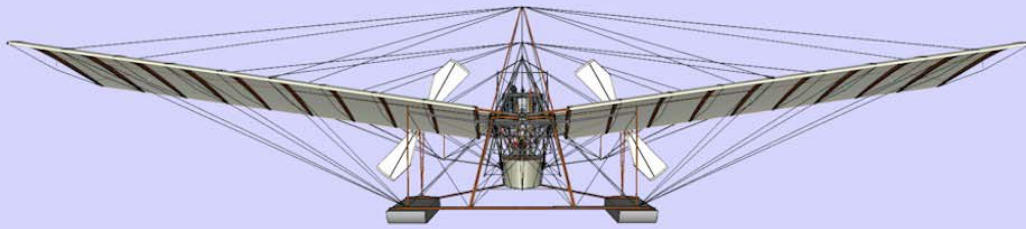
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*1903 Langley Aerodrome*

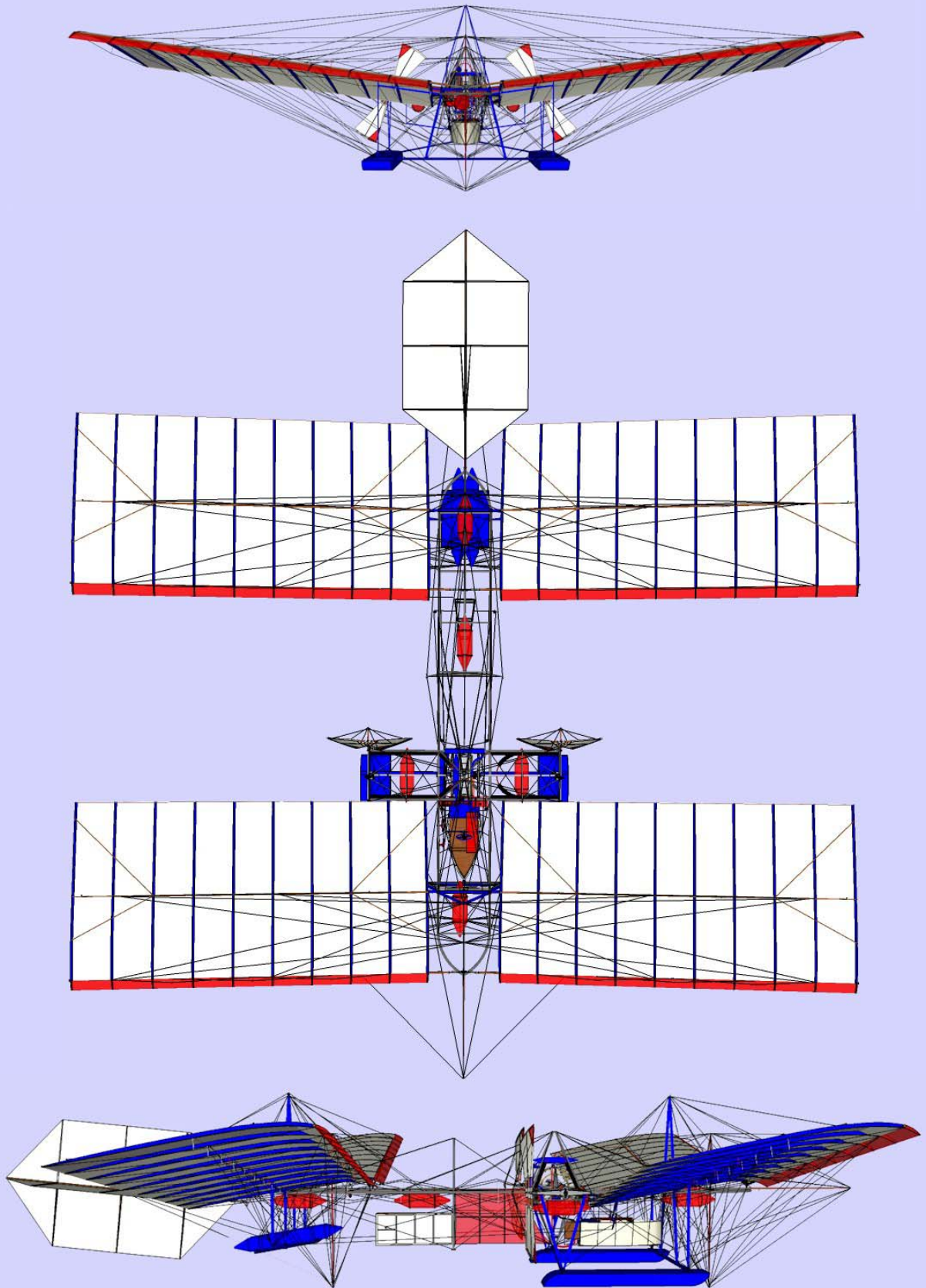




*1914 Langley Aerodrome*







## 1903/1914 Composite Aerodrome

Red indicates 1903 parts that were discarded in 1914; blue indicates parts that were added or modified in 1914.

